

November 2021

## Spence™ Air-Operated Steam-Atomizing Desuperheaters



*Figure 1. Air-Operated, Steam-Atomizing Desuperheater*

### Features

- **Reduces the temperature of superheated steam by controlled direct injection of cooling water**
- **Steam atomizing 20:1 turndown**
- **Line Sizes 3 in. to 24 in. (larger sizes available upon request)**
- **Velocities to 8000 feet per minute**
- **Air operated only**

### Introduction

The Steam-Atomizing Desuperheater is designed to reduce and control the temperature of superheated steam by the controlled injection of a cooling water mist.

### Principle of Operation

The controls consist of two valves, one for cooling water and one for atomizing steam. The valve's position is determined by the air signal from a pneumatic temperature controller. On a rise in temperature, the controller's air signal varies and the control valves open. This provides a balanced flow of steam and water to the Spence injector nozzle.

Cooling water emerges from the nozzle in a swirling spray. Atomizing steam issues from the concentric impact nozzle and disperses the water spray in the form of a fine mist. The coolant is injected counterflow to the superheated steam to promote full evaporation. Coolant flow is modulated to maintain the desired temperature setpoint.

# Steam-Atomizing Desuperheater

## Specifications

The specifications section on this page provides the ratings and other specifications for the air-operated, steam-atomizing desuperheater.

### Available Types

1, 3, 5, 6 and 8

### Maximum Temperature<sup>(1)</sup>

750°F / 399°C

### Maximum Pressure<sup>(1)</sup>

600 psig / 41.4 bar

### Materials of Construction

Stainless steel

1. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation should not be exceeded.

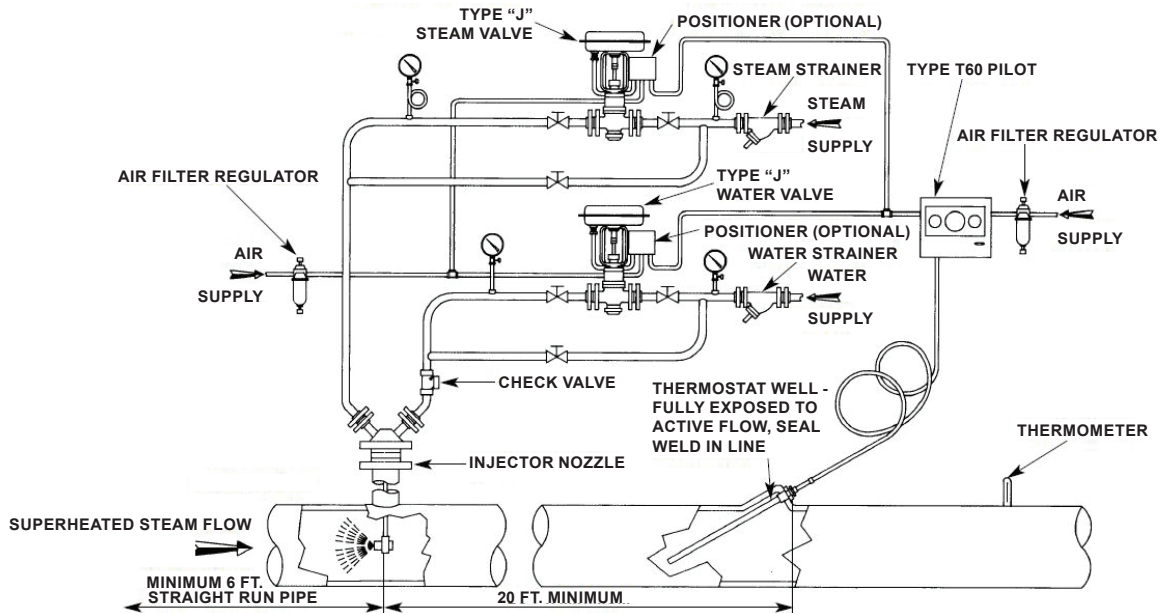


Figure 2. Air-Operated, Steam-Atomizing Desuperheater Station Installation

## Installation

1. Install the injector assembly with the nozzle outlet facing upstream.

### Note

**The injector nozzle is orificed for specific water and steam supply pressures. Verify the actual pressures against your order specification.**

2. Install the control valves and strainers as shown with the arrows pointing in the direction of flow. See Figure 2.
3. Install the thermostat well so that its full length extends across the inside of the pipe. Seal weld the well to the pipe.

4. Read the separate instructions supplied with the pneumatic controller. Then install the controller at a convenient location remote from the thermostat well.
5. Pour heat transfer oil into the thermostat well and install the thermostat bulb.
6. Connect the output connection of the controller to the control valves with 3/8 in. / 9.53 mm copper tubing.
7. Connect a regulated source of instrument air to the supply connection of the controller and the positioner, if required.
8. Install the required pressure gages and thermometer as shown in Figure 2.

