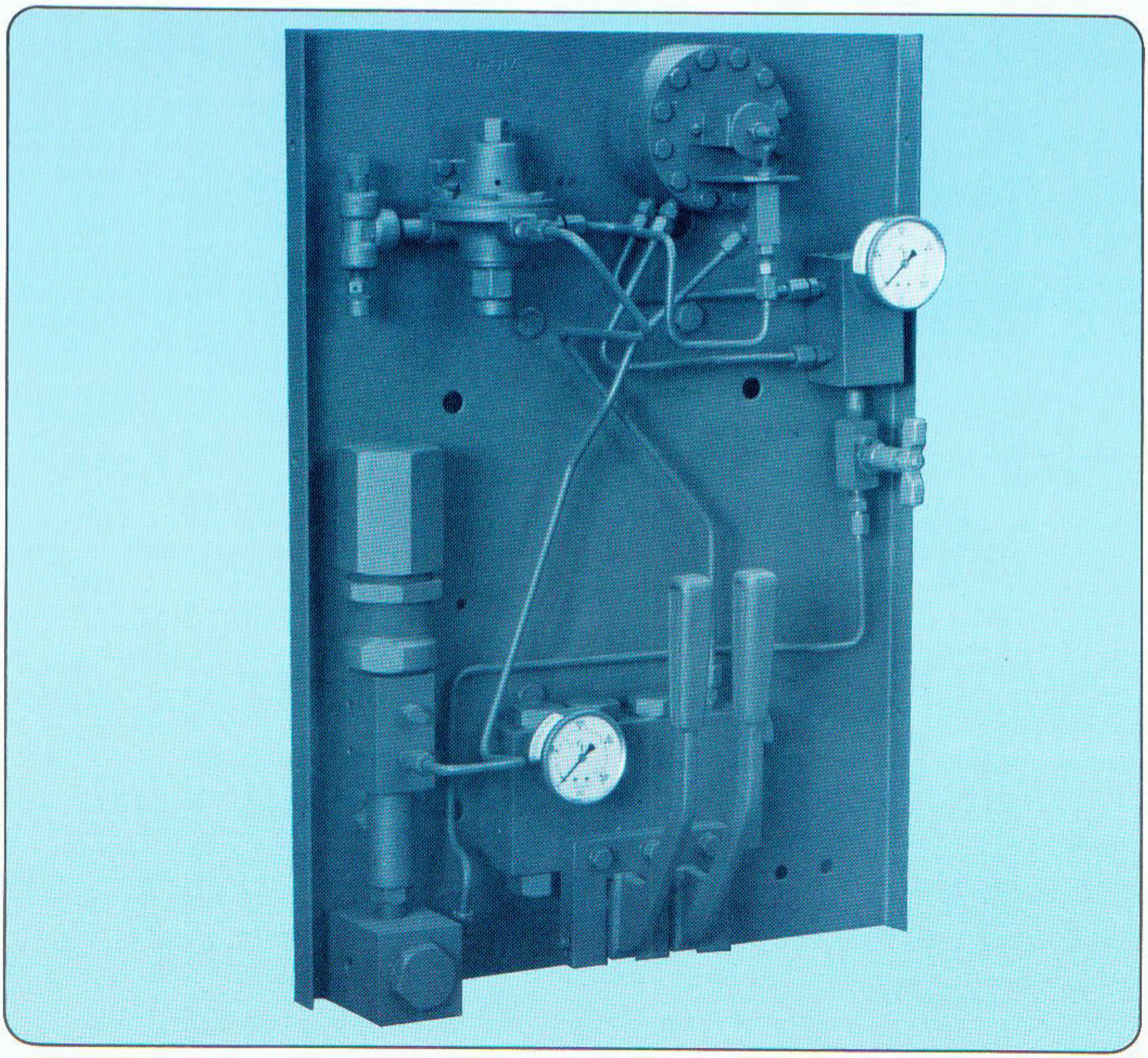
For Fast Positive Closure of
Ball, Plug and Gate Valves.

