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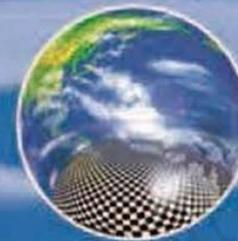
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## G series steam-fired LiBr absorption chiller



Shanghai Venttech Refrigeration Equipment Co., Ltd



## LiBr absorption chiller FG/SG/NG-H series

### Business scope:

Designs, productions, manufactures, sales, installations, and after-sale services for chillers featuring environmental protection and energy-integrated utilization, for air-conditioning machinery, and for related environmental protection machinery, etc.

### Product kinds:

- Central air-conditioning equipment: absorption chiller/heater — sole refrigeration or refrigeration and heating (70~23256kW).  
Steam-fired, direct-fired, hot water-fired, modular type, packaged type, heat pump type, etc.
- Commercial air-conditioning equipment: GHP gas heat pump and chiller unit — refrigeration and heating (16HP-50HP).  
VRF variable refrigerant flow unit — refrigeration and heating (4HP-60HP).
- Heating equipment: vacuum boiler — heating and hot water supplying (80,000~6,000,000kcal/h).

### Application:

- Central air-conditioning equipment: mainly provide heating and cooling source for large scale central air conditioning system and other places needing chilled or hot water, widely applied in building, hotel, department store, cinema, stadium, factory and oil field, etc.
- Commercial air-conditioning equipment: widely applied in places needing air conditioning equipments, such as small and middle scale department store, hotel, building, entertainment place, hospital, factory, dormitory, residence, school, etc.
- Heating equipment: widely applied in hotel, department store, residence, villa, bath house, advanced swimming pool, etc., where needing heating and hot water, used with absorption chiller, it will be ideal for cooling, heating and hot water supplying.

**G Series Enhancement Model Energy saving nonesuch · Safe guarantee**



### Strong Technology and Quality Guarantee

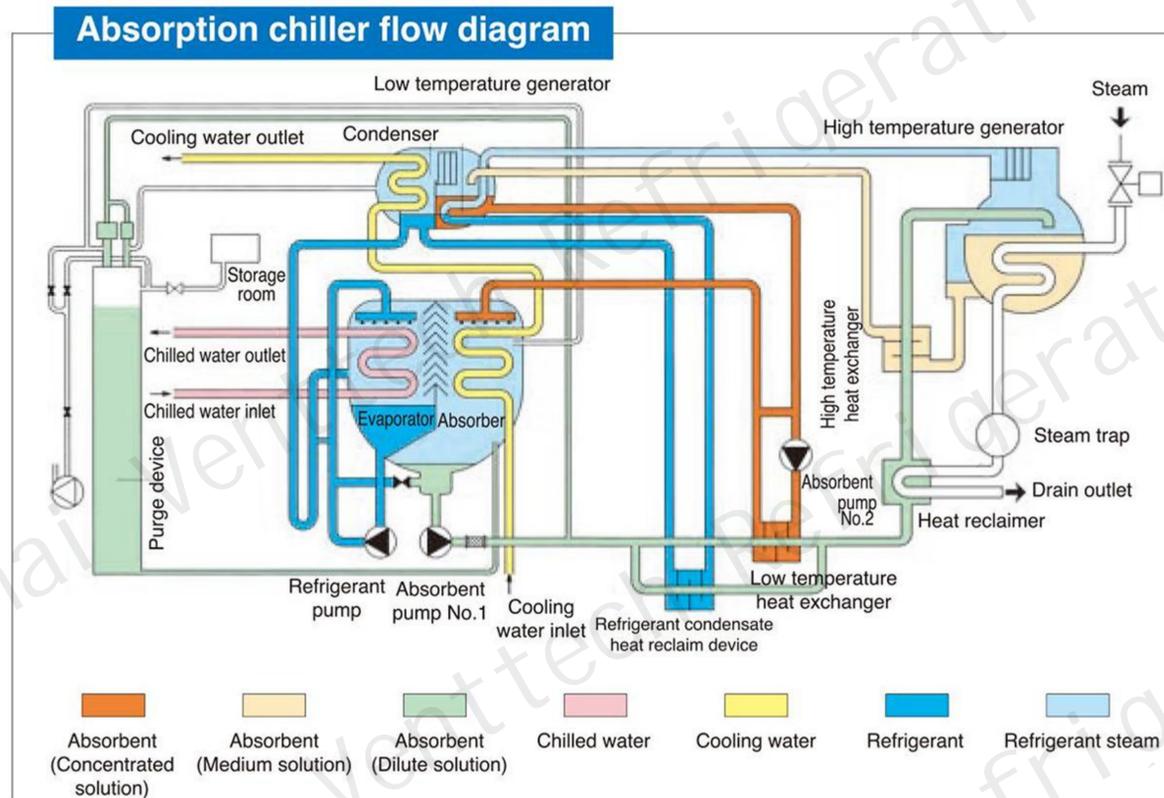


### Characteristics

High efficiency & Energy saving  
Run economy  
Environment friendly  
Safe and reliable  
Intelligent design  
Network management

# Absorption chiller flow diagram

# Energy saving technology new nonesuch



G series steam-fired LiBr absorption chiller is made of evaporator, absorber, condenser, low temperature generator, high temperature generator, refrigerant condensate heat reclaim device, heat exchanger, heat reclaimer, solution pump and refrigerant pump etc.

Principle of operation: chilled water is cooled in evaporator by low temperature refrigerant which has been decompressed and throttled from condenser, and the refrigerant is turned into vapour after absorbing the heat of chilled water, then is absorbed into absorber where the concentrated solution is turned into dilute solution.

The dilute solution in the absorber is pumped through refrigerant condensate heat reclaim device, low temperature heat exchanger, heat reclaimer, high temperature heat exchanger where the solution temperature goes up, to the high temperature generator at last, where the dilute solution is heated and condensed into medium solution.

The medium solution flows through high temperature heat exchanger, into low temperature generator where the medium solution is heated by the refrigerant vapour coming from high temperature generator and turned into final concentrated solution. The concentrated solution flows through low temperature heat exchanger where the temperature goes down, then into the absorber and is sprayed on the cooling water tubes where it absorbs the refrigerant vapour from evaporator and is turned into dilute solution. On the other hand, the vapour in the high temperature generator produced by heating lithium-bromide solution, floats into low temperature generator where it heats the medium solution and itself is coagulated into refrigerant through the refrigerant condensate heat reclaim device where the temperature goes down. Then the refrigerant floats into condenser with refrigerant vapour from low temperature generator and is cooled into refrigerant after being decompressed and throttled in the condenser. After that, the refrigerant flows into evaporator where it is sprayed on the condensed coils, cool the chilled water in the evaporator. Above process circles again and again for producing chilled water continuously.

## Adopt new style high efficient heat exchange tube

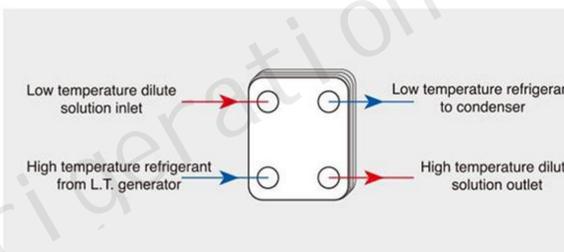
Evaporator: Enlarge heat exchange area, strengthen heat exchange effect, and increase the heat efficiency by 10%



Absorber: Strengthen the external absorbing of pipe and increase turbulent disturbance in the pipe to prevent scaling.



## Adopt new style patent refrigerant condensate heat reclaim device



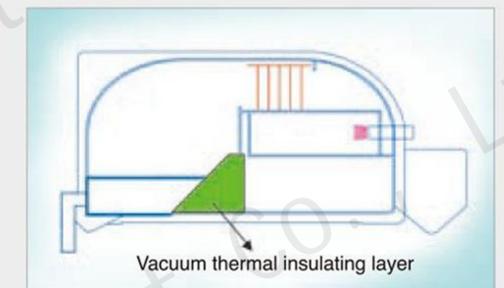
- Fully utilize the heat quantity of refrigerant condensate to increase the heat efficiency by 10% and decrease the heat load of cooling water.
- Increase the dilute solution temperature of the low temperature heat exchanger outlet to make solution circuit far from crystal area, so make sure the machine operation is more safe and reliable.

## Adopt new style high efficient heat exchanger

- Low temperature heat exchanger adopts plate-type heat exchanger to increase the heat efficiency of the machine.
- High temperature heat exchanger adopts new style multipaths heat exchanger to increase the heat exchanger greatly.

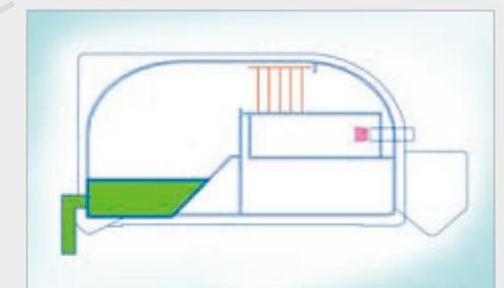
H.T. generator cold-state regeneration technology. Temperature is low and heat exchange efficiency is high

Inside of the upper shell is installed the vacuum thermal insulating layer to decrease inside loss



## Internal refrigerant self-adapting cold storage device

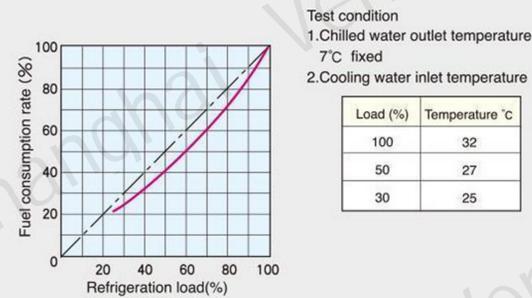
- Adapt change in load and supply the refrigerant of evaporator automatically.
- "Cold storage", save energy running farthest.
- Shorten the starting time of machine.
- Shorten the dilution running time.
- Adapt the more lower cooling water inlet temperature.
- Prevent "cavitation" of the refrigerant pump to prolong the pump operating life.



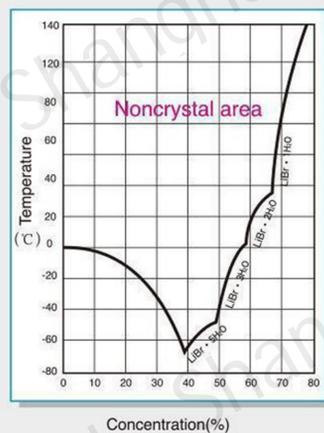
## Energy saving technology new nonesuch

Design tailored for partial load, the machine realizing high efficient energy saving operation

Suits low load operation of 40-80%, adopts new frequency conversion control system, internal refrigerant self-adjusting cooling storage device, quick heat state balance circulation technology, obviously saves partial load and start time energy consumption, Integrated Partial Load Value (IPLV) rises greatly.



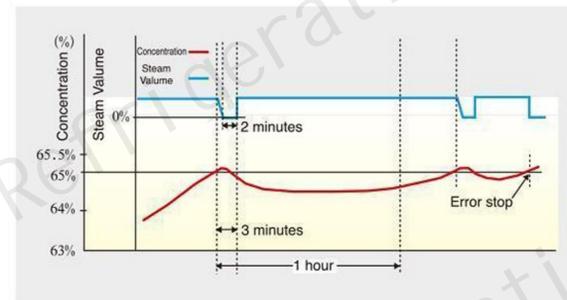
### Multi crystallization prevention safety control



Micro-computer monitors and calculates the solution concentration automatically to make the solution circuit far from crystal area, and adjust solution flowrate and fuel volume automatically to prevent crystallization completely.

High temperature generator cold-state regenerator technology. Temperature is low and running is safe.

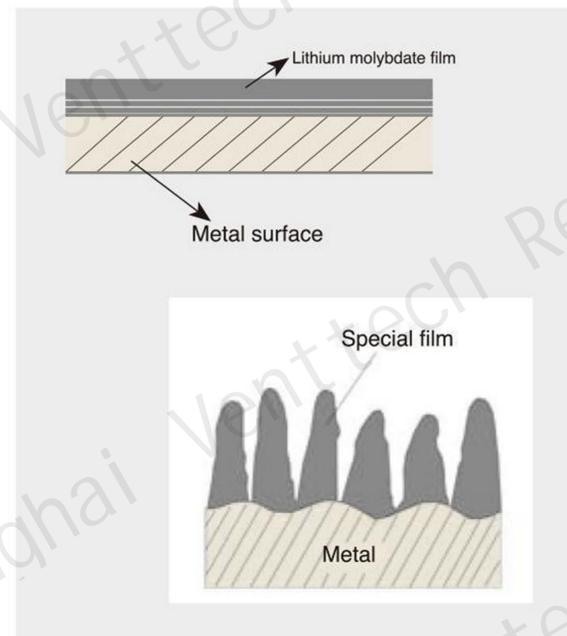
Adopt new style patent refrigerant condensate heat reclaim device to increase the dilute solution temperature of the low temperature heat exchanger to make solution circuit far from crystal area, so make sure the machine operation is more safe and reliable.



### Overall anti-corrosion safety design

- Adopt patent LiBr solution
  - Adopt lithium molybdate as inhibitor
- Lithium molybdate inhibitor is safe and no harm to environment, and form protection film on the surface of copper tube and steel plate and not easily resolved even in high temperature condition.

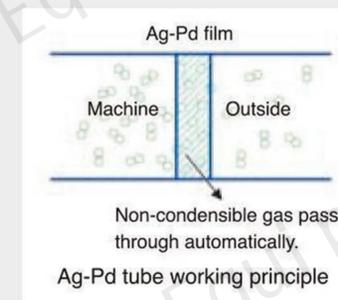
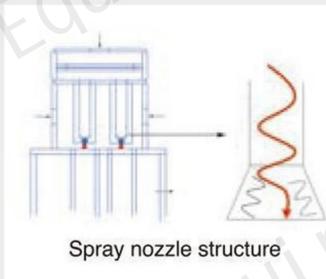
Remove the grease and rusty spot of material surface completely to form compact and uniform safety film through eighteen different procedure.



H.T.Generator adopts more capacity splitter design to prevent refrigerant pollution

### New bow wave spray Ag-Pd automatic purge device

- Five vacuum keeping design
- Bow wave type spiral spray nozzle.
  - New patented upper/down shell fractional pressure gas/steam separator, utilizing lowering pressure de-air technology.
  - Ag-Pd tube automatic exhaust.
  - Storage room lowering-pressure to enlarge capacity design.
  - Upper/down shell two purge system.



### New speed type PID control, accuracy much higher

Replace the original position-type PID control to make the accuracy much more higher and can be quick responsive to sudden load change.

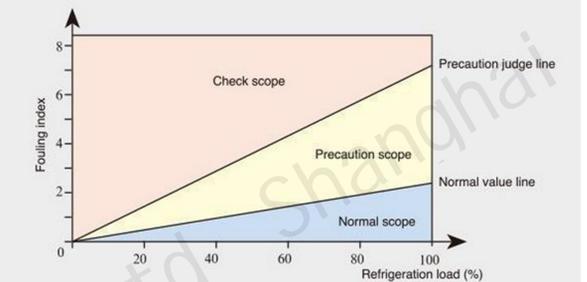
### Cooling water safe operation scope is more extensive

Micro-computer monitors the cooling water temperature to adjust the fuel consumption and solution circulation automatically which make the cooling water operate even in the temperature range of 19~34°C.

