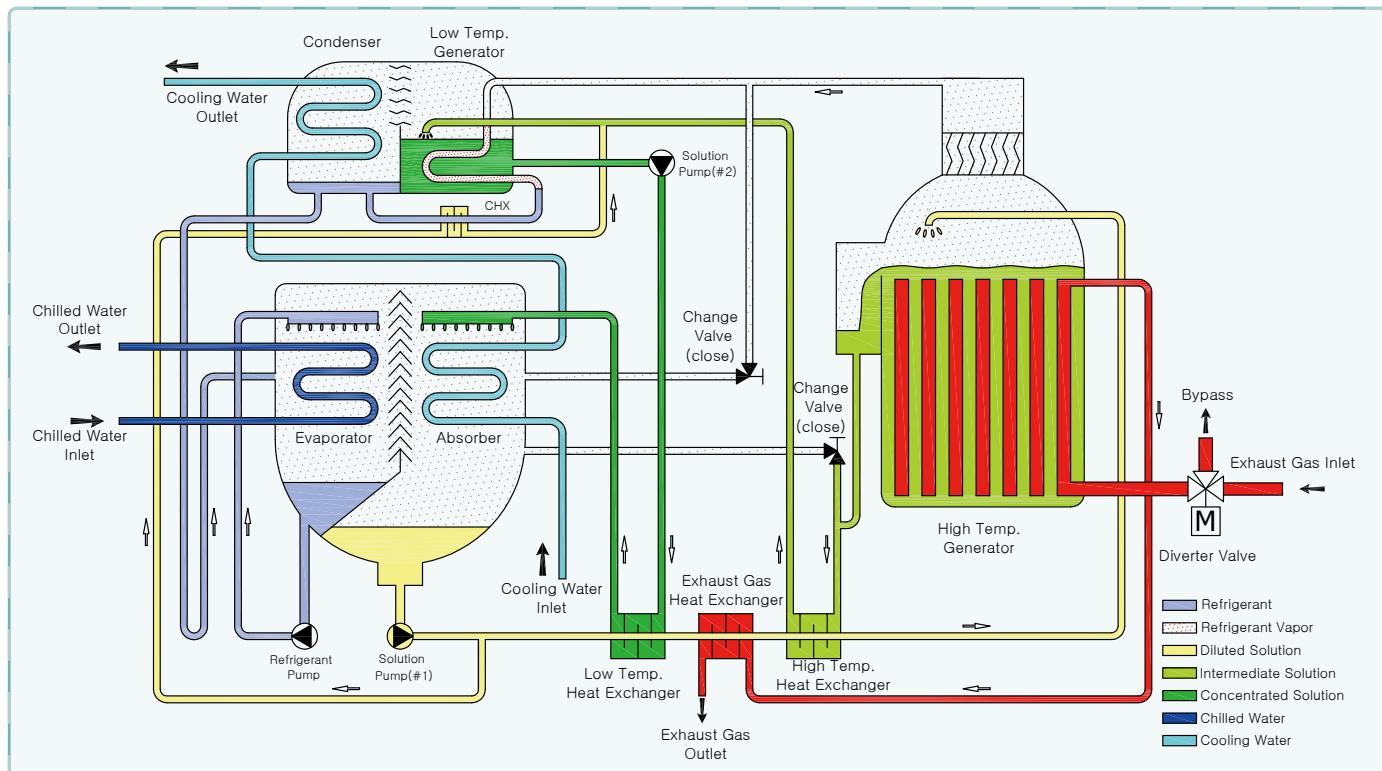




Double Effect Exhaust Gas Driven Absorption Chiller

CHP Series

- Cooling Cycle



The double-effect, exhaust-gas driven absorption machine is consisted of an evaporator, absorber, condenser, high/low temperature generators, solution heat exchangers, refrigerant & solution pumps, purge system, controls and accessories.

When the chiller is under cooling mode, water boils at a low temperature approximately at 4.4 °C (40 °F) because it is under vacuum condition. Thereby chilled water is cooled down through the tubes in evaporator by the evaporative latent heat. The process of this cycle is like below. A refrigerant pump is used to spray the refrigerant(distilled water) over the evaporator tubes to improve heat transfer.

To make the cooling process continuous, the refrigerant (water) vapor flows into the absorber and it is absorbed in lithium bromide solution (which has a high affinity for water) As this process continues, the lithium bromide becomes diluted solution and reduce its absorption capacity. A solution pump then transfers this diluted solution to the generators where it is re-concentrated in two stages (double-effect) to boil off the previously absorbed water.

The diluted solution is pumped to the high-temperature generator where it is heated and re-concentrated to a medium concentration solution by the exhaust heat from the gas turbine or reciprocating engine exhaust gas. The intermediate solution from the high-temperature generator flows to the low-temperature generator where it is heated to become a

concentrated solution by the high temperature water vapor released from the solution in the high temperature generator.

