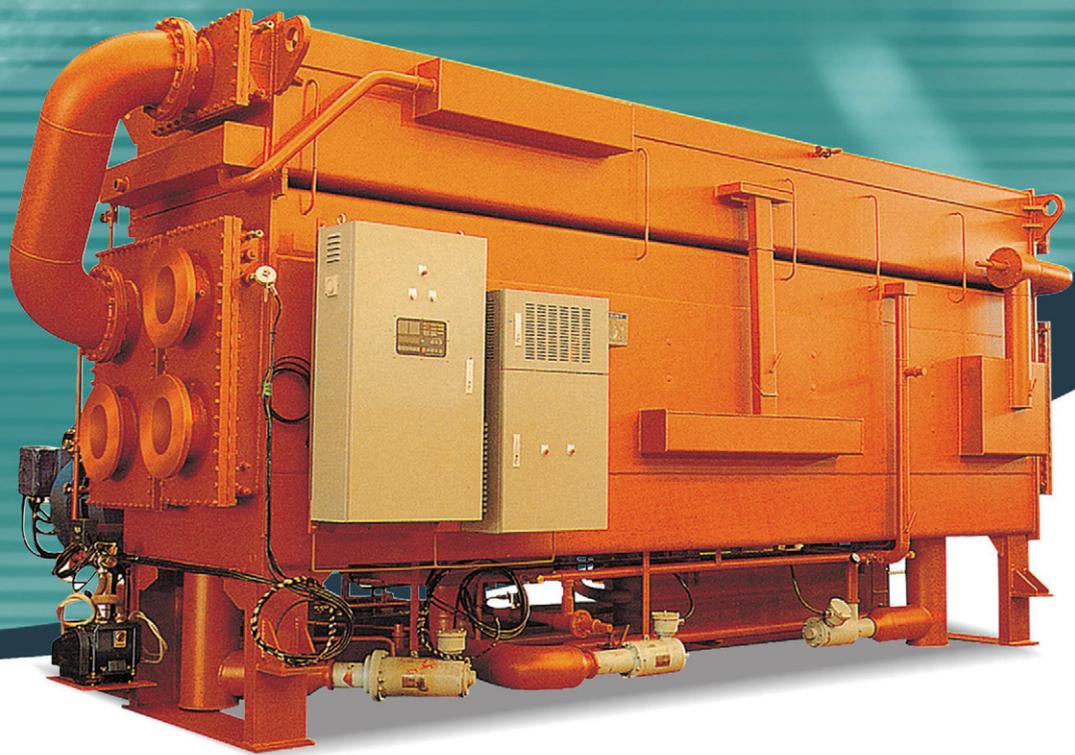


ABSORPTION CHILLING SYSTEM





FEATURS

1. Direct-fired absorption chiller-heater gives both heating and cooling.
2. The high efficiency associated with the absorption chilling system has reduced the space required for installation.
3. Absorption chiller gives lower running costs than eletrical chiller.
4. Ozone safe, cfc free, cooling requirements are met without chlorine based refrigerants.
5. Low noise and vibration. Hyundai absorption chilling system does not utilize a large motor-compressor, and this leads to quiet, trouble free operation.
6. Three different leak tests are performed in the shop to minimize leaks and to ensure high quality and reliability.
7. Hyundai absorption chilling system provides fully automatic control system such as stabilizer control, override control and de-crystalization system for simple, trouble-free operation.
8. Excellent for peak shaving during high electrical demand periods.

HOW IT OPERATES



The principle of refrigeration is the exchange of heat, and in direct-fired absorption chiller-heaters, there are five basic heat exchangers; evaporator, absorber, high and low pressure generators and condenser. In absorption chiller-heaters, the refrigerant is water.

But like any other refrigeration system, the absorption chiller uses evaporation and condensation to remove heat. To maintain effective evaporation and condensation, the two-stage absorption chiller-heater employs two shells or one shell partitioned into two zones.

The lower shell or zone (Evaporator and Absorber) has an internal pressure of about one-hundredth that of the outside atmosphere, or 6mm Hg, a relatively high vacuum.

