Installation, Operation & Maintenance

Aquestia
Directing the Flow

DOROT Control Function Surge Anticipation (RE)

Control Function Surge Anticipation (RE) **Surge Anticipating Using 31-100 and 68510 Pilots**	
Applicable Series:	Sizes:
S100, S300	3” - 6” / 80-150mm

1. Function Description

Dorot Series 300 Surge Anticipating Valve (’30-RE’) is an automatic control valve, activated by the pressure of the pipeline. It protects the pumping system from water hammer caused by sudden pump shut-off (during power failure, for example). Assembled at a T-junction on the main pipeline, the valve instantly opens if the pump stops operating; relieving the return high pressure wave. The valve slowly closes once pressure returns to a static level. The ’30-RE’ can also function as a pressure relief valve.

2. Technical Features

- Media: Water; natural, non-aggressive fluids
- Pressure rating: PN16 or PN25 (250psi or 360 psi) per specific valve-model
- Temp. range:
  S300: 2 – 80°C (35 - 176°F)
  S500/S100: 2 – 60°C (35 - 140°F)
- Max. flow velocity for intermittent operation: 8 m/sec (26 ft/sec)

Notes:

- In case the designed/actual operating conditions are not suitable for the above defined standard features, please contact Aquestia Applications-Engineering.
- Refer to specific valve model publications for further details.

3. Safety Guidelines

- Injury or damage to the system/surroundings may occur if installation, commissioning, operation or maintenance instructions are not followed correctly, or if applicable codes of practice and regulations are ignored.
- Dorot valves are designed for use in fresh water-systems. Please consult Aquestia Applications-Engineering in case other media is to be used.
- Be sure to depressurize the valve, prior to any disassembly of valve or control-trim parts.
- Electrical works (e.g. connection of solenoid-valves, limit-switches etc.), must be executed by a certified electrician.
- Errors in the layout-design, installation or operation may affect valve performance and may be a risk to the system and operators/users. Please note, the system layout, installation and commissioning of valves is the responsibility of the system designer, installer and/or user.
- In any case of doubt and prior to taking any further action, please contact Aquestia representative for assistance.

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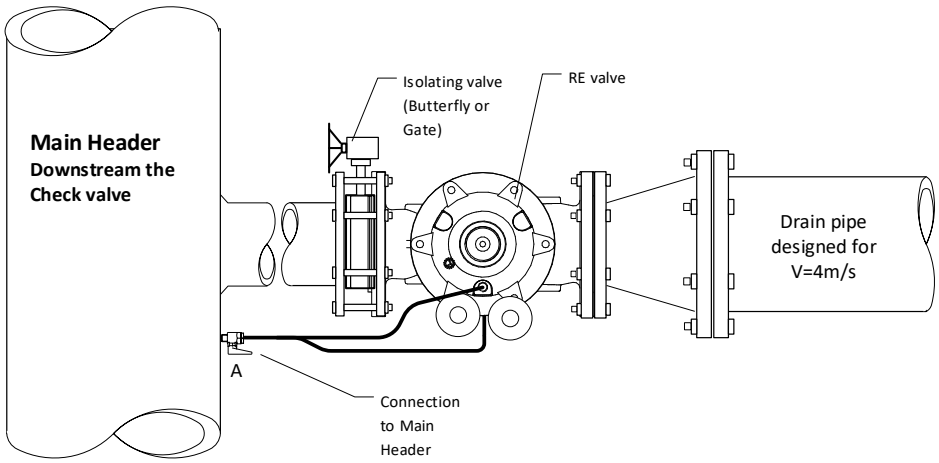
4. Installation



a. Assemble the valve on the pump station as shown in the diagram above.
b. Drainage pipe, leading from the valve to the dam/sump, should be larger than valve size to avoid a relief flow velocity higher than 5 m/sec. The discharge pipe should be 50 to 100mm larger than the valve diameter.
c. Connect Control Filter [h] (refer diagram 2, next page) to a ½" socket, welded to the upstream Main Header and connected by the supplied pipes to RE Valve control loop.

