BYVAP® Steam desuperheater
TYPE DMBC

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 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 , 1.0352/A105
Seat material : Stellite
TMS: 570°C
PMS: 150 bar
ΔPMax : 120 bar
PN250 / Class1500
Steam flange DN80
Water flange: 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

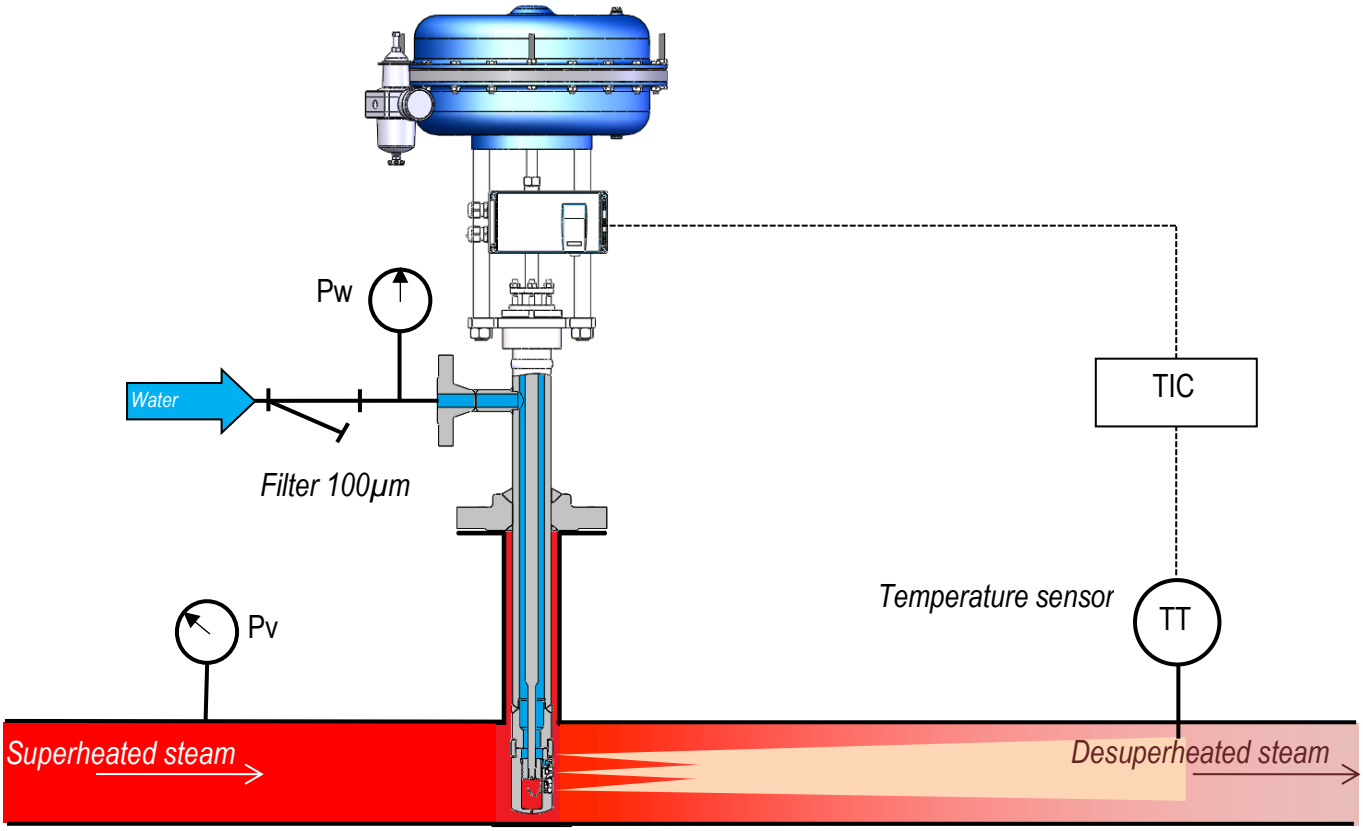
DMBC Matière…, PN/Class …, Kv…, Bride eau PN/Class …

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

Certification

Directive 2014/68/UE.

Schematic Diagram



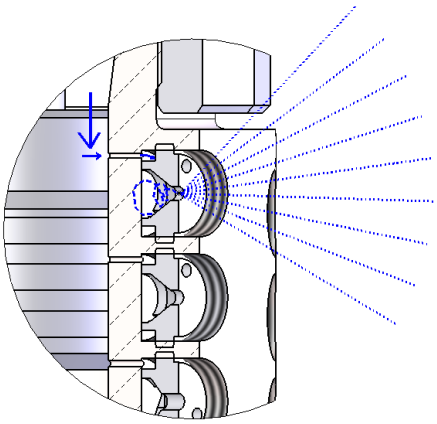
Operation

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 nozzles 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 3.5 bar above the steam pressure at the temperature control. The DMBC is designed:

- To have a metal / metal class V between the stellited seat and the plug,
- 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
- Class1500



Recommandations

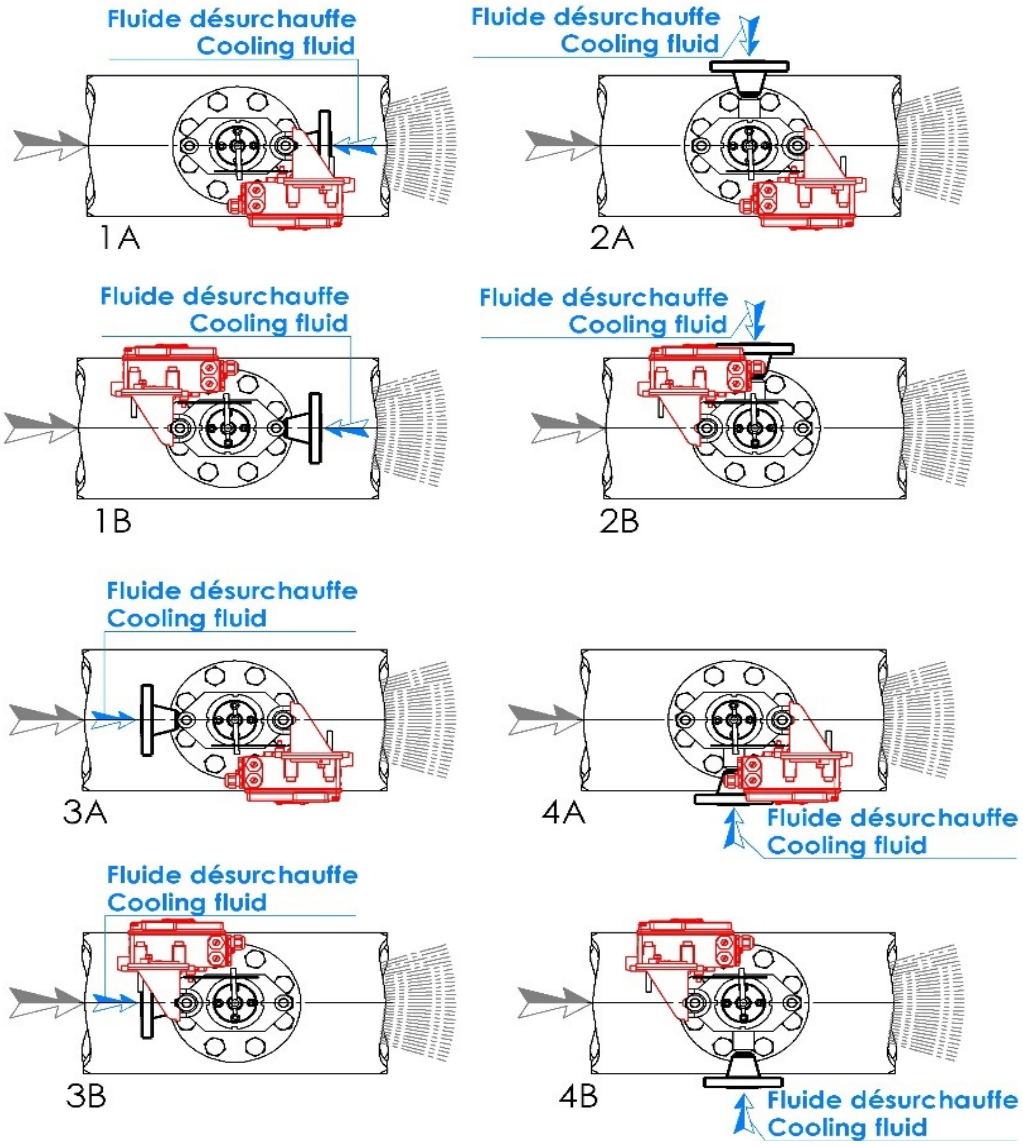
Filter
The installation of a 100µm filter in the desuperheating water line is recommended to protect the desuperheater DMBC

