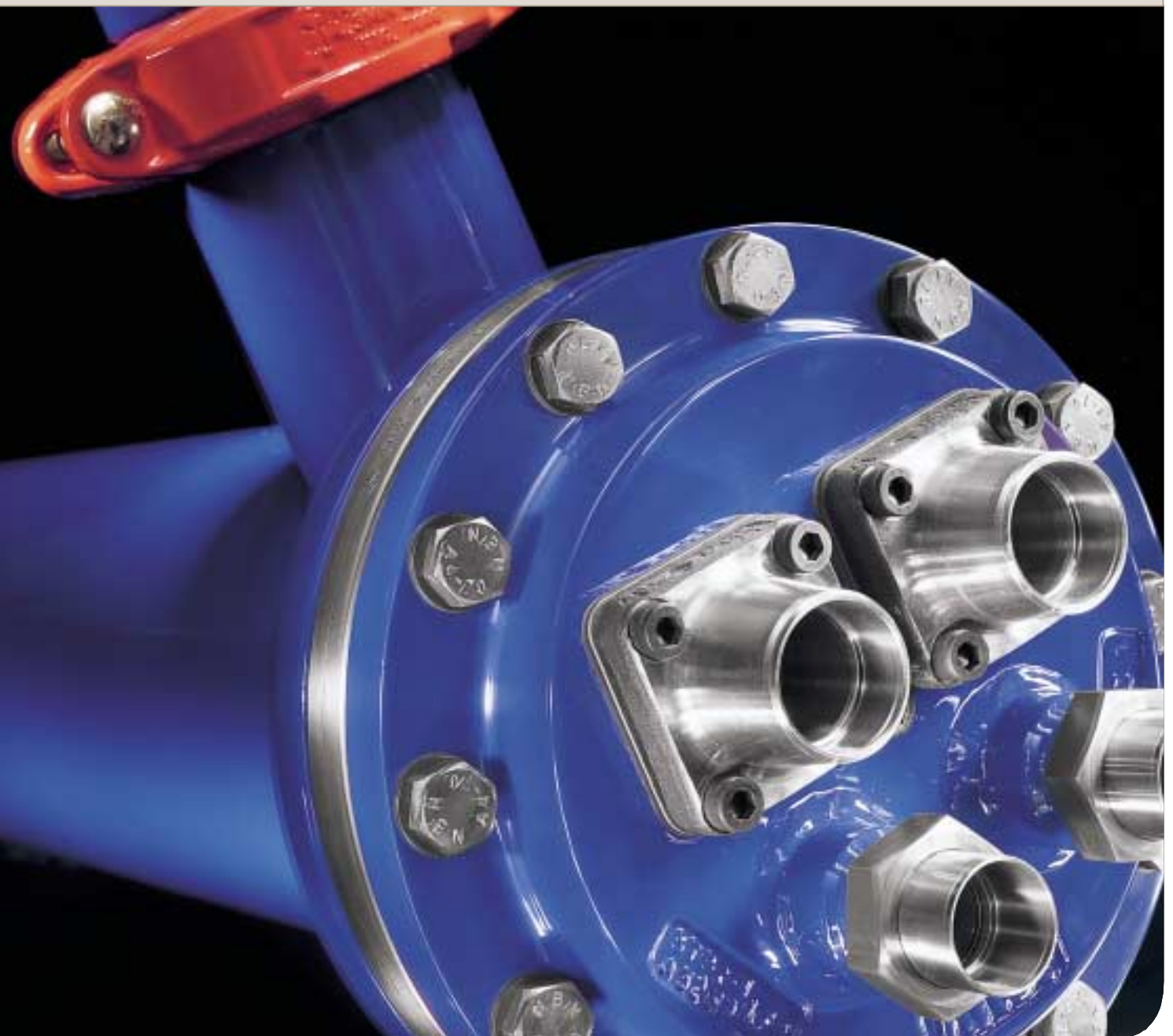




Dryplus-3 shell & tube evaporators

Dry expansion evaporators optimised for the air conditioning and refrigeration world

