

## Model 'AV' Series, Auto Re-circulation Valves

Valution's automatic recirculation valve (ARV) is a multifunctional valve that ensures that the pump always has a predetermined minimum flow rate in the water supply and pressurized system using a centrifugal pump.

In this system, it is important because if minimal flow is not guaranteed, the centrifugal pump will cause overheating and cavitation, and if idling, it will be permanently damaged.

In particular, the minimum flow rate designed in a state where the differential pressure is maximized during the initial operation of the centrifugal pump must be preserved, and a fluid velocity control trim was applied to prevent extreme cavitation and damage in the minimum flow rate preservation area.

The automatic flow check valve of the pump automatic recirculation valve is a special type of lift check valve installed downstream of the boiler feed pump and ensures minimum flow under low flow operation.

The automatic recirculation valve incorporates the minimum flow protection function of the centrifugal pump and is a fully self-operated mechanical valve that does not require a separate actuator to save energy and reduce costs.



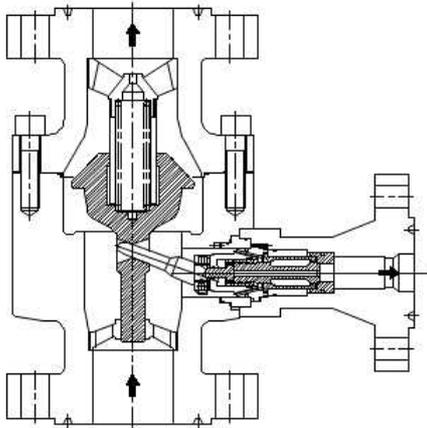
### 1. Numbering System

| Model | Standard                                    | Pr. Ratings  | End Type                                    | Body Material   | Option Nozzle                                |
|-------|---|--|---|---|--|
| AV    | 1. ASME<br>2. KS(JIS)<br>3. DIN<br>4. Other | 1. 300#/20K/PN20<br>2. 600#/40K/PN40<br>3. 900#/60K/PN63<br>4. 1500#/100K/PN100<br>5. 2500#/200K/PN250<br>6. Other | 1. RF Flanged<br>2. RTJ Flanged<br>3. Other | 1. Carbon Steel<br>2. Stainless Steel<br>3. Alloy Steel<br>4. Other | Optional<br>Branch Nozzle<br>1. No<br>2. Yes |

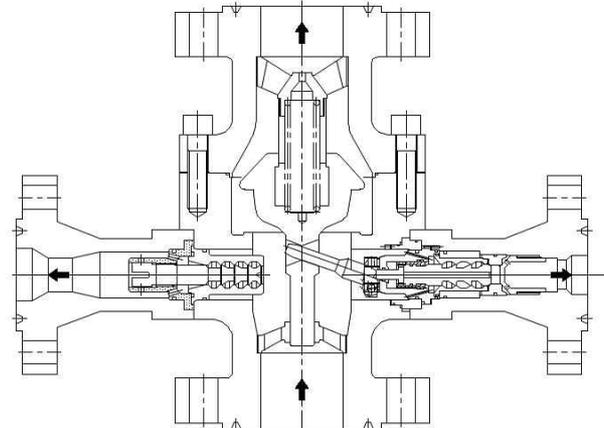
## 2. Features

1. The 'AV' valve is operates in its self actuating which incorporates the centrifugal pump's minimum flow protection.
2. Fully mechanical construction that relies on its own construction, regulating valves, saves energy and reduces costs
3. The main configuration has a check valve function
4. Bypass is a multistage vortex decompression structure that is resistant to cavitation and erosion
5. Leakage rating: ANSI Class V
6. Size & ratings : DN25~DN300, ANSI Class 300~2500LB
7. Body materials : Carbon steel, Stainless steel, Alloy steel
8. End connections : RF or RTJ Flanged

## 3. 'AV' Structure



<Fig-1, AV - Standard>



<Fig-2, AV - Branch Nozzle Type>

## 4. 'AV' Function

- 1) **Flow Perception** : The valve disk of the AV automatically recognizes the main flow of the processing system. And the main valve and bypass valve disk locations are determined according to the flow.
- 2) **Recirculation control** : Automatic recirculation valve automatically adjusts pump H-Q characteristics to achieve recycling.
- 3) **Bypass - Multistage Pressure Reduction** : The bypass control system of the automatic recirculation valve reduces the backflow medium from the outlet of the high pressure pump to a suitable backflow to the low pressure storage unit with less noise.
- 4) **Check** : The automatic recirculation valve also provides a check valve effect to prevent liquid from flowing back to the pump body.

