

# Direct Fired

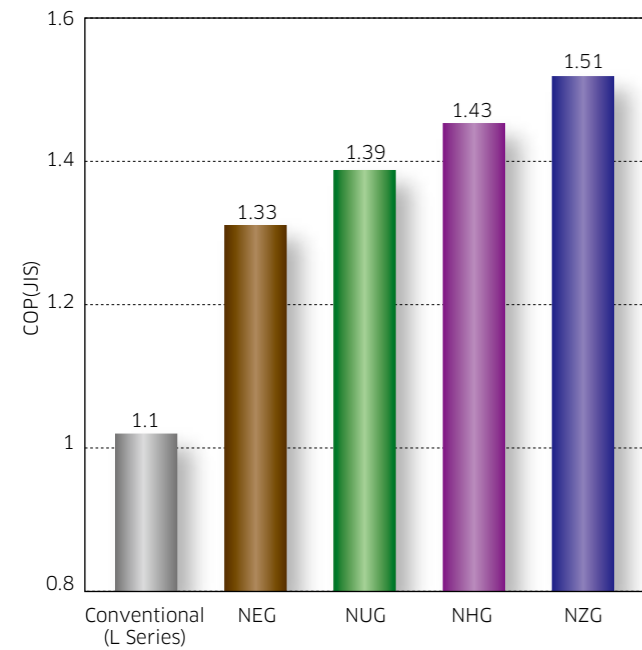
Supply of Chilled or Hot Water by means of highly efficient fuel combustion energy



With the ideal heat exchanging method of the parallel cycle a higher energy saving rate is achieved.

## High COP model

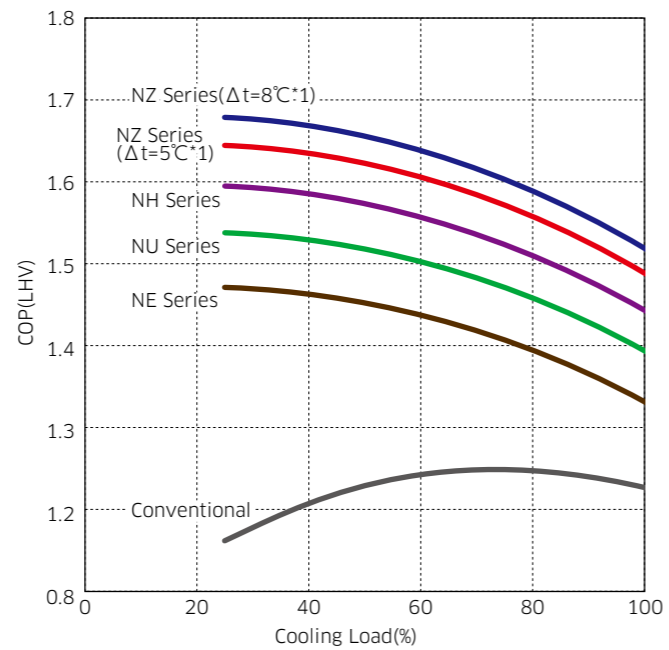
Efficio has various type of COP model. The gas consumption rate can be reduced as follows compared with the conventional model.



Note  
COP is calculated in accordance with JIS standard.

## Fuel Consumption Rate at Partial Load

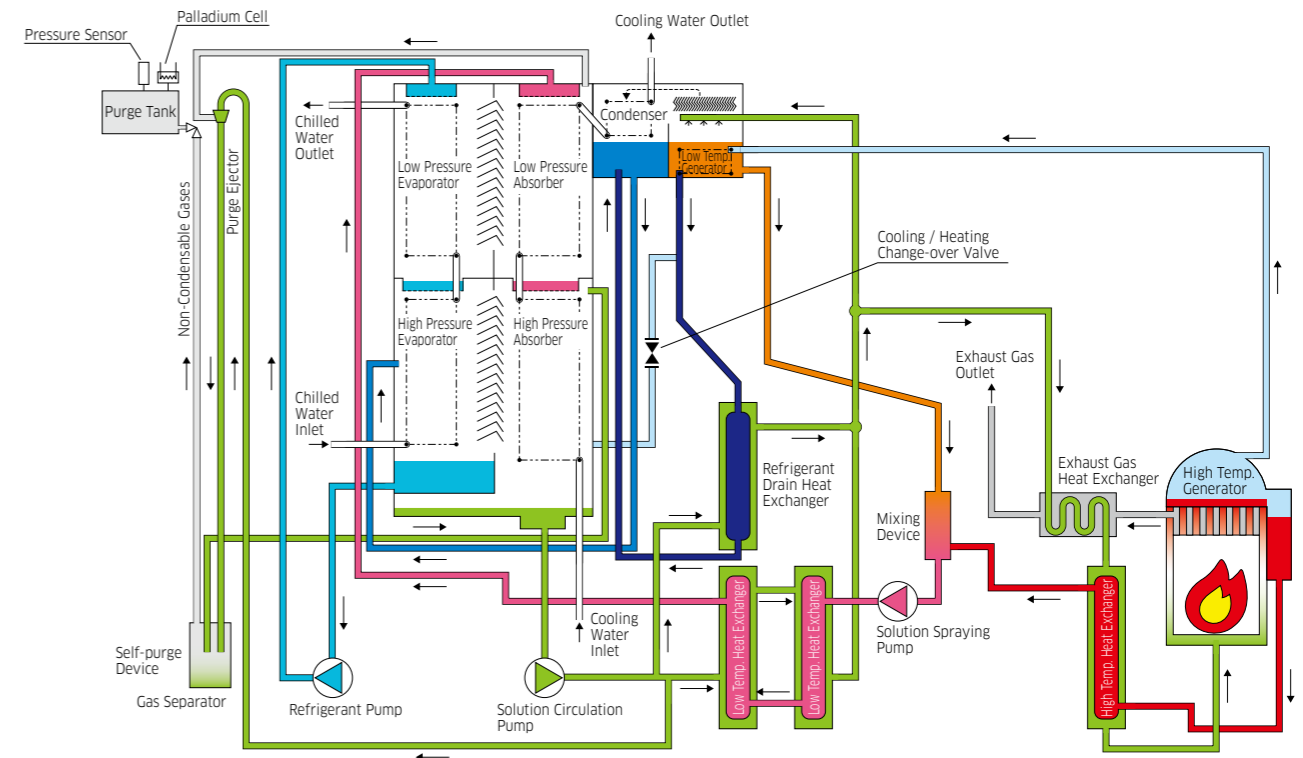
You can save more fuel gas consumption with the inverter control for the solution pump.



