

# Fisher™ Yarway™ AT-25 VenTemp Desuperheater

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Figure 1. Fisher Yarway AT-25 VenTemp Desuperheater



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## Introduction

### Scope of Manual

This instruction manual includes installation and operation information for the AT-25 Desuperheater.



Do not install, operate, or maintain a AT-25 Desuperheater without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your [Emerson sales office](#) before proceeding.

### Description

The AT-25 Desuperheater offers efficient desuperheating in steam pipelines of NPS 16 and less. It is designed primarily for use in low-capacity superheated steam systems where the load is fairly constant. By utilizing a spray nozzle assembly that is removable from outside the desuperheater assembly, the AT-25 provides a venturi solution while maintaining a high level of serviceability.

Table 1. Specifications

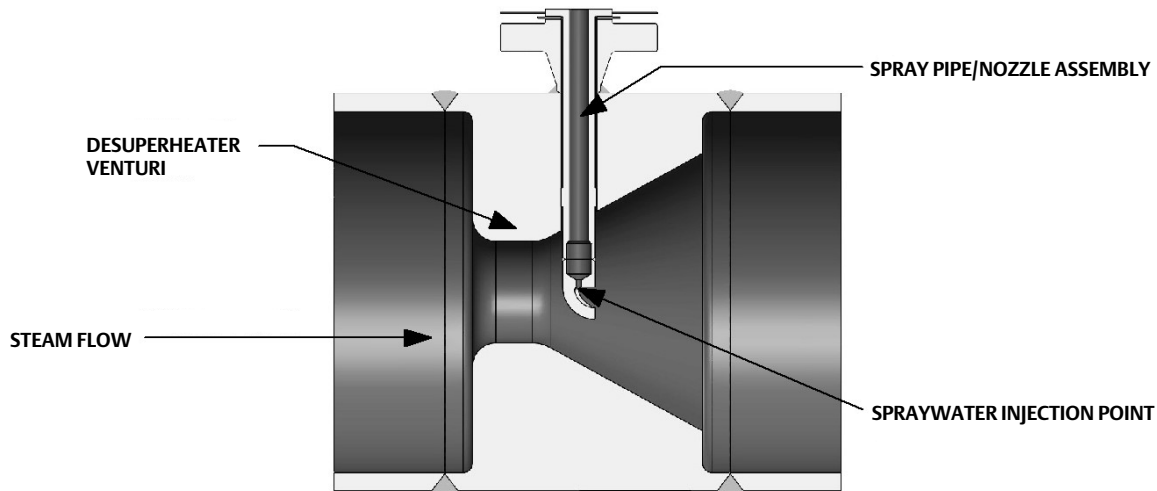
<p><b>Steam Line Connections</b></p> <ul style="list-style-type: none"> <li>■ BWE per ASME B16.25 or DIN 2559</li> <li>■ NPS 2 through 16, CL150 to 2500</li> <li>■ DN 50 through 400, PN25 to 400</li> </ul> <p><b>Spraywater Connections</b></p> <ul style="list-style-type: none"> <li>■ RF per ASME B16.5 or Type B per EN 1092-1</li> <li>■ NPS 1/2 through 2, CL150 to 2500</li> <li>■ DN 15 through 50, PN10 to 400</li> </ul> <p><b>Maximum Inlet Pressure and Temperature<sup>(1)</sup></b></p> <p>Consistent with applicable pressure-temperature ratings per ASME B16.34 or EN 12516-1</p>	<p><b>Spraywater Flow Coefficients</b></p> <ul style="list-style-type: none"> <li>■ Minimum <math>C_v</math>: 0.016 (<math>K_v</math>: 0.014)</li> <li>■ Maximum <math>C_v</math>: 14.708 (<math>K_v</math>: 12.723)</li> </ul> <p><b>Spraywater Pressure Required</b></p> <p>0.4 to 35 bar (6 to 500 psi) greater than steam line pressure – depending on nozzle selection</p> <p><b>Construction Materials<sup>(2)</sup></b></p> <ul style="list-style-type: none"> <li>■ SA105, ■ SA182 F11, ■ SA182 F22,</li> <li>■ SA182 F91, ■ P250GH, ■ 1.7335, and ■ 1.7380</li> </ul>
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1. The pressure or temperature limits in the referenced tables and any applicable code or standard limitations should not be exceeded.  
 2. For availability of materials other than those listed, consult your [Emerson sales office](#).

