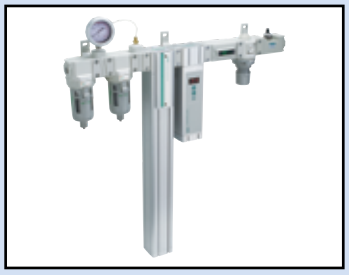


Nitrogen Extraction Unit System Type

NSU Series

Easily Provides Stable Supply of Nitrogen Gas.

- Nitrogen gas can be obtained simply by piping to an air pressure source.
- All-in-one design provides excellent installability.

CE UKCA RoHS

For detailed applicable model numbers, refer to our website.

Model No. Indication Method

NSU - 4 S A 10A NN - N T

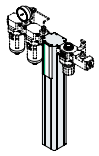
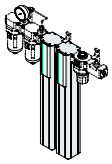
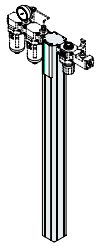
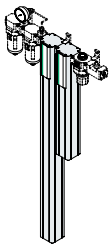
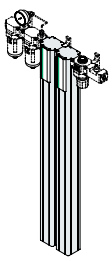
- NSU: Model No.
- 4: ❶ Body Size
- S: ❷ Membrane Unit Size
- A: ❸ Needle Valve
- 10A: ❹ Port Size
- NN: ❺ Oxygen Analyzer / Flow Sensor
- N: ❻ Option
- T: ❼ Installation Orientation

✳: For other combinations, please consult our sales office.

❶ Body Size

Code	Content
3	Main Unit Width 63
4	Main Unit Width 79

❷ Membrane Unit Size

	Code	Content	
	S	Short	
✳1	F	Short + Short	
	L	Long	
✳1	G	Long + Short	
✳1	H	Long + Long	

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

❸ Needle Valve

Code	Content			Body size, membrane unit size (❶❷Combination) 3S	3L	4S/4F	4L/4G/4H
A	Max. Flow Rate	20 L/min		●	●	●	●
B		80 L/min		●	●	●	●
C		160 L/min			●	●	●
D		240 L/min				●	●
E		400 L/min					●

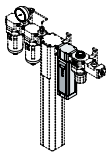
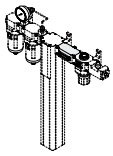
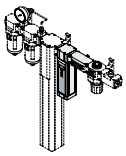
Note: Select a range suitable for the needle valve for the flow sensor.

❹ Port Size

	Code	Content
	10A	Rc3/8
✳1	10B	G3/8
✳2	10C	NPT3/8

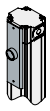
✳1: When selecting G3/8, the regulator pressure gauge units will be shown as bar.
✳2: When selecting NPT3/8, the regulator pressure gauge units will be shown as psi.

❺ Oxygen Analyzer / Flow Sensor

Content			Code
None			NN
With Oxygen Analyzer (✳1)			AK
With Oxygen Analyzer, Traceability Certificate, System Diagram, Inspection Report (✳1)			AM
With Flow Sensor (✳2)	(20 L/min Specification)		BA
	(50 L/min Specification)		BB
	(100 L/min Specification)		BC
	(200 L/min Specification)		BD
	(500 L/min Specification)		BE
With Oxygen Analyzer / Flow Sensor (✳1, ✳2)	(20 L/min Specification)		CA
	(50 L/min Specification)		CB
	(100 L/min Specification)		CC
	(200 L/min Specification)		CD
	(500 L/min Specification)		CE
Oxygen Analyzer (With Traceability) / Flow Sensor (✳1, ✳2)	(20 L/min Specification)		CF
	(50 L/min Specification)		CG
	(100 L/min Specification)		CH
	(200 L/min Specification)		CJ
	(500 L/min Specification)		CK

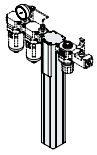
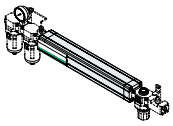
✳1: An external power supply is required for the oxygen concentration monitor. However, the connector cable is not included. Please order the connector cable using its standalone model number.
✳2: Switch output for the flow rate sensor is NPN. ❻If you specify option "P", PNP will be output.

❻ Option

	Code	Content	✳1
	N	No Option	
✳1	E	With Exhaust Port	
	K	Flow Sensor with Unit Switching Function (Overseas models only)	
	P	Flow Sensor Switch output: PNP output	
✳2	X	Reverse Flow	

✳1: Exhaust air (oxygen-enriched gas) from Standard Products is released into the atmosphere. If "E" is selected, connection for exhaust (oxygen-enriched gas) piping is possible. The exhaust port size 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.

❼ Installation Orientation

Code	Content	
No Code	Vertical Installation	
T	Horizontal Installation (Selectable models are NSU-4S, 4L)	

Connector Cable Standalone Model No.

●DC Cable

PNA-1D

❶ Cable Length

❶ Cable Length

Code	Content
1D	1000 mm
3D	3000 mm
5D	5000 mm

●AC Adapter Standalone

PNA-A

●AC Adapter+ Convert Plug Set

PNA-AG

For exterior dimension drawings, refer to P. 16.

Food Process Specifications (Catalog No. CC-1271AA)

●Uses food-grade lubricating oil usable in food manufacturing processes, and resin/rubber materials compliant with the Food Sanitation Act.

NSU-·····-FP✳

Specifications

Item				NSU-3S	NSU-3L	NSU-4S	NSU-4F	NSU-4L	NSU-4G	NSU-4H
Operating Condition Range	Operating 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						
	Inlet Air Relative Humidity		RH	50%						
	Ambient temperature		°C	5 to 50						
Rating	Inlet air pressure dew point		°C	10						
	Inlet Air Pressure		MPa	0.7						
	Inlet Air Temperature		°C	25						
	Ambient temperature		°C	25						
Rated Flow Rate	Outlet Nitrogen Gas Flow Rate L/min (ANR) (✳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 Filter		Filtration	μm	5						
Oil Mist Filter		Oil Removal	mg/m^3	0.01 or less (after oil saturation 0.1 or less) ✳ Value at primary side oil concentration 30 mg/m^3, 21°C.						
Regulator		Set Pressure Range	MPa	0.05 to 0.85						
Oxygen Analyzer				For specifications, refer to P. 31.						
Flow Sensor				For specifications, refer to P. 18.						
Needle Valve		Flow Characteristics		Refer to P. 5.						
Standard Equipment				Pressure Gauge / Differential Pressure Gauge / Bracket						

✳1: Inlet air pressure when NS-QFS-E is assembled is 0.4 to 0.75 MPa.
✳2: When membrane unit size "H" is selected, if inlet temperature is 50°C, use with outlet flow rate of 39 L/min or less for 99.9% nitrogen gas concentration. If exceeding the operating range, please inquire.
✳3: Verify the outlet nitrogen gas flow rate against the needle valve flow characteristics and confirm it is within the operating range. If outside the operating range, please inquire.
✳4: When membrane unit size "L" is selected, if using 90% concentration nitrogen gas, use with inlet air temperature of 40°C or less. If using above 40°C, please inquire.
✳5: When membrane unit size "G" or "H" is selected, if using 90% concentration nitrogen gas, please inquire.

Model Selection Method

Since temperature and inlet air pressure affect the outlet nitrogen gas flow rate, correction is necessary if conditions differ from the rated specifications.

STEP 1 Checking Operating Conditions
Outlet Nitrogen Gas Flow Rate [L/min(ANR)]
Outlet Nitrogen Gas Pressure [MPa]
Inlet Air Pressure [MPa]
Inlet Air Temperature [°C]

STEP 2 Check the correction factor for outlet nitrogen gas flow rate due to the influence of inlet air temperature.

① Temperature - Gas Flow Rate Correction Factor

Temperature (°C)	Outlet Nitrogen 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 Check the correction factor for outlet nitrogen gas flow rate due to the influence of inlet air pressure.

② Pressure - Gas Flow Rate Correction Factor

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 An appropriate body size and a membrane unit size are determined from the rated outlet nitrogen gas flow rate of each model. **Rated Outlet Nitrogen Gas Flow Rate × ① Temperature Gas Flow Rate Correction Factor × ② Pressure Gas Flow Rate Correction Factor = Corrected Refined Nitrogen Gas Flow Rate**
Select a body size / membrane unit size where the above corrected refined nitrogen gas flow rate meets 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, select a needle valve based on the needle valve flow rate characteristics (P. 5)

STEP 6 Select the model based on STEP 4 and STEP 5.

STEP 7 Check the correction factor for inlet air flow rate due to the influence of inlet air temperature.

③ Temperature - Air Flow Rate Correction Factor

Temperature (°C)	Outlet Nitrogen 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 Check the correction factor for inlet air flow rate due to the influence of inlet air pressure.

④ Pressure - Air Flow Rate Correction Factor

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 The inlet air flow rate is determined from the rated outlet nitrogen gas flow rate of each model. **Inlet Air Flow Rate of Model Selected in STEP 4 × ③ Temperature Air Flow Rate Correction Factor × ④ Pressure Air Flow Rate Correction Factor = Corrected Inlet Air Flow Rate**
Check if usable with the compressor capability based on the above corrected inlet air flow rate.

Calculation Example

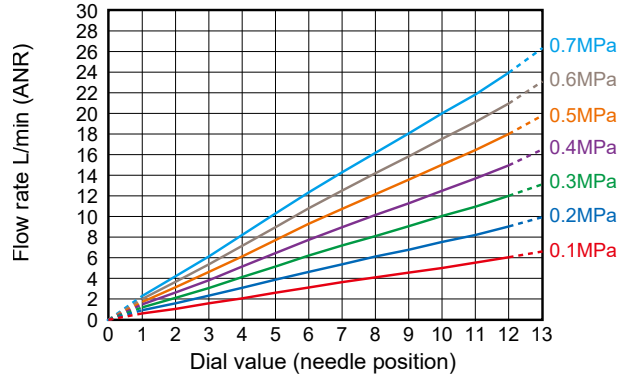
Condition Item	Operating Conditions	Selection Conditions	Correction Factor for Outlet Nitrogen Flow Rate	Correction Factor for Inlet Air Flow Rate
Outlet Nitrogen Concentration	99 [%]	99 [%]	-	-
Outlet Nitrogen Pressure	0.2 [MPa]	0.2 [MPa]	-	-
Inlet Air Temperature	35 [°C]	35 [°C]	①1.05	③1.17
Inlet Air Pressure	0.6 to 0.7 [MPa]	0.6 [MPa]	②0.75	④0.91

Substitute the above conditions into the above formula to determine the outlet nitrogen gas flow rate when using NSU-4L□ at 99% nitrogen concentration.
66.9 (Rated Outlet Nitrogen Gas Flow Rate) × 1.05 × 0.75 = 52.7 L/min (ANR).
Select the model if the required product nitrogen gas flow rate is below this value.
The inlet air flow rate at that time is 278.8 × 1.17 × 0.91 = 296.8 L/min (ANR).
For the needle size, select NS-QDVL-160, adjustable to 53 L/min (ANR) at 0.2 MPa.

