CLEAN STEAM PRODUCTS

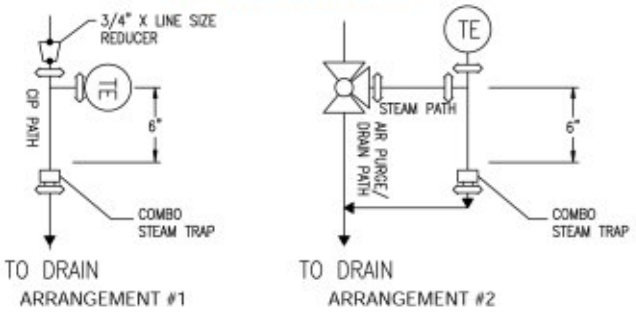
Steam-in-place sterilization (SIP) systems for vessels and associated piping are highly engineered systems. There are several different arrangements used by the Biotech Industry to purge air, heat-up the vessel and maintain a steam temperature of 121°C for a minimum of 15 minutes. Typically clean steam is introduced to the top of the vessel and exits through feed lines, vent lines and drain lines. Air, steam and condensate typically flow through a three-way valve (Piping Diagram) located at the remote end of each pipeline. During this heat up stage the peak condensate loads shown in the table below are encountered. When the vessel is heated to 95°C, the air is considered to be sufficiently purged and the three-way valve switches over to the Nicholson Model CME-A "CoMBo" Steam Trap. Once the temperature reaches the desired 121°C, tank heat losses are minimal and the steady condensate maintenance load shown in the table below are maintained.

PEAK CONDENSATE LOADS

Tank Volume (Liter)	Peak Condensate heat-up Load lb/hr (kg/hr)	Condensate Maintenance Load lb/hr (kg/hr)
40000	2500 (1134)	27 (12)
15000	1250 (567)	14 (6)
7200	400 (181)	7 (3)
3000	300 (136)	5 (2)
1500	200 (91)	3 (1.4)
600	100 (45)	2 (.9)
100	30 (14)	1 (.4)
20	15 (7)	0.5 (.2)

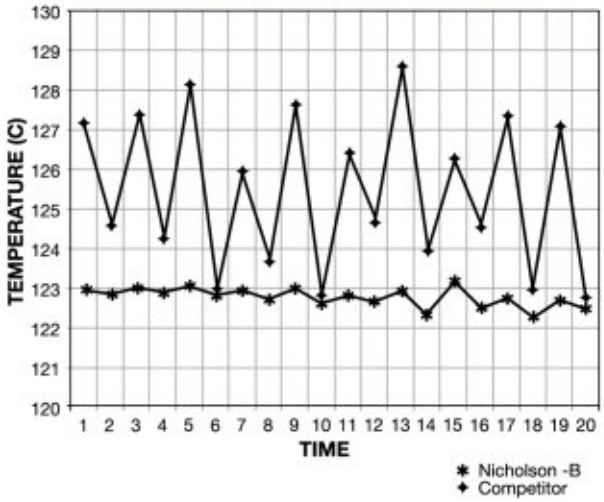
The high capacity of the CME-A makes it an excellent choice when a 3-way valve is not utilized. The Nicholson model CME-A can be used to pass Clean-In-Place Return (CIPR) as shown in the CME-A Piping Diagram. The Nicholson CME-A can pass 3608 #/Hr (1636 kg/hr) of 80°C condensate at 20 psi (1.4 bar) which exceeds the design peak condensate load of 2500#/Hr (1134 kg/hr) for all tank volumes shown above. The requirement to use multiple steam traps or a 3-way valve on the bottom of a sterilization tank depends on the time required to purge the air and condensate during the air purge cycle. The ball valve allows a faster purging of the condensate, but increases the sterilization time since it slows pressure build-up if steam is vented.