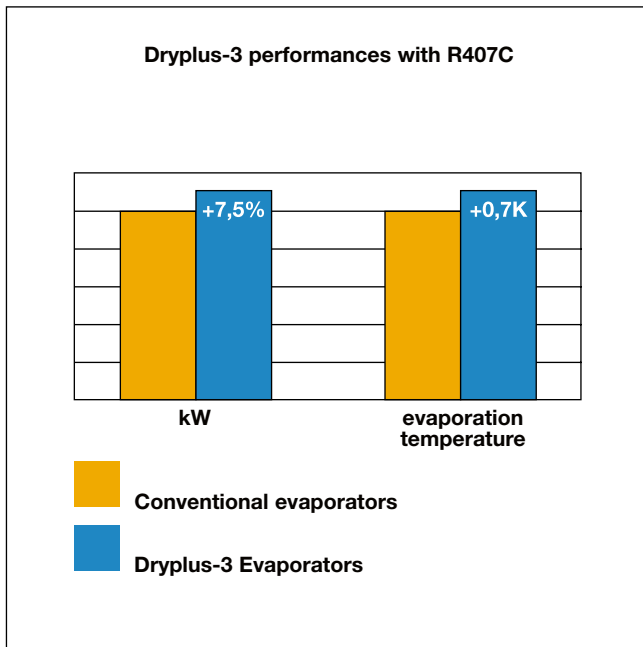
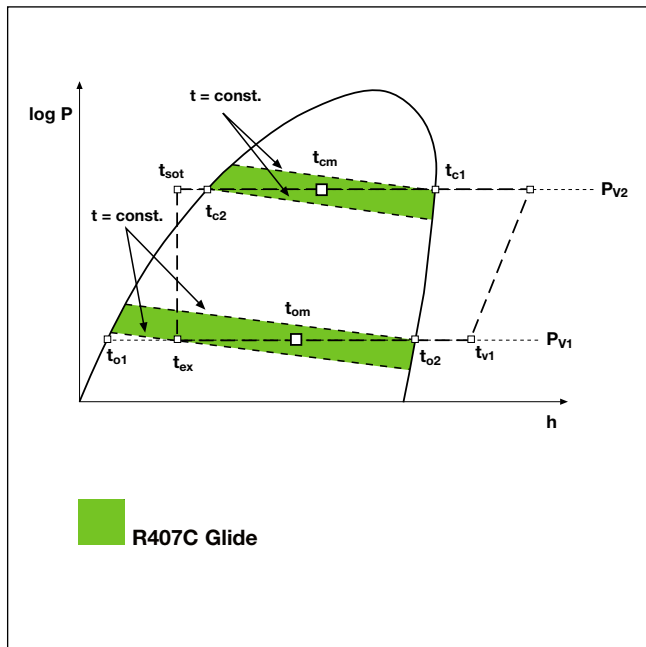


Dryplus-3 series of shell and tube evaporators represent the natural technological evolution of a generation of heat exchangers leader in the air conditioning and refrigeration applications.

The models of the series ensure cooling capacities up to 1500 kW at nominal conditions, from 1 to 4 independent cooling circuits, 3 different baffle distances depending on the working water flows and 3 different positions of the water connections.

In particular, the evaporators have been optimised for opera-

tion with R407C refrigerant. The adoption of a dedicate, high efficiency exchange tube allowed to exalt performances increasing the cooling capacities by values close to 10%. This performance improvement can be alternatively translated into a raising of the evaporation temperature and then in an optimisation of the COP of the cooling system, not only in combination with R407C but also with the other refrigerants. Particular attention has been paid to the lubricant oil flow aspect.



*Average results on the different models in the 135-1000 kW range

Performances and features

1. The first shell and tube evaporator optimised for R407C
2. Exalted performances with no size increase, thanks to new high efficiency tubes and design
3. Exchange tubes designed to ensure a safe flow for the most viscous lubricant oils
4. Reduced water side pressure drops
5. A range designed to operate as a standard in heat pump mode
6. 3 baffle distances available
7. Extractable tube bundle
8. Stainless steel versions
9. Reduced length versions
10. IT integrate water tank solutions



Perfection in construction

Alfa Laval shell and tube evaporators include the results of a research intended to ensure a high level of mechanical strength and resistance to vibration and corrosion. The "U" design of the tube bundle allows the thermal expansion between the tubes and the shell avoiding any tension. Thanks to this solution the tube bundle can be extracted from the shell for inspection or maintenance (starting with model DX_56) and it is possible to rotate the shell in order to change the water connection position.

