DA Series
Variable Area Desuperheaters

Desuperheater overview

Hiter direct contact desuperheaters reduce the temperature of superheated steam to produce steam temperatures approaching saturation temperature. Spray water is injected directly into the steam, flashing into vapour by absorbing heat from the steam.
The DA series desuperheater is designed to precisely and economically control the downstream steam temperature by injecting cooling water directly into the superheated steam flow. It consists of a single actuator and a spray control valve integrated into a single unit.

Typical applications:

- High turndown applications that are beyond the scope of fixed area desuperheaters.
- To safely reduce the steam temperature to allow the operation of downstream process equipment designed for lower temperatures, maintaining a constant temperature for processes precise temperature control
- To reduce the temperature of steam discharge from turbine by-pass systems on power plants for heat exchangers, dump stations etc.
- To improve heat transfer of indirect contact heat exchangers- shell and tube, plate type, reactor heating jackets, etc.

Features:

- Easy installation
- Low maintenance
- Robust design
- Wide Cv range
- Minimal steam pressure drop
- Rapid evaporation to minimise over spray
- Flexible design options

Standard and approvals

- Pressure rating and connections according to ASME B16.34 and ASME B16.5, EN12516-1 and EN1092-1.
- The products listed comply with the requirements of The EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations and carry the CE/UKCA mark when so required.
- Welding is in accordance with ASME IX.
- Connections are sized to suit the process conditions.
- Standard ASTM materials of construction include: carbon steel, stainless steel and chrome molybdenum steel. Special materials are available on request.

Documentation and certification:

Each Spirax Sarco DA will be supplied with the following documentation & certification pack:

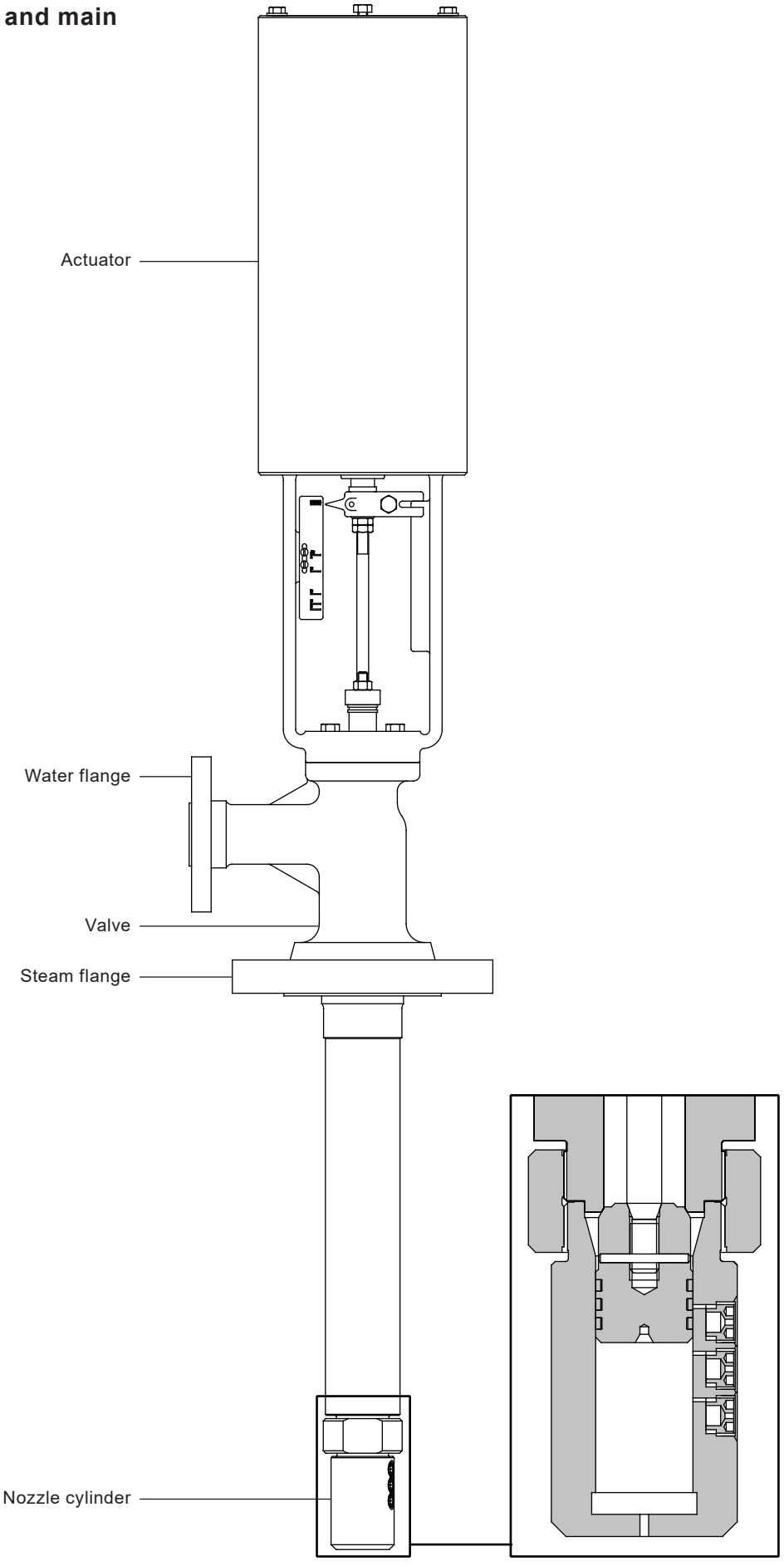
- Material traceability certificates to EN 10204 3.1 for body assembly, plug, stem, and nozzles
- Quality certificate indicating hydrostatic test and seat leakage (Class IV) test results
- Warranty terms & conditions

