

# Steam-Conditioning Valve



**ARCA**  
VALVES  
*quality engineered  
control valves*

## Steam-Conditioning Valve

## Components Tailored to Meet Any Requirement

### Powerful actuator

Whether you want to use it for control or safety applications, the actuator for ARCA's steam-conditioning valves is designed with your plant in mind. This is made possible by our wide range of pneumatic, electric, and hydraulic actuators such as the series 812 pneumatic actuator (pictured). The valve-closing force and stroking time of all actuators is sized according to your requirements.

### Multi-functional positioner

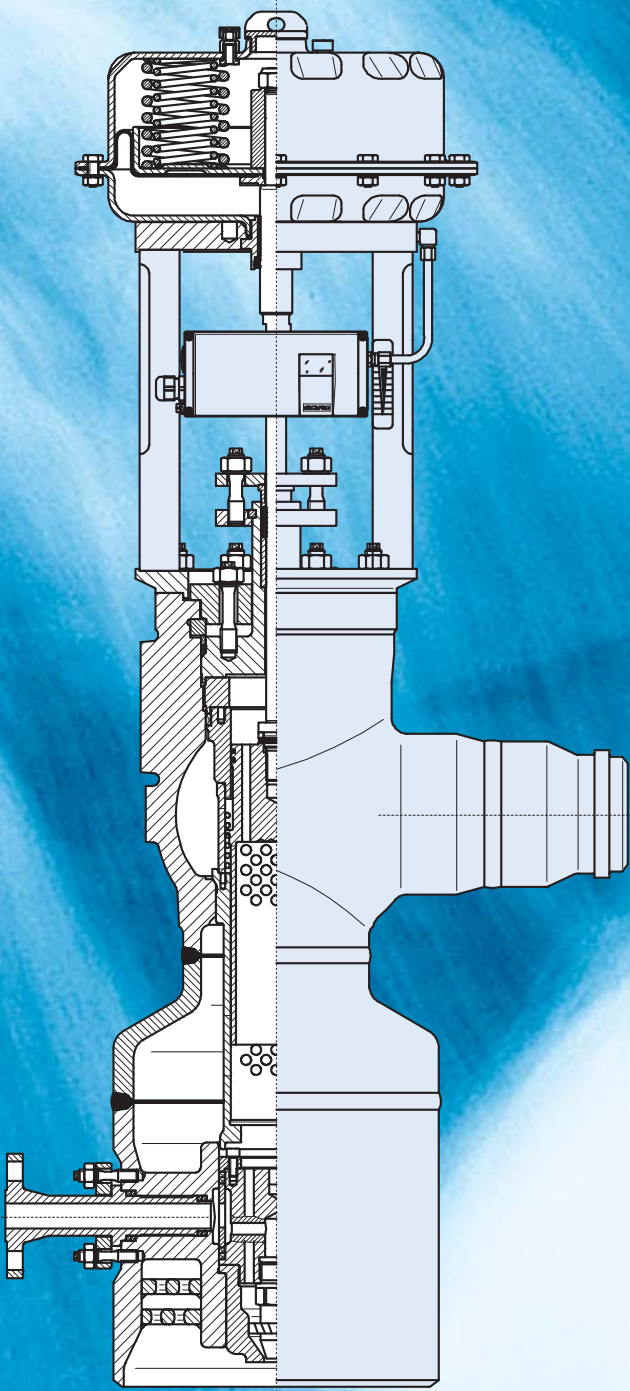
The digital ARCAPRO® positioner allows the steam-conditioning valve to communicate with the controller or process control system via a multi-functional interface. The positioner is connected to the actuator either directly or using the NAMUR mounting method and ensures that the stroke feedback is always free from backlash for maximum precision control. The standard input is the standardized 4 to 20 mA analogue signal. HART®, Profibus®, and Foundation® fieldbus standards can also be used to establish a digital interface with bidirectional data exchange (including status messages). This means that the positioner can be parameterized in the field as well as remotely via the communication system. Optional accessories such as boosters, limit switches, and solenoid valves are available to customize the valve to suit your individual requirements.