The material choice is linked not only to heat exchange targets, but also to pressure design needs due to years of intensive usage:

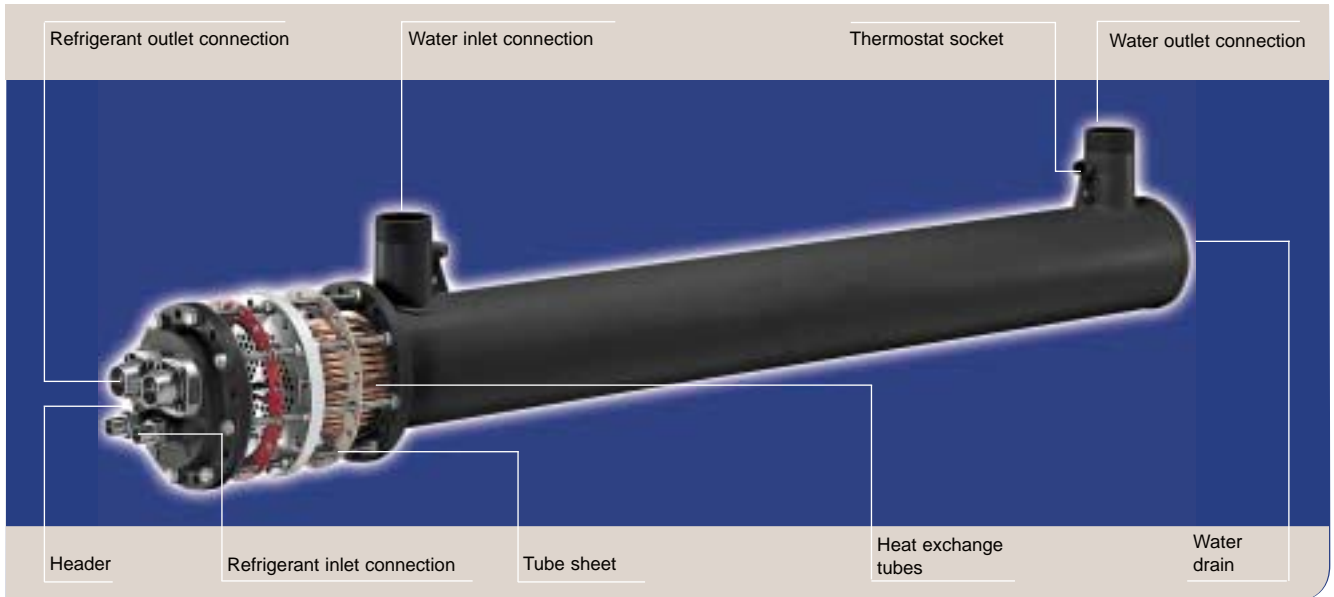
- Header, tube sheet, shell, refrigerant and water connections

are made of carbon steel;

- High efficiency exchange tubes are in copper, internally finned;
- Baffles are made of brass or other suitable material (carbon steel);
- The bolt system is made of steel alloys or stainless steel depending on working conditions and temperatures, while gaskets are made of an asbestos free compound.

Evaporators are available in stainless steel execution (AISI 316) following the requests (in the configurations tube sheet and exchange tubes; shell, tube sheet and exchange tubes; the whole unit in stainless steel).

Three different insulation versions are available.



Integrate water tank solutions

To integrate in one unique solution a shell and tube evaporator and a water tank. The logic that supports the IT (Integrated Tank) solution is simple and profitable:

- This solution reduces considerably the space occupied by these two components, allowing to place a water tank where this operation would be not possible, as in several package chiller models;
- Two versions are available: water flow with storage before or after

the evaporator. In the second case the advantage is the creation of a reservoir of cold water which tends to stabilize the outlet water temperature and reduces in this way the number of start-ups of the compressors;

- The whole integrate solution (evaporator and tank) is CE approved, completely tested and supplied with supports. IT integrated water tanks are available in 9 sizes, from 240 to 3000 litres.



Quality means to count on a design and a manufacturing process certified according to ISO9001 and to offer the widest range of pressure vessel approvals. On request, it is possible to obtain certifications by the major marine classification bodies.

Each Alfa Laval evaporator undergoes to the following tests:

- Pressure test refrigerant and water side at the pressure values and following the process indicated by the Alfa Laval standard or by the chosen pressure vessel code;
- Differential pressure test of the single refrigerant circuits;
- Leakage test with helium (maximum acceptable leakage value is 3 g/yr of R22).

After tests, the cooling circuit is dried and protected with adsorbing charges.



