

## LAMPIRAN



## Lampiran 1 Gambar-gambar survey



Gambar L. 1 Perkampungan nelayan yang dikunjungi



Gambar L. 2 kapal nelayan yang dijadikan referensi desain



Gambar L. 3 Palka dengan kapasitas 120 kg ikan dalam kondisi terbuka



Gambar L. 4 Palka dengan kapasitas 120 kg ikan dalam kondisi tertutup



Gambar L. 5 Kondisi ikan ketika tiba di pelabuhan



Gambar L. 6 Mesin penghancur es di kapal nelayan

## Lampiran 2 Tabel-Tabel Beberapa Refrigerant Yang Umum Digunakan

Tabel L. 1 Sifat-sifat fisik beberapa refrigerant

Refrigerant		Chemical Formula	Molecular Mass	Boiling Pt. (NBP) at 101.325 kPa, °C	Freezing Point, °C	Critical Temperature, °C	Critical Pressure, kPa	Critical Density, kg/m <sup>3</sup>	Refractive Index of Liquid <sup>b,c</sup>
No.	Chemical Name or Composition (% by Mass)								
728	Nitrogen	N <sub>2</sub>	28.013	-195.8	-210.0	-146.96	3395.8	313.3	1.205 (83 K) 589.3 nm
729	Air	—	28.959	-194.25	—	-140.59	3789.6	335.94	—
740	Argon	Ar	39.948	-185.85	-189.34	-122.46	4863.0	535.6	1.233 (84 K) 589.3 nm
732	Oxygen	O <sub>2</sub>	31.999	-182.96	-218.79	-118.57	5043.0	436.14	1.221 (92 K) 589.3 nm
50	Methane	CH <sub>4</sub>	16.043	-161.48	-182.46	-82.586	4599.2	162.66	—
14	Tetrafluoromethane	CF <sub>4</sub>	88.005	-128.05	-183.61	-45.64	3750.0	625.66	—
170	Ethane	C <sub>2</sub> H <sub>6</sub>	30.07	-88.598	-182.8	32.18	4871.8	206.58	—
503	R-23/13 (40.1/59.9)	—	87.247	-87.76	—	18.417	4280.5	565.68	—
508A <sup>4</sup>	R-23/116 (39/61)	—	100.1	-87.377	—	10.844	3668.2	570.62	—
508B <sup>4</sup>	R-23/116 (46/54)	—	95.394	-87.344	—	11.827	3789	572.13	—
23	Trifluoromethane	CHF <sub>3</sub>	70.014	-82.018	-155.13	26.143	4832	526.5	—
13	Chlorotrifluoromethane	CClF <sub>3</sub>	104.46	-81.48	-181.15	28.85	3879	582.88	1.146 (25) <sup>2</sup>
744	Carbon dioxide	CO <sub>2</sub>	44.01	-78.4 <sup>d</sup>	-56.558 <sup>e</sup>	30.978	7377.3	467.6	1.195 (15)
504	R-32/115 (48.2/51.8)	—	79.249	-57.695	—	61.084	433.7	504.62	—
32	Difluoromethane	CH <sub>2</sub> F <sub>2</sub>	52.024	-51.651	-136.81	78.105	5782.0	424	—
410A	R-32/125 (50/50)	—	72.585	-51.443	—	71.358	4902.6	459.53	—
125	Pentafluoroethane	C <sub>2</sub> HF <sub>5</sub>	120.02	-48.09	-100.63	66.023	3617.7	573.58	—
1270	Propylene	C <sub>3</sub> H <sub>6</sub>	42.08	-47.69	-185.2	92.42	4664.6	223.39	1.3640 (-50) <sup>1</sup>