### Optimized static and dynamics sealing

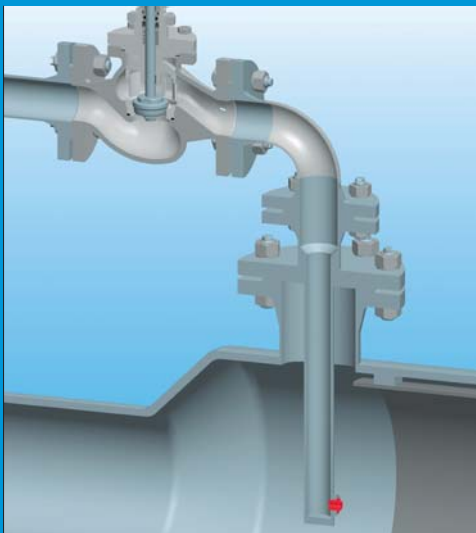
We have engineered a dynamic stem seal and static bonnet seal in the force bypass that are optimized in line with the pressure and temperature range of your application. The surface finish of the stem and the packing material are also taken into account here. The force bypass design used for the bonnet seal prevents assembly problems during service and maintenance. A self-sealing bonnet is used for high-pressure applications to ensure that the valve remains tight regardless of the torque applied to the bonnet screws. These design features also ensure that the valve seat and plug are not subjected to any lateral forces, thereby also minimizing internal leakage.

### Versatile valve trims

These are the most crucial functional elements for controlling pressure and temperature. The perforated valve plug and seat ring are designed and manufactured to suit the prevailing flow conditions and the rangeability required. The type of water-injection selected is suited to the steam and cooling water temperature. For safety applications, a dirt strainer is inserted at the opening of the steam inlet. This prevents the ingress of contaminants and protects against defects. The patented retained seat ensures that maintenance is fast, simple, and cost-effective and does not require special tools.

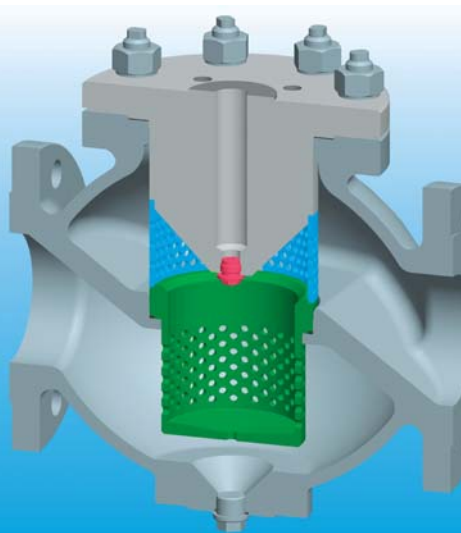


## Injection systems



### Single-phase nozzle (type 596)

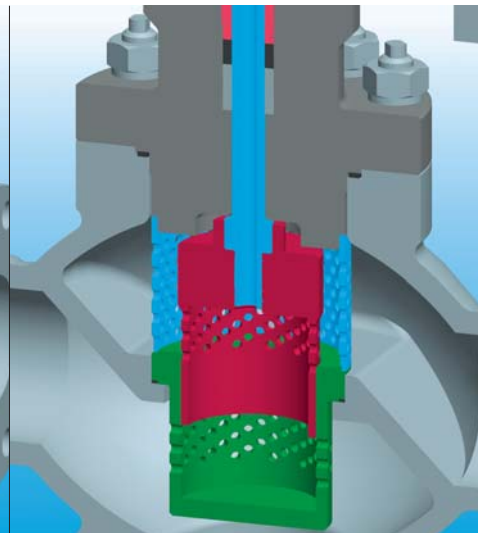
This nozzle is used as a simple means to cool overheated steam in applications that involve high-pressure water injection and a continuous supply of steam. The cooling water is regulated via the interaction between the nozzle and the cooling water control valve (in this case, an ECOTROL® valve), both of which are compatible with each other. System control ratio: up to 1 : 3.



### Mini cooler (type 595)

The mini cooler, which is based on the single-phase nozzle, is used in steam-conditioning stations that process very small quantities of injected water. Once the pressure has been reduced, the water is injected into a perforated valve seat orifice to ensure ultra-high turbulence for optimal vaporization conditions. The orifice also protects the valve housing (which can also be fitted with a condensate drain connection) from coming into direct contact with the injected water.

