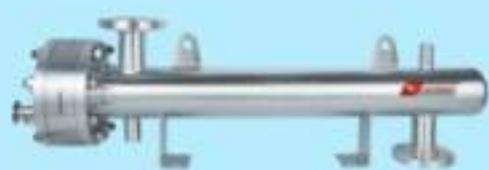


## KingLai BioClean Heat Exchanger

Protecting Product Integrity in Every Thermal Exchange.

## Tubular Heat Exchanger





①



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③



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⑤

- ① Double Tubesheet (DTS) Heat Exchanger
- ② FB Heat Exchanger
- ③ PoU Point-of-Use Heat Exchanger
- ④ mini Heat Exchanger
- ⑤ Umini Heat Exchanger

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- P06 FB Heat Exchanger
- P14 PoU Point-of-Use Heat Exchanger
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- P19 Umini Heat Exchanger

# Double Tubesheet (DTS) Heat Exchanger

## Application

KingLai BioClean DTS Heat Exchangers are widely used in pharmaceutical water systems, such as Water for Injection (WFI), Purified Water (PW), and for heating or cooling other pharmaceutical products.

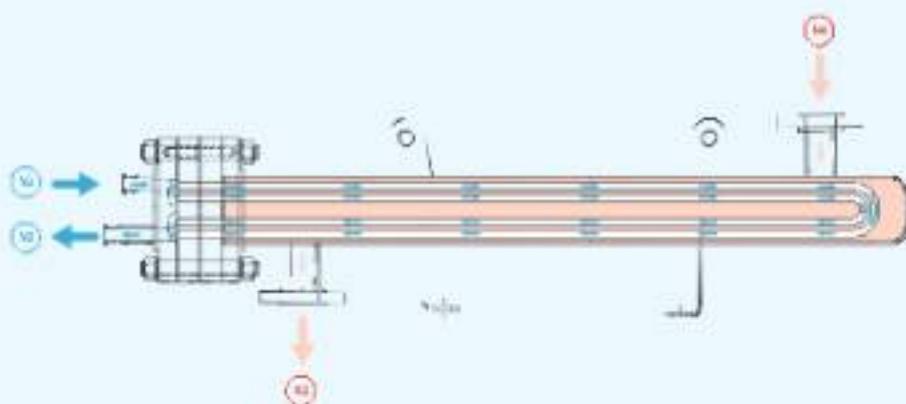
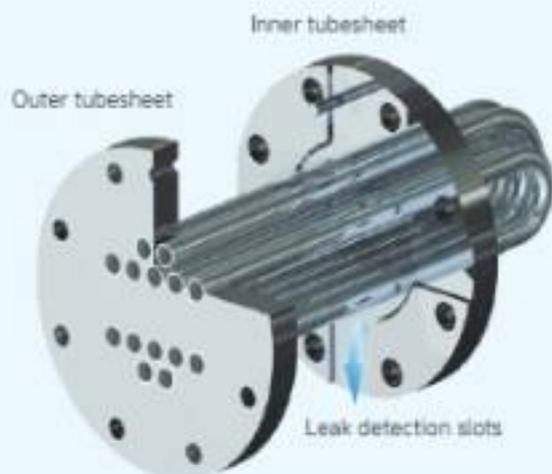


## Working Principle

The DTS Series Heat Exchanger is meticulously engineered to meet the stringent requirements of ASME BPE, USP, and cGMP standards, ensuring uncompromising quality and safety for pharmaceutical applications.

Featuring a double-tube sheet design, the DTS series effectively eliminates the risk of cross-contamination between the product and the heating or cooling medium. The outer tube sheet is in direct contact with the process fluid, while the inner tube sheet interfaces with the thermal medium. In the rare event of a leak, any fluid escapes through the gap between the two tube sheets, allowing for immediate detection and preventing contamination of the product stream.

This intelligent design not only enhances operational safety but also simplifies maintenance and compliance, making the DTS series an ideal choice for critical pharmaceutical water systems such as Water for Injection (WFI), Purified Water (PW), and other temperature-sensitive processes.



## Design Features

### • Safety & Hygiene

Double-tube sheet design

Prevents cross-contamination between product and thermal medium.

Zero dead-leg design

Ensures complete drainage in both horizontal and vertical installations.

SIP (Sterilization in Place) compliant

Meets stringent pharmaceutical sterilization requirements.

### • Precision Engineering

Orbital automatic welding

Guarantees consistent weld quality between tubes and tube sheets.

Advanced hydraulic expansion

Protects tube inner surfaces from scratches and deformation.

U-bend forming technology

Prevents cracks and orange peel defects; meets ASME BPE R-radius standards.

High-precision machining

Ensures tight sealing between tube sheets and headers.

### • Efficiency & Sustainability

Professional thermal design software

Maximizes heat transfer efficiency and promotes energy savings.

Uniform heating

Delivers consistent thermal performance across the system.

### • Rigorous Quality Control

Comprehensive testing procedures, including:

→ Hydrostatic pressure test

→ Dye penetrant test

→ Radiographic (X-ray) inspection

→ Surface roughness measurement

→ Drainability test

→ Endoscopic inspection of tube interiors

## Technical Specifications

**Metal:** 316L (wetted parts), 304 (others)

**Non-metal:** EPDM or VITON O-rings (FDA 21CFR177, USP Class VI)

**Pressure:** -1-10Bar

**Temperature:** -10-200°C

**Tube type:** Seamless or welded

**Standards:** GB, ASME VIII, PED, TSG

**Surface Finishing:**

Tube inner: SF1 (Ra ≤ 0.51 μm), SF4 (Ra ≤ 0.38 μm)

Outer surface: Sandblasted or brushed

**Welding:** SS-EN-ISO 15614-1, EN 287-1, EN 1418, ASME IX

**Insulation:** Rock wool or aluminum silicate (shell-side)

## Flexible Installation

The DTS heat exchanger is designed for versatile installation.

