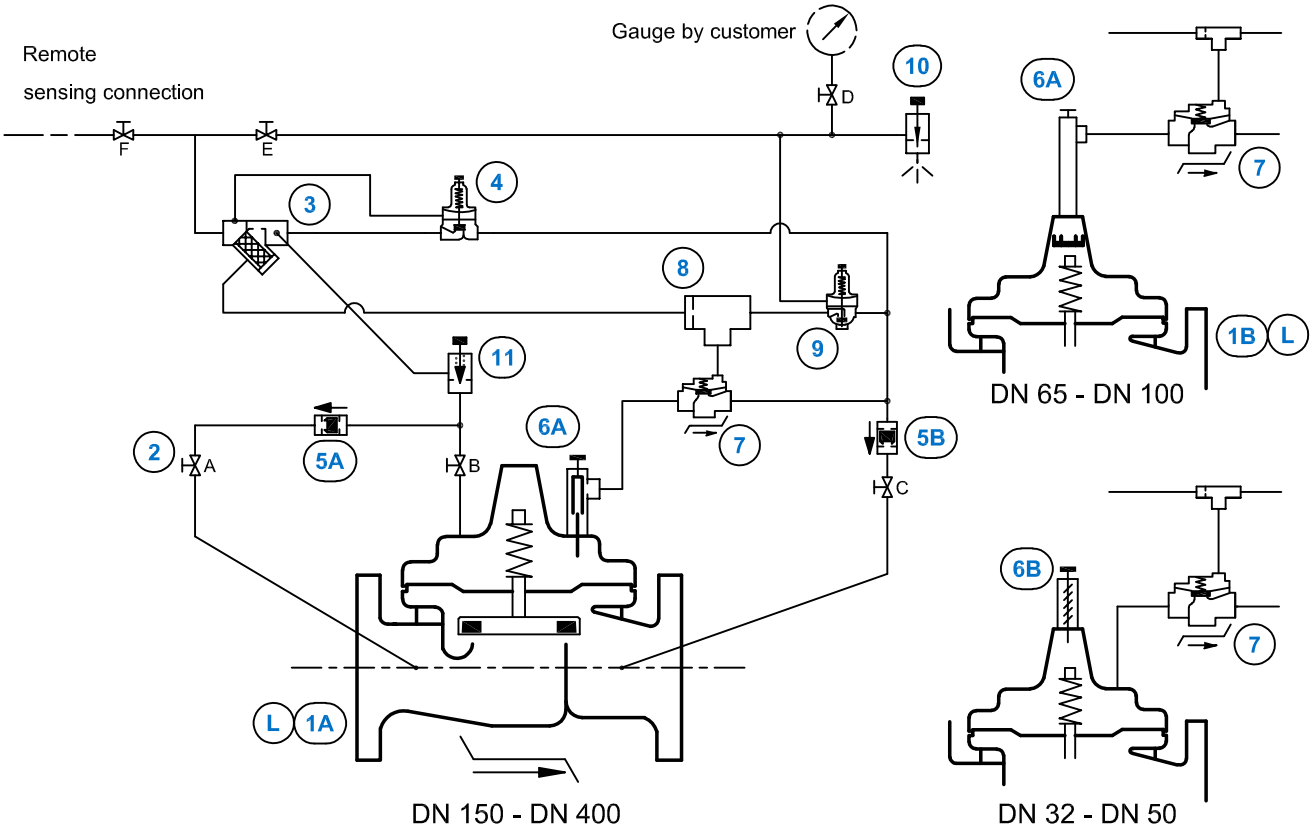
CLA-VAL 52-03R

Surge Anticipator and Pressure Relief Valve with Reverse Flow Control



STANDARD EQUIPMENT			
No	**Description**	**Qty**	**Type**
1A	MAIN VALVE HYTROL AE/GE/NGE	1	100-01/KH
1B	MAIN VALVE HYTROL/KN AE/GE/NGE	1	100-01/KHN
2	ISOLATION BALL VALVE	6	RB-117
3	STRAINER WITH INCORPORATED ORIFICE	1	X44-A
4	PRESSURE RELIEF CONTROL	1	CRL / CRL-60
5	CHECK VALVE	2	CDC-1 (#)
6A	HYDRAULIC LIFT LIMITER	1	X102-F
6B	MECHANICAL LIFT LIMITER	1	X102A
7	AUXILIARY VALVE HYTROL	1	100-KHR
8	RESTRICTION ASSEMBLY	1	X58A-CSA
9	PRESSURE REDUCING CONTROL	1	CRA
10	NEEDLE VALVE	1	6120
11	ONE-WAY FLOW CONTROL	1	CV

OPTIONAL FEATURES			
No	**Description**	**Qty**	**Type**
L	LOW FLOW SYSTEM	1	LFS

NOTES

AE/GE : DN 32 - DN 400 / NGE : DN 50 - DN 600

(#) = According to valve size this feature type could change

OPTIONAL FEATURES : —— —— —— ——

NOT FURNISHED BY CLA-VAL : —— – ——— – ——

Operating data

1.1 SURGE RELIEF CONTROL

Pressure relief control (**4**) remains closed when upstream pressure is less than the set point of control (**4**). When upstream pressure exceeds set point of control (**4**), it opens. This relieves the main valve cover pressure downstream and the main valve (**1**) opens.

