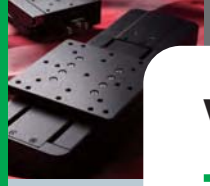


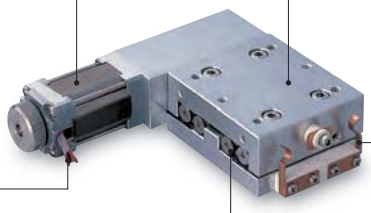
Vacuum Compatible Motorized Stage Guide | VSGSP Guide

For use in vacuum environments, the vacuum compatible stage series offers replacement with a stainless steel or machined aluminum body as well as replacement with vacuum grease, and uses a vacuum rated motor and a contact type or mechanical driven type switch, and Teflon coated cables for signal wires.
The series is suited for positioning in environments where the degree of vacuum is between 10^{-4} and 10^{-5}Pa. For the vacuum characteristics, see the measurement data of outgas volume, degree of vacuum, and mass component ratio.

- In addition to the standard lineup, motor replacement, sensor replacement, special specifications such as vacuum compatible large mirror holders, and replacement of grease to vacuum grease for the guides or feed screws of standard specification stages to deal with low vacuum specifications are available. Contact our Sales Division for more information.

Vacuum Compatible 5 Phase Stepping Motor
The □24mm minimum size and lightest type motor saves space.

Compact Body
Machined Aluminum and use of a crossed roller for the linear guide achieved the thin body.



Limit Sensor
The copper plate contact type limit sensor enables limit detection inside a vacuum chamber.

Teflon Coated Cable

Vacuum Grease
(Fomblin Grease)

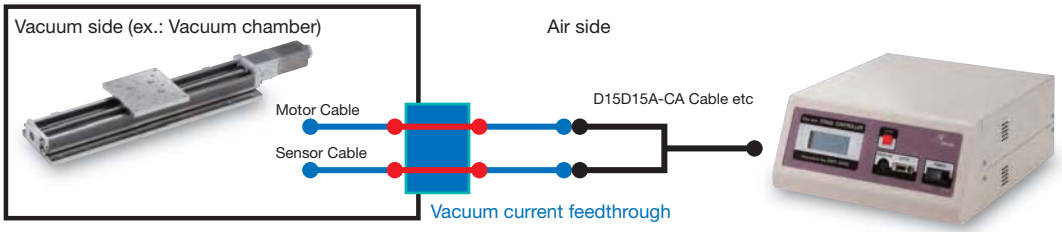
Rotation Table
The body is made of aluminum machining.

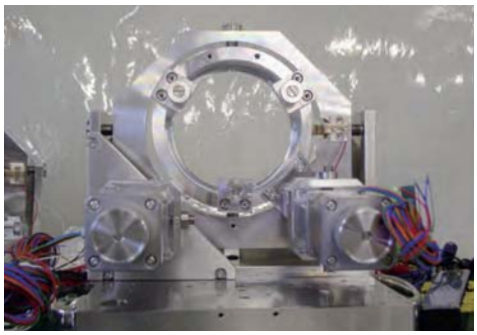
Limit Sensor
The high-vacuum compatible limit switch enables origin detection with high repeatability inside a vacuum chamber.
* Only for VSGSP-120YAW

Vacuum Grease
(Fomblin Grease)

Vacuum Compatible 5 Phase Stepping Motor
The motor size for VSGSP-60YAW is □24mm and VSGSP-120YAW is □42mm.

[Attention] To use a vacuum compatible stage in a vacuum chamber, the connection cables between the vacuum side and the atmosphere side need to be relayed using a vacuum current feedthrough or the like. Prepare the feedthrough according to the vacuum chamber specifications.





[Example of Special Order]
Vacuum Compatible Large Mirror Holder

Guide

- Because heat dissipation generally deteriorates in vacuum, specification temperature conditions are stricter than those for atmosphere. Check the usage conditions such as stage operation to make sure that the motor case temperature does not exceed 80°C.

●Emitted amount of gas

Part Number	Emitted Amount of Gas Q (after 40 minutes of emission)	
	(Torr·ℓ/s/unit)	(Pa·ℓ/s/unit)
VSGSP26-200	4.77×10^{-4}	6.36×10^{-2}
VSGSP-60	6.75×10^{-5}	9.00×10^{-3}
VSGSP-120YAW	4.78×10^{-4}	6.37×10^{-2}

Evaluation and Device Specifications
Exhaust system: Turbo-Molecular Pump STP-301
Seiyu Instruments Inc. (Now Edwards Japan Limited)
Pumping speed: 300ℓ/sec
Mass spectroscope: Quad Mass Spectrometer QME200
Pfeiffer Vacuum
Mass range: 1 – 200amu

Emitted amount of gas is found by the following equation:

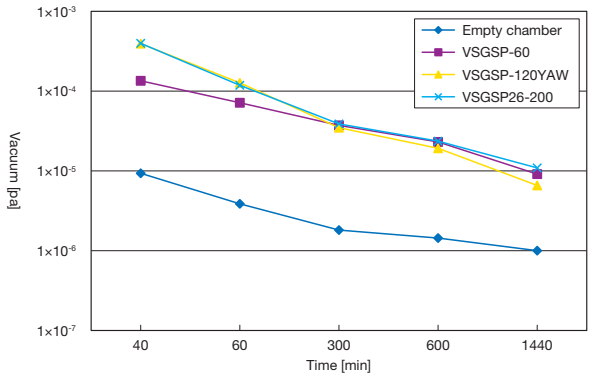
$$Q = \frac{(P - P') \times V}{t \times N}$$

P : Vacuum immediately after seal off
P′ : Vacuum after seal-off time has elapsed
N : Number of stage units (1unit)
V : Vacuum chamber volume (ℓ)
t : Seal-off time (600s)

From the measurement results of gas volume discharged from a vacuum compatible motorized stage

The main components of outgas are water and nitrogen. This is because the gas was caused by residual air on the stage surface, and grease used for drive components is considered to have little impact on the amount of gas.