## 5. How does the 'AV' work?

The automatic recirculation valve (ARV) is a multifunctional valve. The AV ensures that a predetermined minimum flow in the water supply system using a centrifugal pump is always transmitted through the centrifugal pump.

Therefore, the automatic recirculation valve is basically a pump protection device.

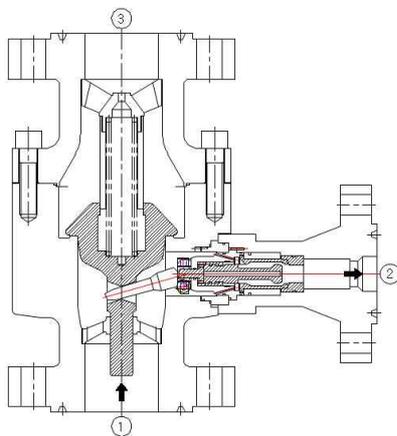
These valves function very importantly to avoid permanent damage (destruction) due to cavitation and overheating (thermal damage).

A key component of an automatic recirculation valve (ARV) is a check valve disk that detects the flow rate of fluid.

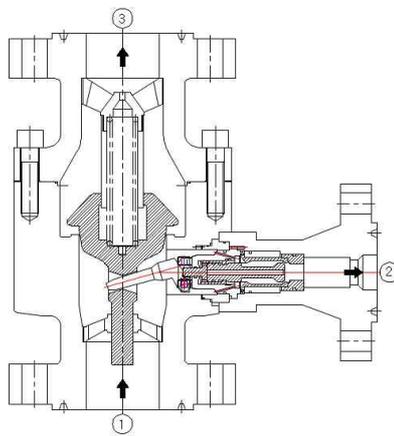
The valve disc is sensitive to flow and not to pressure.

It controls the flow of fluid and ensures that the specified fluid volume passes through.

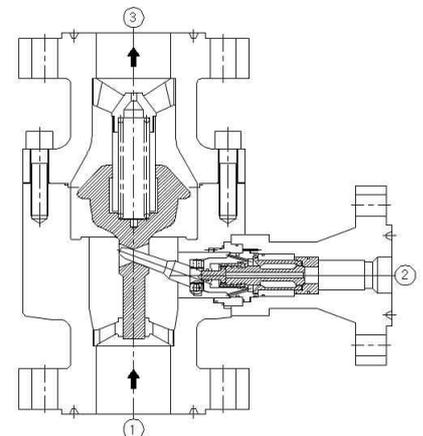
The control properties result in a consistent and stable flow over a wide range of pressures.



