SINGER VALVE
Result-Based Solutions. Globally.™

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SINGER MODEL 106/206-RPS-L&H

Anticipating Relief Valve Schematic A0400C (Size 2" to 6" 106, 4" to 8" 206)
Installation, Operating and Maintenance Instructions

DESCRIPTION:

Model 106/206-RPS-L&H dissipates surges caused by power failure to pumps. The valve anticipates the surge by opening on low line pressure associated with sudden stopping of pumps. This assures that the valve is open when the return high pressure surge arrives.

106/206-RPS-L&H is a hydraulically operated, single seated valve controlled by two pilot valves. The valve is closed when the line pressure is between the set points of the two pilots. The valve opens when the line pressure drops below the setting of the low pressure pilot. The valve also opens when the line pressure exceeds the setting of the high pressure (relief) pilot.

Unless otherwise specified, 106/206-RPS-L&H is assembled for service temperatures up to 180^{O} F (80^{O} C).

NOTE: Sizing and set point selection are critical for 106/206-RPS-L&H installations. The valve is not suitable for all pumping systems. Please refer to "Adjustment and Test Procedure" for details. Several models derived from 106/206-RPS-L&H for special applications are available; consult the factory or your SINGER Representative for details.

DESCRIPTION OF OPERATION:

Main Valve (1) is normally open when pressure is applied to the valve inlet. When this same pressure is applied to the bonnet, the Main Valve closes tight because the area of the diaphragm is greater than the area of the seat. Pressure above the diaphragm determines the position of the Main Valve.

Bonnet pressure is controlled with a pilot circuit consisting primarily of the following items:

1. Pilot line with Strainer (3) and Closing Speed Control (4) from the header to the bonnet.
2. Pilot line from the bonnet through two parallel pilots (8 and 9), and a Check Valve (11) to the outlet of the Main Valve.

Pressure from the upstream side of Main Valve (1) is directed to the bonnet through the Closing Speed Control (4), keeping the Main Valve closed if there is no flow through the two pilots. If one of the pilots opens, there will be more flow out of the bonnet than is coming in, resulting in opening of the Main Valve.

INSTALLATION AND START-UP:

Model 106/206-RPS-L&H is installed on a "Tee" from the main line (header) into atmosphere.

1. Refer to 106/206-PG "Installation". Bypass and strainer are normally not used.
2. Model 106/206-RPS-L&H operated normally under conditions which cause very high velocities and severe cavitation. These conditions may cause considerable vibration. The supports for the valve must be designed accordingly.
3. **CONNECT THE PILOT SUPPLY LINE (2A) TO THE HEADER. Use ½" copper or larger. Note that hole into the header must be 3/8" or larger.**
4. To fill the system, the 106/206-RPS-L&H must be closed manually. Close Isolating Valve (2C). As soon as the header pressure is above the setting of Low Surge Pilot (8), open Isolating Valve (2C) to put the valve into automatic operation.

WARNING: Isolating Valve (2C) must be always open, otherwise Main Valve will not function.

ADJUSTMENT AND TEST PROCEDURE:

To assure satisfactory performance, it must be determined that the line pressure will recover above the setting of Low Surge Pilot (8) with the Main Valve fully open.

Following procedure should be used to establish that this condition is satisfied:

1. After filling the system as outlined in section "Installation and Start-Up, shut the pumps.
2. Open needle valve (5) one-half turn. Open needle valve (7) slowly. The pressure shown on Pressure Gauge (6) will drop slowly. Observe the pressure at which Low Surge Pilot (8) opens the Main Valve. This is the setting of Low Surge Pilot (8). Let the Main Valve open fully.
3. When the Main Valve is fully open, close Needle Valve (7). The reading of Pressure Gauge (6) is now the pressure in the header. This pressure should be above the setting of Low Surge Pilot (8) and the Main Valve should close slowly without causing a surge.