Shafer™

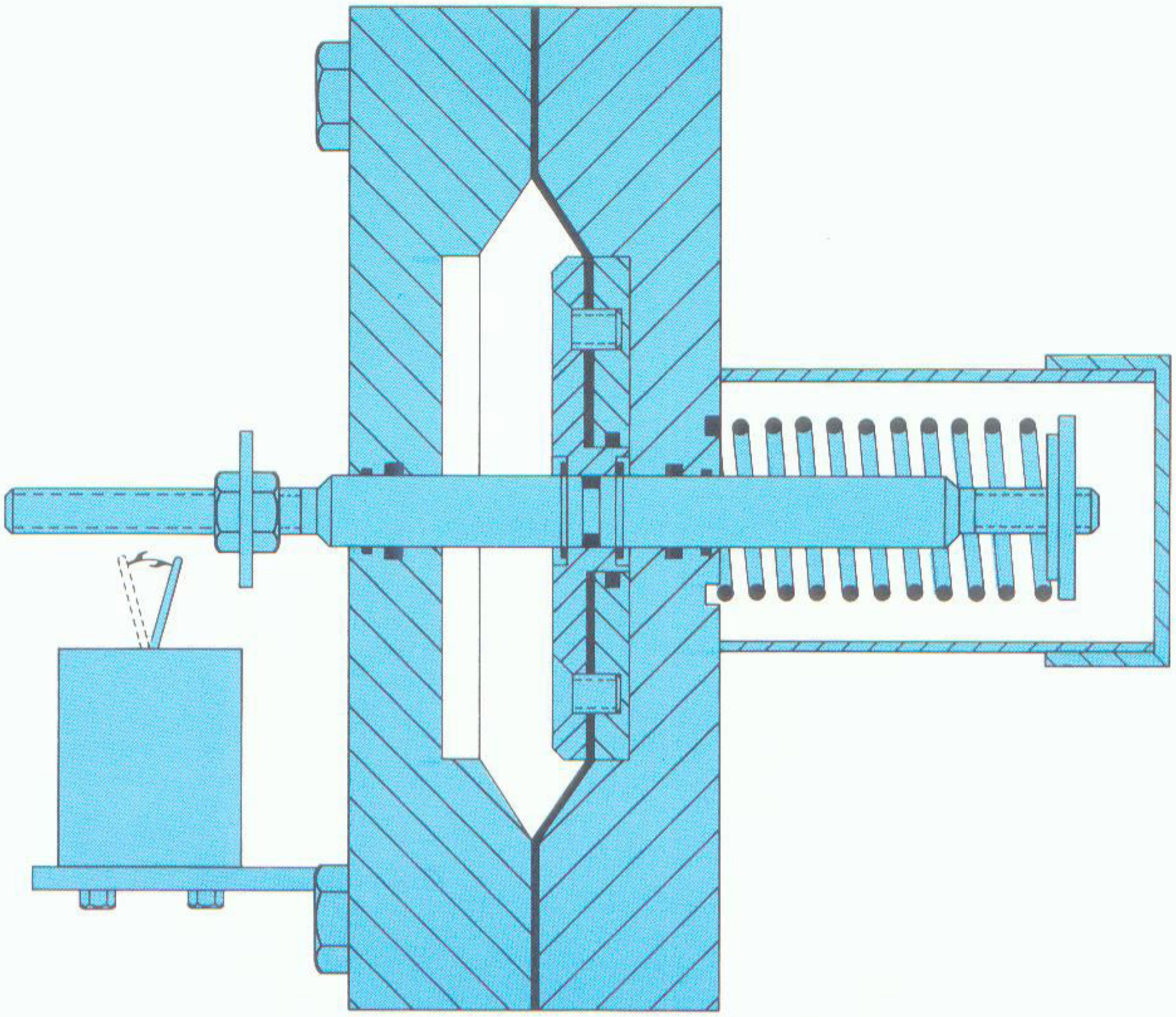
BULLETIN ALB-370-85

AUTOMATIC LINE BREAK CONTROL



Shafer®

AUTOMATIC LINE BREAK CONTROL



INTRODUCTION:

Breaks can and do happen, regardless of safety factors designed into a pipeline. The Shafer Automatic Line Break Control, without any manual aid, reacts instantly to trouble-heralding pressure drop. The speed, reliability and dependability of the Automatic Line Break Control prevents loss of huge quantities of gas; will minimize, if not prevent, damage to surrounding property; and, under some circumstances, even averts loss of life by avoiding fire or reducing its intensity on a ruptured line.

