LENNOX®

REFROIDISSEUR DE LIQUIDE MONOBLOC
GROUPE DE CONDENSATION A AIR

PACKAGED LIQUID CHILLER
AIR COOLED CONDENSING UNIT

PROVIDING GLOBAL SYSTEM SOLUTIONS

LCH V

From September we will be fitting Bitzer compressors and our new condenser fan on the existing range of LCH V chillers.
As a result there are some changes in the product which you need to be aware of.
This temporary sales catalogue is designed to highlight all the changes.

COP improved & Capacity Extended.

Items Highlighted are Competitive advantage points when compared to other competitors

CONSTRUCTION

The chiller is constructed on a solid rugged base frame constructed of **"C" section steel** beams welded together to form a ridged base. The base is structurally able to carry the unit weight and is torsion ally ridged with no vibrating sections The base is **hot dipped galvanised for corrosion protection**. The chiller is lifted, moved and mounted via the base frame that contains AVM mounting and lifting points as standard.
The Evaporator is DX type with independent refrigeration circuits. The shell is carbon steel trace heated (option) and insulated. The tubes are copper with enhanced surface area mounted in a U bundle. The evaporator is protected from freezing via the Climatic II control via both temperature and pressure monitoring. The evaporator connections are **Flanged as standard**. Option for a **dp flow switch fitted and wired**.
The condenser is constructed with enhanced surface seamless copper tubes arranged in a staggered pattern mechanically expanded onto high efficiency aluminium fins. The fins have full fin collars to enhance heat transfer. The fins are rippled but not lanced to provide a **surface that can be cleaned to maintain efficiency**. The condenser contains an intergral sub-cooler circuit that increases the chiller performance with out additional costs.

ELECTRICAL CONTROL CENTRE

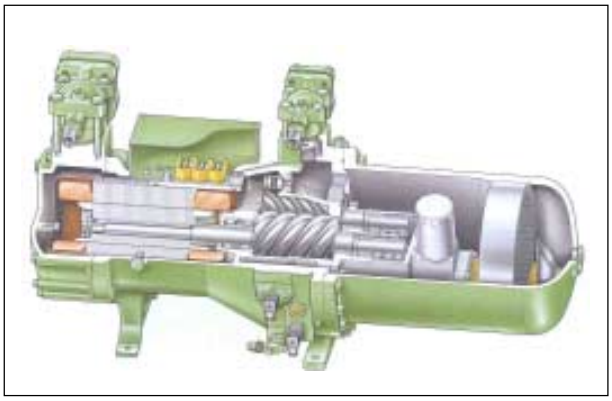
The components of both power and control are split into two sections of one panel. Individual key locked doors access each section, which prevents unauthorised entry. The panel is manufactured to insure protection in all weather conditions.
The electrical system is designed to be **plug and play** as a customer needs only to connect a power supply to enable the unit to operate all the necessary controls and safety devices are already installed. The panel has a internal thermostatically controlled ventilation system to maintain ideal operating conditions.
Power section contains contactors, **thermal overloads for compressors and fans**, phase protection, mains isolation and customer connection points. All 3-phase connections are fully shrouded to prevent any accidental contact.
Control is via the **CLIMATIC™ II** controller that provides full control of the chiller and refrigeration system. All the safety and scheduling of the refrigeration system, compressors and condenser fans. Control of the chilled water system to provide the design off water temperature at the maximum efficiency by matching the system load, ambient and operating conditions at the minimum power consumption.
The Climatic II has a full digital display with trend logging, reading 2050 points of data. Display of all system conditions on a single screen. Alarm signalling and display. Diagnostics by individual refrigerant circuit. Full PID control of chilled water and electronic TEV per circuit with adaptive control logic. Hours run and automatic compressor scheduling. High pressure and low pressure adaptive control to prevent nuisance trips. Anti freeze protection, remote control options. Options can be added to enhance the level of control and external communications capabilities.

"HUSH TONE" CONDENSER FAN

The new Hush tone condenser fan features six aerofoil pitched blades statically and dynamically balanced. The blades have sickle end section in a bell mouth orifice for reduced noise and improved performance. This fan design is unique to ***LENNOX***.
The fans are direct driven via a three phase motor with permanently lubricated ball bearings. The motors are designed for external operation and are available in 3 different speeds with the option of two-speed motor.

