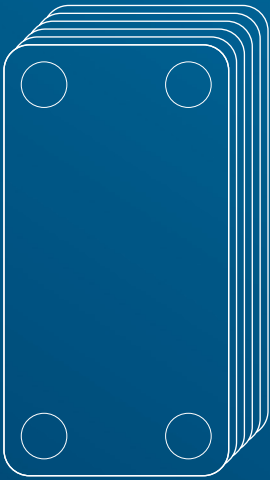


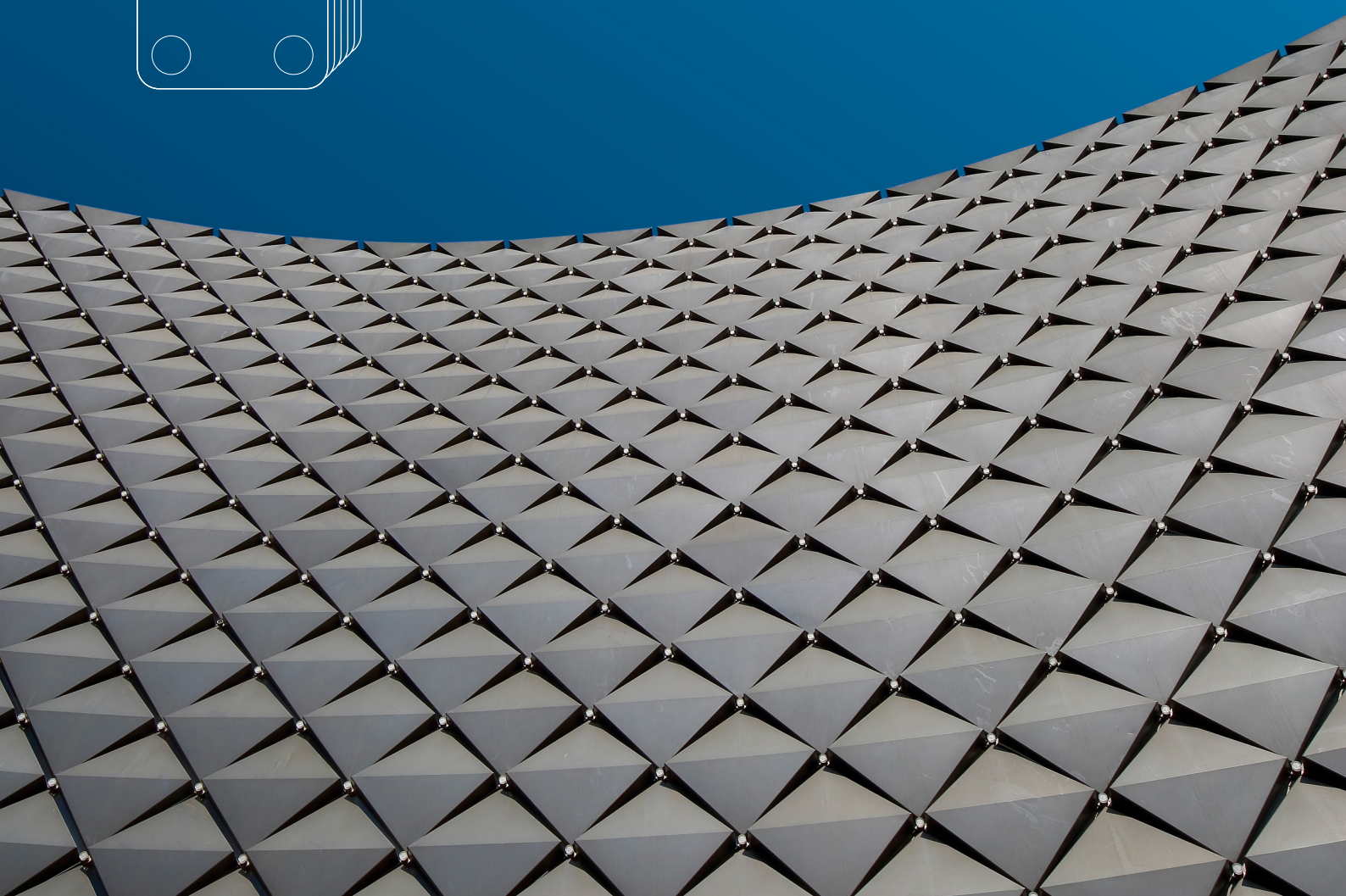
SANHUA

Stainless Steel Braze Plate Heat Exchanger

A magnificent turn into new chapter



SANHUA's patented asymmetric plate design has in average **25%** lower pressure drop on secondary side compared to other solutions available on the market.



