

Mark 93 Series

Sanitary Steam Traps

The Mark 93 is a balanced port, thermostatic steam trap designed specifically for use in validated clean steam systems. The sanitary design follows ASME BPE guidelines including a 20Ra μ m finish on all internal wetted parts, self-draining design, and all relevant materials, marking and documentation guidelines.

The MK93 has been specifically designed to provide higher flow rates at low pressures and low subcooling levels. **In lab testing, the MK93 consistently exhibited excellent flow rates at subcooling levels of less than 3°F or less (<1,7°C).** Note: Low subcooling operation insures that condensate won't back up and wet (cool) the upstream validated temperature sensor.

There are two base designs within the MK93 product range: the standard MK93 – good for differential pressures (P1) up to 50 psi (3,4 bar), and the MK93 Option "P" for differential pressures ranging from 45 – 90 psi (3,1 – 6,2 bar). Both designs are rated to 90 psi (6,2 bar) operating pressure but are recommended for use within the specified inlet pressure ratings.

During start-up, the bellows element is contracted and fully open to discharge all non-condensable gas and condensate. The heat of entering steam causes the element to expand, closing the valve. As condensate accumulates in the body, the element cools, causing the bellows/stem tip to retract allowing condensate to drain.

Features

- Fill fluid meets FDA/ICH Q3C/FDA Class 3 criteria designation
- Low subcooling operation reduces probability of temperature validation faults and resultant SIP delays
- CRN Registration Number available
- Thermostatic steam trap in 316L stainless steel that is designed for clean steam tracing, drip-leg and process applications
- All 316L stainless steel housing and internals
- Polished components – body interior and exterior are mechanically polished to 20Ra and 40Ra finish respectively
- Sanitary clamp ends standard, other ends (tube weld, threaded, ISO/DIN) available upon request
- Self draining when installed vertically (outlet side down)

NOTE! Order code and horizontal connection dimension change April 2020 (See lay-in dimension changes on pages 5-15)



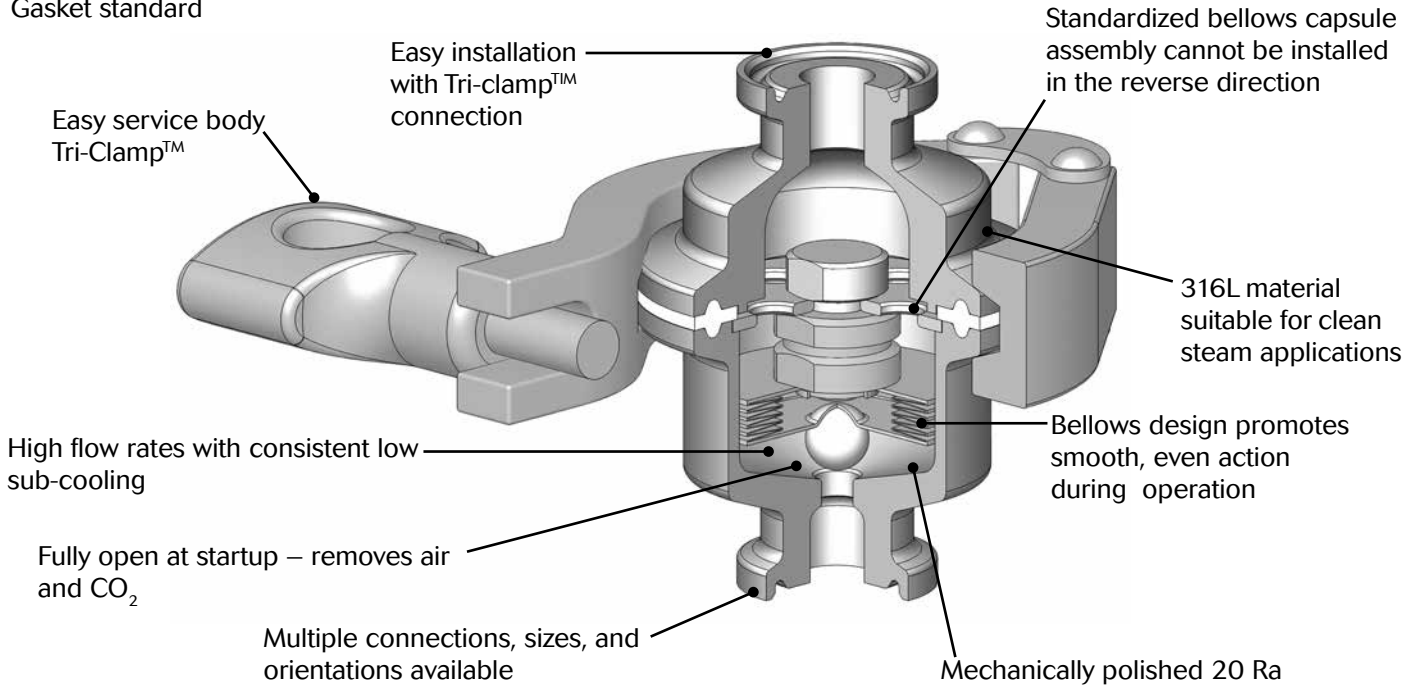
- New design provides excellent flow rates with low subcooling
- FDA and USP Class VI TFE-VIT gasket standard on clamped body, or FDA and USP Class VI o-ring on bolted option
- Option for electropolished body
- Warranties:
 - 5 year material and workmanship
 - 2 year low subcooling performance

Applications

- Typical applications are: sterilization drainage for fermenters, bioreactors, separation and filtration equipment, lyophilizers, autoclaves, process piping equipment and steam barriers
- Condensate drainage from process systems using clean steam – fermenters, bioreactors, SIP systems and sterilizers

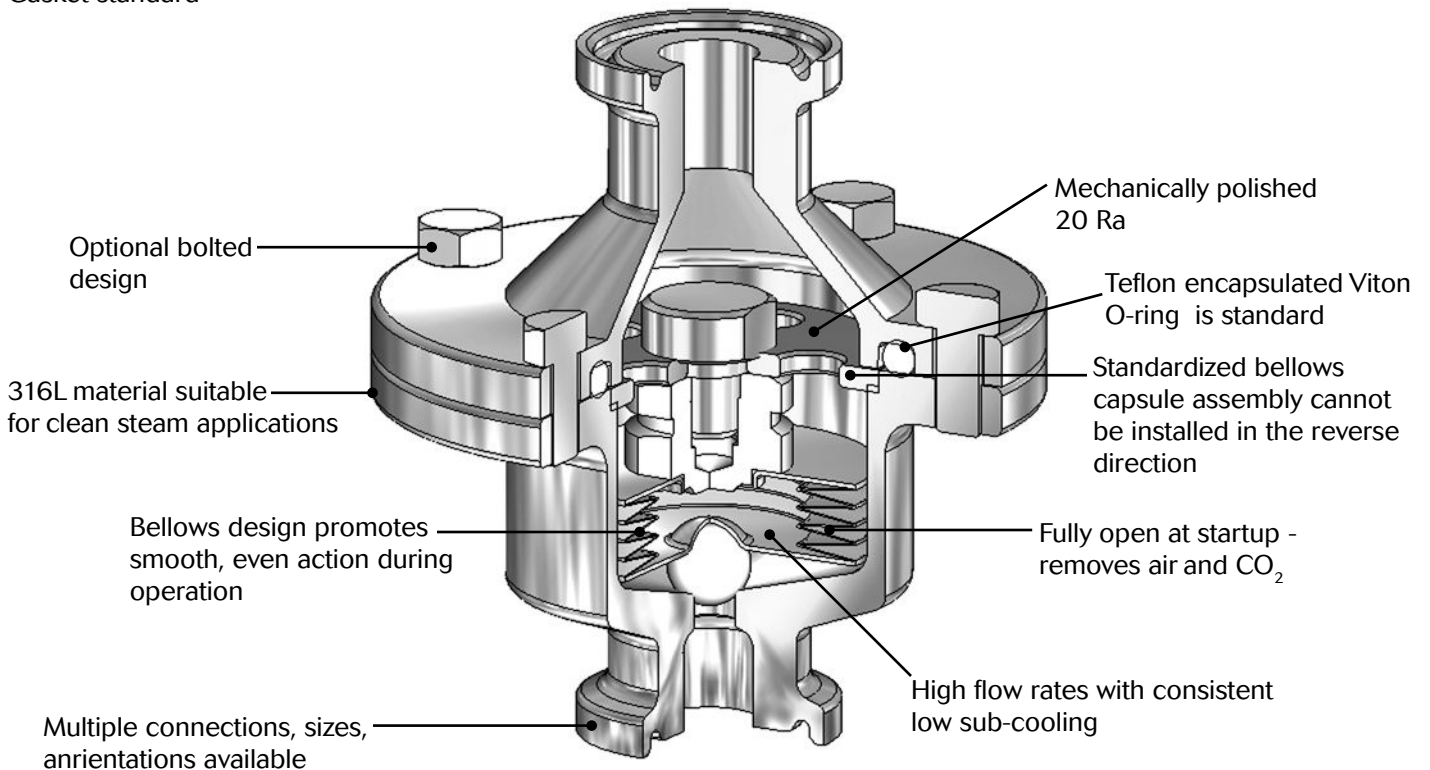
FEATURES & BENEFITS – MK93 WITH TRI-CLAMP ENDS

