IMI CCI®

DA4S

Engineering
GREAT Solutions

Steam Desuperheater with Mechanical Water Atomisation and Integrated Spraywater Control

IMI Critical Engineering

DA4S

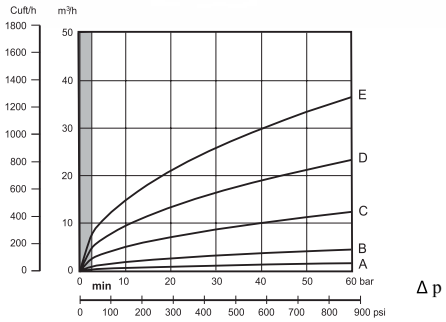
The BTG Steam Desuperheater DA4S is a combination of an injection nozzle and a control valve. It is inserted in a steam line of minimum diameter DN 150 mm/6". The nozzle is inserted in the steam pipe through a flanged pipe stud that is welded to the steam pipe.

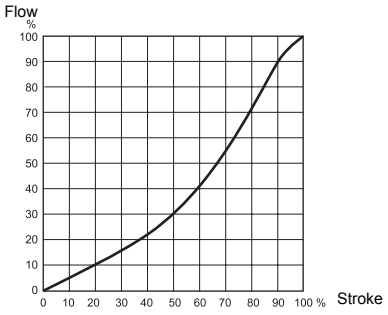
Key features

The cooling water from the water pipe enters the area between the front part of the inlet pipe and the injection nozzle.

The control plug is guided in the injection nozzle. The injection nozzle and the sealing surfaces of the control plug are lapped together to ensure tight shut-off. When the plug is in the closed position all water admission holes in the injection cage will also be closed. As the plug lifts from the injection nozzle seat, it simultaneously opens up a number of water admission holes in the injection cage. The number of free ports will therefore be directly related to the lift of the plug.

The inlet or admission holes in the injection cage are arranged so that a, from the control point of view, good characteristic is obtained. The cooling water, that enters the injection cage through the tangentially positioned admission holes, is induced to a fast rotation around the tip of the plug and is subsequently ejected through the nozzle as a rapid ly evaporating coneshaped mist. The quantity of injected cooling water depends on the number and size of the ports that are opened up by the control plug. The signal from the temperature transmitter located downstream of the desuperheater controls the position of the plug via the actuator.





Benefits

> Injection nozzle with variable geometry

> High rangeability, 40:1 (water) and high steam cooling efficiency

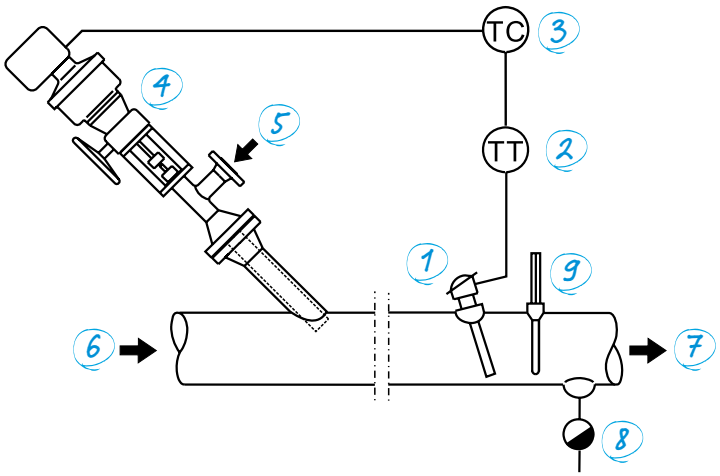
> Combined control valve and injection nozzle in one unit

> Tight shut-off

> High reliability and resistance against wear – only one moving part – the stem and control plug. Hard-faced control plug and injection nozzle with inner parts of high quality alloy steel.

> Simple installation – in vertical, horizontal or sloping pipes – min size, DN 150 mm/6".

Installation example



1 Temperature sensor
2 Temperature transmitter
3 PID temperature controller
4 DA-4 Steam Desuperheater
5 Spray water
6 Superheated steam
7 Desuperheated steam
8 Condensate trap / drain
9 Control thermometer

Product specification

Capacity
7 different injection nozzle sizes: A, B, C, D, E, EO and F with following max. Kv/Cv-values:
A = 0.22/0.25, B = 0.6/0.69, C = 1.6/1.8, D = 3.0/3.4, E = 4.7/5.4, EO = 6.4/7.4, F = 9.7/11.2

Control characteristic (Integrated control valve)
Almost equal percentage (logarithmic)

Control range (Water)
40:1

Pressure class
DIN PN 16 - 400
ANSI 150 - 2500

Max steam temperature
550°C (1022°F)

Materials

Housing	Low alloy steel CS17CrMo55, ~ equiv. to ASTM A217WC6
Plug	Stainless steel X20Cr13, ~ equiv. to AISI 420, surface hardened
Atomiser	Stainless steel X20Cr13, ~ equiv. to AISI 420, surface hardened
Nozzle head	Steel X90 CrMoV 18, ~equiv. to ASTM 440B.
Stuffing box packing	Graphite

Other options
The DA4S is a standardized product, with options limited to what is described within this document. If customized adaptations (e.g. but not limited to accessories, painting, materials, etc.) are desired, IMI CCI recommends the DA4.
Note that any price quoted for the DA4S assumes strict adherence to the specifications described within this document.

