



caring for the environment

*The most efficient and easiest solution
for heating with renewable energy*



Absorption heat pumps and chillers
powered by natural gas and renewable energy

www.robur.com
export@robur.it

Always close to our Customers

Robur Pre-Sales Service

T +39 (0)35 888 111 presales@robur.it

Robur Technical Support

T +39 (0)35 888 111 cst@robur.it



- Company, corporate values, awards and certifications

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- Guidelines for choosing Robur solutions
- ErP label for your best choice

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- Absorption technology efficiency evolution
- What is the Robur GAHP Gas Absorption Heat Pump powered by renewable energy
- Good reasons for choosing the Robur GAHP Gas Absorption Heat Pumps
- The value of experience: best applications

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- Gas absorption heat pumps powered by renewable energy
- Gas absorption chillers also with heat recovery
- Gas condensing boiler for outdoor installation
- Complete systems with gas absorption heat pump powered by renewable energy
- Trivalent integrated outdoor packages
- Control systems
- Accessories and system components

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ROBUR VALUES

Mission

Robur is dedicated to dynamic progression in research, development and promotion of safe, environmentally-friendly, and energy-efficient products, through the commitment and care of its employees and partners

Vision

Robur turns THE LOVE FOR BEAUTY AND WELL-MADE THINGS into innovative heating and cooling systems that are especially designed and developed to answer the specific needs of Man

7 pillars

Sharing values
Training
Quality
Innovation
Service
Social responsibility
Testimony

The right choice can make the difference

A responsible purchase behaviour may have a great influence on our way of life.

Consider that a product consumes tons of oil during its whole life cycle, generating pollution that the forest cannot rebalance. That's why, when choosing a product, we take a great responsibility. Even the choice for the heating system may have a big impact.

To all who choose responsibly, Robur offers high efficiency heating systems with low environmental impact, and moreover concepts, data and facts to spread the culture of energy efficiency and environmental protection.



















Benito Guerra - Robur Chairman



ROBUR AWARDS AND CERTIFICATIONS

- 1995 - ISO 9001 Certification
- 2000 - First Prize Italian Quality Award
- 2001 - Robur is the first ISO 9001:2000 (Vision 2000) certified company in Europe in HVAC sector
- 2003 - Special Prize Winner of "European Quality Award"
- Robur, with its reversible Gas Absorption Heat Pump (GAHP) won the Technological Innovation Award
- 2004 - Benito Guerra, chairman of Robur, received a nomination as finalist in the "Quality of life" category of the National Businessman of the Year Award, promoted by Ernst&Young
- 2005 - ISO 14001: 2004 Certification
- CSA Certification (USA)
- 2006 - Honourable mention at AHR Expo Innovation Award sponsored by ASHRAE (American Society of Heating, Refrigerating and Air- Conditioning Engineers - USA)
- 2007 - Mentioned as best product category for GAHPs as part of the "Impresa Ambiente" Prize
- Special mention in Enterprise Prize for Innovation promoted by Confindustria (Italian Industry Association)
- 2008 - ROBUR Test Laboratories accredited by California Energy Commission - CEC
- GAHPs performances are tested by VDE and DVGW-Forschungsstelle
- 2009 - Special mention in the category Energy Efficiency Development Prize 2009 by the Foundation Sustainable Development and Ecomondo
- 2011 - It is supported by European Commission under the EU's Seventh Framework Programme for Research and Technological Development
- 2012 - GAHPs are tested by Engler-Bunte-Institut (EBI) of the Karlsruher Institut fuer Technologie (KIT)
- 2013 - GAHPs are tested by the Cetiat Laboratory in Lyon (EN ISO 17025)
- 2014 - The air-source GAHP has been presented at the European Parliament as one of the most innovative heating technologies during the Gas Week 2014
- 2016 - The GAHP is awarded as the Best Energy Efficient Product Award at SEAI 2016 in Dublin
- The company Robur is awarded with the Positive Business Award by the Business School Palo Alto

GUIDELINES FOR CHOOSING ROBUR SOLUTIONS

| SERVICE | ADVANTAGE | | APPLICATION |
|---|--|---|---|
| HEATING AND DOMESTIC HOT WATER PRODUCTION | HIGH EFFICIENCY USING RENEWABLE ENERGY | RENEWABLE ENERGY: AIR-SOURCE The most cost-effective renewable energy |   |
| | | RENEWABLE ENERGY: GROUND-SOURCE Ideal under severe climate conditions |   |
| | | RENEWABLE ENERGY: WATER-SOURCE Ideal where the use of water-source renewable energy is required |   |
| HEATING COOLING AND DOMESTIC HOT WATER PRODUCTION | HIGH EFFICIENCY USING RENEWABLE ENERGY | RENEWABLE ENERGY: AIR-SOURCE The most cost-effective renewable energy |   |
| | | RENEWABLE ENERGY: WATER-SOURCE Ideal where the use of water-source renewable energy is required |    |
| COOLING | IDEAL WHERE ELECTRIC ENERGY SUPPLY IS LIMITED | |  |
| | IDEAL IN HOT CLIMATES UP TO 50 °C | |  HIGH TEMPERATURE |
| | FOR DOMESTIC HOT WATER PRODUCTION FOR FREE DURING COOLING MODE | |   |
| SPECIAL APPLICATIONS | SIMULTANEOUS USE OF HOT AND COLD WATER | |  simultaneous |
| | PROCESS APPLICATION | |  |
| | REFRIGERATION | |  |

ROBUR ICONS GUIDE



HEATING



COOLING



DHW PRODUCTION



DHW PRODUCTION WITH HEAT RECOVERY

| ROBUR SOLUTION | P. | AVAILABLE ALSO AS |
|--|----|---|
| MODULATING AND CONDENSING ABSORPTION HEAT PUMP POWERED BY NATURAL GAS + AIR-SOURCE RENEWABLE ENERGY GAHP-A | 26 | <ul style="list-style-type: none"> - OUTDOOR (p. 26) or INDOOR (p. 30) installation; - pre-assembled units for higher capacity, combined with Robur chillers and/or boilers (from p. 28); - E³ A complete system (p. 54); - integrated outdoor package with condensing boiler Gitié AHAY (p. 56). |
| MODULATING AND CONDENSING ABSORPTION HEAT PUMP POWERED BY NATURAL GAS + GROUND-SOURCE RENEWABLE ENERGY GAHP-GS | 38 | <ul style="list-style-type: none"> - pre-assembled units for higher capacity (p. 40); - E³ GS complete system (p. 54). |
| MODULATING AND CONDENSING ABSORPTION HEAT PUMP POWERED BY NATURAL GAS + WATER-SOURCE RENEWABLE ENERGY GAHP-WS | 41 | <ul style="list-style-type: none"> - pre-assembled units for higher capacity (p. 43); - E³ WS complete system (p. 54). |
| REVERSIBLE ABSORPTION HEAT PUMP POWERED BY NATURAL GAS + AIR-SOURCE RENEWABLE ENERGY GAHP-AR | 32 | <ul style="list-style-type: none"> - pre-assembled units for higher capacity, combined with Robur chillers and/or boilers (from p. 34); - integrated outdoor package with condensing boiler Gitié ARAY (p. 56). |
| MODULATING AND CONDENSING ABSORPTION HEAT PUMP POWERED BY NATURAL GAS + WATER-SOURCE RENEWABLE ENERGY GAHP-WS | 41 | <ul style="list-style-type: none"> - pre-assembled units for higher capacity (p. 43). |
| GAS ABSORPTION CHILLER GA ACF | 47 | <ul style="list-style-type: none"> - pre-assembled units for higher capacity, combined with Robur heat pumps and/or boilers (p. 28-34-48); - integrated outdoor package with condensing boiler Gitié ACAY (p. 56). |
| GAS ABSORPTION CHILLER GA ACF HT | 50 | <ul style="list-style-type: none"> - pre-assembled units for higher capacity (p. 51). |
| GAS ABSORPTION CHILLER-HEATER WITH HEAT RECOVERY GA ACF HR | 44 | <ul style="list-style-type: none"> - pre-assembled units for higher capacity, combined with Robur heat pumps and/or boilers (p. 28-34-45). |
| MODULATING AND CONDENSING ABSORPTION HEAT PUMP POWERED BY NATURAL GAS + WATER-SOURCE RENEWABLE ENERGY GAHP-WS | 41 | <ul style="list-style-type: none"> - pre-assembled units for higher capacity (p. 54). |
| GAS ABSORPTION CHILLER GA ACF TK | 50 | <ul style="list-style-type: none"> - pre-assembled units for higher capacity (p. 51). |
| GAS ABSORPTION CHILLER GA ACF LB | 50 | <ul style="list-style-type: none"> - pre-assembled units for higher capacity (p. 51). |



SIMULTANEOUS PRODUCTION OF
HOT AND COLD WATER



PROCESS APPLICATION,
REFRIGERATION
AND COOLING IN HOT CLIMATES



AIR-, GROUND-, WATER-SOURCE
RENEWABLE ENERGY

EFFICIENCY AND ENERGY SAVING: ErP LABEL FOR YOUR BEST CHOICE

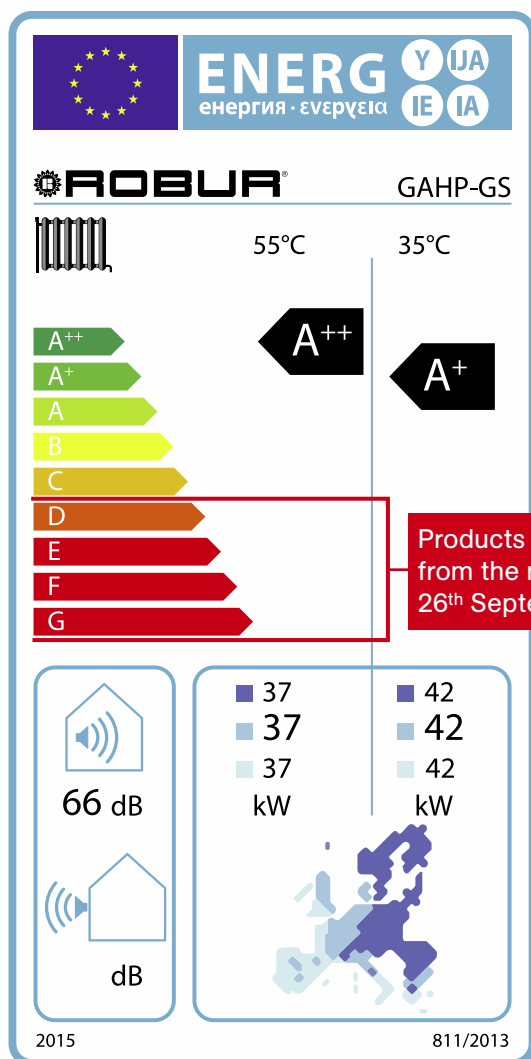
Robur researches, develops and manufactures high efficiency and sustainable heating solutions.

Robur is at the top of the ErP energy classification

What does ErP mean?

ErP - acronym for "Energy related Products" - refers to the European Directive to promote energy efficiency thus reducing energy consumption of heating and DHW-production appliances through eco-design.

The directive confirms the high standard of energy efficiency of Robur solutions.



Which are the advantages for the end user?

Thanks to the mandatory energy label, consumers can learn more about the features of the heating system and simply make their selection.

The energy label displays a scale of energy efficiency running from A++ to G and also provides information on the heat output and the noise emissions.

ErP: Do you know that ...?

From 26th September 2015, heating and DHW production appliances of up to 70 kW output must be marked with a label showing their energy efficiency (delegated regulation EU N 811/2013 - Energy Label).

Robur heat pumps powered by natural gas and air-, ground- and water-source renewable energy **are in A++ energy class** even in applications with radiators for system retrofitting.



The Robur **air-source** heat pump solutions are also designed and supplied **pre-assembled in packages achieving A++ energy class⁽¹⁾** even in applications with radiators for system retrofitting.



⁽¹⁾ As per calculation methods of EN12309.

ErP: Do you know that ...?

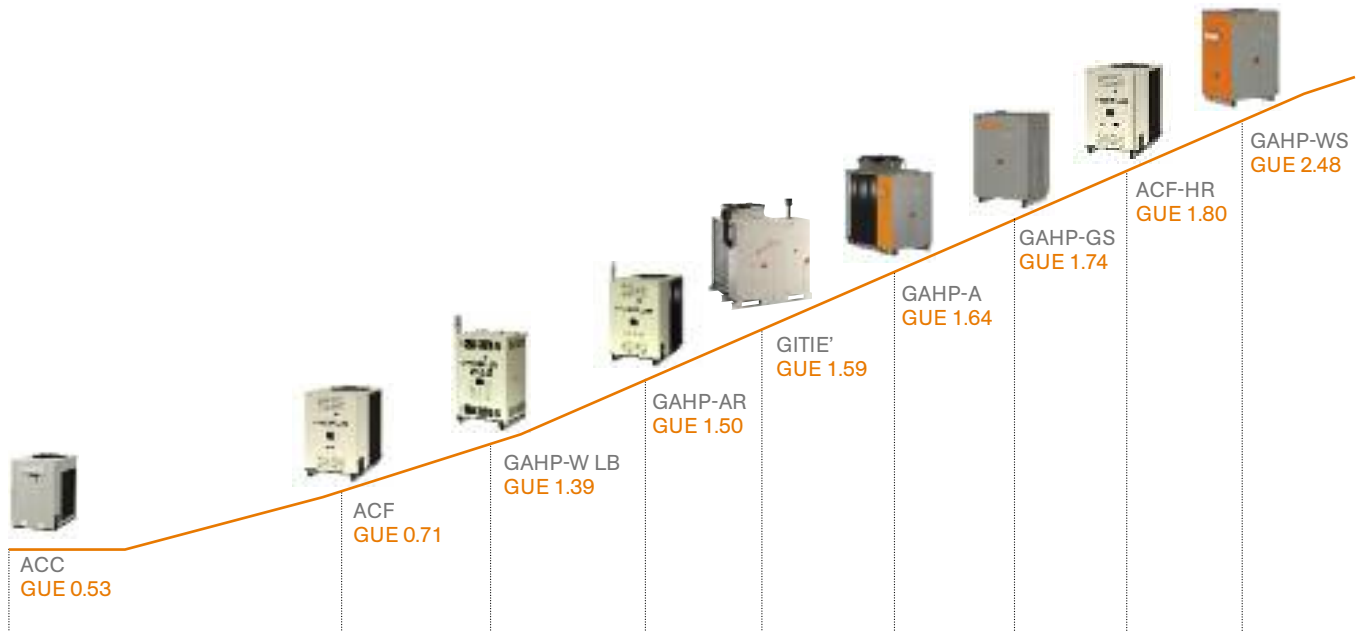
From 26th September 2015 heating packages of up to 400 kW output are required to meet the minimum energy efficiency and maximum sound emission limits (regulation EU N 813/2013 - Ecodesign).



