

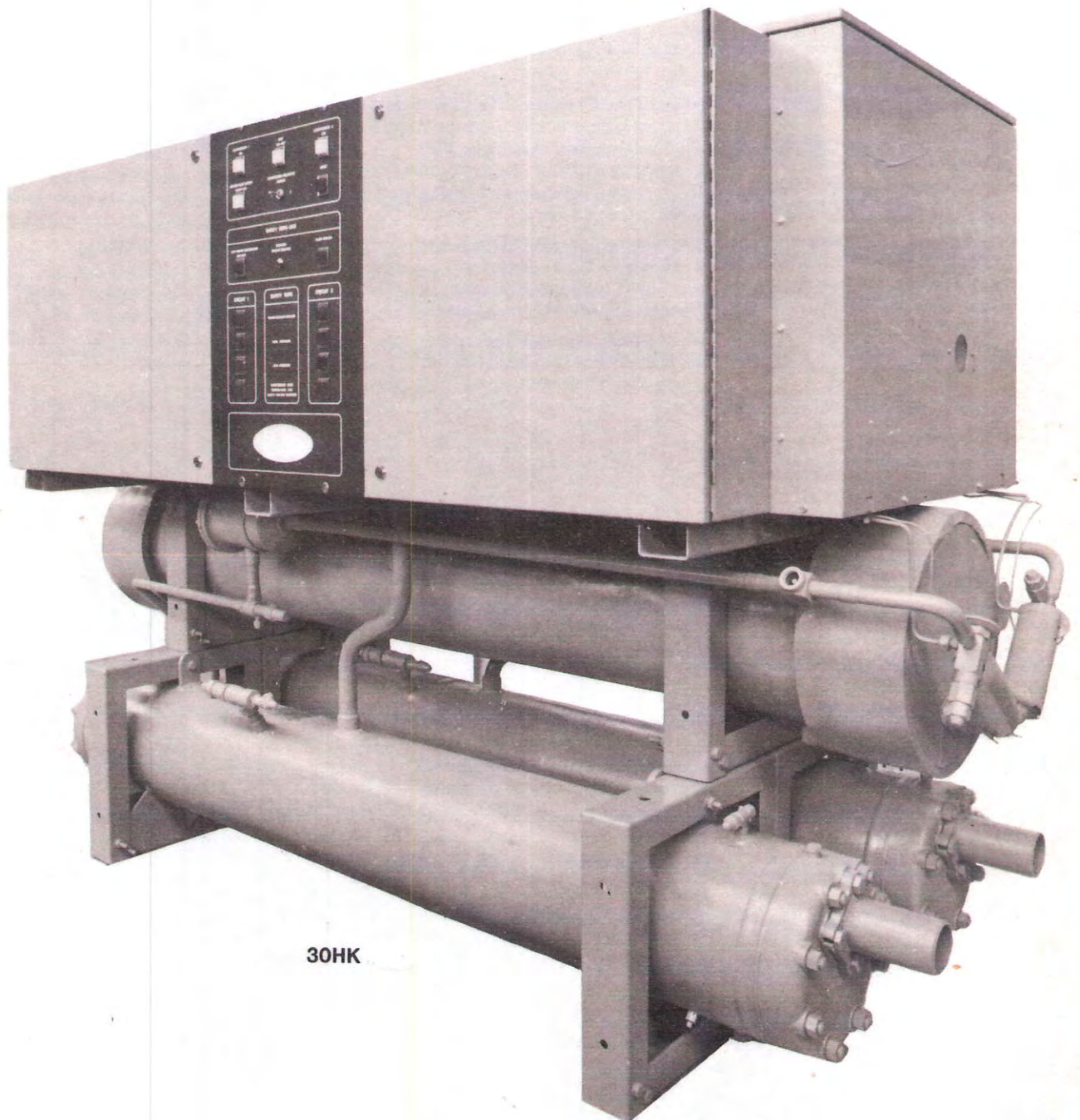


Le
Compresseur
Frigorifique

30HK, HL 030-060

**Reciprocating liquid
chillers L.C.F.**

**Nominal cooling capacities
118 - 210 kW
402 700 - 716 700 Btu/h
50 Hz**



30HK

Description

Specify 30H series hermetic reciprocating liquid chilling packages for use in chilled water air conditioning systems and various types of process cooling applications. Select models in the capacity range from 118 to 210 kW; 402 700 - 716 700 Btu/h and take advantage of cost and energy saving product performance, quiet and reliable operation, and easy servicing over many years of machine life.

Each 30HK, HL machine is completely factory engineered and assembled to

ensure a perfectly balanced refrigeration system that can be installed with minimal field labour. Only external water and power connections need be completed at the jobsite to make the water-cooled (30HK) units operational. Condenserless (30HL) models require the addition of refrigerant line connections to the remote condenser.

The 30HK models are packaged units complete with cooler, condensers, compressors, controls, factory refrigerant charge, and internal piping

and wiring. The 30HL are condenserless versions of the basic 30HK models, shipped with a holding charge of refrigerant and specially designed for applications with remote water, or air-cooled, or evaporating-type condensers. All the easy-rigging 30H series chillers are extremely trim and compact, so they can pass easily through standard doorways, and they require minimal floor space on the job.

Features

Sequential starting and stepping of multiple compressors means low inrush and running current.

Bolted semi-hermetic compressors, easy to service.

Wide range of distribution voltages (300/240 V and 380/415 V).

Manual reset, magnetic trip circuit breakers ensure protection against single-phasing of compressor motors.

Multiple step thermostat provides optimum control of chilled water temperature for closer capacity control.

Spring vibration isolators - Rely on 30H series chillers for unprecedented vibration-free operation. Compressors are mounted on heavy-duty spring vibration isolators to effectively minimise potentially damaging vibration transmission to the building structure.

Insulated panels - To provide quiet unit operation compressors enclosure panels are insulated.

Sound-deadening mufflers - Quiet operation is assured by hot gas mufflers that positively dampen hot gas pulsations and deliver operation that is smooth, trouble-free and exceptionally quiet.

Integral control box - This control box features high and low pressure cutout switches, manual reset low water temperature cutout and a multiple-step capacity thermostat. Box has hinged door for ready access.

DGT discharge gas thermostat protection - Compressor motors are thoroughly protected by quick-sensing elements against overheating.

Filter-drier - Refrigerant circuits are kept free of harmful moisture and contaminants by this standard feature.

Moisture-indicating sight glass - Continuous, direct monitor of the refrigerant system. Easy-to-read colour indicator shows moisture content directly on the spot.

Manual transfer switch which changes the lead compressor in the starting sequence, ensures balanced wear on compressors.

Refrigerant subcooling offers increased system capacity without raising the power requirements.

Compressor crankcase heaters which are on during the compressor off cycle, provide protection against refrigerant migration and oil dilution.

Two separate refrigerant circuits enable partial load operation at higher suction temperatures which means reduced power costs.

Accessories

High pressure safety switch package (standard on 30HL, accessory on 30HK units).

Part winding start relay.

Condenser manifold package - This accessory is available for all 30HK units. The manifold provides common water inlet and outlet connections. Consists of two steel manifolds, each in two sections. Field welding is required.

Control circuit transformer (400/230 V), field installed, provides 230 V secondary circuit if separate control power source is not available (400 V units).

Remote control panel - This accessory permits starting, stopping or resetting the 30HK, HL from a remote location by removing control panel from the unit and placing it where required. Accessory "blank-off" panel is then installed in the place of removed control panel.

Manometer panel measuring suction and discharge pressures, together with shut-off valves to ensure correct operation of the unit at all times.

Physical data

A. Unit*

Unit 30HK,HL			030	040	050	060
Nominal cooling capacity†		kW	118	144	167	210
		Btu/h	402 700	491 500	570 000	716 700
Approximate Operating Weight†† HK		kg	1284	1304	1515	1542
		lb	2825	2869	3333	3392
	HL	kg	798	826	966	993
		lb	1756	1817	2125	2185
Refrigerant (R 22) Charge per circuit	HK	kg	16	18	21	21
		lb	35.2	39.6	46.2	46.2
	HL				Holding charge	
Compressor 06 E			Reciprocating, semi-hermetic (24.2 rps ; 1450 rpm)			
Number			2	2	2	2
% Capacity:						
Circuit 1			50	60	50	50
Circuit 2			50	40	50	50
No. control steps			4	4	4	4
Total No. cylinders			8	10	12	12
Oil charge			4 cylinder compressors : 6.6 L; 232 fl. oz. - 6 cylinder comp : 9 L; 317 fl. oz.			
Condenser 09 RP						
Circuit 1			400 714	400 714	400 714	400 724
Circuit 2			400 714	400 714	400 714	400 724
Refrigerant conn.						
Liquid		in.	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$
Discharge		in.	1 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{3}{8}$

B. Cooler

Unit 30HK,HL			030-040	050-060
Shell, net volume	L/gal		49.6/13.1	57.5/15.2
	OD	mm/ft. in.	273/0'-10 $\frac{3}{4}$ "	273/0'-10 $\frac{3}{4}$ "
	Length	mm/ft. in.	1829/6'-0"	2108/6'-11"
Tubes (copper)			15.8 mm; $\frac{5}{8}$ " OD internally finned copper tubes	
Number			129	129
Length	mm/ft. in.		1892/6'-2 $\frac{1}{2}$ "	2171/7'-1 $\frac{1}{2}$ "
Outside Surface	m ² /ft ²		12.1/130.2	13.9/149.6
Refrigerant circuits			2	2
Refrigerant passes			8	8
Water connections	in.			
In and out (MPT)			3	3
Drain (MPT)			1	1

NOTES

A. Unit

* 30HK shipped with full operating charge; 30HL shipped with holding charge (charge for remote condenser and interconnecting piping added in field).

† Based on chilled water leaving temperature of 7°C; 44.6°F saturated discharge temperature of 40°C; 104°F and chilled water of 6°C; 42.8°F (subcooling: 8.3°C; 16.9°F).

†† Approximate operating weight includes refrigerant charge, cooling water and chilled water.