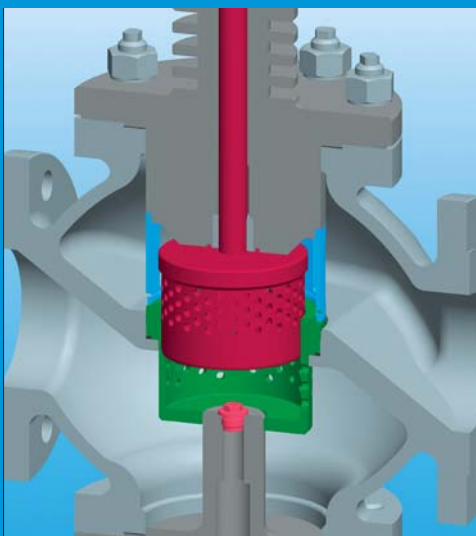
## Steam-Conditioning Valve



### Injection through valve stem

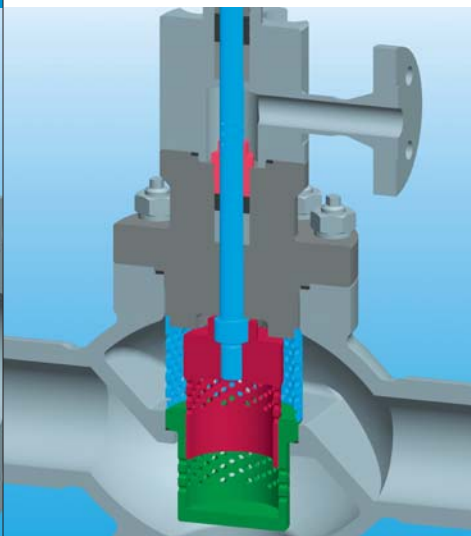
This valve features a hollow stem that uncovers a hole pattern used to inject a controlled amount of water directly into the intermediate pressure-reduction chamber (perforated plug-seat). Turbulence is at its greatest here, where cross-sectional flow areas are restricted in accordance with the quantity of steam required. This ensures optimal vaporization of the injected water and prevents the valve housing from becoming directly exposed to the medium.

## Designs



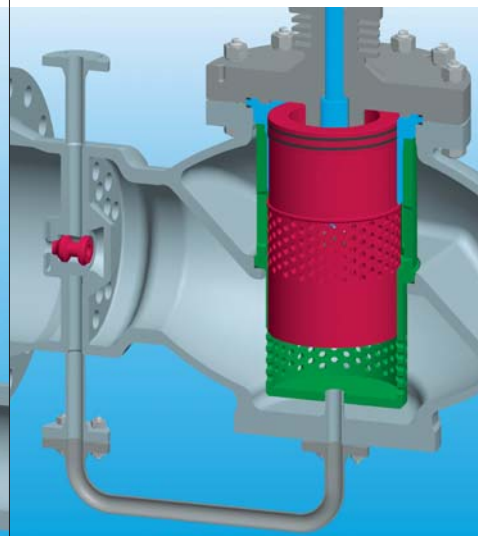
### Globe-style design with flanges (type 52...)

This cast globe-style housing from the basic line (shown here with flange) is optimized for low-pressure applications with minimal differential pressure. Pressure is reduced in the perforated plug-seat while cooling water is injected.



