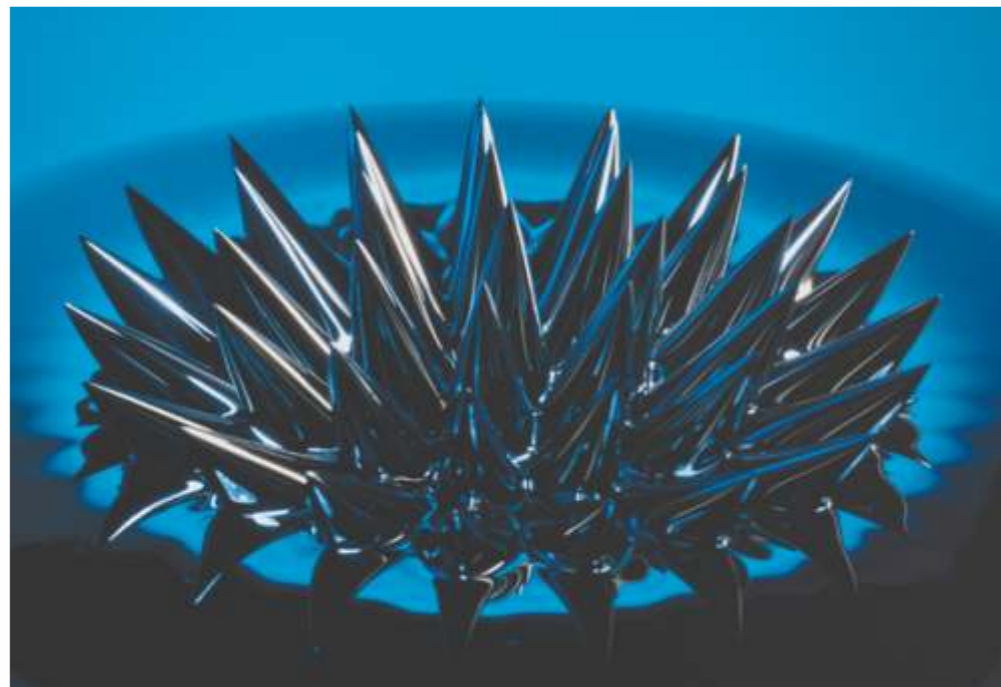




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◎ 磁性流体密封技术

磁性流体密封技术是在磁性流体的基础上发展的,当磁性流体注入具有磁场的间隙中时,它可以充满整个间隙,成为一种液体“O型密封圈”。

磁性流体真空传动装置是一种把旋转运动传入真空容器的装置,其基本构成为一个永久磁场,两个磁极,一个磁性转动轴和磁性流体。传动轴是一个多极结构,由磁极和转轴组成。在每级环形间隙中,充满了磁性流体。在理想状态下,所有磁性流体密封在每一级极间与磁极之间,形成一系列的“磁性流体密封圈”。每级“磁流体密封圈”能承受的压差0.15-0.2个大气压,整个区域的承受能力为密封圈总的承压能力,为适应真空环境,磁性流体密封圈标准设计压力大于两个大气压,所以说是绝对安全的。

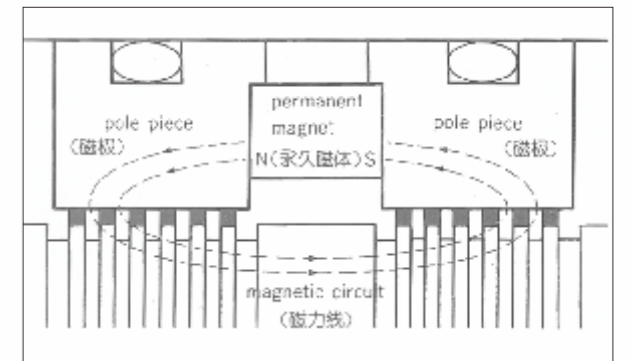
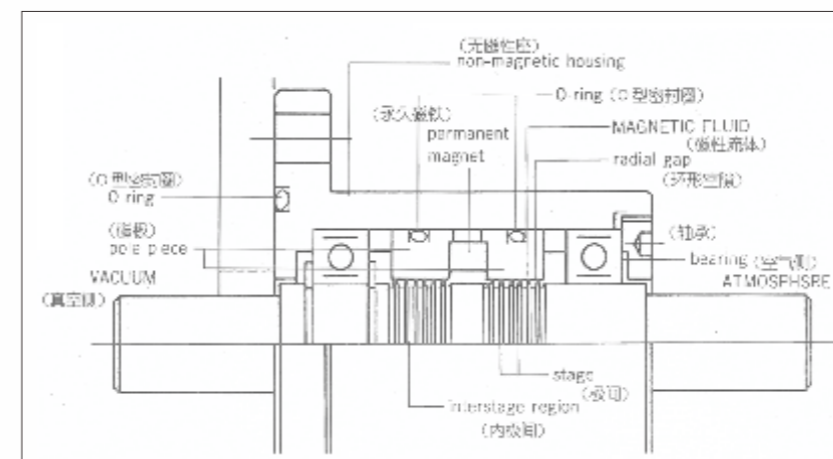


◎ Magneticfluid Sealing Technique

Sealing techniques of Magnetic fluid take advantage of response of Magnetic fluid to magnetic fluids. When a Magnetic fluid is placed into a gap between the surfaces of rotating and stationary elements in the presence of magnetic fluid, it assumes the shape of a "Liquid O-ring" to completely fill the gap.

The Magnetic fluid vacuum rotary feedthrough is a device that transmits rotary motion into a vacuum chamber. The basic components are a permanent magnet, two pole pieces, a magnetically permeable shaft and Magnetic fluid.

◎ 简图：(Schematic Diagram)



The shaft (or pole pieces) contains a multistage structure, completed by the pole pieces and the shaft, concentrating magnetic flux in the radial gap under each stage. In the ideal situation, all flux lines are confined under each stage, and none are in the interstage region. The magnetic fluid is trapped and held in each stage, forming a series of "Liquid O-ring" with intervening regions that are filled with air. Each stage can typically sustain a pressure differential of 0.15-0.2 atmospheres. All stages act in series to provide a total pressure capability for the seal. For vacuum applications Magnetic fluid seals are normally designed to sustain a pressure differential of greater than two atmospheres, thus allowing a safety margin.