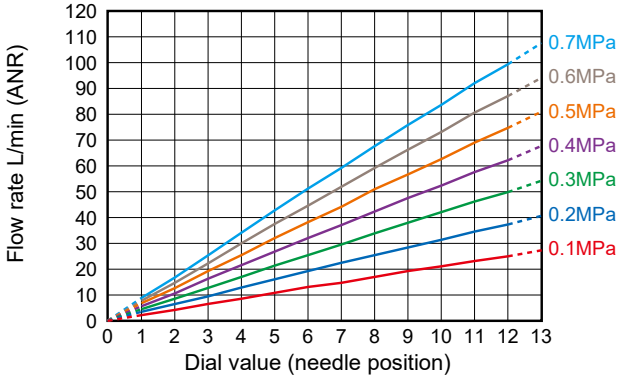
Needle Valve Flow Characteristics

Note: The flow characteristic graph is for reference only and does not guarantee values.

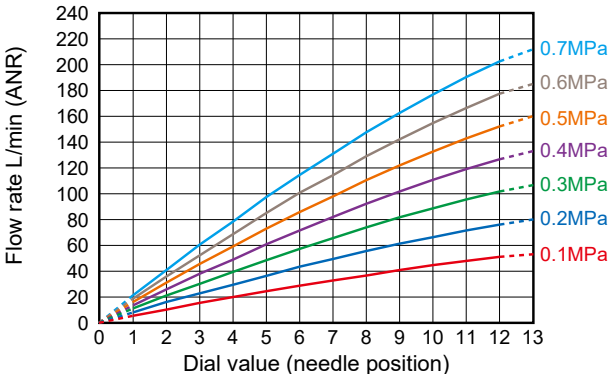
● NS-QDVL-020



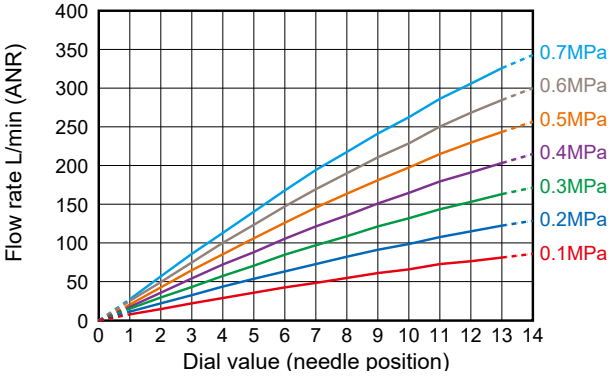
● NS-QDVL-080



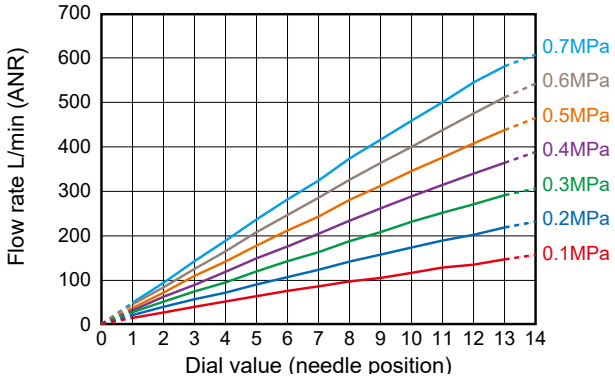
● NS-QDVL-160



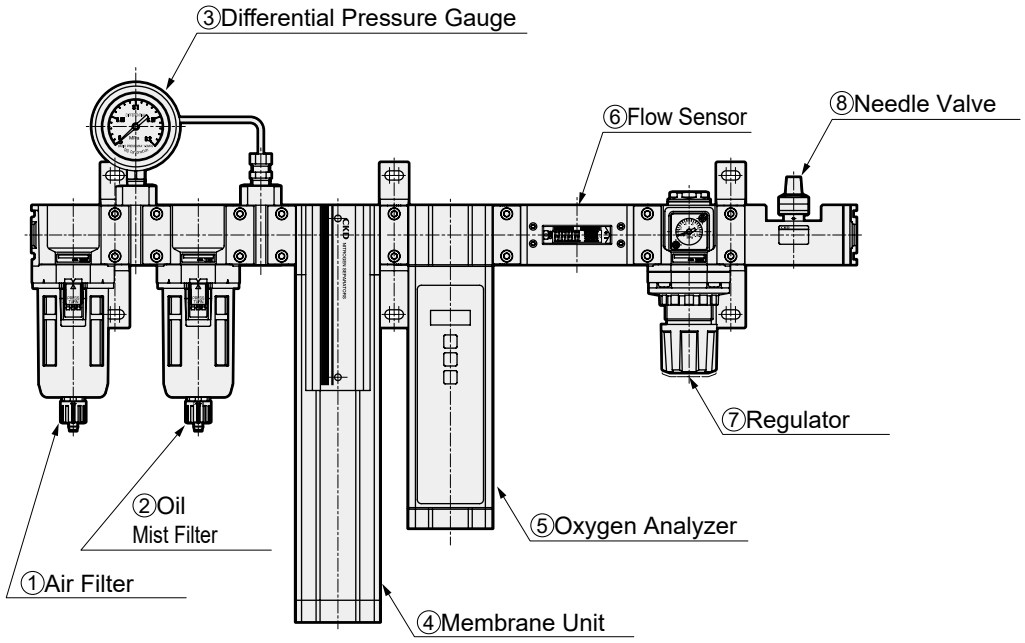
● NS-QDVL-240



● NS-QDVL-400



Configuration Component (Vertical Installation)

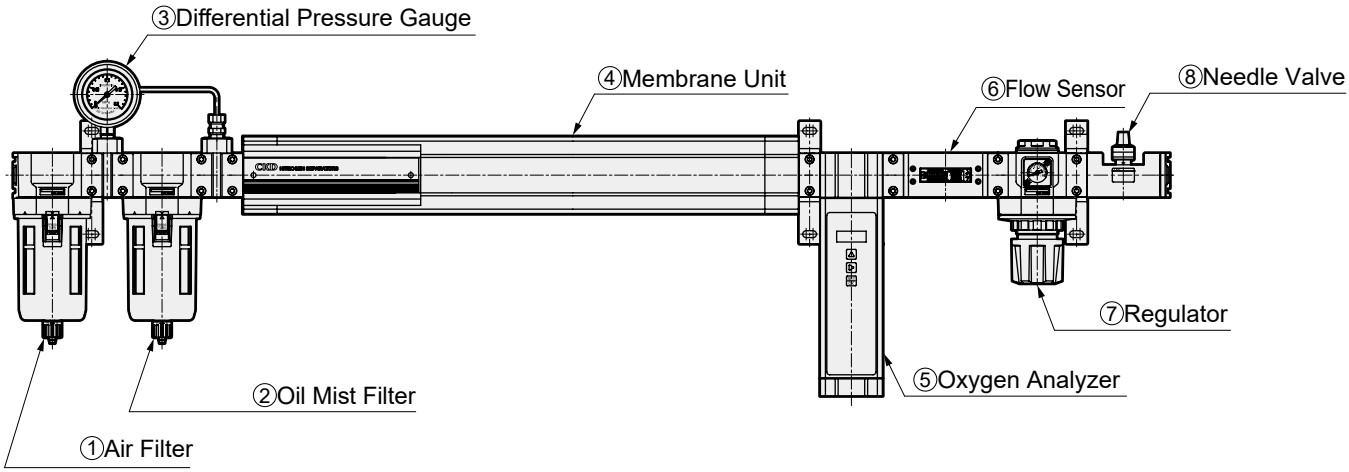


■ Standard (for Connection Aperture Rc 3/8)

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 Analyzer	PNA-10A-□-FP 2						
⑥ Flow 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		

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

Configuration Component (Horizontal Installation)



■ Standard (for Connection Aperture Rc 3/8)

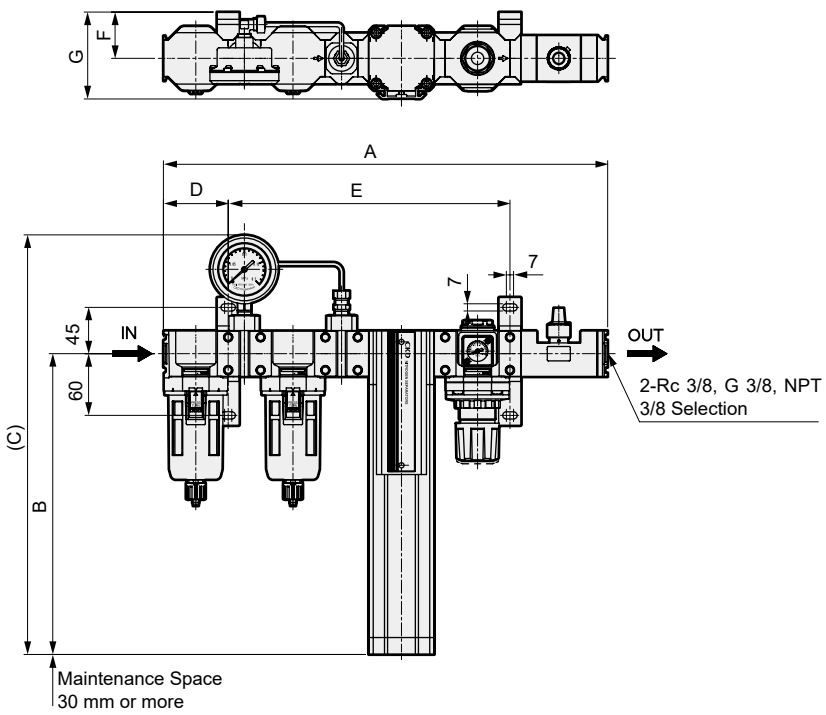
Unit Model No.	NSU-4S□-□T	NSU-4L□-□T
① Air Filter	F4000-10-W-F	
② Oil Mist Filter	M4000-10-W-F1	
③ Differential Pressure Gauge	GA400-8-P02	
④ Membrane Unit	NS-4S110A-□T	NS-4L110A-□T
⑤ Oxygen Analyzer	PNA-10A-□-FP2	
⑥ Flow Sensor	NS-QFS-□	
⑦ Regulator	NS-QR4-FP1	
⑧ Needle Valve	NS-QDVL-020 NS-QDVL-080 NS-QDVL-160 NS-QDVL-240	NS-QDVL-020 NS-QDVL-080 NS-QDVL-160 NS-QDVL-240 NS-QDVL-400

