PILLAR CLEAN SAFETY FRONTIER

MECHANICAL SEAL

PILLAR Corporation

MECHANICAL SEAL

Aerostatic type non-contact dry gas seal

Type PEC™

Type PEC is an aerostatic type non-contact dry gas seal that was originally developed for turbines, blowers, and compressors. This seal mechanism has been used to ensure safety and prevent air pollution in plants that use toxic, flammable, and explosive gases. Taking advantage of its excellent cleanliness, this mechanism has also been adopted as a shaft sealing device in a wide range of fields that require a high level of cleanliness, such as pharmaceuticals and electronic materials.

Features

Type PEC has various outstanding characteristics.
This variety of characteristics is the reason Type PEC is adopted in a wide range of industrial sectors.

Completely sealed with a single seal

Process gas is completely sealed with a single seal. Not only does this product contribute to ensuring safety and environmental friendliness, it also makes accessories extremely simple in configuration, thereby making it possible to reduce both initial and maintenance costs.

High level of cleanliness

Compared to double mechanical seals and dry-contact seals, which have been conventionally used as shaft seals for gases, this product does not leak confined liquid into the process side or produce wear debris.

Wide speed range

This product can continuously retain its seal face in a non-contact state and can therefore handle various shaft states from a stopped state through to a high-speed rotation state.

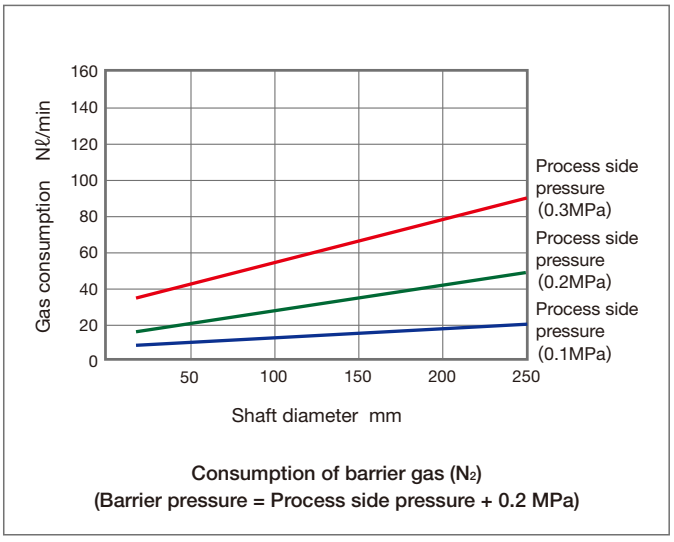
Long service life

This product maintains its seal face in a non-contact state and therefore protects the seal face from wear and damage, extending service life.

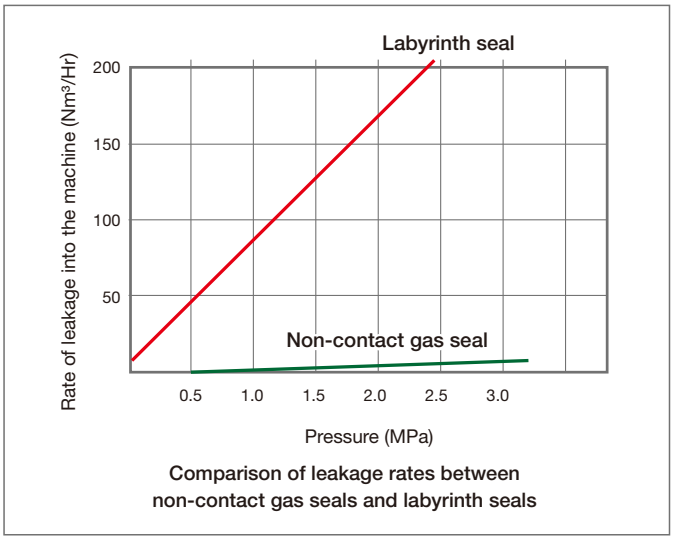
Low power consumption

The seal face is floated, which means that there is almost no loss of motive power.

Consumption of barrier gas (N_2) and comparison of leakage rates between non-contact gas seals and labyrinth seals



Consumption of barrier gas (N_2)
(Barrier pressure = Process side pressure + 0.2 MPa)



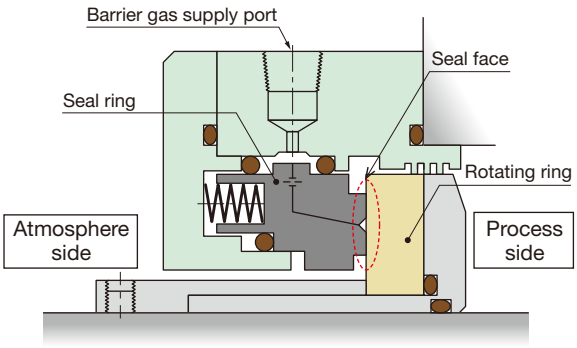
Comparison of leakage rates between
non-contact gas seals and labyrinth seals

∗ For Type PEC, the consumption of barrier gas can be adjusted according to the customer's specifications.
We also offer designs to further suppress the consumption of barrier gas. For details, please consult with us.

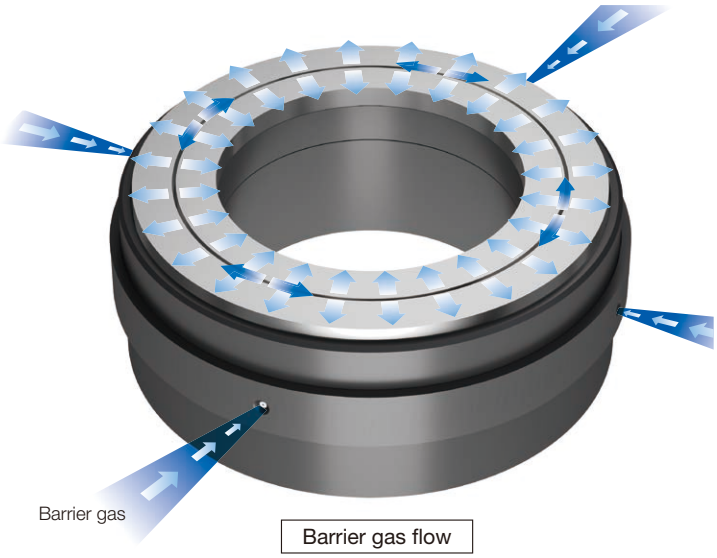
Type PEC™

Basic structure

Type PEC consists of a rotating ring seal face, which is perpendicular to the rotating shaft, and a seal ring seal face, which moves in the axial direction.
The major difference between Type PEC and general mechanical seals is that barrier gas (nitrogen gas, dry air, etc.) is supplied from the outer circumference of the seal ring to the seal face through the orifice.



Basic configuration of Type PEC

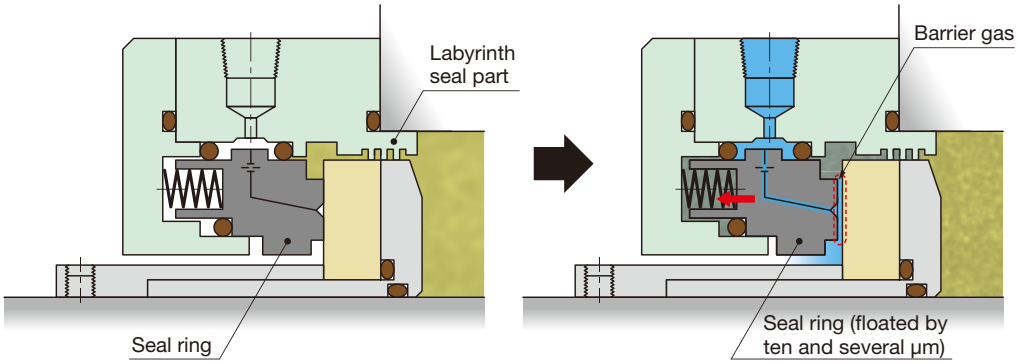


Barrier gas flow

Mechanism

Supplying barrier gas to the seal face from outside generates static pressure on the seal face that retains a floating gap with a width of ten and several micrometers (μm). A gas barrier is formed in the gap and completely seals the process side gas. The leakage rate of barrier gas is as small as 1/1000 times that of labyrinth seal.
Moreover, the barrier gas supply grooves developed using our thorough design expertise automatically control the seal face gap according to pressure distribution, thereby providing high reliability.

Supplying barrier gas with process side pressure + 0.2 MPa



Main models

Model name	Outline	Speed (m/s)	Pressure (MPaG)	Application examples
PEC-3SB	Static balanced type	80 max.	0.8 max.	Seal for blowers and compressors, and upper seal for mixers
PEC-2SA	Static unbalanced type	80 max.	0.05 max.	Seal for various types of powder equipment and blowers, and upper seal for mixers
PEC-9RB	Rotary balanced type (outside)	20 max.	0.2 max.	Seal for various types of powder equipment, and upper seal for mixers

PEC-3SB

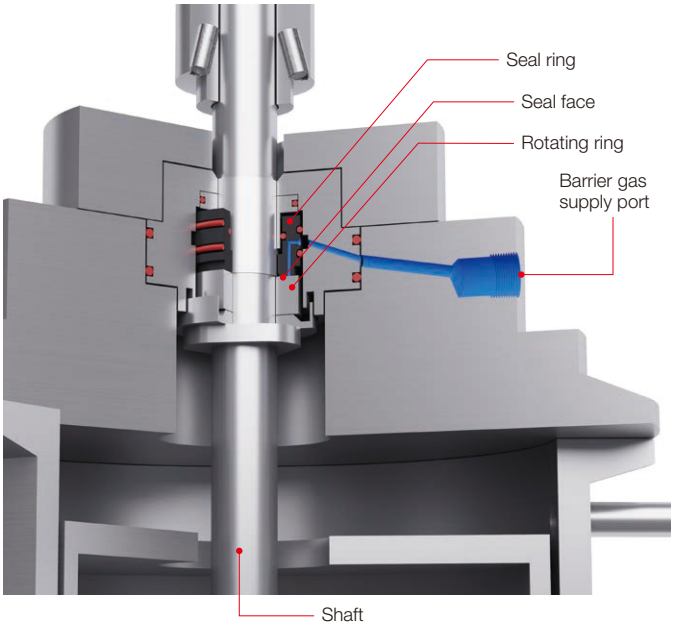
Type PEC™ (High-load aerostatic balanced type)

Medical/ pharmaceutical/ clean | Oil refinery/ petrochemical | Energy/ environment | Chemical | Mixer/low-speed rotary machine | Powder equipment | Compressor/ blower

Examples of applicable devices

For high-speed dispersers, blowers, compressors, and upper seals for mixers

Application image of high-speed disperser



- This aerostatic type non-contact dry gas seal provides a stable gap of several μm to ten and several μm between the seal faces.
- The PEC-3SB adopts the static balanced type and can be used for high-pressure applications.

Application examples

Nanomaterials, functional materials, and fine and specialty chemicals

Because the seal face has no contact, high-speed rotation can be supported. No wear debris is produced, so a high level of cleanliness can be achieved.

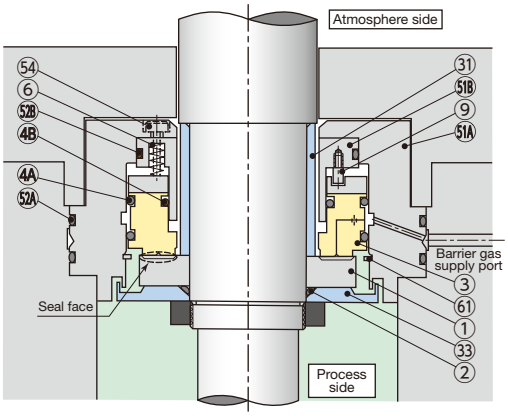
Bulk chemicals and steel

Flammable, volatile, and toxic gases can be sealed with a single seal structure.

■ Specification conditions

Speed (m/s)	Pressure (MPaG)
80 max.	0.8 max.

PEC-3SBJ: Basic structure and materials

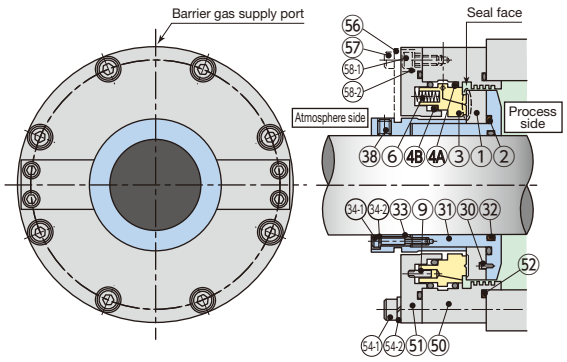


■ Standard materials

No.	Part name	Material	Qty
1	Rotating ring	SUS316 or equiv. and ceramic coating	1
2	O-ring	FKM	1
3	Seal ring	Carbon	1
4A	O-ring	FKM	2
4B	O-ring	FKM	1
6	Spring	Alloy 20	1S
9	Pin	SUS316 or equiv.	1S
31	Sleeve	SUS304 or equiv.	1
33	Collar	SUS304 or equiv.	1
51A	Seal case A	SUS304 or equiv.	1
51B	Seal case A	SUS304 or equiv.	1
52A	O-ring	FKM	2
52B	O-ring	FKM	1
54	Hexagon socket head bolt	SUS304 or equiv.	1S
61	Snap ring	SUS304 or equiv.	1

Note: The materials shown above are based on the standard specifications.

PEC-3SBJ: Basic structure and materials



■ Standard materials

No.	Part name	Material	Qty
1	Rotating ring	SUS316 or equiv. and ceramic coating	1
2	O-ring	FKM	1
3	Seal ring	Carbon	1
4A	O-ring	FKM	2
4B	O-ring	FKM	1
6	Spring	Alloy 20	1S
9	Pin	SUS316 or equiv.	1S
30	Pin	SUS316 or equiv.	1
31	Sleeve	SUS304 or equiv.	1
32	O-ring	FKM	1
33	Stopper ring	SUS304 or equiv.	1
34-1	Hexagon socket head bolt	SUS304 or equiv.	1S
34-2	Spring washer	SUS304 or equiv.	1S
38	Set screw	SUS316 or equiv.	1S
50	Seal case	SUS304 or equiv.	1
51	Sealing flange	SUS304 or equiv.	1
52	O-ring	FKM	2
54-1	Hexagon socket head bolt	SUS304 or equiv.	1S
54-2	Spring washer	SUS304 or equiv.	1S
56	Set plate	SUS304 or equiv.	2
57	Hexagon socket head bolt	SUS304 or equiv.	4
58-1	Hexagon socket head bolt	SUS304 or equiv.	1S
58-2	Spring washer	SUS304 or equiv.	1S

Note: The materials shown above are based on the standard specifications.

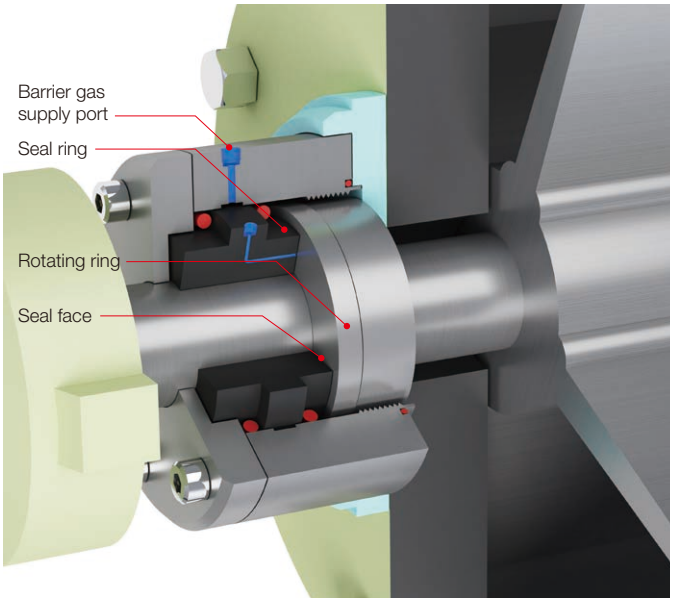
Type PEC™ (Low-load aerostatic unbalanced type)

Medical/ pharmaceutical/ clean | Oil refinery/ petrochemical | Energy/ environment | Chemical | Mixer/low-speed rotary machine | Powder equipment | Compressor/ blower

Examples of applicable devices

For various types of powder equipment, blowers, and upper seals for mixers

Application image of rotary valve (PEC-2SA)



- This aerostatic type non-contact dry gas seal provides a stable gap of several μm to ten and several μm between the seal faces.
- The PEC-2SA adopts the static unbalanced type and can be used for low-pressure applications.

Application example

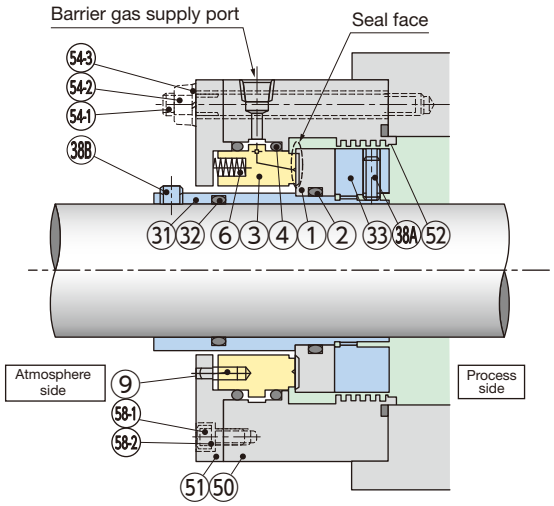
Various powder equipment sectors

Various types of powder equipment can be sealed by using Type PEC, which performs gas sealing.
Stable, long-term sealing performance is provided at minimum running cost.

■ Specification conditions

Speed (m/s)	Pressure (MPaG)
80 max.	0.05 max.

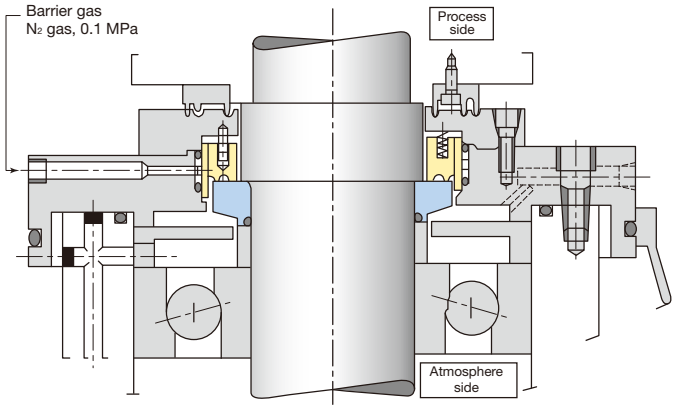
PEC-2SAJ: Basic structure and materials



■ Standard materials

No.	Part name	Material	Qty
1	Rotating ring	SUS316 or equiv. and ceramic coating	1
2	O-ring	FKM	1
3	Seal ring	Carbon	1
4	O-ring	FKM	2
6	Spring	Alloy 20	1S
9	Pin	SUS316 or equiv.	1S
31	Sleeve	SUS316 or equiv.	1
32	O-ring	FKM	1
33	Stopper ring	SUS304 or equiv.	1
38A	Set screw	SUS316 or equiv.	1S
38B	Set screw	SUS316 or equiv.	1S
50	Seal case	SUS304 or equiv.	1
51	Sealing flange	SUS304 or equiv.	1
52	O-ring	FKM	1
54-1	Stud bolt	SUS304 or equiv.	1S
54-2	Hexagon nut	SUS304 or equiv.	1S
54-3	Spring washer	SUS304 or equiv.	1S
58-1	Hexagon socket head bolt	SUS304 or equiv.	1S
58-2	Spring washer	SUS304 or equiv.	1S

Application example of bottom installation for vertical powder grinding machine



PEC-9RB

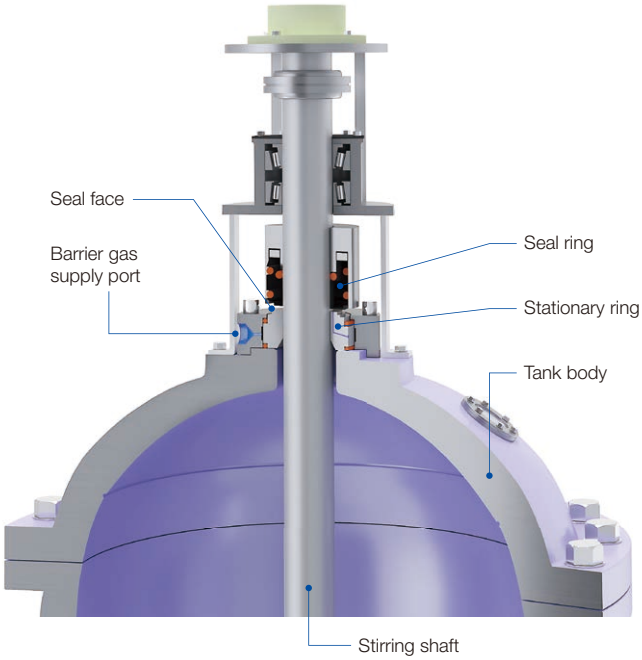
Type PEC™ (Rotary aerostatic balanced type)

Medical/ pharmaceutical/ clean | Oil refinery/ petrochemical | Energy/ environment | Chemical | Mixer/low-speed rotary machine | Powder equipment | Compressor/ blower

Examples of applicable devices

For various types of powder equipment, blowers, and upper seals for mixers

Application image of vertical mixer



- This aerostatic type non-contact dry gas seal provides a stable gap of several μm to ten and several μm between the seal faces.
- The PEC-9RB adopts the rotary balanced type. It can be adopted as “non-metal PEC,” which is combined with a resin lined tank to prevent metal ions from leaching.

Application examples

Nanomaterials, functional materials, fine and specialty chemicals, and pharmaceuticals

Because the seal face has no contact, high-speed rotation can be supported. No wear debris is produced, so a high level of cleanliness can be achieved.

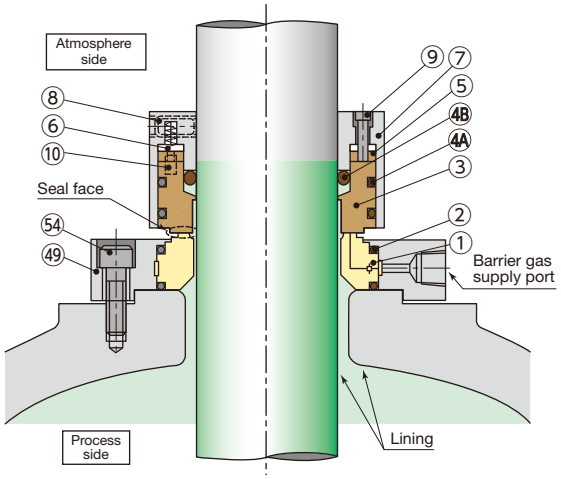
Bulk chemicals and steel

Flammable, volatile, and toxic gases can be sealed with a single seal structure.

■ Specification conditions

Speed (m/s)	Pressure (MPaG)
20 max.	0.2 max.

PEC-9RBS (for lined cauldron mixers): Basic structure and materials

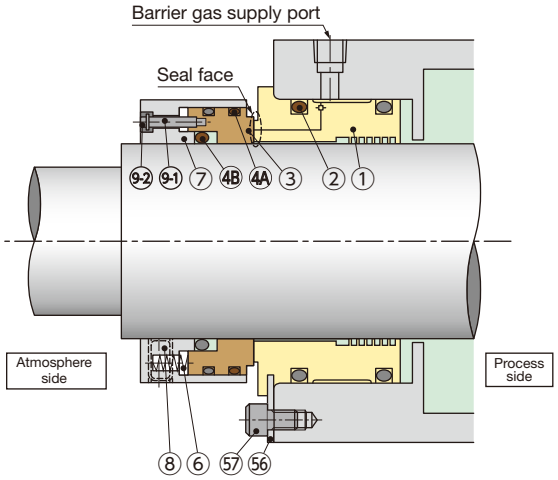


■ Standard materials

No.	Part name	Material	Qty
1	Stationary ring	Carbon	1
2	O-ring	FKM	2
3	Seal ring	Ceramic	1
4A	O-ring	FKM	2
4B	O-ring	FKM	1
5	Drive collar	SUS304 or equiv.	1
6	Spring	Alloy 20	1S
7	Spring retainer	SUS304 or equiv.	1
8	Set screw	SUS316 or equiv.	1S
9	Drive pin	SUS316 or equiv.	1S
10	Pin	SUS316 or equiv.	1S
49	Flange	SUS304 or equiv.	1
54	Hexagon socket head bolt	SUS304 or equiv.	1S

Note: The materials shown above are based on the standard specifications.

PEC-9RBS (for rotary valves): Basic structure and materials



■ Standard materials

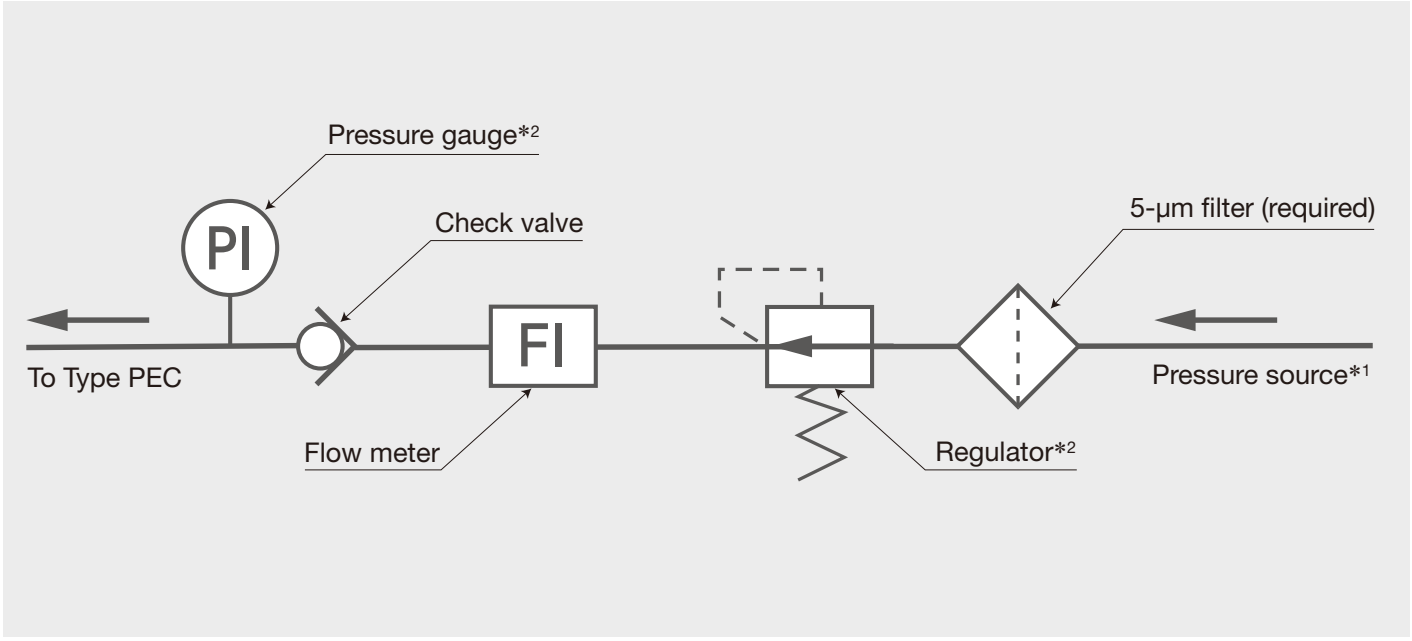
No.	Part name	Material	Qty
1	Stationary ring	SUS304 or equiv. (surface nitriding)	1
2	O-ring	FKM	2
3	Seal ring	SUS304 or equiv. and ceramic coating	1
4A	O-ring	FKM	2
4B	O-ring	FKM	1
6	Spring	Alloy 20	1S
7	Spring retainer	SUS304 or equiv.	1
8	Set screw	SUS316 or equiv.	1S
9-1	Drive pin	SUS316 or equiv.	1S
9-2	Snap ring	SUS304 or equiv.	1S
56	Plate	SUS304 or equiv.	2
57	Hexagon socket head bolt	SUS304 or equiv.	2

Note: The materials shown above are based on the standard specifications.

Guide to accessories and auxiliary devices

For Type PEC, the performance of the seal itself, as well as selection and management of accessories and auxiliary devices determines reliability, longevity, and other factors for the entire system.
We propose a barrier gas supply system that is optimized according to our past achievements.
Please consider this service in conjunction with our products.

Recommended barrier gas supply flow for Type PEC



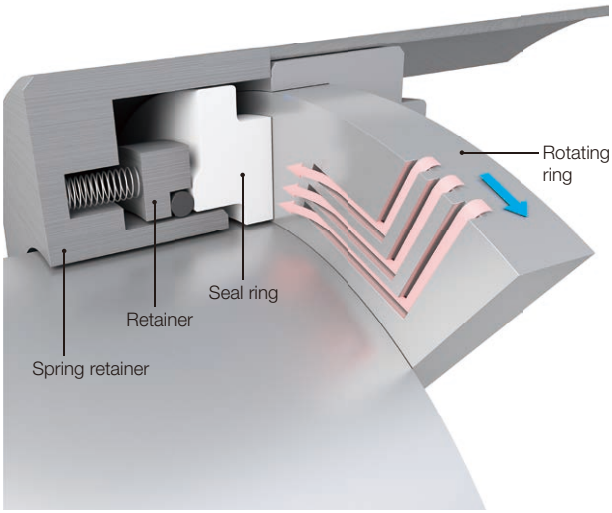
*1 Pressure source must secure sufficient flow rates and must also be stable.
*2 Regulators and pressure gauges must be oil-free types.

PILLAR Phoenix-Seal™ Type PPG

As a total seal manufacturer, we have been continuing to resolve customers' issues with our wide array of sealing technologies.
In the 1970s, as a seal manufacturer in Japan, we succeeded in making practical use of dry gas seal technology for the first time in Japan. We have been continuing daily to expand the deployment range of our technologies to blowers, as well as to liquid seals, containment seals, and other seals.

Aerodynamic type non-contact dry gas seal mechanism

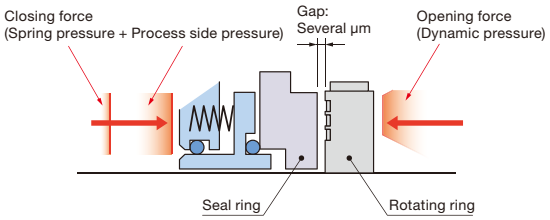
When the shaft rotates, the grooves engraved on the rotating ring generate pressure (called "dynamic pressure") between the rotating ring and the seal ring.
This dynamic pressure keeps the seal ring floating by several μm.
The amount of seal ring floating is as small as only several μm, making the amount of liquid leakage extremely small, at 1/1000 or less the degree in comparison with a labyrinth seal.
The seal face maintains a non-contact state during operation, minimizing motive power consumption, as well as providing various characteristics such as being lubricating oil free and having a long service life.

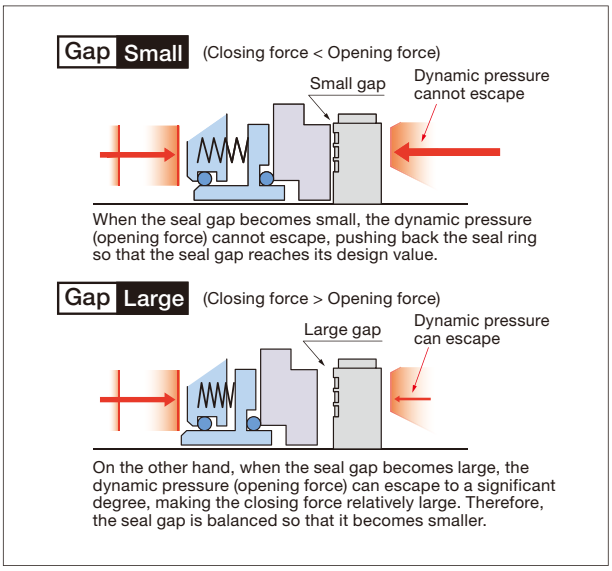


PILLAR original multi-groove design

Automatic gap adjustment mechanism

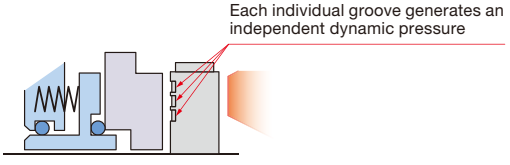
While the dynamic pressure mechanism is in operation, the magnitude of dynamic pressure (opening force) instantly changes according to the gap width between the rotating ring and the seal ring. The gap width is always adjusted so that it approaches the design value, and the seal ring is continuously floated by several μm in a balanced state.

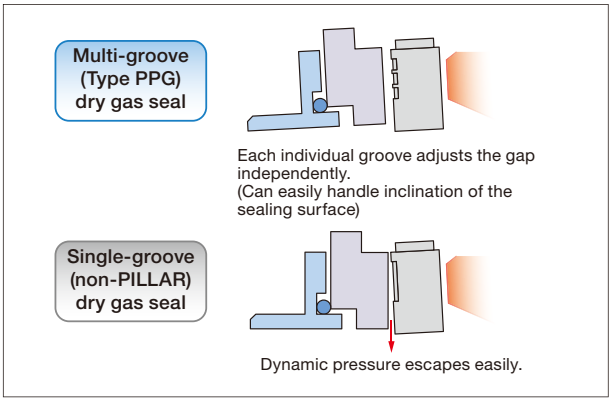




Advantages of multi-groove seal

The Type PPG PILLAR Phoenix Groove seal has multiple independent grooves that support bidirectional rotation. When the dynamic pressure mechanism is in operation, each individual groove generates an independent dynamic pressure and individual pressure distributions are formed.
Compared to single-groove seals, multi-groove seals make dynamic pressure difficult to escape and provide advantages in terms of reliability and safety.





PILLAR Phoenix-Seal™ Type PPG

**The dry gas seal is now recognized as the standard shaft sealing device for turbo-compressors.
This technology and our experience can also be applied to shaft seals for devices other than turbo-compressors.
We have a range of solutions that apply and expand this technology to various issues, including double seals for liquid, vertical mixer top seals, and containment seals.**

Model notation

PPG3S

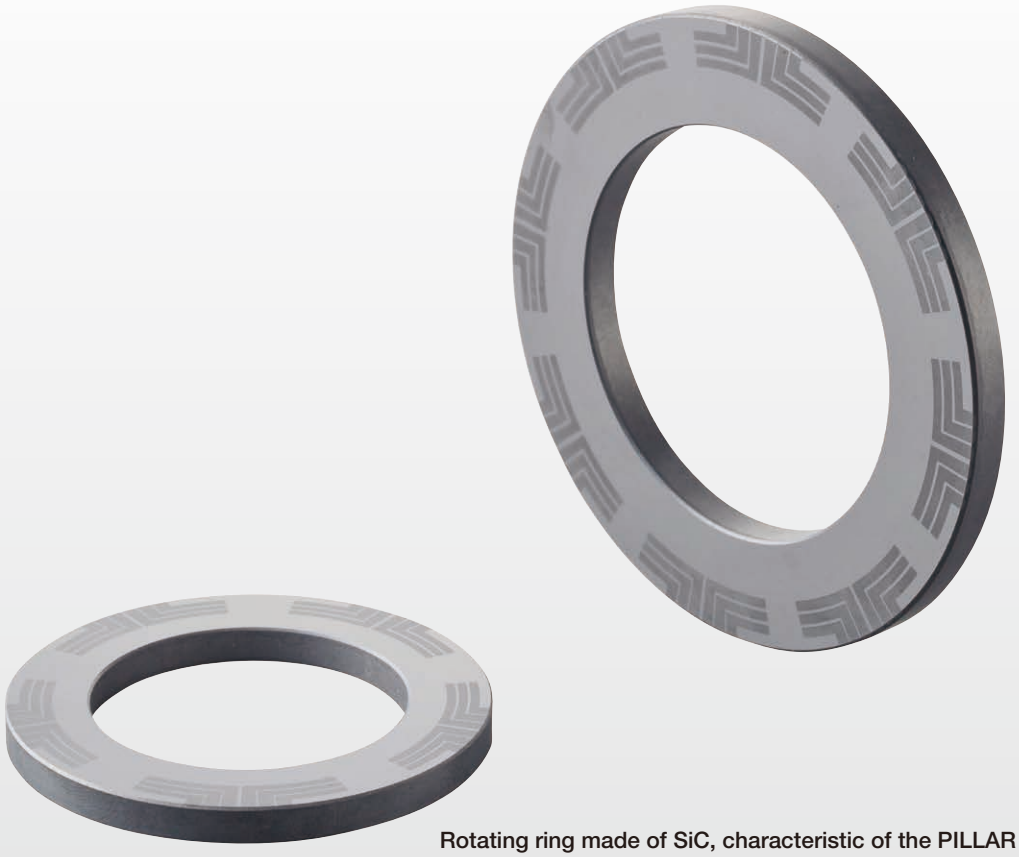
Basic structure
(1R, 3S, 4S, 6S, or 7R)

[Basic structure notation]
1R: Low-load rotary type seal
3S: High-load static type seal
4S: Medium-load general-purpose static type seal
6S: Containment seal
7R: Low-load general-purpose rotary type seal (space-saving type)

Main seal models and scope of application

Model name	Outline	Speed (m/s)	Pressure (MPaG)	Main applications
PPG3S	High-load static type seal	150 max.	10 max.	For compressors and blowers
PPG1R	Low-load rotary type seal	20 max.	1 max.	For general use, containment seals, and blowers
PPG7R	Low-load general-purpose rotary type seal (space-saving type)	20 max.	1 max.	For general use and containment seals
PPG4S	Medium-load general-purpose static type seal	40 max.	1.6 max.	For liquids, vertical mixer top seals, and blowers
PPG6S	Containment seal	25 max.	*1	For containment seals (outer seals)

*1 This model can be operated as a containment seal under a pressure of 4.2 MPaA for at least eight hours in the event of an emergency.



Rotating ring made of SiC, characteristic of the PILLAR Phoenix-Seal™

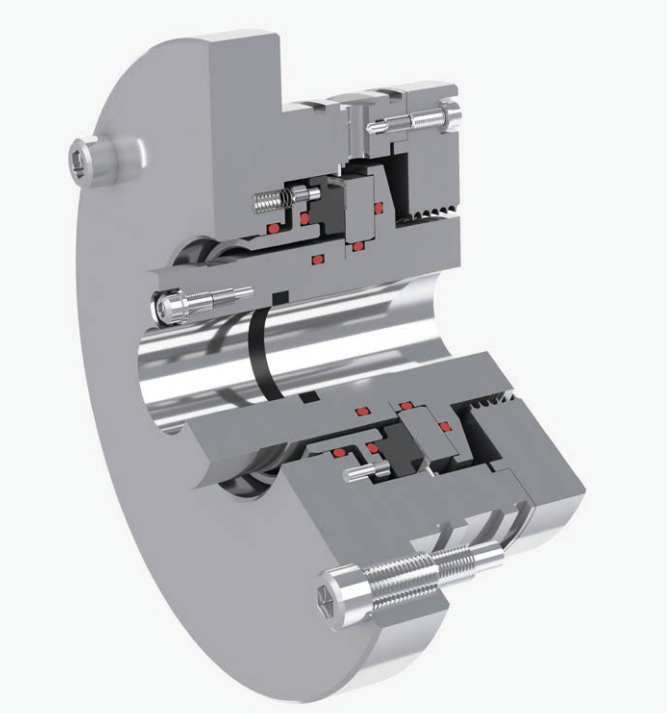
PILLAR Phoenix-Seal™

Type PPG (High-PV-support aerodynamic type, dry gas seal)

Medical/ pharmaceutical/ clean | Oil refinery/ petrochemical | Energy/ environment | Chemical | Compressor/ blower

Examples of applicable devices

For compressors and blowers

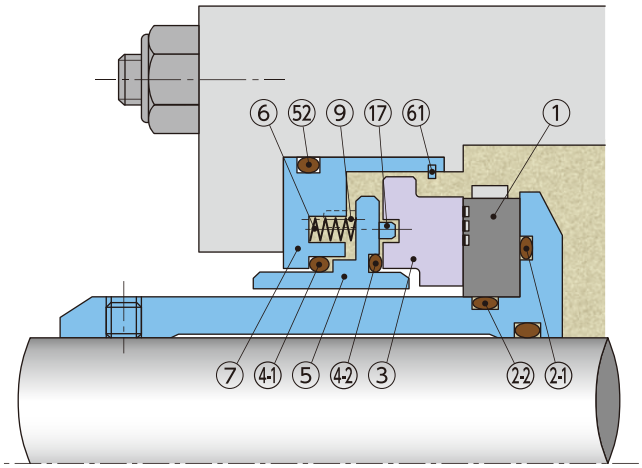


- This aerodynamic seal is provided with PILLAR-specific grooves on the seal face to make effective use of dynamic pressure through multiple barriers.
- This high-load static type dry gas seal is optimally designed for use in turbo-compressors.
- In addition to single seal arrangement, tandem seal arrangement and double seal arrangement are also available.

■ Specification conditions

Speed (m/s)	Pressure (MPaG)
5 to 150	10 max.

PPG3S: Basic structure and materials



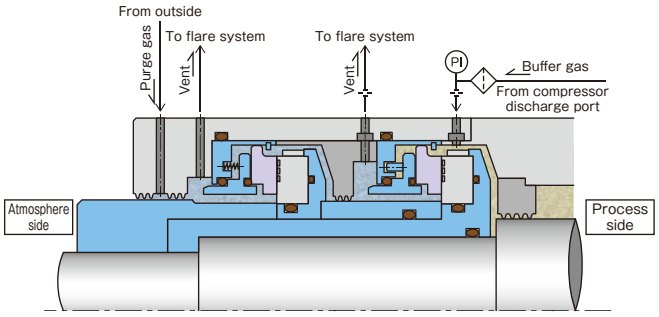
■ Standard materials

No.	Part name	Material	Qty
1	Rotating ring	SiC and titanium	1
2-1	O-ring	—	1
2-2	O-ring	—	1
3	Seal ring	Carbon	1
4-1	O-ring	—	1
4-2	O-ring	—	1
5	Retainer	SUS304 or equiv.	1
6	Spring	SUS304 or equiv.	1S
7	Spring retainer	SUS304 or equiv.	1
9	Pin	SUS316 or equiv.	1S
17	Pin	SUS316 or equiv.	1S
52	O-ring	—	1
61	Snap ring	—	1

Application examples of PPG3S

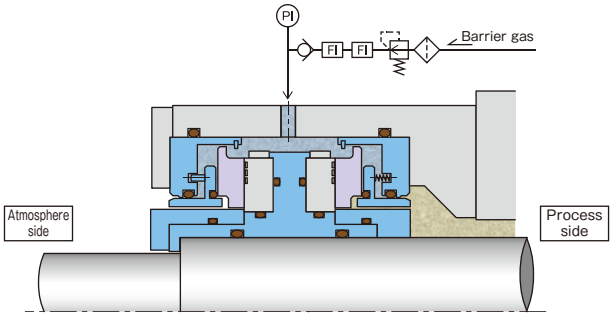
Tandem seal arrangement

For compressors, the PPG3S is generally used as a tandem seal.



Double seal arrangement

When toxic gases such as chlorine gas are not allowed to flow to the atmosphere side, the PPG3S is used as a double seal.
In particular, this arrangement is suitable for high-speed blowers for toxic gases.



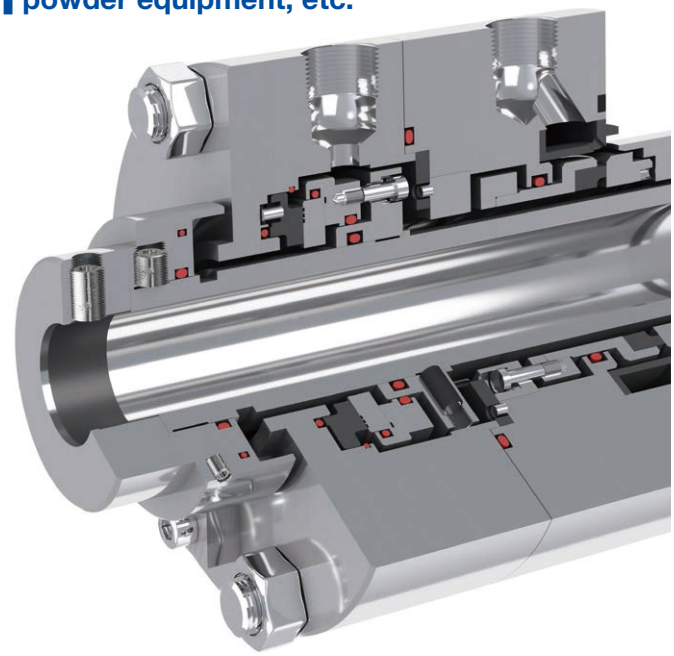
PILLAR Phoenix-Seal™

Type PPG (Aerodynamic type, dry gas seal)

Medical/ pharmaceutical/ clean | Oil refinery/ petrochemical | Energy/ environment | Chemical | Mixer/low-speed rotary machine | Powder equipment | Compressor/ blower

Examples of applicable devices

For containment seals, blowers, powder equipment, etc.

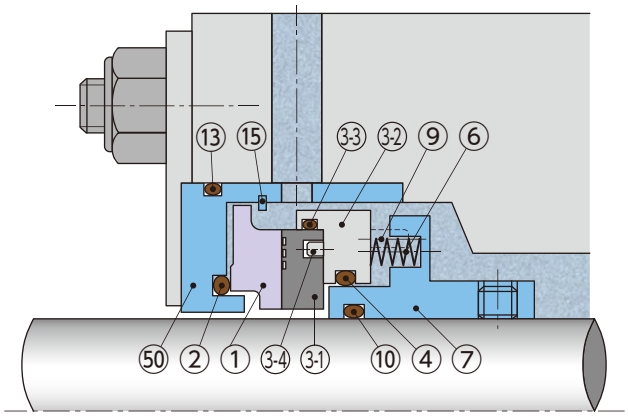


- This aerodynamic seal is provided with PILLAR-specific grooves on the seal face to make effective use of dynamic pressure through multiple barriers.
- A rotary type dry gas seal structure is adopted for simplicity and compactness.
- In addition to pressurized dual arrangement, this product can also be utilized as a containment seal.

■ Specification conditions

Speed (m/s)	Pressure (MPaG)
5 to 20	1 max.

PPG1R: Basic structure and materials



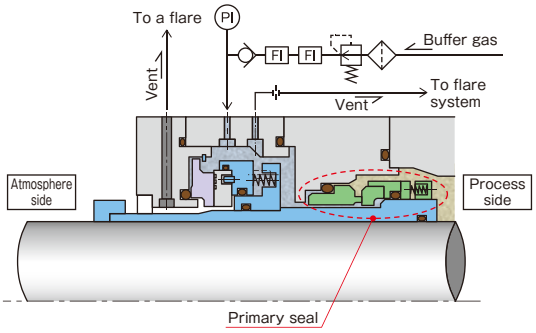
■ Standard materials

No.	Part name	Material	Qty
1	Stationary ring	Carbon	1
2	O-ring	—	1
3-1	Rotating ring	SiC	1
3-2	Retainer	SUS304 or equiv.	1
3-3	O-ring	—	1
3-4	Pin	SUS316 or equiv.	1S
4	O-ring	—	1
6	Spring	SUS304 or equiv.	1S
7	Spring retainer	SUS304 or equiv.	1
9	Drive pin	SUS304 or equiv.	1S
10	O-ring	—	1
13	O-ring	—	1
15	Snap ring	SUS304 or equiv.	1
50	Seal case	SUS304 or equiv.	1

Application examples of PPG1R

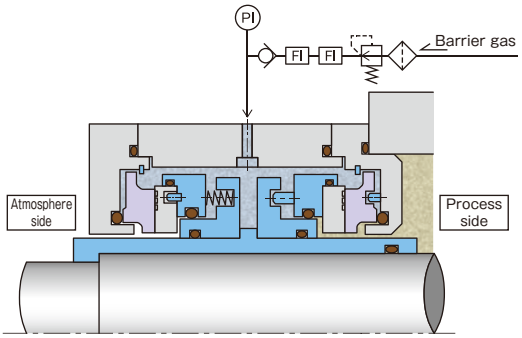
Containment seal

The rotary type dry gas seal can also be used as a containment seal. (For use in high-load areas, select Type PPG6S.)