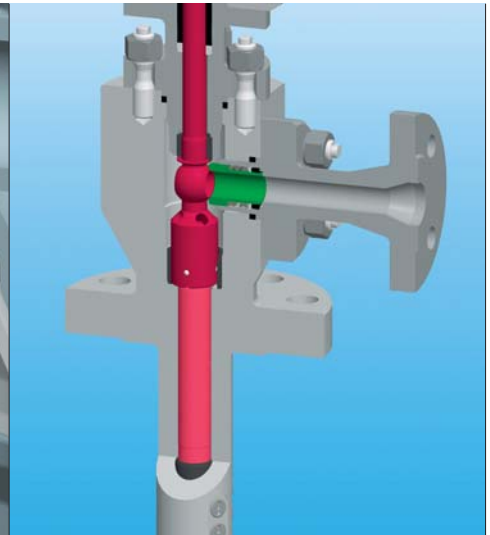
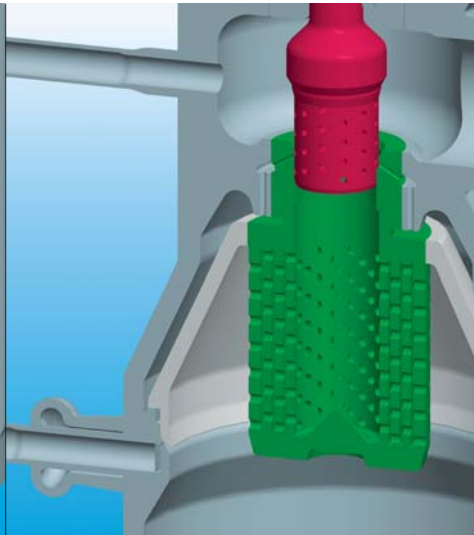
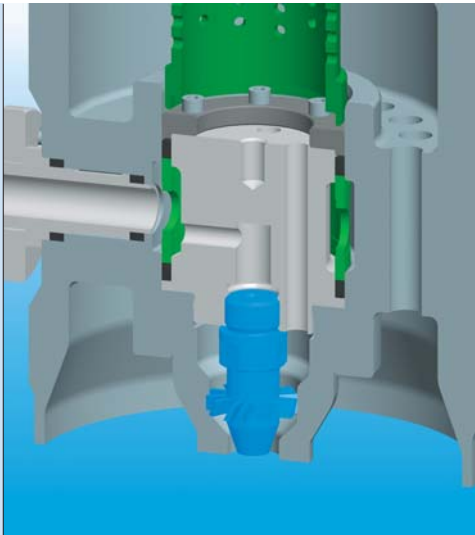
### Globe-style design with welded ends and extension (type 51...)

Steam-conditioning stations are typically welded for applications with reasonable steam pressures. Higher differential pressures must be relieved in graduated steps to reduce sound pressure. This can be accomplished using a three-stage perforated trim, for example (shown). The cast standard valve housing can also be combined with an outlet extension to accommodate expanding steam.



### Globe-style design with steam-assisted nozzle

Part of the steam is siphoned off as motive steam and transferred directly into the two-component nozzle via the auxiliary passage at an intermediate control stage of the perforated plug. The globe valve with the downstream steam-assisted nozzle replaces the additional motive steam valve otherwise required.



**Steam-assisted nozzle (type 598)**

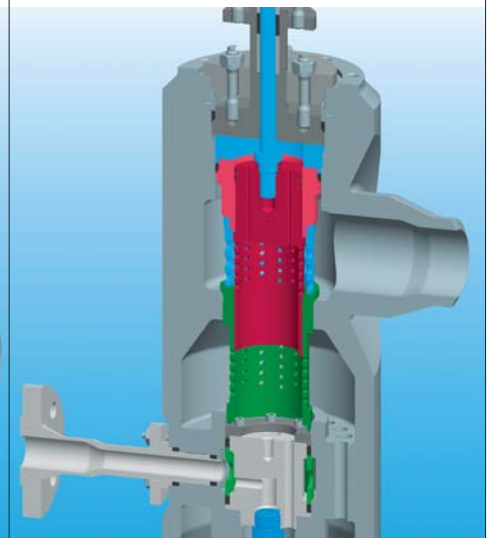
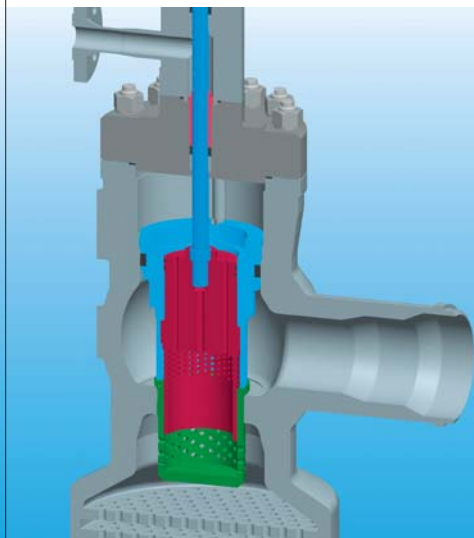
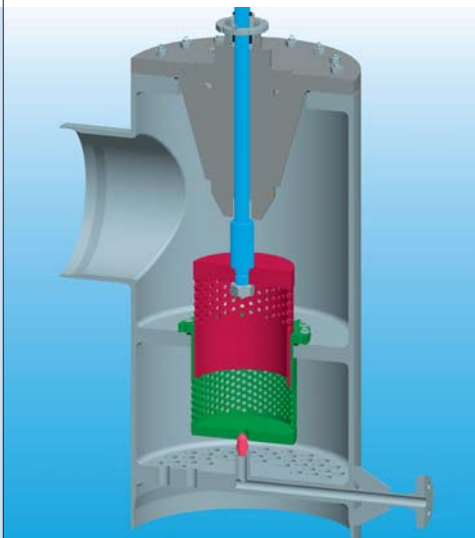
The steam-assisted spray nozzle is an optimal solution for applications in which the temperature difference ( $\Delta T$ ) between the injected water and live steam is exceptionally large, water is injected at low pressure, or minimal loads must be regulated. The nozzle extracts and atomizes the water from the live steam in accordance with the injector principle so that low-pressure vaporization paths can also be realized without turbulence via perforated plug-seats.

