Mammoth
The Leader In Custom HVAC & Energy Saving

Water-To-Water Modular Water Source / Geothermal Heat Pumps (Chiller)

65.9kW - 315kW (50Hz)

Mammoth
The Leader In Custom HVAC & Energy Saving

ISO9001 ISO14001 OHSAS18001

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Mammoth (Shanghai) Air Conditioning Ltd.

MWH-1211-V1.0-T

Printed in China

Since 1935, Mammoth has been producing and installing air conditioning units with the most innovative technologies. Our solutions are found in some of the world's most important buildings for its unparalleled flexibility and efficiency. When performance and energy efficiency are important factors to a project, our products are often chosen as the final solution.

Established in Minneapolis, USA - 1935

Since 1988, Mammoth has been providing energy saving products to projects in China. In 2002, Mammoth invested US$10 million to establish its manufacturing facility in Anji, China's #1 Ecological County, and its national sales headquarter in Shanghai to provide custom engineered air conditioning systems for projects in China and abroad.

Energy Saving & Innovation

Mammoth produces air conditioning equipment that leverages energy saving and innovative technologies. Our products include, but not limited to, geothermal & water source heat pumps, air & water cooled commercial air conditioning units, fan coils, AHU, VAV box, screw chillers, and energy recovery units.

Customization & Energy Saving is Our Standand

Mammoth has been recognized as a leader in providing custom designed Total Energy Solution HVAC Systems. Our solutions can fit any design applications from WSHP systems to geothermal systems, from hybrid systems to various energy saving systems. Based on the needs of our customers, our recommendations help our customers assess the economic benefits of Mammoth solutions over alternative systems.

Outstanding Achievement

Mammoth has also brought its innovative design concepts to the industry. We have printed numerous technical design manuals and books to facilitate engineers in the design of Renewable Energy HVAC Systems. Together with industry associations and the commercial section of the US Embassy and Consulate General Offices, we have frequently conducted technical seminars in major cities in China and abroad. We have supplied our solutions to projects that amount to almost 10 million sq. m., and have been continuously recognized as the leader in Renewable Energy products in China.

With the leading brand in the water source/ground source heat pump field in the world, Mammoth Inc. always commits itself to bringing advanced and well proven water source/ground source heat pump air conditioning systems to customers. The water source heat pump units manufactured by it cover more than 10 series in 2 major specifications (water-to-air type and water-to-water type). Among these products, MWH series water-to-water modular water source/ground source heat pumps (water chilling units) are composed of 20tr and 30tr basic modules which can be combined freely and flexibly according to actual needs of customers for applications in various building structures such as villas, guest houses, office buildings, dwelling houses, hospitals, schools, marketplaces and workshop buildings.

Features

Stable operation, efficient and energy-saving nature

Underground water not only has relatively stable temperature all the year round but also shows large heating capacity and good heat transfer performance. Therefore, the unit operates stably and is immune to seasonal temperature changes. Its operating condition is better than conventional central air conditioning equipment and the troubles of outdoor noise and operation in severe condition that always occur on air cooling heat pumps are avoided. As an efficient, energy-saving, environmental-friendly product, its operating cost is merely 1/3~2/3 of the systems running in conventional mode.

Complete functions

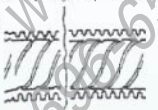
The unit not only can meet the needs for cooling in summer and heating in winter but also can supply sanitary hot water so that one unit fully serves several purposes. In addition to connection with end of an air pan to Mammoth standard, the unit can also serve as a cold/heat source of a floor radiation heating system.

World-class hermetic scroll compresso

A world-class hermetic scroll compressor is selected to ensure efficient and reliable operation of the unit. The compressor is fitted with a "jib damper (a patented technology of Mammoth)" for minimizing shock and noise.

Efficient condenser and evaporator

Each unit is equipped with an efficient condenser and an efficient evaporator. With special rib construction, its heat exchanger has higher efficiency. With neat system flow and structure as well as stable heatexchange, less component failures and easy repair and maintenance are achieved. The efficient heat exchanger specially developed for low-temperature models allows the unit to maintain high energy efficiency under extremely low evaporating temperature.



Built-in freon system switch valve that frees you from manual switching

The unit has a built-in Freon system switch valve which frees you from switching between water system valves during cooling and heating and simplifies line valves of the system.

Built-in communication interface that is compatible with building automation systems allows easy remote monitoring

The control system with perfect protections can monitor the operating condition of the unit at any time. The full Chinese human-centered operation and display interfaces can be controlled in centralized way through standard dry contacts or RS485communication interface and are compatible with building automation management systems allowing remote communication monitoring.

100% units being tested on national-level special test beds for water source/ground source heat pumps

Each Mammoth water-to-water water-source heat pump unit has been fully actually tested on a special test bed for water source heat pumps in the factory.We have performed continuous load testing of each unit in strict accordance with our inspection system and procedure so as to ensure 100% outgoing pass rate. In addition, our units have been completely assembled and filled with refrigerant and refrigeration oil in the factory so that the end users can put their machines into operation after simply connecting water circuit and electric circuit and the time for field installation and commissioning of each unit is minimized.