NDT reports are available on request

Class V leakage certification available upon request.

For up to date information on product compliance please visit: **www.spiraxsarco.com/product-compliance**

Standard scope of supply and main component identification



Technical specifications

Diameters	1" (DN25)	Water Connection	
	3" (DN80)	Steam Connection	
End Connections	FR	Raised Face	
	RTJ	Ring Type Seal ASME600 and ASME900 only	
Pressure Rating/Materials	ASME B16.34	Class 150 - 900	ASME A216 WCB, ASME A217 WC9 and ASME A351 CF8M
	EN1092-1	PN40	ASME A216 WCB and ASME A351 CF8M
	EN 12516-1	PN40	ASME A217 WC9
	EN1092-1	PN63 - 100	EN 10213 GP240GH (1.0619) and EN 10213 GX5CrNiMo19-11-2 (1.4408)
	EN 12516-1	PN63 - 100	PN63 - PN100 - EN 10213 G17CrMo9-10 (1.7379)
Steam Pipe Diameter	6" (DN150) to 24" (DN600)		
Steam Velocity	6 - 90m/s[1]		
Rangibility	Up to 50:1		
Leakage Class	Class IV standard		
	Class V optional - maximum ΔP 30 bar (435.1 psi)		
Minimum approach temperature	6 °C (10.8 °F)		
Differential pressure between water and steam	Minimum 3.5 bar (50.76 psi)		
	Maximum 75 bar (1087.78 psi)		
Maximum allow water pressure	95 bar (1377.86 psi)		
Minimum recommended water temperature	50 °C (122 °F)		
Maximum recommended water temperature	180 °C (356 °F)		
Differential Temperature between water and steam	Up to 232 °C (449.6 °F) without the need of steam thermal sleeve		
	Above 232 °C (449.6 °F) we recommend the use of steam thermal sleeve[1]		

[1] Optional, upon request. A thermal sleeve is recommended for operational velocities below 10m/s (33ft/s) or low spray water temperatures. See IM-P605-11 for details.

Technical specifications continued on next page

Technical Specifications (continued)

	Material	Maximum temperature	Pressure Rating	Maximum allowable pressure
Body materials[2]	ASME A216 WCB	425 °C (797.0 °F)	ASME 150	19.6 bar g (284.2 psi g)
			ASME 300	51.1 bar g (741.1 psi g)
			ASME 600	102.1 bar g (1480.8 psi g)
			ASME 900	153.2 bar g (2222 psi g)
		400 °C (752 °F)	PN40	40.0 bar g (580.1 psi g)
	EN 10213 GP240GH (1.0619)	400 °C (752 °F)	PN63	63.0 bar g (913.7 psi g)
			PN100	100.0 bar g (1450.3 psi g)
	ASME A217 WC9	538 °C (1000.4 °F)	ASME 150	19.8 bar g (287.1 psi g)
			ASME 300	51.7 bar g (749.8 psi g)
			ASME 600	103.4 bar g (1499.6 psi g)
			ASME 900	155.1 bar g (2249.5 psi g)
			PN40	40.0 bar g (580.1 psi g)
	EN 10213 G17CrMo9-10 (1.7379)	538 °C (1000.4 °F)	PN63	63.0 bar g (913.7 psi g)
			PN100	100.0 bar g (1450.3 psi g)
	ASME A351 CF8M	538 °C (1000.4 °F)	ASME 150	19 bar g (275.5 psi g)
			ASME 300	49.6 bar g (719.3 psi g)
			ASME 600	99.3 bar g (1440.2 psi g)
			ASME 900	148.9 bar g (2159.6 psi g)
			PN40	40.0 bar g (580.1 psi g)
	EN 10213 GX5CrNiMo19-11-2 (1.4408)	538 °C (1000.4 °F)	PN63	63.0 bar g (913.7 psi g)
			PN100	100.0 bar g (1450.3 psi g)

