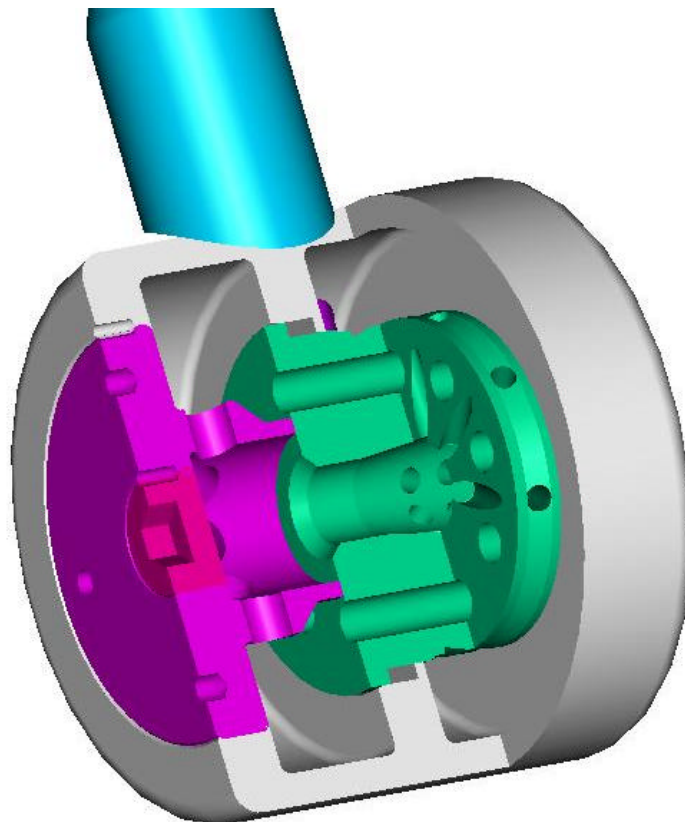


## Steam-Atomising Desuperheater



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## Application of ARTES steam-atomising desuperheaters

Steam-atomising desuperheaters are cooling systems designed for controlling the temperatures of steam and hot gases.

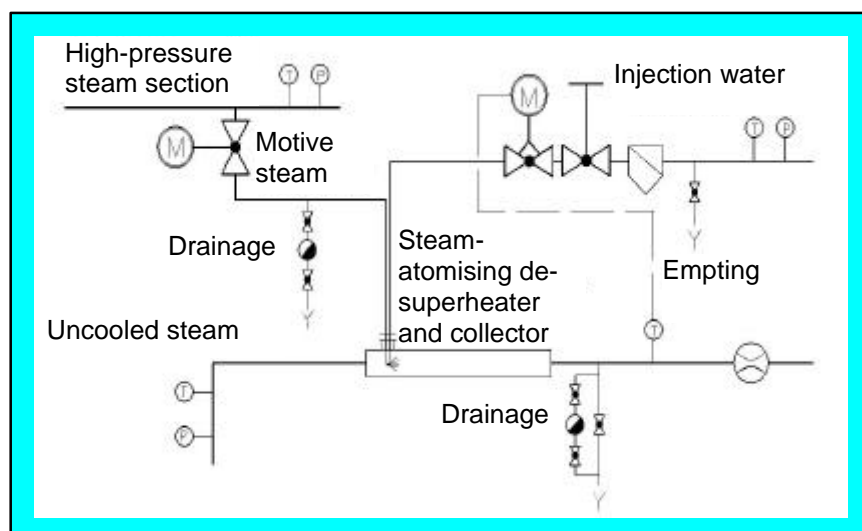
Their task is to reduce excessive temperatures in pipelines, or to provide process steam with a precisely defined temperature.

Steam-atomising desuperheaters are used to cool steam if customary desuperheaters are unsuitable or provide insufficient performance, due to difficult operating parameters.

The steam-atomising desuperheaters are two-component nozzles in which the atomiser steam escapes from the nozzle exit at a critical speed and atomises the injected cooling water into micro-fine droplets.

The typical control circuit is identical to that of a desuperheater (see *Desuperheater brochure*)

A typical control circuit is illustrated below.



