



# Type DMBC

BYVAP®  
Steam Desuperheater



## Description

The BYVAP steam desuperheater type DMBC is designed for accurate and cost effective steam temperature control. The DMBC is a complete temperature control valve and cools the superheated steam by introducing water into the steam flow via a high efficiency multi nozzle design. Temperature can be controlled by a pneumatic or electric actuator.

## Characteristics

- Body material: 1.7383 / A182 F22 cl3  
1.0352 / A105
- Seat material: stellite
- TMS: 1060°F / 570°C
- PMS: 2,175 PSI / 150 bar
- ΔPMax: 1,740 PSI / 120 bar
- PN250 / Class1500
- Steam flange Size 3" - DN80
- Water flange: Size 1"/1 1/2" - DN25/DN40
- Water turndown ratio up to 33:1
- Minimum temperature above saturation 5°C
- Accuracy: +/- 1,5%
- Design code: ANSI B16.34 class 1500/2500

## Features

Excellent spraying by high quality vortex nozzles, greatly reducing the risk of water accumulation in the pipe, and large turndown ratio.

## How to order

DMBC Material..., PN/Class ..., Kv..., Water flange PN/Class ...



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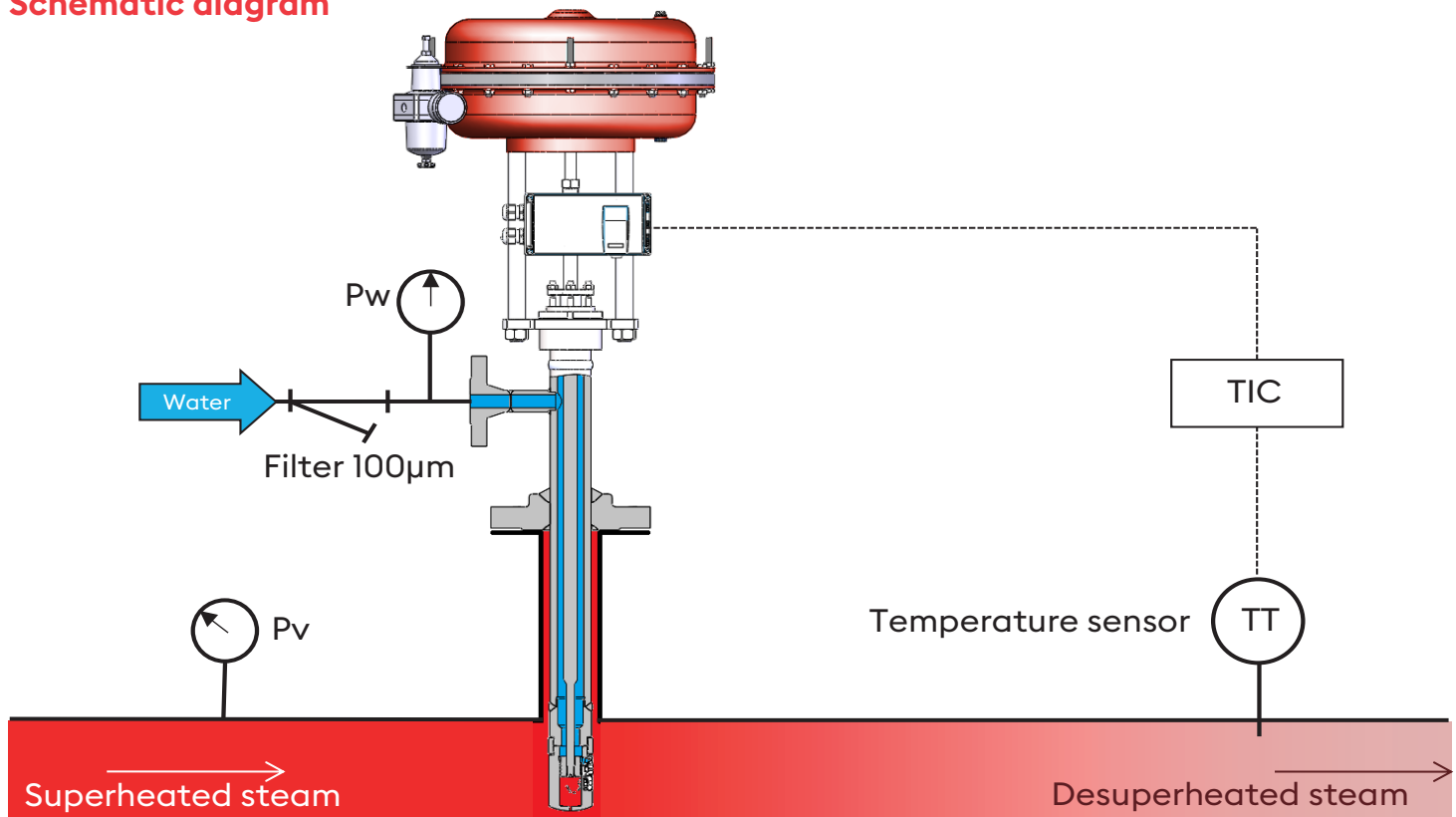
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## Schematic diagram



## Operation

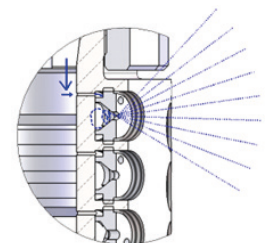
The desuperheater type DMBC has a very simple and reliable operation. It is supplied complete, adjusted and operational.