Trim materials	Plug	Seat	Gasket	Cylinder (Nozzles)	Nozzles	Temperature
	SS 410	Stellite	Inconel	SS 410	SS 416	538 °C (1000.4 °F)

	Nozzle	6A	6A1	9A1	6B	9B	6C	6D	3C6D	6E	3C6E	9E
Flow Coefficient - Cv	Cv	0.19	0.30	0.45	0.80	1.20	2.10	3.18	4.00	5.40	6.20	8.10
	Kv	0.16	0.26	0.39	0.69	1.04	1.81	2.75	3.46	4.67	5.36	7.00

Actuator	Supplied as standard with a pneumatic spring return actuator that closes the water supply in the event of pneumatic of control signal failure. An optional hand wheel (mechanical override) actuator is available upon request. Electric actuators can also be supplied upon request.
Actuator temperature range	-10 °C to +80 °C (14 °F to 176 °F)
Actuator maximum pressure	6.21 bar (90 psi)
Actuator spring range	2.07 bar to 3.45 bar (30 psi to 50 psi)

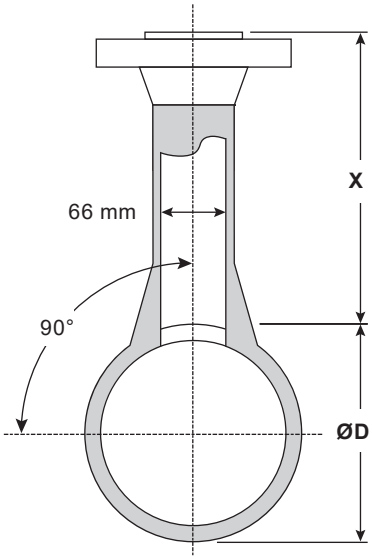
[2] Special materials available on request.

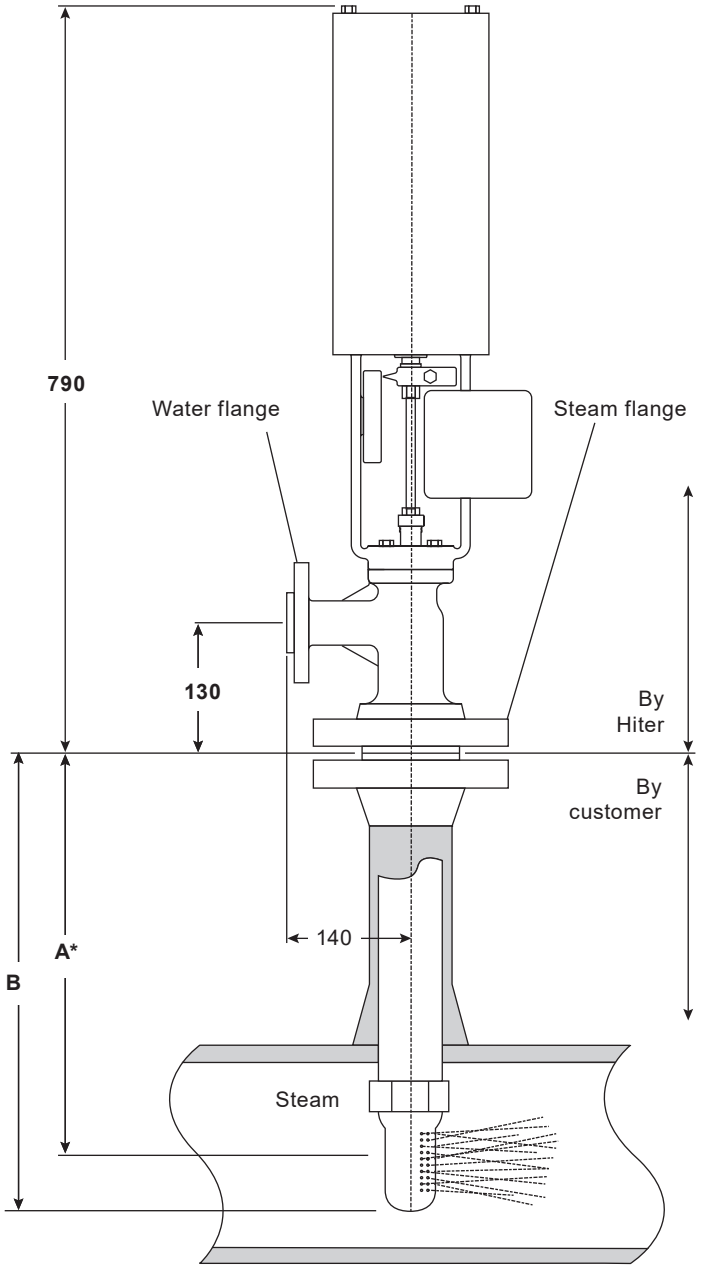
For full operational limitations of the DA by material and pressure rating, please refer to IM-P605-11.