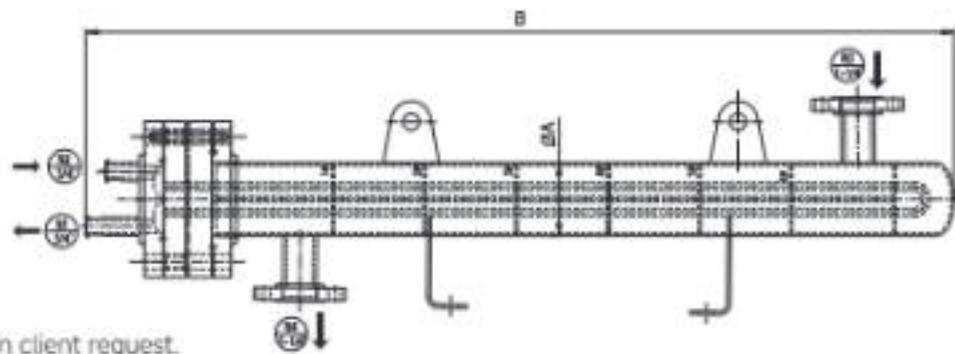
Its mobile support frame allows flexible positioning to suit various site layouts.

Depending on specific operating conditions, the unit can be installed in four orientations: 0° , 90° , 180° , and 270° .

Additionally, the lifting rings integrated into the exchanger design make the installation process safe and convenient.



Specifications



Note: Customization available upon client request.

Model	Passes	Shell Side Spec (µA)	Heat Exchanger Tube Diameter	Heat Exchange Area	Total Length (B)
DTS-2-1-1-0.2	2	73.00	9.53	0.20	1000.00
DTS-2-2-1-0.46	2	88.90	9.53	0.46	1000.00
DTS-2-3-1-0.81	2	114.30	9.53	0.81	1000.00
DTS-2-3-2-0.61	2		12.70	0.61	1000.00
DTS-2-4-1-1.53	2		9.53	1.53	1000.00
DTS-2-4-2-1.22	2	141.30	12.70	1.22	1000.00
DTS-2-5-1-2.29	2		9.53	2.29	1000.00
DTS-2-5-2-1.90	2	168.30	12.70	1.90	1000.00
DTS-2-1-1-0.4	2	73.00	9.53	0.40	1500.00
DTS-2-2-1-0.73	2	88.90	9.53	0.73	1500.00
DTS-2-3-1-1.29	2	114.30	9.53	1.29	1500.00
DTS-2-3-2-0.97	2		12.70	0.97	1500.00
DTS-2-4-1-2.43	2		9.53	2.43	1500.00
DTS-2-4-2-1.94	2	141.30	12.70	1.94	1500.00
DTS-2-5-1-3.64	2		9.53	3.64	1500.00
DTS-2-5-2-3.02	2	168.30	12.70	3.02	1500.00
DTS-2-1-1-0.55	2	73.00	9.53	0.55	2000.00
DTS-2-2-1-1.00	2	88.90	9.53	1.00	2000.00
DTS-2-3-1-1.77	2	114.30	9.53	1.77	2000.00
DTS-2-3-2-1.33	2		12.70	1.33	2000.00
DTS-2-4-1-3.32	2		9.53	3.32	2000.00
DTS-2-4-2-2.66	2	141.30	12.70	2.66	2000.00
DTS-2-5-1-4.98	2		9.53	4.98	2000.00
DTS-2-5-2-4.13	2	168.30	12.70	4.13	2000.00
DTS-4-2-1-0.31	4	88.90	9.53	0.31	1000.00
DTS-4-3-1-0.61	4	114.30	9.53	0.61	1000.00
DTS-4-3-2-0.41	4		12.70	0.41	1000.00
DTS-4-4-1-1.22	4		9.53	1.22	1000.00
DTS-4-4-2-0.95	4	141.30	12.70	0.95	1000.00
DTS-4-5-1-1.93	4		9.53	1.93	1000.00
DTS-4-5-2-1.49	4	168.30	12.70	1.49	1000.00
DTS-4-2-1-0.49	4	88.90	9.53	0.49	1500.00
DTS-4-3-1-0.97	4		9.53	0.97	1500.00
DTS-4-3-2-0.65	4	114.30	12.70	0.65	1500.00
DTS-4-4-1-1.94	4		9.53	1.94	1500.00
DTS-4-4-2-1.51	4	141.30	12.70	1.51	1500.00
DTS-4-5-1-3.07	4		9.53	3.07	1500.00
DTS-4-5-2-2.37	4	168.30	12.70	2.37	1500.00
DTS-4-2-1-0.66	4	88.90	9.53	0.66	2000.00
DTS-4-3-1-1.33	4		9.53	1.33	2000.00
DTS-4-3-2-0.89	4	114.30	12.70	0.89	2000.00
DTS-4-4-1-2.66	4		9.53	2.66	2000.00
DTS-4-4-2-2.07	4	141.30	12.70	2.07	2000.00
DTS-4-5-1-4.21	4		9.53	4.21	2000.00
DTS-4-5-2-3.25	4	168.30	12.70	3.25	2000.00

# FB Heat Exchanger

## Application / Product Introduction

KingLai BioClean FB Heat Exchanger are commonly used for high-viscosity fluids such as milk, jelly, soy milk, and various sauces.