When the steam temperature increases, a control signal is sent, via a positioner, to the actuator, which controls a plug which uncovers nozzle holes, thereby increasing the water flow.

When the temperature drops, the plug goes up and closes the holes, reducing the water flow passing through the spray nozzles.

DMBC provides a very good atomization of desuperheating water from only 50 PSI (3.5 Bar) above the steam pressure at the temperature control. The DMBC is designed:

- To have a metal / metal class V between the stellite seat and the plug
- Without gaskets or springs
- Can be installed vertically or horizontally, if the actuator is properly supported
- With high specification Vortex nozzles welded in position
- With a guided plug with segments for low friction
- With a high resistance stainless steel spray head
- Class 1500



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## Recommendations

### FILTERER

The installation of a 100µm filter in the desuperheating water line is recommended to protect the desuperheater DMBC

### STRAIGHT LENGTH

The first elements that can impair the desuperheating, must not be located less than 6xD upstream and 5m downstream

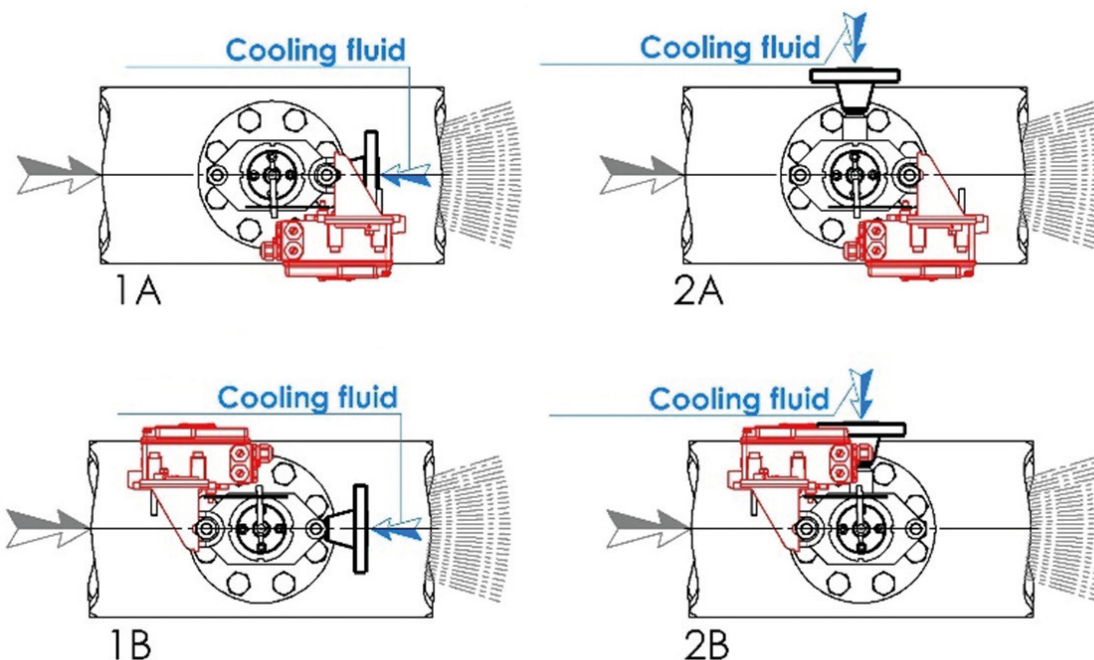
### PRESSURE DIFFERENCE

The difference of pressure between water of desuperheating and steam must be between 50 PSI and 1740 PSI / 3,5bar and 120bar.

### STEAM SPEED

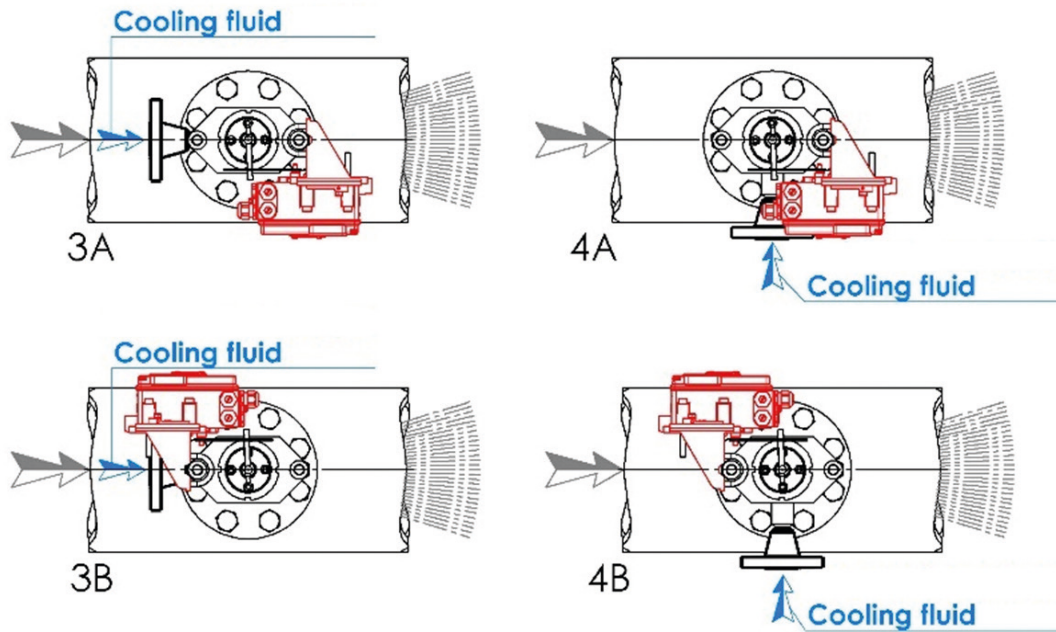
Minimal speed of steam must not be below 39 ft/s / 12m/s.