University Church of England Academy, UK

ABSORPTION TECHNOLOGY EFFICIENCY EVOLUTION

A key technology with a great potential for innovation



GUE - Gas Utilization Efficiency

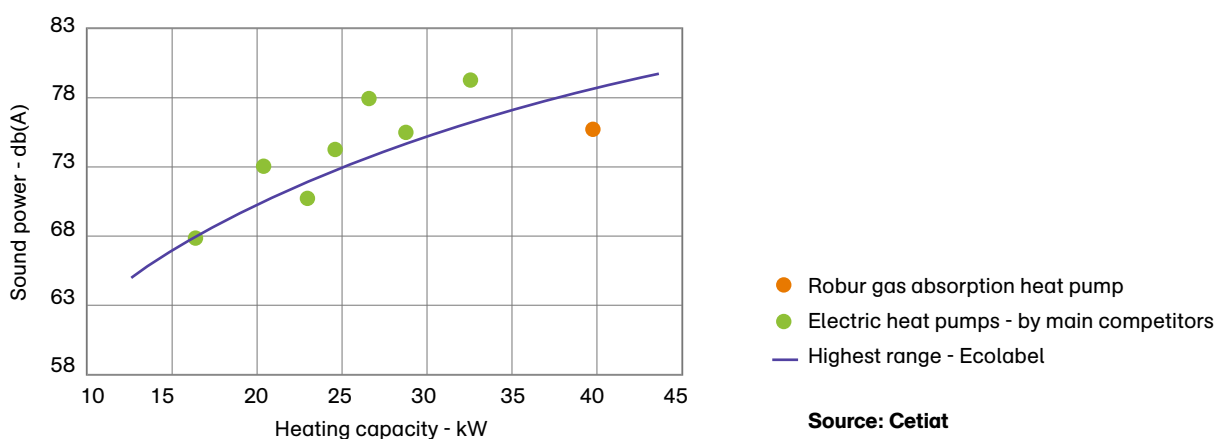
- 1968 **ACC** Gas absorption chiller. ARKLA (Arkansas Louisiana Gas Co.) introduces the first water-ammonia absorption units, with 300,000 pieces sold between 1968 and 1991.
- 1991 Robur Corporation was established to acquire absorption technology from Dometic, a company of Electrolux Group.
- 1998 **ACF** The gas efficiency in absorption units was improved by 34%. Efficiency was becoming a crucial element.
- 2002 **GAHP-W LB** was introduced to the market: a worldwide innovation. This GAHP version has put Robur into the high efficiency heating market with an efficiency much higher than electric heat pumps and boilers.
GAHP-AR High efficiency gas absorption heat pump for alternative heating and cooling. The first reversible gas absorption heat pump in the world.
- 2004 **GAHP-A** High efficiency gas absorption heat pump for heating. Heating efficiency higher than condensing boilers. The most efficient product in gas heating sector worldwide.
ACF-HR The unit with heat recovery was developed and introduced to the market. The heat recovery for production of domestic hot water at temperature up to 85 °C makes the unit very competitive: the total efficiency of the unit is up to 180%.
- 2005 **GAHP-GS** Absorption heat pump powered by natural gas and ground-source renewable energy for high efficiency heating.
GAHP-WS Absorption heat pump powered by natural gas and water-source renewable energy for heating and cooling or the simultaneous production with overall efficiency of 244%.
- 2008 **GAHP-A, GAHP-GS and GAHP-WS** Modulating and condensing gas absorption heat pumps.
- 2014 **Gitié** Trivalent integrated outdoor package with absorption heat pump powered by natural gas and air-source renewable energy: integrated, pre-assembled and custom-made in the manufacturing plant, is a fully plug-'n-play system. This can facilitate correct installation, avoiding the complexity of the integration on field of solar thermal systems.

ROBUR CONTINUOUS IMPROVEMENT

Robur' continuous investment in R&D is one of the key factors for success

An example of continuous improvement of the absorption appliances is represented by sound power, which have been constantly reduced over years.

The chart below compares the sound power of Robur gas absorption heat pumps with the sound power of electric heat pumps manufactured by main competitors. The sound power of Robur GAHP is considerably lower than the limits imposed by Ecolabel and it is the same as the power of smaller (50% of heating capacity) electric heat pumps. Sound power is shown in the chart instead of sound pressure because this data allows a better evaluation of the noise impact of an installed unit.

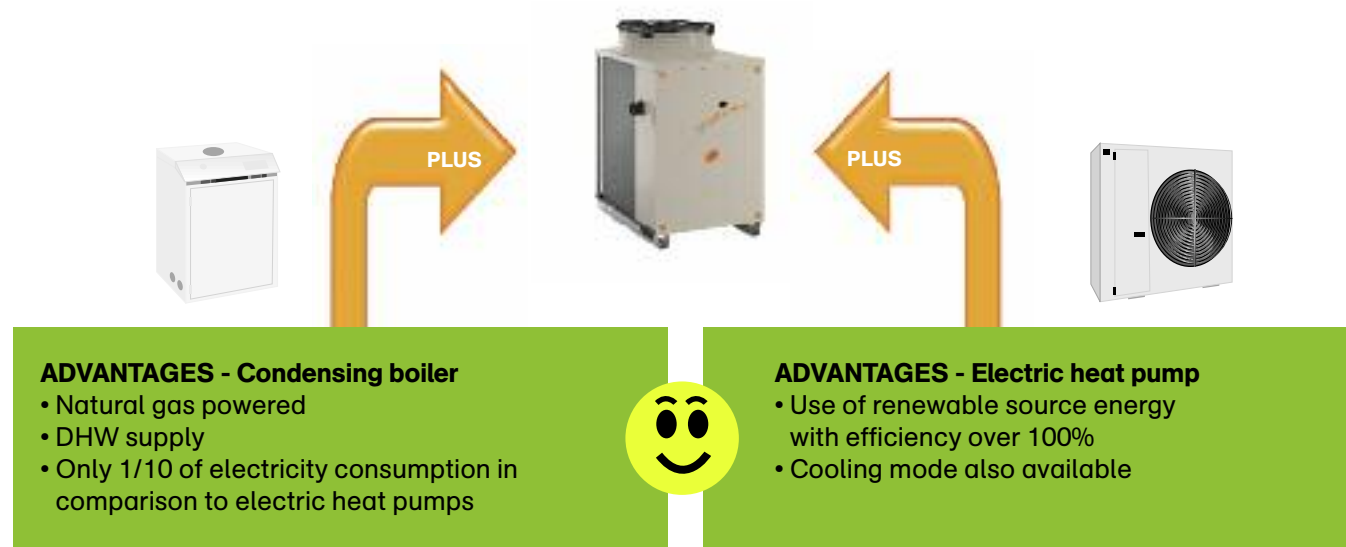


Robur heat pumps and chillers are particularly quiet, enhancing the comfort

Palas Cerequio Resort in Vigna, Barolo wineyard
La Morra (Cuneo, Italy)

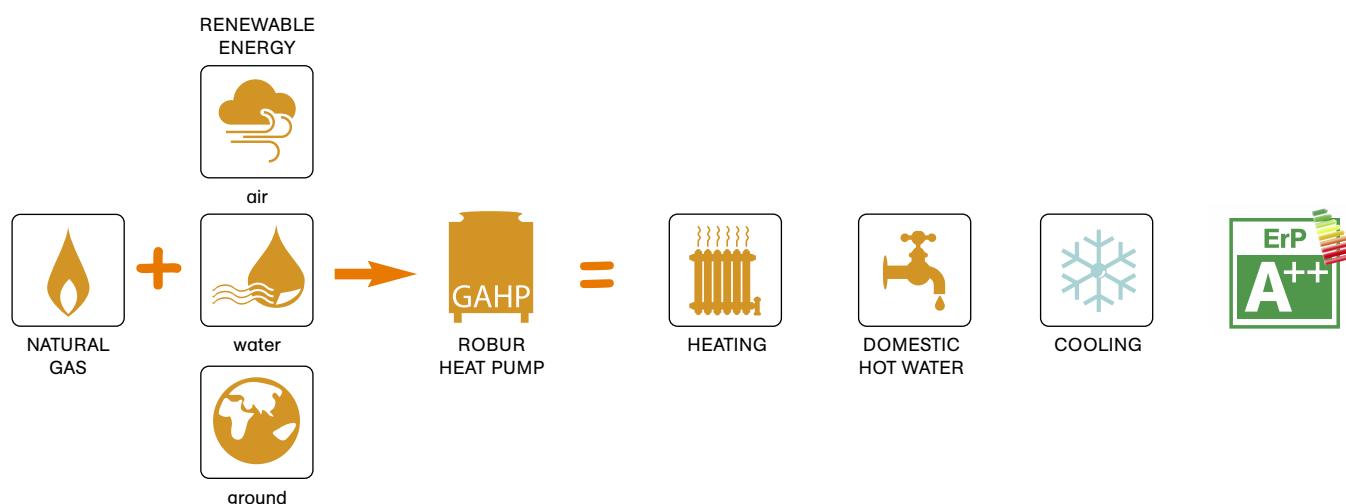
ABSORPTION HEAT PUMP POWERED BY NATURAL GAS AND RENEWABLE ENERGY (GAHP)

The perfect blend of the two most common heating technologies



Similarly to gas boilers, the gas absorption heat pump is a device able to supply high temperature hot water both for heating and for DHW production.

Similarly to electric heat pumps, gas absorption heat pump is able to recover renewable energy in the form of heat from air, water and ground sources, thus achieving efficiency rates up to 170%. Unlike electric heat pumps, gas absorption heat pumps do not use harmful refrigerants, have a negligible electrical consumption and can also provide cold water for summer cooling (reversible version).



6 GOOD REASONS

For choosing GAHP - Gas Absorption Heat Pump powered by renewable energy

1 EFFICIENCY

2 COST AND
ENERGY SAVING

3 LOW ENVIRONMENTAL
IMPACT

4 INCREASE
IN PROPERTY VALUE

5 IDEAL
INTEGRATION

6 ACKNOWLEDGEMENT
OF THE TECHNOLOGY

1 GAHP HEAT PUMPS ARE EFFICIENT

Efficiency and use of renewable energy

A heat pump is an appliance capable of exploiting the large amount of energy available in natural sources at a lower temperature and of transferring it in the form of useful heat to a user at a higher temperature. Electric heat pumps work with a compressor powered by electricity. Absorption heat pumps are powered directly by natural gas or LPG with a negligible electric consumption.

The advantage is higher heating efficiency, due to the fact that main energy input (natural gas) is primary energy and not electricity, which is generated with low efficiencies (40% on average).

In **Fig. A** energy balances between electric heat pumps and Robur absorption heat pumps are shown. The energy balance based on the primary energy highlights the higher efficiency of Robur gas absorption heat pumps in comparison to the electric ones (COP of 3.8).

In **Fig. B** energy balances of Robur gas absorption heat pumps are shown for the 3 different types of renewable energy sources: air, water and ground.

Fig. A - Air-source absorption heat pump powered by natural gas and renewable energy GAHP vs. electric heat pump

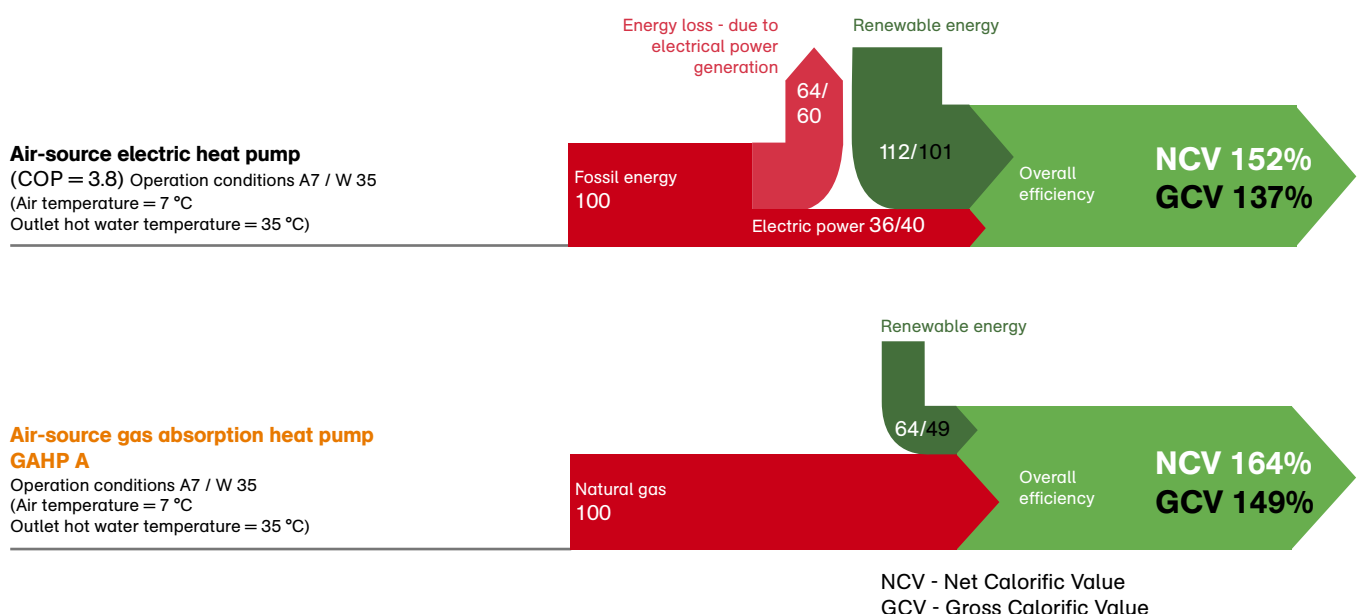
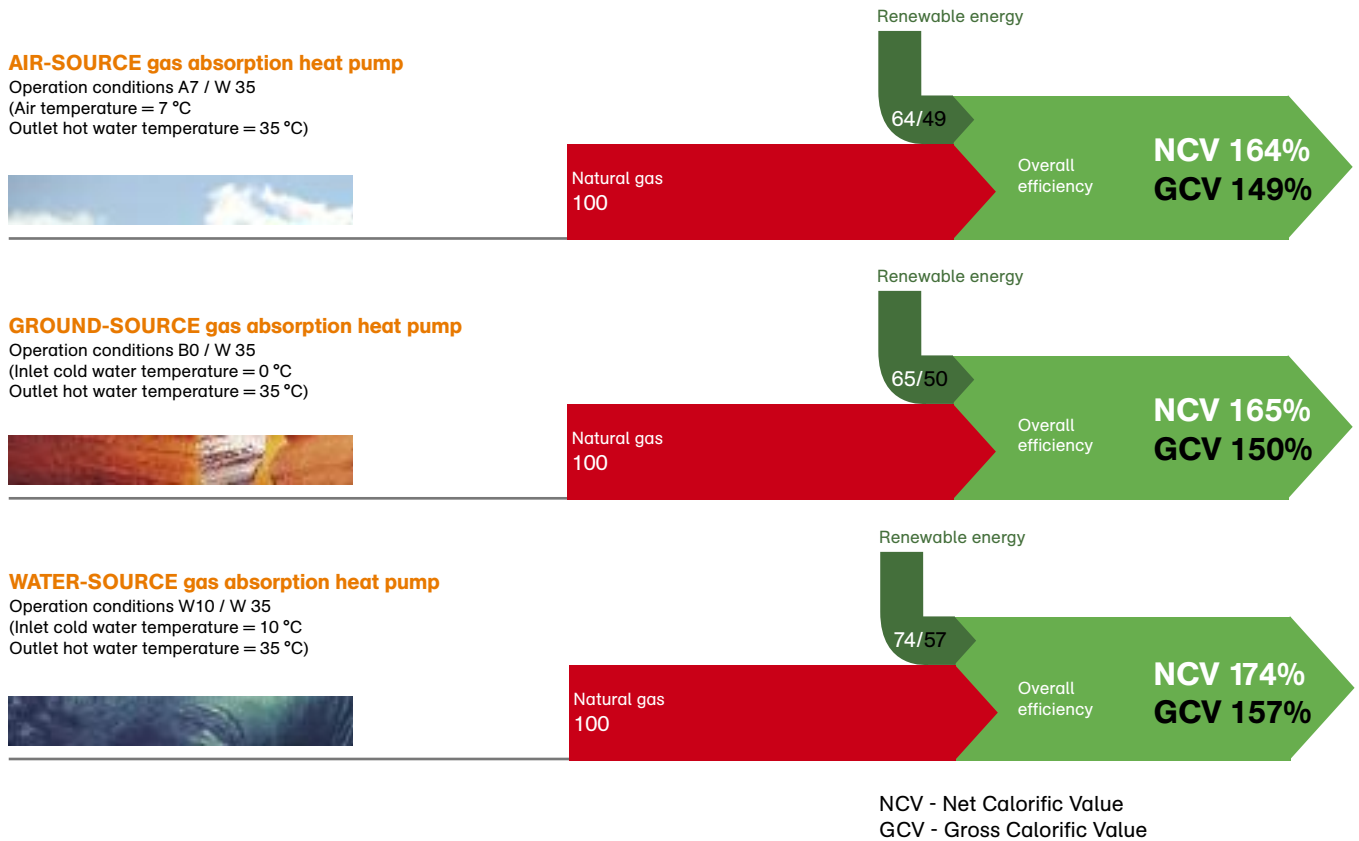





