

Nitrogen Gas Extraction Unit

NSU / NS

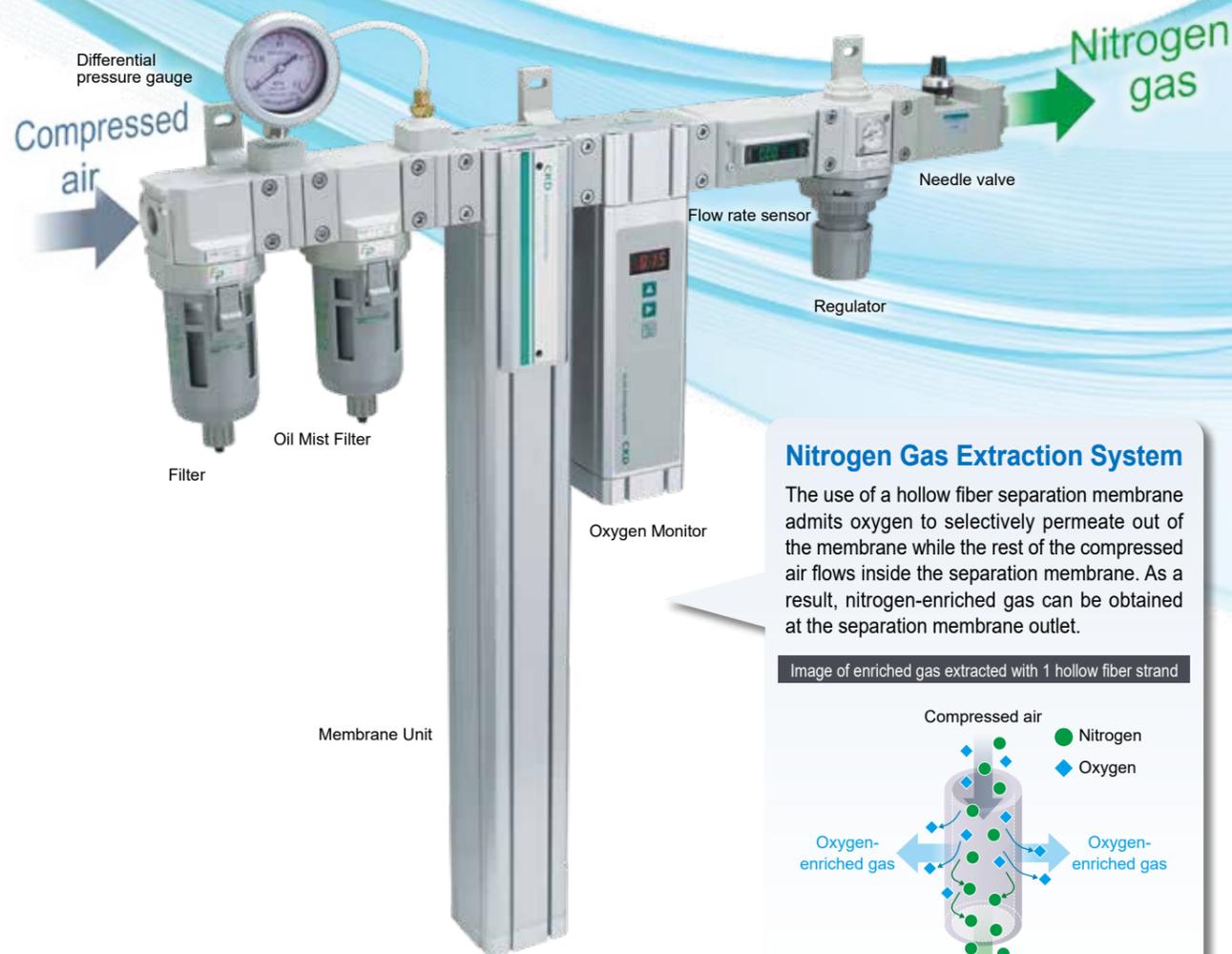
■ Gas Generator



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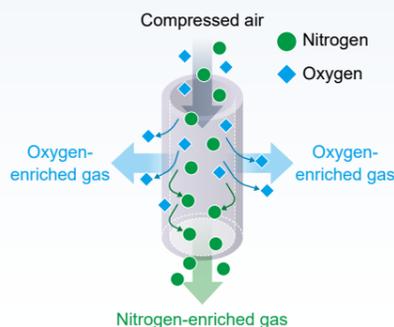
Nitrogen gas can be extracted easily from compressed air.



Nitrogen Gas Extraction System

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 extracted with 1 hollow fiber strand



Support for safe food production process FP Series (optional)

For Safe and Secure Food Manufacturing Processes.

NSF H1 grease for foodstuffs is used

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.
*Refer to catalog No.CC-1271AA for details.

A new recommendation for nitrogen supply

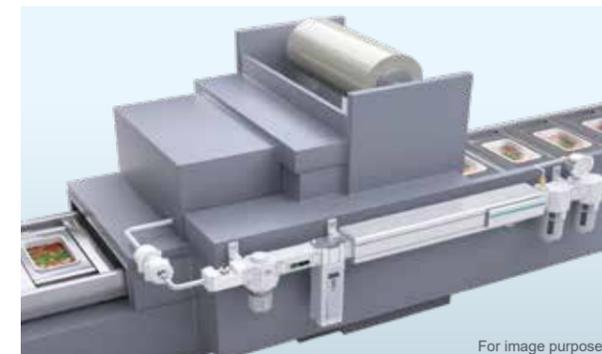
Design Flexibility

New horizontal mounting available

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



For image purposes.

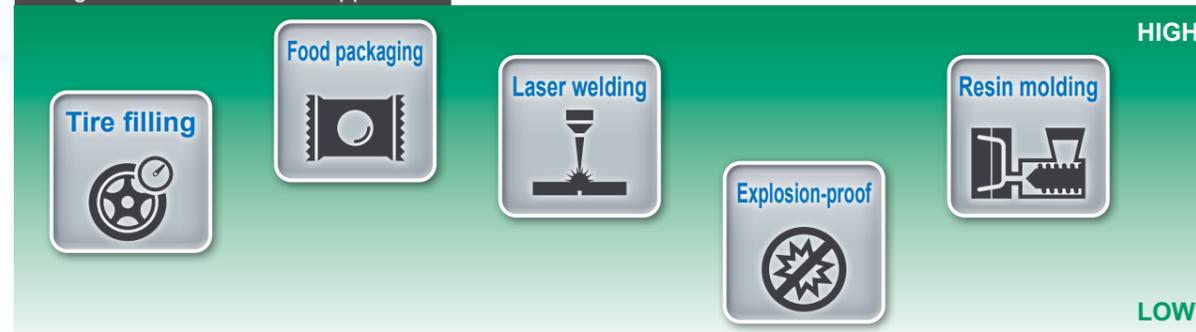


For image purposes.

Degrees of freedom in concentrations

Nitrogen is now available from 90% concentration. Nitrogen supply to low oxygen concentration environments for explosion protection, etc.

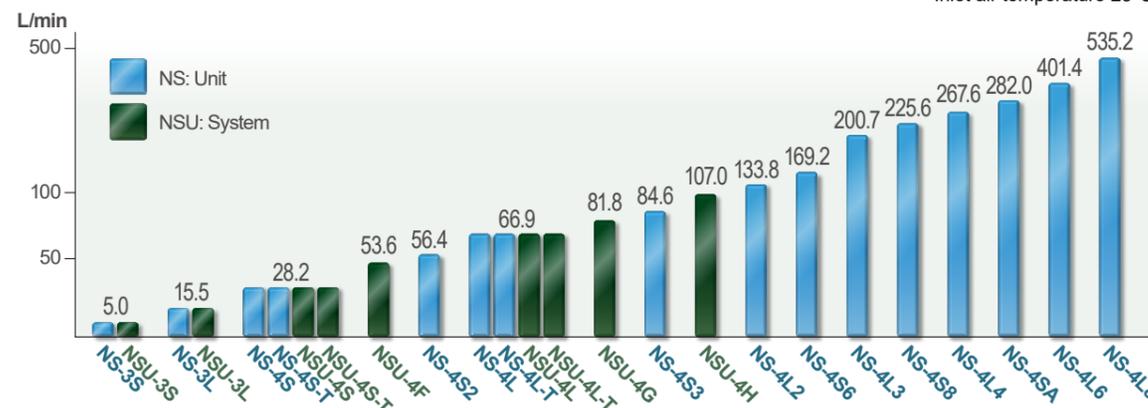
Nitrogen concentration and application



Degrees of freedom in selection

Select the ideal model from the 17 flow rates and 25 model lineup.

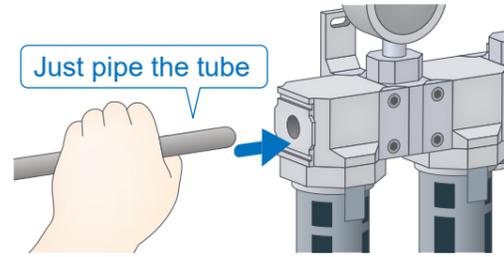
*Nitrogen concentration 99%
Inlet air pressure 0.7 MPa
Inlet air temperature 25°C



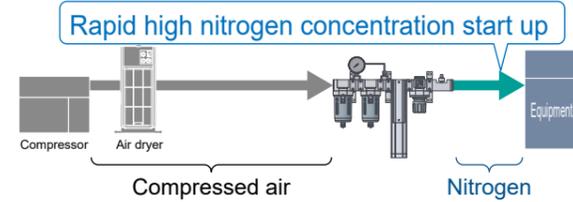
Install anywhere

Reduces processes, piping, and space

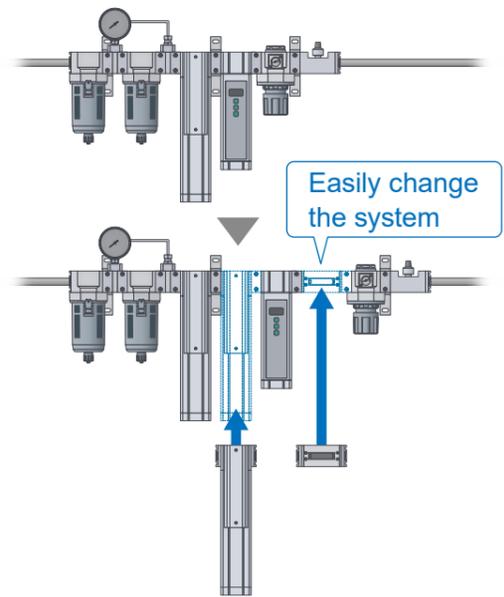
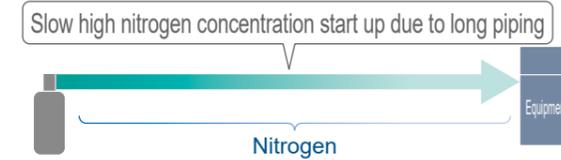
Nitrogen-enriched gas can be obtained simply by supplying compressed air. Design and piping are done easily by providing system components. Its small size and light weight allows it to be installed near the device. No need for long piping work dedicated to nitrogen.



NS Series



Conventional method



Freedom in selection

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 Regions, etc. No malfunctions due to electrical noise. Quiet, with no heat generation as there is no drive system.

*Power supply will be required when oxygen monitor and flow rate sensor (option) are selected.

NS Series configuration

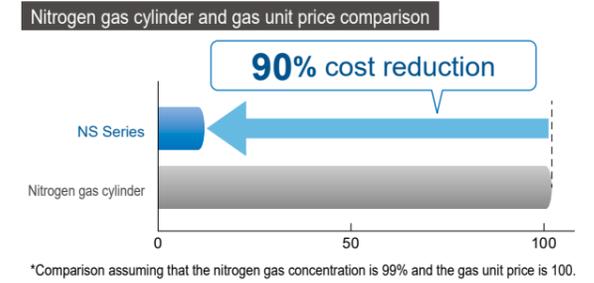
| System | | |
|---------------------|-------------------|--|
| 1-station | 2-station | |
| NSU | | |
| Horizontal mounting | Vertical mounting | |
| | | |

Low cost and reduced processes

Running cost reduction

Running cost is only the cost of electricity for the air compressor. No ongoing costs such as tank replenishments.

*Power supply will be required when oxygen monitor and flow rate sensor (option) are selected.



Reduced administrative processes

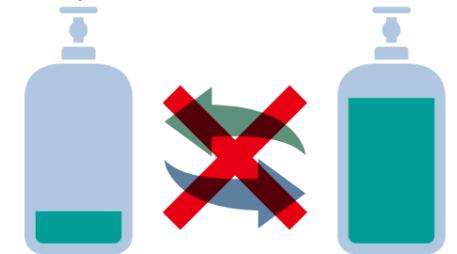
Nitrogen volume control is no longer required. Oxygen monitor and flow rate sensor can be installed inline, enabling continuous control.

