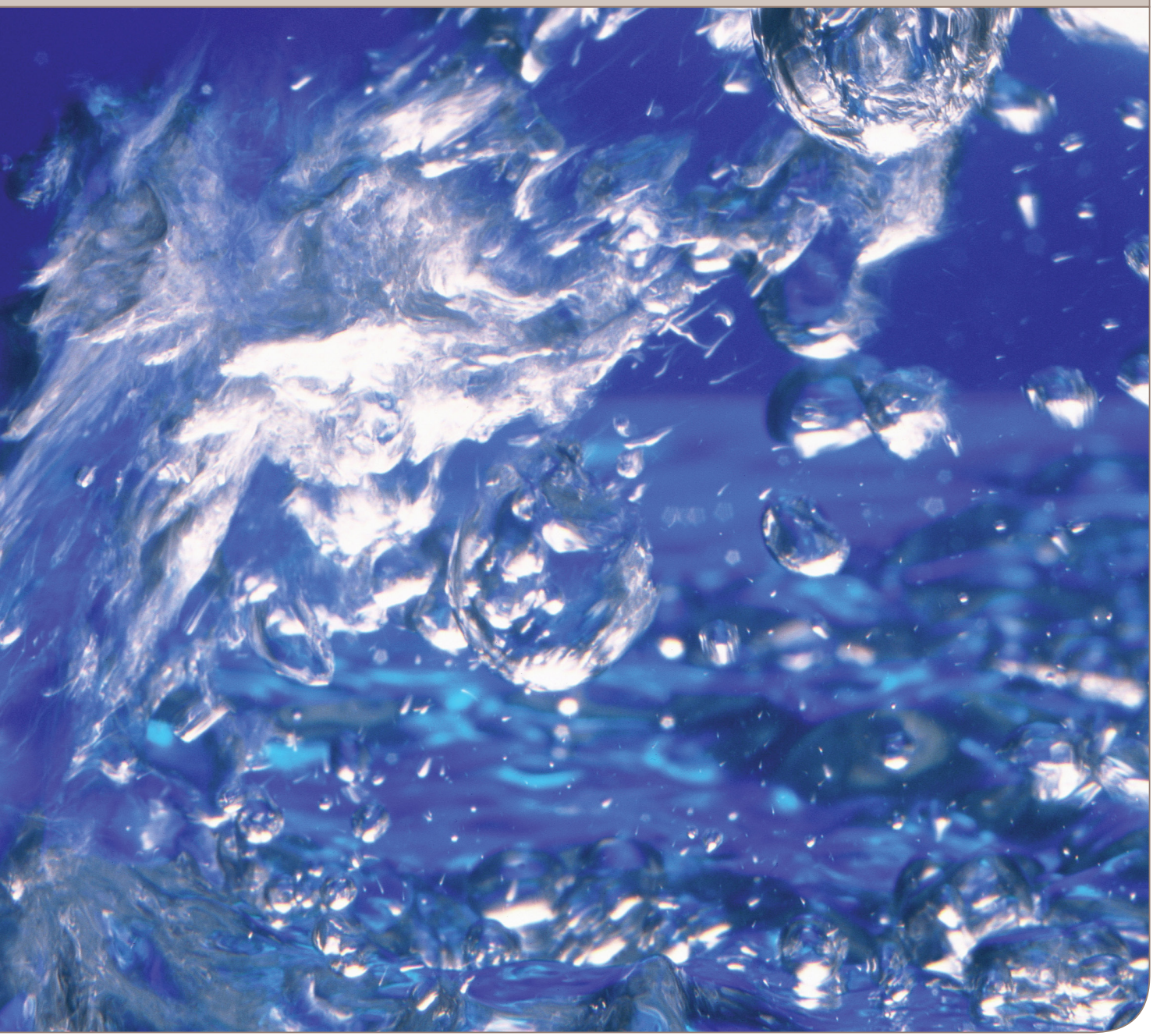
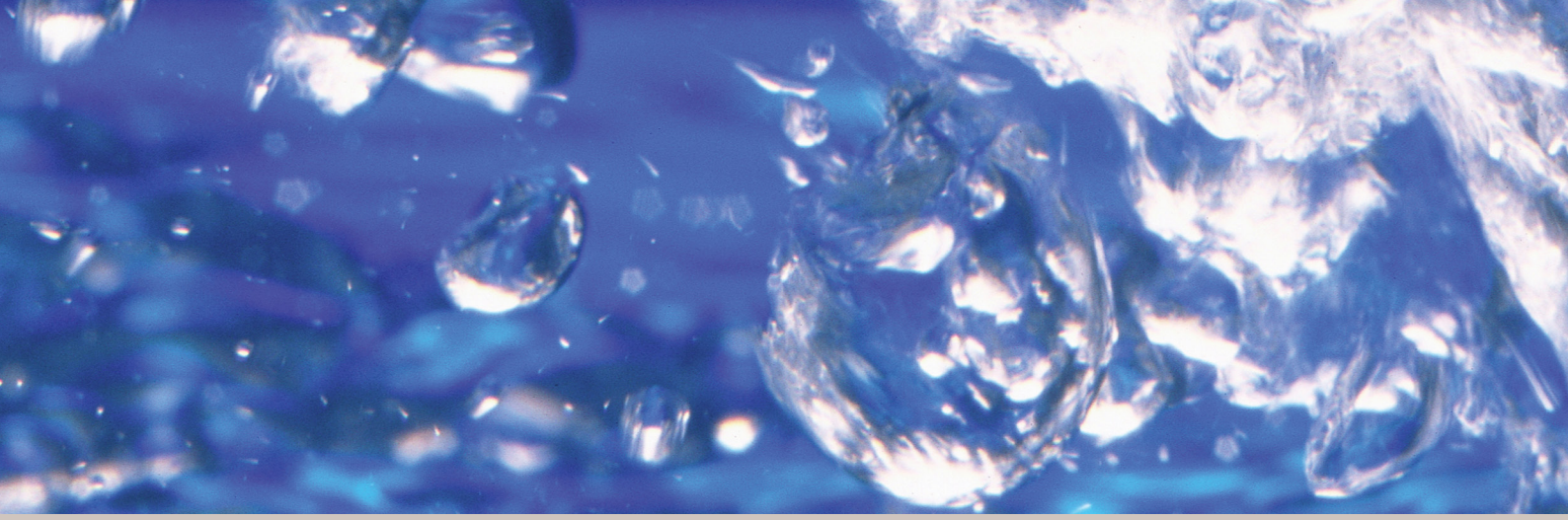
Shell-and-tube fresh water condenser CRF

