DS VARI*flow* & VARI*flow* HDP

Variable area desuperheaters

Suitable for:

- Steam
- Process gas

Markets:

- Oil & gas
- Power
- General industry

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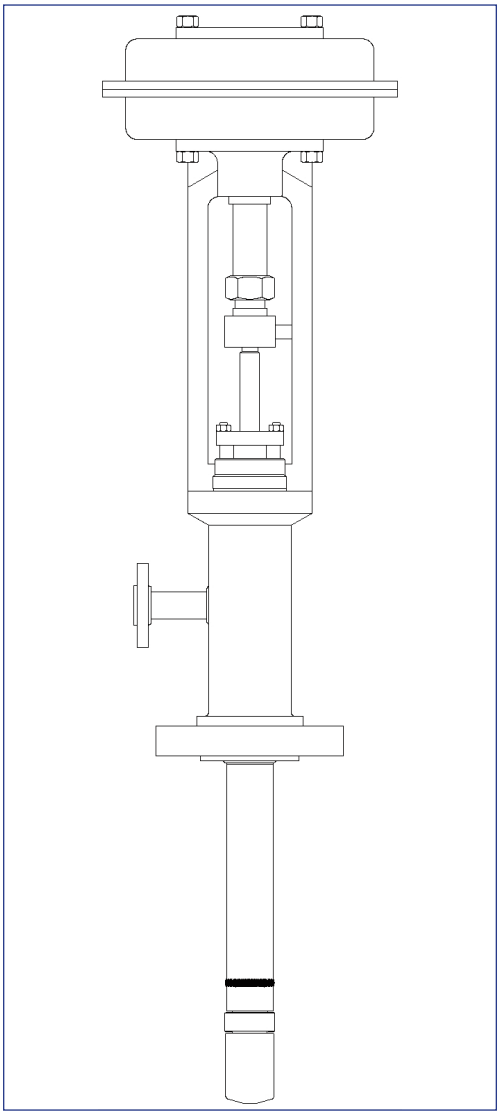

DSH 1525/2525 - DSH 1550/2550

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Introduction

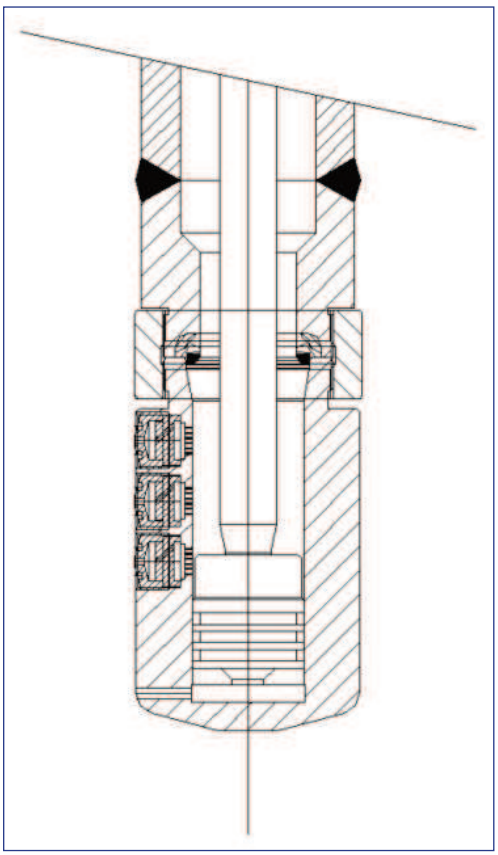
Carraro VARIflow series multiple nozzles desuperheaters are designed to combine excellent water atomization with high rangeability. Many applications require turn-downs in excess of the ones offered by a simple mechanical spray, constant area, Desuperheater but do not necessarily need the performance of more sophisticated and expensive devices. The Carraro VARIflow desuperheater fills the performance gap between the limited capability of a simple fixed area mechanical spray and far more sophisticated high performance solutions. Carraro VARIflow offer a large variety of nozzles combinations (number and sizes) in order to provide accurate control of steam temperature in whatever conditions. By means of associated diaphragm modulating actuator, generally assisted by a positioner, a complete control of the water amount needed for the desuperheating process is assured and no auxiliary control valve is necessary. VARIflow are designed for any application with no practical limitations about temperature and pressure of steam. Taking into account the max water pressure differentials from 60 through 80 bar, a supplementary reducing valve on the water supply line is not necessary in most of the applications.

Typical applications in power stations are:

- turbine by-pass stations
- steam dump to condenser
- turbine sealing steam line
- 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 ratings up to ANSI 1500 - forged for heavy duty series - ratings up to 2500.
Materials: A 217 WC6/WC9 - F22 - F91 (or EN equivalent).
Sizes: VARIflow 1525/2525 - water 1”, 1 1/2”, steam 3”.
VARIflow 1550/2550 - water 1 1/2”,2”,3”, steam 4”.
Ratings: ASME/ANSI 150 through 2500.
Connections: RF, RJ, BW on request.
Trim materials:
See sectional drawing.
Number of stages:
One stage in standard construction / two stages when requested by service conditions.
Cv range:
From 0,1 to 21,15 (see Cv table for all the details).
Number of nozzles:
6 or 9 - also mixed sizes configuration is available depending on application and requested rangeability.
Flow characteristic:
Linear or modified linear.
PED class:
Category 1
Shutoff class:
IEC 60534 - 4 / ANSI Class V tight shutoff capability.
Rangeability:
Up to 50:1
Min Δp:
1 bar for nozzles A through D1 , 2 bar for nozzles E through K.
Max Δp:
60 bar for standard design - 80 bar with 2 stages special design.
Max desuperheating:
Up to 7°C above saturation temperature of outlet steam.
Max water %:
The ratio water-to-inlet steam mass flowrate should not exceed 20%.
For higher % please consult Carraro Technical Department.



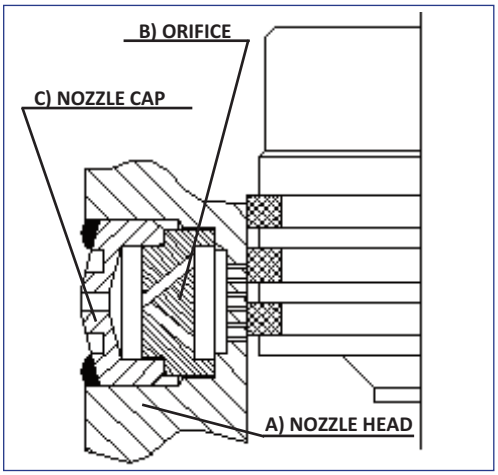
DS VARIflow nozzle head

Multiple nozzle heads

The Variflow multiple nozzle spray desuperheater can be supplied with 6 or 9 nozzles. The nozzles are arranged in two (6 nozzles) or 3 (9 nozzles) columns with an overlapping arrangement to give a continuous change of uncovered discharge area within the stroke of the piston.
In addition, the nozzles can be supplied with mixed capacities in order to provide flow characteristics that best fit the specific application.

Design

The VARIflow multiple nozzle spray desuperheater consists of a cage guided piston situated behind the spray nozzles. The piston moves inside the nozzle head and provides the shutoff and the uncovering of the desired discharge area. The nozzle head threaded end is locked to the main body extension pipe threaded end with a threaded ring. This enables different orientations between the flanges of the cooling water inlet and the spray direction of the nozzles.