- Control of oxygen concentration (nitrogen concentration) - Oxygen Monitor
- Nitrogen flow rate management - Flow rate sensor
- Management of supplied compressed air quality - Differential pressure gauge

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

Replacement not required

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



Easy maintenance

Sustainable reliability

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

Not subject to High Pressure Gas Safety Laws

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



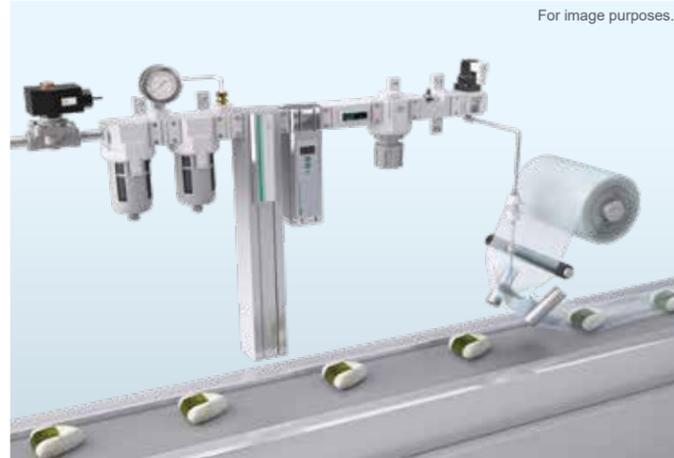
| Unit | | |
|---------------------|-------------------|--|
| Single cylinder | Multi-cylinder | |
| NS | | |
| Horizontal mounting | Vertical mounting | |
| | | |

Case Study

Packaging Gas-filled packaging

When pillow packaging is used, nitrogen gas is filled inside the container to prevent oxidation and deterioration, prevent discoloration, and preserve the aroma.

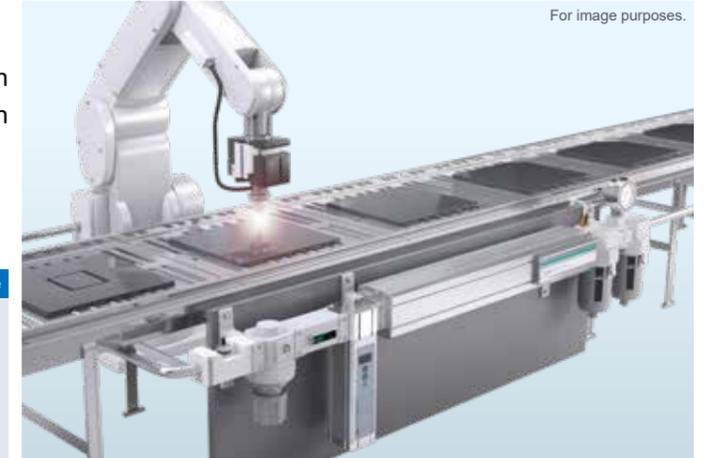
2-port solenoid valve for dry air Bacteria Removing Filter Air nozzle point type



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 Dryers Direct acting 2-port valve



Food / Chemicals Dissolved oxygen removal

By passing nitrogen gas through the liquid, oxygen gas dissolved in the liquid is removed.

Oil-free main line filter Compressed air flow rate sensor 2-port solenoid valve



Machining / Assembling Explosion-proof atmospheres

By filling the container with nitrogen gas, air is purged and positive internal pressure is created, preventing the ingress of explosive or corrosive gases.

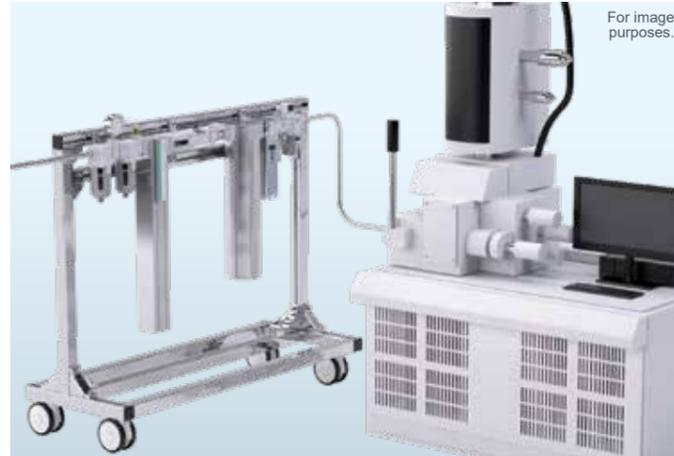
Refrigeration Air Dryers Main Line Filters 2-port solenoid valve



Inspection Electron microscope

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

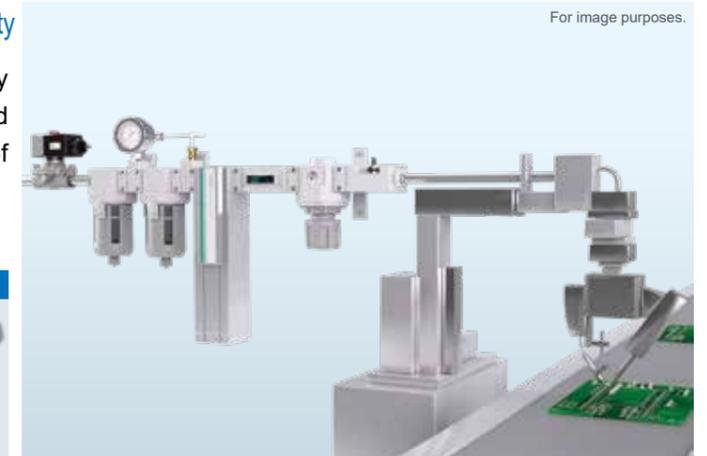
Modular 2-port solenoid valve High-performance oil mist filter Digital Pressure Sensor



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 Actuator



Series Variation

Nitrogen Gas Extraction Unit NSU Series

■ Qty.: 1 unit

| Model No. | Qty.: | Appearance | Flow rate (L/min ANR) and nitrogen concentration (%) | | | | | | | | | | Listed page | | | | | | | | | | | | |
|-----------|-------|------------|--|------|------|----|----|----|----|----|----|----|-------------|----|----|----|-----|-----|-----|-----|-----|----|----|----|----|
| | | | Flow rate (L/min ANR) and nitrogen concentration (%) | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| NSU-3S | 1 | | 10 | | | | | | | | | | 20 | 40 | 60 | 80 | 120 | 160 | 200 | 260 | 320 | 14 | | | |
| NSU-3L | 1 | | 99.9 | 99.5 | 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 | | | | | | | | | | | |
| NSU-4S | 1 | | 99.9 | | 99.5 | | | | | | | | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 | | | | | |
| NSU-4L | 1 | | 99.9 | | | | | | | | | | 99.5 | | 99 | 98 | 97 | 96 | 95 | 94 | 93 | | 92 | 91 | 90 |

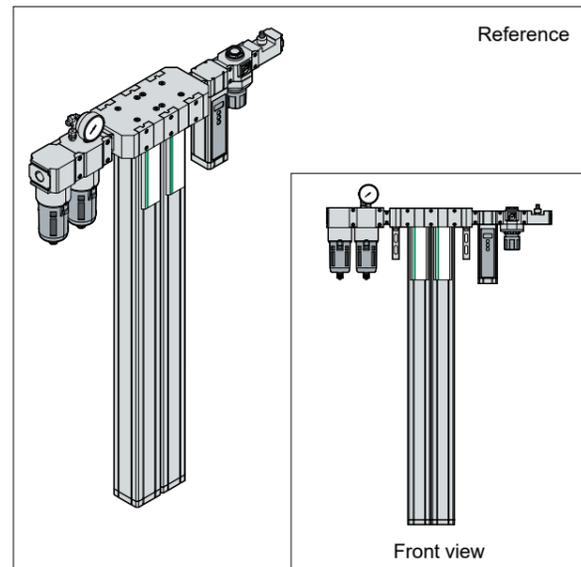
■ Qty.: 2 units

| Model No. | Qty.: | Appearance | Flow rate (L/min ANR) and nitrogen concentration (%) | | | | | | | | | | Listed page | | | | | | | | | | |
|-----------|-------|------------|--|------|------|----|----|--|--|--|--|--|-------------|-----|-----|-----|-----|----|----|----|----|----|----|
| | | | Flow rate (L/min ANR) and nitrogen concentration (%) | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| NSU-4F | 2 | | 50 | | | | | | | | | | 100 | 150 | 300 | 450 | 600 | 14 | | | | | |
| NSU-4G | 2 | | 99.9 | 99.5 | 99 | 98 | 97 | | | | | | 96 | 95 | 94 | 93 | 92 | | 91 | 90 | | | |
| NSU-4H | 2 | | 99.9 | | 99.5 | | | | | | | | 98 | | 97 | 96 | 95 | | 94 | 93 | 92 | 91 | 90 |

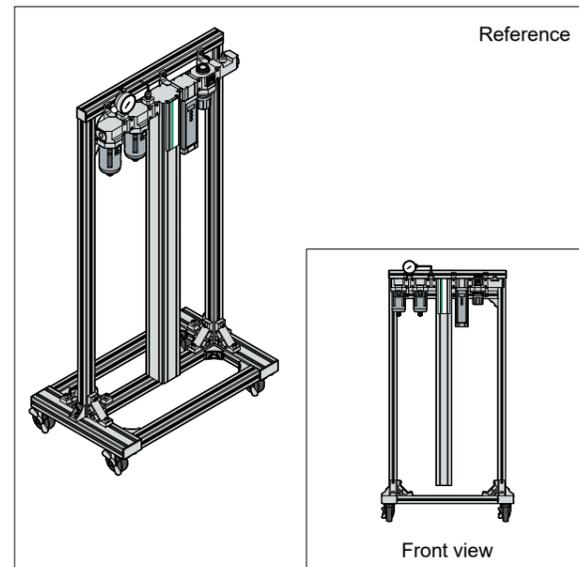
Note: The above figures represent the outlet nitrogen gas flow rate at an inlet air pressure of 0.7 MPa and an inlet air temperature of 25°C.

System example

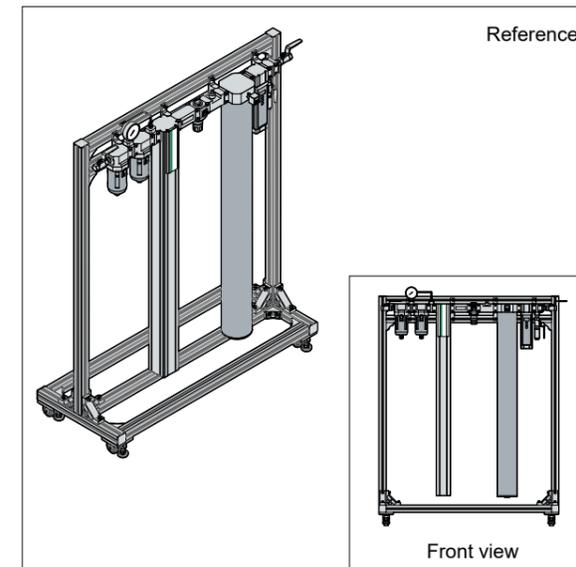
● Compatible with the NS double cylinder system



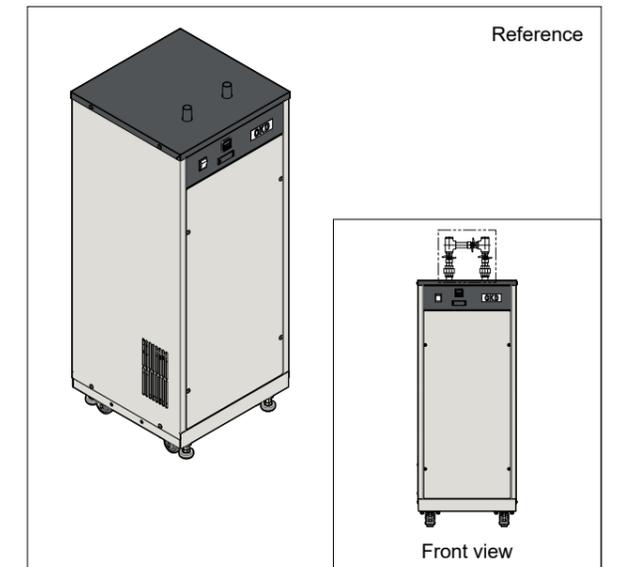
● Installation stand



● Intermittent operation tank system



● Housing installation system



Note: Contact CKD for details.

Ending

Ending



Nitrogen Gas Extraction Unit System

NSU Series

Easily and stably supplying nitrogen gas

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

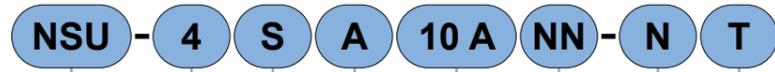


Refer to the CKD website for detailed compatible model Nos.

NSU Series

Model No. Notation

Model No. Notation



Note: Sales Contact CKD for other combinations.

- 1 Body size
- 2 Membrane unit size
- 3 Needle valve
- 4 Port size
- 5 Oxygen monitor / Flow rate sensor
- 6 Option
- 7 Mounting direction

1 Body size

| Code | Description |
|------|---------------|
| 3 | Body width 63 |
| 4 | Body width 79 |

2 Membrane unit size

| Code | Description | Image |
|------|---------------|-------|
| S | Short | |
| F | Short + Short | |
| L | Long | |
| G | Long + Short | |
| H | Long + Long | |

*1: Only the body size "4" is available for the membrane unit sizes "F", "G" and "H".

