TRIMTECK®
OPTIMUX®

OpDSH™ VSpring
DESUPERHEATER
TECHNICAL BROCHURE

OpDSH™ VSpring Desuperheater

INTRODUCTION

Variable area VSpring nozzles solve the problem of fixed area nozzles, which slow down fluid velocity when the flow rate decreases. The VSpring nozzle automatically adjusts the passage area to keep the fluid velocity high enough for proper atomization.

Why is this device called a variable area nozzle? If the nozzle opening stayed the same size, the spray speed would slow down when less water flows through. In spring-assisted nozzles, the spring force stays almost the same, so the nozzle opening gets smaller and the pressure difference (Δp) stays steady.

In simple terms:

- The spring force (Fspring) is roughly constant because it's the product of the thrust area and Δp.
- The flow rate divided by Cv (flow coefficient) and the square root of Δp should also be constant.

Here's how the nozzle works (see Figure 1):

1. The spring (4) is compressed by the nut (3) and keeps the plug (2) closed. The nut is secured by the pin (5) to prevent loosening.
2. When water pressure inside the nozzle increases, the difference in pressure between steam and water rises. Eventually, the water pressure overcomes the spring load, causing the plug to open.
3. Water flows out of the nozzle through specially designed holes in the nozzle body (1), which spin the water before it hits the plug's conical surface.
4. The plug sprays the water in a cone-shaped pattern at about 90 degrees.
5. You can adjust the spring load to set the desired opening pressure.

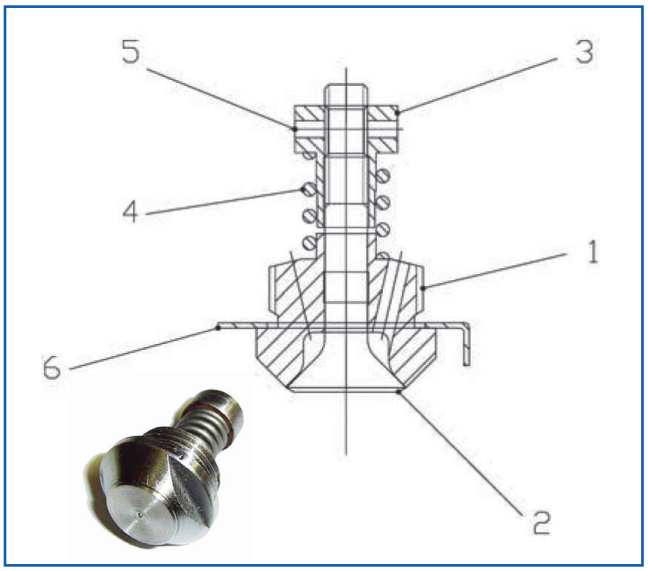


Figure 1 - DM Nozzle

MOUNTING: DM nozzles are used in two different constructions:

- probe type, flanged construction with optional injection chamber
- wall-welded-in , single or multiple construction with a injection chamber

Table 1: Cv and Flow Capability of DM Nozzles

Nozzle	Seat Diameter	Cv max	Travel	Max Flowrate GPM
DM4	14mm	1	0.7	18.9
DM8	21mm	2	1	37.9
DM12	28mm	3	1.2	56.8
DM25	39mm	6	1.5	114.0
DM40	48mm	10	2	189.3
DM65	55mm	15	2.5	284.0

Summarized in the following tables are the rangeability and other characteristics of DM variable area nozzles compared with those of fixed area devices.

DM DESUPERHEATERS PROBE ASSEMBLY

One or two DM nozzles are fastened to a tubular extension flanged to the pipe. Dimensions and ratings are listed in the following tables.

The injection is performed close to the pipe axis by adjusting the probe length. A reference pin located on the desuperheater flange ensures the correct orientation of the nozzle inside the piping. Probe assembly is normally fabricated with the same material as the pipe.

Listed on the table below are the standard combinations of water connections and pipe sizes.