◎ 应用

如今，在许多需自由控制进给的装置上，磁性流体进给装置已得到了广泛的应用。例如：在硅生长、目标位置电子指示器、溅射、等离子蚀剂、化学气相淀积、离子移置技术、液晶再生过程，我们的密封圈技术也可用于隔绝机器人与外界有害物质的密封圈上。磁性流体进给装置减少了不必要的停机时间，具有特殊的意义，从而使大规模生产中许多特殊领域的生产成为可能，这种能力带来的价值是无法估量的。

◎ APPLICATIONS

Today, more than hundreds and thousands of Magnetic fluid feedthroughs are delivering trouble free operation in instrumentation and process applications, for example, in Silicon Growing, EPI, Sputtering, Plasma Etching, CVD, Ion Implantation and Liquid Crystal Display process. Our sealing technology also has been applied for a Exclusion Seal using at the joint of clean robot to prevent contaminants from spreading to the clean environment. Magnetic fluid feedthroughs provide the above-mentioned advantages, leading to significant reduction of down-time, resulting in increase of specialized as well as mass produced applications, making them cost effective.

◎ 型号编号 Model Coding

轴类型 Shape of shaft	机座类型 Housing	磁性流体型号 Fluid	轴外径或内径 O.D. or I.D. of shaft	水冷 Water	结构 Structure	其他 Additional information
实心(S) 空心(H) 同轴(C)	通孔式(T) 法兰式(F) 螺母式(N) 螺栓式(S) 微型(M)	W11 F11 P11 L01 V0401	020 999	水冷式(W) 夹紧式(C) 混合式(M) 无水冷(N)	悬臂式(C) 普通式(N) 重负荷(H) 其他(O)	客户要求

◎ 特性 Speciality

- 1 密封圈特性:磁性流体包围整个转轴,成为一隔绝空气,水气,烟雾等元素的密封圈,几乎无泄漏的特性,密封圈的泄漏微弱到已无法测量,甚至使用质谱仪也无法测量(1×10^{-11} Torr L/sec)
Hermetic sealing: The Magnetic fluid surrounding the shaft provides a hermetic seal against gas, vapor, mist and other contaminants.
- 2 长寿命特性:“液体O型密封圈”由一个稳定的磁性流体构成,其装置可长期使用10年无需维修。
Long life: A (Liquid O-ring) seal is formed by using an inert, stable, low vapor pressure Magnetic fluid. Units have been in operation for over ten years with no maintenance.
- 3 良好可靠性:密封圈由永磁结构和稳定的磁性流体组成,所以机械磨损仅发生在轴承上。
High Reliability: The seal contains a simple, permanent magnetic structure and a non-wearing Magnetic fluid. The only parts subject to mechanical wear are self-contained ball bearings.
- 4 无污染特性:因为密封圈无磨损,没有微粒产生,降低了整个系统的污染,而且低的气压可使密封圈便于维修,其真空度可控制在 10^{-8} Torr。
Non-Contaminating: Since there is no seal wear, there are no particles produced to degrade the system. In addition, low vapor pressure Magnetic fluid maintains seal integrity even in hard vacuums to better than 10^{-8} Torr.
- 5 最佳的力矩传输特性:力矩可100%的输送,保证一个无阻碍的单向运动。
Optimum Torque Transmission: Through-shaft construction permits 100 percent torque transmission and provides in-phase rotation without backlash.
- 6 低阻尼和高速旋转能力:磁性流体极低的粘滞阻力和磁性流体进给装置无需接触密封圈的结构,决定了它的稳定操作和高速转动。
Low Viscous Drag and High-Speed Capability: The low viscous drag of the Magnetic fluid, and non-contacting seal configuration of the Magnetic fluid feedthrough assure its extremely smooth operation and its high-speed capabilities.



实心轴密封传动装置

我们有多种的实心轴传动装置,例如:微型、通孔型、法兰型、重负载型,他们适用于各种场合。

除小径的转轴外,转轴的动力装配部和用户安装部的形状有标准的键槽以外,还能根据用户的要求,设计、制造多种配合形式,如扁平面,螺纹连接、孔连接等。

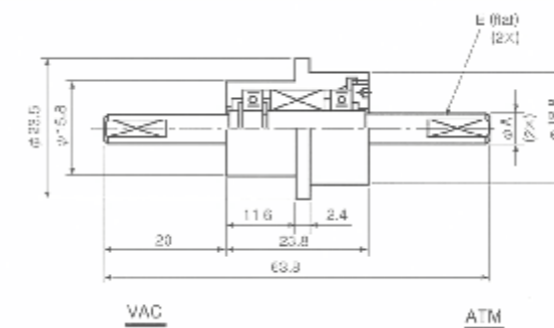
我们的标准公制密封传动装置也有适用于高温、重负载、高速场合时的水冷形式(除一些微型、通孔型磁性流体密封装置以外)

SOLID SHAFT SEALED SPINDLES

Solid Shaft Sealed Spindles are available in a broad selection of models including miniature, through hole mount, flange mount and heavy duty, applicable to a variety of purposes and industries.

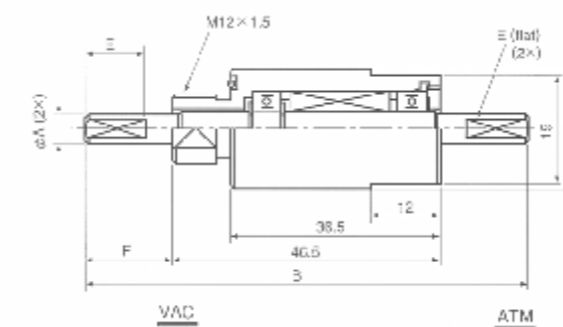
Shaft terminations may be plain cylindrical, keyway, flat, threads, holes, or other configurations as specified by the user.

Most units can be provide with water cooling channels for high temperature applications, heavy duty bearings for higher loads, or other special modifications and features to meet application requirements.



