DAS HERZ DER FRISCHE

WATER COOLED

CONDENSERS

DP-270-2 EN

CRF/CRM SERIES

HEAT EXCHANGER

HFO READY

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PROPANE

Water cooled Shell and tube condensers:
CRF AND CRM SERIES

Applications

CRF and CRM condensers have been developed for cooling applications within commercial and industrial refrigeration, air conditioning, process cooling and marine comfort and provision cooling in combination with refrigerants operating at medium or high pressure.

Designed for HFC, HFO and HFC/HFO blends, CRF and CRM are approved for operation with propane and – in the version with stainless steel or carbon steel tubes – with ammonia.

The secondary fluid is for CRF (featuring copper tubes) normal water or brine in closed loop with a cooling tower or a drycooler or in an open loop with water coming from a well, river, lake or an industrial process.

CRM models (featuring copper-nickel 90/10 tubes) are designed to operate with seawater as secondary fluid.

The capacity range is reaching 2500 kW condensation capacity for CRF models and 1650 kW for CRM models.

Technology

CRF and CRM have a medium pressure version (30 bar design pressure in the shell side) and a high pressure version featuring 48 bar design pressure until models CRF/CRM45.

The highest efficiency extended surface copper tubes are used for CRF, which low-fouling inner profile tubes in copper-nickel 90/10 alloy represent the standard for CRM. AISI316L stainless steel and carbon steel are also available in case of CRF.

CRM seawater models are also equipped as a standard with solid AISI316L tube sheets and end covers, double refrigerant outlet for perfect operation onboard and sacrificial anodes in decarburized steel.

Benefits

// Maximum flexibility of choice: 108 CRF standard models and 108 CRM seawater models using 3 different tube lengths (5, 6 and 7 ft) in order to ensure in any condition the best combination between performance and size

// A wide range of materials available and of design pressure versions makes CRF/CRM suitable for different refrigerants and various applications

// Many options and large customization possibilities

// A large portfolio of pressure vessel approvals (CE, EAC, SELO-CML, ASME) and marine class approvals (DNV, BV, ABS, RS, LRS, RINA).

	CRF	CRM
Tubes	Copper (standard) AISI316L stainless steel, carbon steel (option)	Copper-nickel 90/10 (CuNi10Fe1Mn)
Tube sheets	Carbon steel (standard) AISI316L stainless steel (option)	AISI316L stainless steel
End covers	Cast iron / carbon steel (standard) AISI316L stainless steel (option)	AISI316L stainless steel
Shell	Carbon steel	Carbon steel
Sacrificial anodes		Decarburized steel

HFO READY

Design data
PED (CE), EAC, SELO-CML approvals

Version	Tubes side			Shell side		
	DP (bar)	DT (°C)	Tmin (°C)	DP (bar)	DT (°C)	Tmin (°C)
STD	10	90	-10	30	120	-10
HP – REF*	10	90	-10	48	120	-10
HP – H2O*	16	90	-10	30	120	-10

* High pressure versions are available for models CRF/M16-45

Class approvals (DNV, BV, ABS, RS, LRS, RINA)

Version	Tubes side			Shell side		
	DP (bar)	DT (°C)	Tmin (°C)	DP (bar)	DT (°C)	Tmin (°C)
STD	10	90	-10	30	120	-10

DP Design Pressure // DT Design Temperature // Tmin Minimum temperature

Denomination

CRFS454-7HP-2P SG SS STW CE

- Secondary fluid version
  F = normal water; brine
  M = seawater
- No mention: standard condenser
  S = special or customized
- Shell diameter in cm
- Number of tubes
- Tube length
  5 = 1534 mm
  6 = 1829 mm
  7 = 2134 mm
- Design pressure version
  No mention: medium pressure version (30 bar shell side / 10 bar tube side)
  HP: high pressure version on the shell side (48 bar)
  HPR: high pressure version on the shell and on the tube side (48 / 16 bar)
  HPW: high pressure version on the tube side (30 / 16 bar)
- Number of water-side passes
  2P = 2 passes
  4P = 4 passes
- Sight glass
  No mention: without sight glass (standard for CRF)
  SG: with sight glass (standard for CRM)
- Tube material
  No mention: copper for CRF; copper-nickel 90/10 for CRM
  SS = stainless steel
  CS = carbon steel
- Support feet
  No mention: without support feet
  STW = couple of welded support feet
  STK = couple of universal brackets
- Pressure vessel approval