FDA, USP Class VI
Gasket standard



FEATURES & BENEFITS – MK93 WITH BOLTED BODY WITH TRI-CLAMP ENDS

FDA, USP Class VI
Gasket standard



SPECIFICATIONS

Sizes:

- 1/2", 3/4", 1", 1-1/2"
- DIN DN15, DIN DN20, DIN DN25, DIN DN40
- ISO DN15, ISO DN20, ISO DN25, ISO DN40

End Connections

- ASME, DIN/ISO Sanitary Tri-Clamp
- ASME/DIN/ISO Tube Ends

Material

- Body Inlet/Outlet: 316L Stainless Steel
- Thermal Element: 316L Stainless Steel
- Gaskets (Standard): PTFE/Viton - 350°F (177°C)
Optional: PTFE/EPDM - 300°F (149°C), Tuf-Steel - 350°F (177°C), Silverback - 350°F (177°C), PTFE - 350°F (177°C) All gaskets are FDA and USP Class VI compliant
- Tri-clamp: 304 SST

Cold Water Cv: 3.8

Design Pressure/Temperature Rating

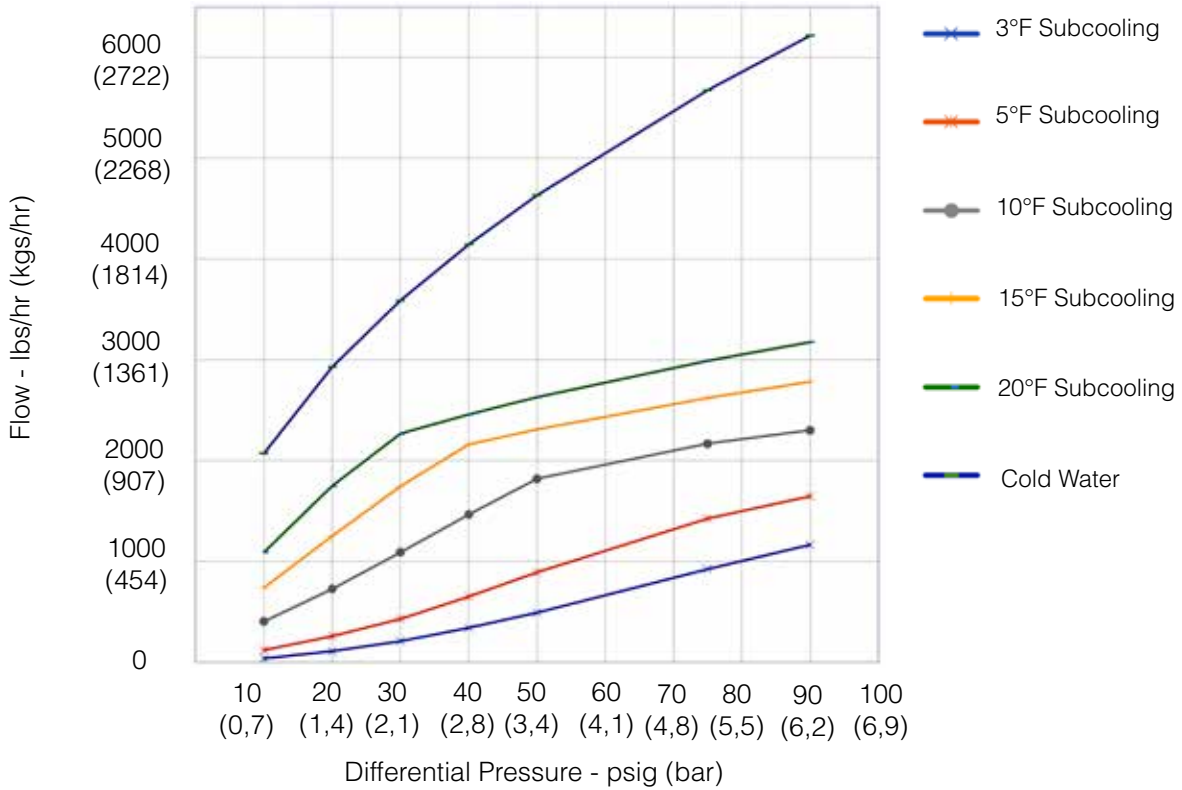
- Maximum Allowable Pressure (PMA): 145 psig (10,0 bar)
- Maximum Allowable Temperature (TMA): 350°F (177°C)

Maximum Recommended Differential Pressure

- MK93: 10 – 50 psi (0,7 – 3,4 bar)
- MK93 Option P: 45 – 90 psi (3,1 – 6,2 bar)

CRN Registration Number: OC12623.5

MARK 93 CAPACITY VS. DIFFERENTIAL PRESSURE - LBS/HR (KGS/HR)



Capacity @ DP and degrees subcooling:

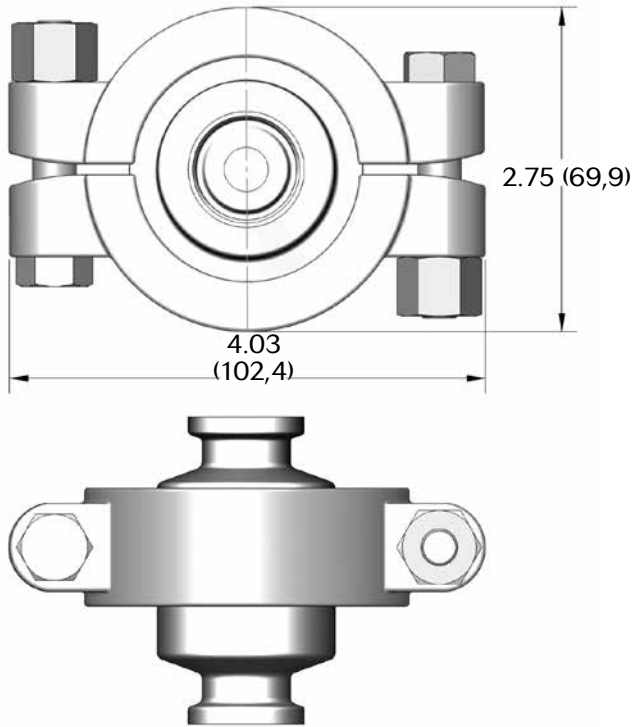
Diff. Pres. Psi	Diff. Pres. Bar	Sub-cool °F	Flow lb/hr	Flow Kgs/Hr
10	0,7	3	37.37	16,95
20	1,3	3	110.14	49,95
30	2,0	3	210.34	95,41
40	2,7	3	342.09	155,17
50	3,4	3	491.93	223,14
75	5,2	3	925.61	419,85
90	6,2	3	1165.23	528,54
10	0,7	5	122.11	55,39
20	1,3	5	259.07	117,51
30	2,0	5	431.33	195,65
40	2,7	5	650.20	294,93
50	3,4	5	893.07	405,01
75	5,2	5	1425.17	646,45
90	6,2	5	1647.50	747,29
10	0,7	10	405.86	184,10
20	1,3	10	727.90	330,17
30	2,0	10	1091.54	495,11
40	2,7	10	1465.67	664,82
50	3,4	10	1821.27	826,11
75	5,2	10	2169.49	984,10
90	6,2	10	2301.66	1044,02

Capacity @ DP and degrees subcooling:

Diff. Pres. Psi	Diff. Pres. Bar	Subcool °F	Flow lb/hr	Flow Kgs/Hr
10	0,7	15	739.76	335,55
20	1,3	15	1251.19	567,53
30	2,0	15	1746.36	792,14
40	2,7	15	2161.12	980,27
50	3,4	15	2309.29	1047,48
75	5,2	15	2623.53	1190,01
90	6,2	15	2784.86	1263,19
10	0,7	20	1091.71	495,20
20	1,3	20	1747.69	792,74
30	2,0	20	2268.00	1028,75
40	2,7	20	2459.61	1115,66
50	3,4	20	2629.82	1192,87
75	5,2	20	2991.12	1356,75
90	6,2	20	3176.75	1440,95
10	0,7	Cold Water	2071.83	939,77
20	1,3	Cold Water	2930.01	1329,03
30	2,0	Cold Water	3588.52	1627,73
40	2,7	Cold Water	4143.66	1879,53
50	3,4	Cold Water	4632.76	2101,38
75	5,2	Cold Water	5673.94	2573,66
90	6,2	Cold Water	6215.50	2819,30

DIMENSIONS - VERTICAL CONNECTIONS

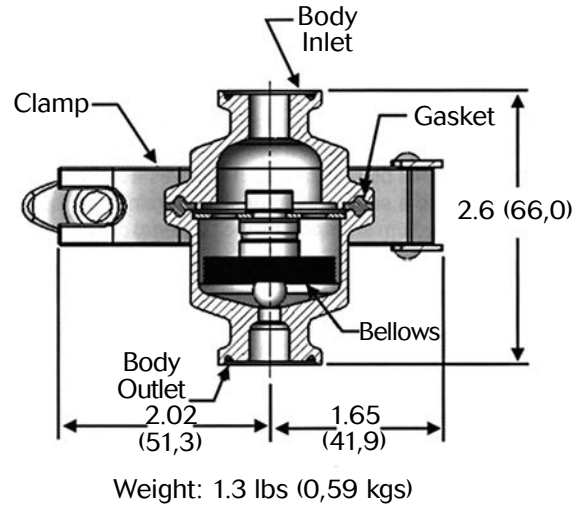
Bolted Tri-Clamp (1/2", 3/4", DN15, DN20)



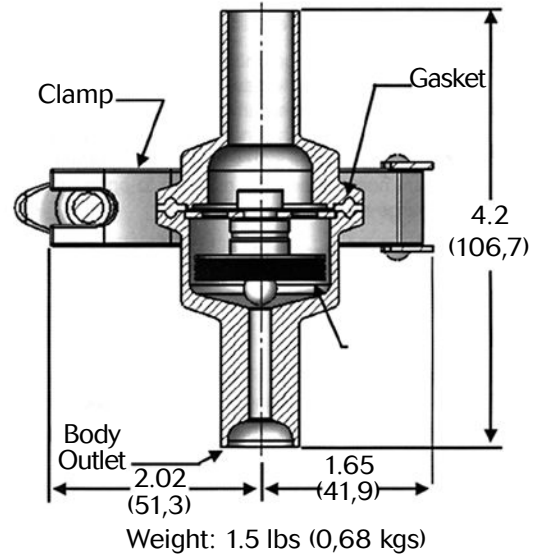
Weight: 1.4 lbs (0,64 kgs)

DIMENSIONS - VERTICAL CONNECTIONS

Tri-Clamp Ends (1/2", 3/4", DN15, DN20)

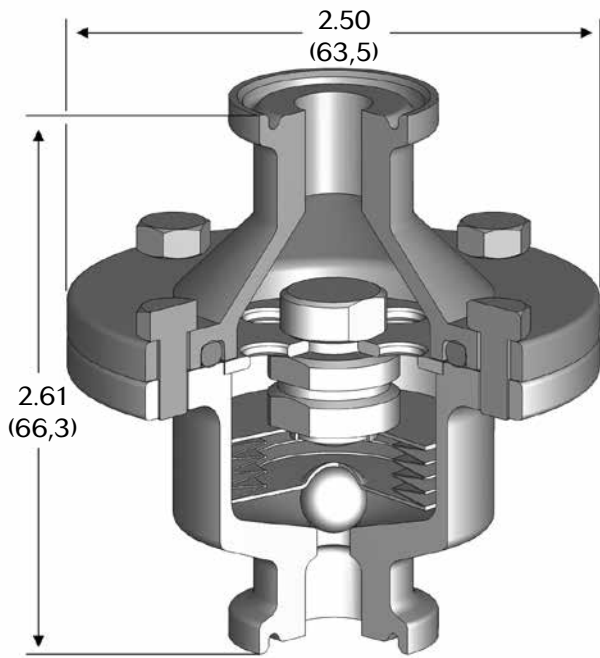


Tube Weld Ends (1/2", 3/4", DN15, DN20)



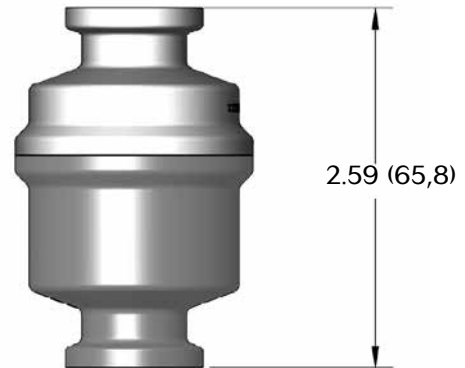
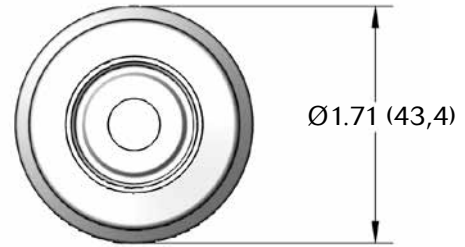
DIMENSIONS - VERTICAL CONNECTIONS

Bolted Body (93B) (1/2", 3/4", DN15, DN20)



Weight: 1.2 lbs (0,55 kgs)

Welded Joint (93W) (1/2", 3/4", DN15, DN20)

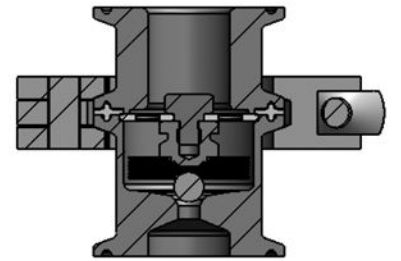
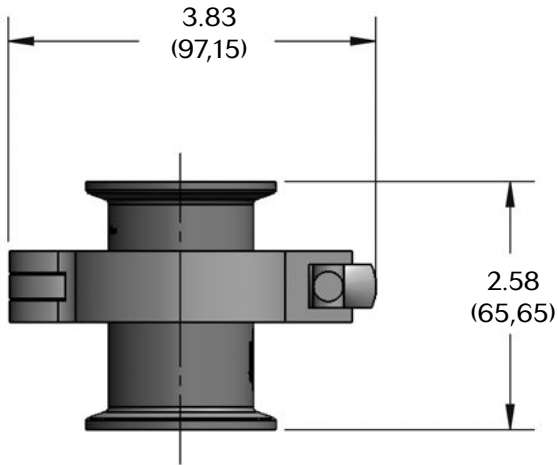
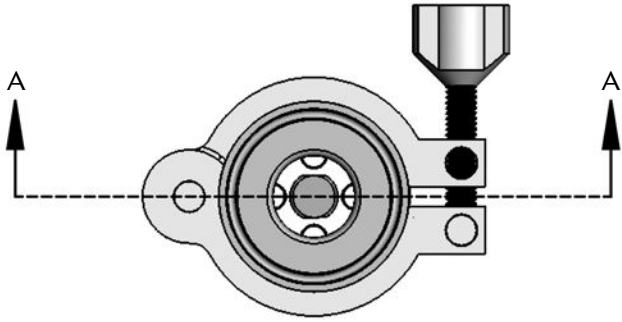


Weight: 1.0 lbs (0,45 kgs)

