Spence N650 Series Thermostatic Steam Traps

Features

- **Positive Shutoff –** Valve and seats are lapped in matched sets, providing tight shutoff for light and no-load conditions which results in improved energy savings.
- **Freeze Proof –** Self draining when installed vertically.
- **Compact–Easy to Install –** Ample extension for pipe wrench provided.
- **Easily Maintained –** Actuator element and valve are attached to cover to facilitate inspection and servicing. Optional stainless blowdown valve permits easy strainer cleaning while in service.
- **Directional Discharge –** Pipe and thread erosion prevented by directing condensate to center of discharge pipe.
- **Hardened Stainless Steel Valve and Seat –** Long life. Lapped as a matched set for water tight seal.
- **Temperature Sensitive Actuators –** One moving part. Stainless steel, fail open or fail closed, welded actuator for maximum corrosion, thermal and hydraulic shock resistance.
- **Positive Shutoff and Long Life –** Integral stainless steel strainer helps prevent debris from depositing onto valve and seat.
- **Strainer –** Integral stainless steel strainer standard on all models.

Introduction

A steam trap is an automatic valve which discharges condensate, undesirable air and non-condensibles from a system while trapping, or holding in, steam. Thermostatic steam traps operate in direct response to the temperature within the trap.

Figure 1. *N650 SeriesThermostatic Steam Traps*

N650 Series is a balanced pressure design with stainless steel welded actuator capable of discharging condensate within 10°F / -12°C of saturated temperature.

For greater sensitivity or protection from flash steam locking, SLR orifice is available to allow condensate and flash steam evacuation at or near saturated temperatures. If subcooling of condensate is desired, alternate thermostatic actuator is available to allow condensate evacuation at or near 40°F / 4.4°C below saturated temperatures.

Thermostatic actuator has a conical valve lapped in matched sets with the seat ring assuring tight shut off. A minimum of four orifice sizes is available allowing for custom capacity sizing. Trap is forged carbon steel Y pattern body with strainer and blow down valve suitable for pressures up to 650 psig / 44.8 bar and available in NPS 1/2 and 3/4 / DN 15 to 20 in NPT or socket weld end connection.

Specifications

This section lists the specifications for the N650 Series. Factory specifications are stamped on the nameplate fastened on the steam trap at the factory.

Available Configuration

Type N651-FO: Y pattern body withstrainer and blowdown port tapped and plugged; low capacity, fail open
Type N652[1]: Reduced capacity
Type N653[1]: Standard capacity
Type N654[1]: High capacity

Body Size

NPS 1/2 and 3/4 / DN 15 and 20

End Connection

NPT and Socket Weld

Maximum Operating Pressure[2]

Standard Traps: 500 psig / 34.5 bar g
ISO Option Traps: 650 psig / 44.8 bar g

Maximum Allowable Pressure[2]

650 psig / 44.8 bar g

Maximum Operating Temperature[2]

Standard Traps: 600°F / 316°C
ISO Option Traps: 650°F / 343°C

Maximum Allowable Temperature[2]

750°F / 399°C

Capacity Information

See Table 1

Materials of Construction

Body and Cover: Forged steel
Actuator: Welded Stainless Steel
Cover Gasket: Stainless Steel Spiral Wound with Graphite Fill
Strainer and Blowdon Valve: Stainless Steel
Valve and Seat: Hardened 416 Stainless Steel

Applications

Unit Heaters
Air Vents
Steam Tracing
Drip Legs
Platen Presses
Plating Tanks
Sterilizers
Tire Presses
Cooking Equipment
Laundry Equipment
Other Process Equipment

Options

B: Blowdown Valve
ISO: ISO Filled Actuator[3]
SK: Skirted Seat[3]
SLR: SLR Orifice
SW: Socket weld

Approximate Weight

5 lbs / 2.3 kg

1. Add (-FC) for fail closed or (-FO) for fail open to end of type number.
2. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation should not be exceeded.
3. Emerson Process Management Regulator Technologies, Inc. (Emerson) recommends ISO filled Actuator above 500 psi / 34.5 bar and for superheated steam. Emerson recommends skirted seat above 300 psi / 20.7 bar.

Table 1. *Maximum Capacity – Lbs/hr 10°F Below Saturation / Kg/hr 5°C Below Saturation*