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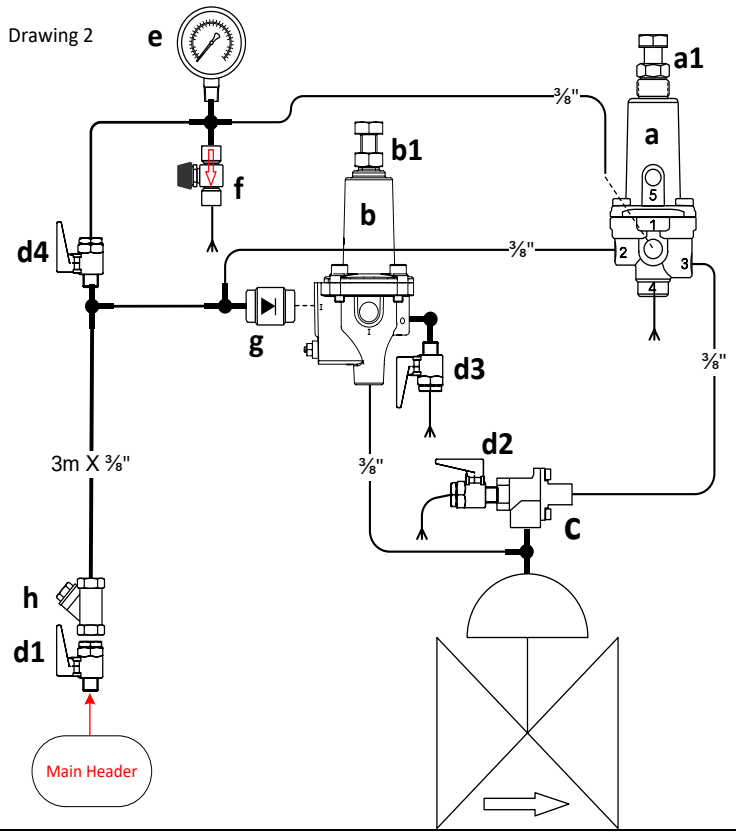
5. Control Trim Design



Main Parts

a. Low Pressure Opening Pilot Valve, Model 31-100.
b. Pressure Relief Pilot Valve, Model 68-510
c. Opening Accelerator Valve, Model 28-200
d. Ball Valve
e. Pressure Gauge
f. Needle Valve
g. Check Valve
h. Screen Filter

6. Commissioning & Adjustment

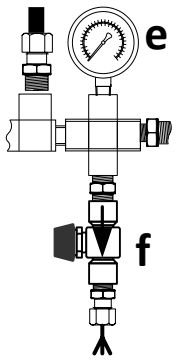
For adjustment (see diagram 2) *REMARK: Most valves are preset at the factory according to Surge Analysis. In such cases,* skip section 6.

6.1. Turn bolt [a1] counterclockwise, and bolt [b1] clockwise all the way.
6.2. Close valves [d2, d3] and start the pump.
6.3. When normal operating pressure is reached, open valve [d3] and turn adjustment bolt [b1] counterclockwise until water starts dripping from valve [d3]. Return until dripping stops, then add 1 turn. High pressure relief is now set.
NOTE: In general, the high pressure set point should be approximately 10m higher than normal pump pressure.
6.4. Open valve [d2] and execute "Low Pressure Simulation Procedure" (see section 6.7). Stop the pump. The RE valve will open on low pressure wave.
6.5. When high pressure wave arrives, main pipe pressure should exceed "low pressure opening point" by 5-10m. Reduce set point of pilot valve [a], if pressure does not rise to desired level or higher.
6.6. Use needle valve [b2] to adjust closure pace.

6.7. Low Pressure Simulation & Adjustment Procedure

This procedure allows verification of low pressure opening. It is advisable to execute this procedure periodically, to ensure correct operation of the RE valve at all times. See simulation unit operating sequence listed below: (refer to drawings 2 and 3):

Drawing 3
L.P Simulation Trim



6.7.1. Close Isolation Valve [d4].

6.7.2. Open Needle Valve [f], slightly.

6.7.3. Check Pressure Gauge [e] and allow pressure to drop to the required low pressure opening set value. Note: Opening pressure should be approx. 2/3 of static pressure.

6.7.4. Close Needle Valve [f] and turn adjustment bolt [a1] clockwise until water starts leaking from the drain port of Pilot Valve [a].

6.7.5. Open isolation Valve [d4]. The RE Valve is now in automatic mode, ready for any power failure occurrence.

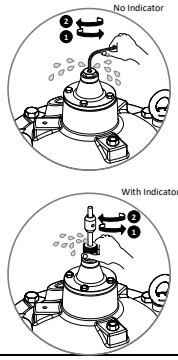
6.7.6. If set opening pressure does not comply with required value (according to the initial design and commissioning), readjust Pilot Valve [a]:
- Opening point too high: Turn adjustment bolt counterclockwise, half a turn.
- Opening point too low: Turn the bolt clockwise, half a turn.
- Repeat steps (6.7.6) until finding to required set point.