Nozzle details

Optimal efficiency design

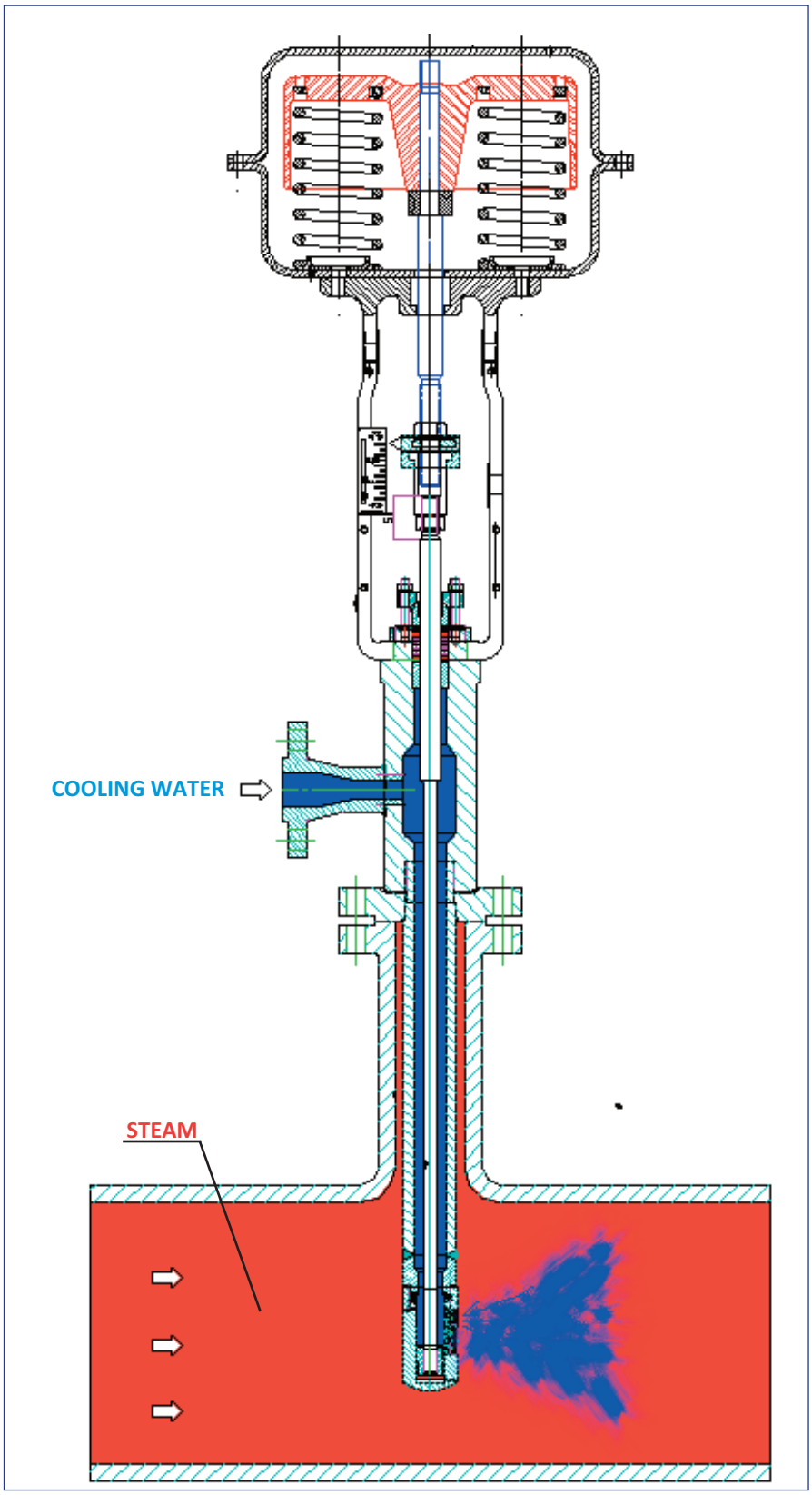
The nozzle design incorporates the latest technology. The high quality surface finish minimizes frictional losses, thereby ensuring that the total pressure difference between water and steam is available for atomization of water. The nozzle assembly consists of three components:

A) **Nozzle head**
B) **Orifice**
C) **Nozzle cap**

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

Principle of operation

The VARIflow desuperheater receives the cooling water through a flange on the main body, this is directed to the nozzle tube to reach the nozzle head on the other end. On the lower end of the body extension pipe the piston controls the flow through the seat and the area of the nozzles that is exposed to the cooling water flow. With the plug in closed position, no cooling water can reach the nozzle head. When the plug is pushed down by the actuator (that follows the input from the temperature control loop) the following opening of the nozzles changes the cooling water flowrate according to the required flow characteristic.



Sample of operation

Standard capacity range

The maximum water flowrates of VARIflow desuperheater in continuos service are:
- 25m³/h for VARIflow 1525/2525
- 50m³/h for VARIflow 1550/2550

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

Q = [m³ / h]
ρ = [kg / dm³]
Δp = [bar]

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

Flow coefficents					
6A	CV = 0,10	KV = 0,09	**9A**	CV = 0,15	KV = 0,13
6B	CV = 0,17	KV = 0,15	**9B**	CV = 0,25	KV = 0,22
6C	CV = 0,35	KV = 0,30	**9C**	CV = 0,52	KV = 0,45
6D	CV = 0,65	KV = 0,56	**9D**	CV = 0,98	KV = 0,84
6D1	CV = 1,27	KV = 1,10	**9D1**	CV = 1,91	KV = 1,65
6E	CV = 2,06	KV = 1,78	**9E**	CV = 3,09	KV = 2,67
6F	CV = 2,85	KV = 2,47	**9F**	CV = 4,27	KV = 3,70
6G	CV = 6,50	KV = 5,62	**9G**	CV = 9,75	KV = 8,43
6H	CV = 8,21	KV = 7,10	**9H**	CV = 12,31	KV = 10,65
6K	CV = 14,10	KV = 12,20	**9K**	CV = 21,15	KV = 18,29

The stroke is 60mm with nozzles A-B-C-D-D1 while the stroke is 90mm with nozzles E-F-G-H-K.
For mixed solutions the stroke is 60mm if there are only A - D1 nozzles while the stroke is 90mm if in the combination there are E - K nozzles. The minimum CV regulable depends on the nozzles combination.
It is 0,0055 with standard solution 6A. With special solution DS VARI*flow* can regulate CV down to 0,0045.
Please contact Carraro Technical Deparment for lower CV.

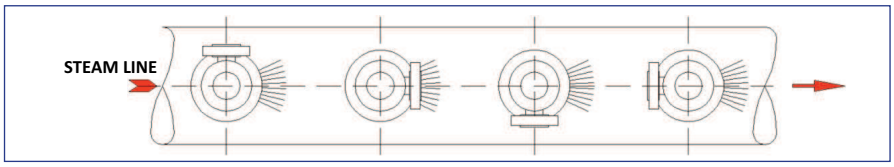
3D sample drawing

Required sizing parameters

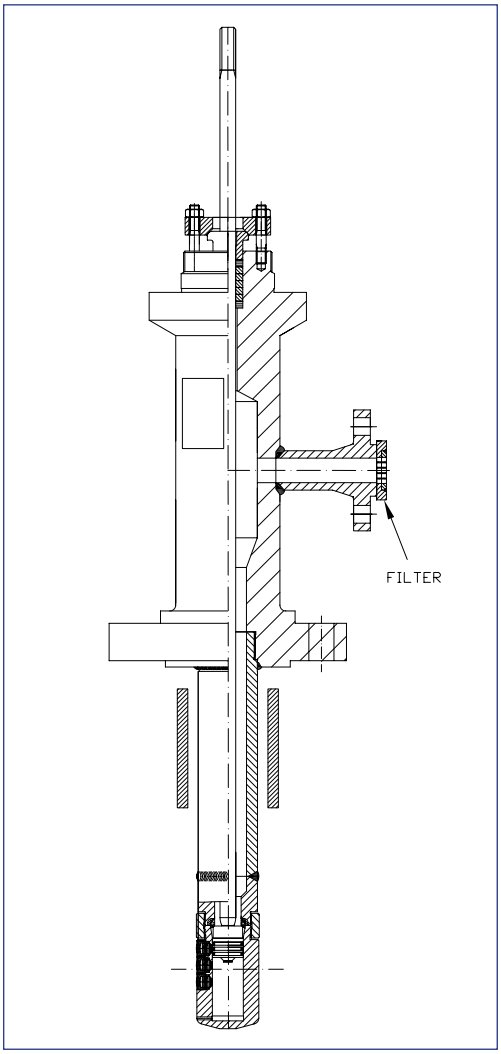
Steam Data
Inlet pressure: bar
Inlet temperature: °C
Outlet temperature: °C (setpoint)
Max steam flowrate (Inlet): kg/h
Min steam flowrate (Inlet): kg/h

Water Data
Inlet pressure: bar
Inlet temperature: °C

Piping
Pipe size: inch/mm
Pipe schedule
Water flange
Water flange orientation:
PFAn | PFAe | PFAs | PFaw



PFAn **PFAe** **PFAs** **PFAw**



Nozzle clogging prevention whit filter

Nozzles are oriented towards the steam outlet. To better comply with the layout of water line, four different orientations of inlet water flange are available, as shown in the above sketch. In case of order the code of flange orientation must be specified and, unless differently requested, the PFAn orientation will be supplied.

