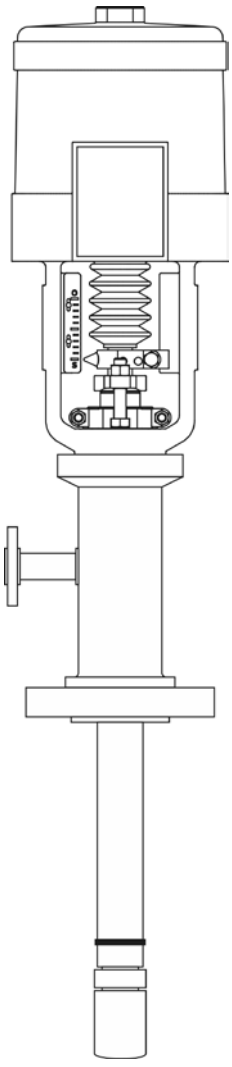
DS VARIFLOW®

DESUPERHEATER
VARIBLE AREA
MULTIPLE NOZZLES

VALTEK™
SULAMERICANA

DS VARIFLOW®



Introduction

The Variflow® Desuperheater from ValtekSul has a flexible architecture to achieve high efficiency and refined control in the process of reducing the temperature, to the desired control point, in superheated vapors.
The multi-nozzle VARIflow® Desuperheater was developed to combine excellent water atomization and high rangeability. Many processes require load variations greater than those offered by a simple mechanical desuperheater with constant area, but do not necessarily need the performance of more sophisticated and expensive devices. The Variflow® desuperheater fills this performance gap between the limited capacity of a fixed-area mechanical sprayer and much more sophisticated high-performance solutions. The Variflow® model offers a wide variety of nozzle combinations (number and sizes) to provide precise control of steam temperature in whatever conditions.
Variflow is designed for any application without practical limitations of temperature and steam pressure, such as:

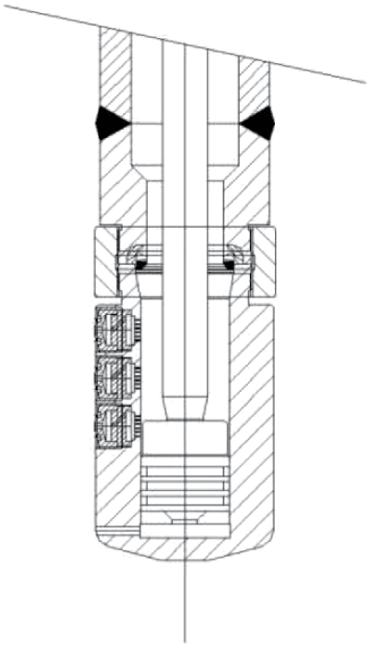
- Turbine by-pass stations
- Steam condensate pot
- Turbine steam piping
- Main steam header to process
- Cold reheat line
- Steam to ejectors
- Burner NOx control
- Oil burner atomizing steam

General Features - Body

Construction: Cast steel for Classes up to ANSI 1500
Forged steel for Class ANSI 2500
Materials: ASTM 217 WC6
ASTM 217 WC9 - F22 - F91 (or equivalent)
Sizes: Variflow Model 1525/2525, Water connection 1 ", 1.1/2"
Variflow Model 1550/2550 – Water connection 1.1/2 ", 2", 3 ", Steam 4"
Class: ASME / ANSI 150 to 2500
Connections: RF, RJ, Standard, BW (under request)
Number of stages: One stage in standard construction
Two stages for severe service conditions
C_V range: From 0.1 to 21.15
Number of Nozzles: 6 or 9 - Configurations of varying sizes are also available depending on the application and the required rangeability
Flow characteristics: Linear or modified linear.
Class PED: Category 1
Shutoff Class: ANSI Class V, Class VI (optional)
Rangeability: Up to 50: 1
Min ΔP: 14.5 psi (1 bar) for nozzles code A to D1; 29 psi (2 bar) for nozzles code E to K
Max ΔP: 870 psi (60 bar) for standard design - 1160 psi (80 bar) for 2 stages under special design
Max Desuperheating: Up to 45°F (7°C) above the saturation temperature of the outlet steam
Max percentage of water: The water/inlet-steam ratio,at maximum flow,must not exceed 20%. For larger percentages please consult our Engineering Department at ValtekSul.