Fig. B - Efficiency and renewable energy utilization in GAHPs



2 COST AND ENERGY SAVING

| | | |
|--|---|--|
|  Robur Gas Absorption Heat Pump |  Condensing boiler |  Traditional boiler |
| Renewable energy: AIR | Renewable energy: NO | Renewable energy: NO |
| COST SAVING | -35% | -50% |

As per calculation methods of:

- Winter season based on 1,800 hours
- Continental climate area
- Average temperature in winter: 6.7 °C (UNI 10349)
- Average seasonal outlet temperature: 50 °C

GAHP installation is cost competitive to other heating technologies.
 Moreover, **GAHP technology can cut running heating costs up to 50% every year.**
 It is eligible for subsidies all over Europe.

3 LOW ENVIRONMENTAL IMPACT

using natural gas + renewable energy

- Each Robur GAHP adds 1 kW of natural gas to **0.5 kW of renewable energy**.
- Robur GAHPs are the best solution to the problem of global warming due to greenhouse gases, using a natural refrigerant **with GWP (Global Warming Potential) = 0**.
- According to a study by the Joint Research Centre (JRC - European Commission's in-house science service) Robur GAHP heating technology has the lowest environmental impact (NOx, PM, OCG, COx).

EVERY YEAR THE FIRST 10,000 ROBUR HEAT PUMPS INSTALLED ...



USE **109,452,345 kWh**
OF RENEWABLE ENERGY
(AIR-, GROUND- AND WATER SOURCE)



SAVE **16,938** TONS
OF OIL EQUIVALENT



EQUAL TO **20,842,033 M³**
OF NATURAL GAS



SAVE **42,000** TONS
OF CO₂ EMISSIONS



EQUAL TO THE EMISSION
BY **20,000** CARS



EQUAL TO **5,900,000**
NEW TREES

Discover more at: www.robur.com

(1) JRC - Development of European Ecolabel Criteria for Water based heaters (p. 98-103).

4 INCREASE IN PROPERTY VALUE

GAHPs are the most profitable investment **to increase the value of the building**. Upgrading the heating system only and with a small investment per square meter, the building performance rating will increase. Thanks to their low carbon footprint, GAHPs are also compliant with key legislation and energy targets, such as BREEAM and LEED ratings without incurring high installation or operating costs. Moreover, as the unit are designed for external installation, there is no requirement to use valuable space for plant rooms or bulky storage systems.



Pixel Building in Melbourne, AU
BREEAM and LEED assessments



Open University in Milton Keynes, UK
BREEAM assessment



Embassy Gardens in London, UK
BREEAM assessment

5 IDEAL INTEGRATION

Ensuring energy and cost savings with low environmental impact, **GAHPs are the best choice for integration into existing buildings.**

Efficiency



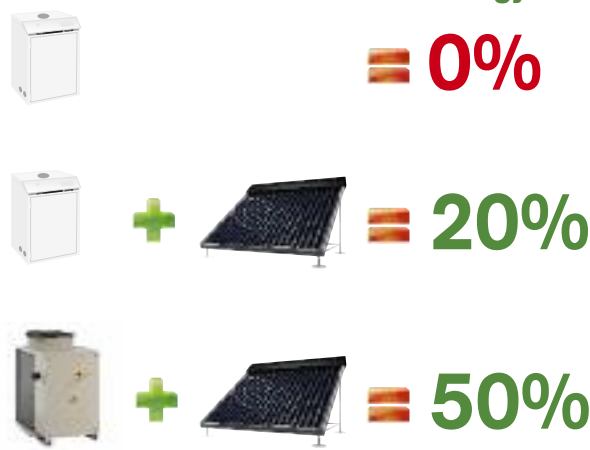
GAHPs are the **ideal integration with boilers**. With heating efficiencies of 40% higher than the best condensing boilers, the system ensures remarkable savings on overall heating operational costs.

Renewable energy

GAHPs **are an excellent choice for integration with solar systems.**

Most solar systems require an auxiliary back-up heating source. For instance, boilers are used during periods when solar radiation is insufficient. The integration of GAHP with solar systems:

- provides the highest efficiency with the greatest use of renewable energy;
- reduces the overall investment cost of the application and its pay-back;
- overcomes architectural constraints in existing buildings, providing green energy even in cases where lack of spaces for solar panels does not allow the installation.



6 ACKNOWLEDGEMENT OF THE TECHNOLOGY



The GAHP Gas Absorption Heat Pump has been supported by European Commission under the EU's Seventh Framework Programme for Research and Technological Development. Moreover it has been tested and certified by:





Robur for the PUBLIC sector



Certosa di Pavia, Italy

Reversible absorption heat pumps powered by natural gas
+ air-source renewable energy **GAHP-AR**
Condensing boiler for outdoor installation **AY**
For high efficiency heating, domestic hot water
production and cooling with low electric demand.



7 detention centres, Italy

Reversible absorption heat pumps powered by
natural gas + air-source renewable energy **GAHP-AR**
Absorption heat pumps powered by natural gas
+ air-source renewable energy **GAHP-A**
For high efficiency heating, domestic hot water
production and cooling with low electric demand.



Credits Coolingways



MAS Museum Aan de Stroom in Antwerp, Belgium

Absorption heat pumps powered by natural gas
+ water-source renewable energy **GAHP-WS**
Heating, cooling and domestic hot water production
where the use of water-source renewable energy
is required.



Credits Gazurco



Technological Incubator in Slupsk, Poland

Reversible absorption heat pumps powered by natural gas
+ air-source renewable energy **GAHP-AR**
Absorption chiller-heaters with heat recovery **GA ACF HR**
Condensing boilers for outdoor installation **AY**
For high efficiency heating and cooling and free
domestic hot water production with heat recovery.





Robur for the SCHOOL



Open University in Milton Keynes, United Kingdom

Absorption heat pumps powered by natural gas
+ ground-source renewable energy **GAHP-GS**

Robur ground-source heat pumps installed at Open University, the largest academic institution in the United Kingdom, contribute to the University's carbon reduction strategy, meeting BREEAM assessment.



Primary School in Plaidt, Germany

Absorption heat pumps powered by natural gas
+ ground-source renewable energy **GAHP-GS**

Data measured by E.ON Ruhrgas show an operating cost saving of 39% and a reduction of CO₂ emissions of 44% per year compared with the previous system made by two electric heat pumps.



Primary School in Sortland Arctic Polar Circle, Norway

Absorption heat pumps powered by natural gas
+ air-source renewable energy **GAHP-A**

Robur air-source heat pumps ensure efficiency levels in excess of 145% even at -7°C, offering high performance in cold climates.



Università degli Studi del Sannio, Italy

Reversible absorption heat pumps powered by natural gas
+ air-source renewable energy **GAHP-AR**

Absorption chillers powered by natural gas **GA ACF**
For high efficiency heating and cooling
with low electric demand.





Robur for the INDUSTRY



Scania Service Facility in Oberschleißheim, Germany

Absorption heat pumps powered by natural gas
+ air-source renewable energy **GAHP-A**
For high efficiency heating and domestic
hot water production.



Credits Gazuno



AME Plus Automotive Industry in Gliwice, Poland

Reversible absorption heat pumps powered by natural gas
+ air-source renewable energy **GAHP-AR**
For high efficiency heating and cooling
with low electric demand.



simultaneous

SERO PumpSystems GmbH in Meckesheim, Germany

Absorption heat pumps powered by natural gas
+ water-source renewable energy **GAHP-WS**
High efficiency simultaneous
hot and cold water production.



Würth Italia in Neumarkt, Italy

Absorption chillers powered by natural gas **GA ACF**
Cooling with low electric energy consumption.





Boscolo Etoile Hotel and Culinary Academy in Tuscany, Italy

Robur for HO.RE.CA.



Holiday Inn Airport Hotel in Istanbul, Turkey

Reversible absorption heat pumps powered by natural gas
+ air-source renewable energy **GAHP-AR**
Absorption chiller-heaters with heat recovery **GA ACF HR**
For high efficiency heating and cooling and free
domestic hot water production with heat recovery.



LO.AN Group 8 Facilities in Rome, Italy

Absorption chillers powered by natural gas **GA ACF**

*For 10 years LO.AN Group has chosen Robur units
for all its hotels in Rome.*



simultaneous

Jardines de Nivaria Resort in Tenerife, Spain

Absorption heat pumps powered by natural gas
+ water-source renewable energy **GAHP-WS**
High efficiency simultaneous hot and cold
water production.



Chateau Talbot banqueting in Saint-Julien-Beychevelle, France

Absorption chillers powered by natural gas **GA ACF**
Cooling with low electric energy consumption.





Robur for the RETAIL sector



Carrefour 24 points of sale, Italy

Absorption heat pumps powered by natural gas
+ air-source renewable energy **GAHP-A**
For high efficiency heating and domestic
hot water production.

*"Robur solutions installed guarantee remarkable cost saving
compared with previous systems."*

Alfio Fontana, Energy Manager Carrefour Italy



Credits Gazuno



Brico Marché in Małopolska, Poland

Condensing boilers for outdoor installation **AY**
For heating.



Cisalfa Intersport in Saint-Christophe, Italy

Reversible absorption heat pumps powered by natural gas
+ air-source renewable energy **GAHP-AR**
For high efficiency heating and cooling
with low electric demand.



Mercedes Benz car dealer in Wielkopolska, Poland

Reversible absorption heat pumps powered by natural gas
+ air-source renewable energy **GAHP-AR**
Condensing boilers for outdoor installation **AY**

*Robur heat pumps provide monitored
efficiency of 149%.*





Type-A building in Milan, A Gold KlimaHouse top energy classification

Robur for the RESIDENTIAL sector



Multi Family House in Berlin, Germany

Absorption heat pumps powered by natural gas + ground-source renewable energy **GAHP-GS**
For high efficiency heating and domestic hot water production in geothermal applications.



18th Century Historic Building in Pistoia, Italy

Absorption heat pumps powered by natural gas + air-source renewable energy **GAHP-A**
Condensing boilers for outdoor installation **AY**
For high efficiency heating and domestic hot water production.



Multi Family House in Verrières-le-Buisson, France

Absorption heat pumps powered by natural gas + ground-source renewable energy **GAHP-GS**

Robur solution provides monitored heating efficiency of 141%.



Multi Family House in Rome, Italy

Reversible absorption heat pumps powered by natural gas + air-source renewable energy **GAHP-AR**
Absorption chiller-heaters with heat recovery **GA ACF HR**
For high efficiency heating and cooling and domestic hot water production with heat recovery.





Embassy Gardens multifunctional luxury building in London, UK

Robur for ...



San Patrignano Rehab Centre in Rimini, Italy

Absorption heat pumps powered by natural gas + water-source renewable energy **GAHP-WS**
Absorption chiller-heaters with heat recovery **GA ACF HR**
Heating, cooling and domestic hot water production also with heat recovery where the use of water-source renewable energy is required.



Credits Gazuno



Helipad Air Rescue, District Hospital in Bochnia, Poland

Absorption heat pumps powered by natural gas + air-source renewable energy **GAHP-A**

Under severe winter climate conditions, Robur solution prevents icing at the rooftop helipad.



Sky Line Swimming Pool in Cremona, Italy

Absorption heat pumps powered by natural gas + air-source renewable energy **GAHP-A and GAHP-AR**
For high efficiency heating, domestic hot water production and cooling with low electric demand.



Credits Techneco



Westerkerk Church in Amsterdam, Netherlands

Absorption heat pumps powered by natural gas + water-source renewable energy **GAHP-WS**

Robur solution fully conforms architectural constraints in historical buildings.





Nursing Home in Kutna Hora, Czech Republic

Absorption heat pumps powered by natural gas + ground-source renewable energy **GAHP-GS**
For high efficiency heating and domestic hot water production in geothermal applications.



Golden Town Apple Products in Thornbury, Canada

Absorption chillers powered by natural gas **GA ACF**
Cooling with low electric energy consumption.



Masciarelli Winery and Cellar in San Martino sulla Marrucina, Italy

Absorption chillers powered by natural gas **GA ACF-LB**
Process refrigeration in systems requiring negative fluid temperatures.



Sixtus Italia Medical Warehouse in Prato, Italy

Reversible absorption heat pumps powered by natural gas + air-source renewable energy **GAHP-AR**
Absorption chillers powered by natural gas **GA ACF**

"Food supplements and medical treatments should be stored properly. Also thanks to the Robur solution we can guarantee a higher standard quality of products." Mauro Marrucci, President Sixtus Italy



Lundegaarden Greenhouse in Odense, Denmark

Absorption heat pumps powered by natural gas + air-source renewable energy **GAHP-A**
For high efficiency heating.



German Red Cross Family Care in K lbingen, Germany

Absorption heat pumps powered by natural gas + air-source renewable energy **GAHP-A**
Condensing boilers for outdoor installation **AY**
For high efficiency heating and domestic hot water production.





For high efficiency heating and domestic hot water production.