轴径 Shaft Diameter	004	005	006
A	$4^{+0}_{-0.018}$	$5^{+0}_{-0.018}$	$6^{+0}_{-0.018}$
E	$0.5^{深}_{Dp} \times 10^{长}_{Lg}$	$0.5^{深}_{Dp} \times 10^{长}_{Lg}$	$0.5^{深}_{Dp} \times 10^{长}_{Lg}$

型号 Model Number	SML	SML	SML
	004	005	006
	NN	NN	NN
允许传递扭矩 Torque capacity[kg.cm]	5.8	6.4	6.4
真空度 Degree of vacuum pressure Pa[Torr]	$10^{-6} [10^{-8}]$		
允许氦泄漏量 Leake rate (He) [Pa.m ³ /sec]	$<10^{-10}$		
	[Torr.l/sec]		
	$<10^{-9}$		
耐压差 Pressure capacity (Static) [kg/cm ²]	1.0		
使用温度范围 Temperature range [°C]	0~80		
使用气体 Gas compatibility	非活性气体 Inert Gas *		



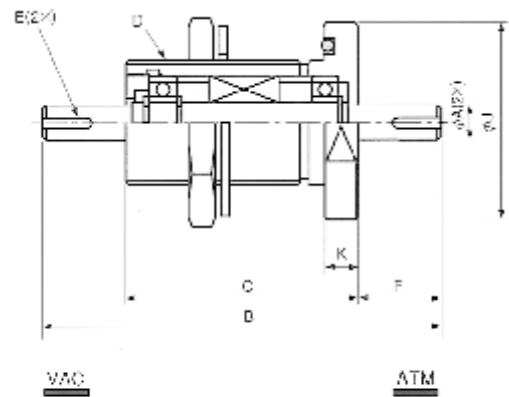
轴径 Shaft Diameter	004	005	006
A	$4^{+0}_{-0.018}$	$5^{+0}_{-0.018}$	$6^{+0}_{-0.018}$
B	76.5	76.5	76.5
E	$0.5^{深}_{Dp} \times 10^{长}_{Lg}$	$0.5^{深}_{Dp} \times 10^{长}_{Lg}$	$0.5^{深}_{Dp} \times 10^{长}_{Lg}$
F	15	15	15

型号 Model Number	SSL	SSL	SSL
	004	005	006
	NN	NN	NN
允许传递扭矩 Torque capacity[kg.cm]	5.8	6.4	6.4
真空度 Degree of vacuum pressure Pa[Torr]	$10^{-6} [10^{-8}]$		
允许氦泄漏量 Leake rate (He) [Pa.m ³ /sec]	$<10^{-10}$		
	[Torr.l/sec]		
	$<10^{-9}$		
耐压差 Pressure capacity (Static) [kg/cm ²]	1.0		
使用温度范围 Temperature range [°C]	0~80		
使用气体 Gas compatibility	非活性气体 Inert Gas *		

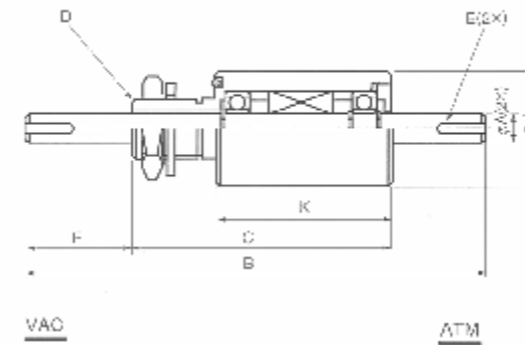
Although all spindles may be used for positive pressure applications, the dimensional drawings indicate the suggested mounting arrangement for vacuum systems.

* Reactive gas compatible sealed spindles are also available.(Specify application when requesting quotation or placing order.)

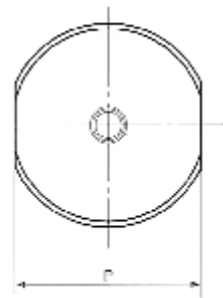
可订制适用活性气体的密封传动装置



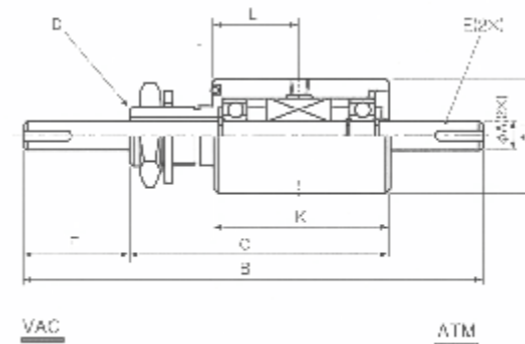
轴径 Shaft Diameter	006	010
A	6 ⁺⁰ _{-0.018}	10 ⁺⁰ _{-0.022}
B	97.5	119.5
C	57.5	69.5
D	M32×1.5	M38×1.5
E	0.5 Dp. × 12 Lg. (扁平 Flat)	3 W × 1.8 Dp. × 14 Lg.
F	20	25
J	55	60
K	10	10
P	49	55



轴径 Shaft Diameter	012	020
A	12 ⁺⁰ _{-0.027}	20 ⁺⁰ _{-0.033}
B	179	211
C	109	121
D	M25×1.5	M30×1.5
E (Keyway)	4 W × 2.5 Dp. × 20 Lg.	6 W × 3.5 Dp. × 25 Lg.
F	40	55
J	48	63
K	74	82
L	36.5	40.5