PFAn: Transverse left to direction of flow
PFAe: Along direction of flow
PFAs: Transverse right to direction of flow
PFAw: Opposite to direction of flow

Engineering practice for efficient desuperheating

Steam velocity
The higher is the velocity of steam in the injection point, the greater is local turbulence and the mixing of water into the steam is optimized. The efficiency of desuperheating is improved and the time for evaporating the water drops is reduced. Minimum steam velocity principally depends on the size and distribution of nozzles and it is carefully selected by Carraro Technical Department.
A general rule indicates a minimum steam velocity of about 8 through 10 m/s depending on service conditions and type of installation - reduced values are allowable by means of an appropriate selection and/or distribution of the nozzles.
When steam velocity is too low an internal liner of reduced dimension must be fitted into the injection chamber.

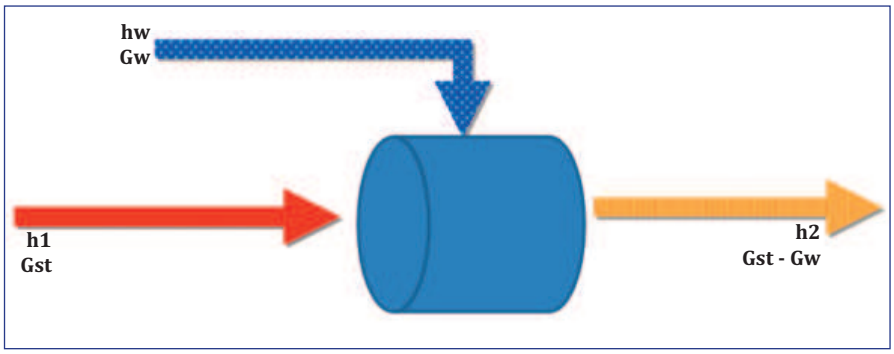
Nozzle clogging prevention
The installation of a strainer close to the water inlet is recommended to protect the desuperheater from nozzles clogging.
The sieve openings should not exceed 0,5 ÷ 1 mm (16 ÷ 30 mesh).
The desuperheater is normally provided with a filter mounted at desuperheating water inlet. After plant start-up it is recommended to inspect the aforementioned filter to remove the eventually retained dirt particles.

Distance to sensor
Distance of temperature sensor from the injection point is from 10 trough 20 meters depending on some parameters and principally on the steam velocity and the difference between the desired outlet temperature and the saturation temperature of steam at the downstream pressure.
The recommended value of this minimum distance is shown in the data sheet. However, to avoid excessive response lag of the system, also a maximum distance of the temperature sensor from the injection point must be stated. Maximum distance should be lower than Vxt_{max}, where V is the steam velocity (m/s) and t_{max} (seconds) is the maximum allowable response time for a stable process control.

Downstream straight pipe run
The well experienced distance of the first pipe bend downstream the water injection is shown in the data sheet and/or the drawings. The concentric reducers can be taken into account to evaluate the requested straight run. Except some particular applications the min straight run depends only on the steam velocity at injection point and in any case should be not less than 5 x DNj , where DNj is the internal diameter of the injection chamber.

Minimum diameter of pipeline
The minimum diameter of pipeline depends on the dimention of the spray head. If there is spray head with stroke 60 mm the minimum diameter is 6 inches while if the stroke is 90 mm the minimum diameter is 8 inches.

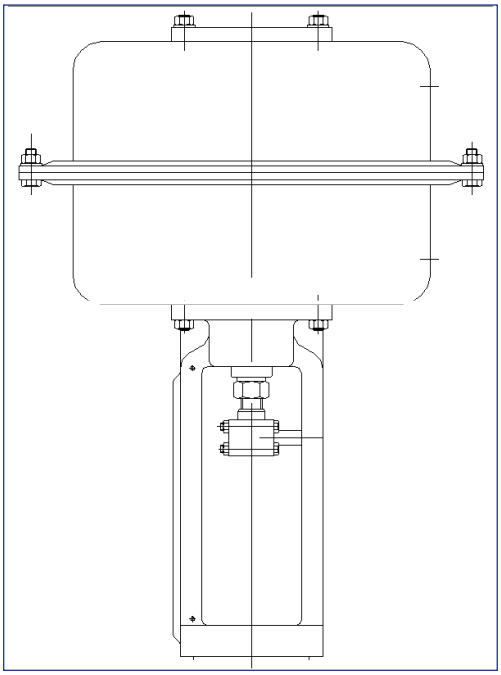
Sizing equation of desuperheater



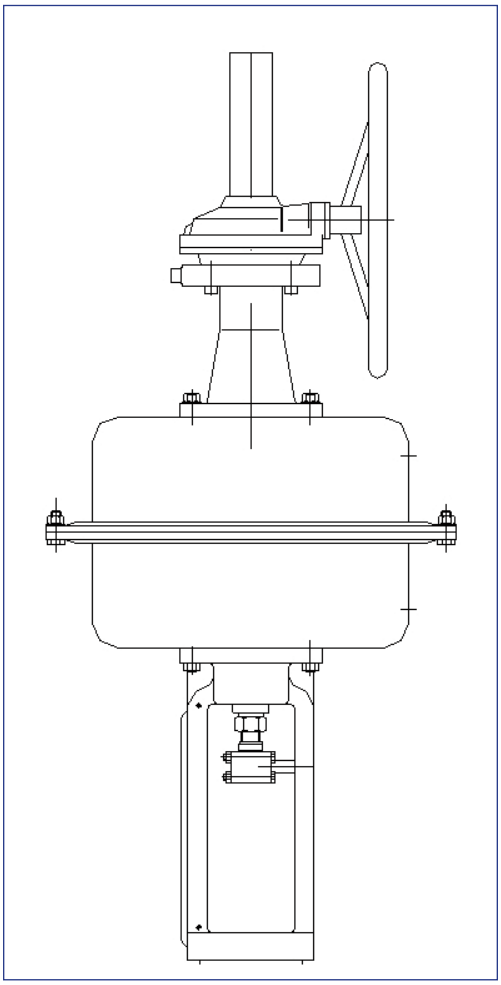
$$Gw = Gst \times \frac{h1 - h2}{h2 - hw}$$

Where:
Gw = Injected water mass flowrate - Kg/h
Gst = Inlet steam mass flowrate - Kg/h
h1 = Enthalpy of the inlet steam - KJ/Kg
h2 = Enthalpy of the outlet steam - KJ/Kg
hw = Enthalpy of the injected water - KJ/Kg

This formula enables the calculation of the water amount needed to reduce the inlet steam temperature to the required temperature of the outlet steam.

