FLUITEN

A strong link of your system

MECHANICAL SEALS

FOR MIXERS AND DRYERS

Technical manual

Fluiten is a leader in the field of sealing technology for modern industrial process machinery such as mixers, dryers, fermenters and reactors.

Mechanical seals used on such equipment often need to be engineered and optimised to ensure the requirements of a specific production process are met.

This manual is intended as a useful guide to selecting the best design solution for a wide variety of applications with the aim of ensuring safe and reliable mechanical seal performance.

Fluiten mechanical seals offer peace of mind and security to the user emanating from inherent good design practices, correct selection of materials of construction and robust quality control.

EXPERIENCE

KNOW - HOW

SERVICE

Member of CEQ Federation
RINA
ISO 9001:2000
Certified Quality System

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- TECHINCAL MANUAL
- COMPANY FOCUS
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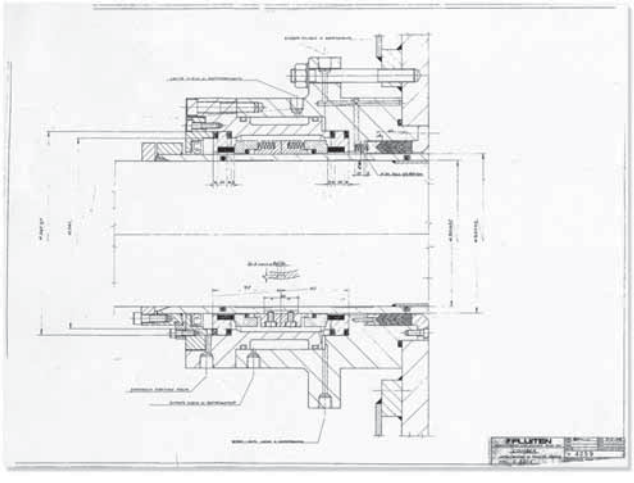
NOTE: The illustrations in this manual are subject to modifications without notice

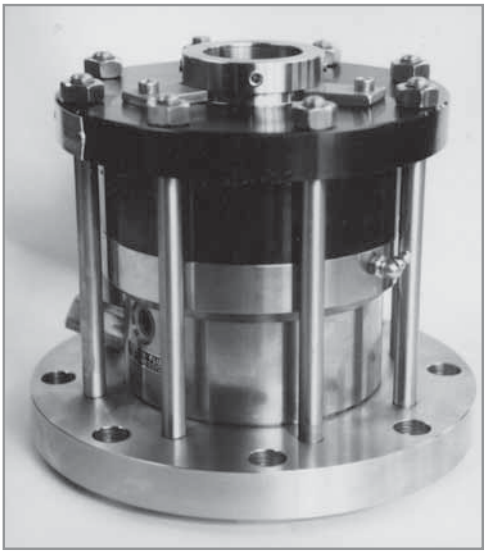
The history of Fluiten

Fluiten has designed and manufactured mechanical seals for rotating equipment since 1962. Thanks to our ability to develop customised, engineered mechanical seals, Fluiten has built considerable experience working with manufacturers of agitators, dryers, fermenters, reactors and other machines for industrial processes. With a long and successful track record, Fluiten is today a benchmark manufacturer of engineered mechanical seals for this type of rotating equipment.

This catalogue introduces new seal designs that include experience gained by manufacturing thousands of products and learning the needs of many equipment manufacturers and end users. Furthermore it explains the reasons why the construction and choices made must comply with certain requirements to ensure good operation and service life.



Dual mechanical seal for a horizontal dryer for the pharmaceutical and food sectors developed in 1976



Dual mechanical seal with integral bearing for a top entry mixer manufactured in 1978

Dual reactor seal designed and tested for Pressindustria in 1985. They were installed in a large rubber production plant in Russia

We would particularly like to thank all those customers and technicians who have placed their trust in us and worked with us to develop new products for ever more demanding applications. Thanks to this cooperation and our ongoing commitment, we are confident that we can continue to grow and conquer new markets.

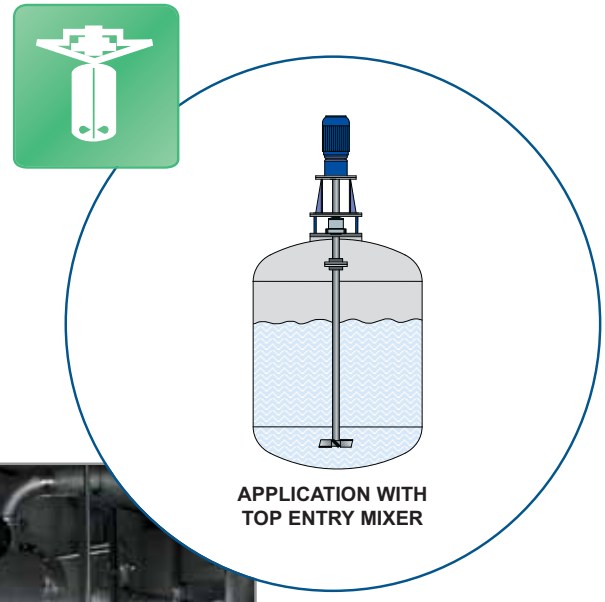
Processes and machines

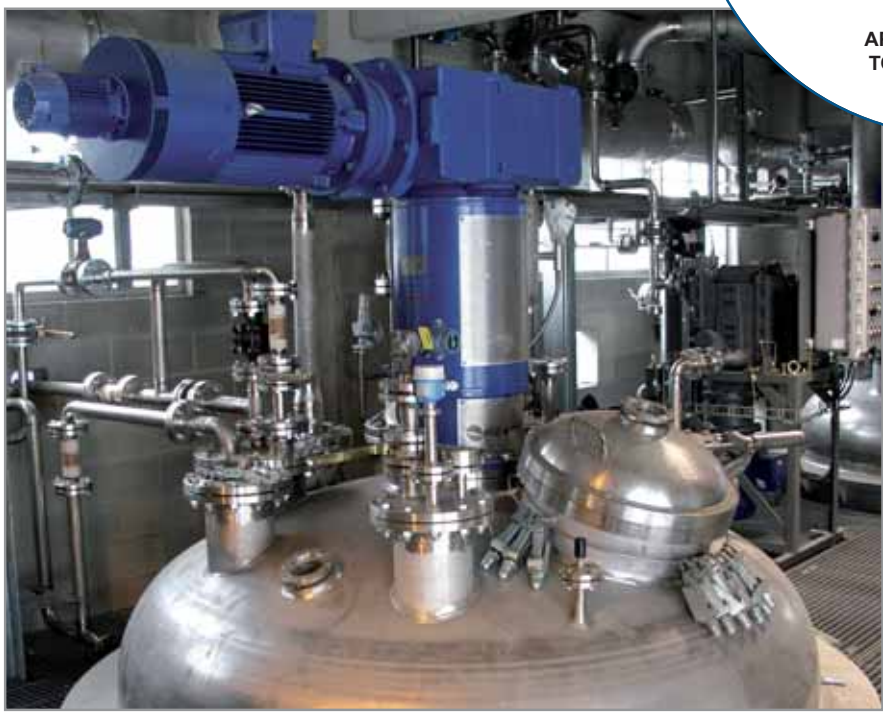
Rotating equipment such as agitators, reactors, fermenters and dryers is often used in chemical, pharmaceutical, cosmetic, food, wine, waste water purification and petroleum industry production processes.

These devices have many different tasks. They may mix different fluids to a uniform solution or cause them to react with each other. They may filter and dry a mixture, prevent the heaviest components of a solution from depositing in a storage tank, or do many other things.

Such equipment generally comprises a vessel and a power driven shaft with blades or vanes that passes through the vessel wall at the top, the bottom or through the side.

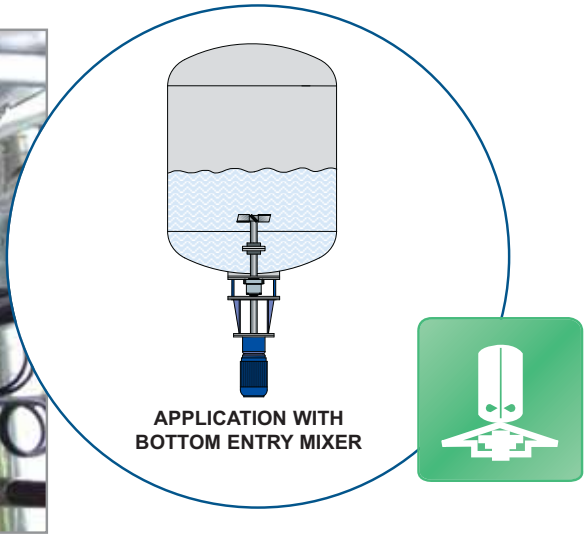
The process fluids inside may be at temperatures and pressures that differ from atmospheric conditions. For this reason, the inside of the vessel must be sealed from the atmosphere at the point where the shaft passes through its wall.





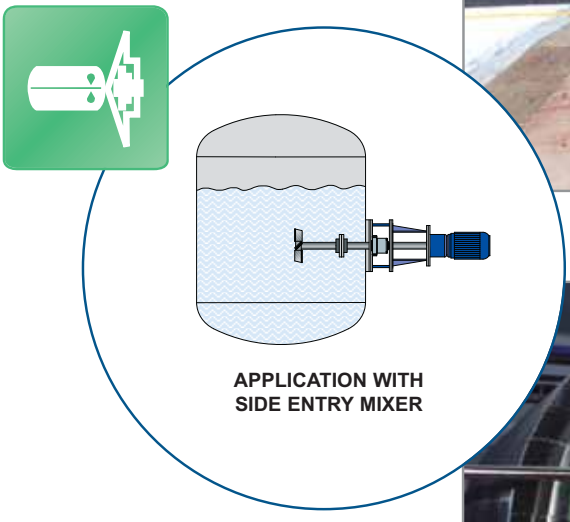
Top entry reactor used in the pharmaceutical industry

Processes and machines



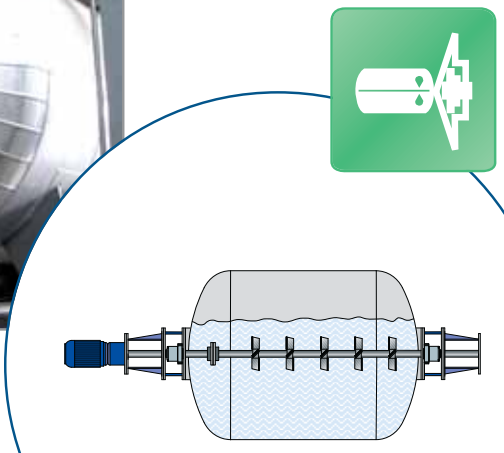
Typical equipment used in the chemical industry

Storage tank used in oil plants



Pressure vessel used in the wine and food industries

Processes and machines



APPLICATION WITH HORIZONTAL SHAFT SUPPORTED AT EACH END

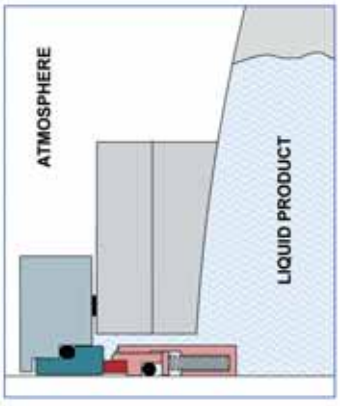
Horizontal dryer used in the chemical and pharmaceutical industries

Basic seal configurations

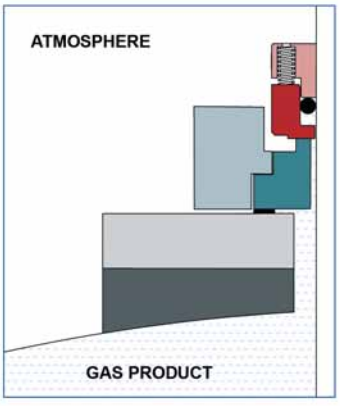
Mechanical face seals are the most widely used among the various rotating equipment manufacturers since they are able to meet the required specifications reliably. They may be chosen in several configurations and materials according to the nature of the products to be sealed and the different operating conditions.

A mechanical seal on a rotating shaft must isolate a pressurised vessel or a vessel under vacuum and maintain a long service life while subject to the effects of pressure, temperature, speed and nature of the sealed substances. The sealed substances may be corrosive, abrasive, toxic, explosive, highly viscous, volatile, gas, liquid, solid or various combinations of all of these at different stages in the production cycle.

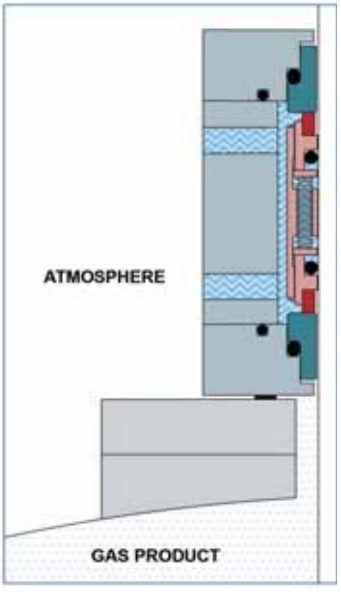
Seals must also be designed to withstand the mechanical stresses on the shaft. Therefore, equipment construction, thermal expansion, possible manufacturing tolerances, coupling errors and misalignment between the vessel and shaft must all be taken into consideration when they are chosen. They should also ensure operation at different parameters of pressure, shaft speed and temperatures. Depending on the type of equipment, the seal may be fitted inside or outside the vessel. The operating conditions, on the other hand, affect the configuration (single or dual seal) as described below.



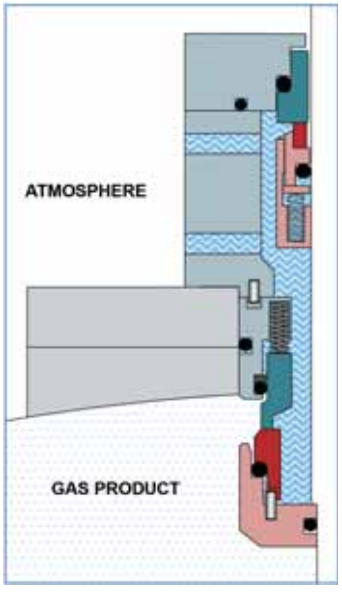
Internal single seal



External single seal



Dual seal with rotating springs



Dual seal with stationary inboard springs

Shaft run-out

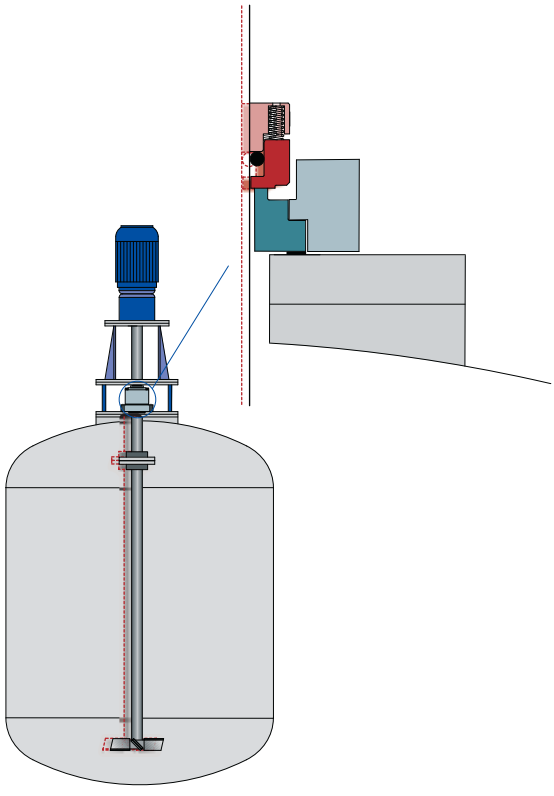
Manufacturing tolerances inevitably lead to errors in the angles and/or concentricity between the axis of the rotating shaft and the axis of the stationary parts of the equipment. Furthermore, the mechanical stresses that stem from the weight and resistance of the substance inside the vessel cause radial forces on the shaft that can increase the relative movement between the shaft and the fixed part of the machine.

Mechanical seals consist of two parts, one connected to the fixed part of the machine and the other to the rotating shaft. Any shaft play leads to stresses and misalignment that the seal components must withstand to ensure correct operation and reliability.

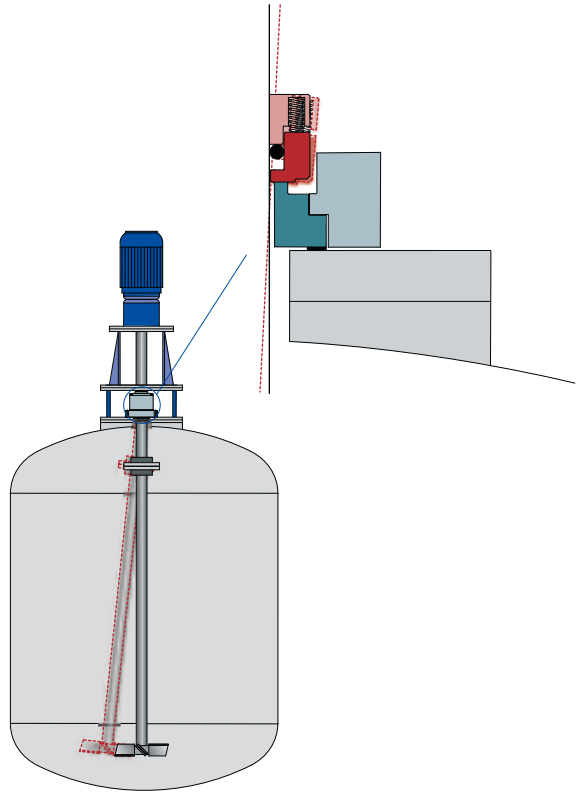
A mechanical face seal must be capable of tolerating the total indicated run-out (TIR) associated with the equipment and should be designed so that the seal faces remain in contact to minimise leakage.

The majority of shaft run out is taken up by the resilience of the spring loaded seal ring assembly, known as the dynamic unit. This typically includes the seal ring, seal ring holder and drive, springs and dynamic gasket (o-ring or polymer seal). The seal ring is allowed to tilt and move axially as a consequence of shaft run out to maintain contact with its counter face.

Usually, the dynamic unit is the rotating part, but in some configurations (e.g. for high speed), it may be the stationary part. The radial space between the shaft (or sleeve) and the stationary unit must be large enough to prevent contact and potential damage during operation. The dimensions of the seal ring sliding surfaces must be sufficient to maintain satisfactory radial contact even if the shaft oscillates.



Radial play



Angular play

Cartridge seals

To minimise the possibility of damage during transportation and handling and also make installation safer and more reliable, mechanical seals are increasingly supplied in cartridge form.

This unitised design generally incorporates a shaft sleeve and a gland plate or housing that enables such seals to be assembled and tested before leaving the factory.

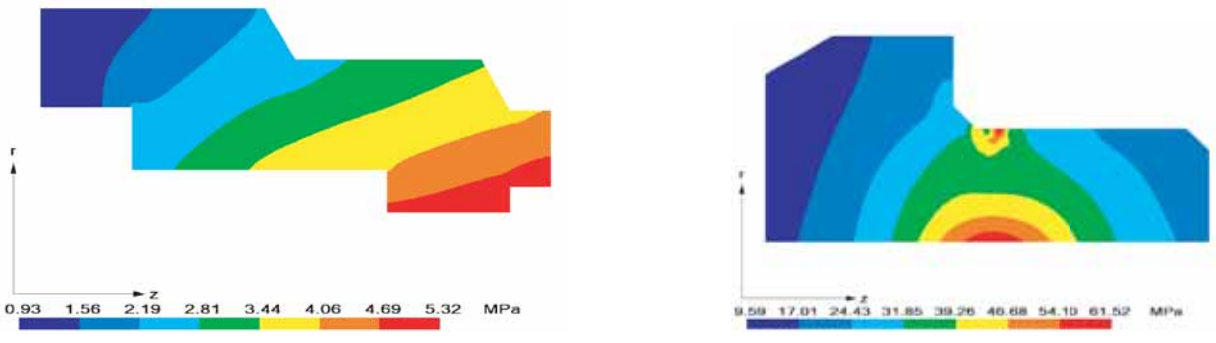
The European Standard DIN28138 applies to mechanical seal cartridges for agitators. The standard lays down the key design and dimensional parameters. It also provides for seal cartridges with an integral bearing to increase shaft support and minimise radial movement. Cartridges must be designed to withstand the loads to the bearing, drive system and the complete assembly. They must also be straight forward to assemble and maintain.