Pressure relief control (4) adjustment: Turn adjusting screw clockwise to increase pressure setting.

1.2 LOW PRESSURE CONTROL

Pressure reducing control (**9**) remains closed when upstream pressure exceeds the low pressure setting. This closes auxiliary valve (**7**). When upstream pressure lowers to the set point of control (**9**), it opens. This opens auxiliary valve (**7**) which in turn permits line pressure to open the main valve (**1**).

Pressure reducing control (9) adjustment: Turn adjusting screw clockwise to increase pressure setting.

Control (**9**) may be adjusted after the valve is installed as follows:

1. Install a pressure gauge between isolation ball valve (**2E**) and needle valve (**10**).
2. Turn the adjusting screw on control (**9**) counter clockwise to relieve the spring load. This is the lowest setting for control (**9**).
3. Close needle valve (**10**) and open isolation ball valve (**2E**).
4. Pressurize the main valve (**1**) in the closed position and bleed air from all high points. Normal pressure should be shown on the pressure gauge.
5. Close isolation ball valve (**2E**).
6. Slightly open needle valve (**10**) and when the desired low pressure opening is reached, close needle valve (**10**).
7. Turn control (**9**) adjusting screw slowly clockwise until control (**9**) opens which in turn opens auxiliary valve (**7**) and the main valve (**1**).

   The following methods may be used to determine when the main valve (**1**) opens:

   - 6" and larger size valves: Observe stem in type X101 position indicator.
   - 4" and smaller size valves: Observe main valve (**1**) discharge if visible.

   Install a pressure gauge in the main valve cover and the indicator will "DIP" when the main valve (**1**) opens.
8. Open isolation ball valve (**2E**).

1.3 CLOSING SPEED

Needle valve (**11**) controls the closing speed of the main valve (**1**).

Needle valve (11) adjustment: Turn the adjusting stem clockwise to make the main valve (**1**) close more slowly.

Note: Do not close one-way flow control (**11**) completely or the main valve will not close (suggested initial setting of needle valve is 1 turn open).

1.4 REVERSE FLOW FEATURE

When the inlet pressure of main valve (**1**) is becoming lower than its outlet pressure, respectively than the atmospheric pressure, the check valve (**5A**) discharges the cover pressure of main valve (**1**) to its inlet, the check valve (**5B**) prevents any supply of pressure into the cover chamber: therefore, the main valve (**1**) is opening in reverse flow, allowing either the atmospheric pressure or the outlet pressure to flow back into the system protected by the surge anticipator valve.

1.5 FLOW LIMITING FEATURE

Flow limiter (**6**) limits the opening of the main valve (**1**). Turn the adjusting screw counter clockwise all the way out to permit full opening of the main valve (**1**). Turn the adjusting screw clockwise to limit the opening of the main valve (**1**). Position indicator X101 indicates how far the main valve (**1**) is open.

1.6 ▸ (E*) EUROPEAN STANDARDS

ITEM (**2**) - Isolation ball valve:

The isolation ball valves are used to isolate the pilot system from main line pressure.

These valves (**2A**), (**2B**), (**2C**) and (**2E**) must be open during normal operation, with the exception of cock (**2D**), to be closed.

ITEM (**3**) - Y-strainer with incorporated orifice:

The strainer is installed in the pilot supply line to protect the pilot system from foreign particles. The strainer screen must be cleaned periodically.

1.7 ▸ CHECK LIST FOR A PROPER OPERATION

- ☐ System valves open upstream and downstream.
- ☐ Air removed from pilot system at highest points.
- ☐ One-way flow control (**11**) open at least ¼ turn.
- ☐ Isolation ball valve (**2E**) full open.
- ☐ Needle valve (**10**) closed.
- ☐ Isolation ball valves (**2A**), (**2B**) and (**2C**) open.
- ☐ Gauge isolation ball valve (if no gauge mounted) (**2D**) closed.
- ☐ Remote sensing line properly connected.
- ☐ Periodic cleaning of strainer (**3**) is recommended.

1.8 ▸ ADJUSTMENT PROCEDURE

1.8.1 ▸ PELIMINARY ADJUSTMENTS

1. Turn adjusting screw on control (**4**) all the way in, clockwise. Do not force.
2. Turn adjusting screw on flow limiter (**6**) stem valve all the way in, clockwise.
3. Turn adjusting screw on control (**9**) all the way out, counter clockwise.
4. Open one-way flow control (**11**) one ½ turn.
5. Open isolation ball valve (**2E**) all the way.
6. Close needle valve (**10**).
7. Open all ball valves (**2A**), (**2B**) and (**2C**) in the pilot system and also in the remote sensing line.
8. Open gate valve upstream of main valve (**1**).