Introduction

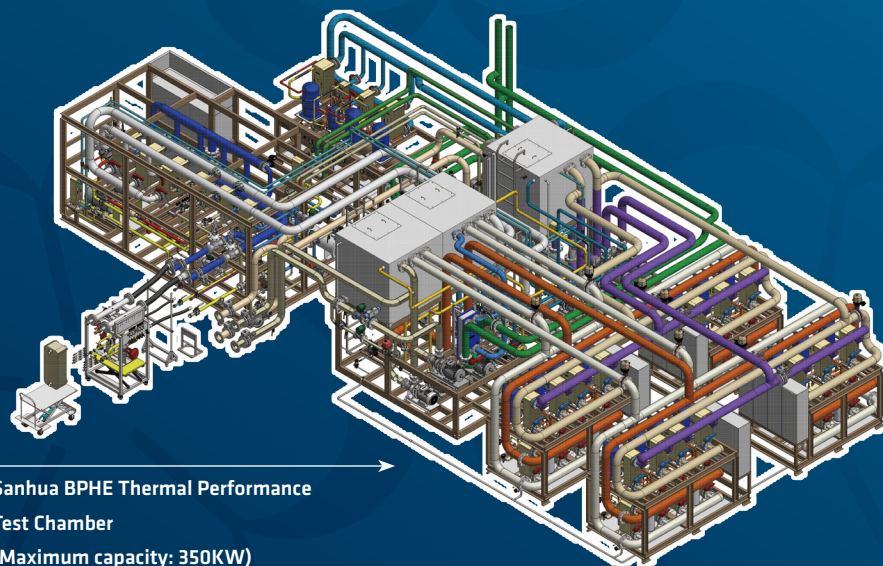
With the carbon neutralization goal, it is the top priority of most industries to apply renewable energies and technologies to save energies and reduce the emissions. In the field of HVAC&R, such as heat pump, electric bus A/C and energy storage battery cooling are typical applications where renewable energies are used and inside of those you will find brazed plate heat exchangers (BPHEs) are playing very important roles.

On the other side the most direct and effective way to save energies is to improve our system efficiency. Compared with other heat exchangers of the same purpose, properly designed BPHE can provide higher heat transfer efficiency and lower secondary side pressure drop. It is also widely used for heat reclaim circuit to deliver hot water or heating while cooling, thus to improve the overall efficiency of the system.

Obviously BPHE is able to contribute from both sides. In year 2021, Sanhua officially entered to stainless steel BPHE industry, and we strongly believe BPHE will contribute greatly to our eco-friendly solutions to customers.

Prior to the acquisition, Sanhua has studied in the field of aluminium BPHE for many years and been leading the industry of automotive and residential appliances. A series of optimization designs were immediately introduced to the stainless steel BPHE portfolio. Thanks to Sanhua's professional and powerful laboratory, the advantages of these new designs could be presented to our customers with visible values. Meanwhile the availability of these data is greatly beneficial to our customers since many tests we did in our lab are under comprehensive conditions.

Hereby we are very glad to introduce some of our new technologies and the portfolio they go into.



Sanhua BPHE Thermal Performance
Test Chamber
(Maximum capacity: 350KW)

Visible performance and reliability

• Plate with reduced depth



By reducing the depth of the plate, the heat transfer efficiency is improved but the pressure drop is still within acceptable range. BPHE with reduced plate depth is especially suitable for economizer functions.

• Temperature fatigue resistance

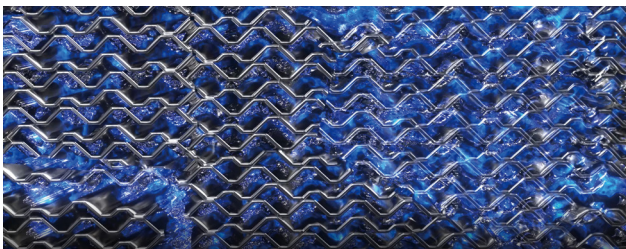


Temperature fatigue happens mostly in heat pump or cascade systems where high and low temperatures exchanges frequently, as a result the brazing between the plates will fail. The mixing of media of both sides will damage the entire system and even lead to more serious consequences.

• Anti-freezing design



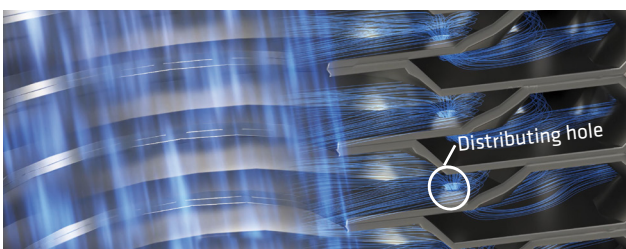
In the scenario of refrigerant/water exchange, it is necessary to prevent water temperature from falling to the freezing point and the plates from cracking. The mixing of refrigerant and water will damage the entire system and even lead to more serious consequences. Especially in chillers and heat pumps, during the start-up low pressure and low temperature may happen and resulting in icing on the water side. When the heat pump is switched from heating to defrosting, there is also a high risk of water freezing. Although proper system control can minimize the risk, there are still a lot of work can be done with BPHE itself. The BPHE is designed in the way that the water bypasses the risky areas and the areas with very low velocity, as a result the risk of freezing is much lower. Such extreme conditions are always challenges to achieve in customer's system test but Sanhua's freezing test bench can verify the freezing temperature at various conditions, so that customers can use them with confidence.