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 3,5bar and 120bar.

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

Water inlet flange and positioner top view



Standard capacity:

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

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

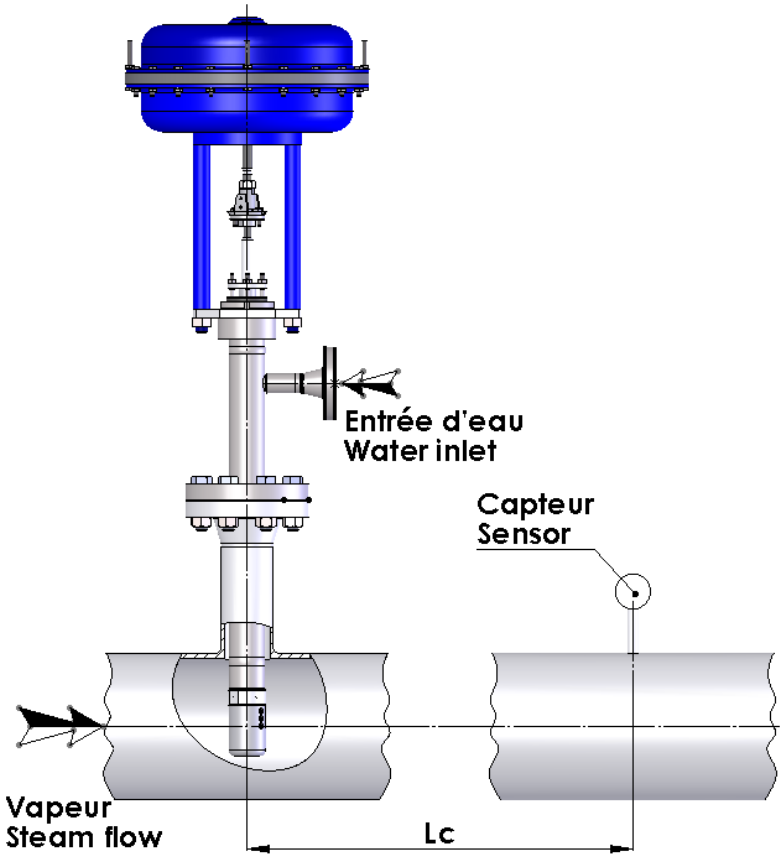
A simplified Kv calculation can be done using the following formula:

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

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

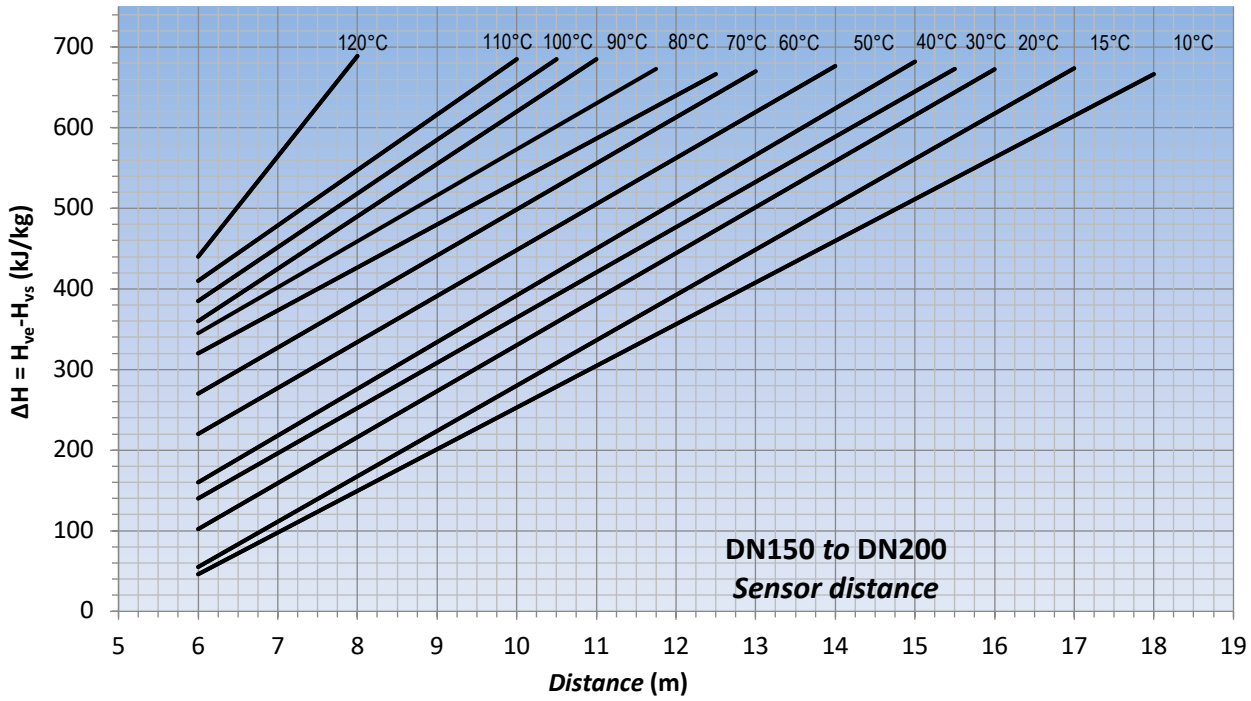
Sensor distance

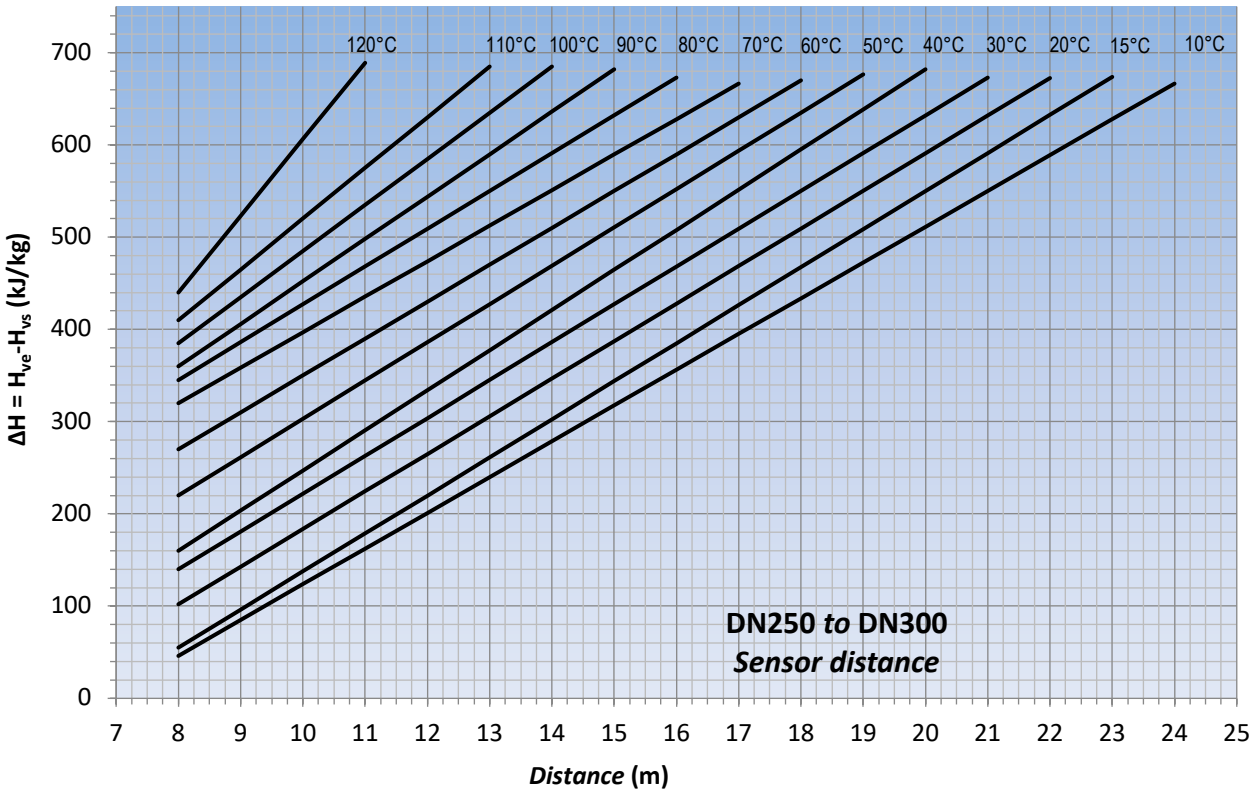
The temperature sensor is positioned as a function of the enthalpy difference and depending on the proximity of the temperature to be controlled to the saturation temperature. The graphs below indicate the position of the temperature sensor.



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


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
ΔH = Hve-Hvs (kJ/kg)
0
100
200
300
400
500
600
700
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
DN150 to DN200
Sensor distance
Distance (m)


