VICOT SOLAR TECHNOLOGY CO., LTD.

Add：Hongdu Road, Dezhou Economic
Development Zone, Shandong, China
Tel：+86 531 8235 5568/5566/5752
Fax：+86 531 8235 7911
Email: export@vicot.com.cn
www.vicot.com.cn

VICOT

VICOT SOLAR TECHNOLOGY CO., LTD.

HEATING & DHW

Gas Fired Absorption Heat Pump (GAP)

HEATING & DHW

Gas Fired Absorption Heat Pump

MESSAGE FROM PRESIDENT

To make our private life be meaningful, make products and service good for society and benefiting our staff & society is Vicot founders common sense in our mission and honor at the beginning of Vicot establishment. Vicot has been having many supports from friends and clients and growing up in the market, basing on the pursuit of life meaning and enterprise value. With those precious supports, we deeply understand a person or a team who is striving for dream is not alone in the process of adventure. The gas and/or solar fired air source absorption heat pump (GAP) and solar boiler as Vicot R & D achievement from many years' of intelligence, vigor and capital input, perfectly express Vicot's pursuit of value.

GAP represents the most advanced productivity, broke the limit of solar and air source energy industry, combines three types of clean energy in the commercial and industrial application in the same time, extends the application field of clean energy in a milestone way and proves Vicot capability of creating industry benchmark with its technology patent achievements. GAP also stands for the clean energy's increasing powerful impact to human daily life, the earth is for us and for our next generations also, clean energy will become the prevailing main energy with its incomparable advantage of environment protection and serve more people, more districts and benefit the planet environment.

There were many difficulties in the process of the R&D and manufacturing of new products, but we remained in firm confidence. We are sure that we will win a better tomorrow no matter how painful is the process, because we have the industry technology and production experience accumulated in many years and the pursuit of product value. Now, the era creating product is right here, it stands for bigger market, more harmonious relation between human and nature and more magnificent behavior. Those new products in the clean energy industry will bring the true sense of honor to their innovator, manufacturer, distributor and user. We are striving for a better earth!

MISSION

ONE DREAM ONE TEAM
FOR STAFF FOR SOCIETY

VISION

THE SAME BREATH
ENERGY SAVING TOGETHER

KEY CAPABILITY

SATISFY THE CLIENTS'
DEMAND OF VALUE
CREATIVITY QUALITY SERVICE
SOCIAL RESPONSIBILITY

Vicot Certificate & Award

2010 Verification report proves that Vicot's research has obvious and international leading creativity and benefit of energy saving and environment protection, issued by Shandong Economy & Information Committee.

2010 Scientific Technology Achievement verification certificate awarded by Shandong Provincial Science & Technology Department.

2011 National Energy Science Progress 3rd Prize award by China National Energy Administration.

2012 Vicot Cooling & Heating Source System assessment report issued by Construction Environment & Equipment Branch of China Engineering and Consulting Association, all experts has the conclusion that Vicot's research has technology creativity with obvious benefit of energy saving and environment protection, is a significant breakthrough and reaches international leading level.

2013 Shandong Construction Technology Creation 1st Prize,

2013 Vicot participates the Solar Cooling Research of "The 12th Five Year Plan" National Science and Technology Support Scheme,