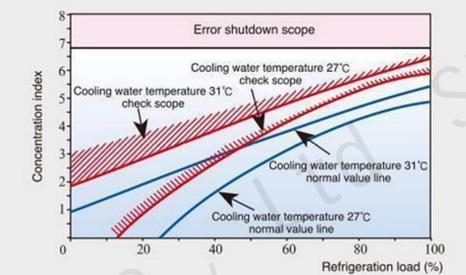
## Safe and reliable running mode

### Self-diagnosis professional function on the machine

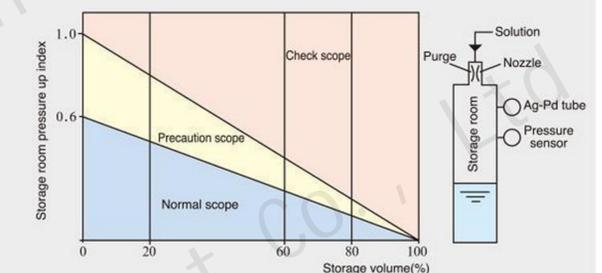
#### ① Cooling water system heat transfer tube fouling state



#### ② Absorbent concentration up trend



#### ③ Vacuum state time monitor



# Specifications

## FG Series(Steam Pressure 4kg/cm<sup>2</sup> • G)

Model		FG-***H	E11	E12	E13	E14	E21	E22	E23	E24	E31
Refrigeration capacity		USRT	83	100	125	149	174	199	232	266	299
		kW	292	350	438	525	613	700	817	934	1,051
Chilled water system inlet temperature:12℃ outlet temperature: 7℃	Flow rate	m <sup>3</sup> /h	50.2	60.5	75.3	90.4	105	120	141	161	181
	Pressure drop	mH <sub>2</sub> O	8.3	9.1	6.1	6.1	5.3	5.7	3.8	4.1	4.4
		kPa	81	89	60	60	52	56	37	40	43
	Inlet/outlet connection	A	80	80	100	100	125	125	150	150	150
Cooling water system inlet temperature:32℃ outlet temperature: 37.1℃	Flow rate	m <sup>3</sup> /h	90	108	135	162	189	216	252	288	324
	Pressure drop	mH <sub>2</sub> O	4.0	4.4	6.1	7.1	5.4	5.9	10.8	11.6	8.9
		kPa	39	43	60	70	53	58	106	114	87
	Inlet/outlet connection	A	125	125	125	125	150	150	200	200	200
Steam system	Steam consumption	kg/h	357	428	535	642	749	857	999	1,142	1,285
	Steam inlet connection	A	50	50	50	50	65	65	65	65	80
	Drain outlet connection	A	25	25	25	25	25	25	25	25	40
	Steam control valve connection	A	32	32	40	40	40	50	50	50	65
Power 3φ、380V、50Hz	Total currency	A	10.8	10.8	14.1	14.1	14.2	14.2	17.0	17.0	17.0
	Wire area	mm <sup>2</sup>	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Power consumption	kVA	8.5	8.5	11.3	11.3	11.3	11.3	13.6	13.6	13.6
Motor	No.1 absorbent pump	kW(A)	1.3(3.5)	1.3(3.5)	2.5(6.8)	2.5(6.8)	2.5(6.8)	2.5(6.8)	3.4(9.1)	3.4(9.1)	3.4(9.1)
	No.2 absorbent pump	kW(A)	1.1(3.9)	1.1(3.9)	1.1(3.9)	1.1(3.9)	1.3(4.0)	1.3(4.0)	1.3(4.0)	1.3(4.0)	1.3(4.0)
	Refrigerant pump	kW(A)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.4(1.8)	0.4(1.8)	0.4(1.8)
	Purge pump	kW(A)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)
Overall dimension	Length	mm	2,715	2,715	3,735	3,735	3,830	3,830	4,850	4,850	4,930
	Width	mm	1,620	1,620	1,620	1,620	1,860	1,860	1,860	1,860	1,965
	Height	mm	2,330	2,330	2,330	2,330	2,425	2,425	2,425	2,425	2,605
	Clearance	mm	2,400	2,400	3,400	3,400	3,400	3,400	4,500	4,500	4,500
Weight	Operation weight	ton	4.5	4.8	6.0	6.2	7.4	7.7	9.4	10.0	11.9
	Max. moving weight	ton	4.1	4.4	5.5	5.6	6.7	6.9	8.5	9.0	10.7
	Total weight	ton	4.1	4.4	5.5	5.6	6.7	6.9	8.5	9.0	10.7
	Moving state		One - section								

Water maintained in machine	Chilled water system	/	120	130	150	170	220	240	280	300	340
	Cooling water system	/	310	340	380	420	530	580	630	690	890

- Note: (1) 1 USRT=3,024kcal/h=3.52kW  
 (2) Standard chilled water inlet/outlet temperature is 12℃→7℃(Standard inlet/outlet temperature difference is 5℃).  
 (3) Standard cooling water inlet/outlet temperature is 32℃→37.1℃(Standard inlet/outlet temperature difference is 5.1℃).  
 (4) Max. working pressure in chilled water and cooling water system: 8kg/cm<sup>2</sup> • G. High pressure model is available, dimension and foundation may be changed,so please enquire with the manufacturer.  
 (5) Range of chilled/cooling water flow:50~120%.

# Specifications

## FG Series(Steam Pressure 4kg/cm<sup>2</sup> • G)

E32	E41	E42	E51	E52	E53	E61	E62	E63	E71	E72	E73	E81	E82
332	374	415	470	529	588	672	756	840	924	1,008	1,092	1,176	1,260
1,167	1,313	1,459	1,654	1,861	2,068	2,363	2,658	2,954	3,249	3,544	3,840	4,135	4,431
201	226	251	284	320	356	406	457	508	559	610	660	711	762
4.7	4.1	3.6	8.7	12.0	5.8	12.1	5.4	7.0	14.1	5.9	7.3	5.9	7.2
46	40	35	85	118	57	119	53	69	138	58	72	58	71
150	200	200	200	200	200	200	250	250	250	300	300	350	350
360	405	450	504	567	630	720	810	900	990	1,080	1,170	1,260	1,350
9.4	8.1	8.2	6.7	9.1	11.9	8.6	11.5	15.1	10.2	12.9	15.9	13.4	16.1
92	79	80	66	89	117	84	113	148	100	126	156	131	158
200	250	250	300	300	300	350	350	350	400	400	400	400	400
1,428	1,606	1,785	2,023	2,276	2,528	2,890	3,251	3,612	3,973	4,334	4,696	5,057	5,418
80	80	80	100	100	100	125	125	125	150	150	150	150	150
40	40	40	50	50	50	65	65	65	80	80	80	80	80
65	65	65	80	80	80	80	80	100	100	100	100	100	125
17.0	18.4	18.4	22.7	22.7	22.7	25.4	29.4	29.4	40.8	40.8	40.8	40.8	40.8
4.0	4.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	16.0	16.0	16.0	16.0	16.0
13.6	14.8	14.8	18.3	18.3	18.3	20.5	23.8	23.8	33.1	33.1	33.1	33.1	33.1
3.4(9.1)	3.4(9.1)	3.4(9.1)	3.7(13.4)	3.7(13.4)	3.7(13.4)	5.5(15.0)	5.5(19.0)	5.5(19.0)	8.5(24.0)	8.5(24.0)	8.5(24.0)	8.5(24.0)	8.5(24.0)
1.3(4.0)	1.8(5.4)	1.8(5.4)	1.8(5.4)	1.8(5.4)	1.8(5.4)	1.8(6.4)	1.8(6.4)	1.8(6.4)	3.7(12.0)	3.7(12.0)	3.7(12.0)	3.7(12.0)	3.7(12.0)
0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)
0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.75(1.8)	0.75(1.8)	0.75(1.8)	0.75(1.8)	0.75(1.8)
4,930	4,960	4,960	5,040	5,590	6,080	5,690	6,190	6,710	6,450	6,975	7,475	6,960	7,460
1,965	2,235	2,235	2,505	2,505	2,505	2,750	2,750	2,750	3,220	3,220	3,220	3,410	3,410
2,605	2,820	2,820	3,140	3,140	3,140	3,430	3,430	3,430	3,615	3,615	3,615	3,920	3,920
4,500	4,500	4,500	4,600	5,100	5,600	5,200	5,700	6,200	6,000	6,500	7,000	6,500	7,000
12.3	14.3	14.8	19.6	21.3	22.9	28.6	30.7	32.9	38.2	40.5	43.1	47.3	50.3
11.0	12.7	13.1	17.1	18.6	20.0	24.8	26.7	28.6	27.0	28.4	30.2	33.3	35.3
11.0	12.7	13.1	17.1	18.6	20.0	24.8	26.7	28.6	33.1	35.1	37.4	41.0	43.6
One - section										*1			

360	460	480	650	710	770	990	1,060	1,130	1,410	1,510	1,610	1,830	1,940
950	1,110	1,190	1,870	2,010	2,140	2,790	2,970	3,150	3,670	3,900	4,110	4,510	4,760

- (6) \*1: At delivery and hand-over, LiBr solution is stored separately.  
 (7) Steam control valve is electric powered.  
 (8) "A" stands for nominal diameter, unit is mm.  
 (9) Implementation standard JISB8622.  
 (10) And, the values in above table may be modified without notice.

# Specifications

## SG Series(Steam Pressure 6kg/cm<sup>2</sup> · G)

Model		SG-***H	E11	E12	E13	E14	E21	E22	E23	E24	E31
Refrigeration capacity		USRT	98	118	147	176	206	235	274	314	353
		kW	345	414	517	620	724	827	965	1,103	1,241
Chilled water system inlet temperature:12°C outlet temperature: 7°C	Flow rate	m <sup>3</sup> /h	59.3	71.1	88.9	107	124	142	166	190	213
	Pressure drop	mH <sub>2</sub> O	6.0	6.1	8.3	8.3	7.2	7.7	5.1	5.5	5.9
		kPa	59	60	81	81	71	75	50	54	58
	Inlet/outlet connection	A	100	100	100	100	125	125	150	150	150
Cooling water system inlet temperature:32°C outlet temperature: 38°C	Flow rate	m <sup>3</sup> /h	86.9	104	130	156	183	209	243	278	313
	Pressure drop	mH <sub>2</sub> O	3.7	4.2	5.7	6.6	5.0	5.5	10.1	10.9	8.3
		kPa	36	41	56	65	49	54	99	107	81
	Inlet/outlet connection	A	125	125	125	125	150	150	200	200	200
Steam system	Steam consumption	kg/h	395	474	592	711	829	948	1,106	1,264	1,422
	Steam inlet connection	A	50	50	50	50	65	65	65	65	80
	Drain outlet connection	A	25	25	25	25	25	25	25	25	40
	Steam control valve connection	A	32	32	40	40	40	40	50	50	50
Power 3φ, 380V, 50Hz	Total currency	A	10.8	10.8	14.1	14.1	14.2	14.2	17.0	17.0	17.0
	Wire area	mm <sup>2</sup>	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Power consumption	kVA	8.5	8.5	11.3	11.3	11.3	11.3	13.6	13.6	13.6
Motor	No.1 absorbent pump	kW(A)	1.3(3.5)	1.3(3.5)	2.5(6.8)	2.5(6.8)	2.5(6.8)	2.5(6.8)	3.4(9.1)	3.4(9.1)	3.4(9.1)
	No.2 absorbent pump	kW(A)	1.1(3.9)	1.1(3.9)	1.1(3.9)	1.1(3.9)	1.3(4.0)	1.3(4.0)	1.3(4.0)	1.3(4.0)	1.3(4.0)
	Refrigerant pump	kW(A)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.4(1.8)	0.4(1.8)	0.4(1.8)
	Purge pump	kW(A)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)
Overall dimension	Length	mm	2,670	2,670	3,690	3,690	3,710	3,710	4,760	4,760	4,830
	Width	mm	1,535	1,535	1,535	1,535	1,755	1,755	1,755	1,755	1,880
	Height	mm	2,225	2,225	2,225	2,225	2,310	2,310	2,310	2,310	2,440
	Clearance	mm	2,400	2,400	3,400	3,400	3,400	3,400	4,500	4,500	4,500
Weight	Operation weight	ton	4.4	4.6	5.9	6.1	7.3	7.6	9.2	9.6	11.8
	Max. moving weight	ton	4.0	4.2	5.3	5.5	6.6	6.8	8.3	8.6	10.6
	Total weight	ton	4.0	4.2	5.3	5.5	6.6	6.8	8.3	8.6	10.6
	Moving state		One - section								

Water maintained in machine	Chilled water system	/	120	130	150	170	220	240	280	300	340
	Cooling water system	/	310	340	380	420	530	580	630	690	890

Note: (1) 1 USRT=3,024kcal/h=3.52kW

- Standard chilled water inlet/outlet temperature is 12°C→7°C (Standard inlet/outlet temperature difference is 5°C).
- Standard cooling water inlet/outlet temperature is 32°C→38°C (Standard inlet/outlet temperature difference is 6°C).
- Max. working pressure in chilled water and cooling water system: 8kg/cm<sup>2</sup> · G. High pressure model is available, dimension and foundation may be changed,so please enquire with the manufacturer.
- Range of chilled/cooling water flow:50~120%.

# Specifications

## SG Series(Steam Pressure 6kg/cm<sup>2</sup> · G)

E32	E41	E42	E51	E52	E53	E61	E62	E63	E71	E72	E73	E81	E82
392	441	490	549	617	686	784	882	980	1,078	1,176	1,274	1,372	1,470
1,378	1,551	1,723	1,930	2,171	2,412	2,757	3,101	3,446	3,791	4,135	4,480	4,824	5,169
237	267	296	332	373	415	474	533	593	652	711	771	830	889
6.3	5.6	4.9	4.4	5.9	7.7	5.3	7.1	9.4	6.2	7.9	9.8	7.9	9.6
62	55	48	43	58	75	52	70	92	61	77	96	77	94
150	200	200	200	200	200	250	250	250	300	300	300	350	350
348	391	435	487	548	608	695	782	869	956	1,043	1,130	1,217	1,304
8.8	9.3	9.7	7.2	9.8	12.7	8.8	11.7	15.2	9.6	12.1	14.9	12.5	15.1
86	91	95	71	96	124	86	115	149	94	119	146	123	148
200	250	250	300	300	300	350	350	350	400	400	400	400	400
1,580	1,777	1,975	2,212	2,488	2,765	3,160	3,554	3,949	4,344	4,739	5,134	5,529	5,924
80	80	80	100	100	100	125	125	125	150	150	150	150	150
40	40	40	50	50	50	65	65	65	80	80	80	80	80
65	65	65	65	80	80	80	80	100	100	100	100	100	100
17.0	18.4	18.4	22.7	22.7	22.7	25.4	29.4	29.4	40.8	40.8	40.8	40.8	40.8
4.0	4.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	16.0	16.0	16.0	16.0	16.0
13.6	14.8	14.8	18.3	18.3	18.3	20.5	23.8	23.8	33.1	33.1	33.1	33.1	33.1
3.4(9.1)	3.4(9.1)	3.4(9.1)	3.7(13.4)	3.7(13.4)	3.7(13.4)	5.5(15.0)	5.5(19.0)	5.5(19.0)	8.5(24.0)	8.5(24.0)	8.5(24.0)	8.5(24.0)	8.5(24.0)
1.3(4.0)	1.8(5.4)	1.8(5.4)	1.8(5.4)	1.8(5.4)	1.8(5.4)	1.8(6.4)	1.8(6.4)	1.8(6.4)	3.7(12.0)	3.7(12.0)	3.7(12.0)	3.7(12.0)	3.7(12.0)
0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)
0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.75(1.8)	0.75(1.8)	0.75(1.8)	0.75(1.8)	0.75(1.8)
4,830	4,890	4,890	5,040	5,590	6,080	5,690	6,190	6,710	6,430	6,960	7,460	6,960	7,460
1,880	2,030	2,030	2,460	2,460	2,460	2,660	2,660	2,660	3,250	3,250	3,250	3,375	3,375
2,440	2,600	2,600	3,060	3,060	3,060	3,480	3,480	3,480	3,580	3,580	3,580	3,780	3,780
4,500	4,500	4,500	4,600	5,100	5,600	5,200	5,700	6,200	6,000	6,500	7,000	6,500	7,000
12.2	14.7	15.1	19.5	21.3	22.9	28.0	30.0	32.0	37.8	39.9	42.3	45.9	48.5
10.9	13.1	13.4	17.0	18.6	20.0	24.2	26.0	27.7	25.6	26.8	28.4	30.7	32.4
10.9	13.1	13.4	17.0	18.6	20.0	24.2	26.0	27.7	32.7	34.5	36.6	39.6	41.8
One - section										*1			

360	460	480	650	710	770	990	1,060	1,130	1,410	1,510	1,610	1,830	1,940
950	1,110	1,190	1,870	2,010	2,140	2,790	2,970	3,150	3,670	3,900	4,110	4,510	4,760

- \*1: At delivery and hand-over, LiBr solution is stored separately.
- Steam control valve is electric powered.
- "A" stands for nominal diameter, unit is mm.
- Implementation standard JISB8622.
- And, the values in above table may be modified without notice.



# Specifications

# Specifications

NG Series(Steam Pressure 8kg/cm<sup>2</sup> · G)

NG Series(Steam Pressure 8kg/cm<sup>2</sup> · G)

Model		NG-***H	E11	E12	E13	E14	E21	E22	E23	E24	E31
Refrigeration capacity		USRT	100	120	150	180	210	240	280	320	360
		kW	352	422	527	633	738	844	985	1,125	1,266
Chilled water system inlet temperature:12℃ outlet temperature: 7℃	Flow rate	m <sup>3</sup> /h	60.5	72.6	90.7	109	127	145	169	194	218
	Pressure drop	mH <sub>2</sub> O	6.2	6.4	8.6	8.6	7.6	8.1	5.3	5.8	6.2
		kPa	61	63	84	84	74	79	52	57	61
Inlet/outlet connection	A	100	100	100	100	125	125	150	150	150	
Cooling water system inlet temperature:32℃ outlet temperature: 37.9℃	Flow rate	m <sup>3</sup> /h	90	108	135	162	189	216	252	288	324
	Pressure drop	mH <sub>2</sub> O	4.0	4.4	6.1	7.1	5.4	5.9	10.7	11.6	8.9
		kPa	39	43	60	70	53	58	105	114	87
Inlet/outlet connection	A	125	125	125	125	150	150	200	200	200	
Steam system	Steam consumption	kg/h	393	472	590	707	825	943	1,100	1,258	1,415
	Steam inlet connection	A	50	50	50	50	65	65	65	65	80
	Drain outlet connection	A	25	25	25	25	25	25	25	25	40
	Steam control valve connection	A	32	32	32	32	40	40	40	50	50
Power 3φ, 380V, 50Hz	Total currency	A	10.8	10.8	14.1	14.1	14.2	14.2	17.0	17.0	17.0
	Wire area	mm <sup>2</sup>	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Power consumption	kVA	8.5	8.5	11.3	11.3	11.3	11.3	13.6	13.6	13.6
Motor	No.1 absorbent pump	kW(A)	1.3(3.5)	1.3(3.5)	2.5(6.8)	2.5(6.8)	2.5(6.8)	2.5(6.8)	3.4(9.1)	3.4(9.1)	3.4(9.1)
	No.2 absorbent pump	kW(A)	1.1(3.9)	1.1(3.9)	1.1(3.9)	1.1(3.9)	1.3(4.0)	1.3(4.0)	1.3(4.0)	1.3(4.0)	1.3(4.0)
	Refrigerant pump	kW(A)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.2(1.3)	0.4(1.8)	0.4(1.8)	0.4(1.8)
	Purge pump	kW(A)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)
Overall dimension	Length	mm	2,645	2,645	3,665	3,665	3,710	3,710	4,760	4,760	4,830
	Width	mm	1,440	1,440	1,440	1,440	1,660	1,660	1,660	1,660	1,755
	Height	mm	2,200	2,200	2,200	2,200	2,250	2,250	2,250	2,250	2,390
	Clearance	mm	2,400	2,400	3,400	3,400	3,400	3,400	4,500	4,500	4,500
Weight	Operation weight	ton	4.3	4.5	5.7	5.9	7.0	7.3	8.7	9.1	11.1
	Max. moving weight	ton	3.9	4.1	5.2	5.3	6.3	6.5	7.8	8.1	9.9
	Total weight	ton	3.9	4.1	5.2	5.3	6.3	6.5	7.8	8.1	9.9
	Moving state		One - section								