• Highly efficient distributor



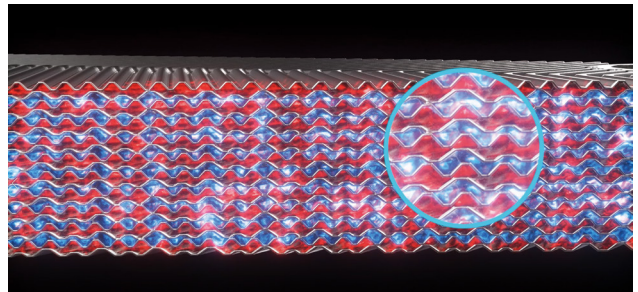
The design of distributor is especially critical for medium and large size evaporators. Sanhua distributor has its own design patent, and the distribution holes are part of the plates and making the heat exchanger extremely compact. Through the thermal imager in our laboratory, we can find how equally the distributor is distributing the refrigerant into all channels, maximizing the use of heat exchange area.



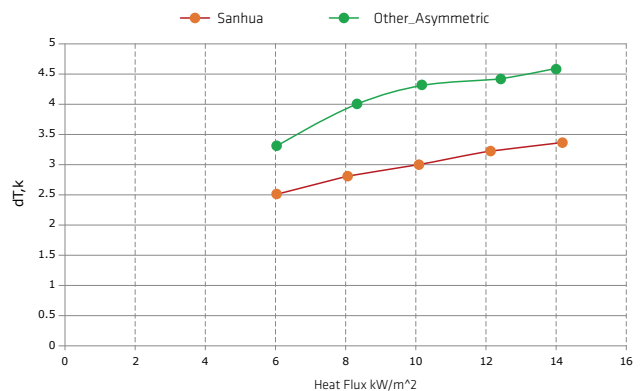
• Asymmetric Plate



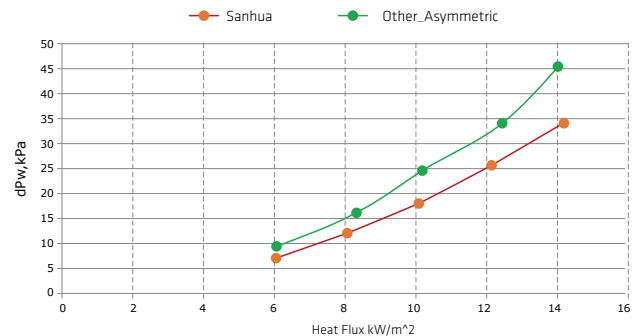
With traditional symmetrical design, the channel area of primary and secondary sides are almost identical, it is simple and easy to produce. In reality different channels are required for primary and secondary side. By introducing asymmetric plate design, we properly reduced the volume of primary side to increase the evaporating temperature and heat transfer efficiency but still control the pressure drop within acceptable range. We take care of pressure drop more on secondary side, by increasing the volume of secondary side, the pressure drop is reduced dramatically and as a result the power consumption of the pump will be reduced drastically as well. Sanhua's thermal performance test chamber is able to test the temperature approach (dT) and pressure drop with various refrigerant and conditions. The data is showing in average 1K lower in dT and 25% lower in pressure drop even compared to asymmetric design from others.