FOR MAIN LINE VALVE PROTECTION

The unique Shafer Automatic Line Break Control operates on a diaphragm principle to automatically close main pipeline valves in the event of excessive sustained drop in line pressure. It reacts seconds after a break occurs and only to a sustained rate of pressure drop. A "lost motion" feature causes any short, sudden drop to be absorbed without tripping the control. As a safety factor, the control is usually furnished so that the valve must be manually reopened.

FOR RIVER CROSSING PROTECTION

River crossings are usually the weak points of high pressure gas transmission systems. It is desirable to resort to dual lines when crossing a river; when one of the lines fails the remaining line will carry the flow after the defective line is shut off for repairs. Rapid manipulation of the valves controlling the crossing is required. Valves equipped with Shafer Automatic Line Break Controls will perform this function with the most speed and reliability available.

In the event of a rupture, all valves will immediately close, isolating and starving the ruptured line. The Shafer Automatic Line Break for River Crossing protection, however, will react to a predetermined static pressure, and reopen the unbroken line to ensure uninterrupted flow of gas.

FOR BALL & PLUG VALVES

PRESSURIZED HYDRAULIC FLUID

NON-PRESSURIZED HYDRAULIC FLUID

HIGH PRESSURE GAS

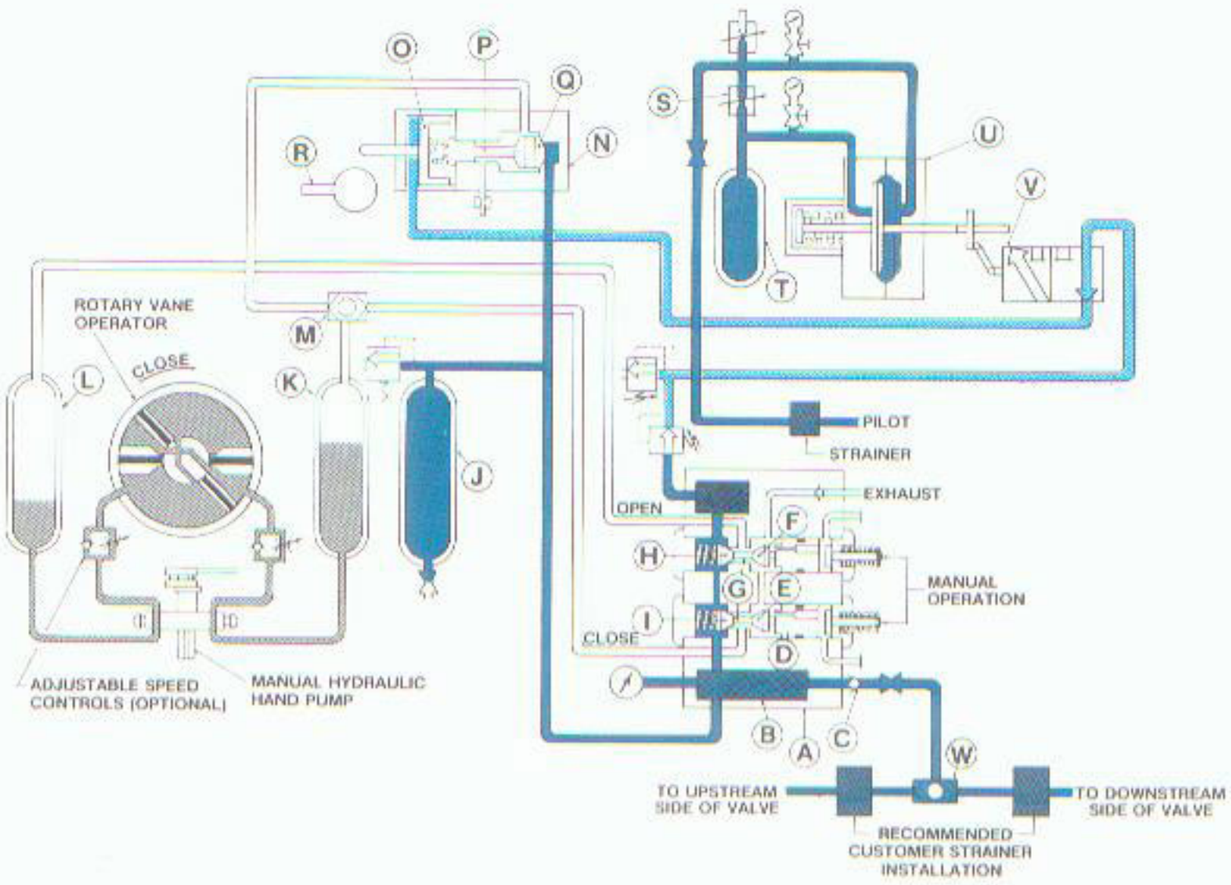
MEDIUM PRESSURE GAS

LOW PRESSURE GAS

EXHAUST GAS

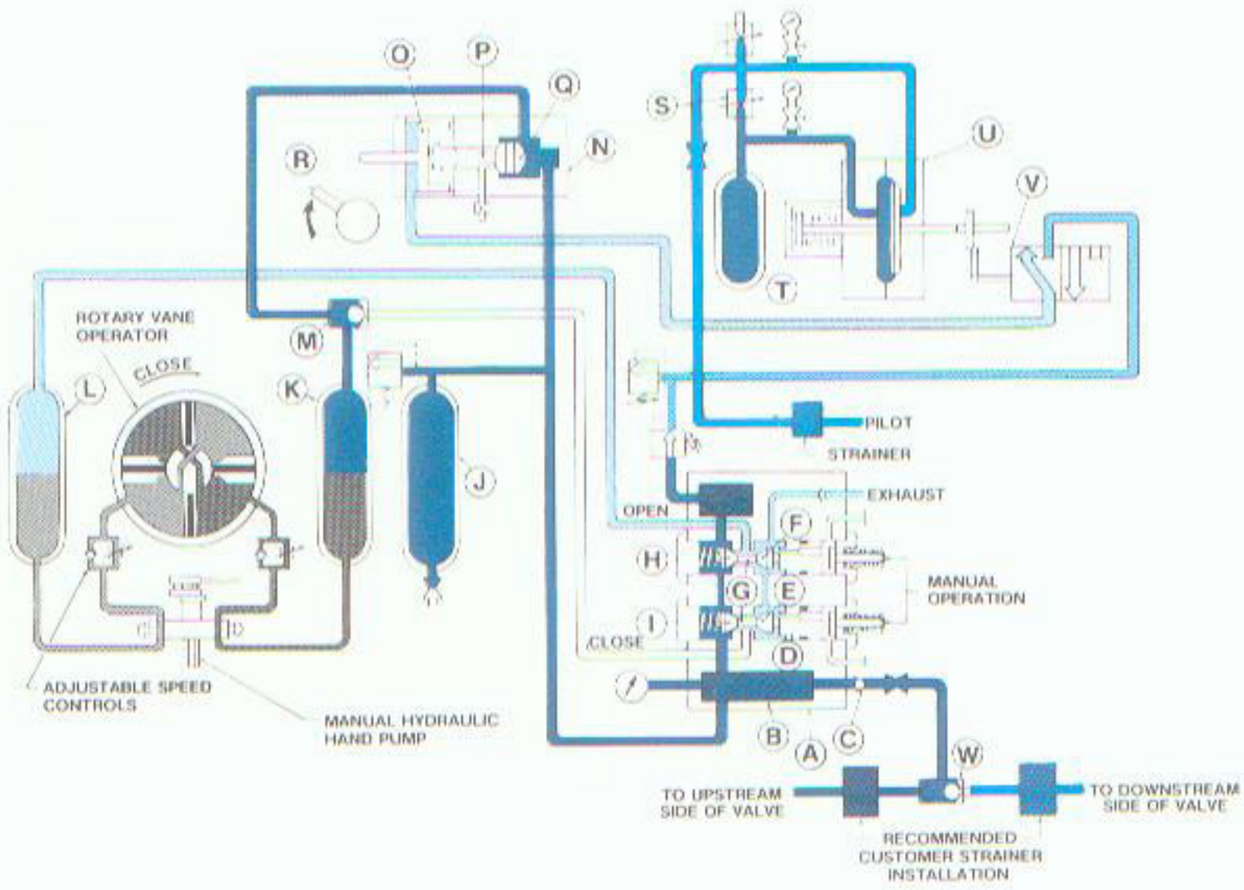
SEQUENCE 1 - VALVE FULLY OPEN

The basic Shafer Automatic Linebreak Control utilizes a diaphragm assembly pre-set to react to an excessive sustained pressure drop. Control components include: an adjustable orifice (S), a diaphragm actuator (U), two gas hydraulic tanks (K) and (L), an ESD poppet valve (N), a reference tank (T) and a toggle valve (V). The rate of pressure drop required to move the diaphragm (U) is regulated entirely by the adjustable orifice (S). The diaphragm remains unaffected by normal fluctuations in line pressure. It has a setting range of 10 to 150 PSI pressure drop per minute. Sequence 1 shows the operator in the full open position.



