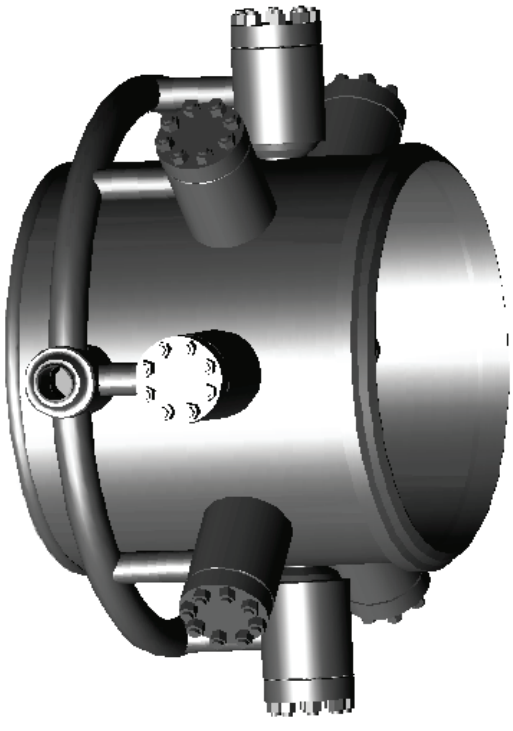
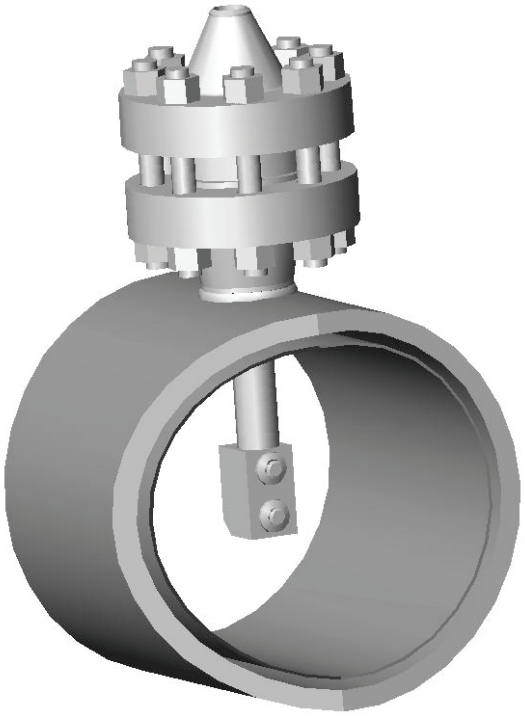
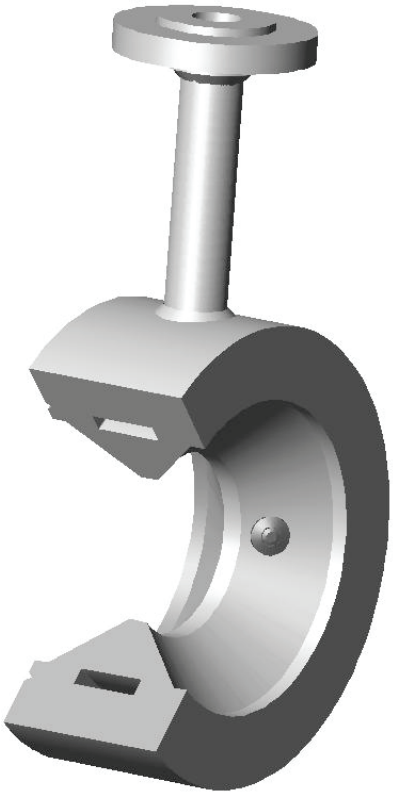
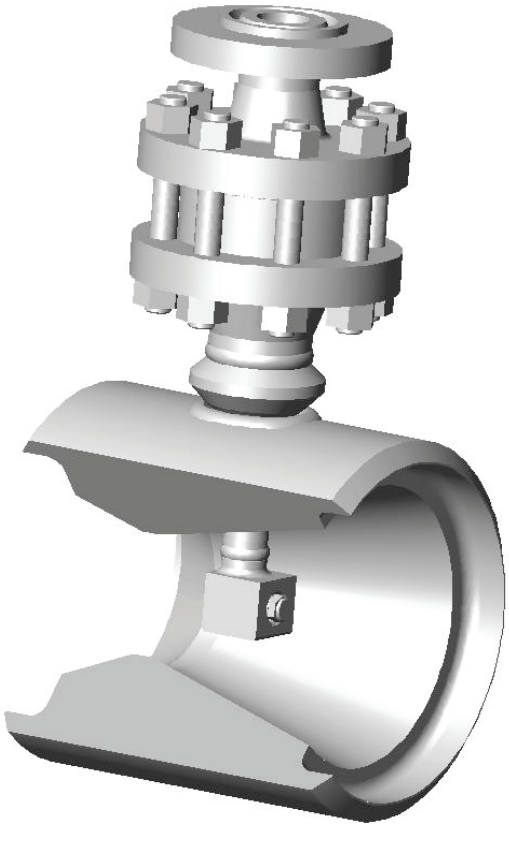
10000 SERIES

Steam Desuperheater With Spray Nozzles









Engineering Data

General
The desuperheaters Series 10000 provide the right technical solution to reduce steam temperature when large spray water flows are required.
The superheated steam flows through a pipe section where one or more spray nozzles are fitted. The nozzles atomize the water producing small droplets that quickly evaporate thanks to the heat transferred by the superheated steam. This heat transfer allows to reduce the steam temperature.