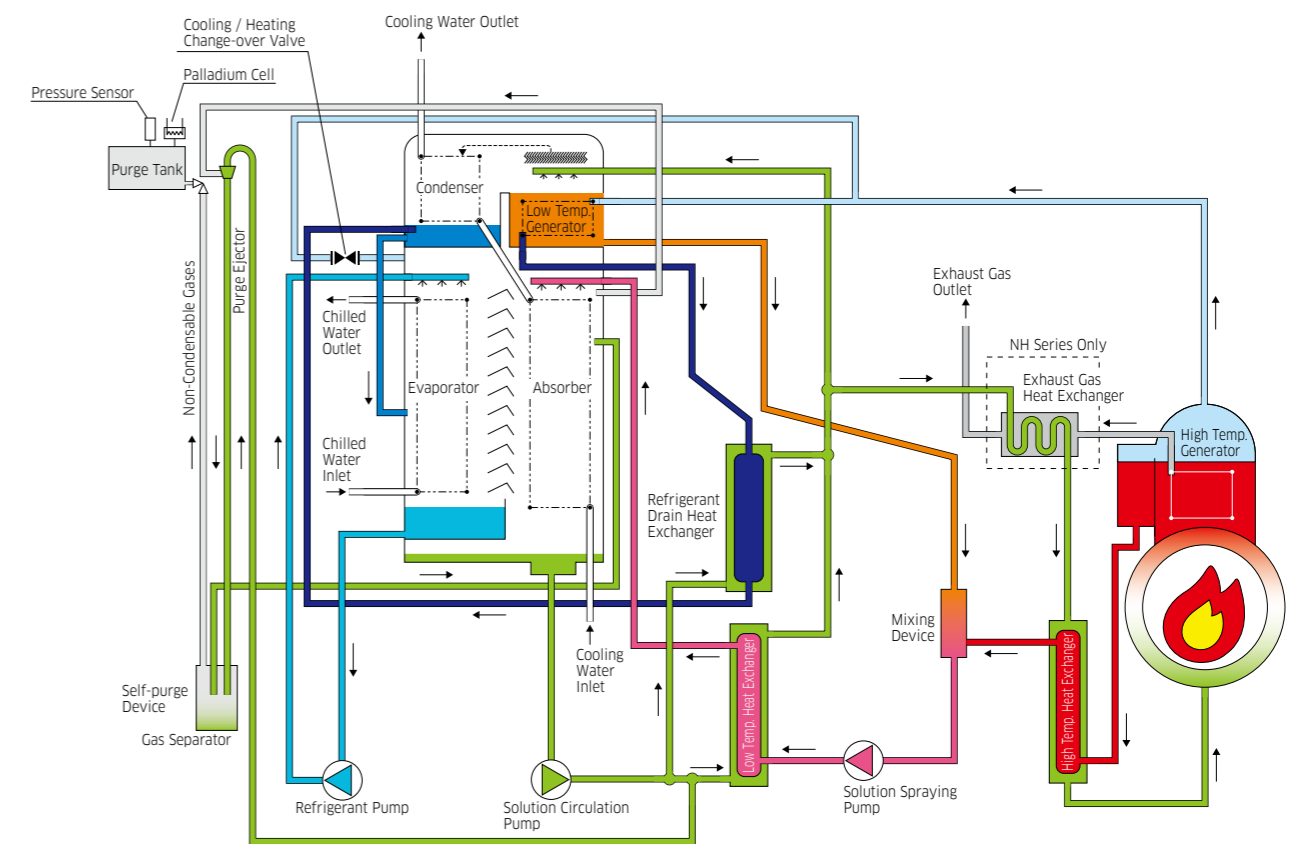
\*1 Chilled Water differential temperature between inlet and outlet

- Note
1. Efficio series are equipped with the inverter control for the solution pump as standard.
  2. Cooling water inlet temperature conditions are as specified by the JIS standards (32°C at 100% load, 27°C at 0% load, with the temperature varying proportionally at loads between 0% and 100%).
  3. The above graph shows plotted points of maximum COP and the actually measured value might be changed due to machinery and/or site condition.
  4. The tolerance of performance is in compliance with JIS B8622-2009.

## NZ Series Cooling Cycle



## NH/NU/NE Series Cooling Cycle



COP=1.51 (Chilled Water Inlet/Outlet Δ t=8°C)

			NZG-80A	NZG-100A	NZG-120A	NZG-150A	NZG-180A	NZG-210A
Capacity	Cooling	kW (USRT)	281 (80)	352 (100)	422 (120)	528 (150)	633 (180)	739 (210)
	Heating	kW (Mcal/h)	186 (160)	232 (199)	278 (239)	348 (299)	417 (359)	487 (419)
Chilled (Hot) Water	Chilled Water Inlet/Outlet Temp.	°C	15.0 → 7.0					
	Hot Water Inlet/Outlet Temp.	°C	54.7 → 60.0					
	Flow Rate	m <sup>3</sup> /h	30.2	37.8	45.4	56.7	68.0	79.4
	Pressure Loss	kPa	70.9	72.5	94.7	90.1	97.0	98.5
	Retained Water Volume	m <sup>3</sup>	0.14	0.16	0.19	0.22	0.27	0.30
Cooling Water	Inlet/Outlet Temp.	°C	32.0 → 37.0					
	Flow Rate	m <sup>3</sup> /h	80	100	120	150	180	210
	Pressure Loss	kPa	38.1	41.1	71.2	73.8	59.3	64.2
	Retained Water Volume	m <sup>3</sup>	0.30	0.34	0.41	0.47	0.66	0.72
Heat Input (Gas Firing)	Cooling	MJ/h	743	927	1,112	1,391	1,670	1,949
		kW	206	258	309	386	464	541
	Heating	MJ/h	743	927	1,112	1,391	1,670	1,949
		kW	206	258	309	386	464	541
	Gas Inlet Pressure	kPa	7.85	7.85	7.85	7.85	7.85	7.85
Electricity	Power Source		50Hz 400V 3 φ					
	Capacity	KVA	5.2	5.2	5.7	5.7	7.8	7.8
	Current	A	6.85	6.85	7.5	7.5	10.6	10.6
	Total Motor Power	kW	2.10	2.10	2.45	2.45	3.55	3.55
Connection	Chilled (Hot) Water Inlet/Outlet	A	80	80	100	100	100	100
	Cooling Water Inlet/Outlet	A	125	125	125	125	150	150
	Fuel Gas Inlet	A	40	40	40	40	40	40
	Exhaust Gas Outlet	mm	185 × 185	185 × 185	227 × 227	227 × 227	269 × 269	269 × 269
External Dimensions	Length	mm	2,759	2,759	3,662	3,662	3,862	3,862
	Width	mm	2,065	2,065	2,065	2,061	2,340	2,340
	Height	mm	2,154	2,154	2,154	2,154	2,266	2,266
Weight	Operating Weight	ton	5.0	5.3	6.5	7.0	8.9	9.3
	Total Shipping Weight	ton	4.5	4.8	5.9	6.3	7.9	8.2
Delivery Form			One Piece / Solution Charge					

