



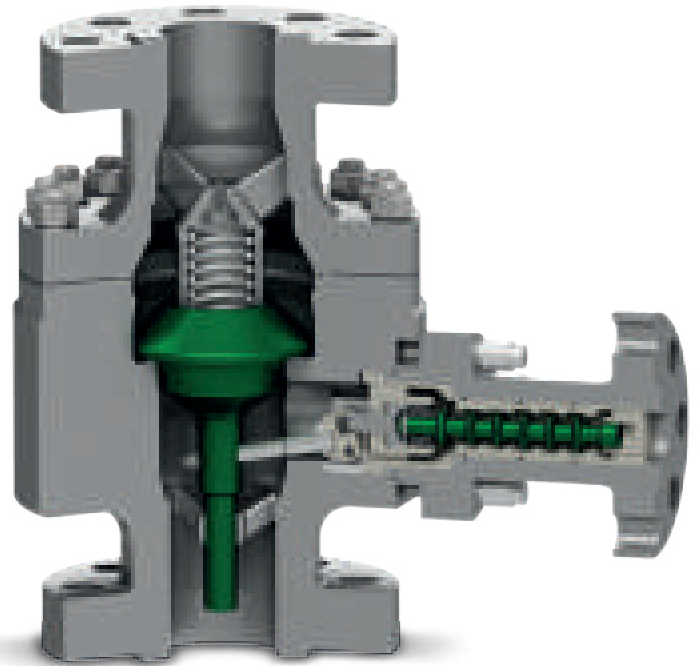
reliable pump protection

A black and white photograph of an industrial facility at night, illuminated by bright lights. The image shows a complex network of pipes, valves, and structural steel. A large, circular, ribbed structure is visible in the background. The scene is industrial and technical.

# SIP 18-20

## Fields of application

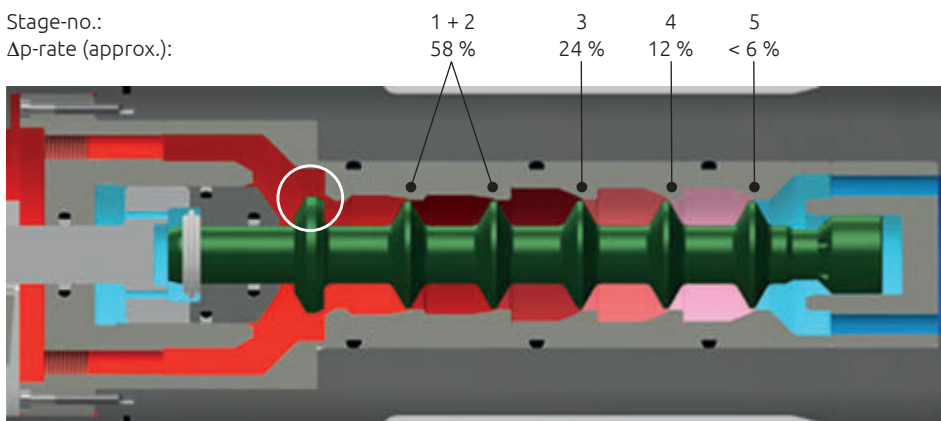
The SIP automatic recirculation valve is the completion of the Schroeder portfolio and particularly developed to cover high pressure applications up to 250 bar with frequent plant operation at minimum flow conditions, i.e. with open bypass. Typical for this valve-type and the most relevant application is the boiler feed water cycle of combined cycle power plants (CCPP). In these power plants the bfw-pumps operate frequently at minimum flow conditions with pressures of 120–250 bar. The reason is the technical concept of a CCPP (e.g. gas turbine cooling with bfw.) as well as its purpose to cover load peaks in the energy grid.



## Technical features

### Bypass control and pressure reduction

Stage-no.:  
 $\Delta p$ -rate (approx.):