RTD - RING TYPE DESUPERHEATER

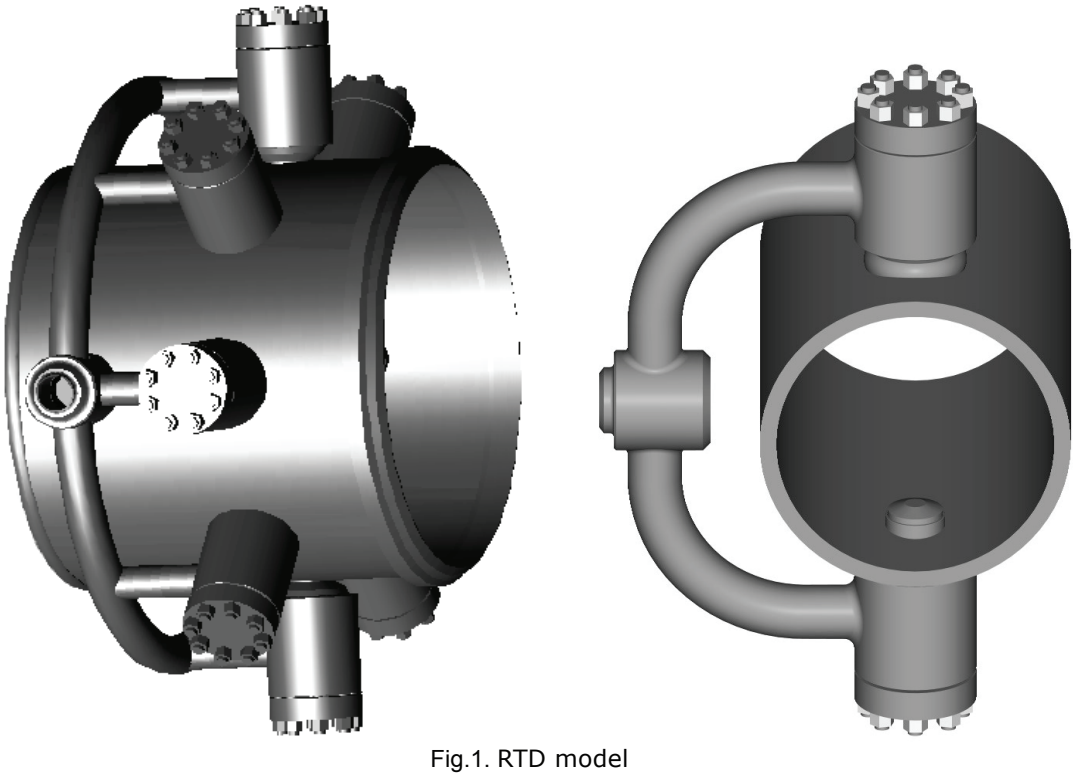


Fig.1. RTD model

Technical Data

Connection (Spray water side): Flanged RF for ANSI 150 ÷ 600
Flanged RTJ for ANSI 900 ÷ 2500
Butt welding ends

Nozzle Sizes:

Nozzle type	Number of nozzles *	Cv value
OP14	1	1
OP14	n	n
OP20	1	2
OP20	n	2·n
OP28	1	5
OP28	n	5·n
OP40	1	10,4
OP40	n	(10,4)·n

* n depends on the working conditions

Characteristic: See Fig. 2

Flow control: Separate spray water control valve

Materials: With reference to the Fig. 3 the materials used are those indicated in Tab.1

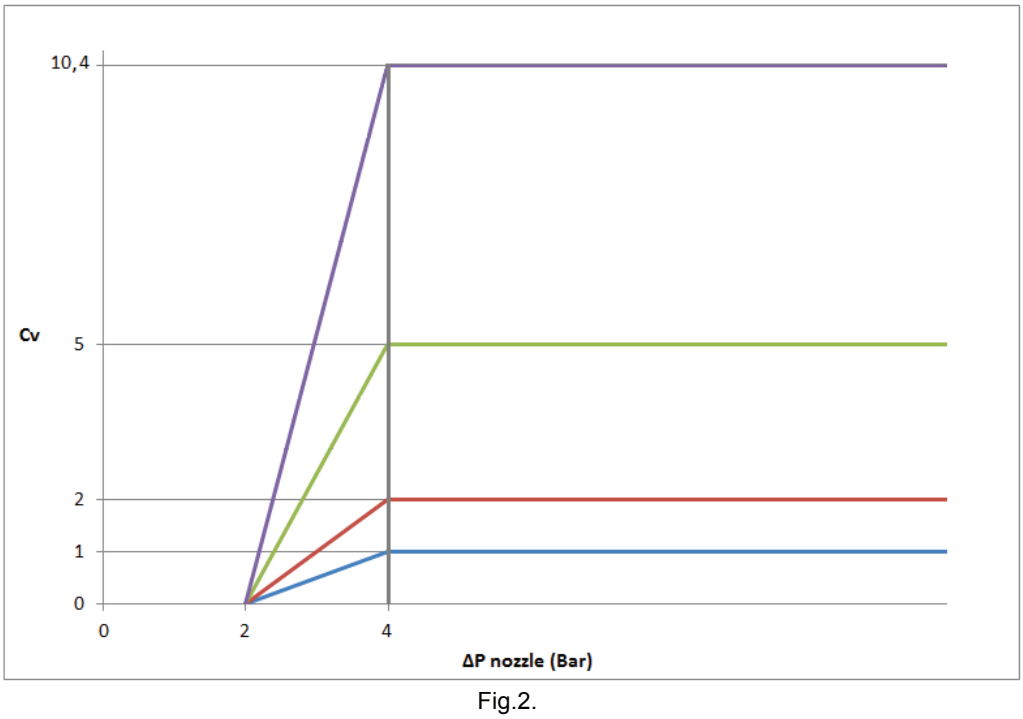


Fig.2.