Since the low-stage generator acts as the condenser for the high-stage generator, the heat energy firstly applied in the high-stage generator is used again in the low-stage generator, thus reduced heat input is approximately 45% compared to an single-stage chiller.

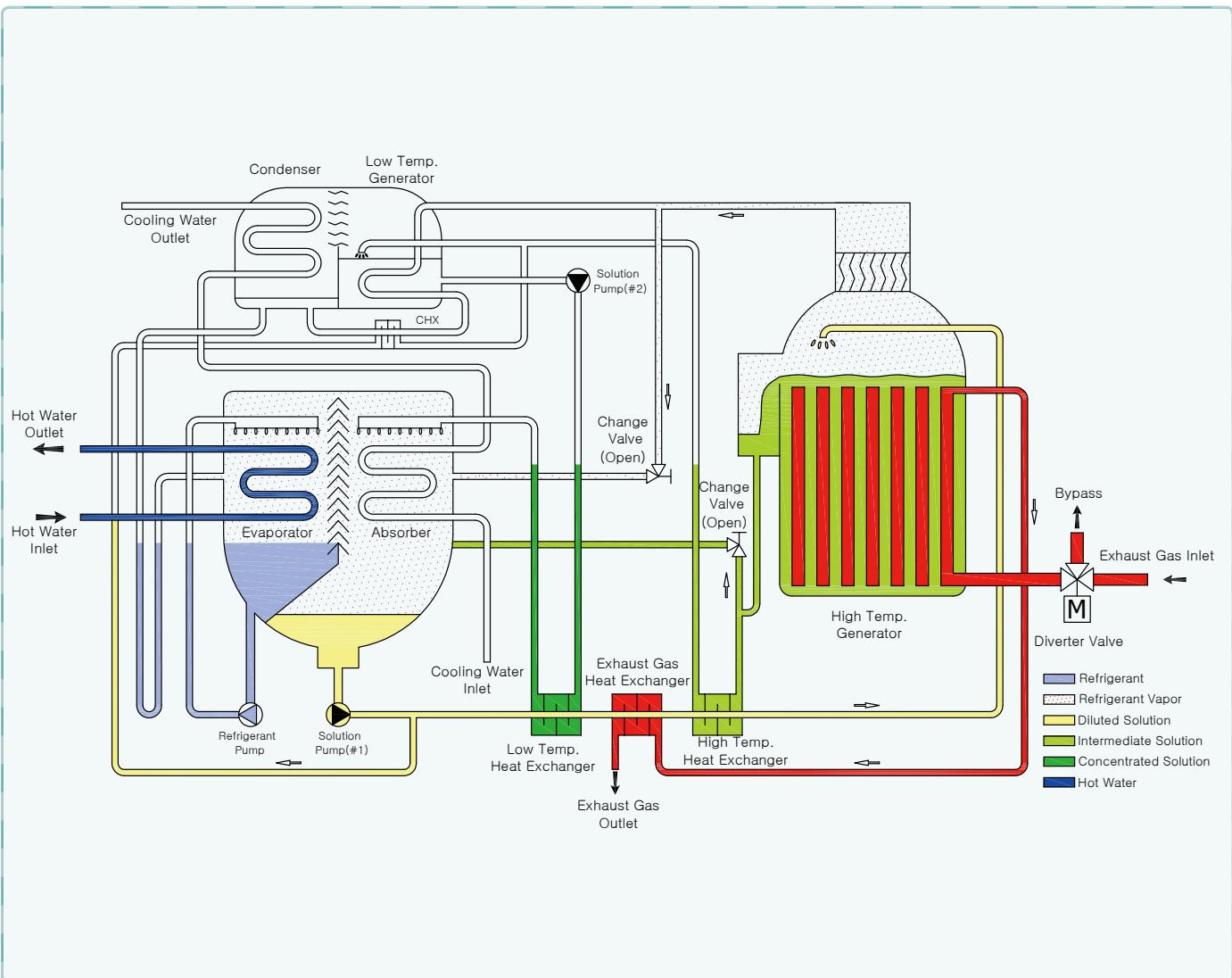
Vapor released in the shell side of the low-stage generator enters the condenser to be cooled and return to a liquid state. The refrigerant water then returns to the evaporator to begin a new cycle.

To remove heat from the machine, cooling water from a cooling tower is firstly circulated through the tubes of the absorber to remove the heat of vaporization. The water is then circulated through the tubes of the condenser. The re-concentrated (strong) solution from the low temp. generator flows back to the absorber to begin a new cycle.

For efficiency purposes, the medium concentration solution from the high-temp. generator passes through the high-temperature solution heat exchanger to pre-heat the diluted (weak) solution, while pre-cooling the medium concentration solution. The re-concentrated (strong) solution from the low-temp. generator passes through the low temperature solution heat exchanger to pre-heat/cool the solution before being returned to the absorber.

