



We Solve Control Valve Problems



SULZER Valves



DA-M

Steam desuperheater with multiple variable section spray nozzles for large spray water flows

- Each nozzle prevents flashing inside the nozzle
- Each nozzle maintains a certain water atomization pressure at any flow condition
- No pressure drop in the steam line
- Designed to handle large spray water flow quantities
- Distributes the spray water evenly in the steam desuperheater

General

The BTG steam desuperheater DA-M is used in desuperheater applications where large spray water flows are required for cooling of the steam.

The DA-M is part of the steam line with a number of water atomizing nozzles, OP-nozzles, attached to it. The nozzles are connected to a common spray water pipe connection.

The spray water flow is controlled by a separate spray water control valve. A liner can be installed in the DA-M to improve the system turn down or to protect the steam line.

The DA-M can easily be adapted for any special requirement, such as incorporation of separate emergency cooling arrangement or split range operation.

Operating principle, OP-nozzle

The OP-nozzle is a variable orifice, mechanically atomizing nozzle – see fig 2.

The OP-nozzle body (3) is screwed into the nozzle holder which houses the nozzle and distributes the water to the nozzle.

The cooling water enters the inner nozzle chamber (2) in the OP-nozzle through the admission holes (4). In the inner nozzle chamber the water is rotated around the control plug (1) thanks to the special arrangement of the admission holes. The design of plug and seat is made to create maximum velocity of the water at nozzle edge point.

The high velocity of the water when it leaves the nozzle – guarantee a fine atomization which provides fast evaporation of the cooling water.

In order to maintain specific pressure inside the inner nozzle chamber the control plug of the nozzle is preloaded by a spring (5). The force required to open the nozzle is set by



Fig 1 BTG Desuperheater DA-M with liner

adjusting the nut (6). The setting of the opening force is determined by the differential pressure between the cooling water and the steam and, when applicable, the temperature of the cooling water, to avoid flashing inside the nozzle.

The control characteristics of the OP-nozzle compensates for any load variation in the external water control valve by changing the orifice section of the nozzle, assuring optimum water atomization within the load range.

Installation of the DA-M

Select the location of installation carefully. This is especially important in cases where the steam velocity is low and the steam temperature is close to saturation. Straight pipe runs upstream and downstream are very important as well as the distance between the temperature sensor and the DA-M.

Use the following rules of thumb:

- Minimum straight pipe run upstream the DA-M: 6 x pipe diameter or at least 4 m / 13 ft for pipe diameters larger than, or equal to 700 mm / 28 in.
- Minimum straight pipe run downstream the DA-M: 6 m / 20 ft.
- Minimum distance to the temperature sensor downstream the DA-M: 12 m / 40 ft or 8 m / 30 ft with a protective sleeve for the thermowell. Longer distance is often required, see details below.

More detailed information about the installation is available in the BTG manual II500.10 "System Design Considerations Desuperheaters".

Technical Data

Type	DA-M		
Manufactured by	BTG, Säffle, Sweden		
Capacity	Unlimited. Depends on size and number of orifices		
Size of OP-nozzle	OP-20	OP-28	OP-40
Max. K_v (m ³ /h)	2.0	3.6	5.9
Max. C_v (US gal/h)	2.3	4.2	6.8
Rangeability			
- Nozzle turndown	Limited only by turndown of selected water control valve		
- System turndown	Min steam velocity for temperature control: 8 m/sec / 30 ft/sec		
Pressure class	DIN PN 16-320 ANSI 150-2500		
Differential pressure Water/steam	1-20 bar / 15-300 psi See diagram, fig 5		
Materials			
- Nozzle body	X19CrMoVNb11.1, AISI 616		
- Plug	X19CrMoVNb11.1		
- Spring	Heat resistant spring steel, NIMONIC 90 for Boiler applications		
- Adjustment nut	X20Cr13, AISI 420		
- Steam pipe / liner	10CrMo910, A335-P22 or 13CrMo44, A335-P12 or St35.8 (A105)		

- Water pipes 13CrMo44, A335-P12 or St35.8 (A105)