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

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

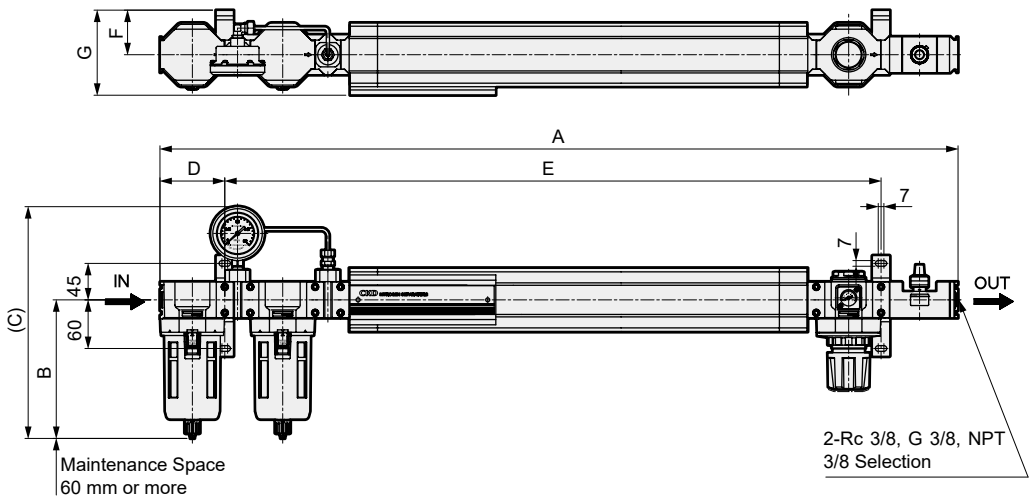
External Dimension Drawing (Single Type)

●No Oxygen Analyzer / No Flow 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

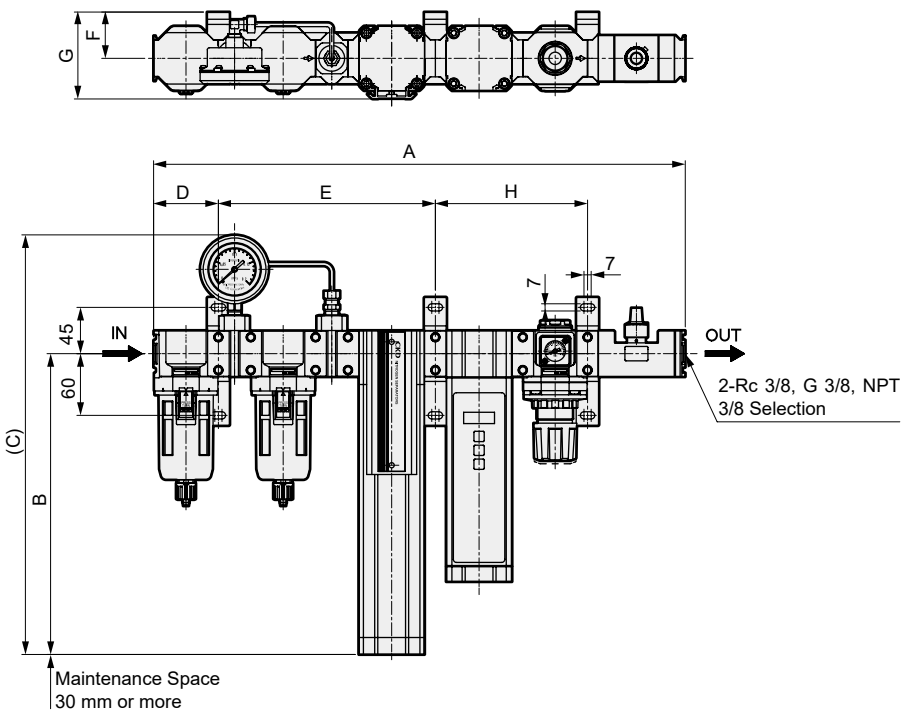
●Without oxygen monitor/without flow rate sensor (NSU-4$^{S}_{L}$ ✳10✳NN-✳T)



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

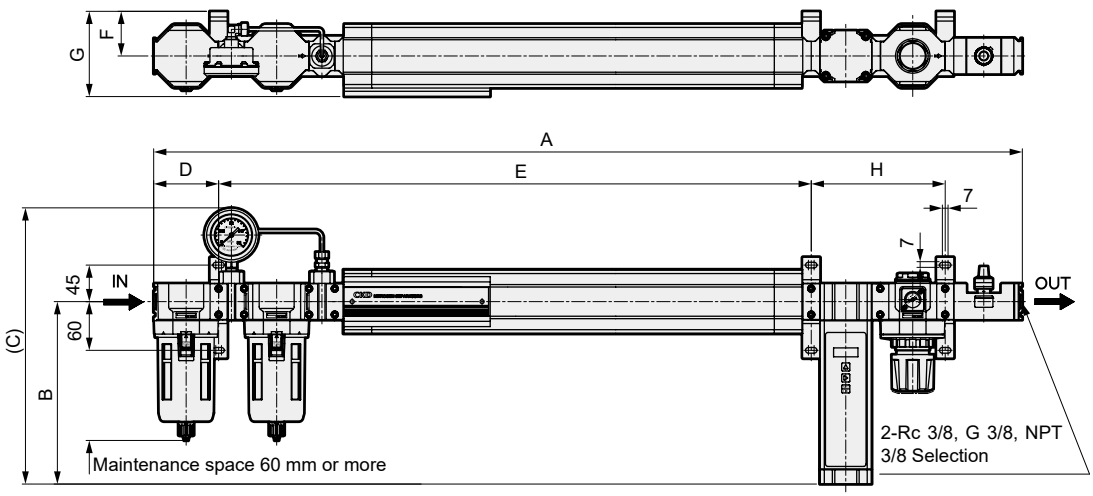
External Dimension Drawing

●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 rate sensor (NSU-4$^{S}_{L}$ ✳10✳A✳-✳T)

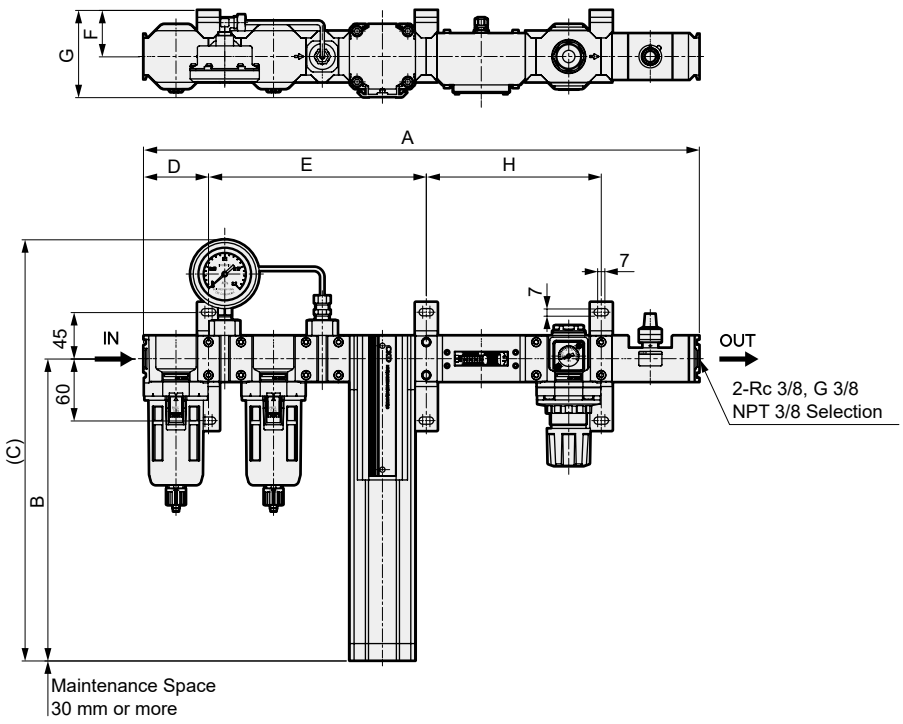


Note: A wiring space of 60 mm or more is required below the oxygen analyzer.

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

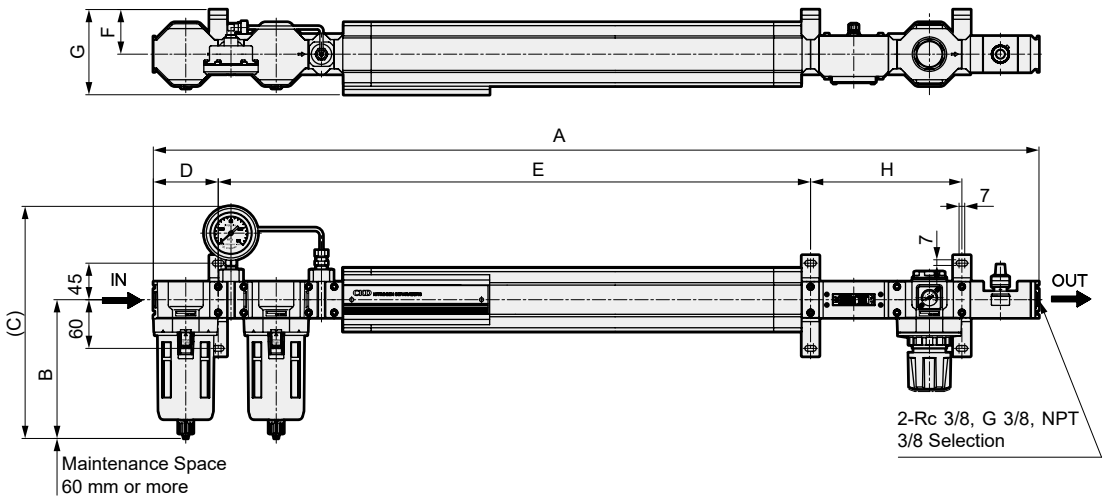
External Dimension Drawing (Single Type)