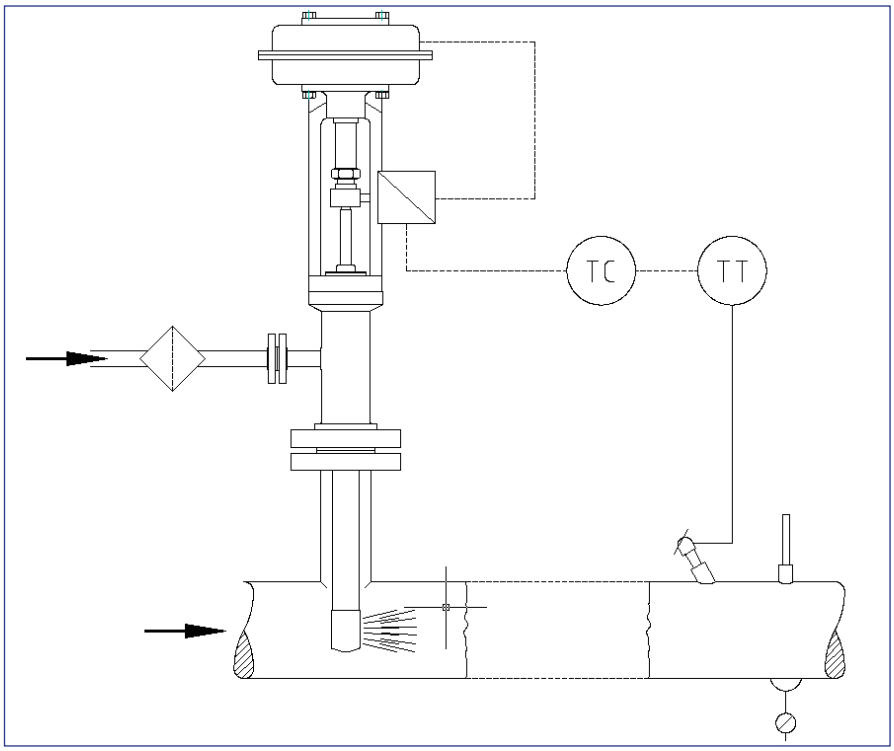


Version without handwheel



Version with handwheel

Control system



Water amount passing through the desuperheater is determined by the steam temperature control loop, as shown in the above sketch. Signals from temperature controller are consistent with all the actuators types used by Carraro both with analogue and digital field bus technique.

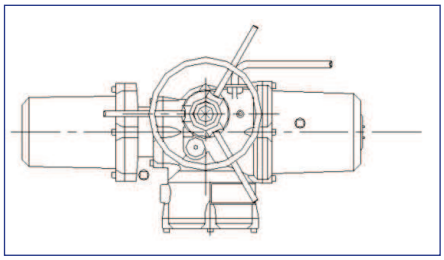
Actuators

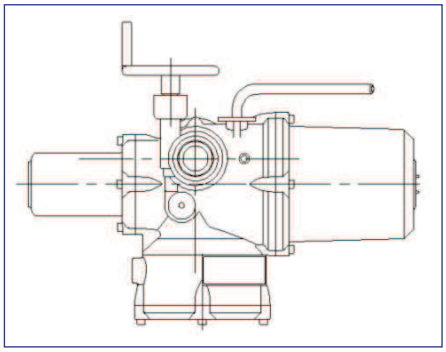
Pneumatic diaphragm actuators
Sizes:
540 and 1080 cm^2 depending on stroke
Stroke:
60 and 90 mm depending on nozzles selection
Air supply:
max 50 psi
Fail action:
standard to close valve - to open valve on request
Positioner:
pneumatic, elettropneumatic, smart analogue, smart digital in compliance with the Customer requirements
Handwheel:
top/side mounted
Other accessories:
boosters, lock-up valves, air filter, limit switches, solenoid valves.

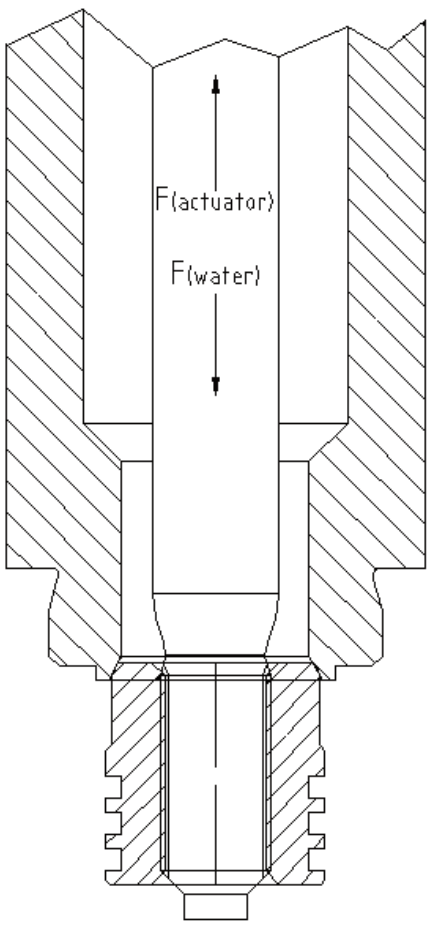
For actuators different from Carraro's standard, a different stem coupling can be supplied.

Electric actuators

All the main types of control electric actuators are available with the different qualified performances consistent with the expected process duty. The same electric or digital interfaces of positioner are available. Care should be taken in selecting these actuators with regards to max supplied thrust which must not exceed the max allowable one of valve stem. In some cases Carraro supplies a special spring loaded device fitted into the coupling with the valve stem







F(water) = P(water) x A_{load} + F(friction) + Seat load
F(actuator) > F(water)

Trim details

Actuator stem forces:

The stem forces for 1525/2525 & 1550/2550 can be calculated by the following relantionships

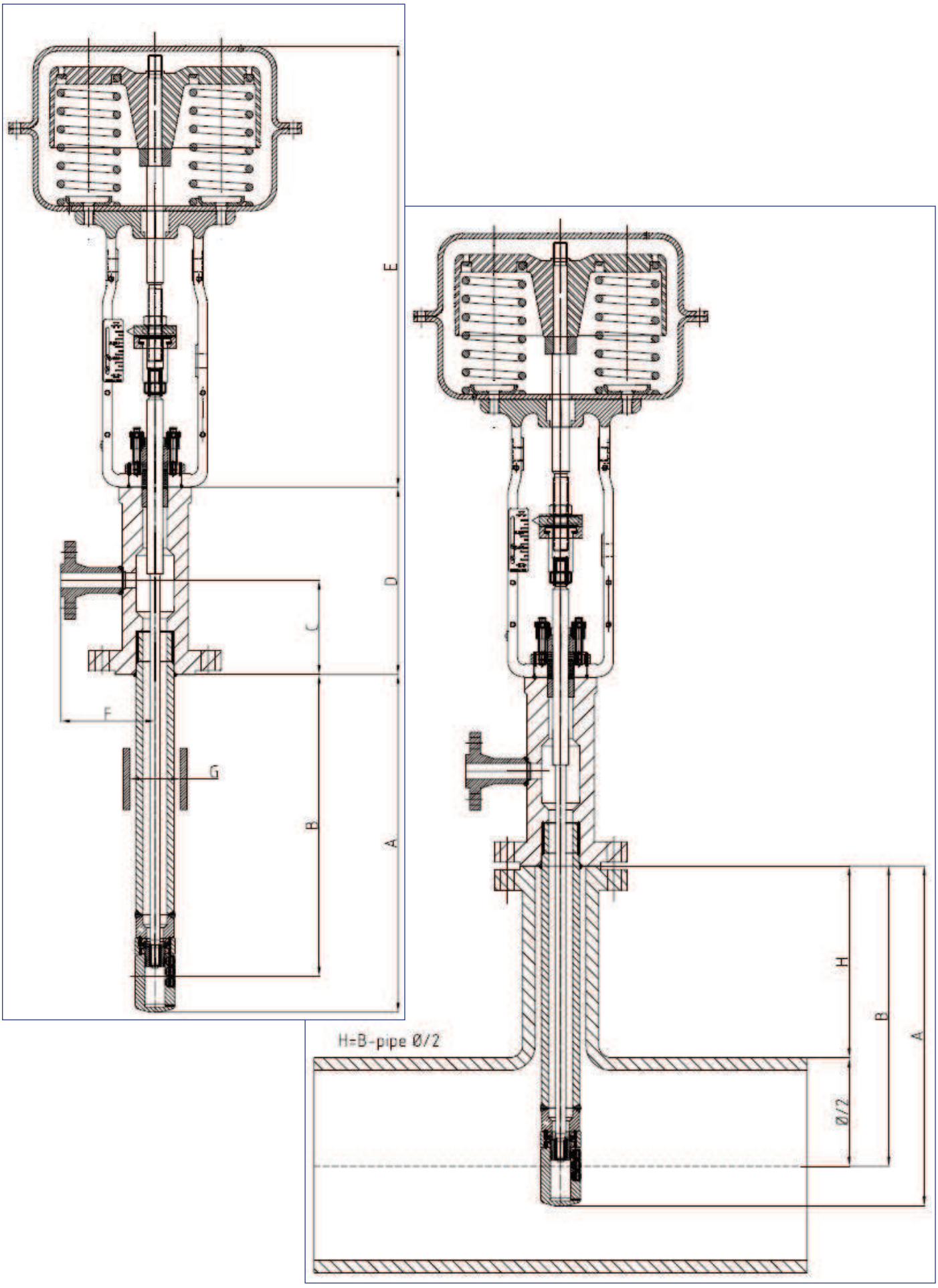
1525/2525: F_{water} (N) = 50 • P_{water} + 0,013 • P^2_{water} + 1600 (P_{water} in bar)

1550/2550: F_{water} (N) = 130 • P_{water} + 0,013 • P^2_{water} + 1950 (P_{water} in bar)

Calculations are based on the following hypothesis:
- Downstream steam pressure is neglected and P_{water} is the inlet pressure of water
- A seat load necessary for leakage class V
- High friction graphite packing

The stem force must be limited to a max value of 46kN.