DS VARIFLOW®

Characteristics



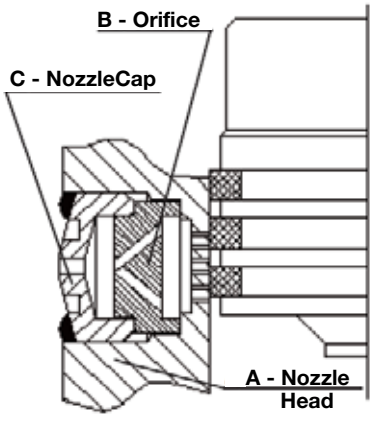
DS Variflow Nozzle Head

Multiple Nozzle Heads

The multi-nozzle Variflow® desuperheater can be supplied with 6 or 9 nozzles. The nozzles are arranged in two columns (6 nozzles) or three columns (9 nozzles) with an overlapping arrangement to provide a continuous discharge area regardless of the position of the plug. This advanced technology allows the nozzles to be supplied with mixed capacities, and thus achieve flow characteristics that best fit the specific application.

Design

The Variflow® multi-nozzle desuperheater consists of a plug guided by a retainer where the spray nozzles are located. The plug moves inside the nozzle head to meet the need for the desired discharge area. The nozzle head threaded end is locked by a set of rings in the body of the desuperheater allowing different orientations between the flange of the cooling water inlet and the spray direction of the nozzles.



Atomizing Nozzle

Optimal Efficiency Design

The nozzle architecture incorporates the latest spray technology. The high quality surface finishing minimizes friction losses, thus ensuring that the total pressure difference between water and steam is available for water atomization. The nozzle consists of three components:

A) Nozzle Head

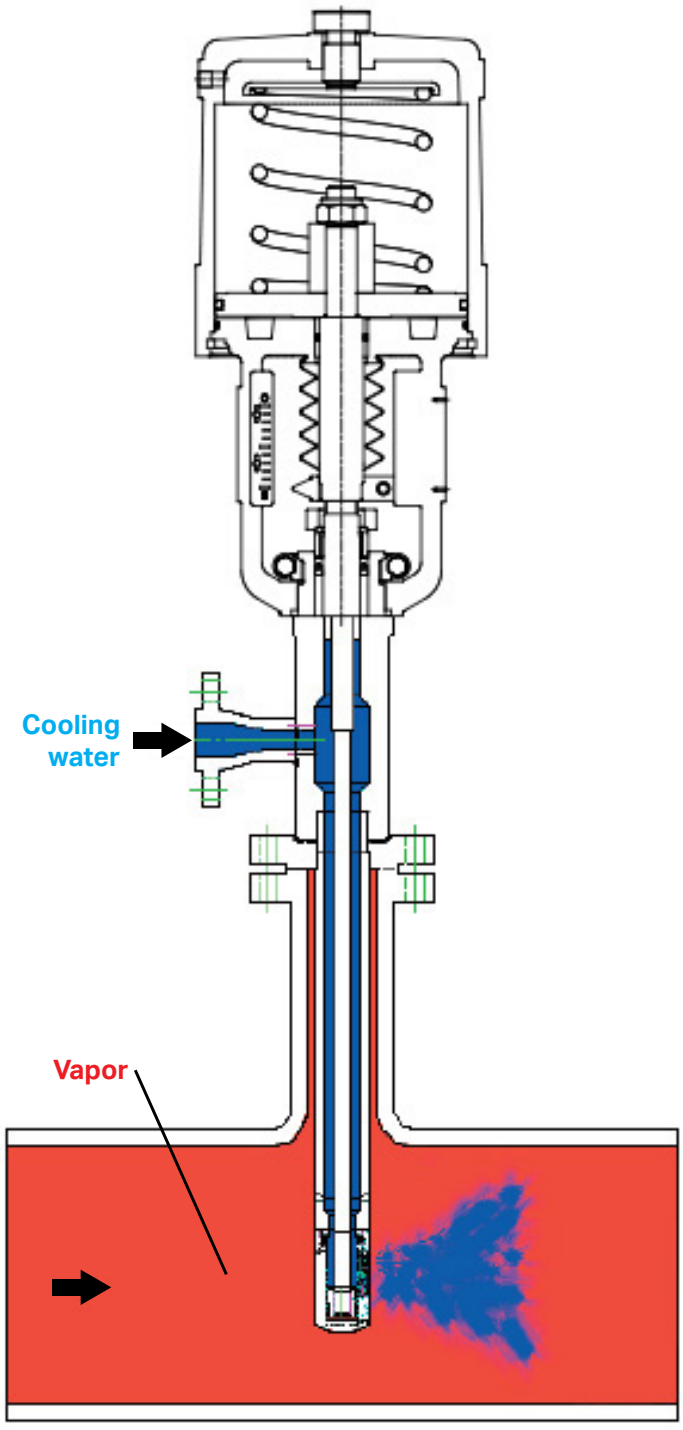
B) Orifice

C) Nozzle Cap

Each nozzle head is served by individual spray feed holes. Water enters the chamber through these openings. The relatively large volume of this chamber ensures that the water is evenly distributed through each orifice. The pressure across the orifice results in an increase of the speed of the fluid. The water is subsequently rotated in the nozzle chamber before being expelled through the central orifice. The combination of splitting the feed flow, increasing velocity and causing a rotation effect, ensures that the water is injected into the system as a thin hollow and symmetrical spray cone.

DS VARIFLOW®

Characteristics



Principle of Operation

The VARIflow® desuperheater reduces the steam temperature by injecting water directly into the steam stream. The VARIflow® desuperheater receives cooling water through a flanged connection located on the main body. This flow is directed to the body cavity and reaches the spray nozzle head at its atomizing end. The movement of the plug controls the flow of cooling water, according to the signal sent by the temperature controller, which, as standard, is 6ºC above the saturation vapor temperature.With the plug in the closed position, no cooling water can reach the nozzle head. When the plug is pushed down by the actuator (which obeys the signal from the temperature control loop), the opening of the nozzles changes the flow rate of cooling water according to the required flow characteristic.

Standard Capacity Range

The maximum flow rate of Variflow desuperheater in continuous service is:

- 25m³/h for VARIFlow model 1525/2525
- 50m³/h for VARIFlow model 1550/2550

$$K_V = Q\sqrt{\frac{\rho}{\Delta p}}$$

$$C_V = \frac{K_V}{0.865}$$

$Q = [m^3 / h]$

$\rho = [kg / dm^3]$

$\Delta p = [bar]$

DS VARIFLOW®

Characteristics

Configurations

Stroke

Nozzles A-B-C-D-D1: 60mm (VariCryo 1525)
Nozzles E-F-G-H-J-K: 90mm (VariCryo 1555)

Flow coefficient - C_V

Optionally available with minimum C_V between 0.10 and 0.004

Desuperheater Body Assembly

Flow Coefficients - C_V

Number of Nozzles	Nozzle Code	C_V	K_V	Number of Nozzles	Nozzle Code	C_V	K_V
6	A	0.10	0.09	9	A	0.15	0.13
6	B	0.17	0.15	9	B	0.25	0.22
6	C	0.35	0.30	9	C	0.52	0.45
6	D	0.65	0.56	9	D	0.98	0.84
6	D1	1.27	1.10	9	D1	1.91	1.65
6	E	2.06	1.78	9	E	3.09	2.67
6	F	2.85	2.47	9	F	4.27	3.70
6	G	6.50	5.62	9	G	9.75	8.43
6	H	8.21	7.10	9	H	12.31	10.65
6	K	14.10	12.20	9	K	21.15	18.29

