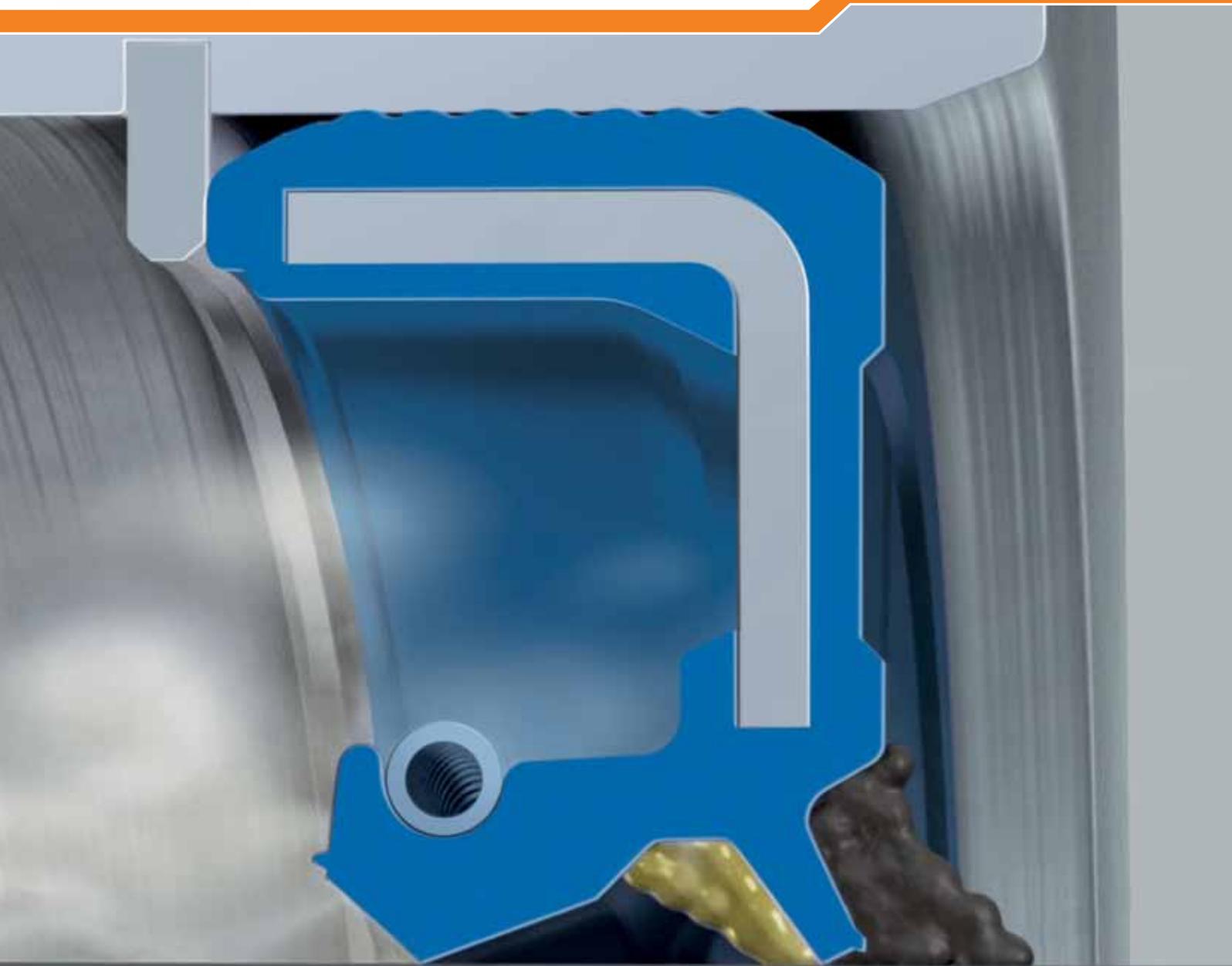


When leaks must be avoided

Intelligent Drivesystems, Worldwide Services



GB

**Sealing systems
for every requirement**

NORD
DRIVESYSTEMS

Partners in motion

Whenever leaks must be avoided.