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
ΔH = Hve-Hvs (kJ/kg)
0
100
200
300
400
500
600
700
7
8
9
10
11
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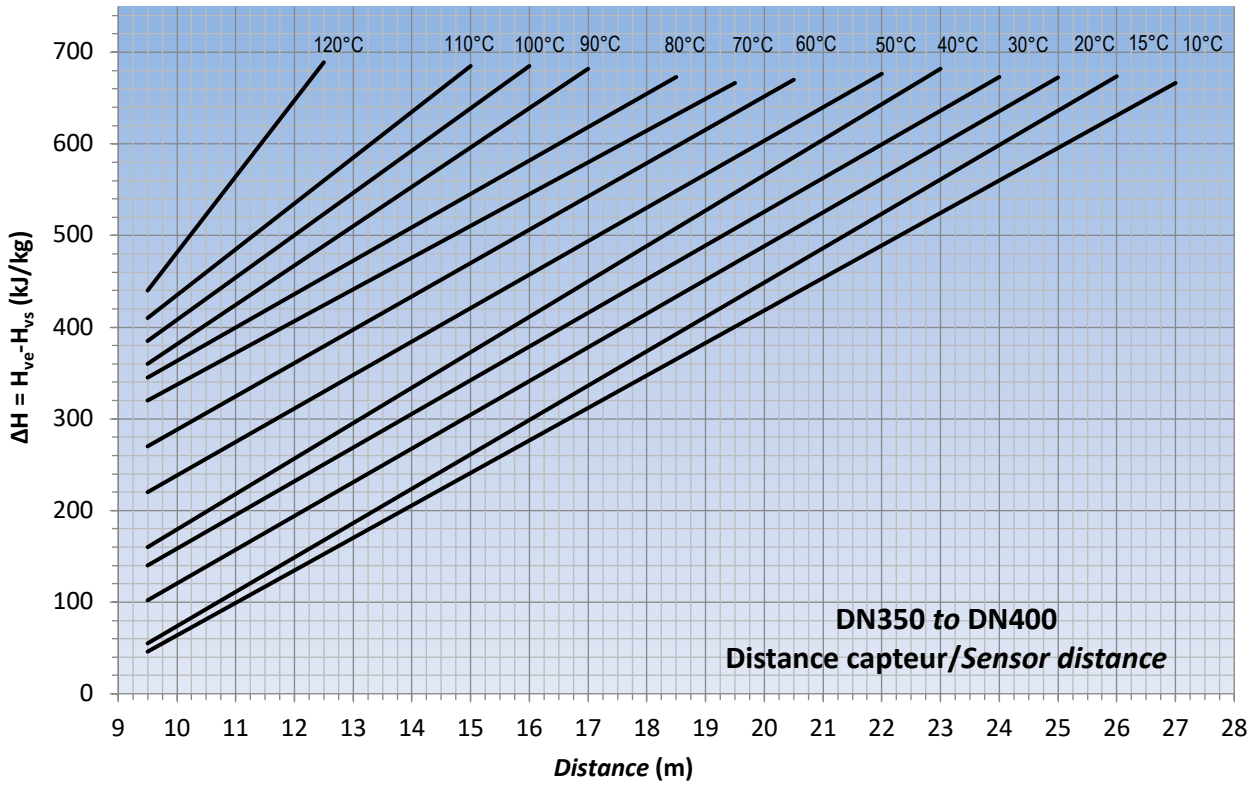