143a	Trifluoroethane	CH <sub>3</sub> CF <sub>3</sub>	84.041	-47.241	-111.81	72.707	3761.0	431.0	—
507A	R-125/143a (50/50)	—	98.859	-46.741	—	70.617	3705	490.77	—
404A	R-125/143a/134a (44/52/4)	—	97.604	-46.222	—	72.046	3728.9	486.53	—
502	R-22/115 (48.8/51.2)	—	111.63	-45.174	—	80.153	3917.6	566.03	—
407C	R-32/125/134a (23/25/52)	—	86.204	-43.627	—	86.034	4629.8	484.23	—
290	Propane	C <sub>3</sub> H <sub>8</sub>	44.096	-42.09	-187.67	96.675	4247.1	218.5	1.3397 (-42)
22	Chlorodifluoromethane	CHClF <sub>2</sub>	86.468	-40.81	-157.42	96.145	4990.0	523.84	1.234 (25) <sup>2</sup>
115	Chloropentafluoroethane	CClF <sub>2</sub> CF <sub>3</sub>	154.47	-38.94	-99.39	79.95	3120.0	613.1	1.221 (25) <sup>2</sup>
500	R-12/152a (73.8/26.2)	—	99.303	-33.603	—	102.09	4168.6	495.1	—
717	Ammonia	NH <sub>3</sub>	17.03	-33.327	-77.655	132.25	11333.0	225.0 <sup>d</sup>	1.325 (16.5)
12	Dichlorodifluoromethane	CCl <sub>2</sub> F <sub>2</sub>	120.91	-29.752	-157.05	111.97	4136.1	565.0	1.288 (25) <sup>2</sup>
134a	Tetrafluoroethane	CF <sub>3</sub> CH <sub>2</sub> F	102.03	-26.074	-103.3	101.06	4059.3	511.9	—
152a	Difluoroethane	CHF <sub>2</sub> CH <sub>3</sub>	66.051	-24.023	-118.59	113.26	4516.8	368	—
124	Chlorotetrafluoroethane	CHClF <sub>2</sub> CF <sub>3</sub>	136.48	-11.963	-199.15	122.28	3624.3	560.0	—
600a	Isobutane	C <sub>4</sub> H <sub>10</sub>	58.122	-11.67	-159.59	134.67	3640.0	224.35	1.3514 (-25) <sup>1</sup>
142b	Chlorodifluoroethane	CClF <sub>2</sub> CH <sub>3</sub>	100.5	-9.15	-130.43	137.11	4070.0	446.0	—
C318	Octafluorocyclobutane	C <sub>4</sub> F <sub>8</sub>	200.03	-5.975	-39.8	115.23	2777.5	619.97	—
600	Butane	C <sub>4</sub> H <sub>10</sub>	58.122	-0.55	-138.28	151.98	3796.0	227.84	1.3562 (-15) <sup>1</sup>
114	Dichlorotetrafluoroethane	CClF <sub>2</sub> CClF <sub>2</sub>	170.92	3.586	-94.15	145.68	3257.0	579.97	1.294 (25)
11	Trichlorofluoromethane	CCl <sub>3</sub> F	137.37	23.708	-110.47	197.96	4407.6	554.0	1.362 (25) <sup>2</sup>
123	Dichlorotrifluoroethane	CHCl <sub>2</sub> CF <sub>3</sub>	152.93	27.823	-107.15	183.68	3661.8	550.0	—
141b	Dichlorotrifluoroethane	CCl <sub>2</sub> FCH <sub>3</sub>	116.95	32.05	-103.3	206.81	4460.0	460.0	—
113	Trichlorotrifluoroethane	CCl <sub>2</sub> FCClF <sub>2</sub>	187.38	47.585	-36.22	214.06	3392.2	560.0	1.357 (25) <sup>2</sup>
718 <sup>3</sup>	Water	H <sub>2</sub> O	18.015	99.974	0.01	373.95	22064.0	322.0	—