Descriptions of module combinations and models

$$\underset{1}{\text{MWH}}\ \underset{2}{020}$$

1: Product type: MWH represents water-to-water modular water source heat pump unit (water chilling unit).
2: Product serial number

Description of module combinations

The unit can be assembled and combined freely with the 2 types of basic modules. However, it is recommended that combinations of same modules be used as far as possible in view of water balance. The modular water inlet and outlet pipes go in the same way. At the same time, the number of module combinations should not exceed 6 for one unit. For example, MWH060 can be assembled using two 030 modules or three 020 modules.

B Series MWH020-090 Specification(Ground Water Condition——Table 1)

Item \ Model			MWH 020	MWH 030	MWH 040	MWH 050	MWH 060	MWH 070	MWH 080	MWH 090
Cooling Capacity kW			70	105	140	175	210	245	280	315
Cooling Power Input kW			13.4	19.8	26.8	33.2	39.6	46.6	53	59.4
Heating Capacity kW			78	117	156	195	234	273	312	351
Heating Power Input kW			19.5	29.2	39	48.7	58.4	68.2	77.9	87.6
Load Side	Cooling	Entering/Leaving Water Temp.℃	12/7							
		Water Flow m^3/h	12.1	18.1	24.2	30.2	36.2	42.3	48.3	54.3
		Water Pressure Drop kPa	66	69	66	69	69	69	69	69
	Heating	Entering Water Temp.℃	40							
		Water Flow m^3/h	12.1	18.1	24.2	30.2	36.2	42.3	48.3	54.3
		Water Pressure Drop kPa	66	69	66	69	69	69	69	69
Source Water Side	Cooling	Entering/Leaving Water Temp.℃	18/29							
		Water Flow m^3/h	6.8	9.9	13.6	16.7	19.8	23.5	26.6	29.7
		Water Pressure Drop kPa	55	59	55	59	59	59	59	59
	Heating	Enterning Water Temp.℃	15							
		Water Flow m^3/h	6.8	9.9	13.6	16.7	19.8	23.5	26.6	29.7
		Water Pressure Drop kPa	55	59	55	59	59	59	59	59
Partial Heat Recovery Parameter	Heating Capacity kW		10.5	15.7	21	26.2	31.4	36.7	41.9	47.1
	Water Flow m3/h		1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1
	Water Pressure Drop kPa		48	51	48	51	51	51	51	51
	Pipe Diameter mm(single)		R1"							
Heat Recovery Parameter	Heating Capacity kW		78	117	156	195	234	273	312	351
	Water Flow m3/h		13.4	20.1	26.8	33.5	40.2	46.9	53.6	60.3
	Water Pressure Drop kPa		66	67	66	67	67	67	67	67
	Pipe Diameter mm(single)		R2"							
Compressor	Type		Hermetic Scroll Compressor							
	Power Supply		3Ph-380V/50Hz							
	Qty		2	3	4	5	6	7	8	9
	Starting Method		Direct Starting							
	Working Current A		46	69	92	115	138	161	184	207
	Starting Current A		182	205	228	251	274	297	320	343
Control Type			Digital Operating System, Microprocessor							
Protection			High/Low Pressure Switch, Frost Prevention,Water Flow							
Pipe Diameter mm(Single)			R 2"							
Refrigerant Charge R22 kg			20	30	40	50	60	70	80	90
Oil Charge L			6	9	12	15	18	21	24	27
Dimensions	Length mm		1850	1850	1850	1850	1850	1850	1850	1850
	Width mm		1053	1053	2606	2606	2606	4159	4159	4159
	Height mm		1444	1444	1444	1444	1444	1444	1444	1444
Shipping Weight kg			580	730	1160	1310	1460	1890	2040	2190
Operating Weight kg			660	840	1320	1500	1680	2160	2340	2520

Notes: 1, Standard water side design pressure is 1.0MPa.

2, Under nominal cooling condition, source entering/leaving water temperature is 18℃/29℃, load side entering/leaving water temperature is 12℃/7℃;
In heating mode unit source entering water temperature is 15℃, load side entering water temperature is 40℃.

3, Nominal heat recovery mode, source entering water temperature is 15℃, entering/leaving domestic hot water temperature is 40℃/ 45℃;
Nominal partial heat recovery mode, entering/leaving domestic hot water temperature is 45℃/50℃.

4, Two basic modules are available for the unit and they can be combined freely on customer demand.