A new series of shell-and-tube condensers for fresh water applications





Shell-and-tube fresh water condenser CRF

Application
The new CRF condenser has been developed for HFC cooling applications at medium pressure (PS 30 bar) and high pressure (PS 48 bar) within refrigeration, process cooling and air conditioning.

The secondary fluid is usually fresh water that can be in a closed loop with a cooling tower (tower application) or in an open loop with a well (city application). Some applications can use also glycol.

These applications usually require a condensation temperature in a range of +30°C/+50°C depending on the system working condition and its efficiency rating.

Technology
The CRF design has been optimized for R407C/F and R134a refrigerants but it can be also utilized with HFO1234ze, R410A, R404A and R507.

Thank's to its new high performance tubes, new headers, new shell and the new baffles, the Alfa Laval CRF models provide maximum efficiency with a low cost/kW.

This is an important step ahead compared with the current CDEW and CDEW-E models; the new CRF is ready to fight with competition.

Benefits
- High efficient condenser tube which allows an overall performance increase vc. CDEW models keeping the water pressure drop at the same level.
- Refrigerant connections optimized for R134a to reduce the pressure drops.
- Three tube lenghts to match operating conditions with different temperature approaches.
- Compact design with about 15%-20% shorter lenght and weight comparing with existing solution.
- Water flow optimized to reduce the fouling and erosion risks.

Design data

PED (CE) approval

Version	Tubes side				Shell side			
	DP (bar)	DT (°C)	Tmin (°C)	PT (bar)	DP (bar)	DT (°C)	Tmin (°C)	PT (bar)
STD	10	90	-10	14.3	30	120	-10	42.9
HP	16	90	-10	22.9	48	120	-10	68.6

DP Design Pressure
DT Design Temperature
Tmin Minimum temperature
PT Test Pressure

Denomination

CRF 324-5-S

- Shell size
- Tube length (mm) (5=1534, 6=1829, 7=2134)
- Number of tubes (1-4)
- Shell diameter: 16=168 mm XS, 21=219 mm, S, 27=273 mm, S, 32=324 mm, S, 40=406 mm, M, 45=457 mm, M
- Condenser for fresh water

The XS-S-M in item's description is set according to shell diameter and the chart below.