Double seal arrangement

If this product is used only under low PV conditions, the double seal arrangement can be applied to blowers or similar devices.



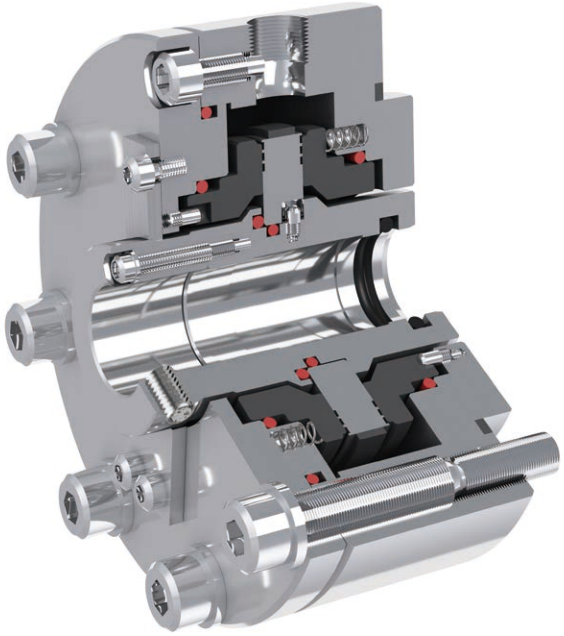
PILLAR Phoenix-Seal™

Type PPG (Aerodynamic type, double seal arrangement)

Medical/ pharmaceutical/ clean | Oil refinery/ petrochemical | Energy/ environment | Chemical | Mixer/low-speed rotary machine | Compressor/ blower

Examples of applicable devices

For pumps, blowers, and upper seals for vertical mixers

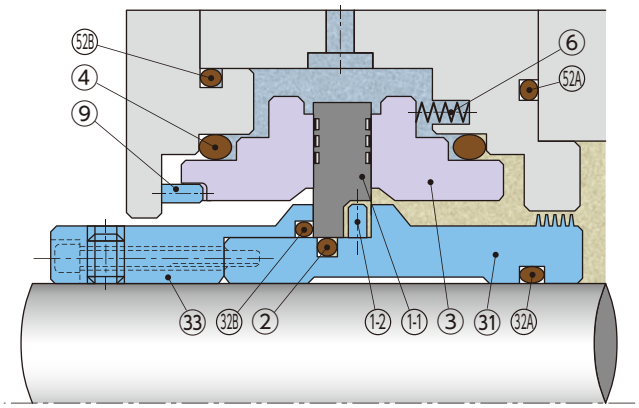


- This aerodynamic seal is provided with PILLAR-specific grooves on the seal face to make effective use of dynamic pressure through multiple barriers.
- This product employs a structure where grooves are arranged on both surfaces of the rotating ring. This results in a compact design.
- As a liquid seal for pumps and other devices, this product can be effectively applied to “high-viscosity fluid,” “slurry fluid,” and “polymerizable fluid,” sensitive to sliding heat.
- This product can be utilized as an upper seal for mixers.

■ Specification conditions

Speed (m/s)	Pressure (MPaG)
3 to 40	1.6 max.

PPG4S: Basic structure and materials



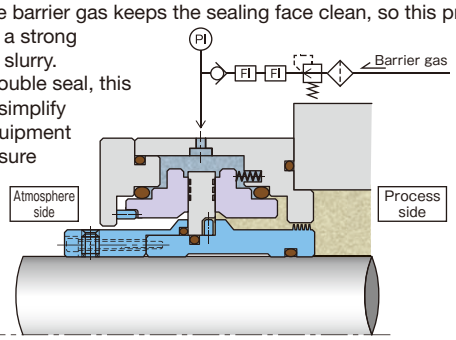
■ Standard materials

No.	Part name	Material	Qty
1-1	Rotating ring	SiC	1
1-2	Pin	SUS304 or equiv.	1
2	O-ring	—	1
3	Seal ring	Carbon	2
4	O-ring	—	2
6	Spring	SUS304 or equiv.	1S
9	Pin	SUS316 or equiv.	1S
31	Sleeve	SUS304 or equiv.	1
32A	O-ring	—	1
32B	O-ring	—	1
33	Stopper ring	SUS304 or equiv.	1
52A	O-ring	—	1
52B	O-ring	—	1

Pump seal

Sealing fluid with a dry gas seal provides a variety of advantages.

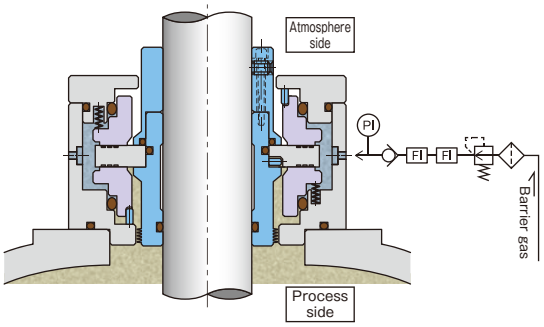
- The liquid contained can be completely sealed.
- Because the sealing face has no contact during operation, sliding heat can be suppressed. This product is suitable for liquids sensitive to heat. Moreover, the barrier gas keeps the sealing face clean, so this product also features a strong resistance to slurry.
- Despite its double seal, this product can simplify incidental equipment such as pressure units.



Upper seal for mixers

The compactly designed PPG4S (aneroid dual gas seal) can be used as a mixer top seal.

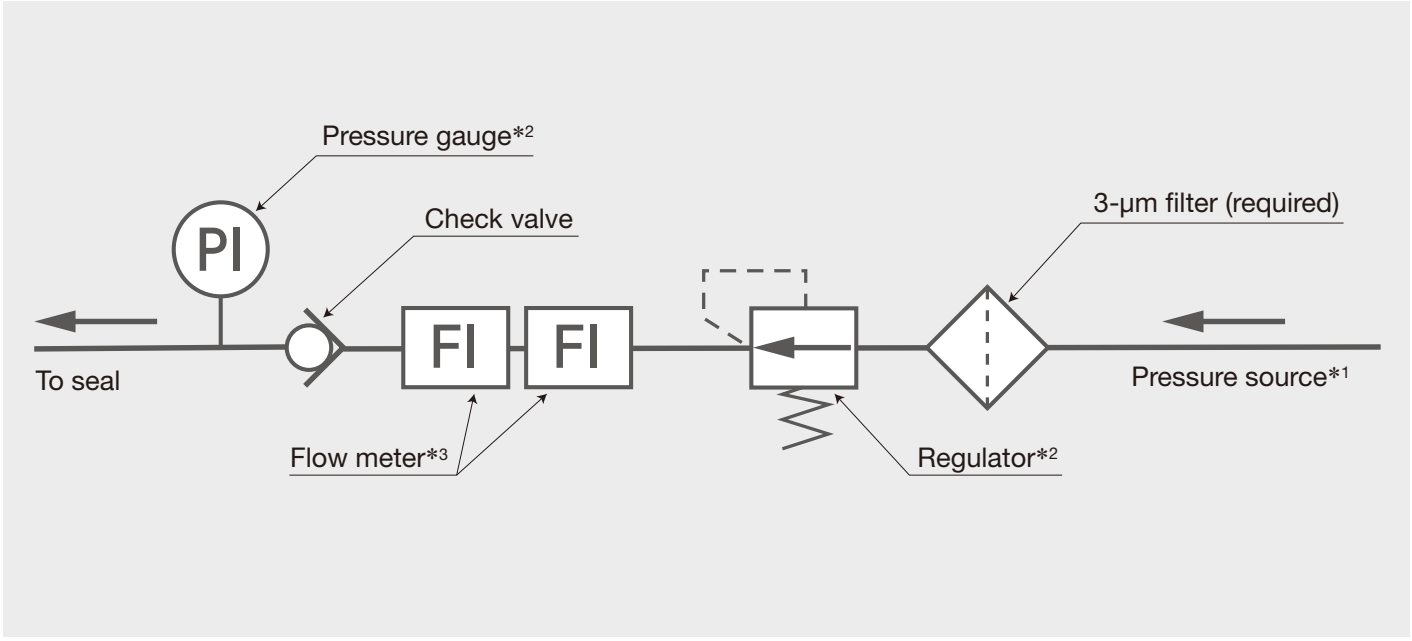
- Process gas is completely sealed with this seal unit.
- Expensive incidental equipment such as pressure units is not required.
- Because of the compact design, modification from gland packings is possible.



Guide to accessories and auxiliary devices

For dry gas seals, the performance of the seal itself, as well as selection and management of accessories and auxiliary devices determines reliability, longevity, and other factors for the entire system.
We propose a barrier gas supply system that is optimized according to our past achievements.

Recommended barrier gas supply flow for Type PPG



*1 Pressure source must secure sufficient flow rates and must also be stable.
*2 Regulators and pressure gauges must be oil-free types.
*3 For flow meters, we recommend a system that can measure a wide range of flow rates by using two flow meters with different measurement ranges in tandem.

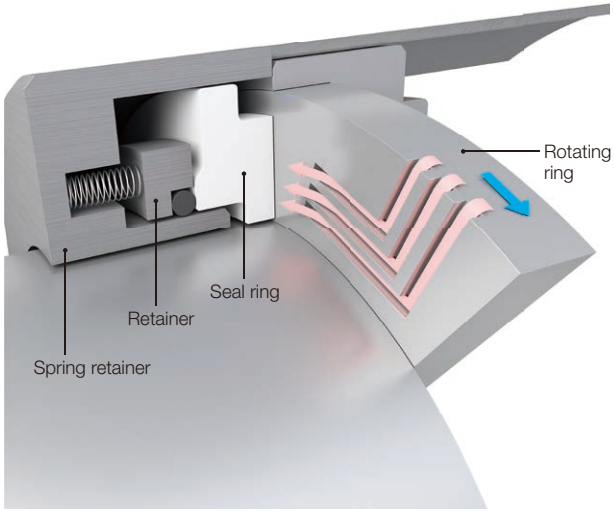
Applying PILLAR's original aerodynamic type non-contact dry gas seal technology to containment seals
PILLAR Phoenix-Seal Type PPG6S

PPG6S seal technology

Containment seals cannot allow even a slight amount of gaseous fluid to leak from the inner seal and escape into the atmosphere, especially in the event of an emergency.
One of our solutions is horizontal deployment of our dry gas seal technology that we have cultivated through our past applications, such as compressors.

Aerodynamic type non-contact dry gas seal mechanism

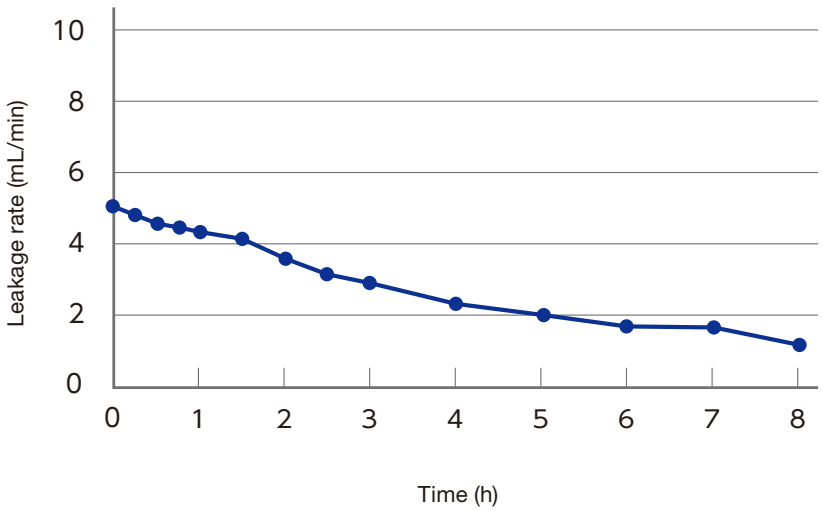
When the shaft rotates, the grooves engraved on the rotating ring generate pressure (called "dynamic pressure") between the rotating ring and the seal ring.
This dynamic pressure keeps the seal ring floating by several μm.
The amount of seal ring floating is as small as only several μm, making the amount of liquid leakage extremely small, at 1/1000 or less the degree in comparison with a labyrinth seal.
The seal face maintains a non-contact state during operation, minimizing motive power consumption, as well as providing various characteristics such as being lubricating oil free and having a long service life.



Maximum pressure test results of PPG6S

■ Testing conditions

Size	Fluid	Pressure	Speed	Flow rate	Time
048	Water	4.2 MPaG	3600 min^{-1}	0 L/min	8 h

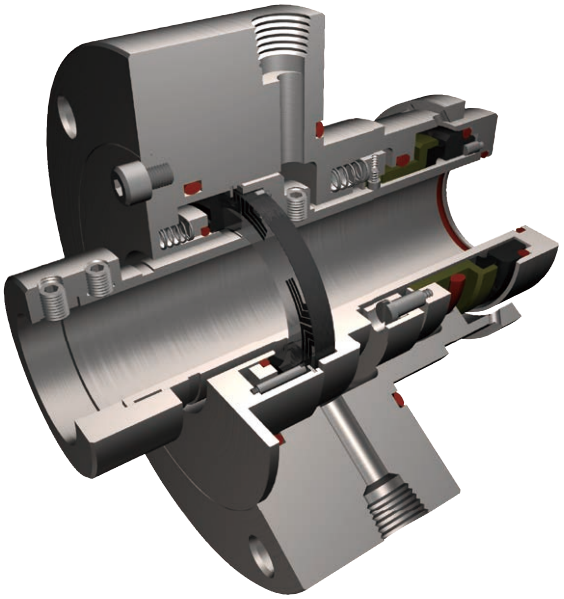


PILLAR Phoenix-Seal™

Type PPG (Aerodynamic type non-contact containment seal)

Oil refinery/ petrochemical | Energy/ environment | Chemical | Pump

Example of applicable devices
For containment seals



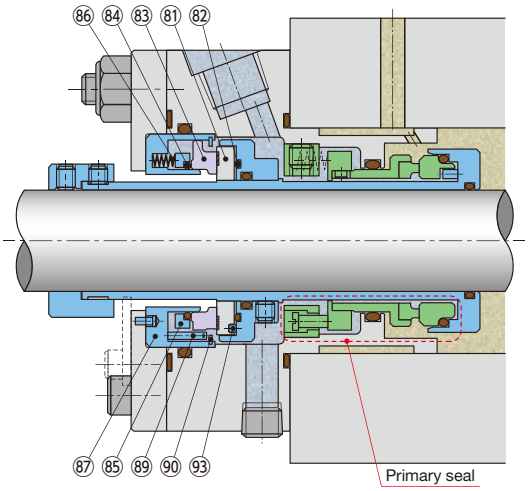
- This non-contact containment seal is designed to correspond with API 682 Seal Flush Plan 70s.
- This aerodynamic seal is provided with PILLAR-specific grooves on the seal face to make effective use of dynamic pressure through multiple barriers.
- This product is effective when leaked objects from the main seal are “vaporizable fluids.”

Specification conditions

Speed (m/s)	Pressure (MPaG)
5 to 25	*1

Note *1 This model can be operated as a containment seal under a pressure of 4.2 MPaA for at least eight hours in the event of an emergency.

PPG6S: Basic structure and materials



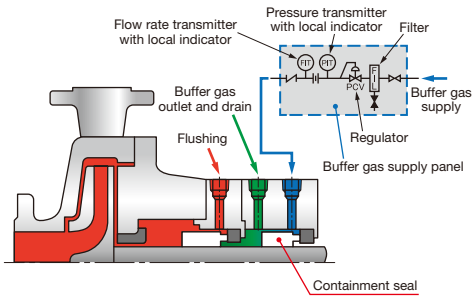
Standard materials

No.	Part name	Material	Qty
81	Rotating ring	SiC	1
82	O-ring	FKM	1
83	Seal ring	Carbon	1
84	O-ring	FKM	1
85	Retainer	SUS316 or equiv.	1
86	Spring	Alloy C-276	1S
87	Spring retainer	SUS316 or equiv.	1
89	Pin	SUS316 or equiv.	1S
90	Snap ring	SUS316 or equiv.	1
93	Pin	SUS316 or equiv.	1

API 682 PLAN 72+76

PLAN 72 and PLAN 76 are examples of API 682 Seal Flush Plan 70s.

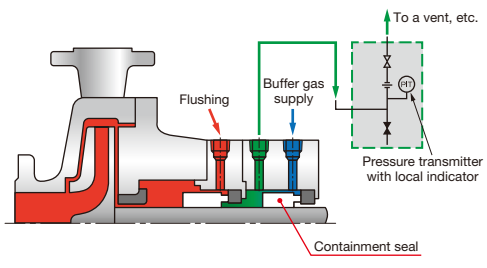
PLAN 72



Description
- This is a buffer gas supply system for unpressurized tandem seals with a containment seal.
- This is used in combination with API 682 Seal Flush Plan 75 or 76.

Features
- Buffer gas is supplied to dilute leaked gas from the primary seal and minimize leakage into the atmosphere.
- Cooling the primary seal is separately required.

PLAN 76



Description
- This is a leakage detection system for unpressurized tandem seals with a containment seal.

Features
- This plan is used when the sealed liquid is a liquid that becomes gas at a normal temperature and under atmospheric pressure (such as LPG). Gas leaked from the primary seal is discharged to a flare system or similar system.
- When a large amount of gas leaks from the primary seal, the pressure changed by the orifice installed on the flare piping is detected with a pressure gauge or pressure transmitter.

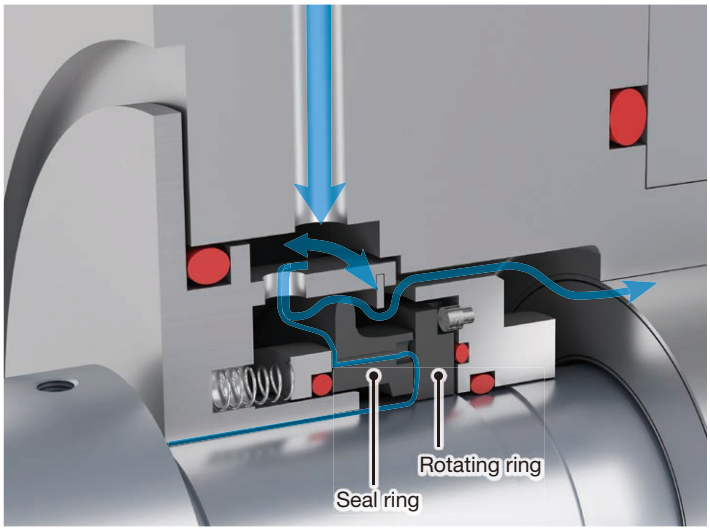
Type RRG30 (Dry-contact containment seal)

RRG30 seal mechanism

This product is an API 682 Seal Flush Plan 70s containment seal that is always used under dry conditions.
The extension of general dry running seal technologies cannot cope with such harsh conditions.
Type RRG30 is PILLAR's dry running type solution that satisfies the safety, reliability, and longevity expected by API 682.

Semi-floating double circular seal ring

Clean buffer gas supplied from the back of the seal ring reaches the seal face through the through-hole and circumferential groove in the seal ring. The buffer gas is then sent separately to the inner circumference (on the inner seal side) and outer circumference (on the atmospheric air side) on the seal face, causing the seal ring to enter a semi-floating state.
As a result, the surface pressure on the seal face becomes extremely small, making it possible to minimize sliding heat and wear.



PILLAR's original "semi-floating double circular seal ring"

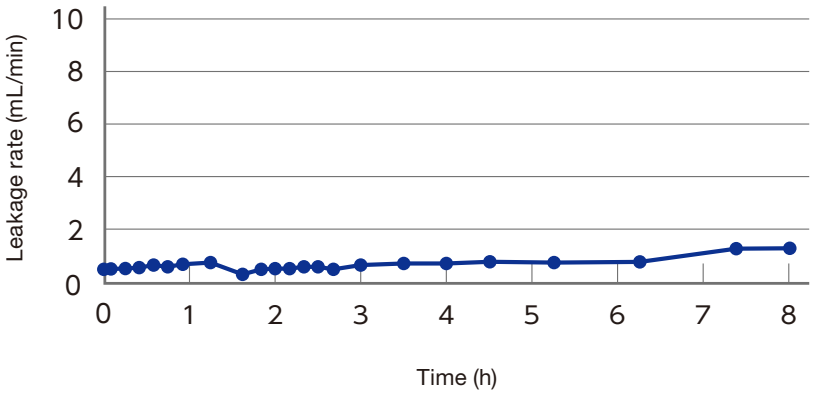
"Special carbon material" with strengthened dry sliding characteristics is used as a seal face material

We can also handle specifications that do not supply buffer gas.

Maximum pressure test results of RRG30

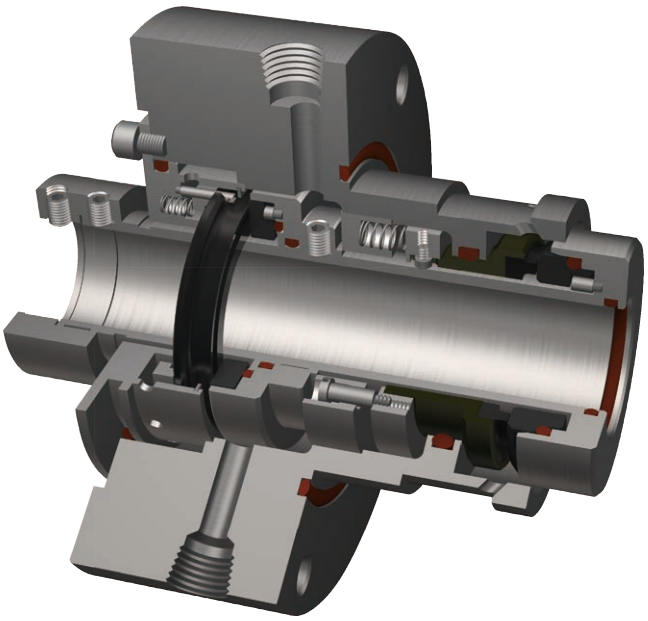
■ Testing conditions

Size	Fluid	Pressure	Speed	Flow rate	Time
048	Water	4.2 MPaG	3600 min^{-1}	2 L/min	8 h



Oil refinery/ petrochemical | Energy/ environment | Chemical | Pump

Type RRG30 (Dry-contact containment seal)



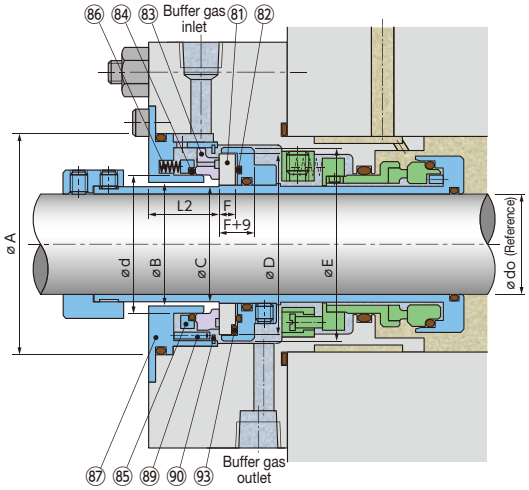
- This dry-contact containment seal is designed to correspond with API 682 Seal Flush Plan 70s.
- The seal face has double sliding surfaces to reduce load, using a special carbon. This product has a long service life even if it is used under dry conditions.
- This product allows the customer to select whether to supply buffer gas (Plan 72).
- This product is applicable even if leaked objects from the main seal are either vaporizable fluids or non-vaporizable fluids.

■ Specification conditions

Speed (m/s)	Pressure (MPaG)
21 max.	∗1

Note: The nominal size is ϕ30 to ϕ130.
∗1 This model can be operated as a containment seal under a pressure of 4.2 MPaA for at least eight hours in the event of an emergency.

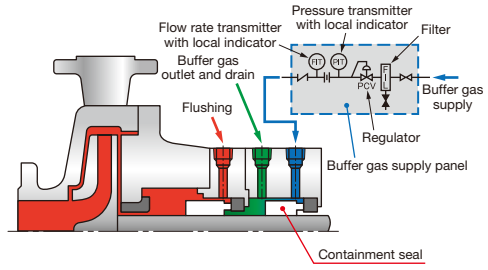
RRG30: Basic structure and materials



■ Standard materials

No.	Part name	Material	Qty
81	Rotating ring	SiC	1
82	O-ring	FKM	1
83	Seal ring	Carbon D4	1
84	O-ring	FKM	1
85	Retainer	SUS316 or equiv.	1
86	Spring	Alloy C-276	1set
87	Spring retainer	SUS316 or equiv.	1
89	Pin	SUS316 or equiv.	4
90	Snap ring	SUS316 or equiv.	1
93	Pin	SUS316 or equiv.	1

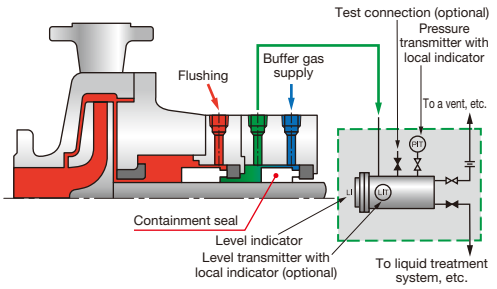
PLAN 72



Description
- This is a buffer gas supply system for unpressurized tandem seals with a containment seal.
- This is used in combination with API 682 Seal Flush Plan 75 or 76.

Features
- Buffer gas is supplied to dilute leaked gas from the primary seal and minimize leakage into the atmosphere.
- Cooling the primary seal is separately required.

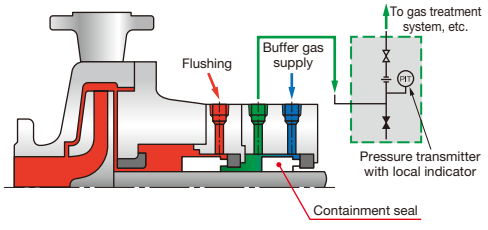
PLAN 75



Description
- This is a leaked liquid collection system for unpressurized tandem seals with a containment seal.

Features
- This plan is used when the sealed liquid is a liquid at normal temperature and under atmospheric pressure. Leaked fluid is separated into gas and liquid components by the drain tank, liquid is collected, and gas is discharged to a flare system.
- When a large amount of liquid leaks from the primary seal, the pressure changed by the orifice installed on the flare piping is detected with a pressure gauge or pressure transmitter.

PLAN 76



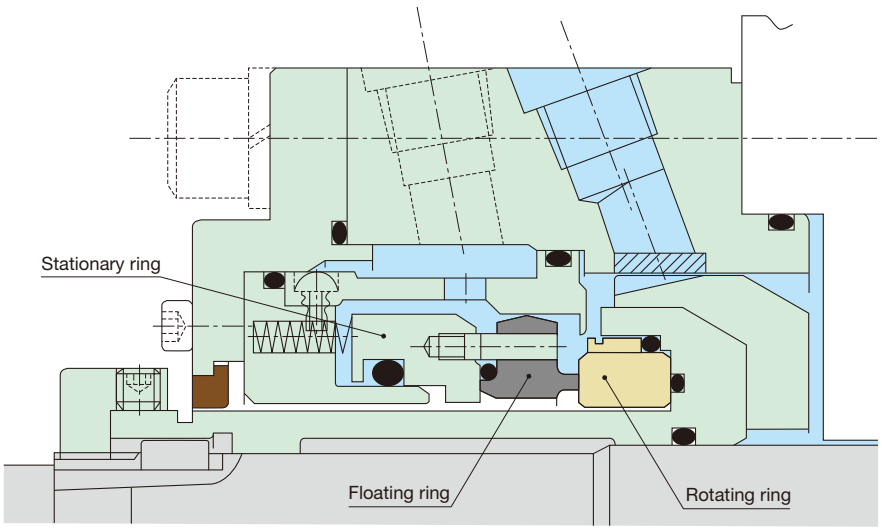
Description
- This is a leakage detection system for unpressurized tandem seals with a containment seal.

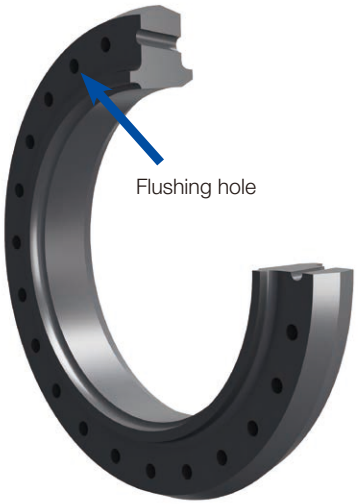
Features
- This plan is used when the sealed liquid is a liquid that becomes gas at a normal temperature and under atmospheric pressure (such as LPG). Gas leaked from the primary seal is discharged to a flare system or similar system.
- When a large amount of gas leaks from the primary seal, the pressure changed by the orifice installed on the flare piping is detected with a pressure gauge or pressure transmitter.

Floating ring type mechanical seal

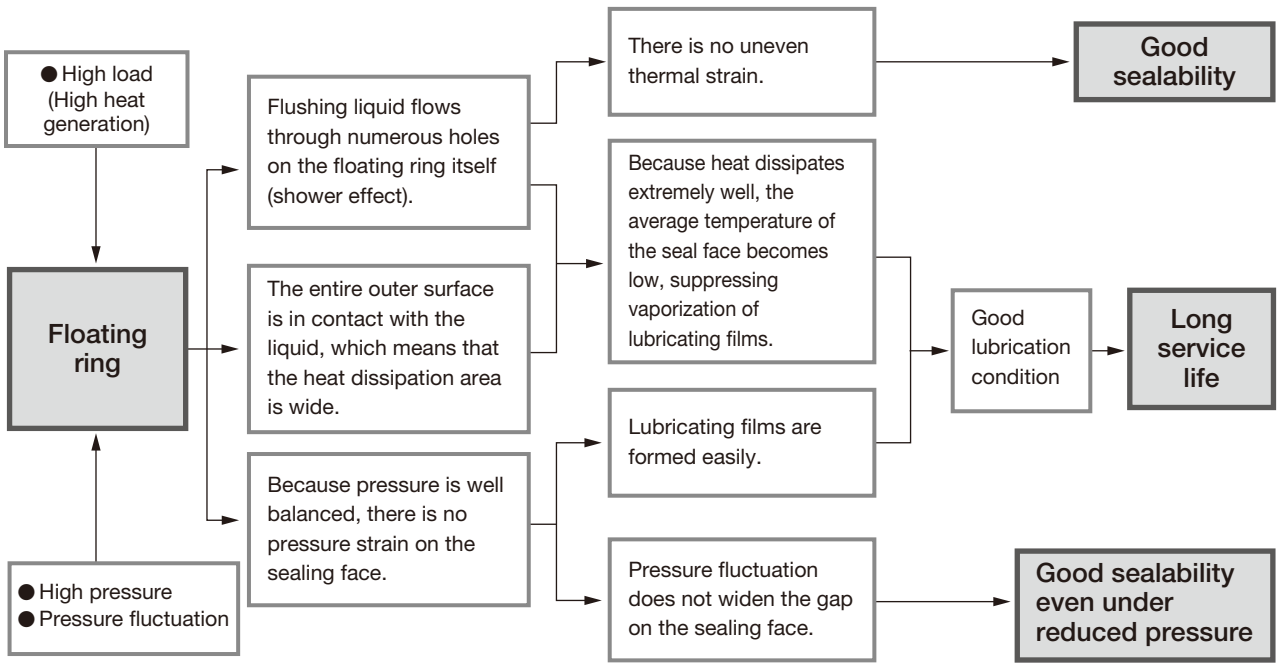
The floating ring type mechanical seal is a seal that has been developed to provide stable sealing performance under high-pressure, high-velocity conditions.
A large number of mechanical seals of this type have been delivered to important plants around the world. Main applications include boiler feed pumps for thermal power plants and high-pressure pumps for fertilizer plants, which are expected to increase in the future.

Structure





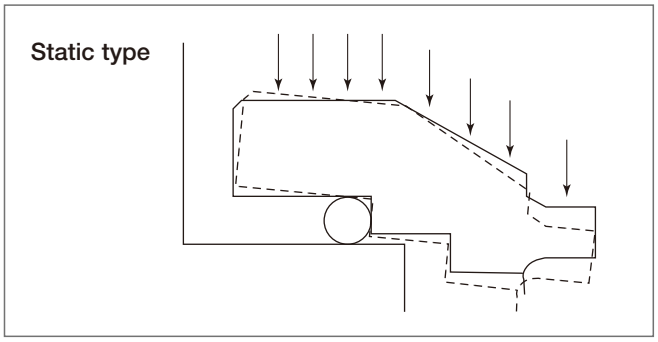
PILLAR floating ring type mechanical seal solutions

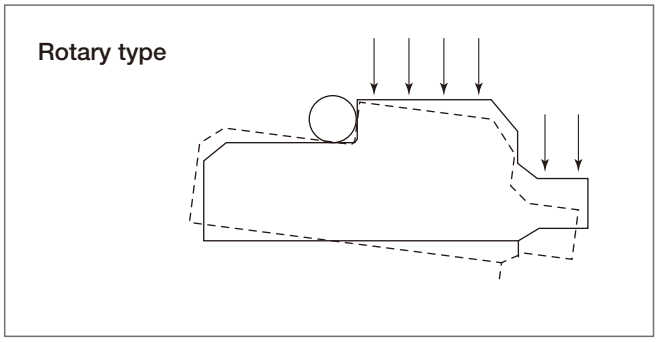


Features

Suitable design for high operating pressure

For general seals, the high-pressure fluid causes deformation of the seal face, creating a convexity of the outer diameter, as shown in the figure below. In this case, it is difficult to form a thin fluid film (lubricating film) between the seal faces due to the extreme contact of the outer diameter, resulting in poor lubrication, which can lead to a rough surface and premature wear of the carbon.

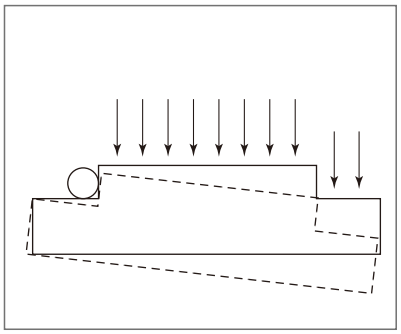


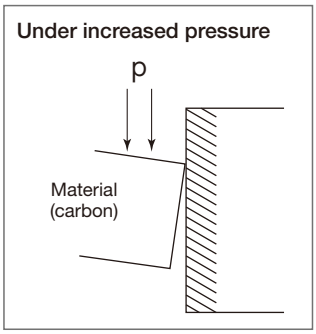


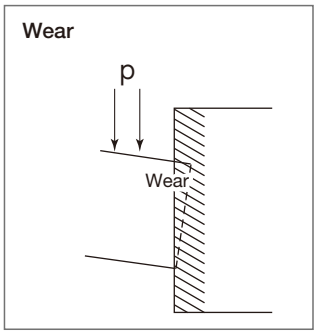
For floating ring type mechanical seals, the floating ring shape is almost bilaterally symmetrical and fluid pressure is used to keep pressure balance. Therefore, the seal does not cause pressure strain that would tilt the seal face (flatness is maintained) and lubricating films are formed stably.

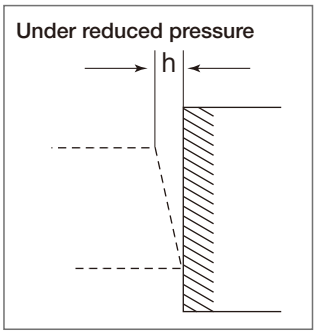
Resistant to pressure fluctuation

For general seals, as mentioned above, the high-pressure fluid deforms the seal face so that it becomes convex in the outer diameter. Once the seal is worn out, upon pressure reduction, the deformation is relaxed and restored, resulting in a wedge-shaped gap on the outer diameter side of the seal face, which reduces sealing performance and increases the amount of leakage.

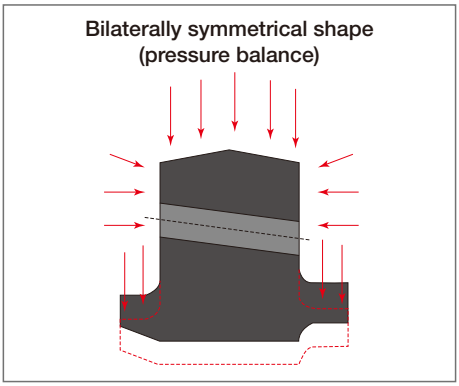






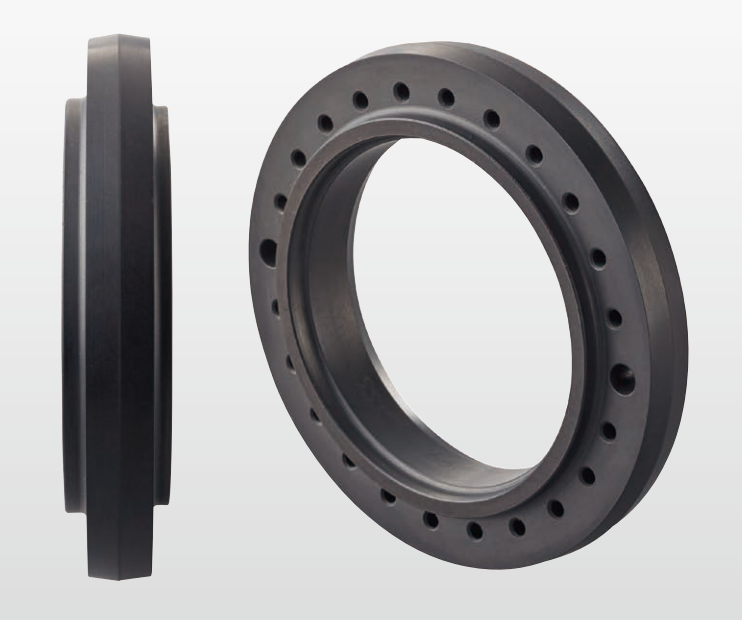


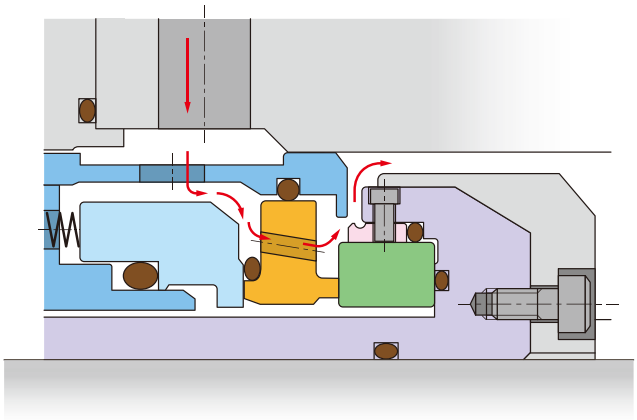
For floating rings, pressure balance hardly causes the fluid pressure to deform the outer surface of the seal face. Therefore, when the pressure decreases, no gap occurs on the seal face, allowing sealability to be maintained.



Suitable design for high load conditions

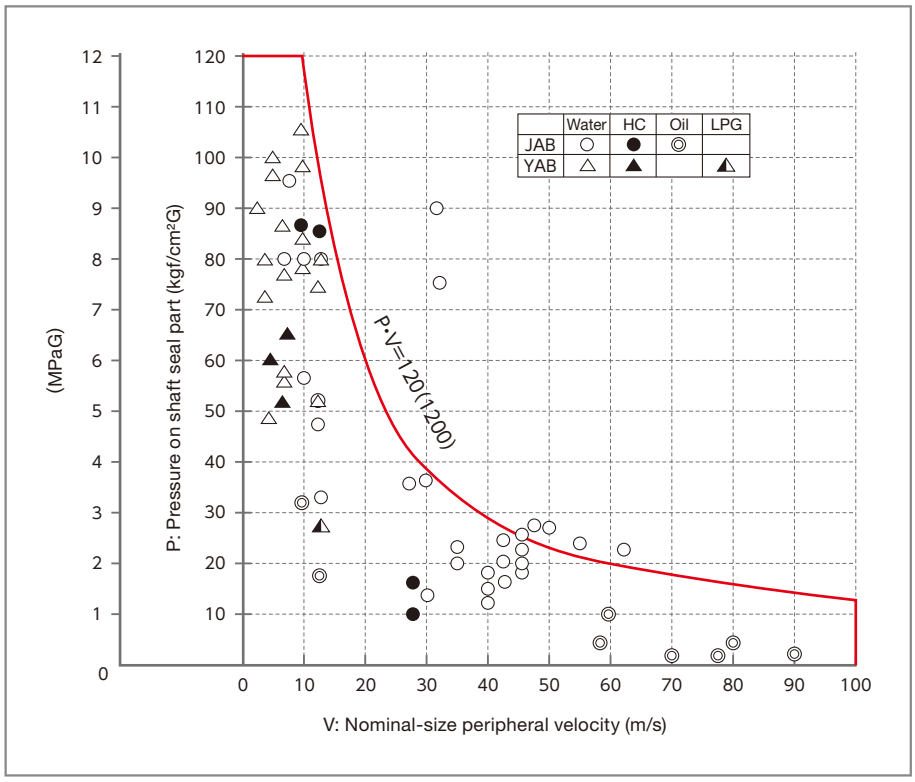
The floating ring has multiple holes through which flushing liquid flows to cool the floating ring itself effectively from inside. It also enables the seal face to be cooled evenly on the circumference, so that the lubrication condition of the seal face can be maintained in good condition. Therefore, stable sealing performance can be provided under high-pressure, high-velocity conditions.





Supply records (extracts)

The floating ring type mechanical seal is a seal that is designed for use under high pressure, high speeds, and pressure fluctuation. It is mainly used in boiler water circulation pumps and boiler feed pumps for thermal power generation and private power generation, as well as reactor feed pumps, reactor water purification system circulation pumps, residual heat removal pumps, and other pumps for nuclear power generation.

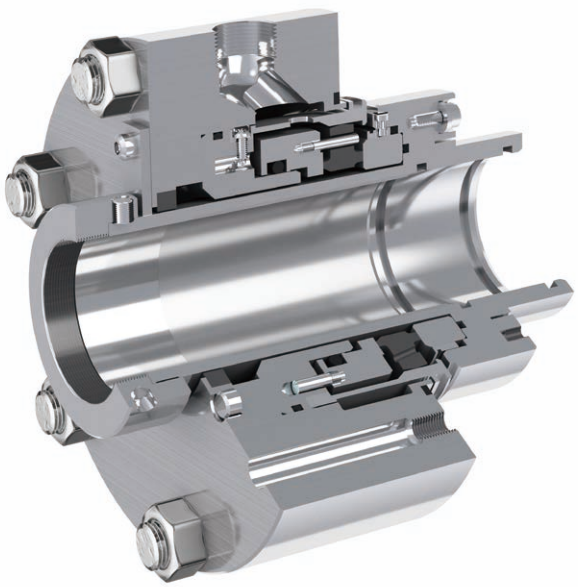


MECHANICAL SEAL

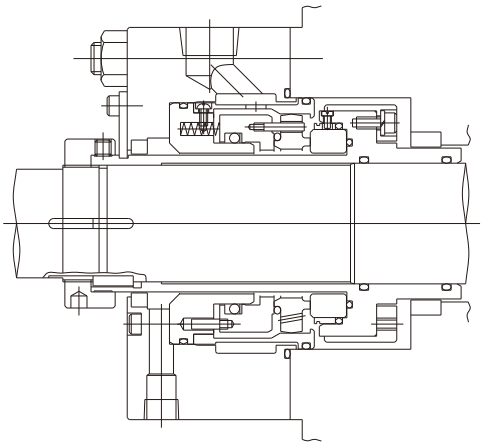
JAB

Floating ring type mechanical seal (Static type)

Oil refinery/ petrochemical | Energy/ environment | Chemical | Pump



- This seal is suitable for use under high load conditions. It provides stable sealability under high velocity, high pressure, and significant pressure fluctuation conditions.
- This product has a structure resistant to significant pressure fluctuations through the use of an almost bilaterally symmetrical floating ring made of carbon.
- Numerous flushing holes on the floating ring are designed to eliminate sliding heat effectively.
- This product adopts a static type structure to allow application under even higher load conditions.



■ Specification conditions

Speed (m/s)	Pressure (MPaG)
80 max.	10 max.

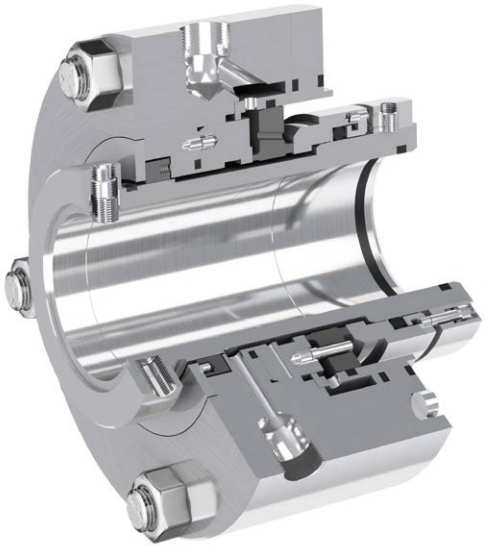
Note: The nominal size is ϕ50 to ϕ250.

MECHANICAL SEAL

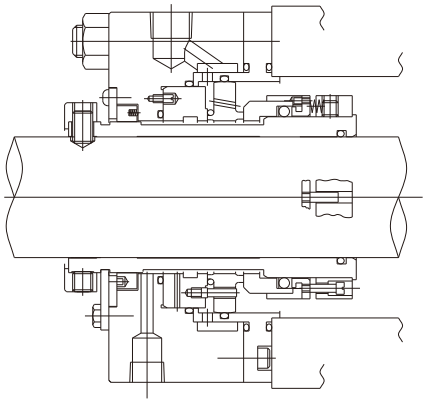
YAB

Floating ring type mechanical seal (Rotary type)

Oil refinery/ petrochemical | Energy/ environment | Chemical | Pump



- This seal is suitable for use under high load conditions. It provides stable sealability under high pressure and significant pressure fluctuation conditions.
- This product has a structure resistant to significant pressure fluctuations through the use of an almost bilaterally symmetrical floating ring made of carbon.
- Numerous flushing holes on the floating ring are designed to eliminate sliding heat effectively.
- This product adopts a rotary type and compact structure.



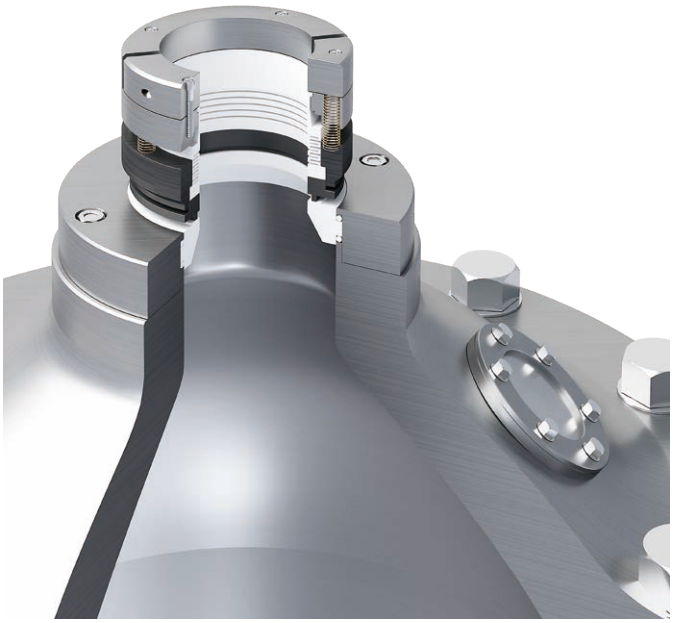
■ Specification conditions

Speed (m/s)	Pressure (MPaG)
20 max.	10 max.

Note: The nominal size is ϕ35 to ϕ130.

Dry-contact seal, Chemimighty

Medical/ pharmaceutical/ clean | Oil refinery/ petrochemical | Chemical | Mixer/low-speed rotary machine



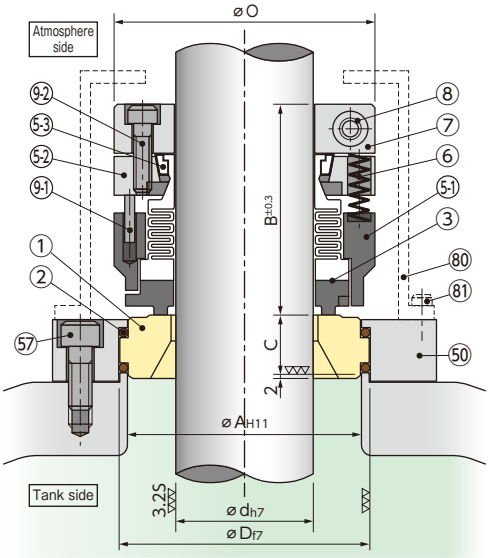
- This dry seal is best suited for sealing the shafts of vertical mixers.
- This dry-contact seal adopts “PTFE bellows” to provide excellent corrosion resistance.
- The wetted parts are made up of PTFE bellows and a stationary ring made of ceramic.
  Because no metal parts are in contact with canister gas, this product provides excellent corrosion resistance and effective measures to reduce contamination.
- No set screws are used to secure this product, so it can be used for lining tanks.
- Seal face materials can be selected according to the specifications.