2013~2014 150 nos. of national invention patent and utility patent approved,

2015 National Construction Committee Science Progress Prize awarded.

2015 The 4th time of "Quality Management System Certificate" and "Environment Management System Certificate" approved.

PATENT LIST OF GAP

No.	Description	Patent No.
1	A solar and air source type absorption heat pump device	ZL 2012 1 0361473.5
2	Solar direct driven ammonia water absorption air source heat pump air conditioning system	ZL 2012 2 0597315.5
3	A complete metal type frame box for air conditioning unit	ZL 2013 2 0054212.9
4	An absorption heat pump with auxiliary defrost	ZL 2013 2 0055451.6
5	A modular type absorption air conditioning unit	ZL 2013 2 0055417.9
6	Manifold and absorber	ZL 2015 2 0848297.7
7	Generator, water storage device and absorption type gas heating device	ZL 2015 2 0846616.0
8	Rectifier	ZL 2015 2 0846571.7
9	Water circuit in heating system	ZL 2015 2 0874295.5
10	Combustion chamber base and burner	ZL 2015 2 0874356.8
11	Orifice assembly	ZL 2015 2 0909833.X
12	Combustion chamber and generator	ZL 2015 2 0915187.8
13	Threaded tube type absorber	ZL 2016 2 0090436.9
14	Dual energy absorption type air conditioning unit	ZL 2016 2 0024695.1
15	Direct fired type high efficiency generator	ZL 2015 2 1056377.5
16	Heat recovery device in absorption unit	ZL 2016 2 0026849.0
17	A hollow pipe scoring machine	ZL 2016 2 0090439.2
18	Threaded tube type absorber and its manufacturing method and manufacturing equipment	ZL 201610062176.9
19	A working medium concentration control method for gas fired absorption heat pump m	ZL 201610024760.5
20	Heat recovery device for absorption unit	ZL 201610018826.X
21	Dual energy absorption type air conditioning unit	ZL 201610017203.0
22	Combustion chamber and generator	ZL 201510788823.X
23	Combustion chamber base and burner	ZL 201510742380.0
24	Pressure control method, device in hot water supply circuit and hot water supply circuit	ZL 201510744259.1
25	Metal anti corrosion substance and its application	ZL 201510732054.1

SHORTNESS
Efficiency is only around 90%

GAS BOILER

ADVANTAGE
Driven by primary clean energy natural gas, energy cost is lower

SHORTNESS
- Driven by secondary energy, electricity, the energy cost is high and consumption is huge.
- Not able to start normally when ambient temperature is low
- Adopts HFC refrigerant, harmful to environment.