Water cooled Shell and tube condensers:
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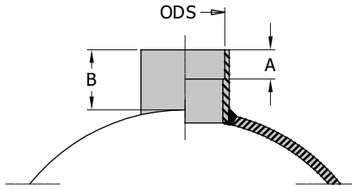
Refrigerant connections

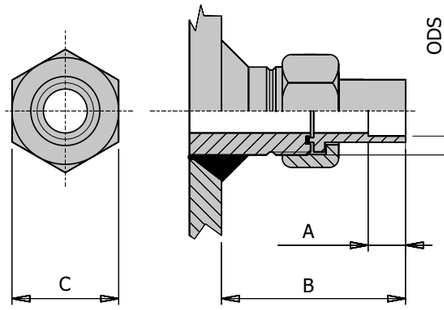
Refrigerant inlet and outlet are equipped with welding or Rotalock brazing connections.

Welding connections



Welding									
		WA42	WA54	WA67	WA80	WA89	WA108	WA133	DN150
A	mm	20	20	25	25	25	25	30	-
B	mm	50	50	50	50	50	50	99	139
ODS	mm	42	54	67	80	89	108	133,5	-
OD	mm	48,3	60,3	76,1	88,9	101,6	114,3	141,3	168,3

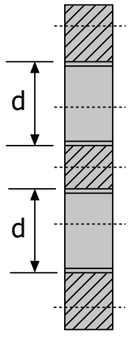
Rotalock connections



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 standard connections are female threaded on CRF/CRM16-45 models and flexible joint (Victaulic) on CRF/CRM50-61 models. Flange connections are available as option on request.

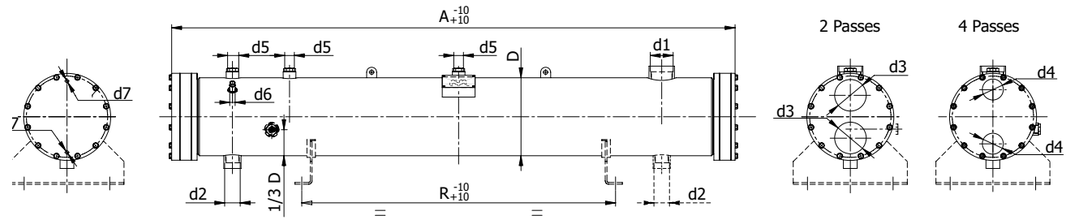


Water	
	d (in)
T1	1
T11	1½
T2	2
T21	2½
T3	3
T4	4
T5	5
T6	6

Options

The following options are available:

// Welded support feet (standard distance “R” is indicated under “General dimensions”)
// Universal brackets (available for models CRF/CRM16-40)
// Sight glass (standard for CRM, optional for CRF; the standard position of the sight glass will be according to the drawing below)



Nominal capacities CRF

CRF and CRM models have been optimized on three different tube lengths, depending on the required thermal approach.
In order to operate an optimized selection of the condenser at a specific working condition, the available tool is the calculation software.