Installation

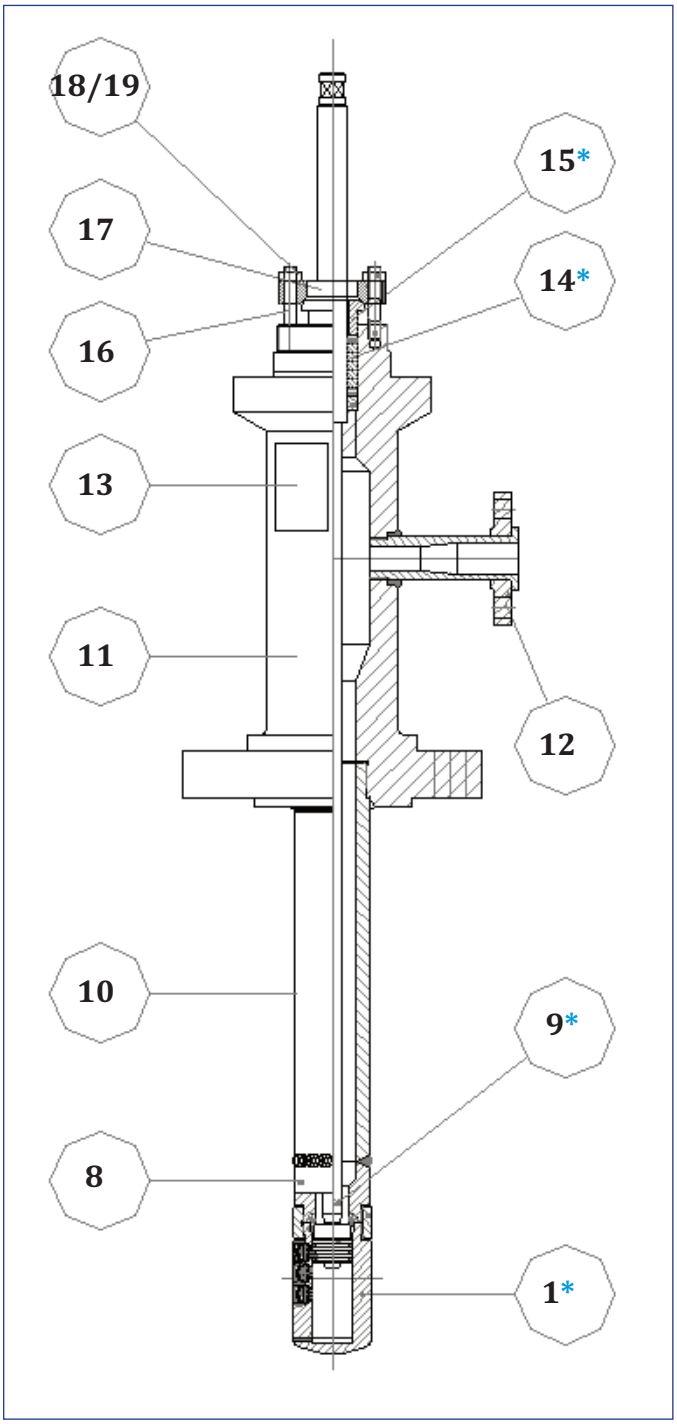


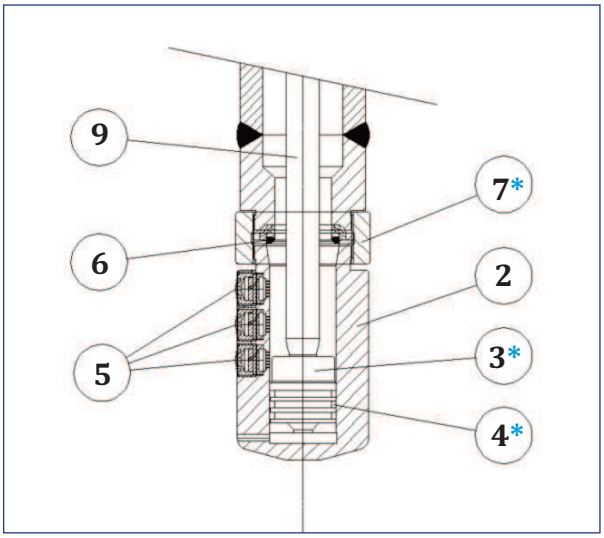
Dimensions

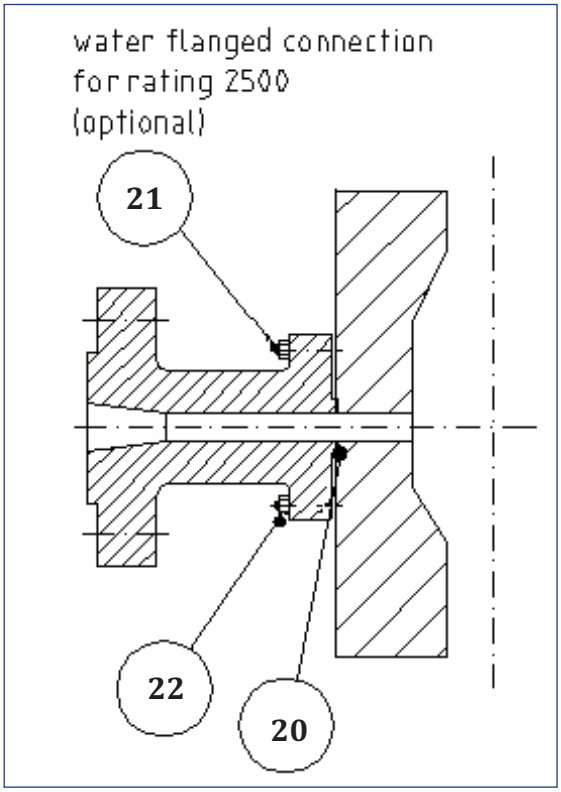
DIMENSIONS (mm)				
	VARIflow 1525/2525 qmax = 25m³/h		VARIflow 1550/2550 qmax = 50m³/h	
Standard length for Steam line size up to 12” (DN 300)				
A	stroke 60	441	stroke 90	476
	stroke 90	476		
B	stroke 60	381		398
	stroke 90	398		
Options: Standard lenght for Steam line size 14”(DN350) through 24”(DN600) [1]				
A	stroke 60	641	stroke 90	676
	stroke 90	676		
B	stroke 60	581		598
	stroke 90	598		
C	200		200	
D	312		312[3]	
E	Depending on the chosen actuator model			
F (min) [2]	150		200	
G (min)	66		80	

[1]For higher DN contact Carraro.
[2]Dimension F depends on size and class.
[3]Dimension D is 362 for 2550.
Dimensions may be subject to change without notice.
Stroke depends on nozzles.