Condensing and modulating absorption heat pump powered by natural gas + air-source renewable energy

GAHP-A

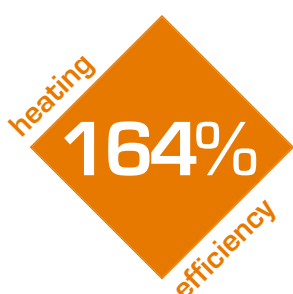
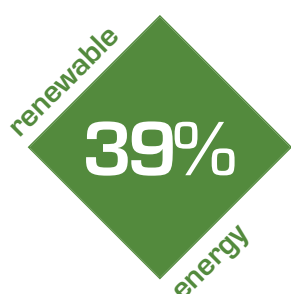
Advantages

- Up to 39% utilisation of air- source renewable energy. Designed to exceed peak efficiency (GUE - Gas Utilization Efficiency) of 164%⁽¹⁾. It ensures efficiency levels in excess of 154% even at -7 °C, so it is also used in especially cold climates. It thus avoids activating back-up systems (boilers and electrical heaters), reducing the seasonal performance coefficients and hence increase consumption.

- It is a super-efficient solution for domestic hot water production.
- It increases the total efficiency of the heating system when it is combined or integrated with boilers with a lower energy performance.
- It provides up to 40% of running cost savings if compared with the best condensing boilers.
- It enhances the energy qualification of buildings with the consequent increase in the value of the building.

- It is eligible for national and local incentive programs all over Europe.
- With a GAHP-A, every year 3.9 Tons of CO₂ emissions are saved, which are equivalent to those absorbed by 550 trees or those produced by 2 green cars; every year 1.7 Tons of Oil Equivalent are saved. Moreover, Robur GAHP-A uses natural refrigerants not subject to normal constraints and phase-out (F-Gas Regulation exempt).

(1) Equivalent to COP 4.10 on energy conversion factor of 2.5.



ELIGIBLE

for national and local incentive programs all over Europe

Please also refer to planning manual. Pdf download at www.robur.com

Applications

- Ideal for heating and domestic hot water production for buildings with high gas/LPG consumption, either with low or high temperature systems.
- For outdoor installation.

Versions

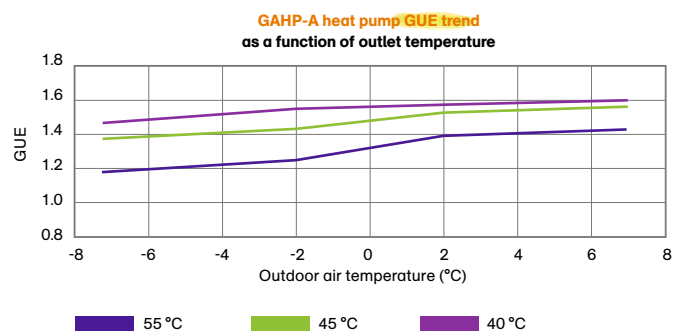
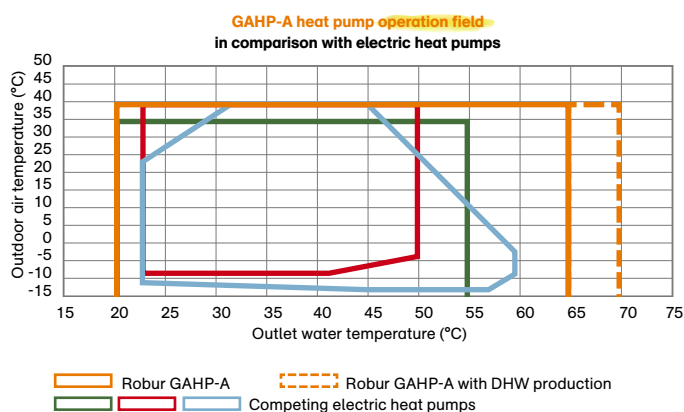
- Available in standard or low-noise version.
- Available also in:
 - pre-assembled units for higher capacity, combined with Robur chillers and/or

boilers (from p. 28);

- E³ A complete system (p. 54);
- integrated outdoor package with condensing boiler Gitié AHAY (p. 56).



Examples of GAHP-A heat pump in residential and light-commercial applications.



HEATING OPERATION MODE ⁽¹⁾

| Energy class ErP (55 °C operation) | | | A+ |
|---|--------------------------------|-------------------|--------------------|
| Working point A7/W35 | GUE gas utilization efficiency | % | 164 |
| | heating capacity | kW | 41.3 |
| Working point A7/W50 | GUE gas utilization efficiency | % | 152 |
| | heating capacity | kW | 38.3 |
| Nominal water flow rate ($\Delta T = 10\text{ °C}$) | | m ³ /h | 3.0 |
| Nominal water pressure loss (outlet water at 50 °C) | | kPa | 43 |
| Maximum outlet water temperature heating/DHW | | °C | 65/70 |
| Maximum inlet water temperature heating/DHW | | °C | 55/60 |
| Outdoor temperature (dry bulb) | max | °C | 40 |
| | min | °C | -15 ⁽²⁾ |

BURNER CHARACTERISTICS

| | | | |
|--------------------------|--------------------------------|-------------------|-----------|
| Thermal input (actual) | | kW | 25.2 |
| Gas consumption (actual) | natural gas G20 ⁽³⁾ | m ³ /h | 2.67 |
| | LPG G30/G31 ⁽⁴⁾ | kg/h | 1.99/1.96 |

ELECTRICAL CHARACTERISTICS

| | | | |
|---|--|----|-----------|
| Voltage | | | 230V-50Hz |
| Nominal electrical power ⁽⁵⁾ | standard version | kW | 0.84 |
| | low noise version ⁽⁶⁾ - max/min speed fan | kW | 0.77/0.50 |

INSTALLATION DETAILS

| | | | |
|--|---|-------|---------|
| Operational weight standard/low noise version | | kg | 390/400 |
| Sound pressure Lp at 5 metres ⁽⁷⁾ Free field, at the front, direction factor 2 | standard version | dB(A) | 57.6 |
| | low noise version ⁽⁶⁾ - max speed fan | dB(A) | 52.0 |
| | low noise version ⁽⁶⁾ - min speed fan ⁽⁸⁾ | dB(A) | 49.0 |
| Connections | water | " F | 1 1/4 |
| | gas | " F | 3/4 |
| | exhaust flue pipe | mm | 80 |
| Electrical degree of protection | | IP | X5D |
| Standard version size ⁽⁹⁾ | width | mm | 854 |
| | depth | mm | 1,260 |
| | height | mm | 1,445 |
| Low-noise version size ⁽⁹⁾ | width | mm | 854 |
| | depth | mm | 1,260 |
| | height | mm | 1,536 |

⁽¹⁾ As per calculation methods of EN12309.⁽²⁾ Available also for lower temperature.⁽³⁾ NCV 34.02 MJ/m³ (9.45 kWh/m³) at 15 °C - 1013 mbar.⁽⁴⁾ NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.⁽⁵⁾ ± 10% depending on the power supply voltage and on the tolerance of the electrical motors power consumption.⁽⁶⁾ High efficiency modulating fan for lower noise emission.⁽⁷⁾ Lw sound power standard version dB(A) 79.6; max speed fan low-noise version dB(A) 74.0 and min speed fan dB(A) 71.0; sound power values measured according to EN ISO 9614.⁽⁸⁾ According to data by manufacturers.⁽⁹⁾ Size does not include exhaust flue pipe.

Heating solutions and DHW production



with high efficiency air-source heat pumps

| Model | Units | Heating capacity heating/DHW kW | System GUE ⁽¹⁾ % | Size w/d/h ⁽²⁾ mm | Weight kg |
|--------------------|-------|------------------------------------|--------------------------------|---------------------------------|--------------|
| RTA ⁽³⁾ | 2 A | 82.60 | 164.3 | 2,314/1,245/1,400 | 888 |
| | 3 A | 123.90 | 164.3 | 3,610/1,245/1,400 | 1,331 |
| | 4 A | 165.20 | 164.3 | 4,936/1,245/1,400 | 1,774 |
| | 5 A | 206.50 | 164.3 | 6,490/1,245/1,400 | 2,227 |

• Data refer to standard outdoor version, 2 pipes version and without circulators. Available with or without circulators, standard or low noise version. Please contact Robur Sales Network.

⁽¹⁾ Average efficiency on residential buildings; outlet water 35 °C.⁽²⁾ Size does not include exhaust flue pipe.⁽³⁾ Outdoor installation.

Solutions for heating and DHW production



with high efficiency air-source heat pumps + condensing boilers

| Model | Units | Heating capacity heating/DHW kW | System GUE ⁽¹⁾ % | Size w/d/h ⁽²⁾ mm | Weight kg |
|---------------------|------------|---------------------------------|-----------------------------|------------------------------|-----------|
| RTAY ⁽³⁾ | 1 A + 2 AY | 110.10 | 145.0 | 2,314/1,245/1,400 | 729 |
| | 2 A + 1 AY | 117.00 | 163.4 | 3,382/1,245/1,400 | 891 |
| | 1 A + 3 AY | 144.50 | 135.6 | 3,382/1,245/1,400 | 975 |
| | 2 A + 2 AY | 151.40 | 157.6 | 3,382/1,245/1,400 | 1,069 |
| | 3 A + 1 AY | 158.30 | 164.1 | 4,936/1,245/1,400 | 1,175 |
| | 1 A + 4 AY | 178.90 | 129.8 | 3,382/1,245/1,400 | 1,351 |
| | 2 A + 3 AY | 185.80 | 150.6 | 4,936/1,245/1,400 | 1,435 |
| | 3 A + 2 AY | 192.70 | 161.8 | 4,936/1,245/1,400 | 1,530 |
| | 4 A + 1 AY | 199.60 | 164.3 | 6,490/1,245/1,400 | 1,635 |
| | 2 A + 4 AY | 220.20 | 144.5 | 4,936/1,245/1,400 | 1,745 |
| | 3 A + 3 AY | 227.10 | 157.6 | 4,936/1,245/1,400 | 1,908 |
| | 4 A + 2 AY | 234.00 | 163.4 | 6,490/1,245/1,400 | 1,993 |
| | 3 A + 4 AY | 261.50 | 152.9 | 6,490/1,245/1,400 | 2,098 |
| | 4 A + 3 AY | 268.40 | 161.0 | 6,490/1,245/1,400 | 2,218 |
| | 4 A + 4 AY | 302.80 | 157.6 | 6,490/1,245/1,400 | 2,302 |

• Data refer to standard version, 4 pipes version and without circulators. Available with or without circulators, standard or low noise version. Please contact Robur Sales Network.

⁽¹⁾ Average efficiency on residential buildings; outlet water 35 °C.

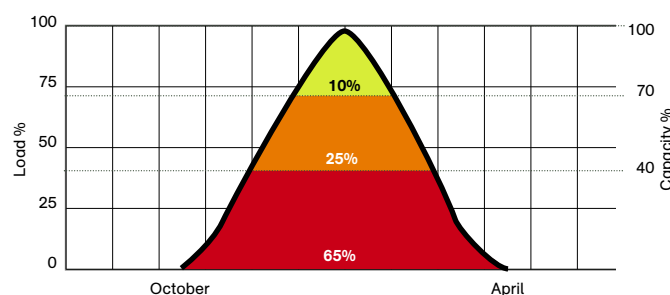
⁽²⁾ Size does not include exhaust flue pipe.

⁽³⁾ Outdoor installation.



The Robur air-source heat pump solutions are also designed and supplied pre-assembled in packages achieving A++ energy class⁽¹⁾ even in applications with radiators for system retrofitting.

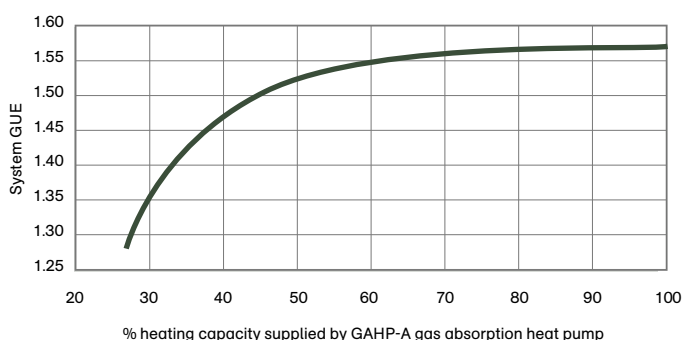
⁽¹⁾ As per calculation methods of EN12309.



Energy supplied in winter season by an integrated system

-composed by 1 heat pump, covering 40% of the overall heating capacity and 2 boilers, covering 60% of the overall heating capacity- is provided by the heat pump accounting for 65% and by the two boilers accounting for 35%.

Energy supplied by second boiler = 10%
Energy supplied by first boiler = 25%
Energy supplied by heat pump = 65%



The picture shows the increase in overall efficiency of an integrated heating system as a function of the percentage of the overall capacity covered by GAHP.



For high efficiency heating and domestic hot water production.

Condensing and modulating absorption heat pump powered by natural gas + air-source renewable energy

GAHP-A INDOOR

Advantages

- It can be installed in the existing plant room and can facilitate correct installation, thanks to the ductwork mounted on the unit.
- It exceeds peak efficiency (GUE - Gas Utilization Efficiency) of 164%⁽¹⁾ thanks to the use of air-source renewable energy. It ensures high efficiency levels also at low temperature, thus avoiding activating back-up systems (boiler and electrical heaters) reducing the seasonal performance coefficients and hence increase consumption.
- It is a super-efficient solution for domestic hot water production.

- It provides up to 40% of running cost savings if compared with the best condensing boilers.
- It represents the most profitable investment to increase the value of the building and its energy performance rating.
- It is eligible for national and local incentive programs all over Europe.
- With a GAHP-A Indoor, every year 3.9 Tons of CO₂ emissions are saved, which are equivalent to those absorbed by 550 trees or those produced by 2 green cars. Every year 1.7 Tons of Oil Equivalent are saved in comparison with a boiler.

Moreover, Robur GAHP-A Indoor uses natural refrigerants not subject to normal constraints and phase-out (F-Gas Regulation exempt).

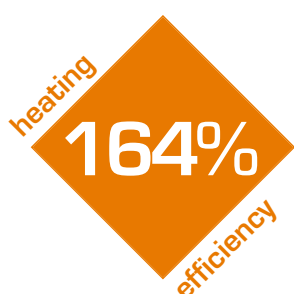
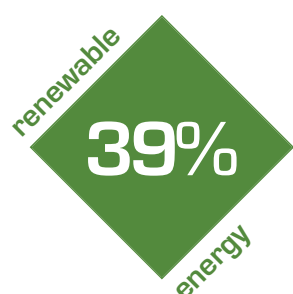
Versions

- Ideal for heating and domestic hot water production in buildings with high gas/LPG consumption.
- Suitable with radiators, floor systems and fan coils.
- For indoor installation.

⁽¹⁾ Equivalent to COP 4.10 on energy conversion factor of 2.5.



THE IDEAL SOLUTION USING RENEWABLE ENERGY FOR THE PLANT ROOM



ELIGIBLE

for national and local
incentive programs
all over Europe

Please also refer to planning manual. Pdf download at www.robur.com



Examples of GAHP-A Indoor application in the plant room.