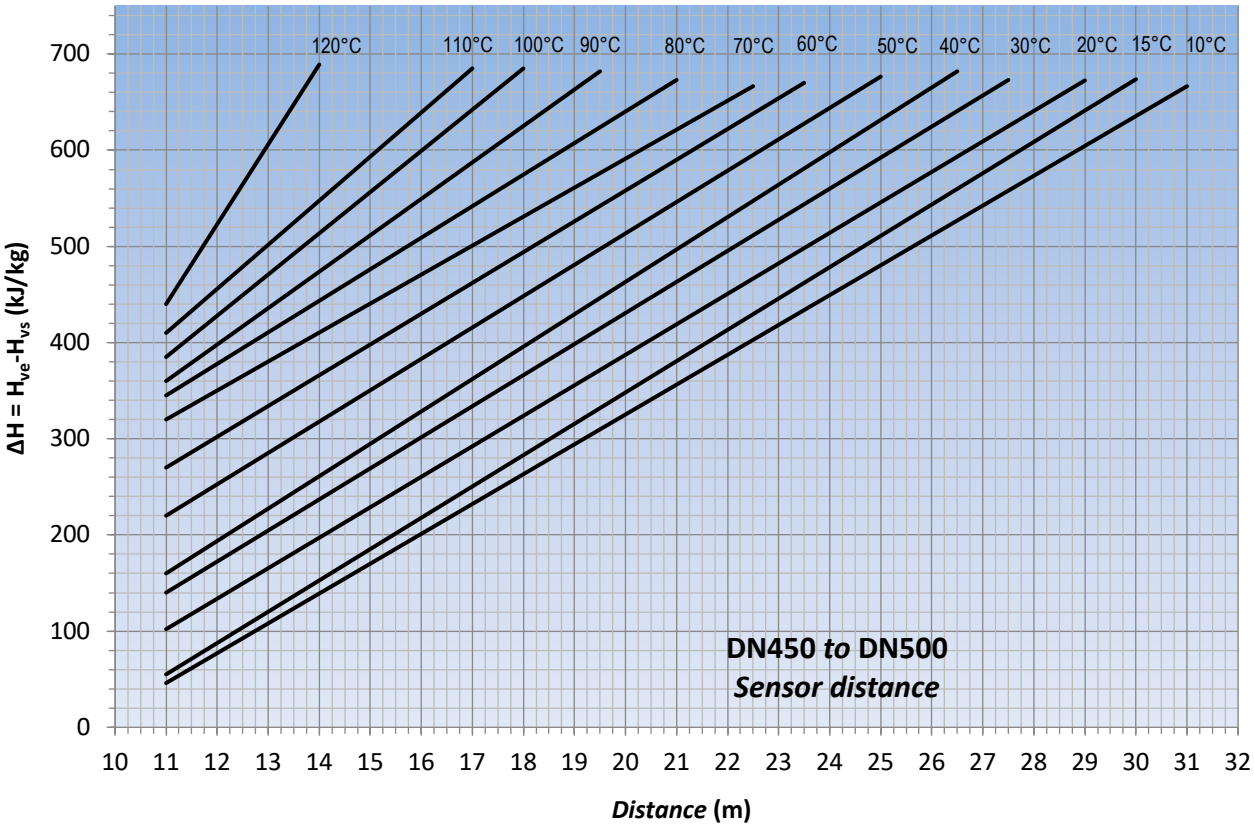
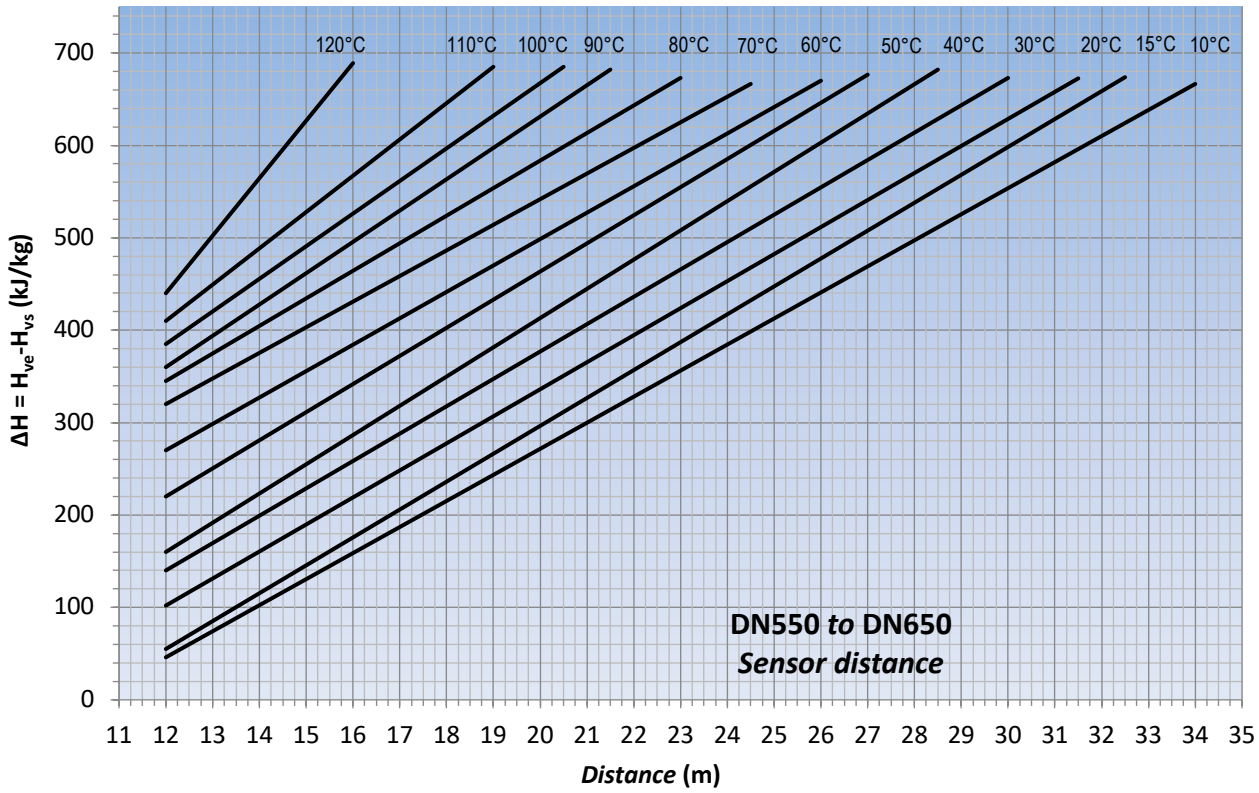
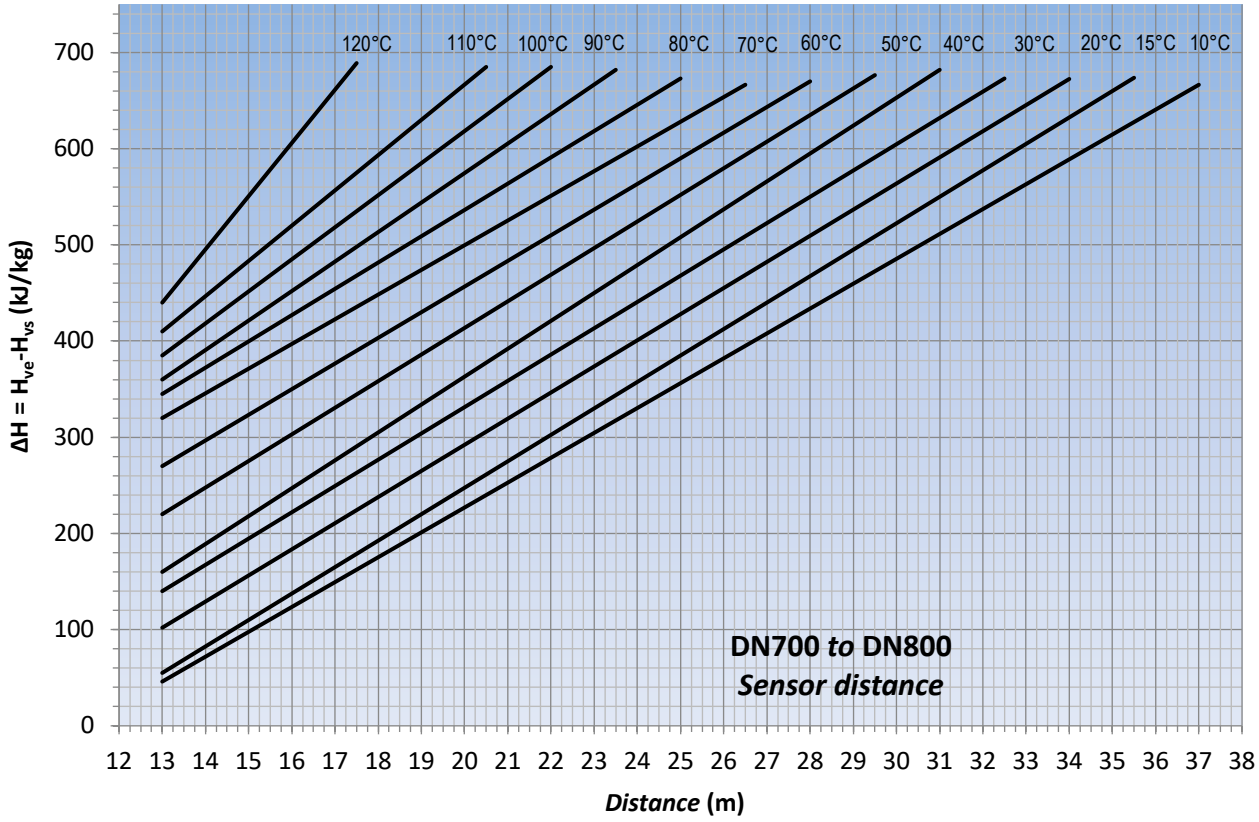
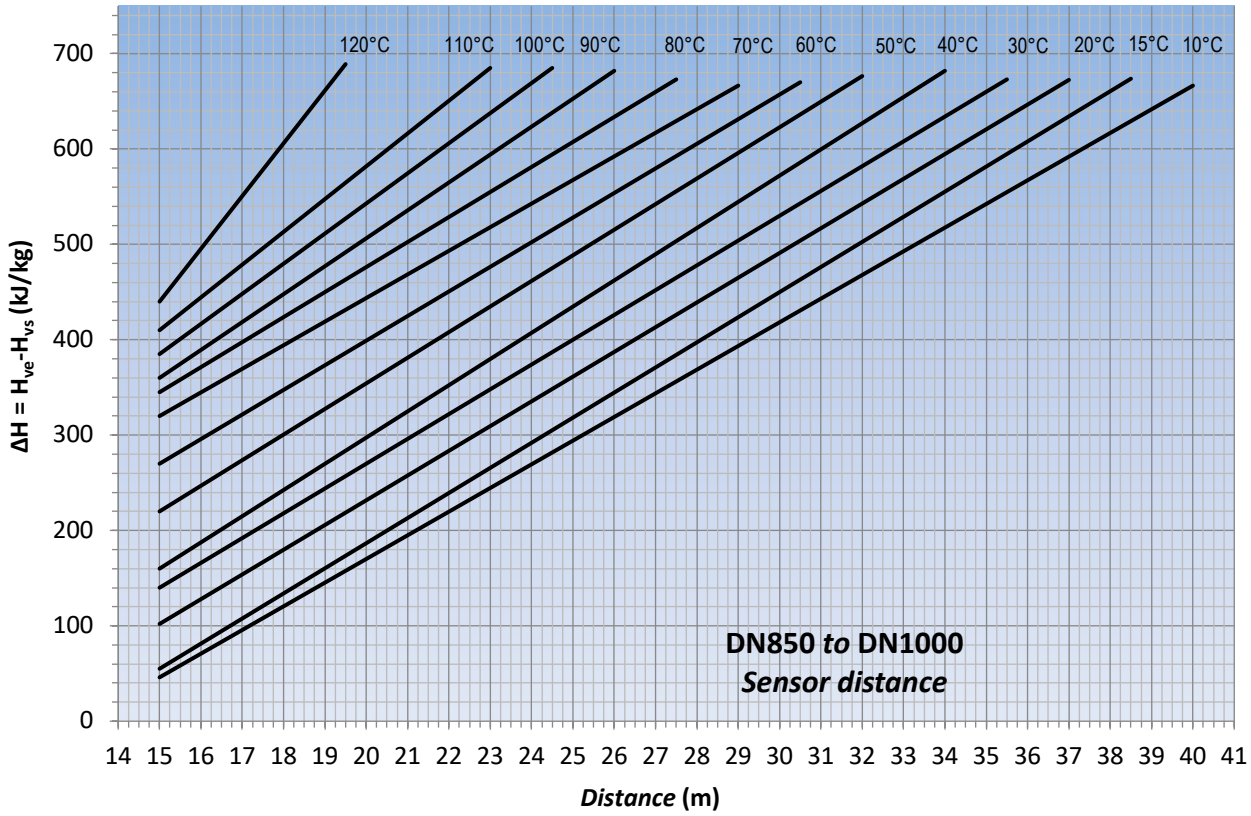
22
23
24
25
DN250 to DN300
Sensor distance
Distance (m)