B Series MWH020-090 Specification(Water Loop Condition——Table 2)

Item \ Model			MWH 020	MWH 030	MWH 040	MWH 050	MWH 060	MWH 070	MWH 080	MWH 090
Cooling Capacity kW			65.9	98.8	131.8	164.7	197.6	230.6	263.5	296.4
Cooling Power Input kW			15.7	23.6	31.4	39.3	47.2	55	62.9	70.8
Heating Capacity kW			90.5	135.8	181	226.3	271.6	316.8	362.1	407.4
Heating Power Input kW			20.5	30.6	41	51.1	61.2	71.6	81.7	91.8
Load Side	Cooling	Entering/Leaving Water Temp.℃	12/7							
		Water Flow m^3/h	11.4	17	22.8	28.4	34	39.8	45.4	51
		Water Pressure Drop kPa	64	67	64	67	67	67	67	67
	Heating	Entering Water Temp.℃	40							
		Water Flow m^3/h	11.4	17	22.8	28.4	34	39.8	45.4	51
		Water Pressure Drop kPa	64	67	64	67	67	67	67	67
Source Water Side	Cooling	Entering/Leaving Water Temp.℃	30/35							
		Water Flow m^3/h	14.4	21.5	28.8	35.9	43	50.3	57.4	64.5
		Water Pressure Drop kPa	66	71	66	71	71	71	71	71
	Heating	Entering Water Temp.℃	20							
		Water Flow m^3/h	14.4	21.5	28.8	35.9	43	50.3	57.4	64.5
		Water Pressure Drop kPa	66	71	66	71	71	71	71	71
Partial Heat Recovery Parameter		Heating Capacity kW	9.9	14.8	19.8	24.7	29.6	34.6	39.5	44.4
		Water Flow m3/h	1.7	2.5	3.4	4.5	5.1	5.9	6.8	7.6
		Water Pressure Drop kPa	47	50	47	50	50	50	50	50
		Pipe Diameter mm(Single)	R1"							
Heat Recovery Parametere		Heating Capacity kW	90.5	135.8	181	226.3	271.6	316.8	362.1	407.4
		Water Flow m3/h	15.5	23.3	31.1	38.9	46.7	54.5	62.3	70
		Water Pressure Drop kPa	66	68	66	68	68	68	68	68
		Pipe Diameter mm(Single)	R2"							
Compressor		Type	Hermetic Scroll Compressor							
		Power Supply	3Ph-380V/50Hz							
		Qty	2	3	4	5	6	7	8	9
		Starting Method	Direct Starting							
		Working Current A	46	69	92	115	138	161	184	207
		Starting Current A	182	205	228	251	274	297	320	343
Control Type			Digital operating system, Microprocessor							
Protection			High/Low pressure Switch, Frost Prevention,Water Flow							
Pipe Diameter(Single)			R 2"							
Refrigerant Charge R22 kg			20	30	40	50	60	70	80	90
Oil Charge L			6	9	12	15	18	21	24	27
Dimensions	Length mm		1850	1850	1850	1850	1850	1850	1850	1850
	Width mm		1053	1053	2606	2606	2606	4159	4159	4159
	Height mm		1444	1444	1444	1444	1444	1444	1444	1444
Shipping Weight kg			580	730	1160	1310	1460	1890	2040	2190
Operating Weight kg			660	840	1320	1500	1680	2160	2340	2520

Note: 1, Standard water side design pressure is 1.0MPa.

2, Under nominal cooling condition，source entering/leaving water temperature is 30/35℃，load side entering/leaving water temperature is 12/7℃.
In heating mode unit source entering water temperature is 20℃,load side entering water temperature is 40℃.

3, Norminal heat recovery mode,source entering water temperature is 20℃，entering/leaving domestic hot water temperature is 40℃/45℃;
Norminal partial heat recovery mode,entering/leaving domestic hot water temperature is 45℃/50℃.

4, Two basic modules are available for the unit and they can be combined freely on customer demand.

B Series MWH020-090 Specification(Ground Loop Condition——Table 3)