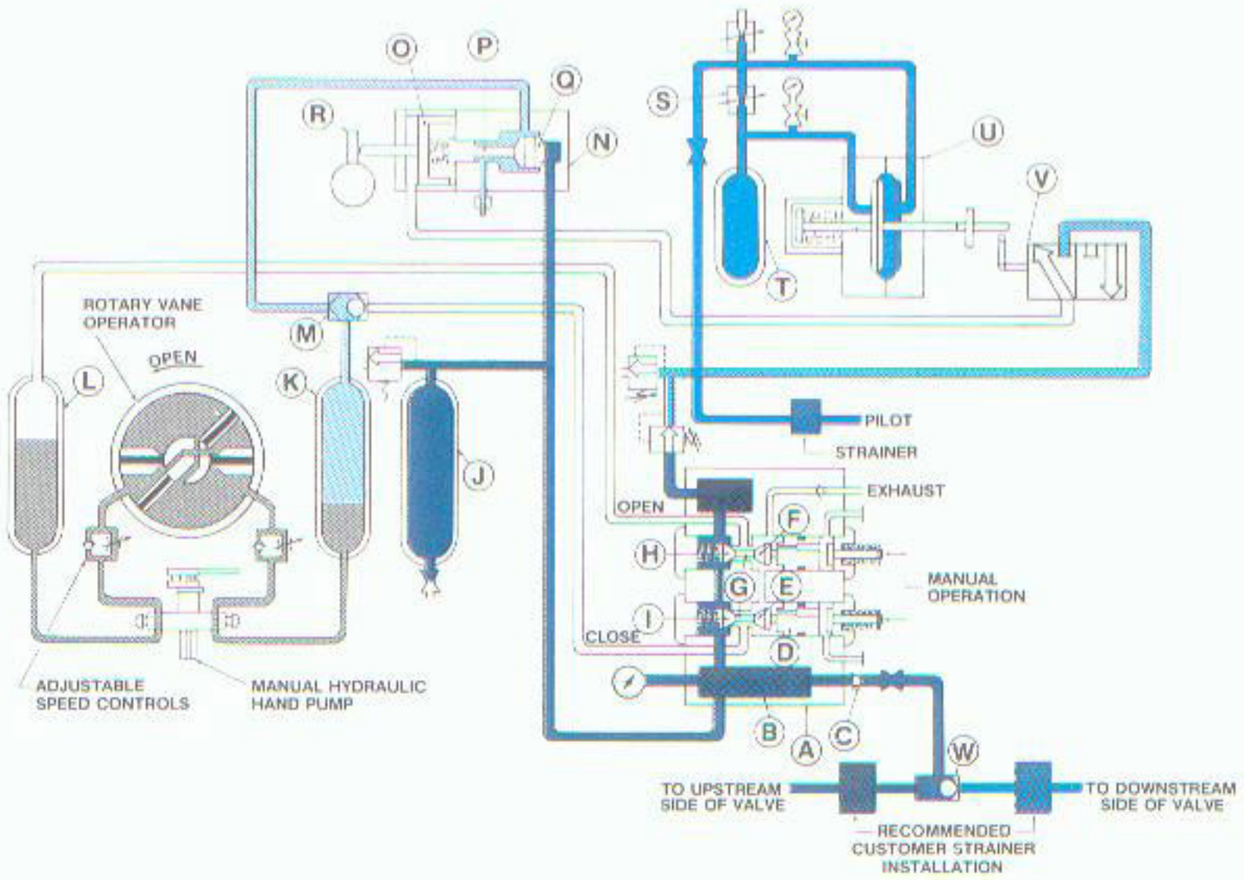
SEQUENCE 2 - VALVE CLOSING

When a severe sustained pressure drop occurs in the main line, the front side of diaphragm (U) will sense the falling pipeline pressure. The remaining higher pressure in reference tank (T) is restricted by adjustable orifice (S) causing a pressure differential across the diaphragm. The diaphragm moves outward with its stem, tripping toggle valve (V) closed. The pilot pressure on ESD poppet valve (N) is vented from the front side of piston (O). Power gas pressure shifts poppet (Q) blocking the exhaust port and allowing power gas to shift shuttle valve (M) which isolates the secondary control (A). Power gas pressurizes the closing gas hydraulic tank (K) forcing high pressure hydraulic fluid into the operator causing the valve operator to close quickly. The resident fluid in the operator is forced into the opening tank (L). As the valve closes, a differential is caused across the valve and shuttle valve (W) shifts and selects the high pressure side of the valve as a power source for the operator.