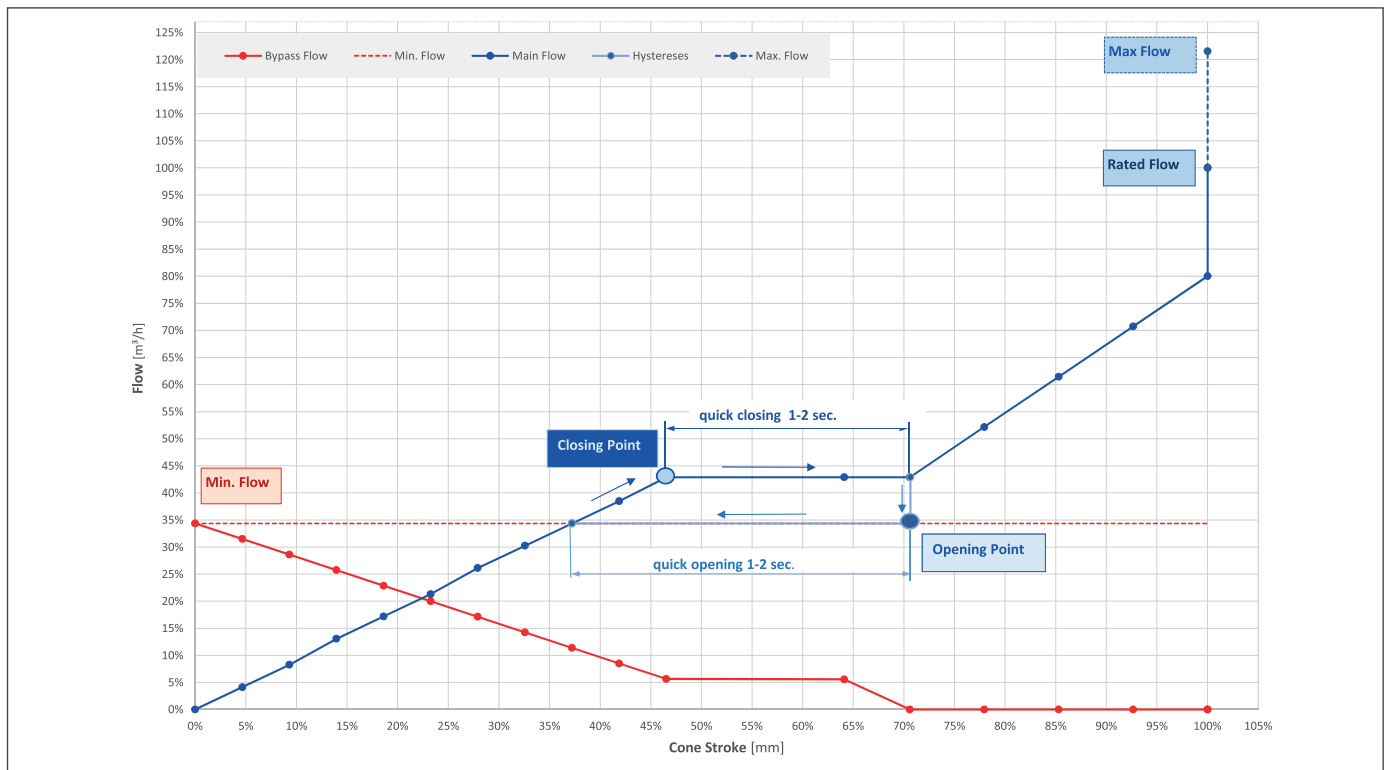
The piston seat (white circle) is separated from the pressure reduction and located at the high pressure side: Thus the shut-off function is optimally protected against cavitation attack. Even if cavitation occurs in the last throttle stages, the shut-off function is not affected and the valve remains fully functional.

### The bypass is controlled by a multistage piston providing

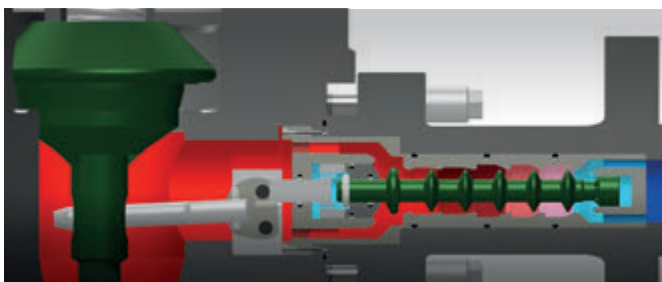
- defined multistage pressure reduction at all flow rates for cavitation-free operation at any time
- modulating flow control from 100 %–15 % bypass flow rate
- accelerated closing at < 15 % opening that avoids most wear critical operation range
- 4-stage pressure reduction at < 180 bar
- 5-stage pressure reduction at 180–250 bar
- max. pressure drop per stage,  $\Delta p_i$  max is decreasing streamwise.

## Flow characteristic

Typical flow curve of an SIP 20 – 4" valve from the Schroeder high pressure test center:



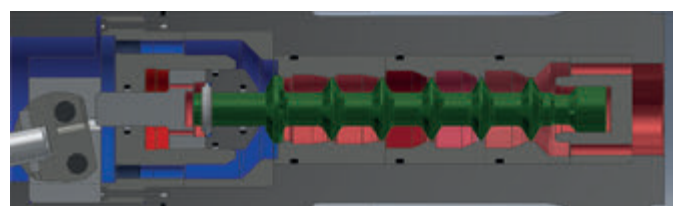
### Actuating concept



The piston is actuated directly by the cone via lever. Pressure balancing reduces the actuating forces in a manner that a pilot system is not required.

Due to this simple actuating concept the SIP18-20 stands for high technical performance with economic design.

### Non-return function



SIP-type valves have an integrated non-return function. The sketch above shows the bypass at stopped pump position and back pressure from the downstream bypass piping.

**Almost wear-free bypass operation in the entire operating range. No restrictions by switch point hysteresis.**



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