Dual cartridge seal with integral bearing for a vertical dryer

Seals and changes in pressure

Process pressures are variable. Mechanical seals must be able to withstand high vacuums, high pressures, pressure changes and unexpected pressure reversals. Seals must be chosen and designed to operate during the various pressure stages encountered in their specific use and according to the most suitable configuration - single internal seal, single external seal or dual seal with pressurised barrier fluid or unpressurised buffer fluid.

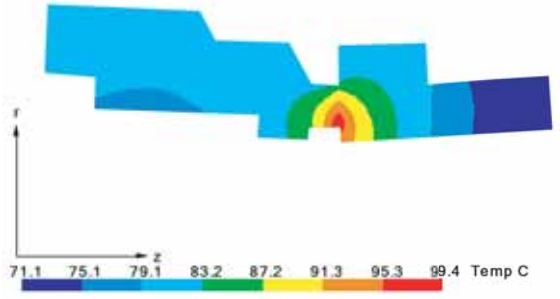
For applications that involve high pressures and high temperatures it is essential to prevent seal ring deformation and control face flatness. Fluiten optimises seal ring designs using finite element analysis (FEA) to ensure stress and deformation are kept to a minimum and seal face flatness is controlled to a fine tolerance.



Change in stress due to pressure according to finite element analysis

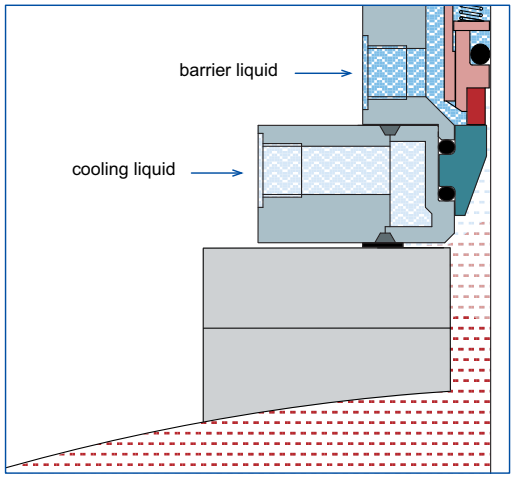
Seals and high temperatures

Industrial processes may reach temperatures of over 300°C. In these cases, a dual seal lubricated with an auxiliary fluid is essential to prevent dangerous emissions to atmosphere and to ensure correct lubrication of the sliding surfaces. Suitable materials must be selected to withstand the application limits.



Changes in seal surface temperature according to finite element analysis

Above 250°C, it is advisable to include a cooling flange between the seal and the vessel incorporating a chamber through which quench cooling fluid may be circulated. This reduces the temperature in the sealing area and prevents the lubricating fluid from evaporating/burning and ensures good seal reliability.



Seal design with a cooled flange

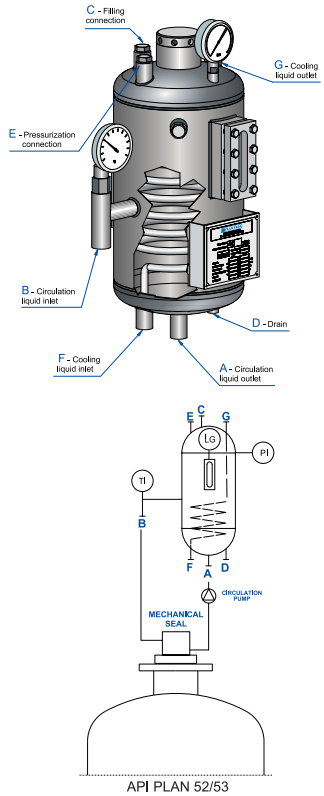
The dual seal is normally connected via suitable piping to a reservoir to create a closed circuit with the mechanical seal. The system must be designed so that it ensures correct circulation and prevents air pockets from forming inside the circuit.

The reservoir may be fitted with instruments to monitor the barrier fluid including level, temperature and pressure gauges and pressure and level alarms for indicating drops in pressure and/or level of the fluid found in the circuit.

A cooling coil inside the reservoir is connected to a water circuit to dissipate the heat generated by the dual seal and the heat conducted from the process.

The temperature difference between the seal and the tank allows natural liquid circulation i.e. a thermosiphon flow is created as the hotter liquid tends to rise and the cooler liquid falls towards the seal.

In particularly heavy duty conditions, it is advisable to fit a circulating pump in the circuit.



API PLAN 52/53

Seals and ATEX 94/9/EC Directive

As a member of the European Sealing Association (ESA), Fluiten supports the position of the European Commission's ATEX Standing Committee, which makes it clear that mechanical seals are parts of a machine and should not be considered components according to the ATEX 95 Directive (94/9/EC), except when used in Zone 0 or where the mechanical seal has been designed for a specific use in order to prevent detonation.

Fluiten mechanical seals are suitable for use in potentially explosive atmospheres and are therefore provided with a Declaration of Conformity pursuant to Section 8, Subsections 1 and 3 of the Directive.

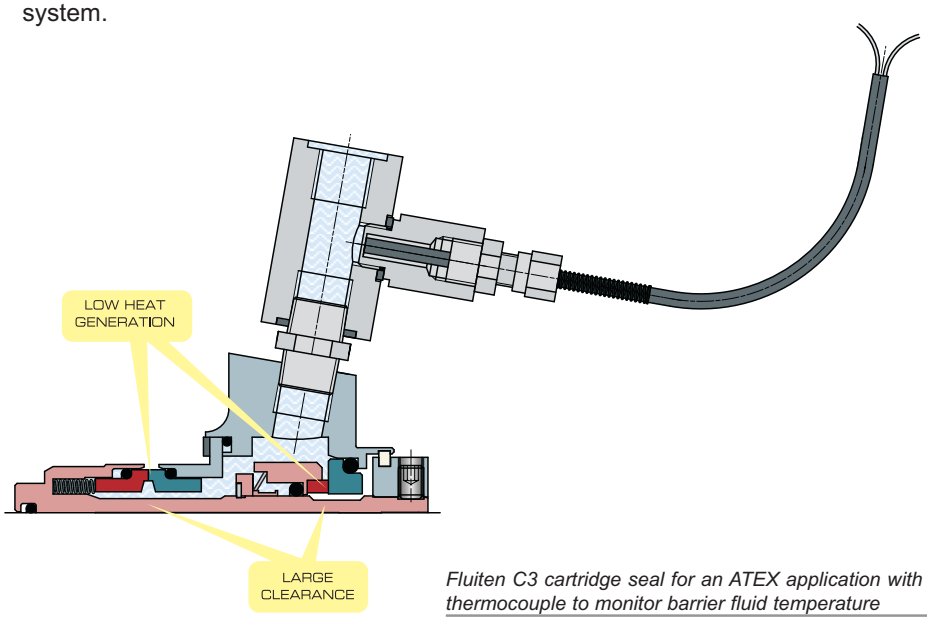
ESA European Sealing Association e.V.

Cartridge seals for general services

The Fluiten Type C3 range of cartridge seals is suitable for use on small agitators. The C3 was developed from the C2 cartridge seal for centrifugal pumps. The C3 includes a thicker, stronger shaft sleeve and greater radial clearances required for reliable operation on agitator applications which often have radial shaft movement.

Type C3 cartridge seals are simple and low-cost due to economical mass production. However they have the same technical characteristics as the seals installed on larger machines. They automatically centre on the shaft thanks to the revolutionary efficient FLUIBELT positioning system.

Fluiten C3D dual mechanical seal cartridge



Fluiten C3 cartridge seal for an ATEX application with a thermocouple to monitor barrier fluid temperature

The wide range of materials available and the slots on the flange mean a design may be found for all operating conditions on top-entry or horizontal mixers.

Cartridge seals for general services

C 3 K C

A bi-rotational, single cartridge seal suitable for general purpose applications. A wave spring with a special profile also makes it suitable for dirty or viscous fluids.

A FLUIGAM seal (spring energised PTFE) is used as standard for the dynamic secondary seal. This makes the C3KC compatible with almost all chemical products and ensures reliable operation at a competitive price.

CHARACTERISTICS

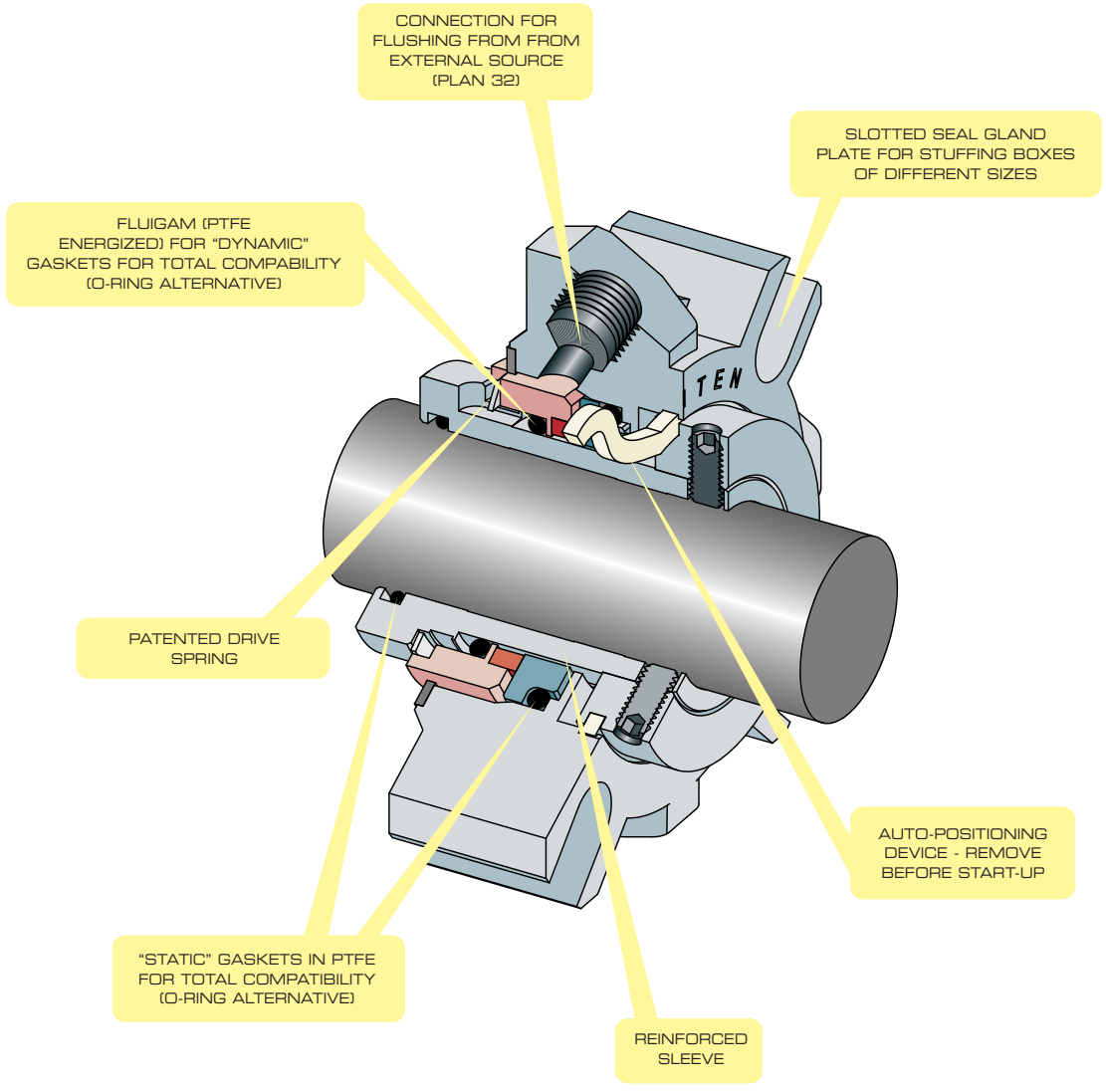
side entry

wine industry

chemical industry

OPERATING CONDITIONS

SPEED (m/sec)	PRESSURE (bar)	TEMPERATURE (C°)
12	12	+200
0	0	-50



Dimensions are available on request

Cartridge seals for general services

C 3 S

A balanced, single cartridge seal with multi-springs positioned out of the process fluid to prevent clogging. These seals can be fitted with FLUPERFLU secondary seals (special Perfluoroelastomer) to ensure excellent chemical and temperature compatibility while maintaining good resilience.

The one piece, solid seal rings are manufactured in carbon, sintered silicon carbide and tungsten carbide. The seal ring design has been optimised using finite element analysis to ensure reliable operation while subjected to the effects of pressure, speed and temperature.

CHARACTERISTICS

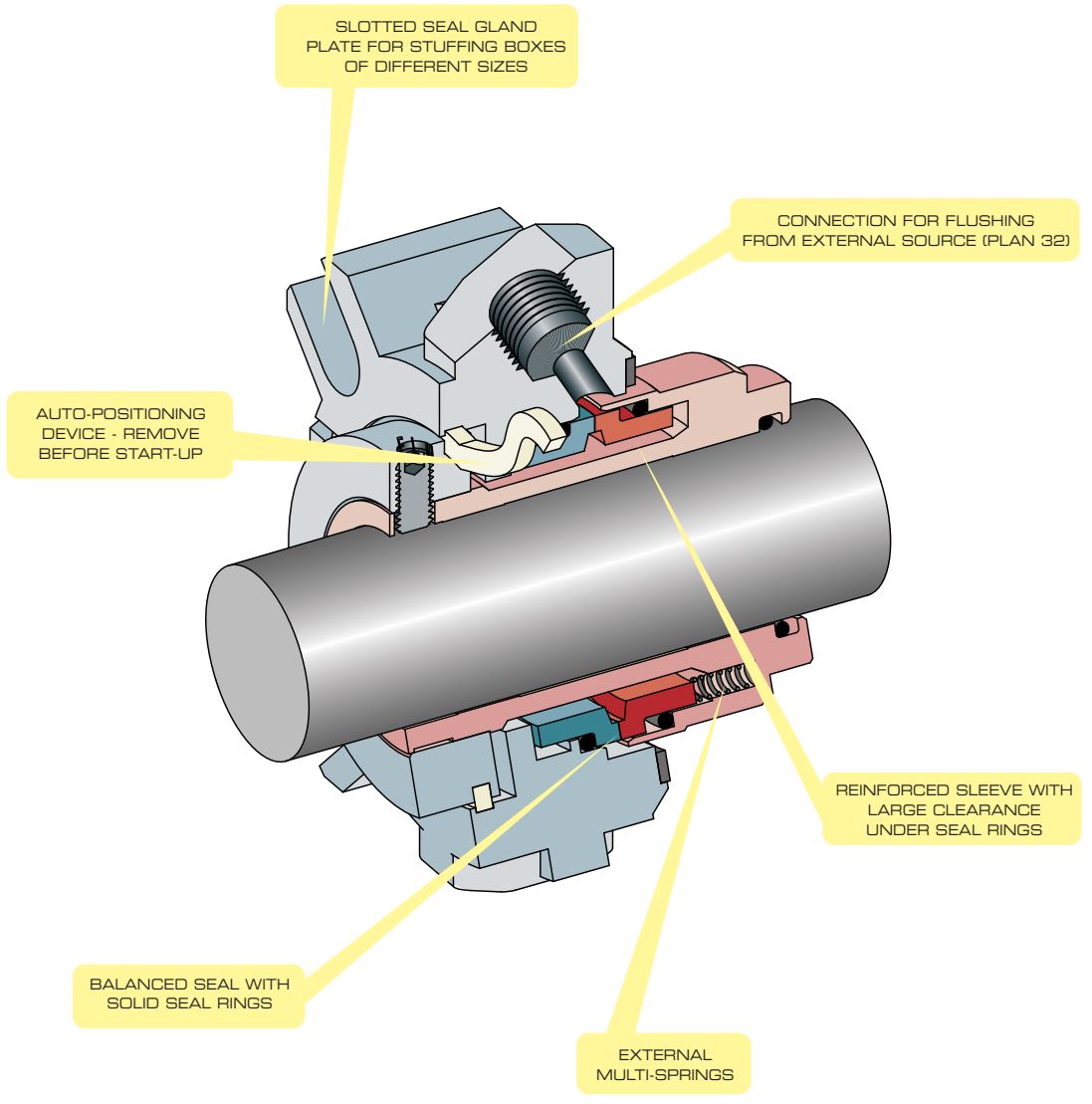
side entry

wine industry

chemical industry

OPERATING CONDITIONS

SPEED *(m/sec)*	PRESSURE *(bar)*	TEMPERATURE *(C°)*
12	25	+250
0	0	-50



Dimensions are available on request

Cartridge seals for general services

C3DQ and C4DQ

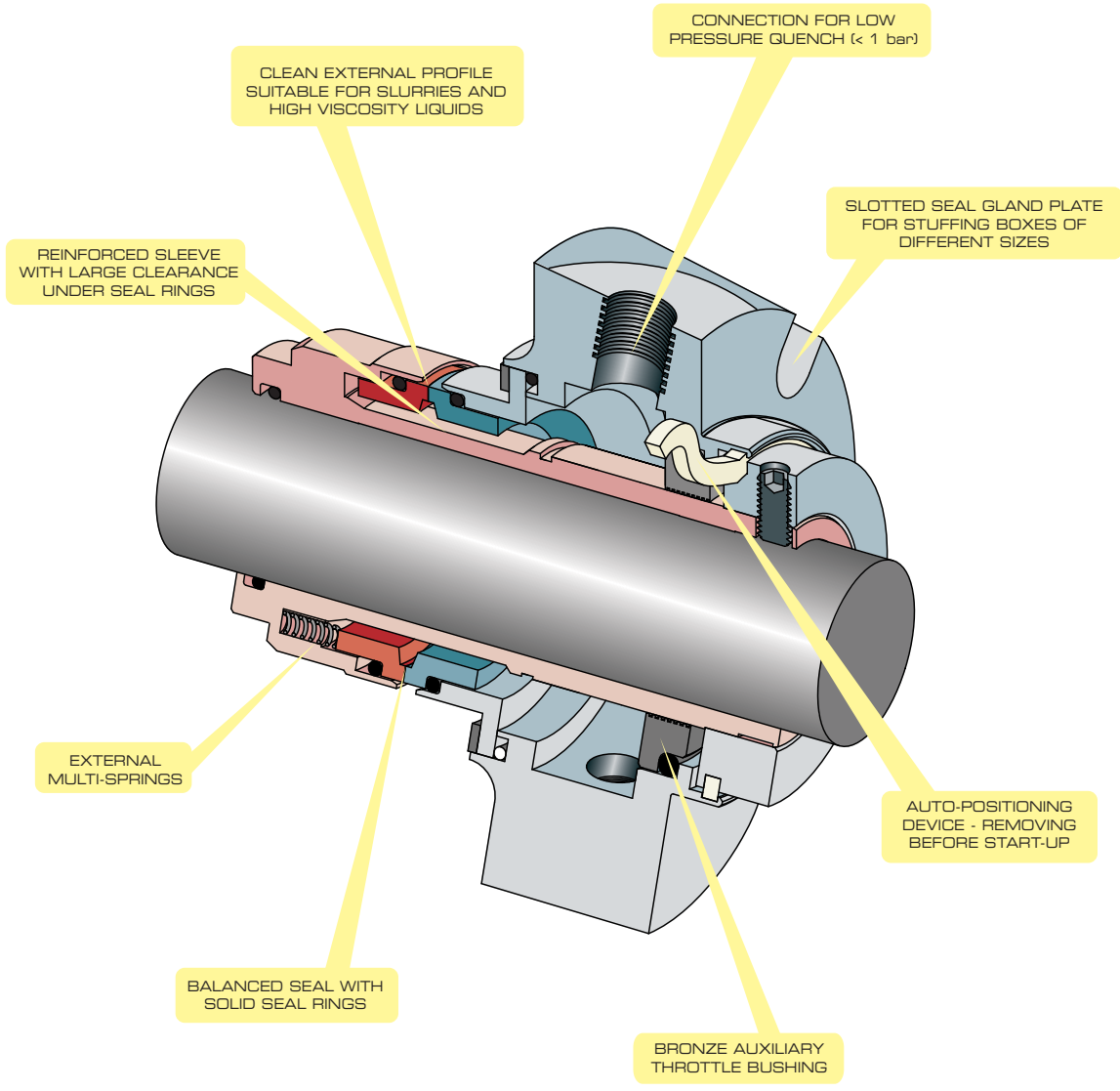
A balanced, single cartridge seal that is suitable for wet and dry running. The multi-springs are positioned out of the process fluid to prevent clogging. The parts in contact with the process have a simple profile compliant with CIP (clean in place) and SIP (sterilise in place) requirements.

