

# American Piledriving Equipment, Inc.

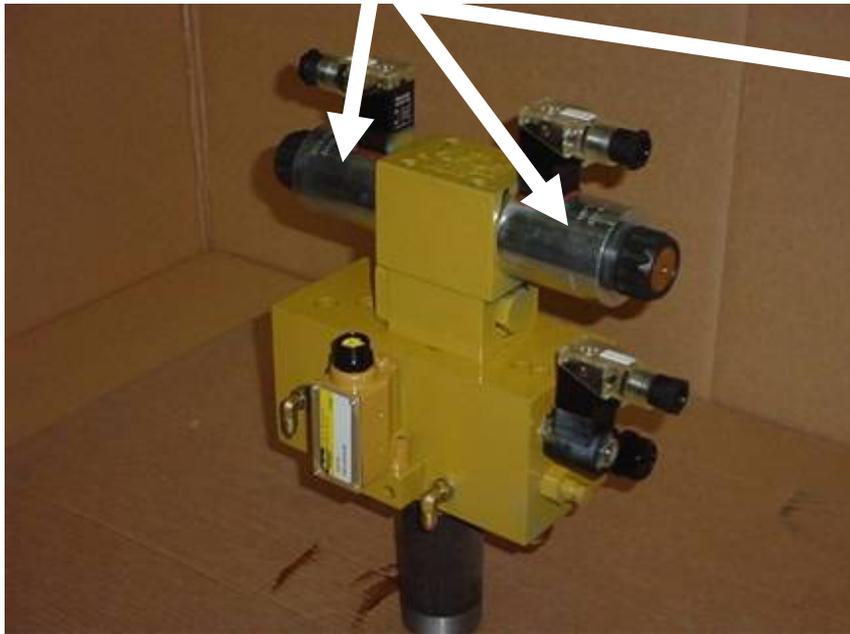


## Removing & Replacing Solenoids on APE Clamp & Drive Valves

# Correcting Bad Information

There has been some incorrect information and problems with replacing solenoids on APE clamp and drive directional control valves. Some reports of high failure rates of these solenoid coils has prompted APE to look at how these coils are serviced.