		NZG-250A	NZG-300A	NZG-360A	NZG-400A	NZG-450A	NZG-500A	NZG-560A	NZG-630A	NZG-700A	NZG-800A	NZG-900A	NZG-1000A
Capacity	Cooling	879 (250)	1,055 (300)	1,266 (360)	1,407 (400)	1,583 (450)	1,759 (500)	1,970 (560)	2,216 (630)	2,462 (700)	2,813 (800)	3,165 (900)	3,517 (1,000)
	Heating	580 (499)	696 (598)	835 (718)	928 (798)	1,044 (898)	1,160 (997)	1,299 (1,117)	1,461 (1,257)	1,623 (1,396)	1,855 (1,596)	2,087 (1,795)	2,319 (1,995)
Chilled (Hot) Water	Chilled Water Inlet/Outlet Temp.	15.0 → 7.0											
	Hot Water Inlet/Outlet Temp.	54.7 → 60.0											
	Flow Rate	94.5	113.4	136.1	151.2	170.1	189.0	211.7	238.1	264.6	302.4	340.2	378.0
	Pressure Loss	79.3	84.6	84.3	85.6	116.5	68.8	69.6	59.8	60.0	57.0	56.6	75.5
	Retained Water Volume	0.36	0.40	0.49	0.54	0.59	0.81	0.89	0.98	1.08	1.31	1.45	1.59
Cooling Water	Inlet/Outlet Temp.	32.0 → 37.0											
	Flow Rate	250	300	360	400	450	500	560	630	700	800	900	1000
	Pressure Loss	66.6	73.3	57.2	58.7	78.7	55.4	58.7	92.9	95.3	89.5	92.9	121.7
	Retained Water Volume	0.82	0.91	1.21	1.30	1.40	1.90	2.05	2.27	2.47	3.02	3.28	3.54
Heat Input (Gas Firing)	Cooling	2,318	2,782	3,340	3,713	4,177	4,641	5,194	5,847	6,495	7,422	8,349	9,281
		644	773	928	1,031	1,160	1,289	1,443	1,624	1,804	2,062	2,319	2,578
	Heating	2,318	2,782	3,340	3,713	4,177	4,641	5,194	5,847	6,495	7,422	8,349	9,281
		644	773	928	1,031	1,160	1,289	1,443	1,624	1,804	2,062	2,319	2,578
	Gas Inlet Pressure	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	98	98	98
Electricity	Power Source	50Hz 400V 3 φ											
	Capacity	8.0	8.9	10.4	11.3	11.3	12.6	15.8	15.8	15.8	22.0	22.0	26.4
	Current	10.8	12.2	14.3	15.6	15.6	17.5	22.1	22.1	22.1	31.0	31.0	37.4
	Total Motor Power	3.65	4.40	5.40	6.10	6.10	7.50	9.50	9.50	9.50	13.20	13.20	17.00
Connection	Chilled (Hot) Water Inlet/Outlet	125	125	150	150	150	200	200	200	200	200	200	250
	Cooling Water Inlet/Outlet	200	200	250	250	250	250	250	300	300	350	350	350
	Fuel Gas Inlet	40	40	40	40	40	40	40	40	40	40	40	40
	Exhaust Gas Outlet	320 × 320	320 × 320	370 × 370	370 × 370	392 × 392	438 × 438	438 × 438	490 × 490	490 × 490	585 × 585	585 × 585	585 × 585
External Dimensions	Length	5,314	5,314	5,516	5,516	6,016	6,166	6,166	7,438	7,438	7,793	7,793	8,505
	Width	2,424	2,424	2,743	2,743	2,743	3,129	3,129	3,163	3,163	3,319	3,319	3,319
	Height	2,272	2,272	2,643	2,643	2,643	2,795	2,795	2,984	2,984	3,368	3,368	3,368
Weight	Operating Weight	11.5	12.2	16.1	16.7	18.2	21.9	22.9	27.2	28.4	31.6	36.3	40.1
	Total Shipping Weight	10.3	10.9	14.3	14.8	16.2	19.2	19.9	24.0	24.8	27.3	31.6	35.0
Delivery Form		One Piece / Solution Charge						Two Pieces / Solution Discharge					

COP=1.49 (Chilled Water Inlet/Outlet Δ t=5°C)

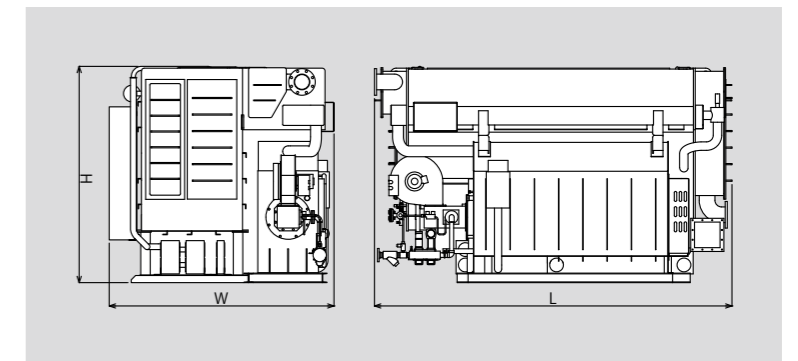
			12.0 → 7.0					
			56.7 → 60.0					
Chilled (Hot) Water	Chilled Water Inlet/Outlet Temp.	°C	12.0 → 7.0					
	Hot Water Inlet/Outlet Temp.	°C	56.7 → 60.0					
	Flow Rate	m <sup>3</sup> /h	48.4	60.5	72.6	90.7	108.9	127.0
	Pressure Loss	kPa	78.5	81.9	72.5	75.1	78.2	81.3
	Retained Water Volume	m <sup>3</sup>	0.14	0.16	0.19	0.22	0.27	0.30
Heat Input (Gas Firing)	Cooling	MJ/h	756	945	1,134	1,418	1,701	1,985
		kW	210	263	315	394	473	551
	Heating	MJ/h	743	927	1,112	1,391	1,670	1,949
		kW	206	258	309	386	464	541
Connection	Chilled (Hot) Water Inlet/Outlet	A	80	80	100	100	100	100
	Cooling Water Inlet/Outlet	A	125	125	125	125	150	150