				Tube length -5 Tc = 40,0=°C	Tube length -6 Tc = 38,5°C	Tube length -7 Tc = 37,5°C
Model	SD (mm)	SD (")	Wm (m³/h)	Qn (kW)	Qn (kW)	Qn (kW)
CRF162	168,3	6⅝	22,4	111	106	101
CRF163	168,3	6⅝	26,5	125	119	114
CRF164	168,3	6⅝	30,6	145	139	132
CRF211	219,1	8⅝	34,7	169	161	153
CRF212	219,1	8⅝	42,9	201	192	183
CRF213	219,1	8⅝	48,9	230	220	210
CRF214	219,1	8⅝	54	255	244	232
CRF271	273	10¾	61,3	293	280	266
CRF272	273	10¾	69,3	327	312	298
CRF273	273	10¾	76,5	361	345	329
CRF274	273	10¾	88,7	420	401	382
CRF322	323,9	12¾	103,9	493	471	448
CRF323	323,9	12¾	116,1	544	520	495
CRF324	323,9	12¾	132,7	614	586	558
CRF401	406,4	16	150,8	698	667	636
CRF402	406,4	16	165,3	765	731	697
CRF403	406,4	16	183,6	851	814	775
CRF404	406,4	16	207,6	956	914	870
CRF452	457,2	18	224,4	1030	985	938
CRF453	457,2	18	235,2	1111	1062	1011
CRF454	457,2	18	235,2	1184	1132	1079
CRFS5001	508	20	235,2	1148	1096	1044
CRFS5005	508	20	235,2	1223	1168	1112
CRFS5009	508	20	235,2	1297	1239	1181
CRFS5013	508	20	235,2	1325	1311	1249
CRFS5016	508	20	235,2	1350	1350	1300
CRFS5501	558,8	22	312	1418	1355	1290
CRFS5505	558,8	22	328,3	1493	1426	1359
CRFS5510	558,8	22	348,8	1587	1516	1444
CRFS5514	558,8	22	365,2	1661	1587	1512
CRFS5518	558,8	22	381,5	1736	1659	1580
CRFS6101	609,6	24	379,5	1703	1627	1550
CRFS6106	609,6	24	399,9	1795	1715	1634
CRFS6112	609,6	24	424,5	1905	1820	1734
CRFS6118	609,6	24	434	2016	1926	1835
CRFS6123	609,6	24	434	2108	2015	1919

Tc Condensing temperature
SD Outer shell diameter
Wm Maximum secondary fluid flow rate
Qn Nominal condensing capacity
Tg Refrigerant inlet temperature
SC Subcooling
Ti Inlet temperature (secondary fluid)
To Outlet temperature (secondary fluid)
FF Fouling factor

2 pass configuration
Refrigerant (shell) side: R134a, Tg 55°C, SC 3K
Secondary fluid (tube) side: water, Ti 30°C, To 35°C, FF 0,000043 m²K/W

Nominal capacities CRM

				Tube length -5 Tc = 40,0=°C	Tube length -6 Tc = 38,5°C	Tube length -7 Tc = 37,5°C
Model	SD (mm)	SD (")	Wm (m³/h)	Qn (kW)	Qn (kW)	Qn (kW)
CRM162	168,3	6⅝	14,6	62	58	55
CRM163	168,3	6⅝	17,2	71	67	63
CRM164	168,3	6⅝	17,5	83	78	74
CRM211	219,1	8⅝	22,5	95	90	85
CRM212	219,1	8⅝	27,4	116	109	103
CRM213	219,1	8⅝	27,4	132	125	118
CRM214	219,1	8⅝	27,4	147	139	131
CRM271	273	10¾	39,8	167	158	149
CRM272	273	10¾	45,1	188	178	168
CRM273	273	10¾	49,8	208	196	185
CRM274	273	10¾	57,8	241	228	216
CRM322	323,9	12¾	67,7	283	268	253
CRM323	323,9	12¾	70	315	297	281
CRM324	323,9	12¾	70	357	337	319
CRM401	406,4	16	98	406	384	362
CRM402	406,4	16	107,6	444	420	397
CRM403	406,4	16	119,6	495	468	442
CRM404	406,4	16	135	557	527	498
CRM452	457,2	18	146	601	569	538
CRM453	457,2	18	156,7	651	617	582
CRM454	457,2	18	156,7	698	659	624
CRMS5001	508	20	156,7	668	632	598
CRMS5005	508	20	156,7	712	673	636
CRMS5009	508	20	156,7	755	714	676
CRMS5013	508	20	156,7	798	755	714
CRMS5016	508	20	156,7	832	786	743
CRMS5501	558,8	22	202	825	781	738
CRMS5505	558,8	22	213	868	822	778
CRMS5510	558,8	22	226	922	873	826
CRMS5514	558,8	22	237	966	916	864
CRMS5518	558,8	22	247	1010	956	904
CRMS6101	609,6	24	246	996	943	891
CRMS6106	609,6	24	259	1050	994	940
CRMS6112	609,6	24	275	1115	1056	997
CRMS6118	609,6	24	289,3	1180	1117	1056
CRMS6123	609,6	24	289,3	1234	1168	1104