ELECTRIC COMPRESSOR TYPE AIR SOURCE HEAT PUMP

ADVANTAGE
Adopts heat pump technology, gets air source energy freely

Natural gas + Air source energy

Perfect combination of two technologies' advantage

GAP + Solar energy

Solar energy

Renewable energy input Solar energy 50%

Air source energy

Renewable energy input Air source energy 50%

Solar energy + Air source energy

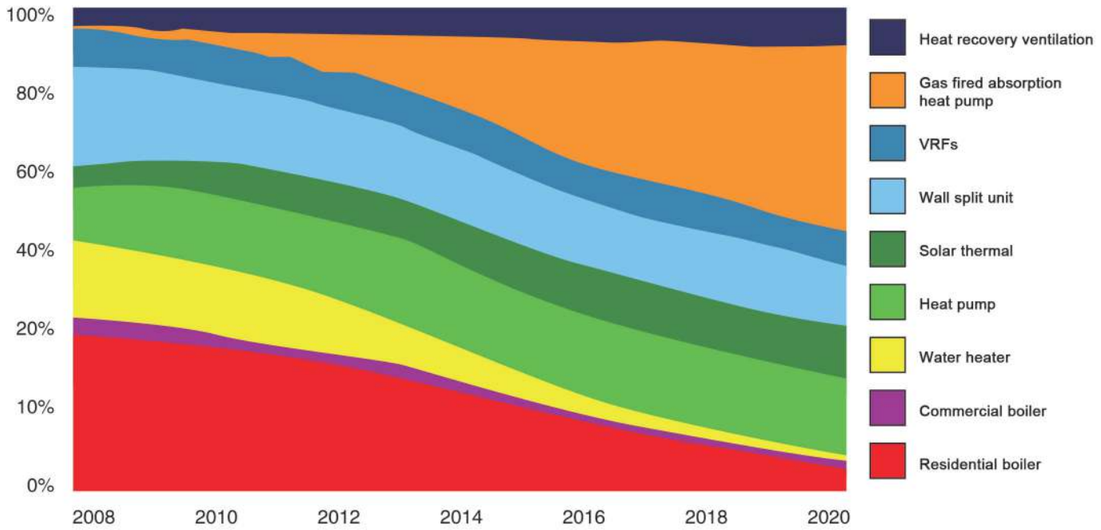
Total energy 100%

Total heating capacity 65.8 kW

VICOT GAP efficiency and the application of renewable energy

GAP Market Analysis

Vicot chooses to develop the absorption heat pump technology in HVAC market in the be–ginning of 21st century. This choice is based on the forecast and confirmation of the HVAC market of next 10 years.



Absorption technology efficiency development history

1850
French engineer Ferdinand P. E. Carre made the 1st R717 absorption cooling unit that works intermittently in 1850.

1920
C. Munters and B. Von Platen made R717 absorption refrig-erator in 1920.

1969
The small size R717 absorption chiller started to enter market in 1969, unit efficiency is less than 30%, R717 ab-sorption technology development is slow while the compressor type air conditioning unit got the market with high efficiency.

1998
High efficiency gas fired R717 absorption unit was born, unit efficiency was increased to 62% in 1998.

2008
Vicot started to develop the high efficiency gas fired R717 ab-sorption chiller with cooperation of an American organization, unit efficiency 80%.

2009
Vicot 85% efficiency solar R717 absorption chiller en-tered the market in 2009.

2011
Vicot dual energy, gas / solar, R717 absorption heat pump entered the market in 2011.

2012
Vicot 180% gas fired R717 absorption heat pump was launched in market in 2012.

2017
Vicot “Frost Free” heat pump was launched into market in 2017.

HEATING & DHW

Gas Fired Absorption Heat Pump

Utilization of natural gas and air source energy, good for environment protection

- Each GAP unit can annually save 55.434 Tons of standard coal, Reduces 136.922 tons of CO_2 emission, in equivalence of planting 19,528 trees.
- Vicot annually produces 12000 sets of GAP, it can save 665208 tons of standard coal and save 665208 tons of standard coal, reduces 1643064 tons of CO_2 emission, in equivalence of planting 234336000 trees,
- SO_2 emission concentration 9 mg/m^3, NO_x emission concentration 27 mg/m^3, particle concentration 2.3 mg/m^3, smoke blackness <1 Ringelmann.

检 验 报 告

TEST REPORT

国空质检（委）字（2013）第A071号

产品名称 Name of Product 太阳能/燃气型 GAX 高效吸收式（热泵）机组

委托单位 Client 山东威特人工环境有限公司

生产单位 Manufacturer 山东威特人工环境有限公司

检验类别 Test Category 委 托 检 验

国 家 空 调 设 备 质 量 监 督 检 验 中 心

National Center of Quality Supervision and Inspection and Testing For Air Conditioning Equipment