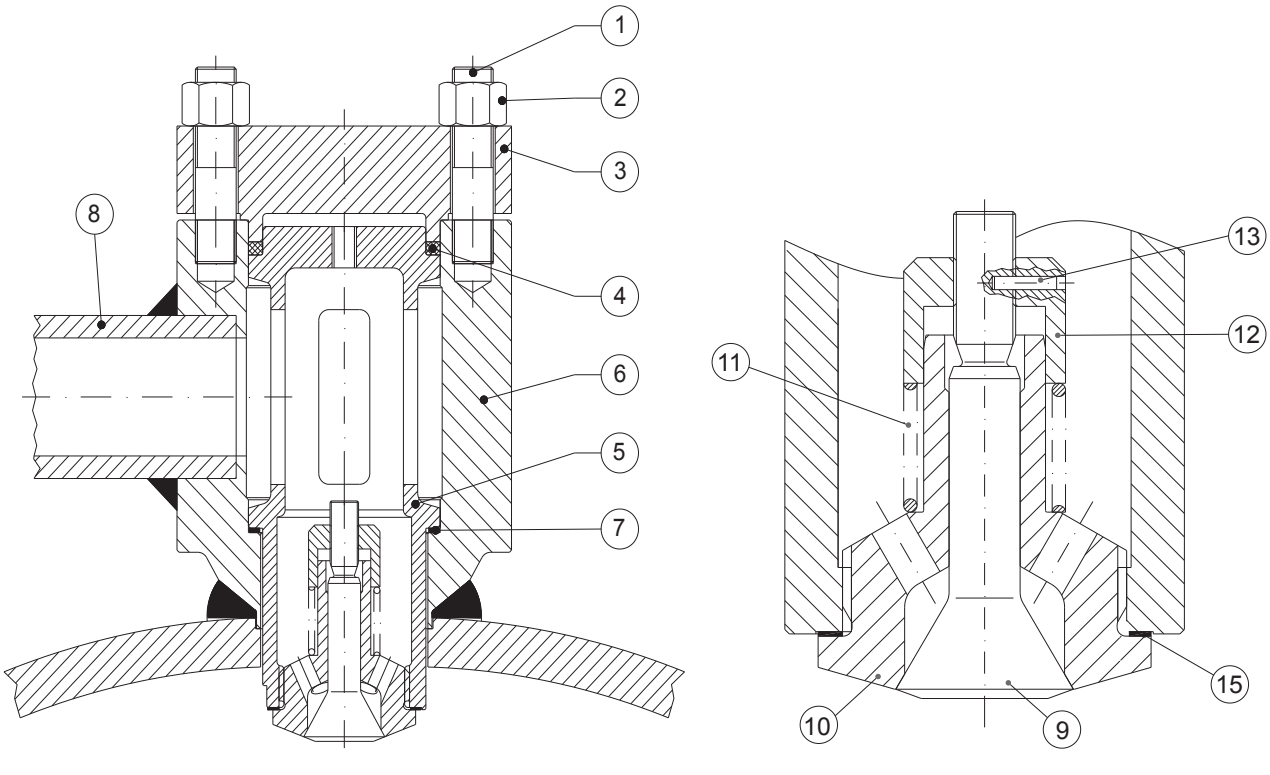


Fig.3. Typical RTD model with Nozzle Detail

ITEM	PART	MATERIALS
1	STUDS	ASTM A193 B7; ASTM A193 B16
2	NUTS	ASTM A194 2H
3	FLANGE	ASTM A182 F91; ASTM A105 ASTM A182 F11; ASTM A182 F22
4	GASKET	GRAPHOIL
5	CAGE	ASTM A565 Type 616
6	BODY	ASTM A182 F91; ASTM A105 ASTM A182 F11; ASTM A182 F22
7	GASKET	GRAPHOIL
8	SPRAY WATER PIPE	ASTM A106; ASTM A335 P11 ASTM A335 P22
9	SHAFT	420 SS; X19CrMoNbVN11-1 X35CrMo17; X39CrMo17-1
10	NOZZLE	420 SS; X19CrMoNbVN11-1 X35CrMo17; X39CrMo17-1
11	SPRING	INCONEL X750; NiCr15Fe7TiAL
12	TENSION SLEEVE	420 SS; X19CrMoNbVN11-1 X35CrMo17; X39CrMo17-1
13	RIVET	316 SS; X6CrMoTi17-12-2
15	GASKET	GRAPHITE

Tab. 1 – Materials

Rangeability

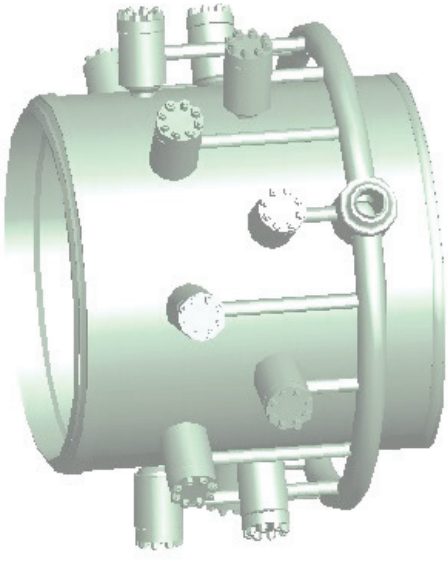
- Nozzle turndown: 20:1
- Spray water control valve turn down: - Standard: 40:1

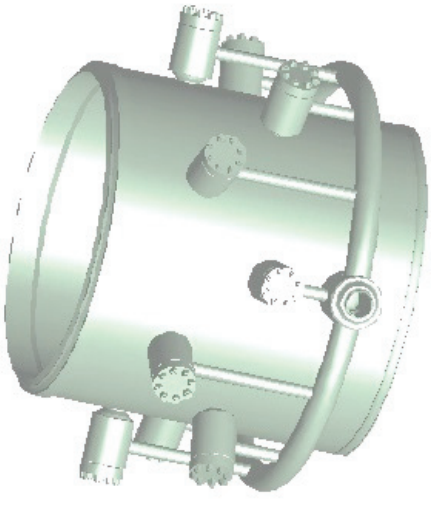
Differential pressure Water/Steam: - Min 2 bar
- Max 15 bar

Distance between desuperheater and temperature sensor:

It is established by means of a calculation of the size of water droplets and their coalescent time before vaporization.
This method depends on:

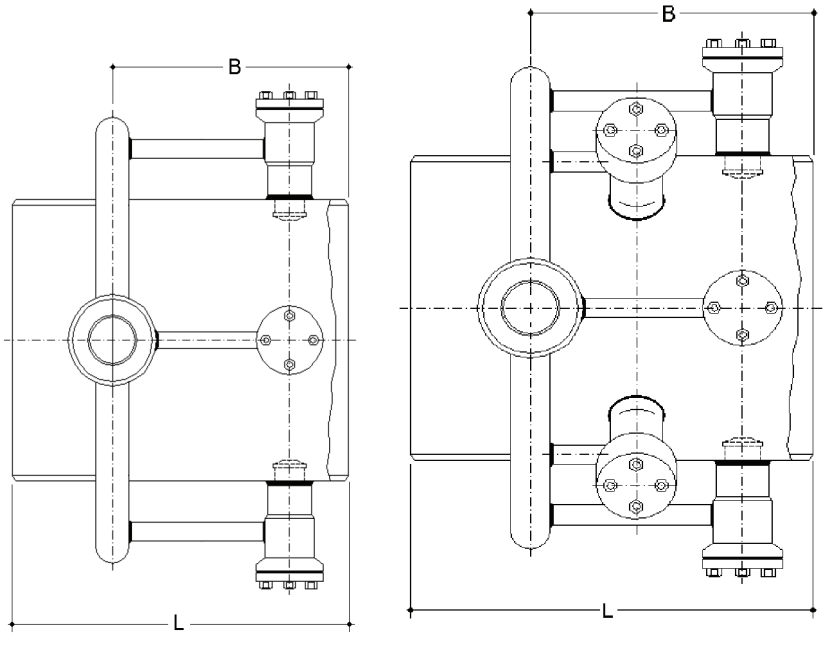
- Steam and water thermodynamic conditions
- Nozzle and desuperheater design





Typical dimension *:

Nominal Pipe Diameter	L	B
mm / inch	mm	mm
200/8	600	400
250/10	650	400
300/12	700	450
350/14	750	450
400/16	800	500
450/18	850	550
500/20	950	600
550/22	1000	600
600/24	1050	650
650/26	1100	650
700/28	1150	700
800/32	1200	700
900/36	1250	750
1000/40	1300	750



Tab.2 – RTD Dimensions

* The dimensions are typical. The length depends on the number of nozzles.