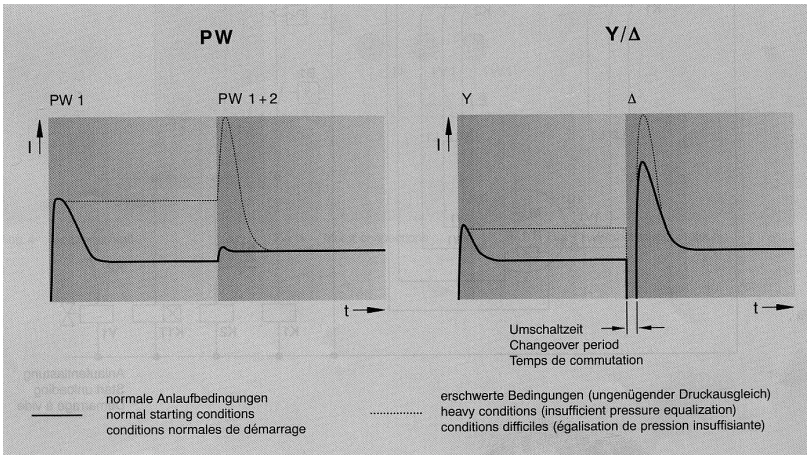
COMPRESSORS

The compressors are a ***LENNOX*** compressor built by Bitzer. These set new standards for technology and performance. Bitzer has a long history of manufacturing screw compressors for the refrigeration market. The new compact design features a semi hermetic twin screw compressor with integral 3 stage oil separation. Robust long life axial bearings with pressure unloading. Double wall pressure compensated compressor housing to provide low noise operation. Large volume motor for part winding start with phase protection, thermal motor protection and discharge gas temperature protection features as standard. Fully unloaded start with 4 stages of capacity control.



Part wind starting V Star Delta.

	LCH V KOBE compressors			LCH V BITZER compressors		
LCH V K	**Pn (kW)**	**In (A)**	**Id Y/D (A)**	**Pn (kW)**	**In (A)**	**Id Y/D (A)**
191	89	165	265	72	127	300
311	151	274	405	131	230	560
372	178	326	425	143	250	425
492	240	435	565	202	350	680
573	267	488	590	214	370	570
622	302	544	675	261	450	780
683	329	597	730	273	470	800
764	356	649	750	285	490	650
803	391	706	840	333	580	900
933	454	820	950	394	680	1050
984	480	867	1000	404	700	1060
1234	603	1085	1215	522	900	1250



You can see that the use of part winding compared to open transition star delta offers an overall reduction in starting current. In part winding the introduction of the second stage of the motor winding takes place with out stopping the motor. On star delta the motor is stopped and as a result there is a significant peak in inrush current in delta at that time. On star delta the initial inrush current is smaller than part winding initial inrush.
When quoting to customers make sure this is understood as some companies refer only to initial inrush current and not the overall starting current.

Note : No change to the options available
Expect a 2 dBa reduction in overall sound level with new compressors and fans.

FAN SPEED : ***700 RPM***

R407C

MODELS	Water outlet temperature °C	Air inlet temperature									
		28 °C		32 °C		35°C		39 °C		43 °C	
		Qo	P	Qo	P	Qo	P	Qo	P	Qo	P
LCH 191 VK	5	185,3	53,9	177,6	59,6	171,2	64,4	161,9	71,6	88,1	42,7
	7	196,7	55,3	188,7	61,2	182,0	66,1	172,3	73,5	94,1	43,3
	9	208,5	56,9	200,1	62,8	193,2	67,8	183,1	75,4	100,4	44,0
	11	220,5	58,4	211,8	64,4	204,6	69,5	112,5	40,1	107,0	44,6
LCH 311 VK	5	328,2	102,2	314,4	114,1	303,0	123,9	286,1	138,4	160,2	79,0
	7	347,4	104,9	332,9	117,1	320,9	127,2	303,3	142,2	170,5	80,2
	9	367,0	107,7	351,7	120,1	339,2	130,5	190,0	72,8	181,0	81,3
	11	386,9	110,5	370,9	123,1	357,8	133,7	201,2	73,7	191,8	82,3