## Water inlet flange and positioner top view





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## Standard capacity

Kv	Cv	Stroke (mm)	Tube Mini	Kv	Cv	Stroke (mm)	Tube Mini	Kv	Cv	Stroke (mm)	Tube Mini
<b>0,39</b>	0,451	41	150	<b>1,357</b>	1,569	54	150	<b>3,348</b>	3,871	66	200
<b>0,48</b>	0,555	78	200	<b>1,371</b>	1,584	56	150	<b>3,574</b>	4,131	78	200
<b>0,5</b>	0,578	45	150	<b>1,45</b>	1,676	68	200	<b>4,009</b>	4,634	80	200
<b>0,505</b>	0,584	45	150	<b>1,579</b>	1,825	60	150	<b>4,061</b>	4,695	85	200
<b>0,52</b>	0,601	41	150	<b>1,775</b>	2,052	58	150	<b>4,086</b>	4,723	77	200
<b>0,55</b>	0,636	45	150	<b>1,801</b>	2,081	73	200	<b>4,208</b>	4,865	89	250
<b>0,6</b>	0,693	45	150	<b>1,88</b>	2,173	62	200	<b>4,515</b>	5,219	79	200
<b>0,68</b>	0,786	54	150	<b>1,929</b>	2,23	62	200	<b>4,601</b>	5,319	84	200
<b>0,76</b>	0,878	50	150	<b>2,032</b>	2,349	63	200	<b>4,83</b>	5,583	96	250
<b>0,779</b>	0,901	78	200	<b>2,136</b>	2,469	67	200	<b>4,938</b>	5,709	81	200
<b>0,809</b>	0,936	50	150	<b>2,38</b>	2,751	65	200	<b>5,838</b>	6,749	83	200
<b>0,915</b>	1,058	56	150	<b>2,458</b>	2,841	77	200	<b>6,704</b>	7,75	84	200
<b>1,019</b>	1,178	54	150	<b>2,585</b>	2,988	69	200	<b>8,604</b>	9,946	111	400
<b>1,162</b>	1,343	52	150	<b>2,688</b>	3,108	73	200	<b>10,281</b>	11,884	137	400
<b>1,256</b>	1,452	62	200	<b>2,7</b>	3,121	80	200	<b>11,734</b>	13,564	164	400
<b>1,291</b>	1,493	64	200	<b>3,133</b>	3,622	75	200	/	/	/	/



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## Flow calculation

To select a Sprayhead to install on the desuperheater two calculations have to be done:

- A calculation to define the water flow based on the process data.
- A calculation to define the Kv

The water flow  $Q_w$  is first calculated from process data using the following formula:

$$Q_w = Q_v \frac{H_{ve} - H_{vs}}{H_{vs} - H_w}$$

$Q_v$  = Steam flow ( $m^3/h$ )  
 $Q_w$  = Water flow ( $m^3/h$ )  
 $H_{ve}$  = Upstream Steam enthalpy  
 $H_{vs}$  = Downstream Steam enthalpy  
 $H_w$  = Water enthalpy

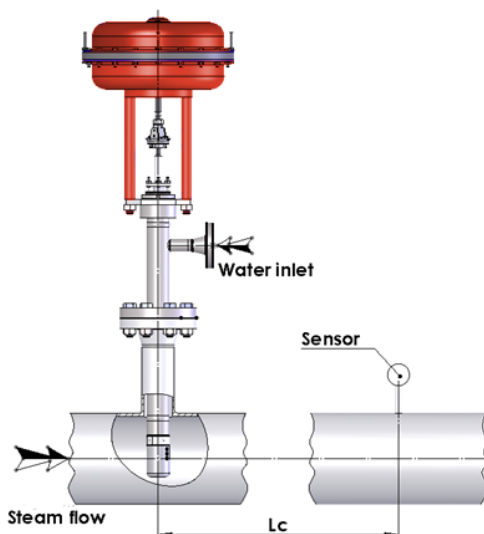
A simplified Kv calculation can be done using the following formula:

$$K_v = \frac{Q_w}{\sqrt{P_w - P_v}}$$

$Q_w$  = Water flow ( $m^3/h$ )  
 $P_v$  = Steam pressure (bar)  
 $P_w$  = Water pressure (bar)

## Sensor distance

The temperature sensor is positioned as a function of the enthalpy difference and depending on the proximity of the temperature to be controlled to the saturation temperature. The graphs below indicate the position of the temperature sensor.