MK93 SANITARY STEAM TRAPS

DIMENSIONS - VERTICAL CONNECTIONS

MK93C 1", DN25 Series

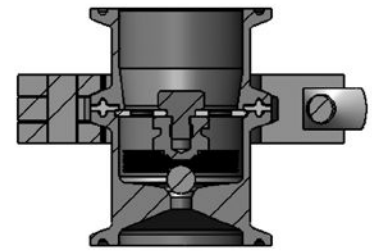
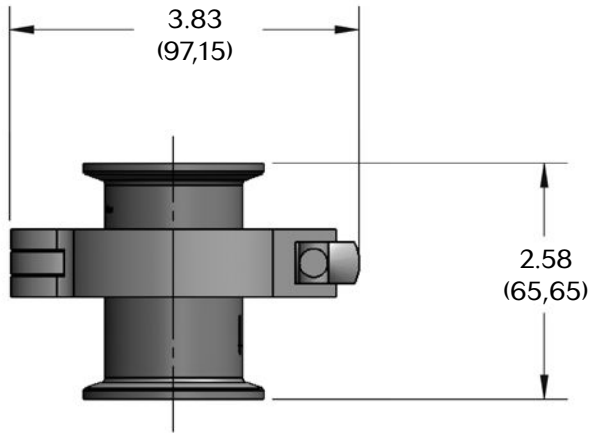
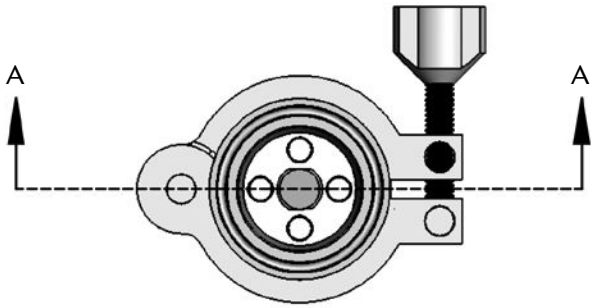