Table 2: Fixed vs. Variable Area Nozzle Characteristics

Type of nozzle	Δp max	Δp min	Cv max ~ Cv min
Fixed area plain hole	30 bar	6 bar	1
Fixed area vortex type	30 bar	1.5 bar	1
Variable area DM type (set pressure 3 bar)	25 bar	3 – 4 bar	8 – 10

Table 3: Standard End Connections

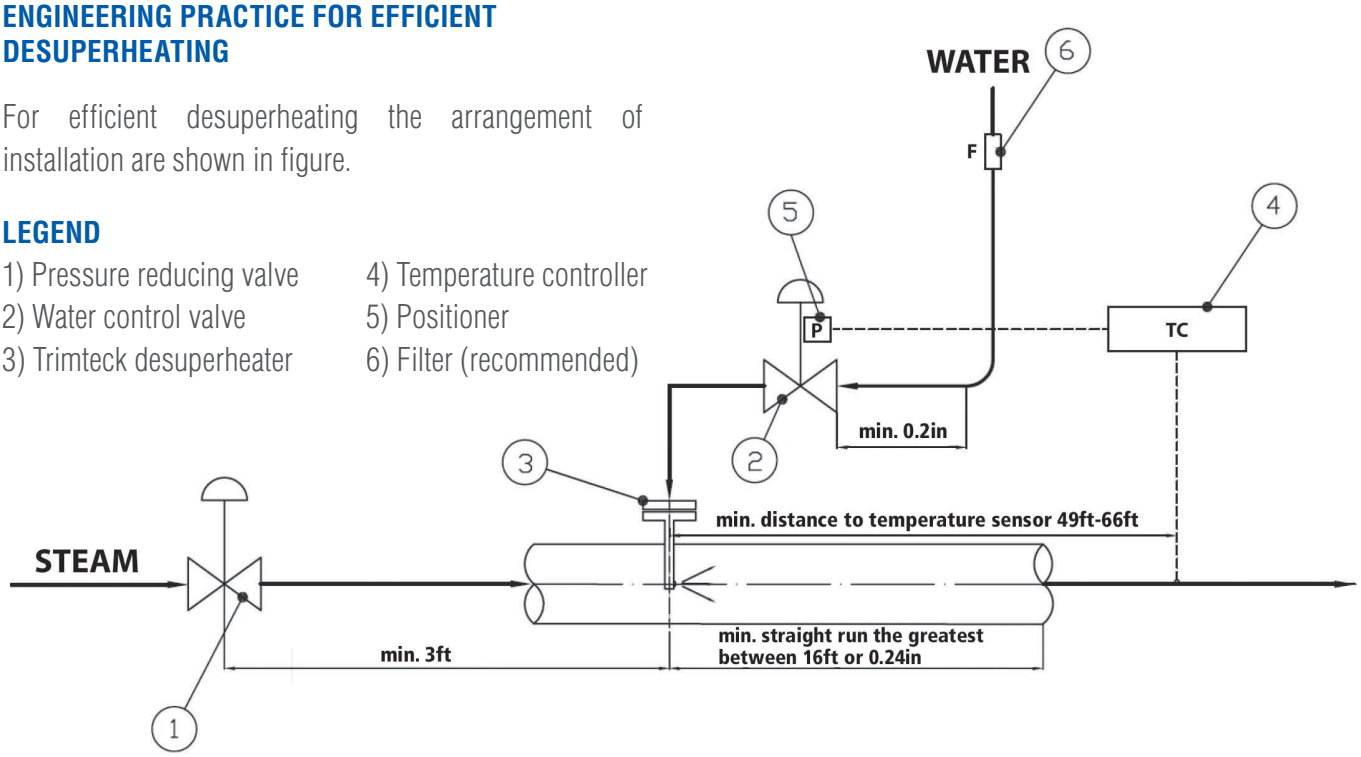
Nozzle Type	DM4	DM8	DM12	DM24	DM40	DM65
Water Connection(1)	1"	1"	1.5"	2"	2.5"	3"
Steam Fitting Connection(1)	2"	3"	4"	4"	6"	8"
Minimum Steam Pipe Size (C)	4"	6"	8"	8"	12"	14"

ENGINEERING PRACTICE FOR EFFICIENT DESUPERHEATING

For efficient desuperheating the arrangement of installation are shown in figure.