Dshell Min - Max range				
	mm		Inches	
XS	51	168	2	6.63
S	194	324	7.63	12.75
M	356	457	14	18
L	508	610	20	24
XL	660	1007	26	42

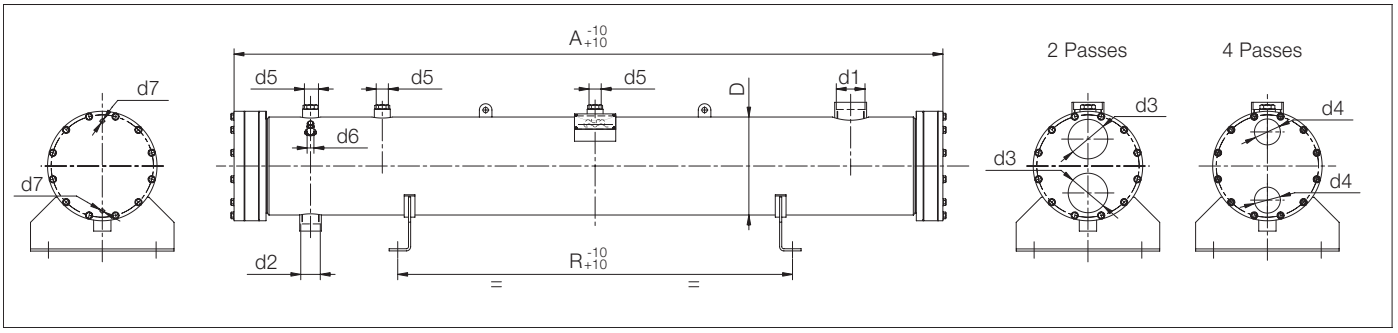
Capacity table

CRF serie has been optimized on three different shell sizes, according to the approach requested.

CRF (Tower version - 2P) Ti = 30°C To = 35°C, SC = 3 [K], FF = 4.3E-05 [m²K/W]																							
CRF Model 5 ft		162-5 XS	163-5 XS	164-5 XS	211-5 S	212-5 S	213-5 S	214-5 S	271-5 S	272-5 S	273-5 S	274-5 S	322-5 S	323-5 S	324-5 S	401-5 M	402-5 M	403-5 M	404-5 M	452-5 M	453-5 M	454-5 M
R407C **Tc = 44.5°C (dew)** **Tg = 85°C**	Qn (kW)	109	123	142	166	197	225	249	287	320	353	410	481	530	598	681	746	829	930	1003	1081	1151
R134a **Tc = 40.0** **Tg = 55°C**	Qn (kW)	111	125	145	169	201	230	255	293	327	361	420	493	544	614	698	765	851	956	1030	1111	1184
CRF Model 6 ft		162-6 XS	163-6 XS	164-6 XS	211-6 S	212-6 S	213-6 S	214-6 S	271-6 S	272-6 S	273-6 S	274-6 S	322-6 S	323-6 S	324-6 S	401-6 M	402-6 M	403-6 M	404-6 M	452-6 M	453-6 M	454-6 M
R407C **Tc = 43.0°C (dew)** **Tg = 85°C**	Qn (kW)	111	125	145	168	200	229	253	292	325	359	417	489	540	608	692	758	843	946	1020	1100	1172
R134a **Tc = 38.5** **Tg = 55°C**	Qn (kW)	106	119	139	161	192	220	244	280	312	345	401	471	520	586	667	731	814	914	985	1062	1132
CRF Model 7 ft		162-7 XS	163-7 XS	164-7 XS	211-7 S	212-7 S	213-7 S	214-7 S	271-7 S	272-7 S	273-7 S	274-7 S	322-7 S	323-7 S	324-7 S	401-7 M	402-7 M	403-7 M	404-7 M	452-7 M	453-7 M	454-7 M
R407C **Tc = 42.0°C (dew)** **Tg = 85°C**	Qn (kW)	113	126	147	170	203	233	257	296	330	365	424	497	548	618	704	770	858	962	1037	1117	1190
R134a **Tc = 37.5** **Tg = 55°C**	Qn (kW)	101	114	132	153	183	210	232	266	298	329	382	448	495	558	636	697	775	870	938	1011	1079
Wm	(m^3/h)	22.4	26.5	30.6	34.7	42.9	48.9	54.0	61.3	69.3	76.5	88.7	103.9	116.1	132.7	150.8	165.3	183.6	207.6	224.4	241.8	262.6

Ti Inlet water temperature
To Outlet water temperature
SC Subcooling
FF Fouling factor
Tc Condensing temperature
Tg Inlet gas temperature
Qn Condensing capacity
Wm Water maximum flow