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Adjustment and Test Procedure (Cont.):

If the pressure in the header does not recover to above the setting of Low Surge Pilot (8), the valve will not close and that Low Surge Pilot setting is too high. Note the pressure to which the line pressure recovers. Low Surge Pilot (8) must be set lower than this pressure to assure that the Main Valve closes after dissipating the surge. Also see "Sizing".

4. Adjust Closing Speed Control (4) to give desired closing speed. The closing speed should be slow enough to keep the Main Valve open from low pressure surge to the arrival of the high pressure surge and also slow enough not to cause excessive surges while the Main Valve is closing. Turn Closing Speed Control (4) clockwise for reduced speed, counterclockwise for increased speed. Unnecessarily slow speed settings should be avoided because this increases the possibility of the speed control being obstructed by dirt or scale.

NOTE: If secondary surges caused by closing speed become difficult to control with Closing Speed Control (4), installation of a Closing Speed Control Pilot should be considered; consult the factory or your SINGER Representative.

5. High Surge Pilot (9) can be set approximately by removing the tubing from the outlet of Pilot (9) and observing Pilot (9) under maximum pumping pressure. Pilot (9) should be set about one turn of the adjusting screw higher than that point where it starts leaking.

SERVICE SUGGESTIONS:

In addition to the service suggestions listed under Model 106/206-PG, we list the following:

TROUBLE: FAILS TO OPEN

If the valve fails to open on Low Surge Pilot (8), see ADJUSTMENT AND TEST PROCEDURE. If the flow is low at time of power failure, the header pressure may not drop enough for the Low Surge Pilot to open. In this case the resulting high surge should be insignificant.

If the valve fails to open on high header pressure, check the setting of Pilot (9) as outlined in ADJUSTMENT AND TEST PROCEDURE. If Pilot (9) does not open the valve, see 81-RP instructions.

TROUBLE: FAILS TO CLOSE

Refer to "Adjustment & Test Procedure" for discussion on Low Surge Pilot setting. Remove pilot piping from the outlet of pilots. See previous section "Fails to Open". If there is no flow from the two pilots, follow these steps: Open Closing Speed Control (4). Loosen a fitting between the pilots and the bonnet. If there is no flow from the loose fitting, the inlet side of the pilot piping, Strainer (3) or Closing Speed Control (4) is obstructed. If there is flow from the loose fitting but the Main Valve does not close, Main Valve diaphragm is damaged, the resilient disc/seat area is damaged or there is an obstruction in the Main Valve.

NOTE:

Do not close Closing Speed Control (4) tight, as this prevents the valve from closing.

SIZING:

There are no simple formulas for sizing anticipating relief valves. Without assuming any responsibility, SINGER VALVE suggests the following procedure for sizing 106/206-RPS-L&H:

1. Size for relief capacity of 25% of maximum pumping capacity.

2. Refer to Singer Curve 106-412, 206 414 or 106-413 as applicable for capacity of the valve. Do not use capacity beyond maximum momentary velocity (45 ft/sec) as shown on the bulletin