- 1 Calculate the total enthalpy difference between the inlet and outlet and draw a horizontal line to the superheat temperature to control.
- 2 From the point found, draw a vertical line down to find the distance



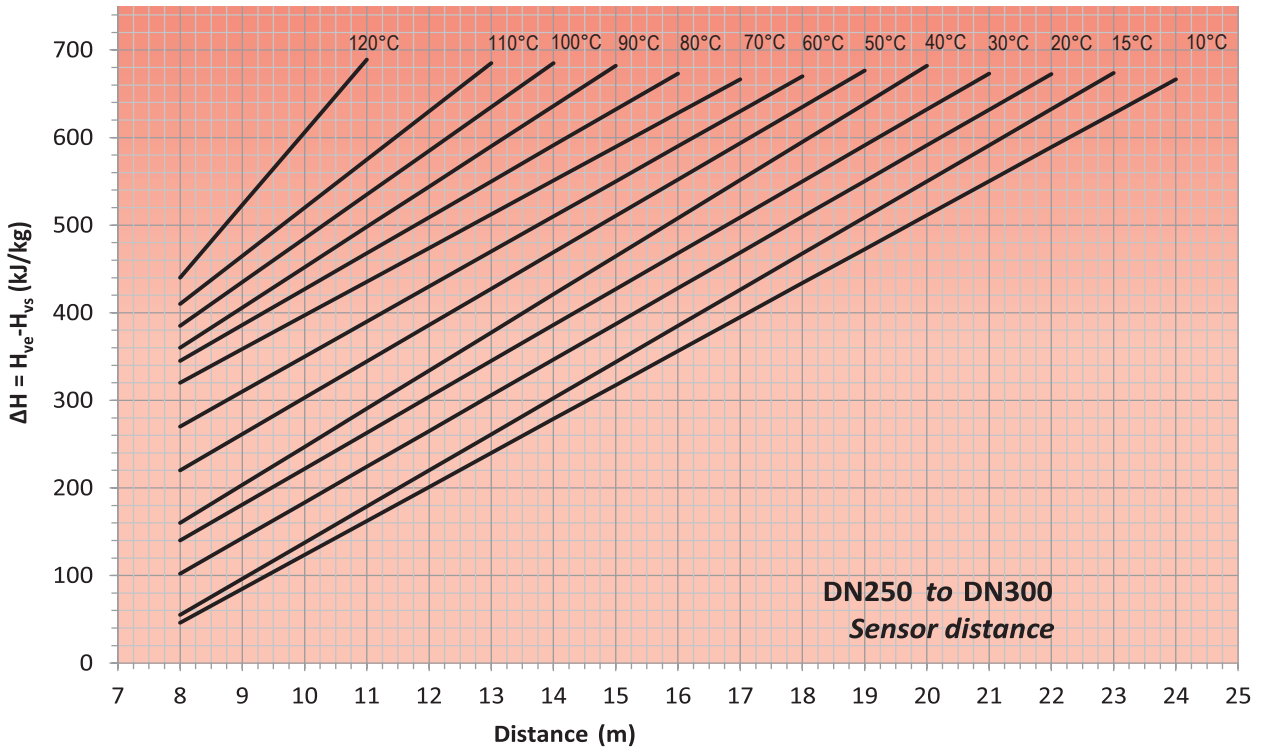
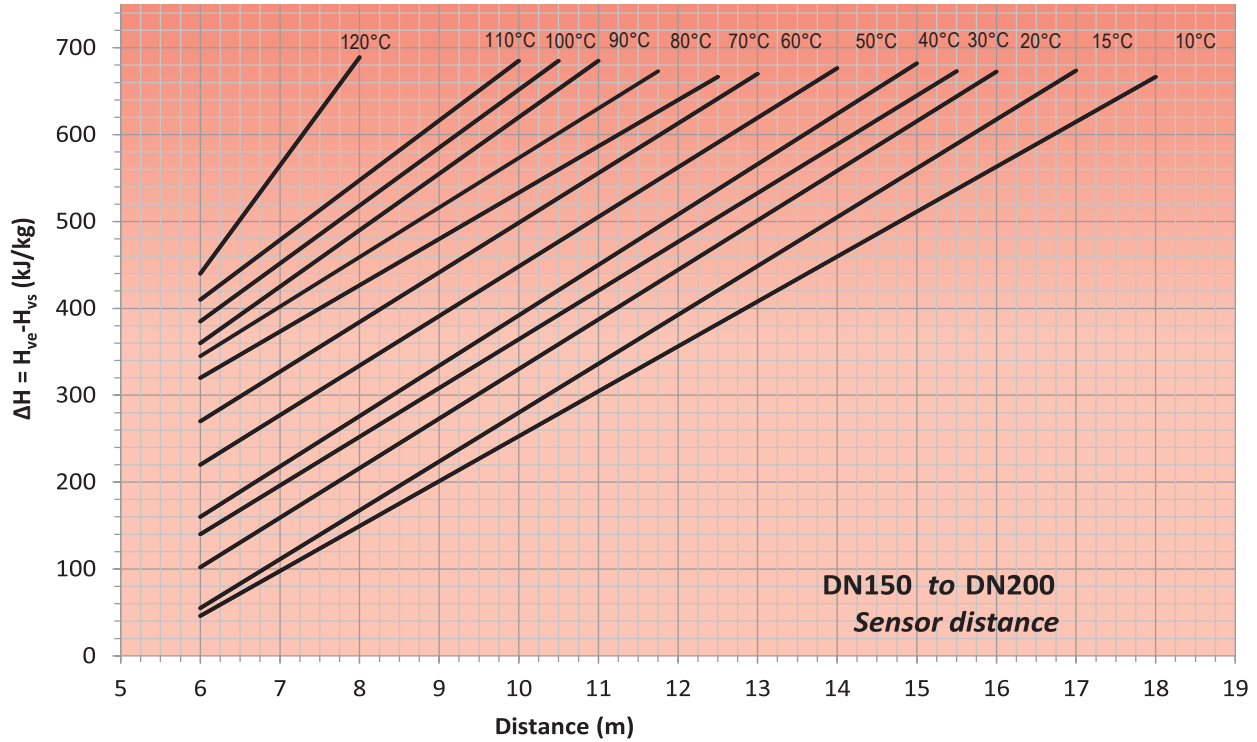
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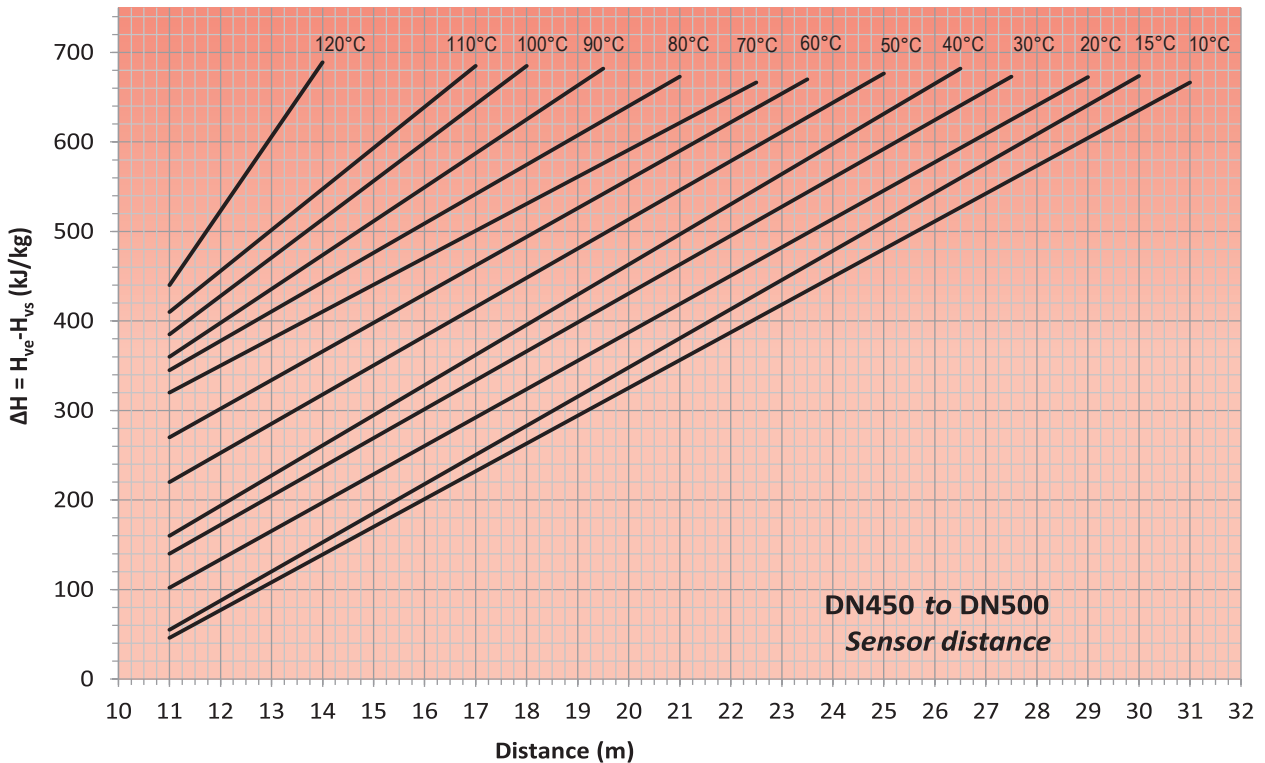