The vacuum allows water (the refrigerant) to boil at a temperature below that of the liquid being chilled. Thus chilled liquid entering the evaporator can be cooled for air conditioning purposes.

1. EVAPORATOR (for cooling only)

Refrigerant enters the top of the lower shell or zone and is sprayed over the evaporator tube bundle.

Heat from the liquid being chilled evaporates the refrigerant.

2. ABSORBER

The refrigerant vapor is then drawn into the absorber side of the lower shell or zone. Here the vapor is absorbed by lithium bromide solution. Lithium bromide is, basically, similar to brine or salt water. But lithium bromide is a salt with an especially strong attraction for water. With the lithium bromide spray, it is as if hundreds of little sponges are sucking up the refrigerant vapor-called the "dilute solution" - which then collects in the bottom of the lower shell or zone.

3. HIGH PRESSURE GENERATOR

The dilute solution is then pumped through the two heat exchangers where is preheated by hot concentrated solution from the generators. The heat exchangers improve the efficiency of the cycle by reducing the amount of gas/oil consumption required to heat the dilute solution in the high pressure generator. The dilute solution then flows to the high pressure generator shell (with a burner unit), beside the upper and lower shells.

The dilute solution flows around the surfaces of the furnace tubes in the high pressure generator and is heated by gas combustion through the inside of furnace and tubes. The hot generator furnace and tubes allow the dilute solution to boil and it is further concentrated. Thus the dilute solution, straight from the high pressure generator is called the intermediate solution.

The pressure in the high pressure generator is approximately 730mm Hg.

The burner output is controlled by a valve in response to the cooling load required.

Local superheat in the high pressure generator is avoided by the well distributed flow of the dilute solution between the shell and the outside of the furnace.

4. LOW PRESSURE GENERATOR

The intermediate solution in the high pressure generator then flows to the upper shell or zone (low pressure generator & condenser) through the high temperature heat exchanger by gravity and pressure difference of both shells.

The pressure in the upper shell is approximately one tenth that of the outside atmosphere, or 55mm Hg.

The intermediate solution flows over the tubes and is reheated by refrigerant vapor-steam, generated previously in the high pressure generator. The refrigerant vapor has enough heat to make the solution more concentrated, releasing refrigerant vapor again at a lower pressure level and is drained to the condenser through a valve.