C. Condenser

* Does not include subcooler tubes

† Nom. pipe size: 2 $\frac{1}{2}$ " -SCH 40

Ext. pipe dia.: 73.0 mm; 2 $\frac{7}{8}$ "

Wall thickness: 5.16 mm; 0.2"

C. Condenser

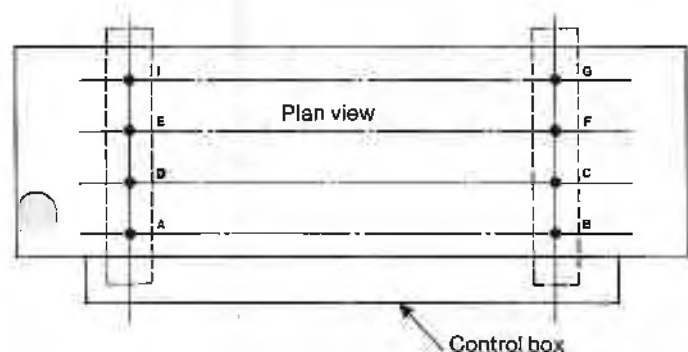
Condenser 09 RP			400 714	400 724
Condensing tubes			18.9 mm OD x 1.32 mm; $\frac{3}{8}$ " OD x 0.05" wall thickness externally finned copper tubes	
Number*			45	56
Length	mm/ft. in.		1782/5'-10 $\frac{1}{8}$ "	1782/5'-10 $\frac{1}{8}$ "
Fin pitch	mm		1,104	1,104
Fins/in.			23	23
Surface area				
Inside	m ² /ft ²		3.34/36.0	4.16/44.8
Outside	m ² /ft ²		10.86/116.9	13.47/145.0
Subcooler tubes			18.9 mm OD x 1.32 mm; $\frac{3}{8}$ " OD x 0.05" wall thickness externally finned copper tubes	
Number			5	5
Length	mm/ft. in.		1782/5'-10 $\frac{1}{8}$ "	1782/5'-10 $\frac{1}{8}$ "
Fin pitch	mm		1,104	1,104
Fins/in.			23	23
Surface area				
Inside	m ² /ft ²		0.37/4.0	0.37/4.0
Outside	m ² /ft ²		1.21/13.0	1.21/13.0
No. water passes			3	3
Water connections†	in.			
In (IPS)			2 $\frac{1}{2}$	2 $\frac{1}{2}$
Out (IPS)			2 $\frac{1}{2}$	2 $\frac{1}{2}$
Shell				
OD	mm/ft. in.		273/0'-10 $\frac{3}{4}$ "	273/0'-10 $\frac{3}{4}$ "
Length	mm/ft. in.		1778/5'-10"	1778/5'-10"

Unit data

Weight distribution

Unit 30	Approx. operating weight		Load at each mounting point															
			A		B		C		D		E		F		G		I	
	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb
030 HK	1284	2824	161	354	161	354	161	354	161	354	160	352	160	352	160	352	160	352
	HL	798	1756	100	220	100	220	100	220	100	220	99	218	99	218	100	220	100
040 HK	1304	2870	164	361	164	361	163	359	163	359	162	356	162	356	163	359	163	359
	HL	826	1818	104	228	104	228	103	227	103	227	103	227	103	227	103	227	103
050 HK	1515	3333	190	418	190	418	187	411	188	414	190	418	190	418	190	418	190	418
	HL	966	2124	122	268	122	268	121	266	121	266	120	264	120	264	120	264	120
060 HK	1542	3392	193	425	193	425	193	425	193	425	192	421	192	421	193	425	193	425
	HL	993	2186	125	274	125	274	124	273	124	273	123	273	124	273	124	273	124

Location of mounting holes



Compressor usage

Unit 30	HK		HL	
	Circuit and 06E compressor number			
	1	2	1	2
030	B 150	B 150	B 250	B 250
040	J 175	B 150	J 275	B 250
050	J 175	J 175	J 275	J 275
060	J 299	J 299	J 299	J 299

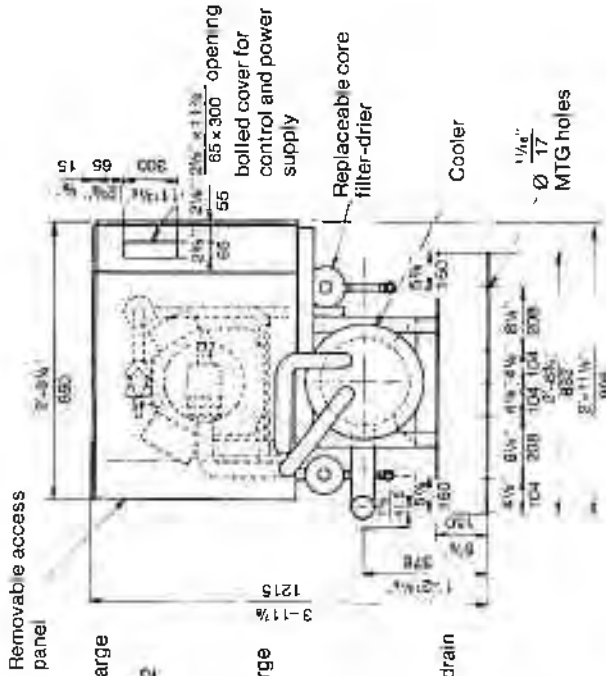
Circuits and compressors numbered from left to right when viewed from front of unit.
Each 06EB and 06EJ compressor has electric unloader on one cylinder bank (2 cylinders)

Capacity control steps

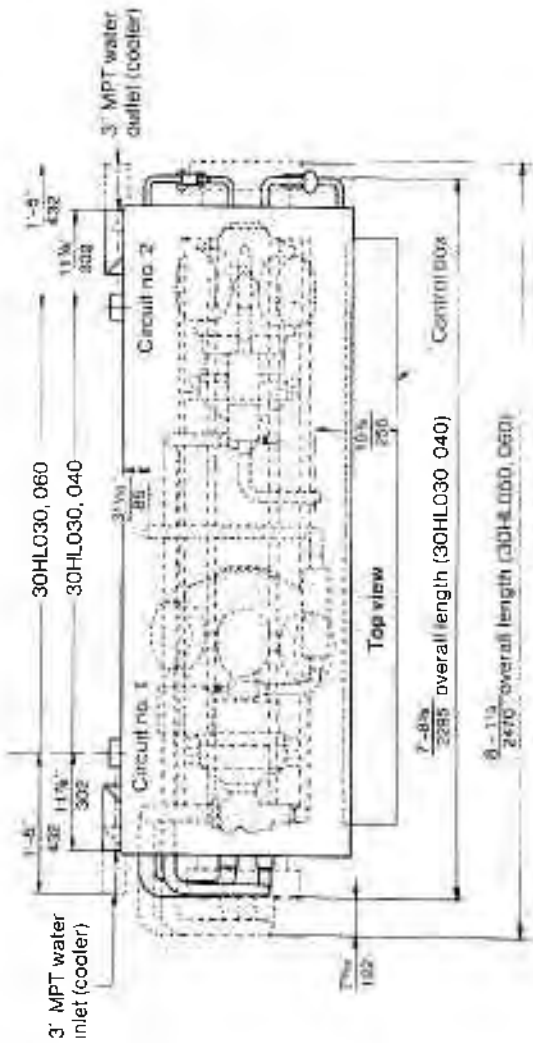
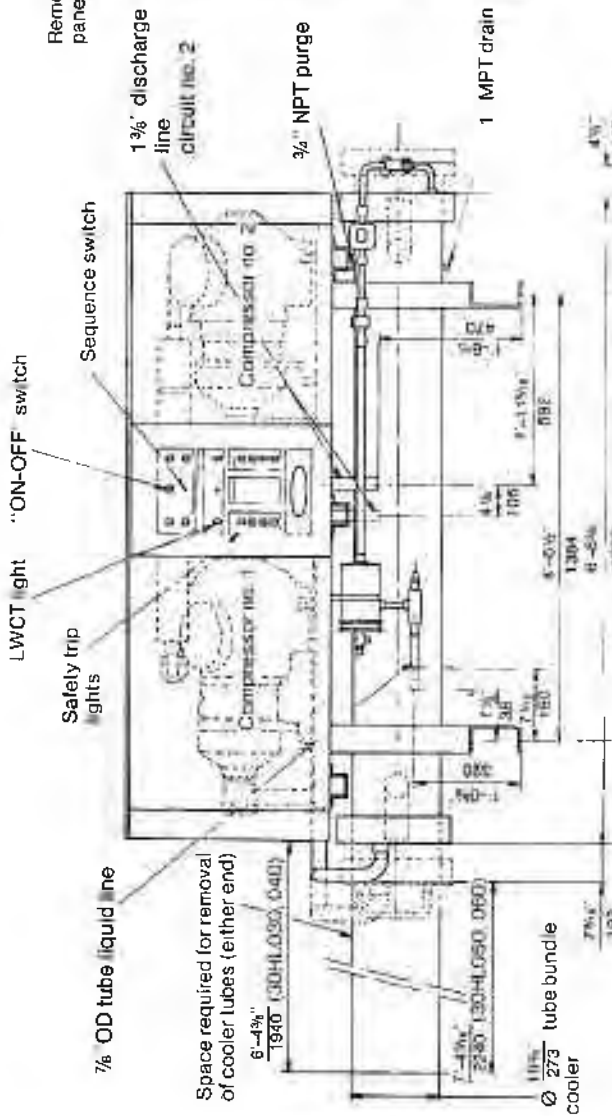
Unit 30HK, HL	Control steps	% Capacity	Total	Operating cylinders			
				Sequence No. 1		Sequence No. 2	
				Circuit 1	Circuit 2	Circuit 1	Circuit 2
030	1	25	2	2	-	-	2
	2	50	4	4	-	-	4
	3	75	6	4	2	2	4
	4	100	8	4	4	4	4
040	1	40	4	4	-	-	-
	2	60	6	6	-	-	-
	3	80	8	6	2	-	-
	4	100	10	6	4	-	-
050	1	20	2	-	-	-	2
	2	40	4	-	-	-	4
	3	80	8	-	-	4	4
	4	100	10	6	6	6	4
060	1	33	4	4	-	-	4
	2	50	6	6	-	-	6
	3	83	10	6	4	4	6
	4	100	12	6	6	6	6