FLANGE CONNECTIONS				
Steam Flange	3”	class 150	4”	class 150
		class 300		class 300
		class 600		class 600
		class 900		class 900
		class 1500		class 1500
		class 2500		class 2500
	DN 80	PN 25/40	DN 100	PN 25/40
		PN 64		PN 64
		PN 100		PN 100
		PN 160		PN 160
		PN 250		PN 250
		PN 400		PN 400
Water flange	1” - 1 1/2”		1 1/2” - 2” - 3”	
	DN 25-40		DN 40 - 50 - 80	
	Pressure classes as per water data requirement			


18/19
17
16
13
11
10
8
15*
14*
12
9*
1*


9
6
5
7*
2
3*
4*


water flanged connection
for rating 2500
(optional)
21
22
20

Materials & Recommended spare parts

ITEM	NAME	MATERIAL (1525 - 1550)	MATERIAL (2525 - 2550)
1*	Spray Nozzle Assembly	AISI 410	AISI 410
2	Spray Head	AISI 410	AISI 410
3*	Piston	AISI 420	AISI 420
4*	Piston Rings	AISI 431 Nitrided	AISI 431 Nitrided
5	Nozzle	AISI 410	AISI 410
6	Seat	Stellite 6	Stellite 6
7*	Fastener Ring	A 182 F11 / F22	A 182 F22 / F91
8	Seat housing	A 182 F11 / F22	A 182 F22 / F91
9*	Stem	AISI 431	AISI 431
10	Body Pipe	A-106 B/A-335 P11 / P22	A-182/A-335 P22 / P91
11	Body	A 217 WC6 / WC9	A 182 F22 / F91
12	Water Flange	A 182 F11 / F22	A 182 F22 / F91
13	Name Plate	AISI 304	AISI 304
14*	Packing Set	Graphite	Graphite
15*	Follower	AISI 431	AISI 431
16	Stud	A 193 B7	A 193 B7
17	Packing flange	AISI 304	AISI 304
18	Nut	A 194 2H	A 194 2H
19	Securing Washer	Steel	Steel
20	Gasket	-	AISI 316 / Graphite
21	Stud	-	A 193 B7
22	Nut	-	A 194 2H

NOTE
Other materials are available on request.
*Recommended spare parts

DS VARI*flow* HDP

Introduction

Variflow HDP type is an evolution of the basic DS series, providing the same excellent performances and the large variety of nozzles combinations to obtain accurate control of steam temperature in whatever conditions.
In addition, the two stages HDP design allows to control water flow under extreme values of Δp up to 80÷100 bar depending on water temperature. The distribution of pressure drops between the two controlling stages and the fixed area drilled cage is carefully selected to ensure the best stability of the plug and the accurate control of the water flowrate.
To comply with these severe applications a quick-change construction allows for an easy maintenance of internal components which are fitted into the body without any thread or weld.
Also, the seat ring is located far from the center of the pipe where max is the temperature of steam so to improve the shut-off performance and the life of the equipment.

General Features

Body:
Construction: fabricated forged steel.
Materials: F11 - F22 – F91 – other on request.
Sizes: DS 1525/2525 water 1”, 1-1/2” / steam 3”.
DS 1550/2550 water 1-1/2”,2”,3” / steam 4”.
Ratings: ASME/ANSI 900/ 1500 and 2500.
Connections: RF, RJ, BW on request.
Trim materials:
See sectional drawing.
Number of stages:
Two variable area stages + one fixed area drilled cage.
Cv range:
From 0,8 to 9,5 (see Cv table for the details).
Number of nozzles:
6 or 9.
Flow characteristic:
Linear or modified linear.
Travel:
60 or 90 mm, depends on nozzles.
Shutoff class:
Std IV – V on request.
Rangeability:
Up to 30:1
Min Δp
1 bar for nozzles D through D1, 2 bar for nozzles E through K.
Max Δp
100 bar for water temperature up to 100°C – some limitations up to 80 Bar for T water >100°C.
Approach temperature:
Up to 7°C above saturation temperature of steam.
Max water %: the ratio water-to-inlet steam mass flowrate should not exceed 25%.

Flow Coefficents

Basic Cv values with linear characteristic. Other nozzles combinations with intermediate Cv values can be selected for each application to optimize control and rangeability. In this case, modified linear characteristics are available.

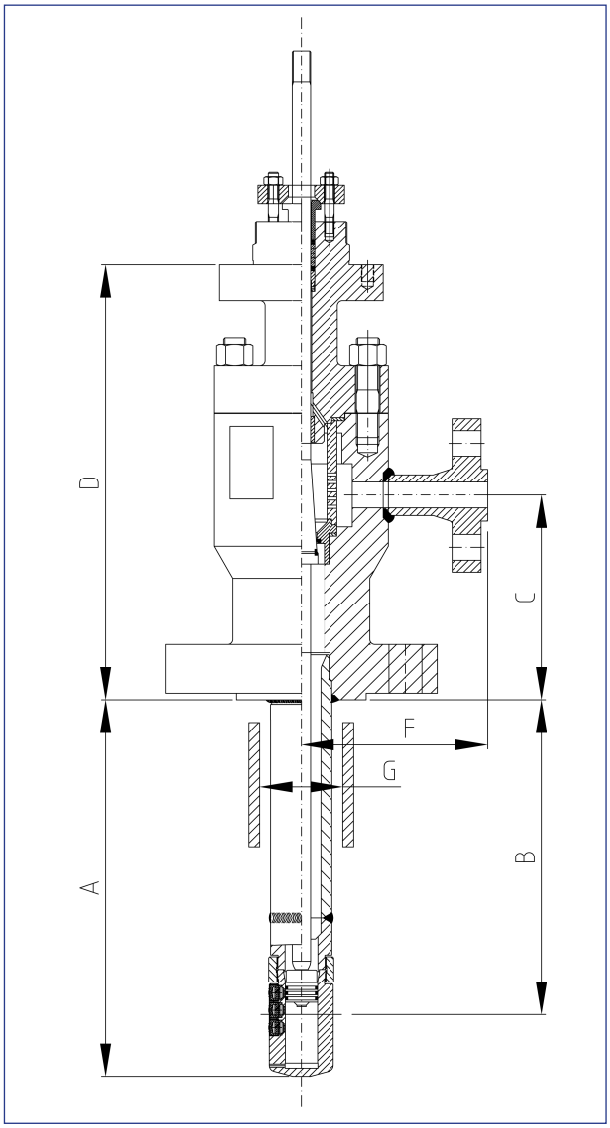
Flow Coefficents									
Nozzles set	9D	6D1	6E	6F	9F	6G	6H	9G	9H
CV	0,8	1	1,6	2,2	3,3	5	6,3	7,5	9,5

