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FLUID CONTROLS INSTITUTE, INC.

# STANDARD FOR SOLENOID VALVE TERMINOLOGY AND NOMENCLATURE

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FCI 86-1-1993 (R2003)

Fluid Controls Institute, Inc.

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Sponsor:



*Fluid Controls Institute, Inc.*  
1300 Sumner Ave  
Cleveland, Ohio 44115-2851

FLUID CONTROLS INSTITUTE STANDARD  
**Standard for Solenoid  
Terminology and Nomenclature**

Sponsor

**Fluid Controls Institute, Inc.**

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**Foreword** (This foreword is included for information only and is not part of FCI 86-1-1993 (R2003), *Standard Solenoid Valve Terminology and Nomenclature*).

The standardization committee of the Solenoid Valve Section of the Fluid Controls Institute, Inc. presented its first draft of this standard to the section members in October, 1991. The final draft was presented to the section on May 18, 1993, designated as draft number 4. This draft was accepted as a FCI standard.

This voluntary standard has been developed as a cooperative effort of the major manufacturers of solenoid valves who are members of the FCI Solenoid Valve Section. It is intended to assist users and specifiers of solenoid valves to understand the common terminology and nomenclature used within this industry.

FCI recognizes the need to periodically review and update this standard. Suggestions for improvement should be forwarded to the Fluid Controls Institute, Inc., 1300 Sumner Avenue, Cleveland, Ohio, 44115-2851. All constructive suggestions for expansion and revision of this standard are welcome.

The existence of a Fluid Controls Institute (FCI) standard does not in any respect preclude any member or non-member from manufacturing or selling products not conforming to this standard nor is the FCI responsible for its use.

FLUID CONTROLS INSTITUTE

Standard Solenoid Valve Terminology  
and Nomenclature

1 SCOPE

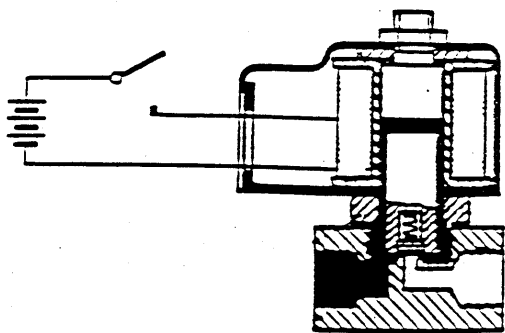
This standard identifies and defines the basic methods of operation, types and functionality associated with most 2- and 3-way solenoid valves. A comprehensive glossary of associated terminology is also provided.

2 PURPOSE

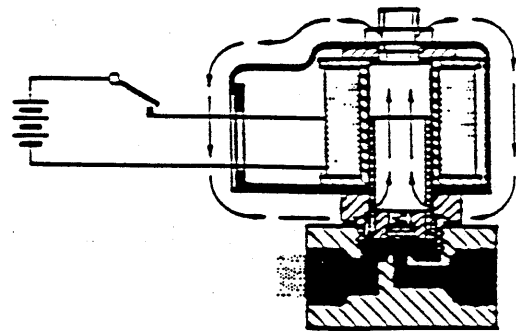
This standard has been created to provide manufacturers and users of solenoid valves with common terminology and nomenclature.

3 PRINCIPLE OF OPERATION

A solenoid valve is an electro-mechanical device which upon energization opens and/or closes a passage controlling fluid flow. It is comprised of two elements: the solenoid (with a plunger), and a pressure vessel. The solenoid converts an electrical signal into a mechanical movement; the pressure vessel contains the passages for flow.



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FLUID PASSES

## 4 METHODS OF OPERATION

### 4.1 Direct Acting

In direct acting valves, the solenoid plunger directly opens or closes the main orifice, depending on whether the solenoid is energized or de-energized.

All of the force required to actuate a direct acting valve is provided by the solenoid operator. The capability of the solenoid is therefore the limiting factor for flow and pressure rating.

Generally, these valves are simple in construction and operation.

### 4.2 Pilot Operated (Internal and External)

In pilot operated valves, line or upstream pressure is converted to pilot pressure to open and close the main orifice in the valve. Pilot pressure is controlled by a direct acting solenoid that pressurizes one side of a diaphragm (or piston). In each case, actuation of the plunger opens a pilot orifice which creates a pressure imbalance across the diaphragm (or piston) to open or close the main orifice. Pilot operated valves will not work without system pressure.

External pilot operated valves operate on the same principle of a pressure imbalance except the pilot is external to the valve. The pilot pressure may be derived from either the controlled fluid or an independent source.

### 4.3 Direct Lift

Direct lift valves combine the features of a direct acting valve with those of a pilot-operated valve. A flexible link between the solenoid plunger and the diaphragm (or piston) allows the valve to function as a direct acting valve at low pressures and as a pilot-operated valve at higher pressures. It is sometimes referred to as a zero delta P (pressure) valve.

When there is insufficient pressure differential to open the diaphragm (or piston), the mechanical linkage will move the diaphragm (or piston) from the main orifice where it remains until the solenoid is de-energized.

Direct lift valves are designed with a pilot orifice that allows the process media to assist with actuation when a pressure differential is present across the valve. This design feature is similar to a pilot operated valve.

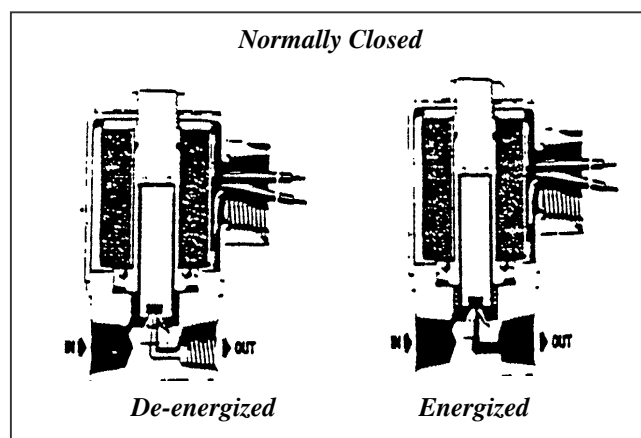
### 4.4 Side Saddle Operated

In a side saddle design, the force of the solenoid coil is amplified by means of a lever arm. This allows the valve to open against a higher pressure than if the solenoid force were not amplified.

## 5 BODY TYPES

### 5.1 2-Way

2-way solenoid valves have one inlet port and one outlet port (pipe connections). This type of valve is usually used to control the flow of fluid through a single passage.



### 5.2 3-Way

3-way solenoid valves have three ports and two orifices. Two ports are in the body of the pressure vessel and one in the sleeve. When one of the two orifices is open, the other is always closed. Three way valves are used to control the direction of flow.