LCH 372 VK	5	370,1	107,7	355,1	119,2	342,6	128,8	324,3	143,4	177,2	85,5
	7	393,0	110,6	377,4	122,3	364,3	132,2	345,2	147,0	189,3	86,8
	9	416,6	113,7	400,2	125,5	386,6	135,6	366,7	150,8	202,0	88,1
	11	440,8	116,8	423,7	128,8	409,6	139,1	226,2	80,2	215,2	89,4
LCH 492 VK	5	514,2	156,2	492,7	173,9	474,8	188,6	448,6	210,2	248,4	121,7
	7	544,9	160,4	522,3	178,4	503,6	193,5	476,3	215,9	264,8	123,6
	9	576,2	164,7	552,5	183,0	533,0	198,4	371,4	147,8	281,7	125,3
	11	608,1	169,0	583,3	187,6	563,1	203,4	393,4	150,6	298,9	126,9
LCH 573 VK	5	554,4	161,4	531,9	178,7	513,2	193,2	485,9	214,9	265,7	128,2
	7	588,7	165,9	565,2	183,4	545,7	198,1	517,2	220,4	283,9	130,1
	9	624,0	170,4	599,5	188,2	579,2	203,3	549,4	226,1	302,9	132,1
	11	660,3	175,1	634,8	193,1	613,6	208,6	339,0	120,3	322,6	134,0
LCH 622 VK	5	660,9	205,0	633,1	228,9	609,9	248,6	575,8	277,5	321,7	158,2
	7	699,5	210,5	670,2	234,9	645,9	255,2	610,5	285,2	342,6	160,6
	9	738,8	216,1	708,0	240,9	682,7	261,7	381,9	145,8	363,7	162,8
	11	778,9	221,6	746,5	246,8	720,2	268,2	404,0	147,5	385,1	164,7
LCH 683 VK	5	699,9	210,1	670,6	233,5	646,3	253,0	610,7	282,0	336,5	164,4
	7	742,0	215,9	711,3	239,7	686,0	259,6	648,9	289,5	359,0	166,9
	9	785,1	221,7	753,0	245,9	726,6	266,3	553,9	223,0	382,1	169,3
	11	829,2	227,5	795,6	252,1	768,1	273,0	586,8	227,8	405,7	171,5
LCH 764 VK	5	731,7	214,3	701,7	237,2	676,8	256,4	640,5	285,3	349,9	170,4
	7	777,0	220,1	745,7	243,4	719,8	263,0	681,9	292,6	374,2	173,1
	9	823,5	226,1	790,9	249,7	763,9	269,7	724,4	300,1	399,2	175,6
	11	871,2	232,3	837,3	256,3	809,2	276,7	768,0	307,9	424,9	178,2
LCH 803 VK	5	869,8	258,6	834,5	288,4	804,9	313,1	761,2	349,4	425,3	201,3
	7	921,6	265,7	884,4	296,0	853,4	321,3	807,8	358,9	452,8	204,3
	9	974,2	272,9	935,1	303,7	902,8	329,6	588,9	222,4	481,1	207,2
	11	1027,7	280,0	986,8	311,3	953,2	337,9	535,4	187,9	510,3	209,7
LCH 933 VK	5	1012,4	298,9	971,6	334,2	937,3	363,4	886,5	406,1	493,2	236,8
	7	1072,3	306,7	1029,2	342,6	993,4	372,4	940,7	416,6	525,4	240,1
	9	1133,6	314,6	1088,2	350,9	1050,8	381,4	729,8	281,3	558,2	243,0
	11	1196,2	322,4	1148,5	359,1	1109,5	390,2	772,4	285,8	591,6	245,6
LCH 984 V	5	1046,9	310,6	1004,1	345,9	968,3	375,2	915,5	418,4	509,8	243,3
	7	1109,5	319,1	1064,6	355,0	1027,2	385,0	972,2	429,6	543,3	247,0
	9	1173,7	327,7	1126,5	364,2	1087,4	395,0	1030,3	441,1	577,8	250,5
	11	1239,3	336,4	1189,8	373,5	1149,1	405,0	643,8	227,4	613,3	253,8
LCH 1234 VK	5	1372,7	411,8	1314,7	459,7	1266,4	499,3	1195,4	557,4	667,4	317,1
	7	1451,3	422,8	1390,2	471,6	1339,7	512,2	1266,0	572,5	708,8	321,7
	9	1533,7	434,1	1469,3	483,7	1416,6	525,5	790,6	292,0	752,9	326,1
	11	1619,5	445,5	1551,8	496,1	1497,1	539,0	838,8	295,5	799,5	330,1