## Advantages and disadvantages of the steam-atomising desuperheater

<u>Advantages of the steam-atomising desuperheater</u>	<u>Disadvantages of the steam-atomising desuperheater</u>
Excellent atomisation into small droplets, which results in good heat transfer as well as low evaporation time.	Motive steam with supercritical downward pressure gradient has to be available.
Excellent control performance with partial load.	Procurement costs for a steam-atomising desuperheater are higher than those for a customary desuperheater.
Large rangeability can be achieved.	Pipeline and stop valve for motive steam have to be available.
The controlled set temperature can be closer to the dew line (saturation vapour) than when using customary desuperheaters.	If there are low points in the motive steam line, draining measures have to be implemented.
Lower amount of excess water.	
Lower thermoshock hazard.	
The distance from the temperature measuring points to the injection point can be smaller than in the case of pressure atomisation.	
Atomiser steam causes higher turbulence in the pipe, which results in more thorough mixing.	

## Description and design of the ARTES steam-atomising desuperheater

The ARTES steam-atomising desuperheater is an **atomiser nozzle with inside mixing**.

The amount of injected water is controlled by means of an upstream ARTES control valve.

With this valve, the flow rate of the cooling water upstream of the injection nozzles is adapted depending on the load. For most applications, the motive steam is not regulated.

A means of stopping the motive steam flow has to be available or has to be installed.

The cooling water is fed into the distribution area of the housing through the lance pipe. Subsequently it is injected into the Laval channel through various radial bore holes.

The atomiser steam flows through the rear lance pipe into the steam distribution area of the nozzle housing and is fed into the steam-atomising nozzle through radial and axial bore holes. When there is a supercritical pressure ratio, the motive steam flows through the diameters in the nozzle centre and exits at the outer diameter of the nozzle at the speed of sound.

The high kinetic energy causes the water jets to be atomised into minute water droplets. The jacket steam at the outer diameter of the nozzle envelopes this dual-phase mix of steam and water droplets.

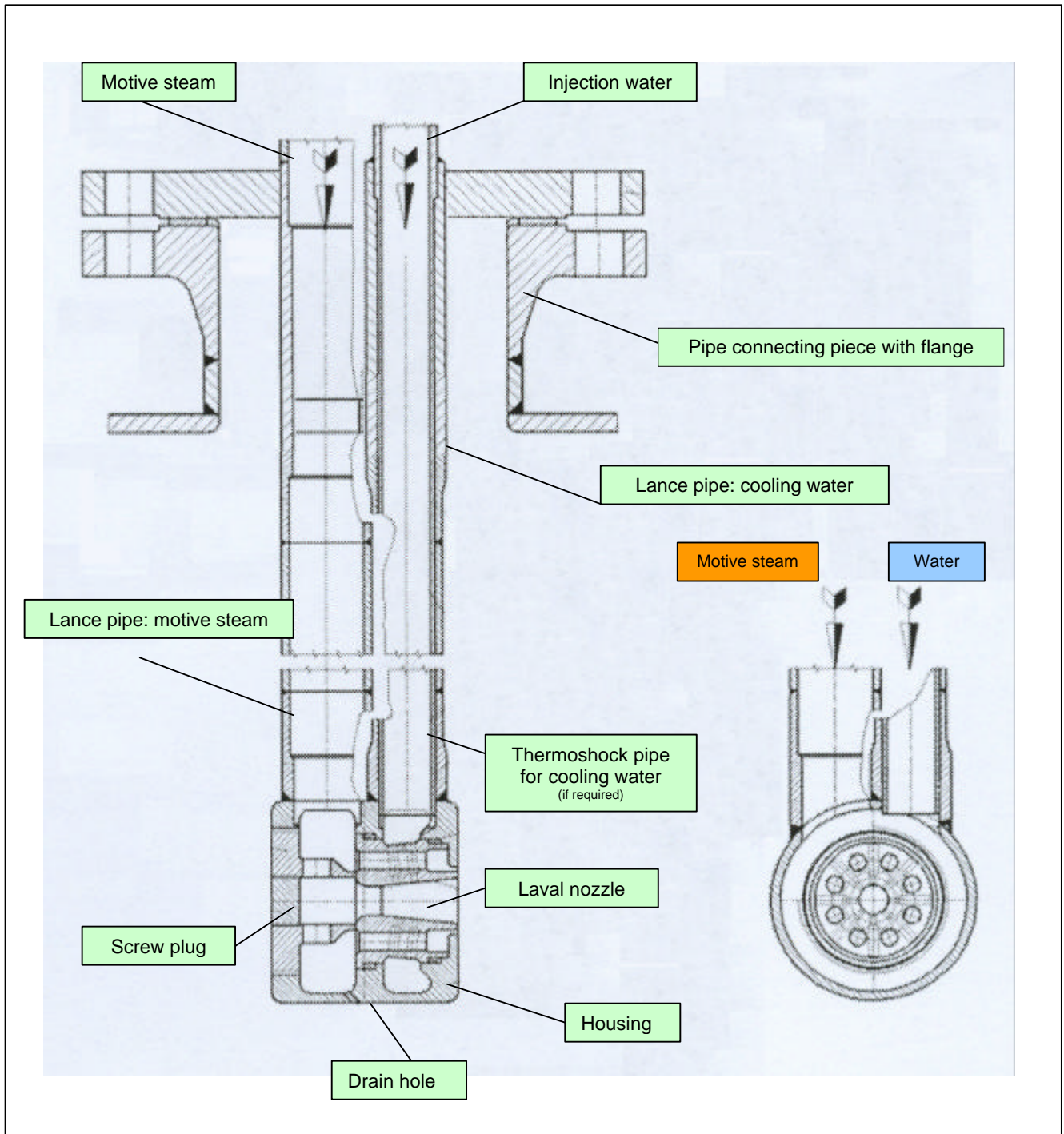
The residual larger water components are atomised into minute droplets through post-expansion and injector action.