3 Needle valve

| Code | Description | Body size, membrane unit size (1 2 Assembled) | | | |
|------|-------------|---|----|---------|--------------|
| | | 3S | 3L | 4S / 4F | 4L / 4G / 4H |
| A | 20 L/min | ● | ● | ● | ● |
| B | 80L/min | ● | ● | ● | ● |
| C | 160L/min | | ● | ● | ● |
| D | 240L/min | | | ● | ● |
| E | 400 L/min | | | | ● |

Note: Select a flow rate sensor with a suitable range for the needle valve.

4 Port size

| Code | Description |
|------|-------------|
| 10 A | Rc3/8 |
| 10B | G3/8 |
| 10C | NPT3/8 |

*1: When selecting G3/8, the regulator pressure gauge units will be shown as bar.

*2: When selecting NPT3/8, the regulator pressure gauge units will be shown as psi.

5 Oxygen monitor / Flow rate sensor

| Description | Code | |
|--|----------------------------|----|
| None | NN | |
| With oxygen monitor (*1) | AK | |
| With oxygen monitor, traceability certification with series variation diagram and company certification (*1) | AM | |
| With flow rate sensor (*2) | (20 L/min specifications) | BA |
| | (50 L/min specifications) | BB |
| | (100 L/min specifications) | BC |
| | (200 L/min specifications) | BD |
| | (500 L/min specifications) | BE |
| With oxygen monitor/flow sensor (*1,*2) | (20 L/min specifications) | CA |
| | (50 L/min specifications) | CB |
| | (100 L/min specifications) | CC |
| | (200 L/min specifications) | CD |
| | (500 L/min specifications) | CE |
| Oxygen monitor (with traceability) with flow rate sensor (*1,*2) | (20 L/min specifications) | CF |
| | (50 L/min specifications) | CG |
| | (100 L/min specifications) | CH |
| | (200 L/min specifications) | CJ |
| | (500 L/min specifications) | CK |

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

*2: Switch output for the flow rate sensor is NPN. Specify the option "P" to obtain PNP output.

6 Option

| Code | Description | Image |
|------|--|-------|
| N | No option | |
| E | With exhaust port | |
| K | Flow rate sensor With unit change function (only for overseas) | |
| P | Flow rate sensor Switch output: PNP output | |
| X | Reverse flow | |

*1: Exhaust air (oxygen-enriched gas) from Standard Products is released into the atmosphere. *When selecting "E", piping connection for exhaust (oxygen-rich gas) is possible. Size of exhaust port is Rc1/2.

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

7 Mounting direction

| Code | Description | Image |
|-------|---|-------|
| Blank | Vertical mounting | |
| T | Horizontal mounting (available with NSU-4S, 4L) | |

Connector Cable Standalone Model No.

- DC cable
- AC adapter single unit

PNA-1D

1 Cable length

PNA-A

- AC adapter + conversion plug set

PNA-AG

1 Cable length

| Code | Description |
|------|-------------|
| 1D | 1000 mm |
| 3D | 3000 mm |
| 5D | 5000 mm |

For Dimensions diagrams, refer to P. 29.

Supports food manufacturing processes (Catalog No. CC-1271AA)

● Food grade lubricants that can be used in food manufacturing processes, and resin and rubber materials that conform to the Food Sanitation Laws are used.

NSU-...-FP

Specifications

| Item | NSU-3S | NSU-3L | NSU-4S | NSU-4F | NSU-4L | NSU-4G | NSU-4H | | | |
|-----------------------------------|--|---|--------|--------|--------|--------|--------|------------|--------|-------|
| 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 | | | | | | | | |
| 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) | | 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 Filters | Filtration rating μm | 5 | | | | | | | | |
| Oil Mist Filter | Oil removal mg/m ³ | 0.01 or less (0.1 or less after oil saturation) *The measured value when primary oil concentration is 30 mg/m ³ at 21°C. | | | | | | | | |
| Regulator | Pressure setting range MPa | 0.05 to 0.85 | | | | | | | | |
| Oxygen Monitor | | For specifications, see Page 50. | | | | | | | | |
| Flow rate sensor | | For specifications, see Page 31. | | | | | | | | |
| Needle valve | Flow Characteristics | See Page 18. | | | | | | | | |
| Standard Accessories | | Pressure gauge/differential pressure gauge/bracket | | | | | | | | |

*1: The inlet air pressure when assembling the NS-QFS-E is 0.4 to 0.75 MPa.
 *2: When the membrane unit size "H" is selected and the inlet temperature is 50 °C, use the outlet flow rate with a nitrogen gas concentration of 99.9% at 39 L/min or less. Contact CKD when working beyond the specified range.
 *3: Refer to the outlet nitrogen gas flow rate and 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 selecting Membrane Unit Size 'G' or 'H' and using outlet nitrogen gas at 90% concentration, please contact us.

Selection Guide

Temperature and inlet air pressure affect the outlet nitrogen gas flow rate, which must be compensated for if it differs from the rating in the specification column.

STEP 1 Confirming 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

| 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 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.
 Using the outlet nitrogen gas flow rate and the outlet nitrogen gas pressure confirmed in STEP1, set the needle valve flow rate characteristics (Page 18) and select the needle valve

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

| 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 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 STEP 4 × (3) Temperature air flow rate correction factor × (4) Pressure air flow rate correction factor = corrected inlet air flow rate
 From the above corrected inlet air flow rate, confirm that the compressor can be used at its capacity.

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 concentration | 99 [%] | 99 [%] | - | - |
| Outlet nitrogen pressure | 0.2 [MPa] | 0.2 [MPa] | - | - |
| Inlet air temperature | 35 [°C] | 35 [°C] | (1) 1.05 | (3) 1.17 |
| Inlet air pressure | 0.6 to 0.7 [MPa] | 0.6 [MPa] | (2) 0.75 | (4) 0.91 |

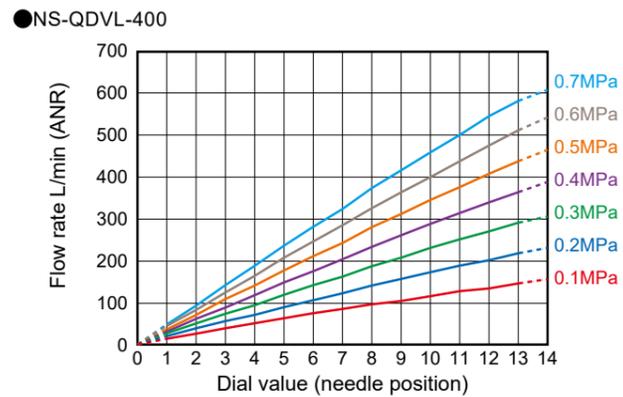
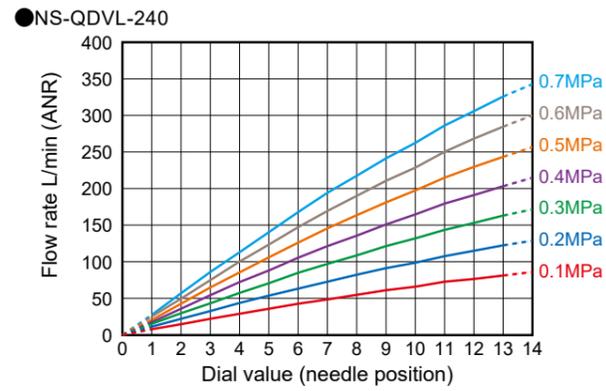
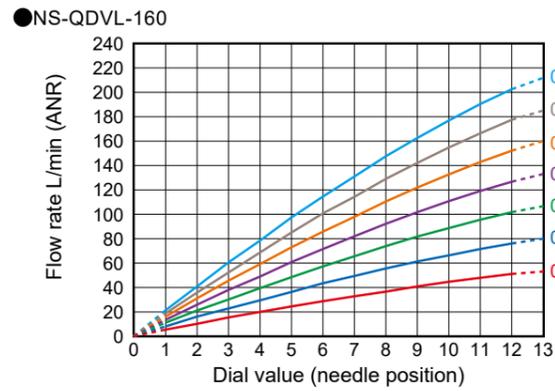
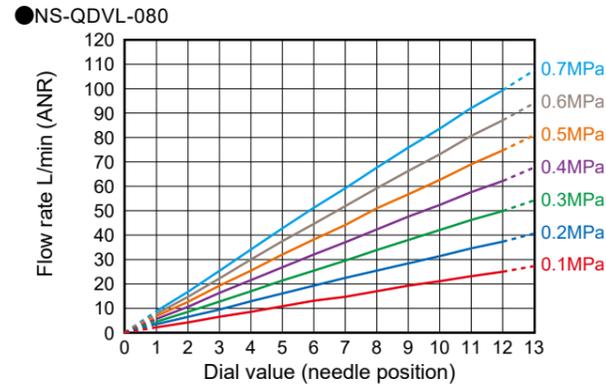
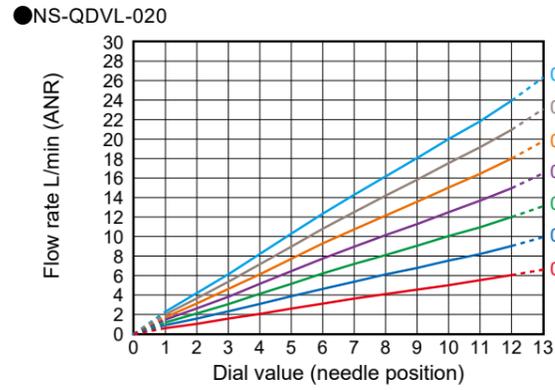
Substitute the above conditions into the equation above to obtain the outlet nitrogen gas flow rate when using NSU-4L□ at a nitrogen concentration of 99%.

66.9 (rated outlet nitrogen gas flow rate) × 1.05 × 0.75 = 52.7 L/min (ANR).

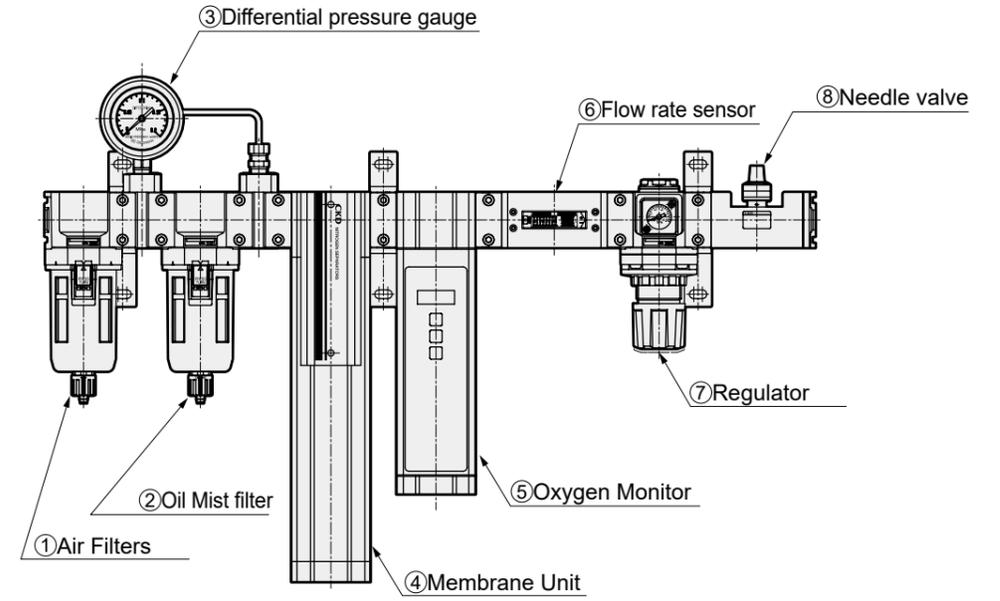
If the required nitrogen gas flow rate is less than or equal to this value, select that model. In this case, the inlet air flow rate is 278.8 × 1.17 × 0.91 = 296.8 L/min (ANR). For needle size, select NS-QDVL-160 at 0.2 MPa, which can be adjusted at 53 L/min (ANR).

Needle valve flow characteristics

Note: The flow characteristics graph gives reference values but does not guarantee the values.



System Components (vertical mount)

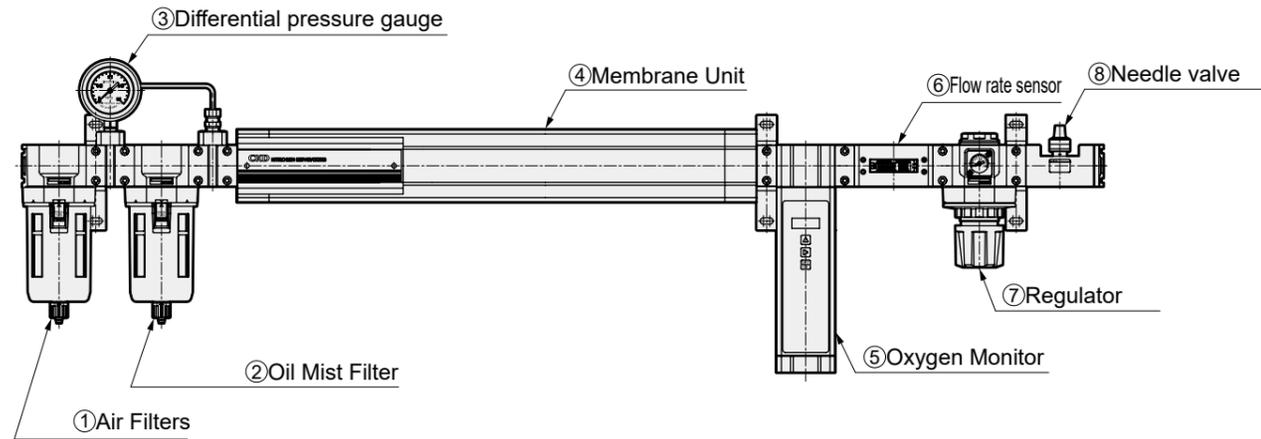


■ Standard (for port size Rc3/8)

| 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 | | |

Note: Sales If the port sizes are G3/8 or NPT3/8, contact CKD.