Note:  
<sup>a</sup>Data from ASHRAE *Thermodynamic Properties of Refrigerants* (Stewart et al. 1986) or from Lemmon et al. (2002), unless otherwise noted.  
<sup>b</sup>Temperature of measurement (°C, unless kelvin is noted) shown in parentheses. Data from *CRC Handbook of Chemistry and Physics* (CRC 1987), unless otherwise noted.

<sup>c</sup>For the sodium D line.  
<sup>d</sup>Sublimes.  
<sup>e</sup>At 527 kPa.

References:  
<sup>1</sup>Kirk and Othmer (1956).  
<sup>2</sup>Bulletin B-32A (DuPont).  
<sup>3</sup>Handbook of Chemistry (1967).  
<sup>4</sup>NIST Standard Reference Database 23, v.7.

Tabel L. 2 Nilai indeks ODP dan HGWP beberapa refrigerant

		Chemical Formula	Molecular Mass	Ozone Depletion Potential (ODP)	Global Warming Potential (HGWP)
Hydrofluorocarbons HFCs					
R-32	Difluoromethane	CH <sub>2</sub> F <sub>2</sub>	52.02	0.0	0.14
R-125	Pentafluoroethane	CHF <sub>2</sub> CF <sub>3</sub>	120.03	0.0	0.84
R-134a	Tetrafluoroethane	CF <sub>3</sub> CH <sub>2</sub> F	102.03	0.0	0.26
R-143a	Trifluoroethane	CH <sub>3</sub> CF <sub>3</sub>	84.0	0.0	
R-152a	Difluoroethane	CH <sub>3</sub> CHF <sub>2</sub>	66.05	0.0	
R-245ca	Pentafluoropropane	CF <sub>3</sub> CF <sub>2</sub> CH <sub>3</sub>	134.1	0.0	
HFC's azeotropics					
R-507	R-125/R-143 (45/55)			0.0	0.98
HFC's near azeotropic					
R-404A	R-125/R-143a (44/52/4)			0.0	0.94
R-407A	R-32/R-125/R-134a (20/40/40)			0.0	0.49
R-407C	R-32/R-125/R-134a (23/25/52)			0.0	0.70
Hydrochlorofluorocarbons HCFCs and their azeotropics					
R-22	Chlorodifluoromethane	CHClF <sub>2</sub>	86.48	0.05	0.40
R-123	Dichlorotrifluoroethane	CHCl <sub>2</sub> CF <sub>3</sub>	152.93	0.02	0.02
R-124	Chlorotetrafluoroethane	CHClCF <sub>3</sub>	136.47	0.02	
HCFC's near azeotropics					
R-402A	R-22/R-125/R-290 (38/60/2)			0.02	0.63
HCFC's azeotropics					
R-401A	R-22/R-124/R-152a (53/34/13)			0.37	0.22
R-401B	R-22/R-124/R-152a (61/28/11)			0.04	0.24
Inorganic compounds					
R-717	Ammonia	NH <sub>3</sub>	17.03	0	0
R-718	Water	H <sub>2</sub> O	18.02	0	
R-729	Air		28.97	0	
Chlorofluorocarbons CFCs, halons BFCs and their azeotropic					
R-11	Trichlorofluoromethane	CCl <sub>3</sub> F	137.38	1.00	1.00
R-12	Dichlorodifluoromethane	CCl <sub>2</sub> F <sub>2</sub>	120.93	1.00	3.20
R-13B1	Bromotrifluoromethane	CBrF <sub>3</sub>	148.93	10	
R-113	Trichlorotrifluoroethane	CCl <sub>2</sub> CF <sub>2</sub> CF <sub>3</sub>	187.39	0.80	1.4
R-114	Dichlorotetrafluoroethane	CCl <sub>2</sub> CF <sub>3</sub>	170.94	1.00	3.9
R-500	R-12/R-152a (73.8/26.2)		99.31		
R-502	R-22/R-115 (48.8/51.2)		111.63	0.283	4.10

Tabel L. 3 Tabel kemanan (*safety*) dan mampu bakar (*flammability*) beberapa refrigerant

	Replacement of	Trade Name	Flammability	Safety
Hydrofluorocarbons HFCs				
R-32				
R-125			Nonflammable	A1
R134a	R-12		Nonflammable	A1
R143a				
R-152a			Lower flammable	A2
R-245ca				
HFC's azeotropics				
R-507	R-502	Genetron AZ-50		
HFC's near azeotropic				
R-404A	R-22	SUVA HP-62		A1/A1 <sup>a</sup>
R-407A	R-22	KLEA 60		A1/A1 <sup>a</sup>
R-407C	R-22	KLEA 66		A1/A1 <sup>a</sup>
Hydrochlorofluorocarbons HCFC's and their azeotropics				
R-22			Nonflammable	A1
R-123	R-11		Nonflammable	B1
R-124				
HCFC's near azeotropics				
R-402A	R-502	SUVA HP-80		A1/A1 <sup>a</sup>
HCFC's azeotropics				
R-401A	R-12	MP 39		A1/A1 <sup>a</sup>
R-401B	R-12	MP 66		A1/A1 <sup>a</sup>
Inorganic compounds				
R-717			Lower flammability	B2
R-718			Nonflammable	
R-729			Nonflammable	
Chlorofluorocarbons CFCs, halons BFCs, and their azeotropics				
R-11			Nonflammable	A1
R-12			Nonflammable	A1
R-13B1			Nonflammable	A1
R-113			Nonflammable	A1
R-114			Nonflammable	A1
R-500	R-12/R-152a (73.8/26.2)		Nonflammable	A1
R-502	R-22/R-115 (48.8/51.2)		Nonflammable	A1

Source: Adapted with permission from *ASHRAE Handbooks 1993 Fundamentals*. Also from refrigerant manufacturers.