Due to their high viscosity and sensitivity, these fluids cannot be sterilized directly with steam. Instead, high-temperature hot water is typically used for pasteurization.

To ensure smooth operation and prevent clogging of the heat exchange tubes, the inner surface roughness is required to be less than 0.5  $\mu\text{m}$ .

Additionally, the system must support CIP (Clean-in-Place) functionality to meet hygiene and operational standards.

## Product Features

The sealing structure adopts a special floating head design, which effectively eliminates thermal stress caused by temperature differences.

This design also significantly reduces material usage, resulting in a compact overall structure with excellent sealing performance.

To ensure reliable operation, the system uses a dual O-ring sealing mechanism, providing enhanced sealing integrity.

The expected pressure resistance exceeds 30 bar, making it suitable for demanding industrial applications.

## Surface Finish Specifications

### Inner Surface:

Typically requires BA (Bright Annealed) finish with surface roughness below 0.5  $\mu\text{m}$ , ensuring hygienic flow and preventing clogging.

### Outer Surface:

Finished with a brushed texture, offering a clean and professional appearance.



Outer Shell Nozzle: A



Outer Shell Nozzle: B



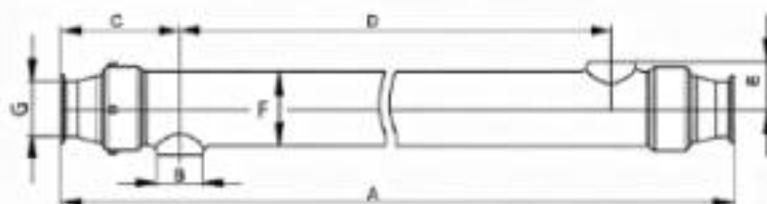
Outer Shell Nozzle: C



Outer Shell Nozzle: D



Specifications



MODEL	A	B	C	D	F	G	M <sup>2</sup>
<b>FB57 Series</b>							
FB57-12-1	6032	Φ38	135	5762	Φ57	Φ38	1.41
FB57-12-2	3050	Φ38	135	2780	Φ57	Φ38	0.69
FB57-12-3	2046	Φ38	135	1776	Φ57	Φ38	0.45
FB57-12-4	1542	Φ38	135	1272	Φ57	Φ38	0.33
FB57-12-5	1034	Φ38	135	764	Φ57	Φ38	0.21
FB57-16-1	6032	Φ38	135	5762	Φ57	Φ38	1.1
FB57-16-2	3050	Φ38	135	2780	Φ57	Φ38	0.54
FB57-16-3	2046	Φ38	135	1776	Φ57	Φ38	0.35
FB57-16-4	1542	Φ38	135	1274	Φ57	Φ38	0.26
FB57-16-5	1034	Φ38	135	764	Φ57	Φ38	0.16
FB57-38-1	6032	Φ38	135	5762	Φ57	Φ38	0.68
FB57-38-2	3050	Φ38	135	2780	Φ57	Φ38	0.33
FB57-38-3	2046	Φ38	135	1776	Φ57	Φ38	0.22
FB57-38-4	1542	Φ38	135	1276	Φ57	Φ38	0.16
FB57-38-5	1034	Φ38	135	764	Φ57	Φ38	0.1
FB57-25-1	6032	Φ38	135	5762	Φ57	Φ38	0.44
FB57-25-2	3050	Φ38	135	2780	Φ57	Φ38	0.22
FB57-25-3	2046	Φ38	135	1776	Φ57	Φ38	0.14
FB57-25-4	1542	Φ38	135	1272	Φ57	Φ38	0.1
FB57-25-5	1034	Φ38	135	764	Φ57	Φ38	0.06
<b>FB70 Series</b>							
FB70-12-1	6032	Φ38, Φ51	135	5762	Φ70	Φ51	2.42
FB70-12-2	3050	Φ38, Φ51	135	2780	Φ70	Φ51	1.19
FB70-12-3	2046	Φ38, Φ51	135	1776	Φ70	Φ51	0.77
FB70-12-4	1542	Φ38, Φ51	135	1272	Φ70	Φ51	0.56
FB70-12-5	1034	Φ38, Φ51	135	764	Φ70	Φ51	0.35
FB70-16-1	6032	Φ38, Φ51	135	5762	Φ70	Φ51	1.93
FB70-16-2	3050	Φ38, Φ51	135	2780	Φ70	Φ51	0.94
FB70-16-3	2046	Φ38, Φ51	135	1776	Φ70	Φ51	0.61
FB70-16-4	1542	Φ38, Φ51	135	1272	Φ70	Φ51	0.45
FB70-16-5	1034	Φ38, Φ51	135	764	Φ70	Φ51	0.28
FB70-20-1	6032	Φ38, Φ51	135	5762	Φ70	Φ51	1.4
FB70-20-2	3050	Φ38, Φ51	135	2780	Φ70	Φ51	0.68
FB70-20-3	2046	Φ38, Φ51	135	1776	Φ70	Φ51	0.44
FB70-20-4	1542	Φ38, Φ51	135	1272	Φ70	Φ51	0.32
FB70-20-5	1034	Φ38, Φ51	135	764	Φ70	Φ51	0.2
FB70-20-6	6032	Φ38, Φ51	135	5762	Φ70	Φ51	1.05
FB70-20-7	3050	Φ38, Φ51	135	2780	Φ70	Φ51	0.51