Section A-A

MK93 SANITARY STEAM TRAPS

DIMENSIONS - VERTICAL CONNECTIONS

MK93C 1-1/2", DN40 Series

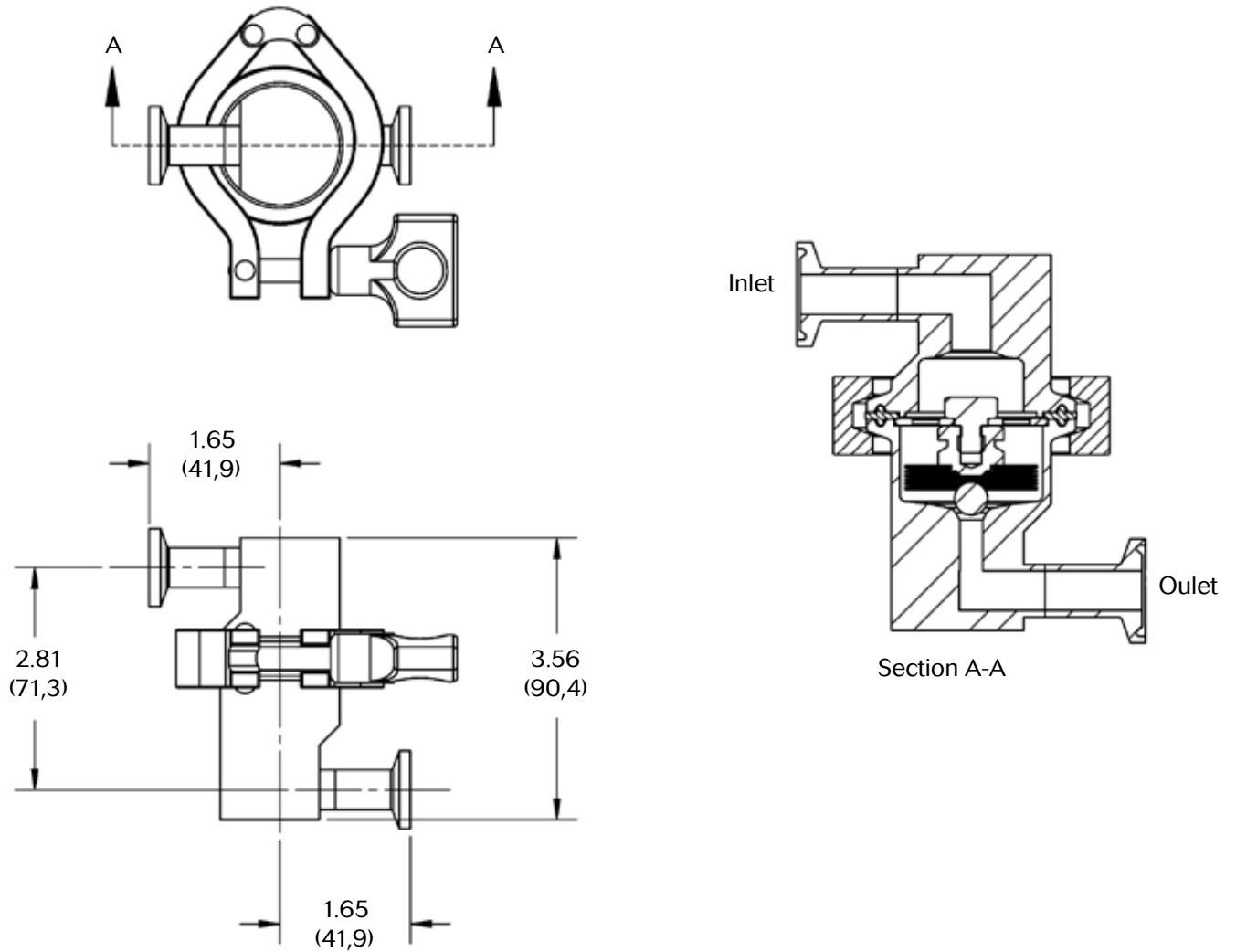


Section A-A

MK93 SANITARY STEAM TRAPS

DIMENSIONS - HORIZONTAL CONNECTIONS

*1/2", DN15 Horizontal Inlet/Outlet (93HHC, 93HHK)**

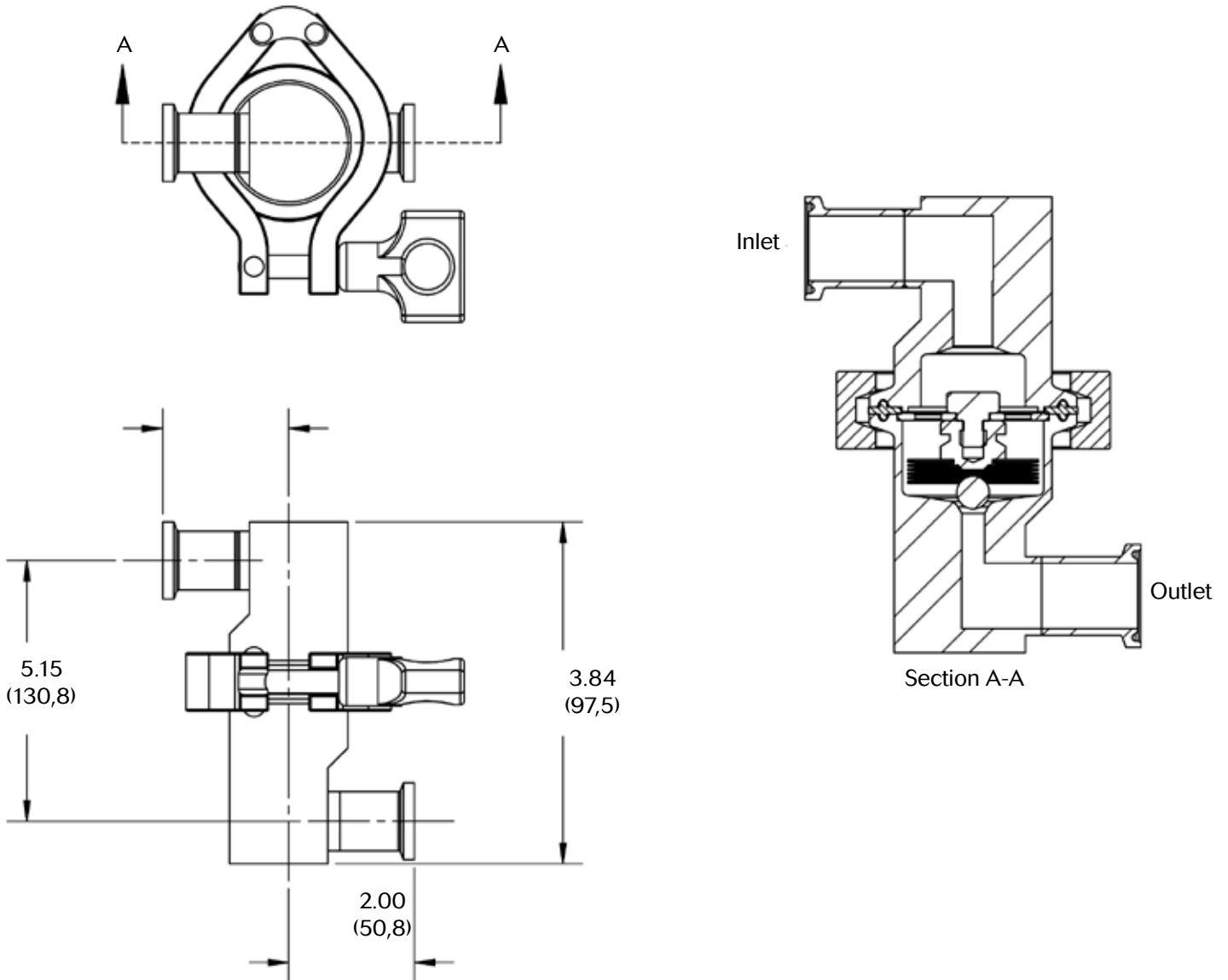


*** Note: Model Code and Installation lay-in dimension were changed on this model in April 2020.**

MK93 SANITARY STEAM TRAPS

DIMENSIONS - HORIZONTAL CONNECTIONS

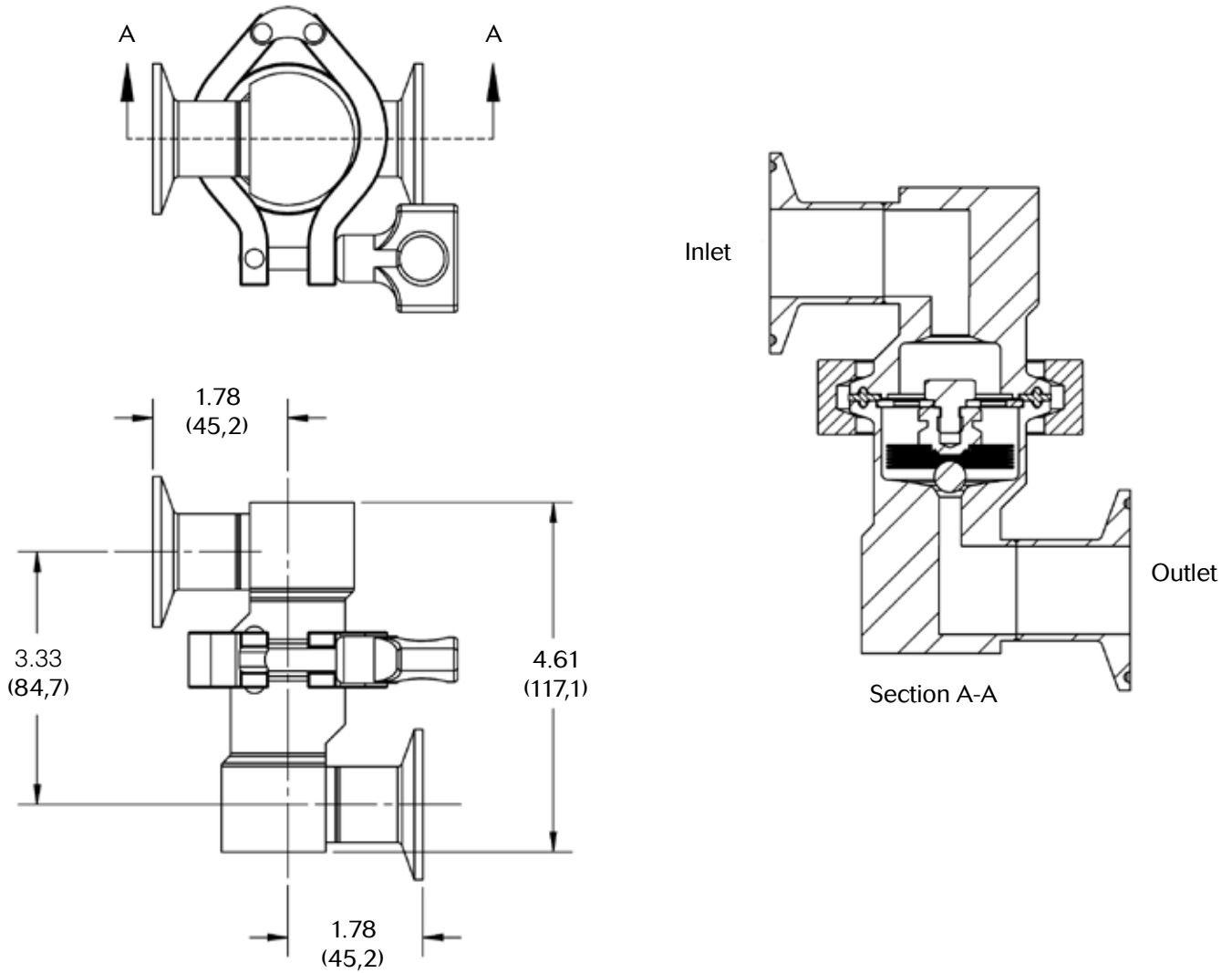
*3/4", DN20 Horizontal Inlet/Outlet (93HHC, 93HHK)**