Primary_Temperature approach

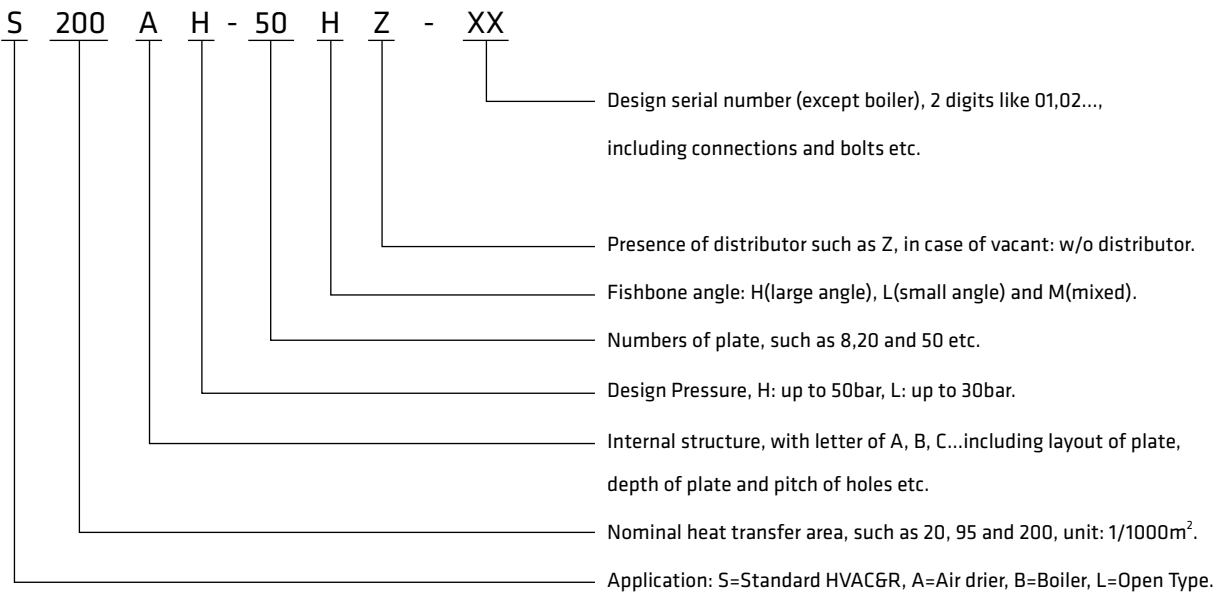


Secondary_Pressure drop



Sanhua is always thinking and working globally, and we have obtained EU PED certification from authorized 3rd party. Our BPHEs legally work with fluid group 1 and group 2, including water, ethylene glycol solution, common HCFC, HFC, HC and HFO refrigerants such as R410A, R32, R454B, R290, R134a, R404A, R507, R448A, R449A, R1234yf, R1234ze and R452A etc. The design pressure is up to 50 bar.

• Designation of SANHUA BPHE



· Below table is showing the recommended applications with different models :

	S6	S11A	S12B	S14B	S20	S20B	S40A	S60	S60B
550mm									
450mm									
350mm									
250mm									
150mm									
50mm									
	54x119	76x154	77x192	77x213	75x317	76x318	118x332	120x527	120x527[mm]

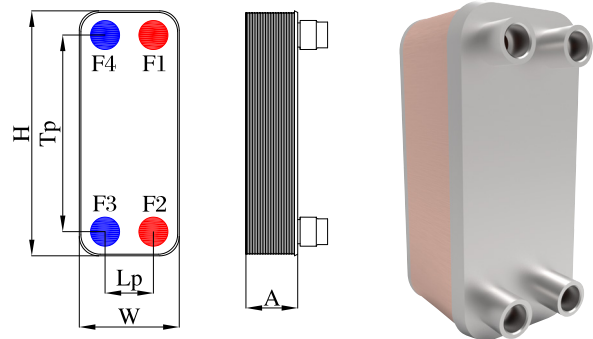
	S6	S11A	S12B	S14B	S20	S20B	S40A	S60	S60B
Capacity(Kw)*	1~5	1~8	1~10	2~15	2~25	2~25	5~40	10~90	10~90
Capactiy(Ton)*	0.3~1.4	0.3~2.3	0.3~2.8	0.6~4.3	0.6~7	0.6~7	1.4~11	2.8~26	2.8~26
Asymmetric	-	-	-	-	-	-	X	-	X
Reduced Depth	-	X	X	-	-	X	-	-	-
Distributor Option	-	-	-	-	-	-	X	-	X
VRF_Eco	X		X		X	X			
ATW/ATA HP_Eco	X	X			X	X			
ATW/GHP HP_Con							X	X	X
Mini Chiller_Con/Evp							X		
E-Bus_Battery Cooling		X							
Energy Storage Cooling			X	X			X		X
Transport_Eco/SuctionGas HX				X	X	X			
Water Chiller_Evp					X	X	X		X
Water Chiller_Eco								X	X
Ref. Rack_Eco					X	X			
Ref._Waterloop_Con	X	X							
Oil Cooler								X	X

Note: * The cooling capacities are based on R410A, condensing temperature 40°C, 5K subcooling, water inlet/outlet temperature 12°C/7°C, 5K superheat.



• INTRODUCTION

SANHUA S6 is widely used as economizer on VRF or as evaporator and condenser on small capacity heat pump. S6 has the compact structure and enhanced heat transfer advantages. The heat transfer capacity range is 1~5KW. Its mechanical design and reliability performance makes it suitable for high-pressure refrigerant such as R410A and R32.



Size Code	mm	IN
H	119	4.69
W	54	2.13
Tp	91	3.58
Lp	26	1.02
A	6+1.3N	0.236+0.051N

• TECHNICAL DATA (N=NUMBER OF PLATES)

Max. no. of plates	60
Max flow(m ³ /h)	1.7
Max. working pressure(MPa)	5.0
Working temperature(°C)	-196/+225
Volume per channel (L)	0.005/0.005
Weight w/o connection(kg)	0.12+0.018N
Flow Direction	Parallel flow
Plate	SUS 316L/SUS 304
Connection	SUS 304
Solder	Copper

• STANDARD CONNECTIONS

F3-F4 Evaporation side	solder 1/4", 3/8"
F1-F2 Subcooling side	thread 1/4", 3/8"



• THIRD-PARTY APPROVALS

Europe: Pressure Equipment Directive (PED) III. For additional requirements, please contact Sanhua.