Continued

MODEL	A	B	C	D	F	G	M <sup>2</sup>
FB70-20-8	2046	Ø38,Ø51	135	1776	Ø70	Ø51	0.33
FB70-20-9	1542	Ø38,Ø51	135	1272	Ø70	Ø51	0.24
FB70-20-10	1034	Ø38,Ø51	135	764	Ø70	Ø51	0.15
FB70-51-1	6032	Ø38,Ø51	135	5762	Ø70	Ø51	0.91
FB70-51-2	3050	Ø38,Ø51	135	2780	Ø70	Ø51	0.45
FB70-51-3	2046	Ø38,Ø51	135	1776	Ø70	Ø51	0.29
FB70-51-4	1542	Ø38,Ø51	135	1272	Ø70	Ø51	0.21
FB70-51-5	1034	Ø38,Ø51	135	764	Ø70	Ø51	0.13
FB70-38-1	6032	Ø38,Ø51	135	5762	Ø70	Ø51	0.68
FB70-38-2	3050	Ø38,Ø51	135	2780	Ø70	Ø51	0.33
FB70-38-3	2046	Ø38,Ø51	135	1776	Ø70	Ø51	0.22
FB70-38-4	1542	Ø38,Ø51	135	1272	Ø70	Ø51	0.16
FB70-38-5	1034	Ø38,Ø51	135	764	Ø70	Ø51	0.1
<b>FB85 Series</b>							
FB85-12-1	6032	Ø38,Ø51,Ø63.5	135	5762	Ø85	Ø63.5	3.84
FB85-12-2	4240	Ø38,Ø51,Ø63.5	135	3970	Ø85	Ø63.5	2.66
FB85-12-3	3050	Ø38,Ø51,Ø63.5	135	2780	Ø85	Ø63.5	1.88
FB85-12-4	2046	Ø38,Ø51,Ø63.5	135	1776	Ø85	Ø63.5	1.22
FB85-12-5	1542	Ø38,Ø51,Ø63.5	135	1272	Ø85	Ø63.5	0.89
FB85-12-6	1034	Ø38,Ø51,Ø63.5	135	764	Ø85	Ø63.5	0.56
FB85-16-1	6032	Ø38,Ø51,Ø63.5	135	5762	Ø85	Ø63.5	2.48
FB85-16-2	3050	Ø38,Ø51,Ø63.5	135	2780	Ø85	Ø63.5	1.21
FB85-16-3	2046	Ø38,Ø51,Ø63.5	135	1776	Ø85	Ø63.5	0.79
FB85-16-4	1542	Ø38,Ø51,Ø63.5	135	1272	Ø85	Ø63.5	0.58
FB85-16-5	1034	Ø38,Ø51,Ø63.5	135	764	Ø85	Ø63.5	0.36
FB85-20-1	6032	Ø38,Ø51,Ø63.5	135	5762	Ø85	Ø63.5	2.44
FB85-20-2	3050	Ø38,Ø51,Ø63.5	135	2780	Ø85	Ø63.5	1.2
FB85-20-3	2046	Ø38,Ø51,Ø63.5	135	1776	Ø85	Ø63.5	0.78
FB85-20-4	1542	Ø38,Ø51,Ø63.5	135	1272	Ø85	Ø63.5	0.57
FB85-20-5	1034	Ø38,Ø51,Ø63.5	135	764	Ø85	Ø63.5	0.35
FB85-25-1	6032	Ø38,Ø51,Ø63.5	135	5762	Ø85	Ø63.5	1.75
FB85-25-2	4240	Ø38,Ø51,Ø63.5	135	2780	Ø85	Ø63.5	0.86
FB85-25-3	3050	Ø38,Ø51,Ø63.5	135	1776	Ø85	Ø63.5	0.56
FB85-25-4	2046	Ø38,Ø51,Ø63.5	135	1272	Ø85	Ø63.5	0.41
FB85-25-5	1542	Ø38,Ø51,Ø63.5	135	764	Ø85	Ø63.5	0.25
FB85-63-1	6032	Ø38,Ø51,Ø63.5	135	5762	Ø85	Ø63.5	1.14
FB85-63-2	3050	Ø38,Ø51,Ø63.5	135	2780	Ø85	Ø63.5	0.56
FB85-63-3	2046	Ø38,Ø51,Ø63.5	135	1776	Ø85	Ø63.5	0.36
FB85-63-4	1542	Ø38,Ø51,Ø63.5	135	1272	Ø85	Ø63.5	0.26
FB85-63-5	1034	Ø38,Ø51,Ø63.5	135	764	Ø85	Ø63.5	0.16
FB85-51-1	6032	Ø38,Ø51,Ø63.5	135	5762	Ø85	Ø63.5	0.91
FB85-51-2	3050	Ø38,Ø51,Ø63.5	135	2780	Ø85	Ø63.5	0.45
FB85-51-3	2046	Ø38,Ø51,Ø63.5	135	1776	Ø85	Ø63.5	0.29
FB85-51-4	1542	Ø38,Ø51,Ø63.5	135	1272	Ø85	Ø63.5	0.21
FB85-51-5	1034	Ø38,Ø51,Ø63.5	135	764	Ø85	Ø63.5	0.13