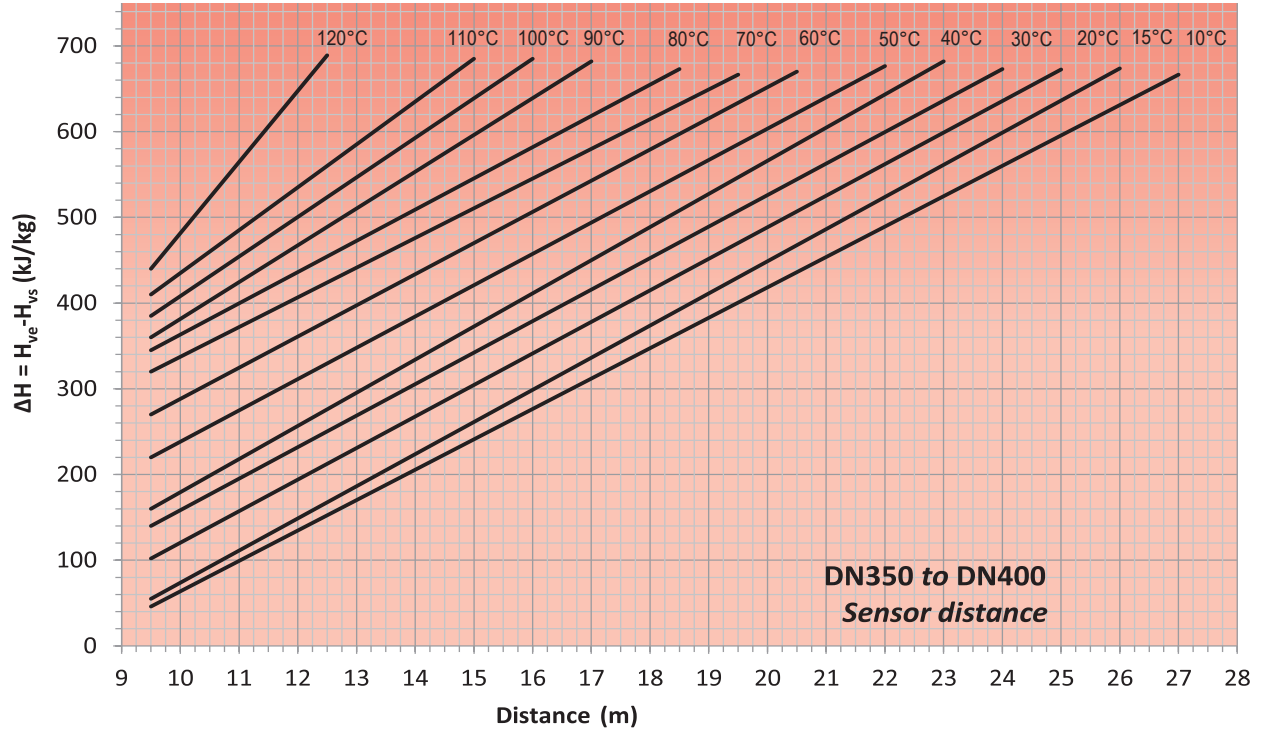
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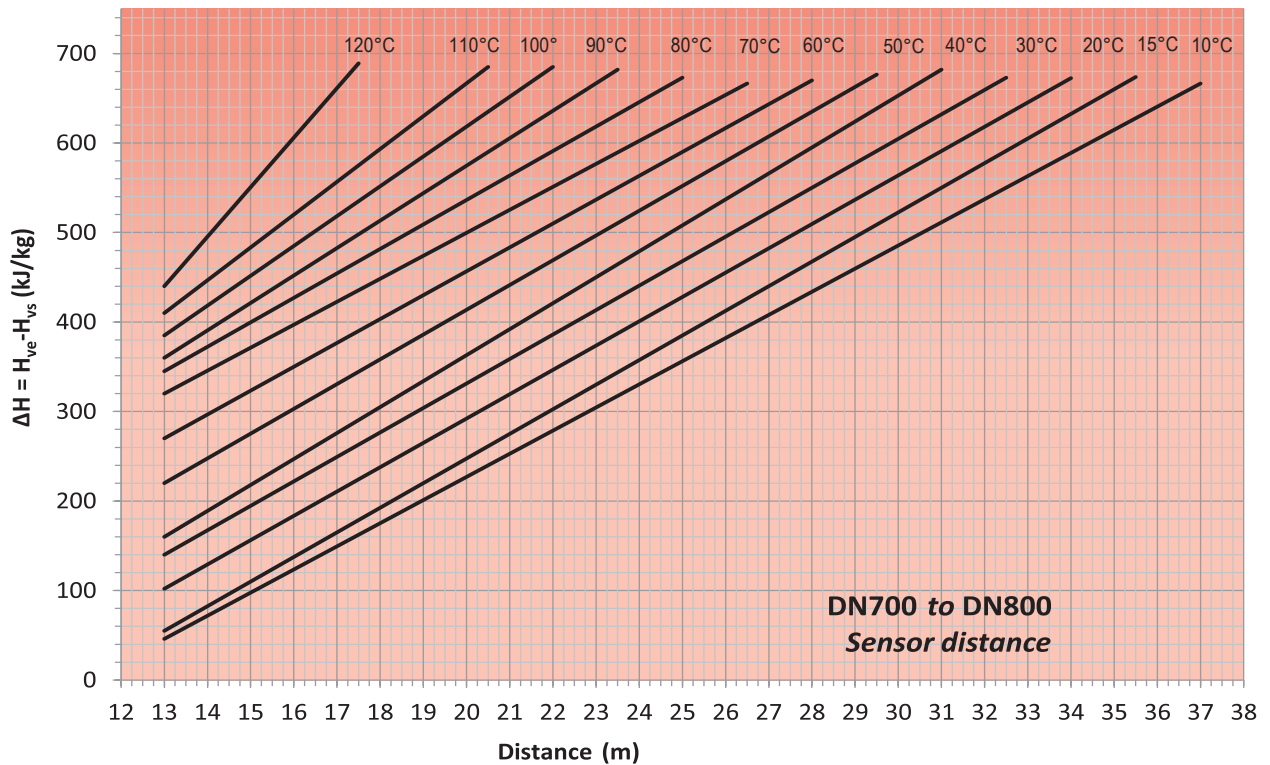
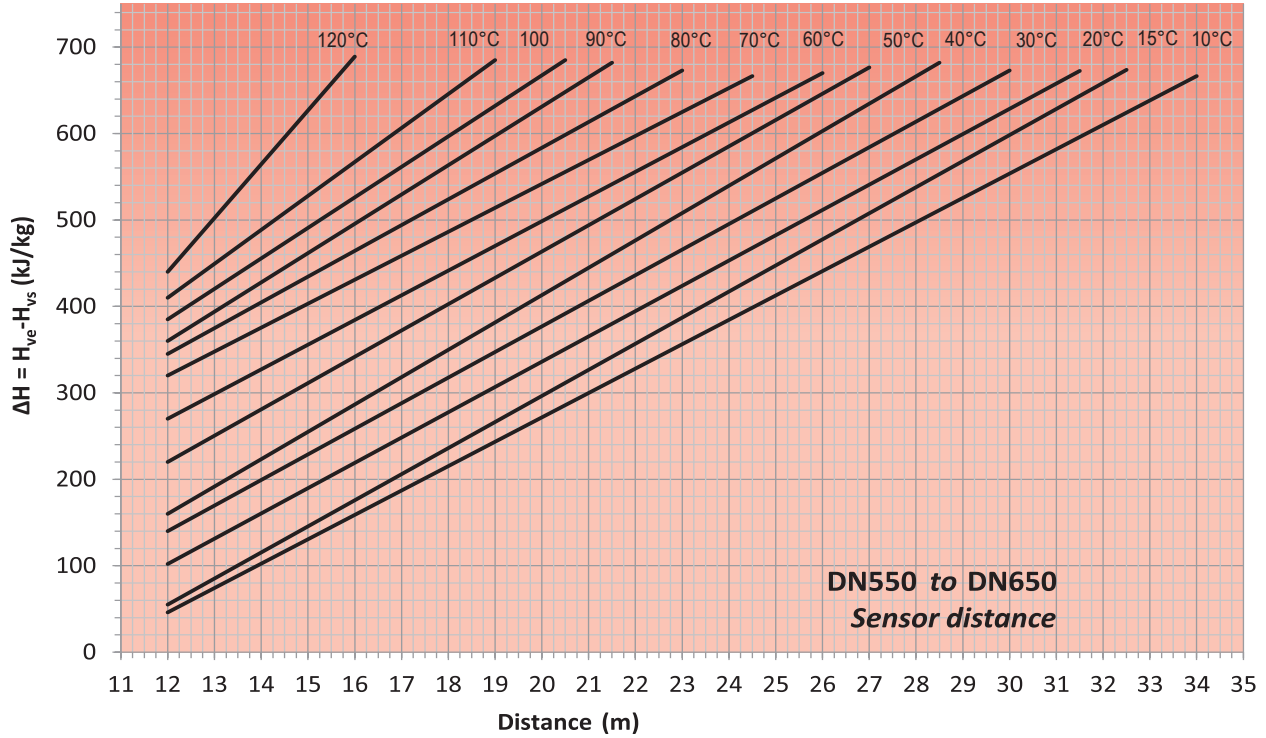