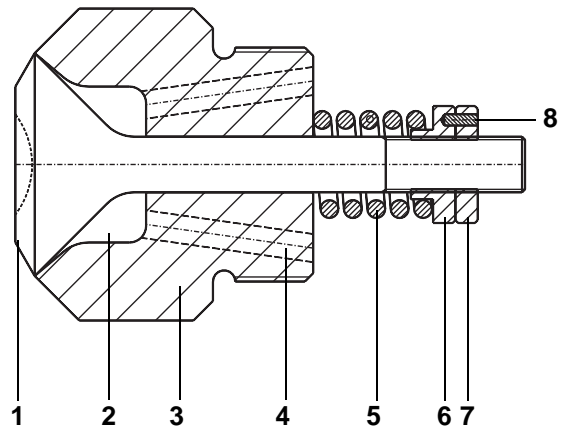


Fig 2 Cross-section of OP-nozzle head

- 1 Nozzle plug
- 2 Inner nozzle chamber
- 3 Body
- 4 Water channels
- 5 Spring for pressure control
- 6 Adjustment nut
- 7 Lock nut
- 8 Pin

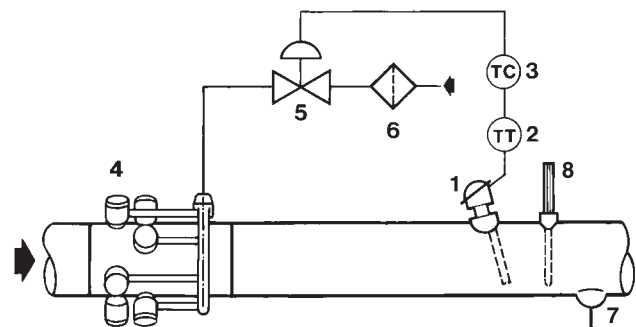


Fig 3 Typical installation of DA-M

- 1 Temperature sensor
- 2 Temperature transmitter
- 3 Temperature controller
- 4 Desuperheater DA-M
- 5 Valve for water injection
- 6 Cooling water strainer
- 7 Drain
- 8 Control thermometer

Table 1 Typical dimension

Nominal pipe diameter	L	A	B	Nominal Water connection
mm / inch	mm / inch	mm / inch	mm / inch	mm / inch
200 / 8	650 / 25.6	280 / 11.0	450 / 17.7	50 / 2
250 / 10	700 / 27.6	310 / 12.2	450 / 17.7	50 / 2
300 / 12	750 / 29.5	335 / 13.2	500 / 19.7	50 / 2
350 / 14	800 / 31.5	350 / 13.8	500 / 19.7	65 / 2.5
400 / 16	850 / 33.5	380 / 15.0	520 / 20.5	65 / 2.5
450 / 18	900 / 35.4	405 / 15.9	520 / 20.5	80 / 3
500 / 20	1000 / 39.4	430 / 16.9	550 / 21.7	80 / 3
550 / 22	1000 / 39.4	455 / 17.9	550 / 21.7	80 / 3
600 / 24	1000 / 39.4	480 / 18.9	600 / 23.6	100 / 4
650 / 26	1000 / 39.4	505 / 19.9	600 / 23.6	100 / 4
700 / 28	1100 / 43.3	530 / 20.9	620 / 24.4	100 / 4
800 / 32	1100 / 43.3	580 / 22.8	620 / 24.4	100 / 4
900 / 36	1200 / 47.2	630 / 24.8	750 / 29.5	150 / 6
1000 / 40	1200 / 47.2	690 / 27.2	800 / 31.5	150 / 6
1100 / 44	1200 / 47.2	740 / 29.1	800 / 31.5	150 / 6
1200 / 48	1300 / 51.2	800 / 31.5	850 / 33.5	150 / 6
1300 / 52	1300 / 51.2	850 / 33.5	850 / 33.5	150 / 6
1400 / 56	1400 / 55.1	900 / 35.4	900 / 35.4	150 / 6
1500 / 60	1400 / 55.1	950 / 37.4	920 / 36.2	150 / 6