Continued

MODEL	A	B	C	D	F	G	M <sup>2</sup>
<b>FB104 Series</b>							
FB104-12-1	6062	φ51,φ63.5 φ76.1	150 156	5762 5750	φ104	φ63.5	5.86
FB104-12-2	4270	φ51,φ63.5 φ76.1	150 156	3970 3958	φ104	φ63.5	4.06
FB104-12-3	3080	φ51,φ63.5 φ76.1	150 156	2780 2768	φ104	φ63.5	2.87
FB104-12-4	2076	φ51,φ63.5 φ76.1	150 156	1776 1764	φ104	φ63.5	1.86
FB104-12-5	1572	φ51,φ63.5 φ76.1	150 156	1272 1260	φ104	φ63.5	1.36
FB104-12-6	1064	φ51,φ63.5 φ76.1	150 156	764 752	φ104	φ63.5	0.85
FB104-16-1	6062	φ51,φ63.5 φ76.1	150 156	5762 5750	φ104	φ63.5	4.41
FB104-16-2	3080	φ51,φ63.5 φ76.1	150 156	2780 2768	φ104	φ63.5	2.16
FB104-16-3	2076	φ51,φ63.5 φ76.1	150 156	1776 1764	φ104	φ63.5	1.4
FB104-16-4	1572	φ51,φ63.5 φ76.1	150 156	1272 1260	φ104	φ63.5	1.02
FB104-16-5	1064	φ51,φ63.5 φ76.1	150 156	764 752	φ104	φ63.5	0.64
FB104-20-1	6062	φ51,φ63.5 φ76.1	150 156	5762 5750	φ104	φ63.5	3.49
FB104-20-2	3080	φ51,φ63.5 φ76.1	150 156	2780 2768	φ104	φ63.5	1.71
FB104-20-3	2076	φ51,φ63.5 φ76.1	150 156	1776 1764	φ104	φ63.5	1.11
FB104-20-4	1572	φ51,φ63.5 φ76.1	150 156	1272 1260	φ104	φ63.5	0.81
FB104-20-5	1064	φ51,φ63.5 φ76.1	150 156	764 752	φ104	φ63.5	0.51
FB104-25-1	6062	φ51,φ63.5 φ76.1	150 156	5762 5750	φ104	φ63.5	3.06
FB104-25-2	3080	φ51,φ63.5 φ76.1	150 156	2780 2768	φ104	φ63.5	1.5
FB104-25-3	2076	φ51,φ63.5 φ76.1	150 156	1776 1764	φ104	φ63.5	0.97
FB104-25-4	1572	φ51,φ63.5 φ76.1	150 156	1272 1260	φ104	φ63.5	0.71
FB104-25-5	1064	φ51,φ63.5 φ76.1	150 156	764 752	φ104	φ63.5	0.44
FB104-76-1	6062	φ51,φ63.5 φ76.1	150 156	5762 5750	φ104	φ63.5	1.36

Continued

MODEL	A	B	C	D	F	G	M <sup>2</sup>
FB104-76-2	3080	Φ51,Φ63.5	150	2780	Φ104	Φ63.5	0.67
		Φ76.1	156	2768			
FB104-76-3	2076	Φ51,Φ63.5	150	1776	Φ104	Φ63.5	0.43
		Φ76.1	156	1764			
FB104-76-4	1572	Φ51,Φ63.5	150	1272	Φ104	Φ63.5	0.32
		Φ76.1	156	1260			
FB104-76-5	1064	Φ51,Φ63.5	150	764	Φ104	Φ63.5	0.2
		Φ76.1	156	752			
FB104-63-1	6062	Φ51,Φ63.5	150	5762	Φ104	Φ63.5	1.14
		Φ76.1	156	5750			
FB104-63-2	3080	Φ51,Φ63.5	150	2780	Φ104	Φ63.5	0.56
		Φ76.1	156	2768			
FB104-63-3	2076	Φ51,Φ63.5	150	1776	Φ104	Φ63.5	0.36
		Φ76.1	156	1764			
FB104-63-4	1572	Φ51,Φ63.5	150	1272	Φ104	Φ63.5	0.26
		Φ76.1	156	1260			
FB104-63-5	1064	Φ51,Φ63.5	150	764	Φ104	Φ63.5	0.16
		Φ76.1	156	752			
<b>FB129 Series</b>							
FB129-12-1	6062	Φ38,Φ51,Φ63.5	150	5762	Φ129	Φ76.1	8.89
		Φ76.1	156	5750			
		Φ101.6	169	5724			
FB129-12-2	4270	Φ38,Φ51,Φ63.5	150	3970	Φ129	Φ76.1	6.16
		Φ76.1	156	3958			
		Φ101.6	169	3832			
FB129-12-3	3080	Φ38,Φ51,Φ63.5	150	2780	Φ129	Φ76.1	4.35
		Φ76.1	156	2768			
		Φ101.6	169	2742			
FB129-12-4	2076	Φ38,Φ51,Φ63.5	150	1776	Φ129	Φ76.1	2.83
		Φ76.1	156	1764			
		Φ101.6	169	1738			
FB129-12-5	1572	Φ38,Φ51,Φ63.5	150	1272	Φ129	Φ76.1	2.06
		Φ76.1	156	1260			
		Φ101.6	169	1234			
FB129-12-6	1064	Φ38,Φ51,Φ63.5	150	764	Φ129	Φ76.1	1.29
		Φ76.1	156	752			
		Φ101.6	169	726			
FB129-16-1	6062	Φ38,Φ51,Φ63.5	150	5762	Φ129	Φ76.1	7.16
		Φ76.1	156	5750			
		Φ101.6	169	5724			
FB129-16-2	3080	Φ38,Φ51,Φ63.5	150	2780	Φ129	Φ76.1	3.51
		Φ76.1	156	2768			
		Φ101.6	169	2742			