Dimensions

DA4-X CL1500 / MSDIII 290RA (actuator without hand wheel)

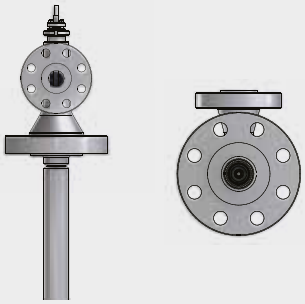
L1	540 mm
M	235 mm
N	500 mm
O	210 mm
K	78 mm
D1	300 mm
Weight	120 kg

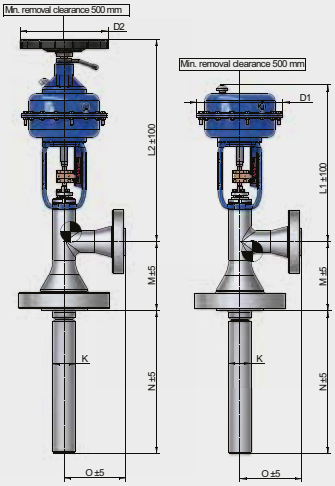
DA4-X CL1500 / MSD290RA HW (actuator with hand wheel)

L2	700 mm
M	235 mm
N	500 mm
O≤	210 mm
K	78 mm
D2	300 mm
Weight	125 kg

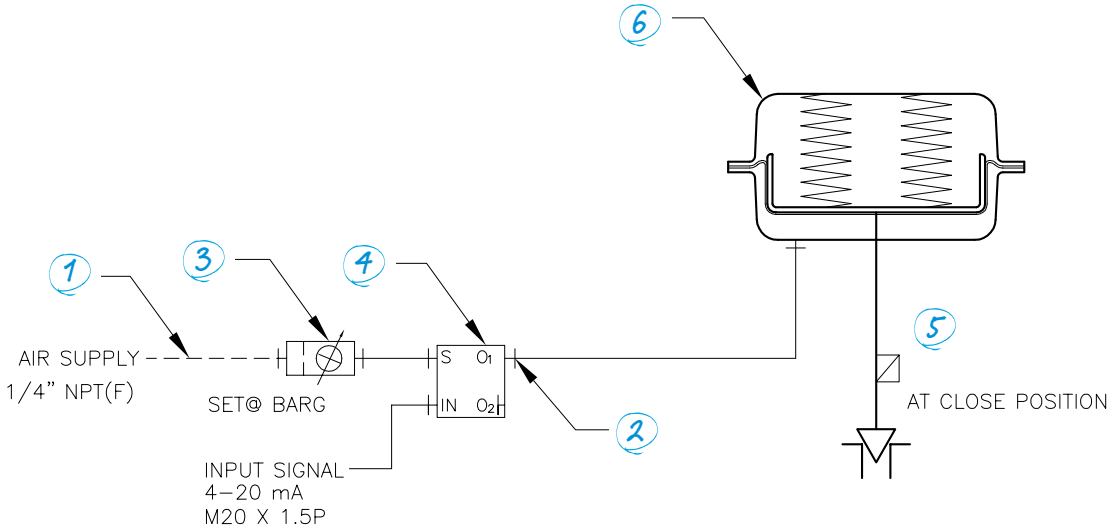
Connections

	ANSI B16.5	EN1759
Steam	4" RF CL1500	DN100 PN250
Water	2" RF CL1500	DN50 PN250



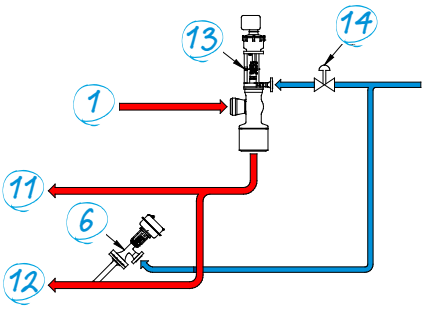


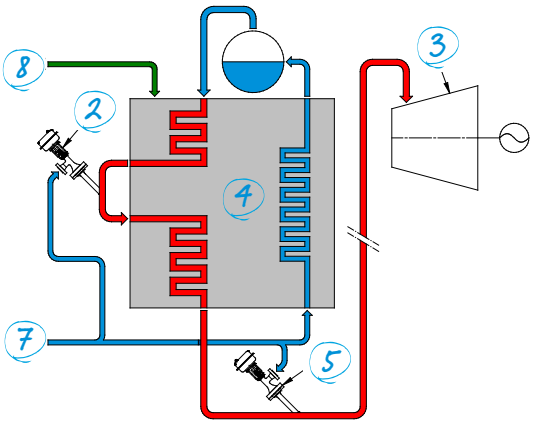
Pneumatic schematic

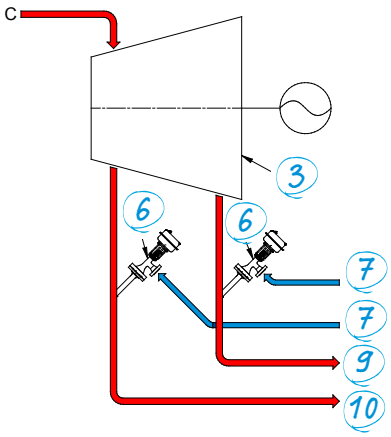


1 Tubing
2 Fittings
3 Filter regulator
4 Positioner
5 Limit switch
6 Actuator

Applications







1. Main steam line
2. DA-4 interstage attemperator
3. Steam turbine
4. Heat Recovery Steam Generator
5. DA-4 Final stage attemperator
6. DA-4 process steam desuperheater
7. Feed water
8. Fuel
9. Exhaust process steam
10. Extraction process steam
11. Process steam
12. Process steam
13. VST-SE steam conditioning valve
14. Spray water control / stop valve

Accessories

Actuator	Type	Pneumatic spring diaphragm actuator
	Air supply	5,0 barg
	Diaphragm port	1/4" NPT
	Effective diaphragm size	250 or 290
	Manual override	Top mounted (optional)
	Tubing material	316L SS
	Stroke speed	≤ 15 seconds
Positioner	Type	SMART C330. Linear, single acting with built-in position transmitter
	Input signal	4-20 mA DC (min: 3.2 mA) increase signal to open
	Feedback signal	4-20 mA DC, HART
	Housing material	Aluminum Diecasting
	Protection class	IP 66
	Ambient temperature	-30 to +85 °C
	Features	LCD display for positioner condition readout. Simple auto calibration. Field adjustable PID parameters. Split range available.
Limit switch	Type	Heavy duty limit switch, Non plug-in double pole A corrosionresistant steel roller and plunger that is adjus to 90° angles. 1x Installed for closed position.
	Housing material	Zinc die-cast with an electrostatic epoxy coating
	Protection class	IP65
	Operating temperature	-12 °C to +121 °C
Air-filter regulator	Type	Manual drain type
	Housing material	Aluminum diecasting