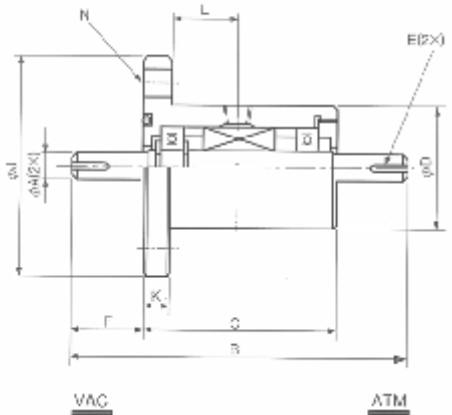
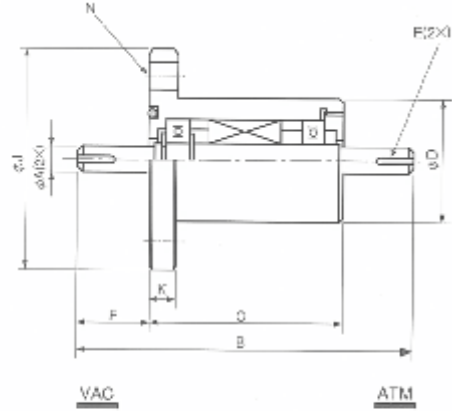
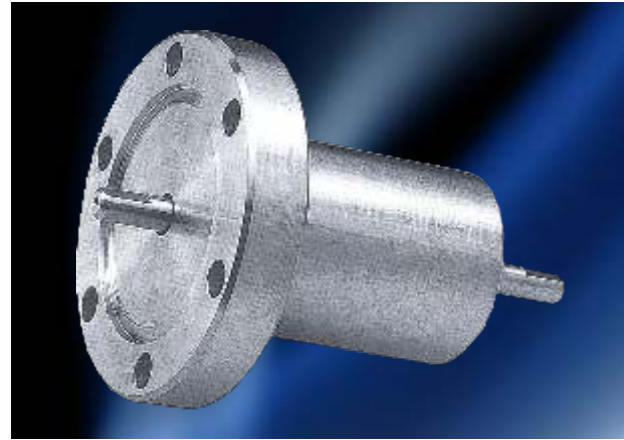
型号 Model Number	SNL 006 NN	SNF 006 NN	SNL 010 NN	SNF 010 NN
允许传递扭矩 Torque capacity [kg.cm]	9.7	9.7	62	62
真空度 Degree of vacuum pressure Pa[Torr]	10 ⁻⁶ [10 ⁻⁸]	10 ⁻⁵ [10 ⁻⁷]	10 ⁻⁶ [10 ⁻⁸]	10 ⁻⁵ [10 ⁻⁷]
允许氦泄漏量 Leake rate (He) [Pa.m/sec]	<10 ⁻¹⁰			
[Torr.l/sec]	<10 ⁻⁹			
耐压差 Pressure capacity (Static) [kg/cm ²]	1.0	1.0	1.0	1.0
使用温度范围 Temperature range [°C]	0~80			
使用气体 Gas compatibility	非活性气体 Inert	活性气体 Reactive	非活性气体 Inert	活性气体 Reactive



L. 水冷位置
Locations for water cooling

Water Cooling Type
水冷型

型号 Model Number	STL 012 NN	STF 012 NN	STL 020 NN	STF 020 NN
允许传递扭矩 Torque capacity [kg.cm]	124	124	615	615
真空度 Degree of vacuum pressure Pa[Torr]	10 ⁻⁶ [10 ⁻⁸]	10 ⁻⁵ [10 ⁻⁷]	10 ⁻⁶ [10 ⁻⁸]	10 ⁻⁵ [10 ⁻⁷]
允许氦泄漏量 Leake rate (He) [Pa.m/sec]	<10 ⁻¹⁰			
[Torr.l/sec]	<10 ⁻⁹			
耐压差 Pressure capacity (Static) [kg/cm ²]	1.0	1.0	1.0	1.0
使用温度范围 Temperature range [°C]	0~80			
使用气体 Gas compatibility	非活性气体 Inert	活性气体 Reactive	非活性气体 Inert	活性气体 Reactive



L.水冷位置
Locations for water cooling

Water Cooling Type
水冷型

轴径 Shaft Diameter	006	010	012	020
A	6 ⁺⁰ _{-0.018}	10 ⁺⁰ _{-0.022}	12 ⁺⁰ _{-0.027}	20 ⁺⁰ _{-0.033}
B	97.5	119.5	133.5	151.5
C	57.5	69.5	73.5	81.5
D	38	44	48	63
E	0.5Dp.×12Lg.(Flat)	3W×1.8Dp.×14Lg.	4W×2.5Dp.×20Lg.	6W×3.5Dp.×25Lg.
F	20	25	30	35
J	80	80	90	105
K	10	10	10	10
L	18	24	27	31
N	PD60/4-φ10	PD60/4-φ10	PD70/4-φ10	PD85/4-φ10

型号 Model Number	SFL NN	SFF NN	SFL NN	SFF NN	SFL NN	SFF NN	SFL NN	SFF NN
允许传递扭矩 Torque capacity[kg.cm]	9.7	9.7	62	62	124	124	615	615
真空度 Degree of vacuum pressure Pa[Torr]	10 ⁻⁶ [10 ⁻⁸]	10 ⁻⁵ [10 ⁻⁷]	10 ⁻⁶ [10 ⁻⁸]	10 ⁻⁵ [10 ⁻⁷]	10 ⁻⁶ [10 ⁻⁸]	10 ⁻⁵ [10 ⁻⁷]	10 ⁻⁶ [10 ⁻⁸]	10 ⁻⁵ [10 ⁻⁷]
允许氦泄漏量 Leake rate (He) [Pa.m ³ /sec]	<10 ⁻¹⁰							
	[Torr.l/sec]							
	<10 ⁻⁹							
耐压差 Pressure capacity (Static) [kg/cm ²]	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
使用温度范围 Temperature range [°C]	0~80							
使用气体 Gas compatibility	非活性气体 Inert	活性气体 Reactive	非活性气体 Inert	活性气体 Reactive	非活性气体 Inert	活性气体 Reactive	非活性气体 Inert	活性气体 Reactive

Note: Conflat flange or any other defined configuration may be specified and is available as an option. Tapped bore for tube fitting is available for uses in high temperature or high rotational speed applications. Shaft length and terminations may be specified by the user.

FerroDrive集成电机磁流体真空传动装置

Ferrotec提供的FerroDrive集成电机磁流体真空传动装置将一个密封Ferrofluidic[®]真空磁流体、一个高精度电机以及控制器集成起来，为客户提供一件紧凑且高性能的密封旋转系统。这种设计根除了客户在联接分立部件时遭遇到的整合挑战以及潜在的机械故障点。

同轴驱动磁流体装置经典应用领域包括：

- MOCVD
- 薄膜产业
- 光学镀膜
- 离子束沉积
- 离子束刻蚀
- 物理气相沉积
- 离子溅射
- 离子注入
- 任何需要应用电机的场合，特别是需要伺服电机的场合。

Ferrotec's FerroDrive System

FerroDrive motorized spindles from Ferrotec combine a hermetic Ferrofluidic[®] vacuum feedthrough with a high precision motor and controller to offer a compact and high performance integrated sealing and rotation system. Ferrotec's motor-integrated feedthroughs eliminate integration challenges and the potential mechanical failure points associated with coupling discrete components.