<u>Air bleed in S-300/500 valves</u>

This should be done with the control chamber pressurized (main valve closed).

Using the supplied Allen key – open air-bleed-screw at the top of the bonnet and reclose it when only water, (no air) is discharged (refer to diagram on the right).

In cases where an indicator rod exists – using hand force only – release and tighten the round nut at the top of the indicator guide.



7. Maintenance

7.1. Inspect and clean the filter [h] as water quality dictates. This service should be performed every few months.

7.2. During this operation, the main valve must be isolated from external pressure by closing upstream Isolation Valve.

7.3. Check readiness by repeating “Low Pressure Simulation Procedure” once every few months.

DOROT Control Function Surge Anticipation (RE)

8. Troubleshooting

8.1. Valve Does Not Open During Power Failure

8.1.1. Check position of valve [d2] (should be open).
8.1.2. Check minimal pressure following the pump stop.
8.1.3. Adjust low pressure opening point use "Low Pressure Simulation Procedure") set at least 10m higher than minimal pressure value.

8.2. Valve Does Not Close After Power Failure (Possible Cause: incorrect low pressure set point)

8.2.1. Verify opening point (using "Low Pressure Simulation Procedure").
8.2.2. Check pressure through power failure (stop pumps).
8.2.3. Pressure rises to [Low Pressure Opening Point + 10m] - Go to stage 6.
8.2.4. Pressure does not rise to [opening point + 10m]
8.2.5. Reduce opening point - not below 12m.
8.2.6. Set point must be reduced below 12m, limit discharge flow by throttling isolating valve, so pressure will rise to selected set point. It is recommended to assemble an orifice plate at a later stage, to prevent excessive flow (consult with factory) and to open Isolation Valve to full stroke.
8.2.7. End of maintenance operation.

8.3. Defining Problem Source: Stop pumps and supervise maintenance steps as follows:

8.3.1. Valve closes as required - end of maintenance operation.
8.3.2. Valve does not close:
8.3.2.1. Open "com" port in high pressure pilot
8.3.2.1.1. Make sure that water flows out of the port.
8.3.2.1.2. If not go to stage 6.4.
8.3.2.2. Water flow through low pressure pilot [a]. Go to stage 6.4.
8.3.2.3. Water does not flow through the high-pressure pilot. Go to stage 6.3.

8.4. Cause: Malfunction 28-200 Relay [c]

8.4.1. Water leak from 28-200 relay [c]. Go to stage 6.3.
8.4.2. Water does not leak from 28-200 relay [c]. Go to stage (6.3).
8.4.3. Dismantle valve [c], check free movement of Seal & Diaphragm Trim. Clean seat. Replace trim if needed.
8.4.4. Assemble & check Relay Valves while pressure gauge shows [opening point +10m].
8.4.5. 28-200 relay [c]. Main valve closes. End of maintenance operation

8.5. Cause: Clogged Connection to Upstream –

8.5.1. Water flow through pilot [b].
8.5.2. Water does not flow through pilot [b].
8.5.2.1. Open Needle Valve [b2], slightly.
8.5.3. Water flows. Clean and reassemble connection [A].
8.5.4. Water does not flow.
8.5.4.1. Check Main Pipe Connection Filter, Pilot [b] and Connecting Control Pipe.

8.5.5. Water flow through connection [A].

8.6. **Cause: Malfunction Low Pressure Pilot [a]**

8.6.1. Check Valve [b2] setting. Should be at least 1 turn open.

8.6.2. Water flow through low pressure pilot [a]. Go to stage 6.3.

8.6.3. Water does not flow through Pilot [a].

8.6.3.1. Disconnect pipe connected to port '1' on Pilot Valve [a] and verify flow through the disconnected pipe.

8.6.3.2. Dismantle Pilot [a], check free movements of Seal & Diaphragm Trim - clean or replace components.

8.6.3.3. Reassemble and repeat from stage 6.3.

8.7. Cause: Ruptured Diaphragm / Broken Spring / Foreign Material in Valve

8.7.1. Dismantle Bonnets, check Diaphragm & Spring, replace if needed.

8.7.2. Remove foreign material from Valve body.

8.7.3. Reassemble.