Maximum spray water quantity: From 20% up to 33% of the steam flow.
It depends on:
- the number of nozzles
- the number of injection sections (one or two)

Liner: it is installed to improve the system turndown or to protect the steam line (Fig. 4)

Cooling water filter: it is advisable to use a filter Mesh 100 (100 holes/sq. inch with a diameter of 0.15 mm) to avoid spray nozzles obstruction

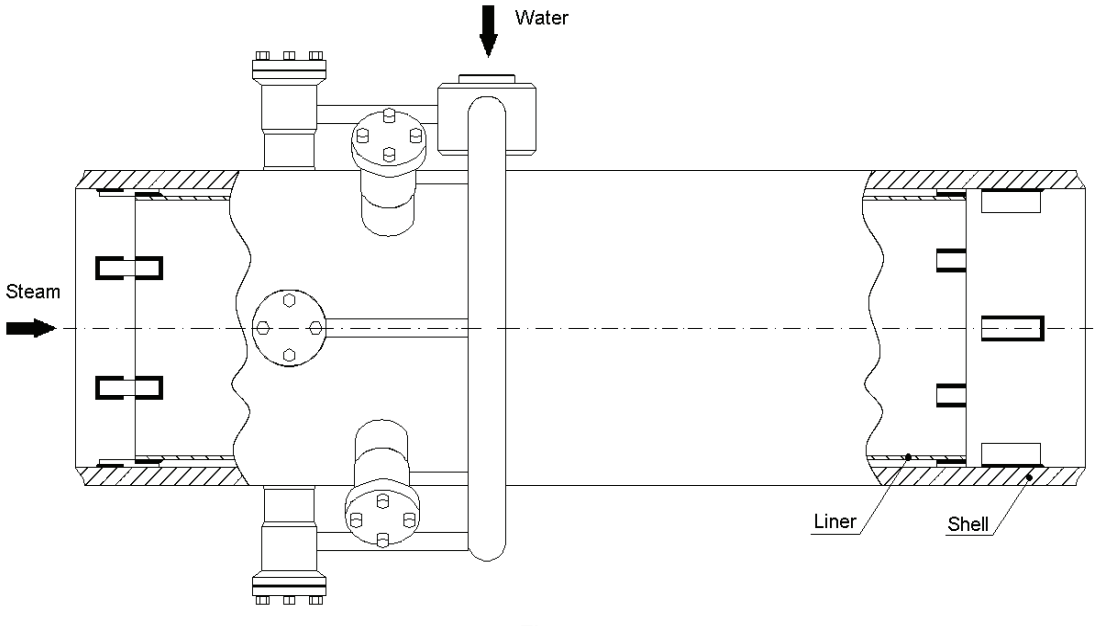


Fig.4.

PTD - PROBE TYPE DESUPERHEATER

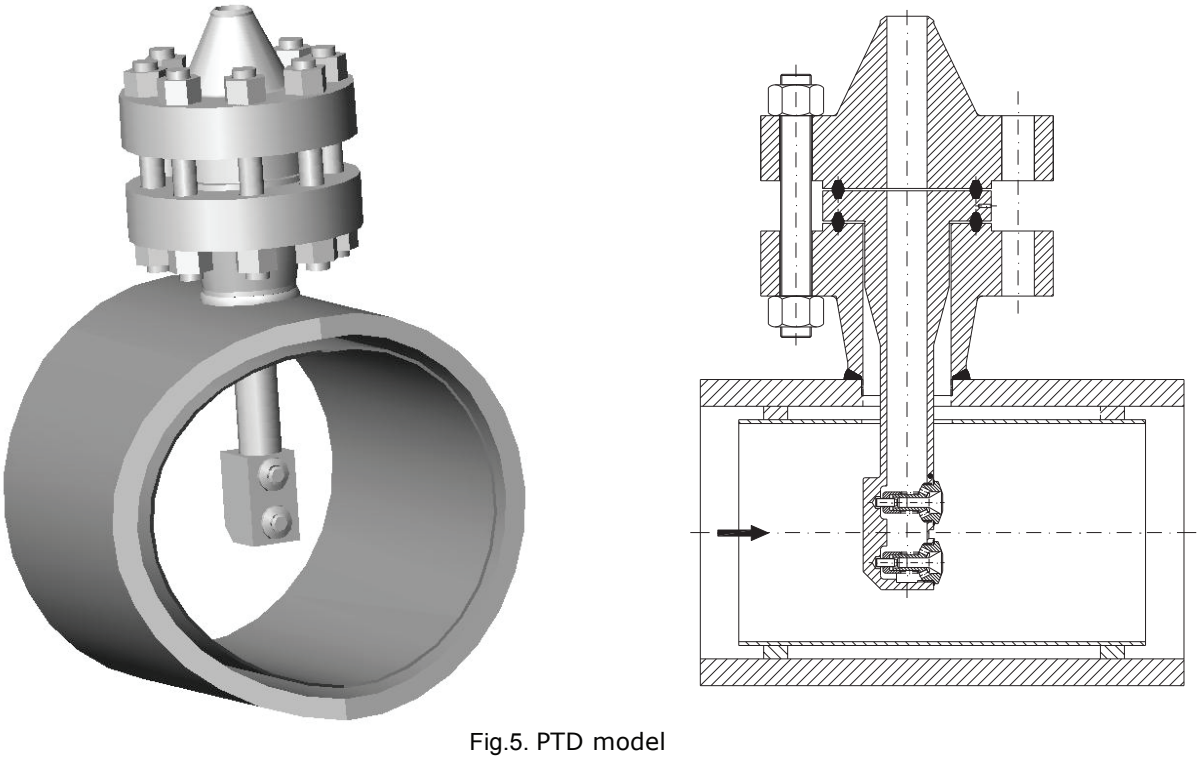


Fig.5. PTD model

Technical Data

Connection:

- Spray water side: Flanged RF for ANSI 150 ÷ 600
  Flanged RTJ for ANSI 900 ÷ 2500
  Butt welding ends.
- Steam side: Flanged RF for ANSI 150 ÷ 600
  Flanged RTJ for ANSI 900 ÷ 2500

Nozzle Sizes:

Nozzle	Number of nozzles	Cv
OP14	1	1
OP14	2	2
OP20	1	2
OP20	2	4
OP28	1	5
OP28	2	10
OP40	1	10,4
OP40	2	20,8

Characteristic: See Fig. 2

Flow control: Separate spray water control valve

Materials: with reference to the Fig. 6 the materials used are those indicated in Tab. 3