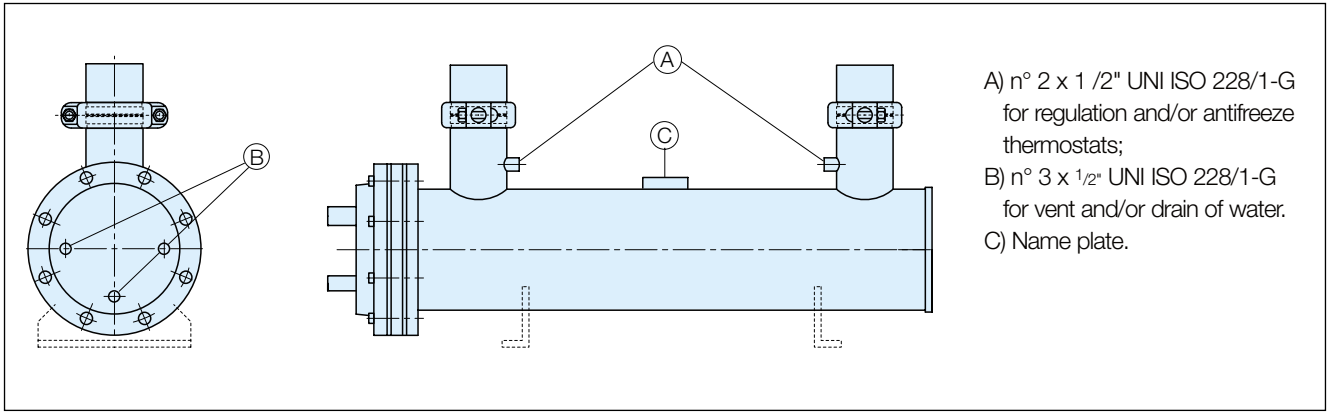
Nominal data DX_18-DX_1000		CE		Alfa Laval std.		UDT		ASME*	SQL		GOST	
		STD	BT	STD	BT	STD	BT	STD	STD	BT	STD	BT
DP refrig.	bar	29	21	25	21	24.5	21	15.5	24.5	21	24.5	21
TP refrig.	bar	41.5	30	27.5	23.1	27.5	23.1	17.05	27	23.1	27	23.1
DP water	bar	16	16	10	10	10	10	10	10	10	10	10
TP water	bar	22.8	15	15	15	15	15	11	15	15	15	15
DT	°C	-10	-40	-10	-40	-10	-40	-10	-10	-40	-10	-40
		+90	+50	+90	+50	+90	+50	+90	+90	+50	+90	+50

*ASME approval includes models starting with size 56 (shell diameter ≥6"). Models 18-47 are UL approved.

Nominal data DX_1100-DX_1500		CE		Alfa Laval std.		UDT		ASME	SQL		GOST	
		STD	BT	STD	BT	STD	BT	STD	STD	BT	STD	BT
DP refrig.	bar	20	20	20	20	20	20	15.5	20	20	20	20
TP refrig.	bar	28.6	28.6	22	22	22	22	17.05	22	22	22	22
DP water	bar	16	16	10	10	10	10	10	10	10	10	10
TP water	bar	22.8	15	15	15	15	15	11	15	15	15	15
DT	C°	-10	-40	-10	-40	-10	-40	-10	-10	-40	-10	-40
		+90	+50	+90	+50	+90	+50	+90	+90	+50	+90	+50

DP: design pressure
 TP: test pressure
 DT: design temperature

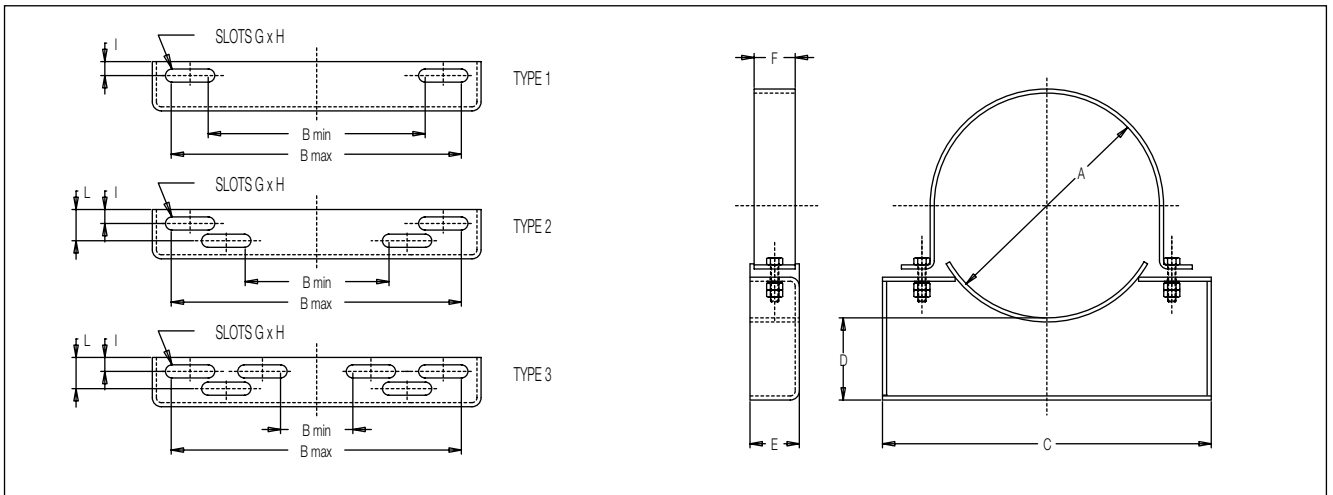




Supports

Alfa Laval evaporators can be equipped with supports welded to the shell (illustrated in the technical data pages which are following) or with universal brackets which are positioned in the installation phase and allows therefore the maximum flexibility (available up to shell diameter 406 mm).

