

December 2022

Spence™ B Series



WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion, fire and/or chemical contamination causing property damage and personal injury or death.

B Series steam trap must be installed, operated and maintained in accordance with federal, state and local codes, rules and regulations, and Emerson Process Management Regulator Technologies, Inc. (Emerson) instructions.

If leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Installation, operation and maintenance procedures performed by unqualified personnel may result in improper adjustment and unsafe operation. Either condition may result in equipment damage or personal injury. Only a qualified person shall install or service the B Series steam trap.

Introduction

Scope of the Manual

This manual provides instructions for installation, maintenance and parts information for the B Series Thermostatic Bellows Steam Traps.



Figure 1. B Series Thermostatic Bellows Steam Trap (Cutaway)

Product Description

The B Series Thermostatic Bellows Steam Traps have a balanced pressure design with stainless steel welded actuator capable of discharging condensate within 10°F / 12°C of saturated temperature. Thermostatic actuator employs a conical valve lapped in matched sets with the seat ring assuring tight shut off.

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Specifications

The specifications section on this page provide the ratings and other specifications for the B Series.

Available Configurations

Type B33: 1/2 NPT / 12.7 mm
straight through trap

Type B43: 3/4 NPT / 19.1 mm
straight through trap

Type B53: 1 NPT / 25.4 mm
straight through trap

Type B63: 1-1/4 NPT / 31.8 mm
straight through trap

Type B73⁽¹⁾: 1-1/2 NPT / 38.1 mm
straight through trap

Type B83⁽¹⁾: 2 NPT / 50.8 mm
straight through trap

Maximum Allowable Pressure⁽²⁾
250 psig / 17.2 barg

Maximum Operating Pressure⁽²⁾
250 psig / 17.2 barg

Maximum Differential Pressure⁽²⁾
250 psig / 17.2 barg

Maximum Operating Temperature⁽²⁾
450°F / 232°C

Materials of Construction

Body and Cover: Cast Iron ASTM A278 Class 30

Actuator: Welded Stainless steel

Cover and Gasket: Graphite

Valve and Seat: Hardened 416 Stainless steel

Options

SLR Orifice

HC - High Capacity Orifice

1. Add (-HC) at the end of type number for high capacity.

2. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.

Principle of Operation

Thermal actuator is filled at its free length with a liquid having a lower boiling point than water. On start-up, valve is normally open. When steam 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 thermal 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.

Additionally, physical damage to the steam trap may result in personal injury or property damage due to escaping of accumulated gas. To avoid such injury and damage, install the steam trap in a safe location.

All pressure equipment should be installed in a non-seismic area; should not be exposed to fire; and should be protected from thunderbolt (lightning) strikes.

1. Before installing trap, blow steam through equipment and piping to remove scale, pipe threading chips and other dirt.

Installation



WARNING

Personal injury or system damage may result if this steam trap is installed, without appropriate overpressure protection, where service conditions could exceed the limits given in the Specifications section and/or steam trap nameplate.

Note

Emerson Thermostatic Bellows Traps do not require change of body or cover for different pressures.

2. Check arrows on trap body or cover to ensure that flow direction is correct. See Figure 2 for recommended installation.