■ Specification conditions

Speed (m/s)	Pressure (MPaG)	Temperature (℃)
1.5 max.	FV to 0.5	0 to 175 ∗1

Note ∗1 For temperatures below 0°C or above 175°C, purge gas and flange jackets are required separately.

Basic structure and materials



■ Standard materials

No.	Part name	Material	Qty
1	Stationary ring	Ceramic	1
2	O-ring	PTFE containing glass fibers	2
3	Seal ring and bellows	PTFE containing filler, and PTFE	1
5-1	Spring retainer	PTFE containing carbon	1
5-2	Drive collar	SUS316 or equiv.	1
5-3	Adapter	SUS316 or equiv.	1
6	Spring	Alloy 20	1 s
7	Stopper ring	SUS316 or equiv.	1
8	Hexagon socket head bolt	SUS316L or equiv.	2
9-1	Drive pin	SUS316 or equiv.	1 s
9-2	Hexagon socket head bolt	SUS316L or equiv.	1 s

■ Optional parts

No.	Part name	Material	Qty
50	Flange	SUS304 or equiv.	1
57	Hexagon socket head bolt	SUS304 or equiv.	1 s
80	Acrylic cover	Acryl	1
81	Hexagon socket head bolt	SUS304 or equiv.	1 s

Seal ring made of PTFE containing carbon fibers

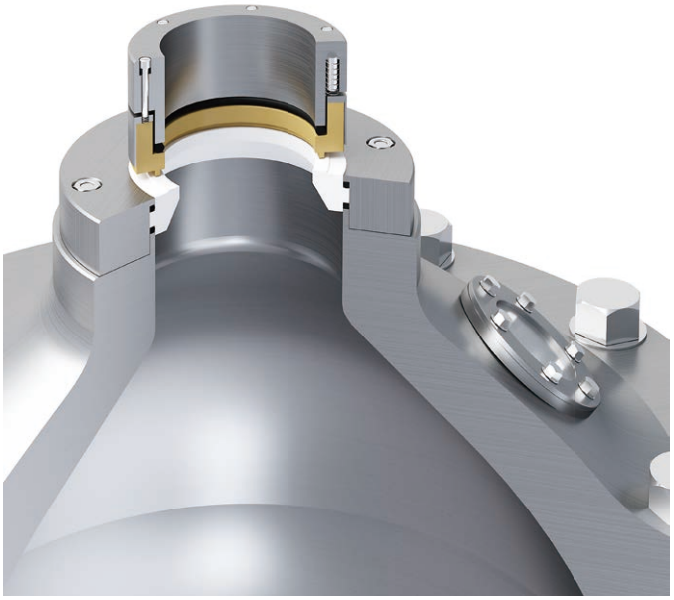
Seal ring made of PTFE containing special filler

Seal ring materials can be selected according to the specifications.
∗ The scope of application differs according to the material.

EAB

Dry-contact seal, Chemimighty Ⅱ

Medical/ pharmaceutical/ clean | Oil refinery/ petrochemical | Chemical | Mixer/low-speed rotary machine



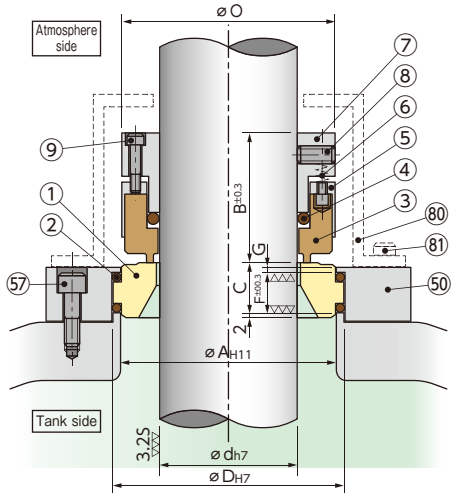
- This dry seal is best suited for sealing the shafts of vertical mixers.
- This product is a general-purpose dry-contact seal that uses a synthetic rubber O-ring as the shaft packing.
- PTFE containing filler and a stationary ring made of ceramic are adopted as the seal face materials.
  Because no metal parts are in contact with canister gas, this product provides excellent corrosion resistance and effective measures to reduce contamination.
- Seal face materials can be selected according to the specifications.

■ Specification conditions

Speed (m/s)	Pressure (MPaG)	Temperature (℃)
1.5 max.	FV to 0.5	0 to 175 ∗1

Note ∗1 For temperatures below 0°C or above 175°C, purge gas and flange jackets are required separately.

Basic structure and materials



■ Standard materials

No.	Part name	Material	Qty
1	Stationary ring	Ceramic	1
2	O-ring	—	2
3	Seal ring	PTFE containing filler	1
4	O-ring	—	1
5	Drive collar	SUS316 or equiv.	1
6	Spring	Alloy 20	1 s
7	Spring retainer	SUS316 or equiv.	1
8	Set screw	SUS316 or equiv.	1 s
9	Drive pin	SUS316 or equiv.	1 s

■ Optional parts

No.	Part name	Material	Qty
50	Flange	SUS304 or equiv.	1
57	Hexagon socket head bolt	SUS304 or equiv.	1 s
80	Acrylic cover	Acryl	1
81	Hexagon socket head bolt	SUS304 or equiv.	1 s

Seal ring made of PTFE containing special filler

Seal ring made of PTFE containing carbon fibers

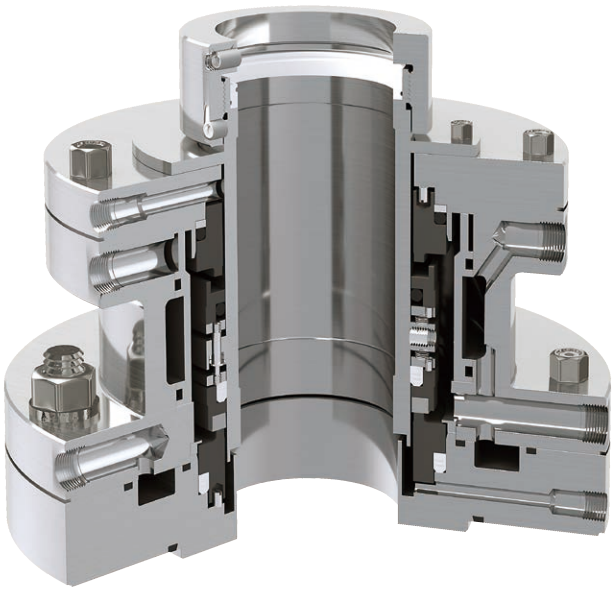
Seal ring materials can be selected according to the specifications.
∗ The scope of application differs according to the material.

MECHANICAL SEAL

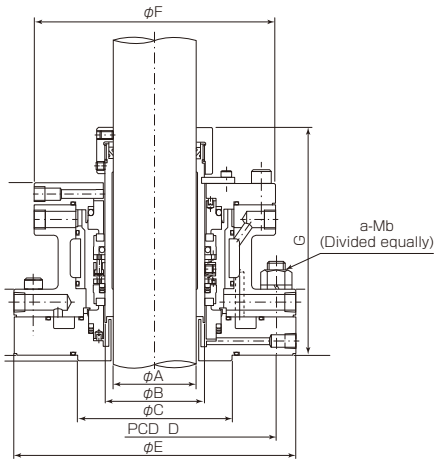
NU type

Mixer seal unit, unbalanced type (without bearing)

Oil refinery/ petrochemical | Chemical | Mixer/low-speed rotary machine



- This product is a rotary unbalanced type standard double seal for mixers. It is used for relatively low-pressure mixers.
- The mechanical seal unit is structured to have no bearings.
- A variety of customized designs can be provided according to the customer's specifications.



■ Specification conditions

Speed (m/s)	Pressure (MPaG)
2 max.	FV to 1

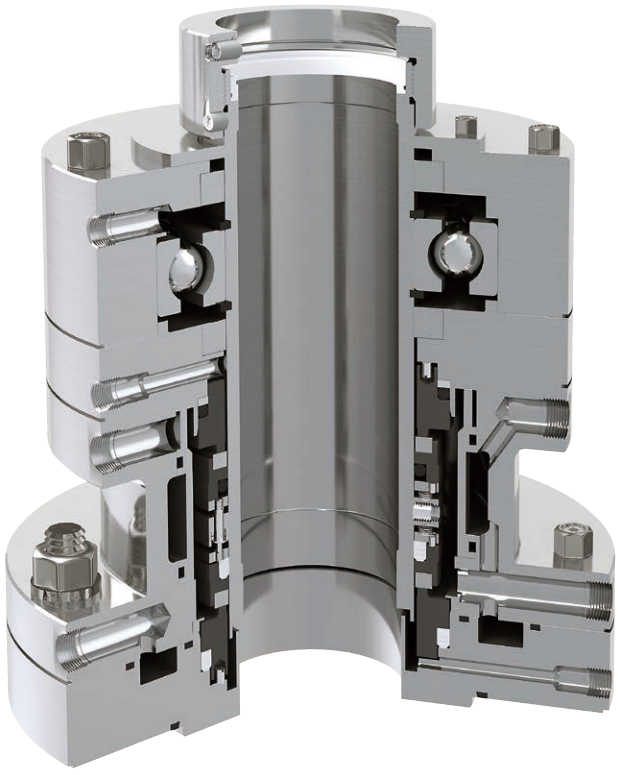
Note: For specifications other than those shown above, various customizations can also be provided. If you are interested in our customization services, please consult with us.

MECHANICAL SEAL

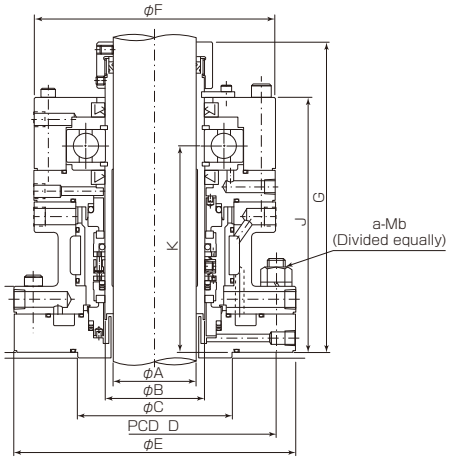
NUR type

Mixer seal unit, unbalanced type (with bearings)

Oil refinery/ petrochemical | Chemical | Mixer/low-speed rotary machine



- This product is a rotary unbalanced type standard double seal for mixers. It is used for relatively low-pressure mixers.
- The mechanical seal unit is designed to have bearings.
- A variety of customized designs can be provided according to the customer's specifications.



■ Specification conditions

Speed (m/s)	Pressure (MPaG)
2 max.	FV to 1

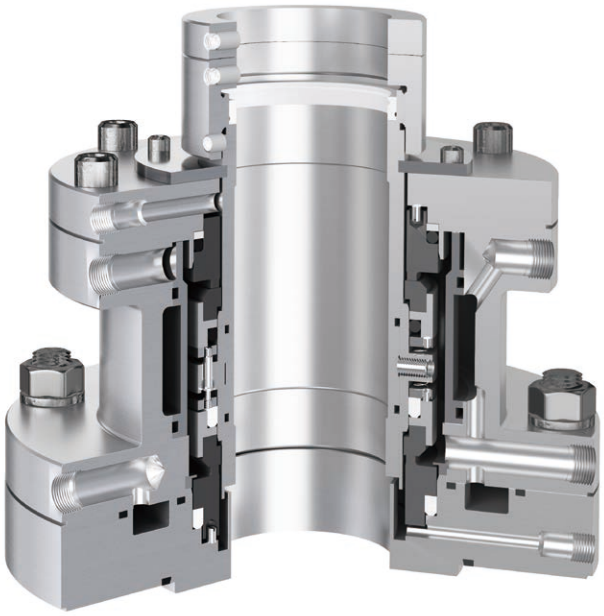
Note: For specifications other than those shown above, various customizations can also be provided. If you are interested in our customization services, please consult with us.

MECHANICAL SEAL

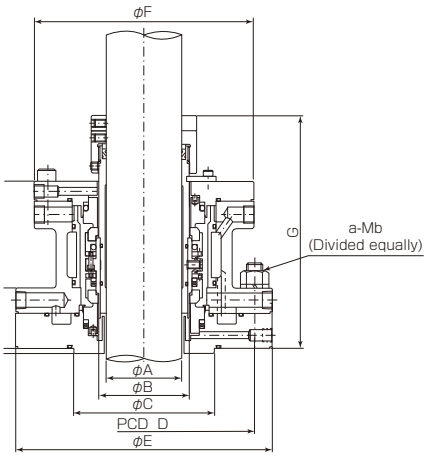
NB type

Mixer seal unit, balanced type (without bearing)

Oil refinery/ petrochemical | Chemical | Mixer/low-speed rotary machine



- This product is a rotary balanced type standard double seal for relatively high-pressure mixers.
- The mechanical seal unit is structured to have no bearings.
- A variety of customized designs can be provided according to the customer's specifications.



■ Specification conditions

Speed (m/s)	Pressure (MPaG)
2 max.	FV to 4

Note: For specifications other than those shown above, various customizations can also be provided. If you are interested in our customization services, please consult with us.

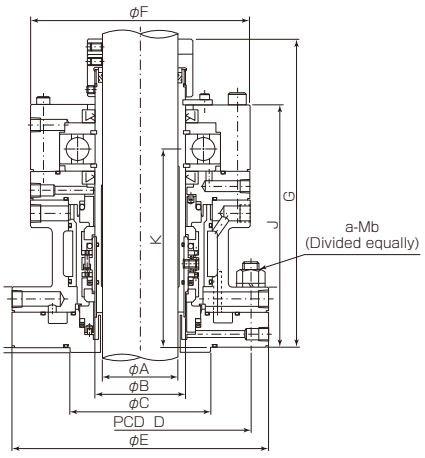
MECHANICAL SEAL

NBR type

Mixer seal unit, balanced type (with bearings)

Oil refinery/ petrochemical | Chemical | Mixer/low-speed rotary machine

- This product is a rotary balanced type standard double seal for relatively high-pressure mixers.
- The mechanical seal unit is designed to have bearings.
- A variety of customized designs can be provided according to the customer's specifications.



■ Specification conditions

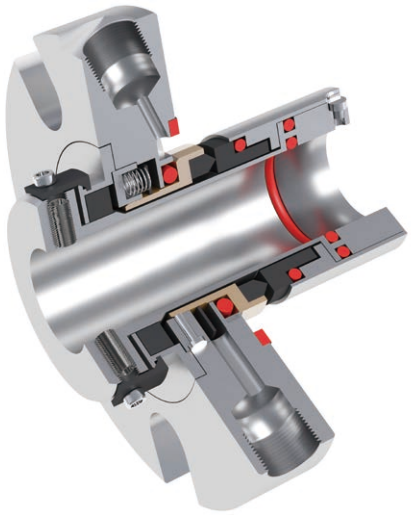
Speed (m/s)	Pressure (MPaG)
2 max.	FV to 4

Note: For specifications other than those shown above, various customizations can also be provided. If you are interested in our customization services, please consult with us.

PILLAR CASSETTE SEAL™ (Static-type cartridge seal)

Highly reliable static type mechanical seal

Because the sleeve is integrally designed, it does not cause shaft wear and provides stable performance for a long time. Moreover, springs are externally mounted, which resolves leakage originating from seal ring operability deterioration.



Product series lineup applicable to various fluids and conditions

Focusing on “type GAKEM,” which employs a knife edge seal, we also have added “type GABE5,” which handles high pressure, “type GXKEM,” which handles high-concentration slurry, and a tandem seal type.

“Four-action installation” that requires no assembly experience

Mechanical seal installation can be completed with only four actions.

Best suited for replacement of gland packing

Gland follower bolts can be reused and our product design is applicable to standard pumps compliant with ISO and DIN standards.

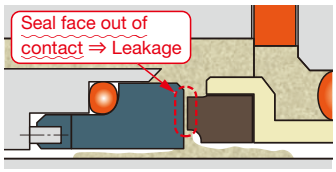
Features

Knife Edge technology

∗Incorporated in all models other than type GABE5

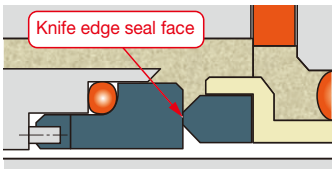
- Silicon carbide (SiC) is adopted as the seal face material. It provides excellent wear resistance and chemical resistance, and a long service life can also be expected.
- This product is particularly suitable for high-viscosity coagulable fluids that are difficult to maintain sealing performance.
- Because of small sliding heat and excellent cooling performance, this product can also be used without flushing, depending on the conditions.
- Because of little sliding resistance, this product features small energy loss.

Best suited for high-viscosity coagulable fluids



General mechanical seal

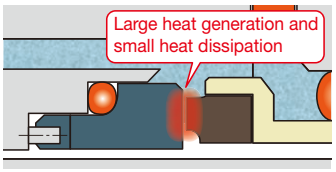
High-viscosity liquid gets caught or coagula are formed on the seal face, causing the sealing face to leave the shaft.



Knife edge seal

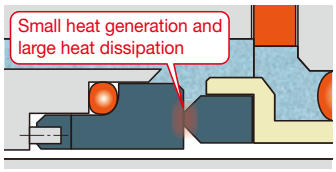
High surface pressure generated by the narrow face width prevents high-viscosity liquid from getting caught on the seal face, and cuts and eliminates coagula. The seal face hardly leaves the shaft, providing high sealability.

Small sliding heat and excellent cooling performance



General mechanical seal

Because the seal face is large and the amount of heat generated is large, if cooling is insufficient, lubricating film may be lost, resulting in seizure.



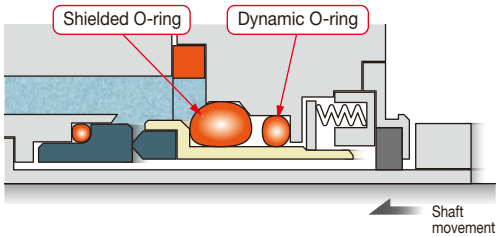
Knife edge seal

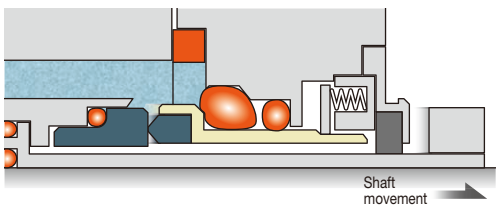
Because the seal face width is small, the amount of heat generated is small. Moreover, the heat dissipation area is large, providing excellent cooling performance.

Technology for resisting high-concentration slurry

∗Incorporated in type GXKEM

In addition to the general advantages of the knife edge seal, “type GXKEM” is additionally equipped with new mechanism “Shielded O-ring.” Cassette seals can now be applied to our services for even higher-concentration slurry.





The type GXKEM “Shielded O-ring” is made of special soft rubber.
This O-ring freely changes its shape by taking advantage of its flexibility and prevents slurry from intruding into the dynamic O-ring part while ensuring the followability of the seal ring.

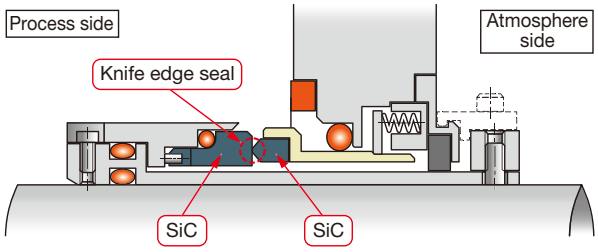
PILLAR CASSETTE SEAL™ (Static-type cartridge seal)

PILLAR Cassette Seal lineup

"PILLAR Cassette Seal" with a number of features such as static type cartridges and easy installation.
Focusing on "type GAKEM," we provide various models and options that can be applied to a wide range of operating conditions.

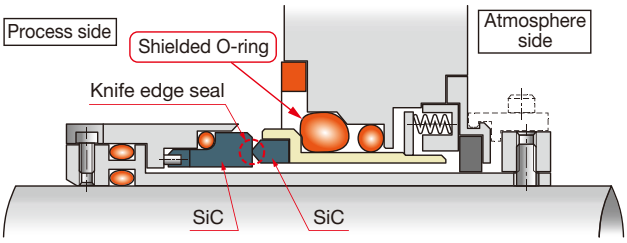
Standard knife edge seal Type GAKEM

The standard configuration of PILLAR Cassette Seal is SiC/SiC seal face materials and knife edge seal.



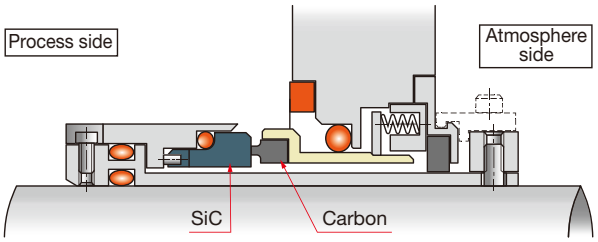
High-concentration slurry resistance type Type GXKEM

This type is equipped with a shielded O-ring to minimize the adverse effects of slurry on performance. It supports high-concentration slurry resistance specifications.



High-pressure resistance type Type GABE5

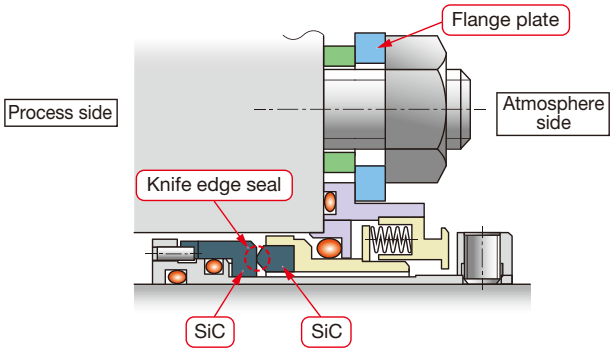
This type consists of general-purpose SiC and carbon seal face materials to resist a fluid pressure of up to 2.5 MPaG.



Flangeless cassette seal Type GAKPM

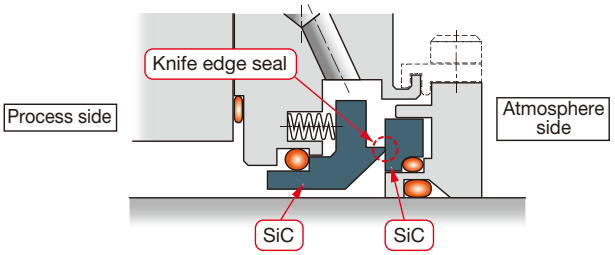
The applicable range of mating dimensions has been expanded by adopting a flange plate that allows the fixing method to be freely designed.

∗ The flange plate is optional.



Outside static-type cartridge type seal Type GAKQM

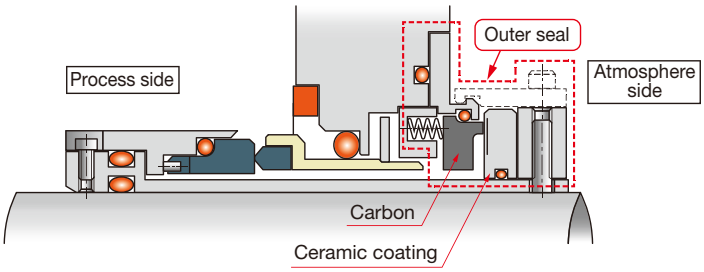
Our original "knife edge seal" has been adopted to further expand the application range.



Tandem seal option Type FCURO

We also provide a lineup of products integrated with an outer seal that can be mounted on any PILLAR Cassette Seal products.

∗ Except for type GAKQM (outside cassette seal) and type GAKPM (flangeless cassette seal)



PILLAR CASSETTE SEAL™

Easy installation with only four actions

“Compact design,” which allows bolt-on installation on pumps compliant with ISO and DIN standards, and “4-action installation,” which requires no dimension adjustment, can now be applied to a large number of pumps, and installation and replacement no longer require experience.

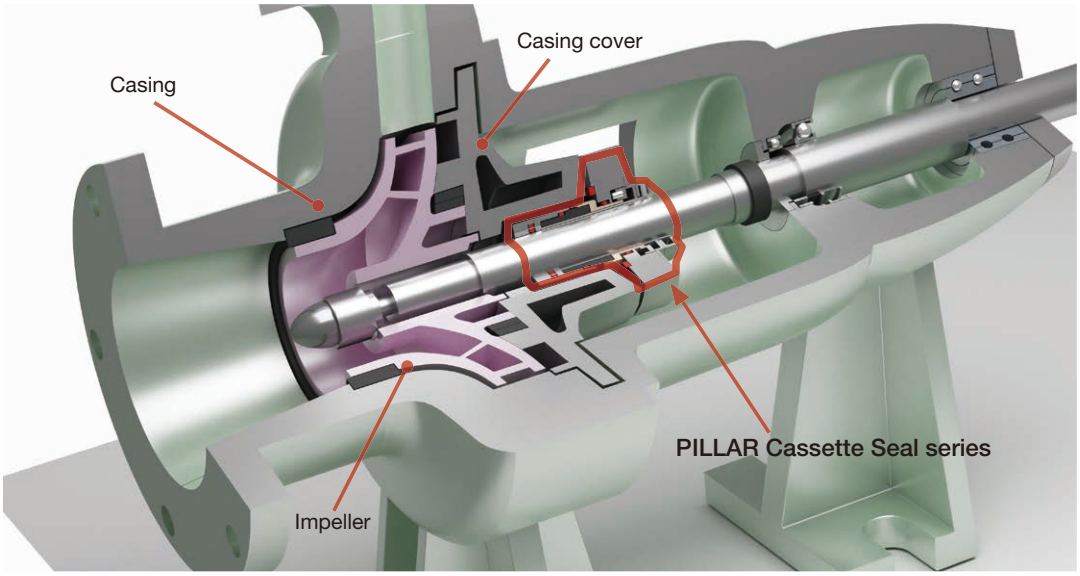
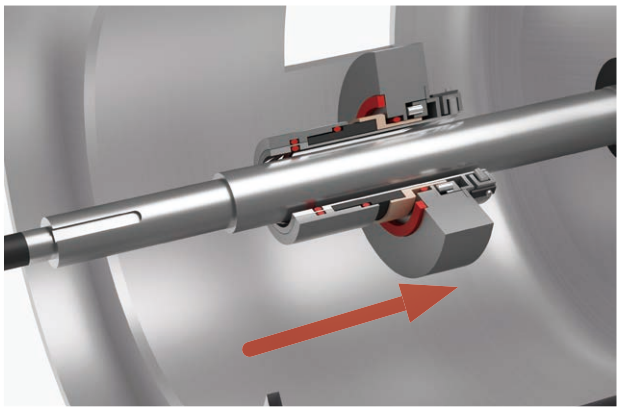


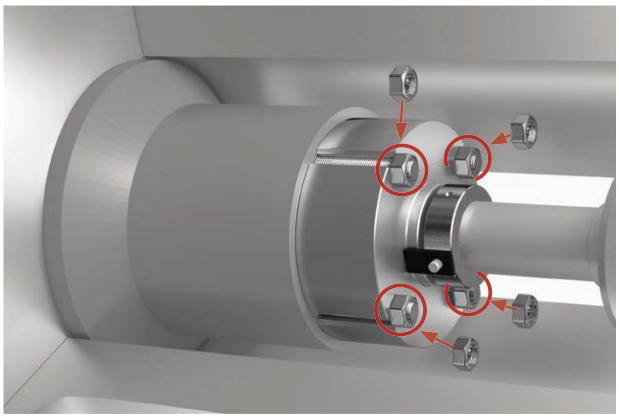
Image of cassette seal mounted on centrifugal pump

Action 1



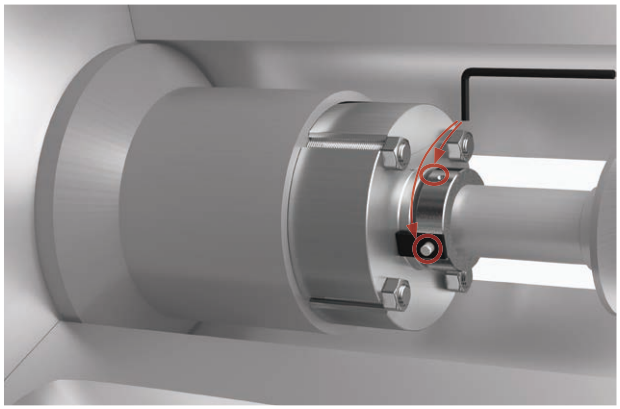
Insert the cassette seal assembly into the shaft of the pump from which the casing, impeller, and casing cover have been removed.

Action 2



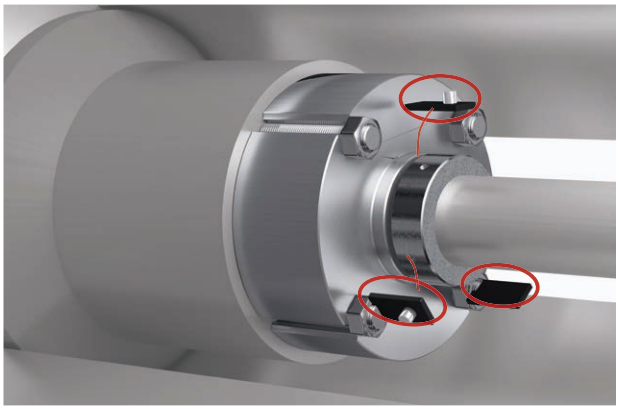
After reassembling the pump body, secure the cassette seal assembly with stuffing box unit bolts.

Action 3



Tighten all the set screws on the cassette seal to secure the parts on the rotation side of the seal onto the pump shaft.

Action 4



Remove the set plates that restrict the cassette seal to the specified mounting length when it is in the assembly state. This completes the mechanical seal installation work.

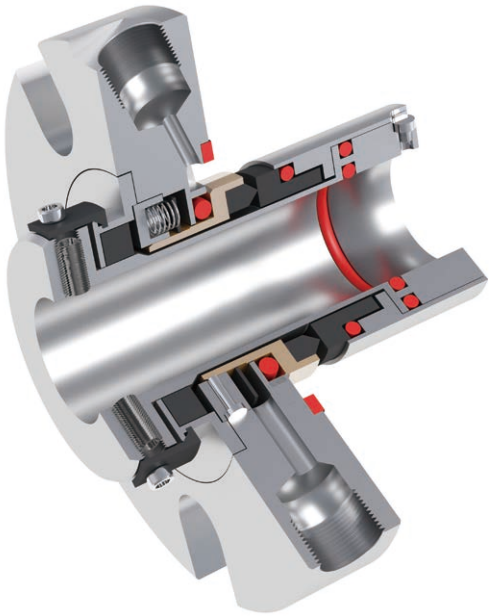
* The set plates are also required to remove the cassette seal.

MECHANICAL SEAL

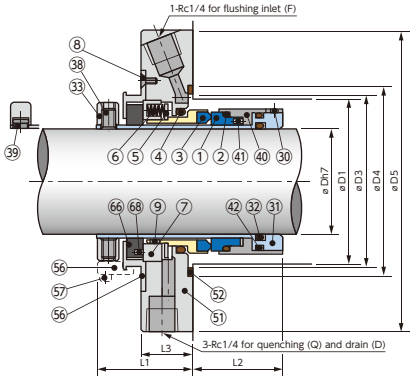
GAKEM

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump | Mixer/low-speed rotary machine

PILLAR CASSETTE SEAL™ (Standard type)



- This product has the standard structure of PILLAR Cassette Seal.
- This product adopts SiC/SiC seal face materials and knife edge seal structure.



■ Specification conditions

Speed (m/s)	Pressure (MPaG)	Temperature (℃)	Slurry concentration (wt%)
20 max.	1.0	−20 to 150	10 max.

Notes: 1) The maximum PV value is 10 MPaG-m/s.
2) If the fluid temperature is below the boiling point (−20°C) of the fluid, we can consider non-flushing and non-quenching applications. (However, this depends on the liquid quality, pressure, and other factors.) If the fluid temperature is above the maximum temperature, an appropriate cooling system such as a flushing cooler is required.
3) The operating temperature differs according to the O-ring material used.

No.	Part	Standard material	Qty
1	Rotating ring	SiC	1
2	O-ring	FKM	1
3	Seal ring	SiC and titanium	1
4	O-ring	FKM	1
5	Plate	SUS304 or equiv.	1
6	Spring	SUS316 or equiv.	1s
7	Spring retainer	SUS304 or equiv.	1
8	Machine screw	SUS304 or equiv.	4
9	Pin	SUS304 or equiv.	2
30	Pin	SUS316 or equiv.	1
31	Sleeve	SUS316 or equiv.	1
32	O-ring	FKM	1
33	Stopper ring	SUS304 or equiv.	1

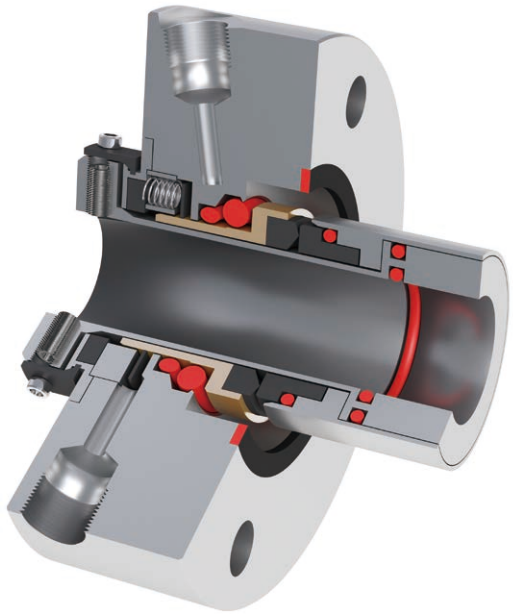
No.	Part	Standard material	Qty
38	Set screw	SUS316 or equiv.	4
39	Pin	SUS304 or equiv.	2
40	Drive ring	SUS316 or equiv.	1
41	Pin	SUS304 or equiv.	1
42	O-ring	FKM	1
51	Flange	SUS316 or equiv.	1
52	Gasket	FKM	1
55	Adapter	SUS304 or equiv.	1
56	Set plate	Carbon steel	3
57	Hexagon socket head bolt	SUS304 or equiv.	3
66	Throttle bushing	Carbon	1
68	Pin	SUS304 or equiv.	1

MECHANICAL SEAL

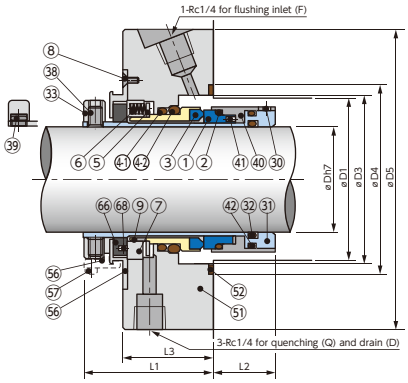
GXKEM

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump | Mixer/low-speed rotary machine

PILLAR CASSETTE SEAL™ (High-concentration slurry resistance type cassette seal)



- High-concentration slurry resistance specification based on the technology for resisting high-concentration slurry
- This product adopts SiC/SiC seal face materials and knife edge seal structure.
- This type is equipped with a shielded O-ring to reduce the adverse effects of slurry on performance.



■ Specification conditions

Speed (m/s)	Pressure (MPaG)	Temperature (℃)	Slurry concentration (wt%)
10 max.	1.0	−20 to 150	30 max.

Notes: 1) The maximum PV value is 6 MPaG-m/s.
2) If the fluid temperature is below the boiling point (−40°C) of the fluid, we can consider non-flushing and non-quenching applications. (However, this depends on the liquid quality, pressure, and other factors.) If the fluid temperature is above the maximum temperature, an appropriate cooling system such as a flushing cooler is required.
3) The operating temperature differs according to the O-ring material used. (The O-ring material can be selected from NBR, EPDM, silicone rubber, and fluoro rubber.)

No.	Part	Standard material	Qty
1	Rotating ring	SiC	1
2	O-ring	NBR	1
3	Seal ring	SiC and titanium	1
4-1	O-ring	NBR	1
4-2	Shielded O-ring	NBR	1
5	Plate	SUS304 or equiv.	1
6	Spring	SUS316 or equiv.	1s
7	Spring retainer	SUS304 or equiv.	1
8	Machine screw	SUS304 or equiv.	4
9	Pin	SUS304 or equiv.	2
30	Pin	SUS316 or equiv.	1
31	Sleeve	SUS316 or equiv.	1
32	O-ring	NBR	1

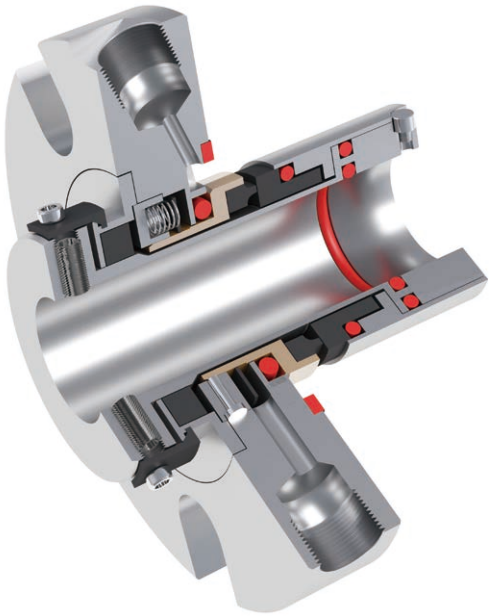
No.	Part	Standard material	Qty
33	Stopper ring	SUS304 or equiv.	1
38	Set screw	SUS316 or equiv.	4
39	Pin	SUS304 or equiv.	2
40	Drive ring	SUS316 or equiv.	1
41	Pin	SUS304 or equiv.	1
42	O-ring	NBR	1
51	Flange	SUS316 or equiv.	1
52	Gasket	NBR	1
55	Adapter	SUS304 or equiv.	1
56	Set plate	Carbon steel	3
57	Hexagon socket head bolt	SUS304 or equiv.	3
66	Throttle bushing	Carbon	1
68	Pin	SUS304 or equiv.	1

MECHANICAL SEAL

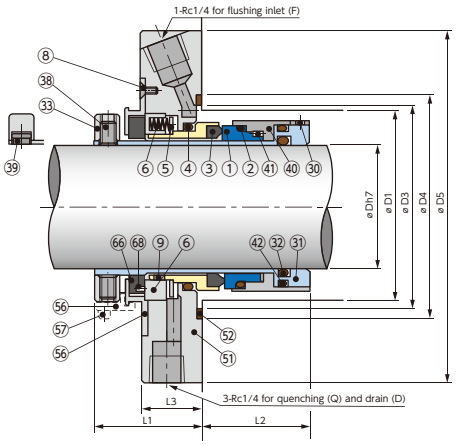
GABE5

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump | Mixer/low-speed rotary machine

PILLAR CASSETTE SEAL™ (High-pressure type cassette seal)



- This cassette seal can handle a fluid pressure of up to 2.5 MPaG according to the combination of SiC and carbon seal face materials.
- This product adopts a static type structure. Shaft wear does not occur and an externally mounted spring system reduces the operability impediment caused by the fluid contained, which achieves long-term stable operation.



No.	Part	Standard material	Qty
1	Rotating ring	SiC	1
2	O-ring	FKM	1
3	Seal ring	Carbon and titanium	1
4	O-ring	FKM	1
5	Plate	SUS304 or equiv.	1
6	Spring	SUS316 or equiv.	1s
7	Spring retainer	SUS304 or equiv.	1
8	Machine screw	SUS304 or equiv.	4
9	Pin	SUS304 or equiv.	2
30	Pin	SUS316 or equiv.	1
31	Sleeve	SUS316 or equiv.	1
32	O-ring	FKM	1
33	Stopper ring	SUS304 or equiv.	1

No.	Part	Standard material	Qty
38	Set screw	SCM435 or equiv.	4
39	Pin	SUS304 or equiv.	2
40	Drive ring	SUS316 or equiv.	1
41	Pin	SUS304 or equiv.	1
42	O-ring	FKM	1
51	Flange	SUS316 or equiv.	1
52	Gasket	FKM	1
55	Adapter	SUS304 or equiv.	1
56	Set plate	Carbon steel	3
57	Hexagon socket head bolt	SUS304 or equiv.	3
66	Throttle bushing	Carbon	1
68	Pin	SUS304 or equiv.	1

■ Specification conditions

Speed (m/s)	Pressure (MPaG)	Temperature (℃)
20 max.	2.5	−20 to 150

Notes: 1) The maximum PV value is 25 MPaG-m/s.
2) The operating temperature differs according to the O-ring material used.
3) The maximum operating temperature is separately limited by the boiling point (−20°C) of the fluid. If the fluid temperature is above the maximum temperature, an appropriate cooling system such as a flushing cooler is required.

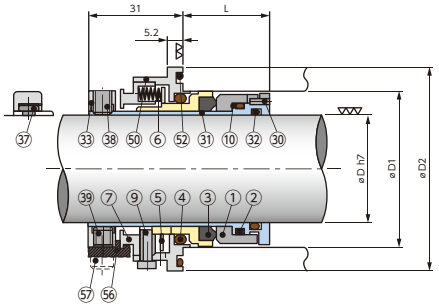
MECHANICAL SEAL

GAKPM

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump | Mixer/low-speed rotary machine

PILLAR CASSETTE SEAL™ (Flangeless cassette seal)

- Cost reduction and space saving have been achieved by changing the fixed flange to a fixed plate.
- This product adopts SiC/SiC seal face materials and knife edge seal structure.



No.	Product name	Standard material	Qty
1	Rotating ring	SiC	1
2	O-ring	FKM	1
3	Seal ring	SiC and titanium	1
4	O-ring	FKM	1
5	Plate	SUS304 or equiv.	1
6	Spring	SUS316 or equiv.	1set
7	Spring retainer	SUS304 or equiv.	1
9	Pin	SUS304 or equiv.	1set
10	Seat	PTFE containing glass fibers	1
30	Pin	SUS316 or equiv.	1

No.	Product name	Standard material	Qty
31	Sleeve	SUS316 or equiv.	1
32	O-ring	FKM	1
33	Stopper ring	SUS304 or equiv.	1
37	Pin	SUS304 or equiv.	2
38	Set screw	SUS316 or equiv.	2
39	Set screw	SUS316 or equiv.	2
50	Casing	SUS316 or equiv.	1
52	O-ring	FKM	1
56	Set plate	Carbon steel	3
57	Hexagon socket head bolt	SUS304 or equiv.	3

■ Specification conditions

Speed (m/s)	Pressure (MPaG)	Temperature (℃)	Slurry concentration (wt%)
10 max.	0.6	−20 to 150	10 max.

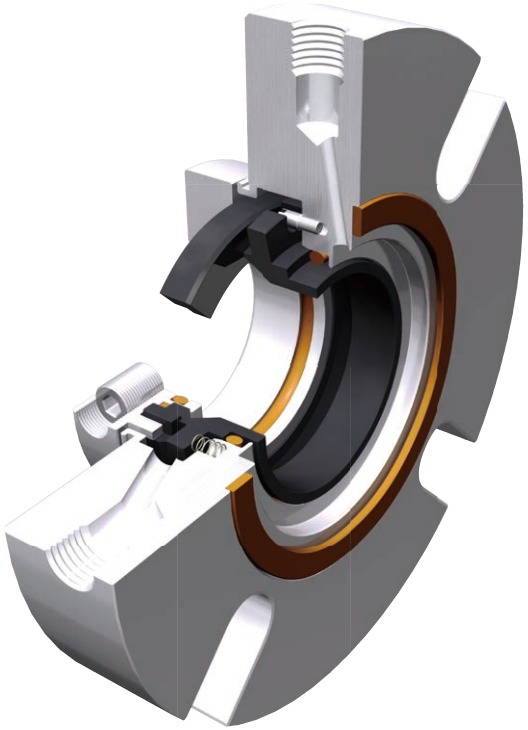
Notes: 1) The maximum PV value is 6 MPaG-m/s.
2) If the fluid temperature is below the boiling point (−20°C) of the fluid, we can consider non-flushing and non-quenching applications. (However, this depends on the liquid quality, pressure, and other factors.)
3) The operating temperature differs according to the O-ring material used.

MECHANICAL SEAL

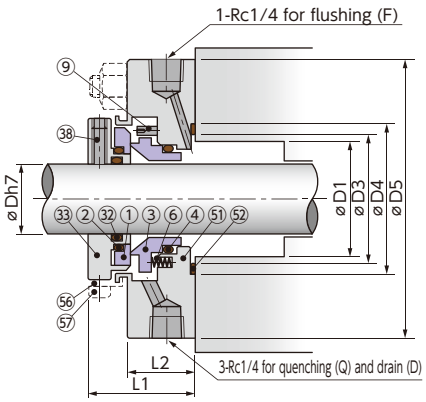
GAKQM

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump | Mixer/low-speed rotary machine

PILLAR CASSETTE SEAL™ (Outside static-type cassette seal)



- This product employs an outside structure that achieves space saving.
- This product adopts SiC/SiC seal face materials and knife edge seal structure.
- Static type structure



No.	Part name	Standard material	Qty
1	Rotating ring	SiC	1
2	O-ring	FKM	1
3	Seal ring	SiC	1
4	O-ring	FKM	1
6	Spring	SUS316 or equiv.	1set
9	Drive pin	SUS316 or equiv.	1set
32	O-ring	FKM	1

No.	Part name	Standard material	Qty
33	Stopper ring	SUS316 or equiv.	1
38	Set screw	SUS316 or equiv.	1set
51	Flange	SUS316 or equiv.	1
52	Gasket	PTFE containing filler	1
56	Set plate	Carbon steel	1set
57	Hexagon socket head bolt	SUS304 or equiv.	1set

■ Specification conditions

Speed (m/s)	Pressure (MPaG)	Temperature (℃)	Slurry concentration (wt%)
15 max.	0.8	−20 to 150	5 max.

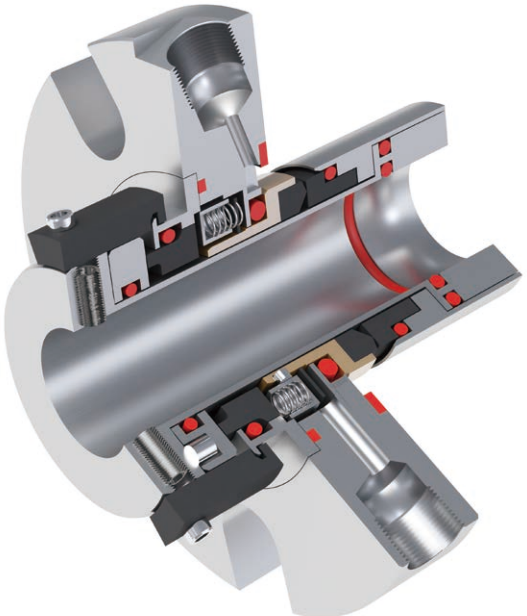
Notes: 1) The maximum PV value is 8 MPaG-m/s.
2) If the fluid temperature is below the boiling point (−40°C) of the fluid, we can consider non-flushing and non-quenching applications. (However, this depends on the liquid quality, pressure, and other factors.) If the fluid temperature is above the maximum temperature, an appropriate cooling system such as a flushing cooler is required.
3) The operating temperature differs according to the O-ring material used.

MECHANICAL SEAL

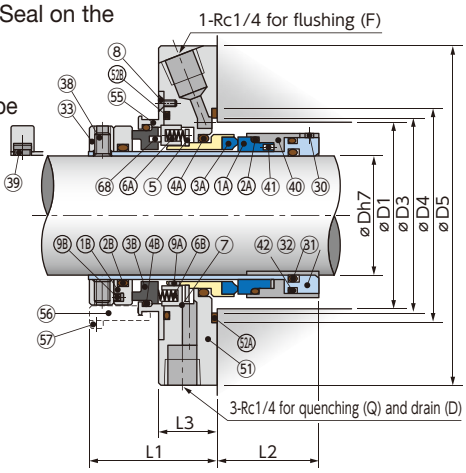
FCURO

Oil refinery/ petrochemical | Energy/ environment | Chemical | Pump | Mixer/low-speed rotary machine

PILLAR CASSETTE SEAL™ (Tandem seal option)



- Tandem seal configuration can be achieved by arranging any PILLAR Cassette Seal on the atmosphere side.
- Tandem seal configuration can be achieved in a space saving way.