System Components (horizontal mount)



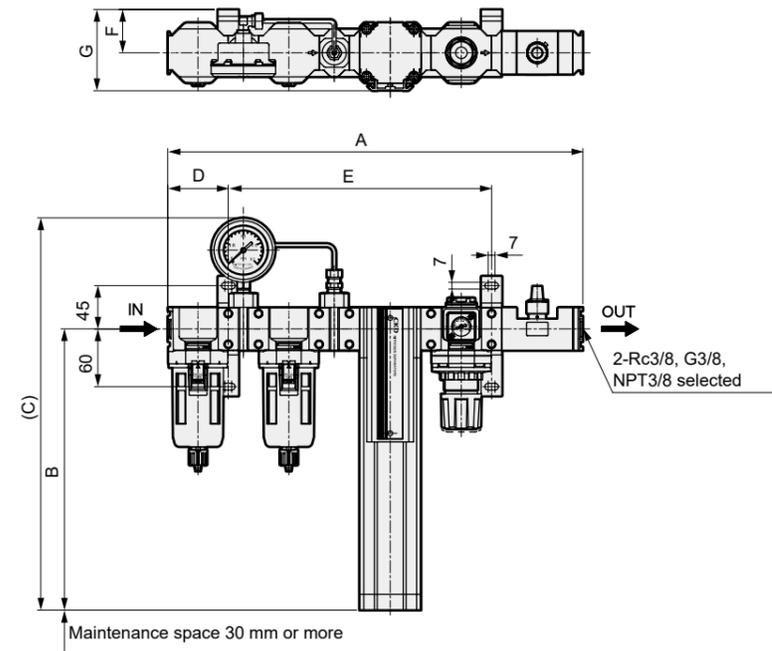
Standard (for port size Rc3/8)

| 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 |

Note: Sales If the port sizes are G3/8 or NPT3/8, contact CKD.

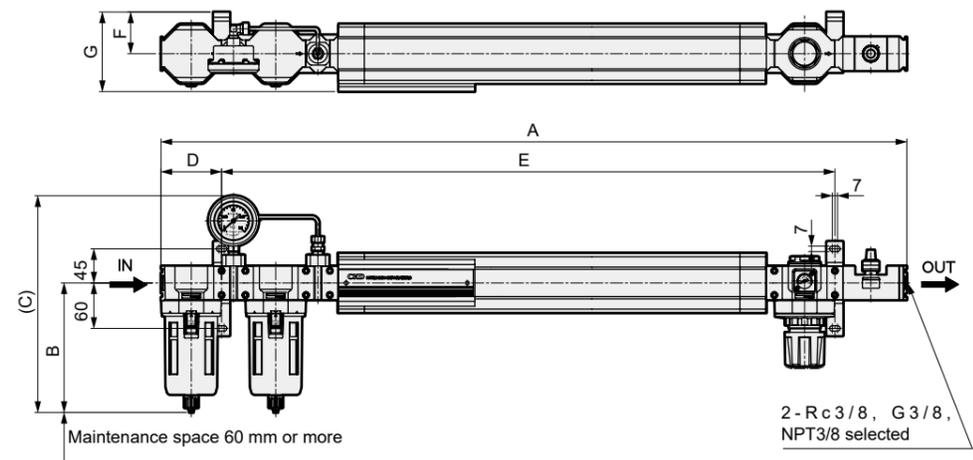
Dimensions (1 station)

Without oxygen monitor/without flow rate sensor (NSU-3S □ □ 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 rate sensor (NSU-4 □ □ 10 □ NN □ T)

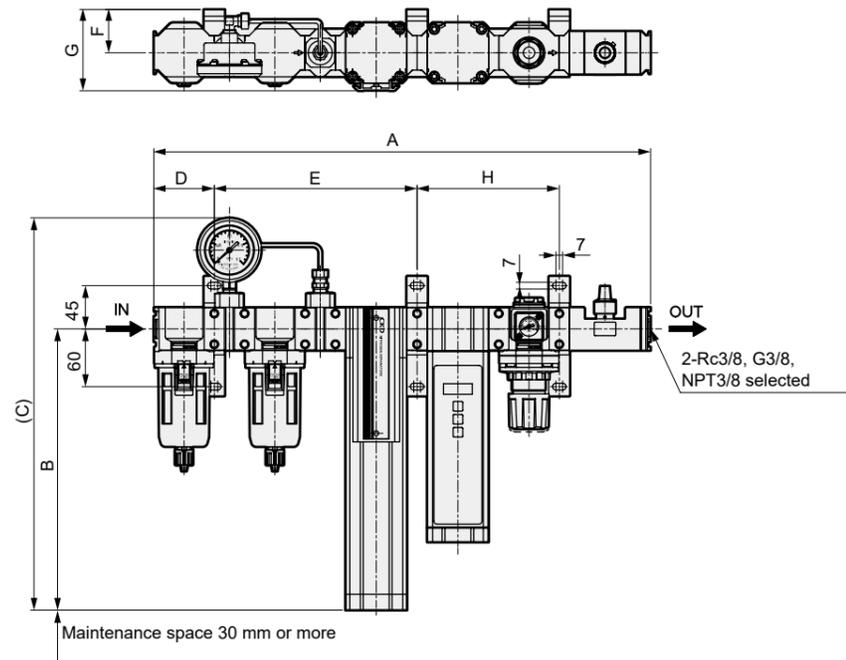


| Model No. | A | B | C | D | E | F | G | Weight (kg) |
|------------------------|------|-----|-----|----|------|----|-----|-------------|
| NSU-4S □ □ 10 □ NN □ T | 985 | 171 | 286 | 80 | 810 | 55 | 106 | 7.1 |
| NSU-4L □ □ 10 □ NN □ T | 1485 | 171 | 286 | 80 | 1310 | 55 | 106 | 9.9 |

For maintenance parts, refer to the CKD Components Product site.
<https://www.ckd.co.jp/kiki/en/> → "Model No." → Maintenance Parts

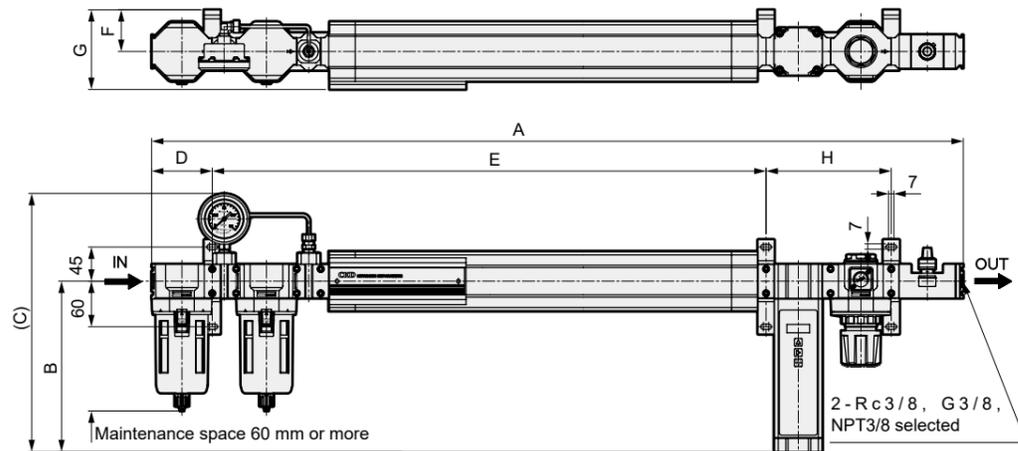
Dimensions

●With oxygen monitor without flow rate sensor (NSU-3^S_{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 rate sensor (NSU-4^S□10□A□□T)

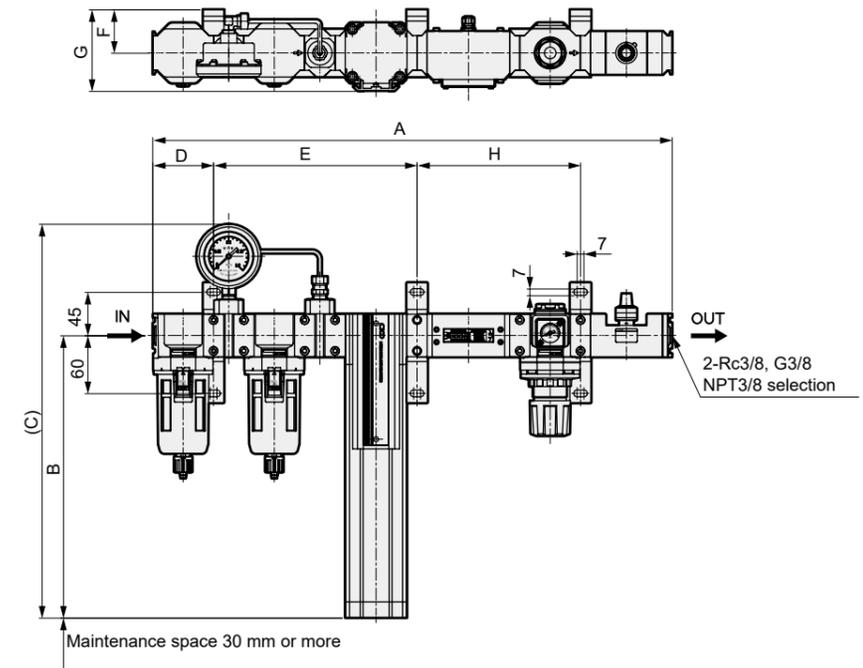


Note: Wiring space of 60 mm or more is required under the oxygen concentration monitor.

| 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 |

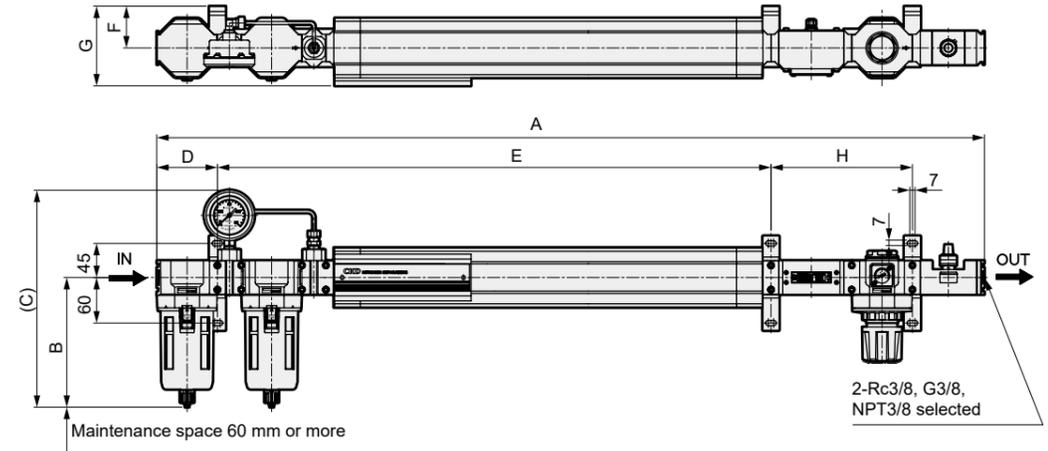
Dimensions (1 station)

●Without oxygen monitor/with flow rate sensor (NSU-3^S_{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 |