●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

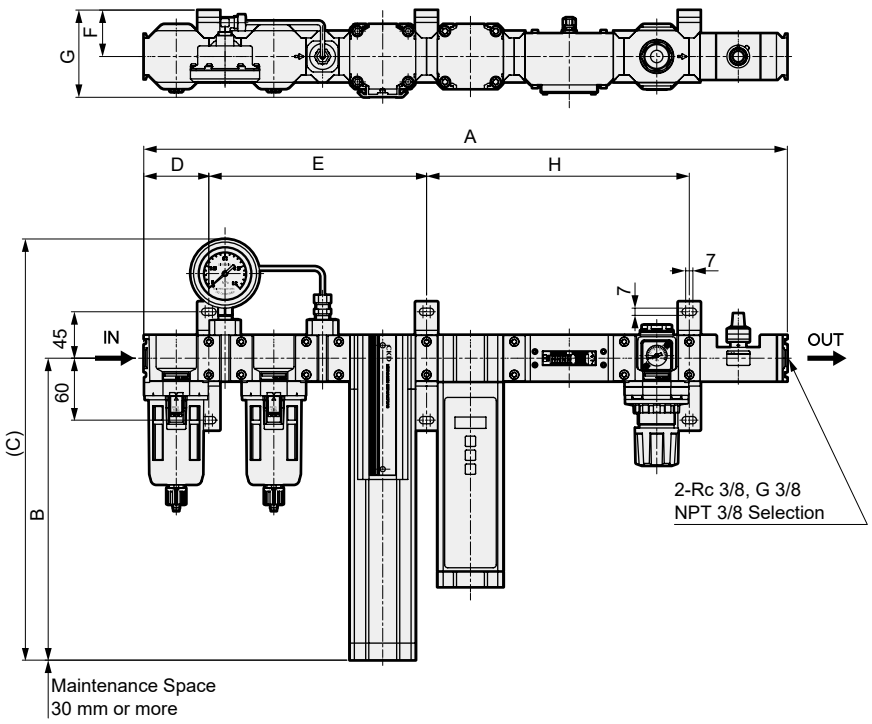
●Without oxygen monitor/with flow rate sensor (NSU-4$^{S}_{L}$ ✳10✳B✳-✳T)



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

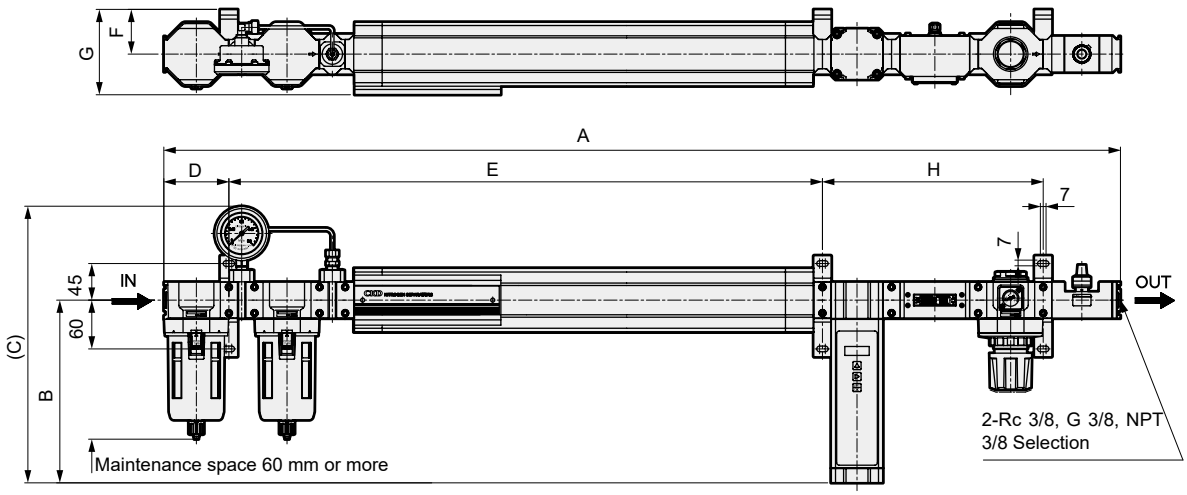
External Dimension Drawing (Single Type)

●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$^{S}_{L}$✳10✳C✳-✳T)

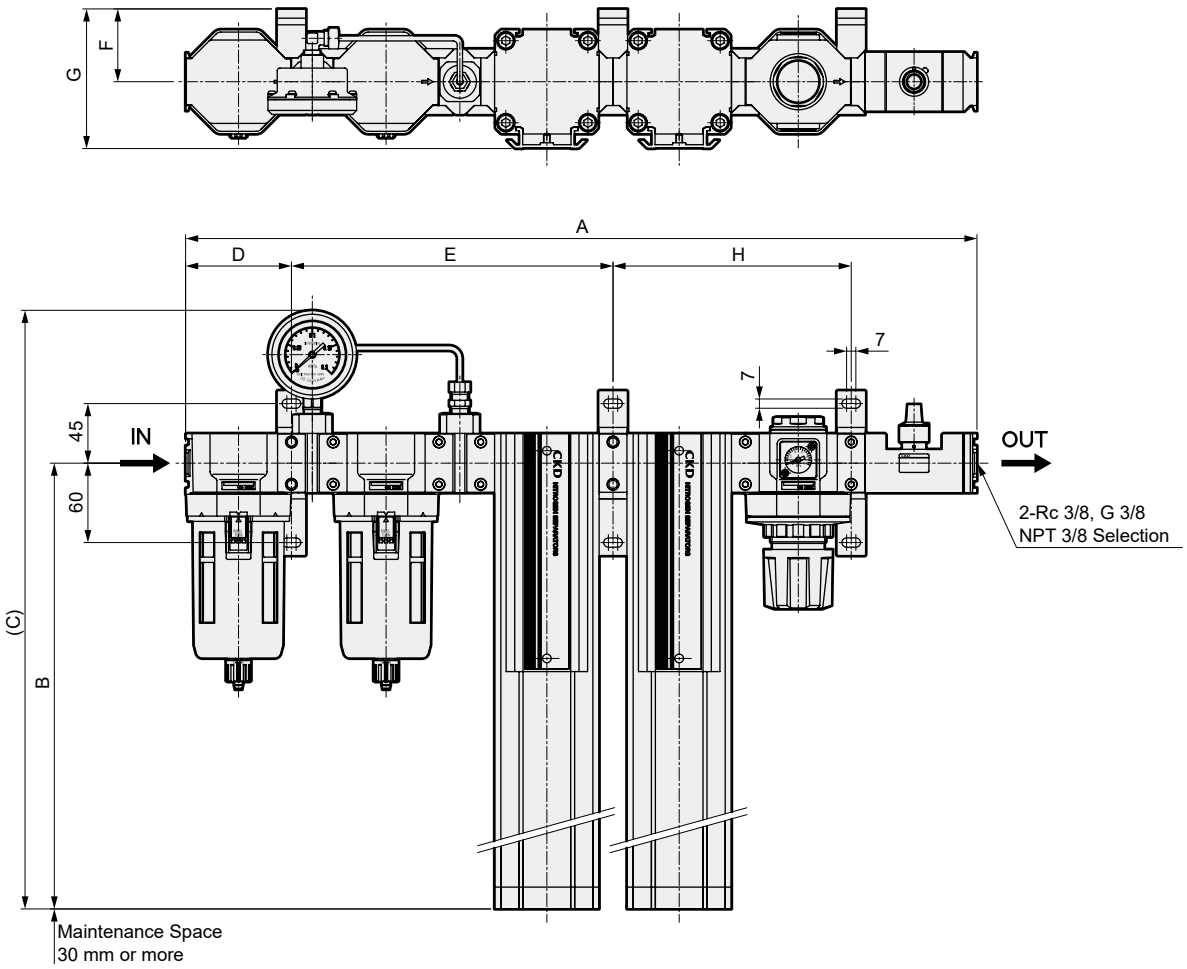


Note: A wiring space of 60 mm or more is required below the oxygen analyzer.

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

External Dimension Drawing (Double Type)

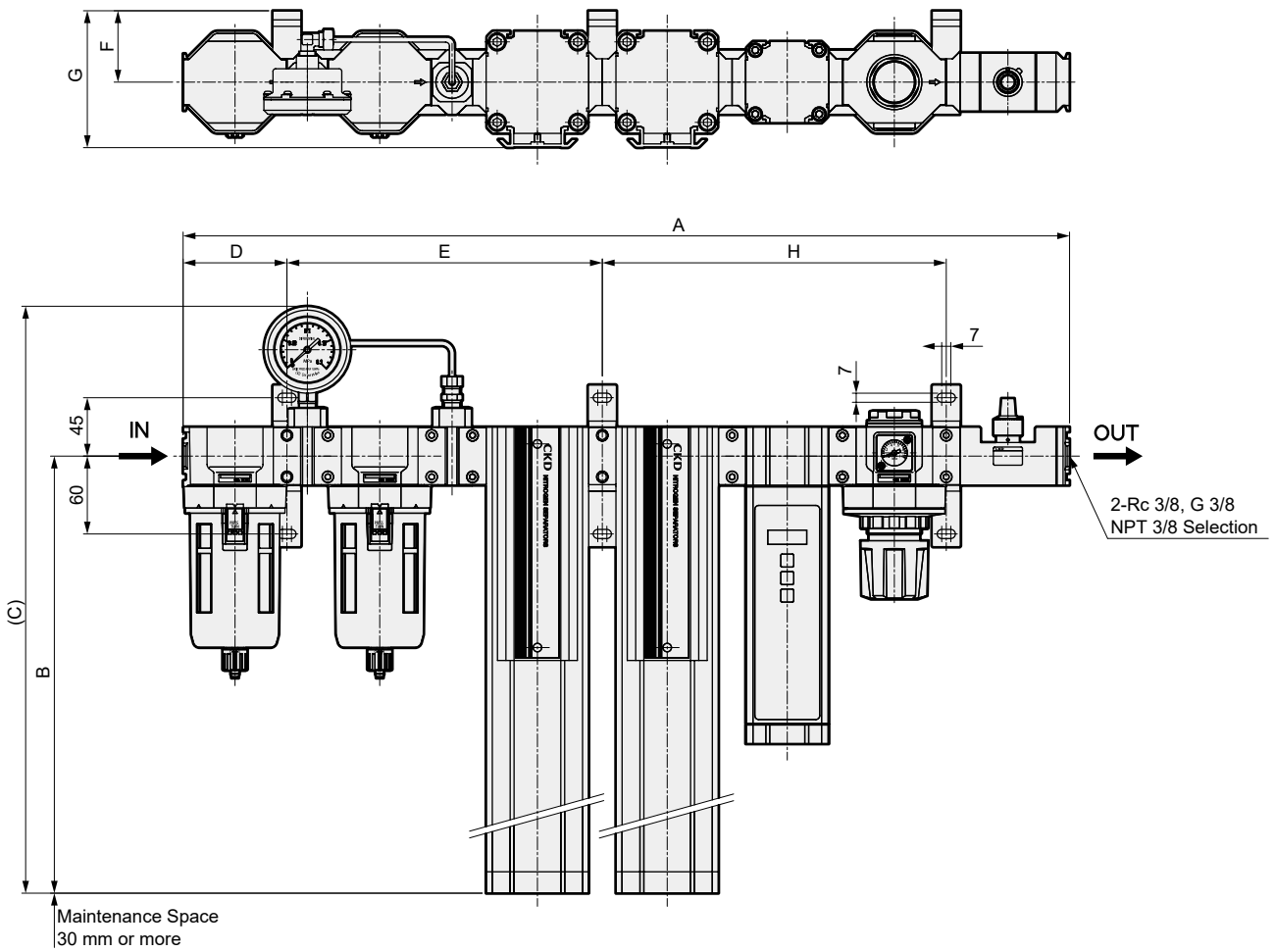
●No oxygen monitor or flow rate sensor (NSU-4 F G H ✳10✳NN)