	Ambient temperature	-20 to +40 °C
	Min. filtering size	5 microns
	Guage range	0 - 10 bar
	Handwheel	Optional, mounted on top of actuator

Type code

	Type code			Ordering example
1	Series	DA4S	Steam desuperheater	DA4S
2	Nozzle size	A	Kv/Cv = 0.22/0.25	C
		B	Kv/Cv = 0.6/0.69	
		C	Kv/Cv = 1.6/1.8	
		D	Kv/Cv = 3.0/3.4	
		E	Kv/Cv = 4.7/5.4	
3	Pressure class	CL1500	ANSI 1500	CL 1500
4	Actuator	MSDIII 290RA	Effective diaphragm size = 290mm	MSDIII 290RA
5	Handwheel	(blank)	No handwheel	HW
		WH	Handwheel	

Painting

Part	Procedure	Description/standard	DFT	Colour
Desuperheater	Cleaning	Blast cleaning Sa 2 ½ (ISO 8501-1:2007)		
	Top coat	Jotun: Solvalitt Alu Corrosion class ISO 12944-5 C3 (C4 at high temperatures)	2x20 µm	Aluminium
Actuator	Cleaning	Blast cleaning to Sa 2 ½ (ISO 8501-1:2007)		
	Primer	NOROO: RF-6800B	15 µm	Black
	Top coat	KCC: PX 7576	65 µm	Blue

Quality control plan

	Process / activity	Procedure / standard		
		PED / EN 12516-2	ASME B16/34	PED / ASME B16.34
Design / manufacture	Design code	EN 12516-2 (Directive 97/23/EC)	ASME B16.34	ASME B16.34
	Mechanical properties / chemical analysis (pressurised matierals)	EN		ASTM (ASME II)
	Welding procedure qualification	EN 15614-1 / EN 288-3	ASME IX	ASME IX
	PWHT	According to internal WPS		
NDT	RT examination	EN ISO 10675-1	PRI 355 (ASME VIII (ASME B16.34 2.1.6))	PRI 355 (ASME VIII (ASME B16.34 2.1.6))
	UT examination (on welds not accessible for RT)	EN ISO 11666	PRI 355 (ASME VIII (ASME B16.34 2.1.6))	PRI 355 (ASME VIII (ASME B16.34 2.1.6))
	MT examination (on welds not accessible for RT or UT)	EN ISO 23278	PRI 355 (ASME VIII (ASME B16.34 2.1.6))	PRI 355 (ASME VIII (ASME B16.34 2.1.6))
Assembley / testing	Hydrostatic pressure test	According to internal procedures		
	Seat leakage test			
	Functional test			
	Visual and dimensional check			
	Painting and preservation			
	Documentation	Quality control plan		
	Affixing of CE-mark	Directive 97/23/EC	N/A	Directive 97/23/EC
	Declaration of conformity	Directive 97/23/EC	N/A	Directive 97/23/EC
	Final inspection	According to internal procedures		

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