No.	Part	Standard material	Qty
1A	Rotating ring	SiC	1
2A	O-ring	FKM	1
3A	Seal ring	SiC and titanium	1
4A	O-ring	FKM	1
5	Plate	SUS304 or equiv.	1
6A	Spring	SUS316 or equiv.	1s
7	Spring retainer	SUS304 or equiv.	1
8	Machine screw	SUS304 or equiv.	4
1B	Rotating ring	SUS316 or equiv. and ceramic	1
2B	O-ring	FKM	2
3B	Seal ring	Carbon	2
4B	O-ring	FKM	2
6B	Spring	SUS316 or equiv.	2
9A	Pin	SUS304 or equiv.	2
9B	Pin	SUS316 or equiv.	2
30	Pin	SUS316 or equiv.	1

No.	Part	Standard material	Qty
31	Sleeve	SUS316 or equiv.	1
32	O-ring	FKM	1
33	Stopper ring	SUS304 or equiv.	1
38	Set screw	SUS316 or equiv.	4
39	Pin	SUS304 or equiv.	2
40	Drive ring	SUS316 or equiv.	1
41	Pin	SUS304 or equiv.	1
42	O-ring	FKM	1
51	Flange	SUS316 or equiv.	1
52A	Gasket	FKM	1
52B	O-ring	FKM	1
55	Adapter	SUS304 or equiv.	1
56	Set plate	SUS304 or equiv.	3
57	Hexagon socket head bolt	SUS304 or equiv.	3
68	Pin	SUS304 or equiv.	1

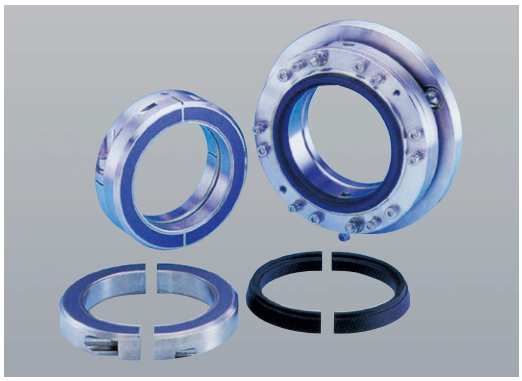
■ Specification conditions

Speed (m/s)	Pressure (MPaG)
20 max.	1.0

Notes: 1) However, the box pressure must be greater than quenching pressure.
2) The operating temperature differs according to the O-ring material used.

Static-type outside split seal (Advanced RⅡ seal)

Pump dry running can be performed by adopting PILLAR ARⅡ Seal™. This contributes to simplifying standby pump systems and shortening maintenance time.



Features

Dry running can be performed

The adoption of special carbon with excellent lubricity that PILLAR developed has made it possible to perform dry running for more than one hour.

Improved maintainability

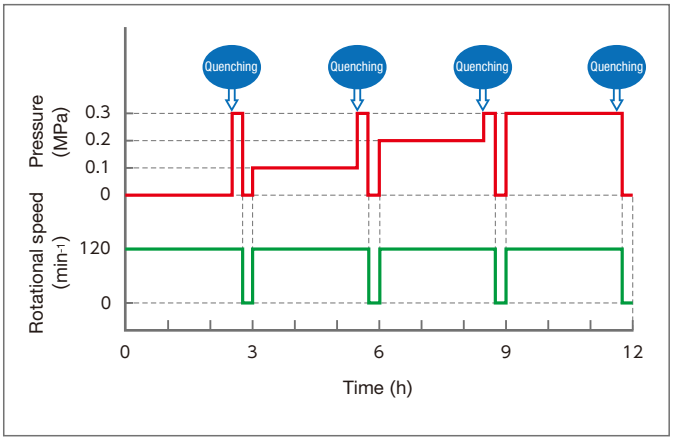
Replacement of mechanical seal parts has been made easier by dividing the sliding parts on the stationary side and parts on the rotation side that are replaced during maintenance into two sections.

Flushing system not required

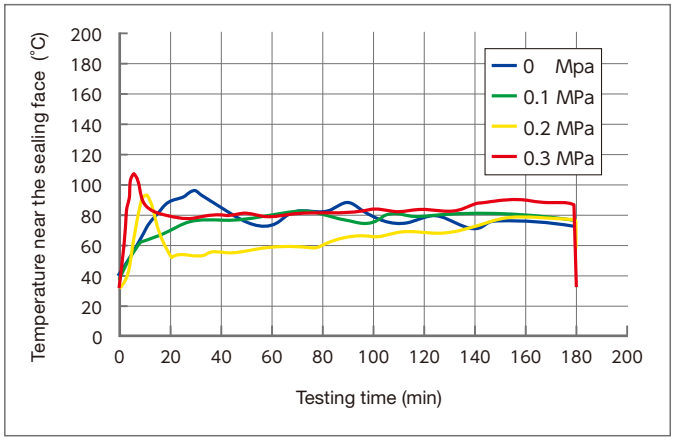
No seal water feed system is required because non-water feed operation can be performed during dry running, as well as during normal operation.

Mechanical seal performance verification testing

Operation mode Mechanical seal being tested: Model "ARⅡ-D," size "ϕ141"



Seal face temperature during dry running

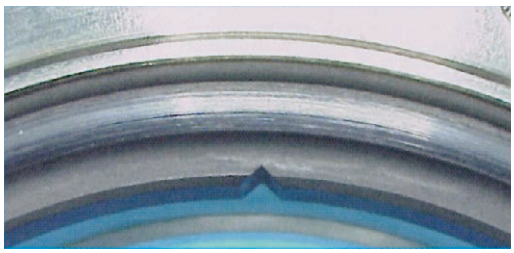


Test results

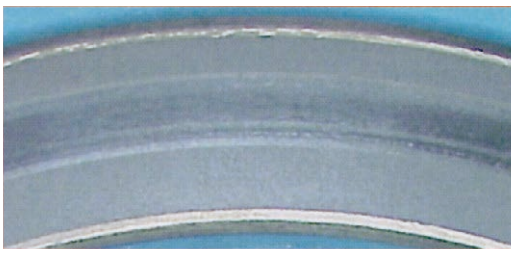
- The seal face temperature increase during dry running was extremely small.
- No problem occurred when dry running was switched to pumping operation.
- After operation, the seal face was in good condition.

Seal face condition after testing

Carbon

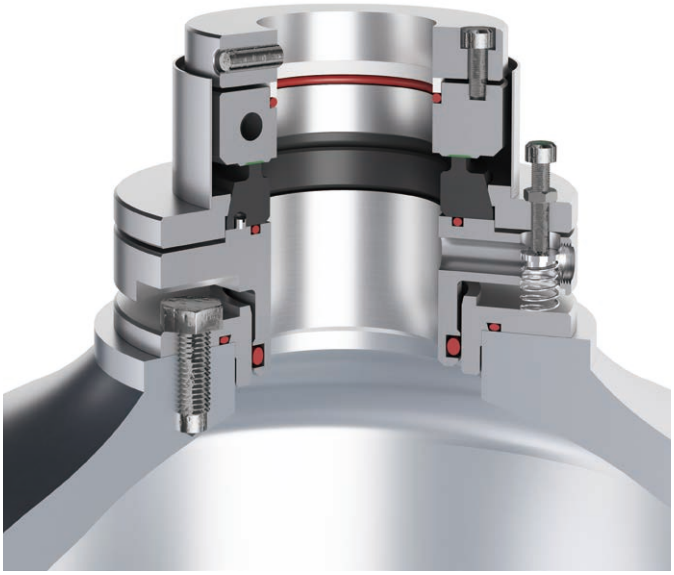


Ceramic coating



After 12-hour dry running, both seal faces had no damage.

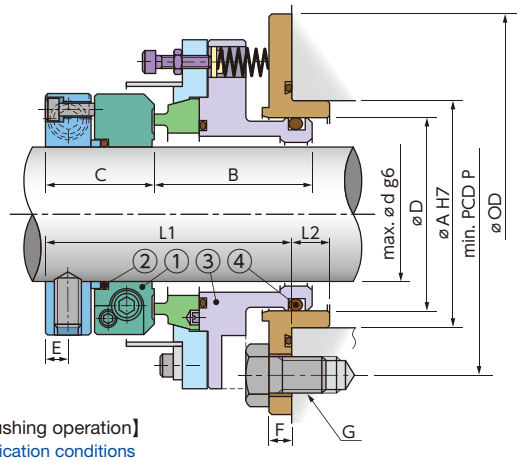
Static-type outside split seal (Advanced RⅡ seal)



Application examples

- Vertical-shaft standby pump
- Vertical-shaft pump for discharging sewage and rainwater
- Vertical-shaft pump for discharging river water

No.	Part name	Standard material
1	Rotating ring (split type)	SUS316 or equiv. and ceramic
2	O-ring	FKM
3	Seal ring (split type)	Special carbon
4	O-ring	NBR
	Other components	SUS304 or equiv.



【Non-flushing operation】

■ Specification conditions

Speed (m/s)	Pressure (MPaG)	Temperature (℃)	Slurry concentration (ppm)
12 max.	0.5	80	2000 max.

Notes: 1) The maximum PV value is 4 MPaG-m/s.
2) Applicable shaft diameter: ϕ30 to ϕ400

【Dry-running operation】

■ Specification conditions

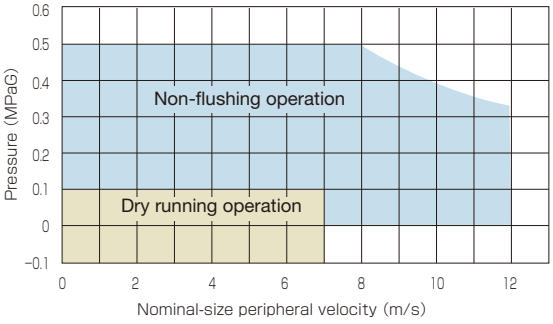
Speed (m/s)	Pressure (MPaG)	Slurry concentration (ppm)
7 max.	0.1 *1	2000 max.

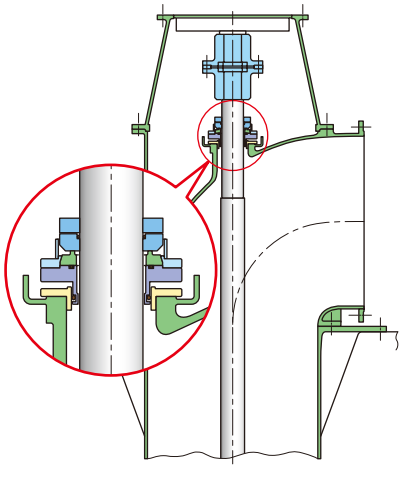
Note: Dry running can be performed for up to one hour.
*1 This product can also be used under continuous load conditions.

Performance

Model	ARⅡ-D	
Sealing materials	Ceramic coating (split) and carbon (split)	
Applicable shaft diameter	ϕ30 to ϕ400	
Usage range (Non-flushing operation)	· Pressure: 0.5 MPa max. · Speed: 12 m/s max.	· PV value: 4 MPa-m/s max. · Temperature: 80°C max.
Dry-running operation performance	· Dry running can be performed for up to one hour · Pressure: 0.1 MPa max.	· Speed: 7 m/s max. · The product can also be used under continuous load conditions
Applicable water quality	Slurry: 2,000 ppm or less	

Scope of application for non-flushing operation (PV value)



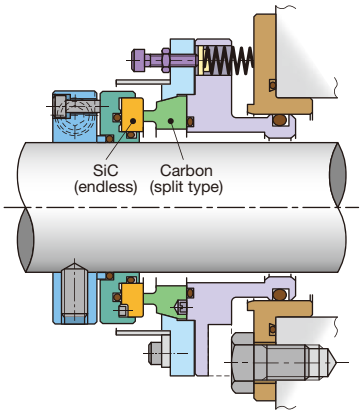


Dry-running (standby operation) resistant mechanical seal

Applications

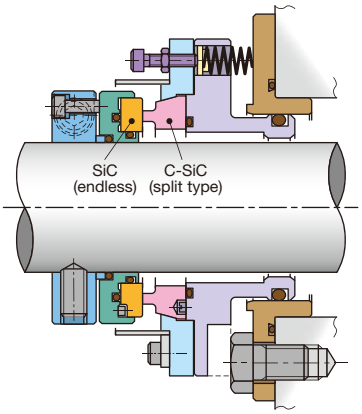
● Deep groundwater pump

A pump that generates boost pressure exceeding 0.5 MPa



● Sludge pump

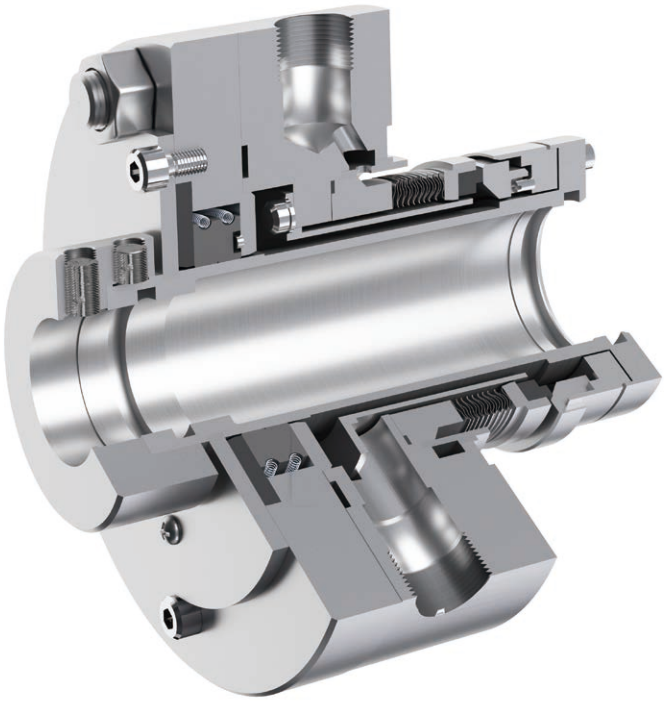
A pump that handles relatively high-concentration slurry



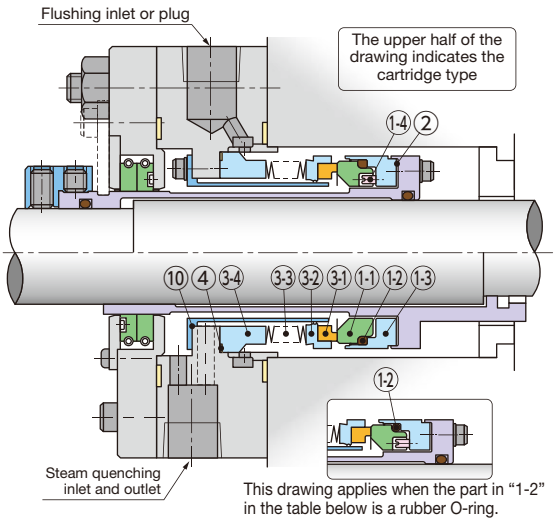
QBS

Static-type welded metal bellows seal

Oil refinery/ petrochemical | Chemical | Pump



- Highly reliable double welded bellows with excellent pressure resistance and flexibility are adopted as a standard feature.
- A static type structure with a high tolerance to perpendicularity is adopted as a standard feature.
- A structure that prevents damage to bellows is used.



■ Specification conditions

Speed (m/s)	Pressure (MPaG)	Temperature (℃)
60 max.	3 ∗1	450 max.

Note: The nominal size is Φ39 to Φ136.
∗1 The maximum operating pressure differs according to the nominal-size peripheral velocity.

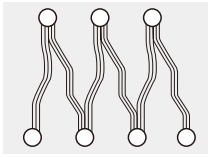
No.	Part name	Standard material	Qty
1-1	Rotating ring	SiC	1
1-2	Gasket O-ring	PILLARFOIL P/#6610 FFKM	1
1-3	Drive ring	SUS316 or equiv.	1
1-4	Pin	SUS316 or equiv.	1
2	Gasket	PILLARFOIL P/#6633	1

No.	Part name	Standard material	Qty
3-1	Seal ring	Carbon	1
3-2	Retainer	Special alloy	1
3-3	Bellows	Inconel	1
3-4	Adapter	SUS316 or equiv.	1
4	Gasket	PILLARFOIL P/#6633	1
10	Baffle	SUS304 or equiv.	1

■ Highest-standard Inconel double bellows adopted as a standard feature

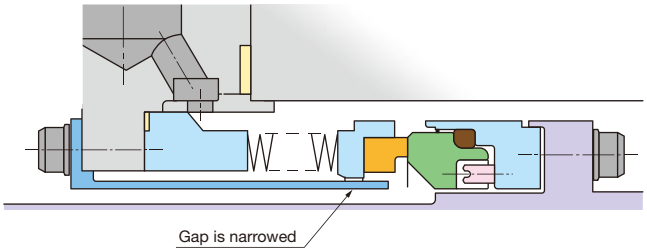
Welded metal bellows employ Inconel with excellent corrosion resistance and mechanical strength as a standard feature and can be applied to a wide range of temperatures.

Schematic illustration of bellows cross-section



■ High-performance bellows seal

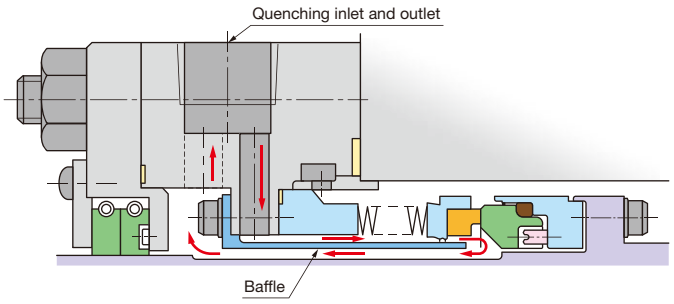
Preventing resonance



If the lubrication condition of the seal face is poor, friction force fluctuation (stick slip) will occur, which may cause the bellows to resonate due to torsional vibration or swinging vibration of the seal ring.

Stable sealability and increased longevity are expected by narrowing the gap in the radial direction between the baffle and the seal ring to prevent the seal ring from vibrating.

■ Preventing torsion caused by coagulated liquid stuck on the sealing face



The liquid between the seal faces may coagulate and get stuck during standby, which may cause excessive torsion at the time of startup.

The effects of steam quenching are enhanced by extending the baffle to the vicinity of the seal face.

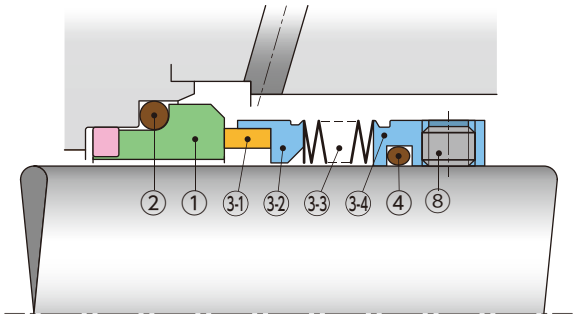
- Enhancing the effects of thermal insulation during standby resolves the problem with liquid coagulation on the seal face and prevents torsion caused by excessive torque at the time of startup.
- Enhancing the cooling effects improves the lubrication condition of the seal face.
- Enhancing the cleaning effects prevents coagulation and buildup of slightly leaked liquid.

WBR

Oil refinery/ petrochemical | Chemical | Pump

Bellows Pack™ (Rotary-type welded metal bellows seal)

- This rotary-type metal bellows seal can also be mounted on pumps compliant with ISO and DIN standards.
- This product adopts Inconel as the bellows material, which enables the product to be used with a wide range of fluids.



No.	Part name	Standard material	Qty
1	Floating seat	SiC	1
2	O-ring	FKM	1
3-1	Seal ring	Carbon	1
3-2	Retainer	Inconel	1
3-3	Bellows	Inconel	1
3-4	Adapter	SUS316L	1
4	O-ring	FKM	1
8	Set screw	SUS316L	3

■ Specification conditions

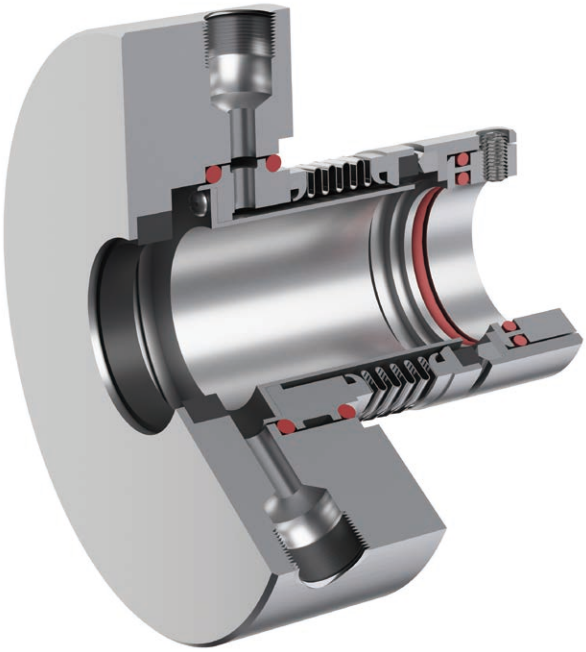
Speed (m/s)	Pressure (MPaG)	Temperature (℃)	Maximum viscosity (mPa·s)	Slurry concentration (wt%)
25	2 ∗1	−50 to 180	500	0.5

∗1 The maximum operating pressure differs according to the nominal-size peripheral velocity.

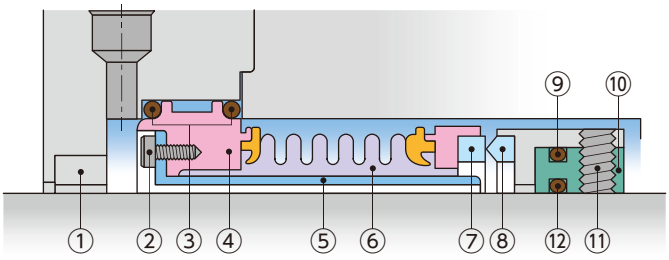
QAK

Static-type molded metal bellows seal

Oil refinery/ petrochemical | Chemical | Pump



- This product has a sharp knife edge seal surface to cut and eliminate high-viscosity, coagulable, and adhesive liquids. It provides stable sealing performance.
- This product adopts molded metal bellows with a unique balancing mechanism. The seal surface is only subject to an elastic load from the bellows, which enables the product to constantly provide stable performance in terms of pressure.



Part number	Part name	Standard material	Qty
1	Bushing	Carbon	1
2	Hexagon socket head bolt	SUS304 or equiv.	1 set
3	O-ring	FKM	2
4	Bellows adapter	SUS316 or equiv.	1
5	Baffle	SUS304 or equiv.	1
6	Bellows	SUS316 or equiv.	1

Part number	Part name	Standard material	Qty
7	Seal ring	Cemented carbide	1
8	Rotating ring	Cemented carbide	1
9	O-ring	FKM	1
10	Stopper ring	SUS316 or equiv.	1
11	Set screw	SUS316 or equiv.	2
12	O-ring	FKM	1

■ Specification conditions

Speed (m/s)	Pressure (MPaG)	Temperature (℃)
20 max.	1	−40 to 150

Note: The nominal size is Φ29 to Φ116.

High-viscosity, coagulable, and adhesive fluid seal

Best suited for high-viscosity, coagulable fluids

The seal face has a sharp knife edge shape to increase the surface pressure, which prevents high-viscosity, coagulable fluid from becoming trapped on the seal face and also enables the sharp knife edge face to cut and eliminate coagula generated near the seal face.

Little affect from thermal distortion and pressure distortion

The seal face width is extremely small compared with that of normal mechanical seals, which can eliminate thermal strain and pressure strain in the radial direction, resulting in no liquid leakage caused by strain.

Excellent cooling characteristics

The sharp knife edge face means that the seal face area is extremely small. Compared with normal mechanical seals, this product features less heat generation and excellent cooling effects.

High-flexibility structure

This product employs molded metal bellows, resulting in excellent followability, compared with normal mechanical seals. There is no liquid leakage caused by stick following failure.

Sharp knife edge shape

This product can seal viscous liquid, coagulable liquid, and adhesive liquid, all of which are the most difficult to seal. The sharp knife edge cuts coagula generated between the seal faces.

Excellent hydrodynamic balance

Because of its unique balancing mechanism, the seal face is influenced very little by fluid pressure and is only subject to an elastic load from the bellows, which makes the product constantly stable in terms of pressure.

∗ Schematic illustration of pressure balance

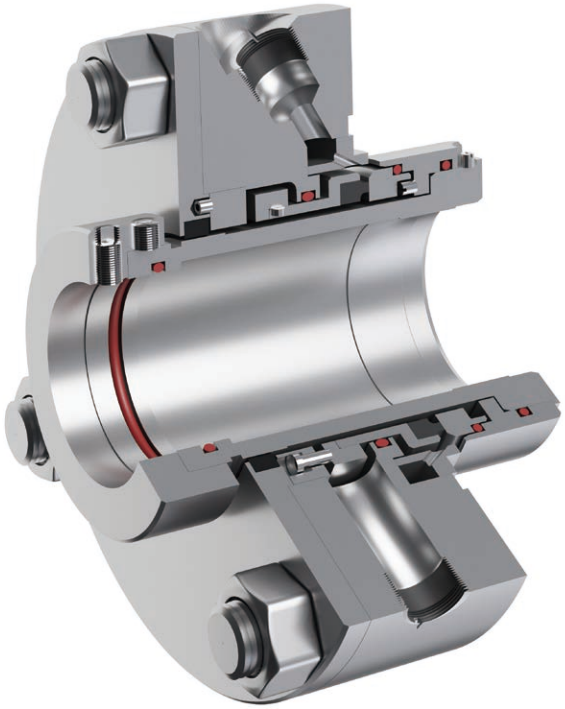
Applicable fluids

This product is best suited for fluids that are difficult for conventional structures to seal.

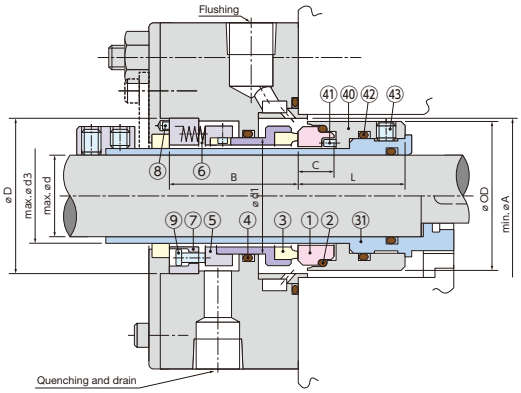
Monomer, polymer, nylon, white liquor, green liquor, black liquor, animal and vegetable oils, molasses, milk, chocolate, electrodeposition coating, various types of paint, tar, SBR Latex, ABR Latex, polymerizable fluid, cornstarch, food, soy sauce, etc.

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump

Static-type mechanical seal (Standard type)



- This product is a standard static-type mechanical seal with a compact design.
- Equipped with a spring on the atmospheric side, this product provides stable sealing performance that enables the seal ring to follow even high peripheral velocity, high viscosity fluids easily.
- Any misalignment in the perpendicularity of the stuffing box end face is absorbed by a spring, thereby enabling the seal face to maintain perpendicularity relative to the shaft center and retain stable sealing performance.



No.	Part name	Standard material	Qty
1	Rotating ring	SiC	1
2	O-ring	FKM	1
3	Seal ring	Carbon "C2" and titanium	1
∗3	Seal ring	Cemented carbide and titanium	1
4	O-ring	FKM	1
5	Collar	SUS316	1
6	Spring	Alloy 20	1 set
7	Spring retainer	SUS316	1

No.	Part name	Standard material	Qty
8	Pin	SUS316	1
9	Pin	SUS316	1 set
31	Sleeve	SUS304	1
40	Drive ring	SUS304	1
41	Pin	SUS316	1
42	O-ring	FKM	1
43	Set screw	SUS316	3

Specification conditions

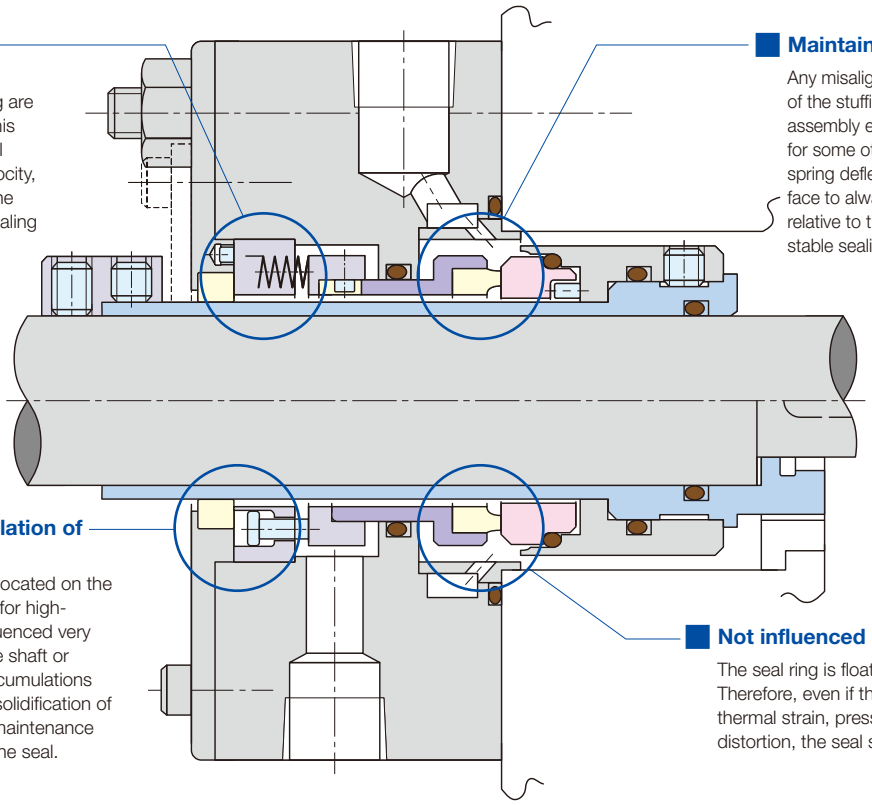
Speed (m/s)	Pressure (MPaG)
40	4 ∗1

∗1 For Type GHK (with knife edge sliding surfaces), the maximum operating pressure is 1 MPaG.

Advantages of static type seals

Stable even at high peripheral velocity

Because the seal ring and spring are located on the stationary side, this seal is not affected by centrifugal force even at high peripheral velocity, enabling the seal ring to follow the shaft easily, resulting in stable sealing performance.



Maintaining perpendicularity

Any misalignment in the perpendicularity of the stuffing box end face due to assembly errors, aging, or pipe stress or for some other reason is absorbed by spring deflection, thereby enabling the seal face to always maintain perpendicularity relative to the shaft center, resulting in stable sealing performance.

Helps preventing accumulation of leaked fluid

The secondary seal (packing) is located on the seal cover side. Therefore, even for high-temperature fluid, the seal is influenced very little by heat conduction from the shaft or sleeve. This helps preventing accumulations caused by the carbonization or solidification of leaked fluids and ensures easy maintenance and consistent performance of the seal.

Not influenced by strain

The seal ring is floated from the seal cover. Therefore, even if the seal cover is subjected to thermal strain, pressure strain, or tightening distortion, the seal surface will not be affected.

MECHANICAL SEAL

AAU/ABU/AAB/ABB

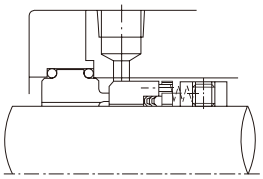
Rotary-type multi-spring mechanical seal

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump

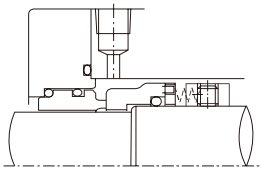
- This product is a general-purpose rotary type seal.
- This product adopts a multi-spring system that can provide stable performance for a wide range of applications.

[Basic structure]

Type AAU/ABU unbalanced type seal



Type AAB/ABB balanced type seal



■ Specification conditions

Speed (m/s)	Pressure (MPaG)	
20	AAU/ABU	1.3
20	AAB/ABB	3.5

MECHANICAL SEAL

AEU/AFU/AEB/AFB

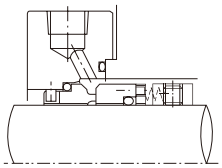
ISO-compliant dimensions applied rotary-type multi-spring mechanical seal

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump

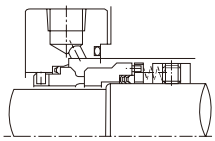
- This seal is designed for application to pumps compliant with ISO and ANSI standards.
- This product adopts a multi-spring system that can provide stable performance for a wide range of applications.

[Basic structure]

Type AEU/AFU unbalanced type seal



Type AEB/AFB balanced type seal



■ Specification conditions

Speed (m/s)	Pressure (MPaG)	
20	AEU/AFU	1.3
20	AEB/AFB	3

MECHANICAL SEAL

PEU/PFU/PEB/PFB

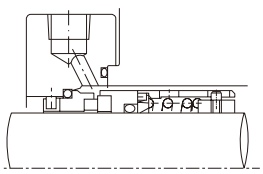
Rotary-type one-coil spring mechanical seal

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump

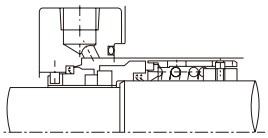
- This one-coil spring seal has strong resistance to corrosion and slurry.
- This product adopts a clutch mechanism to transfer running torque from the seal.

[Basic structure]

Type PEU/PFU unbalanced type seal



Type PEB/PFB balanced type seal



■ Specification conditions

Speed (m/s)	Pressure (MPaG)	
15	PAU/PBU	1.3
15	PAB/PBB	3

MECHANICAL SEAL

TEL8M

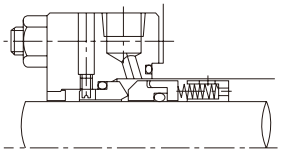
PILLAR SiCx seal

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump

- This product can be used for fluids containing acid, alkaline solutions, and fine particles, as well as a wide range of other fluids.
- This multi-spring type mechanical seal adopts SiC alone as the seal ring, contains radial grooves in the drive collar and spring retainer, and possesses a function for discharging fine particles.

∗ A lineup of carbon seal rings (with flat faces) is available for additional options.

[Basic structure]



■ Specification conditions

Type	Speed (m/s)	Pressure (MPaG)	
TEL8M (Knife edge)	10	SiC + SiC	0.5
TEU80 (Carbon)	10	SiC + carbon	0.8

Note: The size is Φ20 to Φ55.

MECHANICAL SEAL

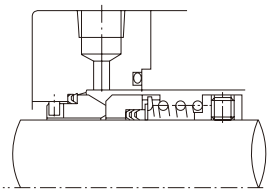
CEU/CFU

ISO-compliant dimensions applied rotary-type multi-spring mechanical seal

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump

- This product is designed for application to ISO-compliant pumps.
- This one-coil spring seal adopts SiC as a seal face material.

[Basic structure]



■ Specification conditions

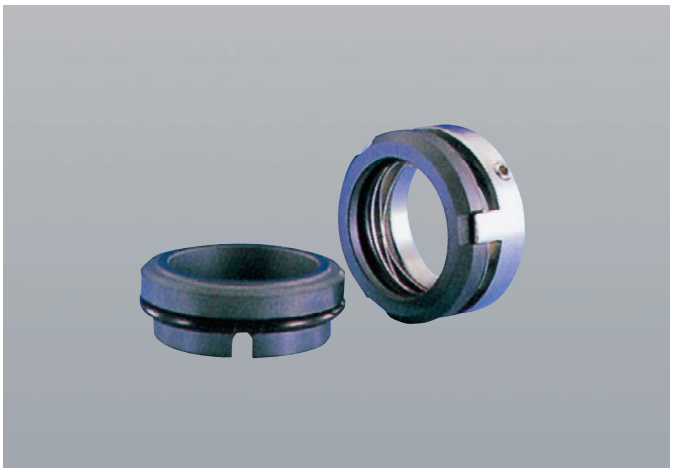
Speed (m/s)	Pressure (MPaG)
15	0.9

MECHANICAL SEAL

VEU/VFU

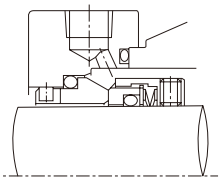
ISO-compliant dimensions applied rotary-type leaf spring mechanical seal

Oil refinery/ petrochemical | Energy/ environment | Chemical | Water supply and sewerage system | Pump



- This product is designed for application to ISO-compliant pumps.
- This product adopts a leaf spring as the spring and is designed so that the length in the axial direction is short.
- This seal is advantageous for food processing as little fluid remains in the seal.

[Basic structure]



■ Specification conditions

Speed (m/s)	Pressure (MPaG)
15	0.9

MECHANICAL SEAL

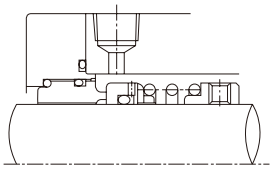
CCU (US-1)

Marine equipment | Water supply and sewerage system | Pump

One-coil spring mechanical seal for ships

- This seal is officially adopted as model US-1 by the Japan Ship Machinery and Equipment Association (JSMEA).
- This product adopts a one-coil spring that is affected very little by corrosion (electrolytic corrosion) and slurry.
- The O-ring for the shaft on the rotating ring has holes that prevent the rotating ring from failing to follow the shaft due to clogging.
- This product can be used for pumps for use in cooling water systems (industrial water, wastewater, and seawater) in any industry.

[Basic structure]



■ Specification conditions

Speed (m/s)	Pressure (MPaG)
15	1

Note: The nominal size is Φ20 to Φ130.

MECHANICAL SEAL

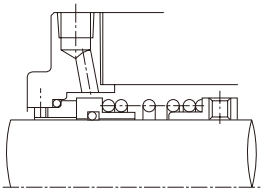
CGU (US-2)

Marine equipment | Water supply and sewerage system | Pump

One-coil spring mechanical seal for ships

- This seal is adopted as model US-2 by the Japan Ship Machinery and Equipment Association (JSMEA).
- This product adopts a one-coil spring that is affected very little by corrosion (electrolytic corrosion) and slurry.
- This product can also be used in any industry other than marine equipment.
- We also provide a lineup of inch-based seals (US-3).

[Basic structure]



■ Specification conditions

Speed (m/s)	Pressure (MPaG)
15	1

Note: The nominal size is Φ20 to Φ140.

MECHANICAL SEAL

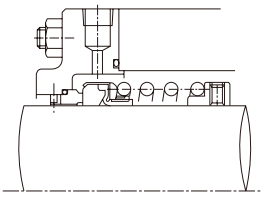
HGU

Marine equipment | Water supply and sewerage system | Pump

One-coil spring mechanical seal for ships

- This product is an improved version of the seals used for marine equipment.
- This product adopts rubber bellows to reduce shaft packing followability problems.
- This product adopts a one-coil spring that is affected very little by corrosion (electrolytic corrosion) and slurry.
- This product can also be used in any industry other than marine equipment.

[Basic structure]



■ Specification conditions

Speed (m/s)	Pressure (MPaG)
15	1

Note: The nominal size is Φ20 to Φ120.

MEMO

PILLAR SUPER JOINT™ (Mechanical seal for rotary unions)

Rotary union for semiconductor and LCD manufacturing equipment

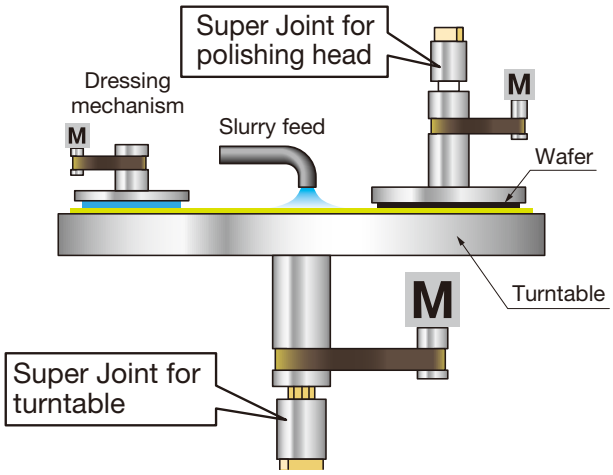
- The flow channel for wetted parts is made of polyetheretherketone (PEEK), taking metal contamination into account.
- The seal face is made of silicon carbide (SiC), which features excellent chemical resistance and slurry resistance.
- This product can be used in a wide range of pressures, from negative pressure to positive pressure.
- This product is certainly subject to oil-free treatment. Moreover, the entire process from cleaning through to assembly and packaging (clean packing) is consistently implemented in cleanrooms.

What is a rotary union?

The rotary union is a rotating device that transfers various fluids flowing through fixed pipes to rotating bodies.
The rotary union consists of a shaft section that revolves together with the rotating body and a housing section that connects the union from the fixed pipe. It is internally equipped with bearings, rotation seals, and other components.

Application

Application example of CMP apparatus (schematic)



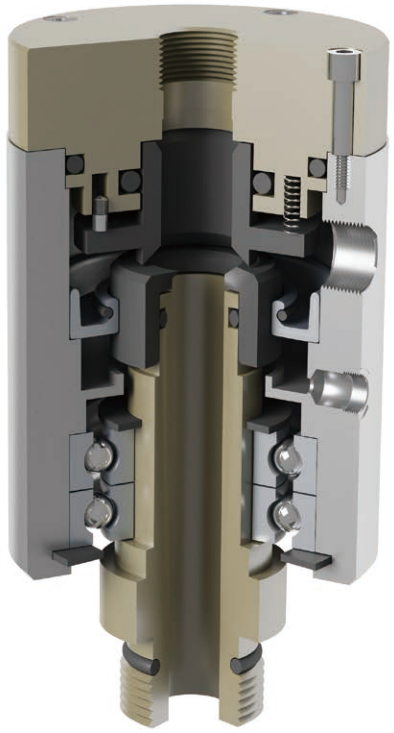
PILLAR SUPER JOINT is a functional part indispensable for semiconductor/LCD manufacturing equipment that does not only supply liquid but also uses a rotating pressure head (typically CMP apparatus).

Main applications

- Air supply for cooling water and wafer pressurization
- Vacuum supply for wafer suction
- Purified water and slurry liquid supply for water faucet
- Cooling water feed to turntable

PILLAR SUPER JOINT™ (Mechanical seal for rotary unions)

Semiconductor/ LCD/ telecommunication



- This product adopts a balanced type sealing mechanism for positive and negative pressures. It maintains stable sealability.
- This product adopts a seal face material that is made of SiC solid and provides excellent slurry resistance and sealing performance.

Applicable fluids

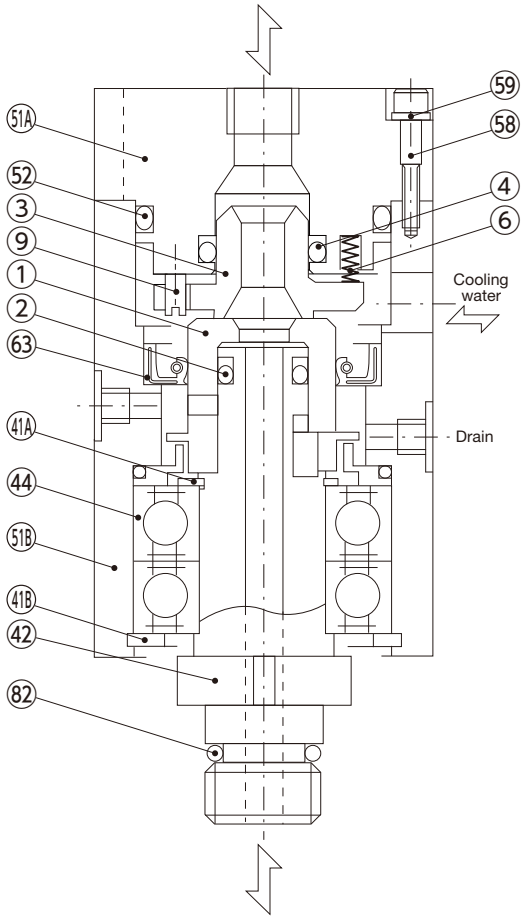
Compressed air and vacuum

Ultrapure water, CMP slurry, etc.

■ Specification conditions

Pressure (MPaG)	Speed (min^{-1})
FV to 1	0 to 1,000

PSJ: Basic structure and materials



■ Standard materials

No.	Part name	Standard material	Qty
1	Rotating ring	SiC	1
2	O-ring	FKM	1
3	Stationary ring	SiC	1
4	O-ring	FKM	1
6	Spring	SUS316 or equiv.	1 set
9	Pin	SUS316 or equiv.	1 set
41A	Snap ring	SUS304 or equiv.	1
41B	Snap ring	SUS304 or equiv.	1
42	Shaft	PEEK	1
44	Bearing	SUS440C	2
51A	Flange	PEEK	1
51B	Flange	SUS316 or equiv.	1
52	O-ring	FKM	1
58	Hexagon socket head bolt	SUS304 or equiv.	4
59	Spring washer	SUS304 or equiv.	4
63	Oil seal	NBR/SUS304	1
82	O-ring	FKM	1

This is just an example of the single port type. We can provide a variety of designs according to the operating conditions, such as a multi-port type, a large flow rate type and a compact type using resin seals.
For details, please contact us.

Rubber end-face seal

Unique structure without shaft wear

Unlike gland packings, this product has a structure that does not slide on the shaft or sleeve, which means that there is no damage to the devices mounted.

Compact design and easy maintenance

The seal unit itself is compact and can therefore be mounted on various devices. The sealing element, which is a sliding part, can be cut and replaced, which makes maintenance easy.

Excellent shaft followability

The sealing element is made of flexible special rubber. Because of its highly flexible structure, the sealing element can cope with shaft misalignment and shaft runout.

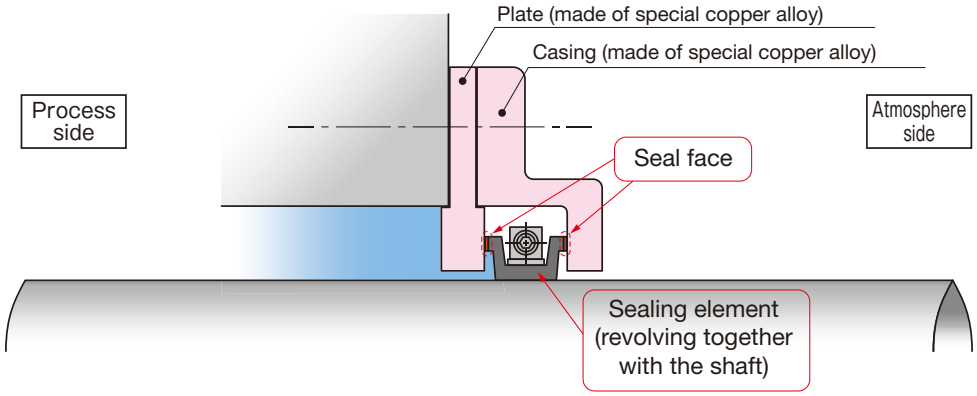
Product series lineup

We provide products optimally designed for each individual application, such as “G1-FL” for flocculators and “G1-PRS” for rudder stocks.

Rubber end-face seal

Basic configuration

The PILLAR G1 series seal employs a simple design that consists of a sealing element that revolves together with the shaft and a structural material on the stationary side that is made of special copper alloy.



Specification conditions

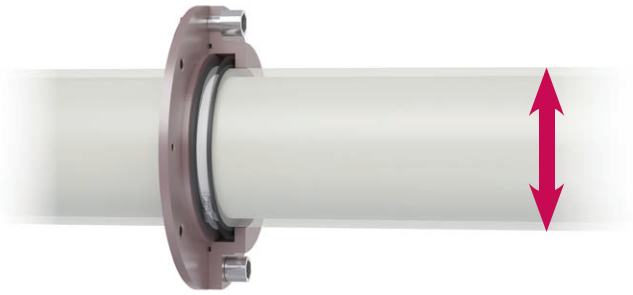
Fluids: Clear water, seawater, river water, sewage, etc.
Equipment: Flocculators, rudder stocks, sink rolls, stern tubes, etc. (shaft sealing portions)

Temperature	Pressure	Speed	Allowable shaft runout
−10 to +60℃	0.2 MPaG (max)	6 m/sec (max)	2 mm (max) in the axial direction, 4 mm (max) in the radial direction

Note: The above specifications may differ according to the combined conditions in actual operation. Therefore, if you are considering use of this product, please consult with us beforehand.