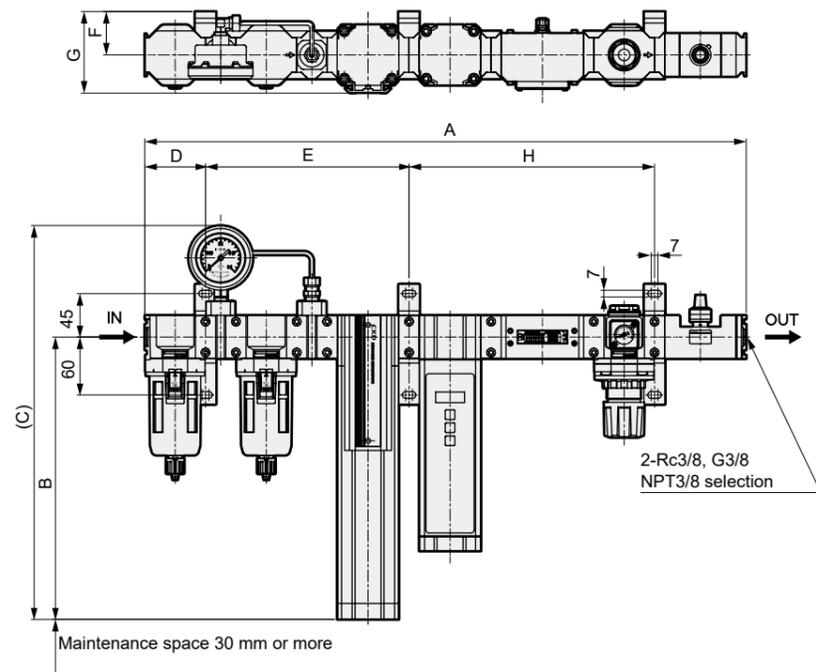
●Without oxygen monitor/with flow rate sensor (NSU-4^S□10□B□□T)



| 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 |

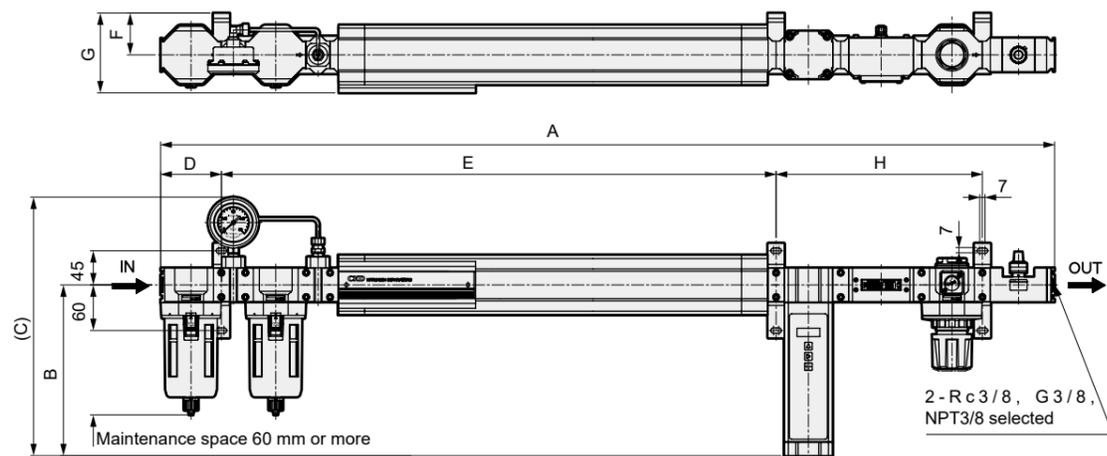
Dimensions (1 station)

●With oxygen monitor with flow rate sensor (NSU-3^S_{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^S_L □10□C□□T)

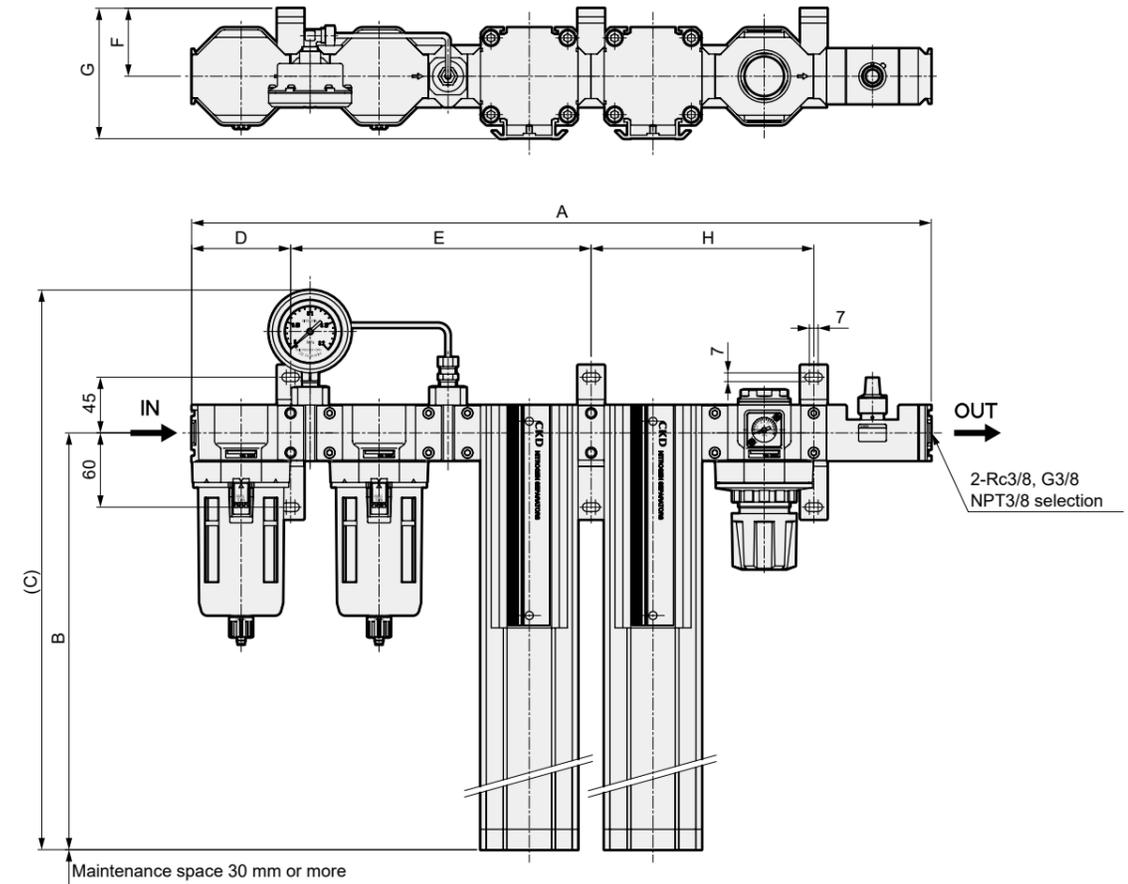


Note: Wiring space of 60 mm or more is required under the oxygen concentration monitor.

| 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 stations)

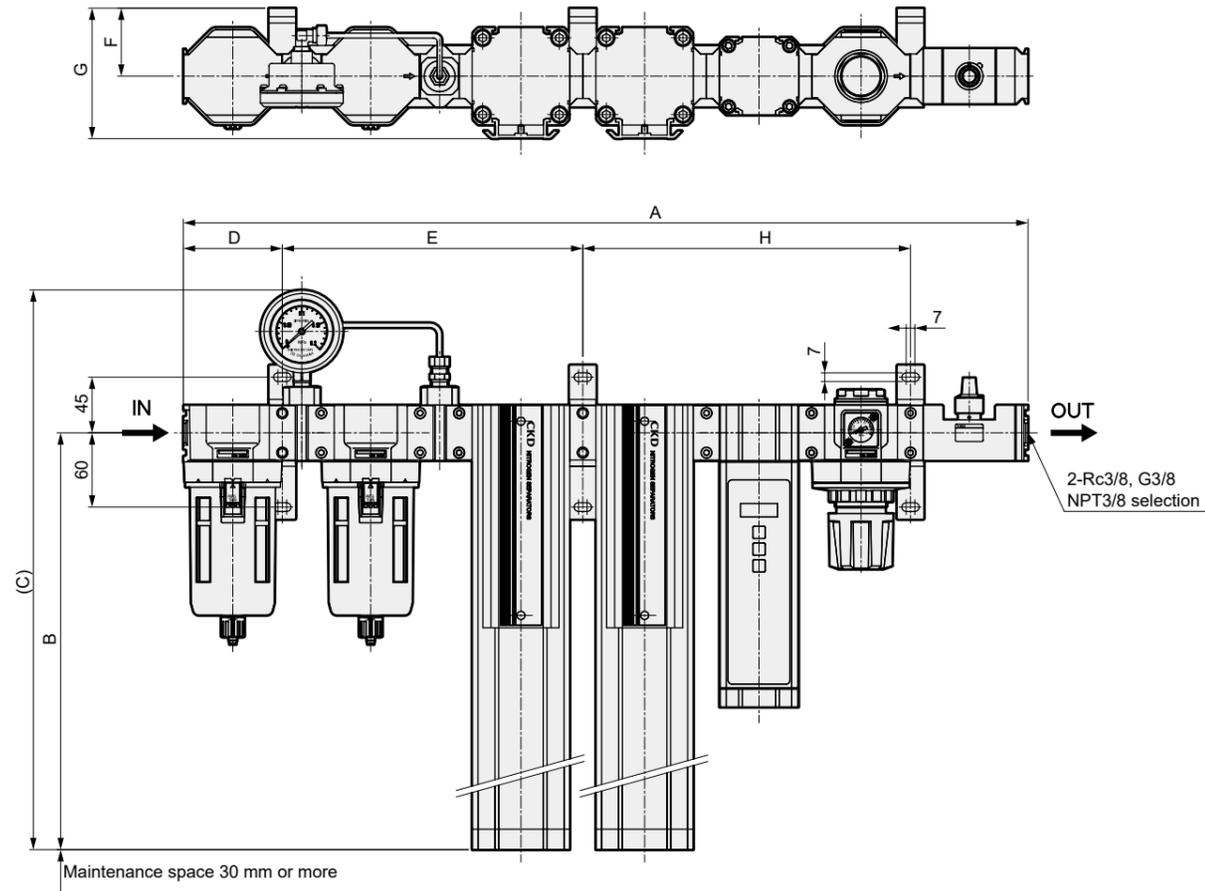
●No oxygen monitor or flow rate sensor (NSU-4^F_H □10□NN)



| 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 stations)

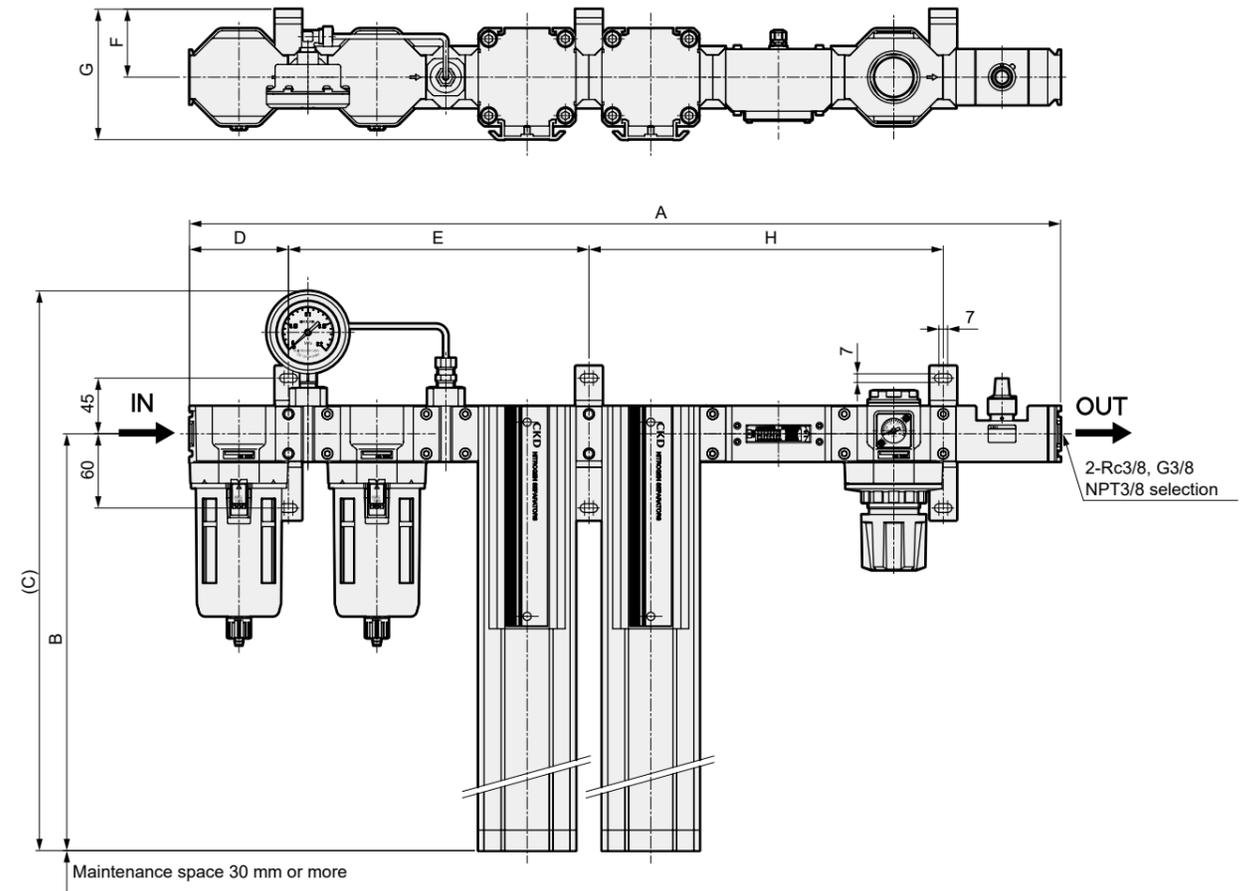
●With oxygen monitor, no flow rate sensor (NSU-4^F_G □10□A□)



| 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 stations)

●Without oxygen monitor with flow rate sensor (NSU-4^F_G □□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 |

