



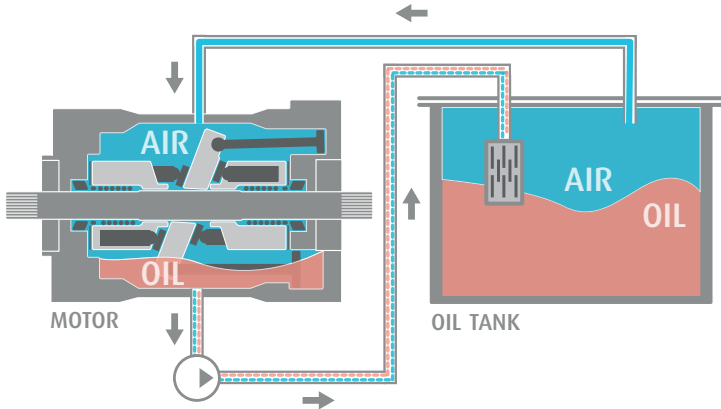
Dry Case Technology

Axial Piston Components

Pumps & Motors



DRY CASE



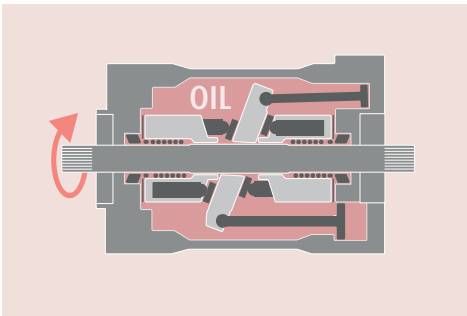
As the world's first manufacturer of hydrostatic drives, Linde Hydraulics introduces the dry case technology. Thanks to the operation of hydraulic components in completely oil drained housing, the efficiency of the components is significantly increased. The required drive power is reduced accordingly. In combination with the proven Linde design and continuation of robustness and reliability an extremely high power density is achieved. The increased efficiency is even more evident when using several components in dry case operation. This novel operating mode is being developed for the existing portfolio of Linde Hydraulics pumps and motors. The first motors - ready for dry case operation - are already available.

Design Characteristics

Advantages

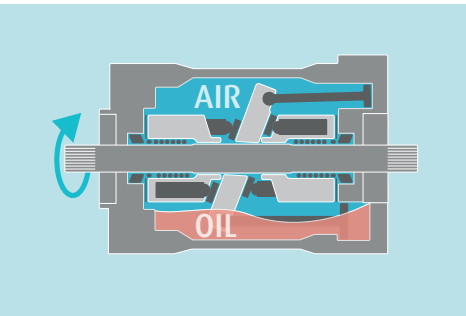
WET CASE

DRY CASE



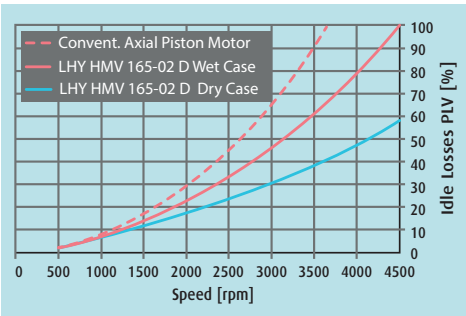
Conventional axial piston pumps and motors - whether swash plate or bent axis design - all have one common feature. The amount of leakage that drains from the rotary group and is discharged via the housing. In order to avoid air in the oil, the housing is completely filled with oil.

Moving these parts (e.g. cylinder block and piston) through the oil sump requires a certain amount of power. Especially at high speeds. This effort can be compared to wading through a swimming pool filled with water. The engine power that has to be applied exclusively for this purpose and is not actually used for propulsion is also known as splash or windage losses.



Dry case causes the rotative group to move through air instead of oil. This results in an extremely reduced resistance. In other words, the windage losses are significantly reduced. The higher the speed, the more this effect is noticeable. Only a small amount of spray oil from the cylinder barrel is left on the housing walls.