• ACCESSORIES-STUD BOLTS

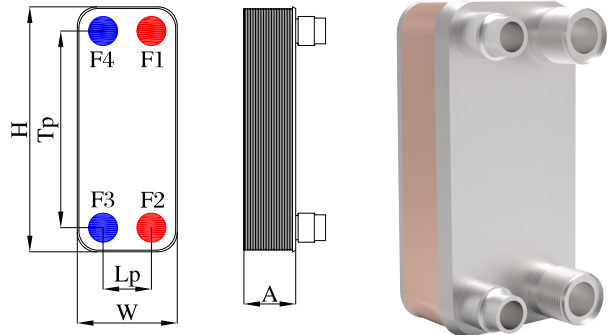
Stud bolts and feet on front /end cover plate for mounting support are available upon request.

• INTRODUCTION

SANHUA S11A is widely used as economizer for VRF and heat pump. It can also be used for E-bus battery cooling or as evaporator for chiller with capacity below 5KW.

With the optimized shallow fishbone design, the heat transfer is enhanced and the pressure drop of water side (or secondary side) is decreased. The lower hold-up volume reduces the system refrigerant charge.

S11A is offering 2 options of design pressure, they are 3MPa and 5MPa for low and high-pressure refrigerant respectively.



Size Code	mm	IN
H	154	6.06
W	76	2.99
Tp	120	4.72
Lp	42	1.65
A	8+N	0.314+0.039N

• TECHNICAL DATA (N=NUMBER OF PLATES)

Max. no. of plates	60
Max flow(m ³ /h)	1.7
Max. working pressure(MPa)	3.0/5.0 (optional)
Working temperature(°C)	-196/+225
Volume per channel (L)	0.0069/0.0069
Weight w/o connection(kg)	0.53+0.034N
Flow Direction	Parallel flow
Plate	SUS 316L/SUS 304
Connection	SUS 304
Solder	Copper

• STANDARD CONNECTIONS

F3-F4 Refrigerant side	solder: 3/8", 1/2", 5/8", 3/4"
F1-F2 Water side	thread: 3/8", 1/2", 5/8", 3/4" solder: 3/8", 1/2", 5/8", 3/4"



Note: The BPHE is used as an evaporator, F3/F4 is the refrigerant inlet/outlet.

• THIRD-PARTY APPROVALS

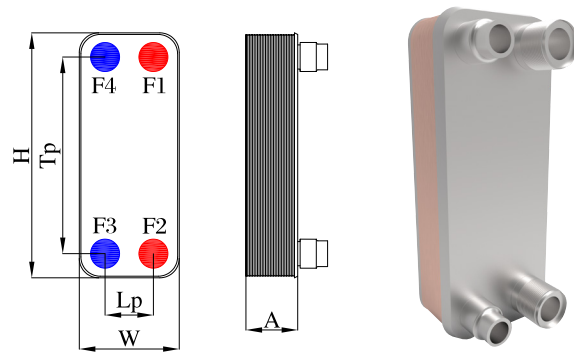
Europe: Pressure Equipment Directive (PED) III. For additional requirements, please contact Sanhua.

• ACCESSORIES-STUD BOLTS

Stud bolts and feet on front /end cover plate for mounting support are available upon request.

• INTRODUCTION

SANHUA S12B is widely used in chillers and heat pumps as evaporator, condenser and economizer. With optimized shallow fishbone design, it enhances the heat transfer and decreases the pressure drop of secondary side. The lower hold-up volume reduces the system refrigerant charge. S12B is suitable for high-pressure refrigerant like R410A and R32. Its heat transfer capacity is up to 10KW.



Size Code	mm	IN
H	192	7.56
W	77	3.03
Tp	154	6.06
Lp	40	1.57
A	9+N	0.354+0.039N

• TECHNICAL DATA (N=NUMBER OF PLATES)

Max. no. of plates	60
Max flow(m ³ /h)	1.7
Max. working pressure(MPa)	5.0
Working temperature(°C)	-196/+225
Volume per channel (L)	0.009/0.009
Weight w/o connection(kg)	0.66+0.042N
Flow Direction	Parallel flow
Plate	SUS 316L/SUS 304
Connection	SUS 304
Solder	Copper

• STANDARD CONNECTIONS

F3-F4 Refrigerant side	solder: 3/8", 1/2", 5/8", 3/4"
F1-F2 Water side	thread: 3/8", 1/2", 5/8", 3/4" solder: 3/8", 1/2", 5/8", 3/4"



Note: The BPHE is used as an evaporator, F3/F4 is the refrigerant inlet/outlet.

• THIRD-PARTY APPROVALS

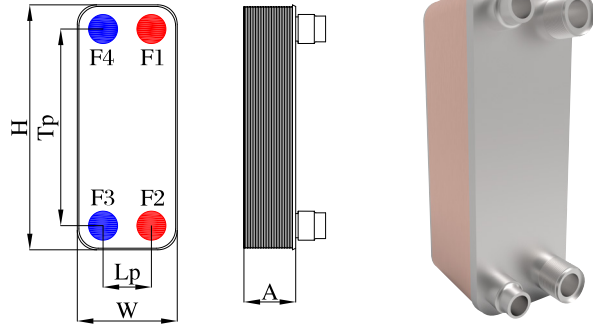
Europe: Pressure Equipment Directive (PED) III. For additional requirements, please contact Sanhua.