General dimensions



CRF Model 5 ft			162-5 XS	163-5 XS	164-5 XS	211-5 S	212-5 S	213-5 S	214-5 S	271-5 S	272-5 S	273-5 S	274-5 S	322-5 S	323-5 S	324-5 S	401-5 M	402-5 M	403-5 M	404-5 M	452-5 M	453-5 M	454-5 M
Dimensions	A	mm	1605			1620				1650				1670			1690				1715		
	D	mm	168.3			219.1				273.0				323.4			406.4				457.0		
	R	mm	900			900				900				900			900				900		
Connections	d1	mm	WA42			WA67				WA80				WA89			WA108				WA108		
	d2	mm	RCL35			WA42				WA54				WA67			WA80				WA80		
	d3	in-G	T2			T21				T4				T4			T6				T6		
	d4	in-G	T11			T2				T21				T3			T4				T5		
	d5	N°xin-NPT	1 x 1/2			1 x 3/4				1 x 1				2 x 1			3 x 1				3 x 1		
	d6	in-NPT	1/4			1/4				1/4				1/4			1/4				1/4		
	d7	in-G	1/4			1/4				1/4				1/4			1/4				1/2		
Volumes and weights	Vr	dm³	21.4	19.9	18.3	38.6	35.5	33.1	31.2	56.4	53.2	50.5	45.8	73.6	68.9	62.6	121.8	116.3	109.3	100	141.1	134.1	126.7
	VH20	dm³	7.6	8.7	9.8	12.7	15.0	16.6	18.0	22.8	25.0	26.9	30.3	36.9	40.3	44.7	55.0	58.9	63.9	70.6	78.7	83.7	89.0
	P	kg	61	65	68	98	105	110	114	172	179	185	194	237	247	260	387	398	413	432	511	526	541

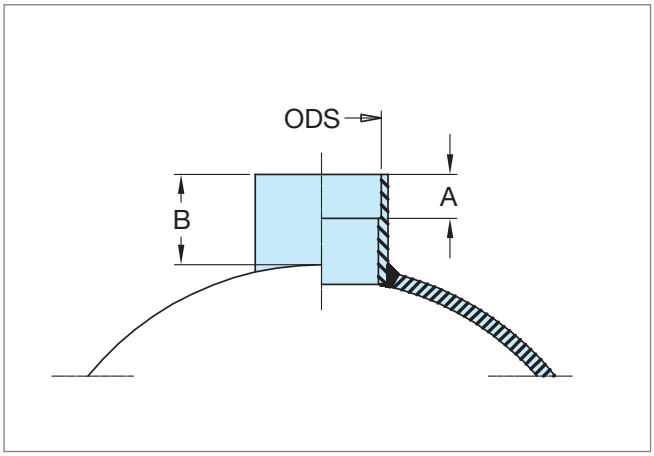
CRF Model 6 ft			162-6 XS	163-6 XS	164-6 XS	211-6 S	212-6 S	213-6 S	214-6 S	271-6 S	272-6 S	273-6 S	274-6 S	322-6 S	323-6 S	324-6 S	401-6 M	402-6 M	403-6 M	404-6 M	452-6 M	453-6 M	454-6 M
Dimensions	A	mm	1910			1925				1955				1975			2000				2020		
	D	mm	168.3			219.1				273.0				323.4			406.4				457.0		
	R	mm	1100			1100				1100				1100			1100				1100		
Connections	d1	mm	WA42			WA67				WA80				WA89			WA108				WA108		
	d2	mm	RCL35			WA42				WA54				WA67			WA80				WA80		
	d3	in-G	T2			T21				T4				T4			T6				T6		
	d4	in-G	T11			T2				T21				T3			T4				T5		
	d5	N°xin-NPT	1 x 1/2			1 x 3/4				1 x 1				2 x 1			3 x 1				3 x 1		
	d6	in-NPT	1/4			1/4				1/4				1/4			1/4				1/4		
	d7	in-G	1/4			1/4				1/4				1/4			1/4				1/2		
Volumes and weights	Vr	dm³	25.8	23.9	22.0	46.5	42.8	39.9	37.6	67.9	64.2	60.9	55.2	88.6	83.0	75.4	147.0	140.4	131.9	120.7	170.3	161.8	152.9
	VH20	dm³	8.8	10.2	11.5	14.6	17.3	19.3	21.0	26.1	28.8	31.1	35.1	42.6	46.6	52.0	63.2	67.9	73.9	81.9	90.9	97.0	103.3
	P	kg	70	74	78	111	119	125	130	194	202	209	221	269	281	296	431	445	462	486	573	591	609