# Steam-Atomizing Desuperheater

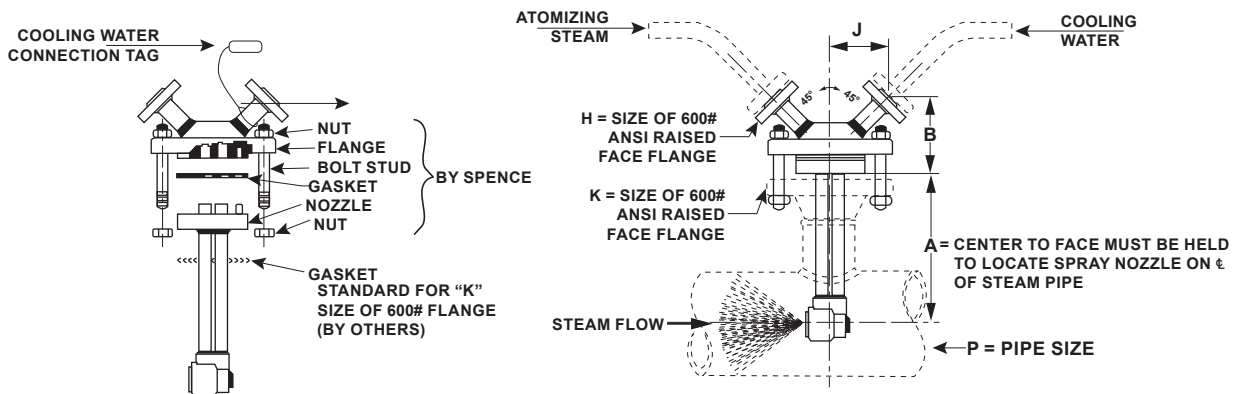


Figure 3. Air-Operated, Steam-Atomizing Desuperheater Dimensions

Table 1. Air-Operated, Steam-Atomizing Desuperheater Dimension A, in. (Imperial)

TYPE	DIMENSION A												
	P = MAIN STEAM PIPE, IN.												
	3	3-1/2	4	5	6	8	10	12	14	16	18	20	24
1	7	7-1/2	8-1/2	10	11	13	15-1/2	16-1/2	17-1/2	19-1/2	21-1/2	23-1/2	27-1/2
3	----	----	8-1/2	10	11	13	15-1/2	16-1/2	17-1/2	19-1/2	21-1/2	23-1/2	27-1/2
5	----	----	----	----	11	13	15-1/2	16-1/2	17-1/2	19-1/2	21-1/2	23-1/2	27-1/2
6	----	----	----	----	----	13	15-1/2	16-1/2	17-1/2	19-1/2	21-1/2	23-1/2	27-1/2
8	----	----	----	----	----	----	15-1/2	16-1/2	17-1/2	19-1/2	21-1/2	23-1/2	27-1/2

Table 2. Air-Operated, Steam-Atomizing Desuperheater Dimension A, mm (Metric)

TYPE	DIMENSION A												
	P = MAIN STEAM PIPE, mm												
	76.2	88.9	102	127	152	203	254	305	356	406	457	508	610
1	177.8	190.5	216	254	279	330	394	419	445	495	546	597	699
3	----	----	216	254	279	330	394	419	445	495	546	597	699
5	----	----	----	----	279	330	394	419	445	495	546	597	699
6	----	----	----	----	----	330	394	419	445	495	546	597	699
8	----	----	----	----	----	----	394	419	445	495	546	597	699

Table 3. Air-Operated, Steam-Atomizing Desuperheater Dimensions

TYPE	DIMENSIONS							
	B		H		J		K	
	In.	mm	In.	mm	In.	mm	In.	mm
1	4-1/2	114	1/4	6.35	2-3/4	69.9	2	50.8
3	5-3/8	137	1/2	12.7	2-3/4	69.9	2-1/2	63.5
5	6-1/2	165	1	25.4	4-1/4	108	4	102
6	7-9/12	197	1-1/4	31.8	6	152	5	127
8	9-13/16	249	2	50.8	7-1/2	190	8	203

# Steam-Atomizing Desuperheater

---

## Ordering Information

When ordering, complete the ordering guide on this page. Refer to the Specifications section. Review the description to the right of each specification and the information in each referenced table or figure. Specify your choice whenever a selection is offered.

## Ordering Guide

Type (Select One)

- 1
- 3
- 5
- 6
- 8

 [SpenceValve.com](https://www.SpenceValve.com)

### Emerson

#### Americas

McKinney, Texas 75069 USA  
T +1 800 558 5853  
+1 972 548 3574

#### Europe

Bologna 40013, Italy  
T +39 051 419 0611

#### Asia Pacific

Singapore 128461, Singapore  
T +65 6777 8211

#### Middle East and Africa

Dubai, United Arab Emirates  
T +971 4 811 8100

VCBUL-15994 © 2021, 2026 Emerson Electric Co. All rights reserved 03/26.  
Spence is a mark owned by a subsidiary of Emerson Electric Co. The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are property of their respective owners.

Neither Emerson nor any of its affiliated entities assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use, and maintenance of any product remains solely with the purchaser and end user.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available upon request. We reserve the right to modify or improve the designs or specifications of such products at any time without notice.

SI5002  
SI5004