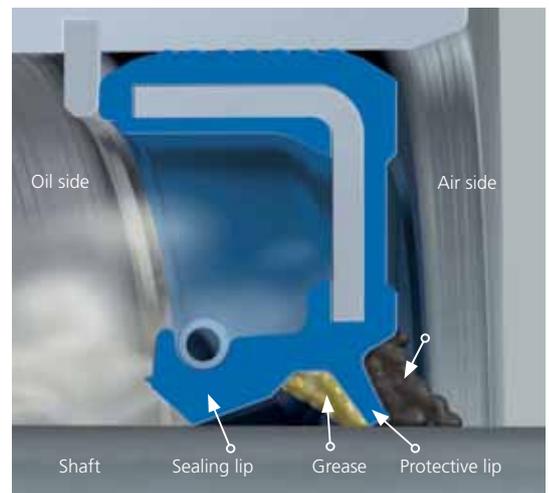
In general, the sealing of gear units and geared motors is very important. This especially applies for NORD DRIVESYSTEMS. Reliable and durable sealing against the entry of foreign materials and the escape of lubricants essentially determines the life cycle costs of the product, because leaks are a significant cause of faults. More than 30 years ago, NORD sustainably reduced the risk of leaks with the introduction of its unicast housing concept, which eliminates housing joints in the power chain.

Now, shaft seals have become very important. Although with geared motors the gear unit seal on the input side is very well protected against environmental influences by the motor, the seal of the output shaft of the gear unit is subject to severe environmental influences. Because of this, NORD has developed various sealing systems for gear unit output shafts, which are matched to the particular environmental conditions in order to ensure an optimum seal.

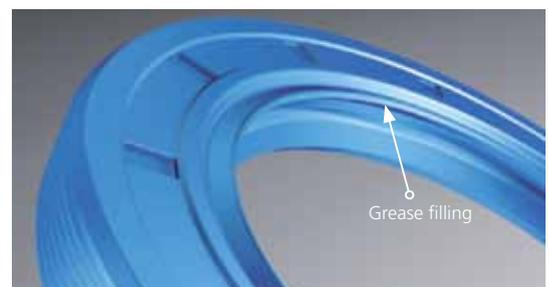
1. Catalogue versions

1.1 Standard version for normal conditions

Standard gear unit output shafts are sealed with radial shaft sealing rings made from nitrile-butadiene elastomer (NBR) and use radial spring-loaded sealing lips to seal in the lubricant as well as an additional protective lip to provide extra protection against the entry of dirt. The space between the sealing lip and the protective lip is filled with a defined amount of special grease which reduces wear of the lips and provides an extra barrier, that protects the sealing lip from dirt from outside. The shaft surfaces are manufactured with precisely specified degrees of roughness at the contacting area of the sealing rings. NORD DRIVESYSTEMS only uses branded shaft sealing rings from selected, well-known suppliers.



Radial shaft sealing ring with sealing lip and protective lip



Grease filling between protective lip and sealing lip



1.2 Double shaft sealing rings

Increased safety is provided by double shaft sealing on the output side. This consists of two shaft sealing rings. Substances which affect the seal from the outside must overcome additional barriers before they reach the inner sealing ring of the oil chamber and can cause leakage. In case of external damage, the second sealing ring provides additional protection against leaks.

The double shaft sealing ring has an inner shaft sealing ring with form A (without protective lip) and an outer shaft sealing ring with form AS (with protective lip). As standard, a defined quantity of special grease is provided between the shaft sealing rings and between the protective lip and the sealing lip. This special grease additionally reduces the friction of the second shaft sealing ring to a minimum and provides a further barrier against entry of dirt from outside.

Double shaft sealing is standard (NORD catalogue standard) for:

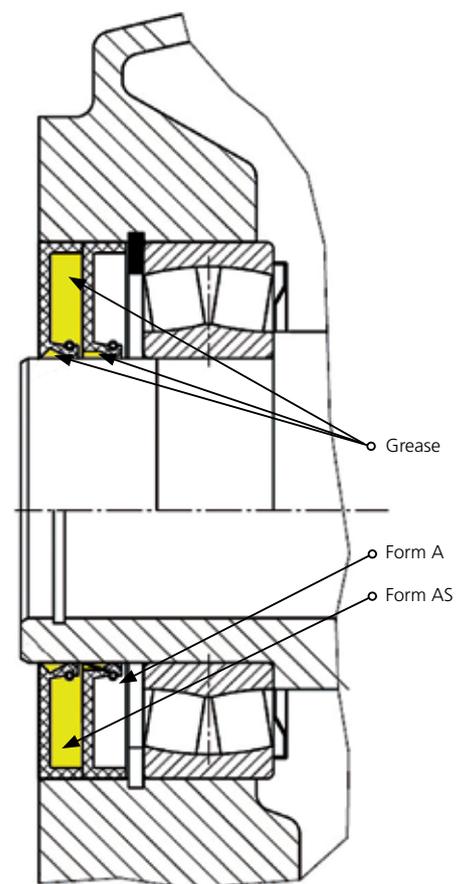
- Industrial gear units (SK 11207 to 15507)
- 3 and 4 stage bevel gear units with hollow shafts (SK 9012.1 to 9096.1) with solid shafts for types SK 9072.1 and SK 9096.1
- 2-stage bevel gear units with hollow shafts from SK 92172 to 92772
- Helical worm gear units with hollow shafts (SK 02040 to 43125)
- Parallel shaft gear units with hollow shafts from SK 0282 NB to 12382*
- Parallel shaft gear units with solid shafts from SK 10282 to 12382
- NORDBLOC helical gear units from SK 772 to 973.1