*** Note: Model Code and Installation lay-in dimension were changed on this model in April 2020.**

DIMENSIONS - HORIZONTAL CONNECTIONS

*1", DN25 Horizontal Inlet/Outlet (93HHC, 93HHK)**

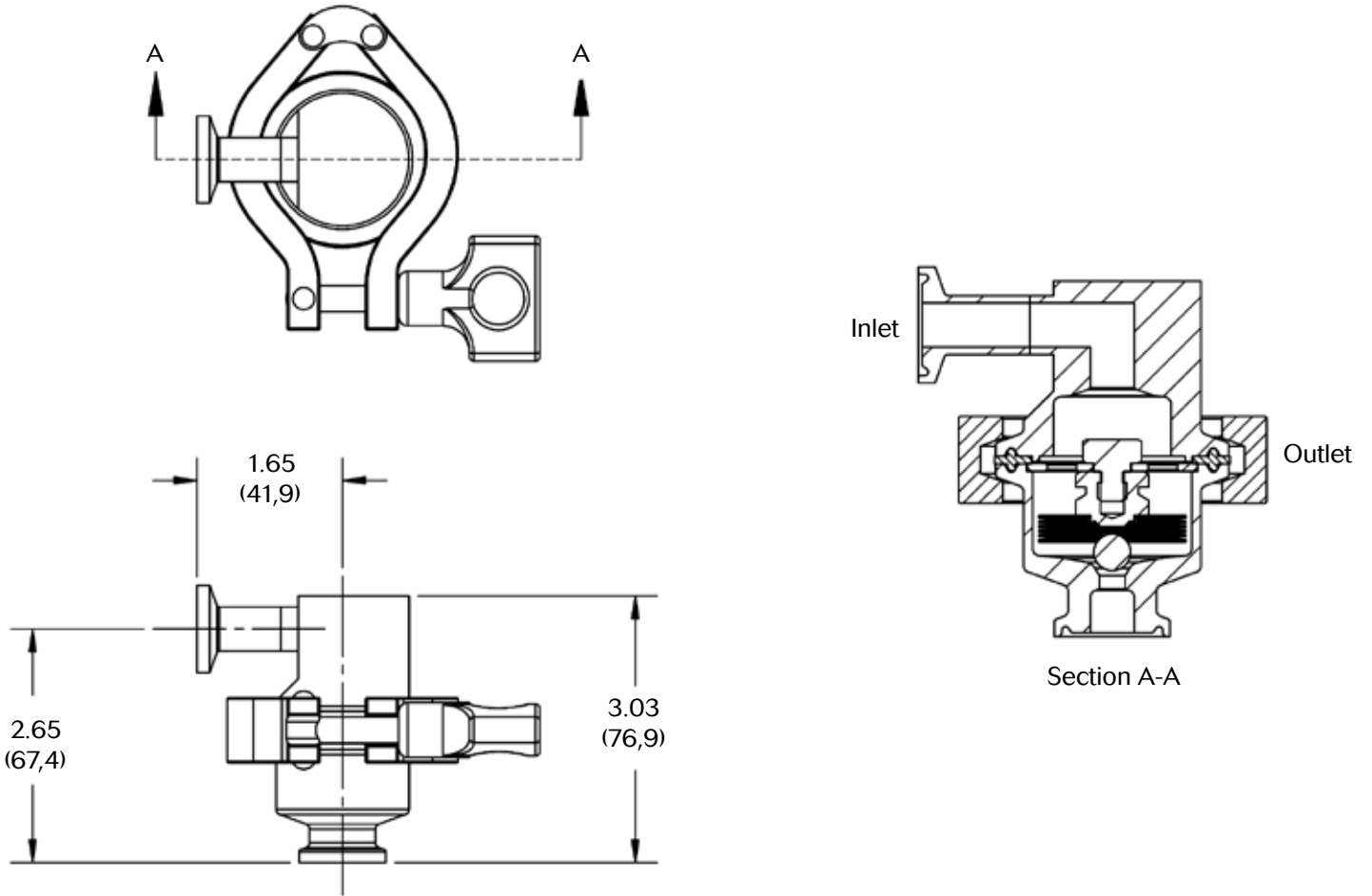


*** Note: Model Code and Installation lay-in dimension were changed on this model in April 2020.**

MK93 SANITARY STEAM TRAPS

DIMENSIONS - HORIZONTAL CONNECTIONS

*1/2", DN15 Horizontal Inlet/Vertical Outlet (93HVC, 93HVK)**

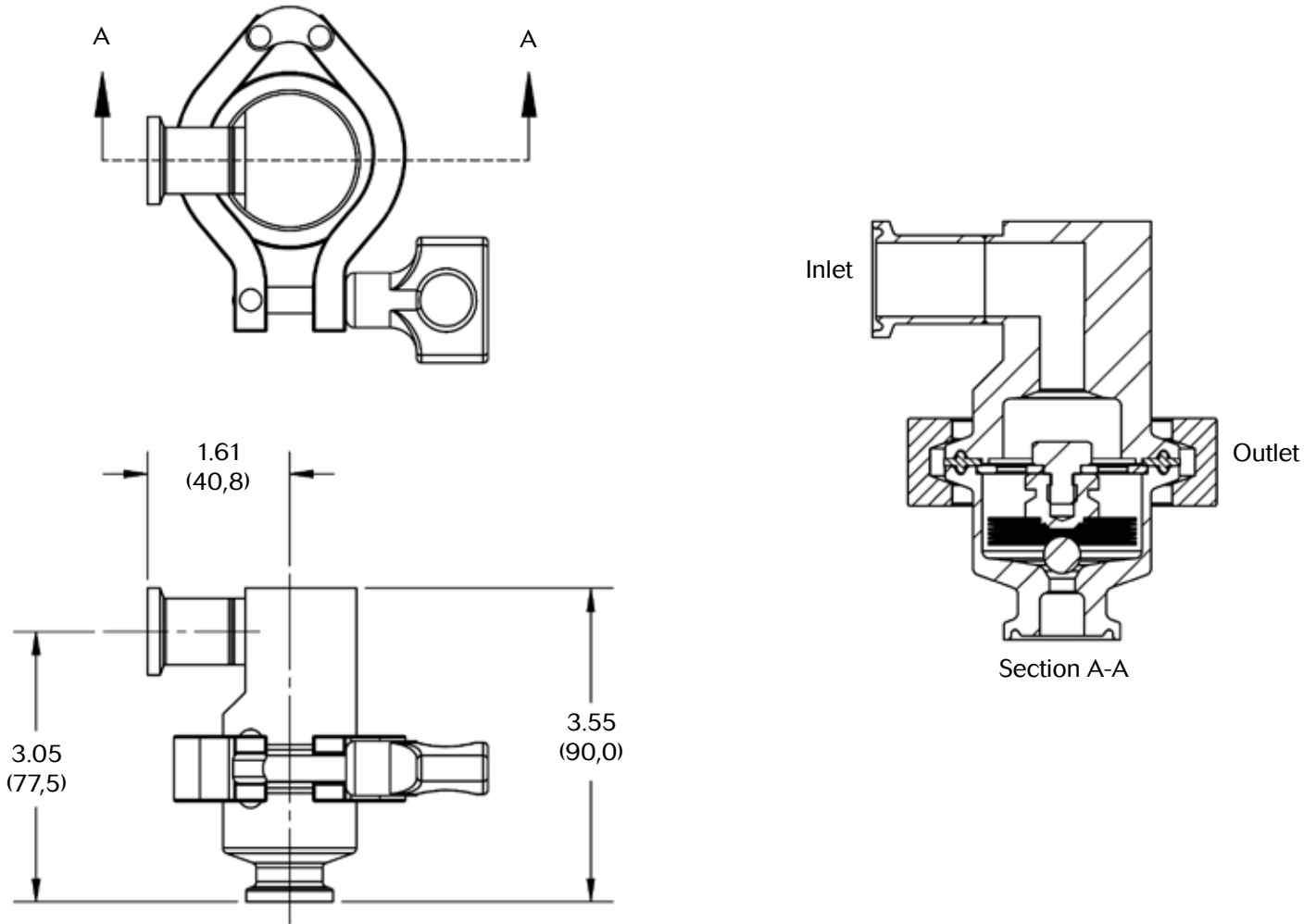


*** Note: Model Code and Installation lay-in dimension were changed on this model in April 2020.**

MK93 SANITARY STEAM TRAPS

DIMENSIONS - HORIZONTAL CONNECTIONS

*3/4", DN20 Horizontal Inlet/Vertical Outlet (93HVC, 93HVK)**

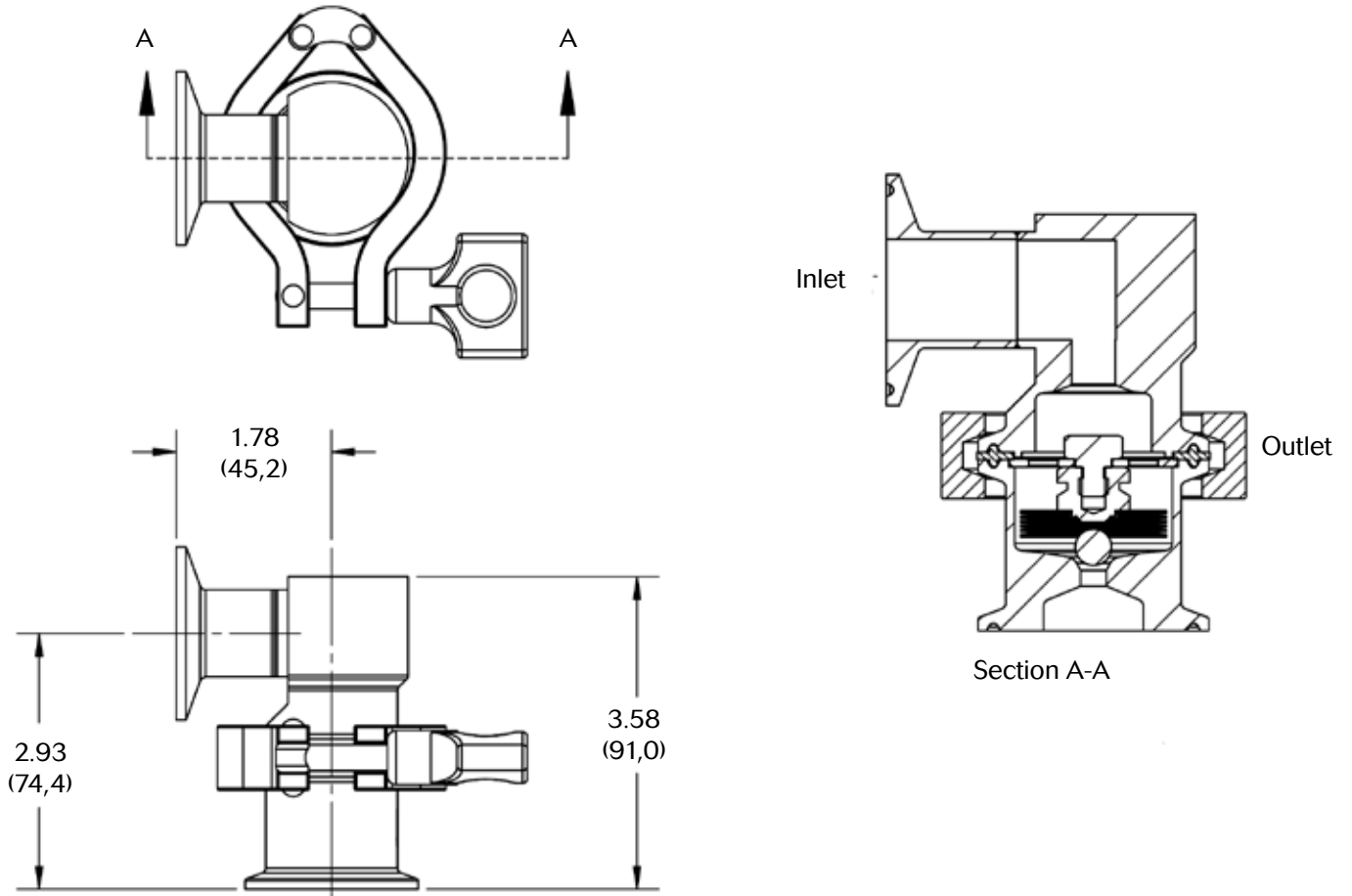


*** Note: Model Code and Installation lay-in dimension were changed on this model in April 2020.**

MK93 SANITARY STEAM TRAPS

DIMENSIONS - HORIZONTAL CONNECTIONS

*1", DN25 Horizontal Inlet/Vertical Outlet (93HVC, 93HVK)**

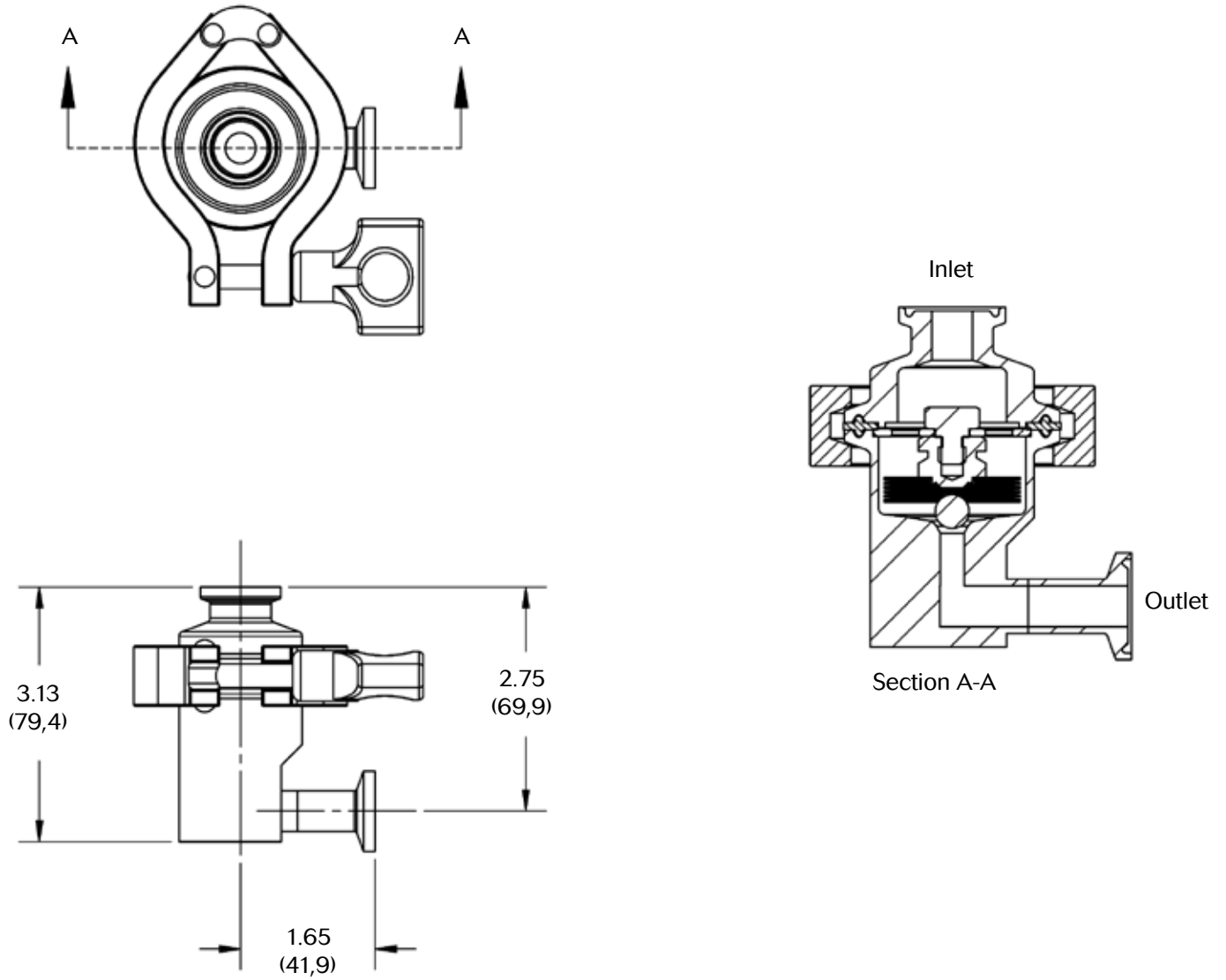


*** Note: Model Code and Installation lay-in dimension were changed on this model in April 2020.**

MK93 SANITARY STEAM TRAPS

DIMENSIONS - HORIZONTAL CONNECTIONS

*1/2", DN15 Vertical Inlet/Horizontal Outlet (93VHC, 93VHK)**

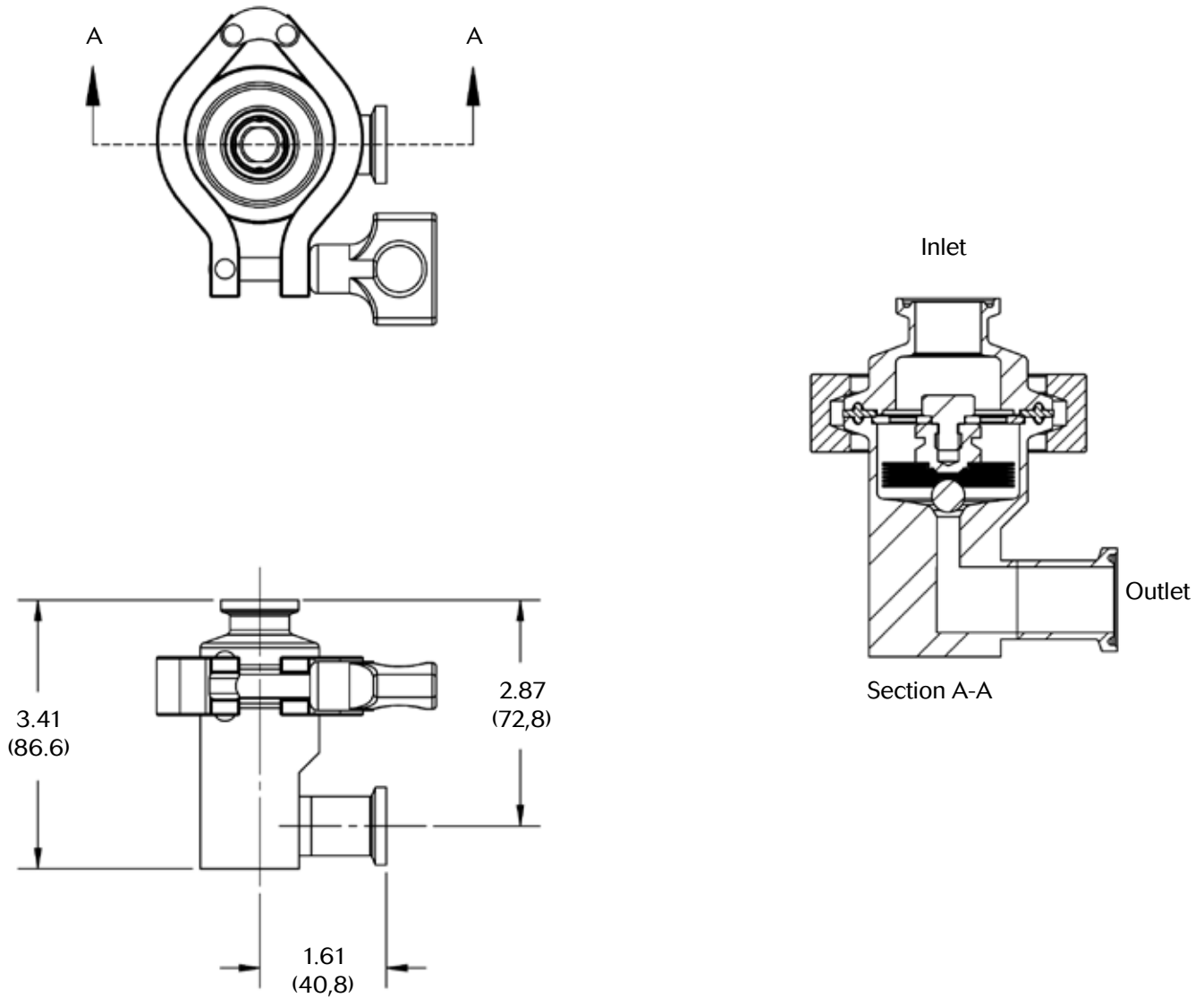


*** Note: Model Code and Installation lay-in dimension were changed on this model in April 2020.**

MK93 SANITARY STEAM TRAPS