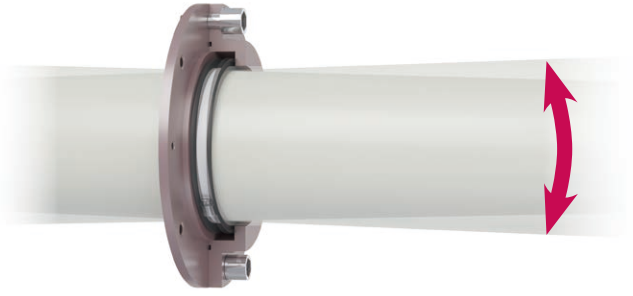
Features

● Coping with shaft misalignment



The sealing element revolves together with the shaft and the structure ensures sufficient followability, enabling this product to maintain good sealing performance even under significant shaft misalignment conditions.

● Coping with shaft runout



The displacement corresponding to shaft runout is absorbed by the sealing element flexibly changing its shape. Therefore, even if this product is mounted on a device that causes relatively large shaft runout, its sealability will be ensured.

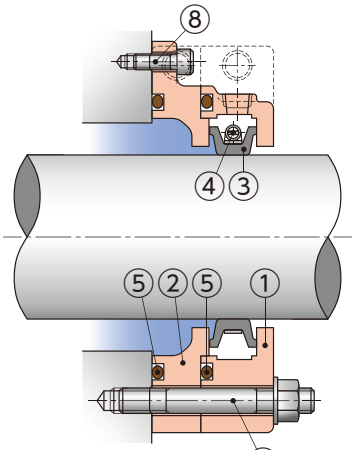
Rubber end-face seal

G1-FL

G1 seal (Standard seal for flocculators)

Energy/ environment | Chemical | Marine equipment | Mixer/low-speed rotary machine

- This product series is optimized for flocculators that are often used in water purification plants and sewage treatment plants.
- This product can be split into individual components. Each component can be replaced or maintained while they are on the shaft.



AOB cross-sectional view

No.	Part	Standard material	Qty	Remarks
1	Casing	Special copper alloy	1 s	Split type
2	Plate	Special copper alloy	1 s	Split type
3	Seal ring	Special rubber	1	
4	Drive band	SUS	1	
5	O-ring	NBR	2	
6	Stud bolt, etc.	SUS304 or equiv.	4 or 6 s	
7	Reamer bolt, etc.	SUS304 or equiv.	4 s	
8	Hexagon socket head bolt	SUS304 or equiv.	2	

■ Specification conditions

Speed (m/sec)	Pressure (MPaG)
6	0.2

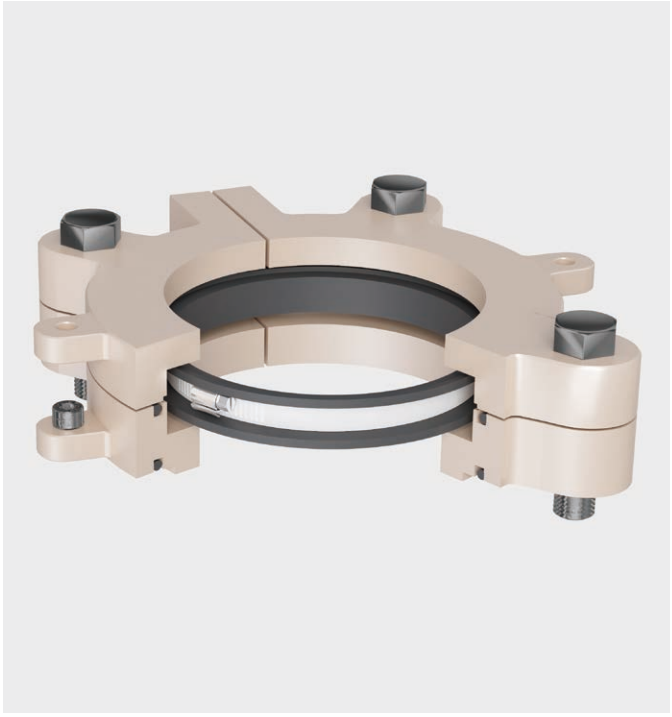
Applicable shaft diameter: ϕ60 to ϕ250

Rubber end-face seal

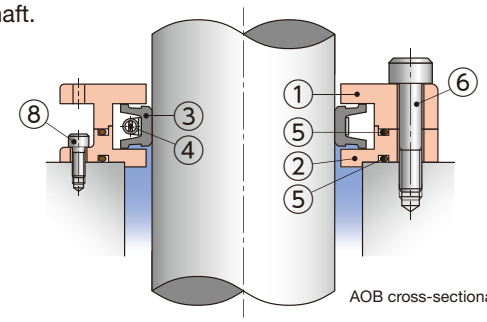
G1-PRS

G1 seal (For rudder stocks used for ships)

Marine equipment



- This product series is customized for rudder stocks used for ships.
- This product can be split into individual components. Each component can be replaced or maintained while they are on the shaft.



AOB cross-sectional view

No.	Part	Standard material	Qty	Remarks
1	Casing	Special copper alloy	1 s	Split type
2	Plate	Special copper alloy	1 s	Split type
3	Seal ring	Special rubber	1	
4	Drive band	SUS	1	
5	O-ring	NBR	2	
6	Hexagon socket head bolt	SUS304 or equiv.	4 to 12 s	
7	Reamer bolt, etc.	SUS304 or equiv.	4 s	
8	Hexagon socket head bolt	SUS304 or equiv.	2	

■ Specification conditions

Pressure (MPaG)
0.2

Applicable shaft diameter: ϕ80 to ϕ990

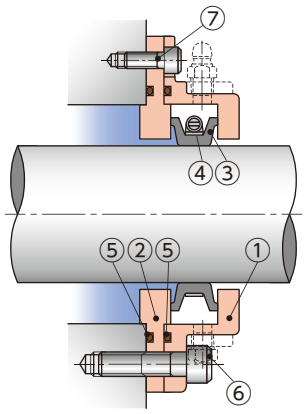
Rubber end-face seal

G1-E-A

G1 seal (Endless-type general-purpose type)

Oil refinery/ petrochemical | Energy/ environment | Chemical | Marine equipment | Mixer/low-speed rotary machine

- All components are of endless structure general-purpose type, the number of components is fewer, and the cost of this product is low.



AOB cross-sectional view

No.	Part	Standard material	Qty	Remarks
1	Casing	Special copper alloy	1	Endless
2	Plate	Special copper alloy	1	Endless
3	Seal ring	Special rubber	1	
4	Drive band	SUS	1	
5	O-ring	NBR	2	
6	Hexagon socket head bolt	SUS304 or equiv.	4 to 16	
7	Hexagon socket head bolt	SUS304 or equiv.	2	

■ Specification conditions

Speed (m/sec)	Pressure (MPaG)
6	0.2

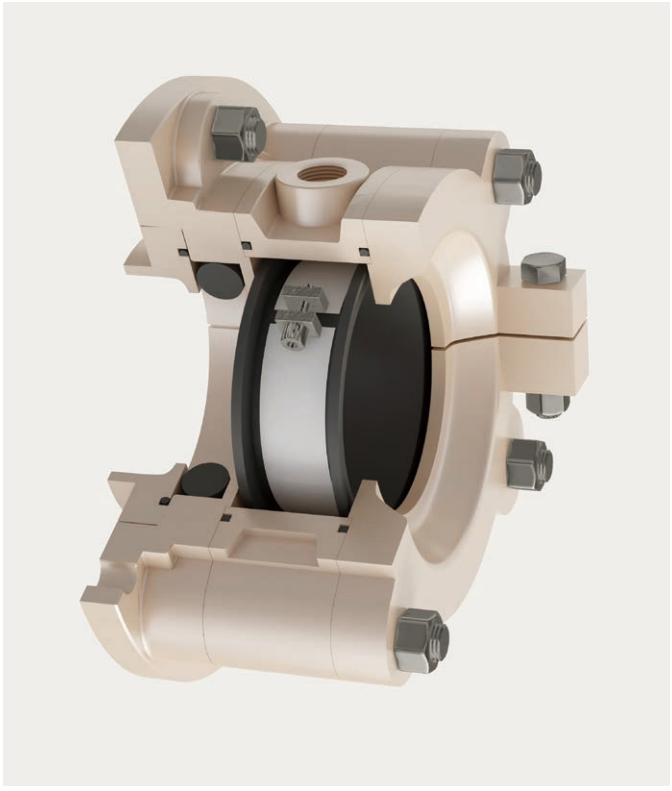
Applicable shaft diameter: Φ50 to Φ450

Rubber end-face seal

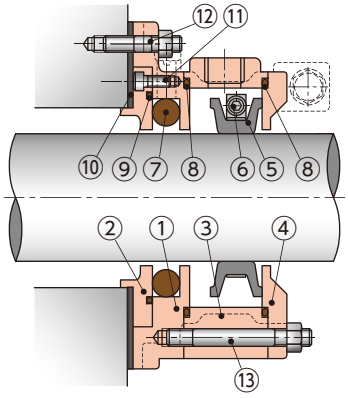
G1-STB

G1 seal (For ships, dedicated to the stern)

Marine equipment



- This product is designed specially for the stern tubes of ships.
- This product has a structure that is equipped with an emergency sealing mechanism.



AOB cross-sectional view

No.	Part	Standard material	Qty	Remarks
1	Mounting ring	Special copper alloy	1	Endless
2	Adapter	Special copper alloy	1	Endless
3	Casing	Special copper alloy	1	Endless
4	Plate	Special copper alloy	1 s	Split type
5	Seal ring	Special rubber	1	
6	Drive band	SUS	1	
7	Emergency seal	Special rubber	1	

No.	Part	Standard material	Qty	Remarks
8	O-ring	NBR	2	
9	O-ring	NBR	1	
10	Gasket	Soft cut gasket	1	
11	Hexagon socket head bolt	SUS316 or equiv.	6	
12	Stud bolt, etc.	SUS304 or equiv.	6	
13	Stud bolt, etc.	SUS304 or equiv.	4	
14	Reamer bolt, etc.	SUS304 or equiv.	2 s	

■ Specification conditions

Speed (m/sec)	Pressure (MPaG)
6	0.12

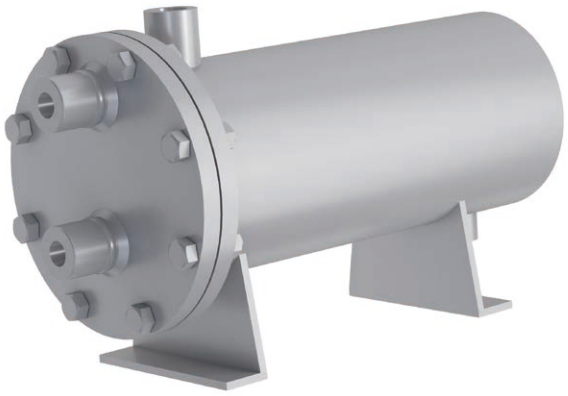
Applicable shaft diameter: Φ65 to Φ450

Accessory

Type: HE

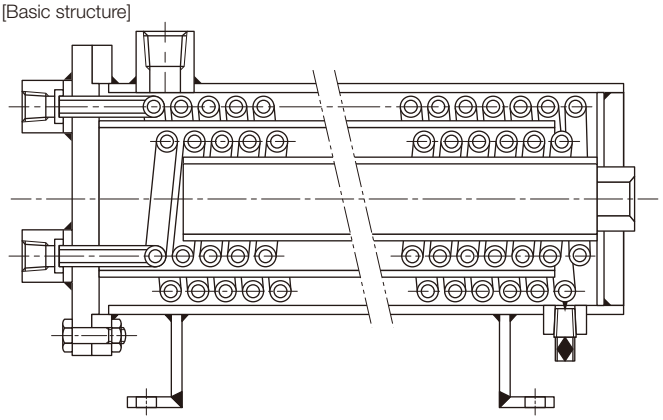
Flushing cooler

Oil refinery/ petrochemical | Energy/ environment | Chemical | Pump



- For high-temperature fluid, this product is mounted in the flushing line to protect the mechanical seal.
- Various heat exchanger tube types (in terms of materials and sizes) are provided so that they can be applied to each kind of fluid.
- We can provide products that conform to the High Pressure Gas Safety Act and ASME standards.

[Basic structure]



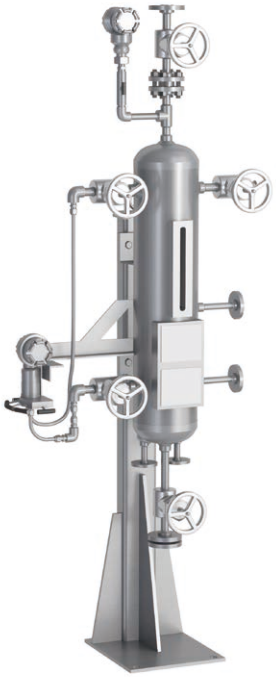
Type	Heat transfer area
HE-5S	0.25 m^2
HE-5A	0.4 m^2
HE-5B	0.6 m^2
HE-5C	0.8 m^2

Accessory

Reservoir

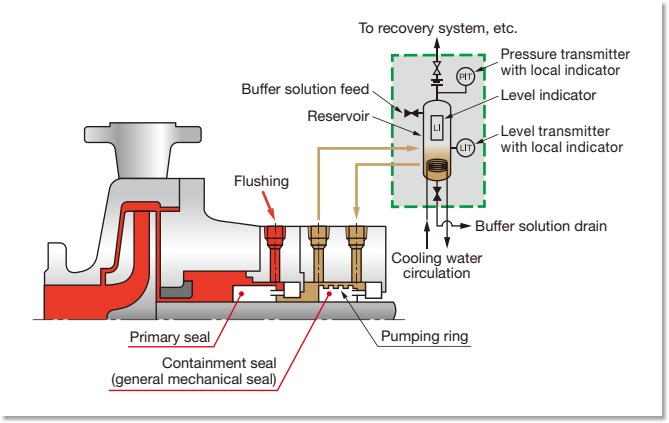
Reservoir

Oil refinery/ petrochemical | Chemical | Pump



- This reservoir is installed when tandem seals for API Plan 52 are adopted.
- We can provide products that conform to the High Pressure Gas Safety Act and ASME standards.
- We can provide a variety of instrumentation devices to be installed.

PLAN 52

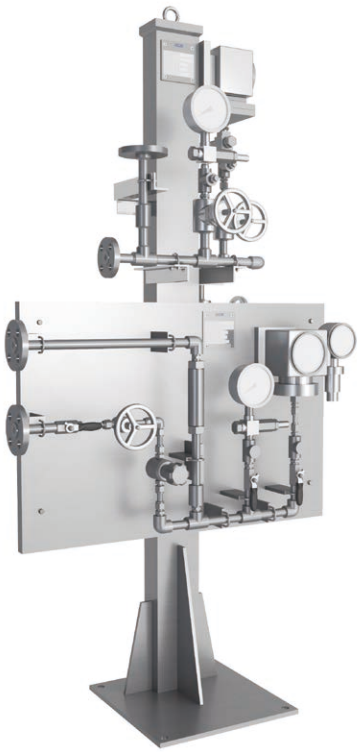


Accessory

Plan 72/76 unit

Plan 72/76 unit

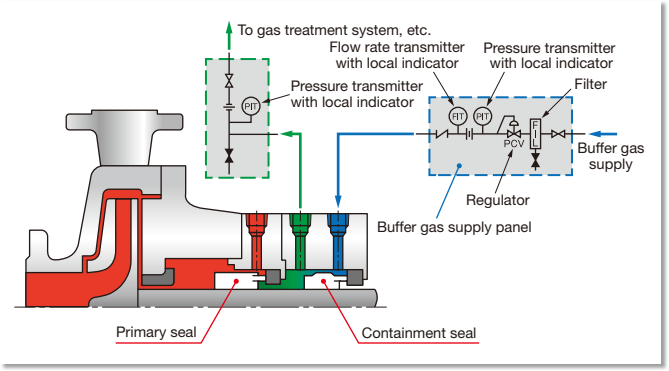
Oil refinery/ petrochemical | Chemical | Pump



- This auxiliary pipe is installed when containment seals for API Plan 72 or 76 are adopted.
- This product can be unitized by installing a nitrogen purging pipe (for API Plan 72) or flare connection pipe (for API Plan 76) on a stay.*1
- We can provide a variety of instrumentation devices to be installed.
- For API Plan 76 gas lines, we can provide products that conform to the High Pressure Gas Safety Act.

*1 For API Plans 72 and 76, we can also panelize our products or deliver individual instrumentation devices separately.

PLAN 72/76

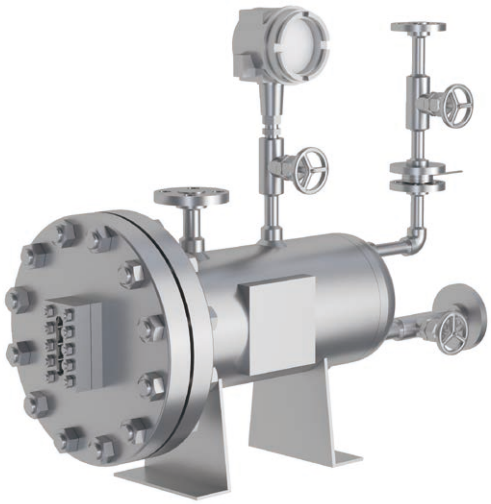


Accessory

Plan 75 unit

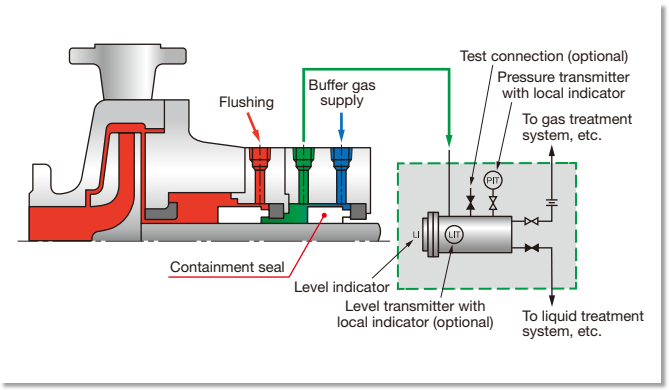
Plan 75 unit

Oil refinery/ petrochemical | Chemical | Pump



- This drain tank unit is installed when containment seals for API Plan 75 are adopted.
- We can provide a variety of instrumentation devices to be installed.

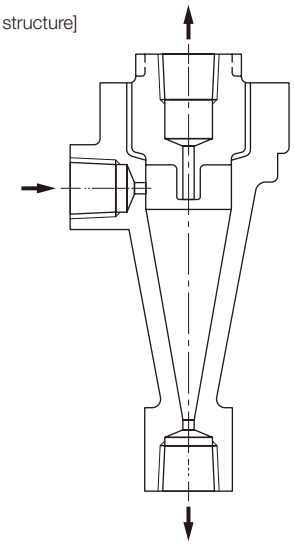
PLAN 75



Cyclone separator

- This product is mounted in the flushing line leading to the stuffing box to protect the mechanical seal from solids.
- Flushing fluid is injected into the conical body of this product and centrifugal force is applied with gyrating motion to separate and discharge solid particles.

[Basic structure]



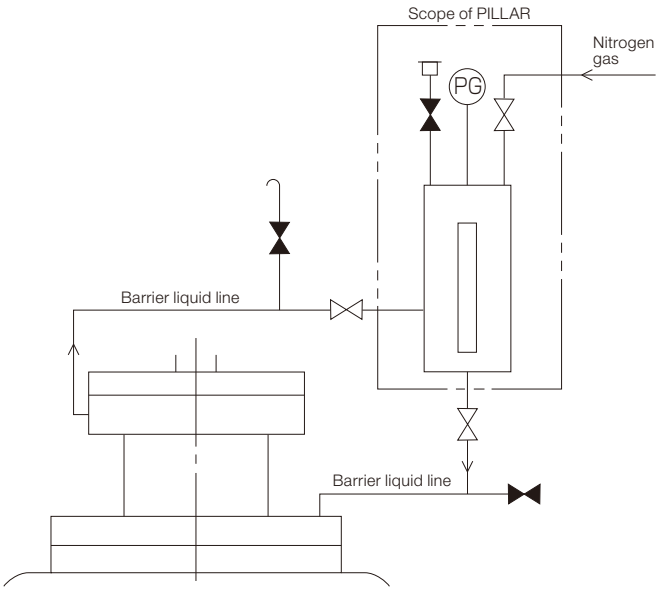
Accessory

Pressure tank

Pressure tank

Oil refinery/ petrochemical | Chemical | Mixer/low-speed rotary machine

- This product is a double-sealed confined liquid pressure tank that is mainly used for mixers.
- We can also provide products that conform to the High Pressure Gas Safety Act, as well as products that incorporate cooling coils.

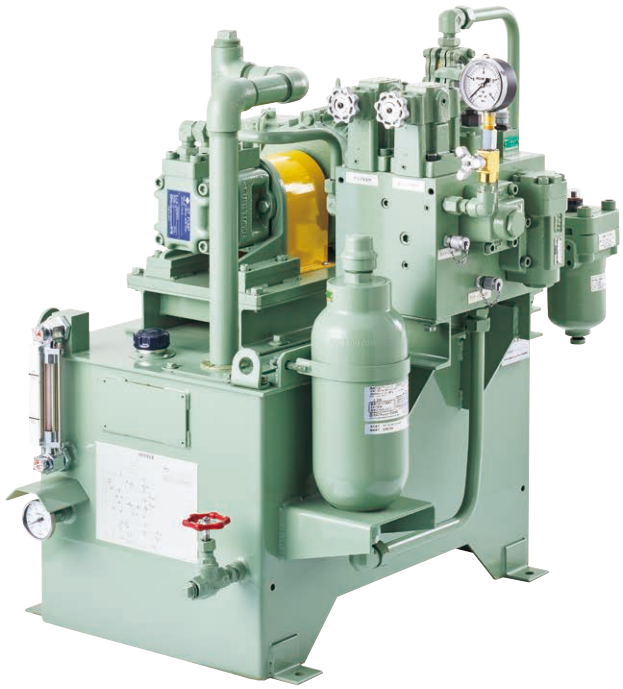


Accessory

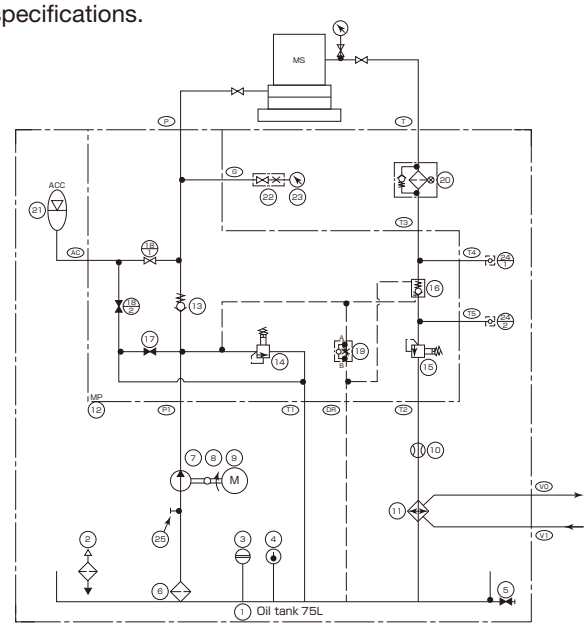
Pressure unit

Pressure unit

Oil refinery/ petrochemical | Chemical | Pump | Mixer/low-speed rotary machine | Compressor/ blower

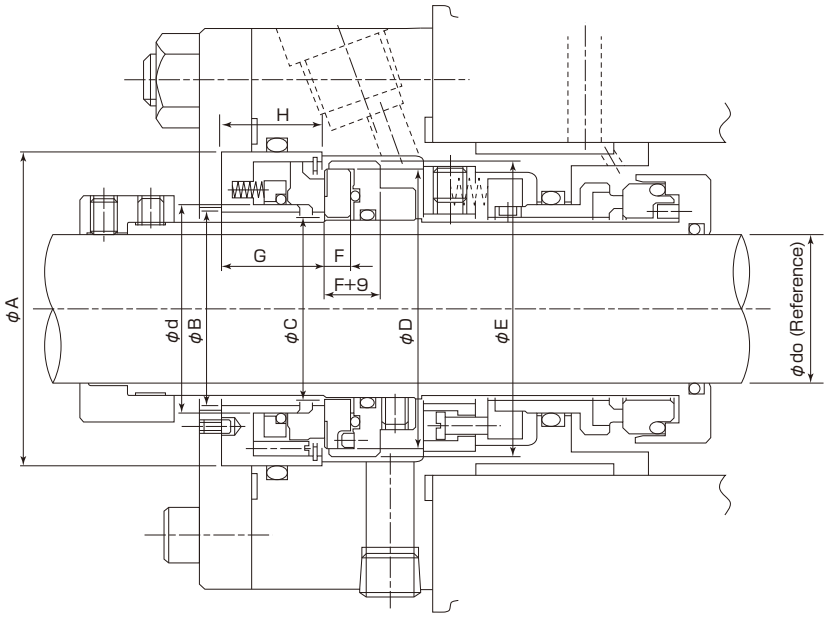


- This product is a double-sealed confined liquid circulation device that is used for mixers, pumps, blowers, and other devices.
- For pressurization methods, we can support the tank pressurization method using nitrogen gas, as well as the pump pressurization method.
- We can customize the tank capacity, required pressure, and required flow rate according to the customer's specifications.



PILLAR Phoenix-Seal™ Type PPG (Aerodynamic type non-contact containment seal)

Basic structure diagram



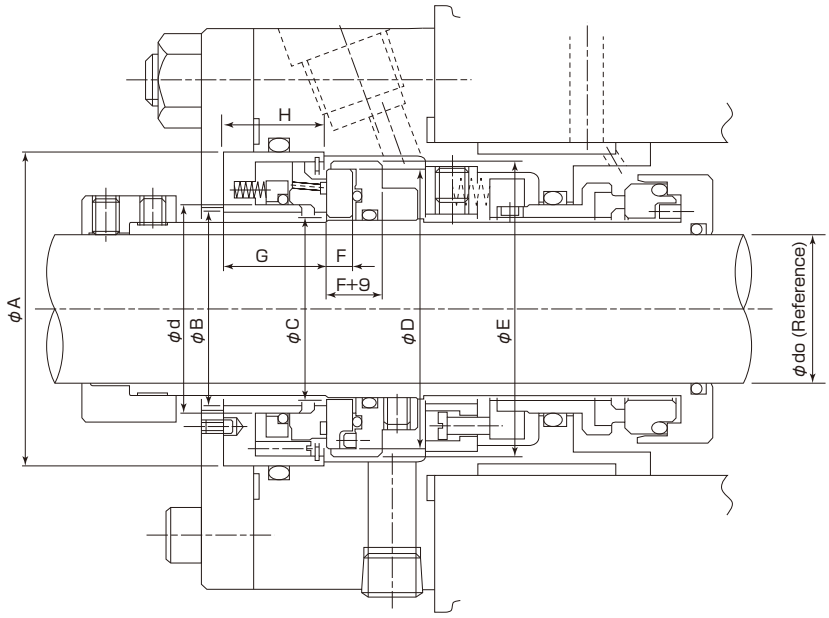
Size table

(Unit: mm)

Φd	ΦdO	ΦA	ΦB	ΦC	ΦD	ΦE	F	G	H
30	20	53	27	26	46	50	6	25.5	25
35	25	58	32	31	51	55	6	25.5	25
43	30	66	40	36	56	60	6	25.5	25
48	38	72	45	44	64	68	6	25.5	25
51	40	75	48	46	66	70	6	25.5	25
56	45	80	53	51	71	75	8	25.5	25
60	50	84	57	56	76	80	8	25.5	25
65	55	89	62	61	81	85	8	25.5	25
70	59	94	67	66	86	90	8	25.5	25
76	63	100	73	71	91	95	8	25.5	25
80	66	107	76	76	98	102	10	28	27.5
86	71	113	82	81	103	107	10	28	27.5
90	76	117	86	86	108	112	10	28	27.5
95	81	122	91	91	113	117	10	28	27.5
100	86	129	96	95	121	125	10	28	27.5
105	91	134	101	100	126	130	10	28	27.5
110	96	139	106	105	131	135	10	28	27.5
115	101	144	111	110	136	140	10	28	27.5
121	106	150	117	115	141	145	10	28	27.5
125	111	154	121	120	146	150	10	28	27.5
130	116	159	126	125	151	155	10	28	27.5

Type RRG (Dry-contact containment seal)

Basic structure diagram



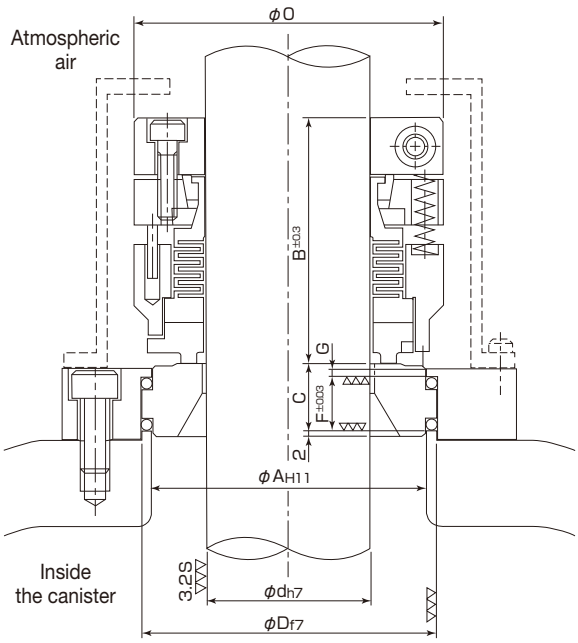
Size table

(Unit: mm)

Φd	ΦdO	ΦA	ΦB	ΦC	ΦD	ΦE	F	G	H
30	18	53	27	26	46	50	6	25.5	25
35	20	58	32	31	51	55	〃	〃	〃
43	25	66	40	36	56	60	〃	〃	〃
48	30	72	45	44	64	68	〃	〃	〃
51	38	75	48	46	66	70	〃	〃	〃
56	40	82	53	51	71	75	8	〃	〃
60	47	84	57	56	76	80	〃	〃	〃
65	50	89	62	61	81	85	〃	〃	〃
70	55	94	67	66	86	90	〃	〃	〃
76	60	100	73	71	91	95	〃	〃	〃
80	63	107	76	76	98	102	10	28	27
86	66	113	82	81	103	107	〃	〃	〃
90	71	117	86	86	108	112	〃	〃	〃
95	76	122	91	91	113	117	〃	〃	〃
100	80	129	96	95	121	125	〃	〃	〃
105	86	134	101	100	126	130	〃	〃	〃
111	90	139	107	105	131	135	〃	〃	〃
115	96	144	111	110	136	140	〃	〃	〃
121	101	150	117	115	141	145	〃	〃	〃
125	106	154	121	120	146	150	〃	〃	〃
130	110	159	126	125	151	155	〃	〃	〃

Dry-contact seal, Chemimighty

Basic structure diagram



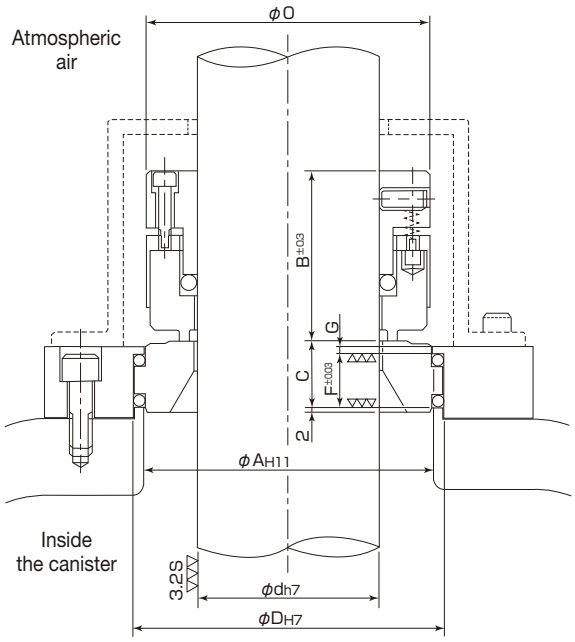
Size table

(Unit: mm)

Shaft diameter Φd	ΦA	B	C	ΦD	F	G	ΦO
20	44	52	22	50.5	16	3	54
25	50	52	22	56.5	16	3	57
30	55	54	24	61.5	18	3	63.5
35	60	54	24	66.5	18	3	66.5
40	65	60	25	71.5	18	4	76
45	70	60	25	76.5	18	4	79.5
50	76	60	26	82.5	18	5	85.5
55	80	60	26	86.5	18	5	89
60	89	66	26	95.5	18	5	106.5
65	94	66	27	100.5	18	6	109.5
70	99	66	27	105.5	18	6	116
75	105	66	27	111.5	18	6	122
80	109	70	27	115.5	18	6	133.5
85	114	70	27	120.5	18	6	139.5
90	119	70	27	125.5	18	6	143
95	124	70	27	130.5	18	6	149
100	129	70	27	135.5	18	6	152.5
105	140	70	29	146.5	20	6	157.5
110	145	70	29	151.5	20	6	162.5
115	150	70	29	156.5	20	6	167.5
120	155	70	29	161.5	20	6	172.5
125	160	70	29	166.5	20	6	177.5
130	167	70	29	173.5	20	6	182.5
135	172	80	38	182.5	28	7	192.5
140	177	80	38	187.5	28	7	197.5
145	182	80	38	192.5	28	7	202.5
150	187	80	38	197.5	28	7	207.5

Dry-contact seal, Chemimighty Ⅱ

Basic structure diagram



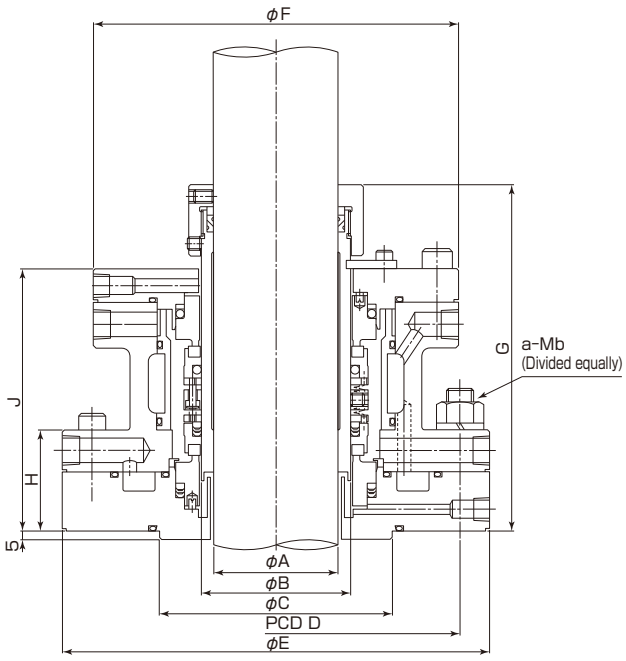
Size table

(Unit: mm)

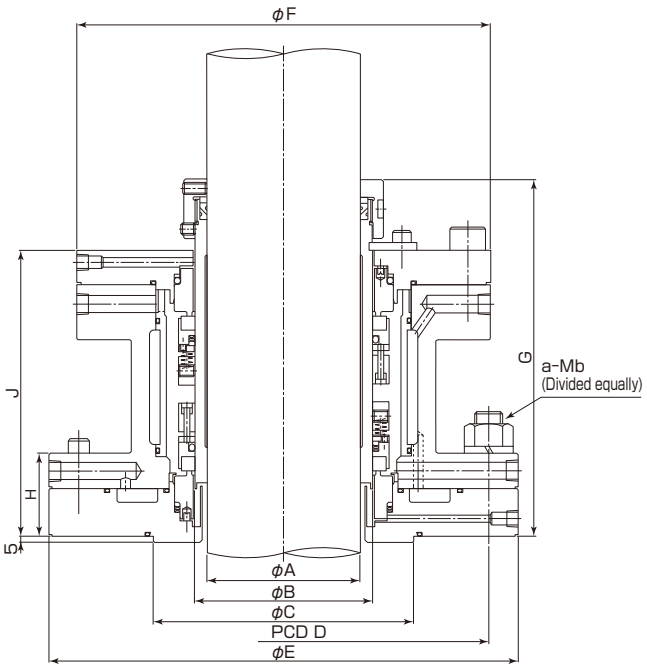
Shaft diameter Φd	ΦA	B	C	ΦD	F	G	ΦO
20	44	43	22	50.5	16	3	43
25	50	43	22	56.5	16	3	48
28	55	43	22	61.5	16	3	51
30	55	43	24	61.5	18	3	53
35	60	43	24	66.5	18	3	59
40	65	48	25	71.5	18	4	64
45	70	48	25	76.5	18	4	69
50	76	48	26	82.5	18	5	74
55	80	48	26	86.5	18	5	79
60	89	48	26	95.5	18	5	88
65	94	48	27	100.5	18	6	93
70	99	48	27	105.5	18	6	98
75	105	48	27	111.5	18	6	103
80	109	48	27	115.5	18	6	108
85	114	48	27	120.5	18	6	113
90	119	48	27	125.5	18	6	118
95	124	48	27	130.5	18	6	123
100	129	48	27	135.5	18	6	128
105	140	53	29	146.5	20	6	138
110	145	53	29	151.5	20	6	143
115	150	53	29	156.5	20	6	148
120	155	53	29	161.5	20	6	153
125	160	53	29	166.5	20	6	158
130	167	53	29	173.5	20	6	166
135	172	58	38	182.5	28	7	171
140	177	58	38	187.5	28	7	176
145	182	58	38	192.5	28	7	181
150	187	58	38	197.5	28	7	186

Mixer seal unit, unbalanced type (without bearing)

Basic structure diagram



Shaft diameter: 30 to 120



Shaft diameter: 130 to 260

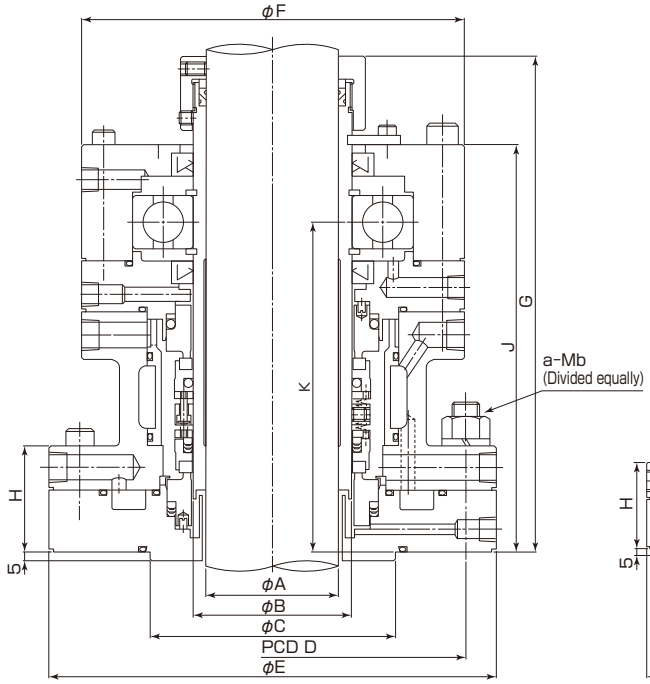
Size table

(Unit: mm)

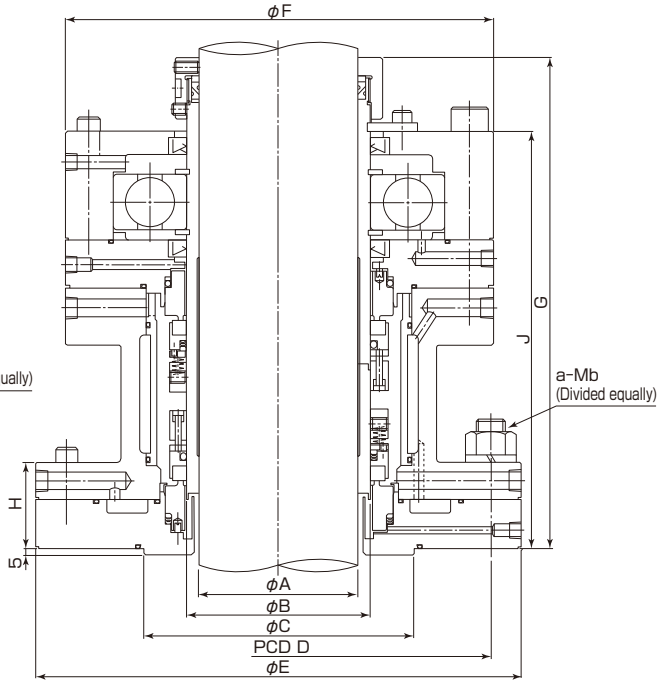
Shaft diameter ΦA h6	Nominal size ΦB	ΦC H8	PCD D	ΦE	ΦF	G	H	J	a-Mb
30	45	80	155	190	155	204	60	154	8-M16
35	50	90	175	210	158	204	60	154	8-M16
40	55	90	175	210	163	204	60	154	8-M16
45	60	100	185	220	178	205	60	155	8-M16
50	65	100	185	220	188	205	60	155	8-M16
55	70	120	200	235	193	205	60	155	8-M16
60	75	120	200	235	198	205	60	155	8-M16
65	80	130	210	245	203	205	60	155	8-M16
70	85	140	220	255	208	205	60	155	8-M16
75	90	140	220	255	218	205	60	155	8-M16
80	95	150	245	285	238	205	60	155	8-M20
85	100	150	245	285	243	205	60	155	8-M20
90	105	160	260	300	258	215	60	165	8-M20
95	110	160	260	300	263	215	60	165	8-M20
105	120	170	270	310	283	215	60	165	12-M20
115	130	190	280	320	298	215	60	165	12-M20
120	140	200	315	355	328	250	70	200	12-M20
130	150	220	345	395	348	300	70	240	12-M24
140	160	230	355	405	368	300	70	240	12-M24
150	170	240	365	415	390	315	70	255	12-M24
160	180	250	375	425	408	315	70	255	12-M24
170	190	260	390	440	418	315	70	255	12-M24
180	200	320	425	475	438	315	70	255	12-M24
190	210	330	435	485	485	335	90	275	12-M24
200	220	350	460	510	485	335	90	275	12-M24
210	230	360	480	530	528	345	90	285	12-M24
220	240	370	505	565	528	345	90	285	16-M27
230	250	380	515	575	573	355	90	295	16-M27
240	260	400	550	610	573	380	90	310	16-M27
250	270	410	560	620	593	380	90	310	16-M27
260	280	410	560	620	593	380	90	310	16-M27

Mixer seal unit, unbalanced type (with bearings)

Basic structure diagram



Shaft diameter: 30 to 120



Shaft diameter: 130 to 260

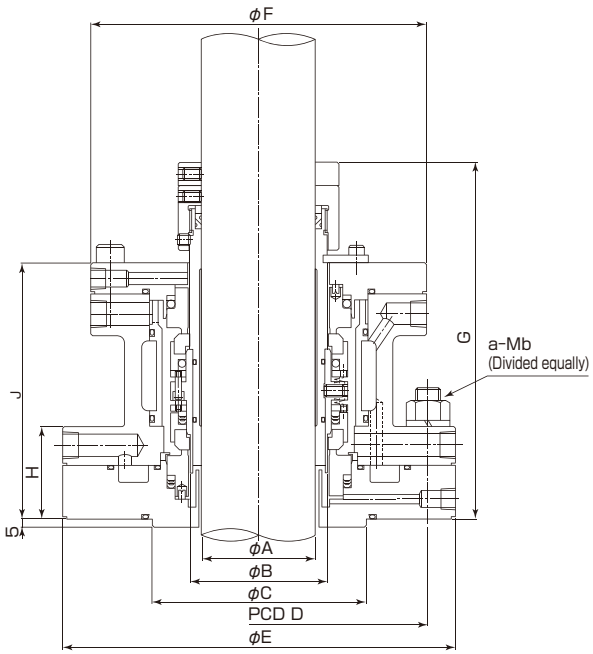
Size table

(Unit: mm)

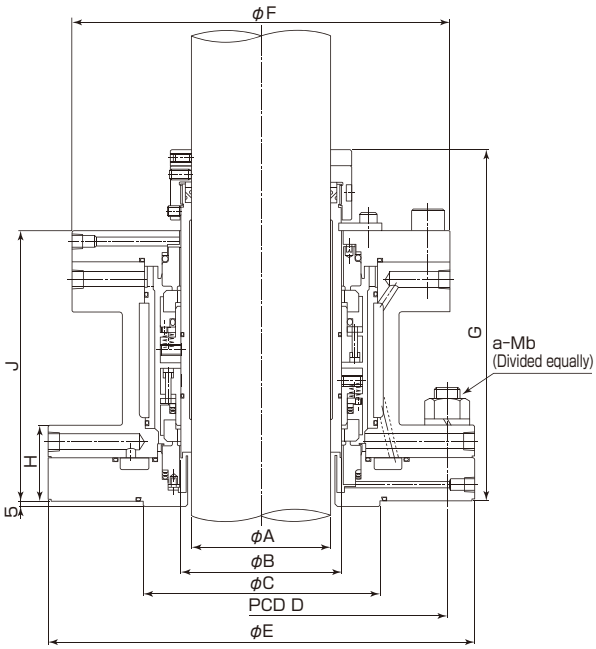
Shaft diameter ΦA h6	Nominal size ΦB	ΦC H8	PCD D	ΦE	ΦF	G	H	J	K	Bearing No.	a-Mb
30	45	80	155	190	155	266	60	216	180	#6209	8-M16
35	50	90	175	210	158	267	60	217	181	#6210	8-M16
40	55	90	175	210	163	268	60	218	182	#6211	8-M16
45	60	100	185	220	178	272	60	222	182	#6212	8-M16
50	65	100	185	220	188	273	60	223	183	#6213	8-M16
55	70	120	200	235	193	274	60	224	183	#6214	8-M16
60	75	120	200	235	198	275	60	225	184	#6215	8-M16
65	80	130	210	245	203	276	60	226	184	#6216	8-M16
70	85	140	220	255	208	279	60	229	186	#6217	8-M16
75	90	140	220	255	218	281	60	231	187	#6218	8-M16
80	95	150	245	285	238	284	60	234	188	#6219	8-M20
85	100	150	245	285	243	286	60	236	189	#6220	8-M20
90	105	160	260	300	258	305	60	255	206	#6221	8-M20
95	110	160	260	300	263	307	60	257	207	#6222	8-M20
105	120	170	270	310	283	309	60	259	208	#6224	12-M20
115	130	190	280	320	298	309	60	259	208	#6226	12-M20
120	140	200	315	355	328	341	70	291	239	#6228	12-M20
130	150	220	345	395	348	398	70	338	281	#6230	12-M24
140	160	230	355	405	368	405	70	345	282	#6232	12-M24
150	170	240	365	415	390	423	70	363	299	#6234	12-M24
160	180	250	375	425	408	423	70	363	300	#6236	12-M24
170	190	260	390	440	418	430	70	370	301	#6238	12-M24
180	200	320	425	475	438	432	70	372	302	#6240	12-M24
190	210	330	435	485	485	470	90	410	338	#6244	12-M24
200	220	350	460	510	485	470	90	410	338	#6244	12-M24
210	230	360	480	530	528	480	90	420	348	#6248	12-M24
220	240	370	505	565	528	480	90	420	348	#6248	16-M27
230	250	380	515	575	573	540	90	470	390	#6252	16-M27
240	260	400	550	610	573	540	90	470	390	#6252	16-M27
250	270	410	560	620	593	550	90	480	410	#6256	16-M27
260	280	410	560	620	593	550	90	480	410	#6256	16-M27

Mixer seal unit, balanced type (without bearing)

