

OPTIMIZATION OF INTERMITTENT FLOWING WELLS



LOCATION

PEMEX EXPLORACIÓN Y PRODUCCIÓN Activo Integral Aceite Terciario del Golfo Poza Rica, Veracruz Mexico

OPERATION CONDITIONS

Pressure at wells: 0 – 1500 psig

Flow: 0 – 1000 BPD

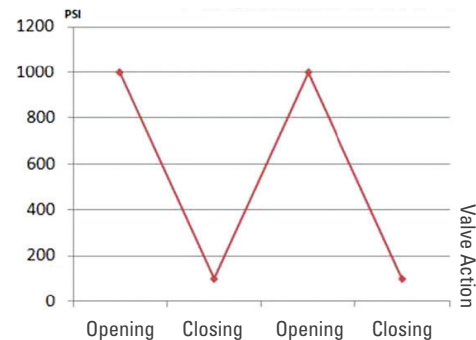
OPERATION

The aim of this valve is to optimize the production volume of intermittent flowing wells, by opening at a set point of 1000 psi, and closing once the discharge pressure of the well is 100 psi. The valve will open again once the discharge pressure of the well reaches the upper adjustment point of 1000 psi.

The Kimray Valve is in charge of choking the well, while pressure pilots command the opening and closure of the valve, allowing flow only when the well column is at an ideal production pressure. This valve consists of a control system formed by a bistable pilot and two pilots, of direct and indirect action, respectively, and a regulation and filtering system for gas supply.

The Kimray Gap Controller is used for liquids and gases. It can control pressure upstream and downstream, according to the set pressure in its high or low status.

PERFORMANCE OF GAP CONTROL



GAP CONTROL

In a gap controller, the sense line is connected upstream or downstream of the valve depending on the control desired. This type of gap control uses a normally open control valve (Pressure close).

The gap controller is totally independent when it is connected to a sense line and supply pressure is provided. A Supply Gas Regulator is installed to decrease the actuator inlet pressure (30 – 35 psi). A drip pot is installed to condensate the liquids that may go through the regulator, as a result of the gas. It is important to clarify that if the sensing line is for liquid service, supply air or gas should be taken as an out source supply. The function of the gap controller is to allow the flow through the valve within the control range of pilots.

Upstream Gap controller regulator: it monitors the upstream pressure and it opens the valve when pressure reaches the “high” set point. The valve will remain opened until the pressure decreases to the “low” set point, and the valve will close. The regulator will remain closed until the “high” set point is detected by the pilot and the valve will open again.

EXAMPLE

Set Point 1 (High): 1000 psi
Set Point 2 (Low): 100 psi

P1 = 1000 psi; valve opens
P2 = 700 psi; valve remains opened
P3 = 100 psi; valve closes
P4 = 700 psi; valve remains closed
P5 = 1000 psi; valve opens

ADVANTAGES

- No gas emissions into the atmosphere.
- Electrical energy is not required.
- Low operation and maintenance costs.
- KIMRAY Warranty

ELEMENTS OF THE GAP CONTROLLER REGULATOR (PROPOSED)

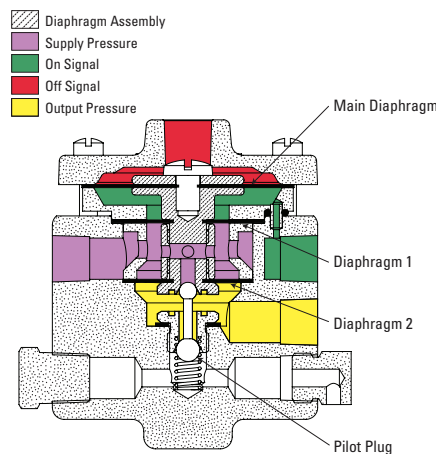
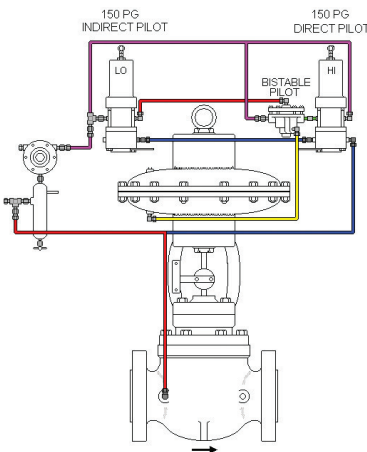
- 1 High Pressure Motor Valve, 2” 600 RF, 7/8 Std. Trim.
- 1 pressure control pilot model 75 PG, Direct action
- 1 pressure control pilot model 75 PG, Indirect action
- 1 Gas regulator model 12 SGR, ¼ NPT connection
- 1 Drip pot
- Bistable pilot Model 3PGB

OPERATION PRINCIPLE

The control valve is actuated by the bistable pilot 3PGB, which controls and exchanges signals from pilots 75 PG that sense high and low pressure respectively.

OPERATION OF BISTABLE PILOT 3PGB

Let us suppose (as it is shown in the diagram) that a supply pressure (purple) is applied, the upper seat on ball 1 is closed and the lower seat on ball 2 is opened. The outlet pressure (yellow) is vented into the atmosphere. Since diaphragm 2 is bigger than diaphragm 1, the diaphragm assembly is kept below and the outlet pressure (yellow) remains being vented into the atmosphere. When an ON signal (green) is applied to the main diaphragm, the diaphragm assembly is forced upward, closing the lower seat and opening the upper seat. When supply pressure (purple) matches the outlet pressure (yellow), supply pressure on diaphragm 1 then keeps the diaphragm assembly on the upper position, and the opening signal (green) can be eliminated. When an OFF signal (red) is applied to the main diaphragm, the diaphragm assembly is forced downward, closing the upper seat and opening the lower seat. This vents the outlet pressure (yellow) into the atmosphere. The off signal (red) can be now eliminated and the pilot will remain on the off position. If 3 PGB is on, when the supply pressure (purple) is applied, an off signal applied to the diaphragm will turn off the 3 PGB.



SUPPLY GAS

Based on the pneumatic requirement for operation of pilots and valve actuator, we propose to install an “air” reserve tank in the wellhead manifold where the GAP CONTROLLER REGULATOR will be used.

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