<sup>a</sup> First classification is that safety classification of the formulated composition. The second is the worst case of fractionation.

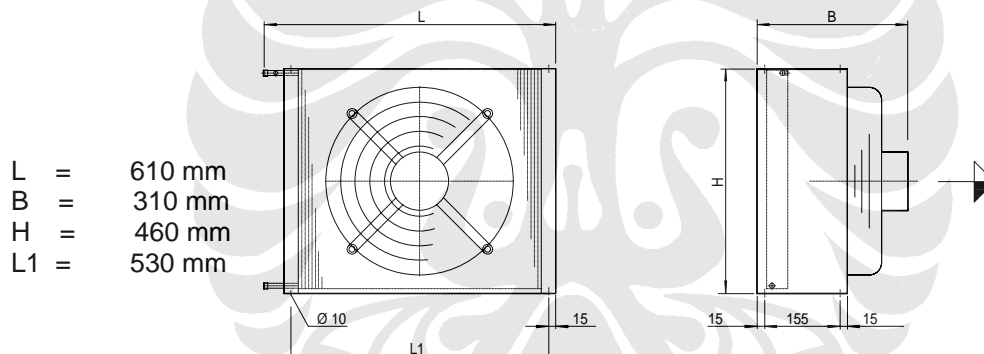
### Lampiran 3 Spesifikasi Kondenser Hasil Pemilihan



**Condenser**

**GVM 037A/1-L**

<b>Capacity:</b>	2.9 kW	<b>Refrigerant:</b>	<b>R134a<sup>(1)</sup></b>
Air flow:	1450 m <sup>3</sup> /h	Hot gas temp.:	82.0 °C
Air inlet:	38.0 °C	Condensation temp.:	50.0 °C
Altitude:	0 m	Condensate outlet:	48.4 °C
Fans:	1 Piece(s) 1~230V 50Hz	Hot gas flow:	0.90 m <sup>3</sup> /h
Data per motor (nominal data):		Noise pressure level:	33 dB(A) <sup>(2)</sup>
Speed:	890 min-1	at a distance of:	10.0 m
Capacity (el.):		Noise power level:	64 dB(A)
Current:	0.28 A <sup>(3)</sup>		
Total el. power consumption:	0.06 kW	Energy efficiency class:	C
Casing:	Galv. Steel, RAL 7035	Tubes:	Copper
Surface:	8.1 m <sup>2</sup>	Fins:	Aluminum
Tube volume:	2 l	Connections per unit:	
Fin pitch:	2.20 mm	Inlet:	9.5 * 1.00 mm
Passes:	36	Outlet:	9.5 * 1.00 mm
Dry weight:	13 kg <sup>(4)</sup>	Distributions:	1 * 1
<b>Dimensions:</b>			



Attention: Drawing and dimensions not valid for all accessory options!

Unit price	328.00 EUR
Total (List price without VAT, incl. transport protection)	328.00 EUR

Terms of delivery:

Payment cond.:

Delivery time:

Validity:

Our general terms of sales and delivery apply!

(1) Fluid group 2 according to directive 67/548/EWG

(2) by using the enveloping surface method acc. to EN 13487

(3) The current consumption can differ in dependence of the air temperature and of the variations of system voltage according to the VDE guidance.

(4) Dimensions and weights are not valid for all possible options!

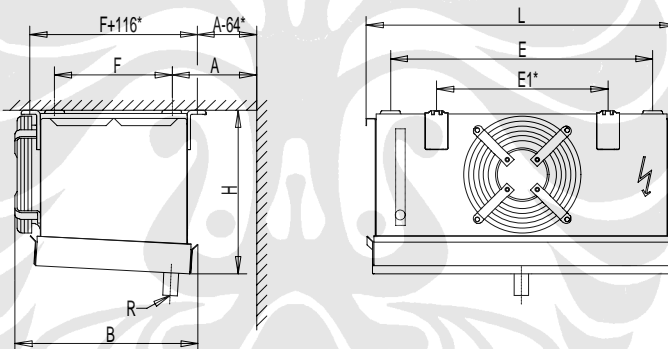
## Lampiran 4 Spesifikasi Evaporator Hasil Pemilihan