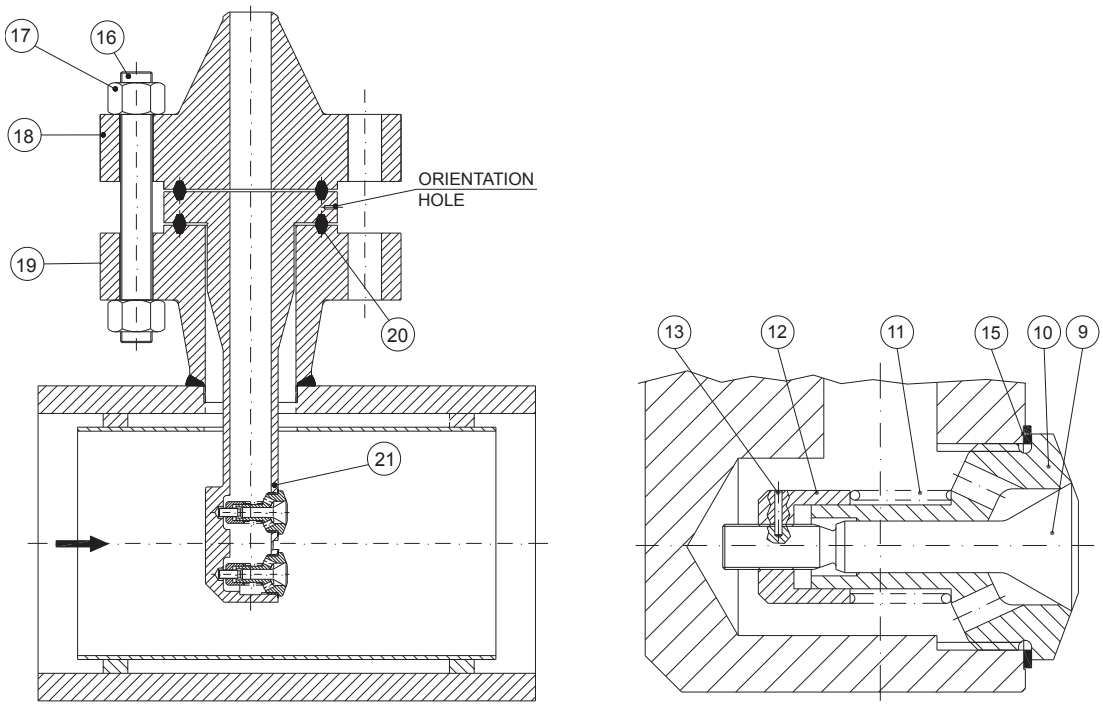


Fig.6. Typical PTD model with Nozzle Detail

ITEM	PART	MATERIALS
9	SHAFT	420 SS; X19CrMoNbVN11-1 X35CrMo17; X39CrMo17-1
10	NOZZLE	420 SS; X19CrMoNbVN11-1 X35CrMo17; X39CrMo17-1
11	SPRING	INCONEL X750 NiCr15Fe7TiAL
12	TENSION SLEEVE	420 SS; X19CrMoNbVN11-1 X35CrMo17; X39CrMo17-1
13	RIVET	316 SS; X6CrMoTi17-12-2
15	GASKET	GRAPHITE
16	STUDS	ASTM A479; XM19 ASTM A193 B7; ASTM A193 B16
17	NUTS	ASTM A479 XM19; ASTM A194 2H
18	FLANGE	ASTM A182 F91; ASTM A105 ASTM A182 F11; ASTM A182 F22
19	COUNTERFLANGE	ASTM A182 F91; ASTM A105 ASTM A182 F11; ASTM A182 F22
20	GASKET	304 SS; GRAPHOIL
21	BODY	ASTM A105; ASTM A182 F91 ASTM A182 F11; ASTM A182 F22

Tab.3 – Materials

Rangeability

- Nozzle turndown: 20:1
- Spray water control valve turn down: - Standard: 40:1

Differential pressure Water/Steam: - Min 2 bar
- Max 15 bar

Distance between desuperheater and temperature sensor:

It is established by means of a calculation of the size of water droplets and their coalescent time before vaporization. This method depends on:

- Steam and water thermodynamic conditions
- Nozzle and desuperheater design

DVTF - DESUPERHEATER VENTURI TYPE FLANGED ENDS

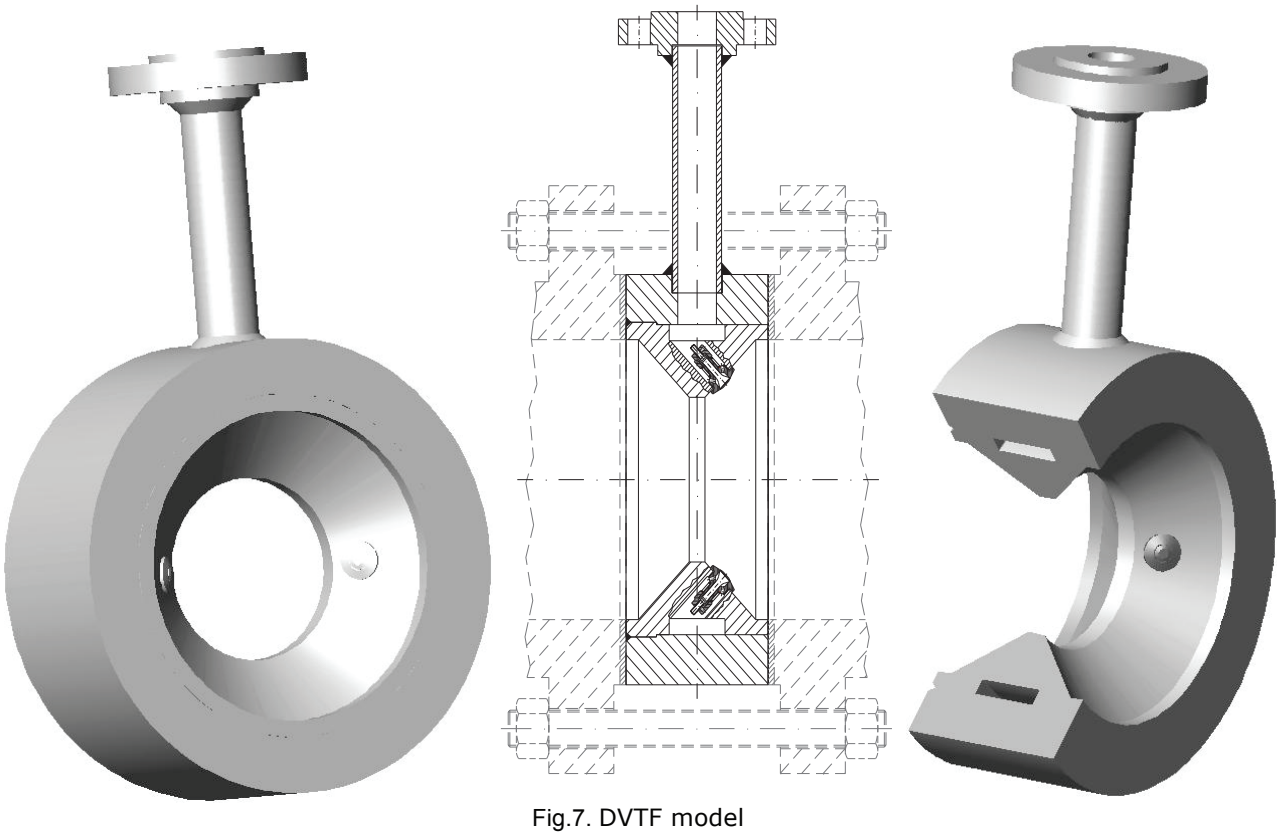


Fig.7. DVTF model

Technical Data

Connection (Spray water side): Flanged RF for ANSI 150 ÷ 1500
Flanged RTJ for ANSI 150 ÷ 1500