Item \ Model			MWH 020	MWH 030	MWH 040	MWH 050	MWH 060	MWH 070	MWH 080	MWH 090
Cooling Capacity kW			69	103.5	138	172.5	207	241.5	276	310.5
Cooling Power Input kW			14.2	21.2	28.4	35.4	42.4	49.6	56.6	63.6
Heating Capacity kW			58.3	87	116.6	145.3	174	203.6	232.3	261
Heating Power Input kW			17.3	25.8	34.6	43.1	51.6	60.4	68.9	77.4
Load Side	Cooling	Entering/Leaving Water Temp.℃	12/7							
		Water Flow m^3/h	11.9	17.8	23.8	29.7	35.6	41.6	47.5	53.4
		Water Pressure Drop kPa	65	68	65	68	68	68	68	68
	Heating	Entering Water Temp.℃	40							
		Water Flow m^3/h	11.9	17.8	23.8	29.7	35.6	41.6	47.5	53.4
		Water Pressure Drop kPa	65	68	65	68	68	68	68	68
Source Water Side	Cooling	Entering/Leaving Water Temp.℃	25/30							
		Water Flow m^3/h	14.5	21.7	29	36.2	43.4	50.7	57.9	65.1
		Water Pressure Drop kPa	66	71	66	71	71	71	71	71
	Heating	Entering Water Temp.℃	0							
		Water Flow m^3/h	14.5	21.7	29	36.2	43.4	50.7	57.9	65.1
		Water Pressure Drop kPa	66	71	66	71	71	71	71	71
Partial Heat Recovery Parameter	Heating Capacity kW		10.5	15.5	21	26	31	36.5	41.5	46.5
	Water Flow m3/h		1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1
	Water Pressure Drop kPa		48	51	48	51	51	51	51	51
	Pipe Diameter mm(Single)		R1"							
Heat Recovery Parameter	Heating Capacity kW		58.3	87	116.6	145.3	174	203.6	232.3	261
	Water Flow m3/h		10	15	20	25	30	35	40	45
	Water Pressure Drop kPa		64	66	64	66	66	66	66	66
	Pipe Diameter mm(Single)		R2"							
Compressor	Type		Hermetic Scroll Compressor							
	Power supply		3Ph-380V/50Hz							
	Qty		2	3	4	5	6	7	8	9
	Starting Method		Direct starting							
	Working Current A		46	69	92	115	138	161	184	207
	Starting Current A		182	205	228	251	274	297	320	343
Control Type			Digital operating system, Microprocessor							
Protection			High/Low pressure Switch, Frost Prevention, Water Flow							
Pipe Diameter mm (Single)			R 2"							
Refrigerant Charge R22 kg			20	30	40	50	60	70	80	90
Oil Charge L			6	9	12	15	18	21	24	27
Dimensions	Length mm		1850	1850	1850	1850	1850	1850	1850	1850
	Width mm		1053	1053	2606	2606	2606	4159	4159	4159
	Height mm		1444	1444	1444	1444	1444	1444	1444	1444
Shipping Weight kg			580	730	1160	1310	1460	1890	2040	2190
Operating Weight kg			660	840	1320	1500	1680	2160	2340	2520

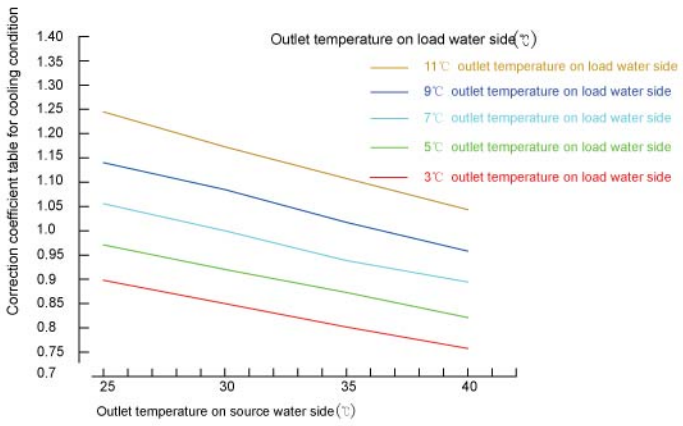
Notes：1, Standard water side design pressure is 1.0MPa.

2, Under nominal cooling condition, source entering/leaving water temperature is 25/30℃，load side entering/leaving water temperature is 12/7℃;
In heating mode unit source entering water temperature is 0℃，load side entering water temperature is 40℃.

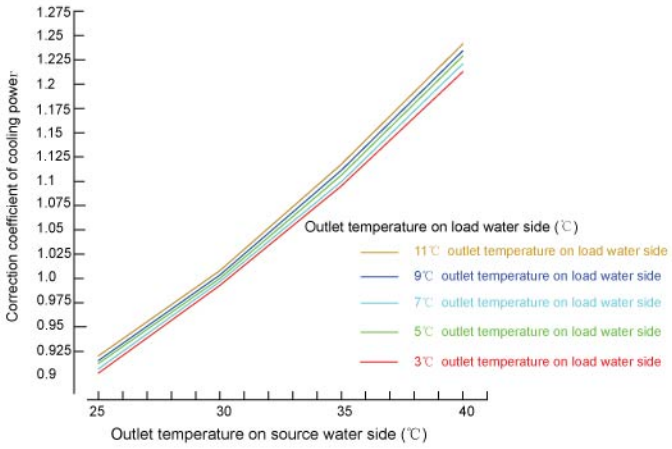
3, Nominal heat recovery mode，source entering water temperature is 0℃，entering/leaving domestic hot water temperature is 40℃/45℃;
Nominal partial heat recovery mode, entering/leaving domestic hot water temperature is 45℃/50℃.

4, Two basic modules are available for the unit and they can be combined freely on customer demand.