Alternatively, please contact your local Spirax Sarco office.

Sizes (mm)

Nozzle	A (Central line insertion distance)	B Total insertion distance
6A	395	445
6A1		
9A1		
6B	402	457
9B		
6C	411	477
6D	415	485
3C6D		
6E	417	489
3C6E		
9E		





A* = Approximate distance to steam pipe centre

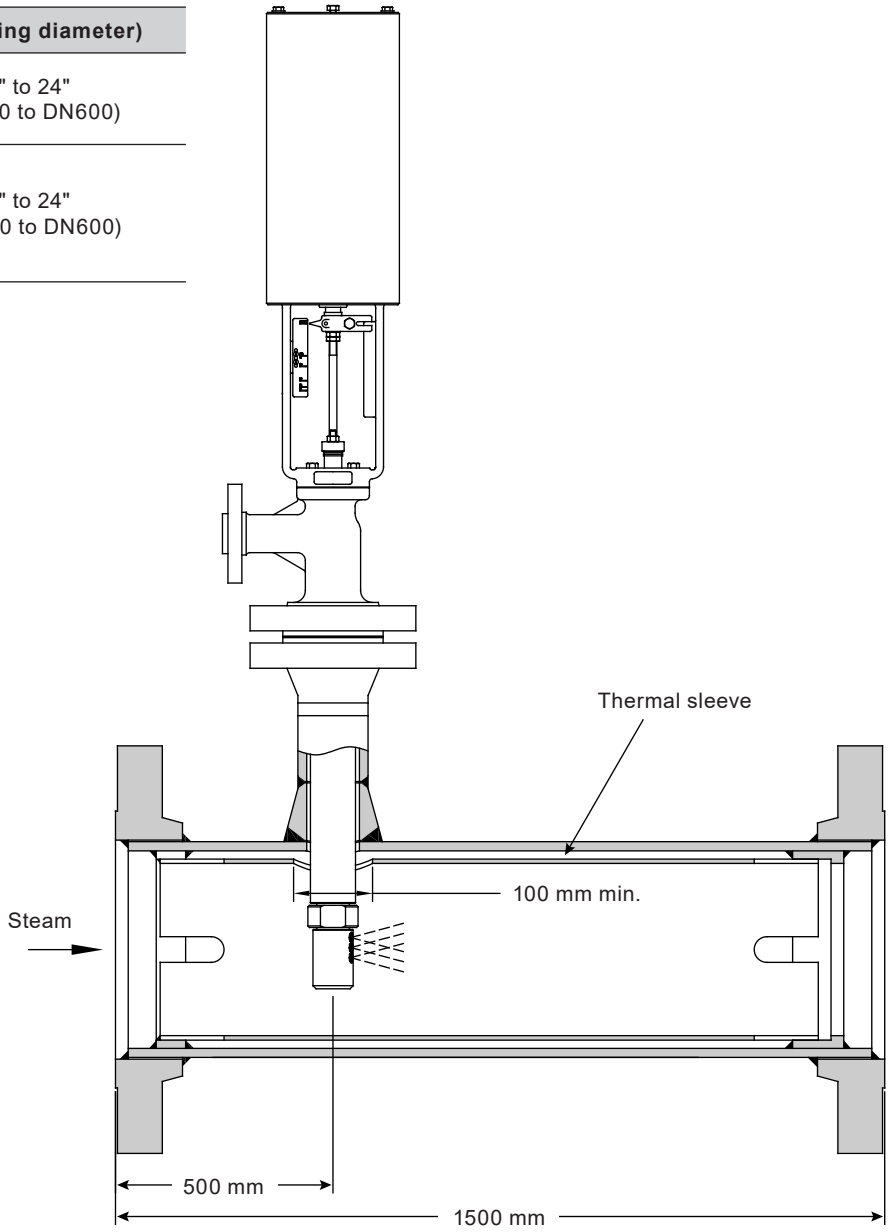
Branch height X calculation

$$X = A - \frac{ØD^*}{2}$$

***Note:** For pipes over 24". X = 83 mm (3¼ ")

Typical installation (mm)

Nozzle	ØD (Piping diameter)
6A/6A1/9A1	6" to 24" (DN150 to DN600)
6B/9B	
6C	8" to 24" (DN200 to DN600)
6D/3C6D	
6E/3C6E/9E	



Pneumatic supply

The maximum allowable compressed air supply pressure to the actuator is 6.21 bar g (90 psi g). Higher pressures must be regulated in accordance with this limitation. The DA position should be controlled by a positioner. In the event of a pneumatic or signal failure, the actuator will fail to a position that closes the water supply to the steam.