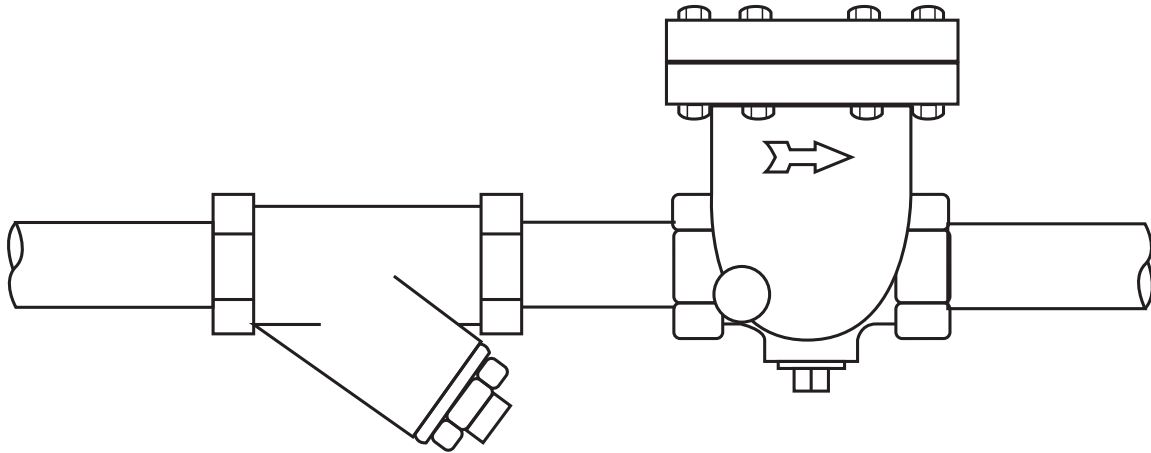


Figure 2. Recommended Piping Layouts

Installation Recommendations

1. Use a separate trap for each unit, coil, surface, chest, etc.
2. Include unions in inlet and outlet piping if trap will be removed from installed location for cleaning and maintenance.
3. For piping conditions in step 12, for siphon-drained equipment and for tilting jacketed kettle, specify traps with “steam lock release valves” (SLR).
4. Provide condensate-collecting pockets for traps draining steam mains, headers, risers and branches.
5. Ensure that return main is large enough to handle the condensate from all traps discharging into it, without causing excessive back pressure.
6. Always discharge high and low pressure traps into separate return mains.

Note

Do not insulate the trap or the piping and fittings between equipment outlet and trap inlet unless absolutely essential.
Do not use piping, nipples and fittings smaller than trap connection size.

7. If possible, do not install trap with a long horizontal run of piping between equipment outlet and trap inlet. If such a hook-up is necessary, specify traps with “steam lock release valves” (SLR).
8. Do not include a by-pass around trap unless equipment drained must be kept in operation while trap is being cleaned or serviced.
9. Do not jeopardize the advantage of a freeze-proof trap by lifting the condensate or by the use of horizontal piping from the trap outlet without considerable pitch in the direction of flow or by piping the trap in any way which will prevent fast gravity drainage when steam is turned off.

Maintenance



WARNING

To avoid personal injury, property damage or equipment damage caused by sudden release of pressure or explosion of accumulated gas, do not attempt any maintenance or disassembly without first isolating the steam trap from system pressure and relieving all internal pressure from the steam trap.

Steam traps that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts manufactured by Emerson should be used for repairing this steam trap.

Due to normal wear or damage that may occur from external sources, this steam trap should be inspected and maintained periodically. The frequency of inspection and replacement of parts depends upon the severity of service conditions or the requirement of local, state and federal rules and regulations.

Do not remove cover while the trap is very hot. Wait until steam pressure has dropped and trap can be comfortably touched with bare hand.



CAUTION

Never open a steam shut off valve rapidly. Condensate always collects at the upstream side of a closed, untrapped steam valve. Waterhammer, destructive to equipment, piping and traps, can be initiated by quick opening of such valves.

1. Adopt a reasonable "Preventive Maintenance" program to schedule all traps for internal inspection and cleaning.
2. Do not drop traps or spare bellows.
3. Do not use a Stillson or Monkey wrench to remove or replace bellows or tighten them excessively in trap cover.
4. Do not store, pile or carry bellows with tools and pipe fittings.
5. Most trap operating difficulties and failures are caused by circumstances which the trap cannot control. Some examples are pipe scale, dirt, water-hammer, corrosive condensate, improper installation and inaccessible location. Try to avoid or correct these detrimental conditions.
6. Ensure to regularly blow down and clean strainers and dirt pockets.

Testing

1. Periodically test the operation of all traps, which are piped so the discharge will not be observed. Use a three-way test valve for visual discharge. A stethoscope or ultrasonic device can be utilized for testing intermittent discharge types of traps. If test valves have not been installed, check temperatures of inlet and outlet piping close to the trap. Use a surface pyrometer or an infrared temperature device to detect temperature. Check for the following conditions:
 - a. If inlet piping is hotter than outlet piping, with temperature of latter rising and falling in sequence with trap discharge, trap is satisfactory.
 - b. If inlet piping is considerably cooler than known temperature of the steam supplied to equipment drained, trap is either not discharging or is too small for the application.
2. The recommended frequency of trap testing depends on the importance of each application and the operating conditions.