In addition, double shaft sealing is available as an option for:

- 3 and 4 stage bevel gear units with solid shafts (SK 9012.1 to 9096.1)
- Parallel shaft gear units with solid shafts from SK 0282 NB to 9382
- Helical gear units from SK 32 to 103

For other types of gear unit, output shaft sealing by means of special measures is possible.

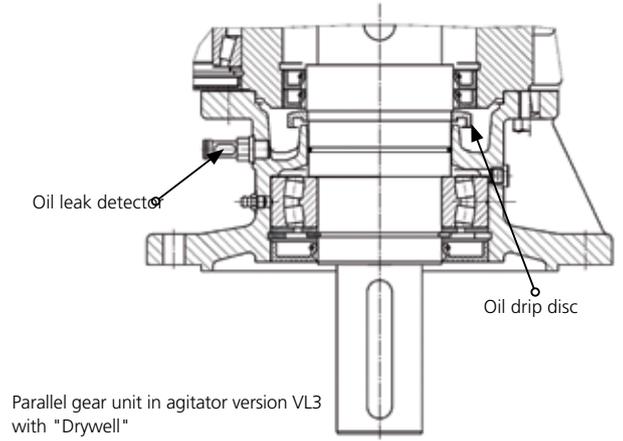
*Note: For space reasons, parallel shaft gear units SK 1282, 2282, 4282 only have double shaft sealing on the A side.



Double shaft seal with two shaft sealing rings

1.3 Option: "FKM" for high temperatures and high resistance to chemicals

As an option, NORD can supply output shaft sealing rings made from fluor-rubber elastomer (FKM) for almost all types of gear units. FKM is also known under the trade name Viton. FKM fulfills higher requirements for resistance to heat and chemicals. Operation temperature range -25°C to 150°C. FKM shaft sealing rings are brown in colour.



1.4 Option: Reinforced output shaft bearings VL3 with "Drywell"

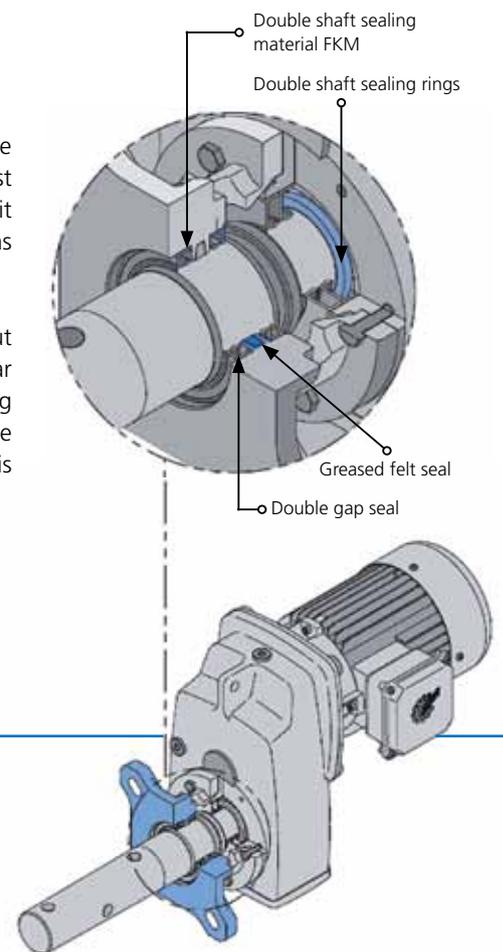
For agitators, NORD supplies specially reinforced output shaft bearings with larger bearing spacing and especially robust bearings, which are also suitable for handling large radial and axial forces. To greatly reduce the probability of lubricant leakage and possible contamination of the material being mixed, a Drywell version is available for the M4 version (output shaft vertically downwards) for parallel shaft gear units, option VL3.