P : Puissance absorbée compresseurs en kW
Compressors power input in kW.

Qo : Puissance frigorifique en kW
Cooling capacity in kW.

Facteur d'encrassement
Fouling factor **:** 0,044 m²C/kW

XXX ΔT eau = 5°C
Water ΔT = 5°C

XXX Fonctionnement en délestage HP
High pressure offloading operating

FAN SPEED : ***540 RPM***

R407C

MODELS	Water outlet temperature °C	Air inlet temperature									
		28 °C		32 °C		35°C		39 °C		43 °C	
		Qo	P	Qo	P	Qo	P	Qo	P	Qo	P
LCH 191 VK	5	176,0	50,1	168,7	55,4	162,6	59,9	153,8	66,6	83,7	39,7
	7	186,9	51,5	179,3	56,9	172,9	61,4	163,7	68,3	89,4	40,3
	9	198,0	52,9	190,1	58,4	183,5	63,0	173,9	70,1	95,3	40,9
	11	209,5	54,3	201,2	59,9	194,4	64,7	106,8	37,2	101,6	41,5
LCH 311 VK	5	311,8	95,0	298,7	106,1	287,8	115,3	271,8	128,7	152,2	73,5
	7	330,0	97,6	316,2	108,9	304,8	118,3	288,2	132,2	161,9	74,6
	9	348,6	100,2	334,1	111,7	322,2	121,3	180,5	67,7	171,9	75,6
	11	367,6	102,7	352,3	114,4	339,9	124,4	191,1	68,5	182,2	76,5
LCH 372 VK	5	351,6	100,2	337,3	110,8	325,5	119,8	308,1	133,3	168,4	79,5
	7	373,4	102,9	358,5	113,8	346,1	122,9	327,9	136,7	179,8	80,7
	9	395,8	105,7	380,2	116,7	367,3	126,1	348,4	140,3	191,9	81,9
	11	418,7	108,6	402,5	119,8	389,1	129,4	214,9	74,6	204,4	83,1
LCH 492 VK	5	488,5	145,3	468,1	161,7	451,1	175,4	426,2	195,5	236,0	113,2
	7	517,6	149,2	496,2	165,9	478,4	179,9	452,5	200,8	251,6	114,9
	9	547,4	153,2	524,9	170,2	506,4	184,5	352,9	137,4	267,6	116,5
	11	577,7	157,2	554,1	174,5	534,9	189,2	373,8	140,0	284,0	118,0
LCH 573 VK	5	526,7	150,1	505,3	166,2	487,5	179,6	461,6	199,9	252,4	119,2
	7	559,3	154,2	537,0	170,5	518,5	184,3	491,3	205,0	269,7	121,0
	9	592,8	158,5	569,6	175,0	550,2	189,0	521,9	210,3	287,7	122,8
	11	627,2	162,9	603,0	179,6	582,9	194,0	322,1	111,9	306,4	124,6
LCH 622 VK	5	627,9	190,6	601,5	212,8	579,5	231,2	547,0	258,1	305,6	147,1
	7	664,5	195,8	636,7	218,4	613,6	237,3	580,0	265,2	325,4	149,4
	9	701,9	201,0	672,6	224,0	648,5	243,4	362,8	135,6	345,5	151,4
	11	740,0	206,1	709,1	229,6	684,1	249,4	383,8	137,2	365,8	153,2
LCH 683 VK	5	664,9	195,4	637,1	217,2	614,0	235,3	580,2	262,2	319,7	152,9
	7	704,9	200,7	675,8	222,9	651,7	241,5	616,5	269,2	341,1	155,2
	9	745,9	206,2	715,4	228,7	690,2	247,7	526,2	207,4	363,0	157,4
	11	787,7	211,6	755,8	234,5	729,7	253,9	557,5	211,8	385,4	159,5
LCH 764 VK	5	695,1	199,3	666,6	220,6	643,0	238,5	608,5	265,3	332,4	158,5
	7	738,1	204,7	708,4	226,3	683,8	244,6	647,8	272,1	355,5	160,9
	9	782,3	210,3	751,4	232,2	725,7	250,9	688,1	279,1	379,3	163,3
	11	827,7	216,1	795,5	238,3	768,7	257,3	729,6	286,3	403,6	165,7
LCH 803 VK	5	826,3	240,5	792,8	268,2	764,7	291,1	723,1	324,9	404,0	187,2
	7	875,5	247,1	840,1	275,3	810,7	298,8	767,4	333,8	430,2	190,0
	9	925,5	253,8	888,4	282,4	857,7	306,6	559,5	206,8	457,1	192,7
	11	976,3	260,4	937,4	289,5	905,5	314,3	508,7	174,7	484,8	195,1
LCH 933 VK	5	961,8	277,9	923,0	310,8	890,4	338,0	842,2	377,7	468,5	220,2
	7	1018,7	285,2	977,8	318,6	943,7	346,4	893,6	387,4	499,1	223,3
	9	1076,9	292,5	1033,8	326,3	998,2	354,7	693,3	261,6	530,3	226,0
	11	1136,4	299,8	1091,0	334,0	1054,0	362,9	733,8	265,7	562,0	228,4
LCH 984 V	5	994,5	288,9	953,9	321,7	919,9	348,9	869,8	389,1	484,3	226,2
	7	1054,1	296,7	1011,4	330,2	975,8	358,1	923,6	399,6	516,2	229,7
	9	1115,0	304,7	1070,2	338,7	1033,1	367,3	978,8	410,2	548,9	233,0
	11	1177,3	312,8	1130,3	347,4	1091,6	376,7	611,6	211,5	582,7	236,0
LCH 1234 VK	5	1304,0	383,0	1249,0	427,5	1203,1	464,3	1135,6	518,4	634,0	294,9
	7	1378,7	393,2	1320,7	438,6	1272,7	476,4	1202,7	532,4	673,4	299,2
	9	1457,0	403,7	1395,8	449,9	1345,8	488,7	751,1	271,5	715,2	303,3
	11	1538,5	414,3	1474,2	461,3	1422,2	501,2	796,9	274,8	759,5	307,0

P : Puissance absorbée compresseurs en kW
Compressors power input in kW.

Qo : Puissance frigorifique en kW
Cooling capacity in kW.