SEQUENCE 3 - VALVE FULLY CLOSED

When the valve operator reaches the end of stroke, the mechanical actuator (R), which is attached to the operator rotor, mechanically closes the ESD poppet valve (N) forcing the poppet (Q) into the power seat allowing the gas hydraulic tank and operator pressures to neutralize. The valve operator is now in emergency failed position. The valve remains closed, isolating the affected pipeline section permitting repairs to be made. The valve operator can only be opened after toggle valve (V) has been manually reset. This pressurizes the pilot of ESD poppet valve (N) and mechanical actuator (R) is no longer required to hold the ESD poppet valve (N) closed. The valve operator can be opened by using the power poppet control (A) or manually hand-pumping.



FOR GATE VALVES

PRESSURIZED HYDRAULIC FLUID
NON-PRESSURIZED HYDRAULIC FLUID
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MEDIUM PRESSURE GAS
LOW PRESSURE GAS
EXHAUST GAS

SEQUENCE 1 — VALVE FULLY OPEN

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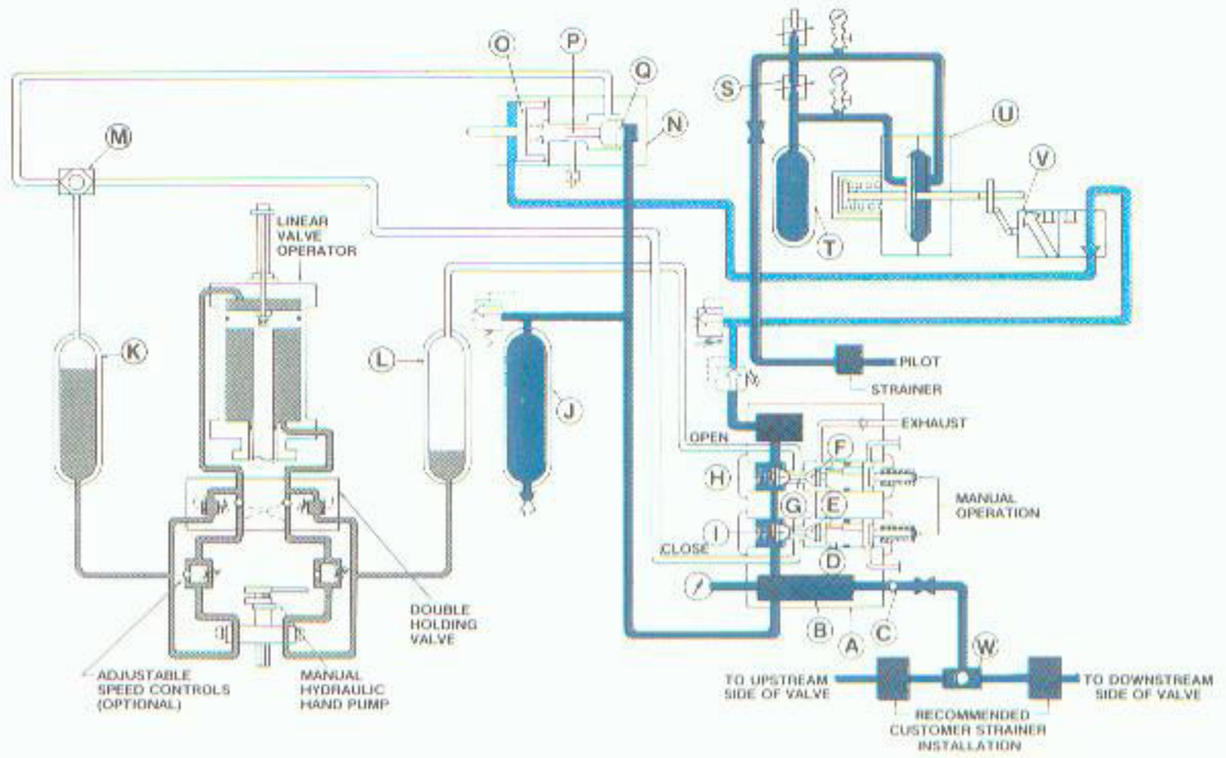