PIPING DIAGRAMS



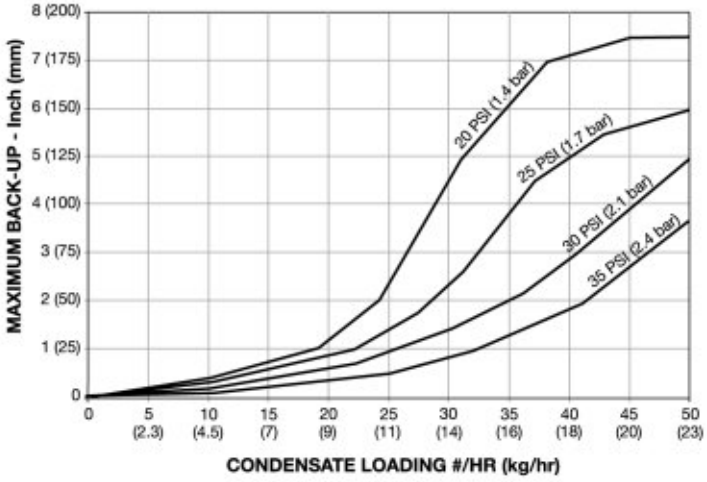
Thermostatic steam traps operate based on the difference in temperature of the condensate and the steam. The Nicholson Model CDS 204 steam trap, with the –B bellows is the most sensitive in the market 1˚C (2-3°F) sub-cool. This means that SIP system temperatures can be set lower and control limits are tighter as shown in the graph below. This lower temperature reduces rouging and extends the life of components.

CoMBo TEMPERATURE CONTROL



Extensive testing with the CME-A CoMBo has shown that the condensate backup varies with the steam pressure and condensate load as shown in the chart below. High sensitivity in combination with the industry's highest capacity, means a minimum condensate leg is required above the trap to achieve the required cooling. The CoMBo maintains condensate below the temperature thermocouple for loads ranging from 1 to 27 lb/hr (0.4-12 kg/hr) which are encountered during SIP maintenance of vessels ranging from 20 liters to 40,000 liters respectively.

CoMBo BACKUP TESTING



CDH SANITARY THERMOSTATIC STEAM TRAPS

Pressures To 100 PSIG (6.9 barg) Temperatures to 338°F (170°C)

Universally Configurable—Horizontal connections from any direction on standard model; AI and AO models feature one multi-directional horizontal and one vertical connection.

Steepest Interior Surfaces—Designed to completely drain without puddling, even in significantly sloped lines.

Stainless Steel Body—Body Material is 316L Stainless Steel with 20 µ in. (0.5 µm) Ra internal finish and 32 µ in. (0.75 µm) Ra external finish. Available with mechanical polishing to 10 µ in. (0.25 µm) Ra and/or electropolish.

Self centering Valve—Leak tight shut off. Assembly of actuator and valve to impingement plate allows the valve to self align with center of the orifice.

Temperature Sensitive Actuator—One moving part. 316L Stainless Steel, fail open, welded actuator for maximum corrosion, thermal and hydraulic shock resistance.

One Size Suits Most Services—Universal hygienic clamp fits both 1/2" and 3/4" piping.

Maintenance—Can be easily removed and disassembled for sterilization and/or repair.

Four Year Guarantee—Guaranteed for four years against defects in material or workmanship.

Inventory Standard Food Grade Gasket—White Viton food grade gasket offers superior performance for higher pressure steam applications.

Superior Air Handling—Best air handling capability provides for fast startup.

Unique SLR Orifice Option—Specify when immediate elimination of condensate and improved sensitivity is desired. An orifice on the valve allows for continuous discharge of condensate. Trap will nominally pass 50 lb/hr (22.7 kg/hr) of condensate at 50 psi (3.4 barg) within 0.5°C (1°F) of saturated temperature.

Bar Stock—Connectiion fittings are not welded onto inlet and outlet pieces.

Applications

- CIP/SIP System Condensate Drainage
- Sterilization of Process Vessels
- Culinary Steam
- Humidifiers
- WFI System Sterilization
- Fermenter Sterilization

Options

- MP - Mechanical Polish to 10 µ in. (0.25 µm) Ra
- EP - Electropolish
- SLR - SLR Orifice
- Tef-Steel, PTFE, Teflon®, E.P.D.M., and other gasket materials available

Applicable Codes

- ASME BPE

Canadian Registration # 0E0591.9C

Models

- **CDH-AI-AO**–Horizontal inlet and outlet
- **CDH-AI**–Horizontal inlet, vertical outlet
- **CDH-AO**–Vertical inlet, horizontal outlet

NOTE: Please specify if Material Test Reports (MTR) or Certificates of Conformance (COC) are required.

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 to discharge air, non-condensibles and condensate. 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 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.