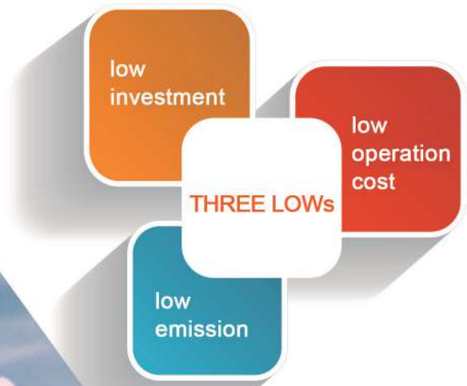
国家空调设备质量监督检验中心

检 验 报 告

国家空调设备质量监督检验中心

检 验 报 告

VOCT GAP FEATURE



HEATING & DHW

Gas Fired Absorption Heat Pump

LOW INVESTMENT

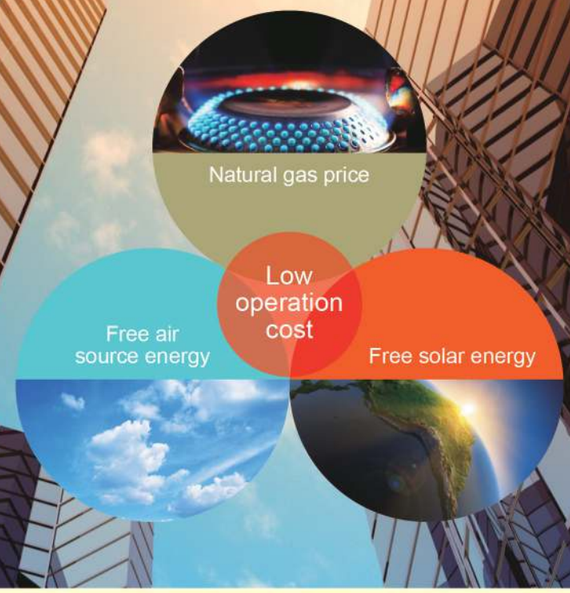
- **Durable in low ambient temperature, less capacity attenuation**
  VICOT GAP can operate durably in - 30 ℃, less capacity attenuation, high output capacity, the total equipment quantity is less for same load and investment is less.

- **Frost free, no attenuation**
  Vicot GAP adopts frost free technology, there is almost no frost in the most severe condition of 0 ℃ 95%. No frost attenuation and the total equipment quantity is less for same load and investment is less.

- **No secondary network**
  It can directly installed on the roof of the building for heating, no secondary network is required and low investment.

- **Modular combination, stepless energy adjustment**
  single unit or multiple units can be applied, it effectively reduces investment.

LOW OPERATION COST



- Uses cheaper primary energy;
- Uses free air source energy, COP up to 1.8;
- No frost attenuation;
- GAP can be installed on the roof of the building for heating, no heat loss of large scale heating network and secondary network;
- GAP adopts frost free and low ambient durable technology, its capacity is improved to against low temp. and high humidity ambient, the natural gas consumption is dramatically reduced;
- GAP modular combination, stepless energy regulation, the unit number can be adjusted according to room heating load with stepless energy regulation, avoids the waste of heat.

LOW EMISSION

- GAP adopts heat pump principle, natural gas consumption amount is 45% of conventional boiler, and emission is reduced by 55%.
- GAP adopts advanced premixing combustion technology, the nitrogen oxide emission is in international leading level.

GAP EMISSION AMOUNT

Unit: mg/m³

Emission description	National boiler standard	National coal power plant standard	Emission standard of boiler in Beijing	Gas fired absorption heat pump
SO_2 emission concentration	50	35	10	9
NO_x emission concentration	150~200	100	30	27
particle concentration	20	5	5	2.3
smoke blackness	≤1	≤1	≤1	<1

Reference standard

GB13271-2014 Newly built boiler requirement in boiler emission standard

GB13223-2011 Coal fired power plant emission standard

DB11/139-2015 Emission standard of boiler in Beijing

监 测 报 告

编号：德环监字 2016 年 第 0427 号

项目名称：废气

监测类别：委托监测

委托单位：山东奇威特太阳能科技有限公司

委托单位地址：德州市经济开发区红都路

报告日期：2016 年 08 月 16 日

德州市环境保护监测中心站

德州市环境保护监测中心站

烟尘（生产性排尘）、烟气监测结果报告表

SAFE FROM INVESTMENT RISK

- Vicot GAP can be installed in steps after the building construction done, it can effectively increase the client's capacity against investment risk and reduce capital cost.

SAFE FROM OCCUPANCY INSTABILITY

- Occupancy instability is out of control of heating supply company, it is a business killer.
- VICOT GAP can work in single unit or multiple units, with stepless capacity adjustment, it fundamentally improves the heating supply company's capacity against occupancy instability, converts "out of control" into "under control" and increases stability of making profit.