LEGEND

1) Pressure reducing valve
2) Water control valve
3) Trimteck desuperheater
4) Temperature controller
5) Positioner
6) Filter (recommended)

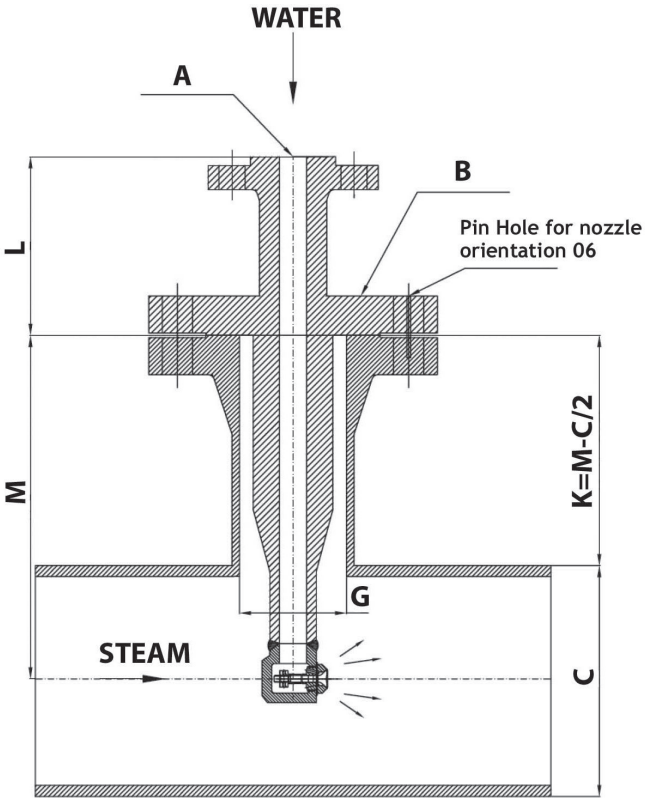


OpDSH™ VSpring Desuperheater

DIMENSIONS (Inches)

DN Steam	M										
	DM4		DM8		DM12		DM25		DM40		DM65
	Nozzle Number										
	1	2	1	2	1	2	1	2	1	2	1
4"	10.1	–	–	–	–	–	–	–	–	–	–
6"		10.1	12.0	–	–	–	–	–	–	–	–
8"				12.0	14.0	–	14.0	–	–	–	–
10"						14.0		14.0	–	–	–
12"									18.0	–	–
14"	11.1									18.0	18.0
16"	12.1										
18"	13.1		13.0								
20"	14.1		13.9		15.0		15.0				
22"	15.1		14.9		15.9		15.9				
24"	16.1		15.9		16.9		16.9				
26"	17.0		16.9		17.9		17.9		19.0		19.0
28"to 40"	18.0		17.9		19.2		19.2		20.0		20.0

Nozzle	L		A	B	C min	G min (1)
	Up to ANSI 900	ANSI 1500				
DM4	5.8	5.8	1"	2"	4"	1.9
DM8	7.3	7.3	1"	3"	6"	2.9
DM12	8.1	8.1	1.5"	4"	8"	3.8
DM25	8.1	8.1	2"	4"	8"	3.8
DM40	9.3	10.5	2.5"	6"	12"	5.7
DM65	9.8	11.8	3"	8"	14"	7.6



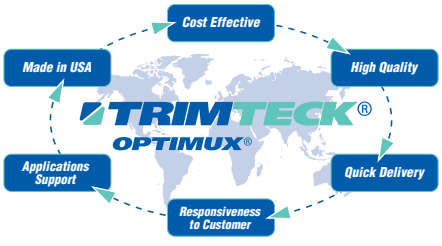
(1) The dimensions are consistent with sch.80 thicknesses. For different design (rating & dimensions) contact your Trimteck sales engineer.

NOTE: K is the same for 28" to 40" pipe diameter

About Trimteck

Trimteck® is a NASA VDB-approved, ISO 9001-2016-registered U.S. company (Registration No. 2012-98243) with over thirty years of experience engineering, manufacturing, and marketing high-quality, cost-effective flow, pressure, and temperature control solutions and equipment for critical processes. Our products are currently helping customers safely improve quality, optimize throughput, and reduce emissions and energy costs across an array of industries in more than 50 countries.

We manufacture a comprehensive line of control valves – and variety of actuators, positioners, severe service trims, and other accessories – that our applications engineers and representatives use to solve even the most complex flow control problems quickly and economically.



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Trimteck, LLC
Engineering & Manufacturing
12461 NW 44th Street
Coral Springs, Florida 33065 USA
+1-954-753-5545

Products in compliance with:

ASME B16.34
ANSI/ISA-75.05.01-2019