Basic structure diagram



Shaft diameter: 30 to 120



Shaft diameter: 130 to 260

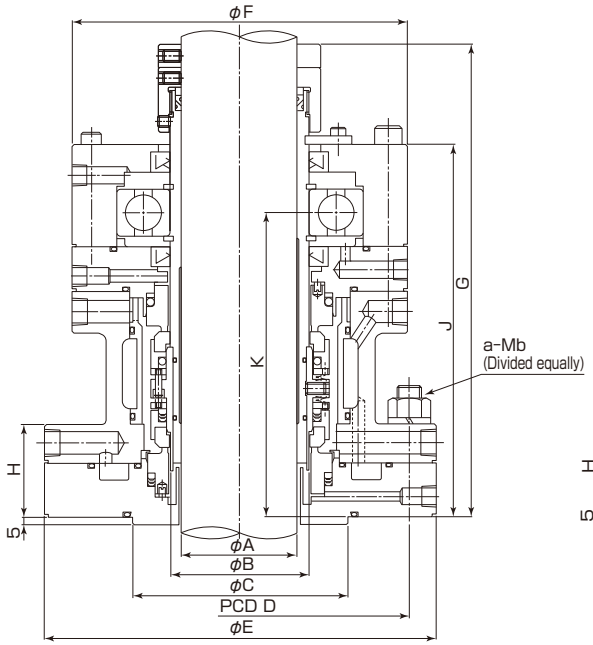
Size table

(Unit: mm)

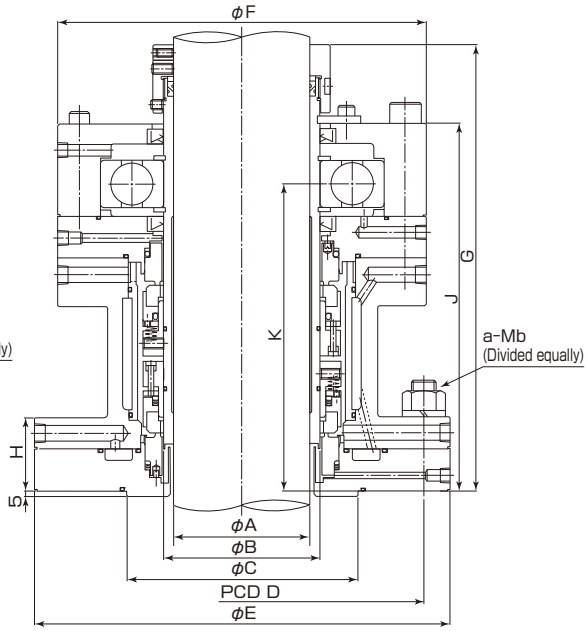
Shaft diameter ΦA h6	Nominal size ΦB	ΦC H8	PCD D	ΦE	ΦF	G	H	J	a-Mb
30	50	80	155	190	155	228	60	163	8-M16
35	55	90	175	210	158	228	60	163	8-M16
40	60	90	175	210	163	228	60	163	8-M16
45	65	100	185	220	178	228	60	163	8-M16
50	70	100	185	220	188	230	60	165	8-M16
55	75	120	200	235	193	230	60	165	8-M16
60	80	120	200	235	198	230	60	165	8-M16
65	85	130	210	245	203	230	60	165	8-M16
70	90	140	220	255	208	230	60	165	8-M16
75	95	140	220	255	218	230	60	165	8-M16
80	100	150	245	285	238	230	60	165	8-M20
85	105	150	245	285	243	237	60	172	8-M20
90	110	160	260	300	258	240	60	175	8-M20
95	115	160	260	300	263	240	60	175	8-M20
105	125	170	270	310	283	240	60	175	12-M20
115	135	190	280	320	298	274	60	209	12-M20
120	145	200	315	355	328	274	70	209	12-M20
130	160	220	345	395	348	325	70	250	12-M24
140	170	230	355	405	368	339	70	264	12-M24
150	180	240	365	415	390	340	70	265	12-M24
160	190	250	375	425	408	340	70	265	12-M24
170	200	260	390	440	418	340	70	265	12-M24
180	210	320	425	475	438	350	70	275	12-M24
190	220	330	435	485	485	360	90	285	12-M24
200	230	350	460	510	485	366	90	291	12-M24
210	240	360	480	530	528	370	90	295	12-M24
220	250	370	505	565	528	370	90	295	16-M27
230	260	380	515	575	573	380	90	305	16-M27
240	270	400	550	610	573	405	90	320	16-M27
250	280	410	560	620	593	405	90	320	16-M27
260	290	410	560	620	593	405	90	320	16-M27

Mixer seal unit, balanced type (with bearings)

Basic structure diagram



Shaft diameter: 30 to 120



Shaft diameter: 130 to 260

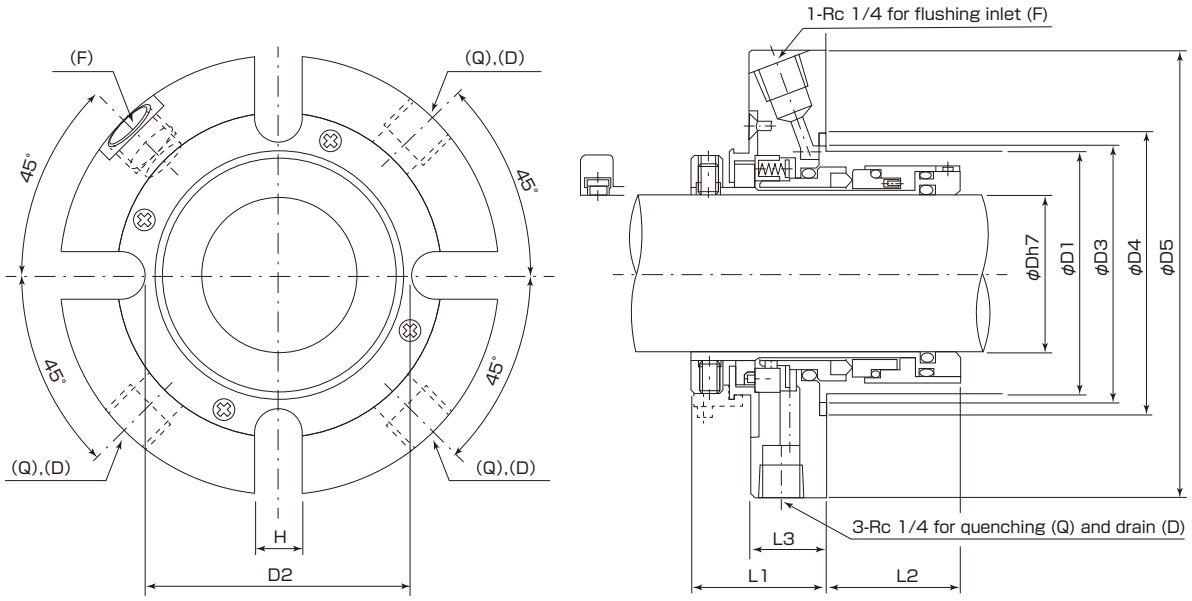
Size table

(Unit: mm)

Shaft diameter ΦA h6	Nominal size ΦB	ΦC H8	PCD D	ΦE	ΦF	G	H	J	K	Bearing No.	a-Mb
30	50	80	155	190	155	289	60	224	188	#6209	8-M16
35	55	90	175	210	158	290	60	225	189	#6210	8-M16
40	60	90	175	210	163	291	60	226	190	#6211	8-M16
45	65	100	185	220	178	295	60	230	190	#6212	8-M16
50	70	100	185	220	188	298	60	233	193	#6213	8-M16
55	75	120	200	235	193	299	60	234	193	#6214	8-M16
60	80	120	200	235	198	300	60	235	194	#6215	8-M16
65	85	130	210	245	203	301	60	236	194	#6216	8-M16
70	90	140	220	255	208	304	60	239	196	#6217	8-M16
75	95	140	220	255	218	306	60	241	197	#6218	8-M16
80	100	150	245	285	238	309	60	244	198	#6219	8-M20
85	105	150	245	285	243	318	60	253	206	#6220	8-M20
90	110	160	260	300	258	330	60	265	216	#6221	8-M20
95	115	160	260	300	263	332	60	267	217	#6222	8-M20
105	125	170	270	310	283	334	60	269	218	#6224	12-M20
115	135	190	280	320	298	363	60	298	247	#6226	12-M20
120	145	200	315	355	328	365	70	300	248	#6228	12-M20
130	160	220	345	395	348	423	70	348	291	#6230	12-M24
140	170	230	355	405	368	443	70	368	306	#6232	12-M24
150	180	240	365	415	390	448	70	373	309	#6234	12-M24
160	190	250	375	425	408	448	70	373	309	#6236	12-M24
170	200	260	390	440	418	455	70	380	311	#6238	12-M24
180	210	320	425	475	438	466	70	391	322	#6240	12-M24
190	220	330	435	485	485	495	90	420	348	#6244	12-M24
200	230	350	460	510	485	495	90	420	348	#6244	12-M24
210	240	360	480	530	528	505	90	430	358	#6248	12-M24
220	250	370	505	565	528	505	90	430	358	#6248	16-M27
230	260	380	515	575	573	555	90	480	380	#6252	16-M27
240	270	400	550	610	573	555	90	480	380	#6252	16-M27
250	280	410	560	620	593	570	90	495	400	#6256	16-M27
260	290	410	560	620	593	570	90	495	400	#6256	16-M27

PILLAR CASSETTE SEAL™ (Standard type)

Basic structure diagram



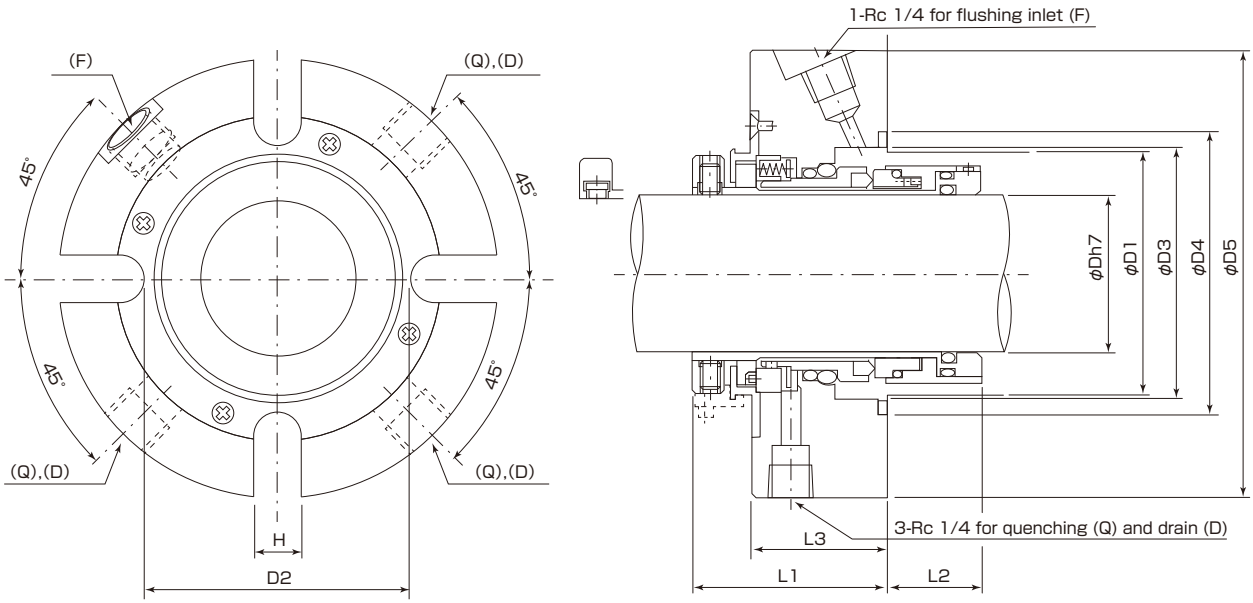
Size table

(Unit: mm)

Nominal size	ΦD (Shaft diameter)	ΦD1		D2	ΦD3	ΦD4	ΦD5	L1	L2	L3	H
		(min)	(max)								
020	20	36	48	56	46	54	98	35	35	21	12
025	25	41	53	61	51	59	105	35	35	21	12
028	28	44	56	64	54	62	108	35	35	21	12
030	30	46	58	66	56	64	108	35	35	21	12
032	32	48	60	68	58	66	115	35	35	21	14
035	35	51	63	71	61	69	115	35	35	21	14
038	38	57	66	76	66	74	125	38	39	22	14
040	40	59	68	78	68	76	125	38	39	22	14
042	42	61	70	80	70	78	128	38	39	22	14
045	45	64	73	83	73	81	128	38	39	22	14
048	48	67	76	86	76	84	135	38	39	22	16
050	50	69	78	88	78	86	135	38	39	22	18
055	55	74	83	93	83	91	158	38	39	22	18
060	60	79	88	98	88	96	164	38	39	22	18
065	65	87	94	108	94	105	168	43	43	24	18
070	70	92	99	113	99	110	178	43	43	24	18
075	75	99	108	122	105	119	198	45	43	24	22
080	80	105	113	128	110	124	198	45	43	24	22
085	85	110	118	133	115	129	208	45	43	24	22
090	90	115	123	138	120	134	208	45	43	24	22
095	95	120	128	143	125	139	218	45	43	24	22
100	100	125	133	148	130	144	218	45	43	24	22

PILLAR CASSETTE SEAL™ (High-concentration slurry resistance type cassette seal)

Basic structure diagram



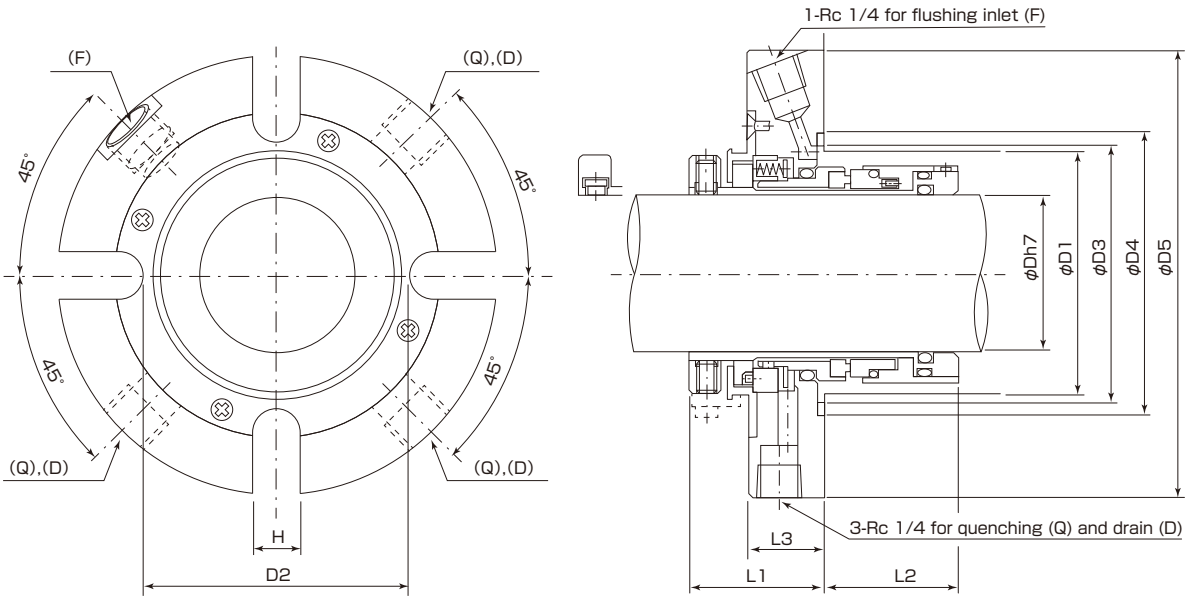
Size table

(Unit: mm)

Nominal size	ΦD (Shaft diameter)	ΦD1		D2	ΦD3	ΦD4	ΦD5	L1	L2	L3	H
		(min)	(max)								
020	20	36	48	56	46	54	98	49	25	35	12
025	25	41	53	61	51	59	105	49	25	35	12
028	28	44	56	64	54	62	108	49	25	35	12
030	30	46	58	66	56	64	108	49	25	35	12
032	32	48	60	68	58	66	115	49	25	35	14
035	35	51	63	71	61	69	115	49	25	35	14
038	38	57	66	76	66	74	125	53	28	37	14
040	40	59	68	78	68	76	125	53	28	37	14
042	42	61	70	80	70	78	128	53	28	37	14
045	45	64	73	83	73	81	128	53	28	37	14
048	48	67	76	86	76	84	135	53	28	37	16
050	50	69	78	88	78	86	135	53	28	37	18
055	55	74	83	93	83	91	158	53	28	37	18
060	60	79	88	98	88	96	164	53	28	37	18

PILLAR CASSETTE SEAL™ (High-pressure type cassette seal)

Basic structure diagram



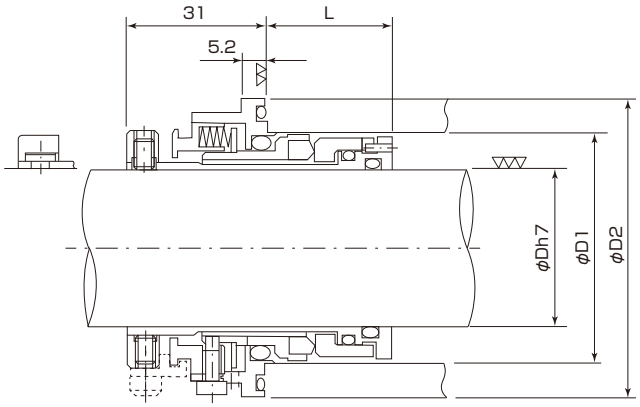
Size table

(Unit: mm)

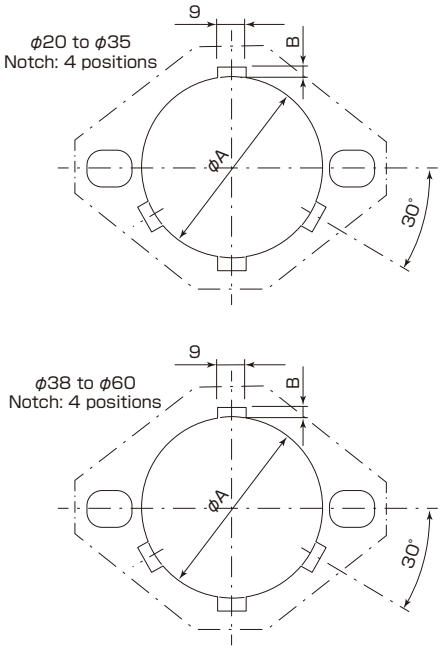
Nominal size	ΦD (Shaft diameter)	ΦD1		D2	ΦD3	ΦD4	ΦD5	L1	L2	L3	H
		(min)	(max)								
020	20	36	48	56	46	54	98	35	35	21	12
025	25	41	53	61	51	59	105	35	35	21	12
028	28	44	56	64	54	62	108	35	35	21	12
030	30	46	58	66	56	64	108	35	35	21	12
032	32	48	60	68	58	66	115	35	35	21	14
035	35	51	63	71	61	69	115	35	35	21	14
038	38	57	66	76	66	74	125	38	39	22	14
040	40	59	68	78	68	76	125	38	39	22	14
042	42	61	70	80	70	78	128	38	39	22	14
045	45	64	73	83	73	81	128	38	39	22	14
048	48	67	76	86	76	84	135	38	39	22	16
050	50	69	78	88	78	86	135	38	39	22	18
055	55	74	83	93	83	91	158	38	39	22	18
060	60	79	88	98	88	96	164	38	39	22	18
065	65	87	94	108	94	105	168	43	43	24	18
070	70	92	99	113	99	110	178	43	43	24	18
075	75	99	108	122	105	119	198	45	43	24	22
080	80	105	113	128	110	124	198	45	43	24	22
085	85	110	118	133	115	129	208	45	43	24	22
090	90	115	123	138	120	134	208	45	43	24	22
095	95	120	128	143	125	139	218	45	43	24	22
100	100	125	133	148	130	144	218	45	43	24	22

PILLAR CASSETTE SEAL™ (Flangeless cassette seal)

Basic structure diagram



Mounting plate dimensions



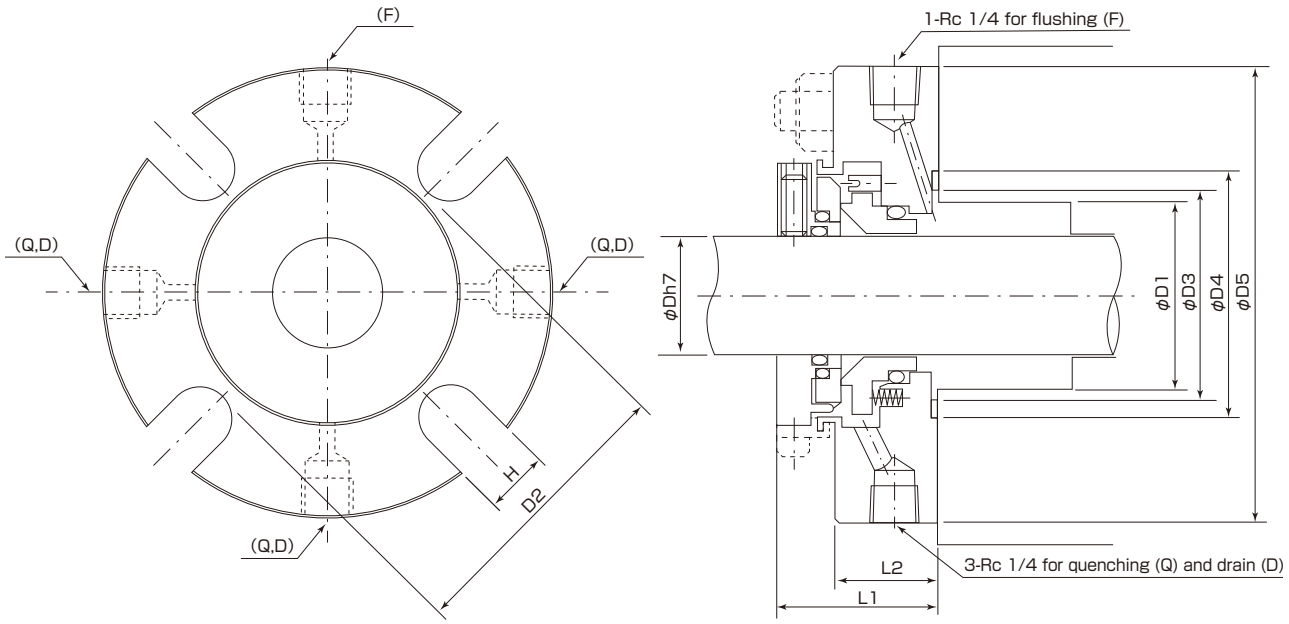
Size table

(Unit: mm)

D	D1	D2	L	Reference: Mounting bolt PCD (min.)						Plate size	
				Hexagon head bolt			Hexagon socket head bolt			A	B
(Shaft diameter)	Min.			M8	M10	M12	M8	M10	M12		
20	36	51	28	61	66	68	60	62	64	45	4.5
25	41	56	↑	66	71	73	65	67	69	50	↑
28	44	59	↑	69	74	76	68	70	72	53	↑
30	46	61	↑	71	76	78	70	72	74	55	↑
32	48	63	↑	73	78	80	72	74	76	57	↑
35	51	66	↑	76	81	83	75	77	79	60	↑
38	57	73	31	82	87	89	82	84	86	66.5	3.5
40	59	75	↑	84	89	91	84	86	88	68.5	↑
42	61	77	↑	86	91	93	86	88	90	70.5	↑
45	64	80	↑	89	94	96	89	91	93	73.5	↑
48	67	83	↑	92	97	99	92	94	96	76.5	↑
50	69	85	↑	94	99	101	94	96	98	78.5	↑
55	74	90	↑	99	104	106	99	101	103	83.5	↑
60	79	95	↑	104	109	111	104	106	108	88.5	↑

PILLAR CASSETTE SEAL™ (Outside static-type cassette seal)

Basic structure diagram



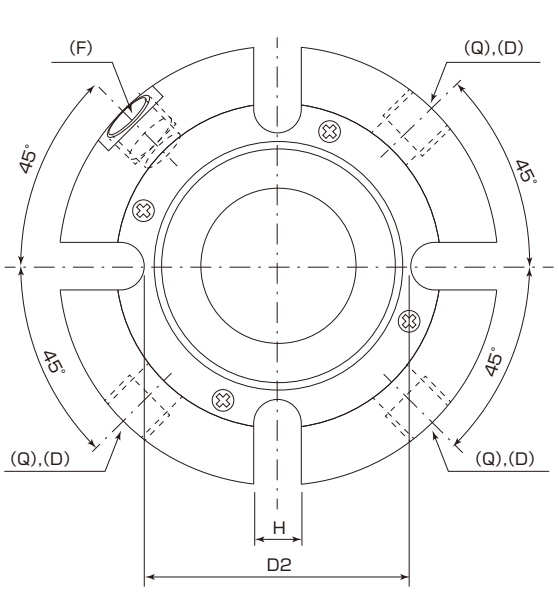
Size table

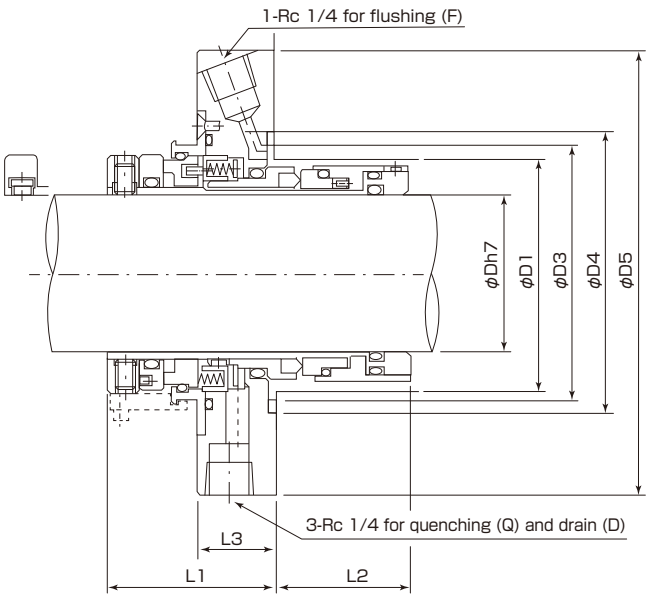
(Unit: mm)

D (Shaft diameter)	D1 (min.)	D1 (max.)	D2	D3	D4	D5	L1	L2	H	Reference: Bolt PCD (min.)		
										Bolt size	Hexagon head bolt	Hexagon socket head bolt
020	36	48	56	46	54	98	35	21	12	4-M10	74	70
025	41	53	61	51	59	105	35	21	12	4-M10	79	75
028	44	56	64	54	62	108	35	21	12	4-M10	82	78
030	46	58	66	56	64	108	35	21	12	4-M10	84	80
032	48	60	68	58	66	115	35	21	14	4-M12	88	84
035	51	63	71	61	69	115	35	21	14	4-M12	91	87
038	57	66	76	66	74	125	38	24	14	4-M12	96	92
040	59	68	78	68	76	125	38	24	14	4-M12	98	94
042	61	70	80	70	78	128	38	24	14	4-M12	100	96
045	64	73	83	73	81	128	38	24	14	4-M12	104	100
048	67	76	86	76	84	135	38	24	16	4-M14	110	105
050	69	78	88	78	86	135	38	24	18	4-M16	114	110
055	74	83	93	83	91	158	38	24	18	4-M16	120	116
060	79	88	98	88	96	164	38	24	18	4-M16	124	120
065	87	94	108	94	105	168	43	27	18	4-M16	132	128
070	92	99	113	99	110	178	43	27	18	4-M16	137	133
075	99	108	122	105	119	198	45	29	22	4-M20	151	146
080	105	113	128	110	124	198	45	29	22	4-M20	156	151
085	110	118	133	115	129	208	45	29	22	4-M20	161	156
090	115	123	138	120	134	208	45	29	22	4-M20	166	161
095	120	128	143	125	139	218	45	29	22	4-M20	171	166
100	125	133	148	130	144	218	45	29	22	4-M20	176	171

PILLAR CASSETTE SEAL™ (Tandem seal)

Basic structure diagram





Note: This diagram shows a tandem seal of Cassette Seal “type GAKEM” as an example.

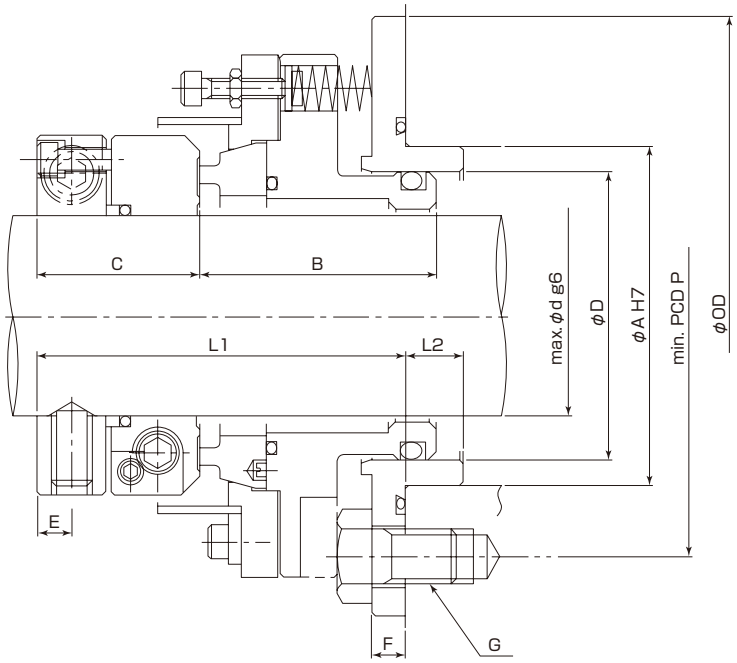
Size table

(Unit: mm)

Nominal size	ΦD (Shaft diameter)	ΦD1		D2	ΦD3	ΦD4	ΦD5	L1	L2	L3	H
		(min)	(max)								
020	20	36	48	56	46	54	98	45	35	21	12
025	25	41	53	61	51	59	105	45	35	21	12
028	28	44	56	64	54	62	108	45	35	21	12
030	30	46	58	66	56	64	108	45	35	21	12
032	32	48	60	68	58	66	115	45	35	21	14
035	35	51	63	71	61	69	115	45	35	21	14
038	38	57	66	76	66	74	125	51	39	22	14
040	40	59	68	78	68	76	125	51	39	22	14
042	42	61	70	80	70	78	128	51	39	22	14
045	45	64	73	83	73	81	128	51	39	22	14
048	48	67	76	86	76	84	135	51	39	22	16
050	50	69	78	88	78	86	135	51	39	22	18
055	55	74	83	93	83	91	158	51	39	22	18
060	60	79	88	98	88	96	164	51	39	22	18
065	65	87	94	108	94	105	168	57	43	24	18
070	70	92	99	113	99	110	178	57	43	24	18
075	75	99	108	122	105	119	198	60	43	24	22
080	80	105	113	128	110	124	198	60	43	24	22

Static-type outside split seal

Basic structure diagram



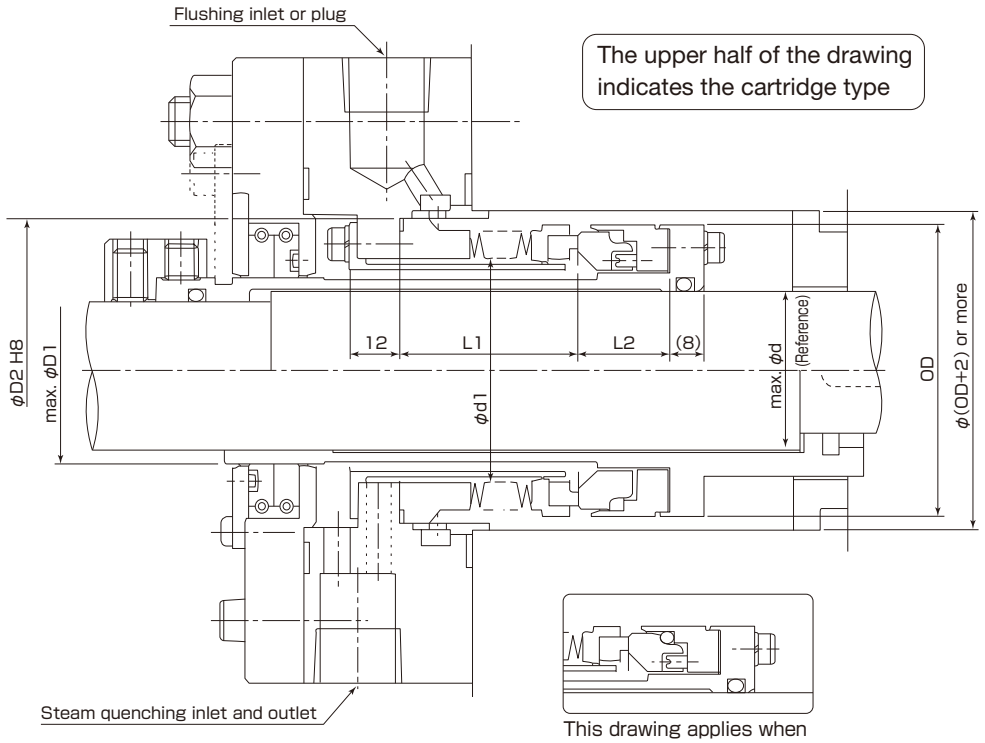
Size table

(Unit: mm)

Φd g6 max.	ΦD	ΦA H7 min.	B	C	E	F	G	L1	L2	PCD P min.	ΦOD min.
33	51	65	67	43	8.5	8	M12	100	15	100	125
40	58	75	67	43	8.5	8	M12	100	15	110	132
46	64	80	67	43	8.5	8	M12	100	15	115	138
50	71	85	70	43	8.5	8	M12	100	15	120	143
55	76	90	70	43	8.5	8	M12	100	15	125	148
60	81	95	70	43	8.5	8	M12	100	15	130	153
65	86	100	72	43	8.5	8	M12	102	15	135	158
70	91	105	72	48	10	8	M12	107	15	140	165
80	101	115	72	48	10	8	M12	107	15	150	175
90	111	125	73	48	10	10	M16	109	15	165	195
100	121	135	73	48	10	10	M16	109	15	175	205
110	131	145	73	48	10	10	M16	109	15	185	215
120	141	155	73	48	10	10	M16	109	15	195	225
130	151	165	78	53	11	10	M16	119	15	205	238
140	161	175	78	53	11	10	M16	119	15	215	248
150	171	185	78	53	11	10	M16	119	15	225	258
160	181	195	78	53	11	10	M16	119	15	235	268
170	196	210	90	65	15	14	M20	142	20	260	298
185	211	225	90	65	15	14	M20	142	20	275	313
200	226	240	90	65	15	14	M20	142	20	290	328
215	241	255	90	65	15	14	M20	142	20	305	338
230	256	270	90	65	15	14	M20	142	20	320	358
240	271	285	105	75	18	14	M24	167	20	340	388
250	286	300	105	75	18	14	M24	167	20	355	398
260	301	315	105	75	18	14	M24	167	20	370	408

Static-type welded metal bellows seal

Basic structure diagram



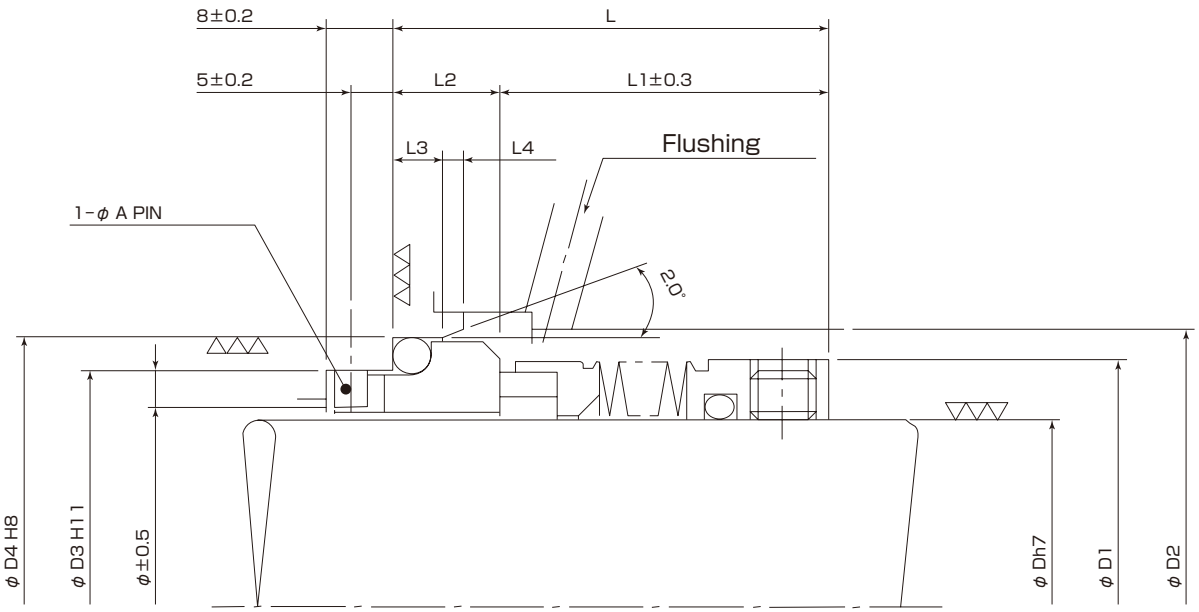
Size table

(Unit: mm)

d1	d	D1	D2	L1	L2	OD
039	24.5	32	58	40	22	55
043	28.5	36	62	42	22	59
049	34.5	42	68	42	22	65
053	38.5	46	72	42	22	69
061	46.5	53	80	42	22	77
069	54	61	90	47	25.5	87
076	61	68	97	48	25.5	94
086	71	78	107	48	25.5	106
096	79	87	117	48	25.5	116
106	89	97	127	48	25.5	126
116	97	106	139	55	29.5	136.5
136	117	126	159	55	29.5	156.5

Bellows Pack™ (Rotary-type welded metal bellows seal)

Basic structure diagram



Size table

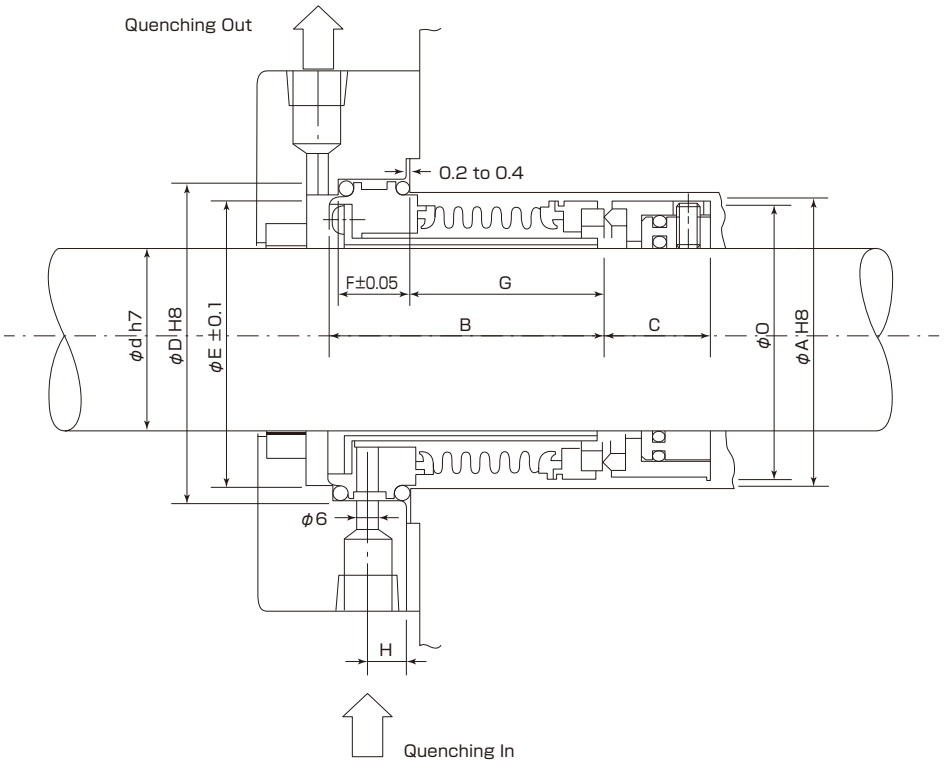
(Unit: mm)

D SIZE	D1	D2	D3	D4	L	L1	L2	L3	L4	A	B
20	33	36	29	35	37.5	27.5	10	5	2	3	3.5
25	39	41	34	40	40	30	〃	〃	〃	〃	〃
30	44	46	39	45	42.5	32.5	〃	〃	〃	〃	〃
35	49	51	44	50	42.5	32.5	〃	〃	〃	〃	〃
40	54	60	51	58	45	34	11	6	〃	4	4
45	59	63	56	63	45	34	〃	〃	〃	〃	4.5
50	64	70	62	70	47.5	34.5	13	〃	2.5	〃	〃
55	69	75	67	75	47.5	34.5	〃	〃	〃	〃	5
60	74	80	72	80	52	39	〃	〃	〃	〃	〃
65	79	89	77	85	52	39	〃	〃	〃	〃	〃
70	86	92	83	92	56	41	15	7	〃	〃	〃
75	91	100	88	97	56	41	〃	〃	〃	〃	〃
80	97	103	95	105	58.5	43	15.5	〃	3	〃	6
85	102	110	100	110	58.5	43	〃	〃	〃	〃	〃
90	107	113	105	115	61.5	46	〃	〃	〃	〃	〃
95	112	119	110	120	61.5	46	〃	〃	〃	〃	〃
100	117	126	115	125	61.5	46	〃	〃	〃	〃	〃

QAK

Static-type molded metal bellows seal

Basic structure diagram



Size table

(Unit: mm)

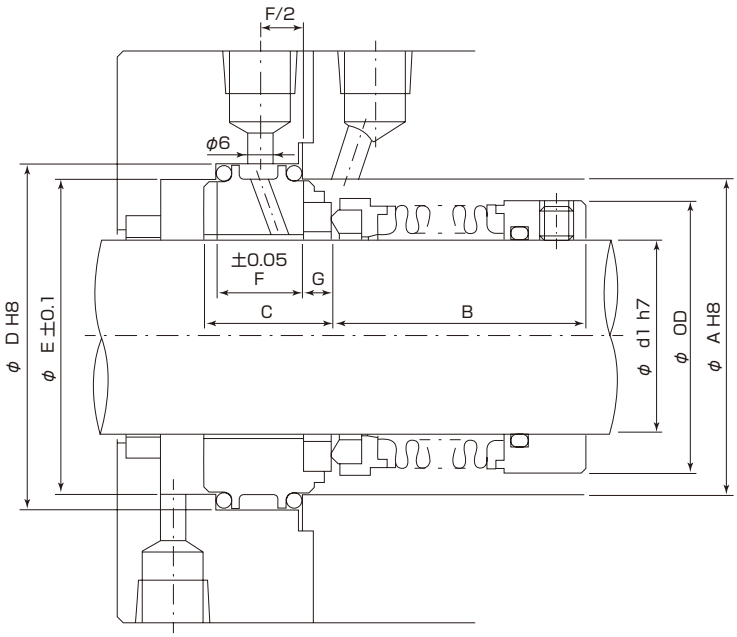
Shaft dia Φd h7				ΦA	B	C	ΦD	ΦE	F	G	H	ΦO
Standard dia			Max. dia	H8			H8	±0.1	±0.05			
20	22		23.5	44	53	26	50.5	44.2	16	34	8	42
25			26.5	48	54	↑	54.5	48.2	18	↑	9	46
28	30		31.5	56	61	↑	62.5	56.2	↑	41	↑	54
32	35		36.5	59	↑	28	65.5	59.2	↑	↑	↑	57
38	40		41.0	66	↑	30	72.5	66.2	↑	↑	↑	64
42	45		45.0	69	↑	↑	75.5	69.2	↑	↑	↑	67
48	50	52	53.0	79	66	↑	85.5	79.2	↑	46	↑	77
55	58	60	61.0	86	↑	35	92.5	86.2	↑	↑	↑	84
62	65	68	68.0	94	↑	↑	100.5	94.2	↑	↑	↑	92
70	75		76.0	105	69	↑	111.5	105.2	↑	49	↑	102
80	85		86.0	116	↑	↑	122.5	116.2	↑	↑	↑	113
90	95		96.0	128	71	↑	134.5	128.2	↑	51	↑	125
100	105		106.0	138	↑	↑	144.5	138.2	↑	↑	↑	135

＊MS-31903-1

WAK

Rotary-type molded metal bellows seal

Basic structure diagram



Combination of standard seal face materials

WC + WC

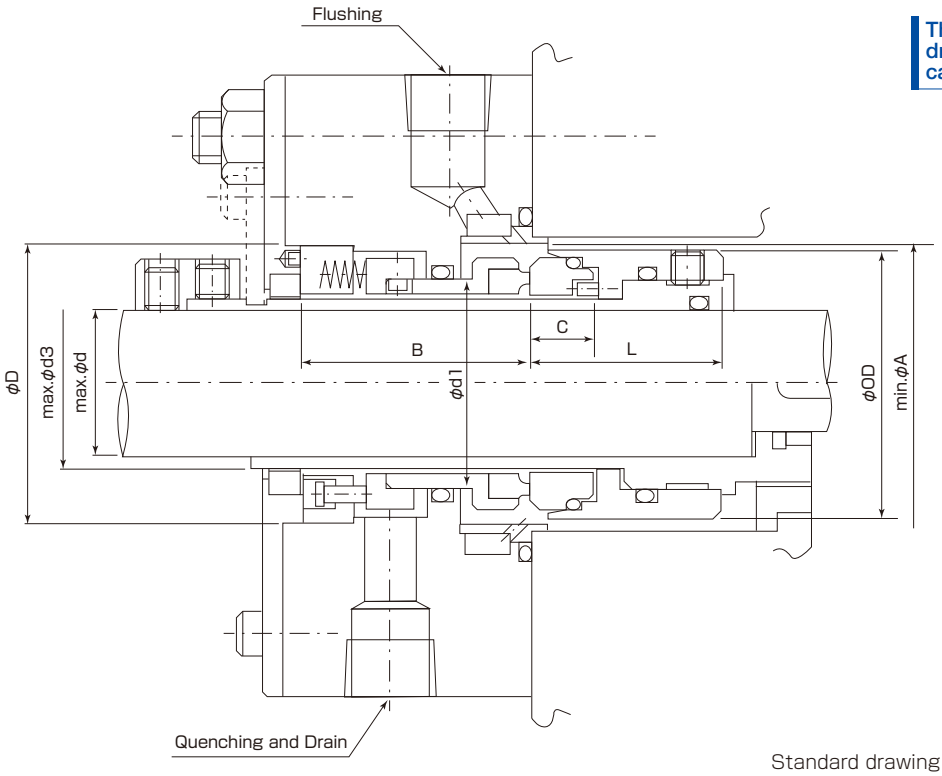
Size table

(Unit: mm)

Nominal size	Φd1	ΦA	B	C	ΦD	ΦE	F	G	ΦOD
020	20	40	46	24	46.5	40.2	16	5	36
022	22	42	〃	〃	48.5	42.2	〃	〃	38
025	25	44	〃	〃	50.5	44.2	〃	〃	42
028	28	47	〃	〃	53.5	47.2	〃	〃	44
030	30	50	〃	26	56.5	50.2	18	6	47
032	32	51	〃	〃	57.5	51.2	〃	〃	〃
035	35	55	54	〃	61.5	55.2	〃	〃	53
038	38	58	〃	〃	64.5	58.2	〃	〃	54
040	40	60	〃	〃	66.5	60.2	〃	〃	57
042	42	63	〃	〃	69.5	63.2	〃	〃	58
045	45	65	57	〃	71.5	65.2	〃	〃	63
048	48	69	58	〃	75.5	69.2	〃	〃	64
050	50	70	〃	〃	76.5	70.2	〃	〃	67
052	52	74	〃	〃	80.5	74.2	〃	〃	68
055,058	55,58	79	63	〃	85.5	79.2	〃	〃	77
059	59	83	〃	28	89.5	83.2	〃	7	〃
060,062	60,62	86	〃	〃	92.5	86.2	〃	〃	84
065	65	89	〃	〃	95.5	89.2	〃	〃	〃
067	67	92	〃	〃	98.5	92.2	〃	〃	〃
070	70	93	〃	〃	99.5	93.2	〃	〃	91
072	72	95	〃	〃	101.5	95.2	〃	〃	92
074	74	98	〃	〃	104.5	98.2	〃	〃	〃
075,080,082	75,80,82	105	66	〃	111.5	105.2	〃	〃	102
084	84	108	〃	〃	114.5	108.2	〃	〃	〃
085,090	85,90	114	〃	〃	120.5	114.2	〃	〃	112
094	94	118	〃	〃	124.5	118.2	〃	〃	〃
095,100,104	95,100,104	128	68	〃	134.5	128.2	〃	〃	124
105,110,114	105,110,114	138	〃	〃	144.5	138.2	〃	〃	134

