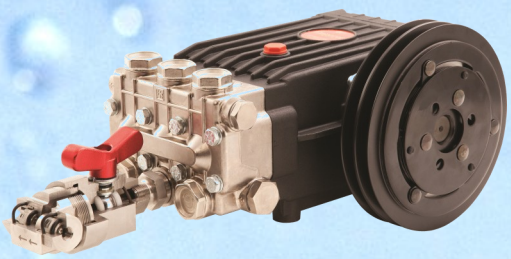
Application Story

HOW NOT TO WEAR PUMPS

No, we are not talking about shoes. We are talking about piston pumps that are primarily used to deliver water at high pressure. Although there are a variety of manufacturers in the market, all pumps basically operate the same. There is an input shaft on the pump driven by an electric motor or gas engine. This shaft is attached to a crank arm inside the pump body. (This is similar to the crank shaft on a car.) When the shaft is rotated, the crank arm moves in an eccentric pattern which in turn, drives the connecting rod to a plunger/piston. This basically turns rotary motion into a linear motion on the pistons. This is the opposite of what happens in a car's engine.



Pump with standard clutch

For applications that are driven by gas or diesel engines, it is beneficial, many times, to disconnect the pump when not in use. By disconnecting the pump, it allows the gas or diesel engine to continue to run without causing additional rotational wear and/or pressure in the pump. By allowing the engine to run efficiently, the engine can deliver its full torque through the clutch/pump. If the engine or an electric motor had to be started every time the pump needed to turn, it could cause a time delay and would definitely cause loss of efficiency.

High pressure piston pumps are used in a variety of industrial and consumer applications. A very common application is pressure washers. Typically, consumer pressure washers do not require a clutch but some industrial pressure washers that have multiple components running off the engine will use clutches. Applications that require occasional high pressure water such as street sweepers, vacuum extractors, carpet cleaning equipment, reverse osmosis systems for boats and mobile vehicle washing also use clutches. By disconnecting the pump, these vehicles reduce the parasitic load on the engine, reducing fuel costs and increasing operational efficiency.

The Ogura mobile clutch has two major components. The first is the field which is typically mounted to the face or a mounting flange on the pump and the second is the pulley armature assembly. This is a one piece assembly with the air gap preset at the factory. This assembly slides onto either a straight or tapered pump shaft and is kept in place via a centerbolt or set screw. There is usually a step or spacer on the straight shaft that sets the position of the clutch. From there, a simple switch to a 12 or 24 volt power source is all that is needed.

Input to the clutch/pump is typically via a single or double groove v-belt. By having a v-belt input, the pump manufacturers are able to change the speed of the pump by changing the pulley ratios to allow the pump to operate at its most efficient speed for a given application.

The clutch pulley is the input and the armature and the hub is considered the output in a clutch/pump application. The rotor/pulley rotates all the time the engine is running. When pump pressure is required, a 12 or 24 volt electrical signal is sent to the coil. The clutch coil becomes energized, creating magnetic flux. That magnetic attraction is passed through the rotor and attracts the armature to the rotor. The armature is magnetically pulled towards the rotor and initially, slips as the armature comes up to speed (typically, 0.2-0.5 seconds). Once fully engaged, there is no slip or efficiency loss. At this point, the pump is producing water pressure via the pistons. When pressure is no longer required, voltage/current to the clutch is stopped. Once the magnetic field degrades (30-80 milliseconds), the springs on the armature pull it back away from the rotor creating an air gap so there is no contact or drag. This helps to extend the life of the pump.●

Pump with special large pulley clutch