Correction coefficient table for cooling condition

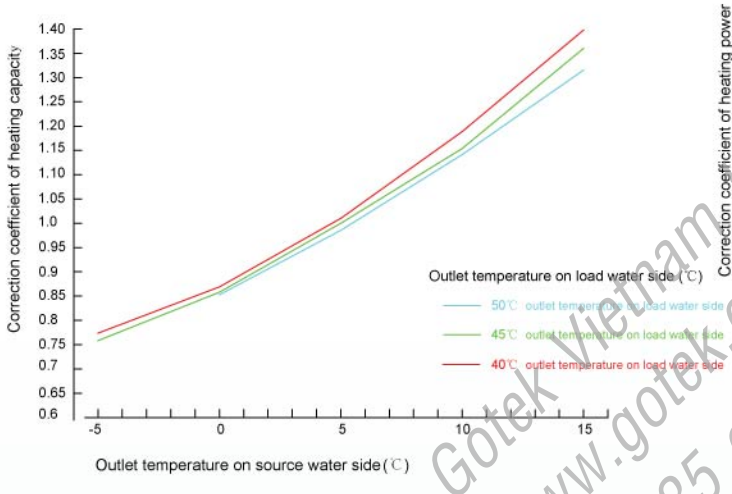


Note: This figure takes 1 as the coefficient of cooling capacity with source water outlet temperatureat 30℃ and load water outlet temperature at 7℃.

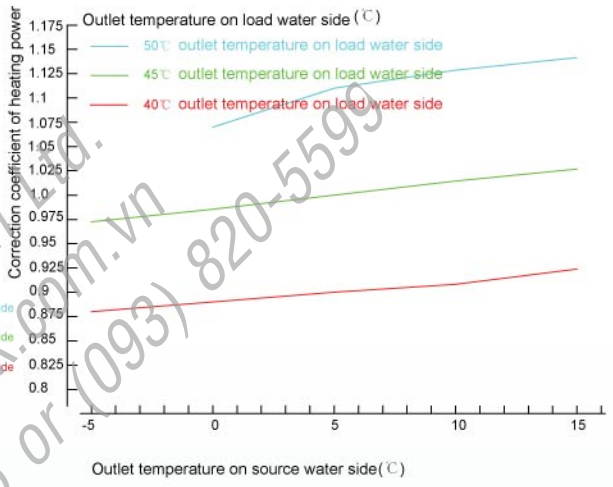


Note: This figure takes 1 as the coefficient of cooling power input with source water outlet temperature at 30℃ and load water outlet temperature at 7℃.

Correction coefficient table for heating condition



Note: This figure takes 1 as the coefficient of heating capacity with source water outlet temperature at 5℃ and load water outlet temperature at 45℃.



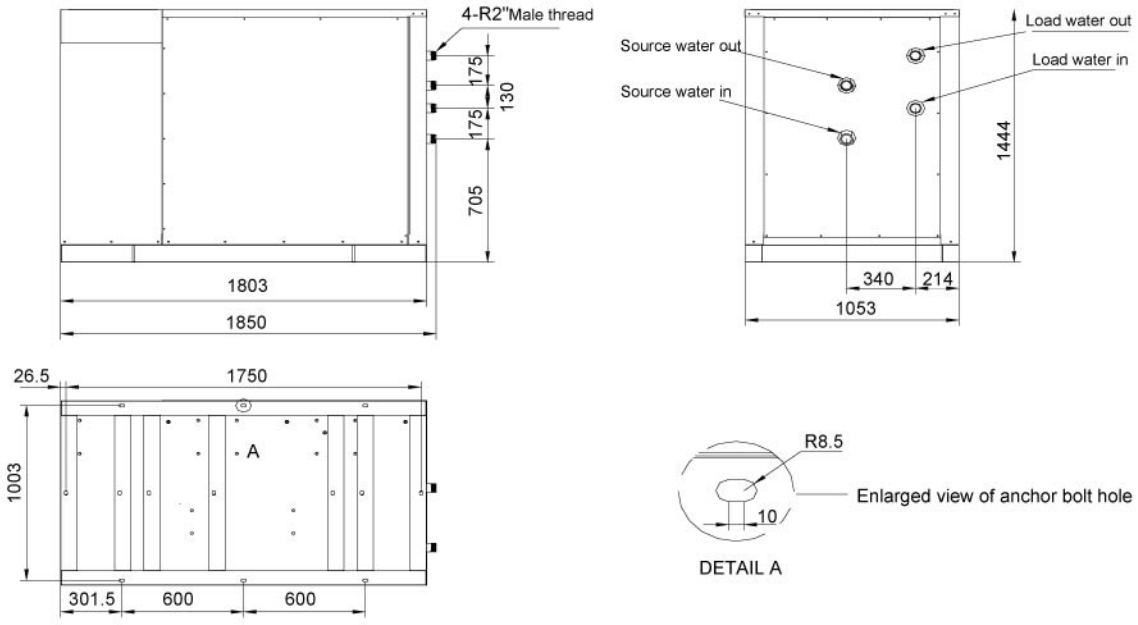
Note: This figure takes 1 as the coefficient of heating power input with source water outlet temperature at 5℃ and load water outlet temperature at 45℃.