Nozzle Sizes:

Nozzle type	Number of nozzles *	Cv value
OP14	1	1
OP14	n	n
OP20	1	2
OP20	n	2·n
OP28	1	5
OP28	n	5·n
OP40	1	10,4
OP40	n	(10,4)·n

* n depends on the working conditions

Characteristic: See Fig. 2

Flow control: Separate spray water control valve

Materials: With reference to the Fig. 8 the materials used are those indicated in Tab. 4

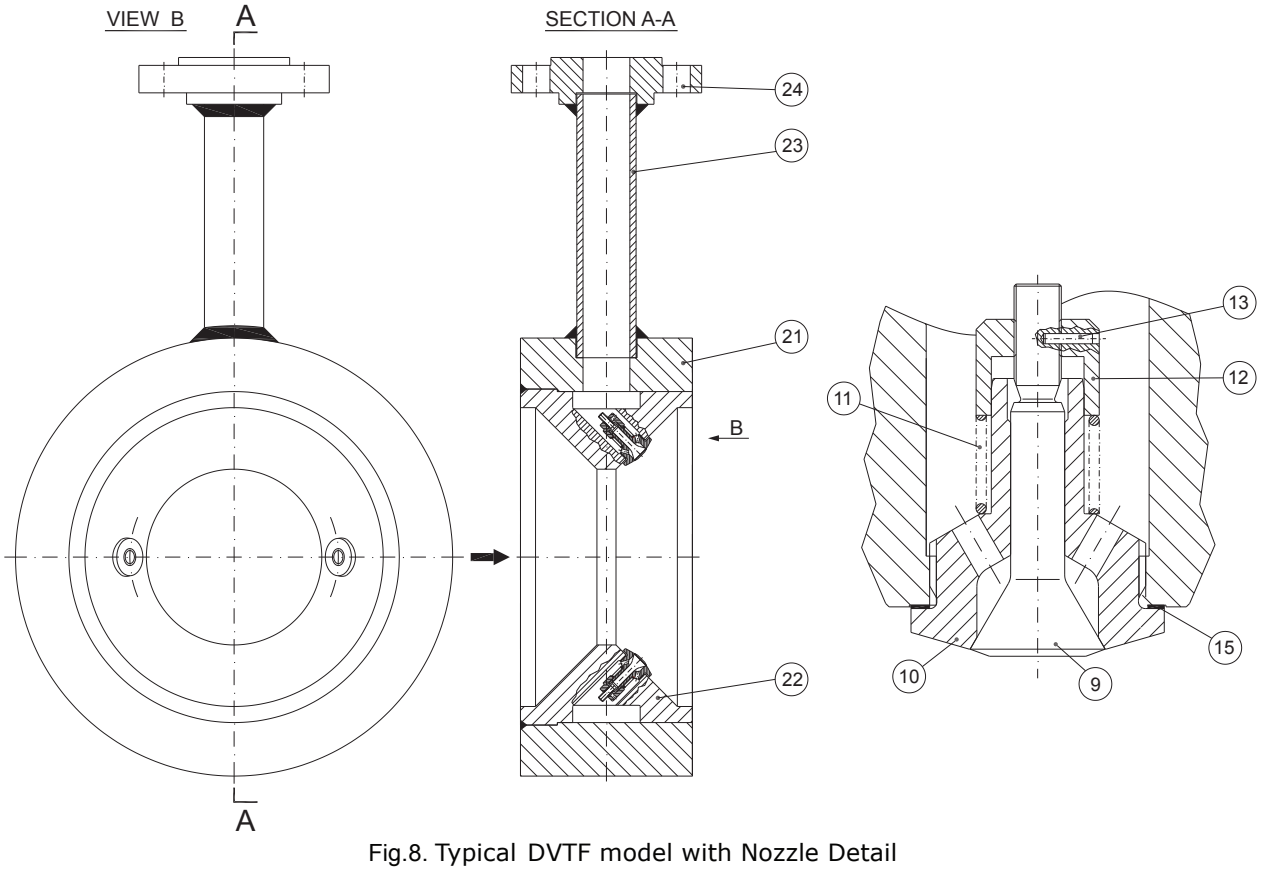


Fig.8. Typical DVTF model with Nozzle Detail

ITEM	PART	MATERIALS
9	SHAFT	420 SS; X19CrMoNbVN11-1 X35CrMo17; X39CrMo17-1
10	NOZZLE	420 SS; X19CrMoNbVN11-1 X35CrMo17; X39CrMo17-1
11	SPRING	INCONEL X750; NiCr15Fe7TiAL
12	TENSION SLEEVE	420 SS; X19CrMoNbVN11-1 X35CrMo17; X39CrMo17-1
13	RIVET	316 SS; X6CrMoTi17-12-2
15	GASKET	GRAPHITE
21	BODY	ASTM A105; ASTM A182 F91 ASTM A182 F11; ASTM A182 F22
22	VENTURI	ASTM A105; ASTM A182 F91 ASTM A182 F11; ASTM A182 F22
23	PIPE	ASTM A105; ASTM A182 F91 ASTM A182 F11; ASTM A182 F22
24	GLANGE	ASTM A105; ASTM A182 F91 ASTM A182 F11; ASTM A182 F22

Tab. 4 – Materials

Rangeability

- Nozzle turndown: 20:1
- Spray water control valve turn down: - Standard: 40:1

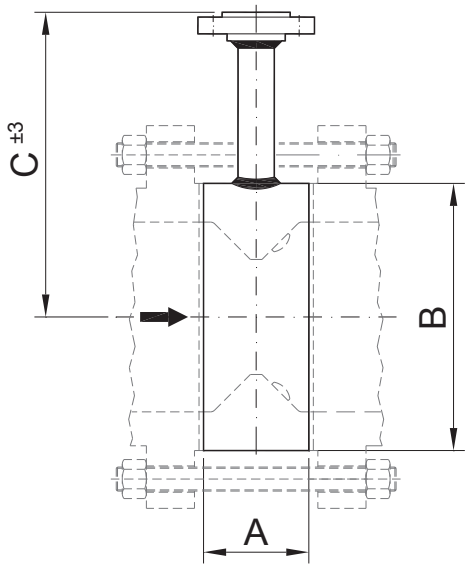
Differential pressure Water/Steam: - Min 2 bar
- Max 15 bar

Distance between desuperheater and temperature sensor:

It is established by means of a calculation of the size of water droplets and their coalescent time before vaporization.
This method depends on:

- Steam and water thermodynamic conditions.
- Nozzle and desuperheater design.