### Evaporator (dx) GHF 020.1A/14-AW

<b>Capacity:</b>	0.76 kW	<b>Refrigerant:</b>	R134a <sup>(1)</sup>
Surface reserve:	0.1 %	Evaporation temp.:	-7.0 °C
Air flow:	725 m <sup>3</sup> /h	Superheating:	5.0 K
Air inlet:	0.0 °C 95 %	Condensing temp.:	50.0 °C
Air outlet:	-1.9 °C 99 %	Subcooled temp.:	45.0 °C
Air pressure:	1013 mbar		
<b>Fans:</b>	1 Piece(s) 1~230V 50Hz	<b>Noise pressure level:</b>	52 dB(A) <sup>(2)</sup>
<b>Data per motor (nominal data):</b>		at a distance of:	1.0 m
Speed:	2400 min-1	<b>Noise power level:</b>	65 dB(A)
Capacity (mech./el.):	0.04 kW/0.07 kW	<b>Air throw:</b>	approx. 5 m
Current:	0.32 A <sup>(3)</sup>	<b>Frost:</b>	0.0 mm
<b>Casing:</b>	AlMg3, Powder coated RAL 9003	<b>Tubes:</b>	Copper
Surface:	3.8 m <sup>2</sup>	<b>Fins:</b>	Aluminum
Tube volume:	1 l	<b>Distr. press. drop:</b>	--
Fin pitch:	4.00 mm	<b>Suction:</b>	12.0 * 1.00 mm
Dry weight:	12 kg <sup>(4)</sup>	<b>Inlet:</b>	12.0 * 1.00 mm

#### Dimensions:

L =	613 mm
B =	362 mm
H =	326 mm
E =	520 mm
F =	220 mm
A =	300 mm
E1 =	350 mm
R =	G <sup>3/4</sup>



\*) alternative suspension Attention: Drawing and dimensions not valid for all accessory options!

Unit price	331.00 EUR
Total (List price without VAT, incl. transport protection)	331.00 EUR

Terms of delivery:

Payment cond.:

Delivery time:

Validity:

Our general terms of sales and delivery apply!

(1) Fluid group 2 according to directive 67/548/EWG

(2) by using the enveloping surface method acc. to EN 13487

(3) The current consumption can differ in dependance of the air temperature and of the variations of system voltage according to the VDE guidance.

(4) Dimensions and weights are not valid for all possible options!

## Lampiran 4 Spesifikasi Kompresor Hasil Pemilihan



### RS+3 Selection Report

Jan 8, 2004 12:12:56 AM

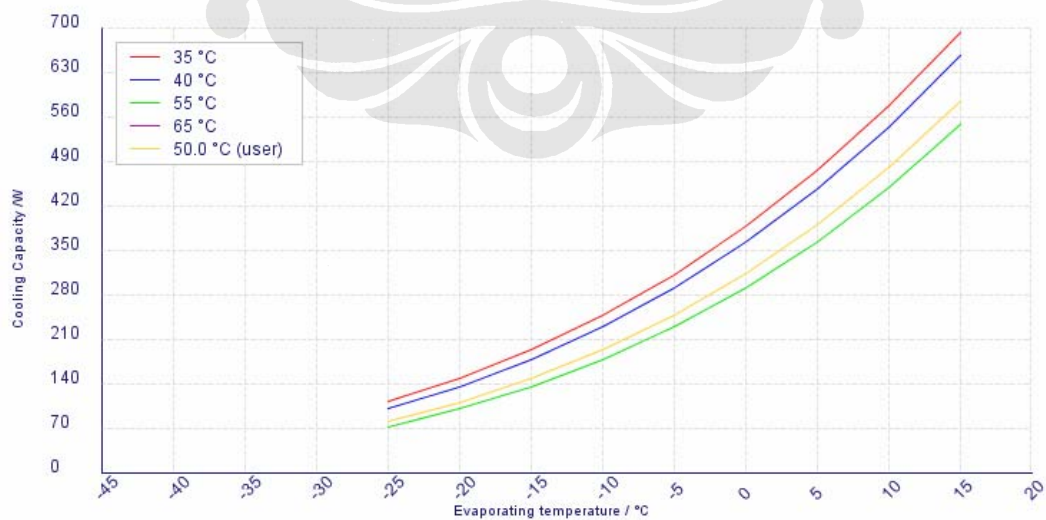
#### General data

Type	BD80F	
Code no.	101Z0280	
Variable Speed	2500-4400 1/min	
Compressor design	Mobile Compressor	
Refrigerant	R134a //	
Nominal voltage (D.C.)	12 24	
Displacement	3.00	cm <sup>3</sup>
Net weight Without accessories	4.3	kg
Maximum refrigerant charge	0.3	kg
Free gas volume	870	cm <sup>3</sup>
Oil quantity	150.0	
Oil type	POE	
Approvals	E4 72/245 95/54 0277 00	