Notes: 1. The data in the figure is for reference only. The actual varying operating parameters may vary a little with compressor model.

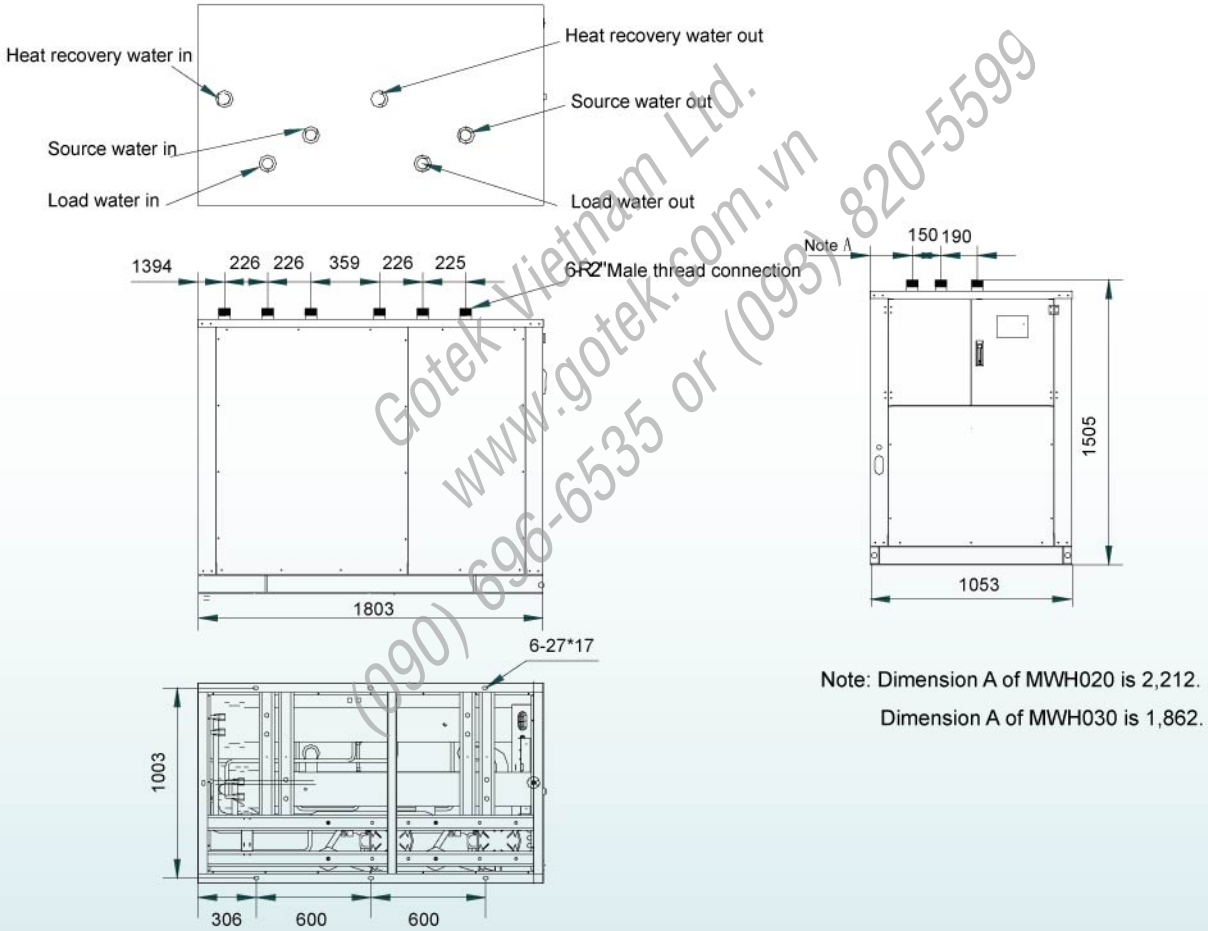
2. The data in the figure is obtained from the actually selected compressor model.