Dimensions – 30HL

End view



Front view



Note:
All dimensions are in $\frac{\text{ft. in}}{\text{mm}}$

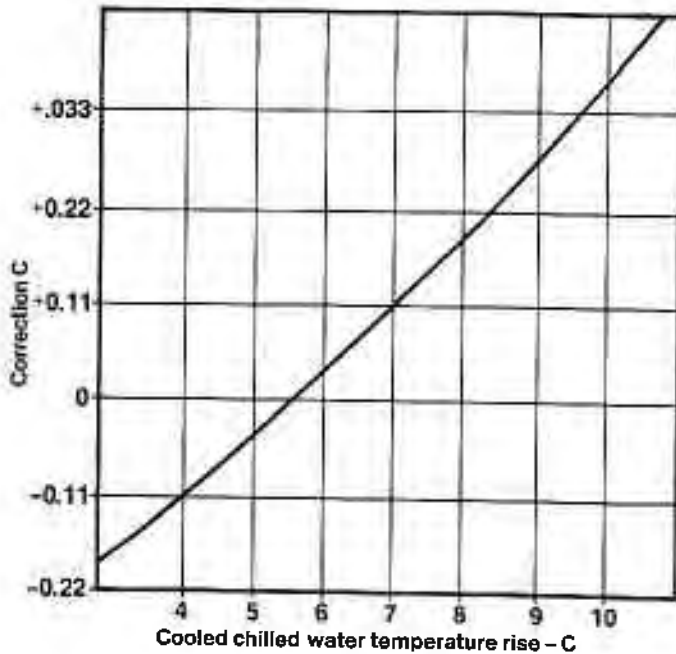
Unit size	Circuit no. 1		Circuit no. 2	Operating weight	
	Compressor	Cooler	Compressor	kg	lb
30HL030, 230 V	06EB250860	30HK400004	06EB250860	798	1756
30HL030, 400 V	06EB250960		06EB250960	798	1756
30HL040, 230 V	06EJ275860	30HK400014E	06EB250860	826	1818
30HL040, 400 V	06EJ275960		06EB250960	826	1818
30HL050, 230 V	06EJ275860	30HK400014E	06EJ275860	966	2124
30HL050, 400 V	06EJ275960		06EJ275960	966	2124
30HL060, 230 V	06EJ299860	30HK400014E	06EJ299860	993	2186
30HL060, 400 V	06EJ299960		06EJ299960	993	2186

NOTES:
Provide 800 mm; 2-7½' for access to control box

Rating notes – SI

1. All ratings are based on:

- a cooler chilled water temperature rise of 6°C. When greater accuracy is desired, correct the design LCWT, before entering the rating tables, by reference to LCWT correction curve



Above 5.6°C, add correction to design LCWT, below 5.6°C, subtract.

LCWT correction

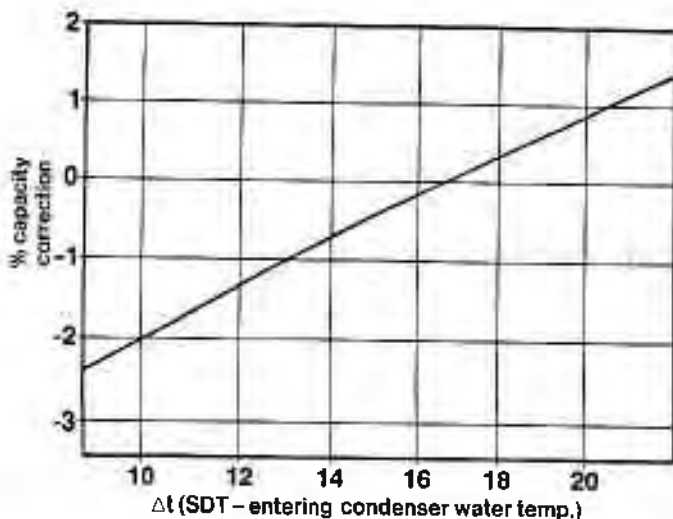
- a fouling factor of 1×10^{-4} (m².K)/W in the coolers and when applicable in the condensers.
- subcooling of 8.3°C. On 30HK units this occurs at 16.6°C Δt (SDT minus entering condenser water temperature). When a 30HK (water-cooled condenser) unit is selected at any other condition, use capacity correction curve below, to correct the capacity read from the ratings table.

Correction = Ratings table cap. x % cap. correction (from curve below)

Above 16.6°C Δt add the correction to rating table capacity. Below this value, subtract the correction from the rating table capacity.

Matching 30HL units with remote condensers which have subcooling either greater or less than 8.3°C will result respectively in an increase or decrease in system capacity. To adjust capacity, multiply the capacity ratings by 0.94 then increase the result by 0.7% for each degree C of available subcooling.

- refrigerant R-22



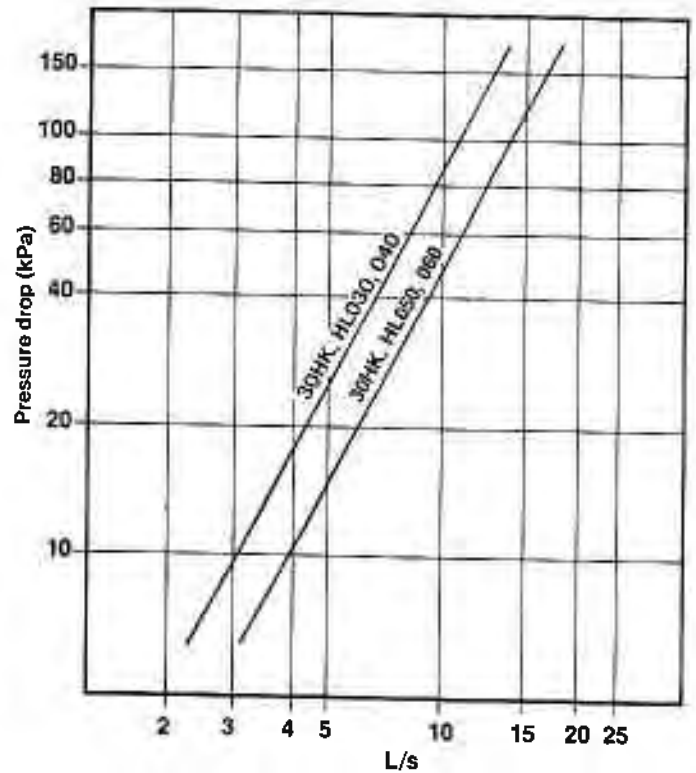
Capacity correction for Δt

2. When a corrected LCWT is used, the cooler pressure drop must also be corrected for the new LCWT:

- enter the ratings table for the corrected LCWT. By interpolation determine the corrected capacity (kW), the saturated discharge temperature (SDT in degrees C) and the power input (kW) to the compressor at its rated voltage.
- calculate the corrected flow rate through the cooler

$$= \frac{0.239 \times \text{capacity in kW}}{\text{temperature rise } ^\circ\text{C}} \text{ L/s}$$

- enter the cooler pressure drop curve (below) at the corrected flow rate and read the pressure drop.



Cooler chilled water pressure drop

3. When the chilled water temperature rise is less than 3°C the high flow rate will normally be accompanied by an excessive pressure drop. In such cases contact your Carrier representative for special selection of a cooler with wider baffle spacing.

4. Ratings showing a saturated discharge temperature above 48°C apply only to 30HL condenserless units.

5. For air-cooled 30HL ratings at saturated discharge temperatures above 63°C unit overloads have to be changed. The overload selections can be obtained from your Carrier representative. The overloads themselves are obtainable from the Service Parts Centre.

6. Air-cooled ARI ratings are at saturated discharge temperatures of 40°C and 49°C.

7. Water-cooled ARI ratings are at:

- leaving chilled water temperature 7°C
- entering condenser water temperature 29°C
- leaving condenser water temperature 35°C.

8. At the higher leaving chilled water temperatures (especially 13°C and 16°C) it may be necessary to change the expansion valve in order to obtain the rated capacity. Contact your Carrier representative for advice.

Selection guide – SI

Standard requirements

Determine the unit size and operating conditions required to provide the specified capacity at the given conditions:

Capacity required	123 kW
Leaving chilled water temperature (LCWT)	7°C
Chilled water temperature rise	6°C
Entering condenser water temperature	29°C
Fouling factor (cooler and condenser)	$1 \times 10^{-4} \text{ (m}^2\text{-K)/W}$

For water-cooled 30HK units:

Enter the ratings table for the specified LCWT (7°C). Read down the capacity (leftmost) column until the specified required capacity (123 kW) is reached. Read the corresponding unit size and operating conditions from the table:

Unit Size	30HK 030
Saturated discharge temperature	38°C
Power input to compressor	29.5 kW
Total heat rejection (THR)	150.6 kW
Cooler water flow rate	4.92 L/s
Cooler water pressure drop	25.6 kPa
Condenser water flow rate	7.88 L/s
Condenser leaving water temperature	33.6°C
Condenser water pressure drop	18.6 kPa

For condenserless 30HL units:

Given:

Capacity required	129 kW
Leaving chilled water temperature (LCWT)	7°C
Chilled water temperature rise	6°C
Fouling factor (cooler)	$1 \times 10^{-4} \text{ (m}^2\text{-K)/W}$
Condenser air entering temperature	35°C

Unit selection should provide for a temperature difference range of 8°C to 16°C, (SDT minus condenser air entering temperature).

Enter the rating table for the specified LCWT (7°C). Read down the capacity (leftmost) column until the specified required capacity (129 kW) is reached. This will be provided by a 30HL 040 with an SDT of 50°C at 42.1 kW power input and 167.3 kW total heat rejection. These values can be used to select an air-cooled condenser.