Table 1. Troubleshooting

WHEN THIS HAPPENS	HERE IS WHERE THE TROUBLE MAY BE	AND HERE IS WHAT TO DO
Trap not discharging - cool to touch	1. Condensate not reaching the trap: a. Pipe and fittings between equipment and trap plugged by dirt. b. Strainer clogged by dirt.	a. Remove the obstruction. b. Blow out or clean strainer.
	2. Condensate not passing through trap. a. Trap discharge orifice blocked by dirt. b. Pipe and/or fittings between trap and return man plugged by dirt.	a. Clean trap and install strainer. b. Remove obstruction.
	3. Valve, upstream or downstream, not open or failed in closed position.	Open or repair valve.
	4. Bellows has developed a leak or crack.	Replace the bellows. Check for corrosive condition and, if present, substitute bellows material.
Trap discharging condensate continuously - warm to touch	1. Trap, strainer or piping partially obstructed by dirt.	Remove the obstruction, blow down strainer and clean trap.
	2. Valve, upstream or downstream, not open wide.	Open valve wide.
	3. Trap too small for condensate load.	Add another trap in parallel or replace with larger trap
	4. Condensate load has increased since trap was installed. a. Boiler priming or foaming. b. Leak in submerged coil of equipment. c. Other traps have failed transferring condensate to overloaded trap.	a. Correct the boiler condition. b. Repair leak or replace coil/tube. c. Locate and repair/replace faulty traps.
Trap discharging live steam	1. Trap valve not closing tight a. Scale or dirt between valve and seat. b. Valve or seat or both, eroded and worn.	a. Clean trap and install strainer. b. Replace valve and seat with a matched set.
	2. Trap has been dropped - bellows misaligned so valve cannot seat.	Replace bellows and inspect trap for other damage.
	3. Mistaking open or leaking by-pass valve for trap leak.	Remove the by-pass if permissible, otherwise close or repair valve.
	4. Bellows damaged by waterhammer.	Replace bellows, eliminate cause of waterhammer.
Slow warm-up or temperature of equipment drained too low.	1. Steam pressure too low for temperature required by process. a. Pressure throttled by thermostatically controlled steam supply valve. b. Increased demand for steam throughout the plant. c. Steam piping too small for adequate supply.	a. Check for lowest throttled pressure and increase if feasible. b. Increase boiler capacity if possible. Shut down unneeded equipment. c. Increase steam pressure or replace piping with larger size.
	2. Pressure differential across trap too low. a. Steam pressure less than when trap was installed. b. Return line pressure higher than when the trap was installed.	a. Raise pressure to former level. b. Return main too small. Other traps discharging live steam into return main. Repair or replace faulty traps. Obstruction in return main or discharge piping.
	3. Short circuiting caused by group trapping.	See Installation Step 5.
	4. Trap steam-locked. a. Long horizontal piping between equipment and trap. b. Trap above drain outlet of equipment - no water seal at bottom of riser. c. Siphon-drained equipment - rotary dryers and tilting jacketed kettles.	a. See Installation Step 2. b. See Installation Step 13.
	5. Apparatus drained by siphon pipe.	Examine siphon for break or leak.

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Repair

1. Wait until trap is cool to the touch.
2. Remove cover - remove and discard old gasket.
3. Remove valve seat from body.
4. Examine bellows by:
 - a. Comparison to new bellows.
 - b. Immersing in cold and hot water to test bellows travel.
5. If bellows are not damaged, reassemble into cover; if damaged, replace. Leave threads of bellows dry, tighten into trap cover and be sure to not over torque.
6. Examine valve and valve seat
 - a. Clean with 80 to 150 grit emory. If no wear is present, the valve and seat can be reused; if damaged, replace. Use small amount of anti-seize compound on seat and valve threads. Valve and seat should be torqued for snug fit.
7. Insert new gasket.
8. Reassemble cover using small amount of anti-seize compound on cover threads if trap has screwed cover. If cover is bolted, use anti-seize compound on the bolts.
9. Seating of cover gasket may be checked by installing a pipe plug in outlet of trap and applying 80 psig / 5.52 barg air to inlet. Use soapy water or leak detection fluid. A slight seepage should be acceptable since air can pass through a small opening that steam will not.
10. If possible, test trap before returning it to service. Any pressure within trap range can be used; a simple drip leg will suffice. Valve in trap should close on steam. Leave trap on line long enough for trap to cycle once.