E32	E41	E42	E51	E52	E53	E61	E62	E63	E71	E72	E73	E81	E82
400	450	500	560	630	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
1,407	1,582	1,758	1,969	2,215	2,461	2,813	3,165	3,516	3,868	4,220	4,571	4,923	5,274
242	272	302	339	381	423	484	544	605	665	726	786	847	907
6.6	5.8	5.1	4.5	6.2	8.0	5.5	7.4	9.7	6.4	8.2	10.1	8.2	9.9
65	57	50	44	61	78	54	73	95	63	80	99	80	97
150	200	200	200	200	200	250	250	250	300	300	300	350	350
360	405	450	504	567	630	720	810	900	990	1,080	1,170	1,260	1,350
9.4	10.0	10.4	7.7	10.4	13.5	9.3	12.4	16.2	10.2	12.9	15.9	13.3	16.1
92	98	102	75	102	132	91	122	159	100	126	156	130	158
200	250	250	300	300	300	350	350	350	400	400	400	400	400
1,572	1,769	1,965	2,201	2,476	2,751	3,144	3,537	3,930	4,323	4,716	5,109	5,502	5,895
80	80	80	100	100	100	125	125	125	150	150	150	150	150
40	40	40	50	50	50	65	65	65	80	80	80	80	80
50	50	65	65	65	65	80	80	80	80	80	100	100	100
17.0	18.4	18.4	22.7	22.7	22.7	25.4	29.4	29.4	40.8	40.8	40.8	40.8	40.8
4.0	4.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	16.0	16.0	16.0	16.0	16.0
13.6	14.8	14.8	18.3	18.3	18.3	20.5	23.8	23.8	33.1	33.1	33.1	33.1	33.1
3.4(9.1)	3.4(9.1)	3.4(9.1)	3.7(13.4)	3.7(13.4)	3.7(13.4)	5.5(15.0)	5.5(19.0)	5.5(19.0)	8.5(24.0)	8.5(24.0)	8.5(24.0)	8.5(24.0)	8.5(24.0)
1.3(4.0)	1.8(5.4)	1.8(5.4)	1.8(5.4)	1.8(5.4)	1.8(5.4)	1.8(6.4)	1.8(6.4)	1.8(6.4)	3.7(12.0)	3.7(12.0)	3.7(12.0)	3.7(12.0)	3.7(12.0)
0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)	0.4(1.8)
0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.4(1.2)	0.75(1.8)	0.75(1.8)	0.75(1.8)	0.75(1.8)	0.75(1.8)
4,830	4,850	4,850	5,040	5,590	6,080	5,690	6,190	6,710	6,430	6,960	7,460	6,960	7,460
1,755	1,975	1,975	2,300	2,300	2,300	2,500	2,500	2,500	3,000	3,000	3,000	3,200	3,200
2,390	2,600	2,600	2,900	2,900	2,900	3,330	3,330	3,330	3,450	3,450	3,450	3,650	3,650
4,500	4,500	4,500	4,600	5,100	5,600	5,200	5,700	6,200	6,000	6,500	7,000	6,500	7,000
11.5	13.3	13.7	19.2	20.8	22.3	27.3	29.2	31.2	36.6	38.6	40.9	44.1	46.6
10.2	11.7	12.0	16.7	18.1	19.4	23.5	25.2	26.9	25.0	26.2	27.7	29.6	31.2
10.2	11.7	12.0	16.7	18.1	19.4	23.5	25.2	26.9	31.5	33.2	35.2	37.8	39.9
One - section										*1			

Water maintained in machine	Chilled water system	/	120	130	150	170	220	240	280	300	340
	Cooling water system	/	310	340	380	420	530	580	630	690	890

360	460	480	650	710	770	990	1,060	1,130	1,410	1,510	1,610	1,830	1,940
950	1,110	1,190	1,870	2,010	2,140	2,790	2,970	3,150	3,670	3,900	4,110	4,510	4,760

- Note: (1) 1 USRT=3,024kcal/h=3.52kW  
 (2) Standard chilled water inlet/outlet temperature is 12℃→7℃(Standard inlet/outlet temperature difference is 5℃).  
 (3) Standard cooling water inlet/outlet temperature is 32℃→37.9℃(Standard inlet/outlet temperature difference is 5.9℃).  
 (4) Max. working pressure in chilled water and cooling water system: 8kg/cm<sup>2</sup> · G. High pressure model is available, dimension and foundation may be changed,so please enquire with the manufacturer.  
 (5) Range of chilled/cooling water flow:50~120%.

- (6) \*1: At delivery and hand-over, LiBr solution is stored separately.  
 (7) Steam control valve is electric powered.  
 (8) "A" stands for nominal diameter, unit is mm.  
 (9) Implementation standard JISB8622.  
 (10) And, the values in above table may be modified without notice.

## Order scope

### Order scope

Item		Standard specification	Option
Chilled water system	Flow rate	0.605m³/h · RT (Δt=5°C constant quantity)	Range of variable flow: 50~120%
	Temperature	12/7°C	Special inlet / outlet temperature of chilled water
	Water quality	Tap water (according to JRA9001)	Industrial water, well water
	Max. working pressure	8kg/cm² · G	Pressure1...10kg/cm² · G Pressure2...14kg/cm² · G Pressure3...16kg/cm² · G Pressure4...18kg/cm² · G Pressure5...20kg/cm² · G
Cooling water system	Flow rate	For the detail information, please see the specification table.	Range of variable flow: 50~120%
	Temperature	FG: 32/37.1°C SG: 32/38°C NG: 32/37.9°C (Lower temperature limit:19°C)	Inlet temperature: 19~34
	Water quality	Tap water (according to JRA9001)	Industrial water, well water
	Max. working pressure	8kg/cm² · G	Pressure1...10kg/cm² · G Pressure2...14kg/cm² · G Pressure3...16kg/cm² · G Pressure4...18kg/cm² · G Pressure5...20kg/cm² · G
Installation place	Place	In machine room	Storage of equipment shall be in accordance with the standard, details refer to factory documents.
	Installation	Body anti-rusting paint (exclusive of heat or cooling insulation, final paint).	
	Ambient Temperature	5~40°C	
	Ambient Humidity	Relative humidity: below 90%	
Package		One-section	Moving separately
Power	Frequency, voltage	3φ / 380V / 50Hz	Special voltage
	Voltage regulation	Within ± 10%	
Electric wiring	Electric allocation	Cable wiring Control: cable Power: cable	
Main body safety device	Type	<ul style="list-style-type: none"> <li>Refrigerant supervision function</li> <li>Chilled water freezing protection function</li> <li>Cooling water temperature supervision function</li> <li>H.T. generator temperature supervision function</li> <li>H.T. generator pressure supervision function</li> <li>H.T. generator solution level supervision function</li> <li>Motor protection function</li> <li>Chilled water flow switch</li> <li>Crystal protection function</li> </ul>	Cooling water flow switch
Capacity control device	Mode	<ul style="list-style-type: none"> <li>Digital PID control by chilled water outlet temperature</li> <li>Inverter control of No.1 absorbent pump</li> <li>Electric steam control valve at steam inlet</li> </ul>	Electric-pneumatic control valve at steam inlet
Control panel	Paint color	Munsell 5Y-7/1 (half smooth)	
	Display	LCD Chinese display	
	Outside wiring terminals	Operation indication ..... point a. Stop indication ..... point a. Alarm indication ..... point a. Auxiliary equipment operation ..... point a. Start confirmation ..... point a. Cooling operation indication ..... point a.	
Purge device	Mode	Liquid injector make non-condensable gas be stored in the slot and palladium pipe exhaust continuously hydrogen	Fully automatic purge
Steam system	Temperature	FG Series:151°C SG Series:164°C NG Series:175°C	Max. temperature: 185 Please use special installation to lower the temperature if it exceeds the limit
	Steam quality	Refer to JISB 8223, GB 15766, and GB 12145	
	Working pressure	FG Series: 4kg/cm² · G (Saturated) SG Series: 6kg/cm² · G (Saturated) NG Series: 8kg/cm² · G (Saturated)	
Water system	Frequency conversion		Frequency controller

## Supply scope

### Supply scope

Item		Delivery construction	Customer construction	Note
Body	Absorption Chiller	<input type="radio"/>		Reference to the caption below the chart
Transportation and installation	From the factory to the building		<input type="radio"/>	
	From the building to the foundation site		<input type="radio"/>	
	Installation of chiller		<input type="radio"/>	
	Testing and adjusting at site	<input checked="" type="radio"/>	<input type="radio"/>	
	Operating direction	<input type="radio"/>		
Electric construction	External electric allocation		<input type="radio"/>	Please wire to the terminal inside the control panel
	Cooling water temperature control device		<input type="radio"/>	Please install and wire for the thermostat used by start-stop fan of cooling tower or for the thermostat of cooling water control valve.
Other construction	Foundation construction		<input type="radio"/>	Exclusive of foundation bolts, weld the frame and washer when fixing foundation bolts.
	External pipe construction		<input type="radio"/>	Exclusive of coordinate flanges
	Pipe anti-freezing		<input type="radio"/>	Take anti-freezing of pipe and water into consideration at rest in winter.
	Water quality management of cooling water		<input type="radio"/>	Install water drainage device in order to have a proper water quality management.
	Heat or cooling insulation construction		<input type="radio"/>	
	Steam control valve installation construction		<input type="radio"/>	Install in the pipe, and wire to terminal inside the control panel.
Painting	Main body primary coat	<input type="radio"/>		Anti-rusting primary coat
	Control panel painting	<input type="radio"/>		Munsell No.5Y-7/1(half-smooth)
Others	Assembly power, water, etc. at site		<input type="radio"/>	
	Power, water and steam, etc. used during trial run		<input type="radio"/>	
	Lithium-Bromide solution, refrigerant	<input type="radio"/>		

### Absorption chiller main body includes

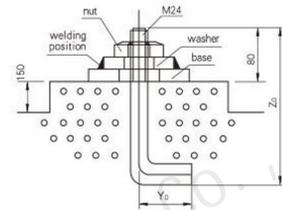
1. Absorption chiller
    - (a) Machine of refrigeration cycle including evaporator, absorber, high temperature generator, low temperature generator, condenser, refrigerant condensate heat reclaim device, heat reclaimer, heat exchanger and pumps, etc.
    - (b) Purge device
    - (c) Capacity control device
    - (d) Steam control valve
    - (e) Safety device
    - (f) Control panel
    - (g) Absorbent and refrigerant
    - (h) Internal piping and electric wiring
  2. Accessory
    - a. Foundation bolts and washers..... 1 set
    - b. Instruction manual..... 1 set
- Extra charge should be calculated separately if required.



# Overall dimension diagram Base diagram

## ● Overall dimension diagram

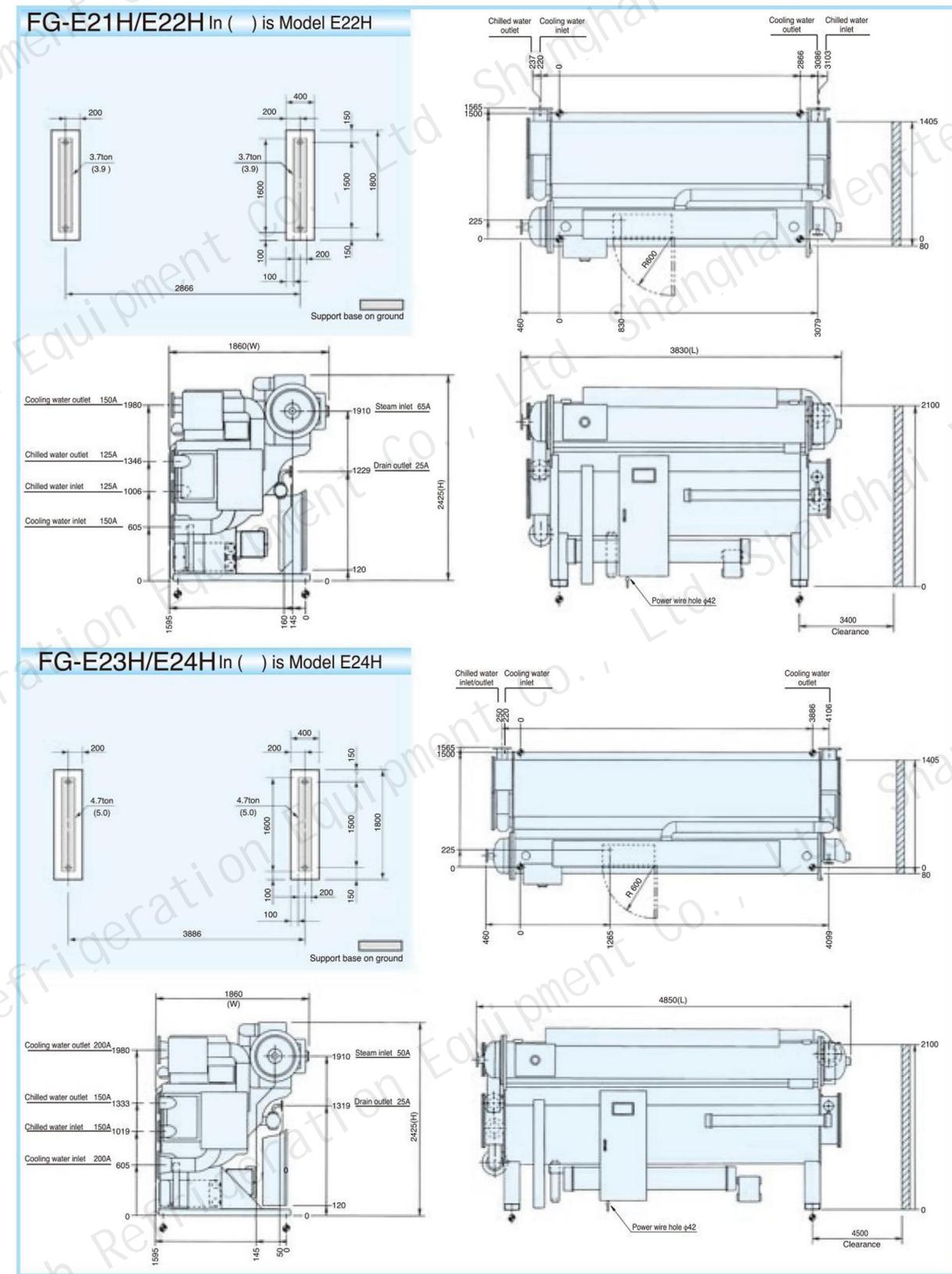
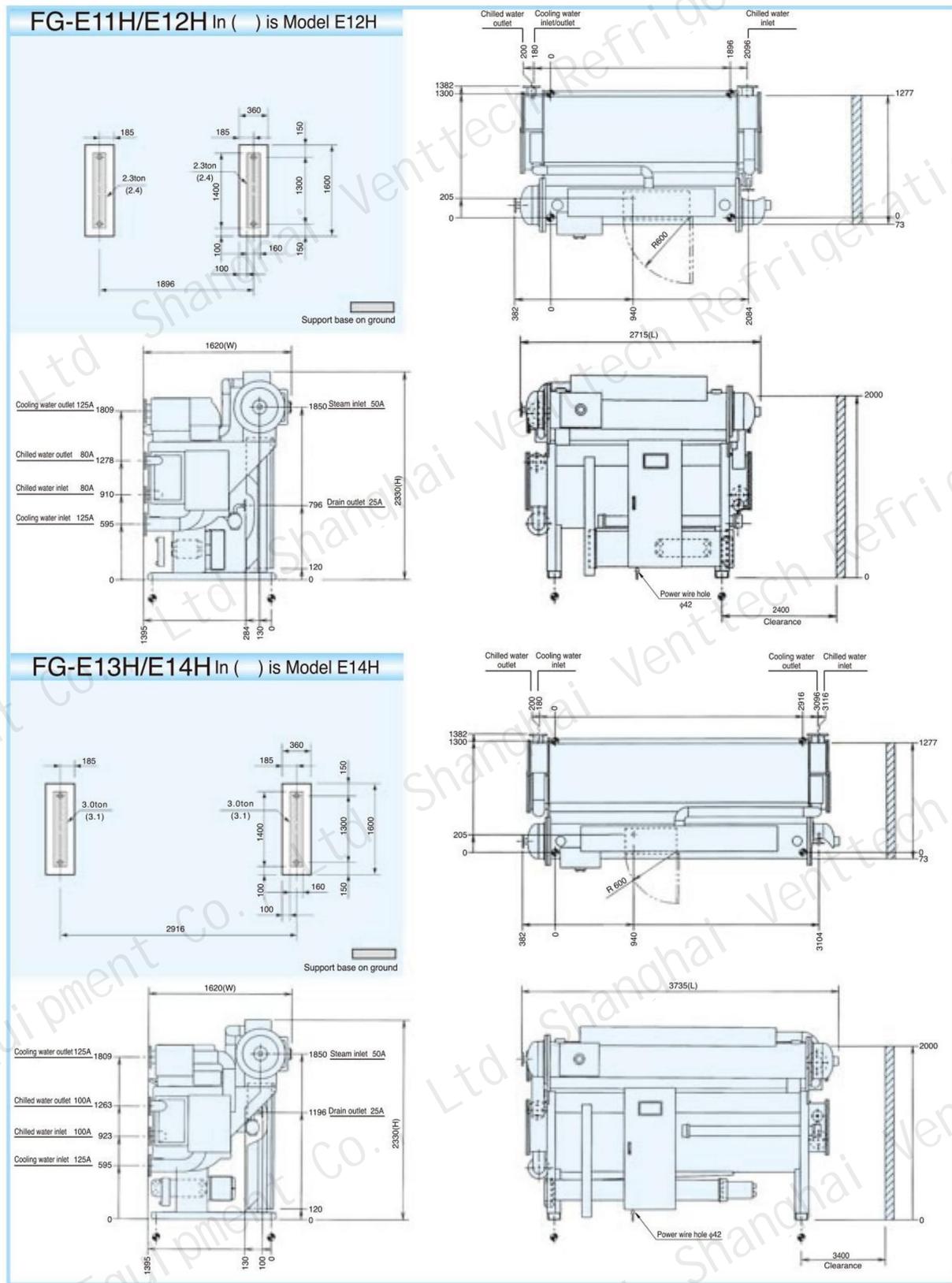
- Note: 1. Overall dimension value (L),(W),(H) is example value.  
 2. Mark  $\odot$  denotes the position of foundation bolts of chiller.  
 3. Clearance space must be saved for either side of the chiller  
 4. Mark  $\uparrow$  is the power wire hole.  
 5. Maintenance space must be saved around the chiller  
 Length direction.....1m Above.....0.2m  
 Control panel direction.....1.2m Others.....0.5m  
 6. "A" stands for nominal diameter, unit is mm.