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

External Dimension Drawing (Double Type)

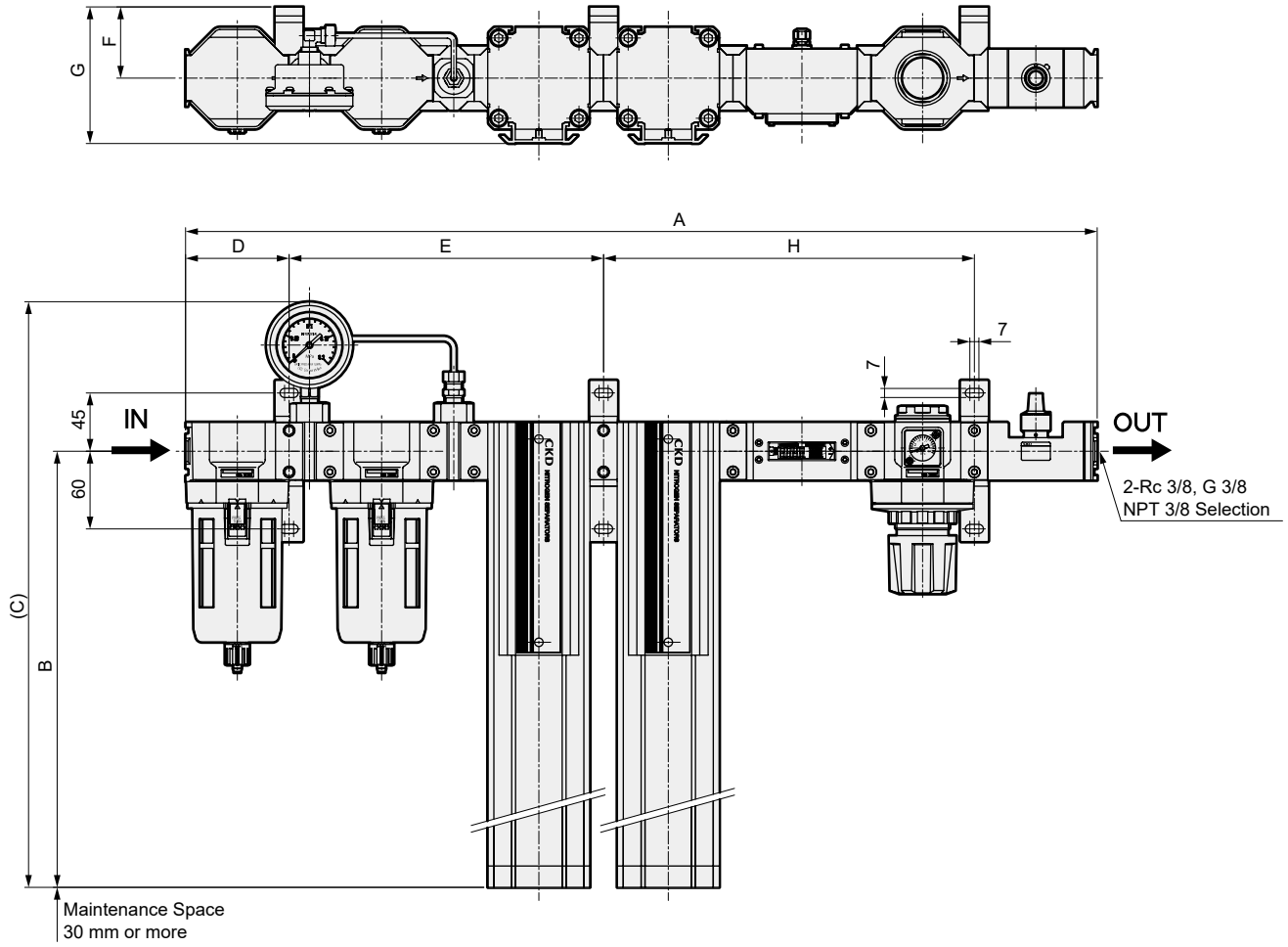
●With oxygen monitor, no flow rate sensor (NSU-4F/G/H✳10✳A✳)



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

External Dimension Drawing (Double Type)

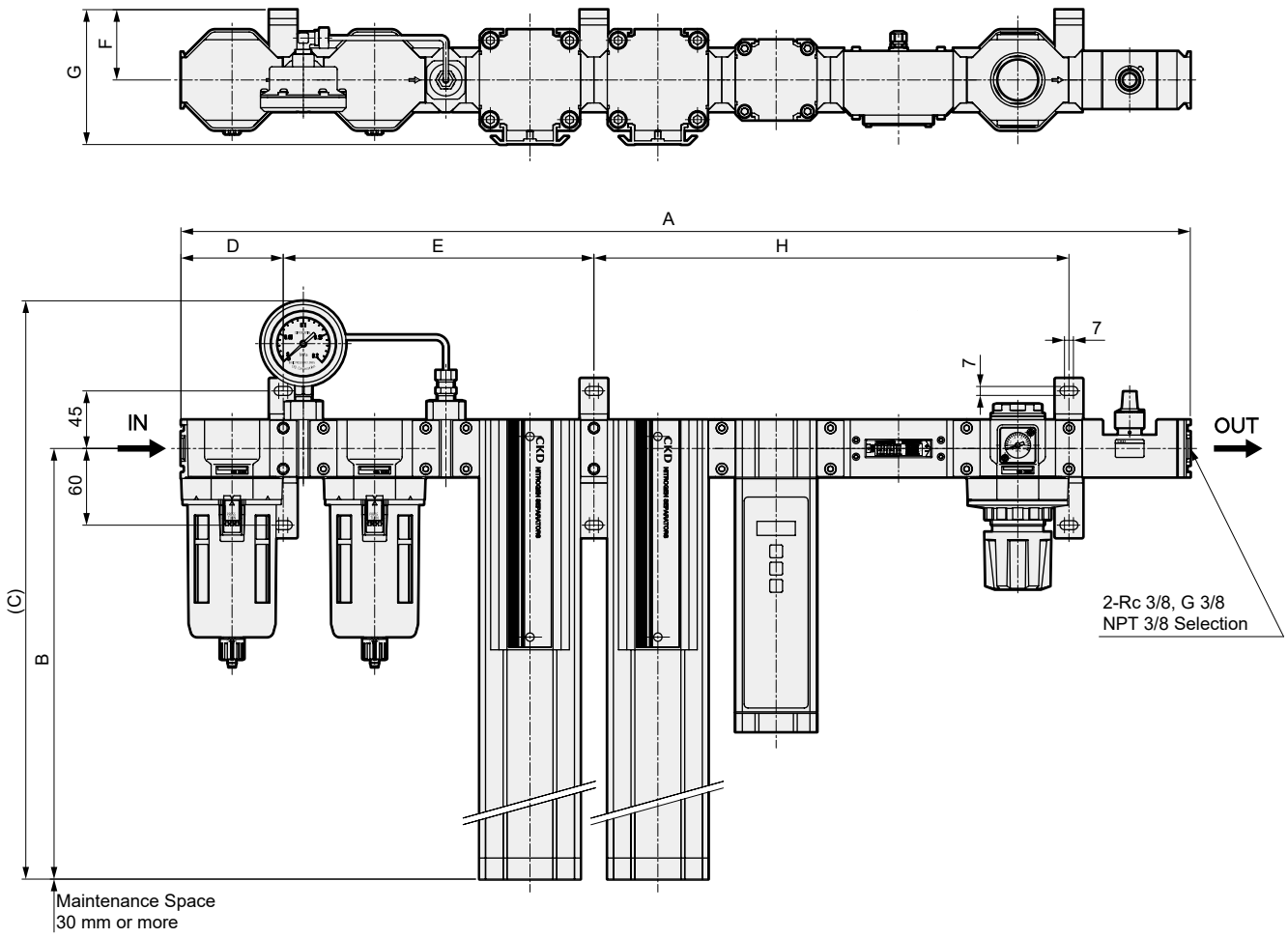
●Without oxygen monitor with flow rate sensor (NSU-4 F G H ✳10✳B✳)



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

External Dimension Drawing (Double Type)

●With oxygen monitor/with flow rate sensor (NSU-4 F G 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

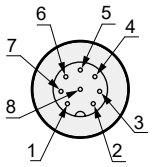
Connector Cable Model No. Indication Method for Oxygen Analyzer and External Dimension Drawing

✳: The connector cable is sold separately from the main unit.

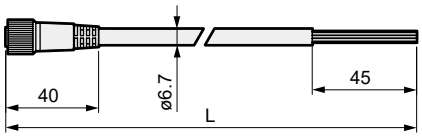
●DC Cable

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

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



No.	Cable Color	Content
1	White	Power +
2	Brown	Power -
3	Green	Analog Output +
4	Yellow	Analog Output -
5	Gray	Contact Output (Relay Output)
6	Pink	
7	Blue	-
8	-	-

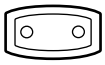
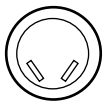
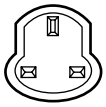


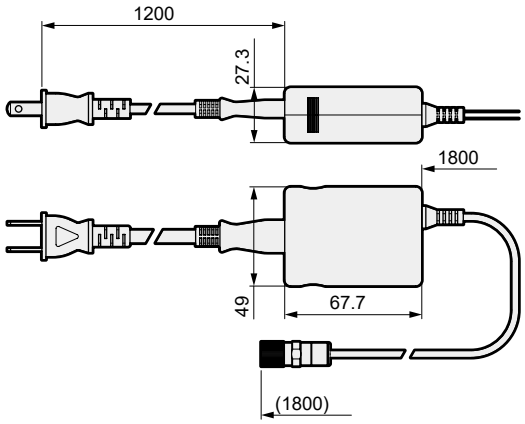
●AC adapter

Use when driving with AC power.