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
700
600
500
400
300
200
100
0
ΔH = Hve-Hvs (kJ/kg)
9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Distance (m)
DN350 to DN400
Distance capteur/Sensor distance

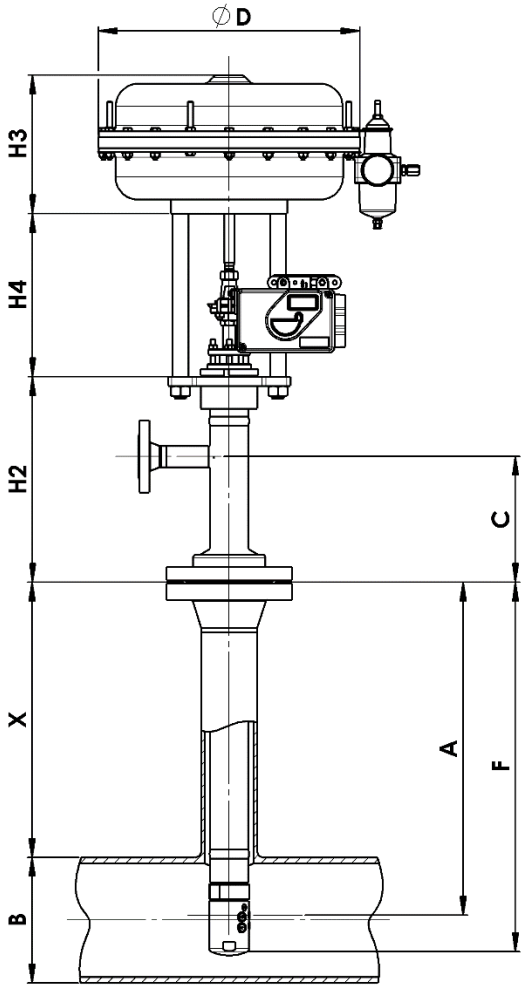

120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
700
600
500
400
300
200
100
0
ΔH = Hve-Hvs (kJ/kg)
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Distance (m)
DN450 to DN500
Sensor distance


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
ΔH = Hve-Hvs (kJ/kg)
0
100
200
300
400
500
600
700
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
Distance (m)
DN550 to DN650
Sensor distance


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
ΔH = Hve-Hvs (kJ/kg)
0
100
200
300
400
500
600
700
12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Distance (m)
DN700 to DN800
Sensor distance


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
700
600
500
400
300
200
100
0
ΔH = Hve-Hvs (kJ/kg)
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
Distance (m)
DN850 to DN1000
Sensor distance

Dimensions



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

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

Kv	**0,39**	**0,48**	**0,5**	**0,505**	**0,52**	**0,55**	**0,6**	**0,68**	**0,76**	**0,779**	**0,809**	**0,915**
F	436	467	436	436	436	436	436	436	436	467	436	436
A	373	391	375	374	373	375	375	379	377	391	377	381
Kv	**1,019**	**1,162**	**1,256**	**1,291**	**1,357**	**1,371**	**1,45**	**1,579**	**1,775**	**1,801**	**1,88**	**1,929**
F	436	436	467	467	436	436	467	436	436	467	467	467
A	379	378	384	384	379	380	387	382	382	389	384	384
Kv	**2,032**	**2,136**	**2,38**	**2,458**	**2,585**	**2,688**	**2,7**	**3,133**	**3,348**	**3,574**	**4,009**	**4,061**
F	467	467	467	467	467	467	467	467	467	467	467	467
A	384	386	385	391	387	389	392	390	386	391	392	396
Kv	**4,086**	**4,208**	**4,515**	**4,601**	**4,83**	**4,938**	**5,838**	**6,704**	**8,604**	**10,281**	**11,734**	/
F	467	480	467	467	480	467	467	467	495	547	547	/
A	391	397	392	394	400	393	394	394	408	421	434	/