• ACCESSORIES-STUD BOLTS

Stud bolts and feet on front /end cover plate for mounting support are available upon request.

· INTRODUCTION

SANHUA S14B can be used as condensers or evaporators in chillers, heat pumps and cascade systems. The plate adopts optimized fishbone design, which has high reliability and high heat transfer efficiency, reduces water side pressure drop and refrigerant charge.



Size Code	mm	IN
H	213	8.39
W	77	3.03
Tp	172	6.77
Lp	42	1.65
A	10+2.15N	0.394+0.085N

· TECHNICAL DATA (N=NUMBER OF PLATES)

Max. no. of plates	60
Max flow(m ³ /h)	4
Max. working pressure(MPa)	5.0
Working temperature(°C)	-196/+225
Volume per channel (L)	0.026/0.026
Weight w/o connection(kg)	0.68+0.048N
Flow Direction	Parallel flow
Plate	SUS 316L/SUS 304
Connection	SUS 304
Solder	Copper

· STANDARD CONNECTIONS

F3-F4 Refrigerant side	solder: 1/4", 3/8", 1/2", 5/8", 3/4", 7/8"
F1-F2 Water side	thread: 1/4", 3/8", 1/2", 5/8", 3/4"

Note: The BPHE is used as an evaporator, F3/F4 is the refrigerant inlet/outlet.



· THIRD-PARTY APPROVALS

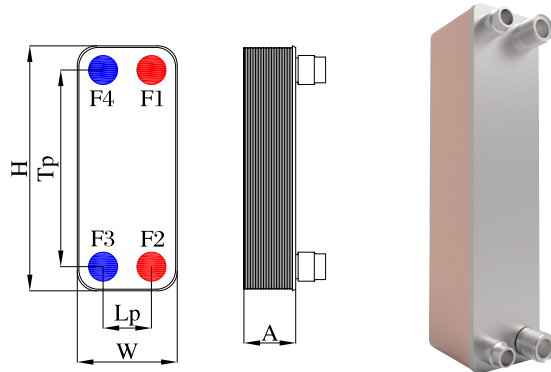
Europe: Pressure Equipment Directive (PED) III. For additional requirements, please contact Sanhua.

· ACCESSORIES-STUD BOLTS

Stud bolts and feet on front /end cover plate for mounting support are available upon request.

• INTRODUCTION

SANHUA S20 can be used as an evaporator, condenser, economizer and desuperheater in chillers and heat pumps. It is also used as economizer or intercooler for commercial and transportation refrigeration, or as water cooled condenser in semi-plug in display case (waterloop). The plate adopts optimized fishbone design, which has high reliability and high heat transfer efficiency.



Size Code	mm	IN
H	317	12.48
W	75	2.95
Tp	278	10.94
Lp	42	1.65
A	10+2.25N	0.394+0.089N

• TECHNICAL DATA (N=NUMBER OF PLATES)

Max. no. of plates	60
Max flow(m ³ /h)	4
Max. working pressure(MPa)	3.0/5.0 (optional)
Working temperature(°C)	-196/+225
Volume per channel (L)	0.04/0.04
Weight w/o connection(kg)	0.72+0.068N
Flow Direction	Parallel flow
Plate	SUS 316L/SUS 304
Connection	SUS 304
Solder	Copper

• STANDARD CONNECTIONS

F3-F4 Refrigerant side	solder: 1/4", 3/8", 1/2", 5/8", 3/4", 7/8"
F1-F2 Water side	thread: 1/4", 3/8", 1/2", 5/8", 3/4" solder: 1/4", 3/8", 1/2", 5/8", 3/4"



Note: The BPHE is used as an evaporator, F3/F4 is the refrigerant inlet/outlet.

• THIRD-PARTY APPROVALS

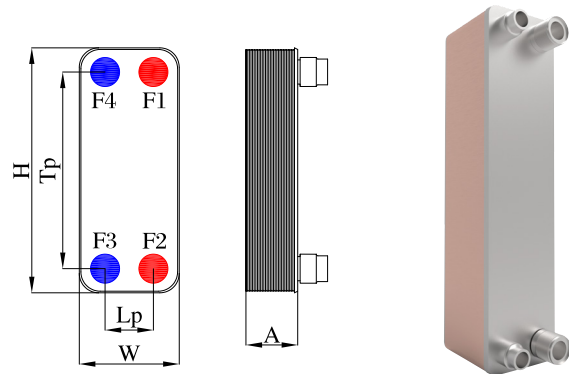
Europe: Pressure Equipment Directive (PED) III. For additional requirements, please contact Sanhua.