Static-type mechanical seal (Standard type)

Basic structure diagram



The upper half of the drawing indicates the cartridge type

Standard drawing number: MSX-3663-3S

Size table

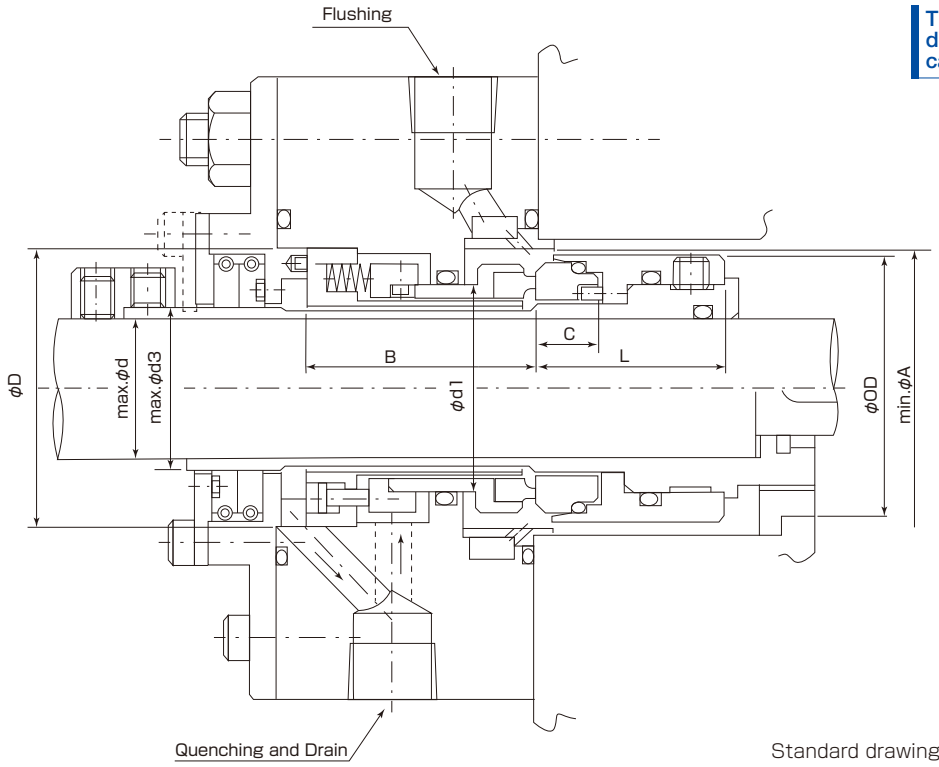
(Unit: mm)

Nominal size △△△	d	d1	d3	D	OD	A	B	C	L
030	17	30	21	45	43	45	54	15	45
032	19	32	23	47	45	47	〃	〃	〃
035	22	35	26	50	48	51	〃	〃	〃
038	25	38	29	53	51	54	〃	〃	〃
040	27	40	31	55	53	56	〃	〃	〃
042	29	42	33	57	56	59	〃	〃	〃
045	32	45	36	60	59	62	〃	〃	〃
048	35	48	39	63	62	65	〃	〃	〃
050	37	50	41	65	64	67	〃	〃	〃
052	39	52	43	67	66	69	〃	〃	〃
054	41	54	45	69	68	71	〃	〃	〃
057	44	57	48	72	71	74	〃	〃	〃
060	47	60	51	76	76	79	〃	〃	〃
063	50	63	54	79	79	82	〃	〃	〃
067	54	67	58	83	83	86	〃	〃	〃
070	57	70	61	86	86	89	〃	〃	〃
076	62	76	67	92	92	95	〃	〃	〃
082	68	82	73	98	98	101	〃	〃	〃
086	72	86	77	102	102	105	〃	〃	〃
092	78	92	83	108	108	111	〃	〃	〃
095	81	95	86	111	111	114	〃	〃	〃
101	87	101	92	117	117	120	〃	〃	〃
105	89	105	94	121	121	124	60	〃	〃
110	94	110	99	126	126	129	〃	〃	〃
115	99	115	104	131	131	134	〃	〃	〃
120	104	120	109	136	136	139	〃	〃	〃
125	109	125	114	141	141	144	〃	〃	〃
130	114	130	119	146	146	149	〃	〃	〃

GHB

Static-type mechanical seal (Baffle type)

Basic structure diagram



The upper half of the drawing indicates the cartridge type

Standard drawing number: MSX-3663-2S

Size table

(Unit: mm)

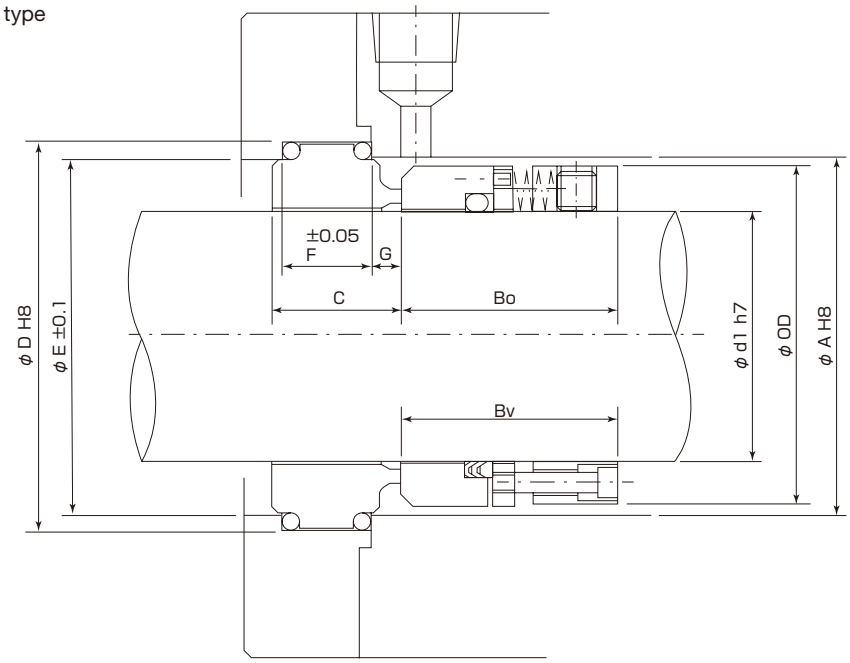
Nominal size △△△	d	d1	d3	D	OD	A	B	C	L
030	16	30	20	45	43	45	54	15	45
032	18	32	22	47	45	47	〃	〃	〃
035	21	35	25	50	48	51	〃	〃	〃
038	24	38	28	53	51	54	〃	〃	〃
040	26	40	30	55	53	56	〃	〃	〃
042	28	42	32	57	56	59	〃	〃	〃
045	31	45	35	60	59	62	〃	〃	〃
048	33	48	37	63	62	65	〃	〃	〃
050	35	50	39	65	64	67	〃	〃	〃
052	37	52	41	67	66	69	〃	〃	〃
054	39	54	43	69	68	71	〃	〃	〃
057	42	57	46	72	71	74	〃	〃	〃
060	45	60	49	76	76	79	〃	〃	〃
063	48	63	52	79	79	82	〃	〃	〃
067	52	67	56	83	83	86	〃	〃	〃
070	55	70	59	86	86	89	〃	〃	〃
076	61	76	65	92	92	95	〃	〃	〃
082	67	82	71	98	98	101	〃	〃	〃
086	71	86	75	102	102	105	〃	〃	〃
092	77	92	81	108	108	111	〃	〃	〃
095	80	95	84	111	111	114	〃	〃	〃
101	86	101	90	117	117	120	〃	〃	〃
105	86	105	91	121	121	124	60	〃	〃
110	91	110	96	126	126	129	〃	〃	〃
115	96	115	101	131	131	134	〃	〃	〃
120	101	120	106	136	136	139	〃	〃	〃
125	106	125	111	141	141	144	〃	〃	〃
130	111	130	116	146	146	149	〃	〃	〃

AAU1/ABU1

Rotary unbalanced type multi-spring seal

Basic structure diagram

AAU1 ✻ (formerly A1): O-ring type
ABU1 ✻ (formerly B1): V-ring type



Combination of standard seal face materials

Carbon + SiC
Carbon + WC
Carbon + Cr_2O_3
SiC + SiC
WC + WC

Note: Only the difference between AAU1✻ and ABU1✻ is the lengths of Bo and Bv.

Size table

(Unit: mm)

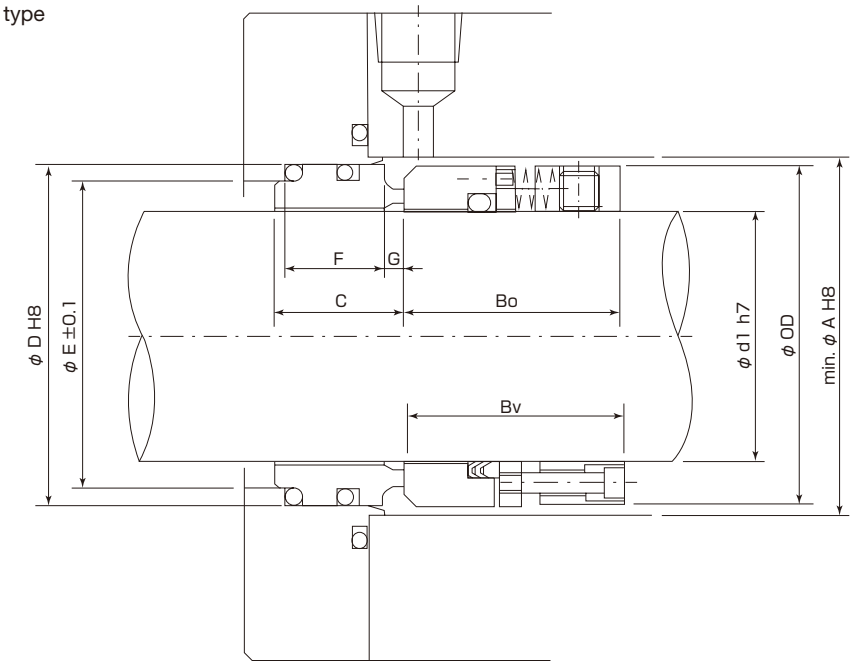
Nominal size	Φd1	ΦA	Bo	Bv	C	ΦD	ΦE	F	G	ΦOD
020	20	40	39	40	24	46.5	40.2	16	5	37
022	22	42	〃	〃	〃	48.5	42.2	〃	〃	39
025	25	44	〃	〃	〃	50.5	44.2	〃	〃	42
028	28	47	〃	〃	〃	53.5	47.2	〃	〃	45
030	30	50	〃	〃	26	56.5	50.2	18	6	47
032	32	51	〃	〃	〃	57.5	51.2	〃	〃	49
035	35	55	〃	〃	〃	61.5	55.2	〃	〃	53
038	38	58	42	43	〃	64.5	58.2	〃	〃	56
040	40	60	〃	〃	〃	66.5	60.2	〃	〃	58
042	42	63	〃	〃	〃	69.5	63.2	〃	〃	60
045	45	65	〃	〃	〃	71.5	65.2	〃	〃	63
048	48	69	〃	〃	〃	75.5	69.2	〃	〃	66
050	50	70	〃	〃	〃	76.5	70.2	〃	〃	68
052	52	74	〃	〃	〃	80.5	74.2	〃	〃	70
055	55	76	〃	〃	〃	82.5	76.2	〃	〃	73
058	58	79	〃	〃	〃	85.5	79.2	〃	〃	76
060	60	83	〃	〃	28	89.5	83.2	〃	7	81
062	62	86	〃	〃	〃	92.5	86.2	〃	〃	83
065	65	89	〃	〃	〃	95.5	89.2	〃	〃	86
068	68	92	〃	〃	〃	98.5	92.2	〃	〃	89
070	70	93	44	45	〃	99.5	93.2	〃	〃	91
075	75	98	〃	〃	〃	104.5	98.2	〃	〃	96
080	80	105	〃	〃	〃	111.5	105.2	〃	〃	101
085	85	108	〃	〃	〃	114.5	108.2	〃	〃	106
090	90	114	〃	〃	〃	120.5	114.2	〃	〃	111
095	95	118	〃	〃	〃	124.5	118.2	〃	〃	116
100	100	123	〃	〃	〃	129.5	123.2	〃	〃	121
105	105	135	48	49	30	141.5	135.2	20	〃	131
110	110	140	〃	〃	〃	146.5	140.2	〃	〃	136
115	115	145	〃	〃	〃	151.5	145.2	〃	〃	141
120	120	150	〃	〃	〃	156.5	150.2	〃	〃	146
125	125	155	〃	〃	〃	161.5	155.2	〃	〃	151
130	130	160	〃	〃	〃	166.5	160.2	〃	〃	156

AAU30/ABU30

Rotary unbalanced type multi-spring seal

Basic structure diagram

AAU30 (formerly A3): O-ring type
ABU30 (formerly B3): V-ring type



Combination of standard seal face materials

Carbon + SiC
Carbon + WC
Carbon + Cr_2O_3

Note: Only the difference between AAU30 and ABU30 is the lengths of Bo and Bv.

Size table

(Unit: mm)

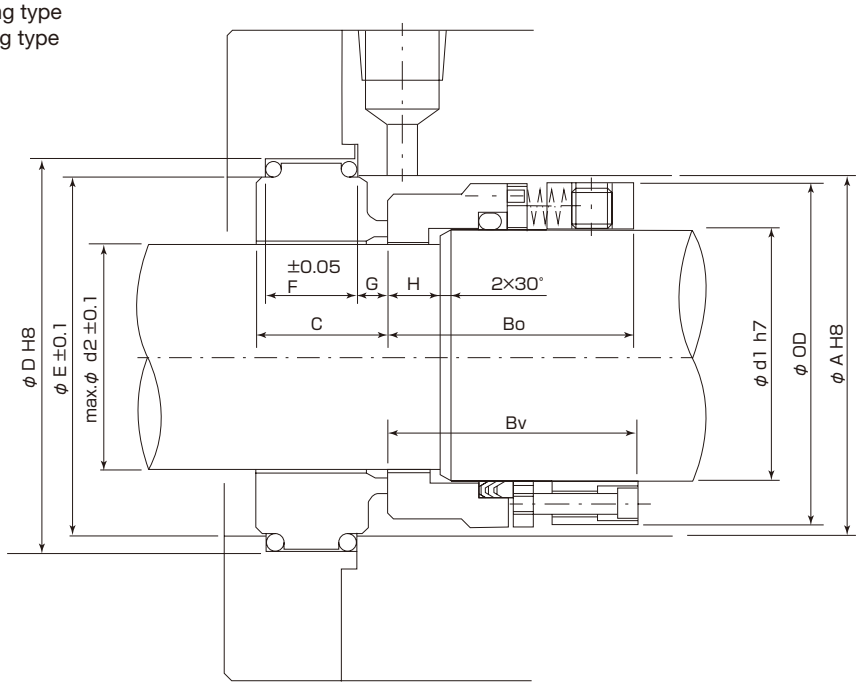
Nominal size	Φd1	ΦA	Bo	Bv	C	ΦD	ΦE	F	G	ΦOD
020	20	40	39	40	24	37	31	20	3	37
022	22	42	〃	〃	〃	39	33	〃	〃	39
025	25	44	〃	〃	〃	40	34	〃	〃	42
028	28	47	〃	〃	〃	44	38	〃	〃	45
030	30	50	〃	〃	26	47	41	〃	4	47
032	32	51	〃	〃	〃	48	42	〃	〃	49
035	35	55	〃	〃	〃	51	45	〃	〃	53
038	38	58	42	43	〃	54	48	〃	〃	56
040	40	60	〃	〃	〃	57	51	〃	〃	58
042	42	63	〃	〃	〃	60.5	54.5	〃	〃	60
045	45	65	〃	〃	〃	61	55	〃	〃	63
048	48	69	〃	〃	〃	64	58	〃	〃	66
050	50	70	〃	〃	〃	67	61	〃	〃	68
052	52	74	〃	〃	〃	70	64	〃	〃	70
055	55	76	〃	〃	〃	73	67	〃	〃	73
058	58	79	〃	〃	〃	76	70	〃	〃	76
060	60	83	〃	〃	28	80	74	22	〃	81
062	62	86	〃	〃	〃	83	77	〃	〃	83
065	65	89	〃	〃	〃	86	80	〃	〃	86
068	68	92	〃	〃	〃	89	83	〃	〃	89
070	70	93	44	45	〃	89	83	〃	〃	91
075	75	98	〃	〃	〃	95	89	〃	〃	96
080	80	105	〃	〃	〃	99	93	〃	〃	101
085	85	108	〃	〃	〃	105	99	〃	〃	106
090	90	114	〃	〃	〃	111	105	〃	〃	111
095	95	118	〃	〃	〃	114	108	〃	〃	116
100	100	123	〃	〃	〃	118	112	〃	〃	121
105	105	135	48	49	30	132	126	24	〃	131
110	110	140	〃	〃	〃	137	131	〃	〃	136
115	115	145	〃	〃	〃	140	134	〃	〃	141
120	120	150	〃	〃	〃	147	141	〃	〃	146
125	125	155	〃	〃	〃	150	144	〃	〃	151
130	130	160	〃	〃	〃	156	150	〃	〃	156

AAB1/ABB1

Rotary balanced type multi-spring seal

Basic structure diagram

AAB1∗ (formerly AB1): O-ring type
ABB1∗ (formerly BB1): V-ring type



Combination of standard seal face materials

Carbon + SiC
Carbon + WC
Carbon + Cr_2O_3
SiC + SiC
WC + WC

Note: Only the difference between AAB1∗ and ABB1∗ is the lengths of Bo and Bv.

Size table

(Unit: mm)

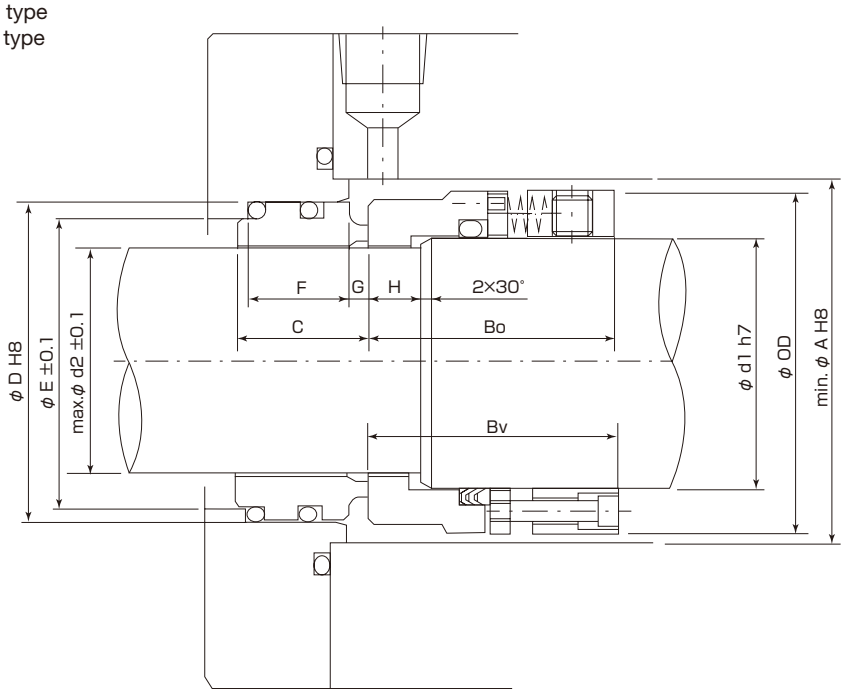
Nominal size	Φd1	Φd2	ΦA	Bo	Bv	C	ΦD	ΦE	F	G	H	ΦOD
020	20	15	40	44	45	24	46.5	40.2	16	5	8	37
022	22	17	42	〃	〃	〃	48.5	42.2	〃	〃	〃	39
025	25	20	44	〃	〃	〃	50.5	44.2	〃	〃	〃	42
028	28	23	47	〃	〃	〃	53.5	47.2	〃	〃	〃	45
030	30	25	50	〃	〃	26	56.5	50.2	18	6	〃	47
032	32	27	51	〃	〃	〃	57.5	51.2	〃	〃	〃	49
035	35	30	55	〃	〃	〃	61.5	55.2	〃	〃	〃	53
038	38	33	58	47	48	〃	64.5	58.2	〃	〃	10	56
040	40	35	60	〃	〃	〃	66.5	60.2	〃	〃	〃	58
042	42	37	63	〃	〃	〃	69.5	63.2	〃	〃	〃	60
045	45	40	65	〃	〃	〃	71.5	65.2	〃	〃	〃	63
048	48	43	69	〃	〃	〃	75.5	69.2	〃	〃	〃	66
050	50	45	70	〃	〃	〃	76.5	70.2	〃	〃	〃	68
052	52	47	74	〃	〃	〃	80.5	74.2	〃	〃	〃	70
055	55	50	76	〃	〃	〃	82.5	76.2	〃	〃	〃	73
058	58	53	79	〃	〃	〃	85.5	79.2	〃	〃	〃	76
060	60	55	83	〃	〃	28	89.5	83.2	〃	7	〃	81
062	62	57	86	〃	〃	〃	92.5	86.2	〃	〃	〃	83
065	65	60	89	〃	〃	〃	95.5	89.2	〃	〃	〃	86
068	68	63	92	〃	〃	〃	98.5	92.2	〃	〃	〃	89
070	70	65	93	49	50	〃	99.5	93.2	〃	〃	〃	91
075	75	70	98	〃	〃	〃	104.5	98.2	〃	〃	〃	96
080	80	75	105	〃	〃	〃	111.5	105.2	〃	〃	〃	101
085	85	80	108	〃	〃	〃	114.5	108.2	〃	〃	〃	106
090	90	85	114	〃	〃	〃	120.5	114.2	〃	〃	〃	111
095	95	90	118	〃	〃	〃	124.5	118.2	〃	〃	〃	116
100	100	95	123	〃	〃	〃	129.5	123.2	〃	〃	〃	121
105	105	100	135	53	54	30	141.5	135.2	20	〃	12	131
110	110	105	140	〃	〃	〃	146.5	140.2	〃	〃	〃	136
115	115	110	145	〃	〃	〃	151.5	145.2	〃	〃	〃	141
120	120	115	150	〃	〃	〃	156.5	150.2	〃	〃	〃	146
125	125	120	155	〃	〃	〃	161.5	155.2	〃	〃	〃	151
130	130	125	160	〃	〃	〃	166.5	160.2	〃	〃	〃	156

AAB30/ABB30

Rotary balanced type multi-spring seal

Basic structure diagram

AAB30 (formerly AB3): O-ring type
ABB30 (formerly BB3): V-ring type



Combination of standard seal face materials

Carbon + SiC
Carbon + WC
Carbon + Cr_2O_3

Note: Only the difference between AAB30 and ABB30 is the lengths of Bo and Bv.

Size table

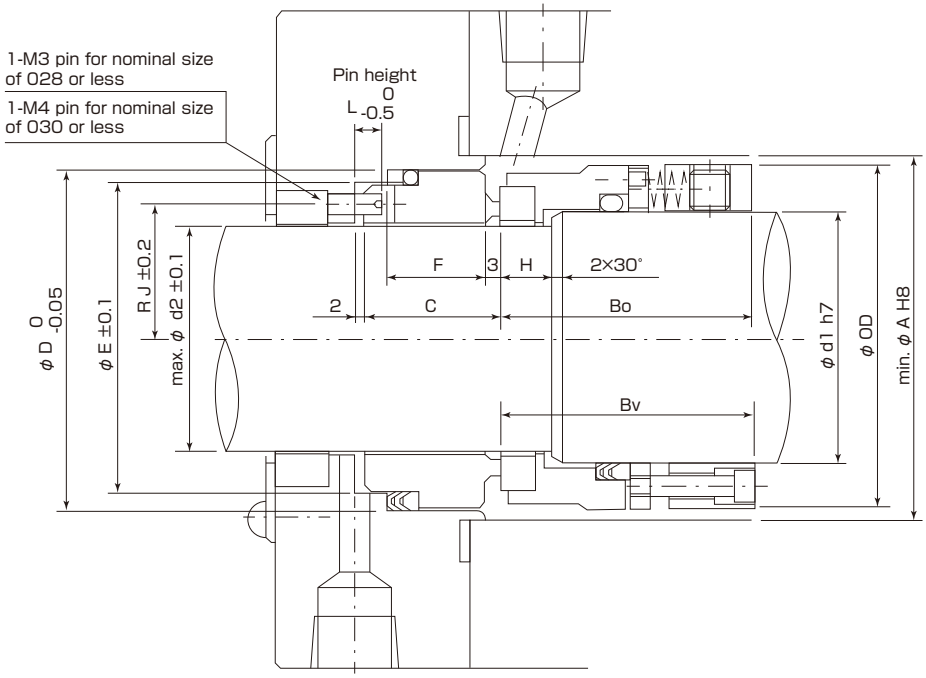
(Unit: mm)

Nominal size	Φd1	Φd2	ΦA	Bo	Bv	C	ΦD	ΦE	F	G	H	ΦOD
020	20	15	40	44	45	24	35	29	20	3	8	37
022	22	17	42	〃	〃	〃	37	31	〃	〃	〃	39
025	25	20	44	〃	〃	〃	39	33	〃	〃	〃	42
028	28	23	47	〃	〃	〃	42	36	〃	〃	〃	45
030	30	25	50	〃	〃	26	44	38	〃	4	〃	47
032	32	27	51	〃	〃	〃	46	40	〃	〃	〃	49
035	35	30	55	〃	〃	〃	48	42	〃	〃	〃	53
038	38	33	58	47	48	〃	51	45	〃	〃	10	56
040	40	35	60	〃	〃	〃	54	48	〃	〃	〃	58
042	42	37	63	〃	〃	〃	57	51	〃	〃	〃	60
045	45	40	65	〃	〃	〃	57	51	〃	〃	〃	63
048	48	43	69	〃	〃	〃	61	55	〃	〃	〃	66
050	50	45	70	〃	〃	〃	61	55	〃	〃	〃	68
052	52	47	74	〃	〃	〃	67	61	〃	〃	〃	70
055	55	50	76	〃	〃	〃	67	61	〃	〃	〃	73
058	58	53	79	〃	〃	〃	73	67	〃	〃	〃	76
060	60	55	83	〃	〃	28	73	67	22	〃	〃	81
062	62	57	86	〃	〃	〃	80	74	〃	〃	〃	83
065	65	60	89	〃	〃	〃	80	74	〃	〃	〃	86
068	68	63	92	〃	〃	〃	86	80	〃	〃	〃	89
070	70	65	93	49	50	〃	86	80	〃	〃	〃	91
075	75	70	98	〃	〃	〃	89	83	〃	〃	〃	96
080	80	75	105	〃	〃	〃	95	89	〃	〃	〃	101
085	85	80	108	〃	〃	〃	99	93	〃	〃	〃	106
090	90	85	114	〃	〃	〃	105	99	〃	〃	〃	111
095	95	90	118	〃	〃	〃	111	105	〃	〃	〃	116
100	100	95	123	〃	〃	〃	114	108	〃	〃	〃	121
105	105	100	135	53	54	30	128	122	24	〃	12	131
110	110	105	140	〃	〃	〃	132	126	〃	〃	〃	136
115	115	110	145	〃	〃	〃	137	131	〃	〃	〃	141
120	120	115	150	〃	〃	〃	140	134	〃	〃	〃	146
125	125	120	155	〃	〃	〃	147	141	〃	〃	〃	151
130	130	125	160	〃	〃	〃	150	144	〃	〃	〃	156

AAB8/ABB8 Rotary balanced type multi-spring seal

Basic structure diagram

AAB8∗ (formerly AB81): O-ring type
ABB8∗ (formerly BB81): V-ring type



Combination of standard seal face materials

Carbon + SiC
Carbon + WC
Carbon + Cr_2O_3
SiC + SiC
WC + WC

Note: Only the difference between AAB8∗ and ABB8∗ is the lengths of Bo and Bv.

Size table

(Unit: mm)

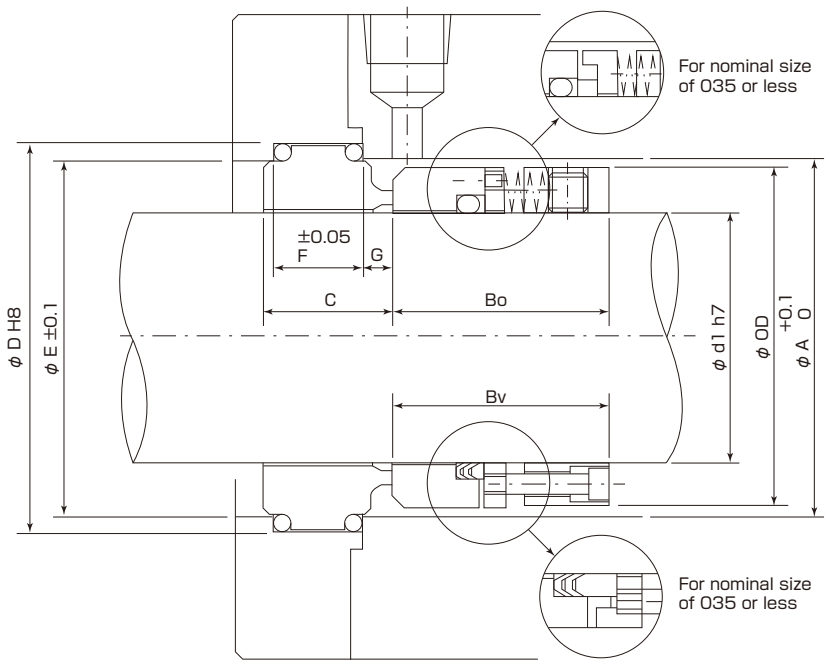
Nominal size	Φd1	Φd2	ΦA	Bo	Bv	C	ΦD	ΦE	F	H	RJ	L	ΦOD
020	20	15	40	44	45	24	36.3	30.4	18	8	11.5	5	37
022	22	17	42	〃	〃	〃	38.3	32.4	〃	〃	12.5	〃	39
025	25	20	45	〃	〃	〃	42.2	35.4	〃	〃	14.0	〃	42
028	28	23	48	〃	〃	〃	45.2	38.4	〃	〃	15.5	〃	45
030	30	25	50	〃	〃	26	47.2	40.4	19	〃	16.5	6	47
032	32	27	52	〃	〃	〃	49.2	42.4	〃	〃	17.5	〃	49
035	35	30	55	〃	〃	〃	52.2	45.4	〃	〃	19.0	〃	53
038	38	33	58	47	48	〃	55.2	48.4	〃	10	20.5	〃	56
040	40	35	60	〃	〃	〃	57.2	50.4	〃	〃	21.5	〃	58
042	42	37	63	〃	〃	〃	59.2	52.4	〃	〃	22.5	〃	60
045	45	40	65	〃	〃	〃	62.2	55.4	〃	〃	24.0	〃	63
048	48	43	69	〃	〃	〃	65.2	58.4	〃	〃	25.5	〃	66
050	50	45	74	〃	〃	〃	70.6	60.4	〃	〃	26.5	〃	68
052	52	47	76	〃	〃	〃	72.6	62.4	〃	〃	27.5	〃	70
055	55	50	79	〃	〃	〃	75.6	65.4	〃	〃	29.0	〃	73
058	58	53	82	〃	〃	〃	78.6	68.4	〃	〃	30.5	〃	76
060	60	55	84	〃	〃	28	80.6	70.4	20	〃	31.5	7	81
062	62	57	89	〃	〃	〃	85.6	75.4	〃	〃	34.0	〃	83
065	65	60	89	〃	〃	〃	85.6	75.4	〃	〃	〃	〃	86
068	68	63	94	〃	〃	〃	90.6	80.4	〃	〃	36.5	〃	89
070	70	65	94	49	50	〃	90.6	80.4	〃	〃	〃	〃	91
075	75	70	99	〃	〃	〃	95.6	85.4	〃	〃	39.0	〃	96
080	80	75	105	〃	〃	〃	100.6	90.4	〃	〃	41.5	〃	101
085	85	80	109	〃	〃	〃	105.6	95.4	〃	〃	44.0	〃	106
090	90	85	114	〃	〃	〃	110.6	100.4	〃	〃	46.5	〃	111
095	95	90	119	〃	〃	〃	115.6	105.4	〃	〃	49.0	〃	116
100	100	95	124	〃	〃	〃	120.6	110.4	〃	〃	51.5	〃	121
105	105	100	135	53	54	30	130.6	120.4	22	12	55.0	〃	131
110	110	105	140	〃	〃	〃	135.6	125.4	〃	〃	57.5	〃	136
115	115	110	145	〃	〃	〃	140.6	130.4	〃	〃	60.0	〃	141
120	115	113	150	〃	〃	〃	145.6	135.4	〃	〃	62.5	〃	146
125	125	118	155	〃	〃	〃	150.6	140.4	〃	〃	65.0	〃	151
130	130	123	160	〃	〃	〃	155.6	145.4	〃	〃	67.5	〃	156

AEU1/AFU1

ISO-compliant dimensions applied rotary unbalanced type multi-spring seal

Basic structure diagram

AEU1∗: O-ring type
AFU1∗: V-ring type



Combination of standard seal face materials

Carbon + SiC
Carbon + WC
Carbon + Cr_2O_3
SiC + SiC
WC + WC

Notes: 1) Only the difference between AEU1∗ and AFU1∗ is the lengths of Bo and Bv.
2) For nominal size above 100, please use AAU1∗ or ABU1∗.
3) The nominal sizes prefixed with ● in the table below can be applied to ISO dimension series.
4) For nominal sizes of 038 or greater, rotary parts are the same as those of AAU and ABU.

Size table

(Unit: mm)

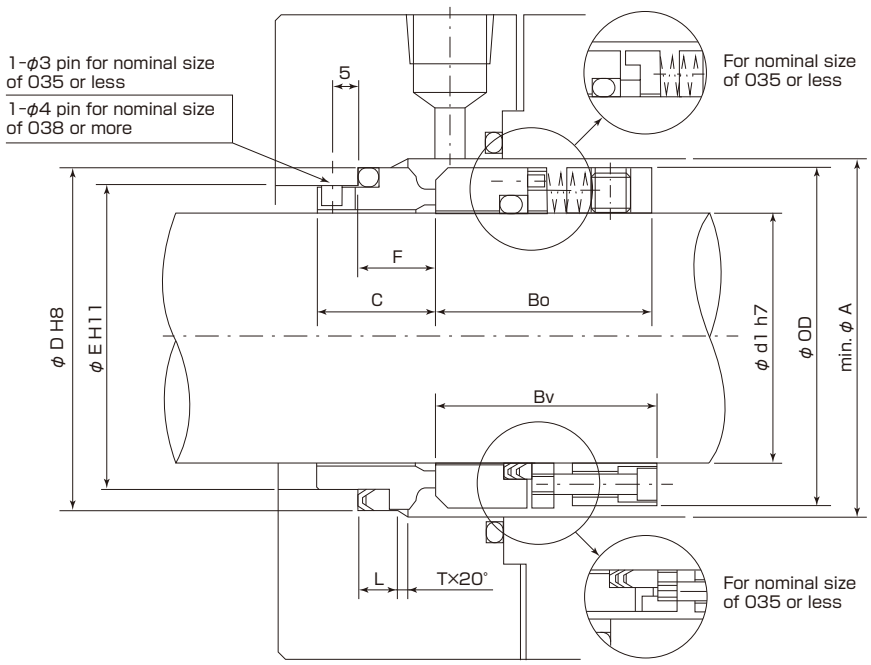
Nominal size	Φd1	ΦA	Bo	Bv	C	ΦD	ΦE	F	G	ΦOD
・018	18	34	40	41	24	40	34	18	4	32
・020	20	36	〃	〃	〃	42	36	〃	〃	34
・022	22	38	〃	〃	〃	44	38	〃	〃	36
・024	24	40	〃	〃	〃	46	40	〃	〃	38
・025	25	41	〃	〃	〃	47	41	〃	〃	39
・028	28	44	〃	〃	〃	50	44	〃	〃	42
・030	30	46	〃	〃	〃	52	46	〃	〃	44
・032	32	48	〃	〃	〃	54	48	〃	〃	46
・033	33	49	〃	〃	〃	55	49	〃	〃	47
・035	35	51	〃	〃	〃	57	51	〃	〃	49
・038	38	58	42	43	〃	64	58	〃	〃	56
・040	40	60	〃	〃	〃	66	60	〃	〃	58
042	42	62	〃	〃	〃	68	62	〃	〃	60
・043	43	63	〃	〃	〃	69	63	〃	〃	61
・045	45	65	〃	〃	〃	71	65	〃	〃	63
・048	48	68	〃	〃	〃	74	68	〃	〃	66
・050	50	70	〃	〃	26	76	70	20	〃	68
052	52	72	〃	〃	〃	78	72	〃	〃	70
・053	53	73	〃	〃	〃	79	73	〃	〃	71
・055	55	75	〃	〃	〃	81	75	〃	〃	73
・058	58	83	〃	〃	27	89	83	〃	5	76
・060	60	85	〃	〃	〃	91	85	〃	〃	81
062	62	87	〃	〃	〃	93	87	〃	〃	83
・063	63	88	〃	〃	〃	94	88	〃	〃	84
・065	65	90	〃	〃	〃	96	90	〃	〃	86
・068	68	93	〃	〃	〃	99	93	〃	〃	89
・070	70	95	44	45	〃	101	95	〃	〃	91
075	75	104	〃	〃	〃	110	104	〃	〃	96
080	80	109	〃	〃	〃	115	109	〃	〃	101
085	85	114	〃	〃	〃	120	114	〃	〃	106
090	90	119	〃	〃	〃	125	119	〃	〃	111
095	95	124	〃	〃	〃	130	124	〃	〃	116
100	100	129	〃	〃	〃	135	129	〃	〃	121

AEU8/AFU8

ISO-compliant dimensions applied rotary unbalanced type multi-spring seal

Basic structure diagram

AEU8∗: O-ring type
AFU8∗: V-ring type



Combination of standard seal face materials

Carbon + SiC
Carbon + WC
Carbon + Cr_2O_3
SiC + SiC
WC + WC

Notes: 1) Only the difference between AEU8∗ and AFU8∗ is the lengths of Bo and Bv.
2) The nominal sizes prefixed with ● in the table below can be applied to ISO dimension series.
3) For nominal sizes of 038 or greater, rotary parts are the same as those of AAU and ABU.

Size table

(Unit: mm)

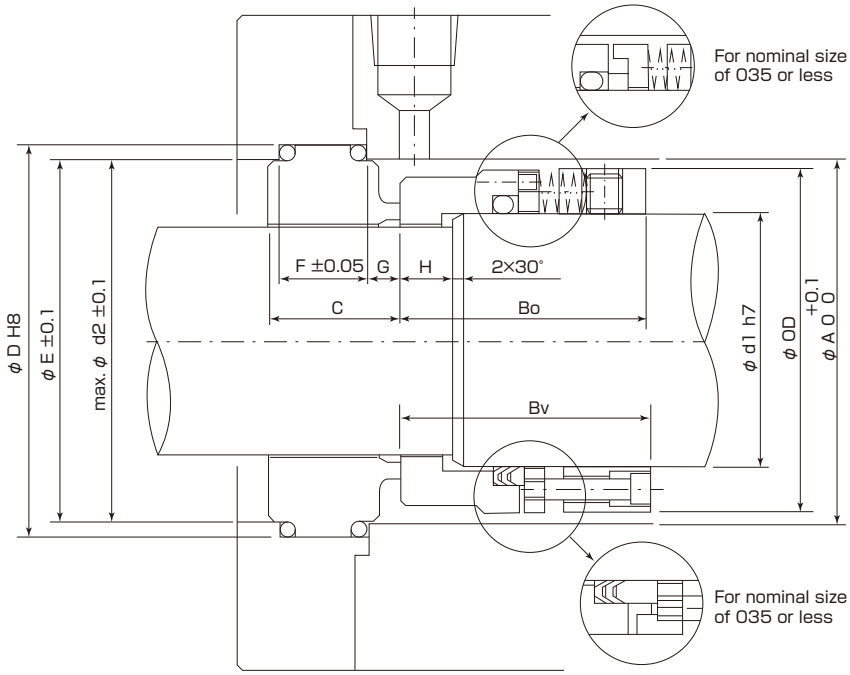
Nominal size	Φd1	ΦA	Bo	Bv	C	ΦD	ΦE	F	L	T	ΦOD
• 018	18	34	40	41	20	33	27	12	5	2.0	32
• 020	20	36	〃	〃	〃	35	29	〃	〃	〃	34
• 022	22	38	〃	〃	〃	37	31	〃	〃	〃	36
• 024	24	40	〃	〃	〃	39	33	〃	〃	〃	38
• 025	25	41	〃	〃	〃	40	34	〃	〃	〃	39
• 028	28	44	〃	〃	〃	43	37	〃	〃	〃	42
• 030	30	46	〃	〃	〃	45	39	〃	〃	〃	44
• 032	32	48	〃	〃	〃	48	42	〃	〃	〃	46
• 033	33	49	〃	〃	〃	48	42	〃	〃	〃	47
• 035	35	51	〃	〃	〃	50	44	〃	〃	〃	49
• 038	38	58	42	43	21	56	49	13	6	〃	56
• 040	40	60	〃	〃	〃	58	51	〃	〃	〃	58
042	42	62	〃	〃	〃	61	54	〃	〃	〃	60
• 043	43	63	〃	〃	〃	61	54	〃	〃	〃	61
• 045	45	65	〃	〃	〃	63	56	〃	〃	〃	63
• 048	48	68	〃	〃	〃	66	59	〃	〃	〃	66
• 050	50	70	〃	〃	23	70	62	15	〃	2.5	68
052	52	73	〃	〃	〃	73	65	〃	〃	〃	70
• 053	53	73	〃	〃	〃	73	65	〃	〃	〃	71
• 055	55	75	〃	〃	〃	75	67	〃	〃	〃	73
• 058	58	78	〃	〃	〃	78	70	〃	〃	〃	76
• 060	60	83	〃	〃	〃	80	72	〃	〃	〃	81
062	62	85	〃	〃	〃	83	75	〃	〃	〃	83
• 063	63	86	〃	〃	〃	83	75	〃	〃	〃	84
• 065	65	88	〃	〃	〃	85	77	〃	〃	〃	86
• 068	68	91	〃	〃	26	90	81	18	7	〃	89
• 070	70	93	44	45	〃	92	83	〃	〃	〃	91
075	75	98	〃	〃	〃	97	88	〃	〃	〃	96
080	80	105	〃	〃	〃	105	95	〃	〃	3	101
085	85	110	〃	〃	〃	110	100	〃	〃	〃	106
090	90	115	〃	〃	〃	115	105	〃	〃	〃	111
095	95	120	〃	〃	〃	120	110	〃	〃	〃	116
100	100	125	〃	〃	〃	125	115	〃	〃	〃	121

AEB1/AFB1

ISO-compliant dimensions applied rotary balanced type multi-spring seal

Basic structure diagram

AEB1∗: O-ring type
AFB1∗: V-ring type



Combination of standard seal face materials

Carbon + SiC
Carbon + WC
Carbon + Cr_2O_3
SiC + SiC
WC + WC

Notes: 1) Only the difference between AEB1∗ and AFB1∗ is the lengths of Bo and Bv.
2) For nominal size above 105, please use AAB1∗ or ABB1∗.
3) The nominal sizes prefixed with ● in the table below can be applied to ISO dimension series.
4) For nominal sizes of 038 or greater, rotary parts are the same as those of AAB and ABB.

Size table

(Unit: mm)

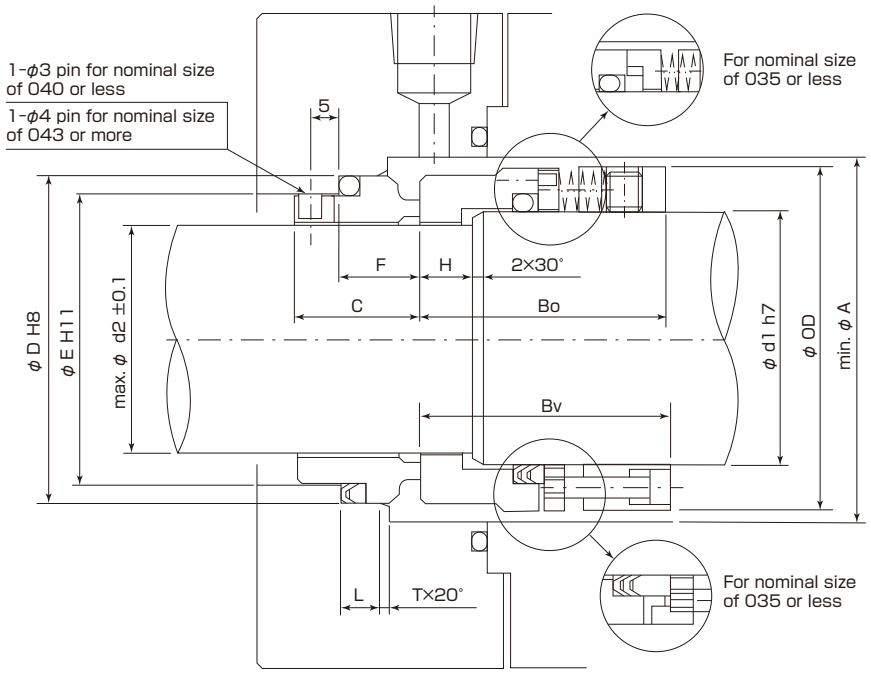
Nominal size	Φd1	Φd2	ΦA	Bo	Bv	C	ΦD	ΦE	F	G	H	ΦOD
020	20	16	36	45	46	24	42	36	18	4	8	34
• 022	22	18	38	〃	〃	〃	44	38	〃	〃	〃	36
• 024	24	20	40	〃	〃	〃	46	40	〃	〃	〃	38
• 026	26	22	42	〃	〃	〃	48	42	〃	〃	〃	40
• 028	28	24	44	〃	〃	〃	50	44	〃	〃	〃	42
• 030	30	25	46	〃	〃	〃	52	46	〃	〃	〃	44
• 033	33	28	49	〃	〃	〃	55	49	〃	〃	〃	47
• 035	35	30	51	〃	〃	〃	57	51	〃	〃	〃	49
• 038	38	33	58	47	48	〃	64	58	〃	〃	〃	56
• 040	40	35	60	〃	〃	〃	66	60	〃	〃	〃	58
• 043	43	38	63	〃	〃	〃	69	63	〃	〃	10	61
• 045	45	40	65	〃	〃	〃	71	65	〃	〃	〃	63
• 048	48	43	68	〃	〃	〃	74	68	〃	〃	〃	66
• 050	50	45	70	〃	〃	26	76	70	20	〃	〃	68
• 053	53	48	73	〃	〃	〃	79	73	〃	〃	〃	71
• 055	55	50	75	〃	〃	〃	81	75	〃	〃	〃	73
• 058	58	53	83	〃	〃	27	89	83	〃	5	〃	76
• 060	60	55	85	〃	〃	〃	91	85	〃	〃	〃	81
• 063	63	58	88	〃	〃	〃	94	88	〃	〃	〃	84
• 065	65	60	90	〃	〃	〃	96	90	〃	〃	〃	86
• 068	68	63	93	〃	〃	〃	99	93	〃	〃	〃	89
• 070	70	65	95	49	50	〃	101	95	〃	〃	〃	91
• 075	75	70	104	〃	〃	〃	110	104	〃	〃	〃	96
080	80	75	109	〃	〃	〃	115	109	〃	〃	〃	101
085	85	80	114	〃	〃	〃	120	114	〃	〃	〃	106
090	90	85	119	〃	〃	〃	125	119	〃	〃	〃	111
095	95	90	124	〃	〃	〃	130	124	〃	〃	〃	116
100	100	95	129	〃	〃	〃	135	129	〃	〃	〃	121
105	105	100	134	53	54	〃	140	134	53	54	〃	131

AEB8/AFB8

ISO-compliant dimensions applied rotary balanced type multi-spring seal

Basic structure diagram

AEB8∗: O-ring type
AFB8∗: V-ring type



Combination of standard seal face materials

Carbon + SiC
Carbon + WC
Carbon + Cr_2O_3
SiC + SiC
WC + WC

Notes: 1) Only the difference between AEB8∗ and AFB8∗ is the lengths of Bo and Bv.
2) For nominal size above 105, please use AAB8∗ or ABB8∗.
3) The nominal sizes prefixed with ● in the table below can be applied to ISO dimension series.
4) For nominal sizes of 038 or greater, rotary parts are the same as those of AAB and ABB.