3. The correction data can not exceed operating scope of the compressor.

Overall dimension drawing for MWH020//030 single module

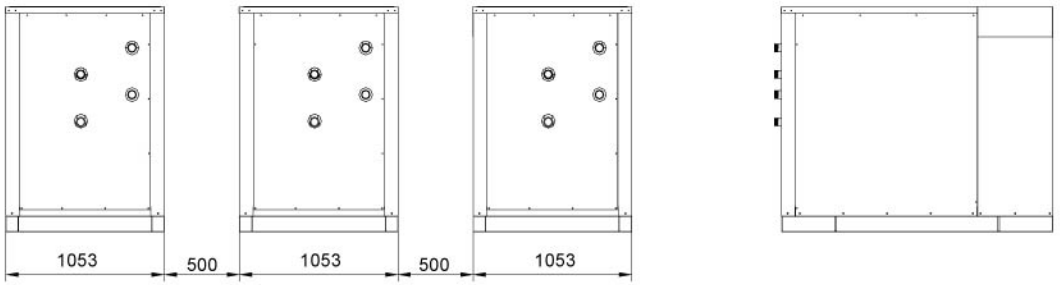


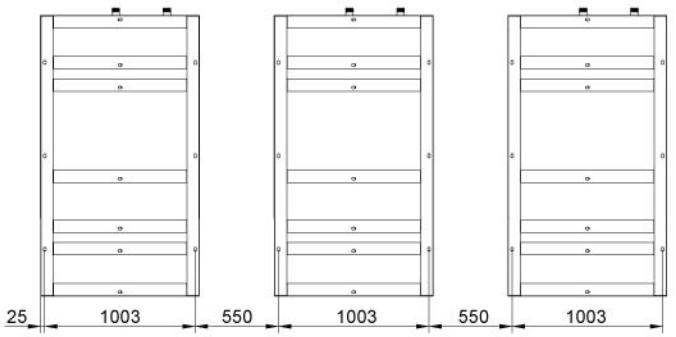
Dimensional drawing of MWH020/030 partial/total heat recovery unit



Note: Dimension A of MWH020 is 2,212.
Dimension A of MWH030 is 1,862.

Schematic layout of module combinations





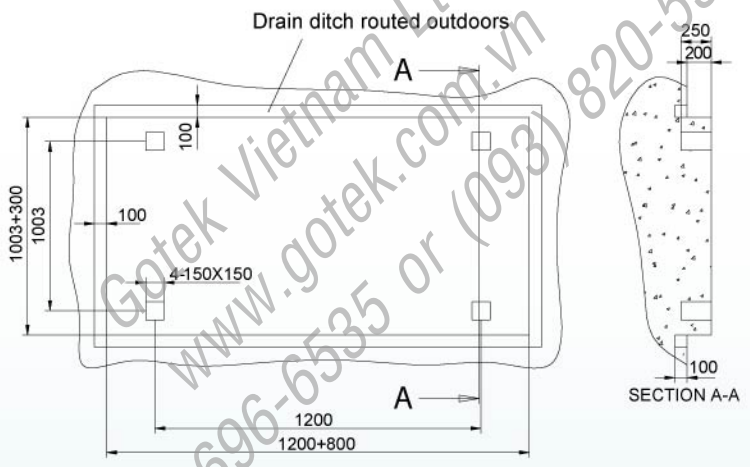
Technical requirements:

1.When installing, a 500 mm clearance should be left between adjacent units for easier installation and maintenance.

2.For single unit, R 2" joints should be used for its water inlet and outlet pipes. It is recommended that DN125 and above water mains are used for connection.

3.When the unit is not operated long in winter, please drain water in it.

Single Module



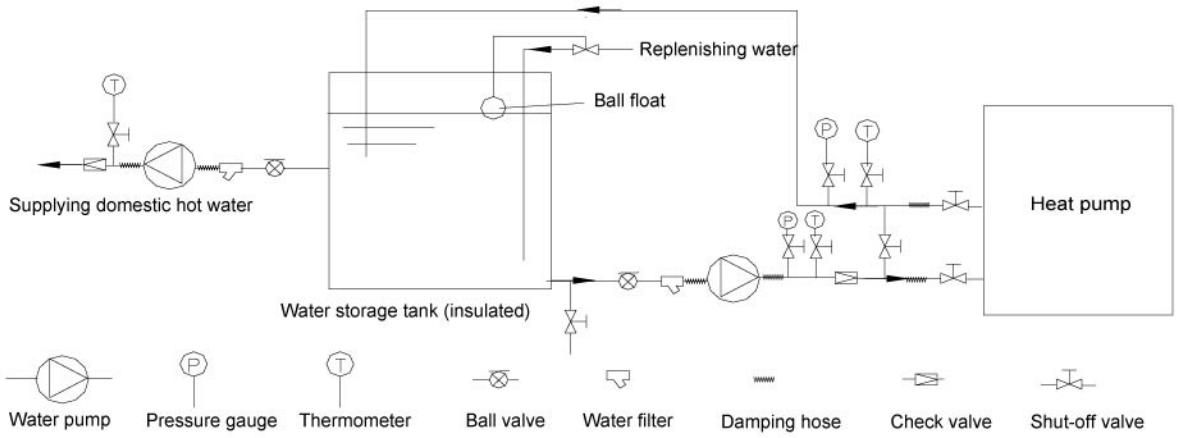
Description:

1, Use M 16 embedded bolts.

2, The channel steel underframe on which the unit is placed should be self-made by the user referring to the overall dimensions of the unit.

3, When fitting the unit with the channel steel underframe together, put 300×200×10 rubber pads for damping.