CRF Model 7 ft			162-7 XS	163-7 XS	164-7 XS	211-7 S	212-7 S	213-7 S	214-7 S	271-7 S	272-7 S	273-7 S	274-7 S	322-7 S	323-7 S	324-7 S	401-7 M	402-7 M	403-7 M	404-7 M	452-7 M	453-7 M	454-7 M
Dimensions	A	mm	2215			2230				2260				2280			2300				2325		
	D	mm	168.3			219.1				273.0				323.4			406.4				457.0		
	R	mm	1500			1500				1500				1500			1500				1500		
Connections	d1	mm	WA42			WA67				WA80				WA89			WA108				WA108		
	d2	mm	RCL35			WA42				WA54				WA67			WA80				WA80		
	d3	in-G	T2			T21				T4				T4			T6				T6		
	d4	in-G	T11			T2				T21				T3			T4				T5		
	d5	N°xin-NPT	1 x 1/2			1 x 3/4				1 x 1				2 x 1			3 x 1				3 x 1		
	d6	in-NPT	1/4			1/4				1/4				1/4			1/4				1/4		
	d7	in-G	1/4			1/4				1/4				1/4			1/4				1/2		
Volumes and weights	Vr	dm³	30.2	28.0	25.7	54.5	50.0	46.7	43.9	79.5	75.1	71.2	64.6	103.7	97.1	88.2	172.1	164.4	154.5	141.3	199.5	189.6	179.1
	VH20	dm³	10.1	11.6	13.2	16.5	19.6	22.0	23.9	29.4	32.6	35.3	40.0	48.3	53.0	59.2	71.5	76.9	83.9	93.3	103.2	110.2	117.6
	P	kg	79	84	88	124	133	139	145	216	225	233	247	301	315	333	476	492	512	540	635	655	677

Refrigerant connections

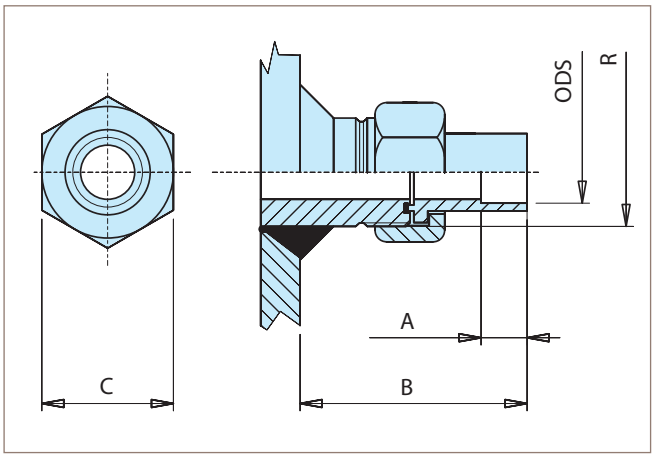
Refrigerant inlet and outlet are equipped with welding or Rotalock brazing connections.

Welding connections



Welding							
		WA42	WA54	WA67	WA80	WA89	WA108
A	mm	20	20	25	25	25	25
B	mm	50	50	50	50	50	50
ODS	mm	42	54	67	80	89	108
OD	mm	48.3	60.3	76.1	88.9	101.6	114.3

Rotalock connections

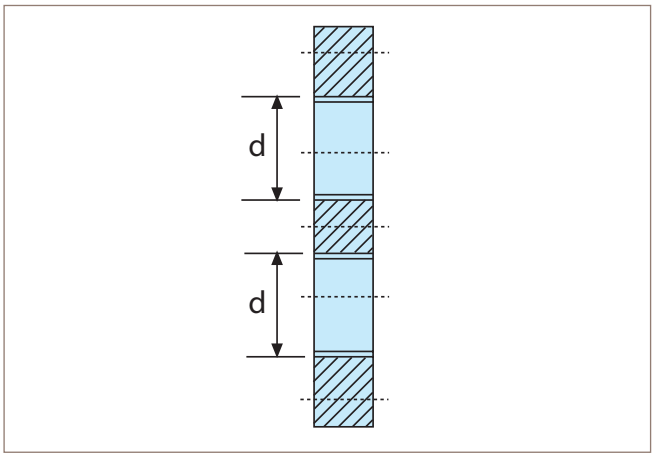


Rotalock				
		Type B	Type C	
A	mm	20	20	20
B	mm	80	80	80
C	mm	36	50	50
RT	-	1¼" 12 NF	1¾" 12 UNF	1¾" 12 UNF
Name	mm	RB22	RC28	RC35
ODS	mm	22	28	35
ID	mm	22.5	28.2	35.3

Brine connections

Water inlet and outlet connections on the condenser CRF are female threaded connections. Flange connections are available as option on request.

