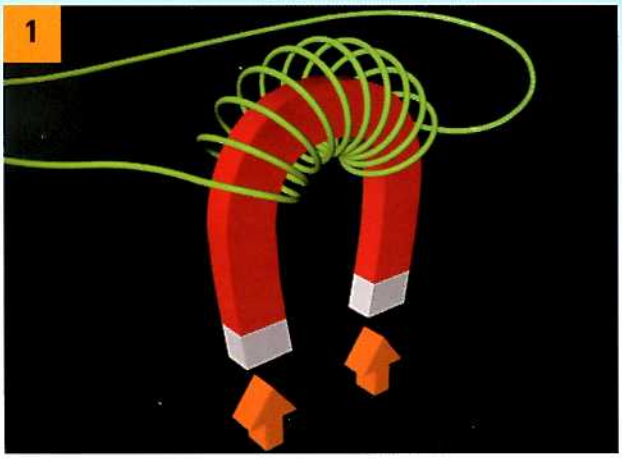
HOW A DC SOLENOID WORKS

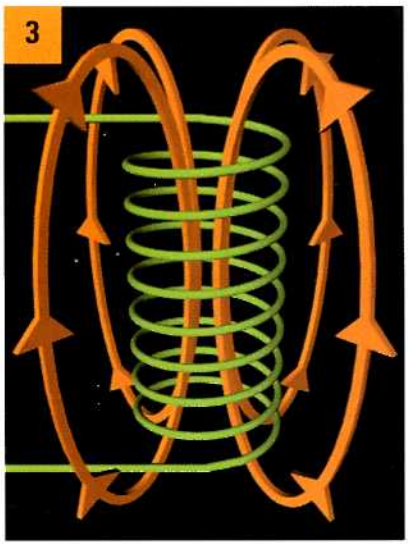
Prepared by Decco®

as a supplement to the AC solenoid brochure entitled *What is a Solenoid?*

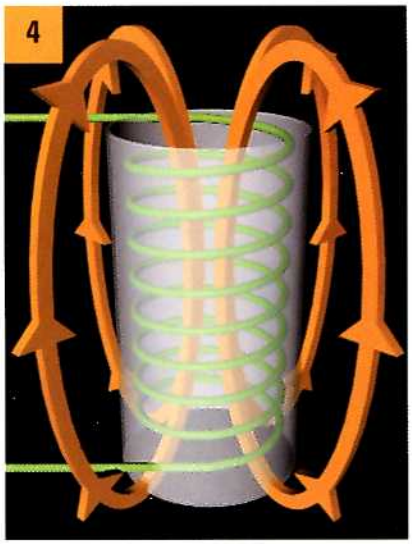


A DC solenoid is actually quite similar to an AC solenoid. Both are specially designed electromagnets.

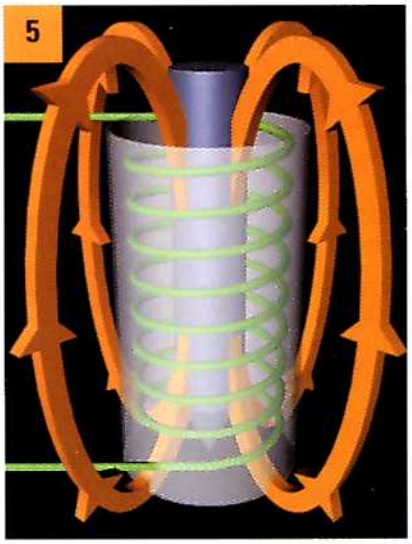
A DC solenoid consists of a **COIL**, a **FIELD** and a **PLUNGER**.



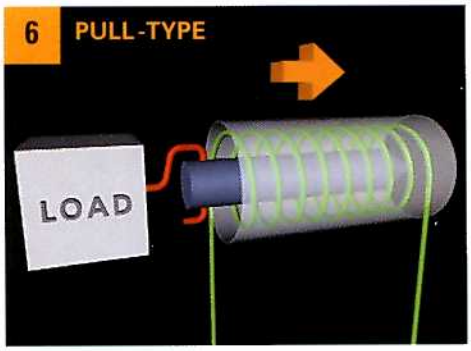
The **COIL** is comprised of many turns of tightly wound copper wire. When DC current flows through this wire, it creates a strong magnetic flux path which flows around the coil and through its center in a doughnut shape.