1. The foundation should be prefabricated according to the construction drawings and installation instructionsof the unit. The location of the foundation must ensure enough spaces for operation and maintenance of the unit.
2. When handling, ensure balance of the unit, select proper hoisting points, and never lift or lower it suddenly or shake it severely. During handling, the inclination of the unit should not be greater than 30°
3. Load water and cooling (heating) source water must be treated before entering the unit. They can not flow through the unit heat exchanger during cleaning of water lines; instead, shorting them before cleaning so as to ensure servicelives of the unit and water pipelines.
4. Both water inlet and outlet pipes of the unit should be fitted with a damping joint and a thermometer, and a pressure gauge and a Y-shaped filter should be added to the water inlet pipe.
5. To ensure normal operation of the unit, an expansion drum or expansion tank must be equipped in the system and the former must be located more than 1.5 m higher than the highest level of the whole water system.
6. Select the topmost position and arrange the vent valve there and set the vent pipe to an appropriate position for draining residual water on water side after seasonal shutdown.
7. All electrical equipment on the unit should be grounded securely.
8. Refer to the following figure when a sanitary hot water tank is equipped：



When the customer is using domestic hot water, the water level in the water storage tank will drop and the replenishing valve will open when a certain water level is reached. The water pump of the unit will turn on to allow the heat pump unit to heat it when the domestic hot water temperature is too low due to increase in water replenishment. When the set temperature is reached, the water pump of the unit will stop operation.

Nomenclature

C B G
1 2 3

1: Refrigerant: C represents R22 refrigerant and B represents R407C refrigerant.
2：Product code: A: First generation product; B: Second generation product.
3：Operating condition options of the unit: G-Ground loop condition;
U-Ground water condition; C-Water loop condition.

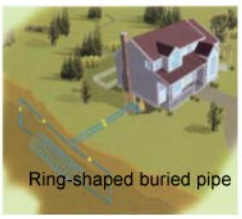
A vertical buried loop system features soil source heat exchange equipment of a considerable scale composed of a certain number of loop pipelines vertically laid under the ground surfaceto a certain depth. Loop pipelines are generally made up of high-density polyethylene pipes.The loop should be put in predrilled 100~150 mm pores first. All vertical pores should be solid filled by means of bentonite grouting. Pore depth is one of the parameters for determing amount of heat exchange and size of loop and generally depends on local soil conditions and subsurface temperature. Vertical buried loops can be divided into parallel and serial types. A parallel system requires smaller pipe diameter, shorter pipe ring, and lower operating cost.


Vertical buried pipe

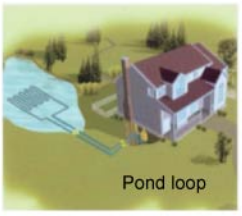
A horizontal buried loop system features soil source heat exchange equipment of a considerable scale composed of a certain number of loop pipelines horizontally laid under the ground surface to a certain depth. Its loop length is increased by 15%~20% when compared with a vertical buried system because of effects of ground surface temperature fluctuations. It is suitable for dwelling houses with large garden plots and buildings with large areas because horizontal burying requires no drilling so that its total cost is lower than vertical burying. Horizontal buried loop systems can also be divided into parallel and serial types.


Horizontal buried pipe

Ring-shaped buried pipes are made up of uncoiled pipe coils with each pipe ring lapping over the next. The ring-shaped loop can either be put in a narrow trench dug by a trencher or be placed flatly in a wide trench dug by a backhoe. Such form of pipe burying is as effective as vertical burying or horizontal burying. Ring-shaped pipe burying requires smaller site than horizontal pipe burying.


Ring-shaped buried pipe

Pond loop systems can be installed in ponds or lakes. To keep residential systems functioning well, generally, sizes of ponds must be over 4,000 m2 with depths over 4.6 m. Installation cost of such a system is low. Each pipe ring is a pipe coil which is connected to a common channel and then floated in a pond or lake and which will go underwater immediately after being filled with water. Satisfactory operating results can thus be ensured even when the water surface is frozen in winter.


Pond loop

An open-type loop system extracts water from a water source such as water well, lake or river and then delivers it directly into a heat pump or loop. The water discharged from the heat pump or loop heat exchanger returns to the water well, lake or river in turn. With enough water intake depth, the water temperature in the open-type system can be maintained around 15℃ throughout the year so that the unit achieves high energy efficiency. Certain treatment must be made to the source water of the open-type system before it enters the unit so as to prevent unfavorable conditions such as corrosion and scaling of the unit heat exchanger.


Open-type loop

In summer, the auxiliary heat source loop can emit heat to the surroundings through a cooling tower; in winter, a special Mammoth auxiliary heat source heat pump unit or an auxiliary heat source such as a boiler can be used to supply heat. In case an underground buried pipe loop or underground water can not be used or number of underground buried pipes or amount of underground water is limited, it can be used as an auxiliary cold/heat source.


Auxiliary heat source loop