4.0°C Leaving Chilled Water Temperature



30HK,HL030

Capacity kW	Saturated discharge temp. C	Compressor power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	
79.4	60.0	35.6	111.8	3.15	10.9									
82.2	58.0	35.1	114.2	3.26	11.7									
84.8	56.0	34.7	116.4	3.37	12.4									
87.5	54.0	34.1	118.6	3.47	13.1									
90.2	52.0	33.6	120.8	3.58	13.9									
92.8	50.0	33.0	122.9	3.69	14.7									
94.2	49.0	32.7	123.9	3.74	15.1									
95.5	48.0	32.4	125.0	3.79	15.5									
98.3	46.0	31.7	127.2	3.90	16.4									
101.0	44.0	31.1	129.3	4.01	17.3									
103.8	42.0	30.3	131.4	4.12	18.2									
105.2	41.0	30.0	132.4	4.18	18.7						5.55	37.7	9.7	
106.5	40.0	29.6	133.5	4.23	19.1						6.58	36.8	13.3	
107.2	39.4	29.4	133.9	4.26	19.4				4.91	35.5	7.7	7.96	36.0	19.0
109.4	38.0	28.8	135.7	4.34	20.1				5.36	35.0	9.1	9.09	35.5	24.3
112.2	36.0	28.0	137.7	4.45	21.1				6.80	33.8	14.2	13.82	34.4	52.9
113.6	35.0	27.6	138.7	4.51	21.7	4.51	31.3	6.6	5.03	33.5	8.1	6.80	32.1	32.0
				5.19	30.4	8.6	6.95	31.8	14.7	10.55	31.3	57.3		

30HK,HL040

Capacity kW	Saturated discharge temp. C	Compressor power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	
98.3	60.0	43.8	138.2	3.90	16.4									
101.4	58.0	43.2	140.7	4.03	17.4									
104.4	56.0	42.5	143.1	4.14	18.4									
107.6	54.0	41.8	145.6	4.27	19.5									
110.6	52.0	41.0	148.0	4.39	20.6									
113.8	50.0	40.3	150.5	4.52	21.7									
115.4	49.0	39.8	151.6	4.58	22.3									
117.0	48.0	39.4	152.9	4.64	22.9									
120.1	46.0	38.6	155.2	4.77	24.1									
123.3	44.0	37.7	157.7	4.90	25.3									
126.5	42.0	36.8	160.0	5.02	26.6									
128.1	41.0	36.3	161.2	5.09	27.3									
129.7	40.0	35.9	162.4	5.15	27.9						7.46	37.2	25.6	
129.8	40.0	35.9	162.4	5.15	27.9						9.01	36.3	36.2	
133.1	38.0	34.9	164.9	5.28	29.3				6.50	35.0	19.9	11.16	35.5	53.3
136.3	36.0	33.9	167.2	5.41	30.7				6.54	35.0	20.1	11.26	35.5	54.2
138.0	35.0	33.4	168.4	5.48	31.4	5.98	30.7	17.1	6.68	32.9	20.9	9.33	33.2	38.6
				6.88	29.9	22.2	11.98	30.4	60.7					

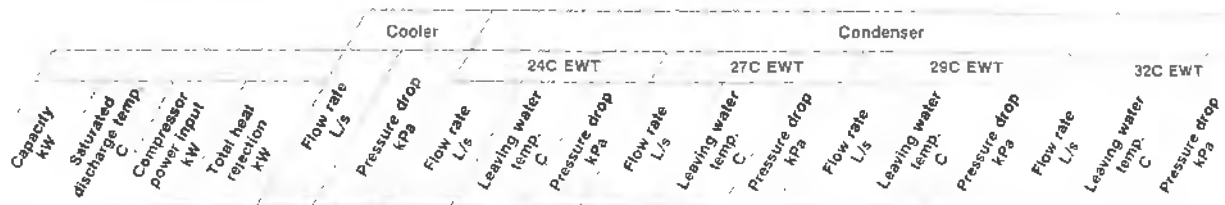
30HK,HL050

Capacity kW	Saturated discharge temp. C	Compressor power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa				
117.0	60.0	52.0	164.4	4.65	13.2												
121.0	58.0	51.3	167.7	4.80	14.1												
124.6	56.0	50.4	170.5	4.95	14.9												
128.4	54.0	49.5	173.5	5.10	15.8												
132.0	52.0	48.6	176.3	5.24	16.7												
135.8	50.0	47.7	179.2	5.39	17.6												
137.7	49.0	47.2	180.6	5.47	18.1												
139.5	48.0	46.6	182.0	5.54	18.5												
143.3	46.0	45.6	184.8	5.69	19.5												
147.2	44.0	44.5	187.7	5.84	20.5												
151.0	42.0	43.4	190.5	5.99	21.5												
152.9	41.0	42.9	191.9	6.07	22.1						5.70	37.0	7.3	8.43	37.4	15.1	
154.8	40.0	42.3	193.3	6.15	22.6						6.48	36.1	9.3	9.98	36.6	20.7	
155.1	39.7	42.1	193.4	6.16	22.7						7.45	35.2	12.0	12.38	35.7	31.0	
158.7	38.0	41.1	196.1	6.30	23.7				5.81	35.0	7.6	7.75	35.0	12.9	13.23	35.5	35.0
162.7	36.0	39.9	199.0	6.46	24.9	5.32	32.9	6.4	6.01	34.7	8.0	10.29	33.6	21.9			
164.6	35.0	39.3	200.4	6.54	25.4	6.82	31.0	10.2	10.52	31.5	22.8	16.72	31.9	54.2			
				7.84	30.1	13.2	13.14	30.7	34.6								

30HK,HL060

Capacity kW	Saturated discharge temp. C	Compressor power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa				
152.3	60.0	75.4	220.9	6.05	21.9												
157.1	58.0	74.2	224.6	6.24	23.2												
161.5	56.0	72.9	227.9	6.41	24.5												
166.2	54.0	71.7	231.4	6.60	25.9												
170.7	52.0	70.3	234.7	6.78	27.3												
175.3	50.0	69.0	238.1	6.96	28.7												
177.7	49.0	68.3	239.8	7.05	29.4												
180.0	48.0	67.6	241.5	7.15	30.2												
184.7	46.0	66.1	244.9	7.33	31.7												
189.3	44.0	64.7	248.1	7.51	33.2												
194.0	42.0	63.2	251.6	7.70	34.9												
196.4	41.0	62.4	253.2	7.80	35.7												
197.4	40.5	62.0	253.8	7.84	36.0	5.73	34.6	7.3	7.61	35.0	10.2	8.41	36.2	15.1	12.84	36.7	33.1
198.8	40.0	61.6	254.9	7.89	36.5	5.98	34.2	8.0	8.03	34.6	13.8	10.18	35.0	19.1	15.69	35.9	48.1
203.6	38.0	60.1	258.3	8.08	38.2	6.31	33.7	8.8	8.57	34.1	15.6	11.09	34.5	25.2	20.26	35.0	77.5
208.3	36.0	58.5	261.5	8.27	40.0	7.83	31.9	13.2	11.34	32.5	26.3	16.28	32.8	51.6			
210.8	35.0	57.7	263.3	8.37	40.9	10.01	30.3	20.8	16.67	30.9	53.9						

6.5°C Leaving Chilled Water Temperature



30HK,HL030

Capacity kW	Saturated discharge temp C	Compressor power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa
88.9	60.0	37.3	122.8	3.53	13.6									
91.9	58.0	36.8	125.4	3.66	14.5									
94.8	56.0	36.2	127.8	3.77	15.4									
97.6	54.0	35.6	130.0	3.88	16.3									
100.5	52.0	34.9	132.3	4.00	17.2									
103.4	50.0	34.2	134.5	4.11	18.1									
104.8	49.0	33.9	135.7	4.17	18.6									
106.3	48.0	33.5	136.8	4.23	19.1									
109.3	46.0	32.8	139.1	4.35	20.2									
112.2	44.0	32.0	141.3	4.46	21.2									
115.2	42.0	31.2	143.6	4.58	22.3							4.67	39.3	7.0
116.7	41.0	30.7	144.7	4.64	22.9							6.28	37.5	12.2
118.2	40.0	30.3	145.8	4.70	23.4				4.83	36.2	7.5	7.45	36.7	16.7
118.4	39.6	30.1	145.9	4.71	23.5				5.56	35.3	9.7	9.09	35.8	24.3
121.2	38.0	29.4	148.0	4.82	24.6			4.52	34.7	6.6	5.85	35.0	10.7	9.88
124.3	36.0	28.5	150.2	4.94	25.6	5.10	31.1	8.3	5.68	33.3	10.1	7.69	33.6	17.8
125.8	35.0	28.1	151.3	5.00	26.4	5.86	30.2	10.7	7.86	31.6	10.5	12.20	32.0	42.0
									9.68	30.8	27.3			

30HK,HL040

109.6	60.0	45.9	151.5	4.36	20.3									
113.0	58.0	45.2	154.1	4.49	21.5									
116.2	56.0	44.4	156.6	4.62	22.7									
119.6	54.0	43.6	159.3	4.76	24.0									
122.9	52.0	42.7	161.8	4.89	25.2									
126.4	50.0	41.8	164.4	5.03	26.6									
128.0	49.0	41.4	165.7	5.09	27.3									
129.8	48.0	40.9	167.0	5.16	28.0									
133.1	46.0	39.9	169.5	5.29	29.4									
136.6	44.0	39.0	172.1	5.43	30.9								6.23	38.6
140.1	42.0	37.9	174.6	5.57	32.4								8.55	36.9
141.8	41.0	37.4	175.8	5.64	33.2								10.36	36.1
143.0	40.3	37.0	176.7	5.68	33.7				6.42	35.6	19.5	12.09	35.5	46.6
143.6	40.0	36.9	177.1	5.71	34.0				7.07	35.0	23.3	12.09	35.5	61.7
147.0	38.0	35.8	179.6	5.85	35.6			5.76	34.4	15.9	7.45	34.7	25.6	
150.6	36.0	34.6	182.2	5.99	37.2	6.74	30.5	21.4	7.61	32.7	26.6	10.73	33.0	49.8
152.4	35.0	34.1	183.4	6.06	38.1	7.86	29.6	28.3	11.00	31.0	52.0			