OPERATING CONDITIONS C3DQ and C4DQ

SPEED (m/sec)	PRESSURE (bar)	TEMPERATURE (C°)
12 C3DQ	25 C3DQ	+250 C3DQ
0,3 C4DQ	3 C4DQ	+150 C4DQ
0	0	-50

CHARACTERISTICS

dry run C4DQ | top entry | side entry | bottom entry | food industry | pharmaceutical industry | chemical industry



Dimensions are available on request

Cartridge seals for general services

C3D and C4D

A dual cartridge seal designed to operate with either pressurised barrier fluid or unpressurised buffer fluid systems. The product seal is double balanced to tolerate unexpected reverse pressure conditions, which makes the seal very reliable. The atmosphere seal is self venting and is fitted with an integrated pumping device to circulate the barrier fluid.

The parts in contact with the process have a simple profile that is compliant with CIP (clean in place) and SIP (sterilise in place) requirements.

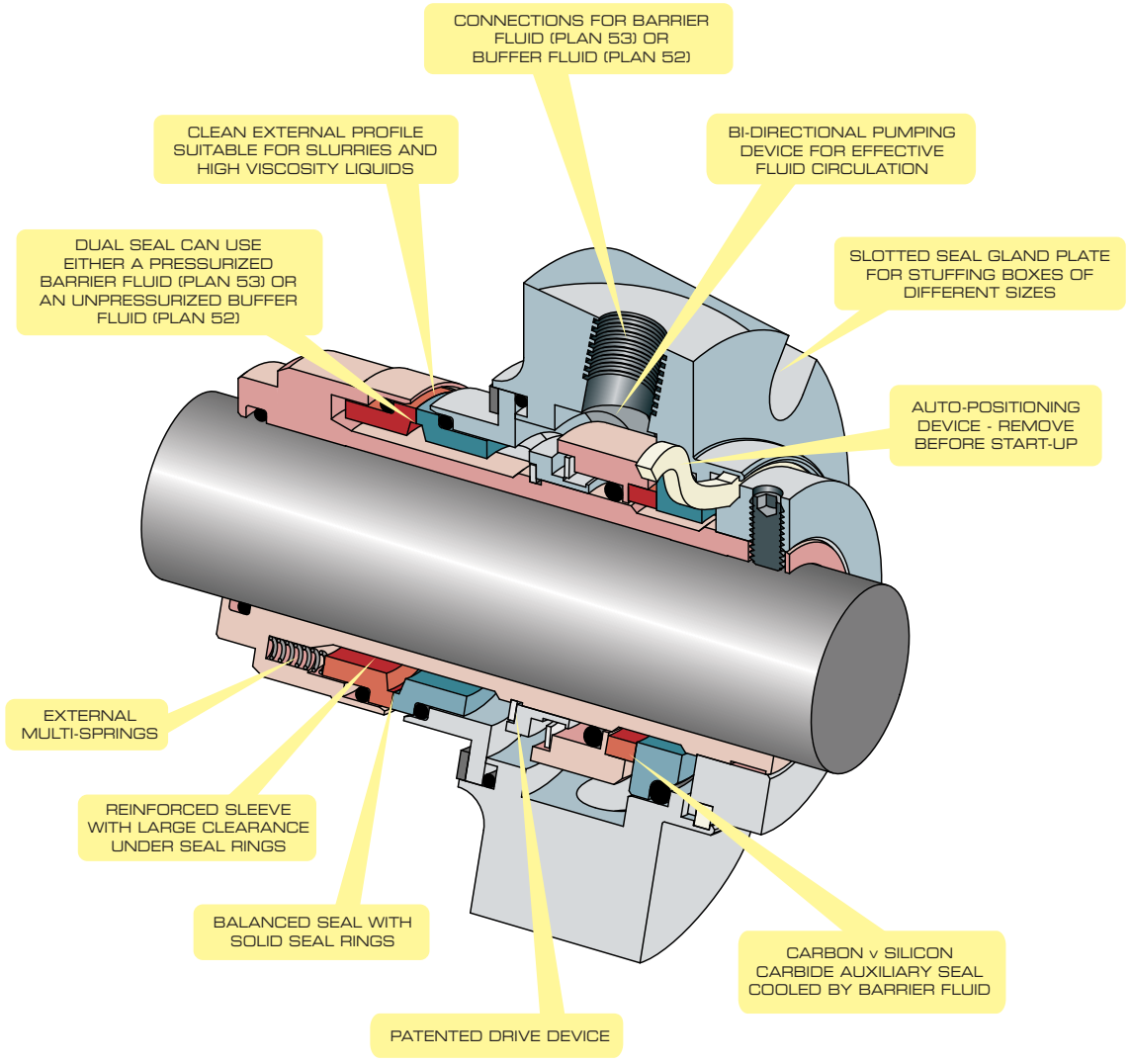
The C4D is designed for dry running operation and can be used with a pressurised nitrogen barrier gas.

OPERATING CONDITIONS C3D and C4D

SPEED (m/sec)	PRESSURE (bar)	TEMPERATURE (C°)
12 C3D	25 C3D	+250 C3D
0,3 C4D	3 C4D	+150 C4D
0	0	-50

CHARACTERISTICS

dry run C4D | top entry | side entry | bottom entry | food industry | pharmaceutical industry | chemical industry



Dimensions are available on request

Fluiten customer service is a “Global Service”

Fluiten has a dedicated after-sales department to meet the ever growing requirement for rapid seal maintenance, repair and modification. The after-sales department offers a complete range of services to meet specific market demands and Fluiten is renowned for the quality and excellence of its aftermarket support.

Whether you require a straight forward seal repair or in depth failure analysis, our team of highly qualified staff can meet your needs. Whatever the application, we make sure that every seal we repair for you will work safely and reliably.

To best meet our customer's expectations, Fluiten's constant commitment is to pursue maximum quality in every single company department, from design and manufacture to after-sales service. Our management team firmly believes it is this philosophy that makes the company successful.

Fluiten offers much more than just a seal repair. When required, Fluiten can look at the feasibility of modifying an existing seal to operate on a new or changed production process or offer an upgrade solution to meet new legislation. We aim to ensure that our customers always receive an effective response to their requests and that they never feel abandoned.

For this reason, Fluiten offers a comprehensive Global Service that provides continuous assistance and technical support.

To ensure a rapid response in the event of urgent service requests, Fluiten also operates an emergency service in which all checks, maintenance and repairs are carried out within 24 to 48 hours.

Fluiten delivers comprehensive, high quality aftermarket support through our network of Fluiten Service Centres around the world. Our support covers ALL BRANDS of mechanical seal, not just our own, enabling us to meet all your mechanical seal needs. And when it is difficult to remove seals and return them to us, Fluiten can provide the necessary on-site support.

Service Department

Lubricated dual seals

Mechanical seals fitted to rotating equipment with a top entry shaft will usually be sealing gas and vapours Consequently, care must be taken to ensure mechanical seal faces are adequately lubricated. Furthermore, if the process fluid is toxic, flammable or poisonous, then a means to prevent emissions to atmosphere must be provided.

Therefore in these cases, a dual mechanical seal is often selected. The two seals create a chamber that lies between the inside of the vessel and the atmosphere. This chamber is filled with a suitable barrier fluid (water, glycol, low viscosity oil) that is compatible both with the process and the atmosphere and able to lubricate and cool the seal faces effectively.

The barrier fluid can be supplied via either an auxiliary tank or an external source and must be maintained at a higher pressure than the process pressure.

Double cartridge seal on a top-entry agitator

Standard Fluiten seals were designed with robust drive lugs in the early 1960s. This feature still sets Fluiten dual seals apart from others found on the market today

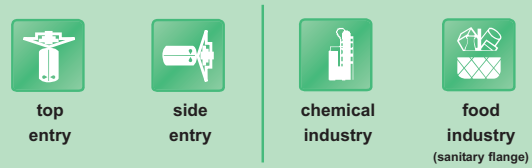
Back-to-back components for a Fluiten dual seal cartridge

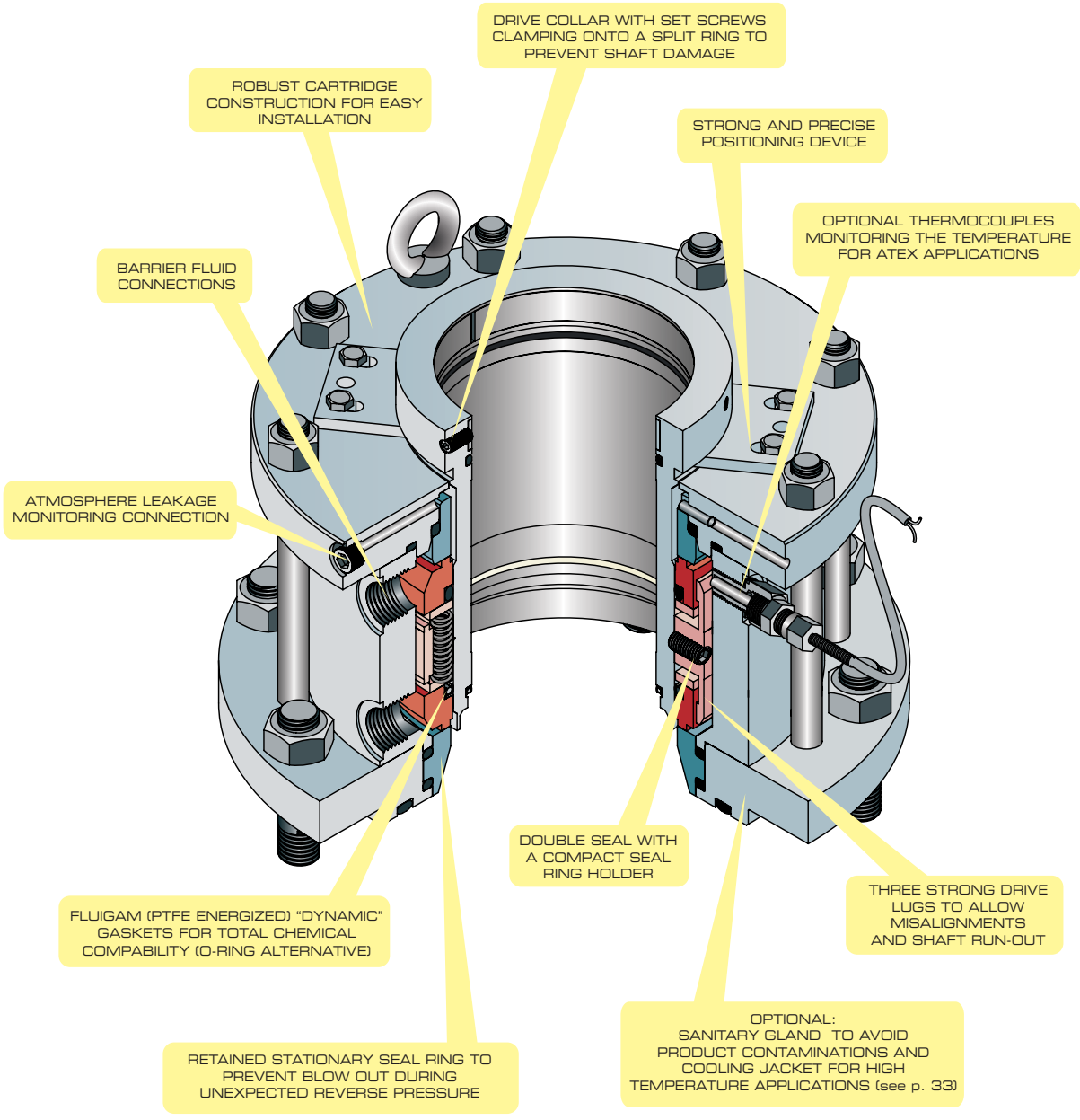
Lubricated dual seals

GT1811A

The GT1811A is a back-to-back double cartridge seal designed for operation with a pressurised barrier fluid (1 bar > process pressure). The GT1811A has a reliable track record dating back to 1988 and there are thousands of units in service at chemical and pharmaceutical plants all over the world. This robust, tried and tested design is available in several configurations, constructed from materials selected according to the specific operating conditions. A configuration with dimensions compliant with DIN 28138 (flange) and 28159 (shaft) is also available: GT1821A.

CHARACTERISTICS GT1811A and GT1810A





Dimensions are available on request

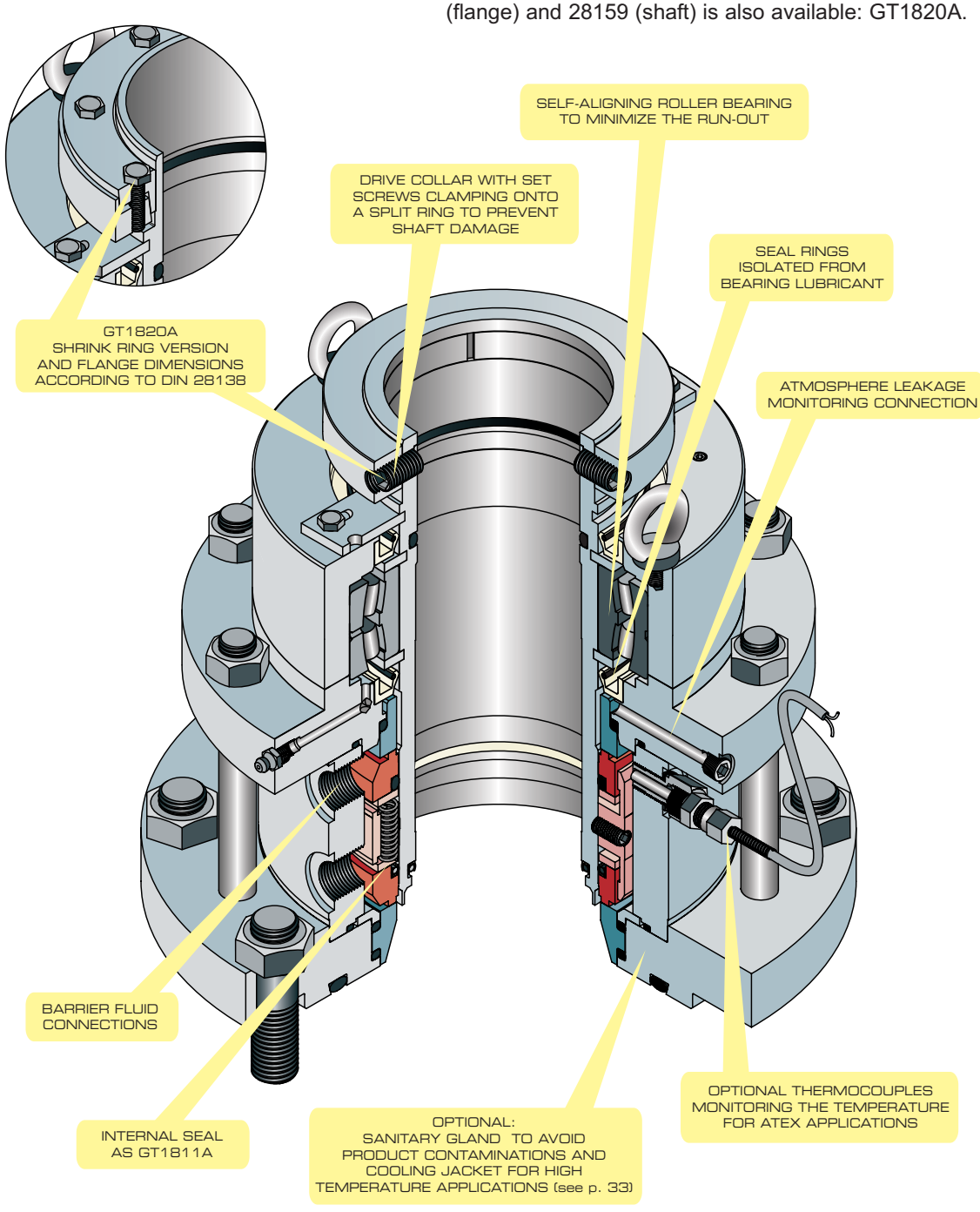
Lubricated dual seals

OPERATING CONDITIONS GT811A and GT1810A

SPEED (m/sec)	PRESSURE (bar)	TEMPERATURE (C°)
10	18	+250
0	0	-50

GT1810A

The GT1810A is a back-to-back double cartridge seal designed for operation with a pressurised barrier fluid (1 bar > process pressure). This seal has the addition of an integrated self-aligning roller bearing to minimise shaft run out at the seal. Like the GT1811A, this robust, tried and tested design is available in several configurations, constructed from materials selected according to the specific operating conditions. A configuration with dimensions compliant with DIN 28138 (flange) and 28159 (shaft) is also available: GT1820A.



Dimensions are available on request

Fluiten test laboratory

Fluiten believes that effective research and development is vital to advance product technology, quality and competitiveness. Consequently, we make significant investment in our test laboratory.

The test beds were built to be flexible and adaptable to new requirements. Horizontal or vertical assemblies may be simulated for internal or external single or dual seals and tests can be carried out with various combinations of pressure, temperature, speed and shaft sizes. Water is used as the test fluid for basic testing. However, other fluids with similar chemical and physical characteristics to those seals will see in service are used when necessary.

The test beds are able to simulate mechanical stress, such as run-outs and shaft misalignment, to verify the performance of components beyond maximum anticipated operating parameters.

The parameters that need measuring during the various test stages are of fundamental importance, especially the torque consumed and heat generated, the flushing required for cooling, the temperatures of the seal rings and other changes that occur as the various parameters change.

The test beds are equipped with numerous instruments and sensors for monitoring temperatures, pressure, speed and fluid levels and enable unmanned endurance tests to be performed in complete safety. The test results are recorded automatically in a database so that the various dynamic tests may be reviewed and compared over time.

New product approval test cycles are established in advance with methods chosen according to the use of the specific seal. Only after this preliminary testing stage are on-site field tests performed at plants run by trusted technicians with whom excellent working relations have been established.