Continued

MODEL	A	B	C	D	F	G	M <sup>2</sup>
FB129-16-3	2076	Φ38,Φ51,Φ63.5	150	1776	Φ129	Φ76.1	2.28
		Φ76.1	156	1764			
		Φ101.6	169	1738			
FB129-16-4	1572	Φ38,Φ51,Φ63.5	150	1272	Φ129	Φ76.1	1.66
		Φ76.1	156	1260			
		Φ101.6	169	1234			
FB129-16-5	1064	Φ38,Φ51,Φ63.5	150	764	Φ129	Φ76.1	1.04
		Φ76.1	156	752			
		Φ101.6	169	726			
FB129-20-1	6062	Φ38,Φ51,Φ63.5	150	5762	Φ129	Φ76.1	6.63
		Φ76.1	156	5750			
		Φ101.6	169	5724			
FB129-20-2	3080	Φ38,Φ51,Φ63.5	150	2780	Φ129	Φ76.1	3.25
		Φ76.1	156	2768			
		Φ101.6	169	2742			
FB129-20-3	2076	Φ38,Φ51,Φ63.5	150	1776	Φ129	Φ76.1	2.11
		Φ76.1	156	1764			
		Φ101.6	169	1738			
FB129-20-4	1572	Φ38,Φ51,Φ63.5	150	1272	Φ129	Φ76.1	1.54
		Φ76.1	156	1260			
		Φ101.6	169	1234			
FB129-20-5	1064	Φ38,Φ51,Φ63.5	150	764	Φ129	Φ76.1	0.96
		Φ76.1	156	752			
		Φ101.6	169	726			
FB129-25-1	6062	Φ38,Φ51,Φ63.5	150	5762	Φ129	Φ76.1	5.25
		Φ76.1	156	5750			
		Φ101.6	169	5724			
FB129-25-2	3080	Φ38,Φ51,Φ63.5	150	2780	Φ129	Φ76.1	2.57
		Φ76.1	156	2768			
		Φ101.6	169	2742			
FB129-25-3	2076	Φ38,Φ51,Φ63.5	150	1776	Φ129	Φ76.1	1.67
		Φ76.1	156	1764			
		Φ101.6	169	1738			
FB129-25-4	1572	Φ38,Φ51,Φ63.5	150	1272	Φ129	Φ76.1	1.22
		Φ76.1	156	1260			
		Φ101.6	169	1234			
FB129-25-5	1064	Φ38,Φ51,Φ63.5	150	764	Φ129	Φ76.1	0.76
		Φ76.1	156	752			
		Φ101.6	169	726			
FB129-76-1	6062	Φ38,Φ51,Φ63.5	150	5762	Φ129	Φ76.1	1.36
		Φ76.1	156	5750			
		Φ101.6	169	5724			
FB129-76-2	3080	Φ38,Φ51,Φ63.5	150	2780	Φ129	Φ76.1	0.76
		Φ76.1	156	2768			
		Φ101.6	169	2742			

Continued

MODEL	A	B	C	D	F	G	M <sup>2</sup>
FB129-76-3	2076	Φ38,Φ51,Φ63.5	150	1776	Φ129	Φ76.1	0.43
		Φ76.1	156	1764			
		Φ101.6	169	1738			
FB129-76-4	1572	Φ38,Φ51,Φ63.5	150	1272	Φ129	Φ76.1	0.32
		Φ76.1	156	1260			
		Φ101.6	169	1234			
FB129-76-5	1064	Φ38,Φ51,Φ63.5	150	764	Φ129	Φ76.1	0.2
		Φ76.1	156	752			
		Φ101.6	169	726			
<b>FB154 Series</b>							
FB154-12-1	6062	Φ38,Φ51,Φ63.5	150	5762	Φ154	Φ97.6	14.75
		Φ76.1	156	5750			
		Φ101.6	169	5724			
FB154-12-2	4270	Φ38,Φ51,Φ63.5	150	3970	Φ154	Φ97.6	10.23
		Φ76.1	156	3958			
		Φ101.6	169	3832			
FB154-12-3	3080	Φ38,Φ51,Φ63.5	150	2780	Φ154	Φ97.6	7.23
		Φ76.1	156	2768			
		Φ101.6	169	2742			
FB154-12-4	2076	Φ38,Φ51,Φ63.5	150	1776	Φ154	Φ97.6	4.69
		Φ76.1	156	1764			
		Φ101.6	169	1738			
FB154-12-5	1572	Φ38,Φ51,Φ63.5	150	1272	Φ154	Φ97.6	3.42
		Φ76.1	156	1260			
		Φ101.6	169	1234			
FB154-12-6	1064	Φ38,Φ51,Φ63.5	150	764	Φ154	Φ97.6	2.14
		Φ76.1	156	752			
		Φ101.6	169	726			
FB154-16-1	6062	Φ38,Φ51,Φ63.5	150	5762	Φ154	Φ97.6	10.19
		Φ76.1	156	5750			
		Φ101.6	169	5724			
FB154-16-2	3080	Φ38,Φ51,Φ63.5	150	2780	Φ154	Φ97.6	4.99
		Φ76.1	156	2768			
		Φ101.6	169	2742			
FB154-16-3	2076	Φ38,Φ51,Φ63.5	150	1776	Φ154	Φ97.6	3.24
		Φ76.1	156	1764			
		Φ101.6	169	1738			
FB154-16-4	1572	Φ38,Φ51,Φ63.5	150	1272	Φ154	Φ97.6	2.36
		Φ76.1	156	1260			
		Φ101.6	169	1234			
FB154-16-5	1064	Φ38,Φ51,Φ63.5	150	764	Φ154	Φ97.6	1.48
		Φ76.1	156	752			
		Φ101.6	169	726			