## Educational Services

Emerson Educational Services  
 Phone: 1-800-338-8158  
 E-mail: [education@emerson.com](mailto:education@emerson.com)  
[emerson.com/mytraining](http://emerson.com/mytraining)

Figure 2. Detail View of the Fisher Yarway AT-25 Desuperheater



## Principle of Operation

Superheated steam flowing along the steam line enters the AT-25 Desuperheater throat, increasing its velocity, while reducing its pressure. This change from static to dynamic pressure is utilized to disintegrate the spraywater, injected from the spray nozzle within the venturi region. Directly after the throat area, the venturi profile is interrupted and the flow area drastically increased, resulting in intense turbulence and enhanced mixing of water and steam.

The outlet steam temperature is controlled by regulating the flow of cooling water by means of a conventional control valve. Spraywater flow is throttled as the control valve responds to the signal generated by the temperature control loop. The spraywater enters the desuperheater water connection and then continues into the spray nozzle. As the flow area is reduced, the spraywater accelerates through the injection point. The accelerated flow results in a fine spray for efficient and rapid evaporation.

## Installation

### **⚠ WARNING**

Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.

Personal injury or equipment damage caused by sudden release of pressure may result if the AT-25 desuperheater is installed where service conditions could exceed the limits given in table 1 or on the nameplate. To avoid such injury or damage, provide a relief valve for over-pressure protection as required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

**⚠ WARNING**

When ordered, the desuperheater configuration and construction materials were selected to meet particular pressure, temperature, pressure drop, and fluid conditions. Do not apply any other conditions to the desuperheater without first contacting your [Emerson sales office](#)

## System Considerations

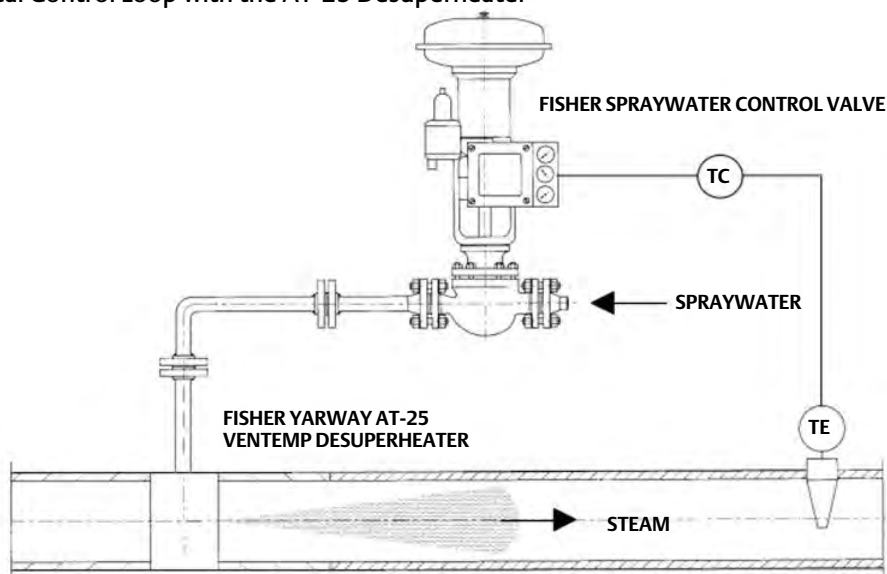
**Note**

The desuperheater water supply should be of good quality, clean and filtered – for example, boiler feed water – and should have a constant pressure as specified in the order documents. Each water supply line should be protected with its own individual strainer. For nozzle sizes N01 through N03, a mesh size of 40 is recommended. For nozzle sizes N04 and above, a mesh size of 20 is recommended.

- A straight run of pipe is required downstream of the desuperheater to ensure complete vaporization of the cooling water. Consult the desuperheater sizing sheet for installation recommendations, including the recommended straight pipe distance required.
- A temperature sensor should be mounted in accordance with the manufacturer's instructions. The recommended distance from the desuperheater to the temperature sensor changes with the velocity and percentage of spraywater required. Consult the desuperheater sizing sheet for installation recommendations, including the recommended distance required before the temperature sensor.
- Allow no branching out from the steam line, to divide or to add to the steam flow, between the temperature sensor and the desuperheater.

A typical control loop is illustrated in figure 3. A temperature sensor generates a signal (pneumatic or digital) through a transmitter. This signal is transmitted to the positioner on the spraywater control valve. The positioner output signal is piped to the actuator, which strokes the spraywater control valve governing the amount of spraywater flow.