#### Performance data

##### Cooling capacity in Watt

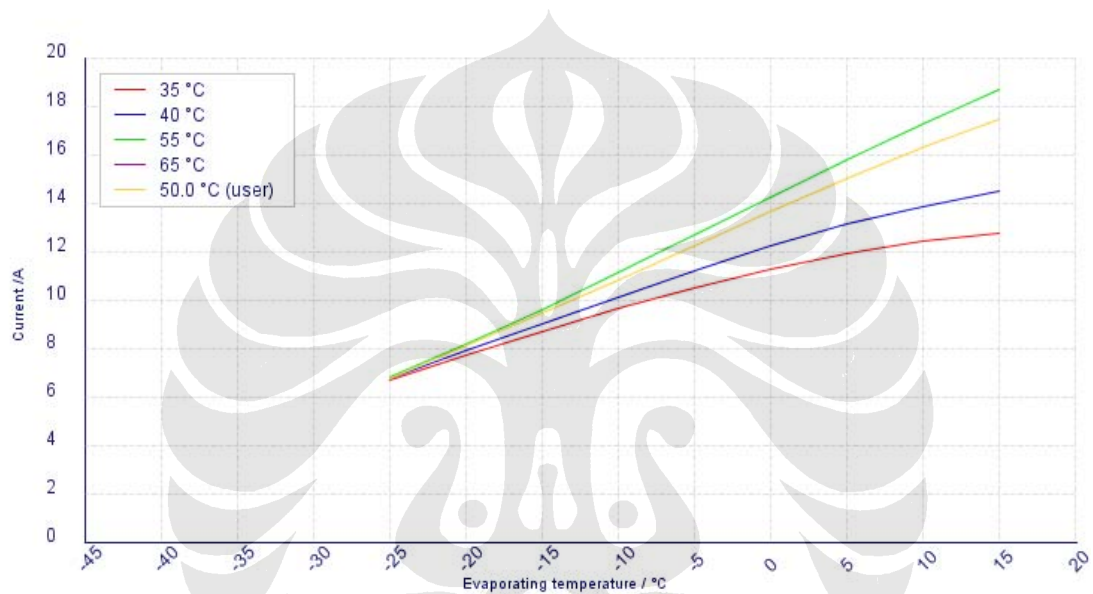
TE	TC35	TC40	TC45	TC50	TC55	TC60	TC65	TCUSER
-45								
-40								
-35								
-30								
-25	111	99.6	88.9	79.5	71.4	64.9		79.5
-20	148	134	122	110	99.5	90.6		110
-15	193	177	162	147	134	123		147
-10	247	228	210	193	177	162		193
-5	311	290	268	248	228	210		248
0	387	362	337	313	290	268		313
5	475	446	418	390	363	336		390
10	576	544	512	479	448	417		479
15	692	656	619	583	547	512		583
20								