Double Effect Exhaust Gas Driven Absorption Chiller

- **Heating Cycle**



During heating mode, the absorber-condenser cooling water circuit is different from typical absorption process.

High temperature water vapor produced in the high-temperature generator section passes directly to the evaporator via the absorber and transfers its heat to the tube bundles and hot water is heated from 55°C to 60°C.

The Condensed water in evaporator flows to the absorber section and be mixed with the concentrated solution returning from the ightemperature generator.

The diluted solution is pumped back to the high temperature generator to repeat the vapor generation phase for the heating function.

To changeover the chiller mode from cooling to heating is simple. Change the position of chiller mode in the control panel first and drain the absorber-condenser water circuit and put the machine into heating mode by switching the positions of change valve.

The hot water inlet temperatures is 60°C (140°F) as a standard and 80°C (176°F) as an option with the additional heat exchanger.

Double Effect Exhaust Gas Fired Absorption Chiller



Performance Data

→ →

Model		Unit	CHP005H	CHP006H	CHP007H	CHP008H	CHP010H	CHP012H	CHP015H	CHP018H	CHP021H	CHP024H	CHP028H	CHP032H	CHP036H	CHP040H							
Cooling Capacity	usRT	50	60	70	80	100	120	150	180	210	240	280	320	360	400								
	kW	176	211	246	281	351	422	527	633	738	844	984	1125	1265	1406								
Chilled Water	Inlet/Outlet Temp.	°C	12 / 7																				
	Flow rate	ton/h	30	36	42	48	60	73	91	109	127	145	169	194	218	242							
	Pressure Drop	mAq	4.0	3.7	6.2	6.9	5.6	5.9	7.6	8.1	7.5	7.4	5.4	5.3	5.8	6.0							
	Connection	mm	80			100				125			150										
Cooling Water	Inlet/Outlet Temp	°C	32 / 37.2																				
	Flow rate	m³/h	50	60	70	80	100	120	150	180	210	240	280	320	360	400							
	Pressure Drop	mAq	7.0	6.1	10.2	10.0	8.9	9.1	10.4	10.8	10.7	11.2	8.9	8.6	8.8	8.7							
	Connection	mm	100			125			150				200										
Heating Capacity	Mcal/h	111	133	156	178	222	267	334	400	467	534	623	712	800	889								
	kW	129	155	181	207	258	310	388	465	543	620	724	827	930	1034								
Hot Water	Inlet/Outlet Temp	°C	55.3 / 60																				
	Flow rate	ton/h	30	36	42	48	60	73	91	109	127	145	169	194	218	242							
	Pressure Drop	mAq	4.0	3.7	6.2	6.9	5.6	5.9	7.6	8.1	7.5	7.4	5.4	5.3	5.8	6.0							
	Connection	mm	80			100				125			150										
Exhaust Gas	Gas Flow rate	kg/sec	0.330	0.396	0.461	0.527	0.659	0.791	0.989	1.187	1.384	1.582	1.846	2.109	2.373	2.637							
	Inlet/Outlet Temp @ Cooling	°C	450 / 120																				
	Inlet/Outlet Temp @ Heating	°C	450 / 125																				
	Pressure Drop	mmAq	44	44	55	53	55	58	57	77	81	103	109	135	99	124							
	Inlet Connection	mm-mm	782*291	782*330	782*369	782*408	922*408	922*486	922*603	922*642	922*681	922*681	922*798	922*876	1376*720	1376*759							
	Outlet Connection	mm	300			400				500				600									
	Diverter Valve	mm	300			400				500				600									
Electric	Power source	-	3PH, 400V, 50Hz																				
	Absorbent Pump	kW	1.5 [4.7] + 0.2 [1.1]				2.0 [6.0] + 0.3 [1.6]				2.4 [7.0] + 0.4 [1.6]				3.2 [9.0] + 0.4 [1.6]								
	Refrigerant Pump	kW	0.2 [1.1]				0.3 [1.5]				0.4 [1.6]				0.4 [1.6]								
	Purge Pump	kW	0.4 [1.45]																				
	Sealing Blower	kW	0.8 [5.2]																				
	Control Panel	KVA	0.2 [0.5]																				
	Ampere @ 400Vac	A	13.7			15.8				16.3			16.5			18.6							
External Dimension	Length (L)	mm	2100		2600		2,638		3,680		3,686		4,744		4,776								
	Width (W)	mm	1683	1722	1761	1800	1,857	1,935	2,052	2,091	2,230	2,230	2,347	2,425	2,270	2,309							
	Height (H)	mm	1800				2,090				2,147				2,420								
Weight	Rigging	ton	3.0	3.2	3.7	3.9	5.0	5.3	6.4	6.8	7.9	8.5	9.8	10.3	12.8	13.2							
	Operation	ton	3.2	3.5	4.0	4.3	5.4	5.8	7.0	7.4	8.6	9.3	10.7	11.3	14.0	14.6							

Note

- Working pressure of each water side is based on 1.0MPa (150psig)
- Fouling factor 0.0001 m².hr. °C/Kcal for Absorber, Condenser and Evaporator.
- Min. outlet temp. of chilled water: 5°C
- Min. allowable inlet temp. of cooling water: 20°C.
- Controllable range shall be 0~100%.
- Standard Power source is 3ph, 400V, 50Hz and available 220, 380, 440V and 460V power source.
- Each water flow can be adjusted within 50~120%.