Typical applications that in-line drive motorized feedthroughs are used for include:

- MOCVD
- Thin film
- Optical coating
- Ion beam deposition
- Ion beam etch
- PVD
- Sputtering
- Ion implantation
- Any application where a motor is used, particularly where servo control is necessary.



空心轴密封传动装置

空心轴密封传动装置有一个卡箍，它通过O型圈密封把用户轴和密封装置的转轴连在一起。

空心轴密封传动装置运用的典型例子就是溅射设备，其中例如电子，中子或离子的注入用旋转单元、旋转物架以及X射线和光学机器。

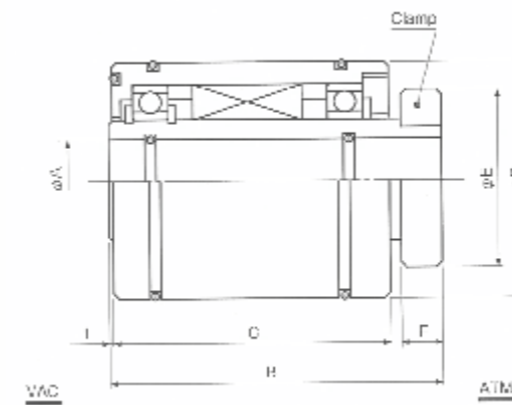
空心轴密封传动装置有通孔型、法兰型等，也可以按照用户的要求进行特殊的设计或不带卡箍。

HOLLOW SHAFT SEALED SPINDLES

Hollow Shaft Sealed Spindles have a cartridge configuration which incorporates an existing shaft into a ferrofluid sealed spindle.

The hollow rotary shaft sleeve of the cartridge is statically sealed to the existing shaft with an O-ring. A clamp is supplied to mechanically couple the existing shaft and the sleeve for rotation. The clamp feature may be omitted if desired.

Typical applications for hollow shaft sealed spindles include rotary vacuum unions and rotating targets for electron, X-ray and optical beam path systems.

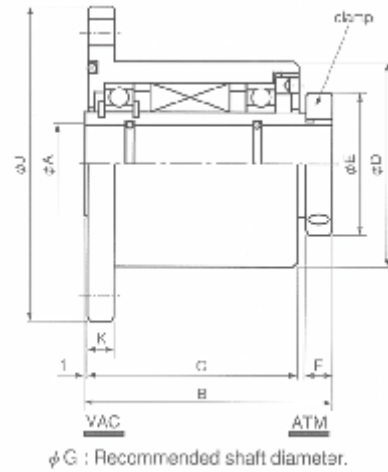


轴径 Shaft Diameter	010	020	025	030	040	050	075
A	10 ^{+0.03} / _{+0.01}	20 ^{+0.04} / _{+0.02}	25 ^{+0.04} / _{+0.02}	30 ^{+0.04} / _{+0.02}	40 ^{+0.04} / _{+0.02}	50 ^{+0.05} / _{+0.02}	75 ^{+0.06} / _{+0.03}
B	78	82.5	88	93	96	98	115
C	64	68.5	74	79	80	82	96
D	48 ⁺⁰ / _{-0.02}	58 ⁺⁰ / _{-0.03}	63 ⁺⁰ / _{-0.03}	73 ⁺⁰ / _{-0.03}	88 ⁺⁰ / _{-0.04}	98 ⁺⁰ / _{-0.04}	137 ⁺⁰ / _{-0.04}
E	34	44	49	54	69	79	109
F	10	10	10	10	12	12	15
φ G	10 ^{-0.01} / _{-0.03}	20 ^{-0.01} / _{-0.03}	25 ^{-0.01} / _{-0.03}	30 ^{-0.01} / _{-0.03}	40 ^{-0.01} / _{-0.03}	50 ^{-0.01} / _{-0.03}	75 ^{-0.01} / _{-0.03}
φ H	48 ^{+0.05} / _{+0.03}	58 ^{+0.06} / _{+0.03}	63 ^{+0.06} / _{+0.03}	73 ^{+0.06} / _{+0.03}	88 ^{+0.07} / _{+0.04}	98 ^{+0.07} / _{+0.04}	137 ^{+0.08} / _{+0.05}

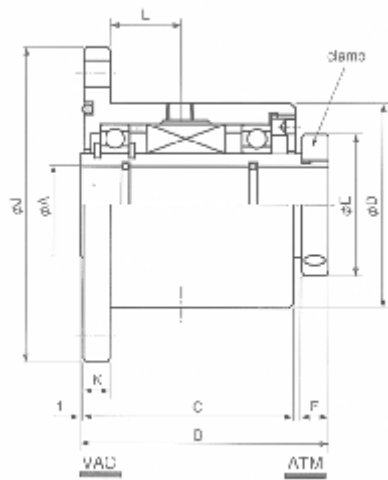
型号 Model Number	HTL	HTL	HTL	HTL	HTL	HTL	HTL
	010	020	025	030	040	050	075
	CN	CN	CN	CN	CN	CN	CN
允许传递扭矩 [Kg.cm]	—						
真空度 Pa[Torr]	10 ⁻⁶ [10 ⁻⁸]						
允许氦泄漏量(He)[Pa.m ³ /sec]	<10 ⁻¹⁰						
[Torr.l/sec]	<10 ⁻⁹						
耐压差 [Kg/cm ²]	1.0						
使用温度范围 [°C]	0~80						
使用气体 Gas compatibility	Inert 非活性气体						

Clamp-less type is available as an option.

Although all spindles may be used for positive pressure applications, the dimensional drawings indicate the suggested mounting arrangement for vacuum systems.