Key	Description	Part Number
2	Cover, Cast Iron Type B33 Type B43 Type B53 Type B63 Types B73, B83, B73HC and B83HC	WAL421145 WAL421146 WAL421147 WAL421147 WAL421148
3	Cover Gasket, Graphite Type B33 Type B43 Types B53 and B63 Types B73, B83, B73HC and B83HC	WAL0621161 WAL0621162 WAL0621163 WAL0621164
4	Pipe Plug Type B33 Type B43 Type B53 Type B63 Types B73 and B73HC Types B83 and B83HC	WAL0000194 WAL0001934 WAL0000196 WAL0001913 WAL0001950 WAL0001951
5	Screw Type B33, 6 required Type B43, 6 required Types B53 and B563 (8 required) Types B73, B83, B73HC and B83HC (8 required)	WAL0046424 WAL0046425 WAL0046426 WAL05-14649-00
6	Nut Type B33, 6 required Types B43, B53 and B563 (6 required) Types B73, B83, B73HC and B83HC (8 required)	WAL0004930 WAL0004931 WAL0004932
7	Bellows, Stainless Steel No SLR Option Types B33 Types B43, B53, B63, B73, B83, B73HC and B83HC With SLR Option Types B33 Types B43, B53, B63, B73, B83, B73HC and B83HC	WAL0015493 WAL0015498 WAL0015493 WAL0015498
8	Seat Ring Type B33 Type B43 Types B53 and B63 Types B73 and B83 Types B73HC and B83HC	WAL421187 WAL421189 WAL421191 WAL421193 WAL421269
9	Seat Gasket Type B33 Type B43 Types B53, B63, B73 and B83 Types B73HC and B83HC	WAL0055100 WAL0055101 WAL0055102 WAL0055104
10	Valve No SLR Option Type B33 Type B43 Types B53 and B63 Types B73 and B83 Types B73HC and B83HC With SLR Option Type B33 Type B43 Types B53 and B63 Types B73 and B83 Types B73HC and B83HC	WAL421179 WAL421180 WAL421181 WAL421182 WAL421250 WAL7SAN-421258 WAL7SAN-421259 WAL7SAN-421260 WAL7SAN-421261 WAL423543
11	Nameplate	-----
12	Drive Screw (2 required)	WAL05-04841-00

Parts Ordering

When corresponding with your local Sales Office about B Series, always reference the assembly number.

Parts List

Key	Description	Part Number
	Spare Parts Kit	See Table 2
1	Body, Cast Iron Type B33 Type B43 Type B53 Type B63 Type B73 Type B83 Type B73HC Type B83HC	WAL421123 WAL421124 WAL421125 WAL421126 WAL421127 WAL421128 WAL421221 WAL421222

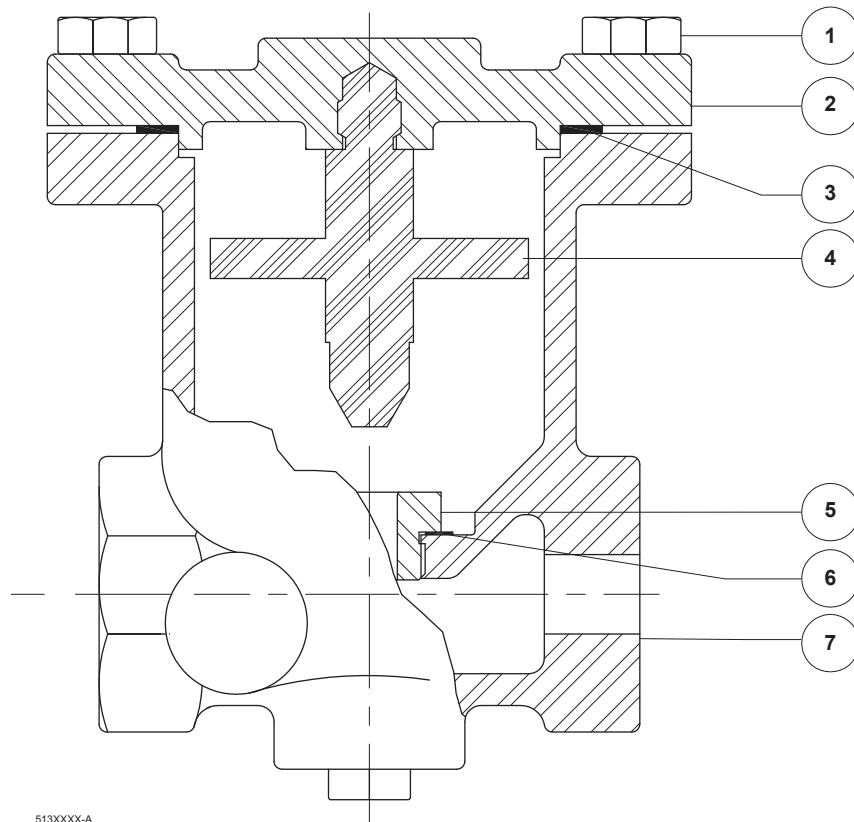


Figure 3. B Series Assembly Drawing

Table 2. B Series Spare Parts Kit

TYPE	SIZE, NPT	HIGH CAPACITY STEAM TRAPS THERMOSTATIC KITS ⁽¹⁾⁽²⁾ PART NUMBER	COVER GASKETS PART NUMBER
B33	1/2	WAL5723400	WAL0621161
B43	3/4	WAL5724600	WAL0621162
B53 and B63	1 to 1-1/4	WAL5726600	WAL0621163
B73 and B83	1-1/2 to 2	WAL5718600	WAL0621164

1. Kits include valve, seat ring, bellows and required gaskets.
2. With steam lock release (SLR) option.

B Series

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