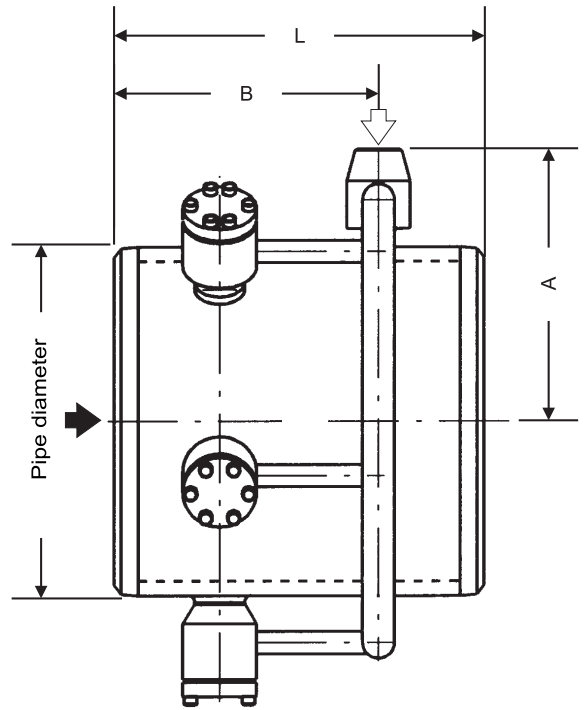


Fig 4 Dimensions

The dimensions are typical. The length of the DA-M and the water connection are dependent on the number of nozzles required.