This version provides the following safety function: In case of leakage at the double shaft sealing rings of the output shaft, the oil passes from the oil drip disc to a collecting space in the flange and is detected by an oil leak detector or an oil sensor. This prevents leakage into the agitator area. The modular NORD gear unit range also enables option VL3 with Drywell in versions M5 and M6.

1.5 Option: parallel shaft gear unit for screw conveyors

In screw conveyors, the output shaft of the gear unit often comes into contact with the materials which are being conveyed. Here, the conveyed material is literally forced against the seal of the output shaft. In order to cater for this application area, a parallel gear unit version was developed that meets the USA market requirements. This gear unit is available as a catalogue gear unit in sizes SK 1282 to 5282.

The characteristic feature of the parallel shaft gear unit for screw conveyors is an output flange in which several different seals are integrated to protect the actual oil seal of the gear unit. If the conveyed material overcomes the two outer FKM shaft sealing rings, the felt ring and the two gap seals, it is still unlikely that it will reach the double oil sealing rings of the output shaft, as the material can fall downwards out of the flange. Result: The shaft seal is very well protected against the conveyed material.

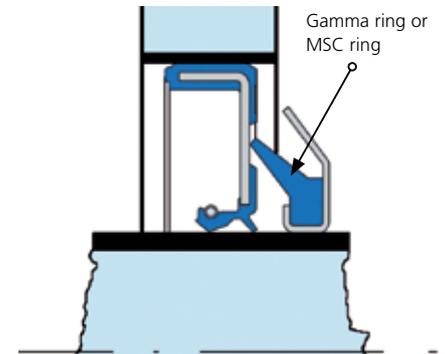


Sealing system for parallel geared motors for screw conveyors

2. Special versions for special applications

2.1 Additional axial gamma ring for moderately dusty conditions

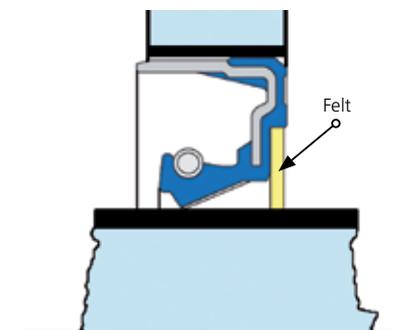
Additional protection against dust is provided by a gamma ring or MSC ring with an extra sealing lip that rubs axially against the outside face of the shaft sealing ring. The gamma ring or MSC ring does not rotate on the output shaft and is an addition to the sealing system. For this, the length of the output shaft is slightly increased. This special version is possible for many types of gear unit.



Additional gamma ring or MSC ring as dust protection

2.2 Additional felt ring for fibres, especially for textile fibres

Fibres, in particular textile fibres and fluff, can disturb a sealing system. If for example a fibre becomes trapped in the sealing ring, it may cause a temporary leak. A fixed felt disc which is glued to the outside of the shaft sealing ring has proved to be a particularly effective protection against fibres. This special version is possible for many types of gear unit.

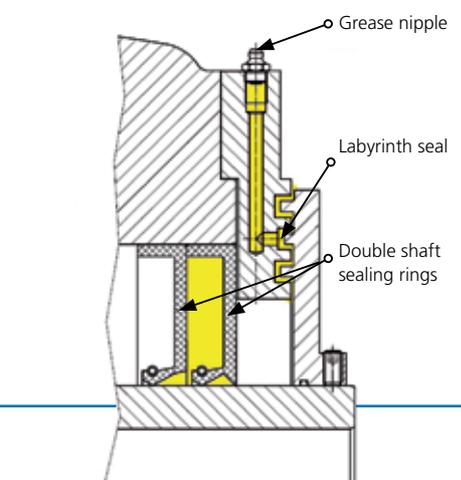


Extra felt disc to protect against fibres

2.3 Taconite sealing system for aggressive stone and ore dust

The Taconite sealing system was specially developed for operation with aggressive stone and ore dust. (Named after taconite, an iron ore which is mined in Minnesota/USA.) The Taconite sealing system consists of two shaft sealing rings and a radial labyrinth seal, which is filled with grease. This grease forms a barrier against the entry of stone dust. Due to regular re-lubrication at the grease nipple, the grease continually removes dust particles from the labyrinth seal, so that the aggressive dust cannot penetrate to the shaft sealing rings.