<Fig-3, AV - Close>



<Fig-4, AV - Slightly Open>



<Fig-5, AV - Fully Open>

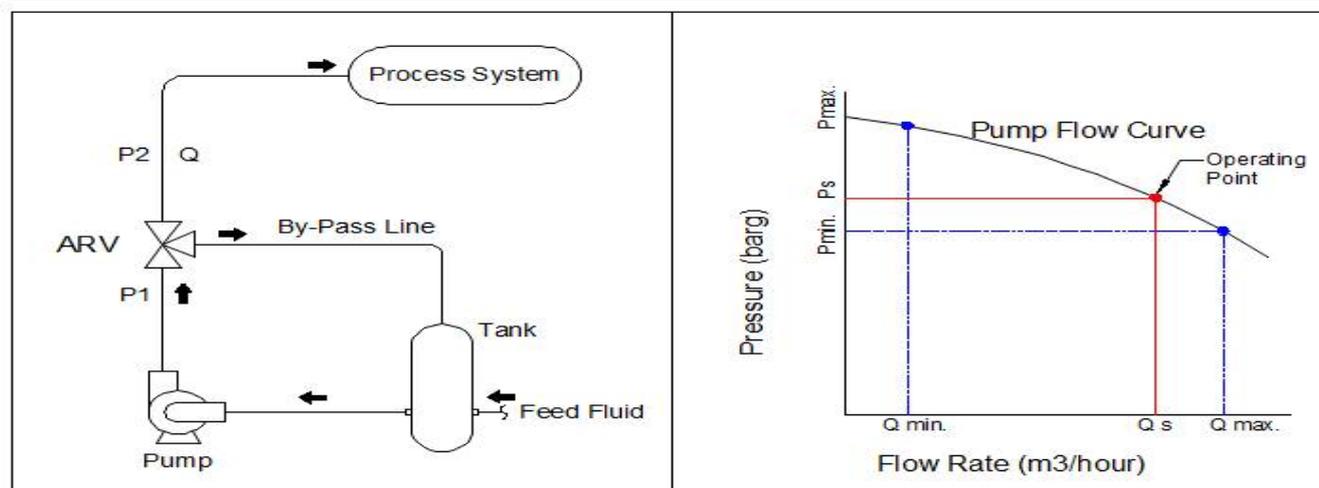
- ① Before the pump is started or when the initial startup is started, the main disk remains closed, and the bypass valve remains open. Therefore, a flow is formed in 1 --> 2 directions (Fig-3).
- ② The disk is lifted with an increase in fluid flow. As a result, the bypass elements critical to the function of the bypass are closed, limiting recirculation. This ensures that the recirculation flow is greater than the minimum volume of fluid flowing through the pump (Fig-4).
- ③ At the maximum capacity of the AV, the main disk opens to the maximum and the bypass valve closes. Therefore, the fluid flow is 1-->3 (Fig-5)

When the flow rate decreases again, the operation is reversed, and the main disk is closed, and the bypass valve is opened, resulting in recirculation.

## 6. AV Data Sheet



| ARV(Automatic Recirculation Valve) Data Sheet |                       |              |      |                    |          |          |
|---|-----------------------|--------------|------|--------------------|----------|----------|
| Customer                                      |                       |              |      | Item No.           |          |          |
| Location                                      |                       |              |      | Q'ty               |          |          |
| Project                                       |                       |              |      | Date               |          |          |
| Item  |                       |              |      | Serial No.         |          |          |
| Document No.                                  |                       |              |      | Revision No.       |          |          |
| No.   | Tag No.               |              | No.  | Line Size & Spec.  |          |          |
| 1   | Service               |              | 4    | Inlet Pipe         |          |          |
| 2   | Fluid                 |              | 5    | Outlet Pipe        |          |          |
| 3   | Fluid Type            |              | 6    | Pipe Material      |          |          |
| 4   |                       | unit         |      | Min.               | Nor.     | Max.     |
| 5   | Flow Rate             | m3/hour      |      |                    |          |          |
| 6   | Inlet Pressure        | barg         |      |                    |          |          |
| 7   | Outlet Pressure       | barg         |      |                    |          |          |
| 8   | Differential Pressure | bar          |      |                    |          |          |
| 9   | Inlet Temperature     | °C           |      |                    |          |          |
| 10  | Density               | kg/m3        |      |                    |          |          |
| 11  | Vapour Pressure       | bara         |      |                    |          |          |
| 12  | Critical Pressure     | bara         |      |                    |          |          |
| 13  | Viscosity             | cp           |      |                    |          |          |
| 14  | Valve Inlet Size      |              | 20   | Valve By-Pass Size |          |          |
| 15  | Valve Outlet Size     |              | 21   | Valve Branch Size  |          |          |
| 16  | Valve Installation    |              | 22   |                    |          |          |
| 17  | Rating                |              | 23   | End Connection     |          |          |
| 18  | Design Pressure       |              | 24   | Body Material      |          |          |
| 19  | Design Temperature    |              | 25   | Trim Material      |          |          |
| 26  | Note                  |              |      |                    |          |          |
| 27  |                       |              |      |                    |          |          |
| 28  |                       |              |      |                    |          |          |
| 29  |                       |              |      |                    |          |          |
| 30  | Revision              | Issue Status | Date | Prep'd by          | Chk'd by | App'd by |
| Valution Inc.                                 |                       |              |      |                    |          |          |



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