## ● Base diagram

- Note: 1. There are  $\phi 50$  holes under the chiller for foundation bolts.  
 2. When fastening foundation bolts, please welding base and washer together with reference to left diagram.  
 3. Please make a drainage ditch around the chiller.  
 4. Please make the ground water proof in order to maintain the chiller.  
 5. The base must be smooth and horizontal(The levelness should be below 2mm for 1,000mm).

	Y <sub>0</sub>	Z <sub>0</sub>
FG-E11~E32H	80	260
FG-E41~E63H	80	340
FG-E71~E82H	90	440

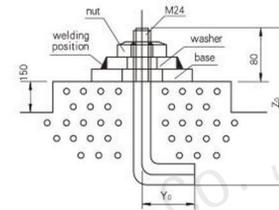




# Overall dimension diagram Base diagram

## ● Overall dimension diagram

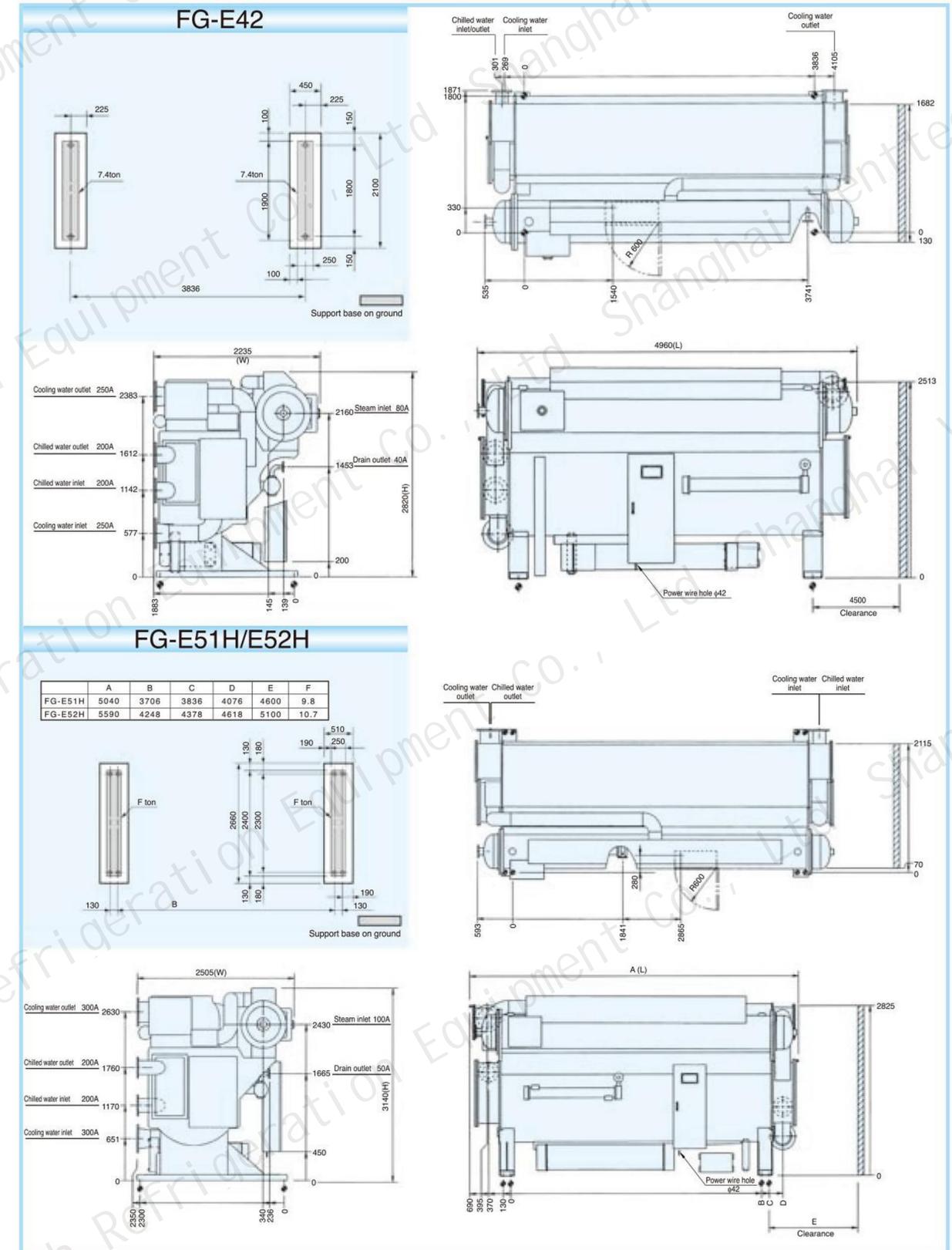
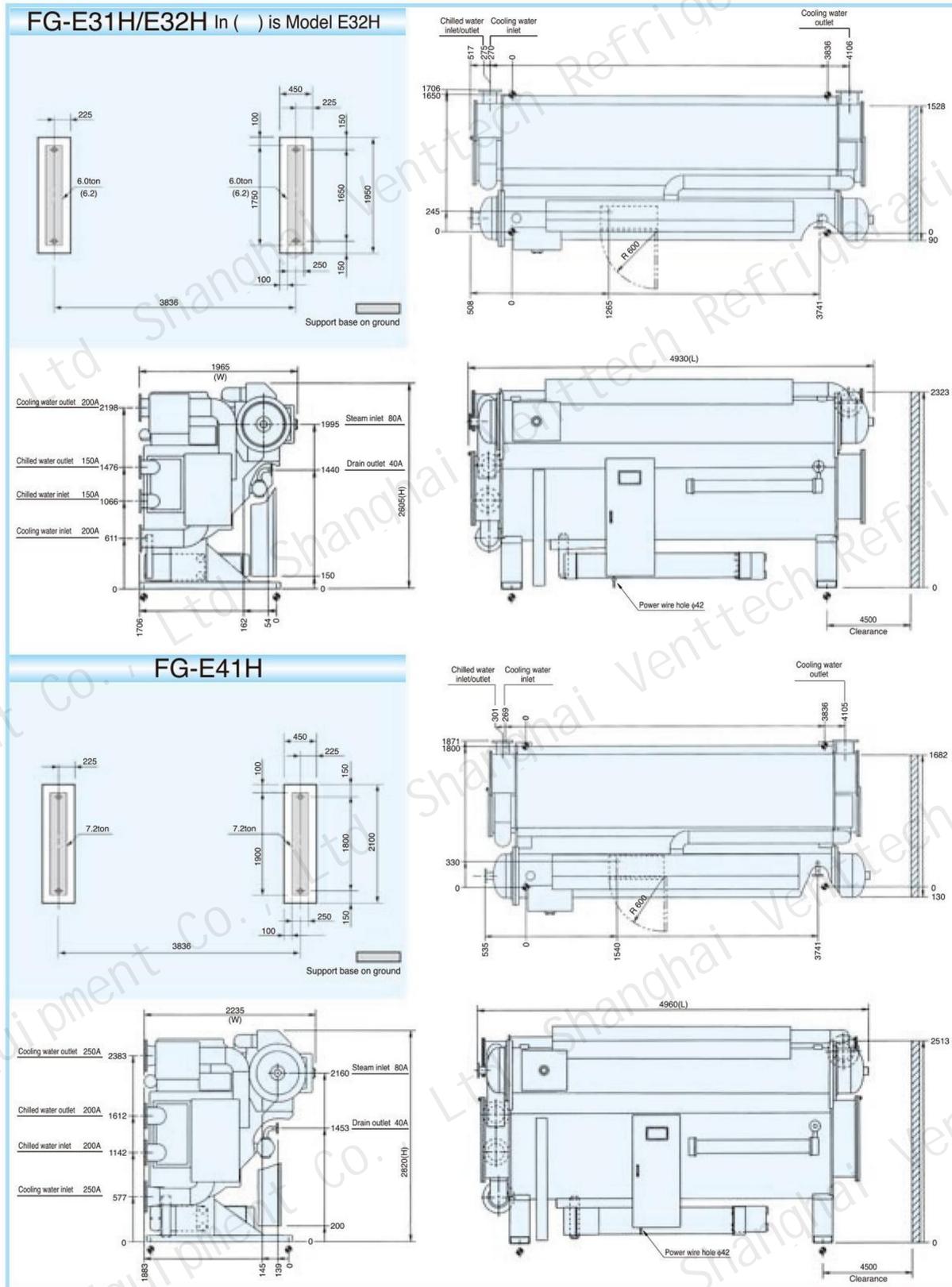
- Note: 1. Overall dimension value (L),(W),(H) is example value.  
 2. Mark  $\odot$  denotes the position of foundation bolts of chiller.  
 3. Clearance space must be saved for either side of the chiller  
 4. Mark  $\uparrow$  is the power wire hole.  
 5. Maintenance space must be saved around the chiller  
 Length direction.....1m Above.....0.2m  
 Control panel direction.....1.2m Others.....0.5m  
 6. "A" stands for nominal diameter, unit is mm.



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- Note: 1. There are  $\phi 50$  holes under the chiller for foundation bolts.  
 2. When fastening foundation bolts, please welding base and washer together with reference to left diagram.  
 3. Please make a drainage ditch around the chiller.  
 4. Please make the ground water proof in order to maintain the chiller.  
 5. The base must be smooth and horizontal(The levelness should be below 2mm for 1,000mm).

	Y <sub>0</sub>	Z <sub>0</sub>
FG-E11~E32H	80	260
FG-E41~E63H	80	340
FG-E71~E82H	90	440

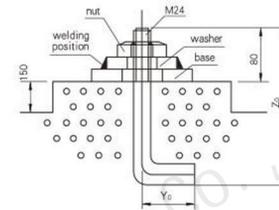




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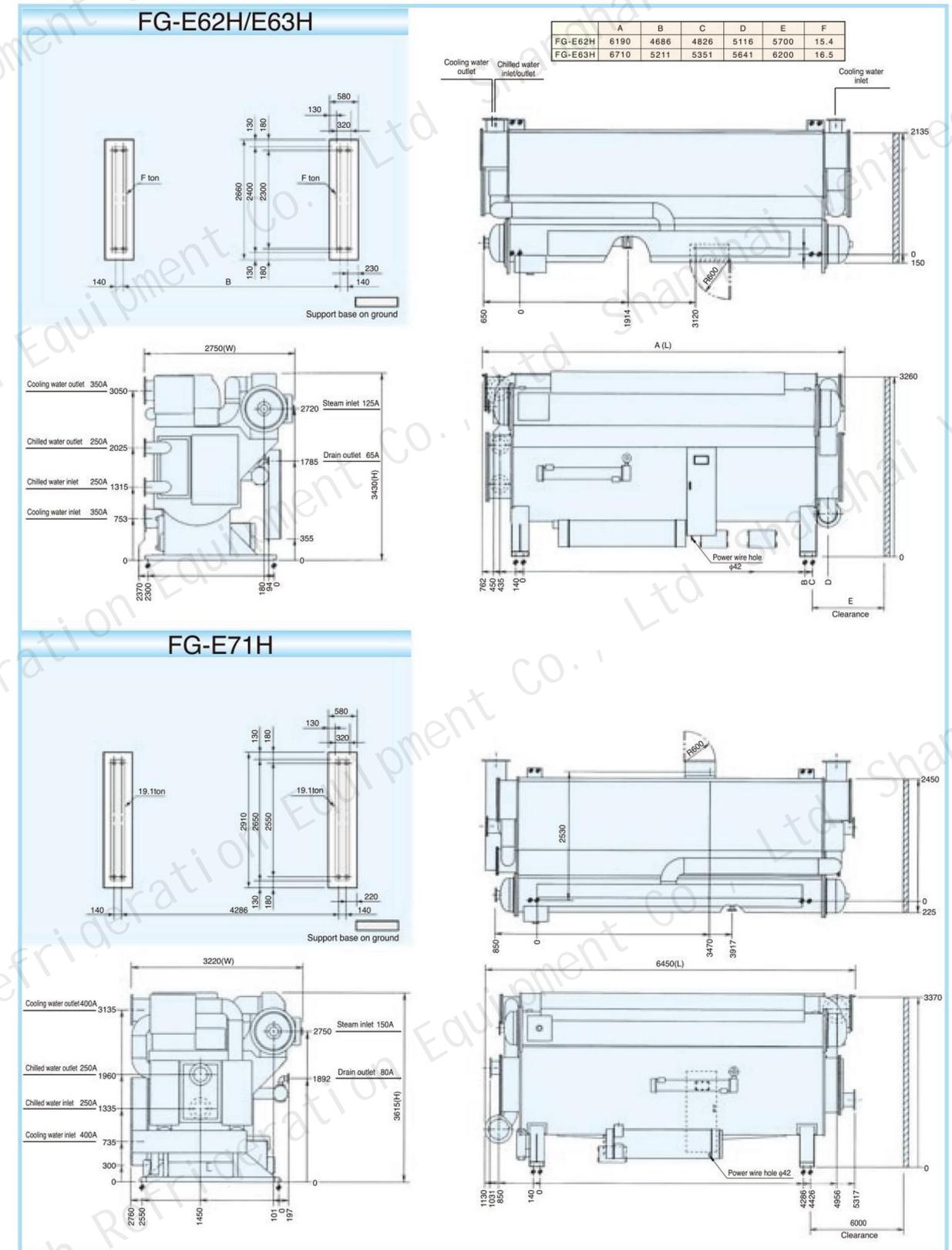
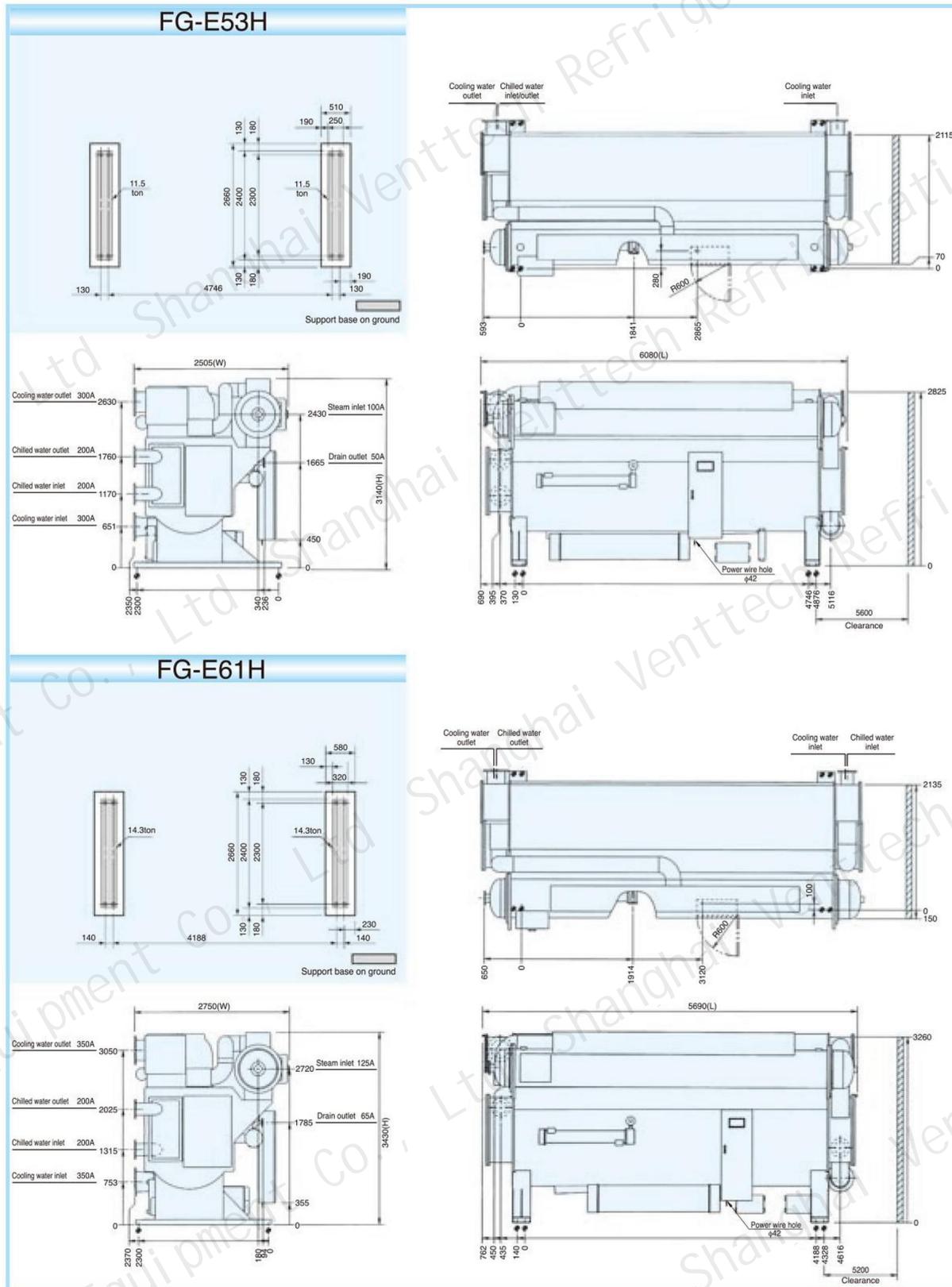
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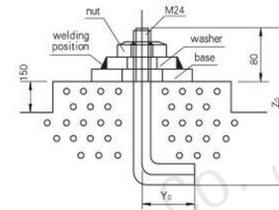
	A	B	C	D	E	F
FG-E62H	6190	4686	4826	5116	5700	15.4
FG-E63H	6710	5211	5351	5641	6200	16.5