Size table

(Unit: mm)

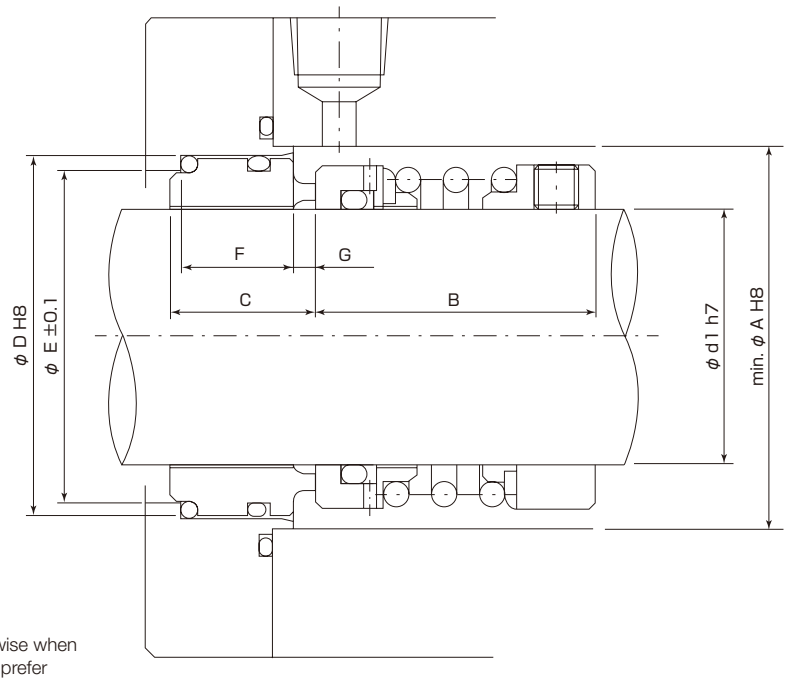
Nominal size	Φd1	Φd2	ΦA	Bo	Bv	C	ΦD	ΦE	F	L	T	H	ΦOD
• 022	22	18	38	45	46	20	33	27	12	5	2	8	36
• 024	24	20	40	〃	〃	〃	35	29	〃	〃	〃	〃	38
• 026	26	22	42	〃	〃	〃	37	31	〃	〃	〃	〃	40
• 028	28	24	44	〃	〃	〃	39	33	〃	〃	〃	〃	42
• 030	30	25	46	〃	〃	〃	40	34	〃	〃	〃	〃	44
• 033	33	28	49	〃	〃	〃	43	37	〃	〃	〃	〃	47
• 035	35	30	51	〃	〃	〃	45	39	〃	〃	〃	〃	49
• 038	38	33	58	47	48	〃	48	42	〃	〃	〃	〃	56
• 040	40	35	60	〃	〃	〃	50	44	〃	〃	〃	〃	58
• 043	43	38	63	〃	〃	21	56	49	13	6	〃	10	61
• 045	45	40	65	〃	〃	〃	58	51	〃	〃	〃	〃	63
• 048	48	43	68	〃	〃	〃	61	54	〃	〃	〃	〃	66
• 050	50	45	70	〃	〃	〃	63	56	〃	〃	〃	〃	68
• 053	53	48	73	〃	〃	〃	66	59	〃	〃	〃	〃	71
• 055	55	50	75	〃	〃	23	70	62	15	〃	2.5	〃	73
• 058	58	53	78	〃	〃	〃	73	65	〃	〃	〃	〃	76
• 060	60	55	83	〃	〃	〃	75	67	〃	〃	〃	〃	81
• 063	63	58	86	〃	〃	〃	78	70	〃	〃	〃	〃	84
• 065	65	60	88	〃	〃	〃	80	72	〃	〃	〃	〃	86
• 068	68	63	91	〃	〃	〃	83	75	〃	〃	〃	〃	89
• 070	70	65	93	49	50	〃	85	77	〃	〃	〃	〃	91
• 075	75	70	98	〃	〃	26	92	83	18	7	〃	〃	96
080	80	75	103	〃	〃	〃	97	88	〃	〃	〃	〃	101
085	85	80	108	〃	〃	〃	105	95	〃	〃	3	〃	106
090	90	85	113	〃	〃	〃	110	100	〃	〃	〃	〃	111
095	95	90	118	〃	〃	〃	115	105	〃	〃	〃	〃	116
100	100	95	123	〃	〃	〃	120	110	〃	〃	〃	〃	121
105	105	100	134	53	54	〃	125	115	〃	〃	〃	〃	131

CCU30 (US-1)

One-coil spring seal for ships

Basic structure diagram

Rotary type one-coil spring seal
(JSMEA standard type US-1)



Combination of standard seal face materials

Carbon + Cr_2O_3

Note: The standard model rotates clockwise when viewed from the flange side. If you prefer counterclockwise rotation, please specify so when placing an order.

Size table

(Unit: mm)

Nominal size	Φd1	ΦA	B	C	ΦD	ΦE	F	G
020	20	40	38	24	37	31	20	3
022	22	42	〃	〃	39	33	〃	〃
025	25	45	〃	〃	40	34	〃	〃
028	28	48	40	〃	44	38	〃	〃
030	30	53	〃	26	47	41	〃	4
032	32	55	〃	〃	48	42	〃	〃
035	35	58	〃	〃	51	45	〃	〃
038	38	62	45	〃	54	48	〃	〃
040	40	64	〃	〃	57	51	〃	〃
042	42	66	50	〃	60.5	54.5	〃	〃
045	45	69	〃	〃	61	55	〃	〃
048	48	72	55	〃	64	58	〃	〃
050	50	75	〃	〃	67	61	〃	〃
052	52	77	58	〃	70	64	〃	〃
055	55	80	〃	〃	73	67	〃	〃
058	58	83	〃	〃	76	70	〃	〃
060	60	85	60	28	80	74	22	〃
062	62	87	〃	〃	83	77	〃	〃
065	65	90	62	〃	86	80	〃	〃
068	68	93	〃	〃	89	83	〃	〃
070	70	95	65	〃	89	83	〃	〃
075	75	100	〃	〃	95	89	〃	〃
080	80	110	70	〃	99	93	〃	〃
085	85	115	〃	〃	105	99	〃	〃
090	90	120	〃	〃	111	105	〃	〃
095	95	130	75	〃	114	108	〃	〃
100	100	135	〃	〃	118	112	〃	〃
105	105	140	〃	30	132	126	24	〃
110	110	145	80	〃	137	131	〃	〃
115	115	150	〃	〃	140	134	〃	〃
120	120	160	85	〃	147	141	〃	〃
125	125	165	〃	〃	150	144	〃	〃
130	130	170	〃	〃	156	150	〃	〃

CGU70 (US-2)

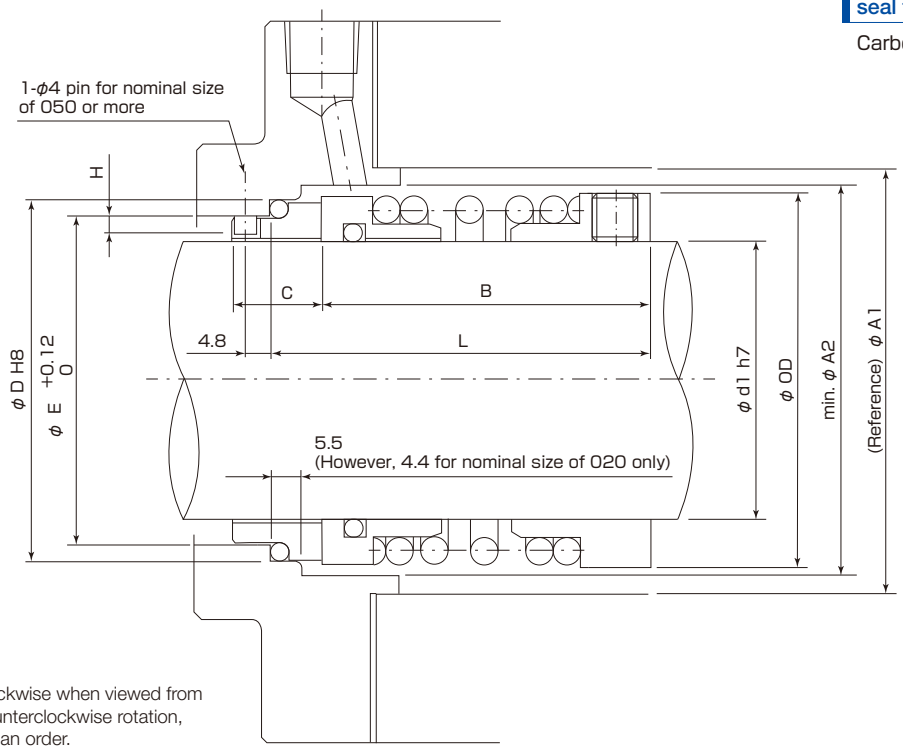
One-coil spring seal for ships

Basic structure diagram

Rotary type one-coil spring seal
(JSMEA standard type US-2)

Combination of standard seal face materials

Carbon + Cr_2O_3



Note: The standard model rotates clockwise when viewed from the flange side. If you prefer counterclockwise rotation, please specify so when placing an order.

Size table

(Unit: mm)

Nominal size	Φd1	ΦA1	ΦA2	B	C	ΦD	ΦE	H	L	ΦOD
020	20	40	37	37.3	11.0	33.32	29.06	—	44.45	34.5
025	25	46	43	40.0	12.0	39.67	33.83	—	49.21	41.0
030	30	51	48	41.6	〃	44.45	38.61	—	50.80	45.5
035	35	56	53	48.0	〃	49.20	43.46	—	57.15	50.0
040	40	61	58	48.0	〃	53.97	48.13	—	57.15	55.0
045	45	65	62	48.0	〃	58.72	52.98	—	57.15	60.0
050	50	72	69	59.1	16.0	65.07	59.33	4.2	68.26	66.0
055	55	76	73	60.7	〃	69.85	64.01	〃	69.85	71.0
060	60	84	81	63.8	〃	76.20	70.36	〃	73.02	77.0
065	65	89	86	67.0	〃	80.97	75.21	〃	76.20	82.0
070	70	93	91	67.0	〃	85.72	79.88	〃	76.20	87.0
075	75	100	97	71.8	〃	90.47	84.73	〃	80.96	91.5
080	80	105	102	78.1	〃	98.42	92.58	5.4	87.31	99.5
085	85	111	108	78.1	〃	104.77	98.93	〃	87.31	105.5
090	90	118	115	78.1	〃	109.52	103.78	〃	87.31	110.5
095	95	122	119	82.9	〃	114.30	108.46	〃	92.07	115.5
100	100	127	124	82.9	〃	119.07	113.31	〃	92.07	120.0
105	105	135	132	89.2	〃	127.00	121.16	6.6	98.42	128.0
110	110	140	137	89.2	〃	131.77	126.01	〃	98.42	133.0
115	115	145	142	89.2	〃	136.52	130.68	〃	98.42	137.5
120	120	150	147	95.5	〃	142.87	137.03	〃	104.72	144.0

CEU80/CFU80/CEL8M/CFL8M

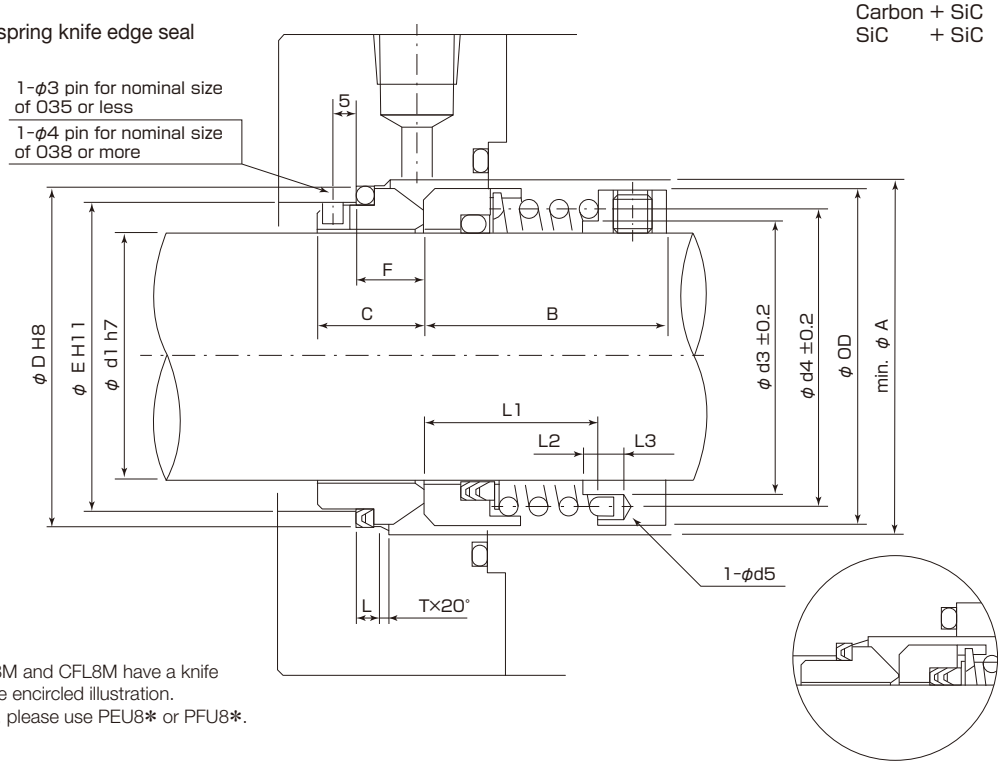
Rotary unbalanced type one-coil spring seal

Basic structure diagram

Rotary unbalanced type one-coil spring seal
CEU80: O-ring type
CFU80: V-ring type
Rotary unbalanced type one-coil spring knife edge seal (ISO-compliant dimensions applied product)
CEL8M: O-ring type
CFL8M: V-ring type

Combination of standard seal face materials

Carbon + SiC
SiC + SiC



Notes: 1) The sliding portions of CEL8M and CFL8M have a knife edge shape, as shown in the encircled illustration.
2) For nominal size above 055, please use PEU8✻ or PFU8✻.

Size table

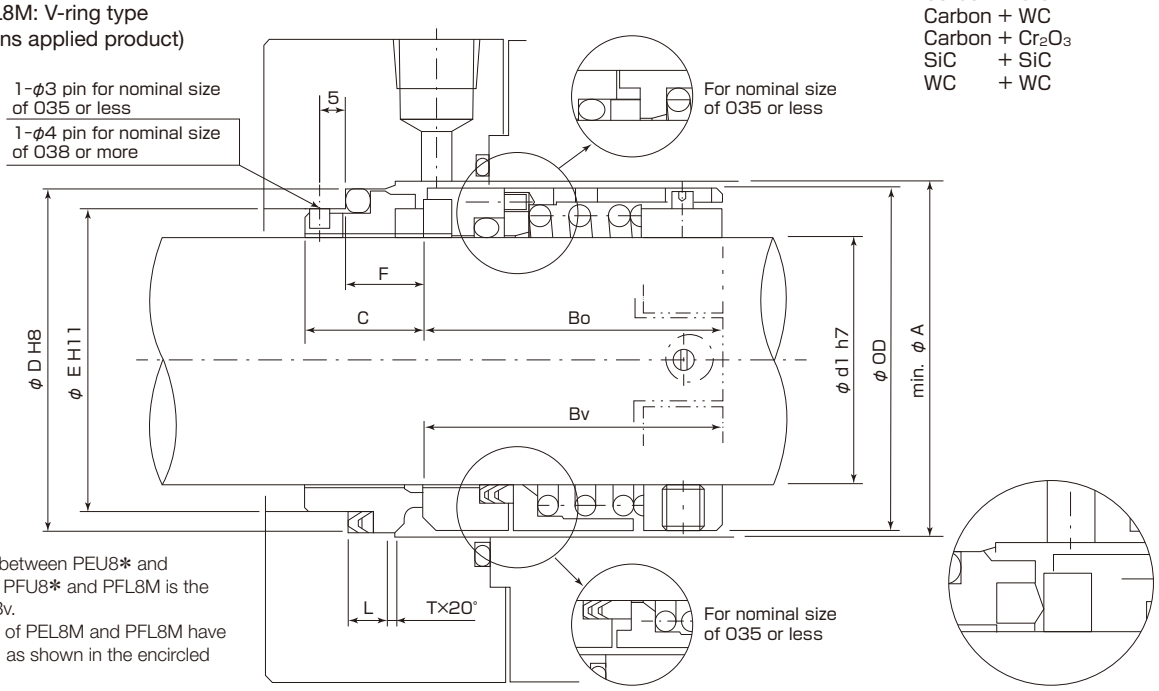
(Unit: mm)

Nominal size	Φd1	ΦA	B	C	ΦD	ΦE	F	L	T	Φd3	Φd4	Φd5	L1	L2	L3	ΦOD
018	18	34	30	20	33	27	12	5	2	22.7	25.2	2.5	22	3.0	4	32
020	20	36	〃	〃	35	29	〃	〃	〃	24.1	26.9	2.8	〃	3.5	〃	34
022	22	38	〃	〃	37	31	〃	〃	〃	26.1	28.9	〃	〃	〃	〃	36
024	24	40	33	〃	39	33	〃	〃	〃	27.7	30.7	3.0	25	〃	〃	38
025	25	41	〃	〃	40	34	〃	〃	〃	28.7	31.7	〃	〃	〃	〃	39
028	28	44	34	〃	43	37	〃	〃	〃	30.7	34.2	3.5	26	4.5	〃	42
030	30	46	〃	〃	45	39	〃	〃	〃	32.7	36.2	〃	〃	〃	〃	44
032	32	48	36	〃	48	42	〃	〃	〃	34.7	38.2	〃	〃	〃	〃	46
033	33	49	〃	〃	48	42	〃	〃	〃	36.7	40.2	〃	〃	〃	〃	47
035	35	51	〃	〃	50	44	〃	〃	〃	37.7	41.2	〃	〃	〃	〃	49
038	38	58	42	21	56	49	13	6	〃	42.7	46.7	4.0	30	5.0	〃	56
040	40	60	〃	〃	58	51	〃	〃	〃	44.7	48.7	〃	〃	〃	〃	58
042	42	63	44	〃	61	54	〃	〃	〃	46.6	51.1	4.5	32	6.0	〃	61
043	43	63	〃	〃	61	54	〃	〃	〃	〃	〃	〃	〃	〃	〃	61
045	45	65	〃	〃	63	56	〃	〃	〃	48.6	53.1	〃	〃	〃	〃	63
050	50	70	46	23	70	62	15	〃	2.5	53.0	58.0	5.0	34	6.5	6	68
055	55	75	48	〃	75	67	〃	〃	〃	57.0	62.5	5.5	36	7.0	〃	73

PEU8/PFU8/PEL8M/PFL8M Rotary unbalanced type one-coil spring seal

Basic structure diagram

Rotary unbalanced type one-coil spring seal (Clutch type)
PEU8✻ (formerly 2PK): O-ring type, PFU8✻ (formerly 2PF): V-ring type
Rotary unbalanced type one-coil spring knife edge seal (Clutch type)
PEL8M: O-ring type, PFL8M: V-ring type
(ISO-compliant dimensions applied product)



Combination of standard seal face materials

Carbon + SiC
Carbon + WC
Carbon + Cr_2O_3
SiC + SiC
WC + WC

Notes: 1) Only the difference between PEU8✻ and PEL8M or between PFU8✻ and PFL8M is the lengths of Bo and Bv.
2) The sliding portions of PEL8M and PFL8M have a knife edge shape, as shown in the encircled illustration.
3) The nominal sizes prefixed with ● in the table below can be applied to ISO dimension series.

Size table

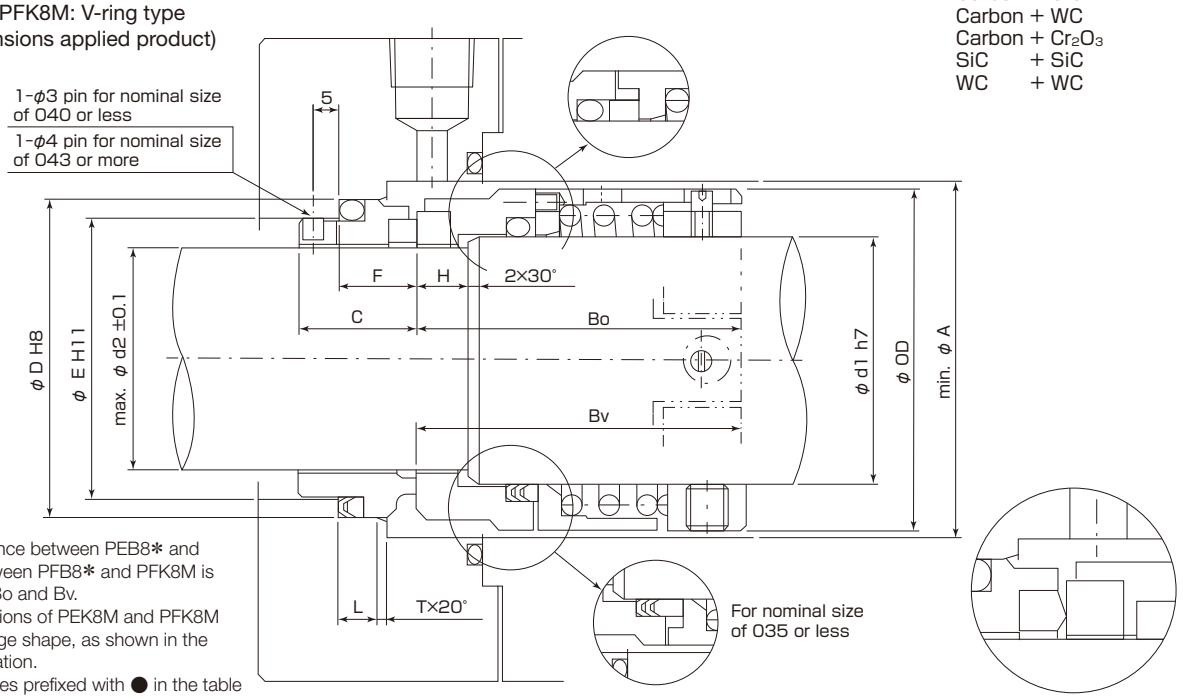
(Unit: mm)

Nominal size	Φd1	ΦA	Bo	Bv	C	ΦD	ΦE	F	L	T	ΦOD
• 020	20	36	45	46	20	35	29	12	5	2.0	34
• 022	22	38	〃	〃	〃	37	31	〃	〃	〃	36
• 024	24	40	47	48	〃	39	33	〃	〃	〃	38
• 025	25	41	〃	〃	〃	40	34	〃	〃	〃	39
• 028	28	44	〃	〃	〃	43	37	〃	〃	〃	42
• 030	30	46	〃	〃	〃	45	39	〃	〃	〃	44
• 032	32	48	50	51	〃	48	42	〃	〃	〃	46
• 033	33	49	〃	〃	〃	〃	〃	〃	〃	〃	47
• 035	35	51	〃	〃	〃	50	44	〃	〃	〃	49
• 038	38	58	53	54	21	56	49	13	6	〃	56
• 040	40	60	55	56	〃	58	51	〃	〃	〃	58
• 043	43	63	57	58	〃	61	54	〃	〃	〃	61
• 045	45	65	〃	〃	〃	63	56	〃	〃	〃	63
• 048	48	68	〃	〃	〃	66	59	〃	〃	〃	66
• 050	50	70	〃	〃	23	70	62	15	〃	2.5	68
• 053	53	73	61	62	〃	73	65	〃	〃	〃	71
• 055	55	75	〃	〃	〃	75	67	〃	〃	〃	73
• 058	58	78	〃	〃	〃	78	70	〃	〃	〃	76
• 060	60	83	62	63	〃	80	72	〃	〃	〃	84
• 063	65	86	〃	〃	〃	83	75	〃	〃	〃	86
• 065	65	88	〃	〃	〃	85	77	〃	〃	〃	86
• 068	68	91	64	65	26	90	81	18	7	〃	89
• 070	70	93	〃	〃	〃	92	83	〃	〃	〃	91
075	75	98	69	70	〃	97	88	〃	〃	〃	96
080	80	105	〃	〃	〃	105	95	〃	〃	3.0	101
085	85	110	〃	〃	〃	110	100	〃	〃	〃	106
090	90	115	71	72	〃	115	105	〃	〃	〃	111
095	95	120	〃	〃	〃	120	110	〃	〃	〃	116
100	100	125	〃	〃	〃	125	115	〃	〃	〃	121

PEB8/PFB8/PEK8M/PFK8M Rotary balanced type one-coil spring seal

Basic structure diagram

Rotary balanced type one-coil spring seal (Clutch type)
PEB8✻ (formerly 2PKB): O-ring type, PFB8✻ (formerly 2PFB): V-ring type
Rotary balanced type one-coil spring knife edge seal (Clutch type)
PEK8M: O-ring type, PFK8M: V-ring type
(ISO-compliant dimensions applied product)



Notes: 1) Only the difference between PEB8✻ and PEK8M or between PFB8✻ and PFK8M is the lengths of Bo and Bv.
2) The sliding portions of PEK8M and PFK8M have a knife edge shape, as shown in the encircled illustration.
3) The nominal sizes prefixed with ● in the table below can be applied to ISO dimension series.

Combination of standard seal face materials

Carbon + SiC
Carbon + WC
Carbon + Cr_2O_3
SiC + SiC
WC + WC

Size table

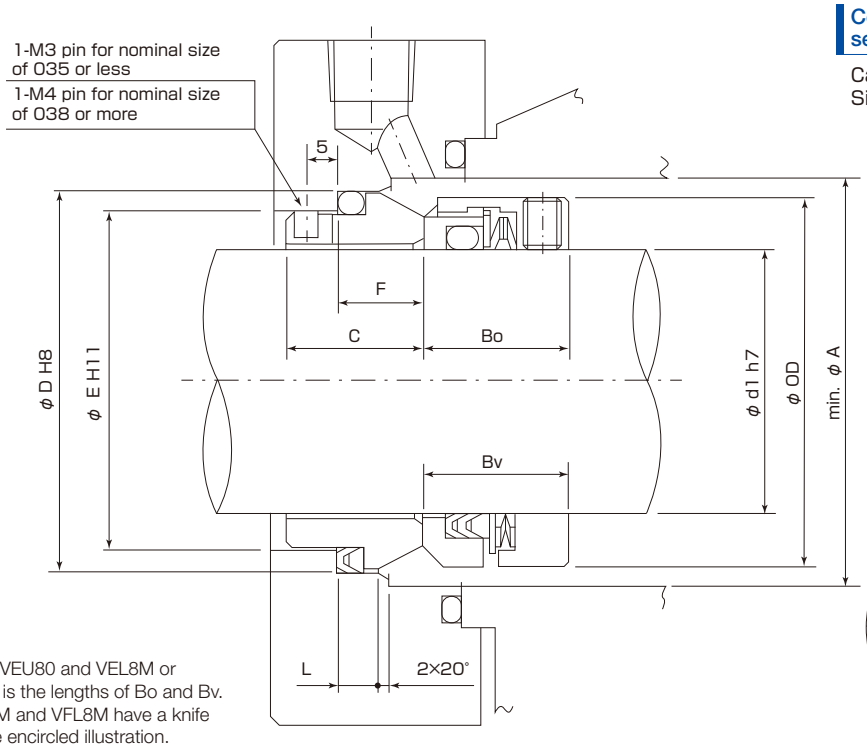
(Unit: mm)

Nominal size	Φd1	Φd2	ΦA	Bo	Bv	C	ΦD	ΦE	F	H	L	T	ΦOD
• 022	22	18	38	50	51	20	33	27	12	8	5	2.0	36
• 024	24	20	40	52	53	〃	35	29	〃	〃	〃	〃	38
• 026	26	22	42	〃	〃	〃	37	31	〃	〃	〃	〃	40
• 028	28	24	44	〃	〃	〃	39	33	〃	〃	〃	〃	42
• 030	30	25	46	〃	〃	〃	40	34	〃	〃	〃	〃	44
• 033	33	28	49	55	56	〃	43	37	〃	〃	〃	〃	47
• 035	35	30	51	〃	〃	〃	45	39	〃	〃	〃	〃	49
• 038	38	33	58	58	59	〃	48	42	〃	〃	〃	〃	56
• 040	40	35	60	60	61	〃	50	44	〃	〃	〃	〃	58
• 043	43	38	63	62	63	21	56	49	13	10	6	〃	61
• 045	45	40	65	〃	〃	〃	58	51	〃	〃	〃	〃	63
• 048	48	43	68	〃	〃	〃	61	54	〃	〃	〃	〃	66
• 050	50	45	70	〃	〃	〃	63	56	〃	〃	〃	〃	68
• 053	53	48	73	66	67	〃	66	59	〃	〃	〃	〃	71
• 055	55	50	75	〃	〃	23	70	62	15	〃	〃	2.5	73
• 058	58	53	78	〃	〃	〃	73	65	〃	〃	〃	〃	76
• 060	60	55	83	67	68	〃	75	67	〃	〃	〃	〃	81
• 063	63	58	86	〃	〃	〃	78	70	〃	〃	〃	〃	84
• 065	65	60	88	〃	〃	〃	80	72	〃	〃	〃	〃	86
• 068	68	63	91	69	70	〃	83	75	〃	〃	〃	〃	89
• 070	70	65	93	〃	〃	〃	85	77	〃	〃	〃	〃	91
• 075	75	70	98	74	75	26	92	83	18	〃	7	〃	96
080	80	75	103	〃	〃	〃	97	88	〃	〃	〃	〃	101
085	85	80	108	〃	〃	〃	105	95	〃	〃	〃	3.0	106
090	90	85	113	76	77	〃	110	100	〃	〃	〃	〃	111
095	95	90	118	〃	〃	〃	115	105	〃	〃	〃	〃	116
100	100	95	123	〃	〃	〃	120	110	〃	〃	〃	〃	121

VEU80/VFU80/VEL8M/VFL8M Rotary unbalanced type leaf spring seal

Basic structure diagram

Rotary unbalanced type
leaf spring seal
VEU80: O-ring type
VFU80: V-ring type
Rotary unbalanced type
leaf spring knife edge seal
VEL8M: O-ring type
VFL8M: V-ring type
(ISO-compliant dimensions
applied product)



Combination of standard seal face materials

Carbon + SiC
SiC + SiC

Notes: 1) Only the difference between VEU80 and VEL8M or between VFU80 and VFL8M is the lengths of Bo and Bv.
2) The sliding portions of VEL8M and VFL8M have a knife edge shape, as shown in the encircled illustration.

Size table

(Unit: mm)

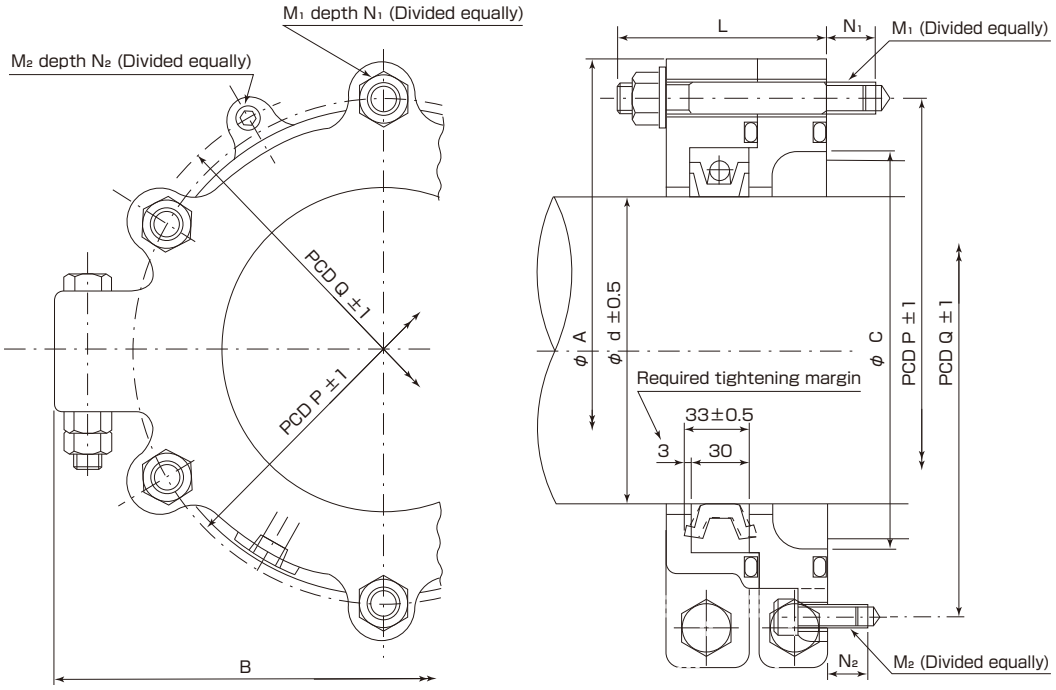
Nominal size	Φd1	ΦA	Bo	Bv	C	ΦD	ΦE	F	L	ΦOD
018	18	34	18	19	20	33	27	12	5	32
020	20	36	19	20	〃	35	29	〃	〃	34
022	22	38	〃	〃	〃	37	31	〃	〃	36
024	24	40	20	21	〃	39	33	〃	〃	38
025	25	41	〃	〃	〃	40	34	〃	〃	39
028	28	44	〃	〃	〃	43	37	〃	〃	42
030	30	46	〃	〃	〃	45	39	〃	〃	44
032	32	48	21	22	〃	48	42	〃	〃	46
033	33	49	〃	〃	〃	48	42	〃	〃	47
035	35	51	〃	〃	〃	50	44	〃	〃	49
038	38	58	22	23	21	56	49	13	6	54
040	40	60	〃	〃	〃	58	51	〃	〃	56
042	42	63	〃	〃	〃	61	54	〃	〃	58
043	43	63	〃	〃	〃	61	54	〃	〃	59
045	45	65	〃	〃	〃	63	56	〃	〃	61

Rubber end-face seal

G1-FL

G1 seal (Standard seal for flocculators)

Basic structure diagram



Combination of standard seal face materials

Synthetic rubber + BC

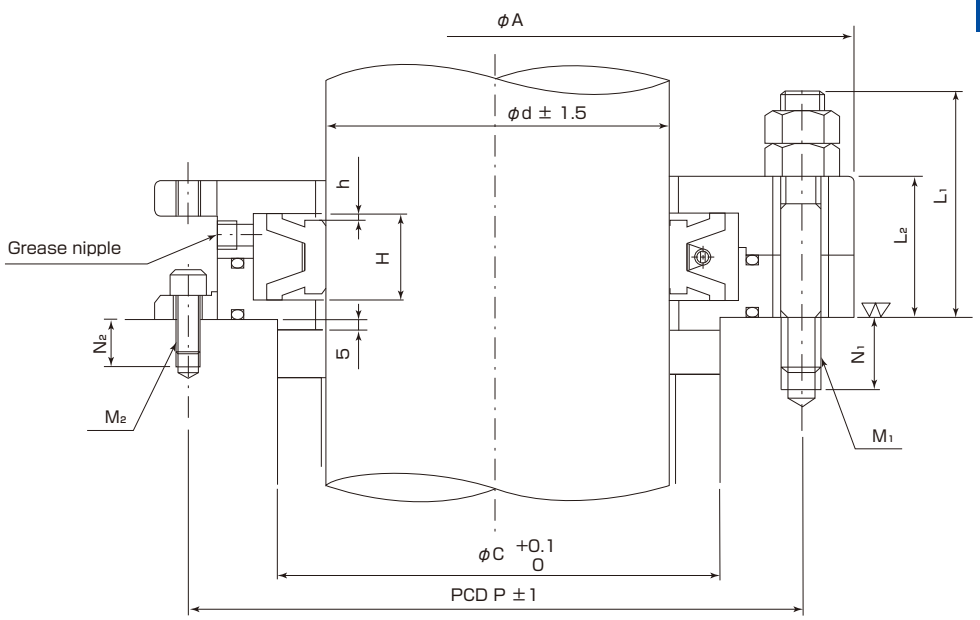
Size table

(Unit: mm)

Φd	ΦA	B	ΦC	M₁	N₁	M₂	N₂	L	P	Q
50<d≦60	185	205	106	4-M12	20	2-M8	15	90	155	165
60<d≦70	195	210	116	〃	〃	〃	〃	〃	165	175
70<d≦80	205	215	126	〃	〃	〃	〃	〃	175	185
80<d≦90	215	220	136	〃	〃	〃	〃	〃	185	195
90<d≦100	240	235	146	4-M16	25	2-M10	20	100	200	215
100<d≦110	250	245	156	〃	〃	〃	〃	〃	210	225
110<d≦120	260	255	166	〃	〃	〃	〃	〃	220	235
120<d≦130	270	260	176	〃	〃	〃	〃	〃	230	245
130<d≦140	280	270	186	〃	〃	〃	〃	〃	240	255
140<d≦150	290	280	196	〃	〃	〃	〃	〃	250	265
150<d≦160	300	350	206	6-M16	〃	〃	〃	〃	260	275
160<d≦170	310	360	216	〃	〃	〃	〃	〃	270	285
170<d≦180	320	370	226	〃	〃	〃	〃	〃	280	295
180<d≦190	330	380	236	〃	〃	〃	〃	〃	290	305
190<d≦200	340	385	246	〃	〃	〃	〃	〃	300	315
200<d≦210	350	395	256	〃	〃	〃	〃	〃	310	325
210<d≦220	360	400	266	〃	〃	〃	〃	〃	320	335
220<d≦230	385	420	276	6-M20	35	2-M12	〃	110	335	350
230<d≦240	395	430	286	〃	〃	〃	〃	〃	345	360
240<d≦250	405	440	296	〃	〃	〃	〃	〃	355	370

G1 seal (For rudder stocks used for ships)

Basic structure diagram



Combination of standard seal face materials

Synthetic rubber + BC

Note: "ΦC" size can be changed. If your preferred size differs from the size shown in the table below, please consult with us.

Size table

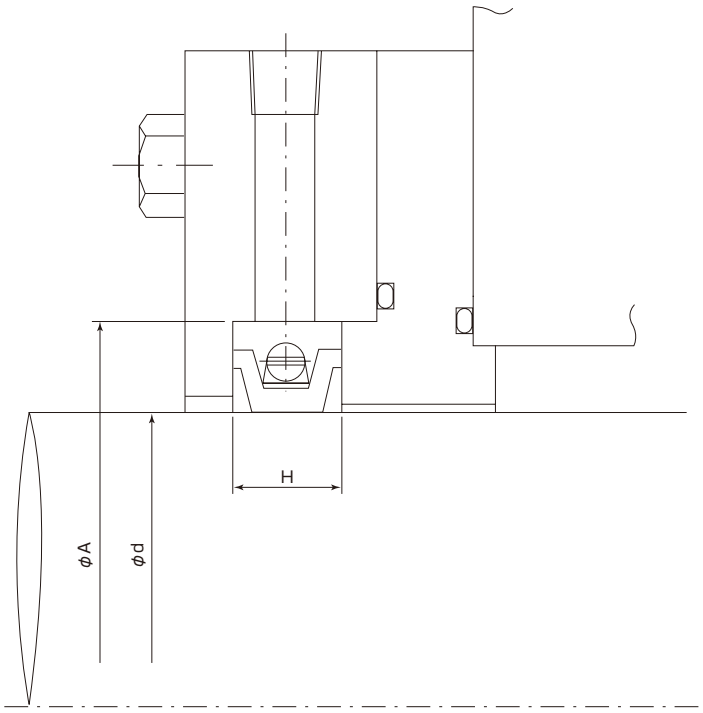
(Unit: mm)

Φd	ΦA	B	ΦC	H	L₁	L₂	M₁	N₁	M₂	N₂	P	h
90<d≦100	250	240	140	35	100	60	4-M16	30	2-M10	20	210	2.5
100<d≦110	260	250	150	〃	〃	〃	〃	〃	〃	〃	220	〃
110<d≦120	270	260	160	〃	〃	〃	〃	〃	〃	〃	230	〃
120<d≦130	280	270	170	〃	〃	〃	〃	〃	〃	〃	240	〃
130<d≦140	290	280	180	〃	〃	〃	〃	〃	〃	〃	250	〃
140<d≦150	300	290	190	35	100	60	4-M16	30	2-M10	20	260	2.5
150<d≦160	310	300	200	〃	〃	〃	〃	〃	〃	〃	270	〃
160<d≦170	320	340	210	〃	〃	〃	6-M16	〃	〃	〃	280	〃
170<d≦180	330	350	220	〃	〃	〃	〃	〃	〃	〃	290	〃
180<d≦190	340	360	230	〃	〃	〃	〃	〃	〃	〃	300	〃
190<d≦200	350	370	240	〃	〃	〃	〃	〃	〃	〃	310	〃
200<d≦210	360	380	250	〃	〃	〃	〃	〃	〃	〃	320	〃
210<d≦220	370	390	260	〃	〃	〃	〃	〃	〃	〃	330	〃
220<d≦240	420	455	290	40	115	70	6-M20	40	2-M12	〃	370	3
240<d≦260	440	475	310	〃	〃	〃	〃	〃	〃	〃	390	〃
260<d≦280	460	495	330	〃	〃	〃	〃	〃	〃	〃	410	〃
280<d≦300	480	515	350	〃	〃	〃	〃	〃	〃	〃	430	〃
300<d≦320	500	535	370	〃	〃	〃	〃	〃	〃	〃	450	〃
320<d≦340	520	560	390	〃	〃	〃	8-M20	〃	〃	〃	470	〃
340<d≦360	540	580	410	〃	〃	〃	〃	〃	〃	〃	490	〃
360<d≦380	560	600	430	〃	〃	〃	〃	〃	〃	〃	510	〃
380<d≦400	580	620	450	〃	〃	〃	〃	〃	〃	〃	530	〃
400<d≦425	605	645	475	〃	〃	〃	〃	〃	〃	〃	555	〃
425<d≦450	630	670	500	〃	〃	〃	〃	〃	〃	〃	580	〃
450<d≦480	720	780	540	60	140	95	8-M24	45	2-M16	25	660	〃
480<d≦510	750	810	570	〃	〃	〃	〃	〃	〃	〃	690	〃
510<d≦540	780	840	600	〃	〃	〃	〃	〃	〃	〃	720	〃
540<d≦570	810	870	630	〃	〃	〃	〃	〃	〃	〃	750	〃
570<d≦600	840	920	660	〃	〃	〃	12-M24	〃	〃	〃	780	〃
600<d≦630	870	950	690	〃	〃	〃	〃	〃	〃	〃	810	〃
630<d≦660	900	980	720	〃	〃	〃	〃	〃	〃	〃	840	〃
660<d≦690	930	1010	750	〃	〃	〃	〃	〃	〃	〃	870	〃
690<d≦720	960	1040	780	〃	〃	〃	〃	〃	〃	〃	900	〃
720<d≦750	990	1070	810	〃	〃	〃	〃	〃	〃	〃	930	〃
750<d≦780	1040	1120	850	〃	175	115	12-M30	55	6-M20	30	970	〃
780<d≦810	1070	1150	880	〃	〃	〃	〃	〃	〃	〃	1000	〃
810<d≦840	1100	1180	910	〃	〃	〃	〃	〃	〃	〃	1030	〃
840<d≦870	1130	1210	940	〃	〃	〃	〃	〃	〃	〃	1060	〃
870<d≦900	1160	1240	970	〃	〃	〃	〃	〃	〃	〃	1090	〃
900<d≦930	1190	1280	1000	〃	〃	〃	16-M30	〃	〃	〃	1120	〃
930<d≦960	1220	1310	1030	〃	〃	〃	〃	〃	〃	〃	1150	〃
960<d≦990	1250	1340	1060	〃	〃	〃	〃	〃	〃	〃	1180	〃

G1-E-A

G1 seal (Endless-type general-purpose type)

Basic structure diagram



Combination of standard seal face materials

Synthetic rubber + BC
Synthetic rubber + SUS304
Synthetic rubber + Cr_2O_3

Size table

(Unit: mm)

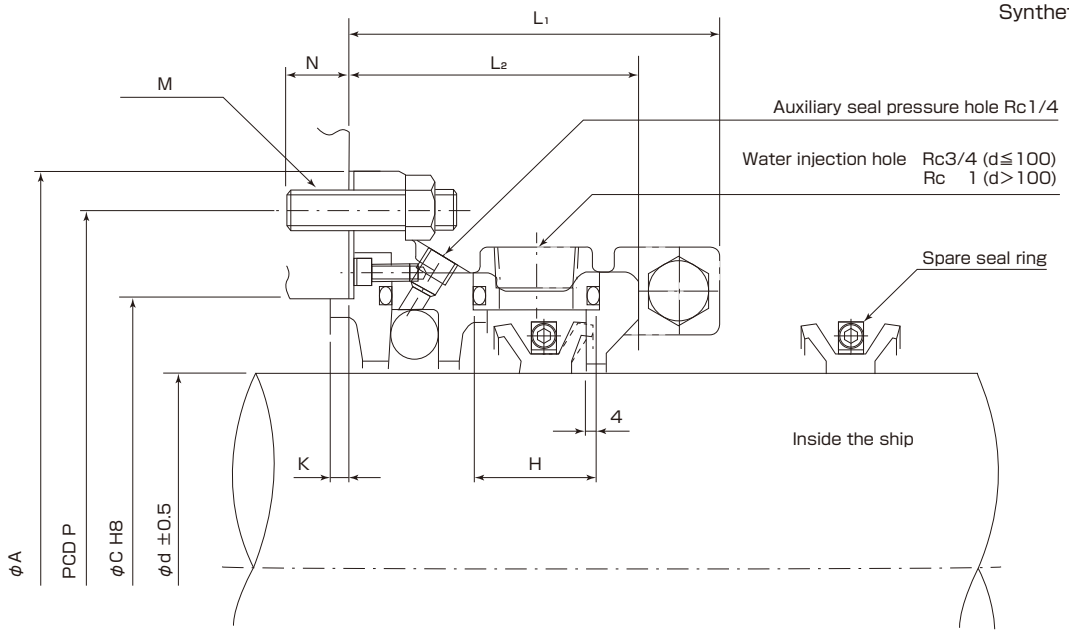
Φd	H	ΦA
30≦d≦250	30	(d+50)
250<d≦450	35	(d+60)

G1 seal (For ships, dedicated to the stern)

Basic structure diagram

Combination of standard seal face materials

Synthetic rubber + BC



Note: "ϕC" size can be changed. If your preferred size differs from the size shown in the table below, please consult with us.

Size table

(Unit: mm)

<Φd≦	ΦA	ΦC	H	K	L1	L2	M	N	P
65<d≦70	190	100	46.5	5	113	90	6-M10	15	165
70<d≦75	195	105	〃	〃	〃	〃	〃	〃	170
75<d≦80	200	110	〃	〃	〃	〃	〃	〃	175
80<d≦90	210	120	〃	〃	〃	〃	〃	〃	185
90<d≦100	220	130	〃	〃	〃	〃	〃	〃	195
100<d≦110	250	155	47	〃	127	102	6-M12	20	220
110<d≦120	260	165	〃	〃	〃	〃	〃	〃	230
120<d≦130	270	175	〃	〃	〃	〃	〃	〃	240
130<d≦140	280	185	〃	〃	〃	〃	〃	〃	250
140<d≦150	290	195	〃	〃	〃	〃	〃	〃	260
150<d≦160	300	205	〃	〃	〃	〃	〃	〃	270
160<d≦170	330	230	49	7.5	148	116	8-M16	25	300
170<d≦180	340	240	〃	〃	〃	〃	〃	〃	310
180<d≦200	360	260	〃	〃	〃	〃	〃	〃	330
200<d≦220	380	280	〃	〃	〃	〃	〃	〃	350
220<d≦240	400	300	〃	〃	〃	〃	〃	〃	370
240<d≦260	460	340	56	10	176	136	8-M20	35	420
260<d≦280	480	360	〃	〃	〃	〃	〃	〃	440
280<d≦300	500	380	〃	〃	〃	〃	〃	〃	460
300<d≦320	520	400	〃	〃	〃	〃	〃	〃	480
320<d≦340	540	420	〃	〃	〃	〃	〃	〃	500
340<d≦360	590	460	57.5	12.5	190	145	8-M24	40	535
360<d≦380	610	480	〃	〃	〃	〃	〃	〃	555
380<d≦400	630	500	〃	〃	〃	〃	〃	〃	575
400<d≦425	655	525	〃	〃	〃	〃	〃	〃	600
425<d≦450	680	550	〃	〃	〃	〃	〃	〃	625

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MPLC2223A-1/CAT.No.232003A