Facteur d'encrassement
Fouling factor : 0,044 m²C/kW

XXX ΔT eau = 5°C
Water ΔT = 5°C

XXX Fonctionnement en délestage HP
High pressure offloading operating

FAN SPEED : ***950 RPM***

R407C

MODELS	Water outlet temperature °C	Air inlet temperature									
		28 °C		32 °C		35°C		39 °C		43 °C	
		Qo	P	Qo	P	Qo	P	Qo	P	Qo	P
LCH 191 VK	5	190,8	50,6	182,9	56,0	176,3	60,5	166,8	67,3	90,7	40,1
	7	202,6	52,0	194,4	57,5	187,5	62,1	177,5	69,1	96,9	40,7
	9	214,7	53,5	206,1	59,0	199,0	63,7	188,5	70,8	103,4	41,3
	11	227,2	54,9	218,2	60,5	210,7	65,4	115,8	37,7	110,2	41,9
LCH 311 VK	5	338,0	96,0	323,9	107,2	312,1	116,5	294,6	130,1	165,0	74,3
	7	357,8	98,6	342,9	110,1	330,5	119,6	312,4	133,6	175,6	75,4
	9	378,0	101,2	362,3	112,9	349,4	122,6	195,7	68,4	186,4	76,4
	11	398,5	103,8	382,0	115,7	368,6	125,7	207,2	69,3	197,5	77,4
LCH 372 VK	5	381,2	101,2	365,7	112,0	352,9	121,1	334,1	134,8	182,6	80,3
	7	404,8	104,0	388,7	115,0	375,2	124,2	355,6	138,2	195,0	81,6
	9	429,1	106,9	412,2	118,0	398,2	127,5	377,7	141,8	208,0	82,8
	11	454,0	109,8	436,4	121,1	421,9	130,8	233,0	75,4	221,7	84,0
LCH 492 VK	5	529,7	146,8	507,5	163,4	489,1	177,2	462,0	197,6	255,9	114,4
	7	561,2	150,8	538,0	167,7	518,7	181,9	490,6	202,9	272,8	116,2
	9	593,5	154,8	569,1	172,0	549,0	186,5	382,6	138,9	290,1	117,8
	11	626,4	158,9	600,8	176,4	579,9	191,2	405,3	141,5	307,9	119,3
LCH 573 VK	5	571,0	151,8	547,8	167,9	528,6	181,6	500,5	202,0	273,7	120,5
	7	606,4	155,9	582,2	172,4	562,1	186,3	532,7	207,2	292,4	122,3
	9	642,7	160,2	617,5	176,9	596,6	191,1	565,9	212,6	311,9	124,2
	11	680,1	164,6	653,8	181,6	632,0	196,0	349,2	113,1	332,2	126,0
LCH 622 VK	5	680,8	192,7	652,1	215,1	628,2	233,7	593,1	260,9	331,4	148,7
	7	720,5	197,9	690,3	220,8	665,3	239,8	628,8	268,1	352,8	151,0
	9	761,0	203,1	729,2	226,4	703,1	246,0	393,3	137,0	374,6	153,1
	11	802,3	208,3	768,9	232,0	741,8	252,1	416,1	138,7	396,6	154,9
LCH 683 VK	5	720,8	197,5	690,7	219,5	665,7	237,9	629,1	265,1	346,6	154,6
	7	764,2	202,9	732,7	225,3	706,5	244,1	668,4	272,1	369,8	156,9
	9	808,7	208,4	775,6	231,1	748,4	250,3	570,5	209,6	393,6	159,1
	11	854,1	213,9	819,5	237,0	791,1	256,6	604,4	214,1	417,9	161,2
LCH 764 VK	5	753,6	201,4	722,7	222,9	697,2	241,0	659,8	268,2	360,4	160,2
	7	800,3	206,9	768,1	228,8	741,4	247,2	702,3	275,0	385,4	162,7
	9	848,2	212,6	814,7	234,7	786,8	253,6	746,1	282,1	411,2	165,1
	11	897,4	218,4	862,4	240,9	833,5	260,1	791,0	289,4	437,6	167,5
LCH 803 VK	5	895,9	243,1	859,5	271,1	829,1	294,3	784,0	328,4	438,1	189,2
	7	949,2	249,8	910,9	278,3	879,0	302,1	832,1	337,4	466,4	192,1
	9	1003,5	256,5	963,2	285,5	929,9	309,9	606,6	209,1	495,6	194,7
	11	1058,5	263,2	1016,4	292,6	981,8	317,6	551,5	176,6	525,6	197,2
LCH 933 VK	5	1042,8	280,9	1000,7	314,1	965,4	341,6	913,1	381,8	508,0	222,6
	7	1104,5	288,3	1060,1	322,0	1023,2	350,1	968,9	391,6	541,1	225,7
	9	1167,6	295,7	1120,9	329,9	1082,3	358,5	751,7	264,5	574,9	228,4
	11	1232,0	303,0	1182,9	337,6	1142,8	366,8	795,6	268,6	609,4	230,9
LCH 984 V	5	1078,3	292,0	1034,2	325,1	997,4	352,7	943,0	393,3	525,1	228,7
	7	1142,8	299,9	1096,5	333,7	1058,0	361,9	1001,4	403,9	559,6	232,2
	9	1208,9	308,0	1160,3	342,4	1120,0	371,3	1061,3	414,6	595,2	235,5
	11	1276,5	316,2	1225,5	351,1	1183,5	380,7	663,1	213,8	631,7	238,6
LCH 1234 VK	5	1413,8	387,1	1354,1	432,1	1304,4	469,3	1231,3	524,0	687,4	298,1
	7	1494,8	397,4	1431,9	443,3	1379,9	481,5	1304,0	538,1	730,1	302,4
	9	1579,7	408,0	1513,4	454,7	1459,1	493,9	814,3	274,4	775,5	306,5
	11	1668,1	418,8	1598,3	466,3	1542,0	506,6	864,0	277,8	823,5	310,3

P : Puissance absorbée compresseurs en kW
Compressors power input in kW.

Qo : Puissance frigorifique en kW
Cooling capacity in kW.

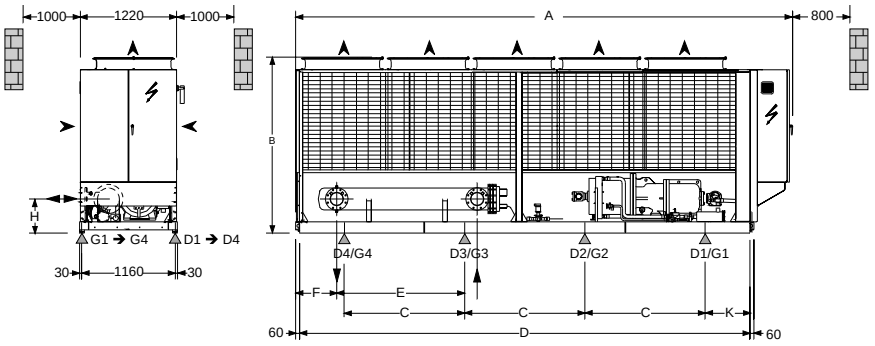
Facteur d'encrassement
Fouling factor **:** 0,044 m²C/kW