Gas Generators

Nitrogen Gas Extraction Unit

Oxygen Conc. Monitor

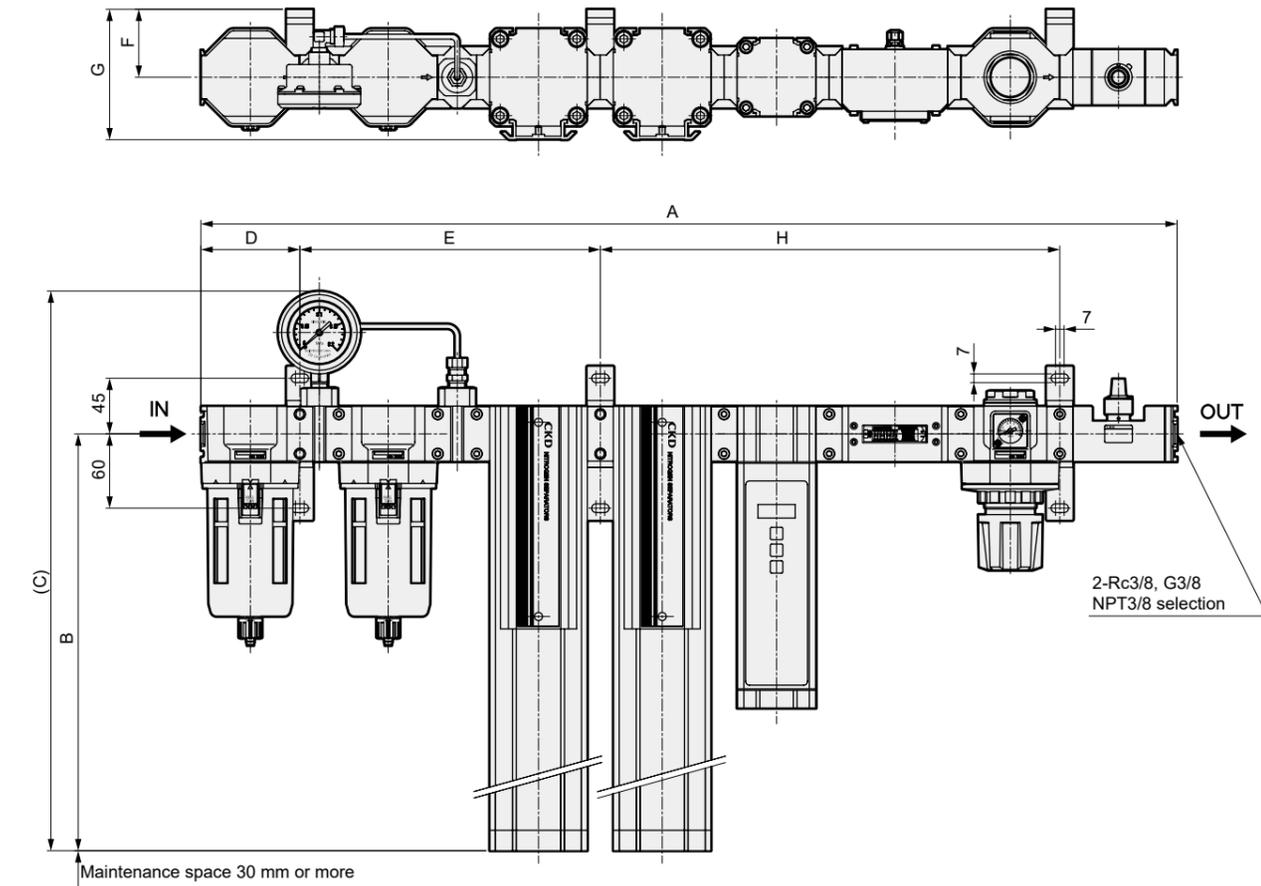
Gas Generators

Nitrogen Gas Extraction Unit

Oxygen Conc. Monitor

Dimensions (2 stations)

●With oxygen monitor/with flow rate sensor (NSU-4^F_H □10□C□)



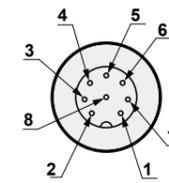
| Model No. | A | B | C | D | E | F | G | H | Weight (kg) |
|--------------|-------|------|------|----|-----|----|-----|-------|-------------|
| NSU-4F□10□C□ | 789.5 | 543 | 658 | 80 | 243 | 55 | 106 | 371.5 | 13.3 |
| NSU-4G□10□C□ | 789.5 | 1043 | 1158 | 80 | 243 | 55 | 106 | 371.5 | 16.1 |
| NSU-4H□10□C□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

Connector cable for oxygen concentration monitor

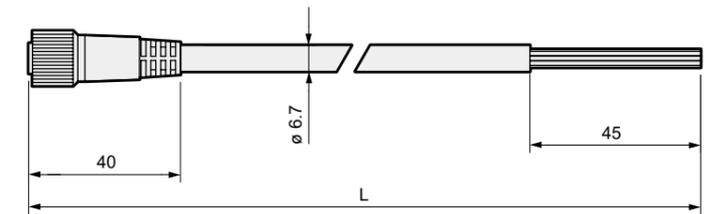
Model No. Notation connector cable for oxygen concentration monitor and Dimensions diagram Note: The connector cable is sold separately from the main body.

●DC cable
Use this cable when driving with a DC power supply or when using analog output or switch output.

| Model No. | Dimension L |
|-----------|-------------|
| PNA-1D | 1000 |
| PNA-3D | 3000 |
| PNA-5D | 5000 |



| No. | Cable color | Description |
|-----|-------------|-------------------------------|
| 1 | White | Power supply + |
| 2 | Brown | Power supply - |
| 3 | Green | Analog output + |
| 4 | Yellow | Analog output - |
| 5 | Gray | Contact output (relay output) |
| 6 | Pink | Contact output (relay output) |
| 7 | Blue | - |
| 8 | - | - |

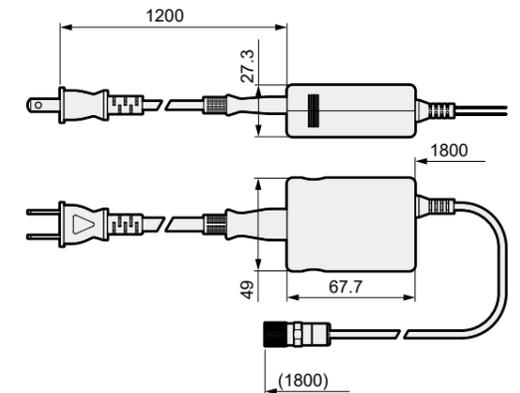


●AC adapter
Use when driving with an AC power supply.

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

• Plug shape

| B-type | C-type | O-type | BF-type |
|--------|--------|--------|---------|
| | | | |





Flow sensor for the Nitrogen Gas Extraction Unit

NS-QFS Series

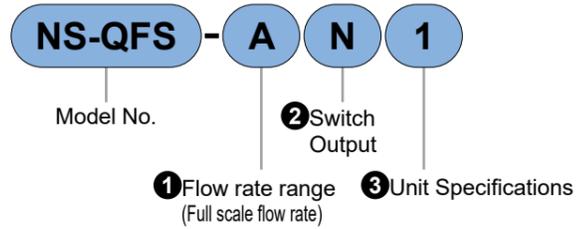
Modular structure that can be connected to the Nitrogen Gas Extraction Unit NS Series

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



Refer to the CKD website for detailed compatible model Nos.

Model No. Notation



*1: When using with the NSU Series reverse flow option, reverse the display. The display inversion settings are on Page 35.
*2: The joiner set (joiner, bolt, O-ring) and one gasket are included.

1 Flow rate range (full scale flow rate)

| Code | Description |
|------|---------------------------|
| 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 |

2 Switch Output

| Code | Description |
|------|-----------------------------------|
| N | NPN open collector output 1 point |
| P | PNP open collector output 1 point |

3 Unit Specifications

| Code | Description |
|------|--|
| 1 | SI units only |
| * 2 | With unit switching function (only for overseas) |

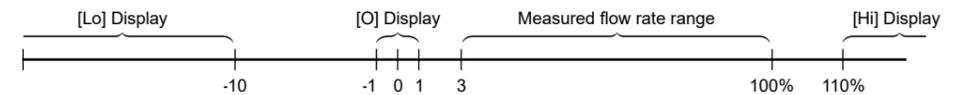
* Models with unit switching cannot be sold in Japan.

NS-QFS specifications

| 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 |
| Indicator type | 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) | Indicator range L | 0.0 to ±999999.9 L | | | 0 to ±9999999 L |
| | Pulse output rate L | 0.2 | 0.5 | 1 | 2, 5 |
| Working Conditions | Applicable fluid | 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 [2] | 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 | 4-20 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 × 5-conductor, insulator outer diameter 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%Rh).

*2: The displays of various flow rates are as shown below.



*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 the settings are counted in number of accesses.)

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 CKD's standard flow rate meter. It does not show absolute accuracy. Repeatability, temperature characteristics, and pressure characteristics are not included for an accuracy of ± 3% F.S.

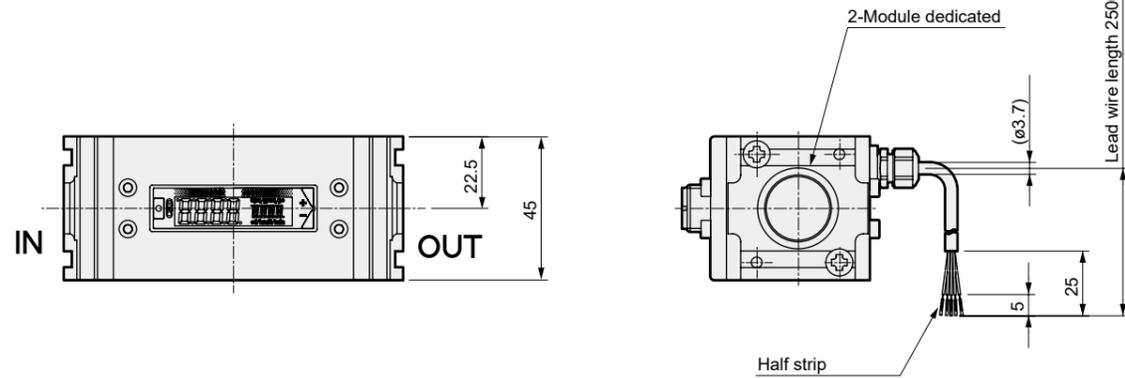
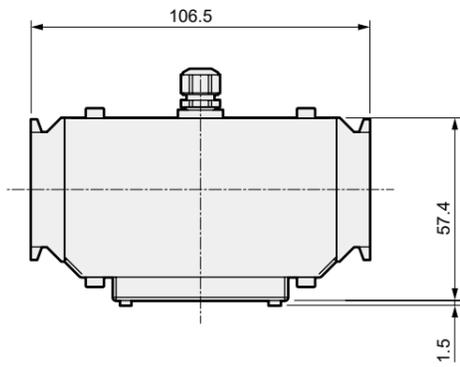
*6: Repeatability is calculated during a short period of time. Change over time is not included.

*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.

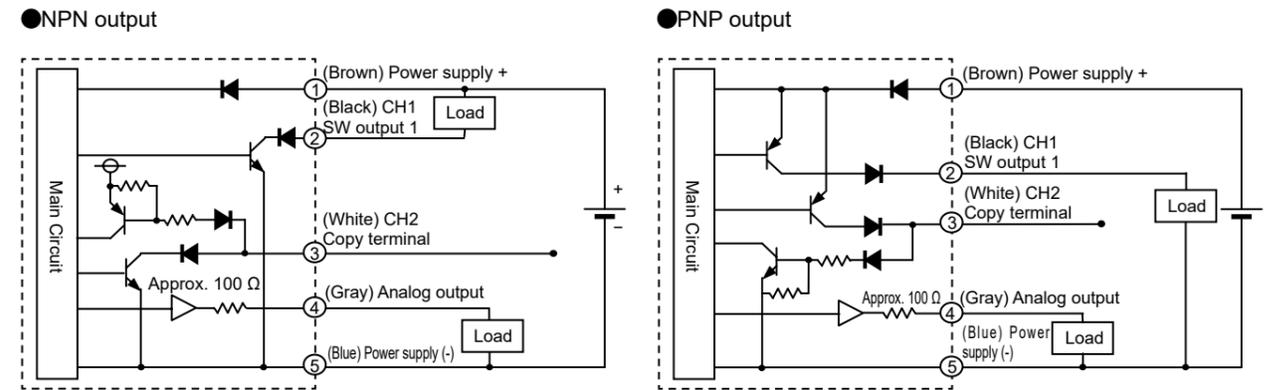
*9: This product's protection function is effective only for specific misconnections and load short-circuits. It does not provide protection for all misconnections.