Continued

MODEL	A	B	C	D	F	G	M <sup>2</sup>
FB154-20-1	6062	Φ38,Φ51,Φ63.5	150	5762	Φ154	Φ97.6	8.72
		Φ76.1	156	5750			
		Φ101.6	169	5724			
FB154-20-2	3080	Φ38,Φ51,Φ63.5	150	2780	Φ154	Φ97.6	4.27
		Φ76.1	156	2768			
		Φ101.6	169	2742			
FB154-20-3	2076	Φ38,Φ51,Φ63.5	150	1776	Φ154	Φ97.6	2.78
		Φ76.1	156	1764			
		Φ101.6	169	1738			
FB154-20-4	1572	Φ38,Φ51,Φ63.5	150	1272	Φ154	Φ97.6	2.02
		Φ76.1	156	1260			
		Φ101.6	169	1234			
FB154-20-5	1064	Φ38,Φ51,Φ63.5	150	764	Φ154	Φ97.6	1.2
		Φ76.1	156	752			
		Φ101.6	169	726			
FB154-25-1	6062	Φ38,Φ51,Φ63.5	150	5762	Φ154	Φ97.6	8.3
		Φ76.1	156	5750			
		Φ101.6	169	5724			
FB154-25-2	3080	Φ38,Φ51,Φ63.5	150	2780	Φ154	Φ97.6	4.07
		Φ76.1	156	2768			
		Φ101.6	169	2742			
FB154-25-3	2076	Φ38,Φ51,Φ63.5	150	1776	Φ154	Φ97.6	2.54
		Φ76.1	156	1764			
		Φ101.6	169	1738			
FB154-25-4	1572	Φ38,Φ51,Φ63.5	150	1272	Φ154	Φ97.6	1.93
		Φ76.1	156	1260			
		Φ101.6	169	1234			
FB154-25-5	1064	Φ38,Φ51,Φ63.5	150	764	Φ154	Φ97.6	1.2
		Φ76.1	156	752			
		Φ101.6	169	726			

# PoU Point-of-Use Heat Exchanger



## Application / Product Introduction

KingLai BioClean PoU Heat Exchanger is specially designed for cooling Water for Injection (WFI) at usage points with flow rates below 1500 Lph.

It features rapid cooling, easy installation and operation, no risk of cross-contamination, and is maintenance-free.

The entire exchanger body is constructed from three-layers seamless stainless steel tubes, formed in a single process to ensure leak-free performance (no internal welding).

On the cooling medium side, turbulence enhancers are placed between the two outer tubes to improve heat transfer.

On the product side, the flow path is completely smooth, with no gaps or dead legs, ensuring hygienic operation.

The tubes are bent into a 180° U-shape, allowing the exchanger to handle large temperature differences during heating, cooling, or even steam sterilization, while eliminating thermal expansion stress.

The exchanger can be supplied as a standalone unit or as a modular system, which is easier to install and operate (plug and play).

The module includes the tube-in-tube exchanger, outer casing, valve assembly, and custom Pitot tube connections for integration into main pipeline systems.

Two standard models are available: 0-1000 LPH, 1000-1500 LPH

## Product Features

- No internal welding, eliminating the risk of internal leakage
- Highly efficient heat transfer, enabling rapid thermal response (within 10 seconds)
- Compact and modular design, ideal for installation in WFI systems and space-saving
- Easy to sterilize online via steam or superheated water
- Maintenance-free heat exchanger body
- Electropolished product-contact surfaces to Ra < 0.4  $\mu\text{m}$ , ensuring hygiene and smooth flow
- Outlet temperature indicator for operator safety
- Special forged connections ensure complete drainage on the product side
- Comes with a comprehensive documentation package

## Technical Parameters

- Instant Cooling for Water for Injection (WFI)
- 500 LPH flow rate: Rapid cooling from 85°C to 40°C  
Rapid cooling from 85°C to 25°C
- 1000 LPH flow rate: Rapid cooling from 85°C to 40°C  
Rapid cooling from 85°C to 25°C

## Specifications

- POU 500LPH-25
- POU 500LPH-40
- POU 1000LPH-25

# mini Heat Exchanger

## Application / Product Introduction

KingLai BioClean mini Heat Exchanger is specially engineered to meet ultra-pure standards, making it ideal for pharmaceutical applications.

It is commonly used for point-of-use cooling of Water for Injection (WFI) and features modular integration for easy deployment.

Beyond pharmaceuticals, it is also well-suited for the semiconductor industry, where it supports heating, cooling, and condensation of gases or ultrapure water.

Its design is particularly effective in environments that demand both high purity and high pressure resistance.

BioClean mini heat exchangers deliver premium performance across industries such as biopharmaceuticals, chemical processing, fuel cells, and semiconductors, offering reliable and hygienic thermal solutions.

## Technical Parameters

Item	Specification
Metal Material	Entirely made of 316L stainless steel or custom alloys upon request
Non-metallic Material	None
Design Pressure	0-104bar
Max Working Pressure	Tube side: < 8.3MPa Shell side: < 5.5MPa
Design Temperature	425°C
Heat Exchanger Type	Single-tube sheet (straight tube) or double tubesheet (straight tube)
Design Standards	GB ASME PED
Surface Finish	Electropolished to Ra < 0.1 μm (EP)
Heat Transfer Area	0.005-3.0m <sup>2</sup>
Connection Type	Water connections: NPT, Rc, etc. Tube side: 1/4 inch Shell side: 1/4 inch

## Product Advantages & Features

### ▶ Straight Tube Design

Simple straight-tube structure with no dead legs. Internally arranged capillary tubes ensure uniform flow and high heat transfer efficiency.

### ▶ Contamination-Free

Optional double tubesheet design completely eliminates the risk of product contamination.

### ▶ Cleanroom Packaging

KingLai owns its own cleanroom facility, enabling cleaning and packaging of semiconductor-grade capillary heat exchangers.

### ▶ Standardized Products

Standardized models with ample inventory to meet urgent delivery requirements.

### ▶ Easy Installation

Compact and lightweight, suitable for direct installation in clean areas.