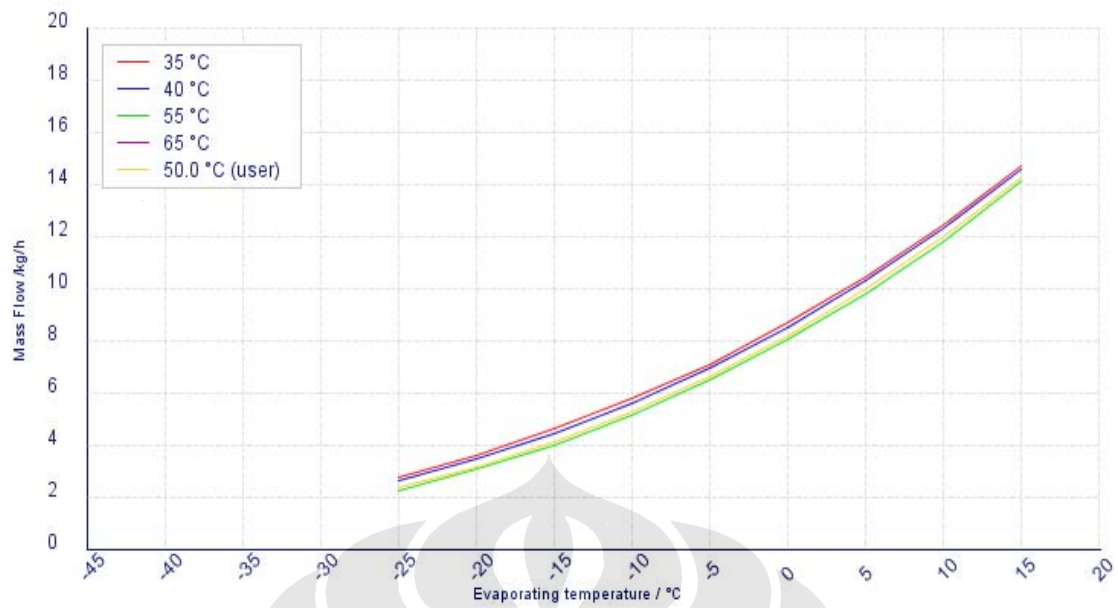
### Power input

TE	TC35	TC40	TC45	TC50	TC55	TC60	TC65	TCUSER
-45								
-40								
-35								
-30								
-25	80.4	81.1	81.2	81.2	81.5	82.4		81.2
-20	92.4	94.5	95.8	96.8	97.8	99.3		96.8
-15	104	108	111	113	115	118		113
-10	116	121	126	130	133	137		130
-5	126	134	141	147	152	157		147
0	135	146	156	164	171	178		164
5	143	157	169	180	189	198		180
10	149	166	182	195	207	219		195
15	153	174	192	209	224	238		209
20								