CDH
SANITARY THERMOSTATIC STEAM TRAPS

Specification

Steam trap shall be of balanced pressure design with 316L welded bellows capable of releasing condensate within 5°C (10°F) of saturated pressure. All other interior wetted components shall be of 316L stainless. It shall have interior body finish of at least 20 µ in. (0.5 µm) Ra and exterior body finish of at least 32 µ in. (0.75 µm) Ra. Trap shall utilize hygienic body clamp allowing disassembly for inspection or cleaning and be entirely self draining in horizontal or angle piping configuration. Trap end connections shall be standard hygienic clamp. Thermostatic actuator shall employ a conical valve lapped to the seat. Traps shall have SLR orifice where drainage at saturated temperatures is required. Traps shall be guaranteed against defects for four years.

Maximum Operating Conditions

PMO: Max. Operating Pressure	100 psig (6.9 barg)
TMO: Max. Operating Temperature	338°F (170°C)
PMA: Max. Allowable Pressure	150 psig (10.3 barg)
TMA: Max. Allowable Temperature	366°F (186°C)

Materials of Construction

Part #	Part Name	Material
1	Body – Inlet	A276 316L
2	Clamp	304
3	Gasket	Viton 3227
4	Body – Outlet	A276 316L
5	Actuator Nut	316L
6	Impingement Plate	316L
7	Actuator	316L SS
8	Valve	316L

Connection

Sanitary Ferrule accommodates 1/2" and 3/4" service

Body Surface Finish:

Internal <20 µ in. (0.5 µm) Ra SFCI.External <32 µ in. (0.75 µm) Ra. Optional mechanical polishing to 10 µ in. (0.25 µm) Ra and/or electropolish SFC4

Gasket Approvals:

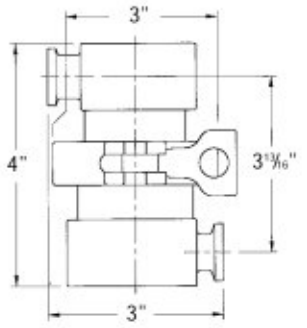
FDA, USDA, USP Class VI, 3A Sanitary Standard, NSF

SLR Orifice Option

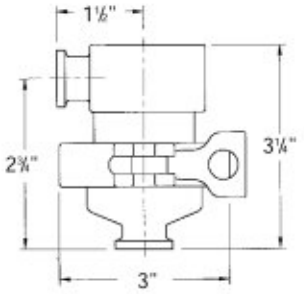
Specify when immediate elimination of condensate and improved sensitivity is desired. An orifice on the valve allows for continuous discharge of condensate. Trap will nominally pass 50 lb/hr (22.7 kg/hr) of condensate at 50 psi (3.4 barg) within 0.5°C (1°F) of saturated temperature.

Polishing Procedure

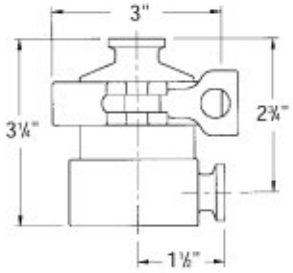
All surface finishes are achieved without the use of additional buffing, compounds or grit.



CDH-AI-AO – 3.9 LB.(1.8 kg)

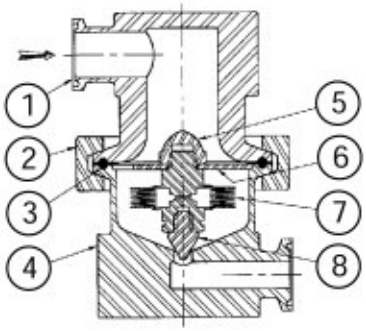


CDH-AI – 2.6 LB. (1.2 kg)



CDH-AO – 3.1 LB. (1.4 kg)

Connections:
1/2/3/4" Hygienic Clamp



U.S. PATENT NO. 6,220,519

Maximum Capacity—lbs/hr 10°F Below Saturation (Kg/hr 5°C Below Saturation

Trap	Orifice Inches	Differential PSIG (bar)										
		5 (0.34)	10 (0.7)	20 (1.4)	30 (2.1)	40 (2.8)	50 (3.4)	60 (4.2)	70 (4.9)	80 (5.6)	90 (6.2)	100 (6.9)
CDH	1/4	550 (249)	825 (374)	1210 (549)	1495 (678)	1750 (794)	1975 (896)	2175 (987)	2350 (1066)	2525 (1145)	2650 (1202)	2825 (1281)

For Kg/Hr Multiply by .454