Dimensions

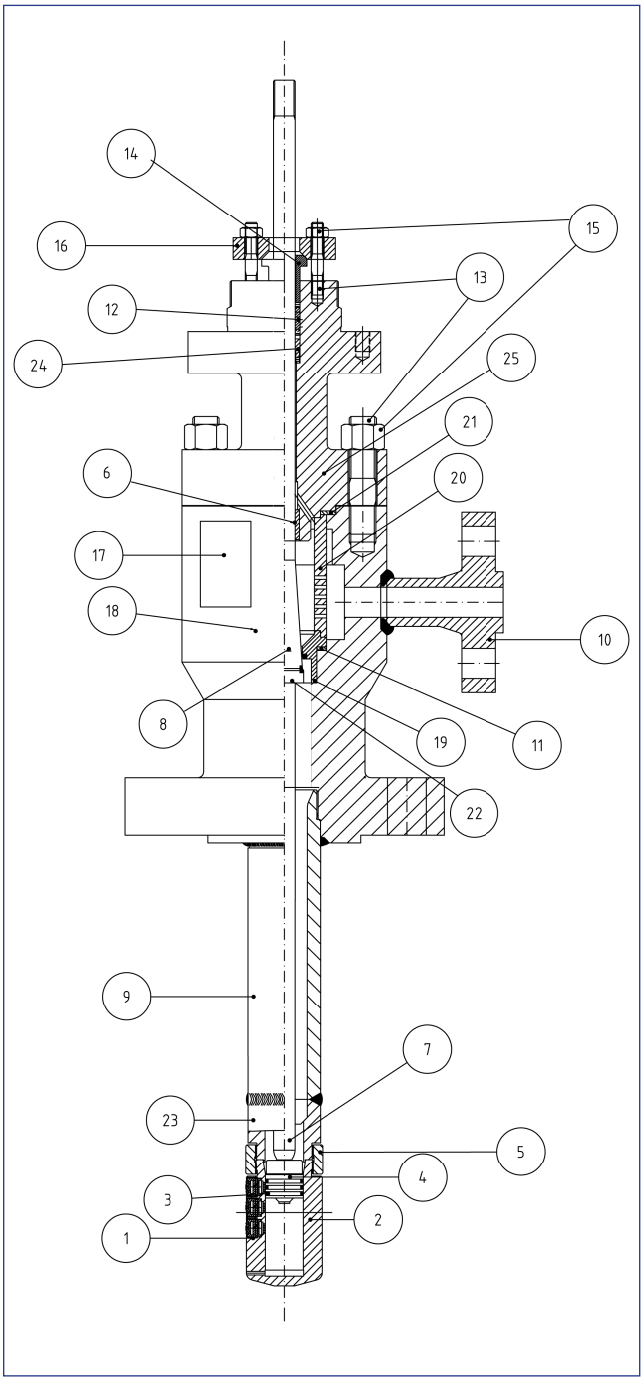
DIMENSIONS (mm)				
	VARIflow HDP 1525 qmax = 25m³/h		VARIflow HDP 1550 qmax = 50m³/h	
Standard length for Steam line size up to 12” (DN 300)				
A	stroke 60	441	stroke 90	476
	stroke 90	476		
B	stroke 60	381		398
	stroke 90	398		
Options: Standard lenght for Steam line size 14”(DN350) through 24”(DN600) (1)				
A	stroke 60	641	stroke 90	676
	stroke 90	676		
B	stroke 60	581		598
	stroke 90	598		
C	200		200	
D	425		425	
F (min) (2)	200		250	
G (min)	66		80	

(1)For higher DN contact Carraro. (2)Dimension F depends on size and class. Dimensions for 2500 on request.
Dimensions may be subject to change without notice. Stroke depends on nozzles selections.

Internal cage

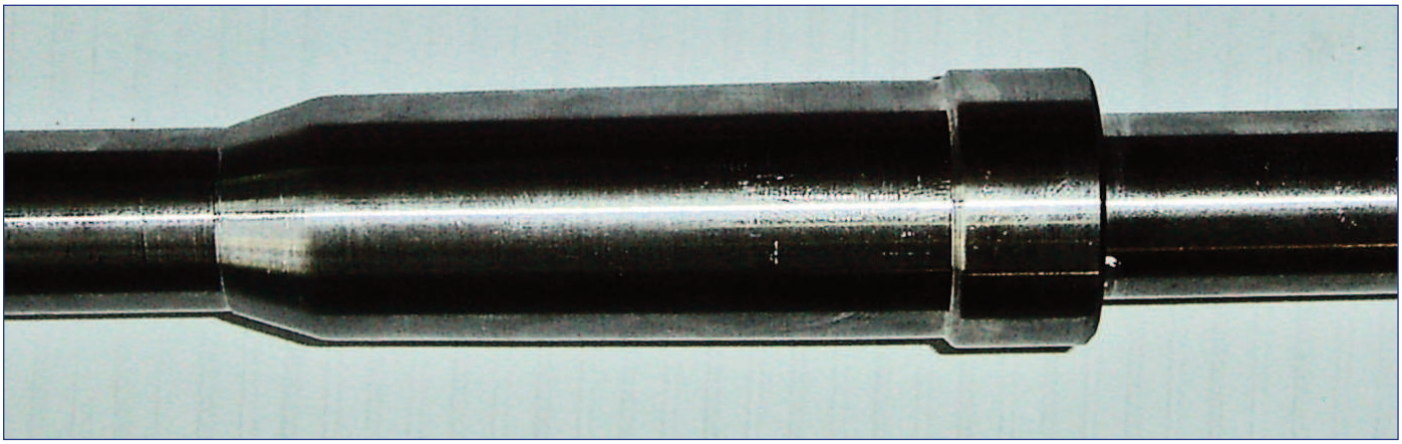


Dimensional drawings



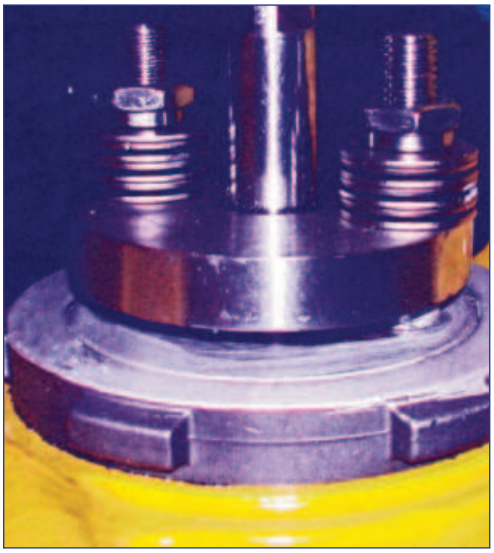
Materials & Recommended spare parts

ITEM	NAME	MATERIAL (1525 - 1550)
1*	Spray Nozzle Assembly	AISI 410
2*	Spray Head	AISI 410
3*	Piston Ring	AISI 431 Nitrited
4*	Piston	AISI 420
5*	Fastener Ring	A182 F11/F22/F91
6	Bushing	AISI 420
7*	Stem	AISI 431
8*	Plug	AISI 431 + Stellite 6
9	Pipe	A335 P11/P22
10	Water Flange	A182 F11/F22/F91
11*	Gasket	AISI 316 - Graphite
12*	Packing set	Graphite
13	Stud	A 193 B7
14*	Follower	AISI 431
15	Nut	A 194 2H
16	Packing flange	AISI 304
17	Nameplate	AISI 304
18	Body	A182 F11/F22/F91
19*	Seat ring	17-4PH + Stellite 6
20	Cage	17-4PH
21*	Gasket	AISI 316 - Graphite
22	Pin	AISI 316
23	Extension	A182 F11/F22/F91
24*	Lantern ring	AISI 431
25	Bonnet	A182 F11/F22/F91



First stage plug

SPECIAL CONSTRUCTIONS



DG VARI*frigo* - *variable area desuperheater for low temperatures*

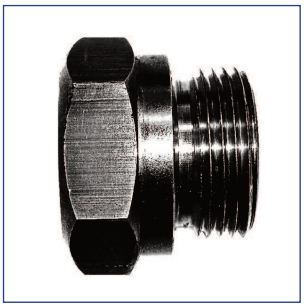
Apart from desuperheating of steam, the Carraro desuperheaters are used in many other applications where the injection of a liquid into a gas stream is requested. While cryogenic processes (see VARIcryo below) which involve LNG, nitrogen, oxigen, ethylene at temperatures lower than -100°C, low temperature VARIflow (also called VARIfrigo) are intended to operate on liquids at temperatures down to -100°C. The general scope of the injection of cold liquids is to adjust the temperature of a gas flowing inside of the piping.
Also the cooling of a gas stream of the same compound is widely used as in the ammonia processes or on the carbon dioxide compressor suction. Generally the low temperature liquids are associated to moderate pressures not exceeding 10 bars.
For applications at temperatures lower than -50°C VARIfrigo are generally constructed in stainless austenitic steels.
The heavy insulation requested by these processes to avoid dangerous gas pockets into the piping and, at the same time, to prevent icing on stuffing boxes, implies the use of long bonnet's extensions.

DC VARI*cryo* - *variable area desuperheater for cryogenic applications*

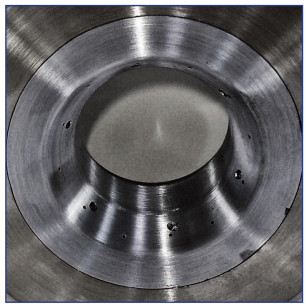
The most important among these applications are the cryogenic processes which involve liquid LNG at temperatures from -130°C down to -150°C depending on the pressures. In the ship loading and unloading systems, LNG liquid is injected into LNG gas supplied to filled-up ship's tanks (vapor return to ship), the involved pressures are low and the max requested rating does not exceed ANSI 300, PN40.
Also in the gas compression stations, the injected LNG used to adjust the gas temperature on the compressor suction is handled at very low temperatures but at a moderate pressure not exceeding 10 bars.
For cryogenic applications VARIcryo desuperheaters, derived from the well-known VARIflow are fully constructed in stainless austenitic steels.
The exceptional insulation requested by these processes to avoid dangerous gas pockets into the piping and, at the same time, to prevent icing on stuffing boxes of equipments, implies the use of large cold boxes around the piping, including control valves. Therefore, an extra-long extension of the valve bonnets is requested and a supplementary stem guide can be fitted inside of this extension.