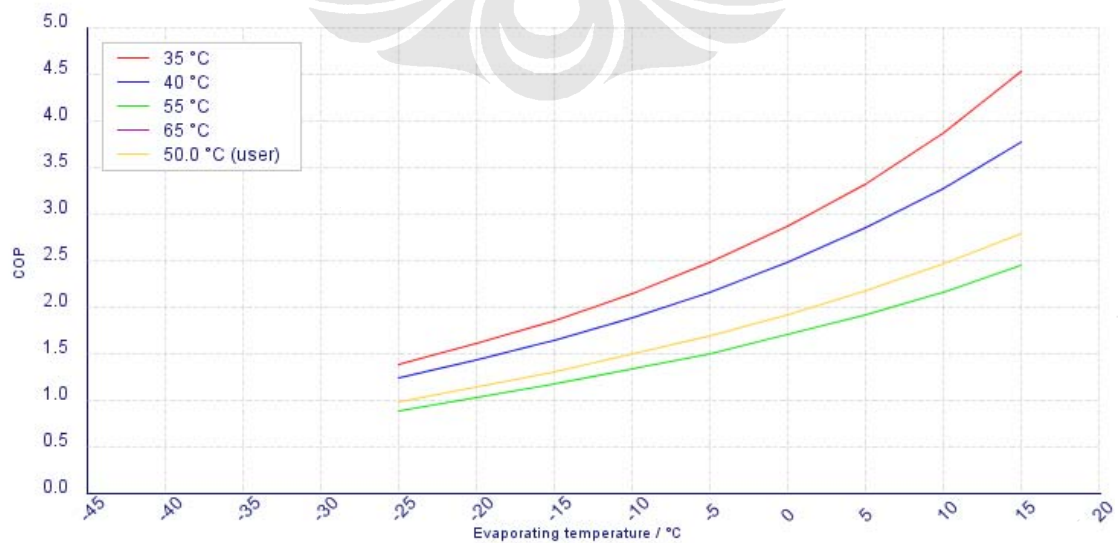
### Current consumption

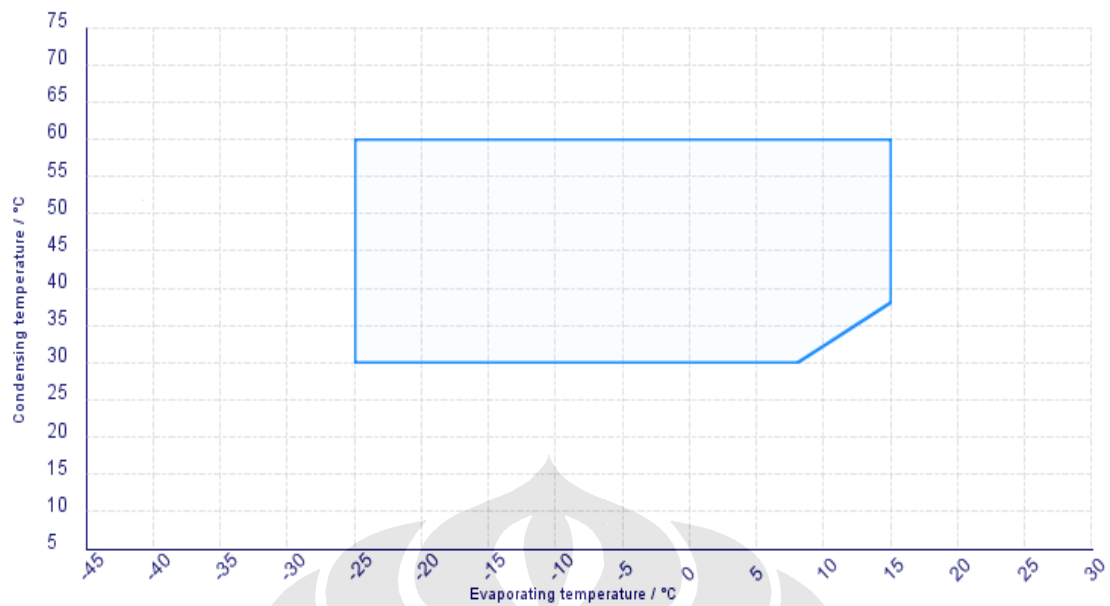
TE	TC35	TC40	TC45	TC50	TC55	TC60	TC65	TCUSER
-45								
-40								
-35								
-30								
-25	6.70	6.76	6.77	6.77	6.79	6.87		6.77
-20	7.70	7.88	7.99	8.07	8.15	8.27		8.07
-15	8.68	9.01	9.24	9.43	9.61	9.80		9.43
-10	9.63	10.1	10.5	10.8	11.1	11.4		10.8
-5	10.5	11.2	11.8	12.2	12.7	13.1		12.2
0	11.3	12.2	13.0	13.6	14.2	14.8		13.6
5	11.9	13.1	14.1	15.0	15.8	16.5		15.0
10	12.4	13.9	15.1	16.3	17.3	18.2		16.3
15	12.7	14.5	16.0	17.4	18.7	19.9		17.4
20								



**Coefficient of Performance COP**

TE	TC35	TC40	TC45	TC50	TC55	TC60	TC65	TCUSER
-45								
-40								
-35								
-30								
-25	1.38	1.23	1.09	0.98	0.88	0.79		0.98
-20	1.60	1.42	1.27	1.14	1.02	0.91		1.14
-15	1.85	1.64	1.46	1.30	1.16	1.04		1.30
-10	2.14	1.88	1.67	1.48	1.32	1.18		1.48
-5	2.47	2.16	1.90	1.69	1.50	1.34		1.69
0	2.86	2.47	2.17	1.91	1.70	1.51		1.91
5	3.32	2.84	2.47	2.17	1.91	1.70		2.17
10	3.87	3.27	2.82	2.46	2.16	1.91		2.46
15	4.53	3.77	3.22	2.79	2.44	2.15		2.79
20								





### Electrical data

Nominal voltage (D.C.)	12 24	V
Motor configuration 1	DC/Permanent Magnet	
Winding resistance (main)	2.0	?
Max stationary winding temp.	125	°C
Max short term winding temp.	135	°C

### Dimensional data

Height	137	mm
Height from baseplate ( B )	135	mm
Height suction	128	mm
Height discharge	73	mm
Suction connector	6.2	mm
Process connector	6.2	mm
Discharge connector	5	mm
Suction connector material	Cu-plated steel	
Suction connector sealing	Al-cap	
Process connector material	Cu-plated steel	
Process connector sealing	Al-cap	
Discharge connector material	Cu-plated steel	
Discharge connector sealing	Al-cap	
Connector tolerance	+/- 0.09, on 5mm +0.12/+0.2	

### Accessories data

#### Rotolok accessories

#### Crankcase heaters

Crankcase heater

#### Miscellaneous accessories

Bolt joint for one compressor (16mm)	118-1900
Bolt joint in quantities (16mm)	118-1901
Snap-on in quantities (16mm)	118-1902

#### SpareParts

##### Electrical accessories

Starting device			101N0280
Cable length in mm	1.0	mm	
Starting device			101N0281
Cable length in mm	28.0	mm	
Remarks on accessories	weight 0,3kg		