		12.0 → 7.0											
		56.7 → 60.0											
Capacity	Cooling	151.2	181.4	217.7	241.9	272.2	302.4	338.7	381.0	423.4	483.8	544.3	604.8
	Heating	85.4	92.4	90.7	92.9	126.0	75.9	77.7	51.5	52.8	46.7	46.2	60.6
	Retained Water Volume	0.36	0.40	0.49	0.54	0.59	0.81	0.89	0.98	1.08	1.31	1.45	1.59
Heat Input (Gas Firing)	Cooling	2,363	2,836	3,403	3,781	4,253	4,726	5,293	5,955	6,612	7,557	8,502	9,448
		656	788	945	1,050	1,182	1,313	1,470	1,654	1,837	2,099	2,362	2,624
	Heating	2,318	2,782	3,340	3,713	4,177	4,641	5,194	5,847	6,495	7,422	8,349	9,281
		644	773	928	1,031	1,160	1,289	1,443	1,624	1,804	2,062	2,319	2,578
Connection	Chilled (Hot) Water Inlet/Outlet	125	125	150	150	150	200	200	200	200	200	200	250
	Cooling Water Inlet/Outlet	200	200	250	250	250	250	250	300	300	350	350	350

NOTE

1. The tolerance of the performance is in compliance with JIS B8622-2009.
2. Operation load range is from 10% to 100%.
3. The maximum operating pressure is 784kPa (gauge) for both Chilled/Hot Water and Cooling Water.
4. The fouling factor of both Chilled/Hot Water and Cooling Water is 8.6 × 10<sup>-5</sup> m<sup>2</sup>·K/W.
5. The Cooling Water Inlet temperature shall not be lower than 18°C.
6. The total motor power is the total value of the constant operation all the motors, excluding the purging pump motor which operates intermittently.
7. The parameters described in this table list of specification can be changed by the manufacturer for the purpose of technical improvement without notice.
8. The exhaust gas temperature is 100°C.

Item	Unit	NG	Remarks
Heating Value		45.0MJ/m <sup>3</sup> N	Gas : based on Higher Heating Value
Exhaust Gas Volume	m <sup>3</sup> /h	19.03	Exhaust gas volume per m <sup>3</sup> N/h of fuel gas at 100°C of exhaust gas
Required Air Volume for Combustion	m <sup>3</sup> /h	14.03	Minimum required air volume per m <sup>3</sup> N/h of fuel as at 25°C of air temperature



COP=1.43 (Chilled Water Inlet/Outlet Δ t=8°C)

			NHG-80A	NHG-100A	NHG-120A	NHG-150A	NHG-180A	NHG-210A
Capacity	Cooling	kW (USRT)	281 (80)	352 (100)	422 (120)	528 (150)	633 (180)	739 (210)
	Heating	kW (Mcal/h)	195 (168)	243 (210)	292 (252)	365 (314)	438 (377)	511 (440)
Chilled (Hot) Water	Chilled Water Inlet/Outlet Temp.	°C	15.0 → 7.0					
	Hot Water Inlet/Outlet Temp.	°C	54.7 → 60.0					
	Flow Rate	m <sup>3</sup> /h	30.2	37.8	45.4	56.7	68.0	79.4
	Pressure Loss	kPa	55.1	55.5	49.4	49.9	49.5	49.7
	Retained Water Volume	m <sup>3</sup>	0.12	0.14	0.16	0.19	0.23	0.26
Cooling Water	Inlet/Outlet Temp.	°C	32.0 → 37.1					
	Flow Rate	m <sup>3</sup> /h	80	100	120	150	180	210
	Pressure Loss	kPa	43.9	45.5	48.2	54.7	45.2	49.8
	Retained Water Volume	m <sup>3</sup>	0.31	0.35	0.39	0.45	0.62	0.68
Heat Input (Gas Firing)	Cooling	MJ/h	779	974	1,169	1,461	1,753	2,045
		kW	216	271	325	406	487	568
	Heating	MJ/h	779	974	1,169	1,461	1,753	2,045
		kW	216	271	325	406	487	568
	Gas Inlet Pressure	kPa	7.85	7.85	7.85	7.85	7.85	7.85
Electricity	Power Source		50Hz 400V 3 φ					
	Capacity	KVA	5.1	5.5	5.5	7.7	7.8	7.8
	Current	A	6.65	7.3	7.3	10.4	10.6	10.6
	Total Motor Power	kW	2.00	2.35	2.35	3.45	4.45	4.45
Connection	Chilled (Hot) Water Inlet/Outlet	A	80	80	100	100	100	100
	Cooling Water Inlet/Outlet	A	125	125	125	125	150	150
	Fuel Gas Inlet	A	40	40	40	40	40	40
	Exhaust Gas Outlet	mm	100 × 350	100 × 350	100 × 350	135 × 350	150 × 390	150 × 430
External Dimensions	Length	mm	3,027	3,067	3,754	3,754	3,927	4,024
	Width	mm	1,771	1,771	1,771	1,771	2,036	2,036
	Height	mm	1,976	1,976	2,005	1,976	2,188	2,188
Weight	Operating Weight	ton	4.3	4.5	5.5	5.9	7.3	7.7
	Total Shipping Weight	ton	3.9	4.1	4.9	5.2	6.4	6.8
Delivery Form			One Piece / Solution Charge					