Alternately use the formula **Q = Cv** $\sqrt{\Delta P}$

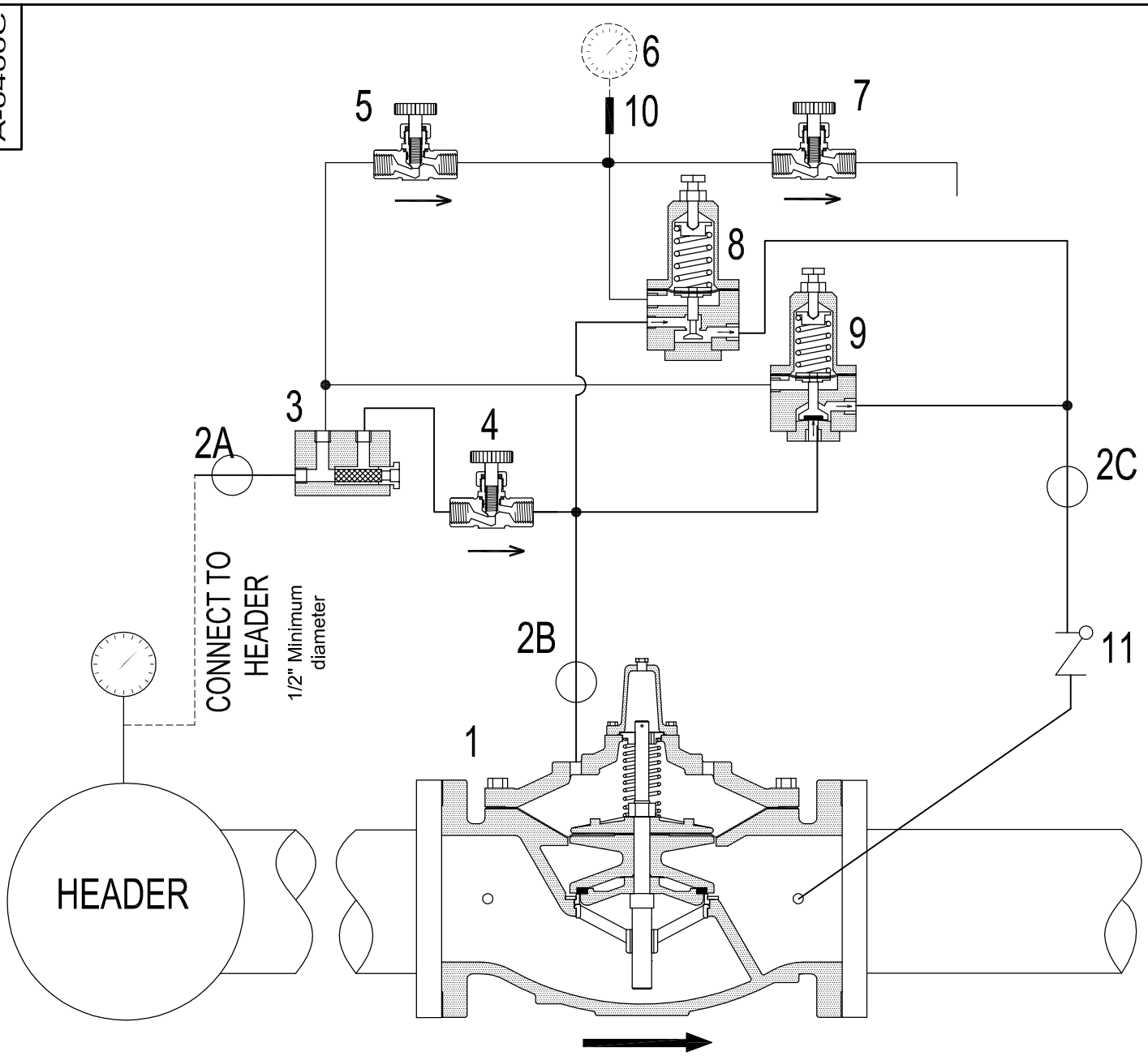
Where

Q	=	Flow (U.S.G.P.M.)
Cv	=	Flow Coefficient
ΔP	=	Pressure drop across valve (psi)

Use for pressure drops over 20 psi. Do not use pressure drop over 80 psi regardless of what the actual pressure drop is.

NOTE: Most 106/206-RPS-L&H valves operate deep in the cavitation zone. This is acceptable for the short periods that the valve is open. Where the valve is operated frequently or for long periods, periodic replacement of wearing parts may be required. Warranty does not cover damage due to cavitation.

A-0400C



1. Main Valve - 106/206PG.
2. Isolation Valves - A, B, C - standard all sizes.
3. Strainer - 40 mesh - J0097A.
4. Closing Speed Control - Model 852-B.
5. Needle Valve - Normal Position Fully Open.
6. Pressure Gauge - BY OTHERS.
7. Needle Valve - Normal Position Fully Closed.
8. Low Surge Pilot - Model 82-PR.
9. High Surge Pilot - Model 81-RP.
10. Pipe Plug for gauge connection.
11. Swing Check Valve - 1/2".

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Date:	Drawing:
March 11, 1995	A-0400C

Model 106 or 206-RPS-L&H