●Vacuum of Vacuum Chamber



●Mass Component Ratio

Mass Number	Component Ratio [%]			Ion	Gas Molecule
	VSGSP-60	VSGSP26-200	VSGSP-120YAW		
1	19.58	19.96	17.90	H^+	H_2, water vapor, hydrocarbon
2	2.81	5.28	3.34	H_2^+	H_2, water vapor, hydrocarbon
12	0.60	0.85	0.79	C^+	CO, CO_2, hydrocarbon
13	0.17	–	–	CH^+	Hydrocarbon
14	0.79	1.26	0.91	N^+, CO^{2+}, CH_2^+	N_2, NH_3, CO, hydrocarbon
15	–	2.37	–	CH_3^+, NH^+	Hydrocarbon, NH_3
16	3.03	–	2.98	O^+, CH_4^+, NH_2^+	O_2, CH_4, NH_3
17	15.77	–	14.48	OH^+, NH_3^+	H_2O, NH_3
18	48.02	17.30	43.89	H_2O^+	H_2O
20	0.22	–	0.29	HF^+, Ar^{2+}	HF, Ar
26	0.33	–	0.53	$C_2H_2^+$	Hydrocarbon
27	0.83	4.53	1.52	$C_2H_3^+$	Hydrocarbon
28	2.17	2.49	2.76	CO^+, N_2^+, $C_2H_4^+$	CO, CO_2, N_2, hydrocarbon
29	0.73	6.08	1.44	$C_2H_5^+$	Hydrocarbon
30	0.08	–	–	$C_2H_6^+$, NO^+	C_2H_6, NO
31	0.14	0.31	0.27	$C_2H_2OH^+$	C_2H_5OH
32	0.26	–	0.27	O^{2+}, S^+	O_2, H_2S, SO_2
39	0.39	2.57	0.78	$C_3H_3^+$	Hydrocarbon
41	0.51	7.44	1.07	$C_3H_5^+$	Hydrocarbon
42	–	–	0.41	$C_3H_6^+$	Hydrocarbon
43	0.74	8.00	1.01	$C_3H_5^+$	Hydrocarbon
44	0.40	–	0.66	$C_3H_8^+$, CO_2^+, N_2O^+, $C_2H_4OH^+$	C_3H_8, CO_2, N_2O, C_2H_4OH
45	–	0.31	0.31	$C_2H_5O^+$	C_2H_5OH
50	–	0.23	–	$C_4H_2^+$	Hydrocarbon

Data

●Interpretation of Mass Peak

The following list shows major gases that appear for each mass number when mass peaks (mass spectra) of residual gas are measured, and their interpretations.

List of Residual Gas Spectra

Mass Number	Ion	Remarks	Mass Number	Ion	Remarks
1	H^+	H_2, H_2O, hydrocarbons, etc	30	NO^+	Appears immediately after emission of dirty vacuum system.
2	H_2^+	H_2, H_2O, hydrocarbons, etc	31	CH_3O^+	Alcohol
3	HD^+	Abundance ratio of D is about 0.01%.	32	O_2^+	Becomes N_{23} : O_{32} = 4 : 1 when air leak occurs.
4	He^+		35	Cl^+	
12	C^+	CO, CO_2, hydrocarbons	37	Cl^+	Cl_{35} : Cl_{37} = 3 : 1
14	N^+, CH_2^+, CO_2^+	N_2, CO_2, hydrocarbons	39	K^+, $C_3H_3^+$	K^+ dissociates from filament.
15	CH_3^+	Molecule that has CH_4, CH_3	40	Ar^+, $C_3H_4^+$	Ar makes up 1% of the atmosphere.
16	C^+, CH_4^+	O_2, CH_4, oxygen compounds	41	$C_3H_5^+$	Hydrocarbon
17	OH^+	H_2O	42	$C_3H_6^+$	Hydrocarbon
18	H_2O^+	H_2O, OH^+ : H_2O_+ ≒ 1 : 5	43	$C_3H_7^+$	Hydrocarbon
19	F^+	Sometimes adsorbed to filaments and electrode surface.	44	CO_2^+	
20	Ar^+, H_2O^+, Ne^+	$H_2O(20)$ is present about 0.2% of abundance ratio of O_{15}.	50	$C_4H_2^+$	Hydrocarbon
22	CO_2^{2+}, Ne^+	Abundance ratio of NE_{22} is 8.8%.	51	$C_4H_3^+$	Hydrocarbon
23	Na^+	Sometimes adsorbed to filaments and electrode surface.	55	$C_4H_7^+$	Hydrocarbon
27	$C_2H_3^+$	Hydrocarbon	56	$C_4H_8^+$	Hydrocarbon
28	N_2^+, CO^+	Remain till the last.	57	$C_4H_9^+$	Hydrocarbon
29	$C_2H_5^+$, N_2^+, CO^+	Abundance ratio of N_{15} is 0.7%, and that of C_{13} is 1.1%.			