Tc Condensing temperature
SD Outer shell diameter
Wm Maximum secondary fluid flow rate
Qn Nominal condensing capacity
Tg Refrigerant inlet temperature
SC Subcooling
Ti Inlet temperature (secondary fluid)
To Outlet temperature (secondary fluid)
FF Fouling factor

2 pass configuration
Refrigerant (shell) side: R134a, Tg 55°C, SC 3K
Secondary fluid (tube) side: seawater, Ti 30°C, To 35°C, FF 0,000086 m²K/W

General dimensions CRF/CRM16-45

CRF/CRM 5			162-5	163-5	164-5	211-5	212-5	213-5	214-5	271-5	272-5	273-5	274-5	322-5	323-5	324-5	401-5	402-5	403-5	404-5	452-5	453-5	454-5
Dimensions	A	mm	1614			1644				1677				1682			1697				1691		
	D	mm	168,3			219,1				273,0				323,9			406,4				457		
	Wi	mm	200			300				400				400			500				485		
	H	mm	275			343				450				505			622				674		
	R	mm	900			900				900				900			800				800		
Connections	d1	ODS	WA42			WA67				WA80				WA89			WA108				WA108		
	d2*	ODS	RCL35			WA42				WA54				WA67			WA80				WA80		
	d3	in-G	T2			T21				T4				T4			T6				J6		
	d4	in-G	T11			T2				T21				T3			T4				T5		
	d5	in-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	V_R	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
	V_{H20}	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
	W	kg	61	65	68	98	105	110	114	172	179	185	194	237	247	260	387	398	413	432	511	526	541

* 2 outlet connections on CRM models

CRF/CRM 6			162-6	163-6	164-6	211-6	212-6	213-6	214-6	271-6	272-6	273-6	274-6	322-6	323-6	324-6	401-6	402-6	403-6	404-6	452-6	453-6	454-6
Dimensions	A	mm	1910			1925				1955				1975			2000				2020		
	D	mm	168,3			219,1				273,0				323,4			406,4				457,0		
	Wi	mm	200			300				400				400			500				485		
	H	mm	275			343				450				505			622				674		
	R	mm	1100			1100				1100				1100			1100				1100		
Connections	d1	ODS	WA42			WA67				WA80				WA89			WA108				WA108		
	d2*	ODS	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	in-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	V_R	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
	V_{H20}	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

* 2 outlet connections on CRM models

CRF Model 7 ft			162-7	163-7	164-7	211-7	212-7	213-7	214-7	271-7	272-7	273-7	274-7	322-7	323-7	324-7	401-7	402-7	403-7	404-7	452-7	453-7	454-7
Dimensions	A	mm	2215			2230				2260				2280			2300				2325		
	D	mm	168,3			219,1				273,0				323,4			406,4				457,0		
	Wi	mm	200			300				400				400			500				485		
	H	mm	275			343				450				505			622				674		
	R	mm	1500			1500				1500				1500			1500				1500		
Connections	d1	mm	WA42			WA67				WA80				WA89			WA108				WA108		
	d2*	ODS	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	in-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	V_R	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
	V_{H20}	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