REMOTE CONTROL, ACTIVE SERVICE

- Each GAP has intelligent CPU, the GAP operation status can be monitored through internet in Vicot headquarter;
- The unit operation can be set via remote control, the operation cost can be maintained in economic way;
- The unit operation status can be viewed via remote control;
- Remote system has automatic error alarm function, Vicot will solve the error through remote control network when there is error, or send our aftersales team to site for maintenance, and the customer will be worry free for operation.
- The unit self-diagnosis function can be controlled and unit will have self-diagnosis after operation of certain period and adjust the problem occurs during operation.

HEATING & DHW

Gas Fired Absorption Heat Pump

VGAHR065、VGAHR065 PARAMETER

Item		Unit	Specification
Nominal heating capacity		kW	65.8
Water flow rate		m^3/h	⩾4
Water side pressure drop		kPa	⩾60
Minimum water inlet temp.		℃	9
Maximum water outlet temp.		℃	65
Ambient temp.	Max. temp.	℃	43
	Min. temp.	℃	–30
Rated thermal input		kW	33.9
Thermal input adjustment range		kW	14~37.7
Rated natural gas consumption		m^3/h	3.6
Gas consumption range		m^3/h	1.5~4.0
Power supply			380V/3Ph/50Hz
Electricity power input		kW	1.25
Unit weight		kg	980
Noise		dB(A)	54
Pipe size	Water pipe (threaded)	In	Rc1 1/4
	Gas pipe (threaded)	In	Rc 1/2
Unit dimension	Length	mm	2380
	Width	mm	1380
	Height	mm	2200
Installation distance		mm	⩾1000

Notes:

① Nominal heating capacity: ambient dry bulb temperature 7 ℃/ ambient wet bulb temperature 6 ℃， water outlet temperature 45 ℃, there will be certain change of heating capacity in different ambient temperature;

② Natural gas lower heating value 34.02 MJ;

③ Test condition: natural gas static pressure 2.5 kPa;

④ The noise value is the average value in 5 meters away from the unit;

⑤ The specification is subject to the value in rating label, and no prior notice before any change.

REFERENCE PROJECTS

HEATING & DHW

Gas Fired Absorption Heat Pump

★ Xianfeng community, Beijing

- Building area: 34500 m^2
- Terminal type: Floor heating
- GAP nos.: 24 sets
- Location: Changpingdong street No. 52, Beijing
- Heat source: GAP
- Date of operation: November 15 2017

Operation analysis:

The GAP system started on Nov. 15 2017 and switched off on March 19 2018, the heating period is 125 days, natural gas consumption is 146600Nm^3, electricity consumption is 123400kW. It consumed natural gas 4.24Nm^3 and electricity 3.57kW for each square meter in the heating season. And the room temperature was kept at 21~22 ℃ according to the remote temperature recording meter in four apartments of this community.

REFERENCE PROJECTS

★ Shuiandongfang community, Tangshan

- Building area: 140000 m²
- Terminal type: Floor heating
- GAP nos.: 67 sets
- Location: Hanqiao Road No. 8, South District, Tangshan, Hebei
- Heat source: GAP
- Date of operation: November 15 2017

Operation analysis:

The GAP system started on Nov. 15 2017 and switched off on March 24 2018, the heating period is 130 days, natural gas consumption is 457000 Nm³, electricity consumption is 405000 kW. It consumed natural gas 4.35 Nm³ and electricity 3.86 kW for each square meter in the heating season. And the room temperature was 21 ℃ according to measurement in the apartments.

★ Lingnanzhuangyuan

- Building area: 46000 m²
- Terminal type: Floor heating
- GAP nos.: 28 sets
- Location: Nansanhuan, Shijiazhuang
- Heat source: GAP
- Date of operation: November 25 2017

Operation analysis:

The GAP system started on Nov. 13 2017 and switched off on March 14 2018, the heating period is 121 days, natural gas consumption is 140300 Nm³, electricity consumption is 110400 kW. It consumed natural gas 4.01 Nm³ and electricity 3.1 kW for each square meter in the heating season. And the room temperature was above 20 ℃ and the heating was highly comfortable according to the feedback from the apartment owners.