HEATING OPERATION MODE ⁽¹⁾

Energy class ErP (55 °C operation)

| | | GAHP-A INDOOR | |
|---|--------------------------------|-------------------|--------------------|
| | | A+ | |
| Working point A7/W35 | GUE gas utilization efficiency | % | 164 |
| | heating capacity | kW | 41.3 |
| Working point A7/W50 | GUE gas utilization efficiency | % | 152 |
| | heating capacity | kW | 38.3 |
| Nominal water flow rate ($\Delta T = 10\text{ }^{\circ}\text{C}$) | | m ³ /h | 3,0 |
| Nominal water pressure loss (outlet water at 50 °C) | | kPa | 43 |
| Maximum outlet water temperature heating/DHW | | °C | 65/70 |
| Maximum inlet water temperature heating/DHW | | °C | 55/60 |
| Outdoor temperature (dry bulb) | max | °C | 40 |
| | min | °C | -15 ⁽²⁾ |

BURNER CHARACTERISTICS

| | | | |
|--------------------------|--------------------------------|-------------------|-----------|
| Thermal input (actual) | | kW | 25.2 |
| Gas consumption (actual) | natural gas G20 ⁽³⁾ | m ³ /h | 2.67 |
| | LPG G30/G31 ⁽⁴⁾ | kg/h | 1.99/1.96 |

ELECTRICAL CHARACTERISTICS

| | | | |
|--|---------------|-----------|------|
| Voltage | | 230V-50Hz | |
| Nominal electrical power ⁽⁵⁾⁽⁶⁾ | max speed fan | kW | 0.87 |
| | min speed fan | kW | 0.50 |

INSTALLATION DETAILS

| | | | |
|---|------------------------------|-------|-------|
| Operational weight | | kg | 405 |
| Sound pressure Lp at 5 metres ⁽⁶⁾⁽⁷⁾ Free field, at the front, direction factor 2 | max speed fan | dB(A) | 52.0 |
| | min speed fan ⁽⁸⁾ | dB(A) | 49.0 |
| Connections | water | " F | 11/4 |
| | gas | " F | 3/4 |
| | exhaust flue pipe | mm | 80 |
| Size ⁽⁹⁾ | width | mm | 848 |
| | depth | mm | 1,258 |
| | height | mm | 1,587 |

⁽¹⁾ As per calculation methods of EN12309.

⁽²⁾ Available also for lower temperature.

⁽³⁾ NCV 34.02MJ/m³ (9.45 kWh/m³) at 15 °C - 1013 mbar.

⁽⁴⁾ NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.

⁽⁵⁾ $\pm 10\%$ depending on the power supply voltage and on the tolerance of the electrical motors power consumption.

⁽⁶⁾ High efficiency modulating fan for lower noise emission.

⁽⁷⁾ Lw sound power max speed fan low-noise version dB(A) 74.0 and min speed fan dB(A) 71.0. Sound power values measured according to EN ISO 9614.

⁽⁸⁾ According to data by manufacturers.

⁽⁹⁾ Size does not include exhaust flue pipe.



For high efficiency heating and cooling using natural gas with low electric demand.

Reversible absorption heat pump powered by natural gas + air-source renewable energy

GAHP-AR

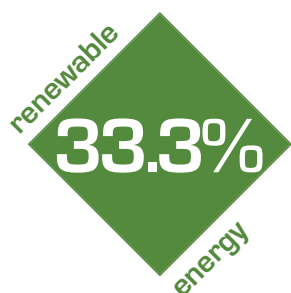
Advantages

- Up to 33.3% utilisation of air- source renewable energy. Designed to exceed peak efficiencies (GUE - Gas Utilization Efficiency) of 150%⁽¹⁾. Ensures efficiency levels in excess of 130% even at -7 °C. No back-up systems are required.
- It provides up to 30% of running cost savings if compared with the best condensing boilers.

- It enhances the energy qualification of buildings with the consequent increase in the value of the building.
- It reduces electricity requirements up to 86% compared to traditional electrical systems, thanks to the prevalent use of natural gas.
- It is eligible for national and local incentive programs all over Europe.

- With a GAHP-AR, every year 3.6 Tons of CO₂ emissions are saved, which are equivalent to those absorbed by 508 trees or those produced by 2 green cars; every year 1.6 Tons of Oil Equivalent are saved. Moreover, Robur GAHP-AR uses natural refrigerants not subject to normal constraints and phase-out (F-Gas Regulation exempt).

⁽¹⁾ Equivalent to COP 3.75 on energy conversion factor of 2.5.



ELIGIBLE

for national and local incentive programs all over Europe

Please also refer to planning manual. Pdf download at www.robur.com

Applications

- Ideal for heating and DHW in buildings with high natural gas/LPG consumption where availability of electric power is limited.
- For outdoor installation.

Versions

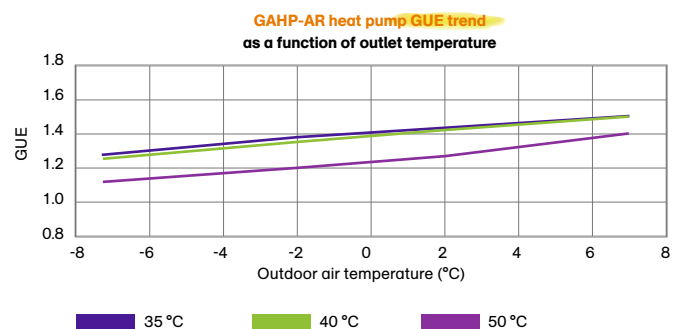
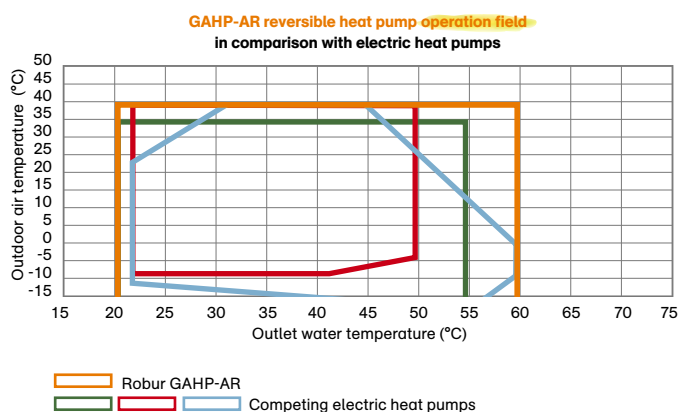
- Available also in standard and low noise version.
- Available also in:
 - pre-assembled units for higher capacity, combined with Robur chillers and/or

boilers (from p. 34);

- integrated outdoor package with condensing boiler Gitié ARAY (p. 56).



Example of GAHP-AR applications in winter and summer operation with radiant panels, fan coils and indirect production of DHW.



HEATING OPERATION MODE ⁽¹⁾

| Energy class ErP (55 °C operation) | | | A+ |
|--|----------------------------------|-------------------|-----------------------|
| Working point A7/W35 | GUE (gas utilization efficiency) | % | 150 |
| | heating capacity | kW | 37.8 |
| Working point A7/W50 | GUE (gas utilization efficiency) | % | 140 |
| | heating capacity | kW | 35.3 |
| Nominal water flow rate ($\Delta T = 10\text{ °C}$) | | m ³ /h | 3.04 |
| Nominal water pressure loss (outlet water at 50 °C) | | kPa | 29 |
| Maximum outlet water temperature ($\Delta T = 10\text{ °C}$) | | °C | 60 |
| Inlet water temperature max/min | | °C | 50/20 |
| Ambient operating temperature (dry bulb) max/min | | °C | 35/-20 ⁽²⁾ |

COOLING OPERATION MODE ⁽¹⁾

| | | | |
|---|----------------------------------|-------------------|------|
| Working point A35/W7 | GUE (gas utilization efficiency) | % | 67 |
| | cooling capacity | kW | 16.9 |
| Nominal water flow rate ($\Delta T = 5\text{ °C}$) | | m ³ /h | 2.9 |
| Nominal water capacity pressure loss (outlet water at 7 °C) | | kPa | 31 |
| Minimum outlet water temperature | | °C | 3 |
| Inlet water temperature max/min | | °C | 45/8 |
| Ambient operating temperature (dry bulb) max/min | | °C | 45/0 |

BURNER CHARACTERISTICS

| | | | |
|--------------------------|--------------------------------|-------------------|------|
| Thermal input (actual) | | kW | 25.2 |
| Gas consumption (actual) | natural gas G20 ⁽³⁾ | m ³ /h | 2.67 |
| | LPG G30/G31 ⁽⁴⁾ | kg/h | 1.96 |

ELECTRICAL CHARACTERISTICS

| | | | |
|---|----------------------------|---------------|-----------|
| Voltage | | 230 V – 50 Hz | |
| Nominal electrical power ⁽⁵⁾ | standard/low noise version | kW | 0.84/0.87 |

INSTALLATION DATA

| | | | |
|---|-----------------------------------|-------|-------------|
| Operational Weight | standard/low noise version | kg | 380/390 |
| Sound power Lp ⁽⁶⁾ Free field, at the front, direction factor 2 | standard version | dB(A) | 57.6 |
| | low noise version | dB(A) | 53.0 |
| Connections | water | " F | 1 1/4 |
| | gas | " F | 3/4 |
| | flue exhaust pipe | mm | 80 |
| Electrical degree of protection | | IP | X5D |
| Size ⁽⁷⁾ | width | mm | 850 |
| | depth | mm | 1,230 |
| | height standard/low noise version | mm | 1,445/1,545 |

⁽¹⁾ As per calculation methods of EN12309.⁽²⁾ Available also for lower temperature.⁽³⁾ NCV 34.02 MJ/m³ (9.45 kWh/m³) at 15 °C - 1013 mbar.⁽⁴⁾ NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.⁽⁵⁾ ± 10% depending on the power supply voltage and on the tolerance of the electrical motors power consumption.⁽⁶⁾ Lw sound power standard version dB(A) 79.6; low-noise version dB(A) 75.0.

Sound power values measured according to EN ISO 9614.

⁽⁷⁾ Size does not include exhaust flue pipe.**Solutions for heating and/or cooling**

with high efficiency air-source reversible heat pumps, also combined with gas absorption chillers

| Model | Units | Heating capacity kW | Cooling capacity kW | System GUE ⁽¹⁾ % | Size w/d/h ⁽²⁾ mm | Weight kg |
|-------|--------------|---------------------|---------------------|-----------------------------|------------------------------|-----------|
| RTAR | 2 AR | 75.60 | 33.80 | 146.8 | 2,314/1,245/1,400 | 886 |
| | 3 AR | 113.40 | 50.70 | 146.8 | 3,610/1,245/1,400 | 1,328 |
| | 4 AR | 151.20 | 67.60 | 146.8 | 4,936/1,245/1,400 | 1,770 |
| | 5 AR | 189.00 | 84.50 | 146.8 | 6,490/1,245/1,400 | 2,222 |
| RTCR | 1 AR + 1 ACF | 37.80 | 34.62 | 146.8 | 2,314/1,245/1,400 | 854 |
| | 1 AR + 2 ACF | 37.80 | 52.34 | 146.8 | 3,610/1,245/1,400 | 1,264 |
| | 1 AR + 3 ACF | 37.80 | 70.06 | 146.8 | 4,936/1,245/1,400 | 1,674 |
| | 1 AR + 4 ACF | 37.80 | 87.78 | 146.8 | 6,490/1,245/1,400 | 2,094 |
| | 2 AR + 1 ACF | 75.60 | 51.52 | 146.8 | 3,610/1,245/1,400 | 1,296 |
| | 2 AR + 2 ACF | 75.60 | 69.24 | 146.8 | 4,936/1,245/1,400 | 1,706 |
| | 2 AR + 3 ACF | 75.60 | 86.96 | 146.8 | 6,490/1,245/1,400 | 2,126 |
| | 3 AR + 1 ACF | 113.40 | 68.42 | 146.8 | 4,936/1,245/1,400 | 1,738 |
| | 3 AR + 2 ACF | 113.40 | 86.14 | 146.8 | 6,490/1,245/1,400 | 2,158 |
| | 4 AR + 1 ACF | 151.20 | 85.32 | 146.8 | 6,490/1,245/1,400 | 2,190 |

• Data refer to standard version, 2 pipes version and without circulators. Available with or without circulators, standard or low noise version. Please contact Robur Sales Network.

⁽¹⁾ Average efficiency on residential buildings; with outlet water 60 °C with climate curve.⁽²⁾ Size does not include exhaust flue pipe.

Solutions for heating, cooling with heat recovery and DHW production all over year



with reversible air-source heat pumps

+ chillers with heat recovery and condensing boilers for integration



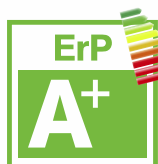
| Model | Units | Heating capacity heating/DHW kW | Cooling capacity kW | Heating capacity recovered up to ⁽¹⁾ kW | System GUE ⁽²⁾ % | Size w/d/h ⁽³⁾ mm | Weight kg |
|-------|------------------------|---------------------------------|---------------------|--|-----------------------------|------------------------------|-----------|
| RTRH | 1 AR + 1 ACF-HR + 1 AY | 72.20 | 34.83 | 32.00 | 142.9 | 3,382/1,245/1,400 | 1,067 |
| | 1 AR + 2 ACF-HR + 1 AY | 72.20 | 52.76 | 64.00 | 142.9 | 4,936/1,245/1,400 | 1,527 |
| | 1 AR + 3 ACF-HR + 1 AY | 72.20 | 70.69 | 96.00 | 142.9 | 6,490/1,245/1,400 | 1,989 |
| | 1 AR + 1 ACF-HR + 2 AY | 106.60 | 34.83 | 32.00 | 133.6 | 3,382/1,245/1,400 | 1,173 |
| | 1 AR + 2 ACF-HR + 2 AY | 106.60 | 52.76 | 64.00 | 133.6 | 4,936/1,245/1,400 | 1,632 |
| | 1 AR + 3 ACF-HR + 2 AY | 106.60 | 70.69 | 96.00 | 133.6 | 6,490/1,245/1,400 | 2,094 |
| | 2 AR + 1 ACF-HR + 1 AY | 110.00 | 51.73 | 32.00 | 146.3 | 4,936/1,245/1,400 | 1,527 |
| | 2 AR + 2 ACF-HR + 2 AY | 110.00 | 69.66 | 64.00 | 146.3 | 6,490/1,245/1,400 | 1,989 |
| | 1 AR + 1 ACF-HR + 3 AY | 141.00 | 34.83 | 32.00 | 126.9 | 4,936/1,245/1,400 | 1,349 |
| | 1 AR + 2 ACF-HR + 3 AY | 141.00 | 52.76 | 64.00 | 126.9 | 4,936/1,245/1,400 | 1,742 |
| | 1 AR + 3 ACF-HR + 3 AY | 141.00 | 70.69 | 96.00 | 126.9 | 6,490/1,245/1,400 | 2,214 |
| | 2 AR + 1 ACF-HR + 2 AY | 144.40 | 51.73 | 32.00 | 142.9 | 4,936/1,245/1,400 | 1,632 |
| | 2 AR + 2 ACF-HR + 2 AY | 144.40 | 69.66 | 64.00 | 142.9 | 6,490/1,245/1,400 | 2,094 |
| | 3 AR + 1 ACF-HR + 1 AY | 147.80 | 68.63 | 32.00 | 146.7 | 4,936/1,245/1,400 | 1,989 |
| | 1 AR + 1 ACF-HR + 4 AY | 175.40 | 34.83 | 32.00 | 122.4 | 4,936/1,245/1,400 | 1,433 |
| | 1 AR + 2 ACF-HR + 4 AY | 175.40 | 52.76 | 64.00 | 122.4 | 6,490/1,245/1,400 | 1,905 |
| | 1 AR + 3 ACF-HR + 4 AY | 175.40 | 70.69 | 96.00 | 122.4 | 6,490/1,245/1,400 | 2,298 |
| | 2 AR + 1 ACF-HR + 3 AY | 178.80 | 51.73 | 32.00 | 138.1 | 4,936/1,245/1,400 | 1,742 |
| | 2 AR + 2 ACF-HR + 3 AY | 178.80 | 69.66 | 64.00 | 138.1 | 6,490/1,245/1,400 | 2,214 |
| | 3 AR + 1 ACF-HR + 2 AY | 182.20 | 68.63 | 32.00 | 145.7 | 6,490/1,245/1,400 | 2,094 |
| | 2 AR + 1 ACF-HR + 4 AY | 213.20 | 51.73 | 32.00 | 133.6 | 6,490/1,245/1,400 | 1,905 |
| | 2 AR + 2 ACF-HR + 4 AY | 213.20 | 69.66 | 64.00 | 133.6 | 6,490/1,245/1,400 | 2,298 |
| | 3 AR + 1 ACF-HR + 3 AY | 216.60 | 68.63 | 32.00 | 142.9 | 6,490/1,245/1,400 | 2,214 |
| | 3 AR + 1 ACF-HR + 4 AY | 251.00 | 68.63 | 32.00 | 139.6 | 6,490/1,245/1,400 | 2,298 |

* Data refer to standard version, 6 pipes version and without circulators. Available with or without circulators. Please contact Robur Sales Network.