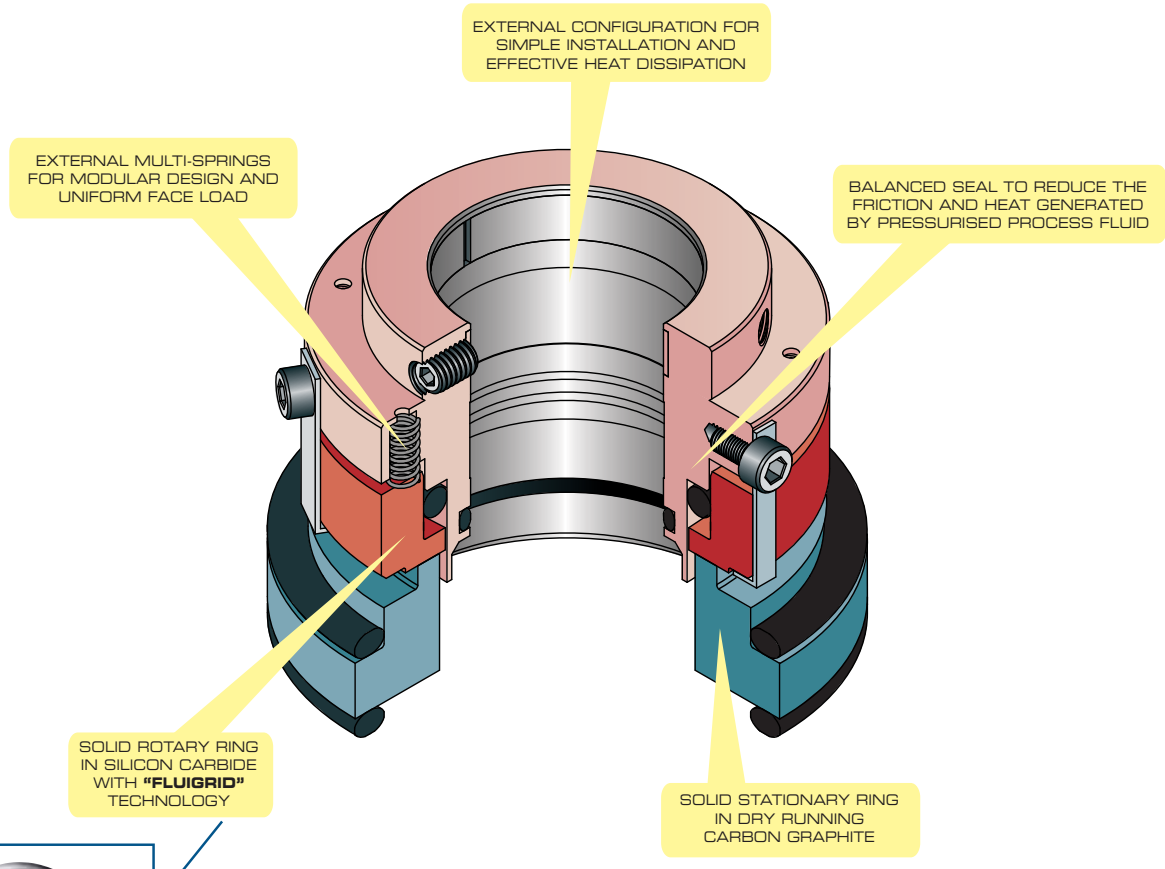
A key feature of the Fluiten test facility and our testing capability is that when required, we can carry out dynamic tests to parameters that closely match our customers' applications. For example, a global chemical manufacturer recently turned to Fluiten for help to resolve a persistent sealing problem on a bottom entry mixer involving latex at 25 bar, 200 rpm and 140 C. After carefully reviewing the application, Fluiten developed a triple mechanical seal cartridge and dedicated support system. As part of the development, the seal and system were dynamically tested at actual operating parameters using latex supplied by the customer. This enabled us to optimise the design of the seal and the support system which in turn lead to much high levels of reliability in service. Consequently, our customer benefited from a dramatic reduction in maintenance costs and a significant increase in plant performance and safety.

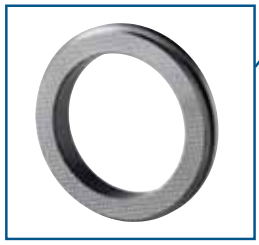
Test laboratory

Single seals for dry running - *FLUIGRID technology*

In rotating equipment with a top entry shaft, the seal must operate on a gas-phase fluid. Fluiten has offered dry running seal designs for many years by careful material selection and detail design for guaranteed long life.

Fluiten has optimised this ability and raised dry running operating limits and reliability using FLUIGRID technology. This is a grid created by laser etched micro-cavities cut into the hard face. These cavities act as small pockets into which the carbon face deposits lubricating micro particles, which results in significantly reduced friction and consequently less heat generation and face wear.





Single seals for dry running - *FLUIGRID technology*

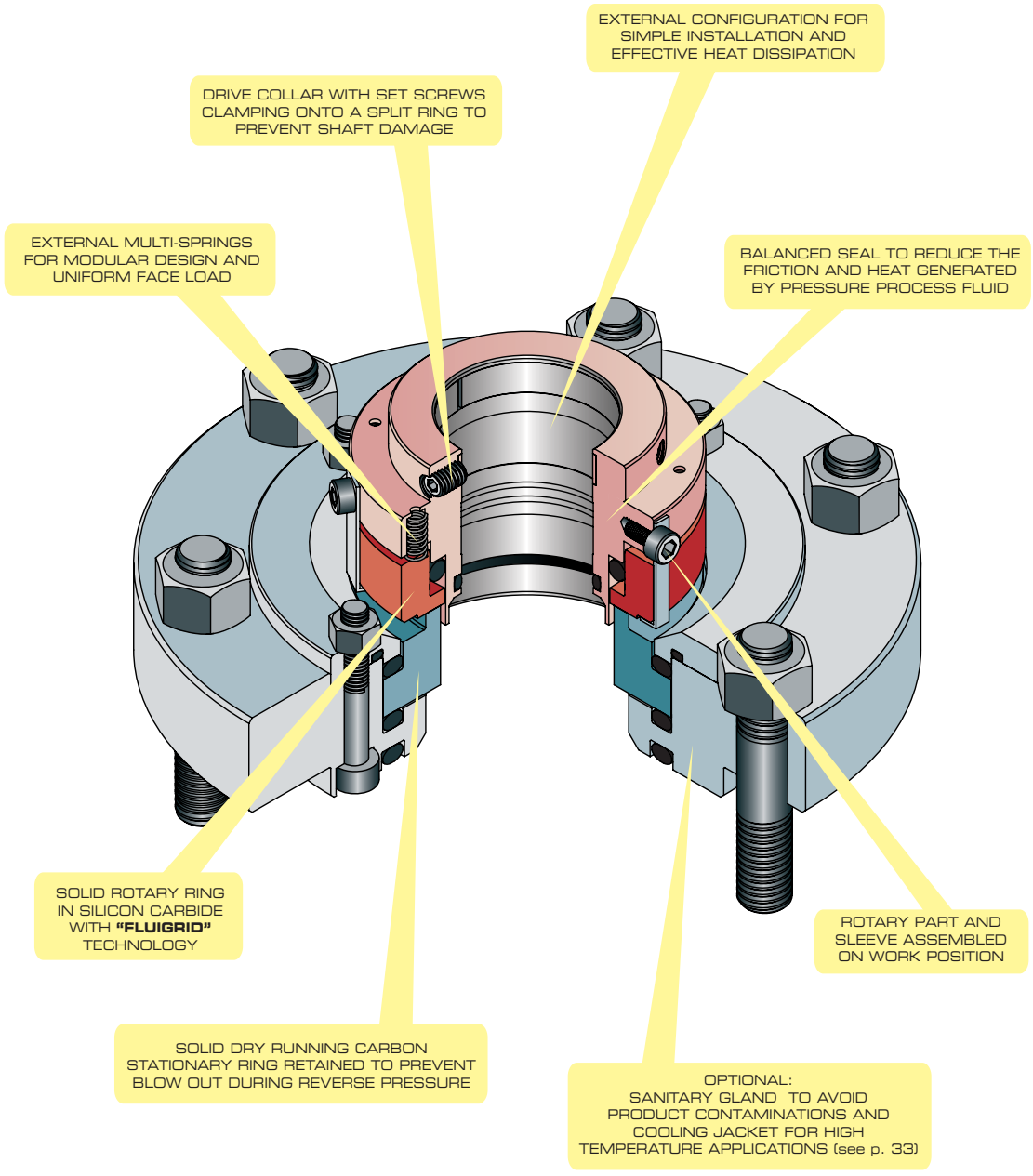
GT1888A

An external single seal designed for dry running. The rotary assembly is pre-set to the working length and the stationary ring is supplied complete with a flange for fitting to the top of the vessel. FLUIGRID technology ensures superior dry running performance while the large radial clearances and inherent flexibility make the seal tolerant to high shaft run-out.

The **GTEDV** component only version without the flange plate is also available. (see drawing on p. 19).

CHARACTERISTICS GT1888A and GT1887A

- dry run
- top entry
- chemical industry
- food industry (sanitary flange)



Dimensions are available on request

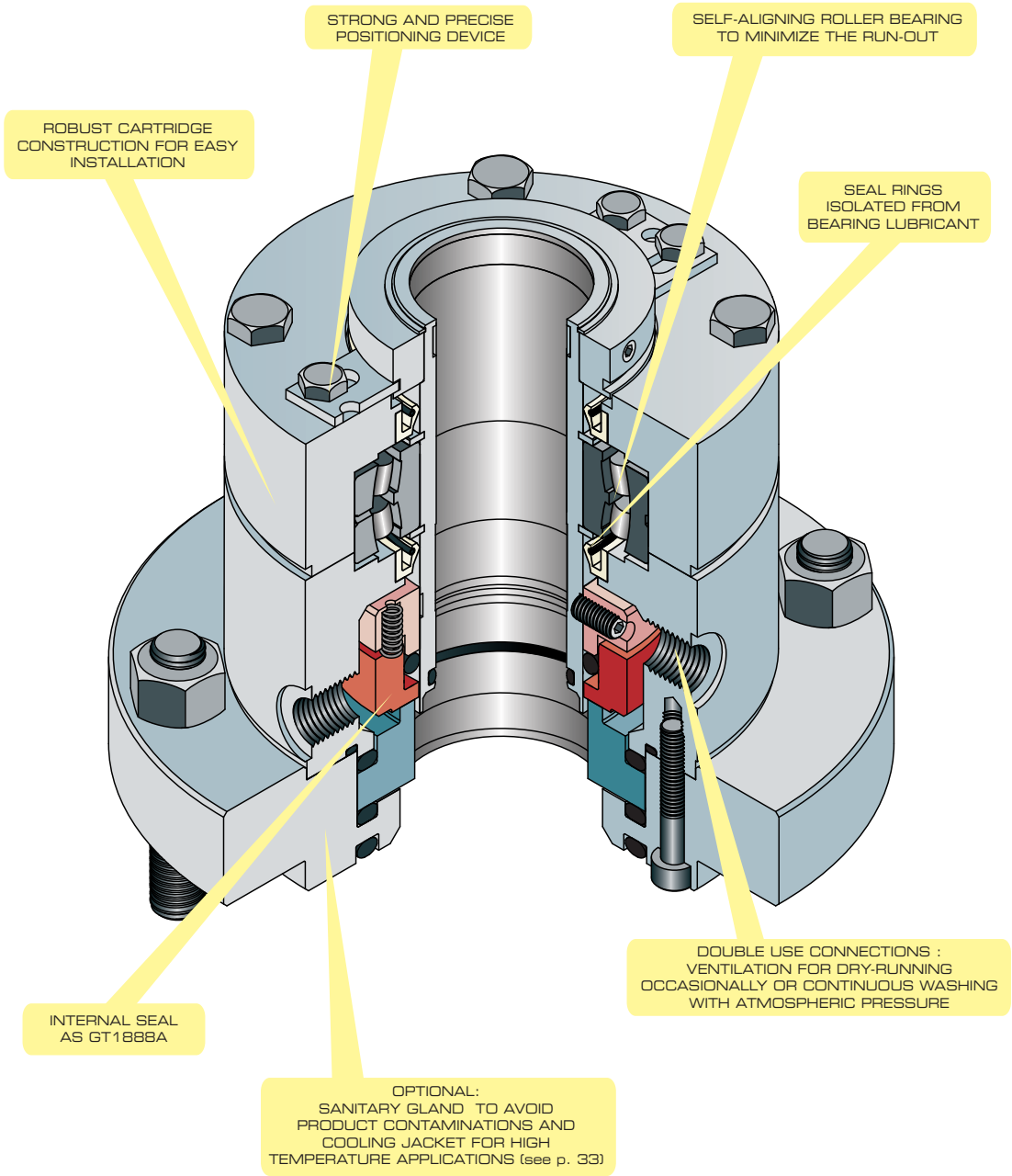
Single seals for dry running - *FLUIGRID technology*

OPERATING CONDITIONS GT1888A and GT1887A

SPEED *(m/sec)*	PRESSURE *(bar)*	TEMPERATURE *(C°)*
3	6	+150
0	0	-50

GT1887A

A preassembled external single cartridge seal suitable for dry running, complete with seal housing and integrated, self-aligning roller bearing. FLUIGRID technology ensures superior dry running performance while the large radial clearances and inherent flexibility make the seal tolerant to high shaft run-out. The connections act as seal ventilation holes, but they can also be used for washing or flushing (even static) at atmospheric pressure.



Dimensions are available on request

Cutting-edge metrology laboratory

Metrology laboratory

Fluiten is an ISO 9001:2008 accredited company with a quality assurance process that goes beyond the standard requirements of compliance. Underlying our process of continuous improvement are many routine inspections carried out on our measuring instruments and machine tools to ensure ongoing conformance. Fluiten continues to develop this capability by sourcing instruments that allow in process inspection of all components with minimum impact on manufacturing time. Parts received from suppliers are also inspected to the highest standard, again, using technology that allows minimum waiting time. Further inspection is carried out on critical components and features where necessary. As a result, we minimise the possibility of unexpected non conformances during mechanical seal assembly, testing and operation.

Fluiten uses the latest generation of laser instruments to measure with an accuracy of tenths of a micrometer. Checks include the flatness and roughness of seal surfaces, the concentricity and perpendicularity of shaft sleeves and flange surfaces and the quality of threaded connections.

Fluiten dry gas seal technology is a further example of our ability to manufacture and inspect precision parts. FLUIGRID and FLUILIFT dry gas seal technologies demand advanced techniques and instrumentation. The precise shapes in the seal surface are cut with laser technology using complex mathematical calculations that are verified by empirical laboratory tests.

Profilometer

Coordinate measuring machine

The shape and precision of these shapes is crucial for reliable performance and as such, dimensional inspection after manufacture is essential. Our equipment was designed in cooperation with leading companies that specialise in the manufacture of measuring instruments and this ensures customers get the best quality and performance from Fluiten products.

Dual gas seals, contact and lift off – *FLUIGRID and FLUILIFT technology*

The pharmaceutical, biotech and food industries are constantly seeking to improve their manufacturing processes to maximise product quality and safety. Consequently, they are committed to developing production machinery that is able to operate reliably in highly sterile environments.

Rotating equipment manufacturers have responded to these ever more stringent sanitary and aseptic requirements by designing equipment to minimise contamination and employing materials that are not harmful to health.

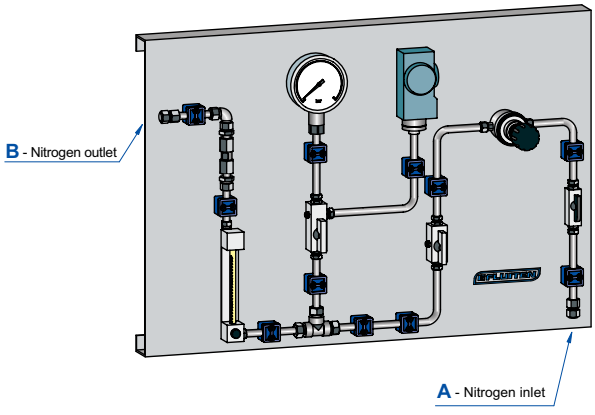
Dual mechanical seal for dry running in sterile conditions

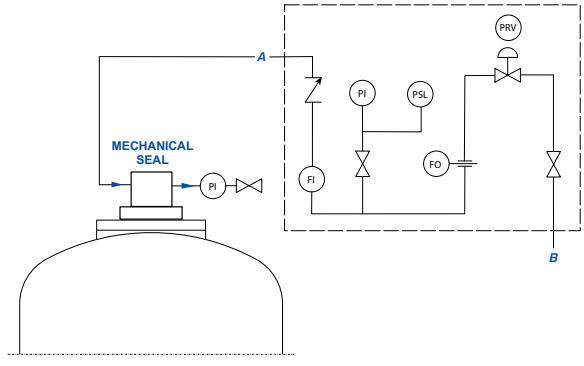
Mechanical seals are often a key component of such equipment and by their very nature can be a source of contamination. Therefore, Fluiten has developed a range of dual seals that completely separate processes from the atmosphere using an inert, dry, pressurised barrier gas.

There are two different types - dry contacting seals and dry lift off seals (usually referred to as dry gas seals). The simplest is a dual seal developed to allow dry contact between the seal rings. To improve reliability, Fluiten developed FLUIGRID technology (see p. 19). For applications where micro particles caused by face wear cannot be released, such as for injectable products, Fluiten offers FLUILIFT dry gas seals with non contacting seal faces. The seal faces are kept apart by a controlled gap that is created by laser etched lift-off grooves on the seal faces. This gap is controlled to prevent seal face contact while maintaining a minimum amount of gas leakage.

Dry gas lift off face

These seals are made of materials that may be FDA (US Food and Drug Administration) certified. The surface shape and finish of these seals are such that they may be cleaned and sterilised to prevent bacteria from forming i.e. CIP & SIP (Clean in Place & Sterilise in Place).





API PLAN 74

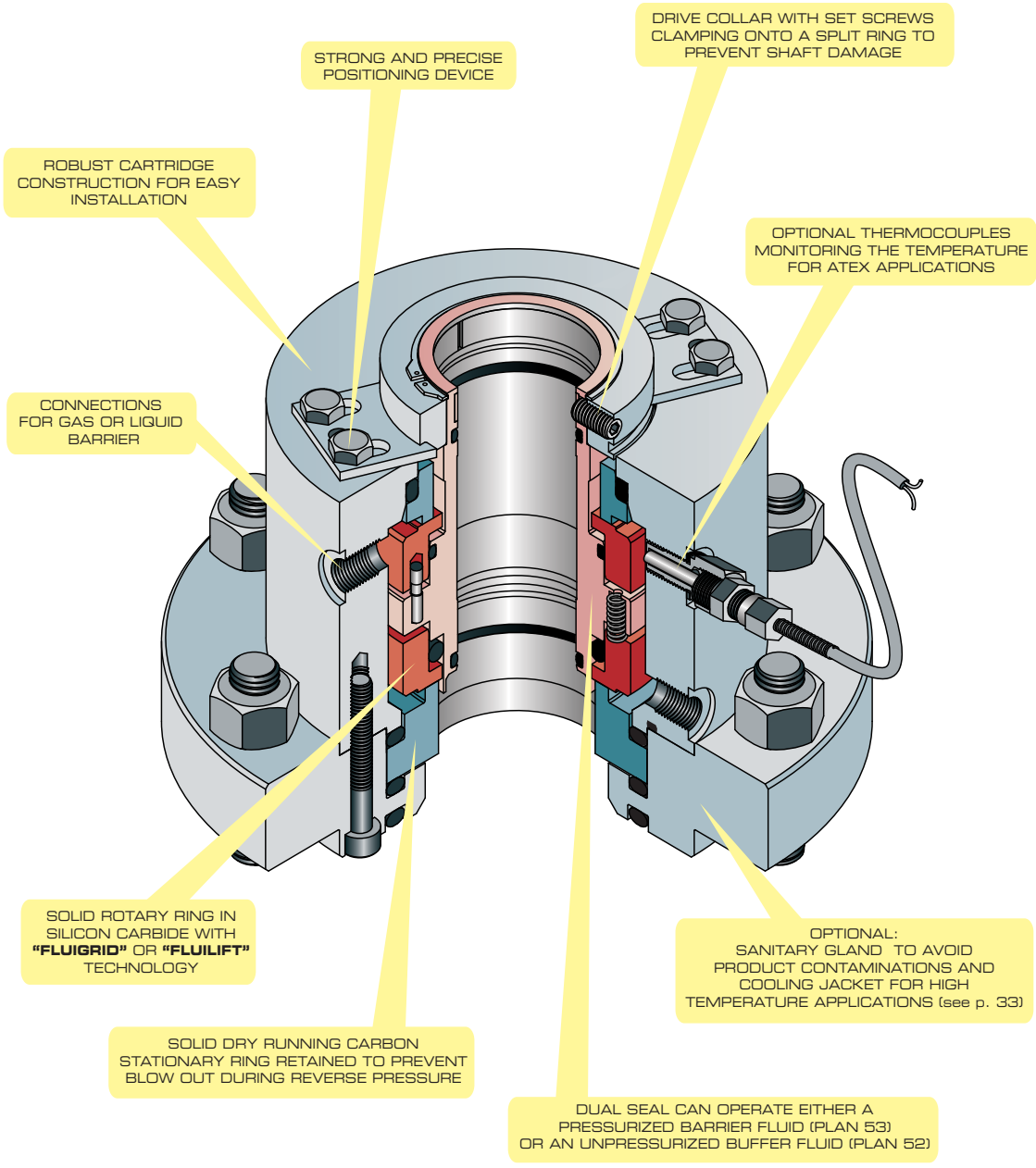
Dual gas seals, contact and lift off – *FLUIGRID and FLUILIFT technology*

GT1866A

A preassembled, back-to-back double cartridge seal. The seal is designed with FLUIGRID technology for effective, low friction dry running on inert gases. Its constructional features tolerate large shaft run-outs, which prevents breakage and premature wear of seal parts. The cartridge can be supplied with a sanitary flange on the process side to prevent wear particles entering the product and to allow CIP or SIP. The GT1866A is also available in configurations to run wet or as a dry gas lift off seal with FLUILIFT technology.