Figure 3. Typical Control Loop with the AT-25 Desuperheater



## Preliminary Checks

1. Check that the information on the documentation, identification plate, and tag number complies with the order specification.
2. Remove the AT-25 Desuperheater carefully from its packaging. Do not use the water inlet connection for lifting.
3. Before installation, check the AT-25 Desuperheater for any visible damage. Make sure that the protective covers are removed, and that butt weld ends and flange faces are clean and without blemish. Any damage to the unit should be reported immediately to your [Emerson sales office](#).

## Mounting Considerations

- When installing the AT-25 Desuperheater, use gaskets and bolting material in accordance with the relevant piping code.
- To reduce the risk of spray nozzle clogging, it is recommended that the unit be installed with the water connection vertically upward.
- Buttweld AT-25 Desuperheaters should be welded inline using proper weld procedures.
- Post-weld heat treatment should be done with the pipeline filled with an inert gas (oxidation of the vena contracta area may lead to a significantly higher pressure drop over the AT-25 than calculated).
- Flush out the water line before connecting to the AT-25 Desuperheater mounting flange.
- For an installation example, see figure 3.

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### Note

The AT-25 Desuperheater should be free of forces, movements, and torques.

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## Maintenance

### **⚠ WARNING**

**Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:**

- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.**
  - **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
  - **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.**
  - **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
  - **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**
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## Servicing

Although the AT-25 desuperheater is a simple design requiring very little maintenance, regular service intervals require removal of the spray nozzle assembly. It may also be necessary to service the unit in the event that the spray nozzle becomes clogged by debris. Prior to removal of the nozzle from the unit, ensure that the necessary gaskets and spare nozzles (if applicable) are available for rebuild if turnaround time for the repair is critical. Do not re-use the graphite gaskets. Review the drawing and specification sheet for clarification. If in doubt as to the construction, advise your [Emerson sales office](#) of the serial number and model number and ask for further clarification.

Service Item	Recommended Service Interval
Spray Nozzle Inspection	Every 18-24 months
Spray Nozzle Replacement	Every 24-36 months

### Spray Nozzle Removal

1. Before removing the spray nozzle from the desuperheater, ensure that there is no residual pressure in either the steam or water lines.
2. Loosen the water flange bolts and disconnect the water supply line from the desuperheater water flange, taking care not to damage the water flange and nozzle mounting surfaces.
3. The spray nozzle may now be removed from the desuperheater.
4. Inspect the desuperheater sealing surfaces for damage. Repair if needed.

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#### Note

If there is damage on the gasket surfaces that is too large for field repair, the unit may require replacement.

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### Spray Nozzle Inspection

1. Inspect the nozzle for excessive wear, erosion/corrosion, and/or blockage due to particulate.
  - Wear is defined as any nicks, cuts, or gouges of the nozzle, especially in or around the orifice.
  - Erosion/corrosion is defined as any form of rust or erosion of the metal on the nozzle.
  - Blockages are defined as small particulate trapped within the nozzle orifice.

If any of the preceding problems are present, replacement of the nozzle is recommended. If not, proceed to step 2.

2. Thoroughly flush the nozzle after inspection.

### Spray Nozzle Installation

1. Verify that all flange and nozzle gasket mating surfaces are clean and free of damage.

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#### Note

If there is damage on the gasket surfaces that is too large for field repair, the unit may require replacement.

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2. Install a new gasket at the surface between the desuperheater water flange and the nozzle mating surface.

3. Insert the spray nozzle with the spray direction pointed in the downstream flow direction.
4. Install a new gasket at the surface between the nozzle mating surface and the water supply line flange.
5. Reconnect the water line flange connection. Use a high temperature nickel compound on the flange bolting.
6. After ensuring that the desuperheater is properly installed in the pipeline, the unit may be returned to service. The desuperheater should be monitored as the unit is brought online to ensure that there are no leaks in the connections.

## Troubleshooting

The following guide (table 2) is a basic first line troubleshooting guide. Contact your [Emerson sales office](#) for assistance if you are unable to resolve your field operation problem.

Table 2. Fisher AT-25 VenTemp Desuperheater Troubleshooting

Problem	Possible Solution
Temperature setpoint is not reached	Check water source availability and pressure
	Check nozzle for plugging
	Make sure the set point is not below the saturation temperature
	Check to ensure full actuator stroke is reached
Temperature is below setpoint	Check temperature control loop – reset
	Check nozzle for fouling/poor spray pattern – clean/replace
	Check temperature sensor location – relocate per guidelines
	Tune control system parameters
Water in steam line	Temperature setpoint may be too close to saturation
	Check that steam traps are functioning properly
Water in steam line when steam line isolated	Review piping configuration for downstream tees and elbows
	Check for leakage of spraywater control valve



## Parts Ordering

Each AT-25 desuperheater is assigned a serial number that can be found on the desuperheater body or on a tag attached to the water pipe. Refer to the serial number when contacting your [Emerson sales office](#) for technical assistance. When ordering a replacement nozzle, refer to the serial number and key number. The key numbers in Figure 4 can be used to help in part identification.