Solenoids

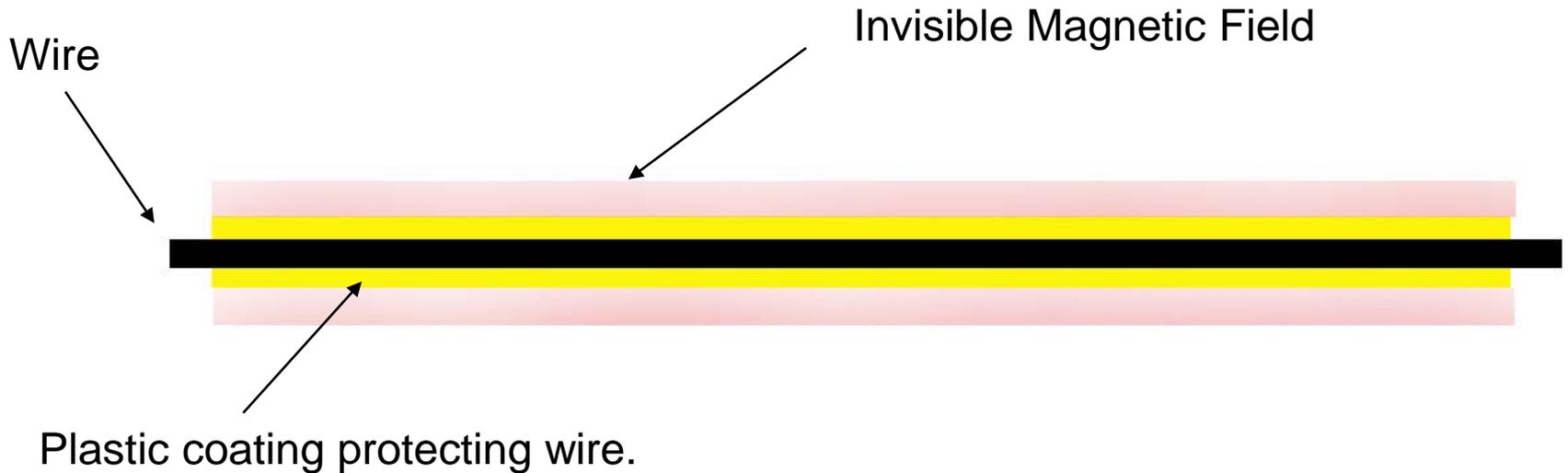


APE Clamp Manifold



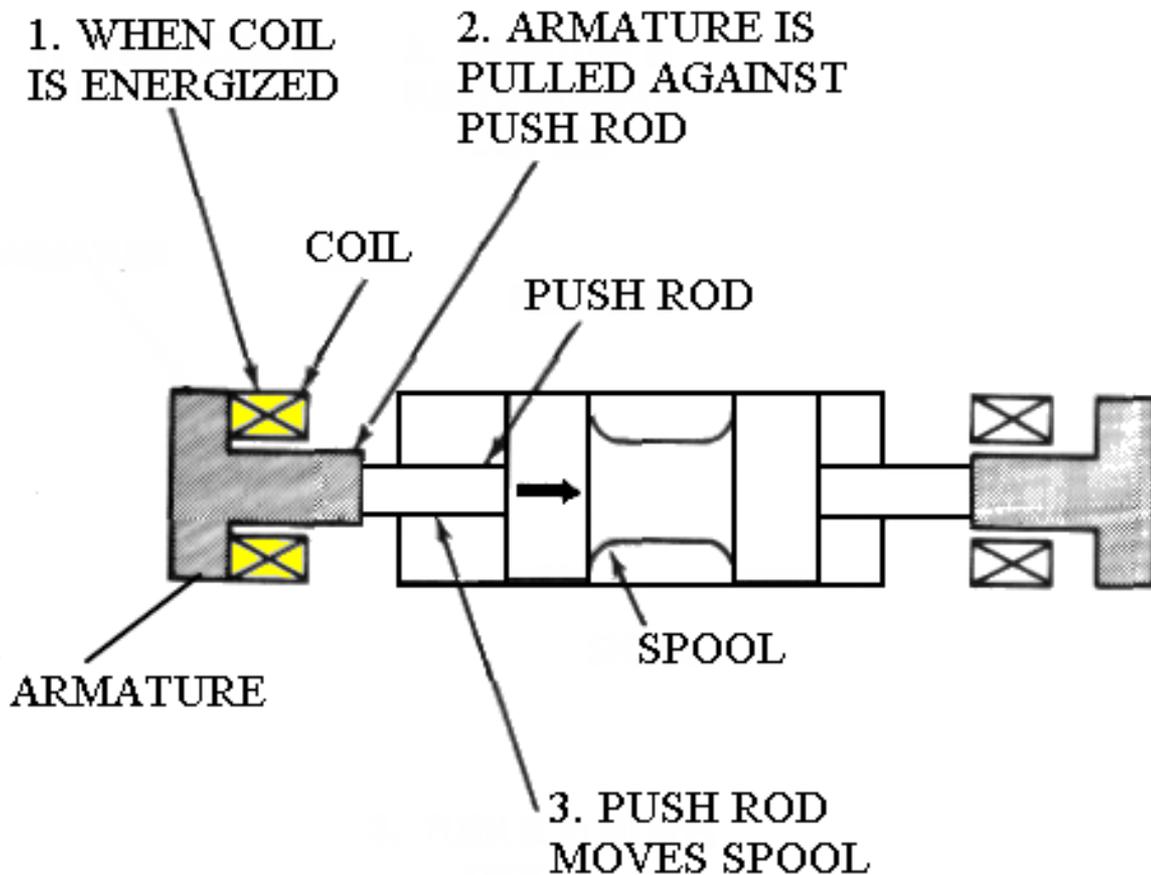
APE Drive Manifold

# What Is A Coil And How Does It Work?



When an electric current flows through a wire, a magnetic field is produced around the wire. The magnitude and direction of the field depends on the shape of the wire and the direction and magnitude of the current through the wire. A simple wire like this will not have much magnetic field but if you coil the wire into many loops it becomes a powerful magnet.

# How Does A Solenoid Valve Work



When a current is passed through the coil, it produces a magnetic field and pulls the armature against the push rod, which then pushes the spool for movement.

When the current is stopped, a spring on either side of the spool will then center the spool back to the center position.

# What We Have Found

- Solenoid Electrical connectors (DIN) do come lose over time.
- Small holes in Din connector can allow water or moisture to enter the coil windings.
- New O-rings and gaskets are not being used or missing when coils are replaced.

# Close Up View Of Solenoid Coil

In the connector, molded to the solenoid coil, there are small holes, that when the gasket is loose or not installed, will allow water or moisture to enter the coil windings.



It is our belief that this moisture will cause the solenoid to fail or short out, causing premature failure of the coil.