XXX ΔT eau = 5°C
Water ΔT = 5°C

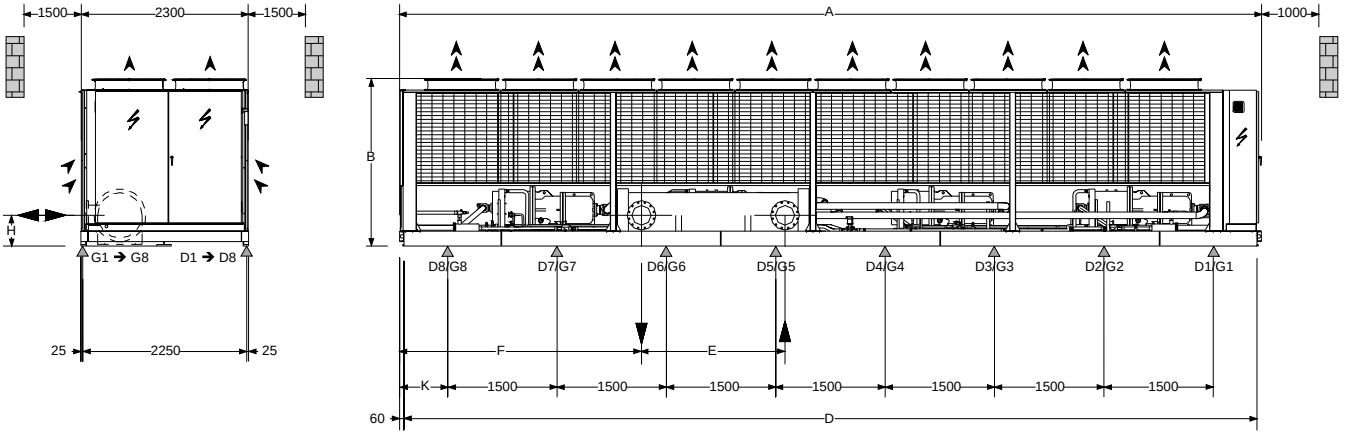
XXX Fonctionnement en délestage HP
High pressure offloading operating

DIMENSIONAL DATA (standard unit)

1



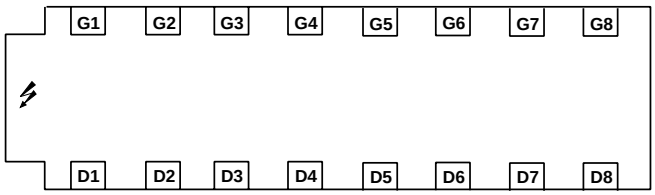
2



LCH		191 V	311 V	372 V	492 V	573 V	622 V	683 V	764 V	803 V	933 V	984 V	1234 V
Drawing		**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
A	mm	3990	6205	3995	6205	7405	6205	7475	7405	9615	9615	9615	11825
B	mm	2175	2195	2215	2215	2235	2235	2235	2235	2255	2255	2255	2255
C	mm	1250	1500	-	-	-	-	-	-	-	-	-	-
D	mm	3510	5620	3390	5600	7280	6080	7350	7280	9490	9490	9490	11700
E	mm	1480	1755	2255	1725	2225	1725	1725	1725	2225	1720	1720	1970
F	mm	370	515	295	405	910	515	905	910	655	1175	1155	3320
H	mm	340	425	390	405	405	450	450	450	450	425	425	415
K	mm	565	620	255	610	700	100	734	700	305	305	305	660
n Ø 20		6	8	6	8	10	10	10	10	14	14	14	16
Weight without water	kg	1659	2758	3396	4471	5237	5591	6093	6683	7746	8477	8513	11502
Operating weight	kg	1700	2840	3490	4580	5370	5780	6260	6850	7960	8800	8820	11940

DIMENSIONAL DATA (cont'd)

LOAD DISTRIBUTION (KG - Operating weights)



WITHOUT noise insulation

LCH		191 V	311 V	372 V	492 V	573 V	622 V	683 V	764 V	803 V	933 V	984 V	1234 V
D1	kg	310	730	710	770	660	530	550	800	840	840	900	1170
D2	kg	340	320	840	420	550	720	400	730	570	570	490	310
D3	kg	120	170	350	580	970	950	910	1060	1000	990	990	950
D4	kg	-	230	-	600	390	590	680	730	850	870	840	840
D5	kg	-	-	-	-	350	310	640	450	720	900	610	1450
D6	kg	-	-	-	-	-	-	-	-	160	380	670	670
D7	kg	-	-	-	-	-	-	-	-	60	200	310	600
D8	kg	-	-	-	-	-	-	-	-	-	-	-	330
G1	kg	340	460	410	770	490	360	420	540	660	650	670	860
G2	kg	350	260	800	280	420	350	360	480	280	280	230	170
G3	kg	240	290	380	570	600	710	750	710	700	720	720	560
G4	kg	-	380	-	590	570	790	920	800	640	680	650	770
G5	kg	-	-	-	-	370	470	630	550	360	540	490	1260
G6	kg	-	-	-	-	-	-	-	-	850	930	970	1370
G7	kg	-	-	-	-	-	-	-	-	270	250	280	180
G8	kg	-	-	-	-	-	-	-	-	-	-	-	450