The larger the rotative group / moving parts of the component, the greater the reduction of required drive power. Consequently, with the combustion of less fuel, the cooling package also has to provide less capacity.



- >> Significantly reduced fuel consumption: e.g. in context of a telehandler setup* by **3.5 l diesel/hour at maximum travel speed**
- >> Drive motor and other components of the drive train can be downsized: e.g. in context of a telehandler setup* by **12.5 kW reduced drive power at maximum travel speed** (significantly reduced acquisition and operating costs) and/or considering the same drive power, the tractive force/gradeability is increased
- >> Cooling package can be reduced in size
- >> Scalable savings effect when using several components in dry case operation

* Data based on calculation example with conventional travel drive (including HMV 165-02 D) for telehandler applications at maximum speed



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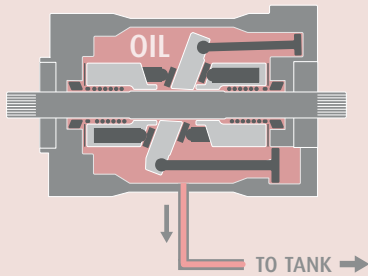


DRY CASE

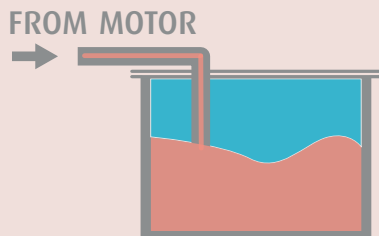
Design Characteristics

Advantages

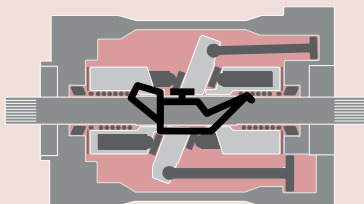
WET CASE



During wet case operation, the leakage is drained to the tank via leakage oil ports

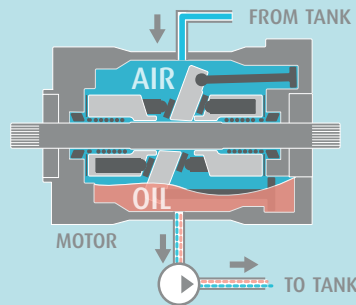


The leakage oil coming from the motor is directed to the tank below the fluid level.

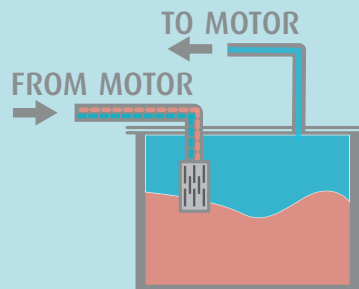


In conventional axial piston swashplates and bent axis pumps and motors, all relevant bearings and moving parts are sufficiently lubricated by the circulating oil in the housing.

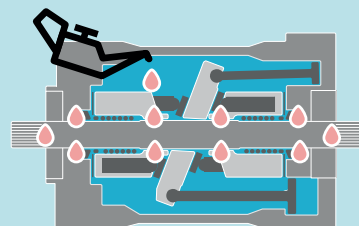
DRY CASE



In dry case operation, the jet pump drains the housing and conveys an oil/air mixture (oil foam) to the tank. The resulting vacuum causes air to flow in to fill the housing.



The oil/air mixture (oil foam) coming from the motor is directed to the tank above the fluid level via a diffuser element. The air is separated here and is available for ventilation of the motor housing.



In dry case mode, all relevant moving parts are supplied with oil via particular spray nozzles. The so called active bearing lubrication works reliably under all operating conditions.

- >> The switchable jet pump allows suction on demand
- >> Reliable oil extraction at any operating point (speed "0" to max. speed)

- >> Reliable calming / degassing of the hydraulic oil - no danger of damage due to mixed friction
- >> Air intake from the same circuit - thus always a controlled amount of air circulating in the oil

>> **No adverse effects on durability and reliability.**