CHPH Series

Double Effect Exhaust Gas Driven Absorption Chiller & Heater

Performance Data

Model		Unit	CHP045H	CHP050H	CHP056H	CHP063H	CHP070H	CHP080H	CHP090H	CHP100H	CHP110H	CHP120H	CHP130H	CHP140H	CHP150H
Cooling Capacity		usRT	450	500	560	630	700	800	900	1000	1100	1200	1300	1400	1500
		kW	1582	1757	1968	2214	2460	2812	3163	3515	3866	4218	4569	4921	5272
Chilled Water	Inlet/Outlet Temp.	°C					12 / 7								
	Flow rate	ton/h	272	302	339	381	423	484	544	605	665	726	786	847	907
	Pressure Drop	mAq	5.1	5.4	4.2	5.8	7.7	5.7	7.7	10.1	6.7	8.6	10.7	8.7	10.6
	Connection	mm	200				250				300				350
Cooling Water	Inlet/Outlet Temp	°C					32 / 37.2								
	Flow rate	m³/h	450	500	560	630	700	800	900	1000	1100	1200	1300	1400	1500
	Pressure Drop	mAq	8.4	8.6	6.8	9.3	12.4	8.8	12.0	15.8	11.1	14.1	17.6	14.0	16.8
	Connection	mm	250				300				350				400
Heating Capacity	Mcal/h	1001	1112	1245	1401	1556	1779	2001	2224	2446	2668	2891	3113	3335	
	kW	1163	1292	1447	1628	1809	2067	2326	2584	2843	3101	3360	3618	3876	
Hot Water	Inlet/Outlet Temp	°C					55.3 / 60								
	Flow rate	ton/h	272	302	339	381	423	484	544	605	665	726	786	847	907
	Pressure Drop	mAq	5.1	5.4	4.2	5.8	7.7	5.7	7.7	10.1	6.7	8.6	10.7	8.7	10.6
	Connection	mm	200				250				300				350
Exhaust Gas	Gas Flow rate	kg/sec	2.966	3.296	3.692	4.153	4.614	5.274	5.933	6.592	7.251	7.910	8.570	9.229	9.888
	Inlet/Outlet Temp @ Cooling	°C					450 / 120								
	Inlet/Outlet Temp @ Heating	°C					450 / 125								
	Pressure Drop	mmAq	128	123	113	100	113	105	117	120	165	165	160	156	139
	Inlet Connection	mm-mm	1376*837	1376*915	1376*1008	1376*1143	1376*1233	1376*1218	1376*1368	1376*1418	1376*1418	1376*1518	1376*1668	1376*1818	1376*2068
	Outlet Connection	mm	600				750				1000				
	Diverter Valve	mm	600				750				1000				
Electric	Power source	-					3PH, 400V, 50Hz								
	Absorbent Pump	kW	3.2 [9.0] + 0.4 [1.6]	5.5 (15.0) + 2.2 [6.5]				7.5 [24.0] + 2.2 [6.5]				7.5 [24.0] + 4.5 [16.0]			
	Refrigerant Pump	kW	0.4 [1.6]								1.5 [4.0]				
	Purge Pump	kW	0.4 [1.45]								0.75[2.3]				
	Sealing Blower	kW					0.8 [5.2]								
	Control Panel	KVA					0.2 [0.5]								
	Ampere @400Vac	A	18.6	29.7				32.3	42.1				51.6		
External Dimension	Length (L)	mm	4,954	4,998		5,540	6,038	5,644	6,142	6,667	6,293	6,818	7,318	6,974	7,475
	Width (W)	mm	2,491	2,569	2,934	3,069	3,159	3,330	3,480	3,530	4,348	4,448	4,598	4,932	5,182
	Height (H)	mm	2,633				2,962				3,380				3,700
Weight	Rigging	ton	15.7	16.5	21.2	23.1	24.6	31.0	33.6	35.6	41.1	43.4	46.4	50.2	54.1
	Operation	ton	17.2	18.1	23.7	25.8	27.5	34.8	37.6	39.9	46.2	48.8	52.1	56.5	60.8

Option

1. Non-standard cooling capacity.
2. Higher working pressure (230psig = 1.6MPa, 300psig = 2.0MPa)
3. Special tubes (material) & thickness.
4. Various temp. conditions (CHW, CW, HW)
5. Outdoor installation.
6. The specifications above are subject to change without prior notice for an improvement of the chiller.