TYPE	ORIFICE, IN. / mm	DIFFERENTIAL PRESSURE, PSIG / bar g																
		5 / 0.34	10 / 0.7	20 / 1.4	50 / 3.5	100 / 6.9	125 / 8.62	150 / 10.3	200 / 13.8	250 / 17.2	300 / 20.7	350 / 24.1	400 / 27.6	450 / 31.0	500 / 34.5	550 / 37.9	600 / 41.4	650 / 44.8
		lbs/hr / kg/hr																
N651	5/64 / 2	84 / 38	119 / 54	168 / 76	265 / 120	348 / 158	375 / 170	398 / 181	439 / 199	472 / 214	502 / 228	529 / 240	553 / 251	575 / 261	595 / 270	615 / 280	635 / 289	650 / 295
N652	1/8 / 3	216 / 98	265 / 120	375 / 170	592 / 269	778 / 354	838 / 381	890 / 405	980 / 445	1055 / 480	1121 / 510	1180 / 536	1235 / 561	1284 / 584	1331 / 604	1377 / 625	1425 / 646	1471 / 667
N653	1/4 / 6	550 / 249	825 / 374	1210 / 549	1975 / 896	2825 / 1281	3140 / 1424	3425 / 1554	3650 / 1656	3960 / 1796	4100 / 1860	4230 / 1919	4420 / 2005	4600 / 2086	4760 / 2161	4910 / 2232	5060 / 2297	5190 / 2359
N654	5/16 / 8	860 / 390	1220 / 554	1725 / 783	2725 / 1237	3575 / 1623	3850 / 1748	4090 / 1857	4505 / 2045	4850 / 2202	5155 / 2340	5425 / 2463	5675 / 2576	5900 / 2679	6110 / 2774	6310 / 2868	6480 / 2945	6625 / 3011

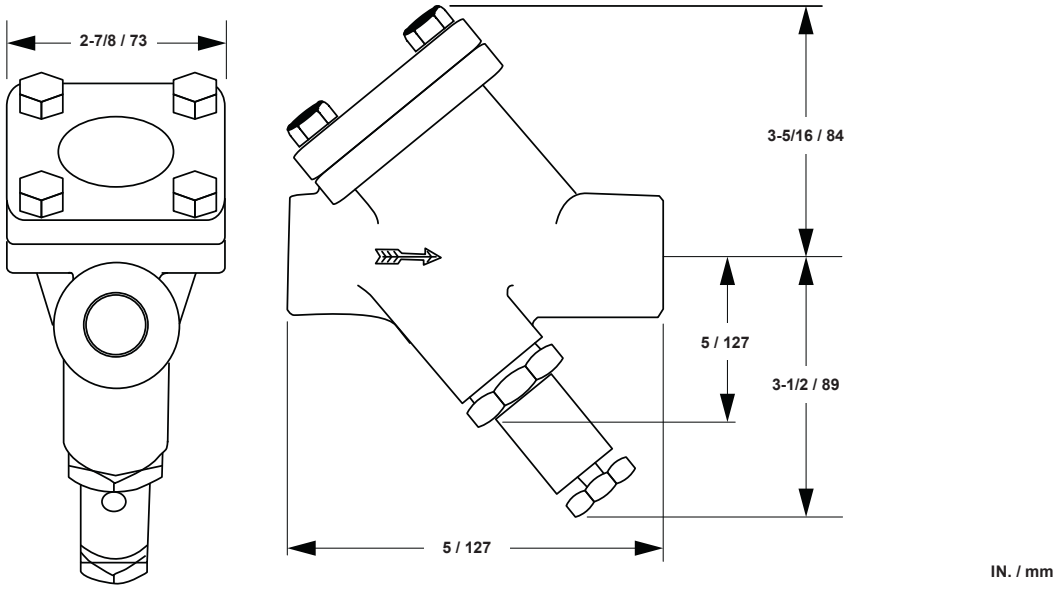

Figure 2. *N650 Series Dimensions*

Principle of Operation

Thermal actuator is filled at its free length with a liquid having a lower boiling point than water. As assembled, valve is normally open. When very hot condensate enters trap, thermal actuator fill vaporizes to a pressure higher than line pressure. This forces valve into seat orifice to prevent any further flow. As condensate collects, it takes heat from the actuator, lowering internal pressure. Line pressure will then compress thermal actuator to open valve and discharge condensate. Valve opening automatically adjusts to load conditions from minimum on very light loads to full lift at maximum load. Optional blowdown valve allows fast and easy cleaning of internal strainer without removing trap from operation.

Installation

1. Before installing trap, blow all dirt and scale from apparatus and piping.
2. Install trap with arrow on body in flow line as close as possible to apparatus with strainer and valve upstream of trap.
3. Pitch all drain lines toward trap.

Note

Approved practice is to install separate traps on each piece of apparatus to be drained. Steam supplied to inlets of several units may be of uniform pressure, but invariably there is a differential at the outlets. Although this differential may be small, unit discharging highest pressure will control the action of trap, while other units become air-bound and water logged. Piping upstream and downstream of trap should be at least equal to or one size larger than trap connection.

4. Record the location of the trap for maintenance accessibility.

Capacity Information

Capacity information for every type of N650 Series is shown in Table 1.

Ordering Information

When ordering, complete the ordering guide on this page. Refer to the Specifications section on page 2.

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)

- ☐ Type N651-FO
- ☐ Type N652-FO
- ☐ Type N652-FC
- ☐ Type N653-FO
- ☐ Type N653-FC
- ☐ Type N654-FO
- ☐ Type N654-FC

Body Size (Select One)

- ☐ NPS 1/2 / DN 15
- ☐ NPS 3/4 / DN 20

End Connection (Select One)

- ☐ NPT
- ☐ Socket Weld

Options

- ☐ B - Blowdown Valve
- ☐ ISO - ISO Filled Actuator
- ☐ SK - Skirted Seat
- ☐ SLR - SLR Orifice
- ☐ SW - Socket weld

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