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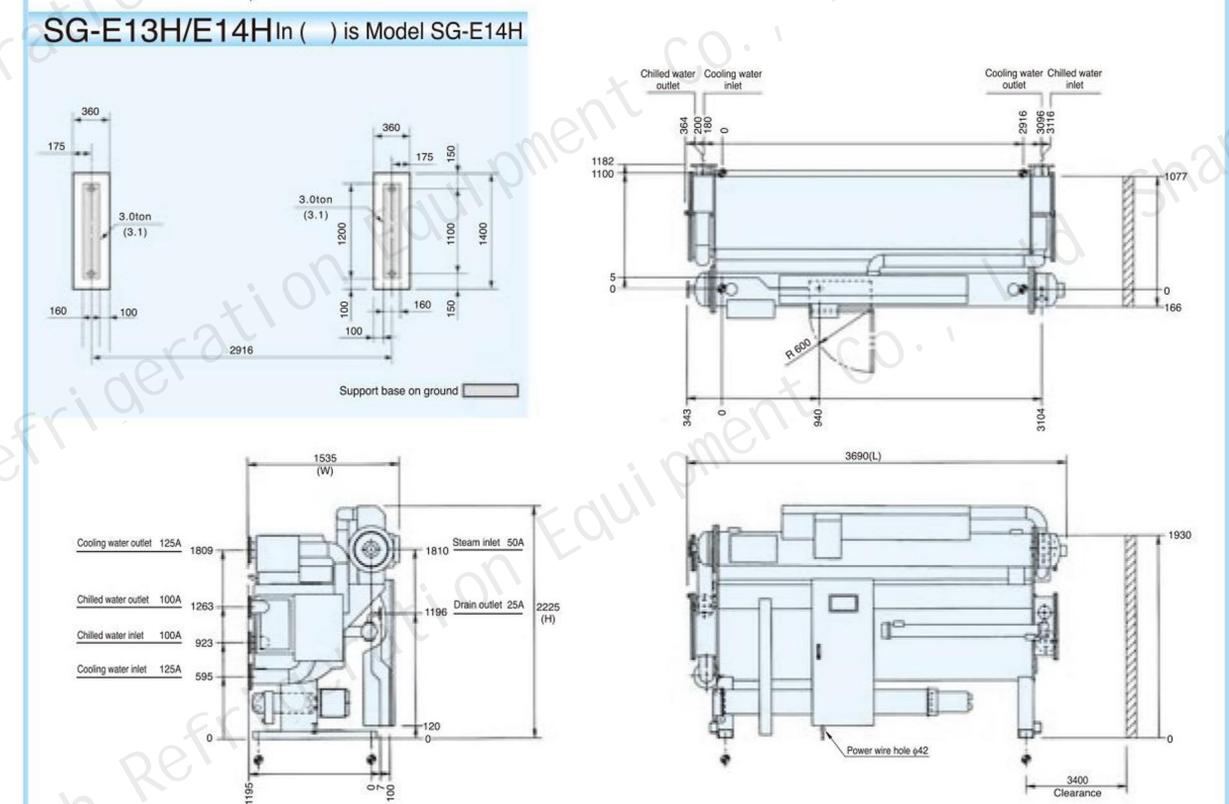
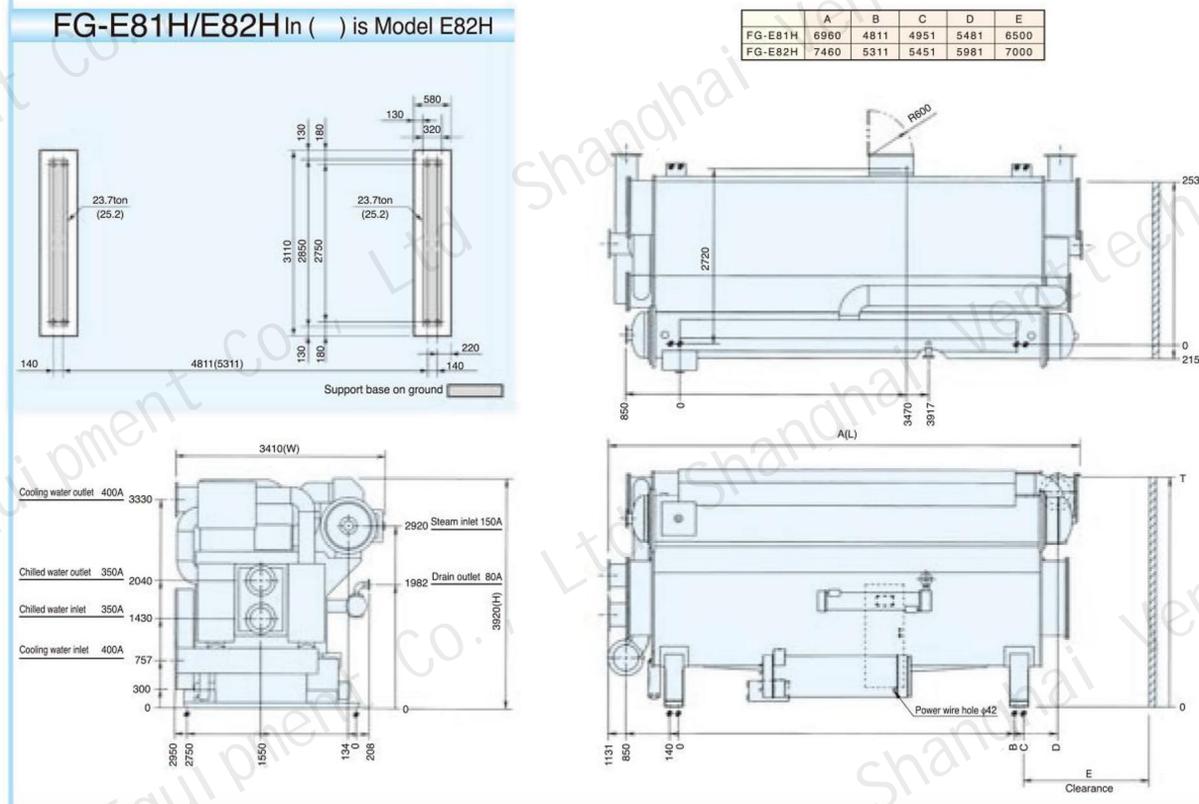
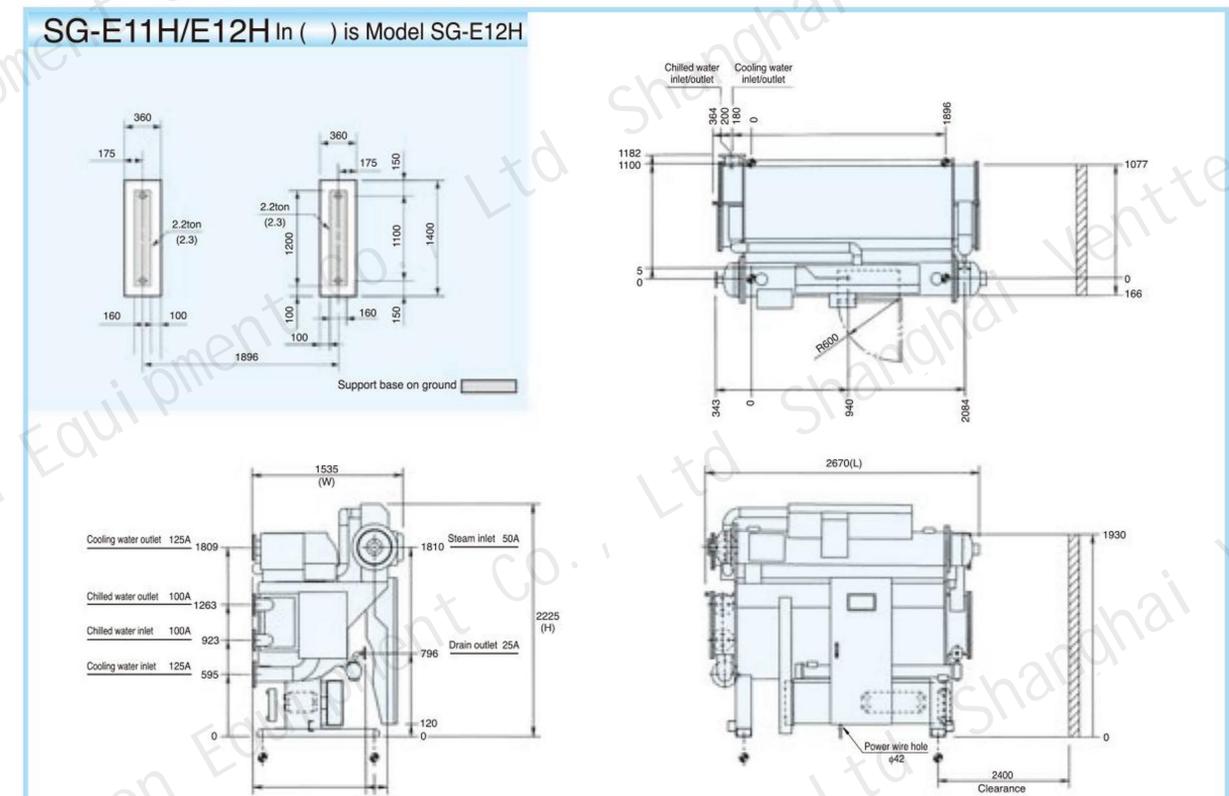
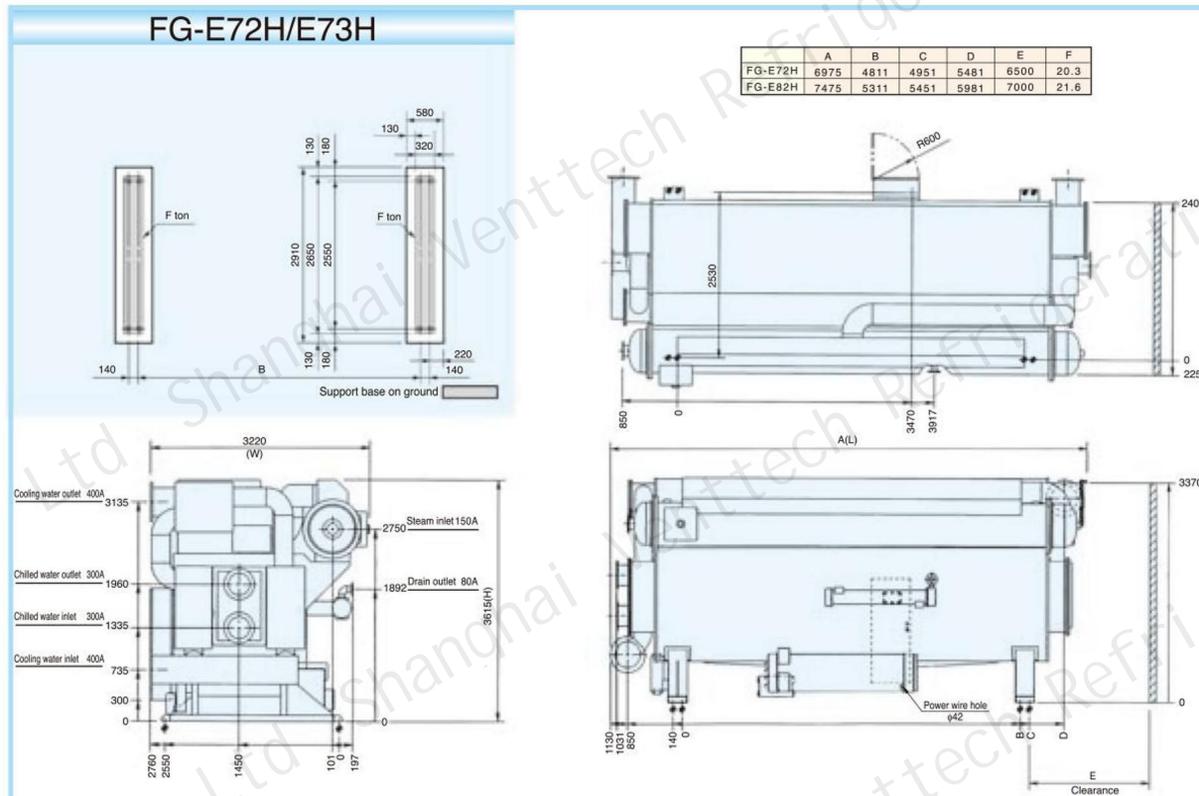
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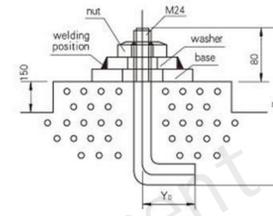




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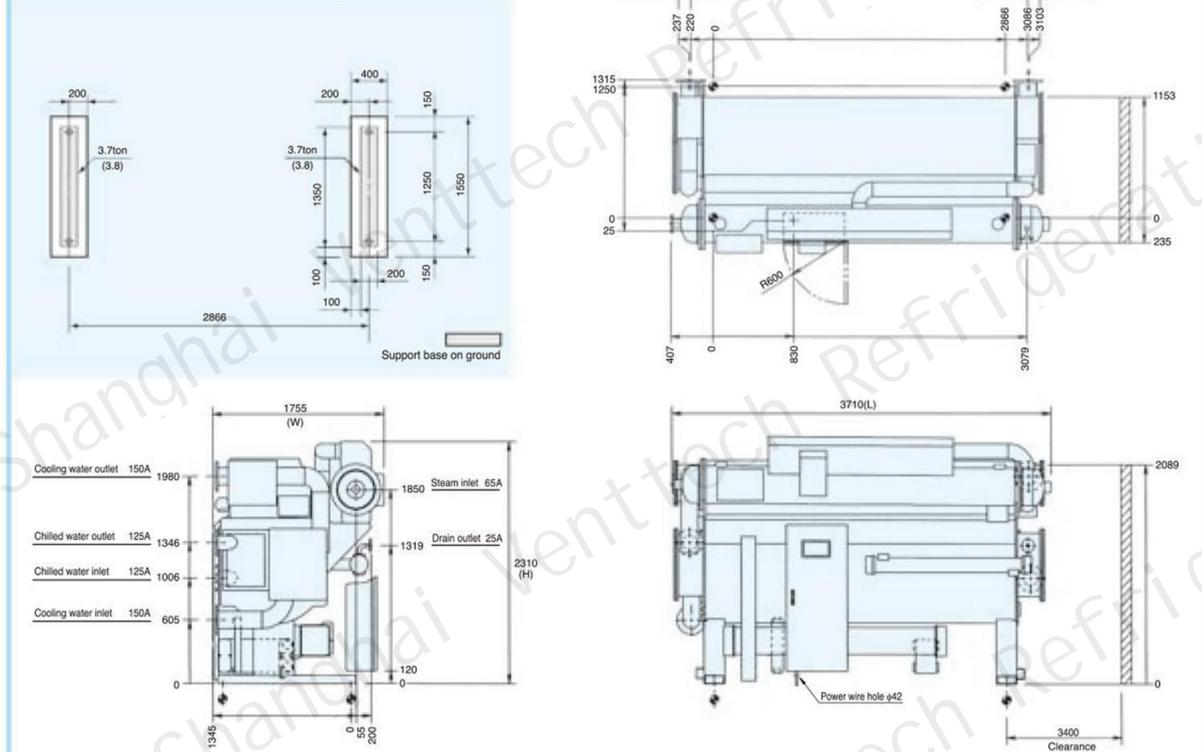