DIMENSIONS - HORIZONTAL CONNECTIONS

*3/4", DN20 Vertical Inlet/Horizontal Outlet (93VHC, 93VHK)**

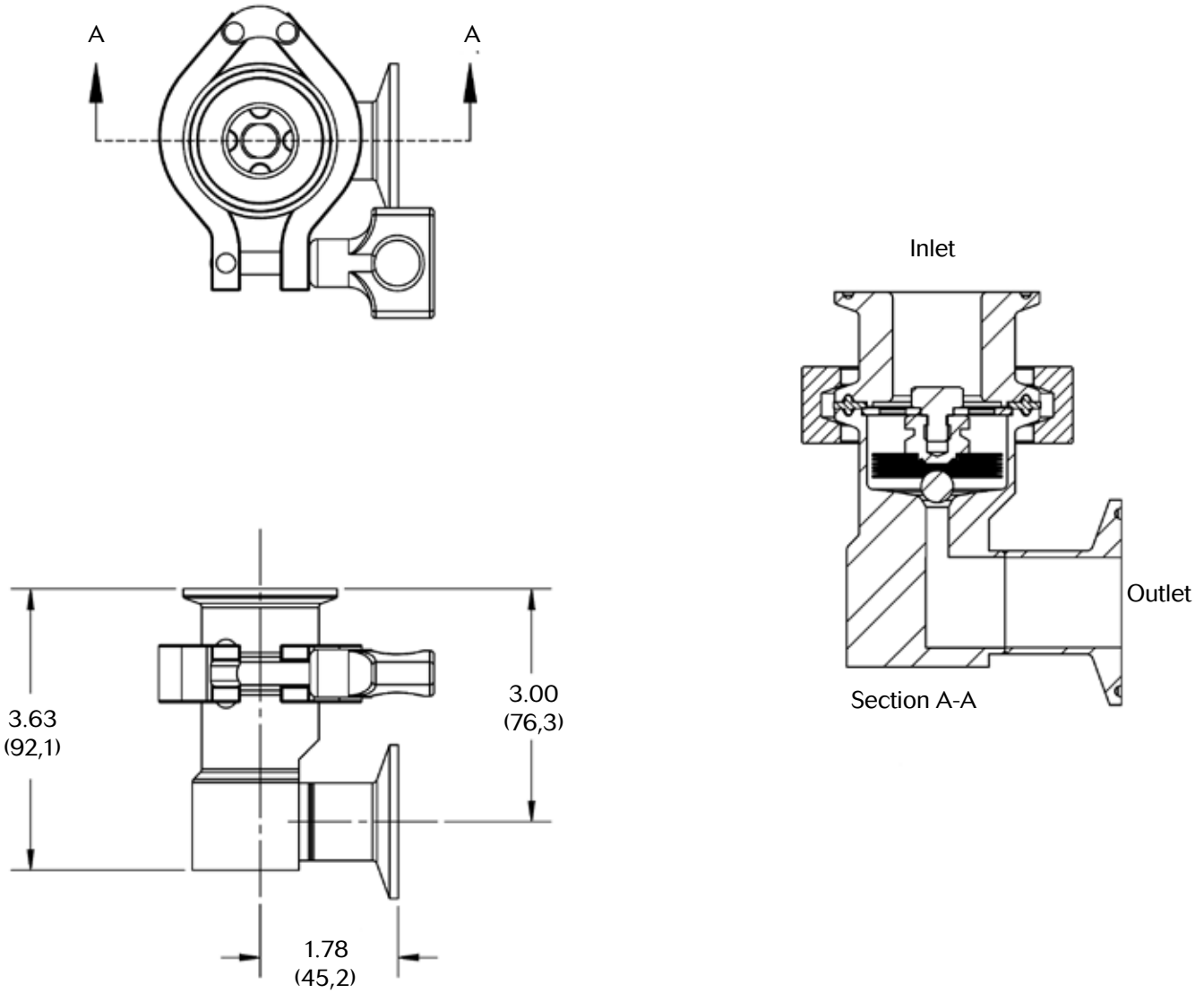


*** Note: Model Code and Installation lay-in dimension were changed on this model in April 2020.**

MK93 SANITARY STEAM TRAPS

DIMENSIONS - HORIZONTAL CONNECTIONS

*1", DN25 Vertical Inlet/Horizontal Outlet (93VHC, 93VHK)**



*** Note: Model Code and Installation lay-in dimension were changed on this model in April 2020.**

ORDERING SCHEMATIC

NOTE: If reordering a MK93 with horizontal connections to replace a previous purchase, or ordering an identical model for a new process, PLEASE NOTE THAT THE THE ORDER CODES AND LAY-IN DIMENSIONS CHANGED IN 2014 and 2020. If you have questions about a replacement trap, please provide the original serial number when reordering.

Model	Body	–	Size	–	End Connections	–	Special Options
93	C		050		C		P

1	Model/Body Joint
93C	Tri-Clamp Body/ Wingnut Clamp/ Vertical In/Out
93B	Bolted Body/ Vertical In/Out
93K	Tri-Clamp Body/ Bolted Clamp
93W	Compact, Welded Body/ Vertical In/Out
93HHC	Tri-Clamp Body/ Wingnut Clamp/ Horizontal In/Out
93HVC	Tri-Clamp Body/ Wingnut Clamp/ Horizontal In/ Vertical Out
93VHC	Tri-Clamp Body/ Wingnut Clamp/ Vertical In/ Horizontal Out
93HHK	Tri-Clamp Body/ Bolted Clamp/ Horizontal In/Out
93HVK	Tri-Clamp Body/ Bolted Clamp/ Horizontal In/ Vertical Out
93VHK	Tri-Clamp Body/ Bolted Clamp/ Vertical In/ Horizontal Out