Model No.	Content
PNA-A	AC Adapter Standalone Type A
PNA-AG	AC Adapter + Conversion Plug Set ✳ Global power conversion plugs B, C, O, BF type included

・Plug Shape

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



Flow Sensor for Nitrogen Extraction Unit

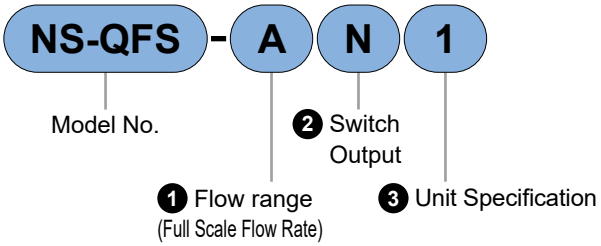
NS-QFS Series

Modular structure connectable to Nitrogen Extraction Unit NS Series

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

For detailed applicable model numbers, refer to our website.

Model No. Indication Method



✳1: When using the reverse flow option of the NSU series, invert the display for use. For display inversion setting, refer to P. 22

✳2: Joiner set (joiner, bolt, O-ring) and 1 gasket are attached.

1 Flow Rate Range (Full Scale Flow Rate)

Code	Content
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	Content
N	NPN Open Collector Output 1 point
P	PNP Open Collector Output 1 point

3 Unit Specification

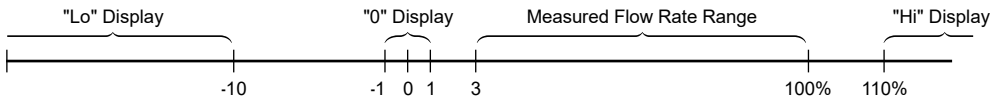
Code	Content
1	SI unit system only
✳ 2	With Unit Switching Function (Overseas models only)

✳:Models with unit switching cannot be sold in Japan.

NS-QFS Specifications

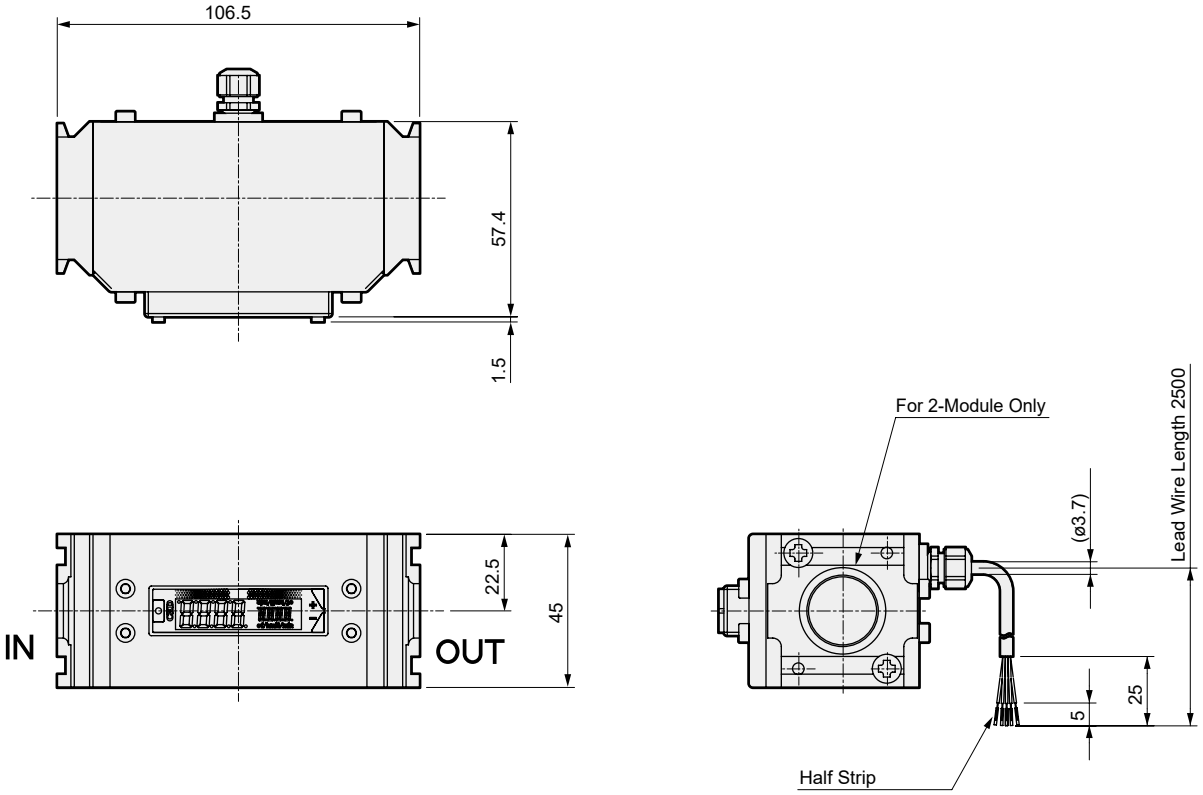
Item			NS-QFS-A	NS-QFS-B	NS-QFS-C	NS-QFS-D	NS-QFS-E
Flow Direction			One Way				
Measurement flow rate range ✳1		(L/min)	0.6 to 20	1.5 to 50	3 to 100	6 to 200	15 to 500
Display Type			4 digits + 4 digits 2-color LCD				
Flow rate display range ✳2		(L/min)	-1.9 to 21.9	-4.9 to 54.9	-9.9 to 109.9	-19 to 219	-49 to 549
Cumulative 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	5
Operating 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% FS (Secondary side open to atmosphere) (Guaranteed range depends on "Measured Flow Rate Range")				
	Repeatability	✳6	Within ±1% FS (Secondary side open to atmosphere)				
	Temperature Characteristics		Within ±0.2% FS/°C (15 to 35°C, 25°C reference)				
	Pressure Characteristics		Within ±5% FS (0.35 MPa reference)				
Response Time		✳7	50 msec or less (When response time setting is OFF)				
Switch Output	[❷]	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 (Connection 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 equivalent × 5 cores, Insulator outer diameter ø1.0, Length 2.5 m				
Included Functions			① Setting copy function, ② Flow integration, ③ Peak hold, etc.				
Protection Structure			IP40 equivalent (IEC standard)				
Protection Circuit		✳9	Power supply 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: Converted to volume flow rate at Standard Condition (20°C, 1 atm (101 kPa), relative humidity 65% Rh).
✳2: The display for each flow rate is as follows.



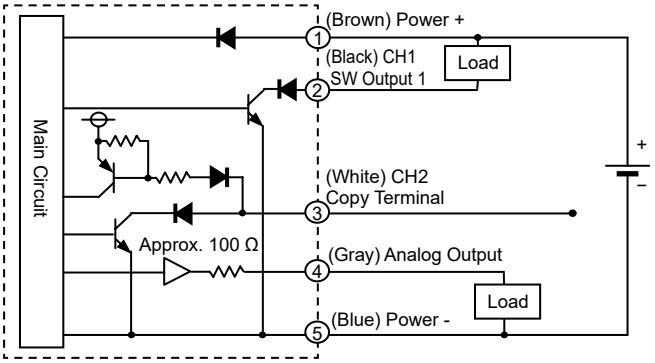
✳3: Integrated flow rate is a calculated (reference) value. When using the integration save function, be careful not to exceed the memory element access count (limit is 1 million times) for the save count. (Changes to the settings are counted in number of accesses.)
No. of saves = usage time/5 min < 1 million cycles
When the instantaneous flow rate is 1% or less, it is not counted as integrated flow rate.
✳4: Compressed air is used for the adjustment and inspection of this product.
✳5: Accuracy is based on our standard flow meter and does not indicate absolute accuracy. Note that accuracy ±3% FS does not include repeatability, temperature characteristics, or pressure characteristics.
✳6: Repeatability in a short time. Does not include changes over time.
✳7: Actual response time varies depending on piping conditions. Response time setting can be selected from 50 msec to 1.5 sec as a guideline.
✳8: Current when load is not connected. Be careful as current consumption changes depending on the load connection status.
✳9: The protection function of this product is effective only against specific incorrect connections and load short circuits, and does not protect against all incorrect connections.

External Dimension Drawing

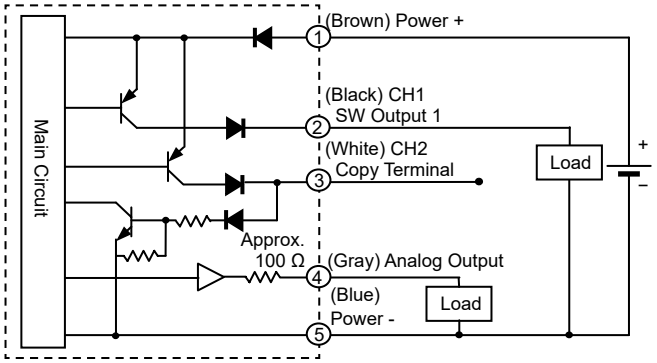


Internal Circuit and Load Connection Example

●NPN output

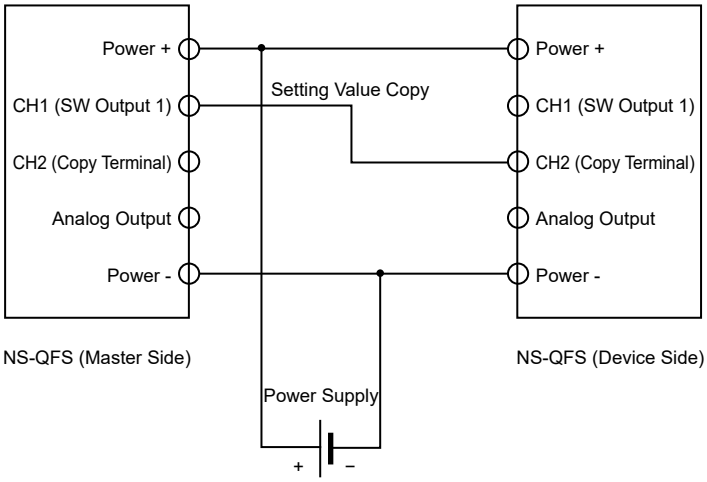


●PNP Output



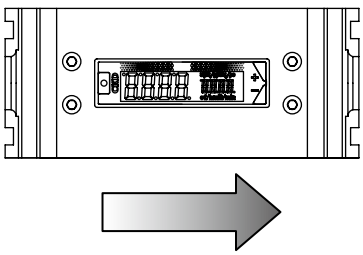
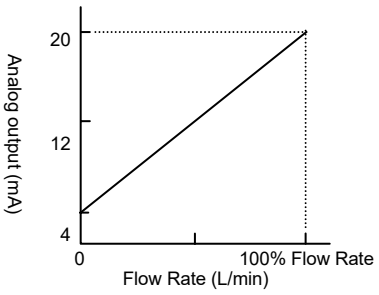
Terminal No.	Option Lead Color	Name
①	Brown	Power + (24 V)
②	Black	CH1 (Switch Output 1: max 50 mA)
③	White	CH2 (Copy Terminal)
④	Gray	Analog Output Current Output: 4-20 mA Load impedance 300 Ω or less
⑤	Blue	Power - (GND)