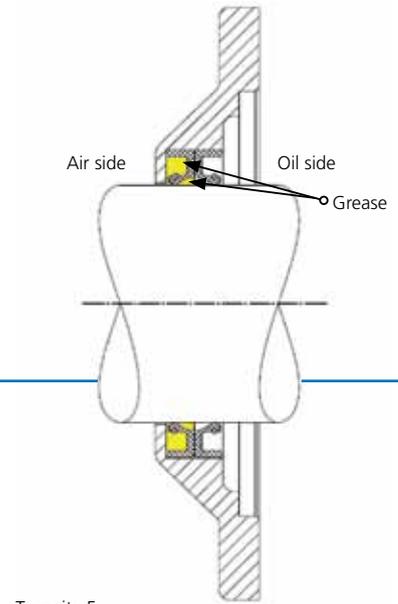
NORD not only supplies the Taconite sealing system as a catalogue option for large industrial gear units, but also implements it as a special version for geared motors.



Taconite sealing system

2.4 Taconite E sealing system for light liquid and dust levels

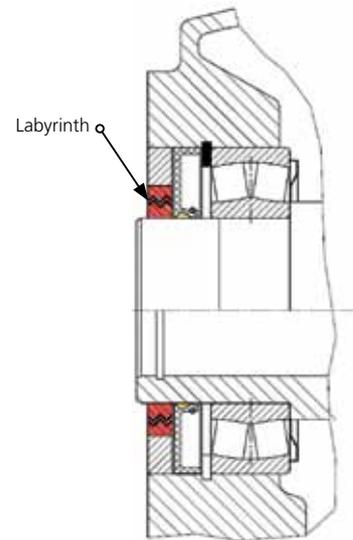
The Taconite E sealing system, which has proved its effect in industrial gear units consists of two form A shaft sealing rings in which the outer shaft sealing ring is installed in the reverse direction. Due to the reversed conveying direction of the outer sealing ring, external liquids in particular are kept away from the inner shaft sealing ring. As well as this, in comparison with a simple seal, substances which affect the seal from the outside must overcome additional barriers before they can reach the inner sealing lip and cause a leak. As standard, the outer shaft sealing ring is installed with a defined quantity of special grease. This special grease also reduces the friction of the second shaft sealing ring to a minimum and provides an additional barrier against the entry of dirt from outside.



Taconite E

2.5 Labyrinth seals for moderate dust and splashed water

A non-lubricated labyrinth seal may be a good solution in cases where the amount of dust is not sufficient to justify the great expense of a Taconite sealing system. These maintenance-free labyrinth seals can often be installed without dimension changes, in place of the outer shaft sealing ring for gear units which enable a double shaft sealing ring. The labyrinth sealing system is therefore a low cost solution.

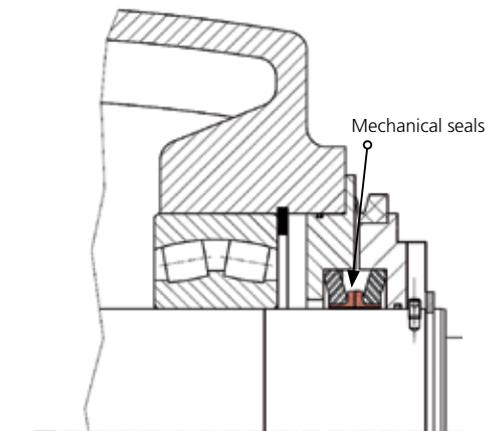


Labyrinth seal

2.6 Mechanical seals for aggressive liquids

Mechanical seals are used if the sealing area of the output shaft often comes into contact with aggressive and dirty liquids. Mechanical seals have proved to be very effective in the field of waste water.

It should be noted that due to their function, mechanical seals have a slight leakage of oil in normal operation and are therefore not completely leak-proof. Mechanical seals can even be used below an external liquid level. In this case, care must be taken that the hydrostatic pressure in the gear unit is always greater than the outside pressure, so that no foreign materials can penetrate into the gear unit. This special version is possible for many types of gear unit.