Dimensions



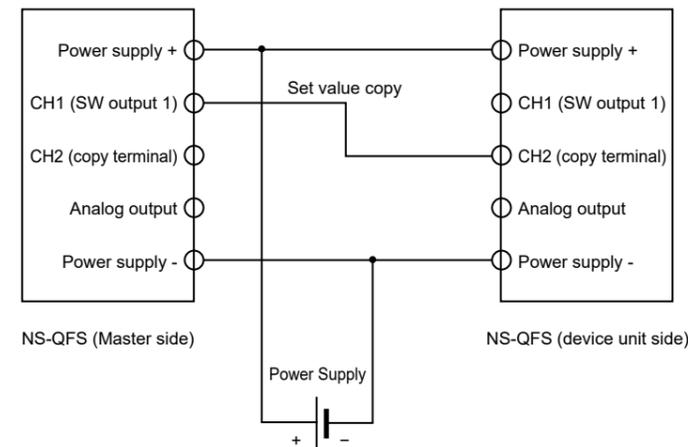
Example of internal circuit and load connection

Example of internal circuit and load connection



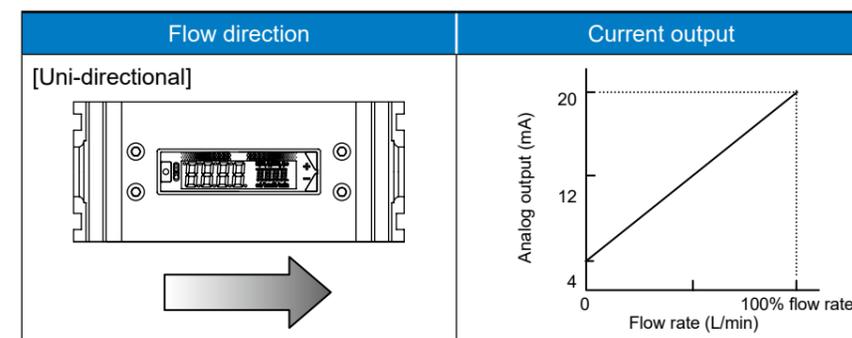
| Terminal No. | Option Lead wire color | Name |
|--------------|------------------------|--|
| ① | Brown | Power supply + (24 V) |
| ② | Black | CH1 (switch output 1: max 50 mA) |
| ③ | White | CH2 (copy terminal) |
| ④ | Gray | Analog output Current output: 4-20 mA load impedance 300 Ω or less |
|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

[When using the setting copy function]



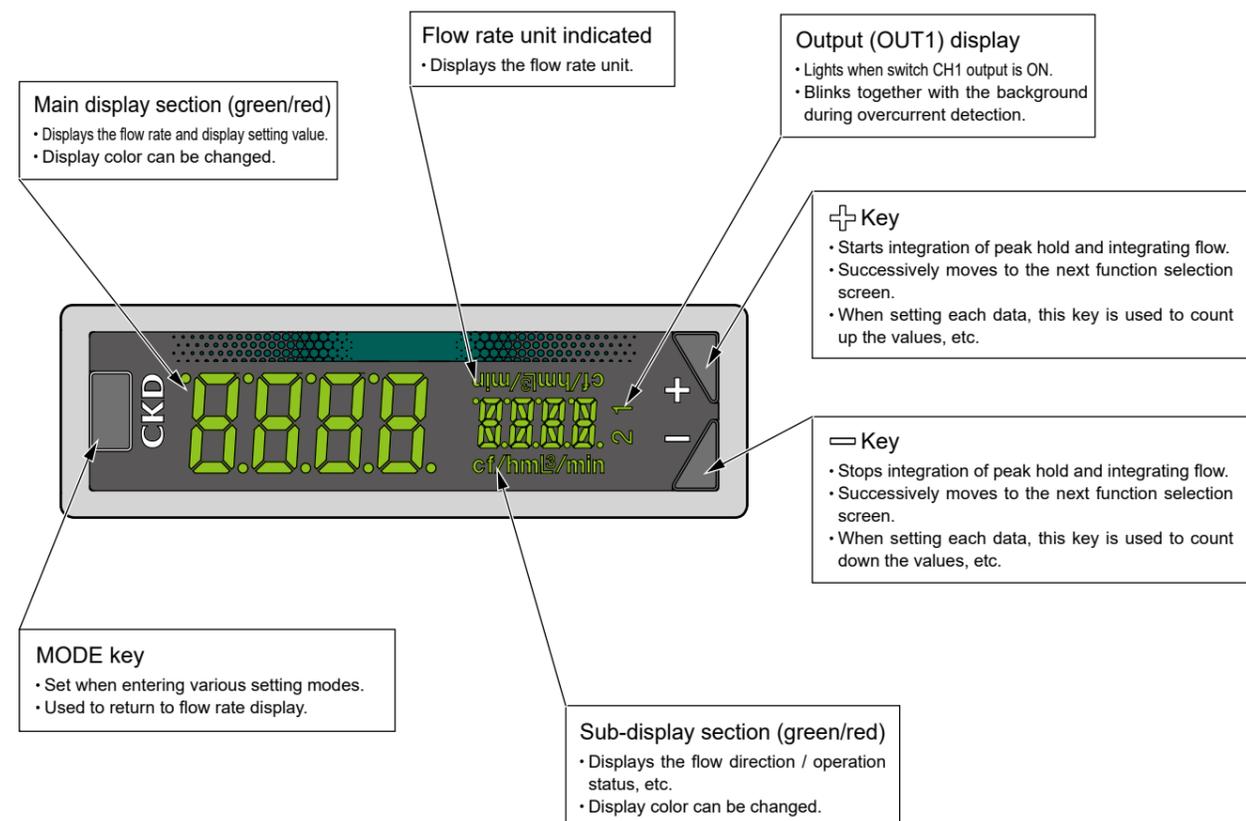
Connect CH1 (SW output 1) on the master side to CH2 (copy terminal) on the device unit side and power ON the sensor to use the setting copy function (F93). Note that this connection can only be used when using the setting copy function. As in the above load connection example, if copying is performed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

Analog output characteristics



Names and functions of display / operation section

●Indicator section name



Names and functions of display / operation section

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 | Indicators the instantaneous flow rate. | Indicator (measurement) |
| Peak hold function | Max. and min. values for the flow rate within a set interval are displayed. | Hidden (Stopped) |
| 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 feature. 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 | Sets the display method for the sub-display. The display can be switched to Flow direction, Reference state, or Numbering display. | Flow direction |
| F.05 | Indicator color setting | Set the display color. (red, green) Display color can be set for normal display and when switch output is ON. | At normal: Green At switch ON: Red |
| F.07 | Indicator 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 condition (ANR): flow rate converted to volume at 20°C, 1 atm, 65%RH Reference condition (NOR): flow rate converted to volume at 0°C, 1 atm, 0% RH | ANR |
| F.09 | Unit setting (overseas models only) | The units can be set. Can be selected from L/min, cf/h. | Domestic model: L/min Overseas model: L/min |
| F.10 | Indicator cycle setting | The digital display refresh cycle can be set in three stages from 0.25 sec to 1 sec. If the display flickers, it can be improved by increasing the display refresh cycle. | 0.5 sec |
| F.11 | Setting response time of analog output | Set the response time. The response can be set in seven steps from 0.05 sec to 1.50 sec. Chattering and mis-operation caused by sudden flow rate changes or noise are prevented. | 0.05 sec |
| 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. 1 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 | Key lock method and PIN method can be set. 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 | Forces the switch output to turn ON and is used to check the initial operation of wiring connections and input devices. | - |
| 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 | You can check the settings made in the SET mode. (Setting details cannot be edited.) | - |

Gas Generators

Nitrogen Gas Extraction Unit
Oxygen Conc. Monitor

Gas Generators

Nitrogen Gas Extraction Unit
Oxygen Conc. Monitor



Nitrogen Gas Extraction Unit

NS Series

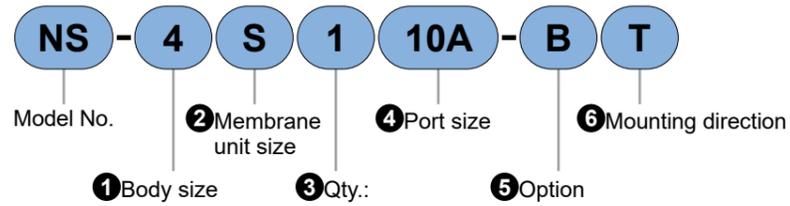
Modular design for easy system expansion with peripheral components

■ Nitrogen gas is obtained just by supplying compressed air.



NS Series
Model No. Notation

Model No. Notation



1 Body size

| Code | Description |
|------|---------------|
| 3 | Body width 63 |
| 4 | Body width 79 |

2 Membrane unit size

| Code | Description |
|------|--|
| S | Short  |
| L | Long  |

3 Qty.:

| Code | Description | Body size, membrane unit size (1-2 Combination) | | | |
|------|--|---|----|----|----|
| | | 3S | 3L | 4S | 4L |
| 1 | 1 pc.  | ● | ● | ● | ● |
| 2 | 2 units  | | | ● | ● |
| 3 | 3 units  | | | ● | ● |
| 4 | 4 units  | | | | ● |
| 6 | 6 units  | | | ● | ● |
| 8 | 8 units  | | | ● | ● |
| A | 10 units  | | | ● | |

Note: For configurations with 6 or more units, the product is a floor-standing type, and brackets are not included.

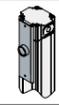
4 Port size

| Code | Description | 3 Qty. | | | | | | |
|------|-------------|--------|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 6 | 8 | A |
| 10A | Rc 3/8 | ● | | | | | | |
| 10B | G 3/8 | ● | | | | | | |
| 10C | NPT 3/8 | ● | | | | | | |
| 20A | Rc 3/4 | | ● | ● | ● | | | |
| 20B | G 3/4 | | ● | ● | ● | | | |
| 20C | NPT 3/4 | | ● | ● | ● | | | |
| 25A | Rc 1 | | | | | ● | ● | ● |
| 25B | G 1 | | | | | ● | ● | ● |
| 25C | NPT 1 | | | | | ● | ● | ● |

6 Mounting direction

| Code | Description |
|-------|--|
| Blank | Vertical mounting  |
| T | Horizontal mounting (available with NS-4S1, 4L1)  |

5 Option

| Code | Description |
|------|---|
| N | No option |
| B | Bracket  |
| C | Bracket + reverse flow |
| D | Bracket + exhaust port |
| F | Bracket + reverse flow + exhaust port |
| X | Reverse flow |
| E | With exhaust port  |
| H | Reverse flow + exhaust port |

*1: Exhaust (oxygen-rich gas) from standard products is released into the atmosphere. When "D", "F", "E", or "H" is selected, piping connection for exhaust (oxygen-enriched gas) is possible. Size of exhaust port is Rc1/2.

*2: Viewed from the front, a standard product has an air inlet on the left port, while an air outlet on the right port. When "C", "F", "X", or "H" is selected, an air inlet is provided on the right port, while an air outlet is provided on the left port.

Specifications for Food Manufacturing (Catalog No. CC-1271AA)

● Food grade lubricants that can be used in food manufacturing processes, and resin and rubber materials that conform to the Food Sanitation Laws are used.

NS - FP□

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 (ISO 8573-1: 2010) | | | | | |
| | Inlet air pressure MPa | 0.7 | | | | | |
| | Ambient temperature °C | 25 | | | | | |
| Rated flow rate | Outlet nitrogen gas flow rate L/min (ANR) | Nitrogen concentration (%) or more | 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) | Nitrogen concentration (%) or more | 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 |

Multi-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 (ISO 8573-1: 2010) | | | | | | | | | | | |
| | Inlet air pressure MPa | 0.7 | | | | | | | | | | | |
| | Ambient temperature °C | 25 | | | | | | | | | | | |
| Rated flow rate | Outlet nitrogen gas flow rate L/min (ANR) | Nitrogen concentration (%) or more | 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) | Nitrogen concentration (%) or more | 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

Temperature and inlet air pressure affect the outlet nitrogen gas flow rate, which must be compensated for if it differs from the rating in the specification column.

STEP 1 Confirm the working conditions and the rated values listed in the specifications.
Working conditions: Inlet air pressure, inlet air temperature, required nitrogen gas flow rate

STEP 2 Confirm the compensation coefficient for 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 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 model based on the rated outlet nitrogen gas flow rate of each model.
Rated outlet nitrogen gas flow rate x (1) temperature gas flow rate correction coefficient x (2) pressure gas flow rate correction coefficient = corrected outlet nitrogen gas flow rate
Select one with sufficient outlet nitrogen gas flow rate after correction with the above formula.

STEP 5 Confirm the compensation coefficient for 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 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 7 Find the inlet air flow rate from the rated outlet nitrogen gas flow rate of each model.
Inlet air flow rate of the model selected in STEP4 x temperature air flow rate correction coefficient x 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 |

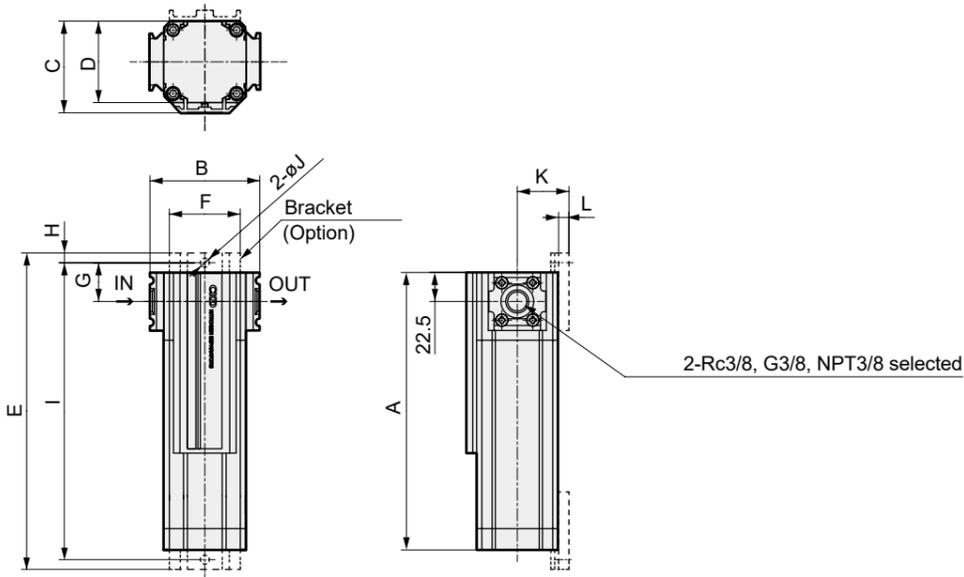
Substitute the above conditions into the above formula to obtain the outlet nitrogen gas flow rate when NS-4L1 is used at 99% nitrogen concentration.
66.9 (rated outlet nitrogen gas flow rate) x 1.05 x 0.65 = 45.7 L/min (ANR).