⁽¹⁾ For further data, please refer to Planning Manual

⁽²⁾ Average efficiency on residential buildings; with outlet water 60 °C with climate curve.

⁽³⁾ Size does not include exhaust flue pipe.



The Robur air-source heat pump solutions are also designed and supplied pre-assembled in packages achieving **A++ energy class⁽¹⁾** even in applications with radiators for system retrofitting.

⁽¹⁾ As per calculation methods of EN12309.



Solar kit (not supplied)



Boiler (optional)



Robur Direct Digital Control (optional)

Robur RB100 (optional)



RTRH solution

Solutions for heating, cooling and DHW production



with reversible air-source heat pumps + condensing boilers for integration
also combined with gas absorption chillers



| Model | Units | Heating capacity heating/DHW kW | Cooling capacity kW | System GUE ⁽¹⁾ % | Size w/d/h ⁽²⁾ mm | Weight kg |
|-------|---------------------|---------------------------------|---------------------|-----------------------------|------------------------------|-----------|
| RTYR | 2 AR + 1 AY | 110.00 | 33.80 | 146.3 | 3,382/1,245/1,400 | 1,067 |
| | 1 AR + 3 AY | 141.00 | 16.90 | 126.9 | 3,382/1,245/1,400 | 890 |
| | 2 AR + 2 AY | 144.40 | 33.80 | 142.9 | 3,382/1,245/1,400 | 1,173 |
| | 3 AR + 1 AY | 147.80 | 50.70 | 146.7 | 4,936/1,245/1,400 | 1,527 |
| | 1 AR + 4 AY | 175.40 | 16.90 | 122.4 | 3,382/1,245/1,400 | 974 |
| | 2 AR + 3 AY | 178.80 | 33.80 | 138.1 | 4,936/1,245/1,400 | 1,349 |
| | 3 AR + 2 AY | 182.20 | 50.70 | 145.7 | 4,936/1,245/1,400 | 1,632 |
| | 4 AR + 1 AY | 185.60 | 67.60 | 146.8 | 6,490/1,245/1,400 | 1,989 |
| | 2 AR + 4 AY | 213.20 | 33.80 | 133.6 | 4,936/1,245/1,400 | 1,433 |
| | 3 AR + 3 AY | 216.60 | 50.70 | 142.9 | 4,936/1,245/1,400 | 1,742 |
| | 4 AR + 2 AY | 220.00 | 67.60 | 146.3 | 6,490/1,245/1,400 | 2,094 |
| | 3 AR + 4 AY | 251.00 | 50.70 | 139.6 | 6,490/1,245/1,400 | 1,905 |
| | 4 AR + 3 AY | 254.40 | 67.60 | 145.0 | 6,490/1,245/1,400 | 2,214 |
| | 4 AR + 4 AY | 288.80 | 67.60 | 142.9 | 6,490/1,245/1,400 | 2,298 |
| RTRC | 1 AR + 1 ACF + 1 AY | 72.20 | 34.62 | 142.9 | 3,382/1,245/1,400 | 1,035 |
| | 1 AR + 2 ACF + 1 AY | 72.20 | 52.34 | 142.9 | 4,936/1,245/1,400 | 1,463 |
| | 1 AR + 3 ACF + 1 AY | 72.20 | 70.06 | 142.9 | 6,490/1,245/1,400 | 1,893 |
| | 1 AR + 1 ACF + 2 AY | 106.60 | 34.62 | 133.6 | 3,382/1,245/1,400 | 1,141 |
| | 1 AR + 2 ACF + 2 AY | 106.60 | 52.34 | 133.6 | 4,936/1,245/1,400 | 1,568 |
| | 1 AR + 3 ACF + 2 AY | 106.60 | 70.06 | 133.6 | 6,490/1,245/1,400 | 1,998 |
| | 2 AR + 1 ACF + 1 AY | 110.00 | 51.52 | 146.3 | 4,936/1,245/1,400 | 1,495 |
| | 2 AR + 2 ACF + 1 AY | 110.00 | 69.24 | 146.3 | 6,490/1,245/1,400 | 1,925 |
| | 1 AR + 1 ACF + 3 AY | 141.00 | 34.62 | 126.9 | 4,936/1,245/1,400 | 1,317 |
| | 1 AR + 2 ACF + 3 AY | 141.00 | 52.34 | 126.9 | 4,936/1,245/1,400 | 1,678 |
| | 1 AR + 3 ACF + 3 AY | 141.00 | 70.06 | 126.9 | 6,490/1,245/1,400 | 2,118 |
| | 2 AR + 1 ACF + 2 AY | 144.40 | 51.52 | 142.9 | 4,936/1,245/1,400 | 1,600 |
| | 2 AR + 2 ACF + 2 AY | 144.40 | 69.24 | 142.9 | 6,490/1,245/1,400 | 2,030 |
| | 3 AR + 1 ACF + 1 AY | 147.80 | 68.42 | 146.7 | 6,490/1,245/1,400 | 1,957 |
| | 1 AR + 1 ACF + 4 AY | 175.40 | 34.62 | 122.4 | 4,936/1,245/1,400 | 1,401 |
| | 1 AR + 2 ACF + 4 AY | 175.40 | 52.34 | 122.4 | 6,490/1,245/1,400 | 1,841 |
| | 1 AR + 3 ACF + 4 AY | 175.40 | 70.06 | 122.4 | 6,490/1,245/1,400 | 2,202 |
| | 2 AR + 1 ACF + 3 AY | 178.80 | 51.52 | 138.1 | 4,936/1,245/1,400 | 1,710 |
| | 2 AR + 2 ACF + 3 AY | 178.80 | 69.24 | 138.1 | 6,490/1,245/1,400 | 2,150 |
| | 3 AR + 1 ACF + 2 AY | 182.20 | 68.42 | 145.7 | 6,490/1,245/1,400 | 2,062 |
| | 2 AR + 1 ACF + 4 AY | 213.20 | 51.52 | 133.6 | 6,490/1,245/1,400 | 1,873 |
| | 2 AR + 2 ACF + 4 AY | 213.20 | 69.24 | 133.6 | 6,490/1,245/1,400 | 2,234 |
| | 3 AR + 1 ACF + 3 AY | 216.60 | 68.42 | 142.9 | 6,490/1,245/1,400 | 2,182 |
| | 3 AR + 1 ACF + 4 AY | 251.00 | 68.42 | 139.6 | 6,490/1,245/1,400 | 2,266 |

• Data refer to standard version, 4 pipes version and without circulators. Available with or without circulators, standard or low noise version, 2 or 4 pipes. Please contact Robur Sales Network.

⁽¹⁾ Average efficiency on residential buildings; outlet water 60 °C with climate curve.
⁽²⁾ Size does not include exhaust flue pipe.

Solutions for heating, cooling and DHW production in cooling operation with heat recovery



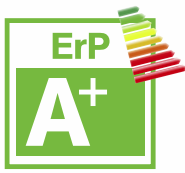
with reversible air-source heat pumps + chillers with heat recovery



| Model | Units | Heating capacity heating/DHW kW | Cooling capacity kW | Heating capacity recovered up to ⁽¹⁾ kW | System GUE ⁽²⁾ % | Size w/d/h ⁽³⁾ mm | Weight kg |
|-------|-----------------|---------------------------------|---------------------|--|-----------------------------|------------------------------|-----------|
| RTAH | 1 AR + 1 ACF-HR | 37.80 | 34.83 | 32.00 | 146.8 | 2,314/1,245/1,400 | 906 |
| | 1 AR + 2 ACF-HR | 37.80 | 52.76 | 64.00 | 146.8 | 3,610/1,245/1,400 | 1,358 |
| | 1 AR + 3 ACF-HR | 37.80 | 70.69 | 96.00 | 146.8 | 4,936/1,245/1,400 | 1,810 |
| | 1 AR + 4 ACF-HR | 37.80 | 88.62 | 128.00 | 146.8 | 6,490/1,245/1,400 | 2,272 |
| | 2 AR + 1 ACF-HR | 75.60 | 51.73 | 32.00 | 146.8 | 3,382/1,245/1,400 | 1,358 |
| | 2 AR + 2 ACF-HR | 75.60 | 69.66 | 64.00 | 146.8 | 4,936/1,245/1,400 | 1,810 |
| | 2 AR + 3 ACF-HR | 75.60 | 87.59 | 96.00 | 146.8 | 6,490/1,245/1,400 | 2,272 |
| | 3 AR + 1 ACF-HR | 113.40 | 68.63 | 32.00 | 146.8 | 3,610/1,245/1,400 | 1,810 |
| | 3 AR + 2 ACF-HR | 113.40 | 86.56 | 64.00 | 146.8 | 4,936/1,245/1,400 | 2,272 |
| | 4 AR + 1 ACF-HR | 151.20 | 85.53 | 32.00 | 146.8 | 6,490/1,245/1,400 | 2,272 |

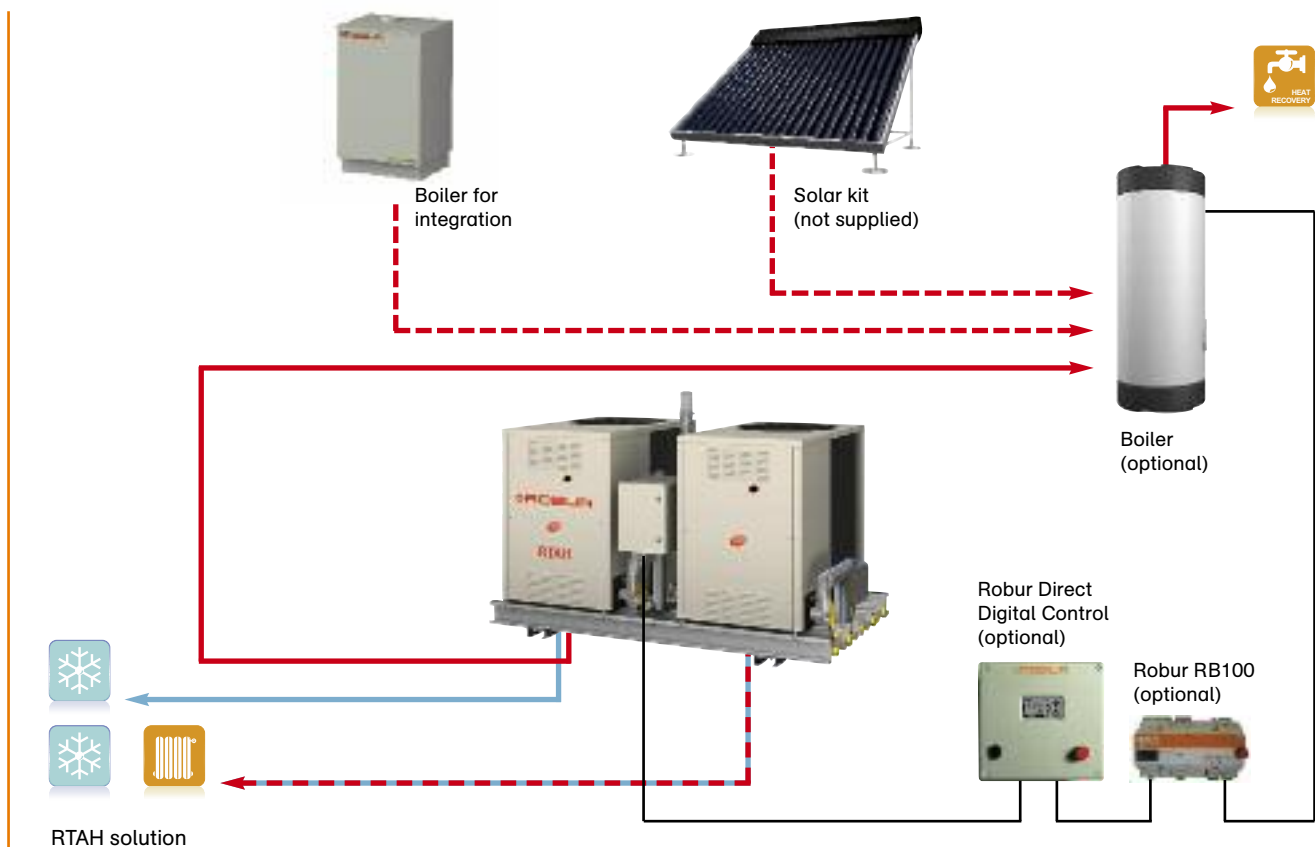
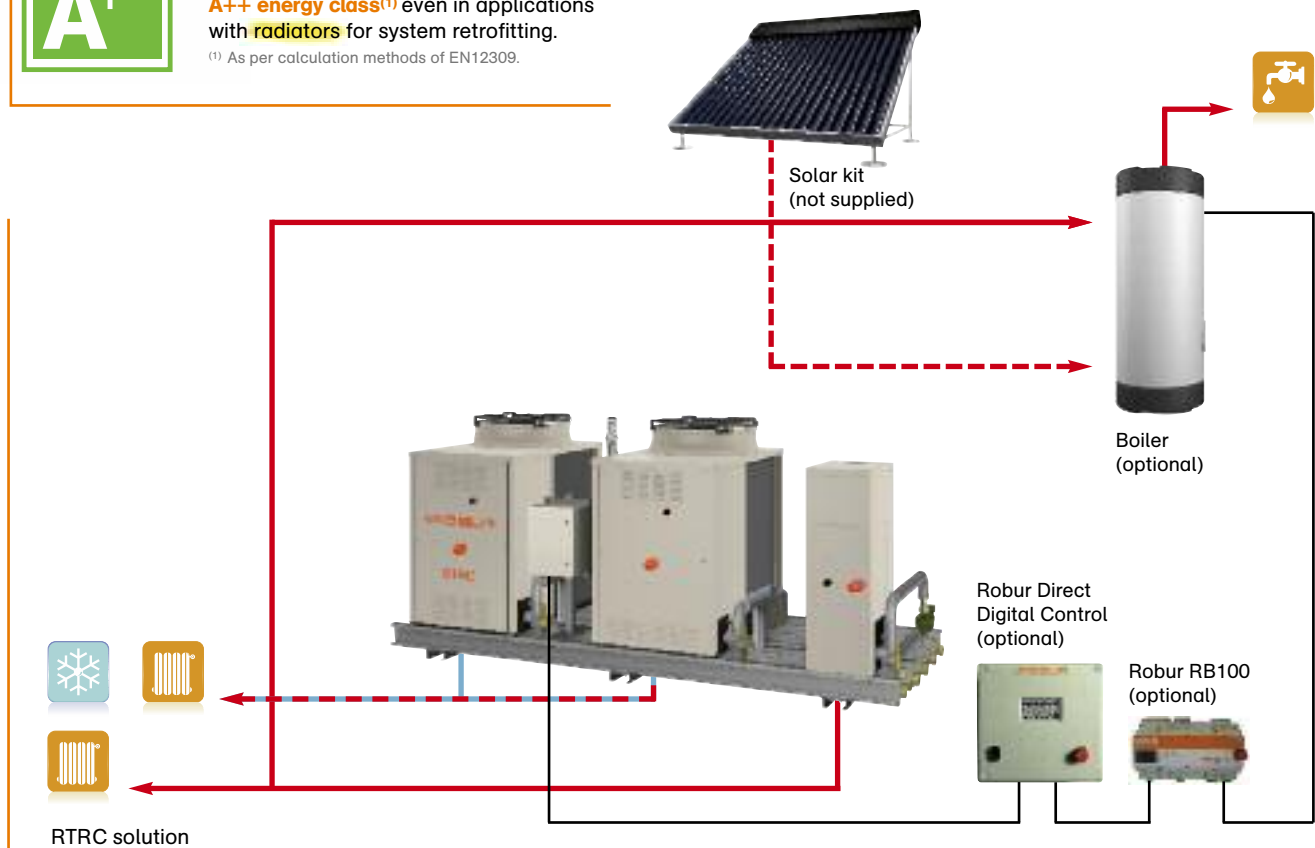
• Data refer to standard version, 4 pipes version and without circulators. Available with or without circulators, standard or low noise version. Please contact Robur Sales Network.
⁽¹⁾ For further data, please refer to Planning Manual.