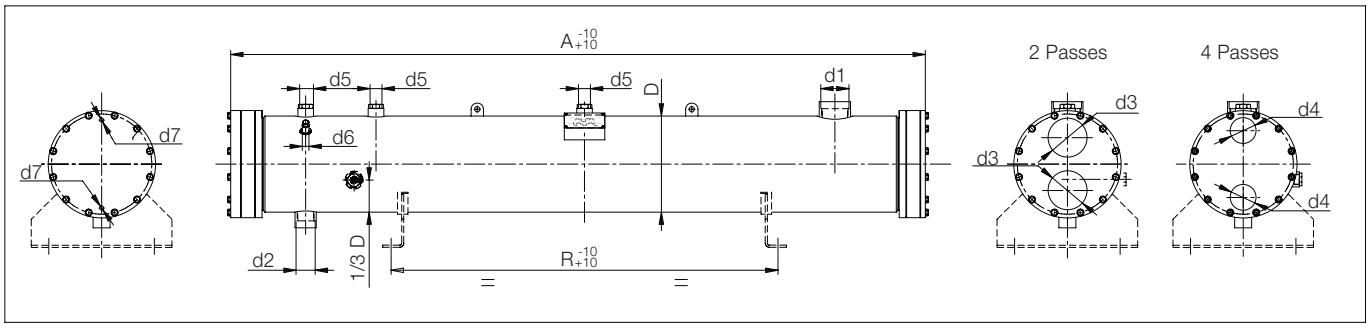
Brine connections



Water	
	d (in)
T1	1
T11	1½
T2	2
T21	2½
T3	3
T4	4
T5	5
T6	6

Options

Welded supports and sight glass are available as options. Please refer to 'General dimensions' table for standard interaxis of welded supports. The standard position of sight glass will be according to the drawing below.

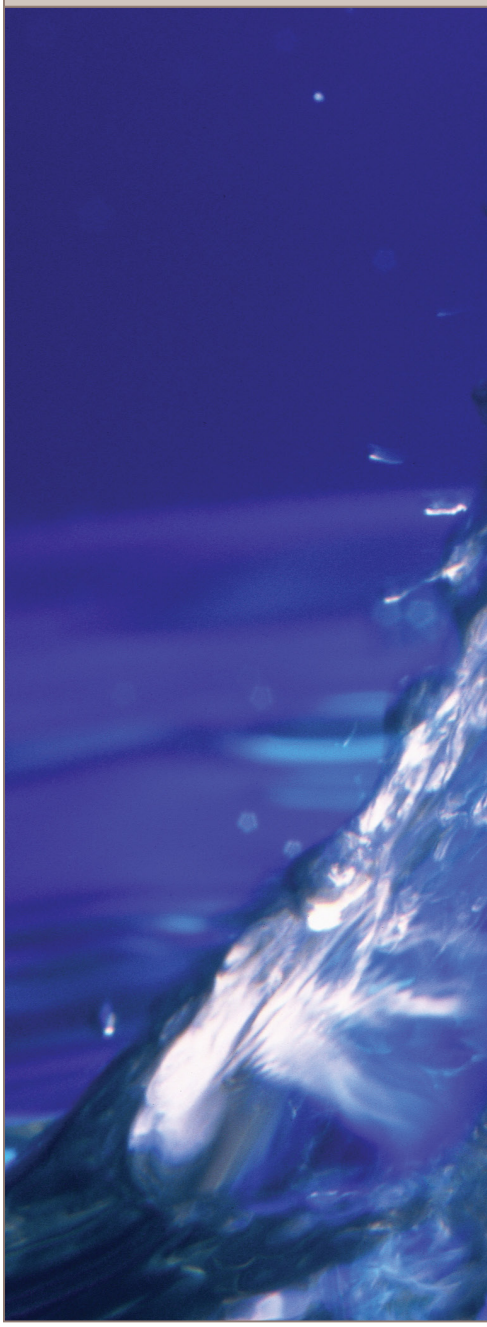


Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineered solutions.
Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.
We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.
Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com



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