Typical dimension:



Nominal Pipe Diameter		A	B	C				
				ANSI CLASS				
mm	inch	mm	mm	150	300	600	900	1500
25	1	100	51	254	254	254	254	254
40	1-1/2	100	73	254	254	254	254	254
50	2	100	92	254	254	254	254	254
80	3	100	127	254	254	254	254	254
100	4	100	157	254	254	254	254	254
150	6	100	216	254	254	254	406	406
200	8	140	270	254	406	406	406	406
250	10	140	324	406	406	406	406	406
300	12	208	381	406	406	406	406	508
350	14	208	413	406	406	406	508	508
400	16	208	470	406	406	508	508	508
450	18	280	533	406	508	508	508	559
500	20	280	584	508	508	508	559	660
600	24	280	692	508	559	559	660	711

Tab. 5 – DVTF Dimensions

Maximum spray water quantity: From 20% up to 33% of the steam flow.
It depends on:
- the number of nozzles
- the number of injection sections (one or two)

Cooling water filter: It is advisable to use a filter Mesh 100 (100 holes/sq. inch. with a diameter of 0.15 mm) to avoid spray nozzles obstruction

DVTW - DESUPERHEATER VENTURI TYPE WELDED ENDS

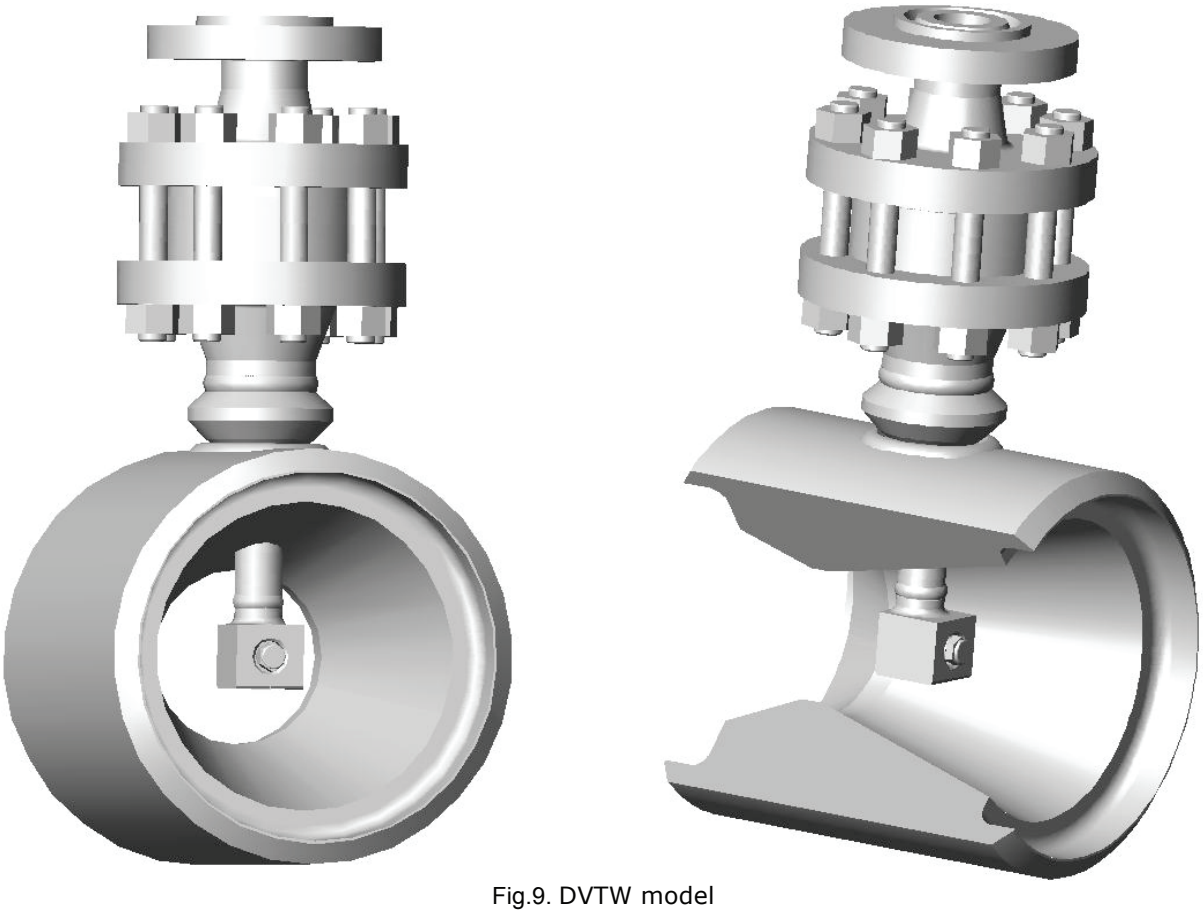


Fig.9. DVTW model

Technical Data

Connection (Spray water side): Welded Ends for ANSI 150 ÷ 2500

Nozzle Sizes:

Nozzle type	Number of nozzles *	Cv value
OP14	1	1
OP14	n	n
OP20	1	2
OP20	n	2·n
OP28	1	5
OP28	n	5·n
OP40	1	10,4
OP40	n	(10,4)·n

* n depends on the working conditions

Characteristic: See Fig. 2

Flow control: Separate spray water control valve

Materials: With reference to the Fig. 10 the materials used are those indicated in Tab. 6