Parameters Required for Selection

Steam

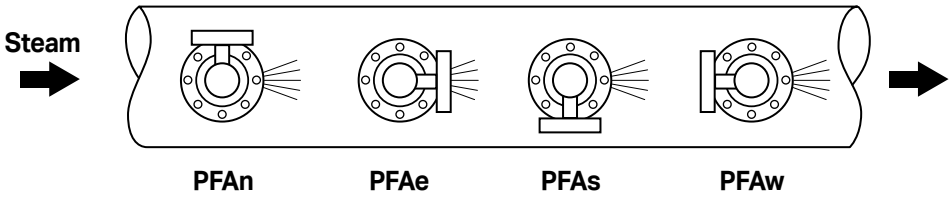
- Inlet pressure, psi (bar)
- Inlet temperature, °F (°C)
- Max. Steam flow at the inlet, pounds/h (kg/h)
- Min. Steam flow at the inlet, pounds/h (kg/h)

Water

- Inlet pressure, psi (bar)
- Inlet temperature, °F (°C)

Piping

- Diameter, in/mm
- Schedule
- Flange type in the inlet feedwater
- Water flange orientation:
- PFAn | PFAe | PFAs | PFAw



The nozzles are oriented in the direction of the steam flow. To better suit the layout of the cooling water inlet pipe, four different orientations are available, as shown in the sketch above. The flange orientation code must be specified, unless requested in a different way.

PFAn guidance will be provided as standard assembly.
PFAn: left transverse to the direction of flow
PFAe: same flow direction
PFAs: right transverse to the direction of flow
PFAw: opposite to flow direction

DS VARIFLOW®

Characteristics

Engineering Recommendation for an Efficient Desuperheating

Steam Velocity

The higher the velocity of the steam at the injection point, the greater the turbulence and the spraying of the cooling water. The efficiency of desuperheating is improved and the evaporation time of water droplets is reduced. The minimum velocity of the steam depends mainly on the size and distribution of the nozzles, carefully selected by our Engineering Department.

As a general rule, a minimum steam speed of about 8 to 10 m / s is recommended, depending on the operating conditions and type of installation. Reduced values are allowed through an appropriate selection and / or distribution of the nozzles. When the steam speed is very low, an internal reduction in the pipe diameter must be inserted in the injection chamber.

Nozzle Clogging Prevention

The installation of a filter at the water inlet is recommended to protect the desuperheater from clogging the nozzles.

The characteristics of the filter screen must not exceed 0.5 - 1 mm (16 - 30 mesh).

After the plant starts operating, it is recommended to inspect the filter to remove any dirt particles that may have been trapped.

Sensor Distance

The distance from the temperature sensor to the injection point is between 10 to 20 meters, depending on some parameters, mainly the steam speed, and the difference between the desired outlet temperature and the saturation temperature of the steam at the outlet.

However, it is necessary to avoid delays in the response of the system signals caused by excessive distance between the temperature sensor and the water injection point.

Construction Materials		
Part	**Model (1525 - 1550)**	**Model (2525 - 2550)**
Spray Head	Stainles steel AISI 410	Stainles steel AISI 410
Plug Piston	Stainles steel AISI 420 HT	Stainles steel AISI 420 HT
Piston Rings	Stainles steel AISI 431	Stainles steel AISI 431
Nozzles	Stainles steel AISI 410	Stainles steel AISI 410
Plug Seat	Solid Alloy 6	Solid Alloy 6
Ring Head	Stainles steel ASTM A 182 F11/F22	Stainles steel ASTM A 182 F11/F22
Plug	Stainles steel AISI 431	Stainles steel AISI 431
Nozzle Extension	ASTM A 106 B	ASTM A 106 A
Body	ASTM A 217 WC6 / WC91	ASTM A 217 WC6 / WC91
Water Connection	Stainles steel ASTM A 182 Gr. F11 / F22	Stainles steel ASTM A 182 Gr. F11 / F22
Packing Set	Grafoil	Grafoil
Follower	Stainles steel AISI 431	Stainles steel AISI 431
Gland Flange	Stainles steel AISI 304	Stainles steel AISI 304