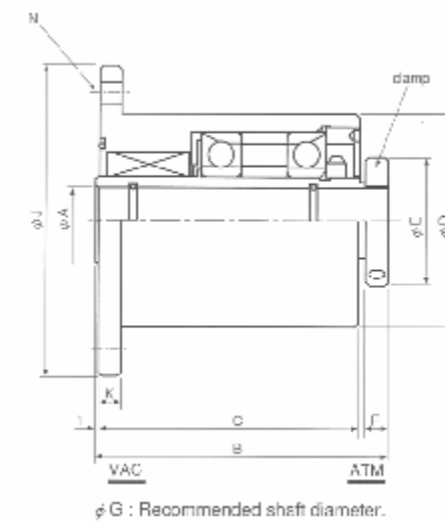


轴径 Shaft Diameter	010	020	025	030	040	050	075
A	10 ^{+0.03} / _{-0.01}	20 ^{+0.04} / _{-0.02}	25 ^{+0.04} / _{-0.02}	30 ^{+0.04} / _{-0.02}	40 ^{+0.04} / _{-0.02}	50 ^{+0.05} / _{-0.02}	75 ^{+0.06} / _{-0.03}
B	78	82.5	88	93	96	98	115
C	64	68.5	74	79	80	82	96
D	51	63	71	78	90	103	143
E	34	44	49	54	69	79	109
F	10	10	10	10	12	12	15
ϕG	10 ^{+0.01} / _{-0.03}	20 ^{+0.01} / _{-0.03}	25 ^{+0.01} / _{-0.03}	30 ^{+0.01} / _{-0.03}	40 ^{+0.01} / _{-0.03}	50 ^{+0.01} / _{-0.03}	75 ^{+0.01} / _{-0.03}
J	90	105	120	120	145	160	210
K	10	10	10	10	10	12	12
L	20	22.5	26	27	27	26.5	33
N	PD70/4- $\phi 10$	PD85/4- $\phi 10$	PD100/4- $\phi 10$	PD100/4- $\phi 10$	PD120/4- $\phi 12$	PD135/4- $\phi 12$	PD185/4- $\phi 12$

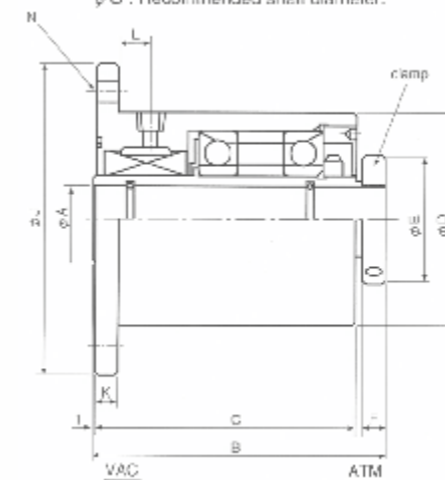


型号 Model Number	HFL	HFL	HFL	HFL	HFL	HFL	HFL
	010	020	025	030	040	050	075
	CN	CN	CN	CN	CN	CN	CN
允许传递扭矩 Torque capacity[kg.cm]	—						
真空度 Degree of vacuum pressure Pa[Torr]	10 ⁻⁶ [10 ⁻⁸]						
允许氦泄漏量 Leake rate (He) [Pa.m ³ /sec]	<10 ⁻¹⁰						
[Torr.l/sec]	<10 ⁻⁹						
耐压差 Pressure capacity (Static) [kg/cm ²]	1.0						
使用温度范围 Temperature range [°C]	0~80						
使用气体 Gas compatibility	Inert 非活性气体						

L.水冷位置
Locations for water cooling
Water Cooling Type
水冷型



轴径 Shaft Diameter	020	025	030	040	050
A	20 ^{+0.04} / _{-0.02}	25 ^{+0.04} / _{-0.02}	30 ^{+0.04} / _{-0.02}	40 ^{+0.04} / _{-0.02}	50 ^{+0.05} / _{-0.02}
B	123.5	126	130.5	141	147.5
C	109.5	112	116.5	125	131.5
D	78	90	96	106	132
E	44	49	54	69	79
F	10	10	10	12	12
ϕG	20 ^{+0.01} / _{-0.03}	25 ^{+0.01} / _{-0.03}	30 ^{+0.01} / _{-0.03}	40 ^{+0.01} / _{-0.03}	50 ^{+0.01} / _{-0.03}
J	120	145	145	160	185
K	10	10	10	12	12
L	14.5	13	14	12	12.5
N	PD100/4- $\phi 10$	PD120/4- $\phi 10$	PD120/4- $\phi 10$	PD135/4- $\phi 12$	PD160/8- $\phi 12$



型号 Model Number	HFF	HFF	HFF	HFF	HFF
	020	025	030	040	050
	CC	CC	CC	CC	CC
允许传递扭矩 Torque capacity[kg.cm]	—				
真空度 Degree of vacuum pressure Pa[Torr]	10 ⁻⁵ [10 ⁻⁷]				
允许氦泄漏量 Leake rate (He) [Pa.m ³ /sec]	<10 ⁻¹⁰				
[Torr.l/sec]	<10 ⁻⁹				
耐压差 Pressure capacity (Static) [kg/cm ²]	1.0				
使用温度范围 Temperature range [°C]	0~80				
使用气体 Gas compatibility	Inert 非活性气体				

Note: Conflat flange is available as an option.

L.水冷位置
Locations for water cooling
Water Cooling Type
水冷型



多轴密封传动装置

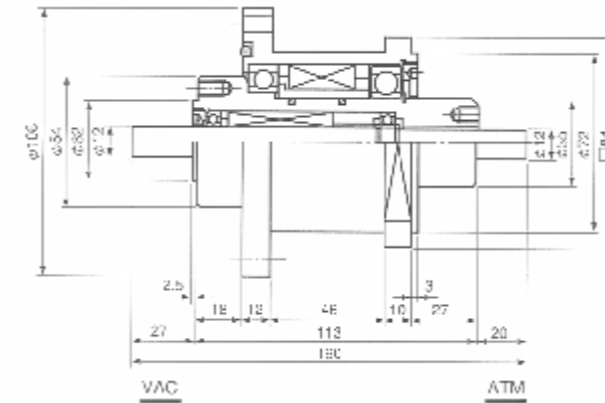
多轴密封传动装置主要为机械手而设计，这类产品广泛应用于半导体的加工和生产。同时，我们也有 10^{-8} Torr的超高真空用密封装置。

MULTIAXIAL SEALED SPINDLES

Multiaxial Sealed Spindles are specially engineered for conveyor robots semiconductor processes are available.

Each shaft has its own seal, which has a capability of 10^{-8} Torr high vacuum. Shaft terminations and other features will be provided to meet application requirements.