Double Effect Exhaust Gas Fired Absorption Chiller


**COP
1.2**

Performance Data



Model		Unit	CHP005	CHP006	CHP007	CHP008	CHP010	CHP012	CHP015	CHP018	CHP021	CHP024	CHP028	CHP032	CHP036	CHP040
Cooling Capacity	usRT		50	60	70	80	100	120	150	180	210	240	280	320	360	400
	kW		176	211	246	281	351	422	527	633	738	844	984	1125	1265	1406
Chilled Water	Inlet/Outlet Temp.	°C														12 / 7
	Flow rate	m³/h	30.2	36.3	42.3	48.4	60.5	72.6	90.7	109	127	145	169	194	218	242
	P. Drop	mAq	4.0	3.7	6.2	5.6	4.8	5.1	6.6	7.0	6.4	6.3	4.6	4.5	5.0	5.1
	Connection	mm				80				100			125			150
Cooling Water	Inlet/Outlet Temp.	°C														32 / 37.5
	Flow rate	m³/h	50	60	70	80	100	120	150	180	210	240	280	320	360	400
	P. Drop	mAq	7.0	6.1	10.2	9.6	11.1	11.3	11.5	11.8	11.8	12.1	11.2	10.7	11.1	10.8
	Connection	mm				100				125			150			200
Heating Capacity	Mcal/h		142	170	198	227	283	340	425	510	595	680	793	906	1019	1133
	kW		165	197	230	263	329	395	494	592	691	790	922	1053	1185	1317
Hot Water	Inlet/Outlet Temp.	°C														55.3 / 60
	Flow rate	ton/h	30	36	42	48	60.5	72.6	90.7	109	127	145	169	194	218	242
	P. Drop	mAq	4.0	3.7	6.2	5.6	4.8	5.1	6.6	7.0	6.4	6.3	4.6	4.5	5.0	5.1
	Connection	mm				80				100			125			150
Exhaust Gas	Flow rate	kg/sec	0.439	0.527	0.615	0.703	0.88	1.05	1.32	1.58	1.84	2.11	2.46	2.81	3.16	3.51
	Temp.	Cooling	°C													450 / 165
		Heating	°C													450 / 125
	Pressure Drop	mmAq	58	58	74	71	77	82	79	92	97	113	129	131	123	131
Electric	Inlet Conn.	mm-mm	782*291	782*330	782*369	782*408	922*408	922*486	922*603	922*642	922*681	922*681	922*798	922*876	1376*720	1376*759
	Outlet Conn	mm			300				400			500				600
	Diverter Valve	mm			300				400			500				600
	Power source	kW														3Ø, 400V, 50Hz
Size	Abs. Pump	kW [A]			1.5 [5.5]				2.0 [6.4]			2.4 [6.9]				3.2 [9.0]
	Ref. Pump	kW [A]			0.2 [1.0]				0.3 [1.2]			0.4 [1.4]				0.4 [1.4]
	Purge Pump	kW [A]							0.4 [1.4]							
	Sealing Blower	kW [A]							0.4 [2.5]							
	Control Panel	kW [A]							0.2 [0.5]							
	Amp.(400Vac)	A			10.8				11.9			12.6				14.7
Weight	Length (L)	mm	2100		2600		2,638		3,680		3,717		4,742			4,872
	Width (W)	mm	1,683	1,722	1,761	1,800	1,857	1,935	2,052	2,091	2,194	2,194	2,310	2,349	2,349	2,349
	Height (H)	mm			1800				2,090			2,147				2,399
Rigging	Rigging	ton	3.0	3.2	3.7	3.9	5.0	5.3	6.4	6.8	7.9	8.5	9.8	10.3	12.8	13.2
	Operation	ton	3.2	3.5	4.0	4.3	5.4	5.8	7.0	7.4	8.6	9.3	10.7	11.3	14.0	14.6

Note

- Working pressure of each water side is based on 1.0MPa (150psig)
- Fouling factor 0.0001 m².hr. °C/Kcal for Absorber, Condenser and Evaporator.
- Min. outlet temp. of chilled water: 5°C
- Min. allowable inlet temp. of cooling water: 20°C.
- Controllable range shall be 0~100%.
- Standard Power source is 3ph, 400V, 50Hz and available 220, 380, 440V and 460V power source.
- Each water flow can be adjusted within 50~120%.