SEQUENCE 2 - VALVE CLOSING

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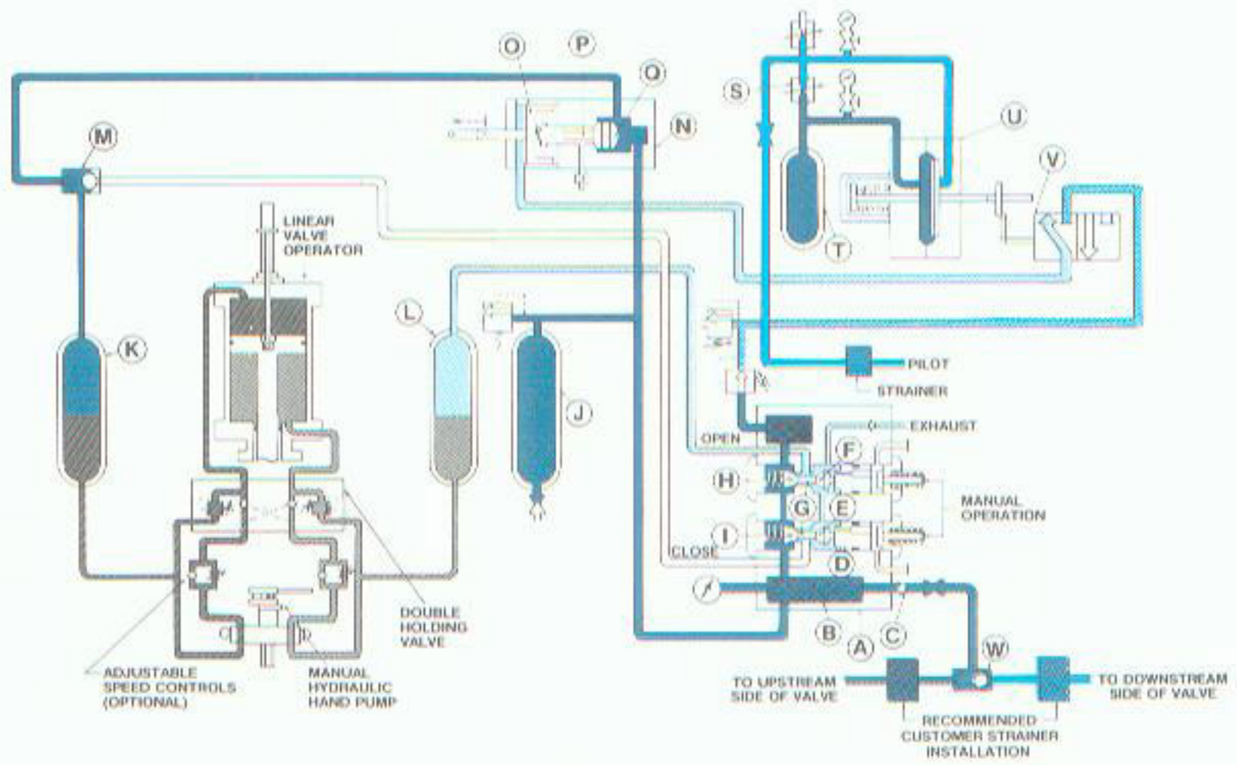
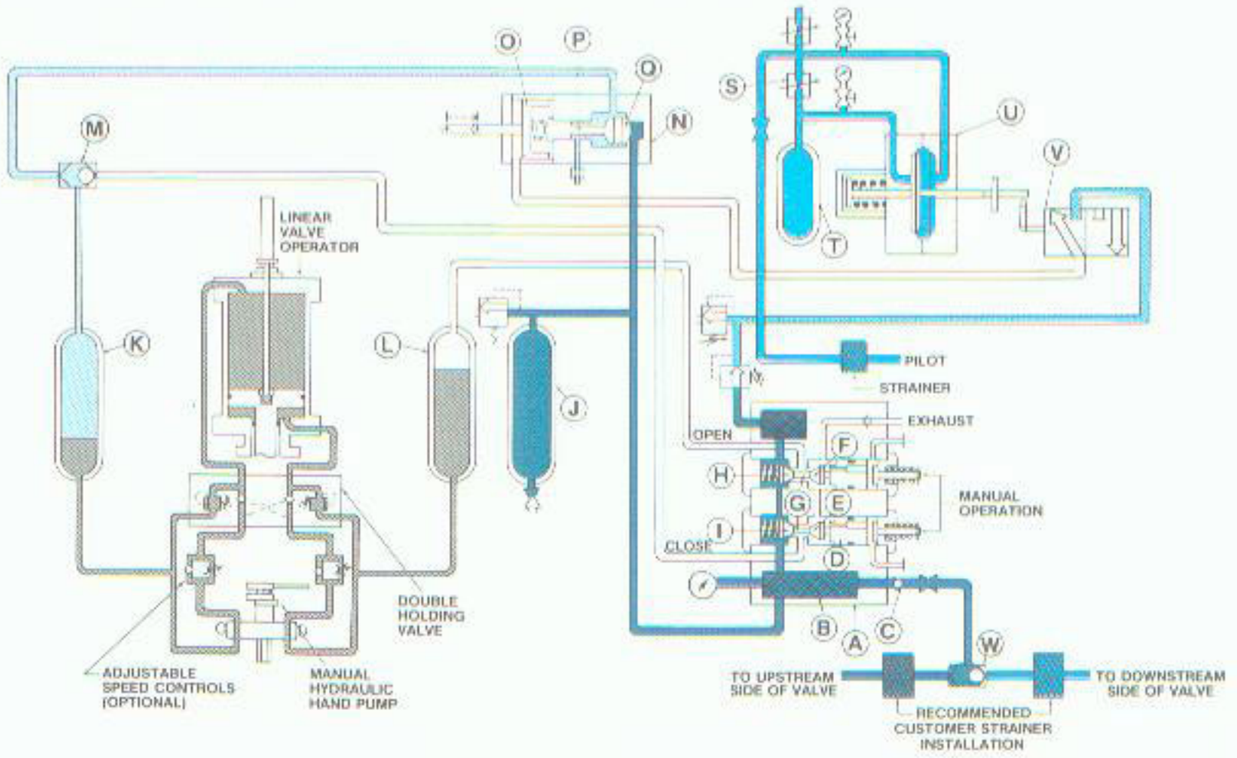


SEQUENCE 3 - VALVE FULLY CLOSED

When the valve operator reaches the end of stroke, a mechanical actuator, which is attached to the operator indicator stem, mechanically closes the ESD poppet valve (N) forcing the poppet (Q) into the power seat, allowing the gas hydraulic tank and operator pressures to neutralize. The valve operator is now in emergency failed position. The valve remains closed, isolating the affected pipeline section permitting repairs to be made. The valve operator can only be opened after toggle valve (V) has been manually reset. This pressurizes the pilot of ESD poppet valve (N) and the mechanical actuator is no longer required to hold the ESD poppet valve (N) closed. The valve operator can be opened by using the power poppet control (A) or manually hand-pumping.



Shafer® valve operating systems

SHAFER VALVE COMPANY
2500 Park Avenue West, Mansfield, OH 44906
Phone (419) 529-4311 • FAX (419) 529-3688

Shafer Valve Company of Houston (Regional Office)
8582 Katy Freeway, Suite 122, Houston, TX 77024
Phone (713) 984-8492 • FAX (713) 984-8496