**Ring nozzle**

The ring nozzle is ideal for use in applications that require very large quantities of live steam and injected water. Its functional principles are similar to those of the steam-assisted spray-nozzle, although the ring nozzle siphons off the motive steam directly from the live steam at the control plug and transfers it along internal veins to the ring chamber. The steam then collides with the injected spray water (regulated by the cooling water valve) at its outer edge and atomizes it.

**Injection-desuperheater valve**

Injection-desuperheater valves are installed as a series of single-phase nozzles that sequentially activate in accordance with water-injection requirements. During operation, the differential pressure required at each nozzle remains almost entirely constant to ensure an optimal spray pattern. An additional pressure control can also be integrated for ultra-high injection pressures.



**Angle-style valve for low-pressure applications**

Low-pressure steam is reduced in the vicinity of the condensers. Angular valves made from piping component are used in applications where pressures are typically very low but large quantities of steam are generated. The temperature can be reduced via an integrated single-phase nozzle on the outlet side.

**With welded ends and extension (type 55...)**

These angle-style control valves are optimized for the flow characteristics and sound pressure levels associated with high-pressure applications. All ARCA cast angle-style housings with welded ends can be extended on the outlet side to meet individual requirements. The bonnet is available as a bolted design or as a self-sealing pinch cap from Bretschneider (optional). The cooling water chamber is constructed as shown here.

**Forged angle-style valve with steam-assisted nozzle (type 58...)**

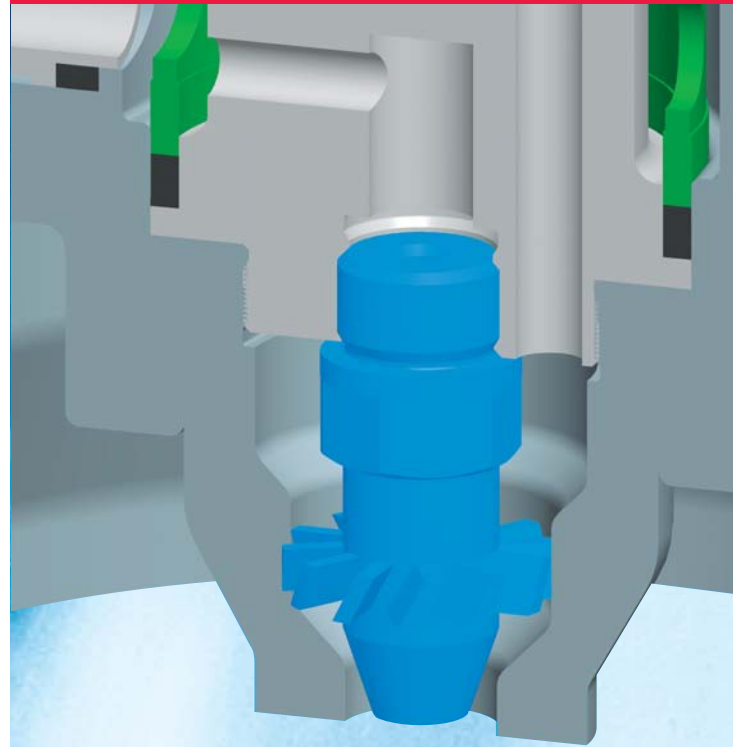
The ever-increasing demands of operating conditions can necessitate the use of fittings made from forged materials. In the design shown here, a fraction of the live steam is siphoned off at an intermediate control stage and used as motive steam by the steam assisted spray nozzle. This allows the temperature control to be maintained by one spray water control valve only; the steam valve previously required to generate the motive steam is no longer needed.