• ACCESSORIES-STUD BOLTS

Stud bolts and feet on front /end cover plate for mounting support are available upon request.

INTRODUCTION

SANHUA S20 can be used as an evaporator, condenser, economizer and desuperheater in chillers and heat pumps. It is also used as economizer or intercooler for commercial and transportation refrigeration, or as water cooled condenser in semi-plug in display case (waterloop). With optimized shallow fishbone design, S20B is compact and has high heat transfer efficiency.



Size Code	mm	IN
H	318	12.52
W	76	2.99
Tp	278	10.94
Lp	42	1.65
A	9+1.5N	0.354+0.059N

TECHNICAL DATA (N=NUMBER OF PLATES)

Max. no. of plates	60
Max flow(m ³ /h)	4
Max. working pressure(MPa)	3.0/5.0 (optional)
Working temperature(°C)	-196/+225
Volume per channel (L)	0.024/0.024
Weight w/o connection(kg)	0.97+0.069N
Flow Direction	Parallel flow
Plate	SUS 316L/SUS 304
Connection	SUS 304
Solder	Copper

STANDARD CONNECTIONS

F3-F4 Refrigerant side	solder: 1/4", 3/8", 1/2", 5/8", 3/4", 7/8"
F1-F2 Water side	thread: 1/4", 3/8", 1/2", 5/8", 3/4" solder: 1/4", 3/8", 1/2", 5/8", 3/4"



Note: The BPHE is used as an evaporator, F3/F4 is the refrigerant inlet/outlet.

THIRD-PARTY APPROVALS

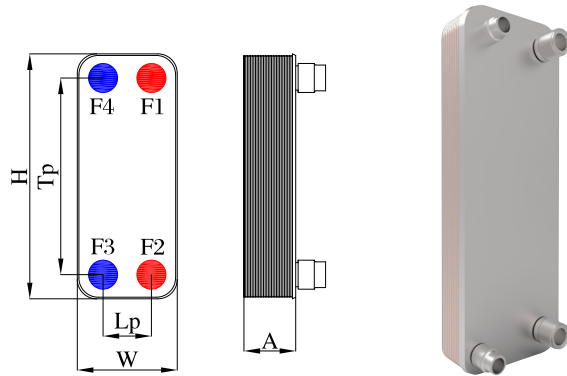
Europe: Pressure Equipment Directive (PED) III. For additional requirements, please contact Sanhua.

ACCESSORIES-STUD BOLTS

Stud bolts and feet on front /end cover plate for mounting support are available upon request.

• INTRODUCTION

SANHUA S40A is widely used as condenser or evaporator in air-cooled chillers (or heat pumps) with capacity up to 50kw. Its high reliable structural design makes it suitable for high-pressure refrigerants such as R410A and R32. The plate adopts optimized asymmetric fishbone design and innovative distributor design, which has high heat transfer efficiency and reduces water side pressure drop. The lower hold-up volume will help to reduce the refrigerant charge.



Size Code	mm	IN
H	332	13.07
W	118	4.65
Tp	279 (F1F2)	10.98
	286 (F3F4)	11.26
Lp	68 (F1F4)	2.68
	75 (F2F3)	2.95
A	11+1.55N	0.433+0.061N

• TECHNICAL DATA (N=NUMBER OF PLATES)

Max. no. of plates	120
Max flow(m ³ /h)	8.8
Max. working pressure(MPa)	5.0
Working temperature(°C)	-196/+225
Volume per channel (L)	0.0486(F1F2)/0.0422(F3F4)
Weight w/o connection(kg)	1.26+0.106N
Flow Direction	Parallel flow
Plate	SUS 316L/SUS 304
Connection	SUS 304
Solder	Copper

• STANDARD CONNECTIONS

F3-F4 Refrigerant side	solder: 1/4", 3/8", 1/2" , 5/8" , 3/4" , 7/8"
F1-F2 Water side	thread: 1/4", 3/8", 1/2" , 5/8" , 3/4"

Note: The BPHE is used as an evaporator, F3/F4 is the refrigerant inlet/outlet.



• THIRD-PARTY APPROVALS

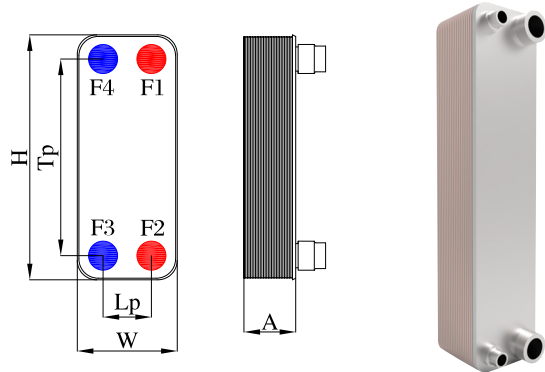
Europe: Pressure Equipment Directive (PED) III. For additional requirements, please contact Sanhua.

• ACCESSORIES-STUD BOLTS

Stud bolts and feet on front /end cover plate for mounting support are available upon request.