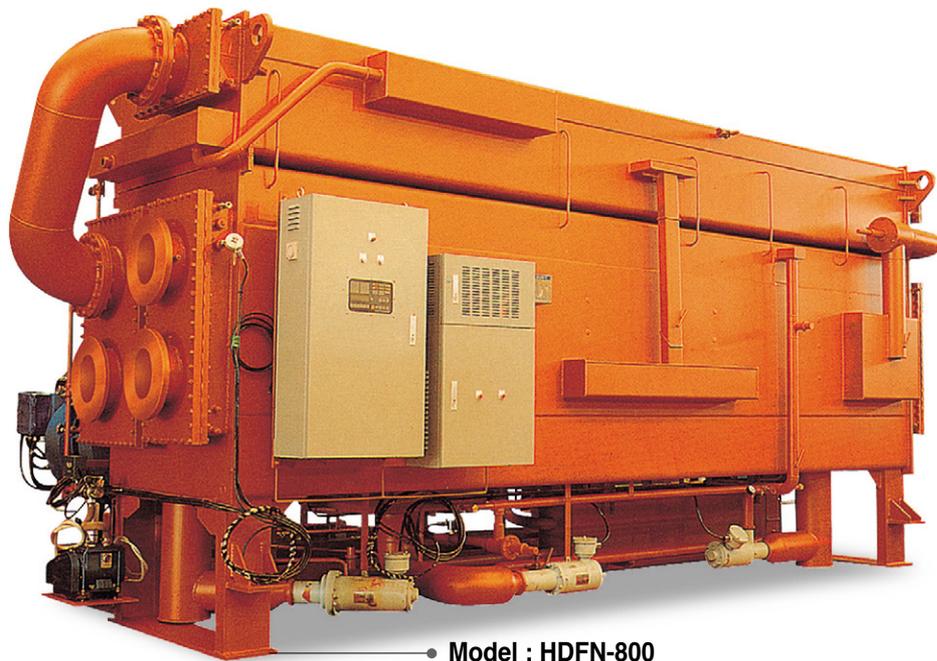
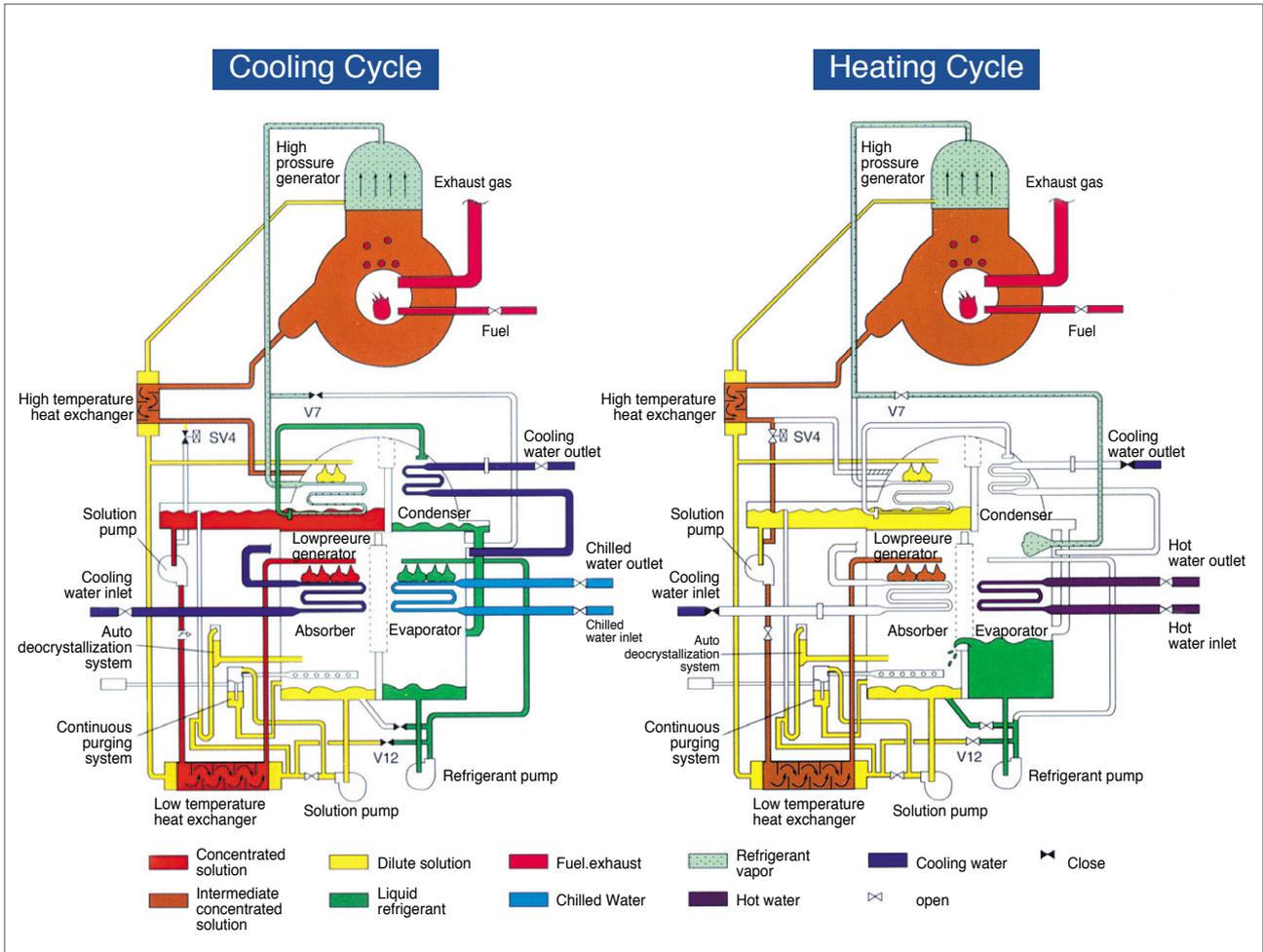
The solution is now concentrated and flows through the heat exchanger, to the educator which is used to mix this solution with the re-diluted solution delivered from the solution pump. Then the mixed solution is sprayed on the absorber tubes.