**SOLENOID WITH CONNECTOR**

# Sealing Up Holes That Expose Windings

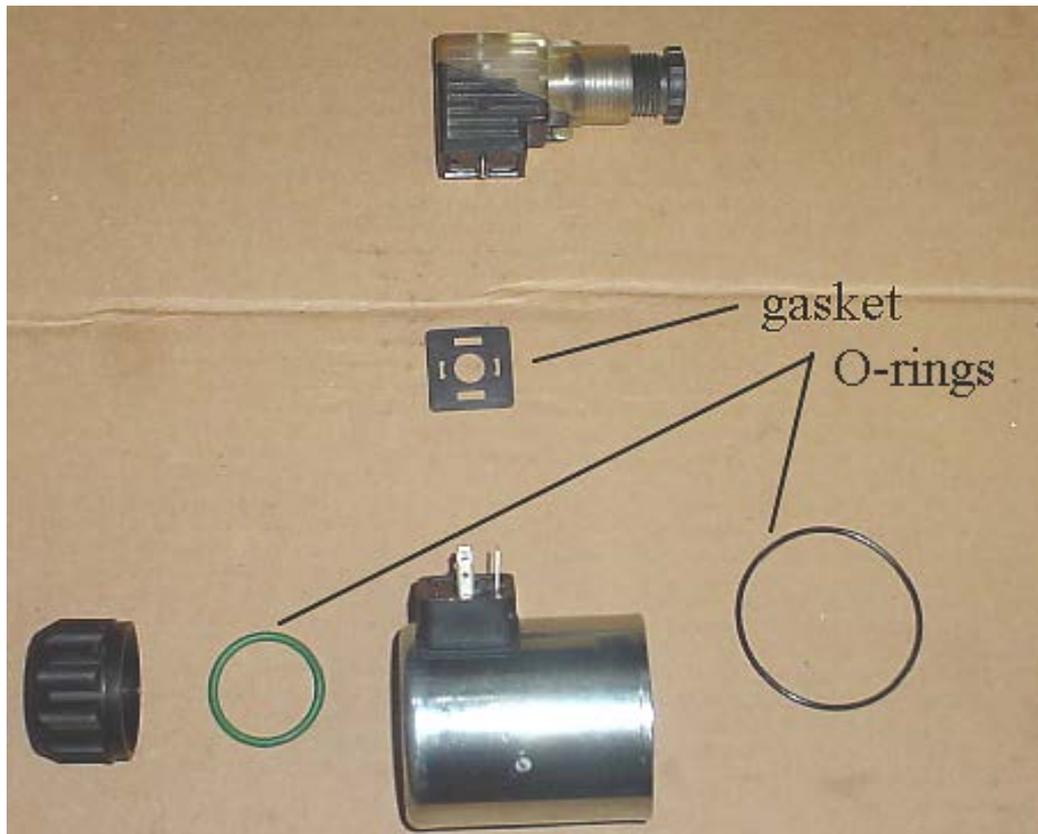


Apply small amount of silicon sealant into all holes to prevent moisture from entering.

Do not over-apply the amount of silicon sealant, just enough to fill the holes. This will also aid in holding the gasket in place during assembly.

# Installing O-rings On Coil Ends

In addition to closing the holes in the connector, it is necessary that new gaskets and O-rings are installed. We have experienced premature failures due to missing O-Rings.



All replacement coils must include two O-rings, and one gasket with the replacement coil. Included in the package will be instructions to fill all holes with silicon sealant prior to installing gasket.

# Instructions For Installing New Solenoids



Fill the small holes with silicon sealant, (just enough to fill the hole only).

Install new Din gasket.

Install new O-rings (two, inner and outer)

Hand tighten solenoid locking nut.

Install Din electrical connector and screw down tight.

Package contents:

1 ea. solenoid coil

1 ea. Din gasket

1 ea outer O-ring

1 ea. inner O-ring

1 ea. instruction for installing coils

This instruction sheet must be in each new solenoid package supplied to customers.

# An Old Myth

- Some believe that any rust build up between the coil and armature will cause the solenoid to fail.
- **This is not true.**
- However, by applying a small amount of general purpose grease or dielectric grease on the armature tube prior to installing the coil will prevent the coil from sticking to the armature over time and will make it easy to remove in the future.
- That is the only reason any grease is used, and the amount should be very small, just enough to coat the armature tube.

# Things You May Have Heard, But are Not true.

- If you leave a solenoid coil energized for long periods it will fail.
- **Not true.**
- Solenoid coils get old and tired.
- **Not true.**
- Switching a solenoid coil off/on several times will wear it out.
- **Not true, they are rated for over 1,000,000 cycles without failure.**

# What Causes Solenoids To Fail

- Using a 12 volt coil on a 24 volt system. It will work for a little while then fail (burn out).
- Allowing moisture or water to enter the coil windings.
- Having very cold thick hydraulic oil and trying to energize the coil. The spool takes more force and longer to shift, which will cause the solenoid to overheat and fail. The coil is designed to pull the valve all the way in. If the valve sticks and does not travel fully, then the coil becomes overloaded causing premature failure. In other words, repeated failure of coils could be due to a faulty functioning valve spool.
- Having loose electrical terminals that may cause a spark and short out the coil.
- A piece of contamination lodged in the hydraulic spool, which will slow down or prevent the spool from moving when shifting.

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- Following simple procedures will assure long life of solenoids used in APE equipment.
- Thank You for taking the time to study this important information.



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