CHP Series

Double Effect Exhaust Gas Driven Absorption Chiller & Heater

Performance Data

Model		Unit	CHP045	CHP050	CHP056	CHP063	CHP070	CHP080	CHP090	CHP100	CHP110	CHP120	CHP130	CHP140	CHP150		
Cooling Capacity		usRT	450	500	560	630	700	800	900	1000	1100	1200	1300	1400	1500		
		kW	1582	1757	1968	2214	2460	2812	3163	3515	3866	4218	4569	4921	5272		
Chilled Water	Inlet/Outlet Temp.	°C					12 / 7										
	Flow rate	m³/h	272	302	339	381	423	484	544	605	665	726	786	847	907		
	P. Drop	mAq	4.4	3.9	3.6	5.0	6.6	4.7	6.4	8.5	7.2	9.2	11.5	8.3	10.2		
	Connection	mm	200				250				300				350		
Cooling Water	Inlet/Outlet Temp.	°C					32 / 37.5										
	Flow rate	m³/h	450	500	560	630	700	800	900	1000	1100	1200	1300	1400	1500		
	P. Drop	mAq	10.7	10.8	7.7	10.6	14.0	8.7	11.8	15.6	3.0	3.8	4.8	4.0	4.8		
	Connection	mm	250				300				350				400		
Heating Capacity	Mcal/h	1274	1416	1586	1784	1982	2266	2549	2832	3115	3398	3682	3965	4248			
	kW	1481	1646	1843	2074	2304	2633	2962	3291	3621	3950	4279	4608	4937			
Hot Water	Inlet/Outlet Temp.	°C					55.3 / 60										
	Flow rate	ton/h	272	302	339	381	423	484	544	605	665	726	786	847	907		
	P. Drop	mAq	4.4	3.9	3.6	5.0	6.6	4.7	6.4	8.5	7.2	9.2	11.5	8.3	10.2		
	Connection	mm	200				250				300				350		
Exhaust Gas	Flow rate	kg/sec	3.95	4.39	4.92	5.53	6.15	7.03	7.91	8.78	9.66	10.54	11.42	12.30	13.18		
	Temp.	Cooling	°C					450 / 165									
		Heating	°C					450 / 125									
	Pressure Drop	mmAq	133	134	143	133	146	155	153	176	213	221	212	206	184		
Electric	Inlet Conn.	mm-mm	1376*837	1376*915	1376*1008	1376*1143	1376*1233	1376*1218	1376*1368	1376*1418	1376*1418	1376*1518	1376*1668	1376*1818	1376*2068		
	Outlet Conn	mm	600				750				1000						
	Diverter Valve	mm	600				750				1000						
	Power source	kW					3Ø, 400V, 50Hz										
	Abs. Pump	kW [A]	3.2 [9.0]				5.5 (15.0)				7.5 [24.0]						
	Ref. Pump	kW [A]	0.3 [1.2]								1.5 [4.0]						
	Purge Pump	kW [A]					0.4 [1.4]				0.75 [2.2]						
	Sealing Blower	kW [A]					0.4 [2.5]										
	Control Panel	kW [A]					0.2 [0.5]										
	Amp.(400Vac)	A	14.7		20.7			23.3			33.1						
Size	Length [L]	mm	4,954		4,998	5,540	6,038	5,644	6,142	6,667	6,293	6,818	7,318	6,974	7,475		
	Width [W]	mm	2,491	2,569	2,934	3,069	3,159	3,330	3,480	3,530	4,348	4,448	4,598	4,932	5,182		
	Height [H]	mm	2,633		2,962			3,380			3,500				3,700		
Weight	Rigging	ton	15.7	16.5	21.2	23.1	24.6	31.0	33.6	35.6	41.1	43.4	46.4	50.2	54.1		
	Operation	ton	17.2	18.1	23.7	25.8	27.5	34.8	37.6	39.9	46.2	48.8	52.1	56.5	60.8		

Option

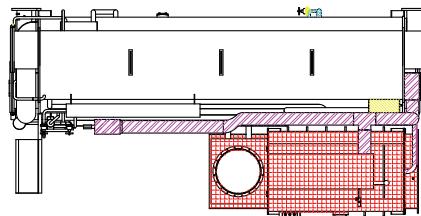
1. Non-standard cooling capacity.
2. Higher working pressure (230psig = 1.6MPa, 300psig = 2.0MPa)
3. Special tubes (material) & thickness.
4. Various temp. conditions (CHW, CW, HW)
5. Outdoor installation.
6. The specifications above are subject to change without prior notice for an improvement of the chiller.