### **⚠ WARNING**

**Use only genuine Fisher replacement parts. Components that are not supplied by Emerson should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.**

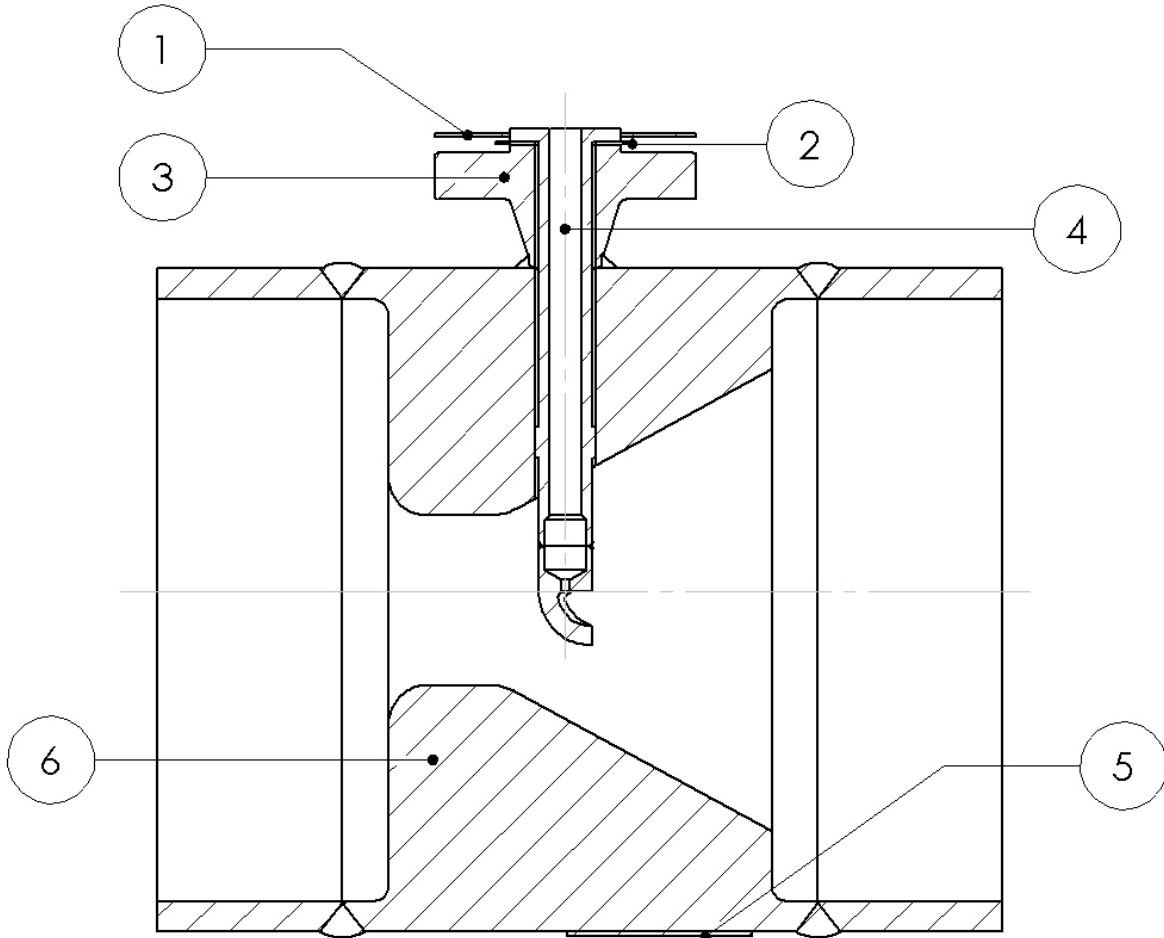
## Parts List

**Note**

Contact your Emerson sales office for Part Ordering information.

Key	Description
1*	Spray Direction Indicator
2*	Gasket
3	Water Flange
4*	Nozzle Pipe Assembly
5	Nameplate
6	Body
	If you need a valve body as a replacement part, order the valve size, Class and desired material. Contact your Emerson sales office.

Figure 4. Fisher Yarway AT-25 VenTemp Valve Assembly





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