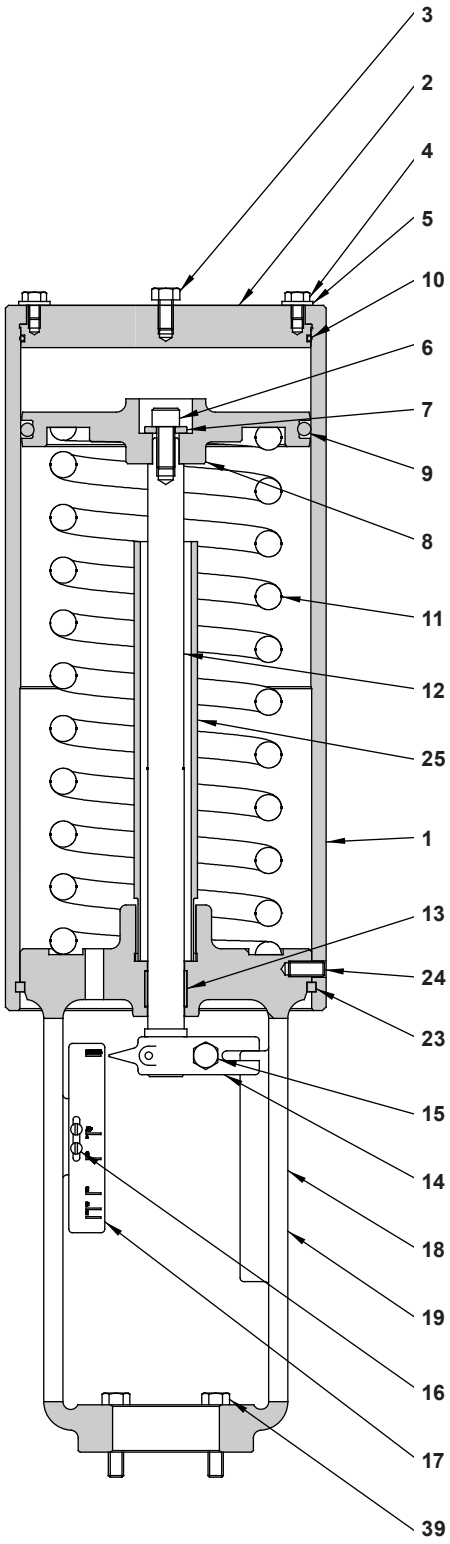
Positioners

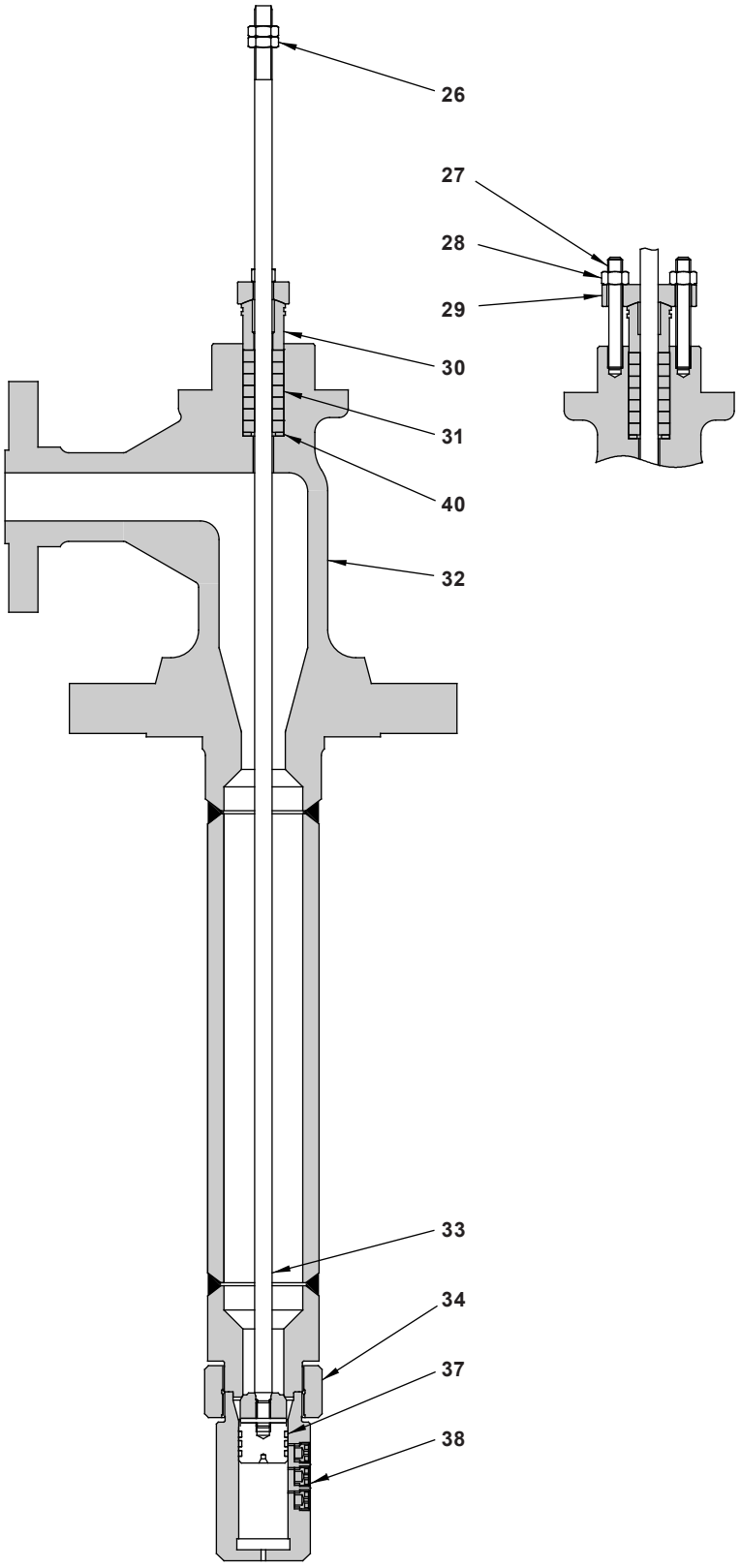
Positioners are available upon request.

Actuator parts list

Item	Description
1	Cylinder
2	Cover
3	Blanking bolt (Thread 5/16/18 UNC)
4	Bolt (cover)
5	Washer (cover)
6	Bolt (piston)
7	Washer (piston)
8	Piston
9*	Piston O-ring (Buna N)
10*	Cover O-ring (Buna N)
11	Spring
12	Stem
13	Bushing guide
14	Stroke indicator
15	Bolt (stroke indicator)
16	Screw (stroke nameplate)
17	Stroke nameplate
18	Nameplate
19	Yoke
23*	Split ring
24	Screw lock (cylinder)
25	Stroke limiter
39	Bolt (yoke)

* Recommended spare parts (see page 11)





Valve parts list

Item	Description
26	Nut (stem)
27	Bolt (packing)
28	Nut (packing)
29	Packing flange
30	Packing follower
31*	Packing set
32	Body assembly
33*	Plug/stem assembly
34	Sleeve
37*	Sealing ring
38	Cylinder/nozzle assembly
40	Retainer ring