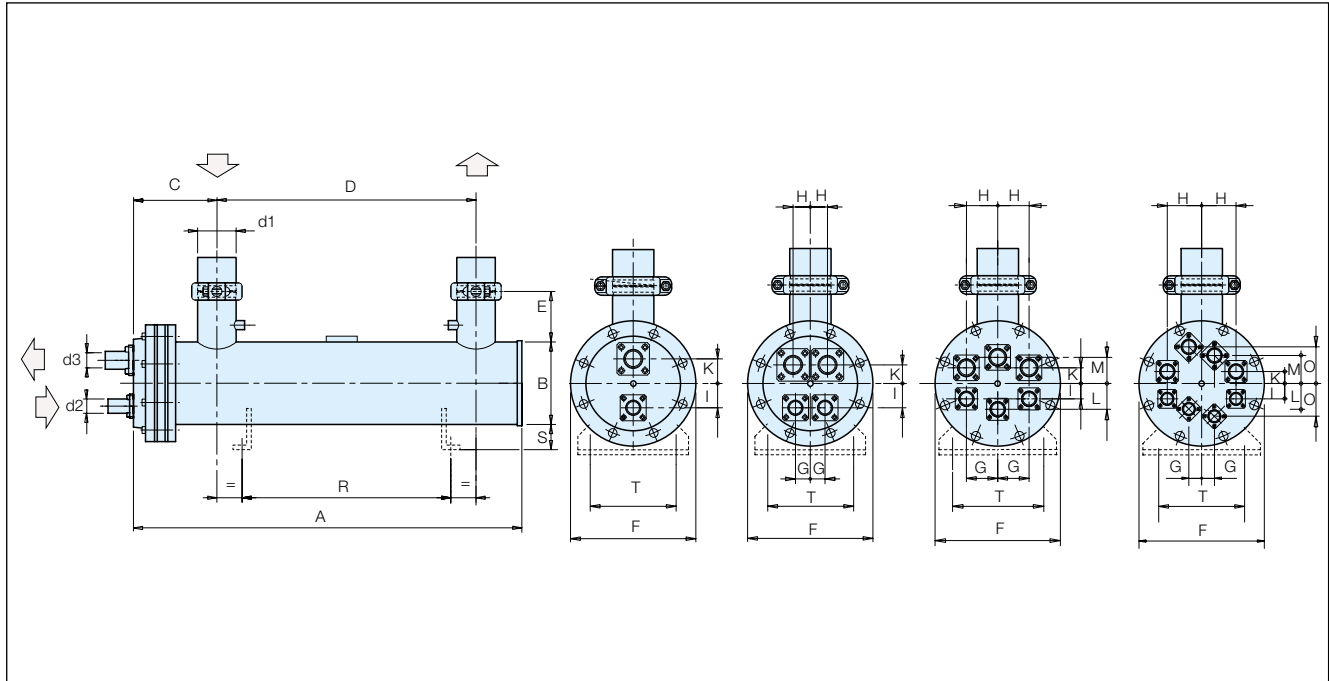
Universal Brackets: dimensions (mm)													
Code	A		B		C	D	E	F	SLOTS			I	L
	min	max	G	H					Type				
55341700	140	82	178	220	60	50	40	12	60	1	25	-	
55341710	168	112	208	250	60	50	40	12	60	1	25	-	
55341720	194	46	238	280	60	50	40	12	60	2	15	32	
55341730	219	82	276	320	80	50	40	12	60	2	15	32	
55341740	273	176	352	400	100	60	50	16	60	2	17	38	
55341750	324	108	372	420	100	60	50	16	60	3	17	38	
55341760	406	216	468	520	120	80	60	18	60	3	20	54	



ORDERING CODE

DXD	300	—	H	BT	CE
Model	Nominal capacity	Water connect. position	Baffles span	Design temperature	Approval
DXS DXD DXT DXQ	kW	— = Top DX = Right SX = Left	— = Standard H = Short distance X = Shorter distance	— = Standard BT = Low temp.	CE UDT ASME GOST SQL