DS VARIFLOW®

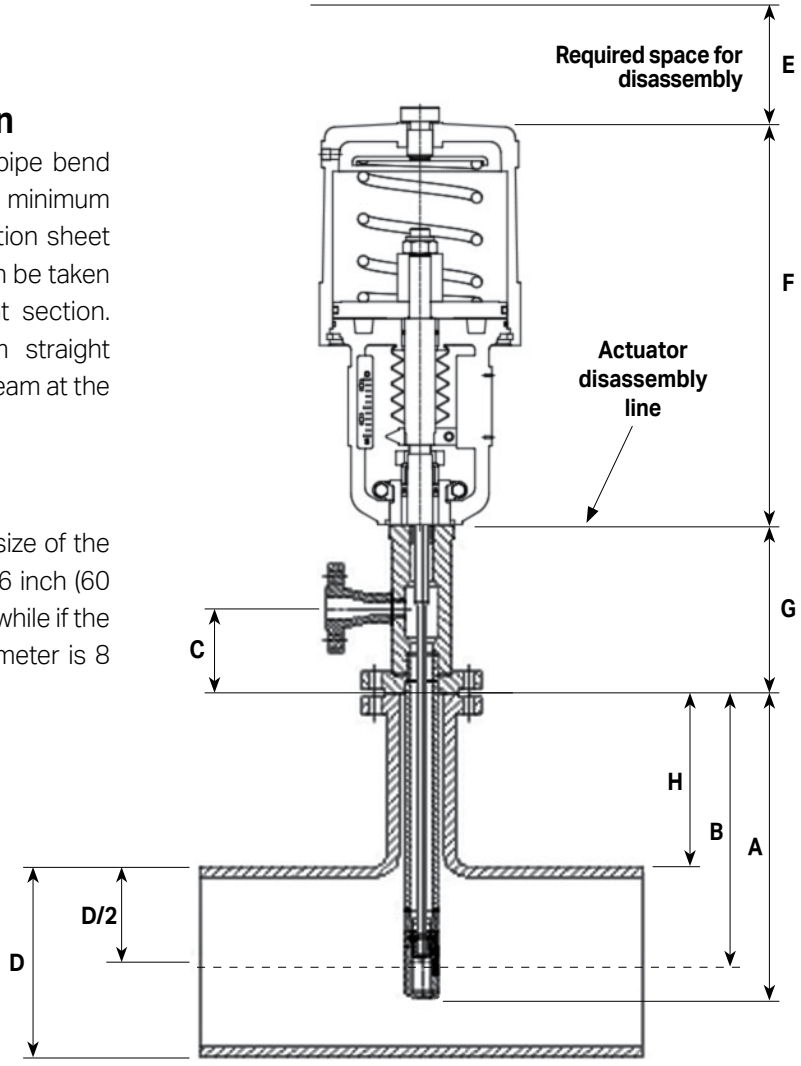
Dimensions

Downstream Pipe Straight Section

It is the recommended distance of the first pipe bend downstream of the water injection point. This minimum distance is always indicated on the specification sheet issued by Valteksul. Concentric reductions can be taken into account to assess the required straight section. Except in some applications, the minimum straight section depends only on the velocity of the steam at the injection point.