CHARACTERISTICS GT1866A and GT1865A

- dry run
- top entry
- chemical industry
- food industry (sanitary flange)



Dimensions are available on request

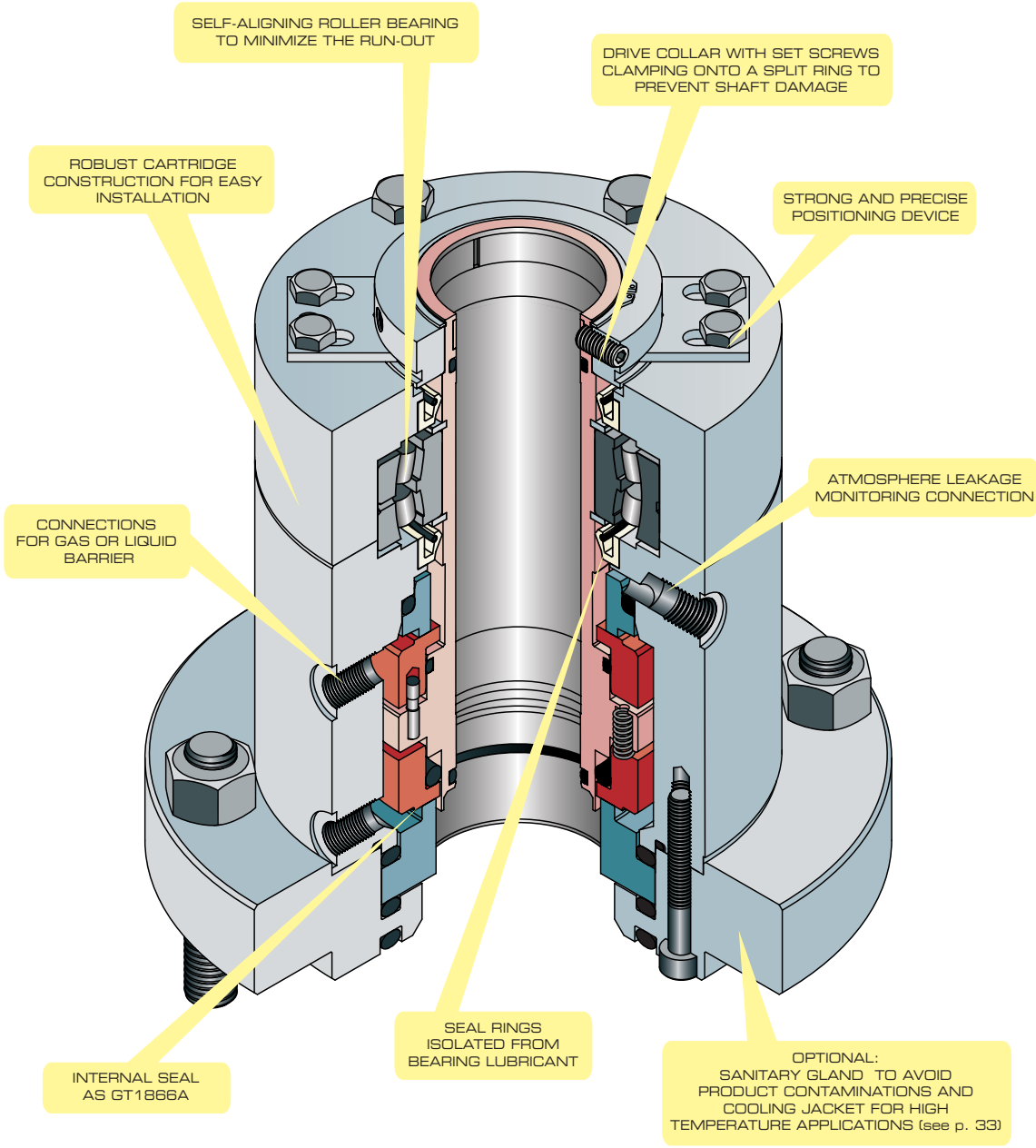
Dual gas seals, contact and lift off – *FLUIGRID and FLUILIFT technology*

OPERATING CONDITIONS GT1866A and GT1865A

SPEED *(m/sec)*	PRESSURE *(bar)*	TEMPERATURE *(C°)*
3 dry contacting	6 dry contacting	+150 dry contacting
8 wet lubricated	10 wet lubricated	+250 wet lubricated
0	0	-50

GT1865A

A preassembled back-to-back double cartridge seal with built-in self-aligning roller bearing. The seal is designed with FLUIGRID technology for effective, low friction dry running on inert gases. Its constructional features tolerate large shaft run-outs, which prevents breakage and premature wear of seal parts. The cartridge can be supplied with a sanitary flange on the process side to prevent wear particles entering the product and to allow CIP or SIP. The GT1866A is also available in configurations to run wet on a barrier liquid or as a dry gas lift off seal with FLUILIFT technology.



Dimensions are available on request

Dual gas seals, contact and lift off – *FLUIGRID and FLUILIFT technology*

GTAF - GTAD - GTAW

A double cartridge seal with a clean external profile suitable for hygienic applications, slurries, high viscosity liquids and polymeric solutions. The cartridge includes an integrated roller bearing to minimise shaft run out for improved reliability.

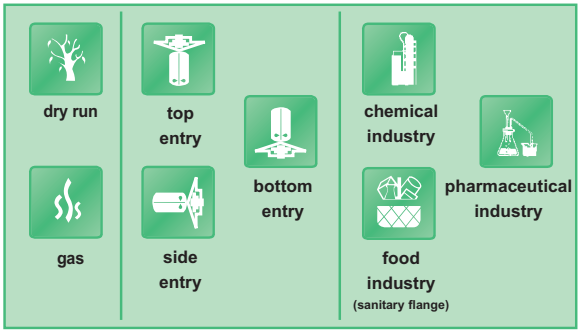
The seal is available in three main configurations:

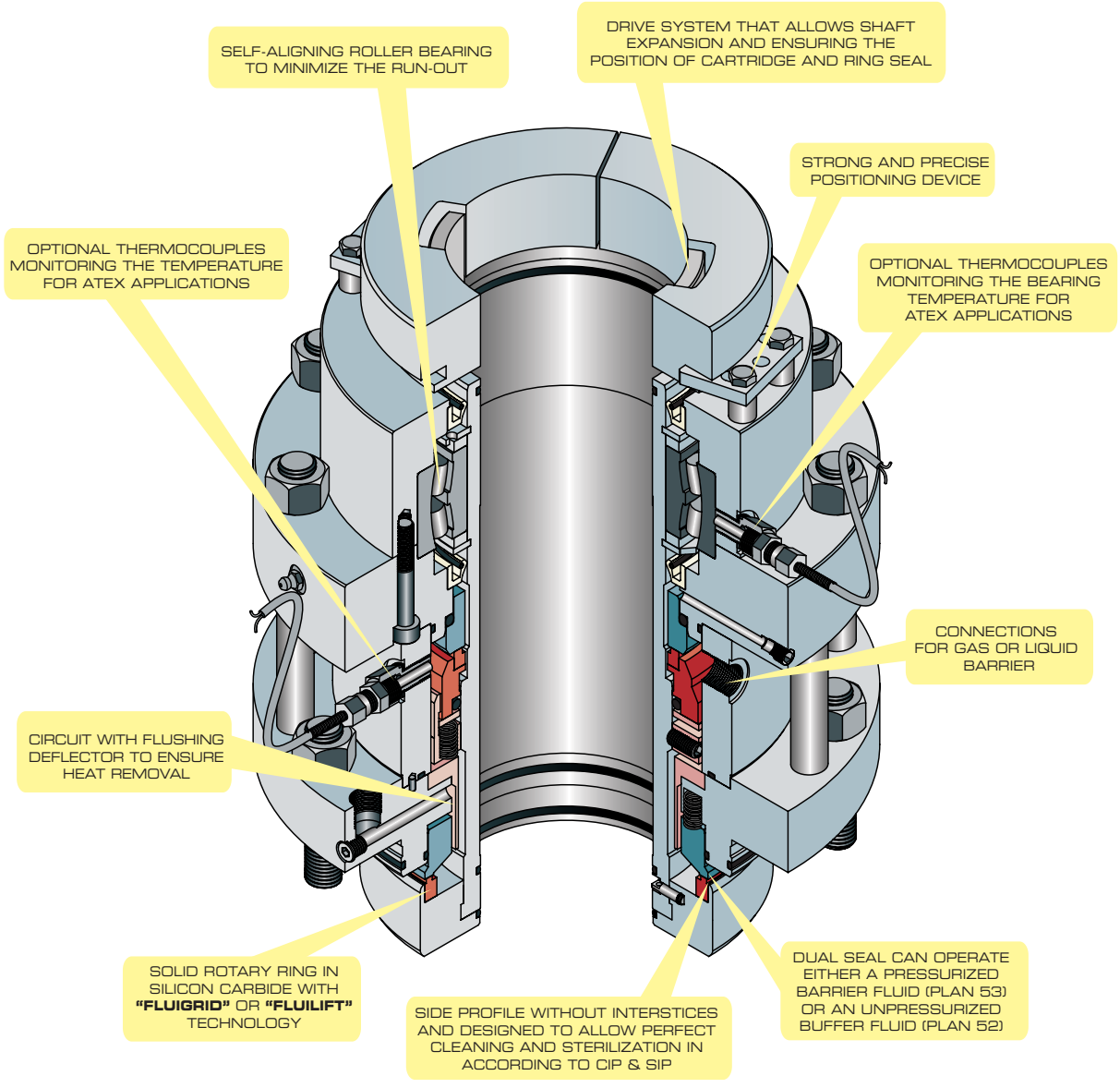
- The GTAW is designed for wet running with a pressurised liquid barrier.
- The GTAD is designed with FLUIGRID technology for contacting dry running on a pressurised inert barrier gas.
- The GTAF is designed with FLUILIFT dry gas lift off faces for non-contacting operation on a pressurised inert barrier gas.

The seal range is available with custom designed flange and shaft sleeve. Other design features and material selections can be engineered to meet operating conditions.

	GTAF (non contacting)	GTAD (dry contacting)	GTAW (wet lubricated)
SPEED *(m/sec)*	5	3	10
PRESSURE *(bar g)*	Vacuum - 8	Vacuum - 6	Vacuum - 18
TEMPERATURE *(C°)*	200	150	250

CHARACTERISTICS GTAF - GTAD - GTAW



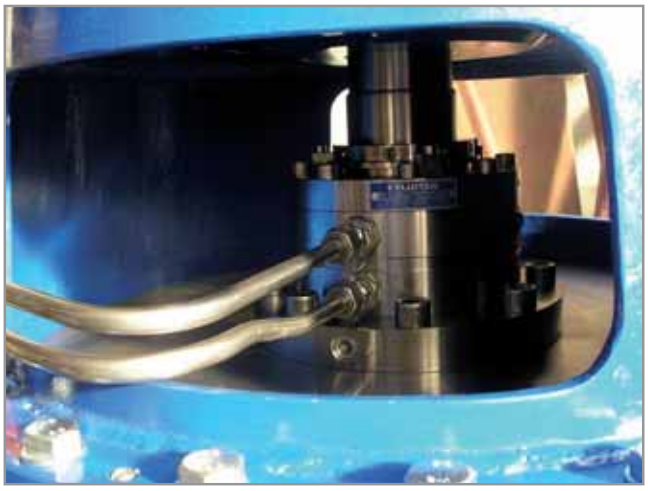


Dimensions are available on request

Dual seals for high pressures

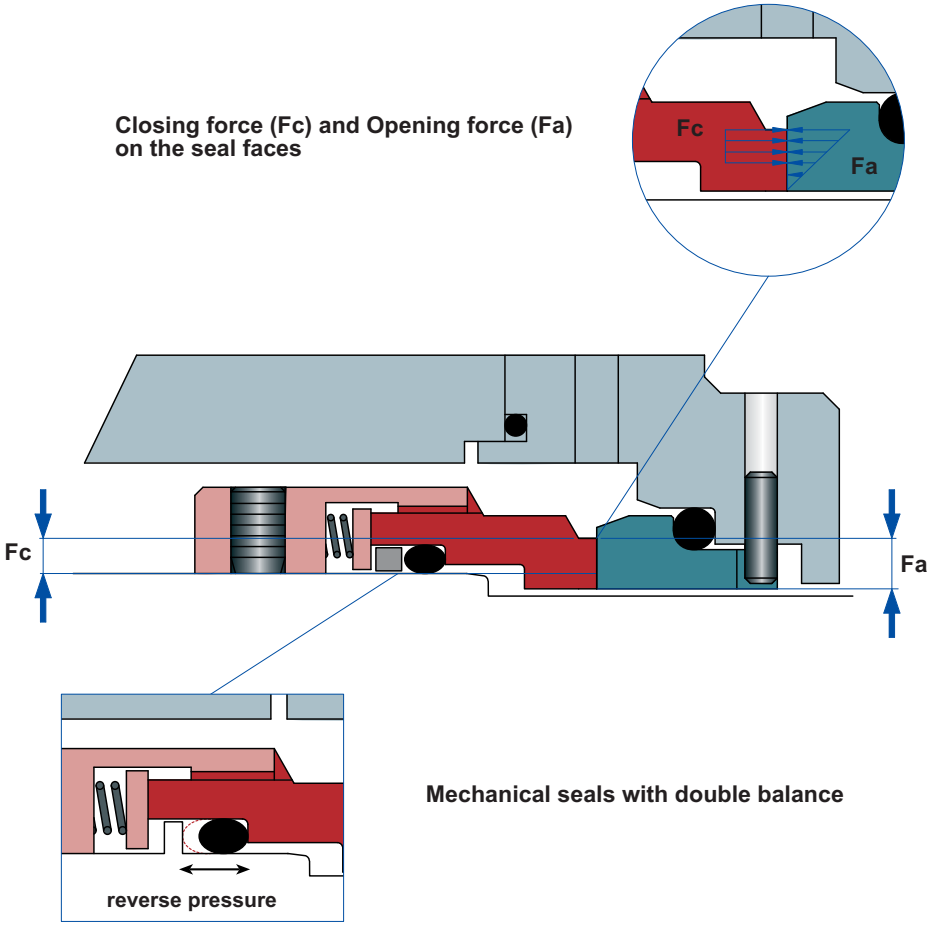
As pressure and speed increase there is a consequential increase in face load and friction, resulting in higher seal face temperatures and greater material stresses. Beyond certain limits it is essential to use a mechanical seal design with hydraulically balanced faces. A balanced mechanical seal is designed to operate with a reduced closing force between the seal rings. This increases face lubrication and allows operation at higher limits of pressure and speed.

Under normal conditions, a pressurised dual seal operates with a barrier fluid at a greater pressure than the process pressure. However, there are times when the process pressure may be greater than the barrier fluid pressure. This is usually considered as an 'upset condition' and may be caused by a loss of barrier fluid pressure or an increase in process pressure because of a plant fault. To withstand this type of unexpected upset, known as 'reverse pressure', a mechanical seal should be double balanced.



Balanced mechanical seal operation, GT923A type

A double balanced mechanical seal can operate on either an internal or external pressure without leakage or significant damage to seal parts.



Mechanical seals with double balance

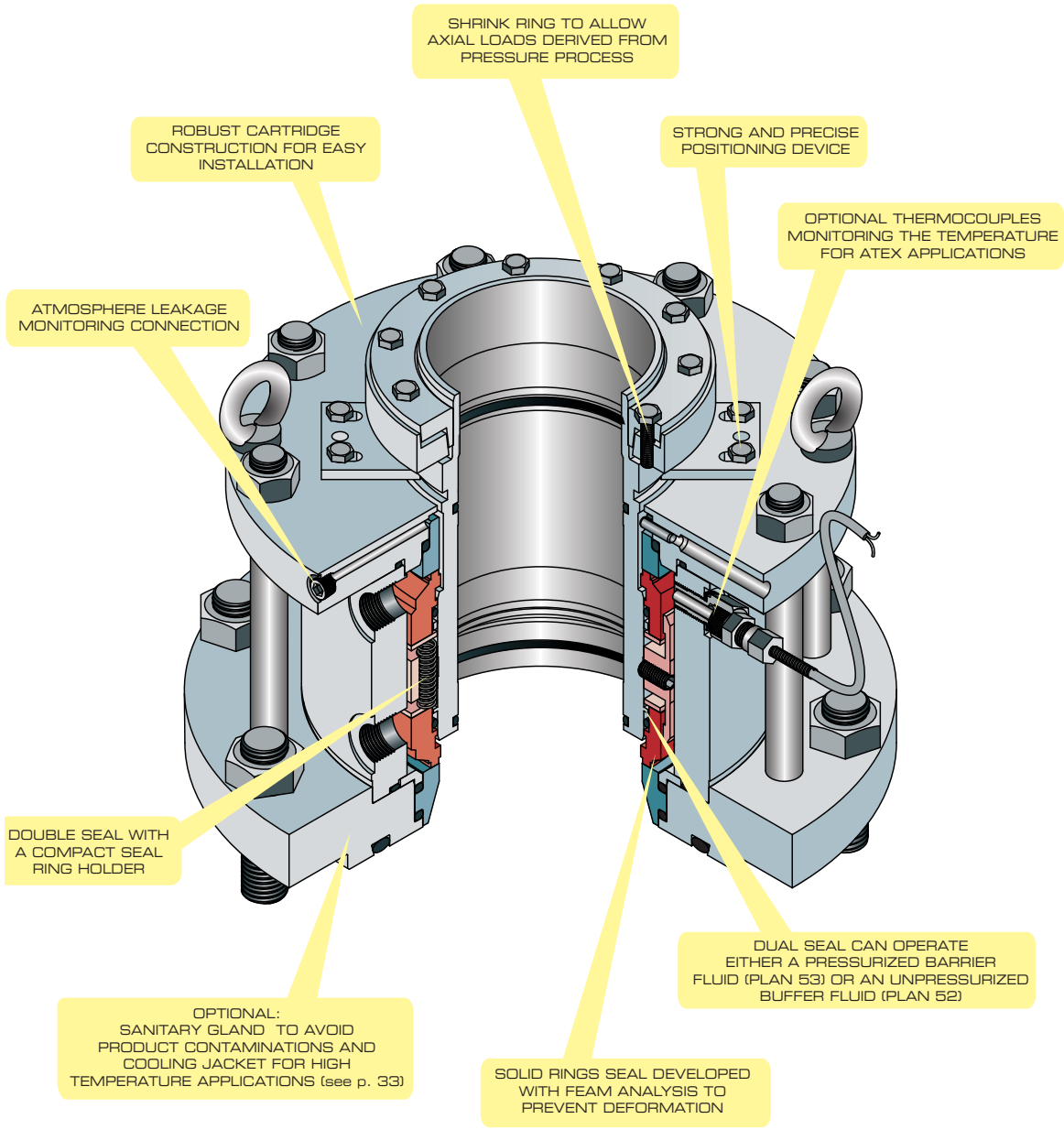
Dual seals for high pressures

GT1924A

A preassembled, back-to-back double cartridge seal suitable for operation with a pressurised barrier fluid (min 1 bar > process pressure). A double balanced model suitable for high working pressures and the ability to operate under reverse pressure if there is a loss of barrier fluid pressure.