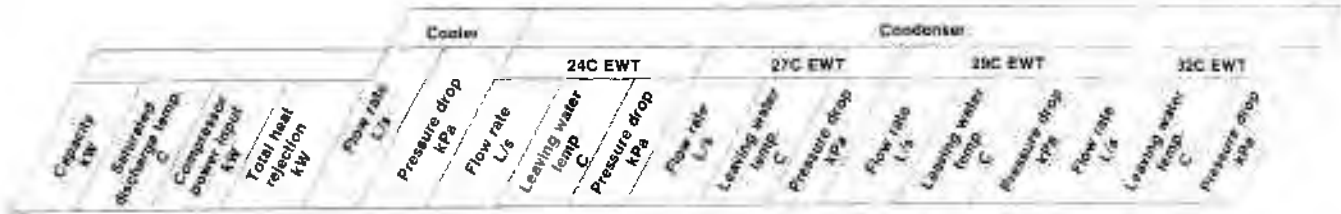
30HK,HL050

130.7	60.0	54.7	180.4	5.20	16.4									
135.0	58.0	53.8	184.0	5.37	17.4									
138.9	56.0	52.8	187.0	5.52	18.4									
142.9	54.0	51.8	190.0	5.68	19.5									
147.0	52.0	50.7	193.2	5.85	20.5									
150.9	50.0	49.6	196.0	6.00	21.6									
152.9	49.0	49.0	197.6	6.08	22.1									
155.0	48.0	48.5	199.1	6.16	22.7									
159.0	46.0	47.3	202.1	6.32	23.9								5.55	40.8
163.2	44.0	46.1	205.1	6.49	25.1								7.11	38.9
167.3	42.0	44.8	208.1	6.65	26.3								9.54	37.2
169.4	41.0	44.2	209.6	6.74	26.9				6.45	36.8	9.2	9.54	37.2	19.0
171.5	40.0	43.6	211.1	6.82	27.6				7.33	35.9	11.7	11.46	36.4	26.8
171.1	40.0	43.5	210.7	6.80	27.5				6.58	34.7	9.5	8.43	35.0	15.1
175.7	38.0	42.2	214.1	6.99	28.9				6.59	34.7	9.5	8.45	35.0	15.2
179.9	36.0	40.9	217.1	7.15	30.2	6.01	32.5	8.1	8.60	33.0	15.7	11.87	33.3	28.6
182.0	35.0	40.2	218.6	7.24	30.9	7.70	30.8	12.8	12.14	31.3	29.8	19.79	31.6	73.8
						8.86	29.9	16.6	15.18	30.5	45.3			

30HK,HL060

169.5	60.0	79.2	241.7	6.74	27.0									
174.6	58.0	77.9	245.5	6.94	28.6									
179.5	56.0	76.5	249.1	7.14	30.1									
184.4	54.0	75.0	252.6	7.33	31.7									
189.4	52.0	73.5	256.3	7.53	33.4									
194.2	50.0	72.0	259.8	7.72	35.0									
196.8	49.0	71.2	261.6	7.83	35.9									
199.3	48.0	70.5	263.4	7.93	36.8									
204.4	46.0	68.9	267.0	8.13	38.6								6.61	41.6
209.3	44.0	67.2	270.5	8.32	40.4				6.17	39.4	8.4	8.20	39.8	14.4
214.4	42.0	65.6	274.1	8.53	42.4	5.89	35.2	7.7	7.69	35.6	12.7	9.49	35.9	18.9
217.0	41.0	64.8	275.9	8.63	43.3	6.46	34.3	9.2	8.59	34.7	15.6	10.85	35.1	24.2
217.0	40.9	64.6	275.8	8.63	43.3	6.53	34.1	9.4	8.70	34.6	16.0	11.05	35.0	25.0
219.5	40.0	63.9	277.7	8.73	44.3	7.12	33.4	11.0	9.67	33.9	19.5	12.78	34.2	32.8
224.5	38.0	62.2	281.1	8.93	46.3	8.82	31.7	16.4	13.04	32.2	34.1	19.13	32.5	69.6
229.8	36.0	60.4	284.8	9.14	48.4	11.44	30.0	26.7	19.61	30.5	72.9			
232.4	35.0	59.6	286.6	9.24	49.4	13.47	29.1	36.2						

7.5°C Leaving Chilled Water Temperature



30HK,HL030

				Cooler		Condenser											
				24C EWT		27C EWT			29C EWT			32C EWT					
Capacity kW	Saturated discharge temp C	Compressor power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa			
92.8	60.0	37.9	127.4	3.69	14.8												
96.0	58.0	37.4	130.1	3.82	15.8												
99.0	56.0	36.8	132.5	3.94	16.7												
101.9	54.0	36.1	134.8	4.05	17.7												
104.9	52.0	35.4	137.1	4.17	18.7												
107.8	50.0	34.7	139.4	4.29	19.7												
109.3	49.0	34.3	140.6	4.35	20.2												
110.8	48.0	33.9	141.7	4.41	20.7												
113.9	46.0	33.1	144.1	4.53	21.9												
116.9	44.0	32.3	146.3	4.65	22.9												
120.0	42.0	31.5	148.7	4.78	24.2				4.46	37.0	6.5	6.60	37.4	13.4			
121.5	41.0	31.0	149.8	4.84	24.7				5.07	36.1	8.2	7.82	36.6	18.3			
123.1	40.0	30.6	150.9	4.90	25.3			4.55	35.0	6.7	5.84	35.2	10.7	9.64			
123.2	39.7	30.4	150.9	4.90	25.4			4.69	34.7	7.1	6.05	35.0	11.4	10.23			
126.2	38.0	29.6	153.2	5.02	26.6			5.96	33.2	11.1	8.07	33.6	19.5				
129.3	36.0	28.7	155.4	5.14	27.8	5.34	31.0	9.0	8.24	31.3	26.2	12.92	31.9	46.7			
130.9	35.0	28.2	156.3	5.21	28.5	6.15	30.1	11.7	10.24	30.7	30.3						

30HK,HL040

114.4	60.0	46.8	157.0	4.55	22.0									
117.8	58.0	46.0	159.6	4.69	23.3									
121.3	56.0	45.1	162.3	4.82	24.6									
124.6	54.0	44.3	164.9	4.96	26.0									
128.1	52.0	43.3	167.5	5.10	27.3									
131.6	50.0	42.4	170.2	5.24	28.8									
133.4	49.0	41.9	171.5	5.31	29.5									
135.1	48.0	41.4	172.8	5.38	30.3									
138.6	46.0	40.4	175.4	5.51	31.8									
142.1	44.0	39.4	178.0	5.65	33.4									
145.8	42.0	38.3	180.7	5.80	35.0					5.92	36.3	16.8	9.00	38.5
147.5	41.0	37.8	181.9	5.87	35.8					6.73	35.5	21.3	10.95	36.8
148.5	40.4	37.5	182.6	5.91	36.3			5.72	34.7	15.8	7.32	35.0	24.9	12.46
149.4	40.0	37.2	183.2	5.94	36.7			6.04	34.3	17.4	7.85	34.6	28.2	
153.0	38.0	36.1	185.8	6.09	38.4			8.02	32.6	29.6	11.35	32.9	55.3	
156.6	36.0	34.9	188.3	6.23	40.1	7.09	30.4	23.5	11.62	30.9	57.7			
158.4	35.0	34.3	189.6	6.30	41.0	8.27	29.5	31.2						

30HK,HL050

136.4	60.0	55.7	187.1	5.43	17.8									
140.9	58.0	54.7	190.7	5.61	19.0									
145.0	56.0	53.7	193.8	5.77	20.0									
149.0	54.0	52.6	196.9	5.93	21.1									
153.1	52.0	51.5	199.9	6.09	22.2									
157.3	50.0	50.3	203.1	6.26	23.4									
159.4	49.0	49.8	204.7	6.34	24.0									
161.5	48.0	49.2	206.2	6.42	24.6									
165.7	46.0	47.9	209.3	6.59	25.9									
169.9	44.0	46.7	212.4	6.76	27.1					5.37	38.5	6.5	7.47	40.6
174.1	42.0	45.4	215.4	6.93	28.4			5.48	36.4	6.8	6.76	36.6	10.0	10.01
176.3	41.0	44.7	216.9	7.01	29.1			6.13	35.5	8.3	7.70	35.8	12.8	12.13
178.2	40.1	44.1	218.4	7.09	29.7			6.84	34.7	10.2	8.75	35.0	16.2	14.88
178.4	40.0	44.0	218.5	7.10	29.8			6.90	34.6	10.4	8.85	34.9	16.5	15.17
182.8	38.0	42.6	221.6	7.27	31.2	6.31	32.4	8.0	9.03	32.9	17.2	12.56	33.2	31.8
187.1	36.0	41.2	224.6	7.44	32.6	8.08	30.7	14.0	10.85	31.2	33.2			
189.3	35.0	40.5	226.2	7.53	33.4	9.29	29.8	18.1	16.12	30.4	50.6			

30HK,HL060

176.8	60.0	80.7	250.3	7.03	29.3									
181.9	58.0	79.3	254.1	7.24	30.9									
187.1	56.0	77.9	257.9	7.44	32.6									
192.0	54.0	76.3	261.5	7.64	34.3									
197.2	52.0	74.8	265.3	7.85	36.1									
202.2	50.0	73.2	268.8	8.04	37.9									
204.8	49.0	72.4	270.7	8.15	38.8									
207.4	48.0	71.6	272.6	8.25	39.8									
212.6	46.0	69.9	276.2	8.46	41.7									
217.7	44.0	68.2	279.8	8.66	43.6					5.40	41.1	6.6	6.94	41.4
223.0	42.0	66.5	283.5	8.87	45.7	6.17	35.0	8.4	8.06	35.4	13.9	9.95	35.8	20.6
225.9	41.0	65.7	285.3	8.97	46.7	6.79	34.1	10.6	8.97	34.6	17.0	11.42	35.0	26.6
225.6	41.0	65.7	285.3	8.97	46.7	6.77	34.1	10.0	9.00	34.6	17.1	11.47	35.0	26.8
228.2	40.0	64.8	287.1	9.08	47.8	7.46	33.2	12.0	10.13	33.8	21.3	13.51	34.1	36.4
233.3	38.0	63.0	290.7	9.28	49.9	9.24	31.6	17.9	13.79	32.1	37.8	20.38	32.4	78.4
238.7	36.0	61.2	294.4	9.50	52.1	12.08	29.9	29.6						
241.4	35.0	60.3	296.2	9.60	53.2	14.23	29.0	40.1						