[When Using Setting Copy Function]



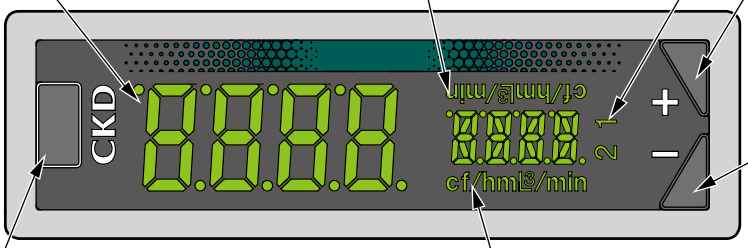
Connect CH1 (SW Output 1) on the master side and CH2 (Copy Terminal) on the slave side, turn on the sensor power, and use the setting copy function (F93). Note that this connection should only be used when using the setting copy function. As shown in the load connection example above, performing copying with the load connected to CH1, or operating the switch with CH1 and CH2 connected, may cause unexpected operation of the equipment side, or damage to the equipment and NS-QFS. Never use with the copy terminal still connected.

Analog Output Characteristics

Flow Direction	Current Output Type
[One Way Type] 	

Names and Functions of Display/Operation Section

●Display Section Name



Main Display Section (Green/Red)
- Displays flow rate display, setting values.
- Display color can be switched.

Flow Rate Unit Display
- Displays the flow rate unit.

Output (OUT1) Display
- Lights up when CH1 output is ON.
- During overcurrent detection, background and it both flash.

Key
- Start capturing peak hold and integrated flow rate.
- Sequentially transitions through function selection screens.
- When setting each data, it is used for counting up numerical values, etc.

Key
- Stop capturing peak hold and integrated flow rate.
- Sequentially transitions through function selection screens.
- When setting each data, it is used to count down numerical values.

MODE Key
- Set when entering various settings modes.
- Used when returning to flow rate display.

Sub Display Section (Green/Red)
- Displays flow direction / operating state.
- Display color can be switched.

Names and Functions of Display/Operation Section

Functions and various settings may be performed during normal flow rate display or after entering each mode.
Each mode is also divided into Maintenance Mode, SET Mode, and Setting Monitor Mode according to frequency of use.

●Normal operation (RUN mode)

Item	Description	Factory Default Setting
Instantaneous Flow Rate Display	Displays instantaneous flow rate.	Display (Measurement)
Peak Hold Function	The maximum and minimum values indicated by the flow rate value within a certain period can be known.	Hidden (Stop)
Integrated Flow Rate Display	It is possible to switch to integrated flow rate display. The switch output function can turn the switch ON/OFF at or above a specified integrated value, or output pulses for each fixed integrated value with the integrated pulse function.	Hidden (Measurement)

●SET mode

No.	Item	Description	Factory Default Setting
F.01	CH1 Operation Selection	Selects the function of CH1. Switch output operation settings and integrated pulse settings can be made.	No Switch Output
F.03	Integration Function Setting	You can select whether to continuously acquire the integrated flow rate value or set a time. You can also choose whether to retain that data or not.	Continuous Acquisition: Data Hold OFF
F.04	Sub Screen Display Setting	Sets the display method for the sub display section. Can switch between "Flow Direction", "Reference State", "Numbering Display".	Flow Direction
F.05	Display Color Setting	Sets the display color. (Red, Green) Display color during normal display and when switch output is ON can be set.	Normal: Green Switch ON: Red
F.07	Display Inversion Function	The LCD display can be inverted vertically.	Standard Display
F.08	Reference State Setting	Standard state or reference state can be selected. Standard State (ANR): Flow rate converted to volume at 20°C, 1 atm, 65% RH Reference State (NOR): Flow rate converted to volume at 0°C, 1 atm, 0% RH	ANR
F.09	Unit Setting (Overseas models only)	Unit can be set. Selectable from L/min / cf/h.	Domestic: L/min Overseas: L/min
F.10	Display Cycle Setting	Digital display update cycle can be changed in 3 steps from 0.25 sec to 1 sec. If the display flickers, it can be improved by lengthening the display update cycle.	0.5 sec
F.11	Analog Output Response Time Setting	Sets the response time. Can be changed in 7 steps from 0.05 sec to 1.50 sec. Prevents chattering and malfunction due to sudden flow rate changes, noise, etc.	0.05 sec
F.12	Numbering Setting	Numbering can be set.	0000
F.14	ECO Mode Setting	ECO mode can be selected. If no button operation occurs for about 1 minute, it transitions to ECO mode and the display backlight turns off. Power consumption can be reduced.	OFF
F.16	Lock Setting	Key lock method and password method can be set. Use differently depending on the operating environment.	OFF
F.17	Peak Hold Setting	You can select whether to continuously acquire peak/bottom values or set a time. You can also choose whether to retain that data or not.	Continuous Acquisition: Data Hold OFF

●Maintenance Mode

No.	Item	Description	Factory Default Setting
F.91	Forced Output Function	Forcibly turns ON switch output for use in checking wiring connections and initial operation of input devices.	-
F.92	Zero Adjust Function	Corrects zero point deviation.	Adjust Value: 0
F.93	Setting Copy Function	Setting values can be copied between two NS-QFS units if the model numbers are compatible for copying. (Copying is possible only between products with the same model number.)	-
F.99	Reset Function	Returns to the factory default setting state.	-

●Setting Monitor Mode

Item	Description	Factory Default Setting
Setting Monitor Function	SETYou can check the settings in MODE. (You cannot edit the settings.)	-

Nitrogen Extraction Unit

NS Series

Modular design facilitates system integration with peripheral components

■ Nitrogen gas can be obtained simply by supplying compressed air.

RoHS

Model No. Indication Method

NS - 4 S 1 10A - B T

- NS: Model No.
- 4: ❶ Body Size
- S: ❷ Membrane Unit Size
- 1: ❸ Quantity
- 10A: ❹ Port Size
- B: ❺ Option
- T: ❻ Installation Orientation

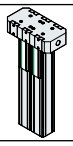
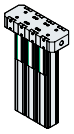
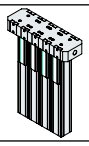
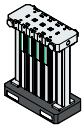
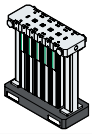
❶ Body Size

Code	Content
3	Main Unit Width 63
4	Main Unit Width 79

❷ Membrane Unit Size

Code	Content	
S	Short	
L	Long	

❸ Quantity

Code	Content		Body size, membrane unit size (❶❷ Combination)			
			3S	3L	4S	4L
1	1 pc		●	●	●	●
2	2 pcs				●	●
3	3 pcs				●	●
4	4 pcs					●
6	6 pcs				●	●
8	8 pcs				●	●
A	10 pcs				●	

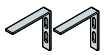
Note: For 6 pcs or more, it is a floor-standing type, so there is no bracket.

❹ Port Size

Code	Content	❸Quantity 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					●	●	●

❺ Option

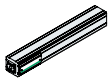
✳1, ✳2

	Code	Content	
	N	No Option	
	B	Bracket	
✳2	C	Bracket + Reverse Flow	
✳1	D	Bracket + With Exhaust Port	
✳1, ✳2	F	Bracket + Reverse Flow + With Exhaust Port	
✳2	X	Reverse Flow	
✳1	E	With Exhaust Port	
✳1, ✳2	H	Reverse Flow + With Exhaust Port	

✳1: Exhaust (oxygen-enriched gas) from standard products is released to the atmosphere. If “D”, “F”, “E”, "H" is selected, connection for exhaust (oxygen-enriched gas) piping is possible. The exhaust port size is Rc1/2.

✳2: Viewed from the front, the Standard Product has an air inlet on the left port, while an air outlet on the right port. If “C”, “F”, “X”, “H” is selected, the right port becomes the air inlet and the left port becomes the air outlet.

❻ Installation Orientation

Code	Content	
Blank	Vertical Installation	
T	Horizontal Installation (Selectable models are NS-4S1, 4L1)	

Food Process Specifications (Catalog No. CC-1271AA)

●Uses food-grade lubricating oil usable in food manufacturing processes, and resin/rubber materials compliant with the Food Sanitation Act.

NS ----- FP✳

Specifications

■Single Cylinder

Item				NS-3S1	NS-3L1	NS-4S1	NS-4L1
Operating Condition Range	Operating 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 Cleanliness Class			1:6:1 (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
Operating Condition Range	Operating 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 Cleanliness Class			1:6:1 (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	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: For 6 pcs or more, it is a floor-standing type.

Model Selection Method

Since temperature and inlet air pressure affect the outlet nitrogen gas flow rate, correction is necessary if conditions differ from the rated specifications.

STEP 1 Check operating conditions and rated specifications.
Operating conditions: Inlet air pressure, Inlet air temperature, Required nitrogen gas flow rate

STEP 2 Check the correction factor for outlet nitrogen gas flow rate due to the influence of inlet air temperature.

① Temperature - Gas Flow Rate Correction Factor

Temperature (°C)	Outlet Nitrogen 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 Check the correction factor for outlet nitrogen gas flow rate due to the influence of inlet air pressure.

② Pressure - Gas Flow Rate Correction Factor

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 × ① Temperature Gas Flow Rate Correction Factor × ② Pressure Gas Flow Rate Correction Factor = Corrected Outlet Nitrogen Gas Flow Rate
Select one where the above corrected outlet nitrogen gas flow rate meets the required gas flow rate.

STEP 5 Check the correction factor for inlet air flow rate due to the influence of inlet air temperature.

③ Temperature - Air Flow Rate Correction Factor

Temperature (°C)	Outlet Nitrogen 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 Check the correction factor for inlet air flow rate due to the influence of inlet air pressure.