5. CONDENSER

The refrigerant flows to the condenser and is condensed. The liquid refrigerant, with the drained liquid from the low pressure generator, flows back to the lower shell, and is once again sprayed over the evaporator. The refrigerant cycle has been completed.

Now the concentrated lithium bromide solution flows from the low pressure generator back to the absorber in the lower shell ready to absorb more refrigerant. Its cycle has also been completed.

DIRECT-FIRED ABSORPTION CHILLER-HEATER SCHEMATIC



STANDARD RATING

DIRECT-FIRED ABSORPTION CHILLER-HEATERS.

Item		Model	HDFN Series							
			HDFN-80	HDFN-100	HDFN-125	HDFN-150	HDFN-180	HDFN-210	HDFN-260	
Coding Capacity		USRT	80	100	125	150	180	210	260	
Heating Capacity		kcal/h	212,000	265,000	331,000	397,000	476,000	556,000	688,000	
CHILLED W.	Flow Rate	m ³ /h	48.4	60.5	75.6	90.7	108.9	127.0	157.2	
	Pressure Drop	mAq	6.8	7.4	7.0	7.1	7.7*	7.4*	7.4	
	Nozzle Size	A	80	80	100	100	125	125	150	
	No. of Pass	-	3	3	2	2	2	2	2	
COOLING W.	Flow Rate	m ³ /h	80	100	125	150	180	210	260	
	Pressure Drop	mAq	6.7	8.0	7.8	8.4	7.5	8.1	8.2	
	Nozzle Size	A	100	100	125	125	150	150	200	
	No. Pass	ABS.	-	6	6	4	4	4	4	3
		COND.	-	1	1	1	1	1	1	1
HOT W.	Flow Rate	m ³ /h	48.4	60.5	75.6	90.7	108.9	127.0	157.2	
	Pressure Drop	mAq	6.8	7.4	7.0	7.1	7.7	7.4	7.4	
	Nozzle Size	A	80	80	100	100	125	125	150	
	No. of Pass	-	3	3	2	2	2	2	2	
ELECTRICITY	Solution Pump 1	kW(A)	1.1(6.8)	1.1(6.8)	1.1(6.8)	2.2(11)	3.0(16)	3.0(16)	3.0(16)	
	Solution Pump II	kW(A)	-	-	-	-	-	-	-	
	Refrigerant Pump	kW(A)	0.4(3.5)	0.4(3.5)	0.4(3.5)	0.4(3.5)	0.75(5.5)	0.75(5.5)	0.75(5.5)	
	Vacuum Pump	kW(A)	0.4(2.1)	0.4(2.1)	0.4(2.1)	0.4(2.1)	0.4(2.1)	0.4(2.1)	0.4(2.1)	
	FDF(Fan)	kW(A)	0.75(3.0)	0.75(3.0)	1.5(6.0)	1.5(6.0)	1.5(6.0)	1.5(6.0)	1.5(6.0)	
	Total	kW(A)	2.65(17.7)	2.65(17.7)	3.4(21.7)	4.5(24.9)	5.65(31.9)	5.65(31.9)	5.65(31.9)	
Cable Size		mm ²	3.5	3.5	3.5	5.5	5.5	8.0	8.0	
DIM.	Length(L)	mm	2,367	2,367	3,288	3,288	3,368	3,368	4,744	
	Width(W)	mm	1,940	1,940	1,940	1,940	2,168	2,168	2,234	
	Height(H)	mm	2,043	2,043	2,043	2,043	2,277	2,277	2,550	
WEIGHT	Operating	ton	5.2	5.4	6.4	6.6	8.1	8.4	10.0	
	Machinery	ton	4.5	4.6	5.3	5.5	6.7	6.9	8.8	
GAS	Consumption (11,000kcal/Nm ³)	Nm ³ /h(冷)	21.06	26.33	32.91	39.49	47.39	55.29	68.45	
		Nm ³ /h(暖)	22.54	28.18	35.19	42.21	50.61	59.12	73.15	
	Consumption (15,000kcal/Nm ³)	Nm ³ /h(冷)	15.44	19.31	24.13	28.96	34.75	40.54	51.20	
		Nm ³ /h(暖)	16.53	20.66	25.81	30.96	37.12	43.35	53.65	
	Pipe Size	A	40	40	40	40	40	50	50	
STD Gas Pressure	mmAq	200	200	200	200	200	200	200		
OIL	Consumption (10,200oil/kg)	kg/h(冷)	20.44	25.55	31.94	38.33	45.99	53.66	66.44	
		kg/h(暖)	21.88	27.34	34.16	41.97	49.12	57.38	71.00	
	Consumption (10,400oil/kg)	kg/h(冷)	20.05	25.06	31.33	37.59	45.11	52.63	65.16	
		kg/h(暖)	21.46	26.82	33.50	40.18	48.18	56.28	69.64	
	Pipe Size	PT	1/2	1/2	1/2	1/2	1/2	1/2	1/2	
Exhaust Size		mm	428×170	428×170	428×240	428×240	493×370	493×370	560×290	
H.P.Generator H.T.Area		m ²	8.5	8.5	9.9	9.9	13.3	13.3	14.8	