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

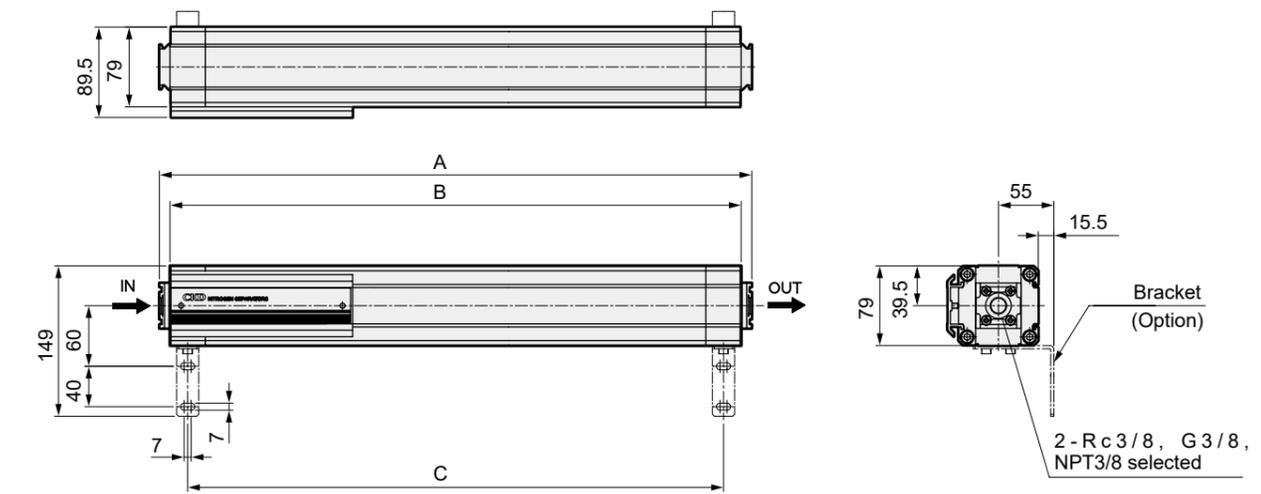
In this case, the inlet air flow rate is 278.8 x 1.17 x 0.79 = 257.7 L/min (ANR).

Dimensions

Dimensions



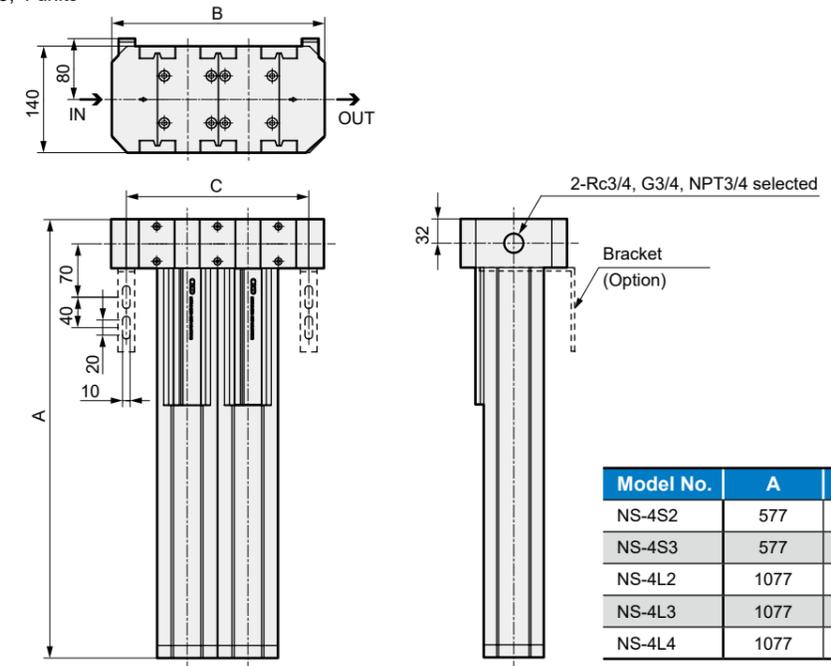
| Model No. | A | B | C | D | Weight (kg) | Bracket relational dimensions | | | | | | | |
|-----------|------|-----|----|----|-------------|-------------------------------|----|------|-----|------|---|----|----|
| | | | | | | E | F | G | H | I | J | K | L |
| NS-3S1 | 315 | 85 | 71 | 63 | 1.8 | 345 | 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 |

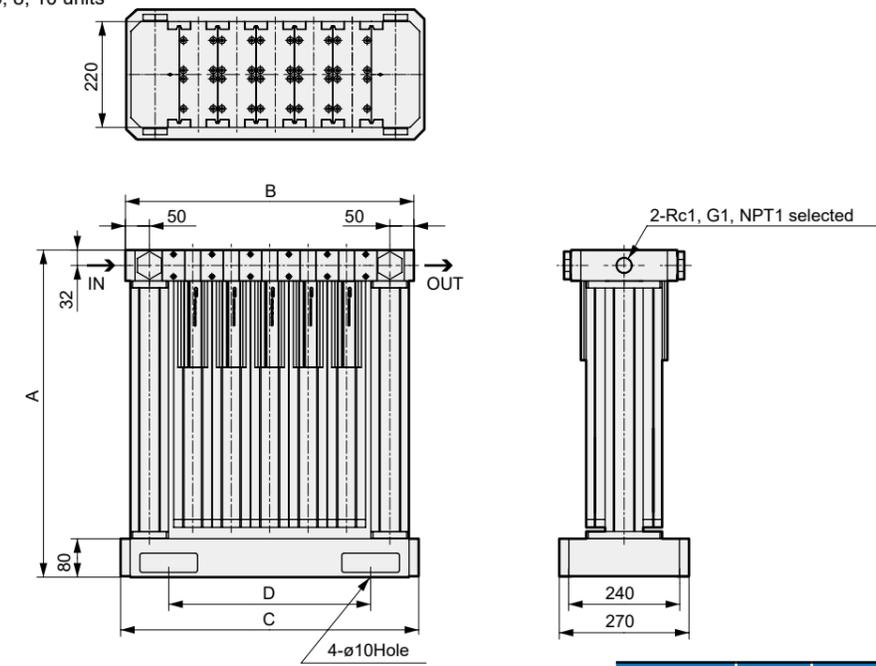
Dimensions

●Quantity: 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 |

●Quantity: 6, 8, 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 |

For maintenance parts, refer to the CKD Components Product site
Refer to (<https://www.ckd.co.jp/kiki/en/>) → "Model No." → Maintenance Parts

Gas Generators

Nitrogen Gas Extraction Unit

Oxygen Conc. Monitor

Gas Generators

Nitrogen Gas Extraction Unit

Oxygen Conc. Monitor



Safety Precautions

Be sure to read this section before use.

For general precautions for pneumatic equipment, please refer to Intro 15.

Product-specific cautions: Nitrogen Gas Extraction Unit NS, NSU Series

* For cautions of PNA and NS-QFS Series, refer to the product-specific cautions for each model (P. 52 and 44).

Design / Selection

WARNING

■ **Nitrogen gas may cause a risk of oxygen deprivation; therefore, use nitrogen gas in accordance with the following instructions.**

- Use in well ventilated locations.
- Ventilate the work area when nitrogen gas is being used.
- Periodically inspect the nitrogen gas piping for leaks.

■ **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 when equipment is being used.

■ **Do not use this product for purposes that directly concern human life.**

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 use 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.).

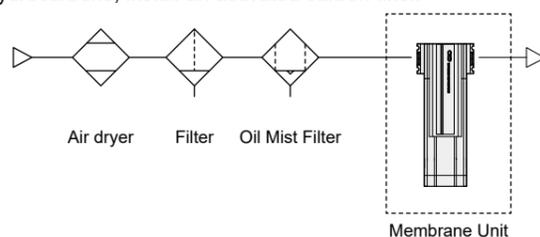
■ The needle valve cannot be used as a stop valve that requires no leakage. Slight leakage is allowed for in this product's specifications.

■ 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.)

■ Please use at your own discretion after thoroughly confirming the compatibility of the materials used in each device with the valve structure, fluid used, and atmosphere in which the device is used.

■ Internal parts may wear when the needle valve operates. If there is any influence, 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.



■ 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. 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.

■ 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]



0.07 MPa

■ The service life of the membrane unit differs according to the working conditions. As a guideline, replace the membrane every 3 to 5 years..

■ Please note that it takes time to obtain the required nitrogen concentration after supplying compressed air.

| Types of Chemicals | Categories of Chemicals | Main Products of Chemicals | General Applications | Polycarbonate |
|---------------------|--|--|--|---------------|
| Inorganic compounds | Acids | Hydrochloric acid, sulfuric acid, fluorine, phosphoric acid, chromic acid, etc. | Acid washing of metals, acidic degreasing solutions, Coating treatment solution | × |
| | Alkalines | Caustic soda, caustic potash, calcium hydroxide, aqueous ammonia, sodium carbonate, etc. | Alkaline degreasing solution for metals | × |
| | Inorganic salts | Sodium sulfide, potassium nitrate, potassium bichromate, sodium sulfate, etc. | | × |
| Organic compounds | Aromatic hydrocarbons | Benzene, toluene, xylene, ethyl benzene, styrene, etc. | Contained in paint thinner (benzene, toluene, xylene) | × |
| | Chlorinated Aliphatic Hydrocarbons | Methyl chloride, ethylene chloride, methylene chloride, acetylene chloride, chloroform, trichloroethylene, perchloroethylene, carbon tetrachloride | Organic Solvent-Based Washing Solution for Metals (Trichloroethylene, Tetrachloroethylene, Carbon Tetrachloride, etc.) | × |
| | Chlorinated Aromatic Hydrocarbons | Chlorobenzene, dichlorobenzene, benzene hexachloride (B/H/C), etc. | Agricultural chemicals | × |
| | Petroleum components | Solvent, naphtha, gasoline | | × |
| | Alcohols | Methanol, ethanol, cyclohexanol, benzyl alcohol | Used as an antifreeze agent | × |
| | Phenol | Carbolic acid, cresol, naphthol, etc. | Disinfectant solution | × |
| | Ethers | Methyl ether, methyl ethyl ether, ethyl ether | Brake fluid additive | × |
| | Ketones | Acetone, methyl ethyl ketone, cyclohexanone, acetophenone, etc. | | × |
| | Carboxylic acids | Formic acid, acetic acid, butyl acid, acrylic acid, oxalic acid, phthalic acid, etc. | Dyes/oxalic acid are used for aluminum treatment Phthalic Acid Is Used as a Paint Base | × |
| | Phosphate ester | Dimethyl phthalate (DMP), diethyl phthalate (DEP), dibutyl phthalate (DBP), dioctyl phthalate (DOP) | Lubricant, synthetic hydraulic fluid, rust preventative additives used as plasticizers for synthetic resins | × |
| | Oxyacids | Glycolic acid, lactic acid, malic acid, citric acid, tartaric acid | | × |
| | Nitro compounds | Nitromethane, nitroethane, nitroethylene, nitrobenzene, etc. | | × |
| | Amines | Methylamine, dimethylamine, ethylamine, aniline, acetanilide, etc. | Brake fluid additive | × |
| Nitriles | Acetonitrile, acrylonitrile, benzonitrile, acetoneitrile, etc. | Raw material for nitrile rubber | × | |

For precautions during mounting, installation, adjustment, use and maintenance, refer to the CKD Components Product Site (<https://www.ckd.co.jp/kiki/en/>) → "Model No. → Instruction Manual"



Pneumatic components (flow rate sensor)

Safety Precautions

Be sure to read this section before use.

For general precautions for pneumatic equipment, please refer to Intro 15.

MEMO

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

Design / Selection

Working fluids

DANGER

- Never use this product with flammable fluids.

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 breakdown. 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

- There is no problem with the sensor even if an excess flow of about twice the measuring range is applied, but if dynamic pressure near the maximum working pressure is applied (pressure difference between the primary and secondary sides greater than the maximum working pressure), there is a possibility of sensor failure. When dynamic pressure is applied, such as when filling a workpiece for leakage inspection, be sure to provide a bypass circuit or a squeezer to prevent dynamic pressure from being applied to the sensor.

Other

CAUTION

- The flow path is not completely free of dust generation, so if dust generation is a problem, a final clean filter should be used in conjunction.

Piping

CAUTION

- Do not install a pressure reducing valve (regulator), solenoid valve, etc. immediately before this product. Deflected currents may occur and cause errors.
- This product is exclusively for Nitrogen Gas Extraction Unit system type NSU. When piping, use modular connections with our products.

For precautions during mounting, installation, adjustment, use and maintenance, refer to the CKD Components Product Site (<https://www.ckd.co.jp/kiki/en/>) → "Model No. → [Instruction Manual](#)