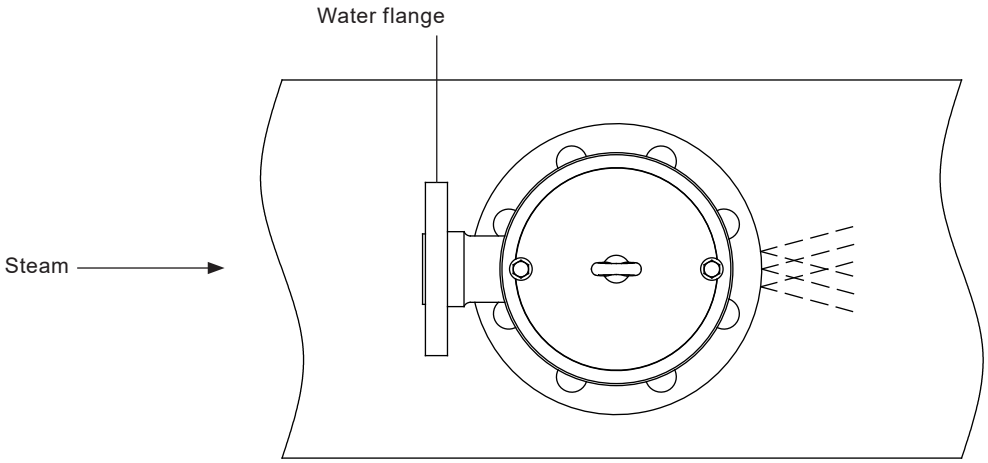
* Recommended spare parts (see page 11)

How to order

Product	**DA**				**DA**
Nominal Diameter	**3**				**3**
Nozzle and Stroke (mm)	**Code**	**Nozzle**		**Stroke (mm)**	**6A1**
	6A	[2]Cv = 0.19	[2]Kv = 0.16	40.90	
	6A1	[2]Cv = 0.30	[2]Kv = 0.26	40.90	
	9A1	[2]Cv = 0.45	[2]Kv = 0.39	40.90	
	6B	[2]Cv = 0.80	[2]Kv = 0.69	54.10	
	9B	[2]Cv = 1.20	[2]Kv = 1.04	54.10	
	6C	[3]Cv = 2.10	[3]Kv = 1.81	72.40	
	6D	[3]Cv = 3.18	[3]Kv = 2.75	80.30	
	3C6D	[3]Cv = 4.23	[3]Kv = 3.46	80.30	
	6E	[3]Cv = 5.40	[3]Kv = 4.67	84.80	
	3C6E	[3]Cv = 6.45	[3]Kv = 5.36	84.80	
	9E	[3]Cv = 8.10	[3]Kv = 7.00	84.80	
Class (Steam and Water) and Standard	**Code**	**Class (Steam and Water)**		**Standard**	**150**
	150	ASME 150		ASME B16.5	
	300	ASME 300		ASME B16.5	
	600	ASME 600		ASME B16.5	
	900	ASME 900		ASME B16.6	
	PN40	PN40		EN1092-1	
	PN63	PN63		EN1092-1	
	PN100	PN100		EN1092-1	
Steam Connection	**Code**	**Steam End Flange**		**Standard**	**FR**
	FR	Raised Face		ASME B16.5/EN1092-1	
	[1]RTJ	Ring Joint Face		ASME B16.5	
Water Connection	**Code**	**Water End Flange**		**Standard**	**FR**
	FR	Raised Face		ASME B16.5/EN1092-1	
	[1]RTJ	Ring Joint Face		ASME B16.5	
Body Material	**Code**	**Body Material**			**WC9**
	WCB	ASME SA-216 Gr. WCB /EN 10213 GP240GH (1.0619)[4]			
	WC9	ASME SA-217 Gr. WC9/EN 10213 G17CrMo9-10 (1.7379)[4]			
	CF8M	ASME SA-351 Gr. CF8M/EN 10213 GX5CrNiMo19-11-2 (1.4408)[4]			
Flange	**SOL**	Integral			**SOL**
Trim Material and Temperature (◦C)	**Code**	**Trim Material**			**Temperature**	**1**
		Stem	**Plug and seat**	**Seal Ring**	**Min.**	**Max.**
	1	SS316	SS410 and Stellite	Inconel	0 °C (32 °F)	538 °C (1000.4 °F)
Actuator	**Code**	Actuator				**0**
	0	Pneumatic actuator with spring return				
	3	Pneumatic actuator with spring return and handwheel (available on request)				
Spring Range and Differential Pressure	**Code**	**Spring Range**		**Maximum Differential Pressure**		**C**
	C	2.07 bar to 3.45 bar (30 psi to 50 psi)		75 bar (1087.78 psi)		