REFERENCE PROJECTS

★ Hehemeijia community

- Building area: 122000 m²
- Terminal type: Floor heating
- GAP nos.: 47 sets
- Location: Tianshanda street, Shijiazhuang
- Heat source: GAP + gas boiler

★ Huanghua Press

- Building area: 18900 m²
- Terminal type: Radiator
- GAP nos.: 18 sets
- Location: Huazhong street, Huanghua, Hebei
- Heat source: GAP + gas boiler

★ Binhe Garden, Xinmi City

- Building area: 380000 m²
- Terminal type: Floor heating
- GAP nos.: 21 sets
- Location: Gegou village, Pingmo Town, Xinmi City, Henan
- Heat source: GAP

REFERENCE PROJECTS

★ Beidaihe Town, Vanke

- Building area: 35000 m²
- Terminal type: Floor heating
- GAP nos.: 10 sets
- Location: Nanda street, Beidaihe, Qinhuangdao, Hebei
- Heat source: GAP + gas boiler

★ Zhoujia community

- Building area: 52000 m²
- Terminal type: Floor heating
- GAP nos.: 28 sets
- Location: Zhoujia community, Shouguang, Weifang
- Heat source: GAP

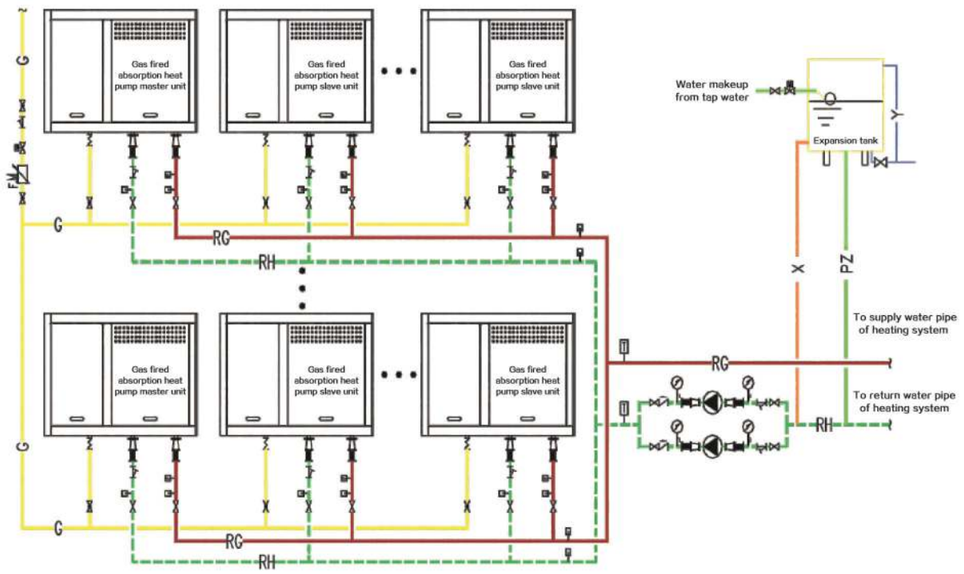
HEATING & DHW

Gas Fired Absorption Heat Pump

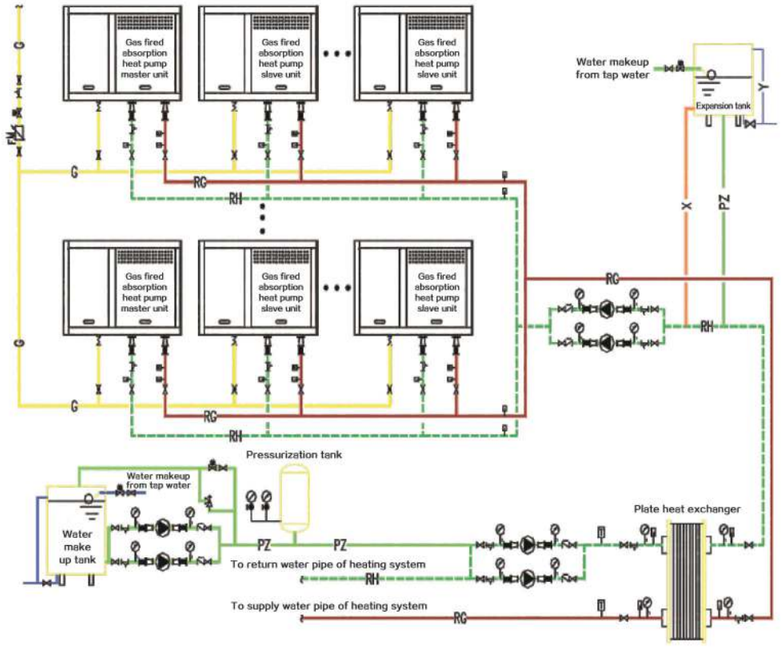
PART OF REFERENCE PROJECTS

Community	Building area (m²)	Terminal type	Nos. of GAP (SETS)	Heating equipment
Yuanmingxinyuan	140000	Floor heating	97	GAP
Jinyulanwan	84000	Floor heating Radiator	48	GAP
Road Branch of Communication Bureau	30000	Radiator	28	GAP+gas boiler
No. 4 middle school of Huanghua	30000	Radiator	26	GAP+gas boiler