Nominal Conditions	Model	DXS505 - DXD505 DXT505 - DXQ505	DXS570 - DXD570 DXT570 - DXQ570
Refrig.: R407c $T_{IN \text{ brine}} = 12^{\circ}\text{C}$ $T_{OUT \text{ brine}} = 7^{\circ}\text{C}$ $T_c(\text{dew}) = 45,26^{\circ}\text{C}$ $T_{\text{vap}}(\text{dew}) = 2,75^{\circ}\text{C}$ $\Delta T_{sc} = 3\text{K}; \Delta T_{sh} = 5\text{K}$ Lubricant oil ISO68	Q_{nom} [kW]	505	570
	W_{nom} [m ³ /h]	86,5	97,6
	W_{max} [m ³ /h]	100	105
	Δp_{nom} [bar]	0,45	0,50



MODEL		DXS 505	DXD 505	DXT 505	DXQ 505	DXS 570	DXD 570	DXT 570	DXQ 570	
Dimensions	A	mm	2697	2697	2693	2693	2697	2697	2693	2693
	B	mm	324	324	324	324	324	324	324	324
	C	mm	277	277	273	273	277	277	273	273
	D	mm	2250	2250	2250	2250	2250	2250	2250	2250
	E	mm	200	200	200	200	200	200	200	200
	F	mm	420	420	420	420	420	420	420	420
	G	mm	-	60	95	31	-	60	95	31
	H	mm	-	65	95	120	-	65	95	120
	K	mm	70	60	55	40	70	60	55	40
	I	mm	75	60	55	40	75	60	55	40
Support	R	mm	1800	1800	1800	1800	1800	1800	1800	1800
	S	mm	100	100	100	100	100	100	100	100
	T	mm	300	300	300	300	300	300	300	300
Connections	d1	—	J6	J6	J6	J6	J6	J6	J6	J6
	d2	—	FA-35	FA-35	FA-35	FA-35	FA-35	FA-35	FA-35	FA-35
	d3	—	FC-80	FC-80	FB-67	FA-54	FC-80	FC-80	FB-67	FA-54
Volumes - Weight	V_R	dm ³	59,9	59,9	59,9	59,9	68,8	68,8	68,8	68,8
	V_{H_2O}	dm ³	124,7	124,7	124,7	124,7	113,5	113,5	113,5	113,5
	P	kg	395	395	397	397	417	417	419	419
PED category*			III	II	II	II	III	II	II	II

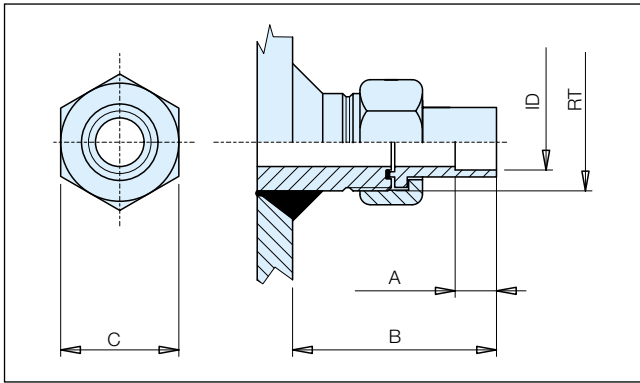
*PED category according to EU Directive 97/23/EC.
 The category refers to the use of Group 2 fluids at the PS value of the standard temperature version.

Q_{nom} Nominal cooling capacity
 W_{nom} Nominal water flow
 W_{max} Maximum water flow
 Δp_{nom} Nominal pressure drop (water side)
 ΔT_{sc} Subcooling
 ΔT_{sh} Superheating

Refrigerant connections

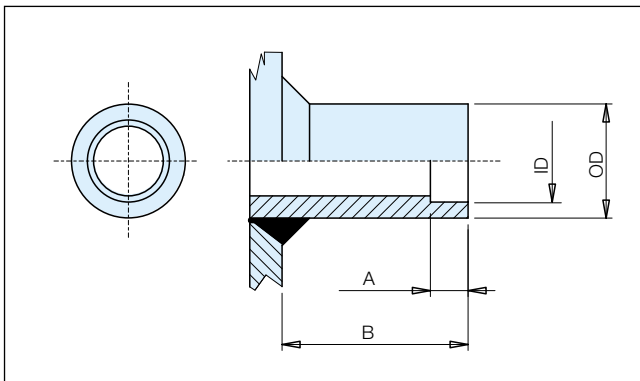
The connection between the evaporator and the refrigerant circuit is made, depending on the evaporator size, with rotalock connections, welding connections or flange connections.