## Full control in steam conditioning

ARCA steam-conditioning valves are customized in line with your specific operating conditions. A wide range of designs and materials – from cast globe-style housings to forged angle-style valves – are available to meet all pressure and temperature requirements.

ARCA control valves optimize efficiency and enable cost-effective operation in small plants and large-scale power-generation facilities. ARCA steam-conditioning valves integrate sound-reduction measures such as perforated plugs and seat rings with graduated control to minimize the impact of sound emissions on humans and the environment. We can even dimension a silencer system that encompasses the condenser of your plant.

## Steam-Conditioning Valve



### Our innovation

- 1** Modular system with standardized components
- 2** Flow-optimized housings
- 3** Optimized trim comprising plug and seat for all application areas
- 4** Standardized interface to valve actuator
- 5** Valve trims can be completely removed

### How you benefit

- ✓ All nominal diameters
- ✓ Fewer components
- ✓ Only one special tool required
- ✓ Low noise emission
- ✓ Optimized KV values for all nominal diameters
- ✓ Adaptable to any requirements
- ✓ High control accuracy
- ✓ Wide control range
- ✓ Low noise emission
- ✓ All types of actuator can be used – pneumatic, electric, and hydraulic
- ✓ Can be easily reconfigured later on
- ✓ Maintenance work is fast and simple
- ✓ All internal parts can be removed
- ✓ No special machines required
- ✓ All interior components are clamped or screwed (no welding)

# Steam-Conditioning Valve

## General specifications

Nominal size/pressure	51... & 52...	55... & 56...	57... & 58...	59...
<b>DN (Housing)</b>	50–600 / 2"–24"	80–200 / 3"–8"	25–250 / 1"–10"	25–100 / 1"–4"
<b>PN/ANSI</b>	16–250 / 150–1500	16–250 / 150–1500	16–400 / 150–2500	16–400 / 150–2500
<b>Housing types</b>	Straight way	Angular	Angular	Angular
<b>Body style</b>	Cast	Cast	Forged	Forged
<b>Materials</b>	<b>EN</b>	<b>for temperatures</b>	<b>ASTM</b>	<b>for temperatures</b>
<b>Cast Housing</b>	1.0619 GP240GH	up to 450 °C	A 216 WCB	up to 450 °C
	1.7357 G17CrMo5-5	up to 530 °C	A 217 WC6	up to 530 °C
	1.4581 GX5CrNiMoNb19-11-2	up to 550 °C	–	–
	1.7379 G17CrMo9-10	up to 580 °C	–	–
	1.4931 GX23CrMoV12-1	up to 600 °C	–	–
<b>Forged Housing</b>	1.0460 P250GH	up to 450 °C	A 105	up to 450 °C
	1.0425 P256GH	up to 450 °C	–	–
	1.5415 16Mo3	up to 530 °C	–	–
	1.7335 13CrMo4-5	up to 570 °C	A 182 F12 Cl.2	up to 570 °C
	1.7380 10CrMo9-10	up to 600 °C	A 182 F22 Cl.3	up to 600 °C
	1.4903 X10CrMoVNb91	up to 620 °C	A 182F91 - P91	up to 620 °C
<b>Valve trims</b>	1.4021 X20Cr13			
	1.4122 X39CrMo17-1			
	1.4571 X6CrNiMoTi17122			
	1.4922 X20CrMoV1 21			
<b>Bonnet</b>	Standard, with cooling fins, self-sealing bonnet, with cooling-water injection			
<b>Plug characteristic</b>	Standard: linear			
	Optional: linear modified			
<b>Rangeability</b>	25 : 1			
<b>Seat leakage</b>	Metal sealing: class IV (0.01% of kvs)			
	Pressure balanced < 0,05 % of KV-value			

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