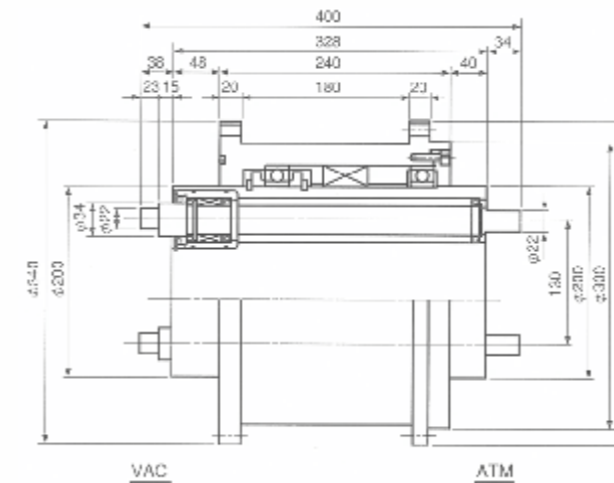
Although all spindles may be used for positive pressure applications, the dimensional drawings indicate the suggested mounting arrangement for vacuum systems.



同轴2轴传动 Two Coaxial Type

型号 Model Number	CFF012NN
真空度 Degree of vacuum pressure Pa[Torr]	10^{-6} [10^{-8}]
允许氦泄漏量 Leake rate (He) [Pa.m ³ /sec]	$<10^{-10}$
[Torr.l/sec]	$<10^{-9}$
耐压差 Pressure capacity (Static) [kg/cm ²]	1.0
使用温度范围 Temperature range [°C]	0~80
使用气体 Gas compatibility	活性气体 Reactive

The small and light weight model with high rotating accuracy and small runout. A typical application is a Wafer Transfer Robot in Vacuum. (Called a SCARA type robot.)



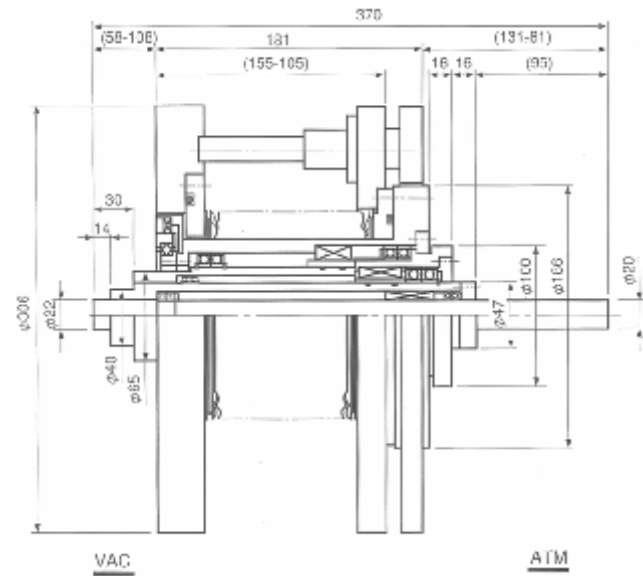
3轴 Three Axis Type

型号 Model Number	CFL200NN
真空度 Degree of vacuum pressure Pa[Torr]	10^{-6} [10^{-8}]
允许氦泄漏量 Leake rate (He) [Pa.m ³ /sec]	$<10^{-10}$
[Torr.l/sec]	$<10^{-9}$
耐压差 Pressure capacity (Static) [kg/cm ²]	1.0
使用温度范围 Temperature range [°C]	0~80
使用气体 Gas compatibility	非活性气体 Inert

Three axis type with high stiffness, provides high rotating accuracy and small runout.

The optimal aluminum housing can be used to minimize the weight of the assembly.

A typical application is a Transfer Robot in Vacuum, designed for handling large glass substrates for LCD manufacturing.(called a Frong arm type.)



Three Coaxial and linear Type

型号 Model Number	CFF022NN
真空度 Degree of vacuum pressure Pa[Torr]	10 ⁻⁶ [10 ⁻⁸]
允许氦泄漏量 Leake rate (He) [Pa.m ³ /sec]	<10 ⁻¹⁰
[Torr.l/sec]	<10 ⁻⁹
耐压差 Pressure capacity (Static) [kg/cm ²]	1.0
使用温度范围 Temperature range [°C]	0~80
使用气体 Gas compatibility	活性气体 Reactive

特点：高精度、高刚性，而且能够实现50mm的直线运动
Three coaxial spindle type with high stiffness, provides high rotational accuracy and small runout.
This model, with 50mm of linear motion stroke, is adapted for a Cluster Tool application.
Typical applications for this spindle include processing 300mm wafers and large glass substrates for LCDs.
A typical application is a transfer robot in a vacuum environment.

磁性流体密封装置的轴承疲劳寿命按照以下的方法来进行计算.

To determine Ball Bearing Rating Fatigue Life of ferrofluid sealed spindles, please use this table and the basic equation below.

L0:壳体端面到负载的距离
Distance from housing end to load point
L2:轴承间距
Ball bearing span
L3:长度
Total length of shaft
C₀:轴承基本额定静负载
Static load rating of ball bearing
n:转速
Rotation speed
P:轴承当量动负载
Equivalent load

L1:真空侧轴承到壳体端面的距离
Distance from load side ball bearing to housing end
C_r:轴承基本额定动负载
Dynamic load rating of ball bearing
F_a:压差产生的轴向负载
Axial exerted by atmospheric pressure
F_r:径向负载
Radial load
f_w:负载系数
Load factor
L_h:额定寿命
Rating fatigue Life

$$L_h = \frac{10^6}{60 \cdot n} \left(\frac{C}{P \cdot f_w} \right)^3$$

- 这些负荷能力特指使用SUJ2材料的轴承,如果使用SUS材料的轴承,则使用参数的80%.
This load capacity is for SUJ2 bearing. If SUS bearing are used. Please apply an 80% derating factor.

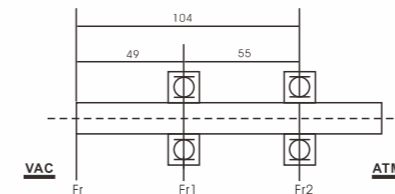
例 1
Example

型号为SFL020NN,其真空侧转轴上的径向负载,Fr=50kgf,转速为n=200rpm时的额定寿命.

For a vacuum application, to obtain the fatigue life factor, L_h, of Model Number SFL020NN, when it is used under a radial load Fr=50kgf at the shaft end and the rotation speed is n=200rpm.