⁽²⁾ Average efficiency on residential buildings; outlet water 60 °C with climate curve.
⁽³⁾ Size does not include exhaust flue pipe.



The Robur **air-source** heat pump solutions are also designed and supplied **pre-assembled in packages achieving A++ energy class⁽¹⁾** even in applications with **radiators** for system retrofitting.

⁽¹⁾ As per calculation methods of EN12309.





For high efficiency heating and domestic hot water production in geothermal applications.

Condensing and modulating absorption heat pump powered by natural gas + ground-source renewable energy

GAHP-GS

Advantages

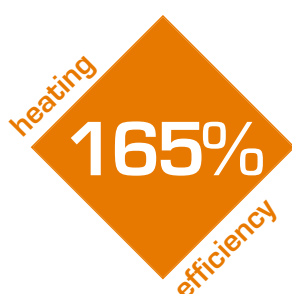
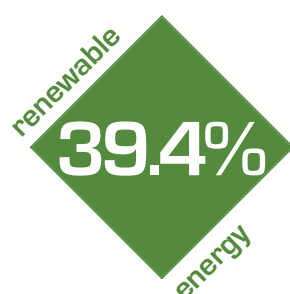
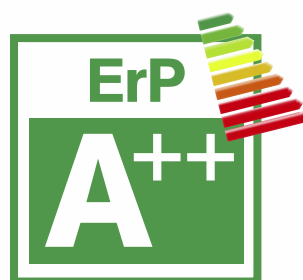
- Up to 39.4% utilisation of ground-source renewable energy. Designed to exceed peak efficiency (GUE - Gas Utilization Efficiency) of 165%⁽¹⁾.
- Reduction in investment costs for geothermal loops can be higher than 50% in comparison to electric heat pumps.

- It is a super-efficient solution for domestic hot water production.
- It provides up to 40% of running cost savings if compared with the best condensing boilers.
- It represents the most profitable investment to increase the value of the building and its energy performance rating.

- It reduces electricity requirements compared to traditional electrical systems, thanks to the prevalent use of natural gas.
- It is eligible for national and local incentive programs all over Europe.
- With a GAHP-GS, every year 4.0 Tons of CO₂ emissions are saved, which are equivalent to those absorbed by 570 trees or

those produced by 2 green cars; every year 1.8 Tons of Oil Equivalent are saved. Moreover, Robur GAHP-GS uses natural refrigerants not subject to normal constraints and phase-out (F-Gas Regulation exempt).

(1) Equivalent to COP 4.13 on energy conversion factor of 2.5.



ELIGIBLE

for national and local incentive programs all over Europe

Please also refer to planning manual. Pdf download at www.robur.com

Applications

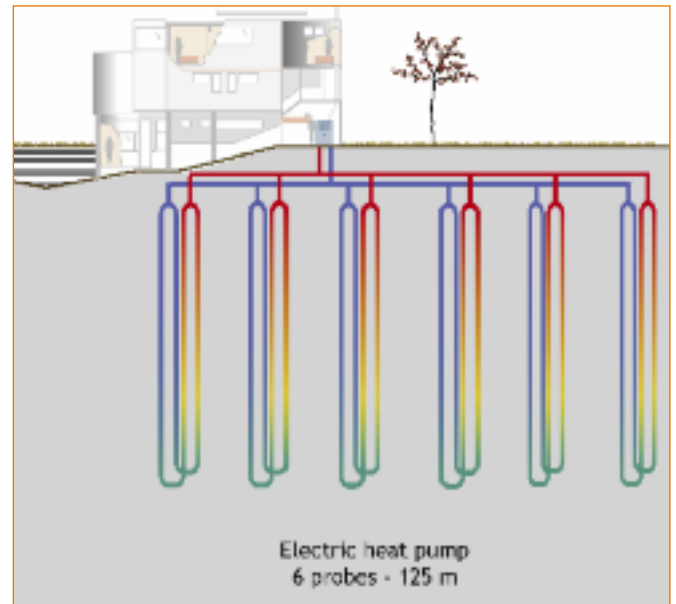
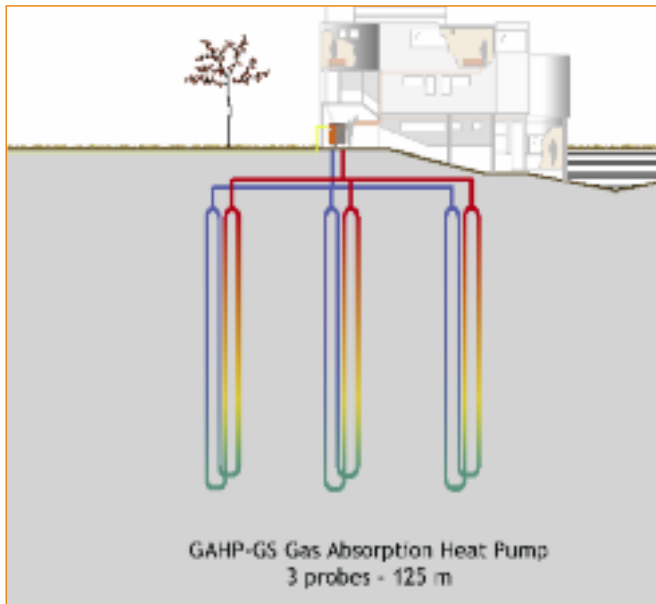
- Ideal for heating and DHW in buildings with high natural gas/LPG consumption.

- Ability to supply cooling as free-cooling mode (unit off) or in geothermal applications with active cooling (unit on).
- For indoor and outdoor installation.

Versions

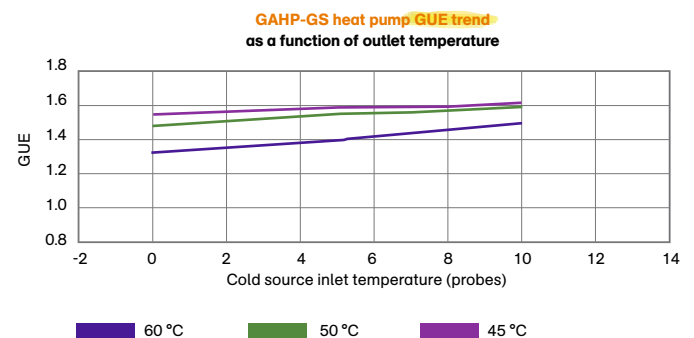
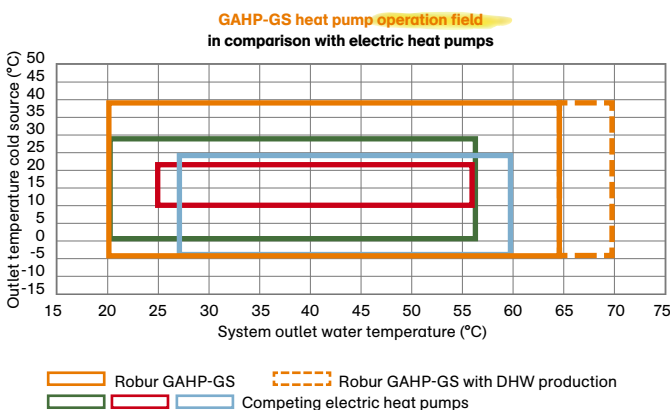
- Available also in:
 - pre-assembled units for higher capacity (p. 40);
 - E³ GS complete system (p. 54).

With GAHP-GS absorption heat pump **reduction in investment costs for geothermal loops can be higher than 50%** in comparison with electric heat pumps.



Example of geothermal heating system of 40 kW.

The length of the loops depends on the type of soil and operating conditions.



HEATING OPERATION MODE ⁽¹⁾

| Energy class ErP (55 °C operation) | | | A++ |
|---|--|-------------------|------------|
| Working point B0/W35 | GUE (gas utilization efficiency) | % | 165 |
| | heating capacity | kW | 41.6 |
| | capacity recovered from renewable source | kW | 16,4 |
| Working point B0/W50 | GUE (gas utilization efficiency) | % | 149 |
| | heating capacity | kW | 37.6 |
| | capacity recovered from renewable source | kW | 12,1 |
| Nominal water flow rate ($\Delta T = 10\text{ °C}$) | | m ³ /h | 3.17 |
| Nominal water pressure loss (outlet water at 50 °C) | | kPa | 49 |
| Maximum outlet water temperature for heating/DHW | | °C | 65/70 |
| Maximum inlet water temperature for heating/DHW | | °C | 55/60 |

BURNER CHARACTERISTICS

| | | | |
|--------------------------|--------------------------------|-------------------|-----------|
| Thermal input (actual) | | kW | 25.2 |
| Gas consumption (actual) | natural gas G20 ⁽²⁾ | m ³ /h | 2.67 |
| | LPG G31/G30 ⁽³⁾ | kg/h | 1.99/1.96 |

ELECTRICAL CHARACTERISTICS

| | | |
|---|---------------|------|
| Voltage | 230 V – 50 Hz | |
| Nominal electrical power ⁽⁴⁾ | kW | 0.41 |

INSTALLATION DETAILS

| | | | |
|---|-------------------|-------|-------|
| Operational Weight | | kg | 300 |
| Sound pressure Lp at 5 metres ⁽⁵⁾ - Free field, at the front, direction factor 2 | | dB(A) | 44.1 |
| Connections | water | " F | 1 1/4 |
| | gas | " F | 3/4 |
| | flue exhaust pipe | mm | 80 |
| Electrical degree of protection | | IP | X5D |
| Size ⁽⁶⁾ | width | mm | 848 |
| | depth | mm | 690 |
| | height | mm | 1,278 |

⁽¹⁾ As per calculation methods of EN12309.⁽²⁾ NCV 34.02 MJ/m³ (9.45 kWh/m³) at 15 °C - 1013 mbar.⁽³⁾ NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.⁽⁴⁾ ± 10% depending on the power supply voltage and on the tolerance of the electrical motors power consumption.⁽⁵⁾ Lw sound power standard version dB(A) 66.1. Sound power values measured according to EN ISO 9614.⁽⁶⁾ Size does not include exhaust flue pipe.**Note:** The capacity recovered is considered as the capacity available for cooling. For any further information, please refer to design manual.**Solutions for heating and DHW production****with high efficiency ground source heat pumps**

| Model | Units | Heating capacity kW | Capacity recovered by RES kW | System GUE ⁽¹⁾ % | Size w/d/h ⁽²⁾ mm | Weight kg |
|-------|-------|---------------------|------------------------------|-----------------------------|------------------------------|-----------|
| RTGS | 2 GS | 83.20 | 32.80 | 165.1 | 2,314/1,245/1,400 | 768 |
| | 3 GS | 124.80 | 49.20 | 165.1 | 3,610/1,245/1,400 | 1,151 |
| | 4 GS | 166.40 | 65.60 | 165.1 | 4,936/1,245/1,400 | 1,534 |
| | 5 GS | 208.00 | 82.00 | 165.1 | 6,490/1,245/1,400 | 1,927 |

* Data refer to standard version, 4 pipes version and without circulators. Available with or without circulators, for outdoor or indoor installation. Please contact Robur Sales Network.

⁽¹⁾ Average efficiency with outlet water 35 °C and geothermal loops 0 °C.⁽²⁾ Size does not include exhaust flue pipe.

The Robur **ground-source** heat pump solutions are also designed and supplied **pre-assembled in packages achieving A++ energy class⁽¹⁾** even in applications with **radiators** for system retrofitting.

⁽¹⁾ As per calculation methods of EN12309.



High efficiency simultaneous hot and cold water production.
Heating, cooling and domestic hot water production
where the use of water-source renewable energy is required.

Modulating and condensing absorption heat pump
powered by natural gas + water-source renewable energy

GAHP-WS

Advantages

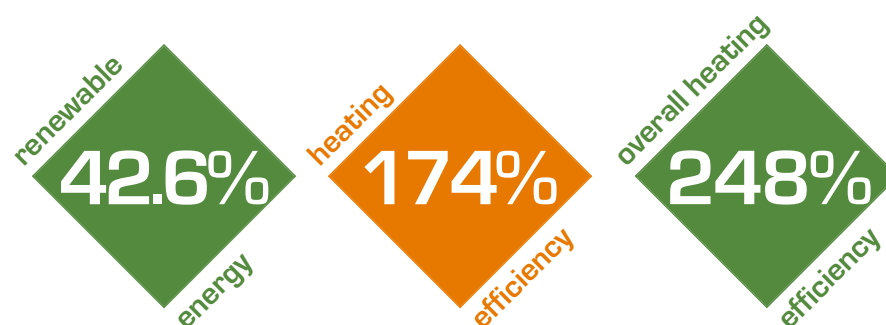
- In case of simultaneous hot and cold water production, it exceeds overall efficiency (GUE - Gas Utilization Efficiency) of 248%⁽¹⁾. External sources are not required, thus reducing system and management costs.
- Up to 42.6% utilisation of water-source renewable energy, exceeding heating efficiency (GUE - Gas Utilization Efficiency) values of 174%⁽²⁾.
- It is a super-efficient solution for domestic hot water production.
- It provides up to 40% of running cost savings if compared with the best condensing boilers.
- It represents the most profitable investment to increase the value of the building and its energy performance rating.
- It reduces electricity requirements compared to traditional electrical systems, thanks to the prevalent use of natural gas.
- It is eligible for national and local incentive programs all over Europe.