Double Effect Exhaust Gas Driven Absorption Chiller

Thermal Insulation

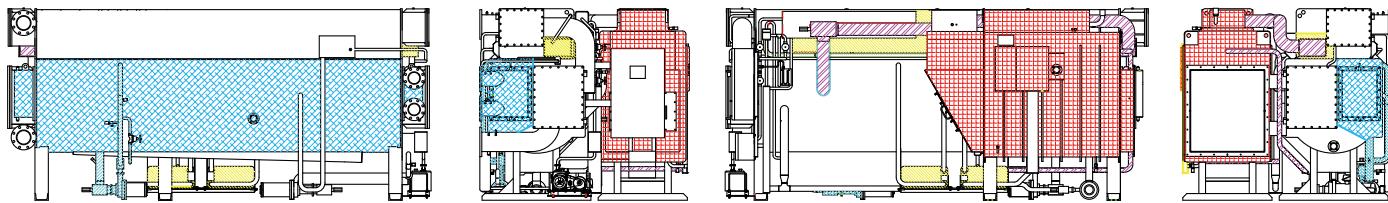
INSULATION FOR HOT SURFACES

- 75mm(3inch) : High Temp. Generator
- 50mm(2inch) : Steam Pipings, Box of Low Temp. Generator, Pipings of High Temp. Generator(Inlet, Outlet), Boxes of High Temp. Heat Exchanger
- 19mm(3/4inch) : Low Temp. Generator Body and Outlet Box(ABSO), High & Low Temp. Heat Exchanger Body and Box of Heat
- 10mm(3/8inch) : Inlet & Outlet Piping of Low Temp. Generator.



INSULATION FOR COLD SURFACES

- 19mm(3/4inch) : Evaporator Body and It's Water Box.
- 10mm(3/8inch) : Piping of Refrigerant Pump(Inlet, Outlet) Generator(Inlet, Outlet), Boxes of High Temp. Heat Exchanger



Note

1. Use only Non-inflammable or flame retardant insulation materials.
2. Do not insulate motor of refrigerant pump.
3. Total insulation area is including pipings.
4. Do not cover components such as service valves, diaphragm valves, sight glass, control valves, thermometers or sensor.
5. Use the standard insulation material and thickness as the recommendation

HOT Surface insulation

- Material of insulation : Glass wool, Thermal Conductivity 0.04kcal/m·h·°C
- Thickness of insulation : 50mm (2 inch), 75mm (3 inch)
- Material of insulation : Closed cell type Non-inflammable polymer sponge
- Thickness of insulation : 19mm (3/4inch), 10mm (3/8inch)

COLD Surface insulation

- Material of insulation : Closed cell type Non-inflammable polymer sponge
- Thickness of insulation : 19mm (3/4 inch), 10mm (3/8 inch)

Wrapping Material when Glass wool is used.

- Insulated parts on body : Colored galvanized steel with 0.45mm thickness or over
- Insulated parts on pipes : Colored galvanized steel with 0.30mm thickness or over

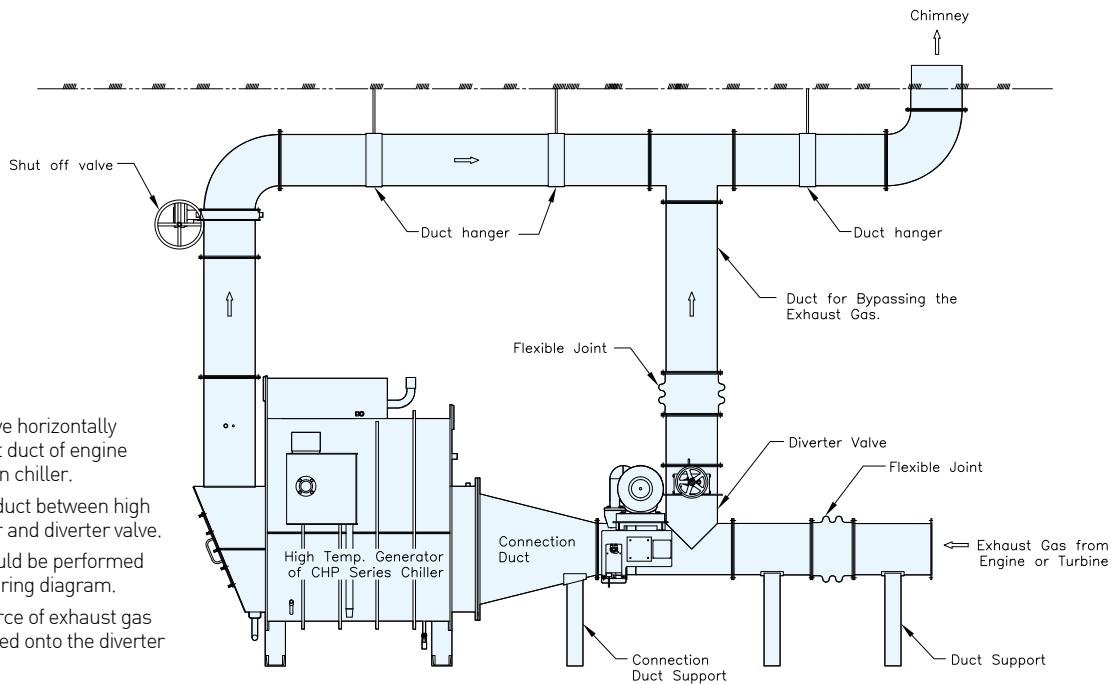
Model	Hot Surface (m ²)			Cold Surface (m ²)		
	75mm	50mm	19mm	10mm	19mm	10mm
CHP005	8.2	0.9	2.7	0.4	2.6	0.3
CHP006	8.2	0.9	2.7	0.4	2.6	0.3
CHP007	8.2	0.9	3.4	0.4	2.6	0.3
CHP008	8.2	1.1	3.4	0.4	2.6	0.3
CHP010	9.5	1.8	4.2	0.7	3.6	0.3
CHP012	10.4	1.8	4.3	0.7	3.6	0.3
CHP015	11.2	2.2	6.3	0.7	4.8	0.3
CHP018	11.4	2.2	6.3	0.7	4.8	0.3
CHP021	12.8	2.2	7.1	0.9	5.8	0.3
CHP024	13.6	2.2	7.1	0.9	5.8	0.4
CHP028	14.1	2.5	8.3	1.1	7.1	0.4
CHP032	18.2	2.5	8.3	1.1	7.1	0.4
CHP036	18.4	3.0	9.1	1.2	7.9	0.4
CHP040	18.4	3.0	9.1	1.2	7.9	0.4