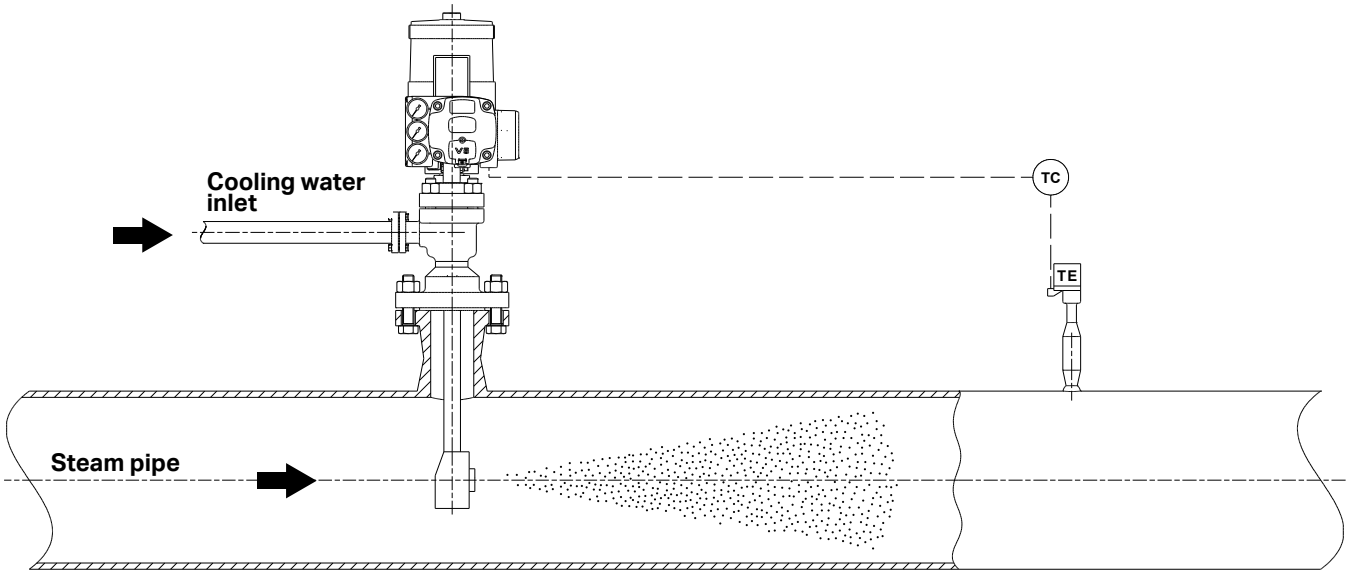
Minimum Piping Diameter

The minimum pipe diameter depends on the size of the spray head. If there is a spray head with a 2.36 inch (60 mm) stroke, the minimum diameter is 6 inches while if the stroke is 3.54 inch (90mm), the minimum diameter is 8 inches.



Dimensions (inch)								
Steam Nominal Piping Diameter D (in.)	Dimension A		Dimension B		C	G	F(1)	H(2)
	Curso		Curso					
	60	90	60	0				
6.0 8.0 10 12	17.4	18.7	15.0	15.7	7.9	12.3	note 2	note 1
14 16 18 20 24	25.2	26.6	22.9	23.5	7.9	12.3	note 2	note 1

Notes:
1: Dimension H is equal to dimension B - minus - half the outside piping diameter (H = B - (D/2))
2: Dimensions F and H, depend on the actuator size. Consult ValtekSul's specification engineering



The information and specifications contained in this bulletin are believed to be accurate. However, they are for information purposes only and should not be considered as certified. Valtek Sulamericana products are continuously improved and the specifications, dimensions and information contained herein may change without prior notice. For additional information or confirmation, consult your Valtek Sulamericana representative.

Quality Management System

ISO 9001-2015
Certificate N° 311001 QM 15
DQS GmbH
DQS Brasil

ValtekSul Brasil
Headquarters and Factory
Rua Goiás, 345 - Diadema - SP - **Brazil**
Call Center +5511 4072-8600
www.valteksul.com
www.valteksul.com.br

VALTEK™ SULAMERICANA
THE CONTROL VALVES COMPANY

Cat. Valtek Sulamericana DS VariFlow-Chonos Rev.01/202E PN-9875002 (Copyright 2021 Valtek Sulamericana) | Printed in Brazil |