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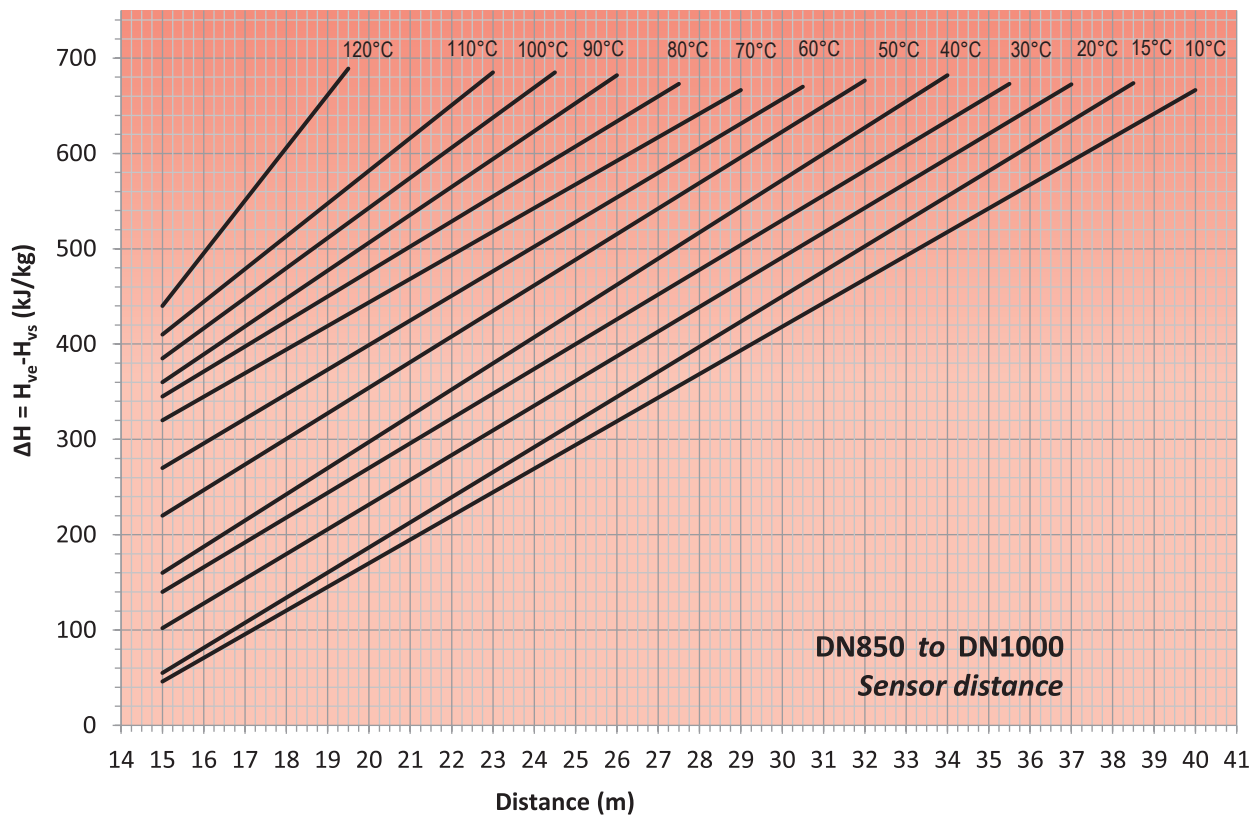
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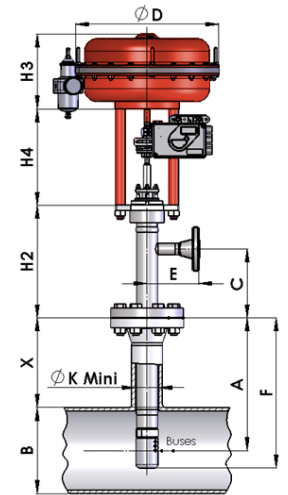