Living building of real estate bureau, Huanghua	20000	Radiator	16	GAP+gas boiler
Nursing home of Huanghua	18000	Floor heating	14	GAP+gas boiler
Living building of Food Bureau	24000	Radiator	20	GAP+gas boiler
Kangxinyuan	60000	Floor heating	38	GAP+gas boiler
Jingang Garden	40000	Floor heating	24	GAP
Medical company & its commercial building	12000	Radiator	10	GAP+gas boiler
Dormitory of Tgood industrial park	42000	Radiator	35	GAP
Wenxindasha	60000	Floor heating	45	GAP
Guojiaxin Village	12000	Floor heating	12	GAP
Sandu community	20000	Floor heating	15	GAP
Zhongchenguanjingyuan	25000	Floor heating	18	GAP+gas boiler

DIRECT HEATING SYSTEM PRINCIPLE DIAGRAM



INDIRECT HEATING SYSTEM PRINCIPLE DIAGRAM



DIRECT HEATING SYSTEM PRINCIPLE DIAGRAM -- APPLICABLE RANGE EXPLANATION

The direct heating system is suitable for:

1. GAP to be placed on ground or the roof of low-rise building;
2. The building with heating area divided into high and low area, GAP to be placed on the roof for direct heating to high area.

INDIRECT HEATING SYSTEM PRINCIPLE DIAGRAM -- APPLICABLE RANGE EXPLANATION

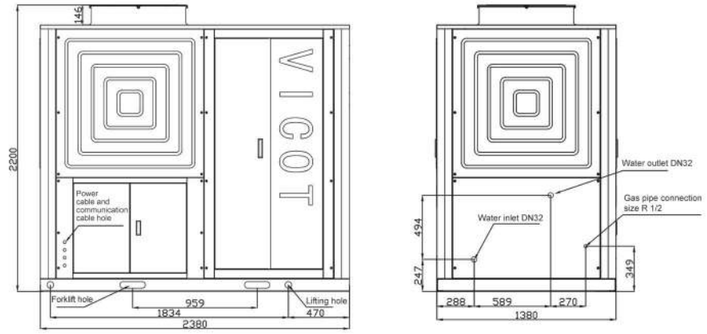
The indirect heating system is suitable for:

1. The building with heating area divided into high and low area, GAP to be placed on the roof for heating to low area where the indoor terminal is not suitable for direct heating due to pressure bearing.
2. When the GAP pressure bearing is above 1.6 MPa.