Rotalock connections (R)



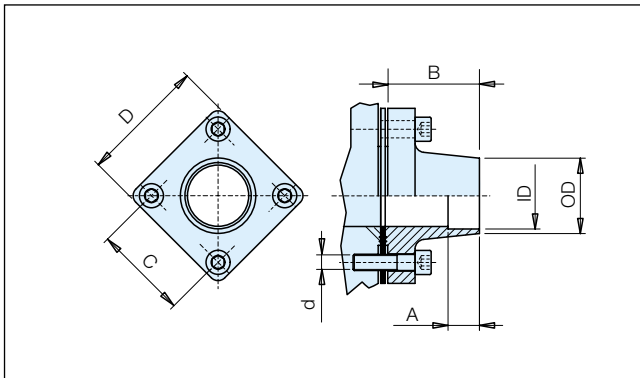
Rotalock								
Type	A	B	C	RT	Name	ODS	ODS	ID
	[mm]	[mm]	[mm]			[mm]	[mm]	[mm]
A	20	80	30	1" - 14UNF	RA16	16	5/8	16,3
B	20	80	36	1 1/4" - 12UNF	RB22	22	7/8	22,5
C	20	80	50	1 3/4" - 12UNF	RC28	28	-	28,3
	20	80	50	1 3/4" - 12UNF	RC35	35	1 3/8	35,3

Welding connections (W)



Welding						
Type	A	B	Name	ODS	ID	OD
	[mm]	[mm]		[mm]	[mm]	[mm]
A	20	80	WA22	22	22,5	26,7
	20	80	WA35	35	35,3	42,4
	20	80	WA42	42	42,4	48,3
	20	80	WA54	54	54,5	60,3

Flange connections (F)



Flange										
Type	A	B	C	D	d	Name	ODS	ODS	ID	OD
	[mm]	[mm]	[mm]	[mm]			[mm]	[mm]	[mm]	[mm]
A	20	60	55	75	M10	FA35	35	1 3/8	35,3	-
	20	60	55	75	M10	FA42	42	-	42,4	-
	20	60	55	75	M10	FA54	54	2 1/8	54,4	-
B	20	70	70	90	M10	FB54	54	2 1/8	54,4	-
	20	70	70	90	M10	FB67	66,7	2 5/8	67,2	76
C	20	70	90	110	M12	FC80	80	-	80,6	88,9

Special connections (flange)

Connection	STANDARD			Connection	SPECIAL					
	Name	ODS			Name		ODS			
					[mm]	[in]	[mm]	[in]	[mm]	[in]
Type A	FA35	35	1 3/8	Type A	FA42	FA54	42	-	54	2 1/8
	FA42	42	-		FA35	FA54	35	1 3/8	54	2 1/8
	FA54	54	2 1/8		FA35	FA42	35	1 3/8	42	-
Type B	FB67	67	2 5/8	Type B	FA54		42		2 1/8	
Type C	FC80	80	-	Type C	FC67		67		2 5/8	
					FC31		-		3 1/8	
					FC89		89		-	

Water connections

Different connections are available, depending on the evaporator size:

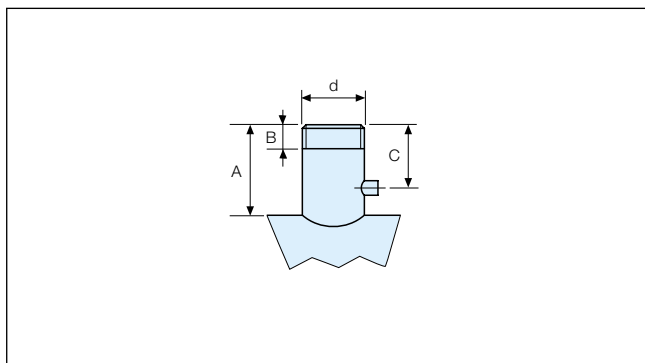
- With UNI/ISO 7/1 R thread up to 3";
- With flexible joint starting with 4" (DN 100);
- With UNI 2278 PN 16 flange connections (not standard alternative: to be specified).

The flexible joint gaskets are compatible with liquids normally

used in refrigeration and air conditioning applications and are suitable to be used within -40°C and $+80^{\circ}\text{C}$.