8.5°C Leaving Chilled Water Temperature



30HK,HL030

Capacity kW	Saturated discharge temp. C	Compressor Power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa
97.0	60.0	38.6	132.1	3.86	16.1									
100.3	58.0	38.0	134.8	3.99	17.1									
103.3	56.0	37.3	137.3	4.11	18.2									
106.3	54.0	36.6	139.6	4.23	19.1									
109.4	52.0	35.9	142.1	4.35	20.2									
112.4	50.0	35.1	144.4	4.48	21.3									
114.0	49.0	34.7	145.6	4.54	21.9									
115.5	48.0	34.3	146.7	4.60	22.5									
118.7	46.0	33.5	149.2	4.72	23.7									
121.7	44.0	32.6	151.4	4.84	24.8									
124.9	42.0	31.7	153.8	4.97	26.1				4.67	36.9	7.0	5.15	39.1	8.4
126.5	41.0	31.3	155.0	5.03	26.7				5.32	36.0	9.0	8.20	36.5	20.1
128.1	40.0	30.8	156.1	5.10	27.4			4.77	34.9	7.3	6.12	35.1	11.6	10.19
128.1	39.0	30.7	156.0	5.10	27.4			4.86	34.7	7.6	6.26	35.0	12.1	10.57
131.3	38.0	29.8	158.5	5.23	28.7	4.37	32.7	6.2	6.25	33.1	12.1	8.47	33.5	21.3
134.5	36.0	28.8	160.7	5.35	30.0	5.60	30.9	9.9	8.65	31.5	22.1	13.77	31.8	52.5
136.1	35.0	28.3	161.9	5.42	30.7	6.45	30.0	12.8	10.83	30.6	33.6			

30HK,HL040

Capacity kW	Saturated discharge temp. C	Compressor Power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa
119.3	60.0	47.6	162.6	4.75	23.9									
122.8	58.0	46.7	165.3	4.89	25.2									
126.4	56.0	45.8	168.1	5.03	26.7									
129.9	54.0	44.9	170.8	5.17	28.1									
133.5	52.0	44.0	173.5	5.31	29.6									
137.1	50.0	43.0	176.2	5.46	31.1									
138.8	49.0	42.5	177.5	5.53	31.9									
140.6	48.0	42.0	178.8	5.60	32.7									
144.2	46.0	40.9	181.4	5.74	34.3									
147.8	44.0	39.8	184.1	5.88	36.0									
151.5	42.0	38.7	186.7	6.03	37.7				6.20	36.2	18.3	9.47	36.7	39.9
153.3	41.0	38.1	188.0	6.10	38.6				7.07	35.4	23.4	11.58	35.9	57.4
154.1	40.0	37.9	188.6	6.14	39.0			5.90	34.7	16.7	7.35	35.0	26.4	12.80
155.2	40.0	37.5	189.4	6.18	39.5			6.32	34.2	19.0	8.26	34.5	31.1	
158.9	38.0	36.3	192.0	6.32	41.3	5.77	32.0	16.1	8.43	32.5	32.3	11.99	32.8	61.2
162.6	36.0	35.1	194.6	6.47	43.2	7.45	30.3	25.8	12.20	30.8	63.9			
164.5	35.0	34.5	195.9	6.55	44.2	8.70	29.4	34.2						

30HK,HL050

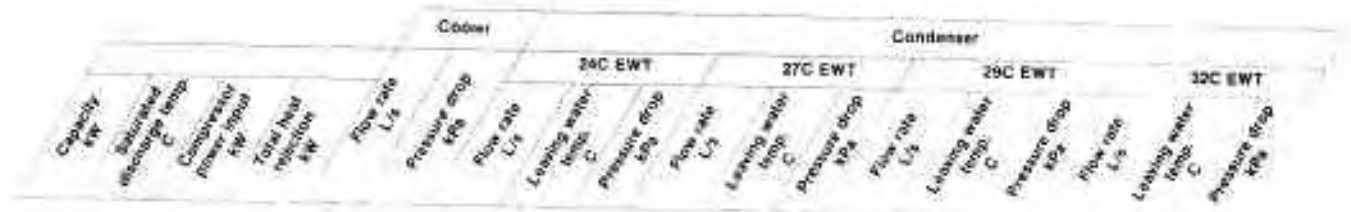
Capacity kW	Saturated discharge temp. C	Compressor Power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa
142.4	60.0	56.7	193.9	5.67	19.3									
146.9	58.0	55.7	197.6	5.85	20.5									
151.1	56.0	54.6	200.8	6.01	21.7									
155.2	54.0	53.4	203.9	6.18	22.8									
159.6	52.0	52.3	207.1	6.35	24.1									
163.9	50.0	51.1	210.3	6.52	25.3									
166.0	49.0	50.4	211.9	6.61	26.0									
168.1	48.0	49.8	213.5	6.69	26.6									
172.5	46.0	48.5	216.7	6.87	28.0									
176.7	44.0	47.2	219.7	7.04	29.3									
181.2	42.0	45.9	222.9	7.21	30.7									
183.4	41.0	45.2	224.5	7.30	31.4			5.75	36.3	7.4	7.10	36.5	11.0	10.51
185.2	40.2	44.6	225.8	7.37	32.0			6.43	35.4	9.1	8.08	35.7	14.0	12.84
185.6	40.0	44.5	226.1	7.39	32.2			7.09	34.6	10.9	9.06	35.0	17.3	15.42
190.1	38.0	43.0	229.2	7.57	33.7	5.33	34.2	6.4	7.24	34.5	11.4	9.29	34.8	18.1
194.4	36.0	41.5	232.2	7.74	35.2	6.62	32.3	9.6	9.47	32.8	18.8	13.29	33.1	35.3
196.7	35.0	40.8	233.9	7.83	36.0	8.47	30.6	15.2	13.58	31.1	36.7			
						9.74	29.8	19.8	17.18	30.3	57.0			

30HK,HL060

Capacity kW	Saturated discharge temp. C	Compressor Power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa	Flow rate L/s	Leaving water temp. C	Pressure drop kPa
184.2	60.0	82.2	259.1	7.33	31.7									
189.5	58.0	80.8	263.0	7.54	33.5									
194.8	56.0	79.2	266.9	7.75	35.3									
199.9	54.0	77.6	270.5	7.96	37.1									
205.2	52.0	76.0	274.4	8.17	39.0									
210.4	50.0	74.4	278.0	8.37	40.9									
213.0	49.0	73.5	280.0	8.48	41.9									
215.7	48.0	72.7	281.9	8.59	42.9									
220.9	46.0	71.0	285.5	8.79	44.9									
226.3	44.0	69.2	289.3	9.01	47.1									
231.6	42.0	67.4	293.0	9.22	49.2	5.45	36.8	6.7	6.90	37.1	10.4	8.29	37.4	14.7
233.8	41.2	66.7	294.5	9.31	50.1	6.46	34.9	9.2	8.44	35.3	15.1	10.42	35.8	22.4
234.3	41.0	66.5	294.9	9.33	50.3	6.97	34.1	10.6	9.24	34.7	17.9	11.79	35.0	28.2
237.1	40.0	65.6	296.8	9.44	51.4	7.09	34.0	10.9	9.43	34.5	18.6	12.11	34.8	29.7
242.4	38.0	63.8	300.4	9.65	53.7	7.82	33.1	13.1	10.64	33.7	23.3	14.27	34.0	40.3
247.9	36.0	61.9	304.2	9.87	56.0	9.67	31.5	19.5	14.56	32.0	41.9			
250.6	35.0	60.9	306.1	9.98	57.2	12.76	29.7	32.7						
						15.02	28.9	44.4						

10.0°C Water Temperature

Leaving Chilled



30HK,HL030

Capacity kW	Subcooled charge temp C	Compressor Power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	
103.4	60.0	39.5	139.3	4.12	18.2										
106.8	58.0	38.9	142.2	4.25	19.4										
110.0	56.0	38.1	144.7	4.38	20.5										
113.1	54.0	37.4	147.1	4.51	21.6										
116.3	52.0	36.6	149.6	4.63	22.8										
119.5	50.0	35.8	152.1	4.76	24.0										
121.1	49.0	35.3	153.3	4.82	24.6										
122.7	48.0	34.9	154.5	4.89	25.3										
126.0	46.0	34.0	156.9	5.02	26.6										
129.2	44.0	33.1	159.3	5.15	27.9										
132.5	42.0	32.1	161.8	5.28	29.3							4.31	40.7	6.1	
134.2	41.0	31.6	163.0	5.35	30.0							5.53	38.9	9.6	
135.9	40.0	31.1	164.2	5.41	30.7			4.54	35.6	6.7	5.02	36.7	8.0	7.43	
139.2	38.0	30.0	166.6	5.55	32.1	4.69	32.5	7.1	5.12	34.7	8.4	5.71	35.9	10.2	8.85
142.5	36.0	29.0	168.9	5.68	33.6	6.01	30.8	11.2	6.71	33.0	13.6	6.57	35.0	13.3	11.08
144.2	35.0	28.4	170.1	5.75	34.4	6.91	29.9	14.6	9.39	31.3	25.8	9.18	33.4	24.7	
									11.75	30.5	39.1	15.14	31.7	62.6	

30HK,HL040

Capacity kW	Subcooled charge temp C	Compressor Power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	
126.9	60.0	48.8	171.3	5.06	26.9										
130.5	58.0	47.8	174.1	5.20	28.4										
134.2	56.0	46.9	176.9	5.35	30.0										
137.9	54.0	45.9	179.7	5.49	31.6										
141.6	52.0	44.9	182.5	5.64	33.2										
145.3	50.0	43.8	185.2	5.79	34.9										
147.2	49.0	43.3	186.6	5.86	35.8										
149.1	48.0	42.7	188.0	5.94	36.7										
152.9	46.0	41.6	190.7	6.09	38.4										
156.7	44.0	40.4	193.5	6.24	40.3										
160.5	42.0	39.2	196.2	6.39	42.2										
162.4	41.0	38.6	197.6	6.47	43.2										
162.9	40.7	38.5	197.9	6.49	43.4			6.01	34.9	17.3	6.64	36.1	20.9	5.72	
164.3	40.0	38.0	198.9	6.55	44.1			6.19	34.7	18.3	7.92	35.0	28.9	7.39	
168.2	38.0	36.7	201.6	6.70	46.1	8.38	31.8	18.3	6.77	34.1	21.7	8.91	34.4	35.8	10.23
172.0	36.0	35.4	204.3	6.85	48.2	8.03	30.1	29.7	9.09	32.3	37.2	13.09	32.7	72.0	12.62
174.0	35.0	34.7	205.6	6.93	49.2	9.38	29.3	34.4							35.8