Discover also the other desuperheaters of our line according to your specific needs.

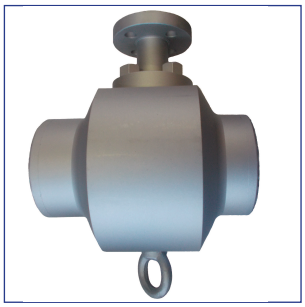
DM VARI*spring*
Spring loaded nozzle desuperheaters



DF VARI*fix*
Fixed nozzle desuperheaters



DY VARI*spray*
Fixed area vortex type desuperheaters



DV VARI*vent*
Venturi type desuperheaters

See all main charateristics on the following page ...

CARRARO DSH COMPARISON TABLE

DSH TYPE	DF VARIFIX	DM VARISPRING	DS VARIFLOW	CD35	DV VARIVENT	DY VARISPRAY
Type of nozzle	Fixed area vortex type	Variable area spring assisted	Variable area multinozzle actuator assisted	Fixed area multinozzle steam assisted	Fixed area multinozzle steam	Fixed area vortex type
Rangeability	4 ÷ 5 : 1	15 ÷ 25 :1	up to 50:1	Up to 25:1	6 ÷ 7 : 1	up to 10:1
Min approach temperature	7°C	7°C	7°C	9°C	5°C	6°C
MaxΔp water-to-steam	30 bar	25 bar	60 bar *	30 bar	40 bar	30 bar
MinΔp water-to-steam	1,5 bar	3 ÷ 6 bar	1 ÷ 2 bar	0,7÷ 2,5 bar	0,5 bar	1 ÷ 2 bar
Max water % vs inlet steam (by weight)	15%	20% ÷ 25 %	20% ÷ 25 %	30% ÷ 35%	20%	15%
Minimum steam velocity	8 m/s	10 m/s	8 ÷ 10 m/s	2 m/s	4 m/s	6 m/s
Minimum downstream straight run	4m or 5DN	5m or 6DN	4m or 5DN	4m or 5DN	3m or 15DN	3m
Distance to temperature sensor	10 ÷ 15 m	10 ÷ 20 m	10 ÷ 20 m	15 ÷ 25 m	5 ÷ 7 m	8 ÷ 10 m
Nozzle CV (water)	0.018÷ 5	1÷ 15	0,1÷ 21	1”÷4”	0,0176÷ 7,3	0,0145÷ 0,928
Max Flowrate	25m3/h	65m3/h	50m3/h	18m3/h	40m3/h	5m3/h

STEAM SERIES (traditional steam desuperheating application)

DSH TYPE	DC VARICRYO	DG VARIFRIGO
Type of nozzle	Variable area multinozzle actuator assisted	Variable area multinozzle actuator assisted
Rangeability	up to 50:1	up to 50:1
Temperature application	Up to -196°C	Up to -100°C
MaxΔp liquid-to-gas	60 bar	60 bar
MinΔp liquid-to-gas	1 ÷ 2 bar	1 ÷ 2 bar
Max liquid % vs inlet gas (by weight)	50%	50%
Minimum downstream straight run	4m or 5DN	4m or 5DN
Distance to tempera-ture sensor	8 ÷ 12 m	8 ÷ 12 m
Nozzle CV (liquid)	0,1÷ 12	0,1÷ 21
Max Flowrate	50m3/h	50m3/h

COLD SERIES (low temperature or crygenic application)

NOTE

* from 80 up to 100 bar with two stage trim for the HDP version.

REMEMBER THAT:

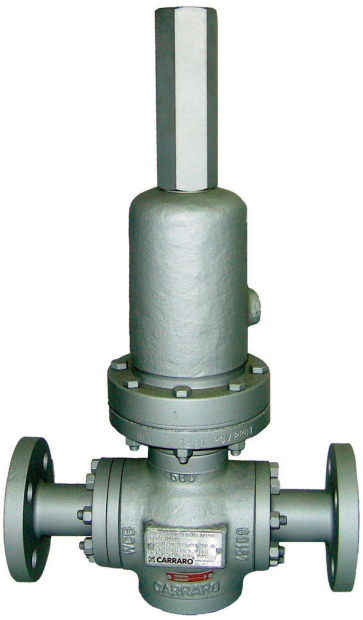
when asking for a desuperheater, the most important infos to provide in order to allow us to size and select the most suitable solution for you are:

- Amount of superheated steam ✔
- Temperature of superheated steam ✔
- Pressure of superheated steam ✔
- Temperature of desuperheated steam ✔
- Temperature of water ✔
- Pressure of water ✔
- Steam pipe size at injection point ✔

CARRARO PRODUCTS

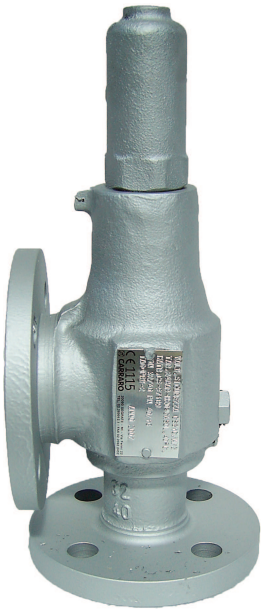
In addition to a complete range of desuperheaters, Carraro manufactures a broad range of industrial self actuated regulators and safety valves, suitable for each kind of dangerous and non-dangerous fluid (water, gases, liquids, oils and steam) with main focus for the Oil&Gas, the Power and the General Industry's applications.

For more information or details, please contact our Sales Department or visit our official website www.carrarovalvole.it.



Regulators

Size: from ¼" up to 20"
Regulated pressure: from 0,0012 up to 50 bar
Temperature: from – 196 up to 570 C°
Up to rating ANSI 1500 class
All kind of connections available



Safety valves

Traditional "pop action" PSV's
"Proportional lift" PSV's
Double adjusting ring philosophy for excellent performances
DIN connections available

All our regulators and safety valves are PED / ATEX compliant and can be realized in "exotic materials" also.

About Carraro

Carraro Srl is a private independent company, operative since 1924 in the field of industrial valves. The firm produces and commercializes worldwide a broad range of industrial pressure regulators, desuperheaters and safety valves for fluids such as steam, process gases and liquids.
The flexible organization of Carraro allows a great customization of the products and the production of "taylor made" constructions. Most of the Carraro's product range can be realized also in "exotic" materials such as e.g. duplex, superduplex, monel, hastelloy, aluminum bronze and others. Supported by a global network of sales offices, representatives and distributors, Carraro offers a wide range of solutions for the Oil&Gas, the Power industry and all other diversified industrial applications.

Carraro: product range

UB Regulators: direct-operated pressure regulators with compact design
Maxomatic Series: multifunction pilot-operated regulators for liquids
MM-BPM series: direct-operated, spring pressure regulators
AT series: direct-operated temperature regulators
M51 series: direct-operated, weight and lever pressure regulators
CS series: safety valves for vapours, gas, liquids
CSV series: safety valves for steam and gases
VRE series: electrically operated control valves
MCP - ACP series: pneumatically operated control valves
AIRMATIC series: electropneumatic safety valves
DSH series: desuperheaters

Approvals and certifications

UNI EN ISO 9001: 2008	✔
UNI EN ISO 14001: 2004	✔
97 / 23 / CE (PED)	✔
94 / 09 / CE (ATEX)	✔
RINA	✔
GOST R+RTN	✔
CRN Canada	✔

Cooperations with notified bodies

LLOYD's REGISTER	✔
ABS	✔
BV	✔
DNV	✔

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