## ● Base diagram

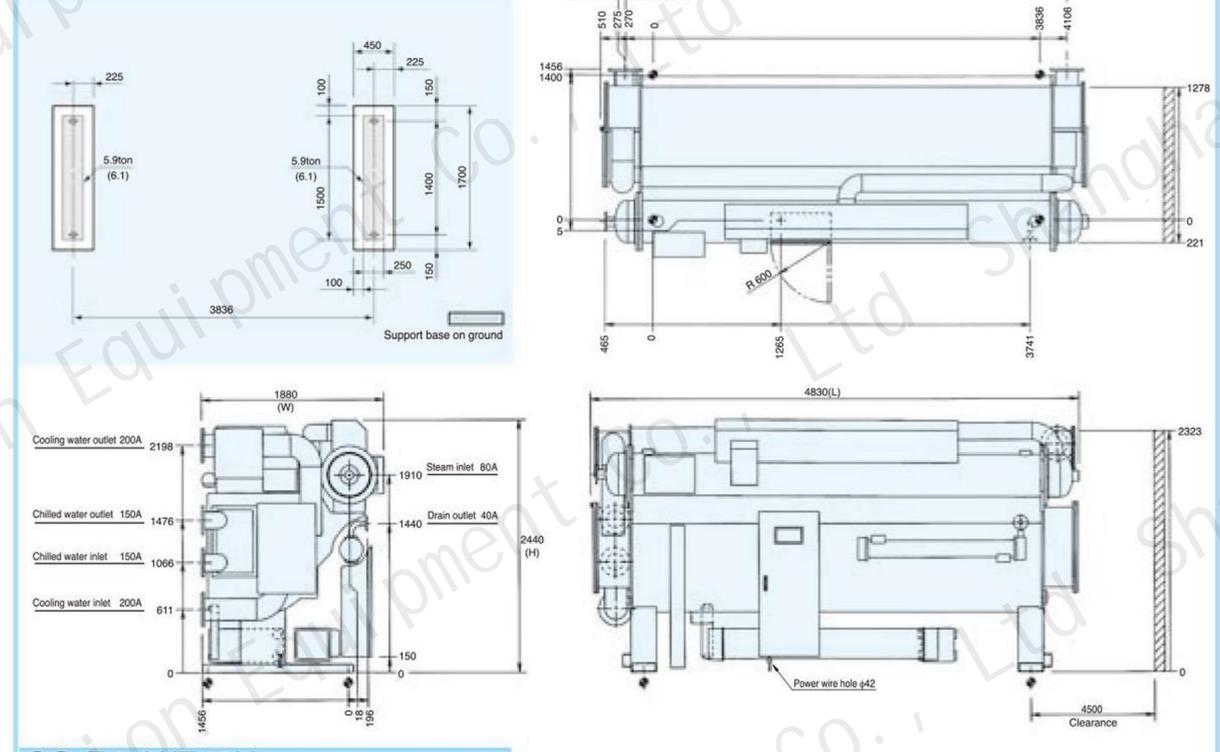
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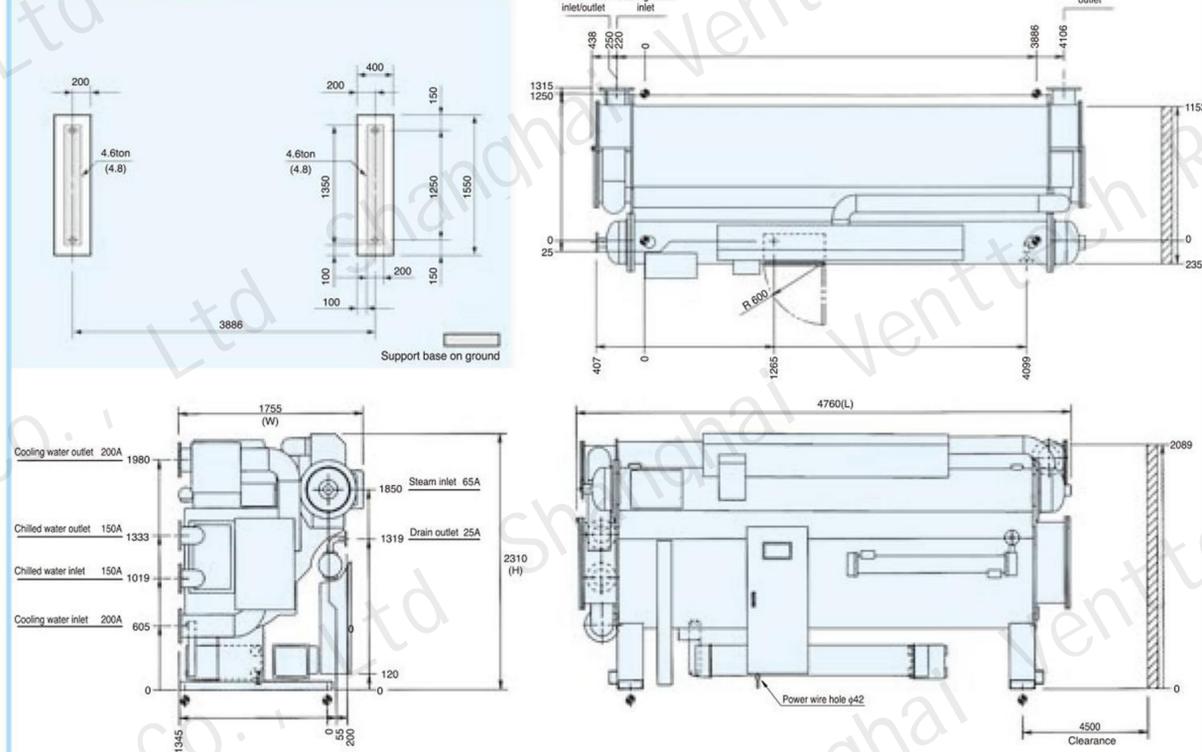
SG-E21H/E22H In ( ) is Model SG-E22H



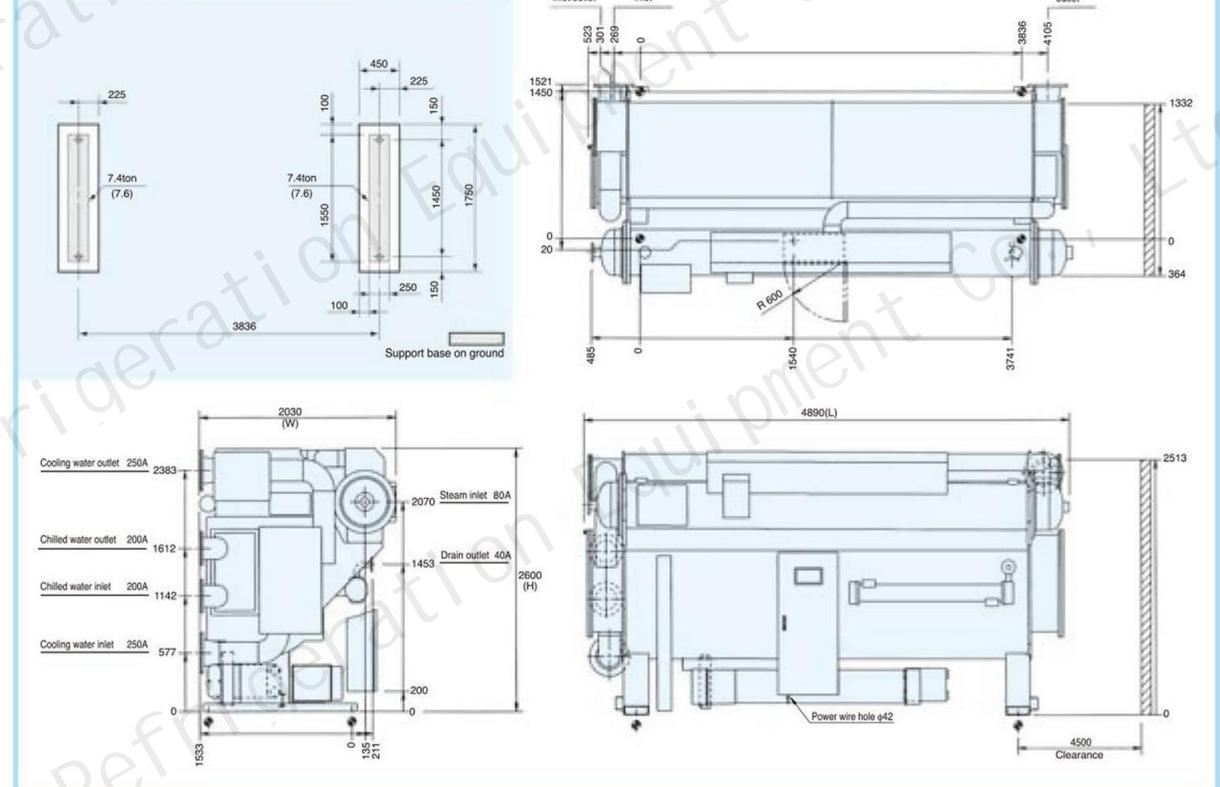
SG-E31H/E32H In ( ) is Model SG-E32H



SG-E23H/E24H In ( ) is Model SG-E24H



SG-E41H/E42H In ( ) is Model SG-E42H





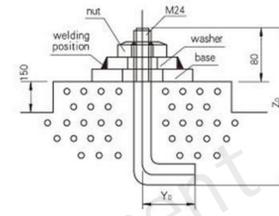




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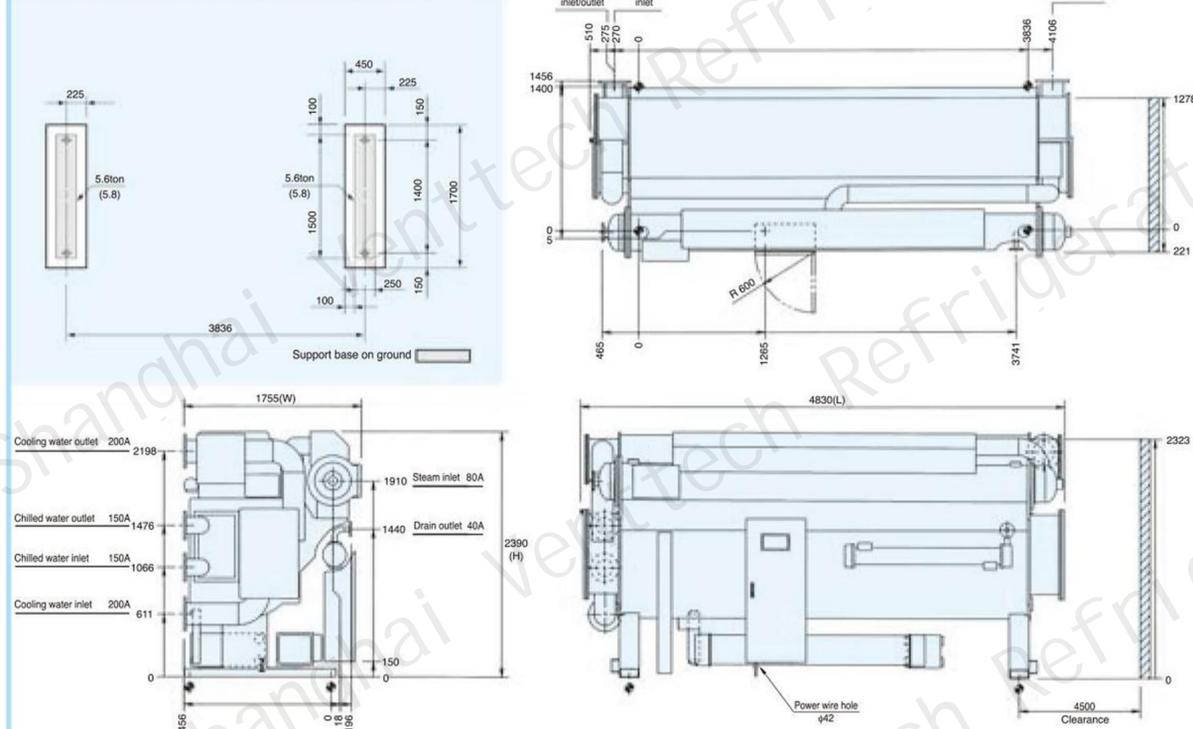


## ● Base diagram

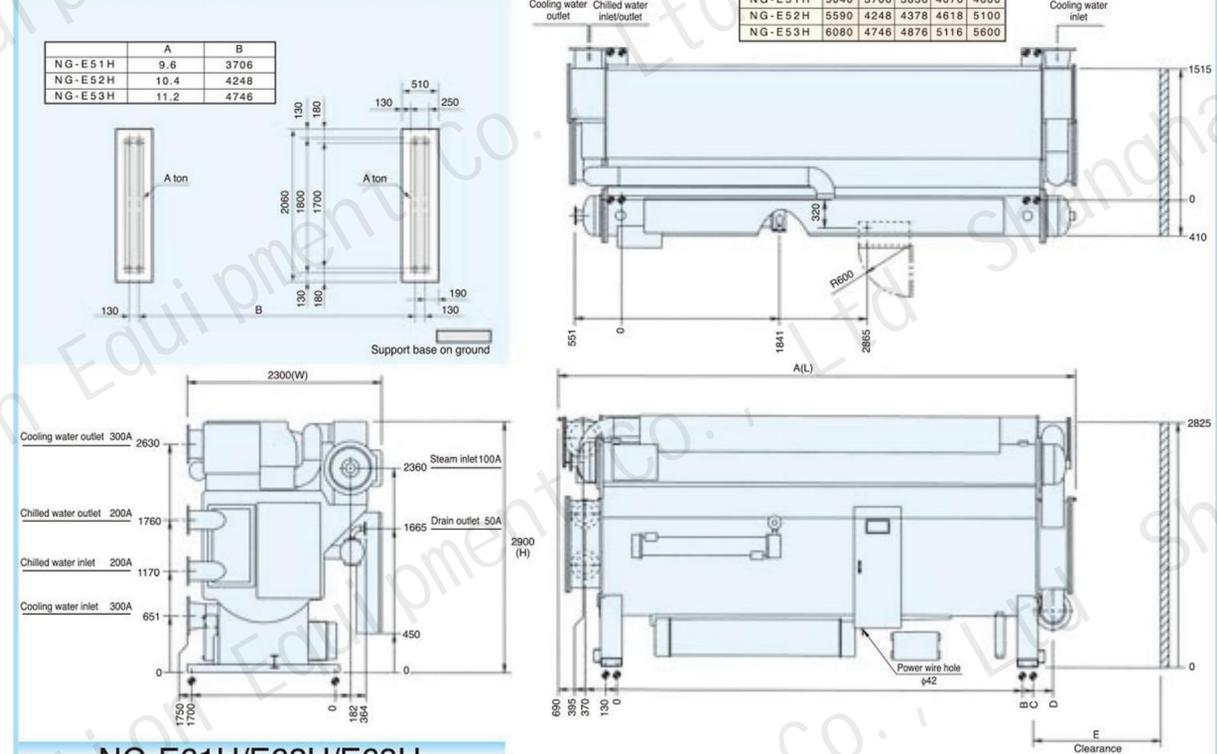
- Note: 1. There are  $\phi 50$  holes under the chiller for foundation bolts.  
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NG-E11~E32H	80	260
NG-E41~E63H	80	340
NG-E71~E82H	90	440