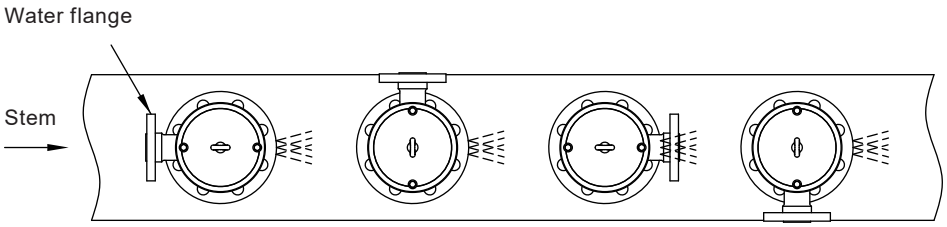
Notes:
[1] RTJ end flanges available on request, only for ASME 600 and ASME 900.
[2] Steam pipe: 6" (minimum)/24" (maximum)
[3] Steam Pipe: 8" (minimum)/24" (maximum)
[4] EN Material available for PN63 and PN100 only

Water connection



Standard assembly position

Spray water flange can be mounted in any orientation. This MUST be specified at point of order and confirmed with the factory prior to delivery.



Standard

Positions 2, 3 and 4 by customer request

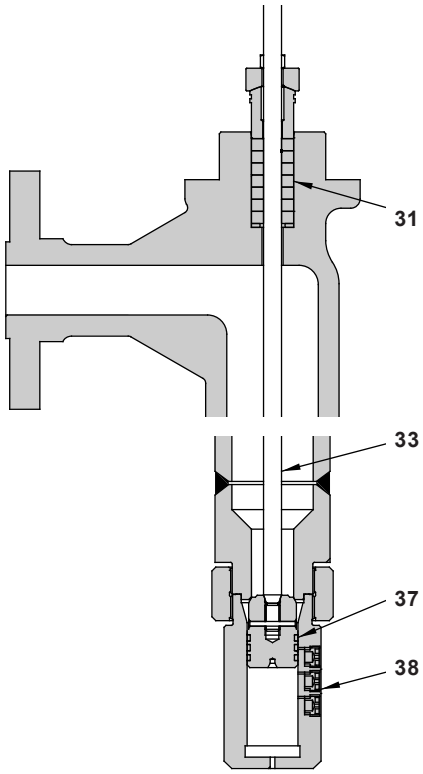
Ordering example:	DA	3	6A1	150	FR	FR	WC9	SOL	1	0	C

Desuperheater DA 3 inch nominal diameter with a Cv = 0.30, Steam and water ASME 150, flanged connections, body material ASME SA-217 Gr. WC9, integral flange, standard trim material, pneumatic spring return actuator with standard spring range.

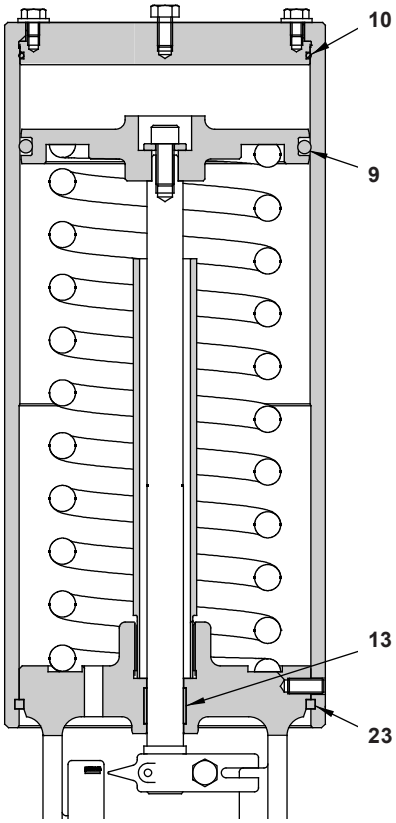
For safety, installation and maintenance information please refer to the Installation and Maintenance Instructions that are supplied with the product.

Spare parts

Item	Description
9	'O' ring (piston)
10	'O' ring (cover)
13	Bushing guide
23	Split ring
31	Packing set
33	Plug/stem assembly
37	Sealing ring (set of 3)
38	Cylinder/nozzle assembly



Valve



Actuator