The jacket steam additionally protects the pressurised steam line against thermoshock.

The steam-atomising desuperheater is inserted into the main steam line by means of a flanged connecting piece.


Installation and removal for checking the steam-atomising nozzle and for inspecting the steam pipe is easy if the connecting pieces for the cooling water and motive steam have a flange design.

*Design of the steam-atomising nozzle*



*Design conforms with the recommendations of VGB 540!*

## Data sheet

Steam-atomising desuperheater, type 1								
1	Customer:	ARTES no.						
2	Plant:	Item						
3	Installation location:	Quantity:						
4	ID no.							
5	<b>Pipe design</b>	Motive steam	Cooling water	Steam line				
6	Dimensions Ø D x s mm							
7	Material							
8	<b>Connections of the steam-atomising desuperheater</b>	Motive steam	Cooling water	Steam line				
9	Nominal width DN							
10	Nominal pressure PN							
11	Pressure bara							
12	Temperature °C							
13	Material							
14	Weld-on ends Ø D x s							
15	Flange ends							
16	<b>Operating conditions</b>							
17		Load case 1	Load case 2	Load case 3	Load case 4	Load case 5		
18	Medium: <b>Steam</b>							
19	Flow rate t/h							
20	Temp. On °C							
21	Temp. Off °C							
22	Pressure bara							
23	Flow speed m/s							
24	Medium: <b>Cooling water</b>							
25	Flow rate t/h							
26	Temp. °C							
27	Pressure ON bara							
28	Pressure OFF bara							
29	Kv value nf/h							
30								
31	Medium: <b>Motive steam</b>							
32	Flow rate t/h							
33	Temp. On °C							
34	Pressure ON bara							
35	Pressure OFF bara							
36	Kv value m <sup>3</sup> /h							
37								
38	<b>Acceptance</b>	Pressure equipment directive 97/23/EC, CE marking						
39		Compliance with requirements of: AD-2000						
40								
41	<b>Installation instruction</b>	Req. straight outflow zone				m		
42		Min. distance to temperature sensors				m		
48	<b>Comments</b>							
49								
50								
51								
52								
53								
54								
55								
56	Revision	0	1	2	3	4	5	6
57	Date:							
58	Created:	H.Roßmann						
59	Checked:	I. Mathes						

Data sheets are considered to be part of the offer.