WITH noise insulation

LCH		191 V	311 V	372 V	492 V	573 V	622 V	683 V	764 V	803 V	933 V	984 V	1234 V
Operating Weight	kg	2110	2850	3770	4890	5890	6340	6790	7320	8310	9390	9400	12580
D1	kg	370	270	770	940	670	610	950	820	990	900	960	1260
D2	kg	410	620	910	610	650	780	420	780	520	600	520	330
D3	kg	190	260	420	720	1070	1060	1020	1110	1060	1060	1060	1030
D4	kg	-	220	-	390	500	620	650	770	820	890	880	930
D5	kg	-	-	-	-	420	440	450	560	570	990	710	1500
D6	kg	-	-	-	-	-	-	-	-	290	450	750	710
D7	kg	-	-	-	-	-	-	-	-	150	300	360	620
D8	kg	-	-	-	-	-	-	-	-	-	-	-	430
G1	kg	410	360	440	800	500	390	490	580	690	670	700	890
G2	kg	410	400	820	280	450	370	490	520	280	300	240	180
G3	kg	320	350	410	650	880	750	790	760	690	740	730	580
G4	kg	-	370	-	500	470	810	870	870	640	690	680	790
G5	kg	-	-	-	-	280	510	660	550	440	560	520	1380
G6	kg	-	-	-	-	-	-	-	-	880	950	1000	1300
G7	kg	-	-	-	-	-	-	-	-	290	290	290	170
G8	kg	-	-	-	-	-	-	-	-	-	-	-	480

Technical specification

To supply and install, where specified in the project n° …. unit(s) air-cooled water chiller with cooling capacity of …. kW, to cool …. m3/sec. of water from …. °C to …. working with …. °C ambient temperature. The unit should work with electricity at …. V. 3ph. 50Hz. The electrical power absorbed should not overcome …. kW. The units COP will be at least …. at the working conditions of the project. Part load COP will be at least …. at the working conditions of the project. For the units with 2, 3 and 4 compressors the chillers will have (2), (3) or (4) independent refrigerant circuits, with the respective electronic microprocessor will allow the starting of the compressors and the control of the chiller. Each chiller will be factory assembled on a robust base frame made of zinc coated steel, protected by an epoxy coated paint, with zinc coated steel panels. The unit will be tested at full load in the factory at the nominal working conditions and water temperatures. Before shipment a full refrigerant test will be held to avoid any losses, and the units will be filled with oil and …… refrigerant.

General

Units are leak and pressure-tested at 24.5 bars (350 psi) high side and 14 bars (200 psi) low side, and then evacuated and charged. Packaged units ship with a full operating charge of oil and refrigerant. Unit panels, structural elements, and control boxes are constructed of 1.5 to 3 mm (11 to 16 gauge) galvanized sheet metal. The chiller is constructed on a solid rugged base frame constructed of "C" section steel beams welded together to form a ridged base. The base is structurally able to carry the unit weight and is torsion ally ridged with no vibrating sections. The base is hot dipped galvanised for corrosion protection. The chiller is lifted, moved and mounted via the base frame that contains AVM mounting and lifting points as standard. Unit panels and control boxes are finished with baked-on powder paint, and the structural-steel base is finished with an air-dry paint. The unit is painted to RAL 2009 as standard. All the internal surfaces are coated in a clear urethane lacquer to protect the insulation and pipework. The units must be constructed to meet European norms and standards specifically EN 60204-1, NR 2037/2000, ISO9001, ISO 3744 & Eurovent certification performance standards

Compressors

2, 3 or 4 Semi hermetic twin-screw helical rotor compressors are used each in a individual refrigerant circuit. The compressor motors shall be hermetically sealed squirrel cage induction type cooled by suction gas with a oversized suction filter with a fine mesh. The compressor power factor will be 0.9 or greater. The compressor rotors shall be enclosed in a double wall pressure-compensated rotor housing to ensure pressure stability and low noise operation.
The support bearings will be robust axial bearings mounted in tandem with pressure unloading and sealed in isolated chambers for lubrication efficiency. Open type single roller bearings are not acceptable. The force lubrication will be by pressure differential and the oil will be filtered through a 10µm filter. Oil separation will be internal in the compressor and will be a three stage process. External oil separation is not acceptable. The compressor will have automatic start unloading and will have 4 steps of capacity control with Vi compensation. The economizer option will have a sliding suction position port to maximize capacity and efficiency. The compressor will be equipped with a discharge check valve, oil sight glass, oil heater, oil service valve and an internal pressure relief system. The compressors must be mounted on vibration isolation pads to reduce noise transmission.

Evaporator

The evaporator is a tube-in-shell heat exchanger design, with internally finned copper tubes roller-expanded into the tube sheet. The evaporator is designed, tested, and stamped in accordance with the appropriate pressure-vessel code approval. The evaporator is designed for a waterside working pressure of 10 bars (146 psi) and refrigerant side 17 bars (250psi). Water connections are flanged for simple site connection the water connections must be sealed for shipping. Each shell includes an automatic air vent, a drain, and fittings for temperature control sensors, and is insulated with 13mm (1/2 inch) (K-0.26). Optional evaporator heaters with thermostats are provided to protect the evaporator from freezing at ambient temperatures down to -25°C (-13°F). The evaporator is designed to operate with a flow detection device. Options are for a paddle type (supplied loose fitting by others) or a factory fitted differential pressure type switch. The evaporator will have 2, 3 or 4 independent refrigerant circuits.