Model	Hot Surface (m ²)			Cold Surface (m ²)		
	75mm	50mm	19mm	10mm	19mm	10mm
CHP045	20.6	3.1	10.1	1.2	7.9	0.4
CHP050	21.3	3.1	10.1	1.2	11	0.4
CHP056	23.4	7.5	11.4	1.4	13.5	0.6
CHP063	24.7	8.3	12.2	1.4	15	0.7
CHP070	25.3	9.2	13.0	1.5	16	0.7
CHP080	32.1	10.5	13.9	1.6	17	1.1
CHP090	33.7	11.5	14.4	1.6	18.5	1.2
CHP100	34.2	13.0	14.9	1.7	20	1.2
CHP110	36.5	15.5	13.7	1.7	22.2	1.4
CHP120	37.6	16.8	14.0	1.7	22.5	1.4
CHP130	39.3	18.2	14.3	1.8	23.4	1.4
CHP140	41.1	18.1	14.6	1.8	26.6	1.5
CHP150	43.9	19.6	15.1	1.8	27.6	1.5

CHP Series

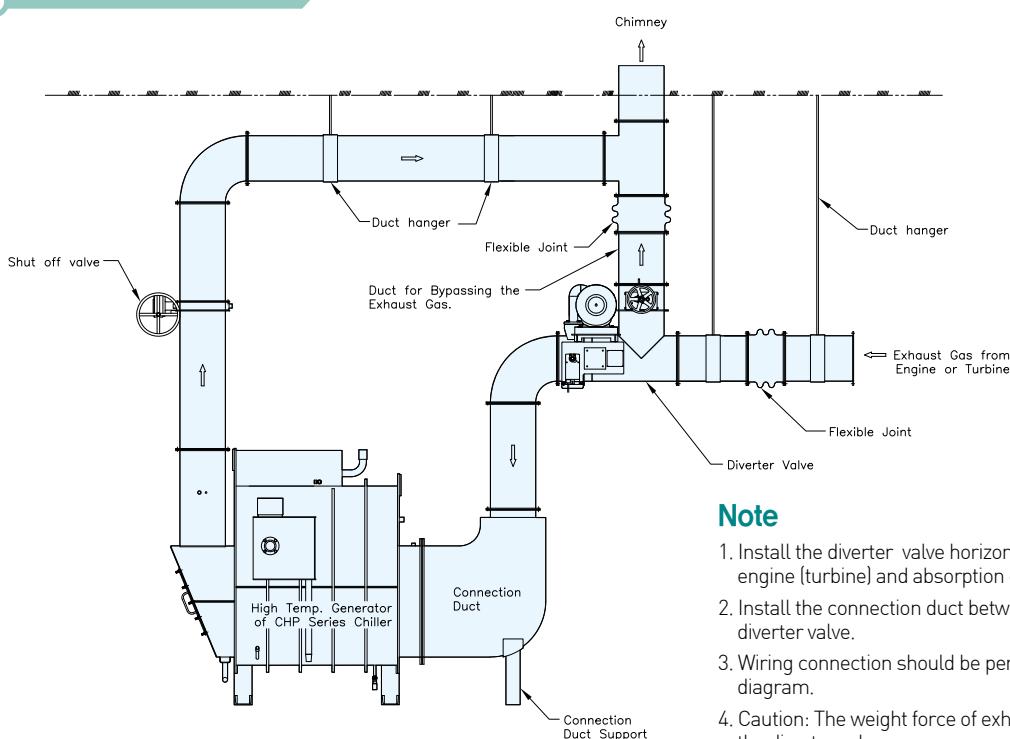
Double Effect Exhaust Gas Driven Absorption Chiller

Diverter Valve Installation Guide



Note

1. Install the diverter valve horizontally in between the exhaust duct of engine (turbine) and absorption chiller.
2. Install the connection duct between high temperature generator and diverter valve.
3. Wiring connection should be performed accordance with the wiring diagram.
4. Caution: The weight force of exhaust gas duct shouldn't be applied onto the diverter valve.



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