Mechanical seal

2.7 True Drywell for agitators

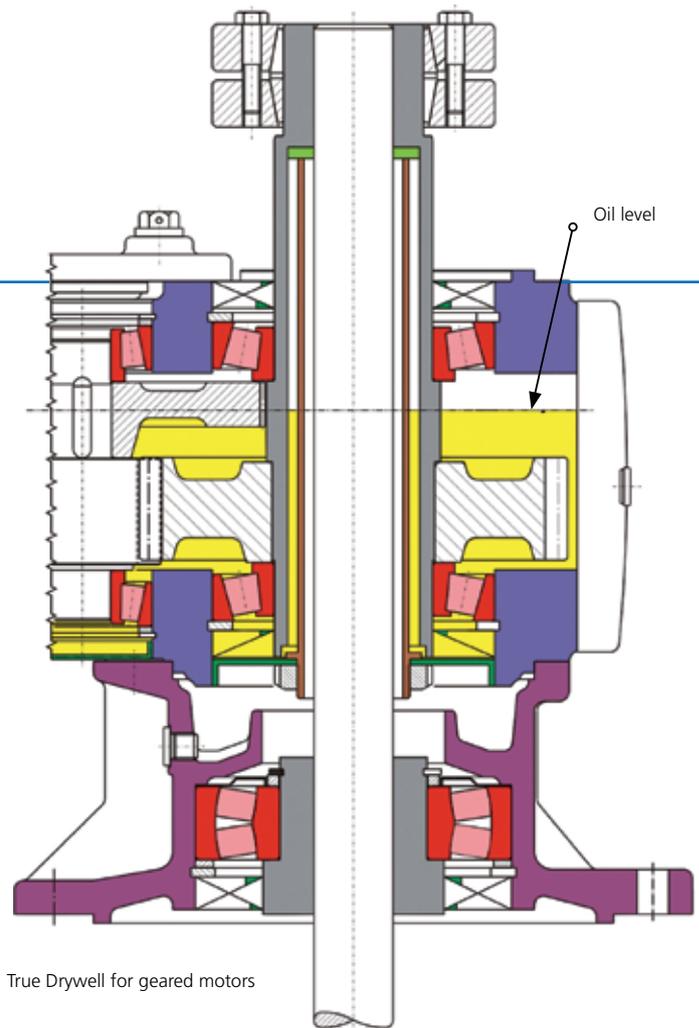
For some applications, such as mixers, the drive unit is operated in a vertical orientation and the output shaft of the gear unit faces vertically downwards. In this case, greatly increased security against lubricant leakage is required in order to prevent contamination of the materials being mixed. The safety of contacting or rubbing seals on a vertically downward-facing gear unit shaft, which present a fundamental risk of leakage in case of wear or contamination, is often assessed to be inadequate.

For these applications, there are NORD 'True Drywell' M4 parallel gear units which fundamentally excludes the risk of leaks from contact type seals. In general, with True Drywell there are no rubbing seals below the oil level, which could lead to leakage in operation.

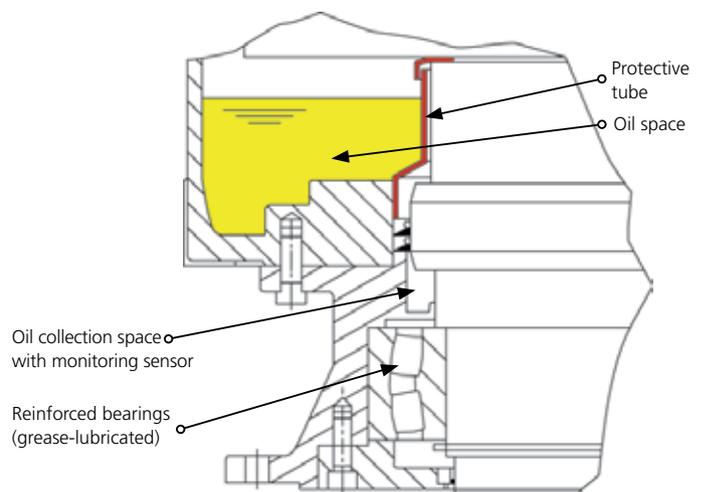
A fixed protective tube, which is located in the hollow output shaft of the gear unit, reaches far beyond the oil level. This provides an additional non-contact and wear-free seal according to the principle that, due to gravity, liquids cannot flow upwards. NORD True Drywell parallel gear units feature a hollow shaft with shrink disc and modified hollow shaft diameter, agitator version VLII, as well as standard gear unit venting (pressure venting is not permissible).

The NORD range of modular gear units also enables the True Drywell version for M5 and M6 bevel gear units. Here however, the sealing of the output side is below the oil level.

There are also True Drywell versions of industrial gear units where a low-level protective tube is used in combination with a reduced oil level, which requires circulation lubrication. In this version, reinforced bearings are installed as standard.



True Drywell for geared motors



True Drywell for industrial gear units



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