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## Dimensions

<b>C</b>	200
<b>H2</b>	327
<b>H4 (max)</b>	280
<b>E (ISO PN40 / PN64* / PN100* FS)</b>	145
<b>E (ISO PN150* / PN250* FS)</b>	178
<b>E (ANSI Class300/ Class600 / Class900* RF)</b>	159
<b>E (ANSI Class 1500 RF)</b>	178
<b>X</b>	A-(B/2)
<b>K Ømini</b>	68
<b>Maxi Mass (kg)</b>	40



The variable dimension is X, in order to have the Sprayhead in the center of the pipe

<b>Kv</b>	0,39	0,48	0,5	0,505	0,52	0,55	0,6	0,68	0,76	0,779	0,809	0,915
<b>F</b>	436	467	436	436	436	436	436	436	436	467	436	436
<b>A</b>	373	391	375	374	373	375	375	379	377	391	377	381

<b>Kv</b>	1,019	1,162	1,256	1,291	1,357	1,371	1,45	1,579	1,775	1,801	1,88	1,929
<b>F</b>	436	436	467	467	436	436	467	436	436	467	467	467
<b>A</b>	379	378	384	384	379	380	387	382	382	389	384	384

<b>Kv</b>	2,032	2,136	2,38	2,458	2,585	2,688	2,7	3,133	3,348	3,574	4,009	4,061
<b>F</b>	467	467	467	467	467	467	467	467	467	467	467	467
<b>A</b>	384	386	385	391	387	389	392	390	386	391	392	396

<b>Kv</b>	4,086	4,208	4,515	4,601	4,83	4,938	5,838	6,704	8,604	10,281	11,734	/
<b>F</b>	467	480	467	467	480	467	467	467	495	547	547	/
<b>A</b>	391	397	392	394	400	393	394	394	408	421	434	/

\* On request  
All dimensions in mm

	MA41-B6	MA41-C6
<b>Ø D</b>	420	420
<b>H3</b>	242	352
<b>Mass (kg)</b>	58	76

All dimensions in mm



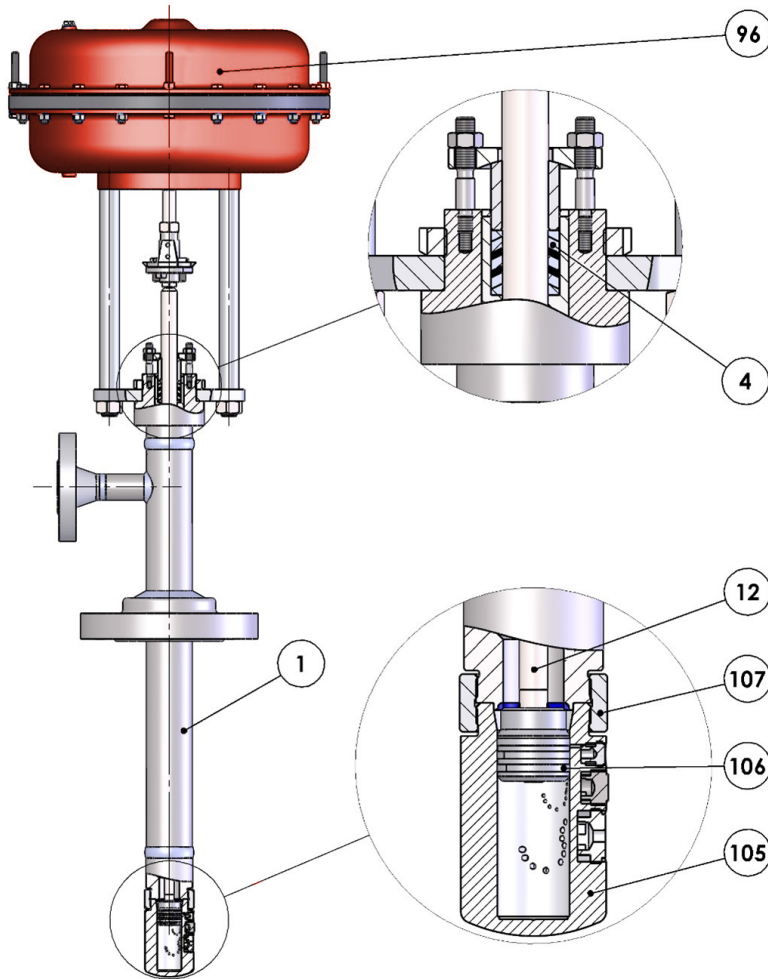
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## Part list



Item	Description	Material
1	Body	1.7383 / A182 F22 cl3 - 1.0352 / A105
4*	Stuffing box	Stainless steel - Graphite
12	Steam assy	AISI 410
96	Actuator	Steel
105*	Sprayhead	AISI 410
106*	Piston ring	AISI 420
107	Nut	AISI 410

\* Pièces de rechange / Spare parts



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