HEATING & DHW

Gas Fired Absorption Heat Pump

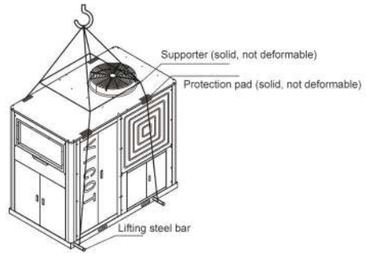
UNIT DIMENSION



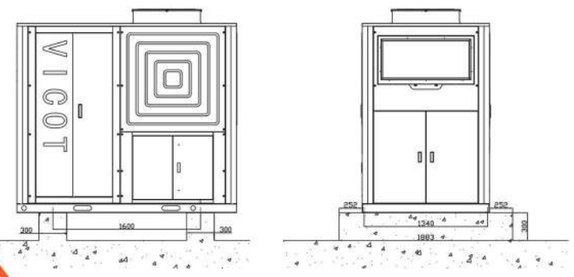
Installation instruction
——Unit lifting requirement

Unit is already R717 charged, transportation and handling should be careful to avoid unit damage due to improper operation. Expanding rod lifting, lifting rope, protection pad should be used, no direct contact of lifting rope on the unit panel and frame.

The unit should be kept in balance during handling.

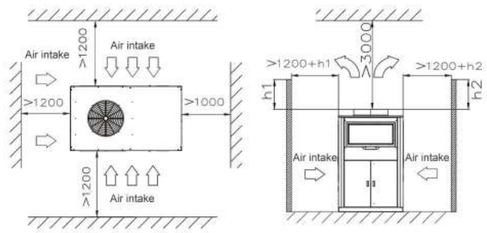


Lifting diagram



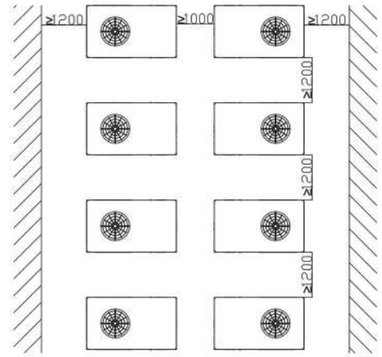
Installation requirement

A. Single unit installation diagram



Minimum surrounding space diagram

B. Modular units installation diagram



Minimum surrounding space diagram when modular installation

HEATING & DHW

Gas Fired Absorption Heat Pump

ABOUT VICOT GROUP

Vicot Group is a high–tech corporation specialized in R&D, production, sales and service of new energy products;

Our production base locates in Solar City, Dezhou, China, has RMB600 million asset, designed annual production value reaches RMB5 billion;

Vicot main products are gas fired absorption heat pump (heating/hot water), solar boiler, solar absorption chiller, solar central heating system, solar central hot water system etc;

Vicot is awarded for many honors such as National Energy Progress 3rd Prize, China Huaxia Construction Science Technology Prize and National Construction Committee Science Progress Prize.

Vicot has 150 nos. of national invention patent and utility patent approved or in the process of approval, and certificates of ISO9001 quality management system and ISO14001 environment management system. The product with international level quality is ensured with strict process control and complete quality management system;

With the vision of “one world, one blue sky”, the corporate focuses on effective utilization of solar energy, air source energy and other renewable energies in construction energy saving heating and industrial energy saving thermal application, strives for technology creation achievement of international new energy application industry.

In accordance with the mission “One Dream, One Team, For Staff, For Society”, Vicot group will make continuous progress in the new energy field and sincerely cooperate and make progress with all the social sectors with quality product, perfect service with a broad mind in a great and firm spirit, and dedicates to creating a happier and richer future for partners, clients and our earth.