30HK,HL050

Capacity kW	Subcooled charge temp C	Compressor Power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	
151.6	60.0	58.1	204.5	6.04	21.8										
156.3	58.0	57.1	208.3	6.23	23.2										
160.6	56.0	55.9	211.5	6.40	24.4										
165.1	54.0	54.7	214.8	6.58	25.7										
169.6	52.0	53.4	218.2	6.75	27.1										
173.9	50.0	52.1	221.4	6.93	28.4										
176.2	49.0	51.4	223.0	7.02	29.2										
178.5	48.0	50.8	224.7	7.11	29.9										
183.0	46.0	49.4	228.0	7.29	31.4										
187.5	44.0	48.0	231.2	7.47	32.8										
192.1	42.0	46.5	234.5	7.65	34.4										
194.4	41.0	45.8	236.1	7.74	35.2			6.17	36.1	8.5	6.05	38.2	8.1	5.29	
195.9	40.3	45.3	237.1	7.80	35.7	5.53	34.3	6.9	6.90	35.2	10.4	8.67	36.4	12.5	6.57
196.7	40.0	45.1	237.7	7.84	36.0	5.72	34.0	7.3	7.46	34.6	12.0	9.49	35.5	15.9	8.41
201.4	38.0	43.5	241.0	8.02	37.7	7.10	32.2	11.0	7.77	34.3	13.0	9.96	35.0	18.9	10.43
205.9	36.0	42.0	244.1	8.20	39.3	9.08	30.5	17.4	10.16	32.7	21.4	14.44	34.7	20.6	13.95
208.3	35.0	41.2	245.8	8.30	40.2	10.44	29.7	22.5	14.74	31.0	42.9	33.0	41.2	16.21	17.73
									18.89	30.1	68.1				35.2

30HK,HL060

Capacity kW	Subcooled charge temp C	Compressor Power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	Flow rate L/s	Leaving water temp C	Pressure drop kPa	
195.6	60.0	84.4	272.5	7.79	35.6										
201.3	58.0	82.9	276.7	8.02	37.6										
206.6	56.0	81.2	280.5	8.23	39.6										
212.2	54.0	79.5	284.6	8.45	41.6										
217.5	52.0	77.8	288.3	8.66	43.7										
223.1	50.0	76.1	292.3	8.89	45.8										
225.8	49.0	75.2	294.3	9.00	46.9										
228.6	48.0	74.3	296.2	9.10	48.0										
234.0	46.0	72.5	299.9	9.32	50.2										
239.6	44.0	70.6	303.9	9.55	52.6	5.84	36.5	7.6	7.40	38.7	8.5	6.07	40.7	8.2	7.80
245.1	42.0	68.7	307.7	9.76	54.9	6.92	34.7	10.5	9.04	36.9	11.8	8.89	38.9	11.4	9.65
246.7	41.4	68.1	308.7	9.83	55.6	7.32	34.1	11.6	9.66	35.2	17.2	11.30	37.2	16.7	12.74
248.0	41.0	67.8	309.7	9.88	56.1	7.59	33.8	12.4	10.10	34.7	19.5	12.37	35.5	26.1	18.30
250.6	40.0	66.8	311.5	9.98	57.3	8.37	32.9	14.9	11.53	34.4	21.2	13.14	34.7	34.6	
256.2	38.0	64.9	315.3	10.21	59.8	10.35	31.3	22.2	15.79	33.5	27.1	15.46	33.8	46.8	
262.1	36.0	62.9	319.3	10.44	62.4	13.82	29.5	38.0							
264.9	35.0	61.9	321.3	10.55	63.7	16.36	28.7	52.0							

12.5 °C Leaving Chilled Water Temperature

				Cooler				Condenser											
Capacity kW	Saturated discharge temp. C	Compressor power input kW	Total heat rejection kW	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Pressure drop kPa	Flow rate L/s	Pressure drop kPa						
				24C EWT				27C EWT				29C EWT				32C EWT			
				Leaving water temp. C	Pressure drop kPa	Leaving water temp. C	Pressure drop kPa	Leaving water temp. C	Pressure drop kPa	Leaving water temp. C	Pressure drop kPa	Leaving water temp. C	Pressure drop kPa	Leaving water temp. C	Pressure drop kPa	Leaving water temp. C	Pressure drop kPa	Leaving water temp. C	Pressure drop kPa
114.6	60.0	41.0	152.0	4.57	22.2														
118.3	58.0	40.2	155.0	4.72	23.6														
121.7	56.0	39.4	157.5	4.85	24.9														
125.1	54.0	38.5	160.2	4.99	26.2														
128.5	52.0	37.6	162.7	5.12	27.6														
132.0	50.0	36.7	165.4	5.26	29.1														
133.7	49.0	36.2	166.7	5.33	29.8														
135.5	48.0	35.7	168.0	5.40	30.6														
138.9	46.0	34.7	170.5	5.54	32.0														
142.5	44.0	33.6	173.1	5.68	33.6														
145.9	42.0	32.6	175.6	5.82	35.2					4.47	38.3	6.5	4.84	40.5	7.5				
147.7	41.0	32.0	176.9	5.89	36.1			4.56	36.2	6.7	5.63	36.5	10.0	6.22	38.7	12.0			
149.0	40.2	31.6	177.8	5.94	36.7			5.10	35.3	8.3	6.41	35.6	12.7	10.14	36.2	29.7			
149.5	40.0	31.4	178.1	5.96	36.9			5.58	34.7	9.8	7.12	35.0	15.4	11.98	35.6	40.0			
153.1	38.0	30.3	180.7	6.10	38.6	5.26	32.3	8.8	7.52	32.8	17.1	10.51	33.1	31.8	35.4	45.1			
156.6	36.0	29.1	183.1	6.24	40.3	6.73	30.5	13.9	10.74	31.1	33.1								
158.5	35.0	28.5	184.4	6.32	41.2	7.74	29.7	18.0	13.55	30.3	50.9								

30HK,HL040

140.3	60.0	50.6	186.4	5.59	32.7														
144.2	58.0	49.6	189.3	5.75	34.4														
148.1	56.0	48.5	192.3	5.91	36.3														
152.1	54.0	47.4	195.2	6.06	38.1														
156.1	52.0	46.2	198.2	6.22	40.1														
160.1	50.0	45.1	201.1	6.38	42.0														
162.1	49.0	44.4	202.5	6.46	43.1														
164.1	48.0	43.8	204.0	6.54	44.1														
168.2	46.0	42.6	206.9	6.71	46.2														
172.3	44.0	41.3	209.8	6.87	48.4														
176.3	42.0	40.0	212.7	7.03	50.6					6.02	35.5	17.5	5.91	37.5	16.8	6.41	39.7	19.6	
178.2	41.1	39.3	214.0	7.10	51.6					6.68	34.7	21.2	7.50	35.8	26.2	8.38	38.0	32.1	
178.3	41.0	39.3	214.1	7.11	51.7					6.73	34.6	21.5	8.57	35.0	33.5	11.73	36.4	59.1	
180.4	40.0	38.6	215.5	7.19	52.8					7.65	33.8	27.2	10.08	34.1	45.1				
184.5	38.0	37.2	218.4	7.36	55.2	6.92	31.6	22.6	10.30	32.1	46.9								
188.7	36.0	35.8	221.2	7.52	57.6	9.09	29.8	37.3											
190.7	35.0	35.0	222.6	7.60	58.8	10.63	29.0	49.7											

30HK,HL050

167.8	60.0	60.5	222.8	6.69	26.6															
172.8	58.0	59.2	226.7	6.89	28.1															
177.6	56.0	57.9	230.3	7.08	29.7															
182.3	54.0	56.5	233.7	7.27	31.2															
187.1	52.0	55.1	237.3	7.46	32.8															
191.8	50.0	53.7	240.7	7.65	34.4															
194.3	49.0	53.0	242.5	7.74	35.2															
196.7	48.0	52.2	244.2	7.84	36.1															
201.6	46.0	50.7	247.7	8.04	37.8															
206.3	44.0	49.1	251.1	8.23	39.5					5.66	37.7	7.2	5.55	39.7	6.9	7.38	40.1	11.8		
211.3	42.0	47.5	254.6	8.42	41.4	5.31	35.5	6.4	6.93	35.8	10.5	6.79	37.9	10.1	9.45	38.4	18.7			
213.8	41.0	46.7	256.3	8.52	42.3	5.82	34.6	7.6	7.74	35.0	12.9	9.73	36.1	15.5	13.10	36.7	34.4			
214.6	40.6	46.4	256.8	8.56	42.6	6.06	34.2	8.2	8.12	34.6	14.1	10.29	35.3	19.7	16.03	35.8	50.1			
216.2	40.0	45.9	258.0	8.62	43.3	6.42	33.6	9.1	8.72	34.1	16.1	11.31	35.0	21.9	17.76	35.5	60.7			
221.2	38.0	44.2	261.5	8.82	45.2	7.96	31.9	13.6	11.57	32.4	27.3	16.65	34.5	26.2						
226.1	36.0	42.5	264.7	9.01	47.1	10.18	30.2	21.5	17.05	30.7	56.2									
228.6	35.0	41.6	266.5	9.11	48.1	11.94	29.4	28.9												