· INTRODUCTION

SANHUA S60 is widely used in chillers, heat pumps and IT cooling as evaporator or condenser. It is also used as economizer or oil cooler for screw chillers. The optimized plate technology can reduce the water side pressure drop and provide efficient heat transfer performance at the same design temperature.



Size Code	mm	IN
H	527	20.75
W	120	4.72
Tp	470	18.5
Lp	63	2.48
A	9+2.3N	0.354+0.091N

· TECHNICAL DATA (N=NUMBER OF PLATES)

Max. no. of plates	120
Max flow(m ³ /h)	17
Max. working pressure(MPa)	3.0/5.0 (optional)
Working temperature(°C)	-196/+225
Volume per channel (L)	0.11/0.11
Weight w/o connection(kg)	2.6+0.18*N
Flow Direction	Parallel flow
Plate	SUS 316L/SUS 304
Connection	SUS 304
Solder	Copper

· STANDARD CONNECTIONS

F3-F4 Refrigerant side	solder, up to 1"3/8
F1-F2 Water side	thread, up to 1"1/4

Note: The BPHE is used as an evaporator, F3/F4 is the refrigerant inlet/outlet.



· THIRD-PARTY APPROVALS

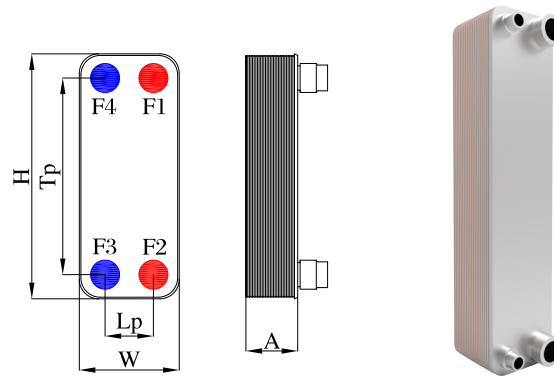
Europe: Pressure Equipment Directive (PED) III. For additional requirements, please contact Sanhua.

· ACCESSORIES-STUD BOLTS

Stud bolts and feet on front /end cover plate for mounting support are available upon request.

· INTRODUCTION

SANHUA S60B is widely used in chillers, heat pumps and IT cooling as evaporator and condenser. It is also be used as economizer or oil cooler for screw chillers. The capacity range is 10~90KW. The asymmetric heat plate and optimized distributor can reduce the water side pressure drop and provide efficient heat transfer performance at the same design temperature.



Size Code	mm	IN
H	526	20.71
W	119	4.69
Tp	470	18.5
Lp	63	2.48
A	8+1.93N	0.315+0.076N

· TECHNICAL DATA (N=NUMBER OF PLATES)

Max. no. of plates	120
Max flow(m ³ /h)	17
Max. working pressure(MPa)	3.0/5.0 (optional)
Working temperature(°C)	-196/+225
Volume per channel (L)	0.0967(F1F2)/0.0863(F3F4)
Weight w/o connection(kg)	2.2+0.168*N
Flow Direction	Parallel flow
Plate	SUS 316L/SUS 304
Connection	SUS 304
Solder	Copper

· STANDARD CONNECTIONS

F3-F4 Refrigerant side	solder, up to 1"3/8
F1-F2 Water side	thread, up to 1"1/4

Note: The BPHE is used as an evaporator, F3/F4 is the refrigerant inlet/outlet.



· THIRD-PARTY APPROVALS

Europe: Pressure Equipment Directive (PED) III. For additional requirements, please contact Sanhua.

· ACCESSORIES-STUD BOLTS

Stud bolts and feet on front /end cover plate for mounting support are available upon request.



Please contact local SANHUA representative for BPHE selection.
Choose application, preferred dimensions and technical details from the table below.

Evaporator	Condenser	Economizer	Boiler
		(Ref./Ref.)	(Water/Water)
Capacity	Capacity	Capacity	Capacity
Primary & Secondary refrigerant	Primary & Secondary refrigerant	Refrigerant	Type of Medium
Inlet & Outlet Temp. of Secondary refrigerant	Inlet & Outlet Temp. of Secondary refrigerant	Inlet & Outlet Temp. of liquid phase refrigerant	Inlet & Outlet Temp. of both sides
Max. permissible pressure drop of Secondary refrigerant	Max. permissible pressure drop of Secondary refrigerant	Max. permissible pressure drop of liquid side	Max. permissible pressure drop of both sides
Inlet temperature of Expansion valve	Inlet Temp. of Condenser	Inlet temperature of Expansion valve	Mass flow of both sides
Evaporating Temperature	Condensing Temperature	Economizer Evap. Temp.	
Superheat	Subcooling	Superheat at economizer outlet	
Max. permissible pressure drop of primary refrigerant	Max. permissible pressure drop of primary refrigerant	Max. permissible pressure drop of vapor side	



SANHUA

Find Local Representative at:
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SANHUA INTERNATIONAL
info@sanhuaeurope.com