### ▶ Rigorous Testing

Each KingLai BioClean mini heat exchanger undergoes strict factory testing, including:

- Hydrostatic pressure test
- Pneumatic pressure test
- Helium leak detection
- Non-destructive testing
- Surface roughness inspection (internal & external)

### ▶ Complete Documentation

Supplied with full documentation, including:

- Material certificates (EN10204 3.1 certificate)
- Surface roughness reports
- Pressure test reports
- Helium leak test records

### ▶ Convenient Cleaning

Supports both CIP (Clean-in-Place) and COP (Clean-out-Place).



## Technical Parameters

Series	Shell Diameter (mm)	Model	Bundle Length (mm)	Tube Pressure (bar)	Shell Pressure (bar)
19	25.4	3250190	190	104	69
19	25.4	3250254	254	104	69
19	25.4	3250381	381	104	69
19	25.4	3250508	508	104	69
19	25.4	3250762	762	104	69
55	38.1	5380254	254	83	55
55	38.1	5380381	381	83	55
55	38.1	5380508	508	83	55
55	38.1	5380635	635	83	55
55	38.1	5380762	762	83	55
55	38.1	5381016	1016	83	55
91	38.1	3380254	254	83	55
91	38.1	3380381	381	83	55
91	38.1	3380508	508	83	55
91	38.1	3380635	635	83	55
91	38.1	3380762	762	83	55
91	38.1	3381016	1016	83	55

Series	Shell Diameter (mm)	Model	Bundle Length (mm)	Tube Pressure (bar)	Shell Pressure (bar)
163	50.8	3510254	254	52	35
163	50.8	3510381	381	52	35
163	50.8	3510508	508	52	35
163	50.8	3510635	635	52	35
163	50.8	3510762	762	52	35
163	50.8	3511016	1016	52	35
91	50.8	5510254	254	52	35
91	50.8	5510381	381	52	35
91	50.8	5510508	508	52	35
91	50.8	5510635	635	52	35
91	50.8	5510762	762	52	35
91	50.8	5511016	1016	52	35
163	63.5	5640254	254	41	28
163	63.5	5640381	381	41	28
163	63.5	5640508	508	41	28
163	63.5	5640635	635	41	28
163	63.5	5640762	762	41	28
163	63.5	5641016	1016	41	28
253	76.2	5760254	254	41	28
253	76.2	5760381	381	41	28
253	76.2	5760508	508	41	28
253	76.2	5760635	635	41	28
253	76.2	5760762	762	41	28
253	76.2	5761016	1016	41	28
421	101.6	51020254	254	48	26
421	101.6	51020381	381	48	26
421	101.6	51020508	508	48	26
421	101.6	51020635	635	48	26
421	101.6	51020762	762	48	26
421	101.6	51021016	1016	48	26



## Packaging, Installation & Commissioning

### Vacuum Packaging

During shipment, the product is vacuum-packed to prevent secondary contamination.

The outer packaging is reinforced to ensure the equipment remains intact and undamaged during transport.

### Sealing Treatment

Packaging follows clean equipment standards, with sealed wrapping and protective caps on all connection ports to prevent contamination.

### Semiconductor Transport Standards

The transportation process complies with international standards for semiconductor equipment, ensuring protection against inversion, impact, moisture, corrosion, packaging damage, and contamination.

## Testing Requirements

- **Pressure Holding Test:** The system is tested at 1.5 times the actual operating pressure using clean high-pressure gas (free of particles larger than 1  $\mu\text{m}$ ). The pressure drop must be less than 0.015 bar within 30 minutes.
- **Cleanliness Test:** Clean gas is introduced, and the outlet is connected to a particle counter. The overall cleanliness must meet ISO 14644-1 Class 4 standards.
- **Weld Inspection:** Brazing is used for weld joints.
- **Flaw Detection:** Ultrasonic testing is performed to ensure no visible cracks and no blockage in flow channels.
- Performance is verified through PQ curve testing to ensure thermal efficiency.

# Umini Heat Exchanger

## Application/ Product Introduction

With high heat transfer efficiency and a compact footprint, KingLai BioClean Umini Heat Exchanger supports flow rates ranging from 500 to 8000 LPH.

It features a standardized design, with lengths available from 200 mm to 1000 mm, and all connections use clamp fittings for easy installation and modular integration.

All product-contact surfaces are made of 316L stainless steel, polished to Ra < 0.5  $\mu\text{m}$  (mechanical polish) or Ra < 0.4  $\mu\text{m}$  (electropolish).

The double tubesheet design ensures strict separation between the process medium and cooling water or steam, eliminating any risk of cross-contamination.

## Product Features

- Compact size — saves space and fits easily into cleanroom environments
- U-shaped structure — single-side fixed tube bundle minimizes leakage risk
- High flow velocity — U-shaped design enhances cleanliness and flow efficiency
- Excellent heat transfer performance
- Laser welding on product side — ensures no contamination from non-316L materials
- Hygienic design — no residue, fully cleanable
- Low pressure drop — reduces energy consumption
- Easy disassembly and maintenance



## Technical Parameters

- Primary Application:  
Instant cooling of Water for Injection (WFI) from 80°C to 25°C (Compatible with any temperature above 25°C)
- Flow Rate Options: 500 LPH, 1000 LPH
- Equipment Length: Approximately 800 mm
- Cooling Medium:  
Typically uses chilled water at 7-12°C for cooling (if chilled water temperature needs adjustment, KingLai will perform recalibration based on thermal requirements)

## Specifications

- 500 LPH — Instant cooling from 85°C to 25°C
- 1200 LPH — Instant cooling from 85°C to 25°C

# Engineering Your Bespoke Heat Exchanger Together



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