PRODUCT INFORMATION
Solenoid valves, function, terminology and construction types

SOLENOID VALVES

A solenoid valve is a combination of two functional units:

1. A solenoid operator essentially consisting of a coil, core, core tube, shading coil and spring(s).
2. A valve body containing orifices in which a disc, diaphragm or piston etc. is positioned according to the type of technology used.

The valve is opened or closed by movement of the magnetic core which is drawn into a solenoid when the coil is energised.

SOLENOID VALVE TERMINOLOGY (Fig. 1)

Coil
Electrical part of the valve consisting of a spool wound with insulated copper wire creating a magnetic flux when energised. The coil is held in place on the tube with a retaining clip.

Core
Soft-magnetic plugnut moved by magnetic forces (flux generated by the coil).

Core spring
Spring which keeps the core in fixed position when the coil is de-energised.

Core tube
Stainless steel tube closed at one end, installed to improve the magnetic flux of the solenoid coil upon energisation.

Cover
Cover mounted on the valve body and incorporating a number of orifices.

Diaphragm
Seal-tight diaphragm isolating the fluid from the control system.

Disc, valve disc
Sealing material on the core or disc-holder which shuts off the seat orifice.

Manual operator
Manual operation of the lever to open or close the orifices.

Manual operator spring
Drawback spring ensuring return of the pulse control device to its initial position

Orifices
Orifices for fluid transit.

Plugnut
Stationary core pressed in the closed end of the core tube, installed to improve the magnetic flux of the solenoid coil upon energisation.

Retainer clip
Clip anchoring the coil to the yoke.

Rocker
Moving part serving to open and close the orifices for the passage of fluid.

Seating or valve seat
Specially formed border of the main valve.

Solenoid enclosure
Metal housing around the coil for electrical and mechanical protection, as well as protection against ingress of water or dust.

Valve body
Main part of the valve with all ports and main seats.

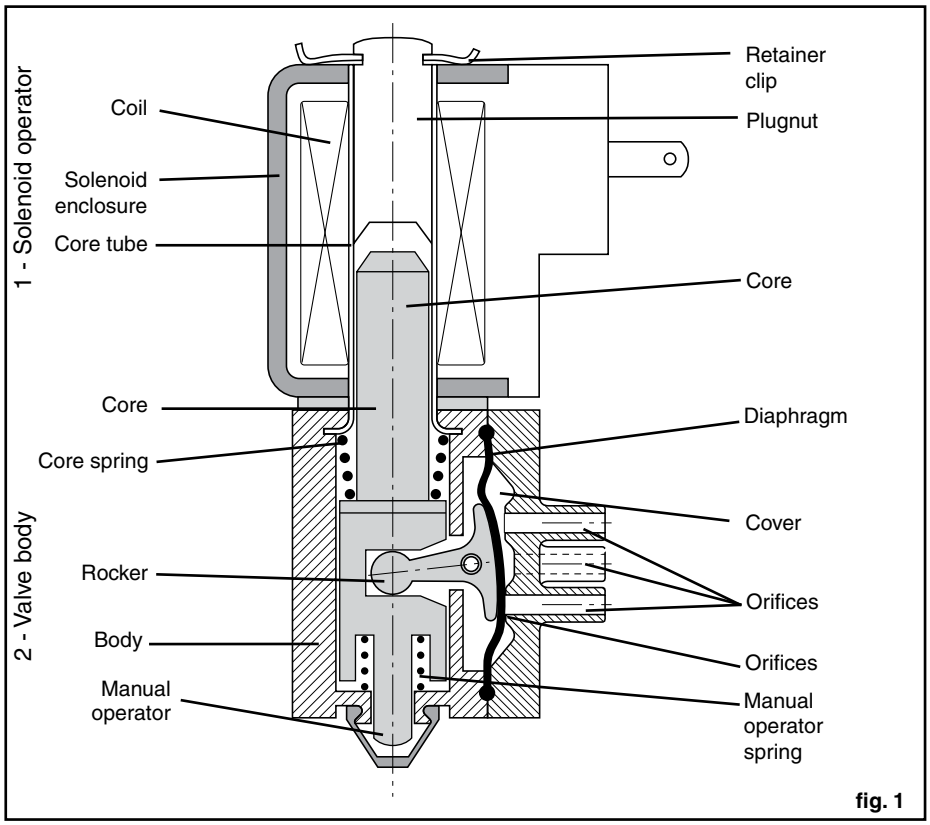

fig. 1

TYPES OF SOLENOID VALVES

2/2-3/2 solenoid valves with fluid isolation

- Diaphragm **(Fig. 2)**:

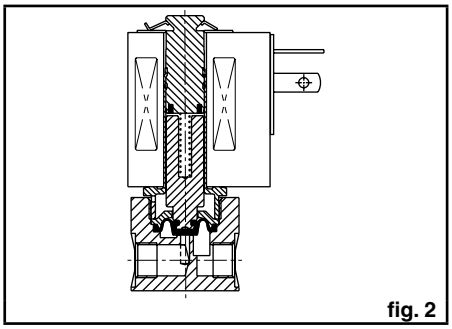
fig. 2

Diaphragm type solenoid valves are compact, and have a very extended service life and a very small internal volume. They are ideal for handling agressive fluids. The valve body is in stainless steel or plastic (PVDF/PP), with a diaphragm in VMQ (silicone), FPM or PTFE. Low power coil. Screwed connections.
Serie 282

- Rocker **(Fig. 3)**:

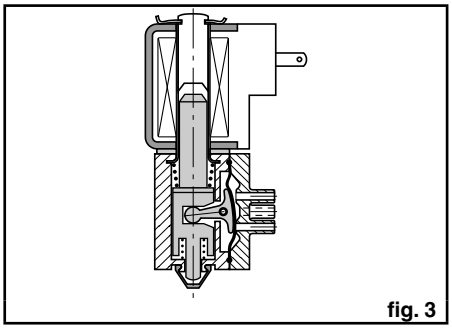
fig. 3

Rocker type solenoid valves are compact, and designed to incorporate a hermetic seal between fluid and control system. These valves are ideal for handling aggressive fluids, or where a maximum level of fluid purity is required. Low power coil and fast response times. Screwed or splined connections.
Series 110/360

- Lever **(Fig. 4)**:

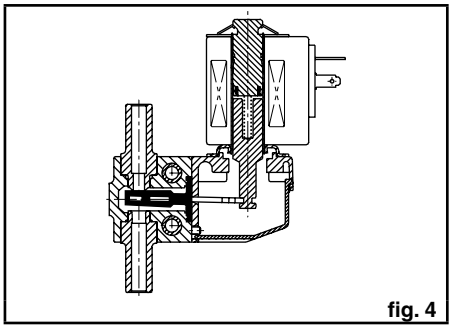

fig. 4

Lever type solenoid valves are designed for high differential pressures and flow rates. Heat dissipation for the electromagnetic part is optimised by separating the control system from the valve itself. These valves are ideally suited for high ambient temperatures. Screwed or spigot connections.
Series 283/383

- Bellows **(Fig. 5)**:

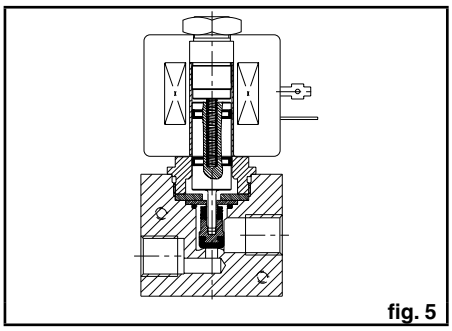

fig. 5

Bellows solenoid valves ensure exceptional operating reliability under severe service conditions and extended life service. A body in PEEK or stainless steel, bellows in PTFE and disc in FFPM make these valves suitable for handling highly corrosive fluids at substantial flow rates. Screwed connections.
Series 296/396

- Tube pinch **(Fig. 6)**:

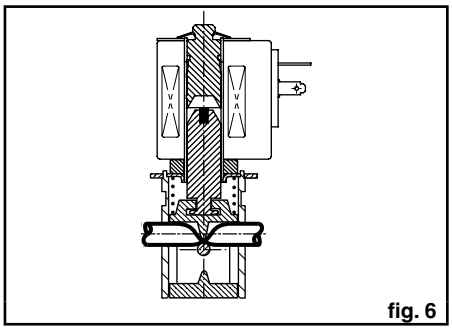

fig. 6

Tube pinch type solenoid valves provide full bore flow (no internal volume) and extended service life. This is achieved by means of the pinch device, designed specially to operate smoothly with a balanced load. No pollution is possible, and operation of the valve is silent. Bidirectional fluid flow.
Series 284/384

Direct operated 2/2 solenoid valves
The core is mechanically connected to the disc and opens or closes the orifice, depending on whether the solenoid coil is energised or de-energised.

Core-disc valve construction (**Fig. 7**).
Operation is not dependent upon line pressure or rate of flow (zero or maximum rated pressure). These valves are generally available in 2/2 NC/NO and 3/2 NC/NO/U versions.
NC – Normally closed:
NO = Normally open
U = Universal

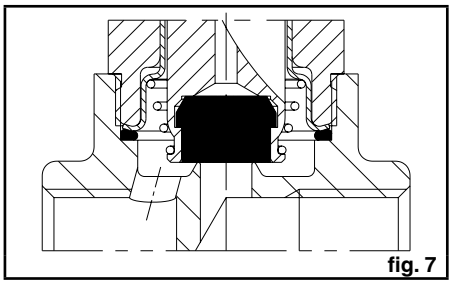

fig. 7

• PRESSURES

Maximum operating pressure differential – MOPD (PS)

The maximum operating pressure differential (DP) is the pressure the solenoid operator has to overcome to open (NC function) or close (NO function) a solenoid valve.
The maximum operating pressure differential refers to the maximum difference in pressure between the inlet and outlet.
If the pressure at the outlet is zero, the supply pressure is to be regarded as the maximum operating pressure differential. In this case, in order to prevent coil burnout, the pressure at the inlet must not exceed the maximum operating pressure differential specified for each valve.
The maximum operating pressure differential may vary according to the fluid or type of power used (AC valves usually have higher pressure ratings than DC valves).

Minimum operating pressure differential

Minimum operating pressure differential (bar) is that which is required to open the valve and keep it open. The valve will start to close below the minimum operating differential pressure.

Maximum allowable pressure
(according to EN 764)

The maximum allowable pressure is the maximum line or system pressure to which the valve may be subjected in normal service and at a given temperature, generally, ambient temperature, without causing damage .

• TEMPERATURES

Normal ambient temperature

The normal ambient temperature is assumed to be in accordance with standard conditions as specified in ISO 554
ambient temperature : 20°C
ambient pressure : 1013 mbar
relative humidity : 65%

Maximum ambient temperature (TS)

The maximum ambient temperature is based on test conditions to determine safe limits for coil insulation. The temperature is determined under continuously energized conditions and with maximum fluid temperatures (as listed) existing in the valve.

Minimum ambient temperature

The minimum ambient temperature of a valve is greatly affected by application and construction.
Damage may occur when liquids solidify above the specified minimum temperature. Be sure to observe minimum and maximum limits.

Maximum fluid temperature (TS)

The maximum fluid temperature listed is valid for an ambient temperature of 20°C and 100% RD (Relative Duty Time).

• VISCOSITY

Viscosity is the resistance of a fluid to flow, due to internal friction. Viscosity affects the flow rate of a valve considerably and the flow factor is reduced when viscous fluids are to pass the valve.
There are two types of viscosity:
a) dynamic viscosity, expressed in Pa.s (Pascal seconds) or Poises
b) kinematic viscosity, which is the ratio between dynamic viscosity and density of the fluid

Kinematic viscosity is expressed in mm^2/s or cStokes; in this catalogue only kinematic viscosity is considered.