NOTE1

- Standard inlet / outlet temperature of chilled water is 12/7 °C
- Standard inlet / outlet temperature of cooling water is 32/37.5 °C
- Standard supplied electricity is based on 220V/380V/440V(50Hz, 60Hz)

- Maximum working pressure (Chilled water, Cooling water, Hot Water) is 10kg/cm²G
- Standard outlet temperature of hot water is 60 °C
- Standard cooling water rate is 1.00m³/h USRT
- 1USRT is 3,024 kcal/h
- If other specification except the shown on the above is needed, please consult with our engineer.

Chilled Water Outlet Temp.	Cooling Water Inlet Temp.	Cooling Water Outlet Temp.	Cooling Water Rate
7°C	32°C	37.5°C	1.00m ³ /h USRT

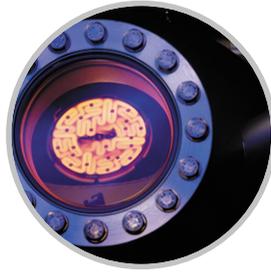
STANDARD RATING

DIRECT-FIRED ABSORPTION CHILLER-HEATERS.

Item		Model	HDFN Series							
			HDFN-310	HDFN-360	HDFN-400	HDFN-450	HDFN-500	HDFN-600	HDFN-700	
Coding Capacity		USRT	310	360	400	450	500	600	700	
Heating Capacity		kcal/h	819,000	900,000	1,000,000	1,125,000	1,250,000	1,584,000	1,848,000	
CHILLED W.	Flow Rate	m ³ /h	187.5	217.7	241.9	272.2	302.4	362.9	423.4	
	Pressure Drop	mAq	7.5	7.0	7.0	7.0	7.0	7.3*	6.2	
	Nozzle Size	A	150	200	200	200	200	250	250	
	No. of Pass	-	2	2	2	2	2	2	2	
COOLING W.	Flow Rate	m ³ /h	310	360	400	450	500	600	700	
	Pressure Drop	mAq	9.3	6.4	6.4	6.4	6.4	7.8	5.6	
	Nozzle Size	A	200	250	250	250	250	300	300	
	No. Pass	ABS.	-	3	2	2	2	2	3	2
		COND.	-	1	1	1	1	1	1	1
HOT W.	Flow Rate	m ³ /h	187.5	217.7	241.9	272.2	302.4	362.9	423.4	
	Pressure Drop	mAq	7.5	7.0	7.0	7.0	7.0	7.3	6.2	
	Nozzle Size	A	150	200	200	200	200	250	250	
	No. of Pass	-	2	2	2	2	2	2	2	
ELECTRICITY	Solution Pump 1	kW(A)	3.0(16)	3.7(21)	3.7(21)	5.5(28)	5.5(28)	5.5(28)	5.5(28)	
	Solution Pump II	kW(A)	-	3.0(16)	3.0(16)	3.0(16)	3.0(16)	3.0(16)	3.0(16)	
	Refrigerant Pump	kW(A)	0.75(5.5)	0.75(5.5)	0.75(5.5)	0.75(5.5)	0.75(5.5)	2.2(11)	2.2(11)	
	Vacuum Pump	kW(A)	0.4(2.1)	0.4(2.1)	0.4(2.1)	0.4(2.1)	0.4(2.1)	0.4(2.1)	0.4(2.1)	
	FD(Fan)	kW(A)	2.2(8.6)	2.2(8.6)	2.2(8.6)	2.2(8.6)	3.7(14.0)	5.5(19.7)	5.5(19.7)	
	Total	kW(A)	6.35(34.5)	10.05(55.5)	10.05(55.5)	11.85(62.5)	13.35(67.9)	16.6(76.8)	16.6(76.8)	
	Cable Size	mm ²	8.0	14.0	14.0	22.0	22.0	30.0	38.0	
DIM.	Length(L)	mm	4,744	4,876	4,876	4,876	4,876	5,316	5,964	
	Width(W)	mm	2,234	2,550	2,550	2,698	2,698	3,369	3,369	
	Height(H)	mm	2,525	2,448	2,448	2,587	2,587	3,110	3,110	
WEIGHT	Operating	ton	11.1	15.8	16.3	17.6	18.5	26.7	28.5	
	Machinery	ton	9.2	13.1	13.4	14.5	15.1	20.2	22.3	
GAS	Consumption (11,000kcal/Nm ³)	Nm ³ /h(冷)	81.61	94.78	105.31	118.47	131.63	157.96	184.28	
		Nm ³ /h(暖)	87.08	95.69	106.33	119.62	132.91	168.42	196.49	
	Consumption (15,000kcal/Nm ³)	Nm ³ /h(冷)	59.85	69.50	77.22	86.88	96.53	115.84	135.14	
		Nm ³ /h(暖)	63.86	70.18	77.97	87.72	97.47	123.51	144.09	
	Pipe Size	A	40	50	50	50	50	50	50	
STD Gas Pressure	mmAq	4,000	4,000	4,000	4,000	4,000	4,000	4,000		
OIL	Consumption (10,200oil/kg)	kg/h(冷)	79.21	91.99	102.21	114.98	127.76	153.31	178.86	
		kg/h(暖)	84.52	92.88	103.20	116.10	129.00	163.47	190.71	
	Consumption (10,400oil/kg)	kg/h(冷)	77.69	90.22	100.24	112.77	125.30	150.36	175.43	
		kg/h(暖)	82.89	91.09	101.21	113.87	126.52	160.32	187.04	
	Pipe Size	PT	3/4	3/4	3/4	3/4	3/4	1	1	
Exhaust Size	mm	560×290	450×600	450×600	450×600	450×600	535×680	625×680		
H.P.Generator H.T.Area	m ²	14.8	16.5	16.5	16.5	16.5	21.5	26.6		

DIRECT-FIRED ABSORPTION CHILLER-HEATERS.