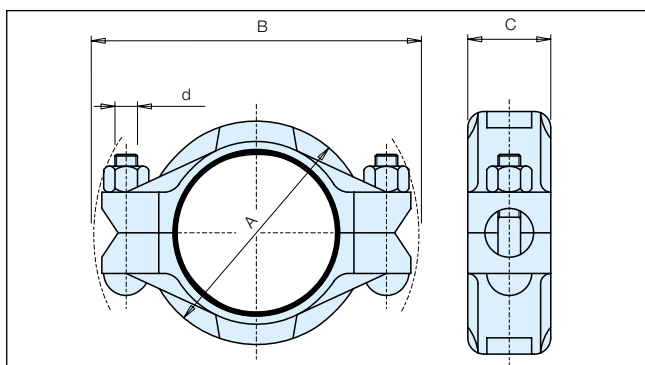
The joints are supplied with the flexible joint and a slot end with groove.

Threaded connections (T)



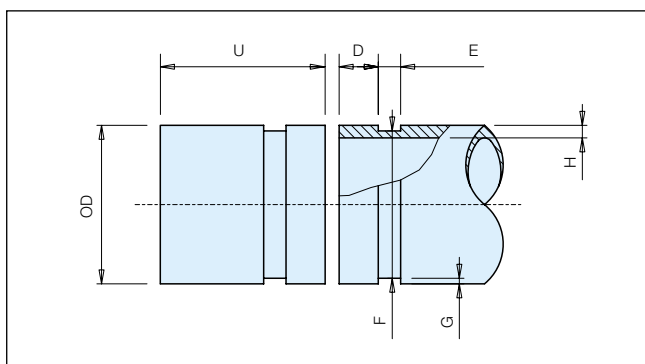
Threaded connections (T)					
Type	A	B	C	Name	d
	[mm]	[mm]	[mm]		[in]
DX18-28	130	25	60	T11	1 1/2
DX35-47	130	25	60	T2	2
DX56-95	130	35	60	T21	2 1/2
DX120-165	130	35	60	T3	3
DX160R	130	35	60	T3	3

Flexible joint (J)



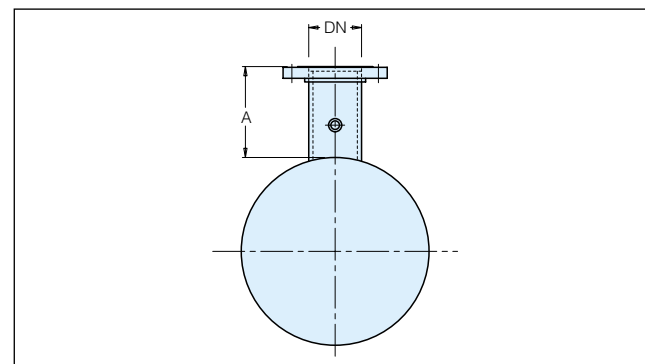
Flexible joint (J)							
Type	A	B	C	d	Name	OD	DN
	[mm]	[mm]	[mm]			[mm]	
DX200-240	149,2	212,8	50,8	M12	J4	114,3	100 (4")
DX300-385	177,8	250,8	50,8	M16	J5	141,3	125 (5")
DX450-570	203,2	285,8	50,8	M16	J6	168,3	150 (6")
DX660-1000	263,5	349,3	60,3	M20	J8	219,1	200 (8")
DX1100-1500	263,5	349,3	60,3	M20	J8	219,1	200 (8")
DX210R-275R	149,2	212,8	50,8	M12	J4	114,3	100 (4")
DX390R-480R	203,2	285,8	50,8	M16	J6	168,3	150 (6")

Connection pipe



Connection pipe							
Type	DN	D	E	F	G	H	U
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
DX200-240	100 (4")	15,9	9,5	110,1	2,1	3,2	100
DX300-385	125 (5")	15,9	9,51	35,5	2,9	4	100
DX450-570	150 (6")	19,5	9,5	163,9	2,2	4	150
DX660-1000	200 (8")	19	11,1	214,4	2,3	6,3	150
DX1100-1500	200 (8")	19	11,1	214,4	2,3	6,3	150
DX210R-275R	100 (4")	15,9	9,5	110,1	2,1	4	100
DX390R-480R	150 (6")	19,5	9,5	163,9	2,2	4	150

Flange connections



Flange connections		
Type	DN	A
		[mm]
DX18-28	40	130
DX35-47	50	130
DX56-95	65	130
DX120-165 160R	80	130
DX200-240 210R-275R	100	160
DX200-385	125	160
DX450-570 390R-480R	150	210
DX660-1000	200	215
DX1100-1500	200	265

Alfa Laval in brief

Alfa Laval is leading global provider of specialized products and engineering solutions.

Our equipment, systems and services are dedicated to assisting customers in optimizing the performance of their processes. Time and time again.

We help them heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuff, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