NHG-250A	NHG-300A	NHG-360A	NHG-400A	NHG-450A	NHG-500A	NHG-560A	NHG-630A	NHG-700A	NHG-800A	NHG-900A	NHG-1000A
879 (250)	1,055 (300)	1,266 (360)	1,407 (400)	1,583 (450)	1,759 (500)	1,970 (560)	2,216 (630)	2,462 (700)	2,813 (800)	3,165 (900)	3,517 (1,000)
609 (524)	730 (629)	876 (755)	974 (839)	1,095 (943)	1,217 (1,048)	1,363 (1,174)	1,534 (1,321)	1,704 (1,468)	1,947 (1,677)	2,191 (1,887)	2,434 (2,096)
15.0 → 7.0											
54.7 → 60.0											
94.5	113.4	136.1	151.2	170.1	189.0	211.7	238.1	264.6	302.4	340.2	378.0
56.1	59.3	60.2	61.6	83.9	48.2	48.9	88.9	88.9	88.2	89.1	118.9
0.31	0.35	0.43	0.47	0.51	0.71	0.78	0.86	0.95	1.11	1.23	1.36
32.0 → 37.1											
250	300	360	400	450	500	560	630	700	800	900	1000
43.9	49.1	38.8	41.0	55.0	48.1	51.3	75.4	76.8	61.5	65.4	85.3
0.80	0.88	1.18	1.26	1.35	1.84	1.98	2.23	2.41	2.88	3.12	3.38
2,435	2,922	3,506	3,896	4,383	4,870	5,454	6,136	6,818	7,792	8,766	9,740
676	812	974	1,082	1,217	1,353	1,515	1,704	1,894	2,164	2,435	2,705
2,435	2,922	3,506	3,896	4,383	4,870	5,454	6,136	6,818	7,792	8,766	9,740
676	812	974	1,082	1,217	1,353	1,515	1,704	1,894	2,164	2,435	2,705
7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	98	98	98
50Hz 400V 3 φ											
10.2	10.2	11.5	12.4	12.4	18.2	19.9	20.0	20.0	23.9	26.3	29.0
14.0	14.0	15.9	17.2	17.2	25.6	28.1	28.2	28.2	33.8	37.2	41.1
5.20	5.20	6.60	7.30	7.30	9.70	11.20	11.30	11.30	15.10	16.90	18.90
125	125	150	150	150	200	200	200	200	200	200	250
200	200	250	250	250	250	250	300	300	350	350	350
40	40	40	40	40	40	40	40	40	40	40	40
180 × 430	200 × 500	220 × 500	250 × 500	280 × 500	310 × 500	310 × 550	350 × 550	360 × 600	410 × 600	460 × 600	510 × 600
5,339	5,339	5,479	5,479	5,979	6,129	6,129	7,409	7,409	7,665	7,665	8,377
2,047	2,214	2,547	2,547	2,547	2,922	2,922	2,929	3,026	3,177	3,216	3,216
2,188	2,188	2,402	2,402	2,402	2,786	2,775	2,745	2,745	3,407	3,407	3,407
9.4	10.2	12.8	13.6	14.9	18.4	19.2	22.1	23.1	27.7	31.3	34.0
8.3	8.9	11.2	11.9	13.0	15.9	16.5	19.0	19.7	23.7	26.9	29.2
One Piece / Solution Charge											One Piece / Solution Discharge

COP=1.43 (Chilled Water Inlet/Outlet Δ t=5°C)

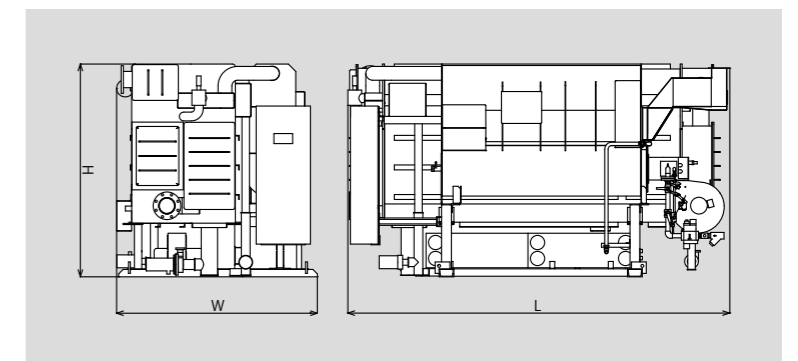
			12.0 → 7.0					
Chilled (Hot) Water	Chilled Water Inlet/Outlet Temp.	°C	12.0 → 7.0					
	Hot Water Inlet/Outlet Temp.	°C	56.7 → 60.0					
	Flow Rate	m <sup>3</sup> /h	48.4	60.5	72.6	90.7	108.9	127.0
	Pressure Loss	kPa	78.5	81.9	72.5	75.1	78.2	81.3
	Retained Water Volume	m <sup>3</sup>	0.14	0.16	0.19	0.22	0.27	0.30
Connection	Chilled (Hot) Water Inlet/Outlet	A	100	100	100	100	125	125
	Cooling Water Inlet/Outlet	A	125	125	125	125	150	150

12.0 → 7.0											
56.7 → 60.0											
151.2	181.4	217.7	241.9	272.2	302.4	338.7	381.0	423.4	483.8	544.3	604.8
85.4	92.4	90.7	92.9	126.0	75.9	77.7	51.5	52.8	46.7	46.2	60.6
0.36	0.40	0.49	0.54	0.59	0.81	0.89	0.98	1.08	1.31	1.45	1.59
150	150	200	200	200	200	200	250	250	250	250	300
200	200	250	250	250	250	250	300	300	350	350	350

NOTE

- The tolerance of the performance is in compliance with JIS B8622-2009.
- Operation load range is from 10% to 100%.
- The maximum operating pressure is 784kPa (gauge) for both Chilled/Hot Water and Cooling Water.
- The fouling factor of both Chilled/Hot Water and Cooling Water is  $8.6 \times 10^{-5} \text{ m}^2 \cdot \text{K/W}$ .
- The Cooling Water Inlet temperature shall not be lower than 18°C.
- The total motor power is the total value of the constant operation all the motors, excluding the purging pump motor which operates intermittently.
- The parameters described in this table list of specification can be changed by the manufacturer for the purpose of technical improvement without notice.
- The exhaust gas temperature is 110°C.

Item	Unit	NG	Remarks
Heating Value		45.0MJ/m <sup>3</sup> <sub>N</sub>	Gas : based on Higher Heating Value
Exhaust Gas Volume	m <sup>3</sup> /h	19.03	Exhaust gas volume per m <sup>3</sup> <sub>N</sub> /h of fuel gas at 110°C of exhaust gas
Required Air Volume for Combustion	m <sup>3</sup> /h	14.03	Minimum required air volume per m <sup>3</sup> <sub>N</sub> /h of fuel as at 25°C of air temperature





COP=1.39 (Chilled Water Inlet/Outlet Δ t=8°C)