30HK,HL060

215.8	60.0	88.0	295.9	8.60	43.1															
221.8	58.0	86.3	300.4	8.84	45.4															
227.6	56.0	84.5	304.5	9.07	47.7															
233.6	54.0	82.6	308.8	9.31	50.1															
239.3	52.0	80.7	312.7	9.54	52.5															
245.1	50.0	78.8	316.8	9.77	55.0															
248.1	49.0	77.8	319.0	9.89	56.3															
250.9	48.0	76.8	320.9	10.00	57.5															
256.8	46.0	74.9	325.0	10.24	60.2	5.58	38.0	7.0	6.91	40.1	7.7	6.79	40.4	10.1	8.72	40.8	16.1			
262.8	44.0	72.9	329.1	10.48	62.9	6.53	36.1	9.4	8.27	38.3	10.4	8.12	38.6	14.1	10.87	39.2	24.3			
268.7	42.0	70.8	333.1	10.71	65.6	7.74	34.3	12.9	10.11	36.6	14.6	9.93	37.0	20.5	14.52	37.4	41.7			
269.1	41.7	70.5	333.3	10.73	65.8	7.90	34.1	13.4	10.37	34.9	21.2	12.08	35.2	33.3						
271.8	41.0	69.8	335.3	10.83	67.1	8.49	33.5	15.3	11.44	34.7	22.2	13.34	35.0	35.6						
274.6	40.0	68.7	337.2	10.95	68.4	9.35	32.7	18.3	13.15	34.0	26.7	14.98	34.4	44.2						
280.6	38.0	66.6	341.3	11.19	71.3	11.78	31.0	28.2	18.35	33.2	34.6	17.94	33.5	61.8						
286.6	36.0	64.5	345.3	11.43	74.3	15.74	29.3	48.4												
289.6	35.0	63.4	347.3	11.55	75.7	18.98	28.4	68.6												

Electrical data

LEGEND

FLA - Full load amps

ICF - Maximum instantaneous current flow during starting (any point in the starting sequence where the sum of LRA for the starting compressor plus FLA for all other running compressors is maximum) (A).

ICI - Maximum incremental current inrush (LRA of the largest compressor motor) (A)

LRA - Locked rotor amps

WSA - Wire sizing amps. To size wires it is necessary to take 125% of the largest motor FLA plus 100% of the FLA for the other motor.

Compressor model prefix letters: B and J have one unloader

Nominal voltage (V-ph-Hz)		230-3-50			400-3-50			Compressor 06E	
Network voltage (V)		220-240			380-415			Circuit 1	Circuit 2
Voltage limits for satisfactory operation (V)		198-264			342-457			Compressor number	
Model 30	kW	WSA	ICF	ICI	WSA	ICF	ICI	1	2
HK 030	35.6	123.8	260	205	72.0	152	120	B 150	B 150
040	43.1	155.0	397	342	89.5	232	200	J 175	B 150
050	50.6	180.0	422	342	103.5	246	200	J 175	J 175
060	78.5	283.5	626	500	164.3	366	292	J 299	J 299
HL 030	41.0	148.5	316	250	83.3	183	146	B 250	B 250
040	49.8	179.8	432	366	104.5	251	214	J 275	B 250
050	58.6	204.8	457	366	121.5	268	214	J 275	J 275
060	87.2	328.5	646	500	180.0	372	292	J 299	J 299

Compressors

Nominal voltage (V)		230			400			
Network voltage (V)		220-240			380-415			
Voltage limits for satisfactory operation (V)		198-264			242-457			
Model	Compressor 06E	kW	FLA	LRA	MTA	FLA	LRA	MTA
30HK	B 150	17.8	55	205	75	32	120	42
	J 175	25.3	80	342	111	46	200	62
	J 299	39.3	126	500	175†	73	292	99
30HL	B 250	20.5	66	250	95	37	146	51
	J 275	29.3	91	366	137†	54	214	76
	J 299	43.6	146	500	200†	80	292	110

NOTES:

- Compressor models 150, 250 are 4-cylinder
- Compressor models 175, 275 and 299 are 6-cylinder
- From the front of the unit, compressors and circuits are numbered from left to right
† Protected by 7-pole switch. Switch MTA is half of the compressor MTA

Control sequence

All units have 4-step temperature controller, factory-set to maintain capacity control through return chilled water temperature. The capacity control system includes a 4-step temperature controller, and solenoid-operated cylinder unloaders.

If chilled water low temperature cut-out is satisfied, field interlocks are closed and temperature controller is calling for cooling, one compressor will start from 0 to 5 min. 42 sec. depending upon position of the timer. The other compressors will start with 17 sec. delay if temperature controller is still calling for cooling. The temperature controller then takes over to start and stop compressors and to alternately load and unload cylinders in compressors to control unit capacity in response to load demand.

If demand limit switch is used (light on), unit will be running with one compressor

only (No. 1 or No. 2, depending on transfer switch position).

Unit completely stopped if control circuit switch is opened, chilled water low temperature thermostat or any auxiliary interlock contacts open, control circuit breaker is opened, or if the chilled water flow stops. Individual compressor stops if low or high pressure switch opens, overtemperature switch opens or oil pressure switch (if used) opens.

Both compressors are stopped if unit reset button is accidentally pushed. They will restart automatically after completion of timer sequence.

When one of the compressors is stopped due to safety trip-out pressing unit reset button will stop second compressor. Both compressors will restart after completion of timer sequence.

If chilled low water temperature cut-out

(LWCT), oil pressure switches (OPSS) control circuit breaker or relays opens, they must be reset manually to restart unit, (press unit reset button)

Low and high pressure switches, overtemperature switch are reset manually by pushing reset button of unit. In case of power interruption, the unit will recycle and restart when power is resumed.

Crankcase heaters prevent refrigerant condensation in crankcase whenever compressor is off. Heaters are always operative even if control circuit is de-energized.

Both circuits are protected by calibrated manual reset magnetic circuit breaker, D.G.T. (Discharge gas thermostat), control circuit breakers and high and low pressure switches.

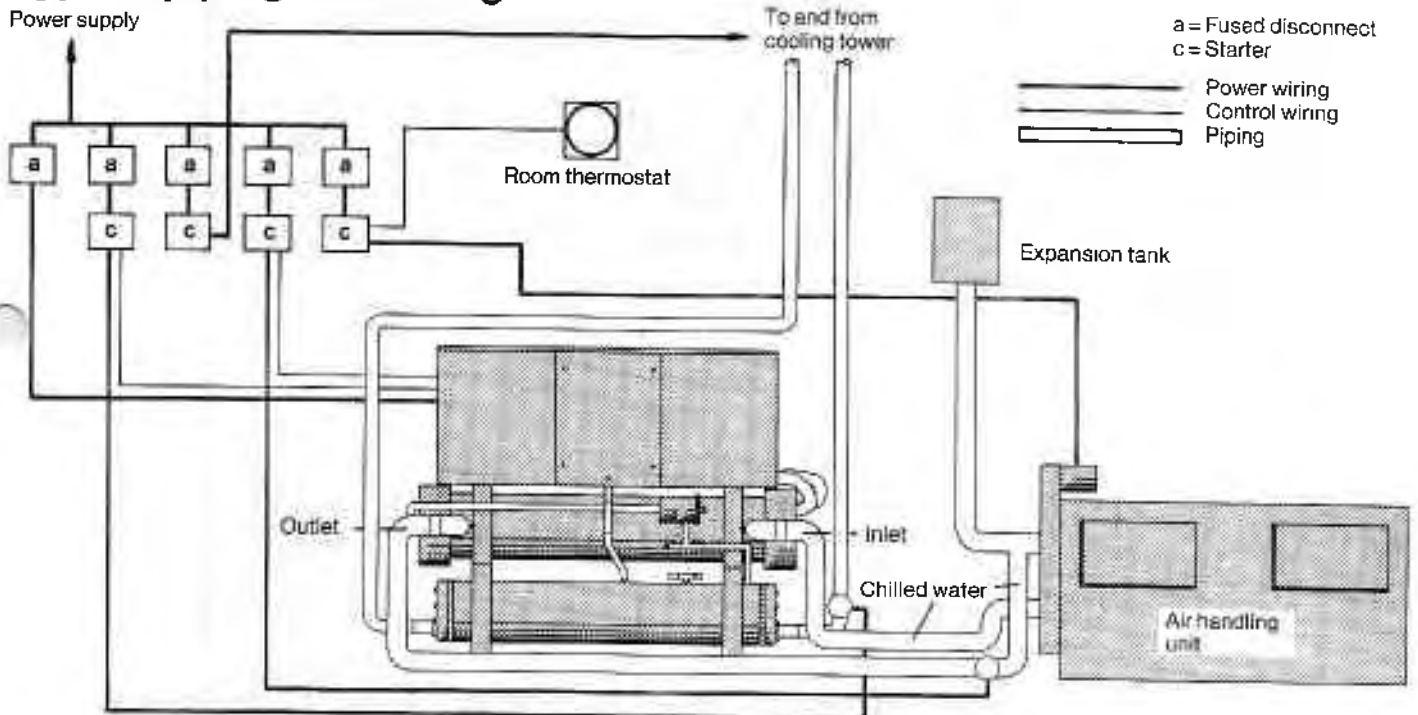
Pressure limits refrigerant side

		Maximum operating pressure			Test pressure		
		MPa	Bar	psig	MPa	Bar	psig
Condenser	Services des mines	3	30	435	6	60	870
	T.U.V.	3	30	435	3.9	39	566
	A.N.C.C.	2.45	24.5	356	3.06	3.06	444
Evaporator	Services des mines	1.8	18	261	Approval not required		
	T.U.V.	1.8	18	261	2.34	23.4	340
	A.N.C.C.	1.8	18	261	2.3	23	334

Maximum operating pressure water side

	MPa	Bar	psig
Condenser	1	10	145
Evaporator	1	10	145

Typical piping and wiring



NOTES:

1. Wiring and piping shown are general points of connection guides only and are not intended to be used or to include all details for a specific installation.

2. All wiring must comply with applicable local and national codes.

3. All piping must follow standard piping techniques. Refer to Carrier System Design Manual for details.

Le Compresseur Frigorifique, S.A

120 Montluel, France Tel: (7) 806 02 25 Telex: 340609/340634

Supplied by

Manufacturer reserves the right to change any product specifications without notice

From: New

Order No 13055, December 1979

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Supersedes order No : New

Printed in England