1.8.2 ▸ ADJUSTMENTS TO BE MADE WITH PUMP STOPPED BUT WITH SYSTEM CHARGES TO PRESURE

1. Adjust control (**4**) until the main valve (**1**) will just stay closed. This is done by backing out on the adjusting screw of the control (**4**) until the main valve (**1**) just starts to open, then turn it in approximately ¼ to ½ turn.
2. Turn adjusting screw on control (**9**) in clockwise until main valve starts to open, then continue for one to two additional turns.
3. As main valve (**1**) starts to open, back out on flow limiter (**6**) adjusting screw until main valve (**1**) opens far enough to drop the main line pressure approximately 25%.
4. Then back out on control (**9**) adjusting screw counter clockwise until the main valve (**1**) starts to close then back out ½ turn more.
5. Check operation of valve by closing isolation ball valve (**2E**) and opening needle valve (**10**). As soon as main valve (**1**) opens, close needle valve (**10**) and open isolation ball valve (**2E**); Main valve (**1**) should close.
6. Start pump and re-adjust control (**4**) until main valve (**1**) just stays closed as in (point 1. / chapter 1.8.2).

1.9 ▸ OPERATING DESCRIPTION

The 52-03R surge control valve is designed to be used in conjunction with a booster pumping system to prevent excessive surge pressure in the event of power failure. The valve is hydraulically operated with pilots that will cause the valve to open on either a low pressure or high pressure wave. Under normal operation the valve can function as a relief valve which can be set to open at any pressure above the normal operating pressure. The low pressure pilot can be set to open the main valve (**1**) at any pressure below its normal operating pressure.

Power failure to a booster pump will usually result in a down surge in pressure followed by an up surge in pressure. The 52-03R surge control valve will open on this initial down surge in pressure and will remain open so that when the high pressure wave returns it will pass through the valve without generating a large up surge in pressure. After this wave has passed the valve will then close slowly without generating any further pressure surges.

Referring to the 52-03R schematic, pressure from the remote sensing connection flows through strainer (**3**) into the diaphragm chamber of the main valve (**1**). From the diaphragm chamber the fluid flows out through the flow limiter (**6**) then to the auxiliary valve (**7**) to the downstream side of the valve. The auxiliary valve (**7**) is kept closed by pressure from the remote sensing connection flowing through an orifice fitting into the diaphragm chamber of the auxiliary valve (**7**). The control (**9**) is the low pressure pilot and is a normally open pilot held closed by pressure under its diaphragm from the remote sensing connection. The relief pilot (**4**) is a normally closed pilot and required pressure under its diaphragm to cause it to open against its spring setting.

The relief pilot should be adjusted so that the main valve (**1**) will just stay closed during a pumping condition. The low pressure pilot (**9**) must be set so that it will open on the initial down surge created by the pump failure but will again close as soon as the initial down surge has passed. The initial down surge in pressure will open the low pressure pilot (**9**) which will bleed the pressure off of the cover chamber of the auxiliary valve (**7**) faster than it can be supplied trough the orifice restriction (**8**) causing the auxiliary valve (**7**) to open. If the system pressure is still positive during the down surge in pressure, the pressure under the main valve disc will push valve open and the fluid in the main valve diaphragm chamber will evacuate trough the flow limiter (**6**) trough auxiliary valve (**7**) to the downstream side of the valve. The flow limiter (**6**) is used during this part of the relief cycle to prevent the valve from going too far open which could drop the system pressure too low in which case the low pressure pilot would not close. The valve is now open so that when the up surge in pressure returns, it will pass through the valve without creating any undue pressure surges on the system. If the main valve (**1**) is not open far enough when the up surge in pressure returns, it will open the relief pilot which will in turn open the valve further to relieve any excess pressure. As soon as the pressure rises above the set point of the low pressure pilot (**9**), it will close, which will in turn close the auxiliary valve (**7**) and the main valve (**1**) will then start to close trough the needle valve (**11**). During the closing cycle the main valve is under control of the relief pilot which will prevent any surges to the system.

If during the initial down surge in pressure following the pump failure the system pressure should go negative, then the check valve (**5**) will prevent atmospheric pressure from coming into the main valve diaphragm chamber and the negative pressure from the system will be applied to the main valve diaphragm chamber trough strainer (**3**) and from the remote sensing connection trough the orifice restriction (**8**) through the low pressure pilot (**9**) and the auxiliary valve (**7**) which will cause the main valve (**1**) to open. As soon as the negative pressure dissipates and returns to normal, the valve will close in the normal manner under control of the relief pilot.