			NUG-80A	NUG-100A	NUG-120A	NUG-150A	NUG-180A	NUG-210A
Capacity	Cooling	kW (USRT)	281 (80)	352 (100)	422 (120)	528 (150)	633 (180)	739 (210)
	Heating	kW (Mcal/h)	195 (168)	244 (210)	293 (252)	366 (314)	439 (377)	512 (440)
Chilled (Hot) Water	Chilled Water Inlet-Outlet Temp.	°C	15.0 → 7.0					
	Hot Water Inlet-Outlet Temp.	°C	53.3 → 60.0					
	Flow Rate	m <sup>3</sup> /h	30.2	37.8	45.4	52.8	60.2	67.6
	Pressure Loss	kPa	55.1	55.5	55.9	56.3	56.7	57.1
	Retained Water Volume	m <sup>3</sup>	0.14	0.16	0.19	0.22	0.27	0.30
Cooling Water	Inlet-Outlet Temp.	°C	32.0 → 37.1					
	Flow Rate	m <sup>3</sup> /h	80	100	120	150	180	210
	Pressure Loss	kPa	42.3	44.3	47.1	53.6	44.1	48.7
	Retained Water Volume	m <sup>3</sup>	0.31	0.35	0.39	0.45	0.62	0.68
Heat Input (Gas Firing)	Cooling	MJ/h	806	1,008	1,211	1,512	1,814	2,120
		kW	224	280	336	420	504	589
	Heating	MJ/h	806	1,008	1,211	1,512	1,814	2,120
		kW	224	280	336	420	504	589
	Gas Inlet Pressure	kPa	7.85	7.85	7.85	7.85	7.85	7.85
Electricity	Power Source		50Hz 400V 3 φ					
	Capacity	KVA	5.1	5.5	5.9	7.7	7.8	7.8
	Current	A	6.65	7.3	7.3	10.4	10.6	10.6
	Total Motor Power	kW	2.00	2.35	2.35	3.45	4.45	4.45
Connection	Chilled (Hot) Water Inlet/Outlet	A	80	100	100	100	100	125
	Cooling Water Inlet/Outlet	A	125	125	125	125	150	150
	Fuel Gas Inlet	A	40	40	40	40	40	40
	Exhaust Gas Outlet	mm	140 × 324	140 × 324	140 × 324	140 × 324	140 × 324	160 × 383
External Dimensions	Length	mm	2,956	3,067	3,754	3,754	3,927	3,967
	Width	mm	1,771	1,771	1,771	1,771	2,036	2,036
	Height	mm	1,976	1,976	1,976	1,976	2,188	2,188
Weight	Operating Weight	ton	4.2	4.4	5.3	5.7	7.1	7.6
	Total Shipping Weight	ton	3.8	3.9	4.8	5.1	6.2	6.6
Delivery Form			One Piece / Solution Charge					

		NUG-250A	NUG-300A	NUG-360A	NUG-400A	NUG-450A	NUG-500A	NUG-560A	NUG-630A	NUG-700A	NUG-800A	NUG-900A	NUG-1000A
Capacity	Cooling	879 (250)	1,055 (300)	1,266 (360)	1,407 (400)	1,583 (450)	1,759 (500)	1,970 (560)	2,216 (630)	2,462 (700)	2,813 (800)	3,165 (900)	3,517 (1,000)
	Heating	609 (524)	731 (629)	878 (755)	975 (839)	1,097 (943)	1,219 (1,048)	1,365 (1,174)	1,536 (1,321)	1,706 (1,468)	1,950 (1,677)	2,194 (1,887)	2,438 (2,096)
Chilled (Hot) Water	Chilled Water Inlet-Outlet Temp.	15.0 → 7.0											
	Hot Water Inlet-Outlet Temp.	53.3 → 60.0											
	Flow Rate	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8
	Pressure Loss	56.1	59.3	60.2	61.6	83.9	48.2	48.9	88.9	88.9	88.2	89.1	118.9
	Retained Water Volume	0.36	0.40	0.49	0.54	0.59	0.81	0.89	0.98	1.08	1.31	1.45	1.59
Cooling Water	Inlet-Outlet Temp.	32.0 → 37.1											
	Flow Rate	250	300	360	400	450	500	560	630	700	800	900	1000
	Pressure Loss	43.0	48.2	37.8	40.0	53.6	46.5	49.8	72.4	73.8	59.5	63.4	82.7
	Retained Water Volume	0.80	0.88	1.18	1.26	1.35	1.84	1.98	2.23	2.41	2.88	3.12	3.38
Heat Input (Gas Firing)	Cooling	2,521	3,025	3,632	4,037	4,542	5,046	5,649	6,355	7,062	8,070	9,079	10,091
		700	840	1,009	1,121	1,262	1,402	1,569	1,765	1,962	2,242	2,522	2,803
	Heating	2,521	3,025	3,632	4,037	4,542	5,046	5,649	6,355	7,062	8,070	9,079	10,091
		700	840	1,009	1,121	1,262	1,402	1,569	1,765	1,962	2,242	2,522	2,803
	Gas Inlet Pressure	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	98	98	98
Electricity	Power Source	50Hz 400V 3 φ											
	Capacity	10.2	10.2	11.5	12.4	12.4	18.2	19.9	20.0	20.0	23.9	26.3	29.0
	Current	14.0	14.0	15.9	17.2	17.2	25.6	28.1	28.2	28.2	33.8	37.2	41.1
	Total Motor Power	5.20	5.20	6.60	7.30	7.30	9.70	11.20	11.30	11.30	15.10	16.90	18.90
Connection	Chilled (Hot) Water Inlet/Outlet	125	150	150	150	200	200	200	200	200	200	250	250
	Cooling Water Inlet/Outlet	200	200	250	250	250	250	250	300	300	350	350	350
	Fuel Gas Inlet	40	40	40	40	40	40	40	40	40	40	40	40
	Exhaust Gas Outlet	160 × 383	210 × 441	210 × 441	250 × 536	250 × 536	270 × 647	270 × 647	290 × 691	290 × 691	290 × 782	290 × 872	290 × 872
External Dimensions	Length	5,339	5,339	5,479	5,479	5,979	6,129	6,129	7,409	7,409	7,665	7,665	8,377
	Width	2,047	2,214	2,547	2,547	2,547	2,922	2,922	2,929	3,026	3,177	3,216	3,216
	Height	2,188	2,188	2,402	2,402	2,402	2,745	2,745	2,745	2,745	3,407	3,407	3,407
Weight	Operating Weight	9.2	10.0	12.7	13.5	14.7	18.2	19.0	21.8	22.8	27.1	30.5	33.2
	Total Shipping Weight	8.1	8.7	11.1	11.7	12.8	15.6	16.2	18.7	19.4	23.1	26.1	28.5
Delivery Form		One Piece / Solution Charge											

COP=1.39 (Chilled Water Inlet/Outlet Δ t=5°C)