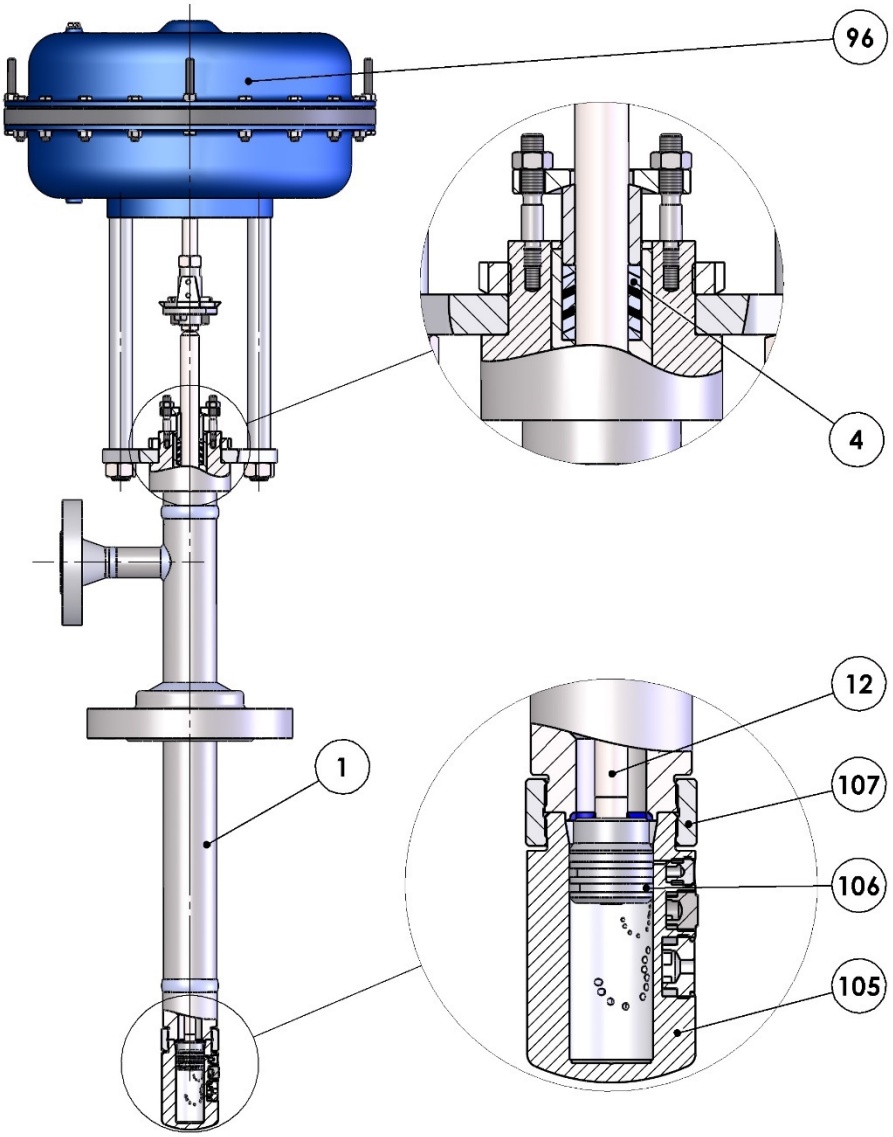
On request

All dimensions in mm

	MA41-B6	**MA41-C6**
Ø D	420	420
H3	242	352
***Mass* (kg)**	58	76

All dimensions in mm

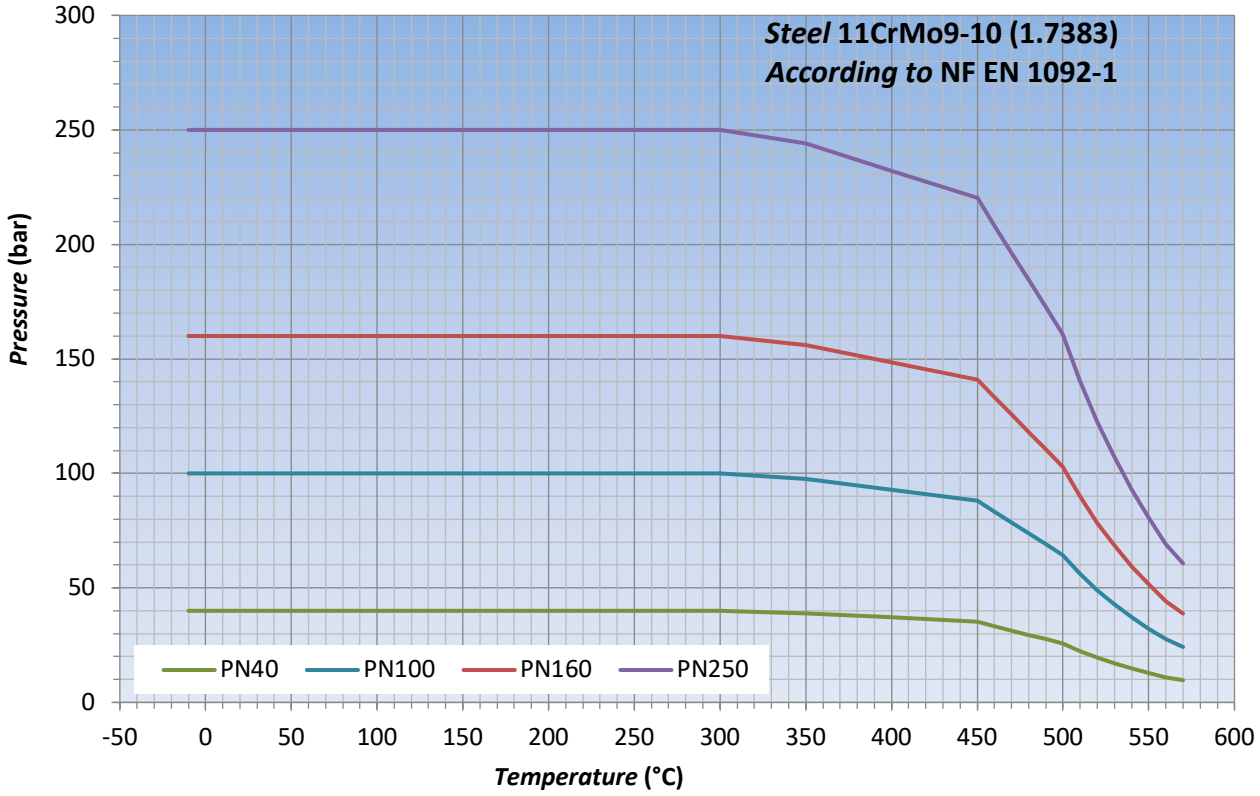
Part List

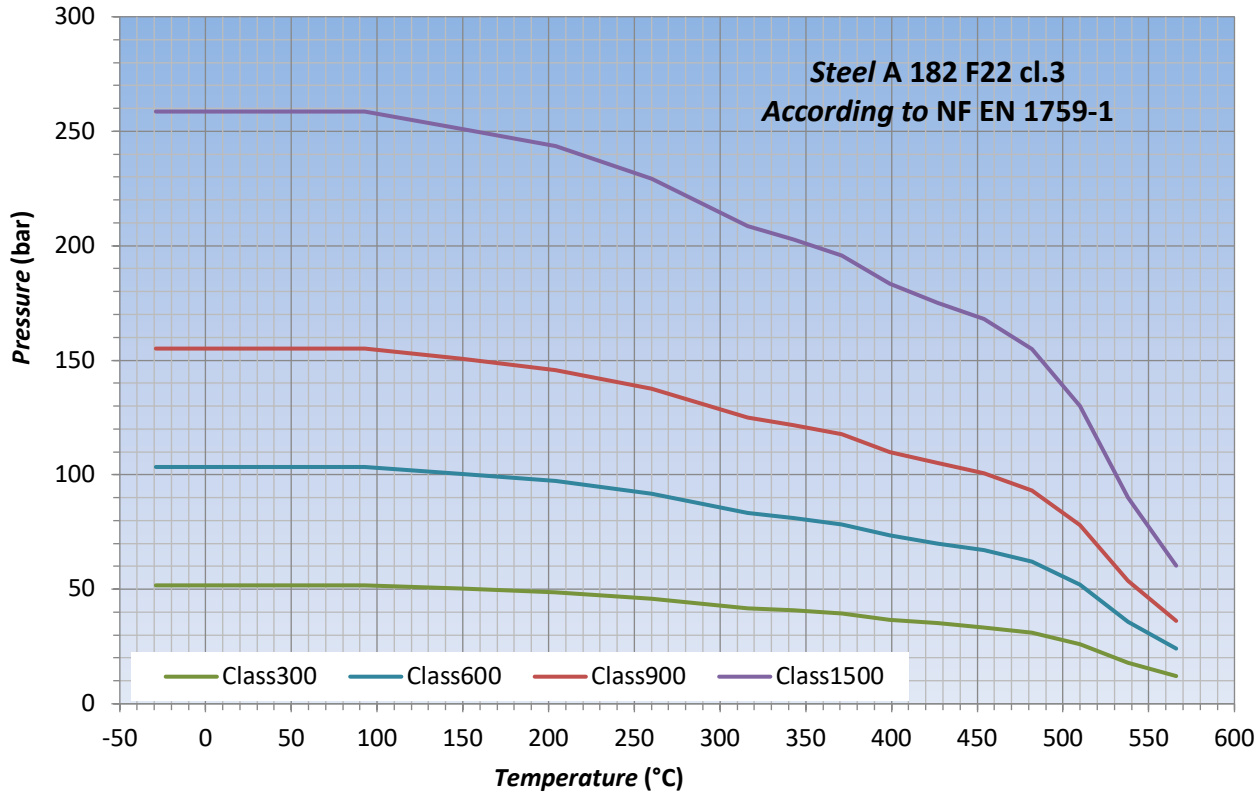


Item	*Designation*	*Material*
1	Corps / *Body*Servomoteur / *Actuator*	1.7383 / A182 F22 cl3 - 1.0352 / A105
4*	***Stuffing box***	*Stainless steel - Graphite*
12	*Stem assy*	AISI 410
96	*Actuator*	Acier / *Steel*
105*	**Sprayhead**	AISI 410
106*	**Segment / piston ring**	AISI 420
107	*Nut*	AISI 410