Condenser coil

the condenser coils are constructed with internally enhanced seamless copper tubes having a "W" configuration and arranged in a staggered row pattern and mechanically expanded into rippled aluminum fins with full fin collars for higher efficiencies. A collar that will increase the surface area in connection with the tubes, protecting them from ambient corrosion, gives the spacing between the fins. The coils have to be washable to maintain operating efficiency. The coils will have an integral subcooler circuit which provides sufficient subcooling to effectively eliminate the possibility of liquid flashing and increase the unit's efficiency of 5¸7% without an increase in power absorbed, and the surface area will be dimensioned in a way to permit an air velocity not greater than 2.8 m/sec.

Condenser fans

the condenser fans are direct drive vertical discharge Hushtone helical type with multiple aerofoil blades for higher efficiencies and lower noise. The fan blade will be of the sickle end type mounted in a bell mouth orifice. The air discharge is vertical and each fan will be coupled to the electrical motor, supplied as standard to IP55 class "F" insulation with 6 poles and capable to work to ambient temperatures of -20°C to +65°C max humidity 80%. The fans are direct driven via a three phase motor with permanently lubricated ball bearings. The motors are designed for external operation and are available in 3 different speeds with the option of two-speed motor.

Control panel

field power connection, controls interlock terminals, and unit control system shall be centrally located in a weatherproof cabinet accessible through a key locked door. Power and starting controls shall be separate from safety and operating controls in different compartments of the same panel. All 3-phase connections shall be fully shrouded to prevent accidental contact. Power and starting controls shall include lockable individual thermal overloads and contactors for each compressor winding and fan motors. Operating and safety controls shall be via Climatic II plus solid-state protection for compressor motor; high and low pressure cut-out switch (for each refrigerant circuit); anti-freeze thermostat. The control enclosure will include a mechanical ventilation system with thermostatic control. Standard single point power connections include main three-phase power to the compressors, condenser fans, and (optional) control power transformer, and (optional) connections are available for the 230-volt single-phase power for freeze protection on the evaporator heaters. All internal cables must be mounted on cable tray and tied. The chillers will have full earth bonding between isolated metal parts.

Control & capacity regulation – will be via the CLIMATIC™ II with a weatherproof LCD crystal backlit display 240x128 pixels. Monitoring upto 2050 points

Control interface will be via push button and menu screens with graphic icons for simple use
All alarms and fault are in full written display, fault codes are not acceptable

Functions

1. A full screen display of all operating conditions in a graphic layout
2. Status of Pumps graphic display (chilled water, condenser water and secondary system)
3. Fault history for each refrigeration circuit (last 24 occurrences)
4. Fault history for pumps
5. Hours run
6. Automatic balance of compressor run hours
7. Time clock, day, date for auto scheduling of the chiller
8. Chilled water set point, with programmable predictive PID control
9. Programmable auto reset of chilled water set point based on ambient temperature
10. Programmable condenser fan staging
11. Start and stop of pumps (run and standby)
12. Auto switching if lead pump fails
13. Display of all refrigerant temperature and pressure values, Ambient and Chilled water temperatures
14. Display of timer status (Start and anti recycle)
15. Display of chilled water temperature curve over 24Hrs
16. Adaptive logic to avoid nuisance fault trips with pre alarm display
17. General machine faults; chilled water flow, loss of power, freeze protection
18. Refrigeration circuit faults; Hp & Lp and high discharge temperature
19. Compressor faults; Motor temperature, phase protection,
20. Capacity staging, plus loading delay on start, and predictive control logic
21. Common alarm
22. Fan circuit breaker trip
23. Pump circuit breaker trip
24. Insufficient chilled water flow
25. Programmable temperature difference set point between flow and return water
26. Freeze protection
27. Programmable Minimum and maximum water set point
28. Self diagnostic on sensors and communications
29. Self diagnostic on electronic expansion valves
30. Adaptive Control of Electronic TEV
31. Phase protection
32. Password protection
33. Options for remote control and BMS interface

Refrigerant piping

each refrigerant circuit shall include a factory insulated suction line, manual compressor discharge isolation valve, manual liquid line isolation valve with charging connection; a replaceable core refrigerant filter drier, sensor indicator; liquid line solenoid valve, electronic thermostatic expansion valve, and 27 bar relief valve. All refrigerant pipework must be clamped to prevent vibration and all small-bore lines should be high pressure plastic with aircraft type fittings. The refrigerant lines should contain independent Schrader valve test points for maintenance. Each refrigerant circuit must contain a refrigerant circuit economizer to ensure maximum operating efficiency

Electronic expansion valve

each refrigerant circuit will be equipped with an electronic expansion valve working with a "pulse with modulation" system, this type of system allows a simple control system that quickly interacts at load variations. This valve combines two functions as a liquid solenoid and electronic expansion valve. It shall be managed directly by the ClimaticII microprocessor.

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