2	Size	
050	1/2"	DN15
075	3/4"	DN20
100*	1"	DN25
150*	1-1/2"	DN40

* Note: 1" and 1-1/2" (DN25, DN50) tubing size is generally used in higher condensate load applications. Make sure you check the capacity chart on page 3 to ensure the MK93 can handle your condensate load. If not, the MK94 or MK934 may be a more appropriate model choice.

3	End Connections	
Inlet	Outlet	
C	Inch Tri-Clamp	
S*	ISO Tri-Clamp	
D****	DIN Tri-Clamp	
N	NPT Threaded Vertical Inlet/Outlet	
B	BSPT Threaded Vertical Inlet/Outlet	
T	Inch Tube	
M**	DIN Tube	
P***	ISO Tube	

* According to DIN 32676 Row B

** According to DIN 1186, DIN 11850 Row A

*** According to ISO DIN 1186 line B, ISO 1127

**** According to DIN 32676 Row A

4	Options
B	20 Ra Ext. - Body Only
E	TFE/EPDM, FDA USP Class VI
G	Tuf-Steel, TFE/SST Body Gasket, FDA USP Class VI
S	Silverback Gasket TFE/SST Body Gasket, USP Class VI
P ¹	High Pressure Bellows
L	Electropolish MK93C or K Body
R	Electropolish, MK93B Bolted Body
F7*	TFE/Viton FDA, USP Class VI @ 250°F (121°C)
TF*	PTFE, USP Class VI @ 250°F (121°C)

1 For applications with inlet pressure > 45 psi (3 bar)

* Document Part #25384 required when ordering

Note: if no gasket is specifically requested, a TFE/Viton gasket is provided. You can combine up to 2 options in alphabetical order.

For example: 93C-075-C-LS = MK93C with 3/4" Tri-Clamp Body, wingnut clamp, vertical inlet and outlet with Electropolish body and Silverback gasket