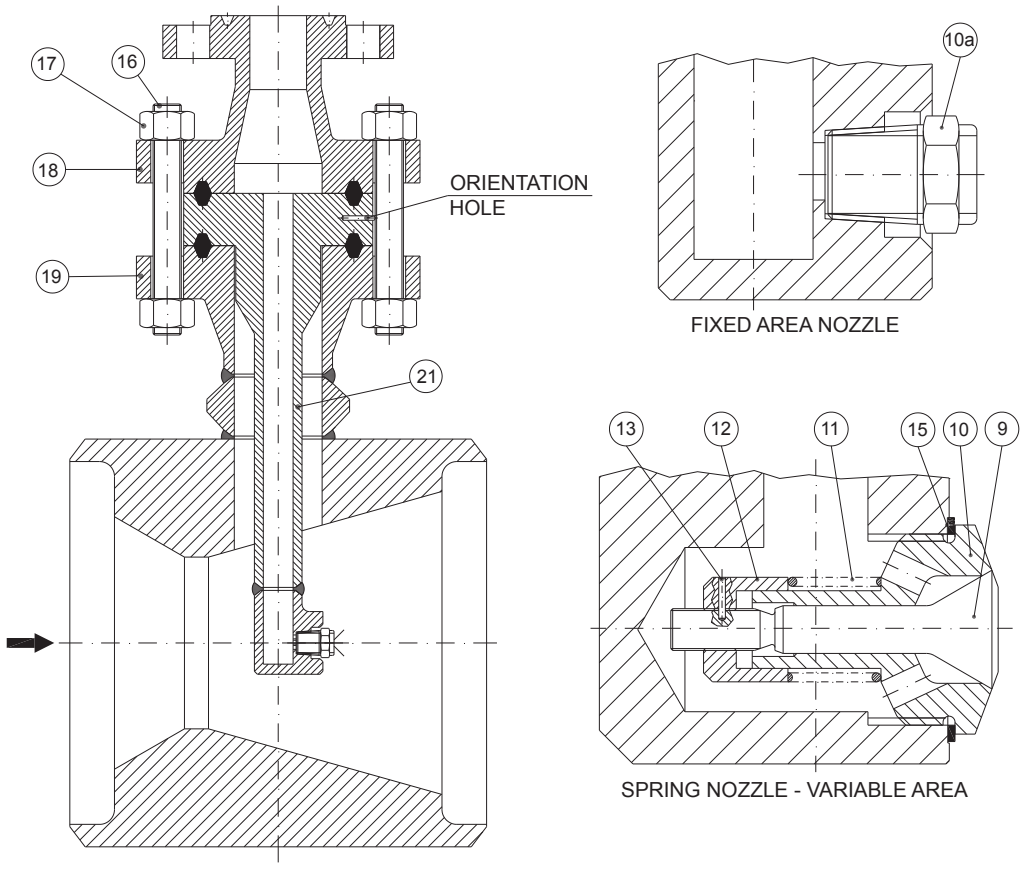


Fig.10. Typical DVTW drawing with nozzles details

ITEM	PART	MATERIALS
9	SHAFT	420 SS: X19CrMoNbVN11-1 X35CrMo17: X39CrMo17-1
10	NOZZLE	420 SS; X19CrMoNbVN11-1 X35CrMo17; X39CrMo17-1
10a	FIXED AREA NOZZLE	303 SS; 316L SS; BRASS
11	SPRING	INCONEL X750; NiCr15Fe7TiAL
12	TENSION SLEEVE	420 SS; X19CrMoNbVN11-1 X35CrMo17; X39CrMo17-1
13	RIVET	316 SS; X6CrMoTi17-12-2
15	GASKET	GRAPHITE
16	STUDS	ASTM A479; XM19 ASTM A193 B7; ASTM A193 B16
17	NUTS	ASTM A479 XM19; ASTM A194 2H
18	FLANGE	ASTM A182 F91; ASTM A105 ASTM A182 F11; ASTM A182 F22
19	COUNTERFLANGE	ASTM A182 F91; ASTM A105 ASTM A182 F11; ASTM A182 F22
20	GASKET	304 SS; GRAPHOIL
21	BODY	ASTM A105; ASTM A182 F91 ASTM A182 F11; ASTM A182 F22

Tab. 6 – Materials

Rangeability

- Nozzle turndown: - Spring nozzle: 20:1
  - Fixed area nozzle: 10:1
- Spray water control valve turn down: - Standard: 40:1

Differential pressure Water/Steam:

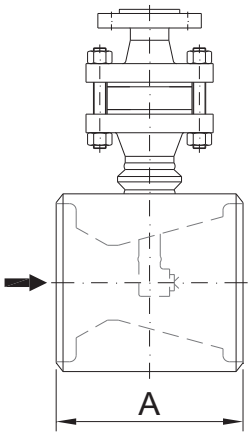
- Min 2 bar
- Max 15 bar

Distance between desuperheater and temperature sensor:

It is established by means of a calculation of the size of water droplets and their coalescent time before vaporization.
This method depends on:

- Steam and water thermodynamic conditions
- Nozzle and desuperheater design

Typical dimension:



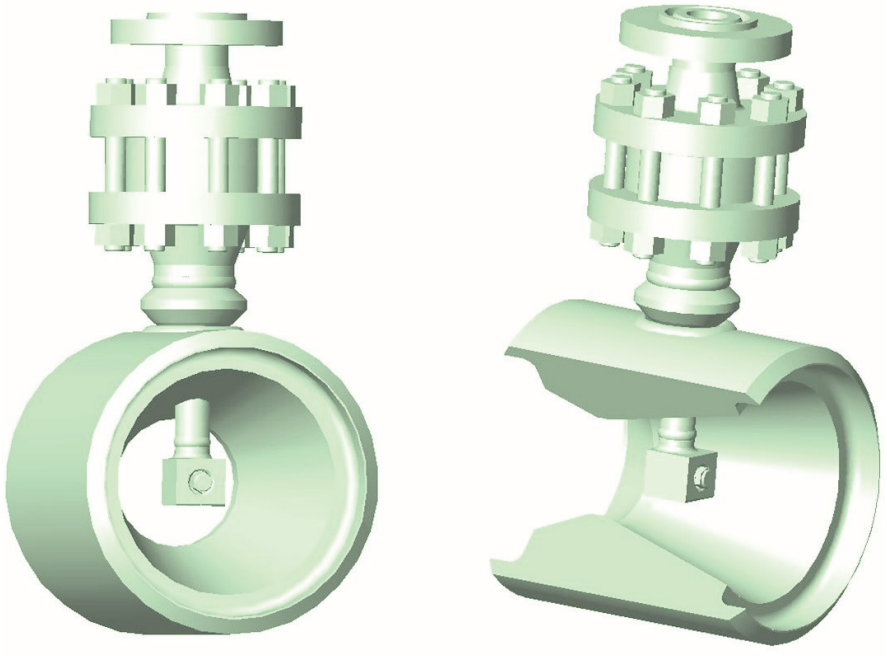
The A dimensions depends upon 'vena contracta'.

Maximum spray water quantity:

From 20% up to 33% of the steam flow.
It depends on:
- the number of nozzles
- the number of injection sections (one or two)

Cooling water filter:

It is advisable to use a filter Mesh 100 (100 holes/sq. inch with a diameter of 0.15 mm) to avoid spray nozzles obstruction



Via Grado, 72
34074 Monfalcone (GO) - Italy
Tel : +39 0481 095250
Fax : +39 0481 095252
www.greencontrol.it