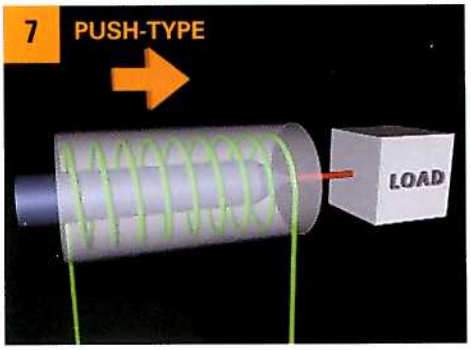


The **FIELD** is a hollow cylindrical casing that surrounds the coil. Since a magnetic flux path flows more easily through iron or steel, this tubular casing adds strength to the magnetic flow.



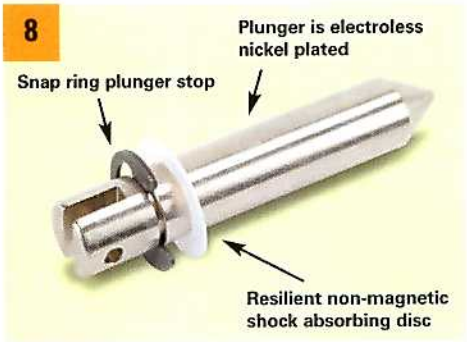
The **PLUNGER** is round in shape with a positive cone on one end. When inserted into the center of the coil it concentrates the magnetism still more. The plunger's conical surface mates with a negative cone at the bottom of the field casing to provide a large area of flux transfer and a better force/stroke characteristic.





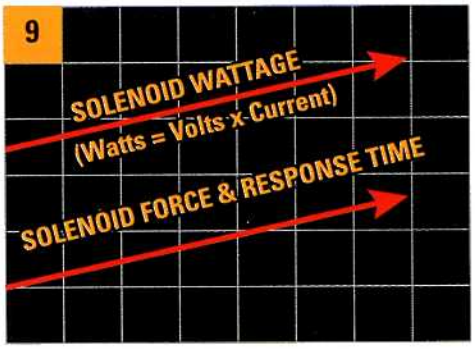
PUSH or PULL?

When energized, a DC solenoid's plunger moves in only one direction...into the coil. We create a **pull-type** solenoid by attaching a hook or "clevis" to the outside end of the plunger. For **push-type** solenoids we attach a pushpin to the plunger's conical end.



WHAT MAKES DECCO TUBULAR DC SOLENOIDS SO QUIET AND RELIABLE?

Our plungers are electroless nickel-plated or emralon-coated steel. When coupled with the nylon bobbin in the coil, these bearing surfaces provide an unusually low coefficient of friction. A snap ring keeps the plunger from bottoming out and deforming any metal surfaces. A shock-absorbing nylon disc under the snap ring absorbs and dampens the impact at the end of each stroke. This extends solenoid life, eliminates residual magnetism and minimizes noise.



DC SOLENOID FORCE AND RESPONSE TIME

A DC solenoid's force and response time are both directly affected by WATTAGE. Since **DC WATTAGE = VOLTAGE X CURRENT,** increasing or decreasing either voltage or current (amperage) will increase or decrease force and response time.

BE CAREFUL!

Too much input voltage or current can be counter-productive. So can running a DC model on AC current. All these things can dangerously raise coil temperature and coil resistance and actually cause a decrease in solenoid force and response time. You may even burn out the coil. Make sure you are using the proper solenoid, voltage and current for the job.

THREE DUTY CYCLES

A solenoid can produce higher forces when it is ON for only a short period of time or cycled infrequently. Decco offers tubular DC models in three "duty cycles":

- Pulse Duty - ON 12.5% of each cycle
- Intermittent Duty - ON 50% of each cycle
- Continuous Duty - On continuously

Intermittent and Pulse Duty Solenoids can generate a large force for a short time, but will quickly overheat if run continuously.

Continuous Duty Solenoids can be held energized indefinitely without overheating, but they produce less force.

DC SOLENOID OPERATING CHARACTERISTICS

1.) DC current does not vary with the position of the plunger, so there is no inrush current.

2.) DC solenoids do not require shading coils but still run quietly.

For more information contact:

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