* 2 outlet connections on CRM models

General dimensions CRF/CRM50-61

CRF/CRM 5			5001-5	5005-5	5009-5	5013-5	5016-5	5501-5	5505-5	5510-5	5514-5	5518-5	6101-5	6106-5	6112-5	6118-5	6123-5
Dimensions	A	mm	2083					2101					2217				
	D	mm	508					559					610				
	Wi	mm	570					625					685				
	H	mm	728					809					858				
	R	mm	800					800					800				
Connections	d1	ODS	141,3					141,3					168,3				
	d2*	ODS	88,9					88,9					101,6				
	d3	in-G	168,3					168,3					219,1				
	d5	in-NPT	3 x 1					3 x 1					3 x 1				
	d6	in-NPT	1/4					1/4					1/4				
	d7	in-G	1/2					1/2					1/2				
Volumes and weights	V_R	dm³	180,6	174,3	168,1	161,9	157,2	217	210,8	203,1	196,9	190,7	258,2	250,4	241,1	231,9	224,1
	V_{H20}	dm³	86,2	90,6	95,1	99,5	102,9	108,5	113	118,6	123	127,5	135,3	140,8	147,5	154,2	159,8
	W	kg	578	591	604	617	627	704	717	733	746	759	827	843	863	882	898

* 2 outlet connections on CRM models

CRF/CRM 6			5001-6	5005-6	5009-6	5013-6	5016-6	5501-6	5505-6	5510-6	5514-6	5518-6	6101-6	6106-6	6112-6	6118-6	6123-6
Dimensions	A	mm	2388					2406					2522				
	D	mm	508					559					610				
	Wi	mm	570					625					685				
	H	mm	728					809					858				
	R	mm	1000					1000					1000				
Connections	d1	ODS	141,3					141,3					168,3				
	d2*	ODS	88,9					88,9					101,6				
	d3	in-G	168,3					168,3					219,1				
	d5	in-NPT	3 x 1					3 x 1					3 x 1				
	d6	in-NPT	1/4					1/4					1/4				
	d7	in-G	1/2					1/2					1/2				
Volumes and weights	V_R	dm³	217,9	210,3	202,8	195,3	189,6	262,2	254,7	245,3	237,9	230,4	311,8	302,5	291,2	280	270,7
	V_{H20}	dm³	100	105,3	110,6	115,9	120	125,5	130,9	137,5	142,9	148,2	155,9	162,6	170,6	178,6	185,3
	W	kg	657	672	688	703	715	796	811	831	847	862	934	953	977	1000	1020

* 2 outlet connections on CRM models

CRF/CRM 7			5001-7	5005-7	5009-7	5013-7	5016-7	5501-7	5505-7	5510-7	5514-7	5518-7	6101-7	6106-7	6112-7	6118-7	6123-7
Dimensions	A	mm	2693					2711					2827				
	D	mm	508					559					610				
	Wi	mm	570					625					685				
	H	mm	728					809					858				
	R	mm	1300					1300					1300				
Connections	d1	ODS	141,3					141,3					168,3				
	d2*	ODS	88,9					88,9					101,6				
	d3	in-G	168,3					168,3					219,1				
	d5	in-NPT	3 x 1					3 x 1					3 x 1				
	d6	in-NPT	1/4					1/4					1/4				
	d7	in-G	1/2					1/2					1/2				
Volumes and weights	V_R	dm³	255,1	246,3	237,5	228,7	222,1	307,3	298,6	287,6	278,8	270,1	365,5	354,5	341,3	328,2	317,2
	V_{H20}	dm³	113,7	119,9	126,1	132,4	137	142,5	148,7	156,5	162,8	169	176,6	184,4	193,7	203,1	210,9
	W	kg	735	754	772	790	804	888	906	929	947	966	1041	1063	1091	1118	1141

* 2 outlet connections on CRM models

Notes

Notes

ALWAYS NEARBY.
BITZER WORLDWIDE.

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