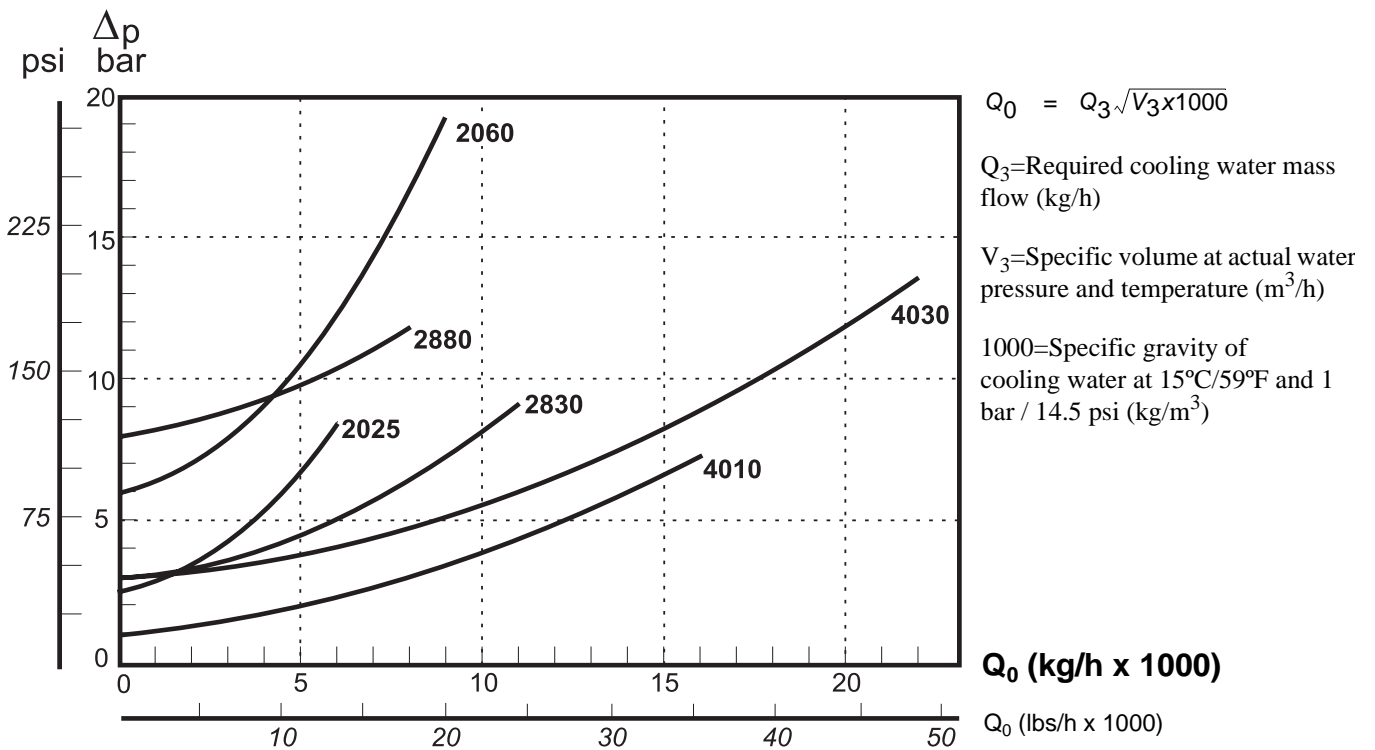


Fig 5 Capacity curves for a single nozzle with standard spring settings

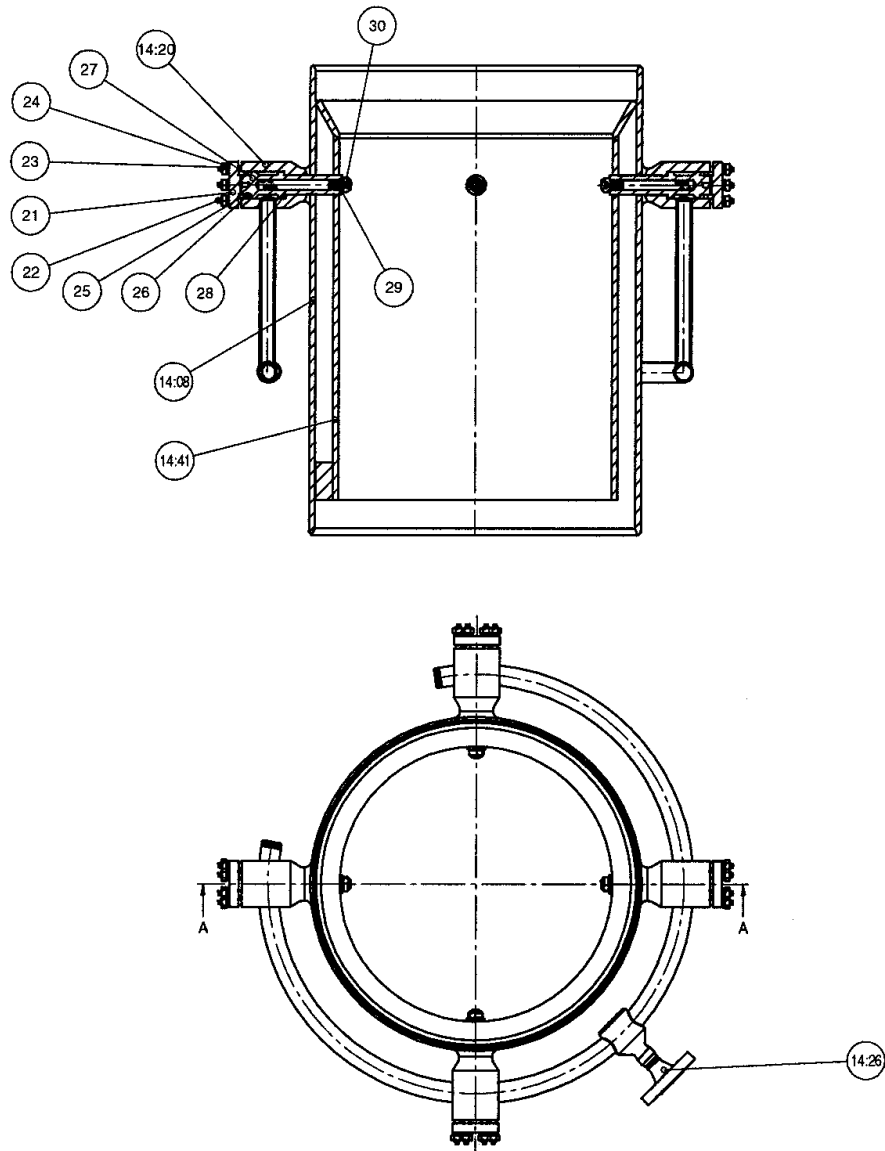


Fig 6 Cross section of DA-M with liner

- | | | | |
|-------|------------------|----|------------------------|
| 14:8 | Outlet | 24 | Lock washer |
| 14:20 | Nozzle stud | 25 | Spacer ring |
| 14:26 | Water connection | 26 | Packing |
| 14:41 | Liner | 27 | Nozzle holder |
| 21 | Flange | 28 | Gasket |
| 22 | Screw | 29 | Lock washer |
| 23 | Nut | 30 | Spray atomizing nozzle |

CCI reserves the right to make technical improvements.

**For sales contacts, please refer to
www.ccivalve.com**