④ Pressure - Air Flow Rate Correction Factor

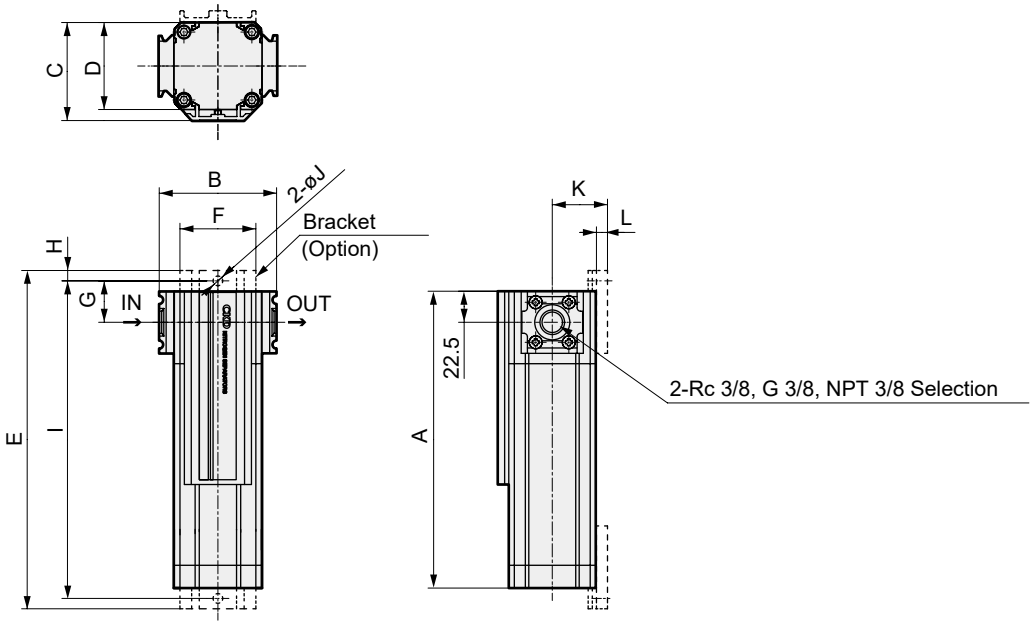
Pressure (MPa)						
0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.61	0.79	0.91	1	1.07	1.2	1.3

STEP 7 Determine the inlet air flow rate from the rated outlet nitrogen gas flow rate of each model.
Inlet Air Flow Rate of Model Selected in STEP 4 × ③ Temperature Air Flow Rate Correction Factor × ④ Pressure Air Flow Rate Correction Factor = Corrected Inlet Air Flow Rate L/min L/min (ANR)
Check if usable with the compressor capability based on the above corrected inlet air flow rate.
Calculation Example

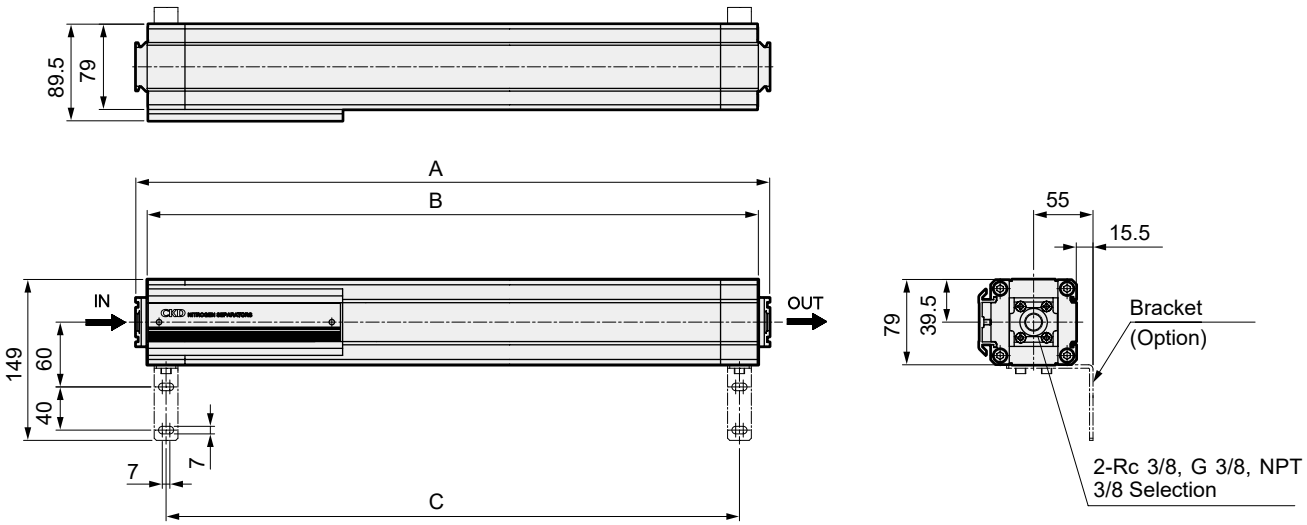
Condition Item	Operating Conditions	Selection Conditions	Correction Factor for Outlet Nitrogen Flow Rate	Correction Factor for Inlet Air Flow Rate
Inlet Air Temperature	35 to 39 °C	35°C	① 1.05	③ 1.17
Inlet Air Pressure	0.5 to 0.55 MPa	0.5 MPa	② 0.65	④ 0.79

Substitute the above conditions into the above formula to determine the outlet nitrogen gas flow rate when using NS-4L1 at 99% nitrogen concentration.
66.9 (Rated Outlet Nitrogen Gas Flow Rate) × 1.05 × 0.65 = 45.7 L/min (ANR).
Select the model if the required product nitrogen gas flow rate is below this value.
The inlet air flow rate at that time is 278.8 × 1.17 × 0.79 = 257.7 L/min (ANR).

External Dimension Drawing



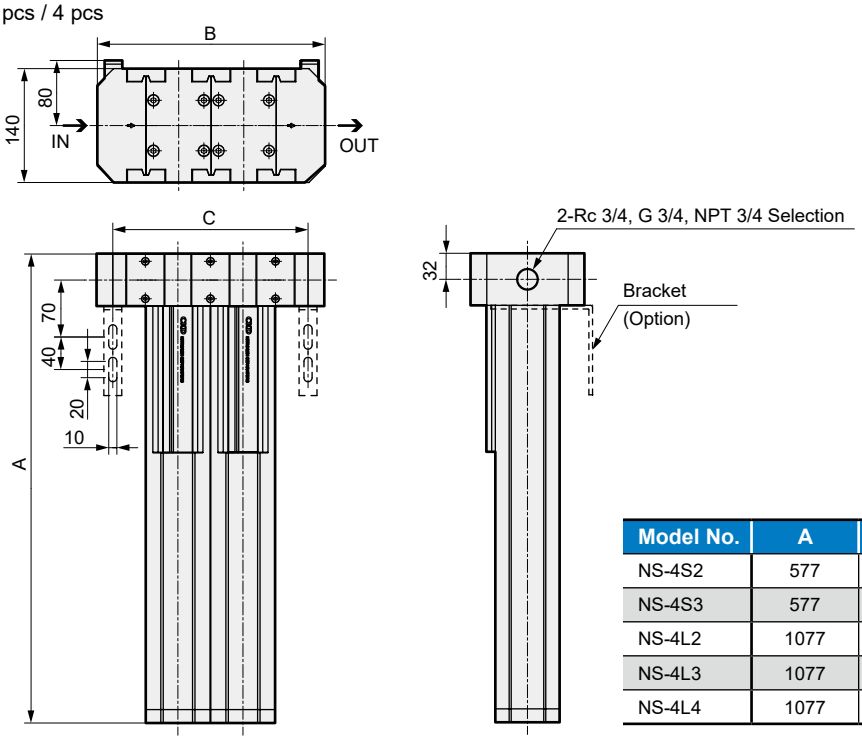
Model No.	A	B	C	D	Weight (kg)	Bracket Related Dimensions							
						E	F	G	H	I	J	K	L
NS-3S1	315	85	71	63	1.8	345	55	30	7.5	330	7	40	8
NS-3L1	565	85	71	63	2.7	595	55	30	7.5	580	7	40	8
NS-4S1	565	100	90	79	4.0	605	70	32.5	10	585	9	50	10
NS-4L1	1065	100	90	79	6.8	1105	70	32.5	10	1085	9	50	10



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

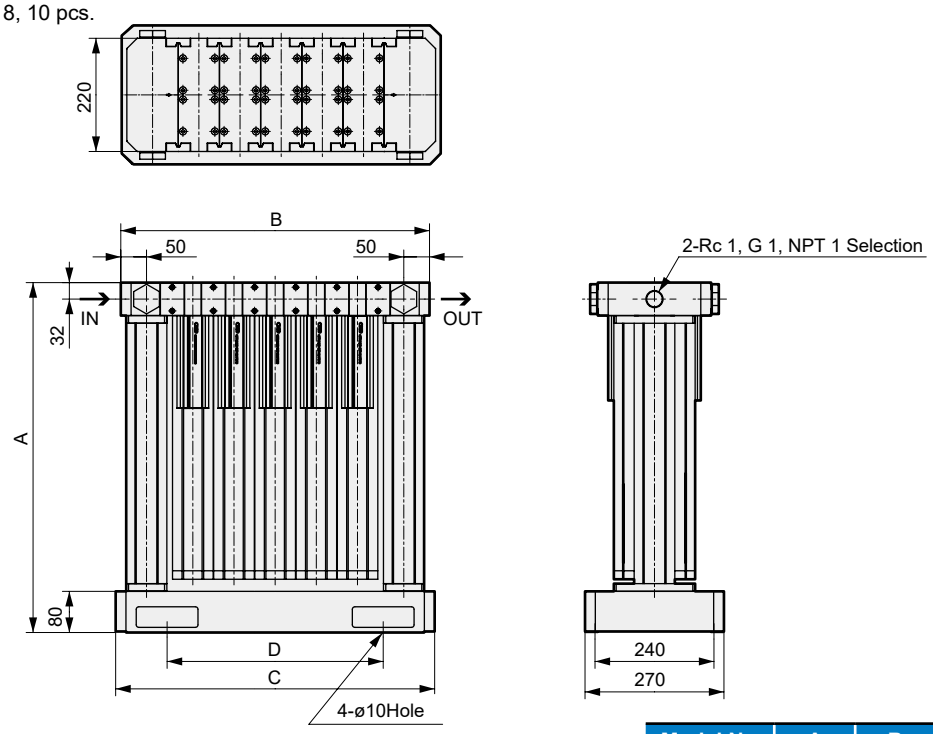
External Dimension Drawing

● Quantity 2 / 3 pcs / 4 pcs



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 pcs.



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 CKD Components Product Site (https://www.ckd.co.jp/kiki/en/)→Model No.→Maintenance Parts.