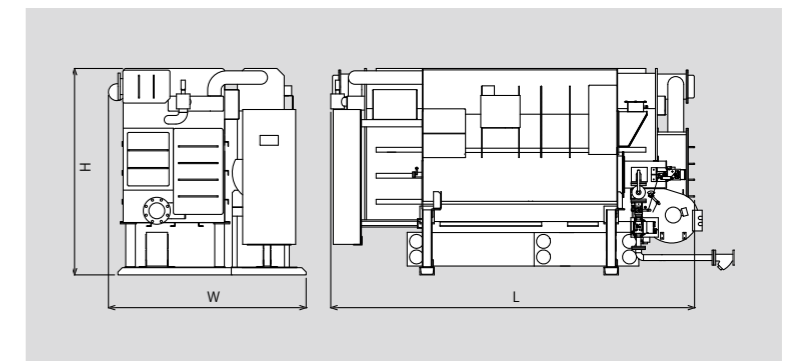
			12.0 → 7.0					
Chilled (Hot) Water	Chilled Water Inlet-Outlet Temp.	°C	12.0 → 7.0					
	Hot Water Inlet-Outlet Temp.	°C	56.5 → 60.0					
	Flow Rate	m <sup>3</sup> /h	48.4	60.5	72.6	90.7	108.9	127.0
	Pressure Loss	kPa	120.0	120.8	112.5	113.8	51.7	52.2
	Retained Water Volume	m <sup>3</sup>	0.12	0.14	0.16	0.19	0.23	0.26
Connection	Chilled (Hot) Water Inlet/Outlet	A	100	100	100	100	125	125
	Cooling Water Inlet/Outlet	A	125	125	125	125	150	150

		12.0 → 7.0											
Chilled (Hot) Water	Chilled Water Inlet-Outlet Temp.	12.0 → 7.0											
	Hot Water Inlet-Outlet Temp.	56.5 → 60.0											
	Flow Rate	151.2	181.4	217.7	241.9	272.2	302.4	338.7	381.0	423.4	483.8	544.3	604.8
	Pressure Loss	42.8	45.6	138.1	141.3	65.6	110.7	112.6	70.1	71.1	69.3	71.0	94.2
	Retained Water Volume	0.31	0.35	0.43	0.47	0.51	0.71	0.78	0.86	0.95	1.11	1.23	1.36
Connection	Chilled (Hot) Water Inlet/Outlet	150	150	200	200	200	200	200	250	250	250	300	300
	Cooling Water Inlet/Outlet	200	200	250	250	250	250	250	300	300	350	350	350

NOTE

- The tolerance of the performance is in compliance with JIS B8622-2009.
- Operation load range is from 10% to 100%.
- The maximum operating pressure is 784kPa (gauge) for both Chilled/Hot Water and Cooling Water.
- The fouling factor of both Chilled/Hot Water and Cooling Water is  $8.6 \times 10^{-5} \text{ m}^2 \cdot \text{K/W}$ .
- The Cooling Water Inlet temperature shall not be lower than 18°C.
- The total motor power is the total value of the constant operation all the motors, excluding the purging pump motor which operates intermittently.
- The parameters described in this table list of specification can be changed by the manufacturer for the purpose of technical improvement without notice.
- The exhaust gas temperature is 200°C.

Item	Unit	NG	Diesel	Remarks
Heating Value		45.0MJ/m <sup>3</sup> <sub>N</sub>	43.5MJ/kg	Gas : based on Higher Heating Value Diesel : based on Lower Heating Value
Exhaust Gas Volume	m <sup>3</sup> /h	19.03	16.14	Exhaust gas volume per m <sup>3</sup> <sub>N</sub> /h of fuel gas at 200°C of exhaust gas
Required Air Volume for Combustion	m <sup>3</sup> /h	14.03	12.07	Minimum required air volume per m <sup>3</sup> <sub>N</sub> /h of fuel gas at 25°C of air temperature



COP=1.33 (Chilled Water Inlet/Outlet Δ t=8°C)

			NEG-80A	NEG-100A	NEG-120A	NEG-150A	NEG-180A	NEG-210A
Capacity	Cooling	kW (USRT)	281 (80)	352 (100)	422 (120)	528 (150)	633 (180)	739 (210)
	Heating	kW (Mcal/h)	236 (203)	294 (253)	353 (304)	442 (380)	530 (456)	618 (531)
Chilled (Hot) Water	Chilled Water Inlet/Outlet Temp.	°C	15.0 → 7.0					
	Hot Water Inlet/Outlet Temp.	°C	53.3 → 60.0					
	Flow Rate	m <sup>3</sup> /h	30.2	37.8	37.8	37.8	37.8	37.8
	Pressure Loss	kPa	26.9	27.2	24.2	24.5	24.2	24.5
	Retained Water Volume	m <sup>3</sup>	0.14	0.16	0.19	0.22	0.27	0.30
Cooling Water	Inlet/Outlet Temp.	°C	32.0 → 37.2					
	Flow Rate	m <sup>3</sup> /h	80	100	120	150	180	210
	Pressure Loss	kPa	42.3	44.3	47.1	53.6	44.1	48.7
	Retained Water Volume	m <sup>3</sup>	0.31	0.35	0.39	0.45	0.62	0.68
Heat Input (Gas Firing)	Cooling	MJ/h	842	1,049	1,260	1,575	1,890	2,205
		kW	234	291	350	438	525	613
	Heating	MJ/h	977	1,215	1,463	1,827	2,192	2,557
		kW	271	338	406	508	609	710
	Gas Inlet Pressure	kPa	7.85	7.85	7.85	7.85	7.85	7.85
Electricity	Power Source		50Hz 400V 3 φ					
	Capacity	KVA	5.5	5.5	5.5	7.7	7.8	7.8
	Current	A	7.30	7.3	7.3	10.4	10.6	10.6
	Total Motor Power	kW	2.35	2.35	2.35	3.45	4.45	4.45
Connection	Chilled (Hot) Water Inlet/Outlet	A	80	80	100	100	100	100
	Cooling Water Inlet/Outlet	A	125	125	125	125	150	150
	Fuel Gas Inlet	A	40	40	40	40	40	40
	Exhaust Gas Outlet	mm	140 × 324	140 × 324	140 × 324	140 × 324	160 × 383	160 × 383
External Dimensions	Length	mm	3,067	3,067	3,754	3,754	3,967	4,299
	Width	mm	1,771	1,771	1,771	1,771	2,036	2,036
	Height	mm	1,976	1,976	1,976	1,976	2,188	2,188
Weight	Operating Weight	ton	4.2	4.4	5.3	5.7	7.1	7.5
	Total Shipping Weight	ton	3.7	3.9	4.8	5.0	6.3	6.5
Delivery Form	One Piece / Solution Charge							