Item		Model	HDFN Series					
			HDFN-800	HDFN-900	HDFN-1000	HDFN-1100	HDFN-1250	HDFN-1400
Coding Capacity		USRT	800	900	1000	1100	1250	1400
Heating Capacity		kcal/h	2,111,000	2,376,000	2,639,000	2,902,000	3,299,000	3,695,000
CHILLED W.	Flow Rate	m ³ /h	483.8	544.3	605.0	665.3	756.0	846.7
	Pressure Drop	mAq	8.5	7.2	6.6*	6.7*	6.8*	6.8*
	Nozzle Size	A	250	300	300	300	350	350
	No. of Pass	-	2	2	1	1	1	1
COOLING W.	Flow Rate	m ³ /h	800	900	1,000	1,100	1,250	1,400
	Pressure Drop	mAq	7.6	6.4	8.4	10.7	7.8	10.3
	Nozzle Size	A	300	350	350	350	400	400
	No. of Pass	ABS.	-	2	2	2	2	2
		COND.	-	1	1	1	1	1
HOT W.	Flow Rate	m ³ /h	483.8	544.3	604.8	665.0	756.0	846.7
	Pressure Drop	mAq	8.5	7.2	6.6	6.7	6.8	6.8
	Nozzle Size	A	250	300	300	300	350	350
	No. of Pass	-	2	2	1	1	1	1
ELECTRICITY	Solution Pump I	kW(A)	6.6(34)	7.5(48.3)	7.5(48.0)	11.0(58.0)	11.0(58.0)	11.0(58.0)
	Solution Pump II	kW(A)	3.0(16.0)	3.7(21.0)	3.7(21.0)	3.7(21.0)	5.5(28)	5.5(28.0)
	Refrigerant Pump	kW(A)	2.0(11.0)	3.7(21.0)	3.7(21.0)	3.7(21.0)	3.7(2.1)	3.7(21.0)
	Vacuum Pump	kW(A)	0.4(2.1)	0.4(2.1)	0.4(2.1)	0.4(2.1)	0.4(2.1)	0.41(2.1)
	FD(Fan)	kW(A)	7.5(27.9)	7.5(27.9)	7.5(27.9)	7.5(27.9)	11.0(39.5)	11.0(39.5)
	Total	kW(A)	19.7(93.3)	22.8(122.6)	22.8(122.6)	26.3(132.3)	31.6(148.8)	31.6(148.8)
	Cable Size	mm ²	50.0	60.0	60.0	80.0	80.0	80.0
DIM.	Length(L)	mm	6,484	6,164	6,764	7,364	6,772	7,372
	Width(W)	mm	3,519	3,694	3,794	3,794	4,059	4,059
	Height(H)	mm	3,110	3,370	3,370	3,370	3,830	3,830
WEIGHT	Operating	ton	33.8	36.6	41.2	41.6	50.4	54.9
	Machinery	ton	25.7	27.7	30.8	31.5	39.2	41.5
GAS	Consumption (11,000kcal/Nm ³)	Nm ³ /h(冷)	210.61	236.94	263.26	289.59	329.08	368.57
		Nm ³ /h(暖)	224.46	252.63	280.60	308.56	350.77	392.88
	Consumption (15,000kcal/Nm ³)	Nm ³ /h(冷)	154.45	173.75	193.06	212.37	241.33	270.28
		Nm ³ /h(暖)	164.60	185.26	205.77	226.27	257.23	288.11
	Pipe Size	A	65	65	65	65	80	80
STD Gas Pressure	mmAq	4,000	4,000	4,000	4,000	4,000	4,000	
OIL	Consumption (10,200kcal/kg)	kg/h(冷)	204.42	229.97	255.52	281.07	319.40	357.73
		kg/h(暖)	217.85	245.20	272.34	299.48	340.45	381.32
	Consumption (10,400kcal/kg)	kg/h(冷)	200.49	225.55	250.61	275.67	313.26	350.85
		kg/h(暖)	213.66	240.49	267.11	293.72	333.91	373.99
	Pipe Size	PT	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2
Exhaust Size	mm	625×770	625×770	550×830	550×830	550×950	640×950	
H.P.Generator H.T.Area	m ²	35.9	35.9	40.4	40.4	44.7	52.5	



HYUNDAI CLIMATE CONTROL CO., LTD.

Head Office

51-51, Mohwa-Ri, Oedong-Eup, Kyongju-si,
Kyongbuk, Korea

- TEL : 82. 54. 745. 8661~5
 - FAX : 82. 54. 745. 8677
 - Homepage : <http://www.hdcc.co.kr>
 - E-mail : hdcc@hdcc.co.kr
-

Seoul Office

Anam Tower #1116, #702-10, Yeoksam-Dong,
Kangnam-Gu, Seoul, Korea

- TEL : 82. 2. 2009. 3121~2
 - FAX : 82. 2. 2009. 3120
-