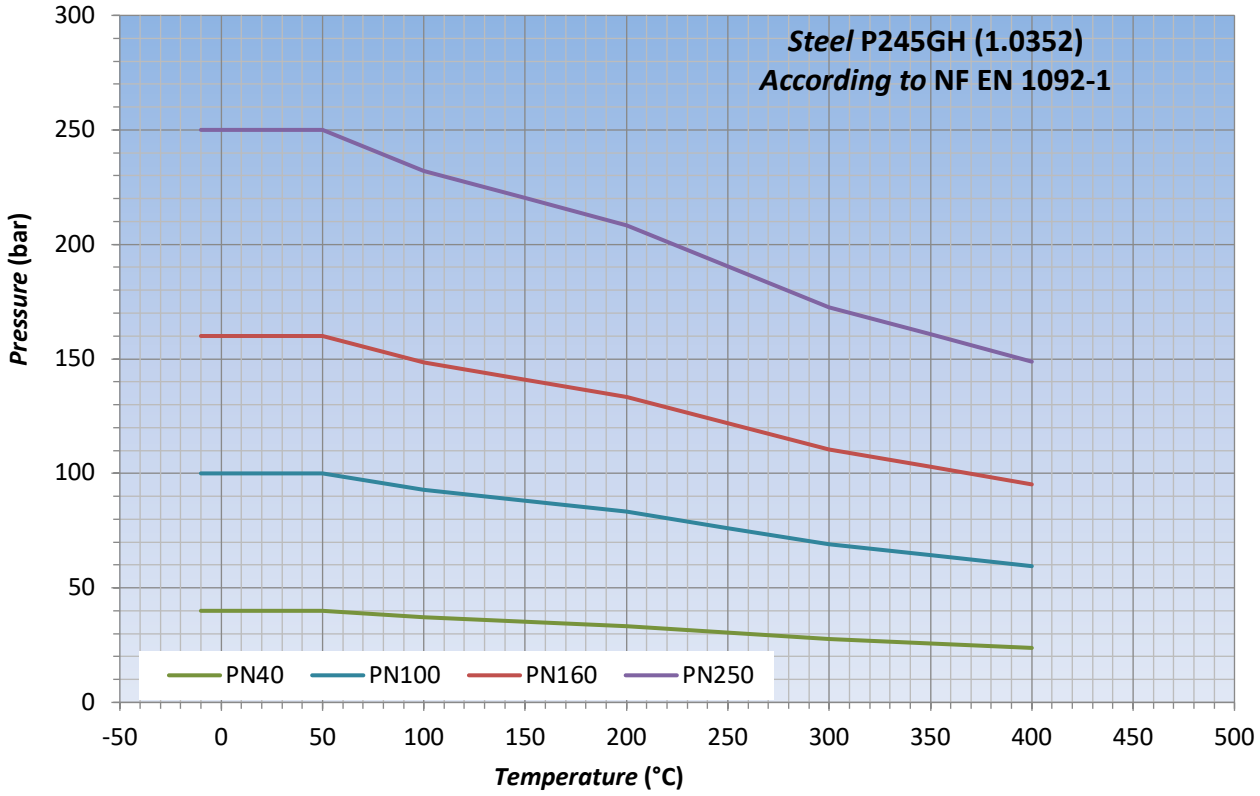
*** Pièces de rechange / *Spare parts***

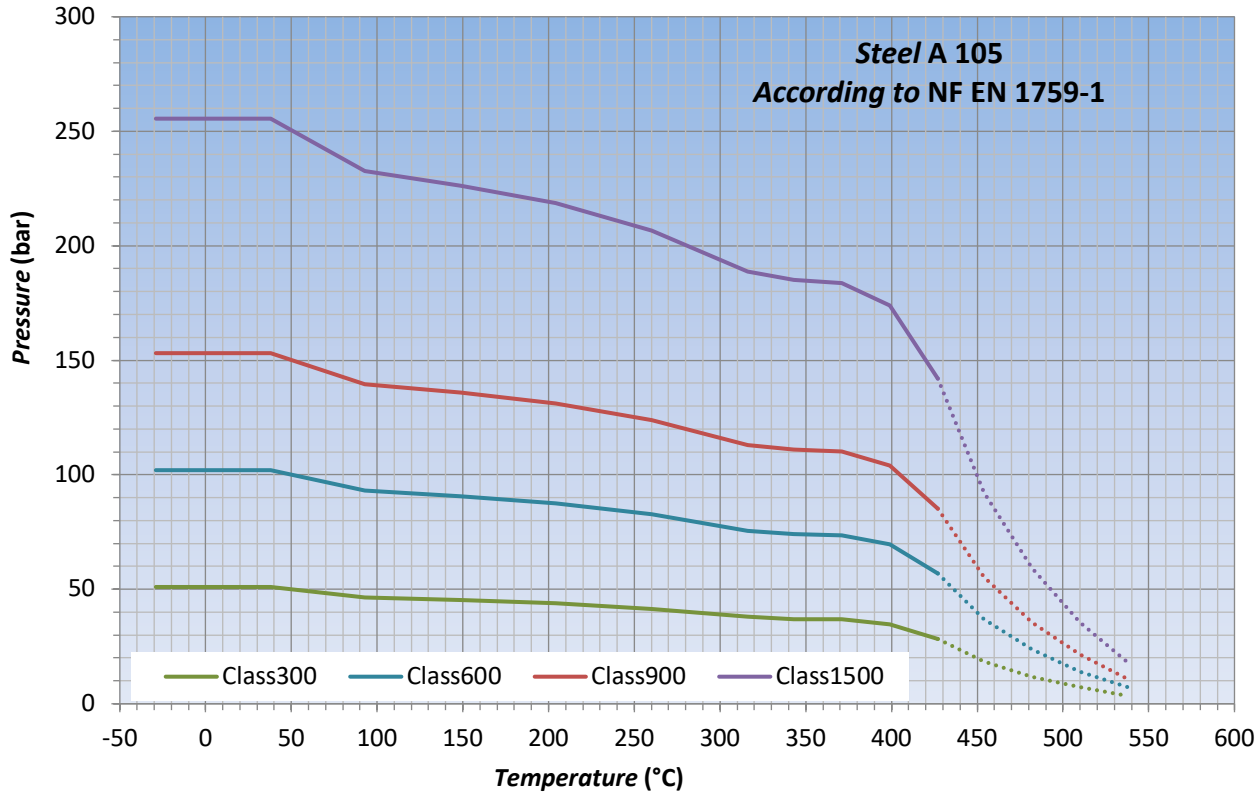
Pressure -Temperature Charts





Pressure -Temperature Charts





Sart von Rohr
25 Rue de la Chapelle
BP 2 – F 68620 Bitschwiller-lès-Thann

Tel. 33/ (0)3 89 37 79 50
Fax 33/ (0)3 89 37 79 51
E-mail : sartventes@sart-von-rohr.fr