		NEG-250A	NEG-300A	NEG-360A	NEG-400A	NEG-450A	NEG-500A	NEG-560A	NEG-630A	NEG-700A	NEG-800A	NEG-900A	NEG-1000A
Capacity	Cooling	879 (250)	1,055 (300)	1,266 (360)	1,407 (400)	1,583 (450)	1,759 (500)	1,970 (560)	2,216 (630)	2,462 (700)	2,813 (800)	3,165 (900)	3,517 (1,000)
	Heating	736 (633)	883 (759)	1,060 (911)	1,178 (1,013)	1,325 (1,139)	1,472 (1,266)	1,649 (1,418)	1,855 (1,595)	2,061 (1,772)	2,355 (2,025)	2,649 (2,278)	2,943 (2,531)
Chilled (Hot) Water	Chilled Water Inlet/Outlet Temp.	15.0 → 7.0											
	Hot Water Inlet/Outlet Temp.	53.3 → 60.0											
	Flow Rate	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8
	Pressure Loss	27.1	28.9	29.6	30.5	41.3	23.8	24.4	46.9	48.4	46.1	47.9	63.1
	Retained Water Volume	0.36	0.40	0.49	0.54	0.59	0.81	0.89	0.98	1.08	1.31	1.45	1.59
Cooling Water	Inlet/Outlet Temp.	32.0 → 37.2											
	Flow Rate	250	300	360	400	450	500	560	630	700	800	900	1000
	Pressure Loss	43.0	48.2	37.8	40.0	53.6	46.5	49.8	72.4	73.8	59.5	63.4	82.7
	Retained Water Volume	0.80	0.88	1.18	1.26	1.35	1.84	1.98	2.23	2.41	2.88	3.12	3.38
Heat Input (Gas Firing)	Cooling	2,629	3,151	3,781	4,204	4,731	5,253	5,883	6,621	7,355	8,408	9,457	10,505
		730	875	1,050	1,168	1,314	1,459	1,634	1,839	2,043	2,336	2,627	2,918
	Heating	3,047	3,655	4,388	4,875	5,482	6,094	6,824	7,679	8,529	9,749	10,964	12,180
		846	1,015	1,219	1,354	1,523	1,693	1,895	2,133	2,369	2,708	3,046	3,383
	Gas Inlet Pressure	7.85	7.85	7.85	7.85	7.85	7.85	7.85	98	98	98	98	98
Electricity	Power Source	50Hz 400V 3 φ											
	Capacity	10.2	10.2	12.4	12.4	14.1	19.9	19.9	20.0	20.0	26.3	29.0	29.0
	Current	14.0	14.0	17.2	17.2	19.7	28.1	28.1	28.2	28.2	37.2	41.1	41.1
	Total Motor Power	5.20	5.20	7.30	7.30	8.80	11.20	11.20	11.30	11.30	16.90	18.90	18.90
Connection	Chilled (Hot) Water Inlet/Outlet	125	125	150	150	150	200	200	200	200	200	200	250
	Cooling Water Inlet/Outlet	200	200	250	250	250	250	250	300	300	350	350	350
	Fuel Gas Inlet	40	40	40	40	40	40	40	40	40	40	40	40
	Exhaust Gas Outlet	210 × 441	210 × 441	250 × 536	250 × 536	270 × 647	270 × 647	290 × 691	290 × 691	290 × 782	290 × 782	290 × 872	290 × 872
External Dimensions	Length	5,339	5,339	5,479	5,479	5,979	6,129	6,129	7,409	7,409	7,665	7,665	8,377
	Width	2,214	2,214	2,547	2,547	2,627	2,922	2,929	3,026	3,033	3,216	3,216	3,216
	Height	2,188	2,188	2,402	2,402	2,473	2,745	2,745	2,745	2,745	3,407	3,407	3,407
Weight	Operating Weight	9.3	9.9	12.8	13.5	14.9	18.0	18.9	21.6	22.8	28.0	30.2	32.3
	Total Shipping Weight	8.2	8.7	11.2	11.7	13.0	15.4	16.2	18.5	19.4	24.0	25.8	27.6
Delivery Form	One Piece / Solution Charge												

COP=1.33 (Chilled Water Inlet/Outlet Δ t=5°C)

			12.0 → 7.0					
Chilled (Hot) Water	Chilled Water Inlet/Outlet Temp.	°C	12.0 → 7.0					
	Hot Water Inlet/Outlet Temp.	°C	55.8 → 60.0					
	Flow Rate	m <sup>3</sup> /h	48.4	60.5	72.6	90.7	108.9	127.0
	Pressure Loss	kPa	61.2	61.9	55.0	55.9	55.1	55.7
	Retained Water Volume	m <sup>3</sup>	0.12	0.14	0.16	0.19	0.23	0.26
Connection	Chilled (Hot) Water Inlet/Outlet	A	100	100	100	100	125	125
	Cooling Water Inlet/Outlet	A	125	125	125	125	150	150

		12.0 → 7.0											
Chilled (Hot) Water	Chilled Water Inlet/Outlet Temp.	12.0 → 7.0											
	Hot Water Inlet/Outlet Temp.	55.8 → 60.0											
	Flow Rate	151.2	181.4	217.7	241.9	272.2	302.4	338.7	381.0	423.4	483.8	544.3	604.8
	Pressure Loss	61.8	65.8	67.4	69.4	94.0	54.1	55.6	35.0	36.1	34.4	35.8	47.1
	Retained Water Volume	0.31	0.35	0.43	0.47	0.51	0.71	0.78	0.86	0.95	1.11	1.23	1.36
Connection	Chilled (Hot) Water Inlet/Outlet	150	150	200	200	200	200	200	250	250	250	300	
	Cooling Water Inlet/Outlet	200	200	250	250	250	250	250	300	300	350	350	

NOTE

- The tolerance of the performance is in compliance with JIS B8622-2009.
- Operation load range is from 10% to 100%.
- The maximum operating pressure is 784kPa (gauge) for both Chilled/Hot Water and Cooling Water.
- The fouling factor of both Chilled/Hot Water and Cooling Water is  $8.6 \times 10^{-5} \text{ m}^2 \cdot \text{K/W}$ .
- The Cooling Water Inlet temperature shall not be lower than 18°C.
- The total motor power is the total value of the constant operation all the motors, excluding the purging pump motor which operates intermittently.
- The parameters described in this table list of specification can be changed by the manufacturer for the purpose of technical improvement without notice.
- The exhaust gas temperature is 200°C.

Item	Unit	NG	Diesel	Remarks
Heating Value		45.0MJ/m <sup>3</sup> <sub>N</sub>	43.5MJ/kg	Gas : based on Higher Heating Value Diesel : based on Lower Heating Value
Exhaust Gas Volume	m <sup>3</sup> /h	19.03	16.14	Exhaust gas volume per m <sup>3</sup> <sub>N</sub> /h of fuel gas at 200°C of exhaust gas
Required Air Volume for Combustion	m <sup>3</sup> /h	14.03	12.07	Minimum required air volume per m <sup>3</sup> <sub>N</sub> /h of fuel as at 25°C of air temperature