由于轴承头部承受有Fr=50kgf,以下方法求出轴承6005上的Fr1,Fr2

Radial load Fr=50kgf is applied at the shaft end, and the radial load on #6005 ball bearing should be distributed to Fr1 and Fr2. They can be obtained from the equation following.



$$Fr_1 = \frac{104}{55} \times 50 \approx 94.5 \text{ (Kgf)}$$

$$Fr_2 = \frac{49}{55} \times 50 \approx 44.5 \text{ (Kgf)}$$

由上述的负载分配求出额定寿命.(由于真空侧轴承上承受的负载比较高,仅计算真空侧轴承的寿命.此外,本计算由于真空压差产生的轴向负载Fa=3.14kgf很小,所以只计算了径向负载.当轴向负载很大时,必须考虑它的影响)

From the distributed radial load Fr above, the rated fatigue Life L_h is obtained as follows.

(In this case, the Fr of the load side bearing is greater than at the second bearing. Calculate the Radial load at the load side only. For a vacuum application, the Axial load exerted by the atmospheric pressure difference, Fa=3.14kgf, is small enough to disregard. Therefore, only the Radial load is calculated. If the value of Fa is large, please include it in the calculation.)

$$L_h = \frac{10^6}{60 \cdot n} \left(\frac{C}{P \cdot f_w} \right)^3 = \frac{10^6}{60 \times 200} \left(\frac{1030}{94.5 \times 2} \right)^3 \approx 13,498 \text{ (h)}$$

注: 假设fw=2
fw=2 is assumed



在拆封和安装磁性流体密封传动装置时，
 请阅读下列注意事项

- 1. 溶剂(丙酮,酒精,氟利昂,油,水等)不能侵入磁性流体密封装置.
- 2. 泄漏检查使用氦质谱检漏仪进行.
- 3. 不得加上超出规定的压力.真空场合时加压1kg/cm²,加压场合时,只能加压到技术说明规定的压力为止.
- 4. 磁性流体的转轴在静止时,对真空腔抽真空或真空中长时间停止后再转动时,会导致真空压力的上升,这个是磁性流体密封装置的固有现象,可以通过提早启动等措施来进行消除.
- 5. 水冷产品使用时,需使用常温,流量为1-3L/min的水,冷却水可使用普通的自来水(氯离子200mg/L,铁分0.3mg/L)此外,还不能结露,因为结露会使轴承生锈,导致回转不良.
- 6. 以下场合使用磁性流体密封时,请联系我们的技术销售人员.
 - 高温,高转速场合
 - 高负载场合(轴向,径向)
 - 电流通场合
 - 高频场合
 - 强磁场场合
 - 粉体悬浮物场合
 - 其他特殊技术要求

Handling and Installation of Sealed Spindles

Before unpadding and installing the ferrofluid sealed spindle, please read the following notes.

- 1. Sealed spindles are shipped in a hermetically sealed plastic wrap that is applied in a clean (dust free) environment. When assembling in production equipment ,do not clean the spindle with liquids such as water or organic solvents such as acetone ,alcohol,etc .Cleaning fluids entering the seal housing should edgrade the system by mixing with lubricant in the rolling element bearing or ferrofluid sealing fluid.
- 2. When performing a leak test, use only a helium lead detector. The Ferrofluid may become damaged by solvents.
- 3. Do not exceed the rated pressure of the sealed spindle. Applied pressure should not exceed 10⁻⁸ Torr for vacuum applications or the rated pressure for other applications.
- 4. It is suggested that the spindle be run at full speed with no pressure differential across the seal prior to rotating the shaft in the application under vacuum of full pressure after installation or an extended idle period. This will assure uniform dispersion of magnetic fluid in the seal stages and extend seal life. Additionally, it will distribute the bearing lubricant to assure proper spindle operation.
- 5. For water-cooled models, the suggested flow rate is 1 to 3 liter/minute. Water quality should meet the following requirements: C1 ion < 200mg/liter, Fe < 0.3mg/liter, and other contaminants should be minimized. If the internal components should become exposed to moisture , the ball bearings, lubricant, and ferrofluid could become degraded.
- 6. If standard spindle products as shown in this catalog do not meet the exact requirements of the application, please contact the sales or engineering staff for assistance.
 Examples of operating characteristics that can be accommodated individually or in combination are as follows.:

- | | |
|---|--------------------------------------|
| • Special shaft or housing mounting configuration | • High temperature |
| • High load :radial, thrust, or combined | • High rotational speed |
| • High frequency wave through the spindle | • Strong external magnetic field |
| • Electric current carrying requirement | • No magnetic field from the spindle |
| • Intergrated drive components, i.e. gears, motor, controls, etc. | • Other requirements not listed |

真空密封传动装置使用情况调查表

INFORMATION SHEET

日期 Date / /

公司 Company Name _____

地址 Address _____

电话 Phone _____ 传真 Fax. _____ E-MAIL _____

联系人 Name (Print) _____ 所属部门 Section _____

装置名称 Application _____

密封要求

SEAL SPECIFICATIONS

氛围气 Atmosphere (Unnecessary for vacuum only) 气体种类 Kind of gases/		浓度 Density/	
真空度 Vacuum Pressure 到达真空度 Absolute Pressure/		Torr	常用真空度 Operation Pressure Torr
允许氦泄漏量 Leakage Rate (He)		Torr.l/Sec	耐压值 Pressure Capacity Kg/cm ²
氛围气温度 Temperature Range 最大值 Max/ °C	最低值 Min/ °C	常用值 Usual/ °C	
轴径 O.D. of Shaft φ /	轴的材料 (有特殊要求时请指明) Material of shaft (if special material required)		
转速 (摆动角度和频率) 最大值 Max/ rmp	最低值 Min/ rmp	常用值 Usual/ rmp	
负荷条件 Load Condition 径向负载 Radial Direction / (大气侧) (ATM side) kg		(真空侧) (VAC side) kg	
轴向负载 Thrust Direction/ kg		传输扭矩 Transfer Torque Requirement kg.cm	
相关的安装尺寸 (请记入简单的尺寸), 请明确指示径向负载轴向负载的位置 (到壳体端面的尺寸)。 Installation Plan (Please make a simple drawing with dimensions), and clarify the direction of Radial and Thrust load with an arrow.			
其它 Remarks			

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