CHARACTERISTICS GT1924A and GT1923A

- top entry
- side entry
- chemical industry
- food industry (sanitary flange)



Dimensions are available on request

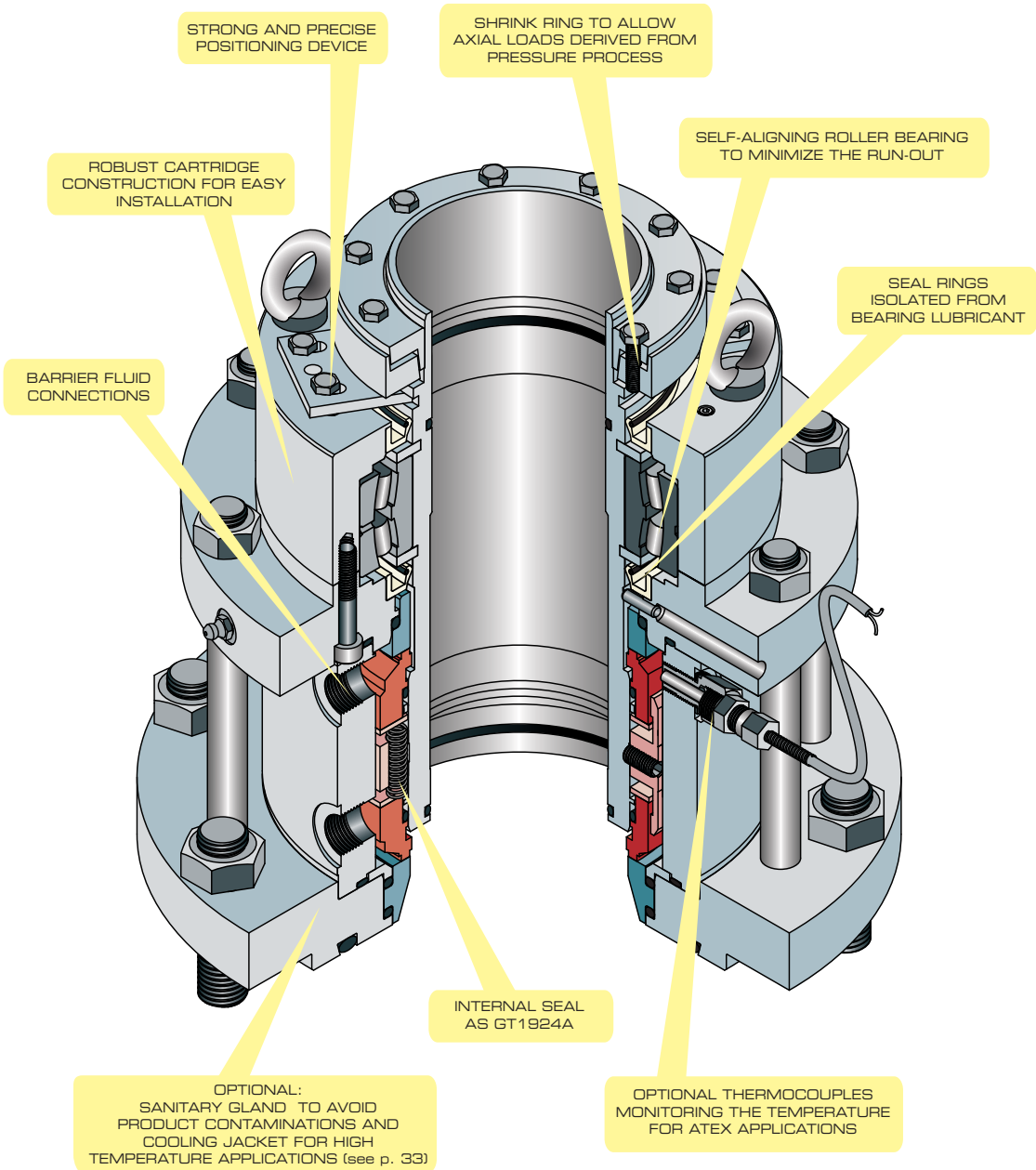
Dual seals for high pressures

OPERATING CONDITIONS GT1924A and GT1923A

SPEED (m/sec)	PRESSURE (bar)	TEMPERATURE (C°)
20	75	+250
0	0	-50

GT1923A

A preassembled, back-to-back double cartridge seal with an integrated, self aligning roller bearing. Suitable for operation with a pressurised barrier fluid (min 1 bar > process pressure). A double balanced model suitable for high working pressures and the ability to operate under reverse pressure if there is a loss of barrier fluid pressure.



Dimensions are available on request

Dual seals for enamelled (glass lined) mixers

Highly acidic or alkaline substances that are very aggressive to metals are often used in the chemical industry. Therefore, equipment is selected that does not have metal parts in contact with the process. Metal surfaces in contact with the process media have a vitrified surface coating that is compatible with a large number of highly corrosive chemicals. Glass lined equipment is also used in the pharmaceutical industry since the low roughness of the coating material makes it easy to clean and sterilise.

Mechanical seals on glass lined equipment must also be made with non-metallic materials in contact with the process. In this case, the base flange of the cartridge containing the seal is coated using the same technology used to manufacture the glass lined vessel. The rotating and stationary rings on the product side are made of silicon carbide and resin-impregnated carbon and all the metal parts of the seal are kept outside the process.

Use of a dual pressurised seal is necessary to prevent process emissions leaking to atmosphere with the consequent risk of environmental pollution.

Enamelled equipment

Mechanical seal flange with glass coating

Seal for enamelled equipment

Dual seals for enamelled (glass lined) mixers

GT1165A

A preassembled back-to-back double cartridge seal with an integrated self-aligning roller bearing. Dimensions compliant with DIN 28138 (flange) and DIN 28159 (shaft). The latest generation materials in contact with the process are almost totally chemically compatible.

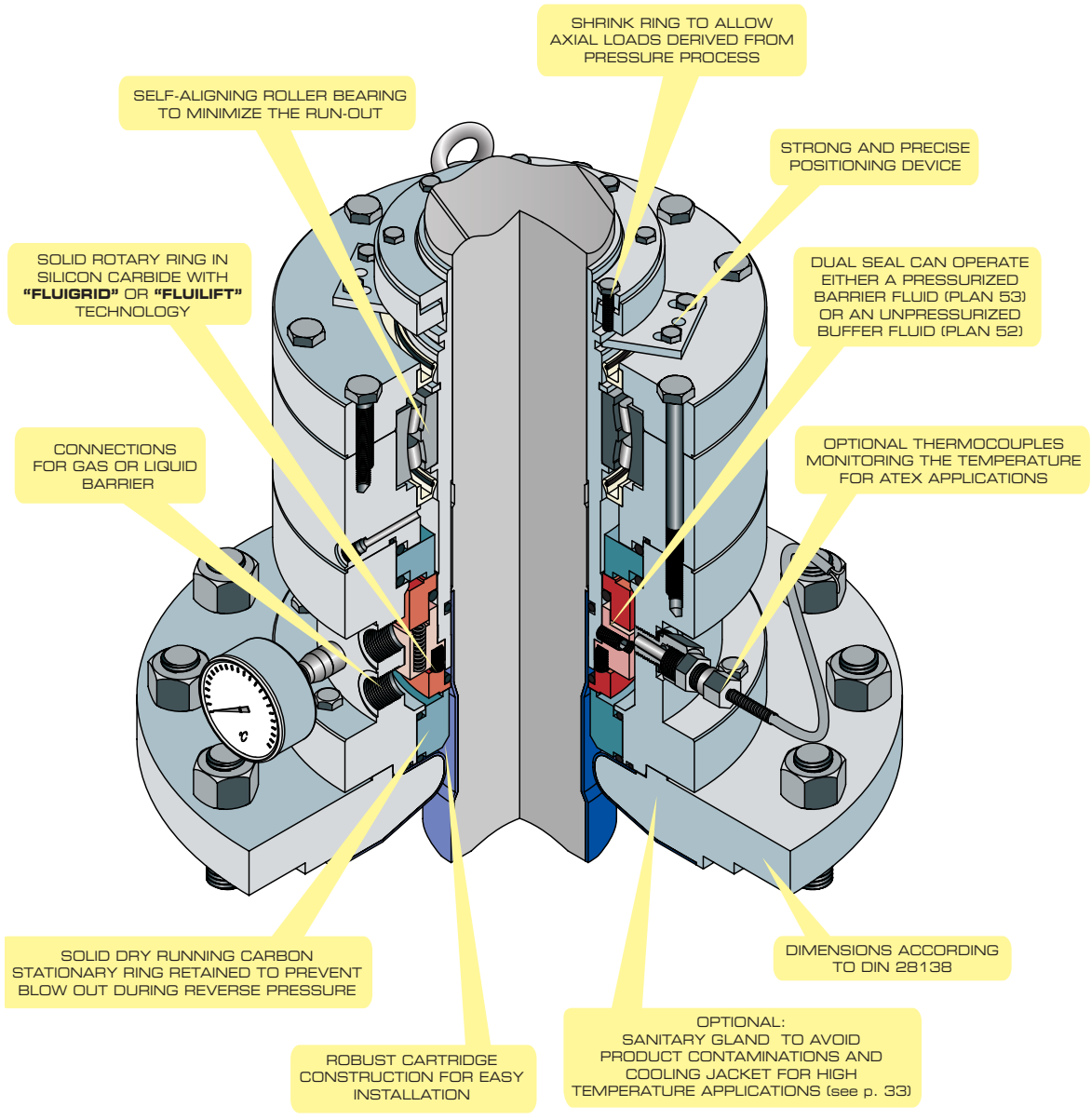
This seal is also available with FLUIGRID dry contacting faces and FLUILIFT dry gas non-contacting lift off faces.

OPERATING CONDITIONS

SPEED *(m/sec)*	PRESSURE *(bar)*	TEMPERATURE *(C°)*
8	10	+250
0	0	-50

CHARACTERISTICS

- dry run
- top entry
- pharmaceutical industry
- chemical industry



Dimensions are available on request

Fluiten's new automated warehouse

BM3A seal

Fluiten recently invested in a cutting edge automated warehouse able to store and handle over 55,000 components.

In addition to greater picking speed and precision, the adoption of a completely automated system has provided additional benefits for Fluiten, including space saving, quicker operations, greater safety, immediate part availability, a higher level of cleanliness and parts that are undamaged and ready for use.

Computerised warehouse management has also allowed Fluiten to route procedures through two dedicated systems, one for business-to-business and one for business-to-consumer.

To create this new automated warehouse, Fluiten extended its site by purchasing a new industrial unit. This tripled the space available and enabled the production department to be separated from the service and warehouse areas. In this way, every area has sufficient space to comply with all safety requirements and allow for future expansion.

The automated warehouse occupies a fifth of the space of a traditional warehouse, thus allowing Fluiten to optimise the floor area devoted to component storage.

The core of this innovative facility is a computer controlled carrier which receives material movement instructions from the control software. A mechanical robot arm picks up the items from the storage racks and takes them directly to the workstation that requires them.

Refilling is also completely automated and this has led to a substantial improvement in warehouse staff safety. The room where the operators are located is isolated and only authorised personnel are allowed access.

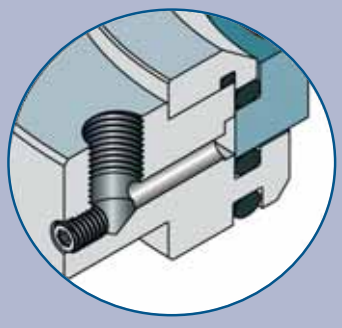
Automated warehouse - loading and unloading bays

Inside the warehouse showing boxes handled by automated robots

Optional flanges

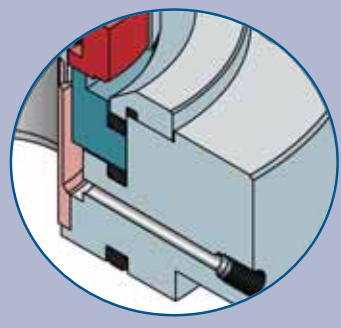
ALTERNATIVE FLANGES FOR DRY-RUNNING SINGLE/DUAL SEAL UNITS
TYPE: GT1888A - GT1887A - GT1866A - GT1865A - GT1165A

C



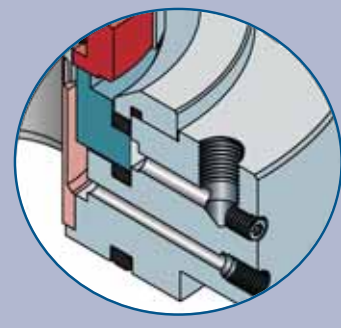
Flange with quench chamber for temperatures of above 80°C

D



Sanitary flange

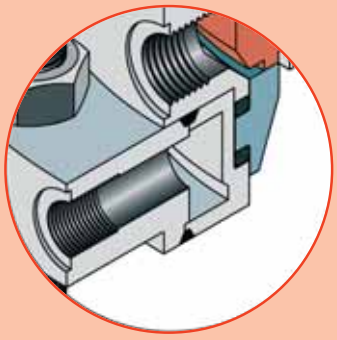
E



Sanitary flange with quench chamber

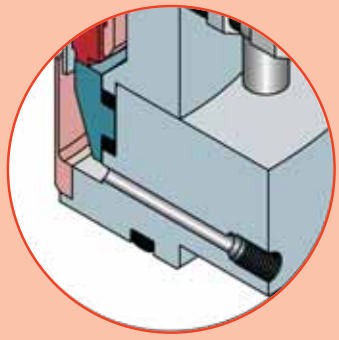
ALTERNATIVE FLANGES FOR LUBRICATED DOUBLE SEAL UNITS AND HIGH PRESSURES
TYPE: GT1811A - GT1810A - GT1924A - GT1923A

C



Flange with quench chamber for temperatures of above 250°C

D



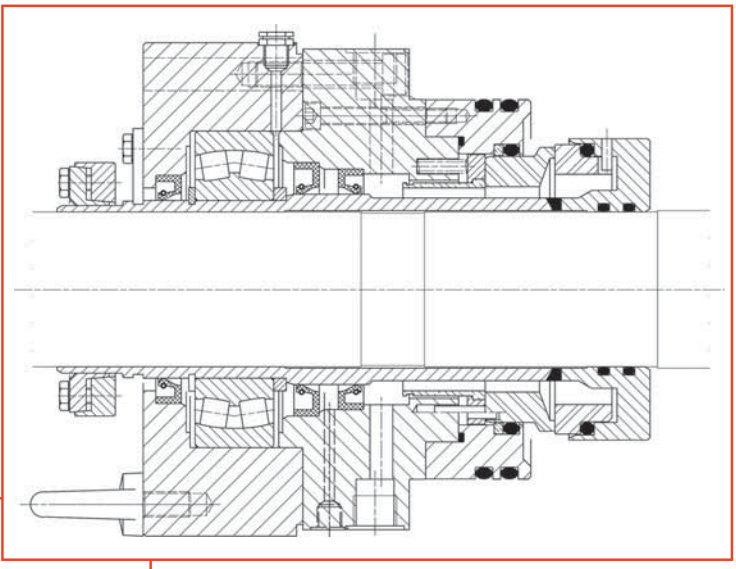
Sanitary flange

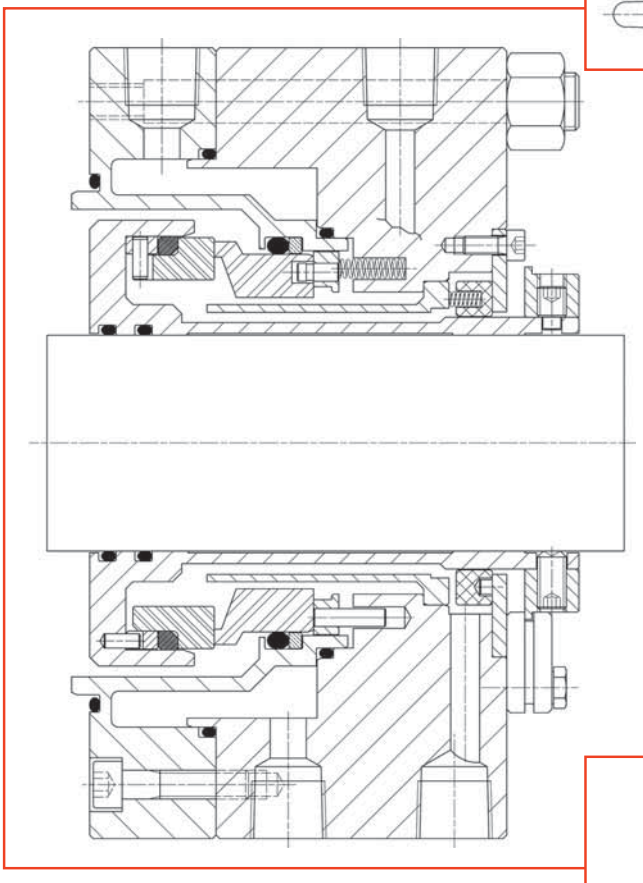
The last letter of the seal code number indicates the type of flange fitted.
The code number of the basic flange version always ends with the letter A. Once you have chosen the flange model you need, specify the type required by replacing the last letter with one of those shown on this page.
Different executions available on request.

Projects on request

F11640

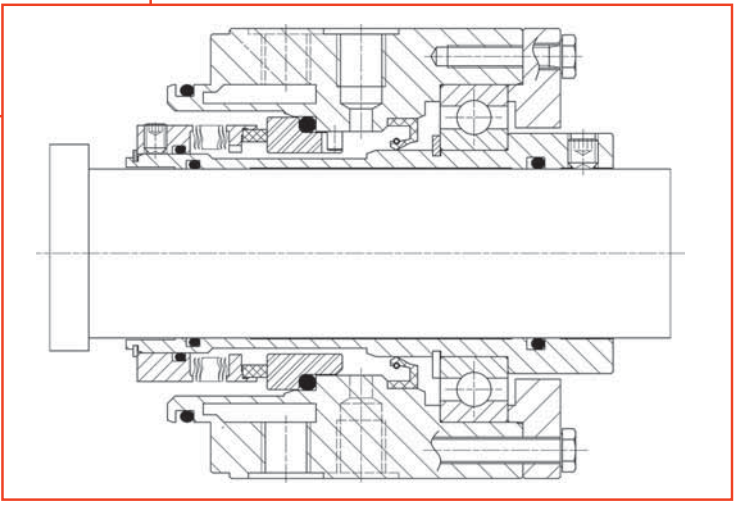
Mechanical seal for side entry mixers with shut off device for FGD process. The solution is also suitable for viscous and abrasive liquids.





F11051

Mechanical seal for side entry mixer with heated flange used for heavy hydrocarbons.