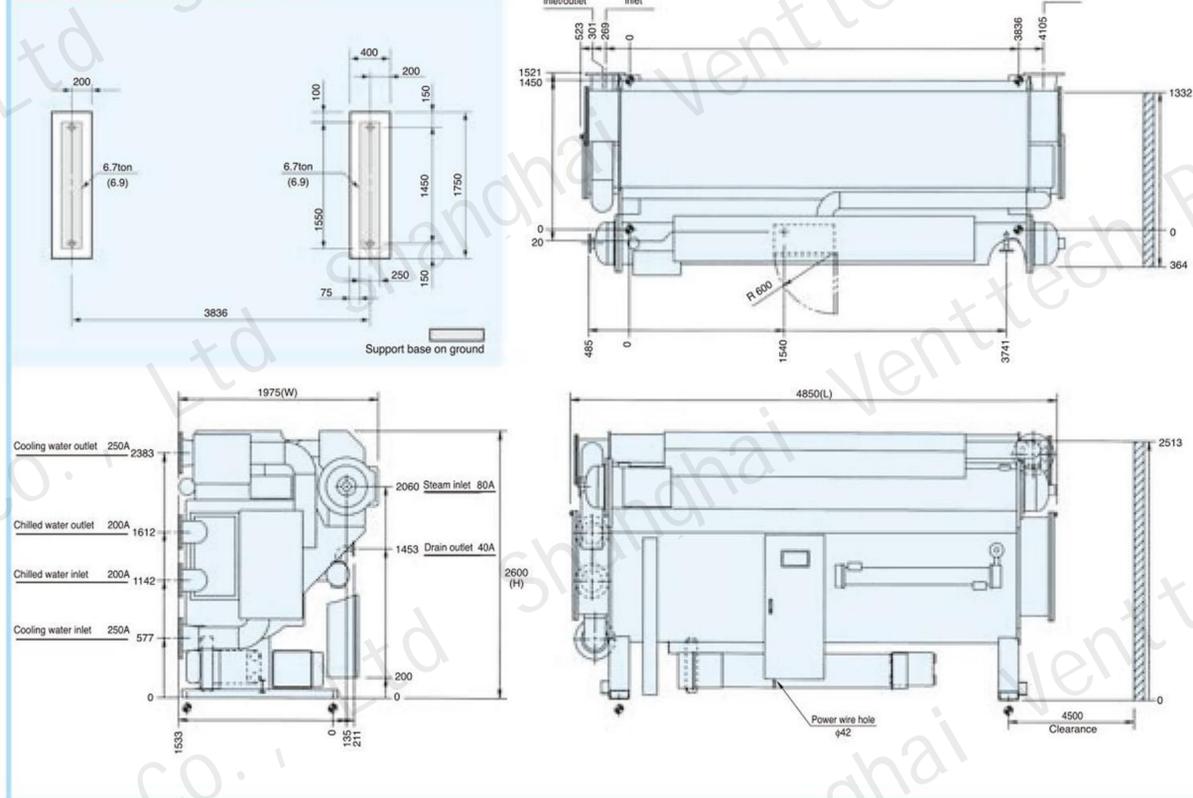
NG-E31H/E32HIn ( ) is Model NG-E32H



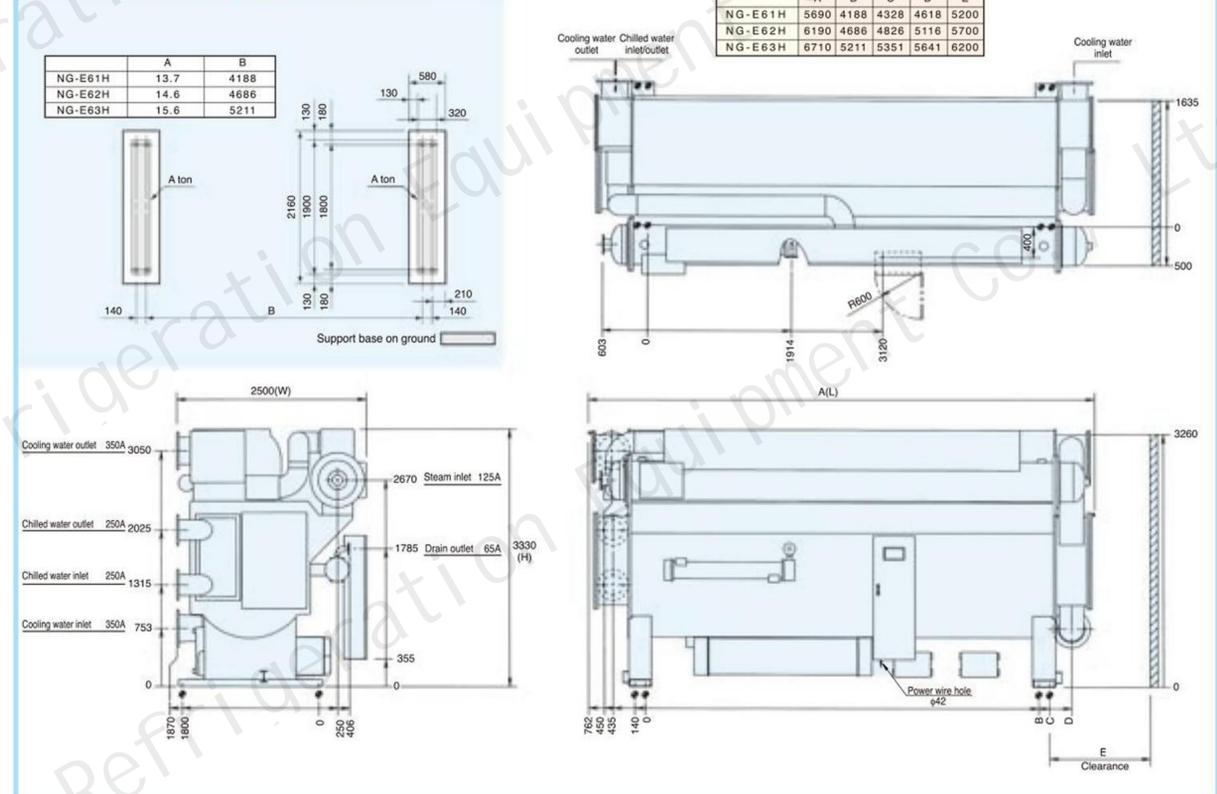
NG-E51H/E52H/E53H



NG-E41H/E42HIn ( ) is Model NG-E42H



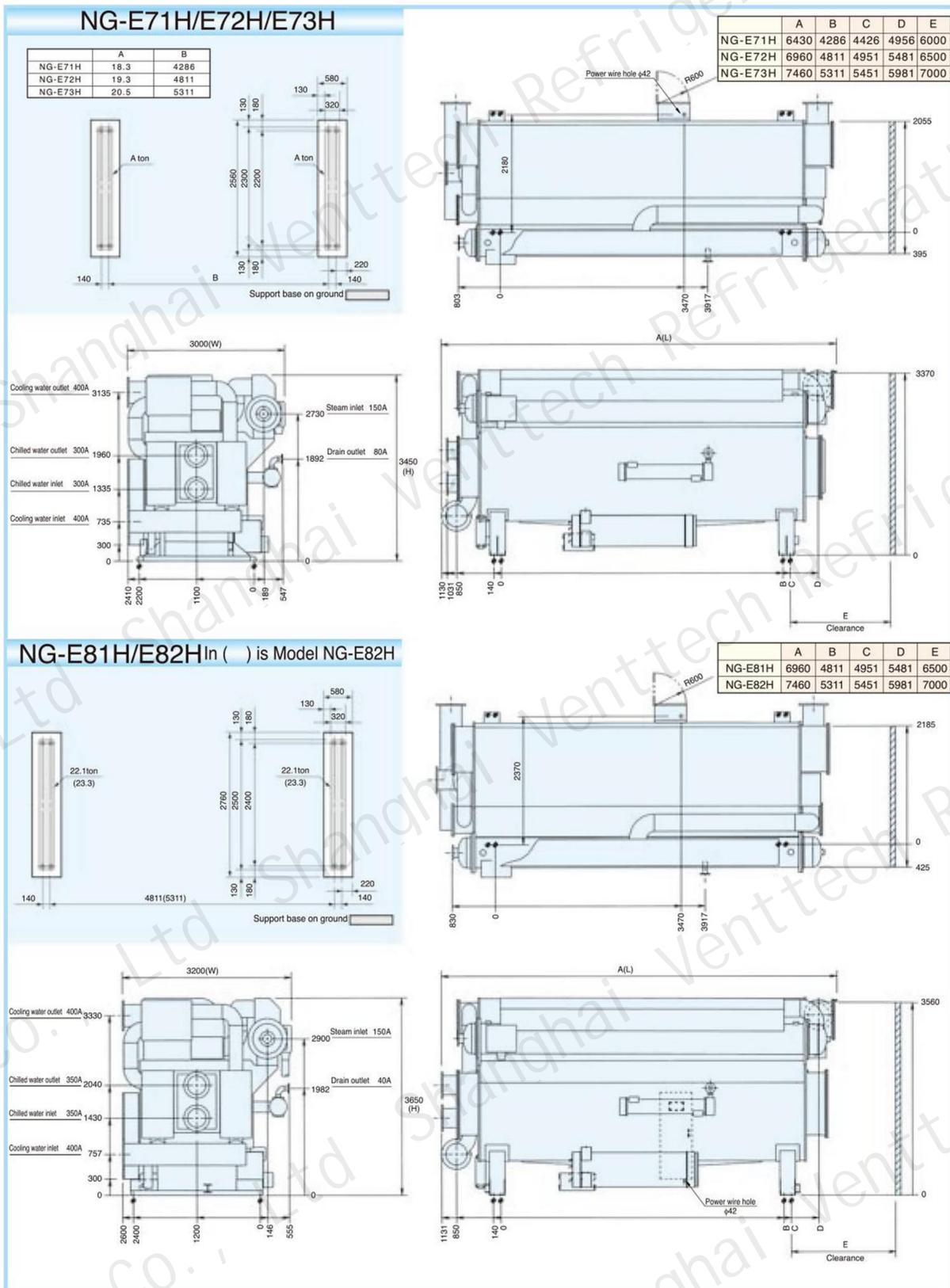
NG-E61H/E62H/E63H





# Overall dimension diagram Base diagram

- Overall dimension diagram
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Length direction.....1m Above.....0.2m  
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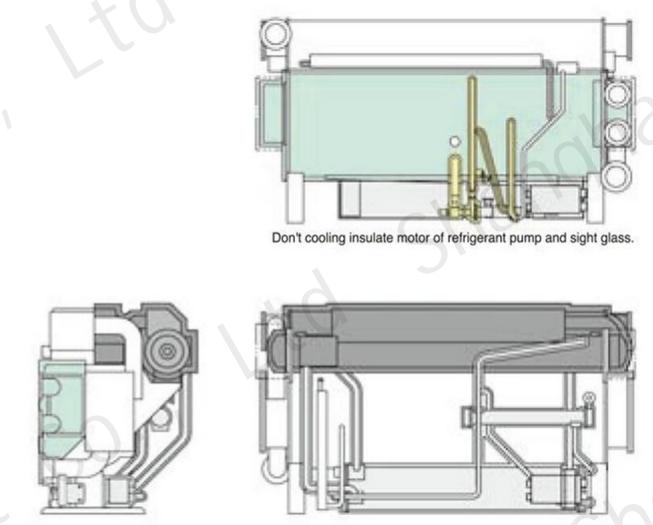


# Heat/cooling insulation area

## Heat/cooling insulation area

- 75mm heat insulation: high temperature generator, low temperature generator, steam pipe etc.
- 30mm heat insulation: heat exchanger, connecting pipes, etc.
- 50mm cooling insulation: evaporator, evaporator water tank, etc.
- 30mm cooling insulation: upper part of refrigerant pump, connecting pipes, etc.
- Please make the part in dotted square removable structure: evaporator water tank, generator head, etc.

- ◆ Heat insulation material: glass fibre, asbestos and the like.
- ◆ Cooling insulation material: polythene foam and the like.
- ◆ Heat/cooling insulation total area includes machine pipe area .
- ◆ Please use non-combustible as heat/cooling material.
- ◆ In above drawing, FG/SG/NG-E11H~E63H is indicated. For others detail,see ex-works file.



## Control panel overall dimension diagram

Model	Partition Insulation thickness	Heat insulation area (m <sup>2</sup> )		Cooling insulation area (m <sup>2</sup> )	
		75mm	30mm	50mm	30mm
FG-E11H		6.6	3.8	4.0	0.4
FG-E12H		6.6	4.1	4.0	0.4
FG-E13H		9.8	5.2	5.5	0.4
FG-E14H		9.8	5.6	5.5	0.4
FG-E21H		10.4	5.7	6.1	0.5
FG-E22H		10.4	5.9	6.1	0.5
FG-E23H		13.8	6.3	7.6	0.5
FG-E24H		13.8	6.4	7.6	0.5
FG-E31H		16.3	6.9	8.5	0.7
FG-E32H		16.3	7.3	8.5	0.7
FG-E41H		17.7	8.4	9.9	0.7
FG-E42H		17.7	8.5	9.9	0.7
FG-E51H		17.7	8.8	13.8	1.1
FG-E52H		20.0	9.4	15.0	1.1
FG-E53H		22.1	10.1	16.1	1.1
FG-E61H		20.0	13.1	17.5	1.2
FG-E62H		22.1	13.4	18.7	1.2
FG-E63H		24.4	14.2	20.0	1.2
FG-E71H		25.5	15.2	10.9	1.4
FG-E72H		28.1	15.5	11.4	1.4
FG-E73H		30.5	16.0	11.8	1.4
FG-E81H		34.5	17.0	13.1	1.5
FG-E82H		37.5	17.5	13.6	1.5

Model	Partition Insulation thickness	Heat insulation area (m <sup>2</sup> )		Cooling insulation area (m <sup>2</sup> )	
		75mm	30mm	50mm	30mm
SG-E11H		5.3	3.8	4.0	0.4
SG-E12H		5.3	4.1	4.0	0.4
SG-E13H		7.5	5.2	5.5	0.4
SG-E14H		7.5	5.6	5.5	0.4
SG-E21H		8.4	5.7	6.1	0.5
SG-E22H		8.4	5.9	6.1	0.5
SG-E23H		11.2	6.3	7.6	0.5
SG-E24H		11.2	6.4	7.6	0.5
SG-E31H		12.7	6.9	8.5	0.7
SG-E32H		12.7	7.3	8.5	0.7
SG-E41H		13.4	8.4	9.9	0.7
SG-E42H		13.4	8.5	9.9	0.7
SG-E51H		16.1	8.8	13.8	1.1
SG-E52H		18.1	9.4	15.0	1.1
SG-E53H		19.9	10.1	16.1	1.1
SG-E61H		21.2	13.1	17.5	1.2
SG-E62H		23.3	13.4	18.7	1.2
SG-E63H		25.4	14.2	20.0	1.2
SG-E71H		27.2	15.2	10.9	1.4
SG-E72H		29.6	15.5	11.4	1.4
SG-E73H		31.9	16.0	11.8	1.4
SG-E81H		32.3	17.0	13.1	1.5
SG-E82H		33.8	17.5	13.6	1.5

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NG-E12H		5.2	4.1	4.0	0.4
NG-E13H		7.3	5.2	5.5	0.4
NG-E14H		7.3	5.6	5.5	0.4
NG-E21H		8.3	5.7	6.1	0.5
NG-E22H		8.3	5.9	6.1	0.5
NG-E23H		10.5	6.3	7.6	0.5
NG-E24H		10.5	6.4	7.6	0.5
NG-E31H		11.6	6.9	8.5	0.7
NG-E32H		11.6	7.3	8.5	0.7
NG-E41H		13.0	8.4	9.9	0.7
NG-E42H		13.0	8.5	9.9	0.7
NG-E51H		13.8	8.8	13.8	1.1
NG-E52H		15.4	9.4	15.0	1.1
NG-E53H		17.0	10.1	16.1	1.1
NG-E61H		18.4	13.1	17.5	1.2
NG-E62H		20.2	13.4	18.7	1.2
NG-E63H		22.0	14.2	20.0	1.2
NG-E71H		20.9	15.2	10.9	1.4
NG-E72H		22.6	15.5	11.4	1.4
NG-E73H		24.6	16.0	11.8	1.4
NG-E81H		24.4	17.0	13.1	1.5
NG-E82H		26.4	17.5	13.6	1.5

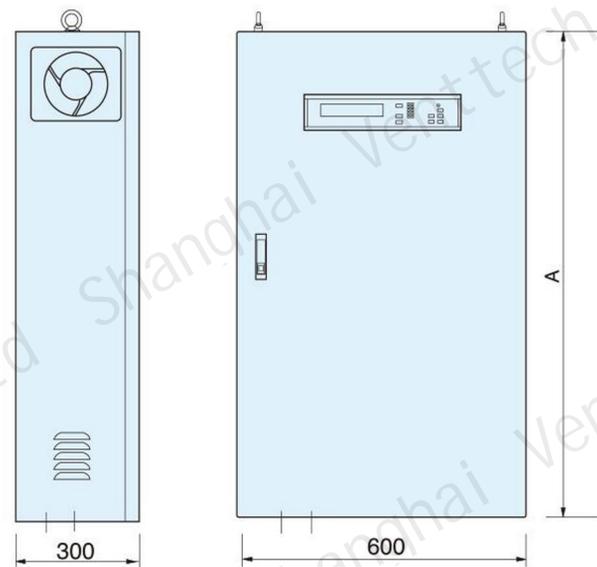
## Control panel



### Indication lamp

symbol	Name	Lamp color
①	Running(Operation) indication lamp	Red
②	Stop indication lamp	Green
③	Alarm indication lamp	Orange
④	Remote / Local select button with lamp	Red
⑤	Mode select button with lamp	Red
⑥	Data display	LED

### Control panel dimension diagram

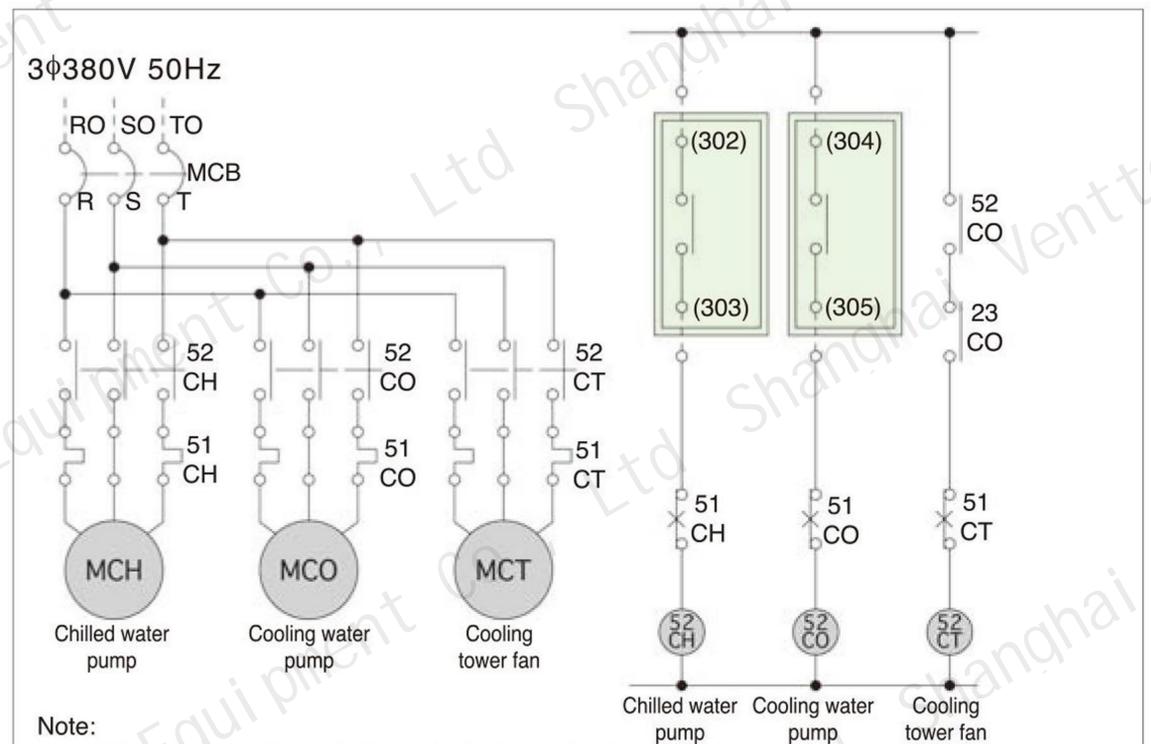


	A
FG/SG/NG-E11H~E42H	1400
FG/SG/NG-E51H~E82H	1600

Steam shutoff valve  
 φ21:FG/SG/NG-E11H~E61H  
 φ27:FG/SG/NG-E62H~E82H  
 Power wire hole φ42  
 Remote control φ27

## Accessory equipment electric circuit essential

### Accessory equipment electric circuit reference example

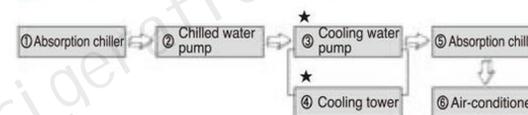


#### Note:

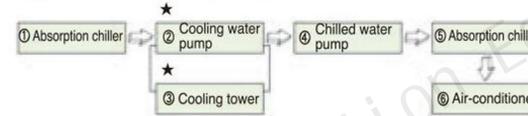
- 23CO(cooling water thermostat) must be installed at the inlet of cooling water.
- In (302) (303) are terminals on absorption chiller control panel. So conduct interlocked start/stop from absorption chiller.
  - \* Use terminals 302-303 on absorption chiller for chilled water pump.
  - \* Use terminals 304-305 on absorption chiller for cooling water pump.

### Accessory equipment start/stop sequence

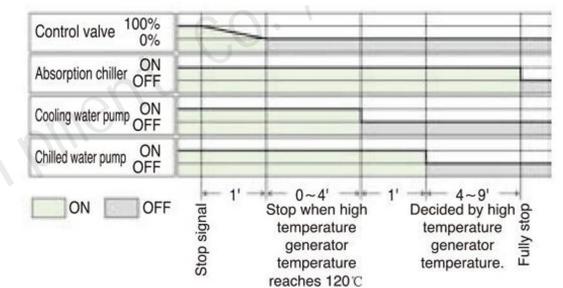
#### Interlocked start sequence



#### Interlocked stop sequence



#### Chiller dilution operation time chart



※ Shortest dilution operation time is 6 minutes, longest 15 minutes.

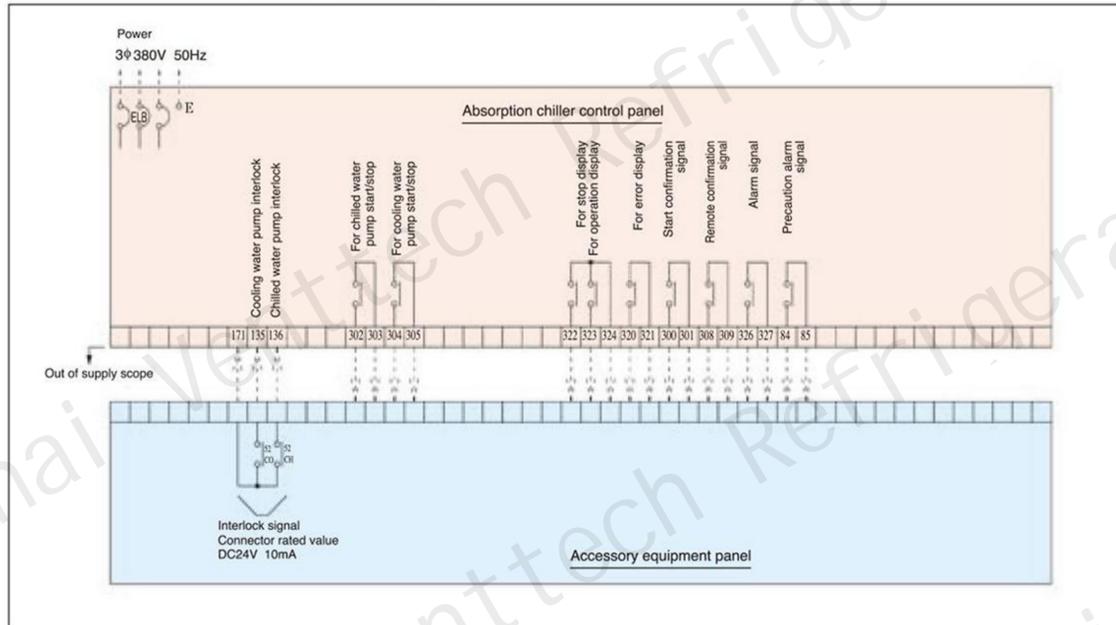
#### Note:

Please stop ⑥ Air-conditioner after absorption chiller fully stopped.

# Electric wiring diagram

# Piping system diagram

## Electric wiring diagram



Note: \* Start confirmation signal: the display after receiving the control signal from "Start" button  
 \* Operation display signal: the display when the machine or the pump is running

## Outside wiring

### Accessory equipment wiring

Please connect user's power wire to the electric leakage breaker in the control panel, power wire earth line to earth terminals in the control panel

	Kinds	Terminal No.	Note
Interlock wiring	Chilled water pump interlock	171-136	DC24V 10mA
	Cooling water pump interlock	171-135	DC24V 10mA
Accessory equipment operation	Chilled water pump operation	302-303	Connector specification AC250V 0.1A
	Cooling water pump operation	304-305	Connector specification AC250V 0.1A
	Steam shutoff valve	345-346	Connector specification AC250V 0.1A

### Wiring of remote start/stop signal.

For remote start/stop, there are signals as follows, select when designing. When using non-voltage connector, please first connect terminals 171 and 332.

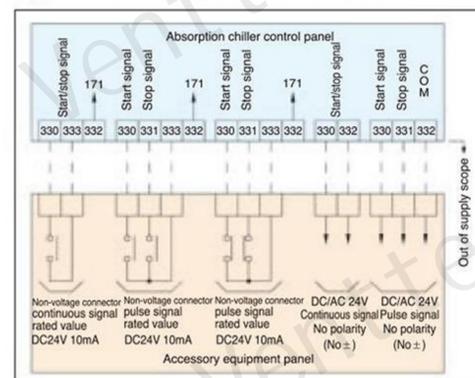
	Kinds	Input signal	Terminal No.	Note
1	Non-voltage connector continuous signal	ON/OFF	330-333	
2	Non-voltage connector pulse signal	ON	330-333	Use connector A
3	Non-voltage connector pulse signal	ON	330-333	Use connector A
		OFF	331-333	Use connector B
4	DC24V continuous signal	ON/OFF	330-332	No polarity (No ±)
5	DC24V pulse signal	ON	330-332	No polarity (No ±)
6	AC24V continuous signal	ON/OFF	330-332	
7	AC24V pulse signal	ON	330-332	
		ON	331-332	

### State display connector wiring.

Please prepare the following six state display connector.

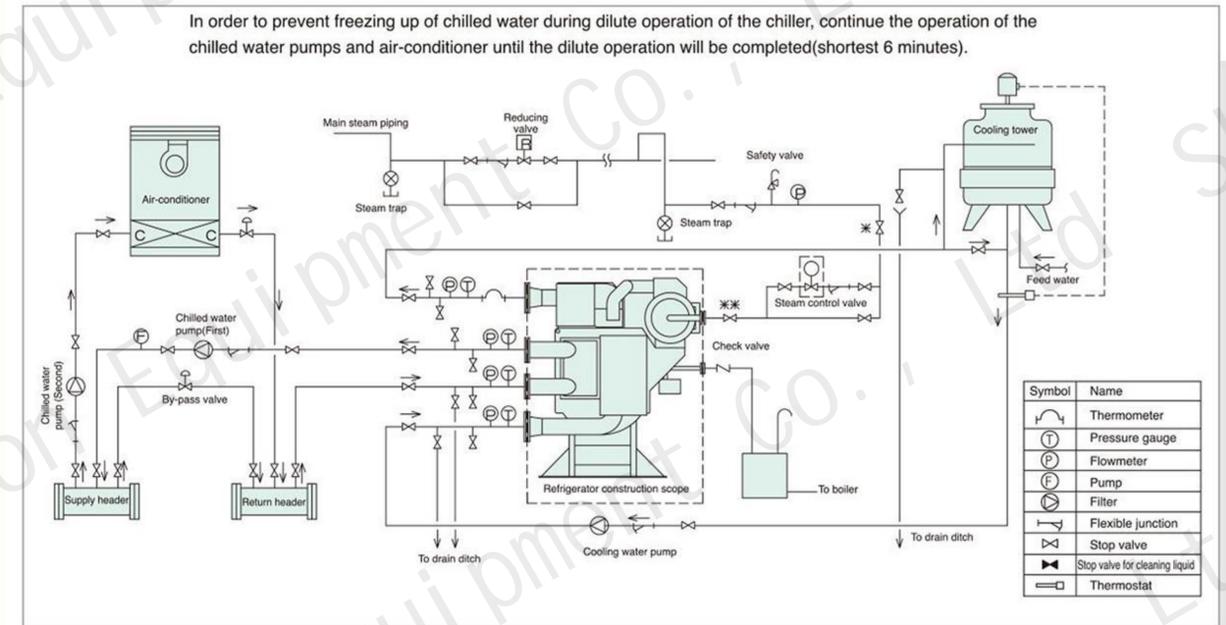
	Kinds	Terminal No.	Note
1	Stop display connector	323-324	Connector specification AC250V 0.1A
2	Operation display connector	322-324	Connector specification AC250V 0.1A
3	Error display connector	320-321	Connector specification AC250V 0.1A
4	Start confirmation connector	300-301	Connector specification AC250V 0.1A
5	Alarm signal	326-327	Connector specification AC250V 0.1A
6	Precaution alarm signal	84-85	Connector specification AC250V 0.1A

### Remote start/stop signal connecting example



## Piping system diagram (Reference example)

In order to prevent freezing up of chilled water during dilute operation of the chiller, continue the operation of the chilled water pumps and air-conditioner until the dilute operation will be completed (shortest 6 minutes).



## Attentions to pipe construction

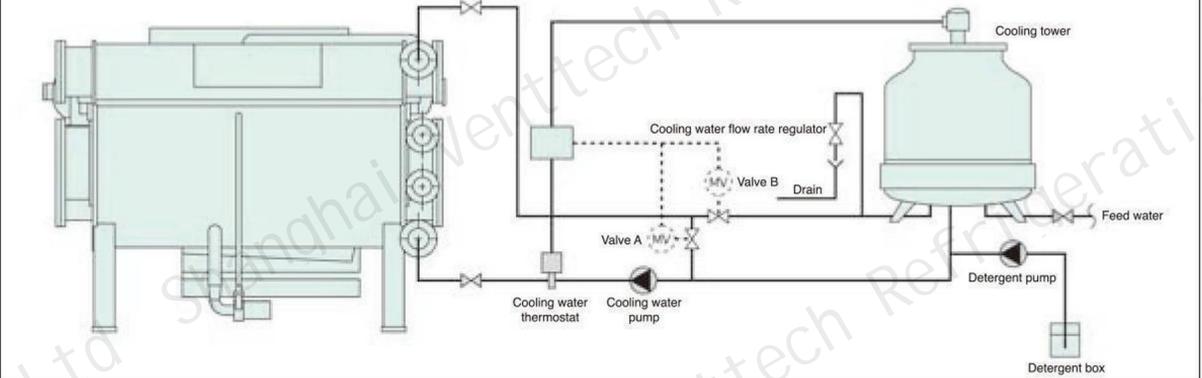
- Work outside the area surround by this line shall have to be executed at the expense of the owner.
- Refer to the overall dimension diagrams and specification tables for pipe connections and diameters.
- Try to make sure the chilled/cooling water flowrate in conformity with standard value. Please keep the range of chilled/cooling water flow between 50%~120% of specified value to prevent freezing, corrosion and leakage.
- Please properly positioned the chilled water pump, cooling water pump, expansion water tank in order to make the pressure on the body not exceed the set value.
- Set special chilled water pump and cooling water pump for each refrigerator with their capacity meeting the specifications. Please make sure to install the flexible junction between the machine and the inlet/outlet of the chilled water pump and cooling water pump, and make sure to have a straight tube on the chilled water inlet/outlet pipe, which length is at least decuple pipe diameter.
- Clean and descale the pipes through by-pass pipeline after installing the whole pipe system, then connect with the machine. Please make sure that the cleaning water cannot pass the machine. Steam pipe also have to be cleaned in order to avoid blocking the control valve.
- The bad water quality could cause corrosion and fouling phenomenon, so please make sure to treat and manage strictly the water quality of chilled water and cooling water system.
- Install a cooling water flow regulate valve at the cooling tower inlet in order to manage the water quality.
- Install filter in the chilled water, cooling water pipes (No.10 filter screen).
- Following devices should be equipped around the chilled, cooling water inlet and outlet exclusive of all kinds of stop valves in order to maintain and supervise chilled water.
  - Install thermometer and pressure gauge around the inlet and outlet of chilled water and cooling water.
  - Install deflating valve above water tank.
  - Install drain valves at the lowest positions between the absorption chiller and the stop valves of chilled water and cooling water, then pipe to the drain ditch.
  - Install stop valves between the absorption chiller and stop valves of all inlets and outlets to clean the water circuit system with clean liquid.
  - The machine belongs to the type pressure vessel, so pressure gauge and safety valve should be installed close to the absorption chiller as possible according to above diagram. Open pressure of the safety valve should be directly connected to outdoors.
  - Standard value of steam pressure: FG series is  $4 \text{ kg/cm}^2 \cdot \text{G}$ , SG series is  $6 \text{ kg/cm}^2 \cdot \text{G}$ , NG series is  $8 \text{ kg/cm}^2 \cdot \text{G}$  (Saturated vapor). When the steam pressure is above standard value, please install pressure relief valve according to above diagram.
  - Filter (No.80~100) and draining valve should be installed close to inlet of the absorption chiller even if pressure relief valve isn't necessary.
  - Back pressure of vapour deflating pipe should be controlled below  $5 \text{ mH}_2\text{O}$ .
  - Vapour and backflowing phenomenon may be arised when the absorption chiller stop, so one-way valve should be installed by customer.
  - Drain valve of vapour deflating system has been installed in the absorption chiller. So it is not necessary to prepare the valve.
  - Stop valve must be installed at\*(or\*\*, please enquire with the valve manufacturer) to prevent vapour backflowing into the absorption chiller at rest. In addition, vapour stop valve that can be automatically stop, should be installed when several absorption chillers are in use (The terminal for vapour stop valve is prepared in the control panel of the chiller).
  - Make the outlet of the chimney and exhaust gas pipe far from the cooling tower.
  - Please be sure to keep the foundation level (levelness within  $2/1000 \text{ mm}$ ) during installation of chiller.

Note: For the design and construction of the system and the machine room, please follow the national relative air-conditioner design code and safety code.



## Cooling water temperature control essential (Reference example)

Cooling water temperature can't be 13°C lower than design temperature. For example, when cooling water inlet temperature is 32°C, cooling water temperature can't drop below 19°C. However, it is no matter even the temperature below above value in the time between start and normal run.



1. Be sure to start and stop the fan by means of the cooling water thermostat.
2. Only in the cooling operation in summer, valve A can be used as hand-operated butterfly valve.
3. In the cooling operation in the middle region and in winter, valve A and valve B should be used as automatic valve(three-throw valve also can be used).The setting value of cooling water thermostat such as: below 22°C shut down the valve, above 25°C open the valve.

Manufacturer	Model	Temperature scope	Temperature difference	Switch
Yamatake Honey well	T675A	-15°C ~ +35°C	1.7°C ~ 5.6°C	SPDT × 1
SAGINOMIYA	TNS-C1034CW	-20 ~ +35°C	4 ~ 20°C	SPDT × 1

## Cooling water quality supervise essential

- Moisture in the cooling water is vaporized and dispersed into the atmosphere when flowing through the cooling tower, therefore cooling water is continuously concentrated and deteriorated.
- If the cooling water quality deteriorate corrosion and dirt accumulation will arise, therefore the unit will be troubled with capacity declination and heat-transfer pipe corrosion. Please install cooling water overflow device to supervise the water quality properly. In addition, proper water quality treatment will have better effect.

## Cooling water quality standard

Item	Circulation		Direct-used mode	Trend		
	Circulation water	Feed water	Direct-used water	Corrosion	Dirt	
Standard item	PH(25°C)	6.5 ~ 8.2	6.0 ~ 8.0	6.8 ~ 8.0	○	○
	Electrical conductivity(25°C)(mS/m)	80 below	30 below	40 below	○	○
	Electrical conductivity(25°C)(μS/m)	800 below	300 below	400 below	○	○
	Cl <sup>-</sup> (mgCl <sup>-</sup> /l)	200 below	50 below	50 below	○	
	SO <sub>4</sub> <sup>2-</sup> (mgSO <sub>4</sub> <sup>2-</sup> /l)	200 below	50 below	50 below	○	
	Acid consumption (PH4.8)(mgCaCO <sub>3</sub> /l)(Malkalinity)	100 below	50 below	50 below		○
	Total hardness (mgCaCO <sub>3</sub> /l)	200 below	70 below	70 below		○
	SiO <sub>2</sub> (mgSiO <sub>2</sub> /l)	50 below	30 below	30 below		○
Reference item	Fe(mgFe/l)	1.0 below	0.3 below	1.0 below	○	○
	S <sup>2-</sup> (mgS <sup>2-</sup> /l)	Beyond measure	Beyond measure	Beyond measure	○	
	NH <sup>+</sup> (mgNH <sup>+</sup> /l)	1.0 below	0.1 below	1.0 below	○	

## Note before order

If the following contents are supplied, we can offer proper plan to satisfy your requirement.

1 Refrigeration capacity	USRT or	kW
2 Quantity	Unit	
3 Chilled water inlet temperature	°C Working pressure	MPa kg/cm <sup>2</sup> · G
4 Chilled water outlet temperature or flow rate	°C or	m <sup>3</sup> /h
5 Cooling water inlet temperature	°C Working pressure	MPa kg/cm <sup>2</sup> · G
6 Cooling water outlet temperature or flow rate	°C or	m <sup>3</sup> /h
7 Steam pressure	MPa or	kg/cm <sup>2</sup> · G
8 Steam temperature	°C	
9 Power voltage		
10 Installation place ( roof, ground, under ground, etc.)		