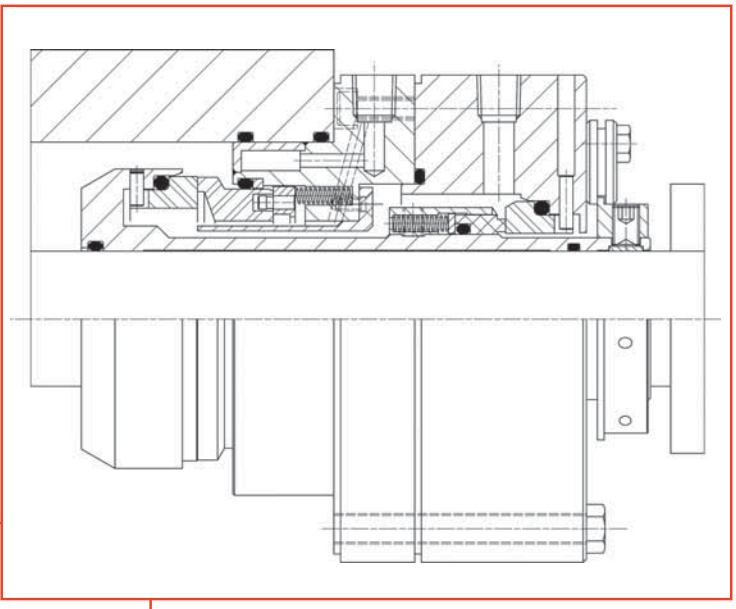
F12160

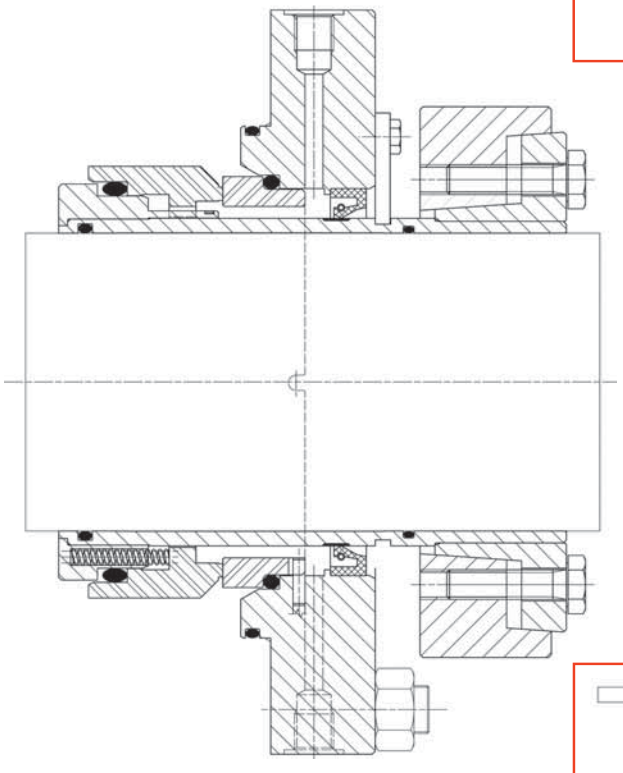
Mechanical seal for side entry mixers with heated flange and bellows seal. Developed for hydrocarbons and products that crystallise on contact with atmosphere.

Projects on request

F10085

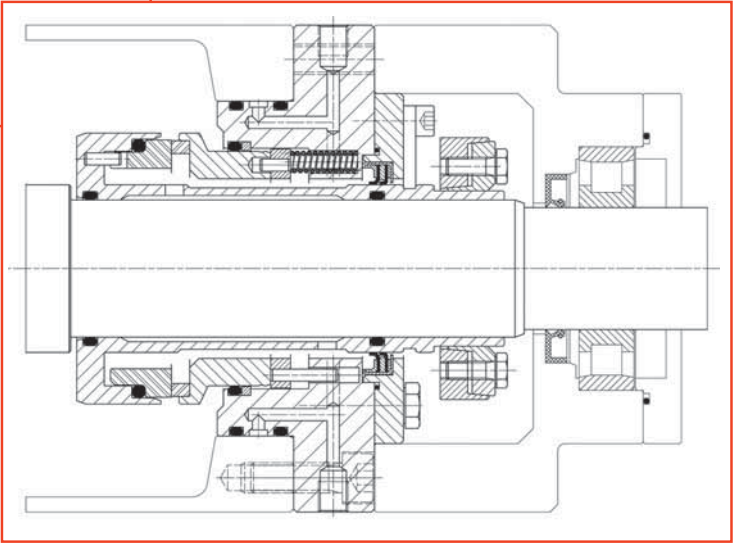
Double mechanical for side entry mixer with shut off device and heated flange.





F13084

Mechanical seal for horizontal mixers used in the food industry. Suitable for pressure up to 100 bar.



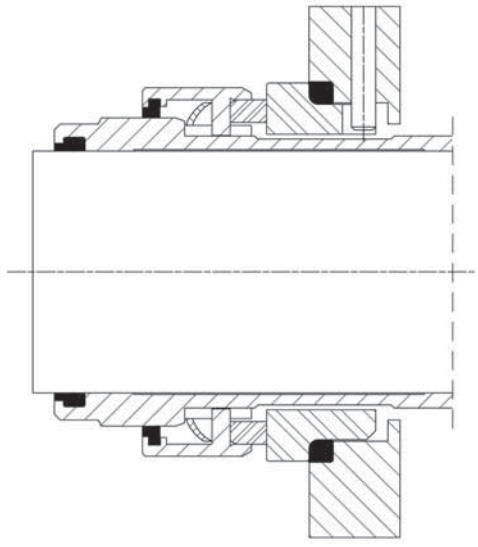
F11449

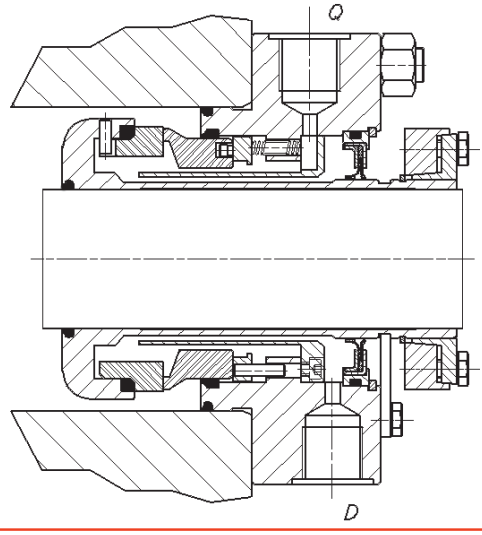
Stationary seal design used in the food industry for the manufacture of tomato juice (scraped surface heat exchanger).

Projects on request

F12524

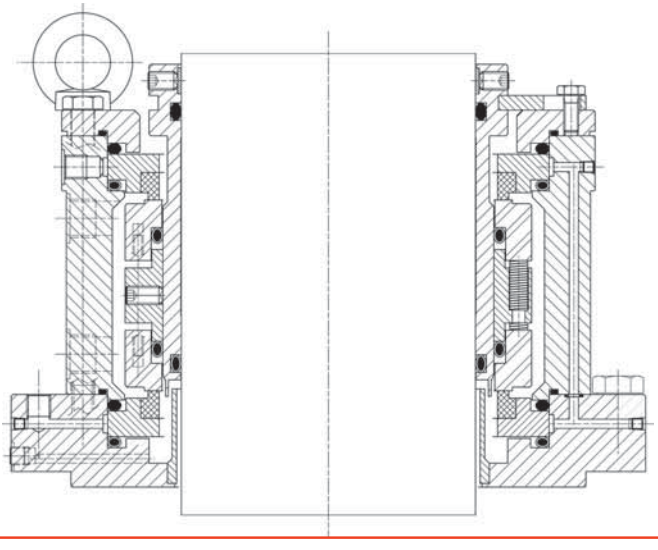
Mechanical seal for sterile equipment. Special o-rings can be provided to avoid any possible area where bacteria can deposit.





F10870

Mechanical seal for sterile equipment. Special o-rings can be provided to avoid any possible area where bacteria can deposit.



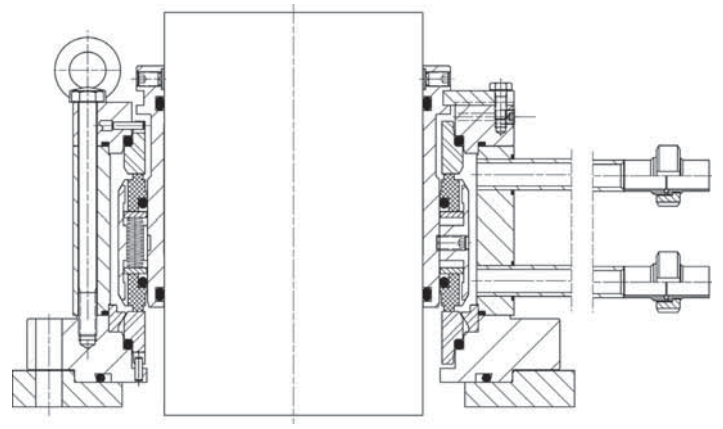
F10241

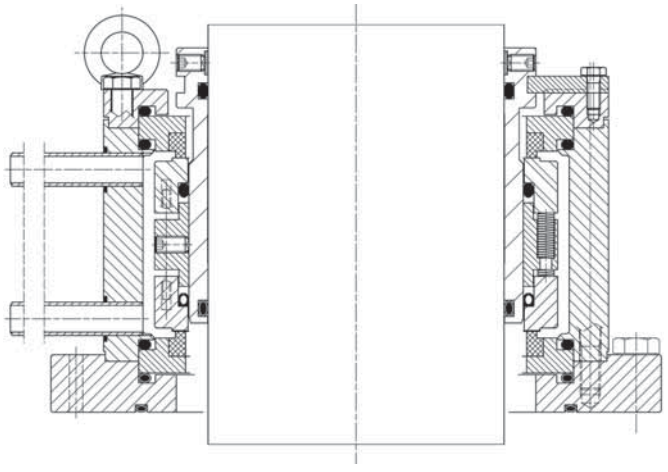
Double dry running mechanical seal with a sanitary gland used in the food and pharmaceutical industry.

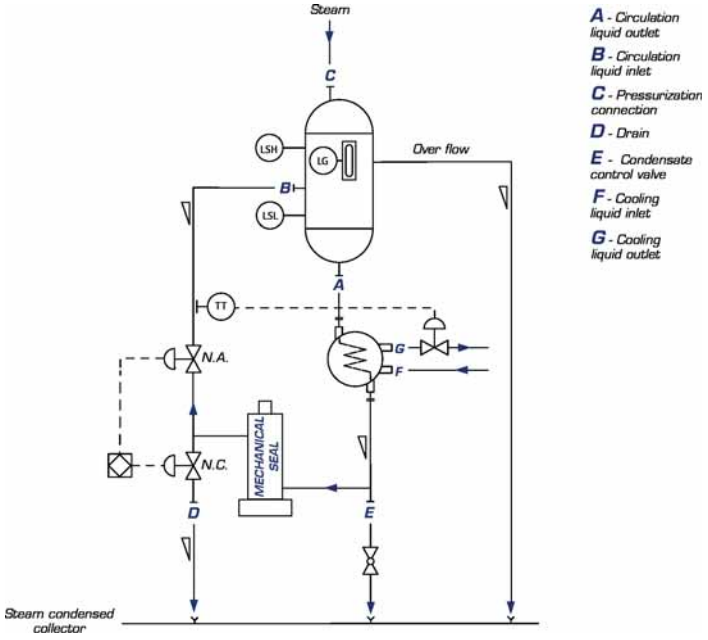
Projects on request

F 1 1 9 8 4

Double mechanical seal with a sanitary gland and flushing connection used in the food and pharmaceutical industry.







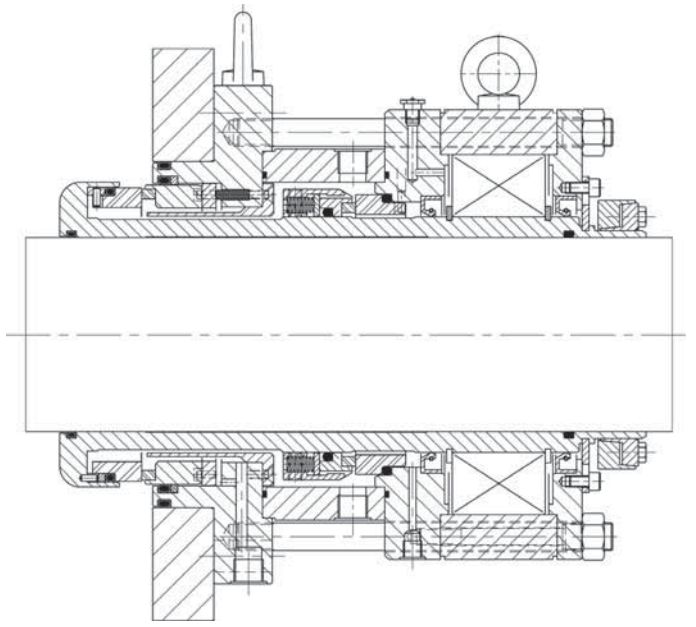
F 1 1 9 1 2

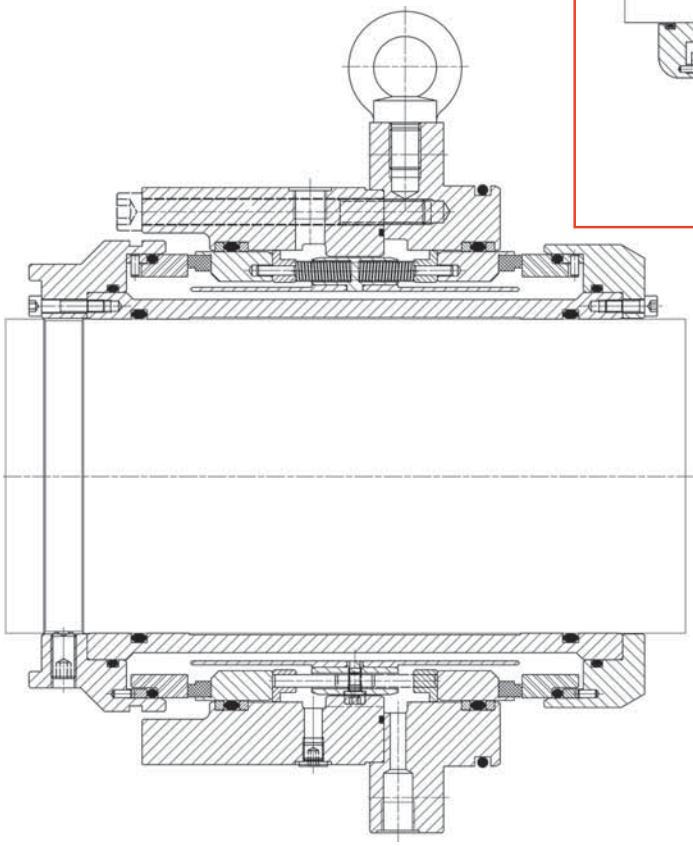
Mechanical seal for top entry fermenter flushed with condensate steam used in the pharmaceutical industry.

Projects on request

F 1 0 6 6 1

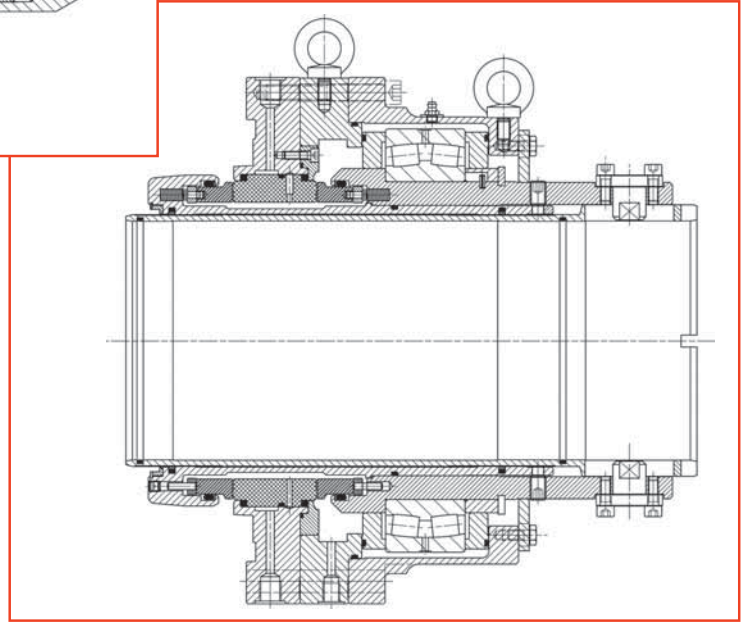
Double cartridge mechanical seal with a bearing for horizontal driers. Suitable for slurries and powders in the chemical, food and pharmaceutical industries.





F 1 1 5 3 6

Mechanical seal with a clean profile for horizontal driers. The solution is used in the pharmaceutical and food industries and is able to accept thermal shaft expansion of 15 mm.



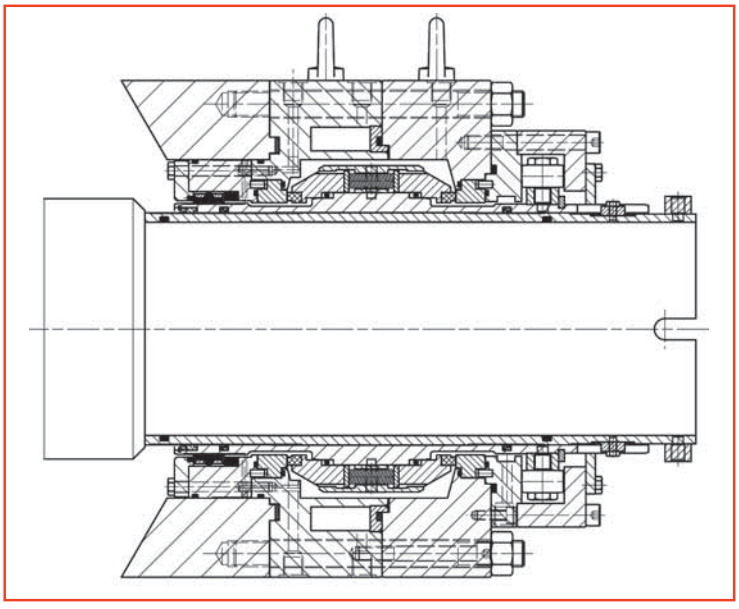
F 1 1 5 9 1

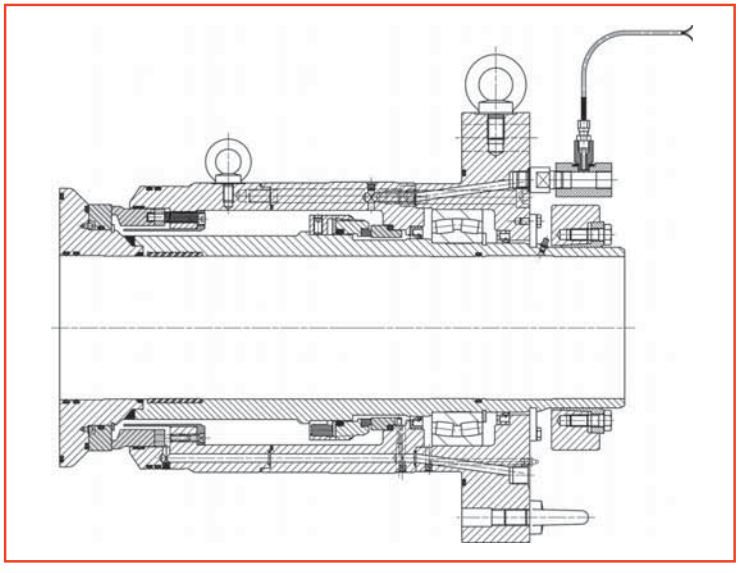
Mechanical seal developed for horizontal driers for pressure up to 50 bar and temperatures of 300°C. The seal is able to accept thermal shaft expansion of 20 mm.

Projects on request

F10489

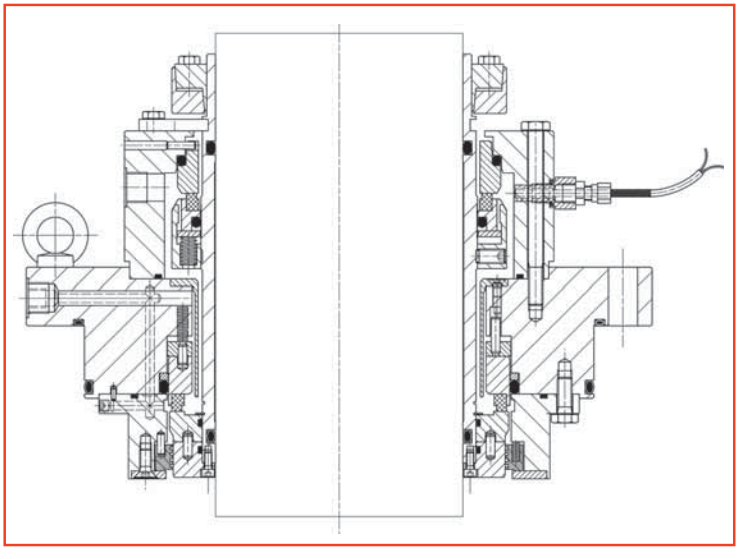
Back to back cartridge seal with seal device product side able to filter solid particles. Application for horizontal driers with pressure of 50 bar and temperature of 300°C. The seal is able to accept thermal shaft expansion of 20 mm.





F10499

Mechanical seal with a clean profile for a horizontal reactor used to produce latex and polymers at high pressure.



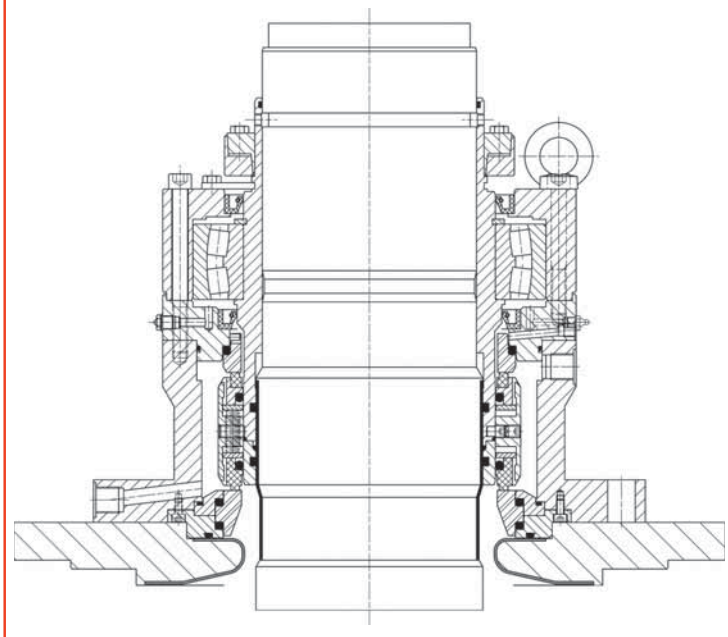
F11837

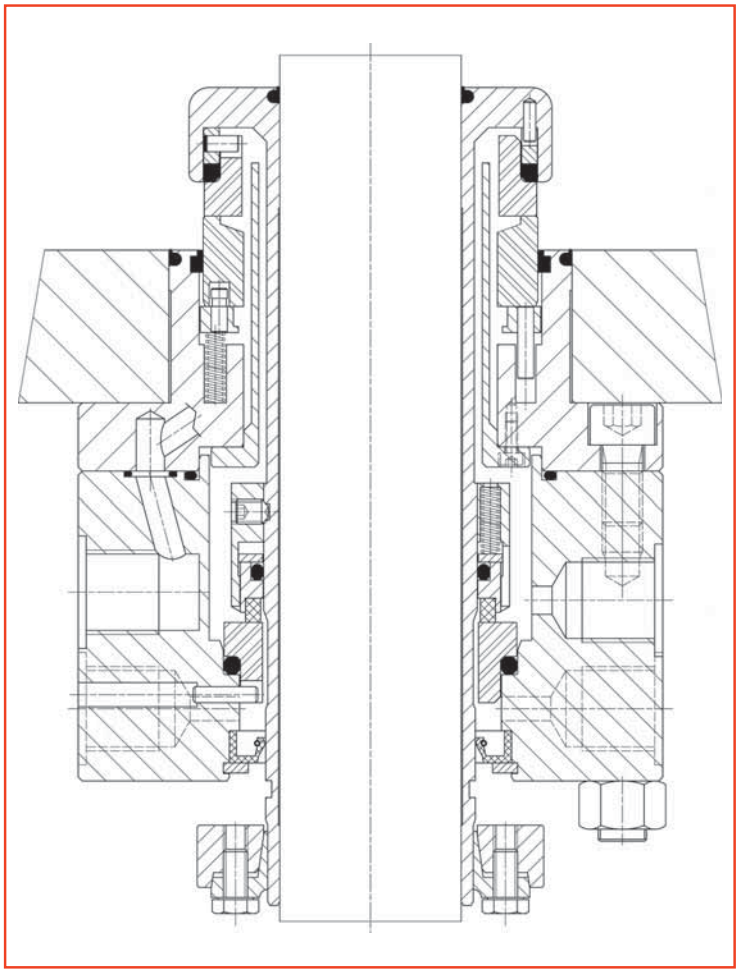
Mechanical seal for top entry reactors used to produce latex and polymers.

Projects on request

F10965

Double mechanical seal for glass lined mixer with 180 mm shaft.





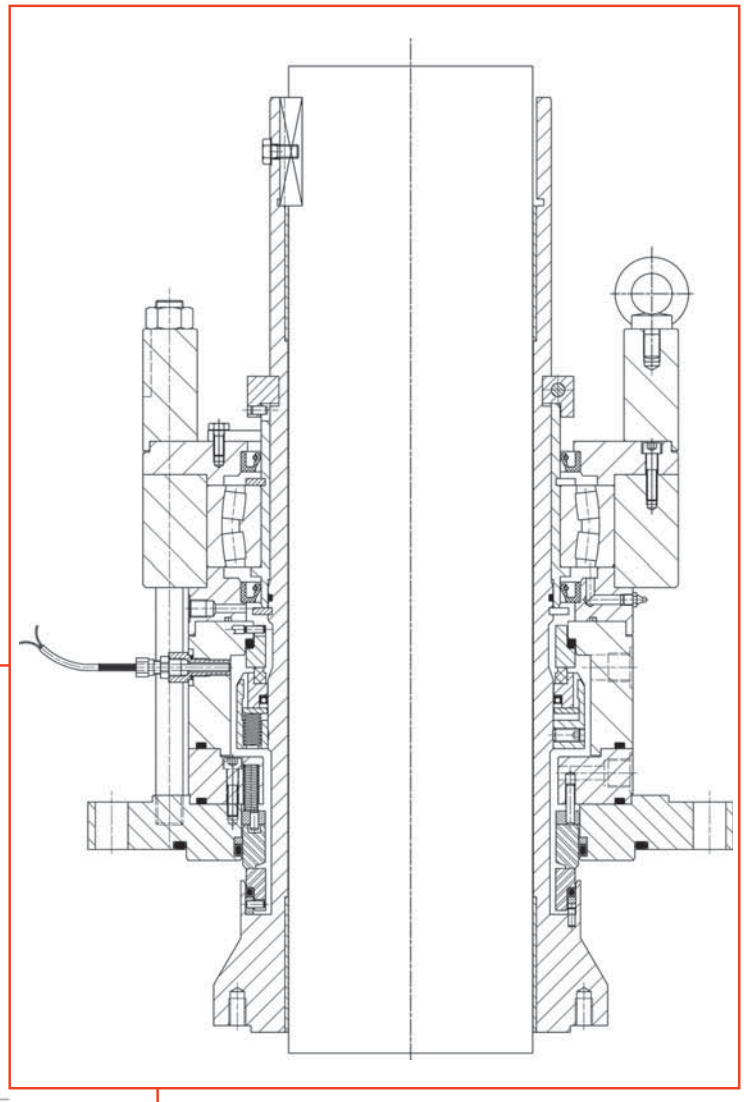
F10949

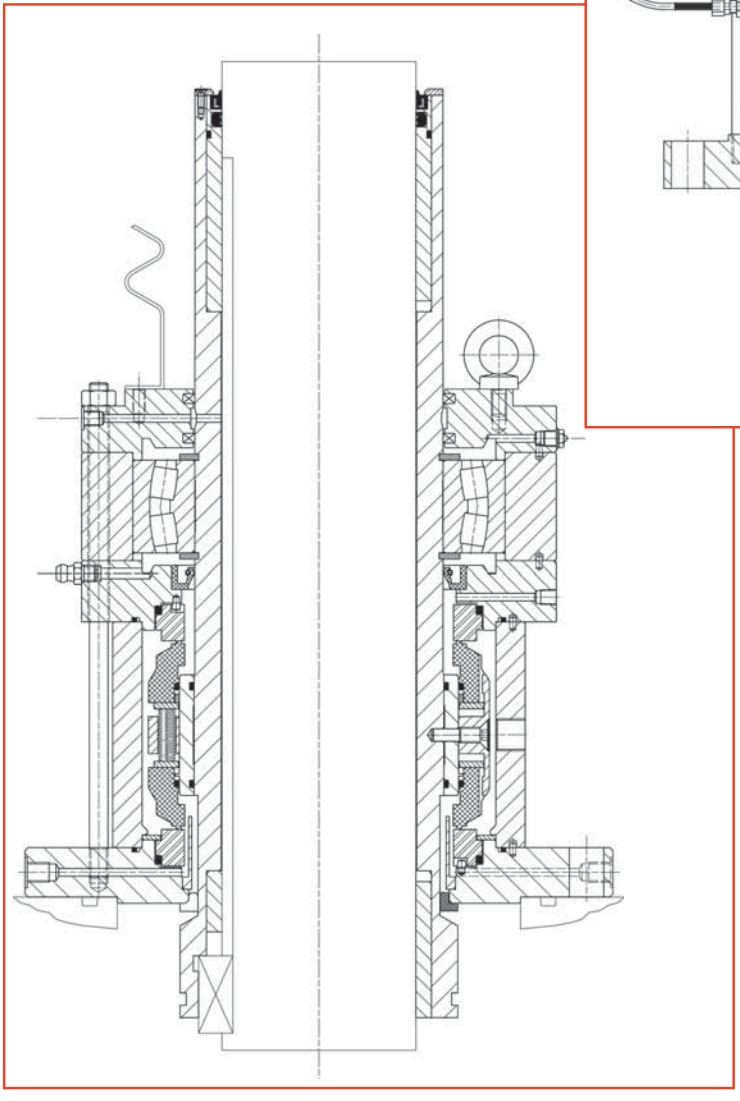
Mechanical seal with a clean profile for bottom entry fermenters used in the chemical and pharmaceutical industry.

Projects on request

F 1 2 1 5 9

Mechanical seal with a clean profile for vertical filter driers able to accept axial shaft movement. Used in chemical, food and pharmaceutical plants.





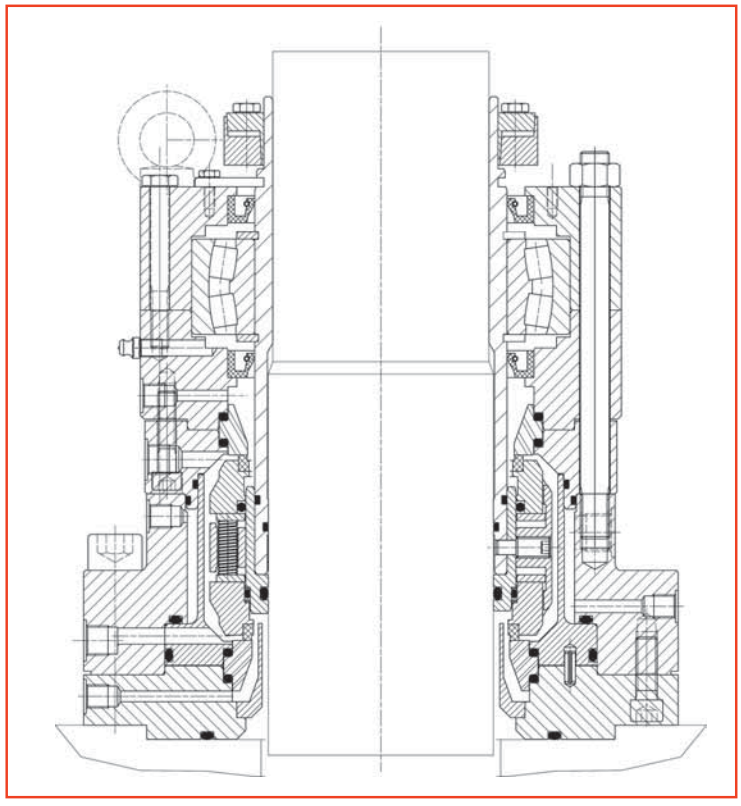
F 1 1 5 3 2

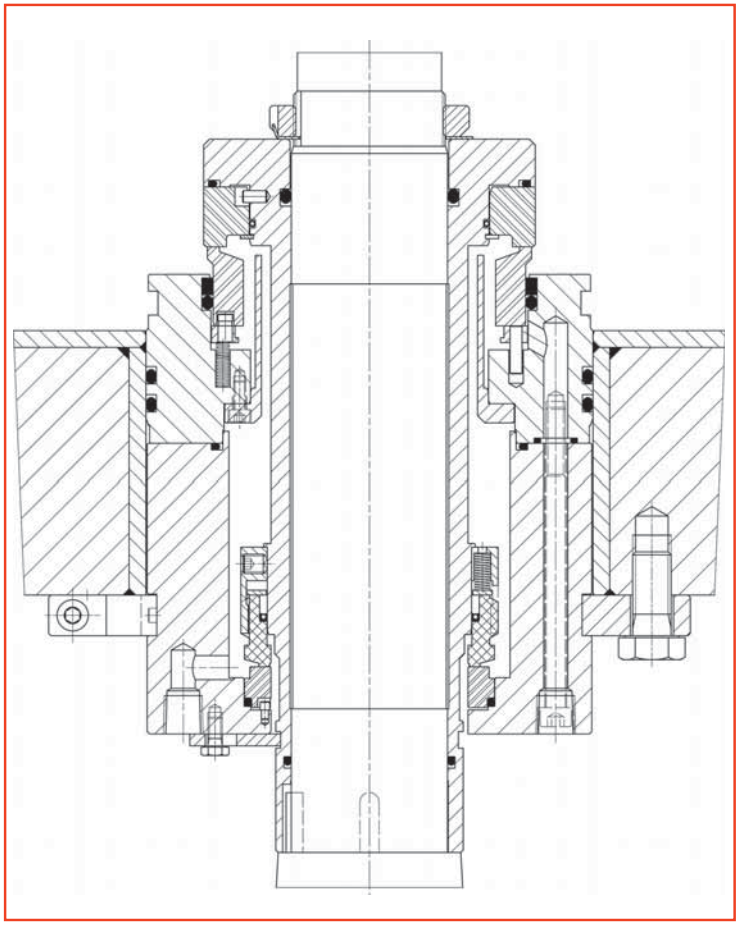
Mechanical seal for vertical filter driers able to accept axial shaft movement. Used on chemical, food and pharmaceutical plants. The seal can be dry running and can be fitted with a sanitary gland.

Projects on request

F10894

Mechanical seal for a vertical hydrogenator. Suitable for processes up to 80 bar.





F12350

Mechanical seal for bottom entry reactor used for very viscous products, pressure over 60 bar and 1500 rpm.

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Company **Name**

Address **Country**

Tel. **E-mail**

MECHANICAL SEAL FOR MIXERS - data sheet selection

MIXER CHARACTERISTICS AND OPERATING CONDITIONS

SHAFT: Diameter (mm) _____

☐ DIN 28159 (with step)

	Min	Max	Design
Speed (rpm)			
Temperature (°C)			
Pressure (bar)			

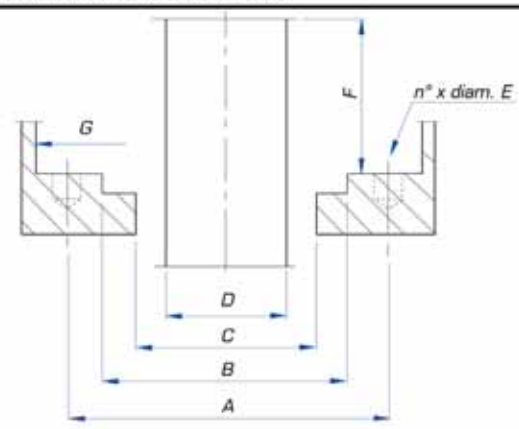
MANUFACTURER _____

CONFIGURATION:

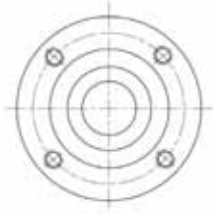
☐ VERTICAL TOP ENTRY
☐ SIDE ENTRY
☐ VERTICAL BOTTOM ENTRY
☐ HORIZONTAL SUPPORTED AT EACH END
SHAFT THERMAL EXPANTION (mm) _____
☐ ENAMELLED (GLASS LINED) MIXER
☐ OTHER: _____

INSTALLATION:

☐ OUTDOOR ☐ INDOOR



A: _____
B: _____
C: _____
D: _____
E x n: _____
F: _____
G: _____



Mark the position of connections

PRODUCT CHARACTERISTICS

LIQUID:

	Name	Per cent (%)	Specific Gravity	Viscosity (cP)
1.				
2.				
3.				

SOLID:

	Nome	Per cent (%)	Specific Gravity	Particle Size	Water Soluble
1.					
2.					
3.					

GAS:

	Name	Per cent (%)
1.		
2.		
3.		

FINAL PRODUCT _____

Concentration _____ Viscosity (cP) _____ Density _____

☐ ABRASIVE ☐ DOUGHY ☐ TOXIC ☐ INFLAMMABLE ☐ CORROSIVE
☐ POISONOUS ☐ CARCINOGEN ☐ EXPLOSIVE ☐ IRRITANT ☐ OTHER

TANK LEVEL ☐ L < 50% ☐ 50% < L < 75% ☐ L > 75%

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MECHANICAL SEAL FOR MIXERS - data sheet selection

SEAL CHARACTERISTICS

☐ NEW APPLICATION

☐ REPLACE CURRENT SEAL
☐ PACKING ☐ OTHER
☐ MECHANICAL SEAL
MODEL: _____
MANUFACTURER: _____

SEAL CONFIGURATION: *

☐ SINGLE ☐ SINGLE DRY RUNNING ☐ DOUBLE ☐ DOUBLE DRY RUNNING/GAS ☐ HYGIENIC

☐ ONLY COMPONENTS ☐ CHARTRIDGE SEAL ☐ SPLIT SEAL

☐ WITHOUT BEARINGS ☐ WITH BEARINGS Axial load (N) _____ Radial load (N) _____

☐ FLANGE WITH QUENCH CHAMBER FOR HIGH TEMPERATURE (see p. 33) ☐ SANITARY FLANGE (see p. 33)

☐ STANDARD FLUITEN ☐ STANDARD DIN 28138 (FLANGE) ☐ STANDARD DIN 28159 (SHAFT)

CONSTRUCTION MATERIALS: *

	Seal Face	Gaskets	Metallic Parts
Product Side			
Atmospheric Side (double seal)			

ACCESSORIES: *

☐ RESERVOIR (double seal)
☐ CIRCULATION PUMP ☐ LEVEL SWITCH ☐ PRESSURE SWITCH

☐ CONTROL PANEL (double gas seal)

☐ TERMOCOUPLE ☐ LEAKAGE DETECTOR

☐ OTHER _____

STRUMENTS CLASSIFICATION: _____

**** if not completed, Fluiten will recommend selection***

DOCUMENTATION AND CERTIFICATIONS

STANDARD DOCUMENTATION:

☐ DRAWING ☐ INSTRUCTION MANUAL ☐ ORDER DECLARATION OF CONFORMITY
☐ MATERIALS CONFORMITY CERTIFICATE ☐ FDA COMPLIANCE CERTIFICATE ☐ ATEX DECLARATION OF CONFORMITY

ATEX:

	Category	Area	Classification of Temperature
Tank inside			
Tank outside			

ADDITIONAL DOCUMENTATION (on request):

_____

_____

LANGUAGE:

☐ ITALIAN ☐ ENGLISH ☐ OTHER (on request)

Fluiten in the World

Distributed by:

FLUITEN

A strong link of your system

Fluiten has designed and manufactured mechanical seals for mixers and dryers since 1962 and is acknowledged as one of Europe's leading sealing technology companies.

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