- With a GAHP-WS, every year 5.5 Tons of CO₂ emissions are saved, which are equivalent to those absorbed by 792 trees or those produced by 3 green cars; every year 2.4 Tons of Oil Equivalent are saved. Moreover, Robur GAHP-WS uses natural refrigerants not subject to normal constraints and phase-out (F-Gas Regulation exempt).

Versions

- For indoor and outdoor installation.
- Available also in:
 - pre-assembled units for higher capacity (p. 43);
 - E³ WS complete system (p. 56).

(1) Equivalent to COP 6.20 on energy conversion factor of 2.5.
(2) Equivalent to COP 4.35 on energy conversion factor of 2.5.



ELIGIBLE

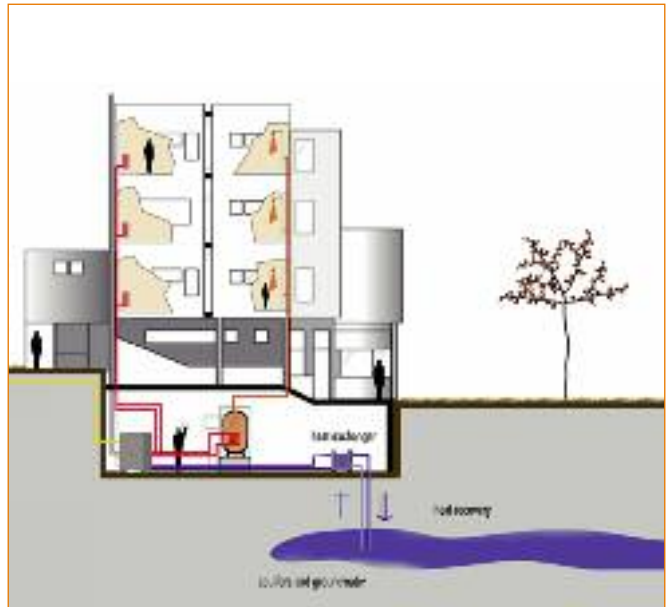
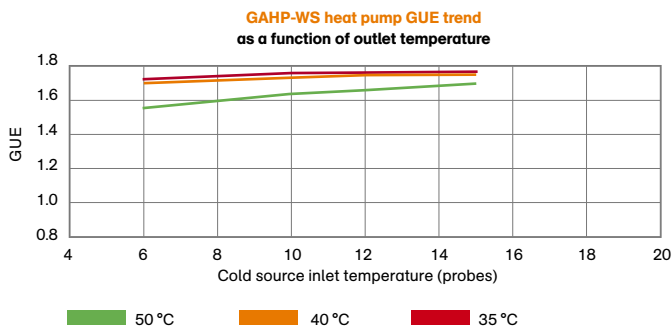
for national and local
incentive programs
all over Europe

Heating and cooling and DHW production

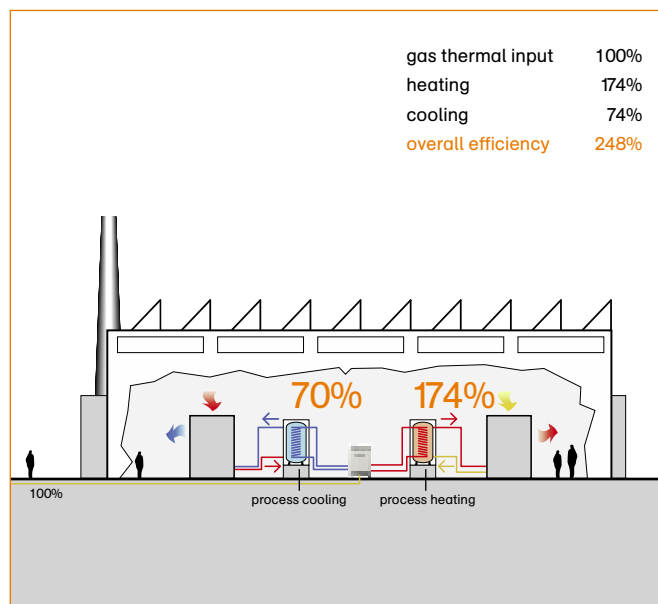


Applications

- Ideal for heating and DHW production. Preheating of DHW in summer in cooling operation (i.e. swimming pools).



Simultaneous production of hot and cold water



Applications

- Simultaneous production of heating and cooling capacity, with overall efficiency (GUE - Gas Utilization Efficiency) of 248%, recovering energy from renewable energy sources.
- Systems that simultaneously require heating and cooling (hospitals, manufacturing process or liquid-ring-based air conditioning systems).

GAHP-WS

HEATING OPERATION MODE ⁽¹⁾

| | | |
|---|--|------------------------|
| Energy class ErP (55 °C operation) | | A++ |
| Working point W10/W35 | GUE (gas utilization efficiency) | % 174 |
| | heating capacity | kW 43.9 |
| | capacity recovered from renewable source | kW 18.7 |
| Working point W10/W50 | GUE (gas utilization efficiency) | % 165 |
| | heating capacity | kW 41.6 |
| | capacity recovered from renewable source | kW 16.6 |
| Nominal water flow rate ($\Delta T = 10\text{ °C}$) | | m ³ /h 3.57 |
| Nominal water pressure loss (outlet water at 50 °C) | | kPa 57 |
| Maximum outlet water temperature for heating/DHW | | °C 65/70 |
| Maximum inlet water temperature for heating/DHW | | °C 55/60 |

COOLING OPERATION MODE

| | | |
|-----------------------|-------------------------------|---------|
| Working point W12/W35 | cooling capacity | kW 18.7 |
| | supplied capacity - condenser | kW 43.9 |
| Working point W12/W50 | cooling capacity | kW 16.8 |
| | supplied capacity - condenser | kW 42.0 |

OPERATION WITH SIMULTANEOUS USE

| | |
|--|-------|
| Working point W10/W35 - Overall efficiency | % 248 |
| Working point W10/W50 - Overall efficiency | % 231 |

BURNER CHARACTERISTICS

| | | | |
|------------------------------|--------------------------------|------|-----------|
| THERMAL CHARGING PERFORMANCE | | | |
| Thermal input (actual) | | kW | 25.2 |
| Gas consumption (actual) | natural gas G20 ⁽²⁾ | m³/h | 2.67 |
| | LPG G30/G31 ⁽³⁾ | kg/h | 1.99/1.96 |

ELECTRICAL CHARACTERISTICS

| | |
|---|---------------|
| Voltage | 230 V – 50 Hz |
| Nominal electrical power ⁽⁴⁾ | kW 0.41 |

INSTALLATION DETAILS

| | | | |
|---|-------------------|-------|-------|
| Operational weight | | kg | 300 |
| Sound pressure Lp at 5 metres ⁽⁶⁾ - Free field, at the front, direction factor 2 | | dB(A) | 44.1 |
| Connections | water | " F | 1 1/4 |
| | gas | " F | 3/4 |
| | flue exhaust pipe | mm | 80 |
| Electrical degree of protection | | IP | X5D |
| Size ⁽⁶⁾ | width | mm | 848 |
| | depth | mm | 690 |
| | height | mm | 1,278 |

⁽¹⁾ As per calculation methods of EN12309.⁽²⁾ NCV 34.02 MJ/m³ (9.45 kWh/m³) at 15 °C - 1013 mbar.⁽³⁾ NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.⁽⁴⁾ ± 10% depending on the power supply voltage and on the tolerance of the electrical motors power consumption.⁽⁵⁾ Lw sound power standard version dB(A) 66.1. Sound power values measured according to EN ISO 9614.⁽⁶⁾ Size does not include exhaust flue pipe.**Note:** The capacity recovered is considered as the capacity available for cooling. For any further information, please refer to design manual.

Solutions for simultaneous hot and cold water for heating, cooling and DHW production



with high efficiency water-source heat pumps



| Model | Units | Heating capacity heating/DHW kW | Capacity recovered by renewable energy kW | System GUE ⁽¹⁾ % | Size w/d/h ⁽²⁾ mm | Weight kg |
|-------|-------|---------------------------------|---|-----------------------------|------------------------------|-----------|
| RTWS | 2 WS | 87.80 | 35.20 | 174.3 | 2,314/1,245/1,400 | 768 |
| | 3 WS | 131.70 | 52.80 | 174.3 | 3,610/1,245/1,400 | 1,151 |
| | 4 WS | 175.60 | 70.40 | 174.3 | 4,936/1,245/1,400 | 1,534 |
| | 5 WS | 219.50 | 88.00 | 174.3 | 6,490/1,245/1,400 | 1,927 |

* Data refer to standard version, 4 pipes version and without circulators. Available with or without circulators, for outdoor or indoor installation. Please contact Robur Sales Network.

⁽¹⁾ Average efficiency with outlet water 35 °C with climate curve, evaporator water 10 °C.⁽²⁾ Size does not include exhaust flue pipe.

The Robur **water-source** heat pump solutions are also designed and supplied **pre-assembled in packages achieving A+++ energy class⁽¹⁾** even in applications with **radiators** for system retrofitting.

⁽¹⁾ As per calculation methods of EN12309.



Cooling and simultaneous domestic hot water production for free up to 75 °C thanks to heat recovery.

Absorption chiller-heater powered by natural gas with heat recovery

GA ACF-HR

Advantages

- For 1 kW of natural gas equivalent used, every unit adds 0.8 kW of renewable energy available 24-hours-a-day for domestic hot water production, with peak efficiency of 180%.
- Saving up to 86% of electric energy consumption compared with a traditional electrical system, thanks to the prevalent use of natural gas.

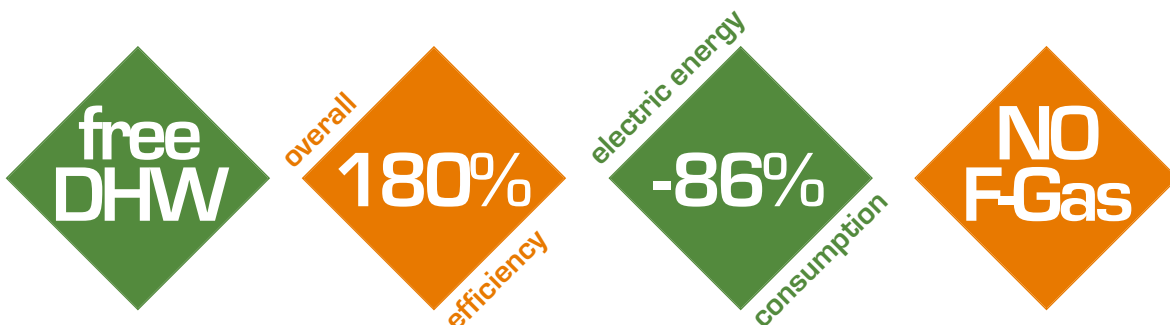
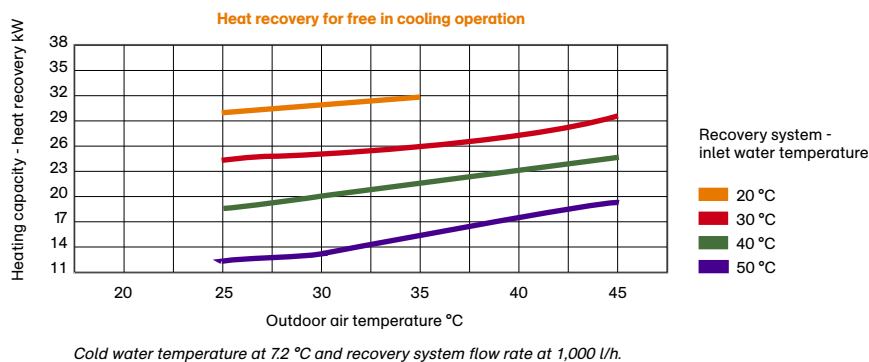
- It is eligible for national and local incentive programs all over Europe.
- Use of natural refrigerants not subject to normal constraints and phase-out (F-Gas Regulation exempt).

Applications

- Ideal for hotel, sport and wellness facilities.
- Ideal for post-heating circuits with air handling unit.
- Outdoor installation.

Versions

- Available in standard or low noise version.
- Available also in pre-assembled units for higher capacity, combined with Robur heat pumps and/or boilers (p. 28-34-45).



Please also refer to planning manual. Pdf download at www.robur.com

GA ACF HR

COOLING OPERATION MODE ⁽¹⁾

| | | | |
|--|-------------------------------------|------|-------|
| Working point A35/W7 | GUE (gas utilization efficiency) | % | 71 |
| | cooling capacity with heat recovery | kW | 17.72 |
| Nominal water flow rate ($\Delta T = 5.5$ °C) | | m³/h | 2.77 |
| Nominal water capacity pressure loss | | kPa | 29 |
| Minimum outlet water temperature | | °C | 3 |
| Inlet water temperature | max | °C | 45 |
| | min | °C | 6 |
| Ambient operating temperature | max | °C | 45 |
| | min | °C | 0 |

HEAT RECOVERY SYSTEM CHARACTERISTICS

| | | | |
|---|-----|-----|-------------|
| Heating capacity with heat recovery for free in cooling operation | | kW | up to 32 |
| Nominal water flow rate | | l/h | up to 2,500 |
| Hot water inlet temperature | max | °C | 75 |
| | min | °C | 10 |

BURNER CHARACTERISTICS

| | | | |
|--------------------------|--------------------------------|------|------|
| Thermal input (actual) | | kW | 25.0 |
| Gas consumption (actual) | natural gas G20 ⁽²⁾ | m³/h | 2.65 |
| | LPG G30/G31 ⁽³⁾ | kg/h | 1.94 |

ELECTRICAL CHARACTERISTICS

| | | | |
|--|-------------------|---------------|------|
| Voltage | | 230 V – 50 Hz | |
| Nominal electrical power ⁽⁴⁾⁽⁵⁾ | standard version | kW | 0.82 |
| | low noise version | kW | 0.87 |

INSTALLATION DETAILS

| | | | |
|--|--------------------------|-------|-------|
| Operational weight | standard version | kg | 390 |
| | low noise version | kg | 390 |
| Sound pressure Lp at 5 metres ⁽⁶⁾ | standard version | dB(A) | 57.6 |
| Free field, at the front, direction factor 2 | low noise version | dB(A) | 53.0 |
| Connections | water | " F | 1 1/4 |
| | gas | " F | 3/4 |
| Electrical degree of protection | | IP | X5D |
| Standard version size | width | mm | 850 |
| | depth | mm | 1,230 |
| | standard version height | mm | 1,445 |
| | low noise version height | mm | 1,545 |

⁽¹⁾ As per calculation methods of EN12309.

⁽²⁾ NCV 34.02 MJ/m³ (9.45 kWh/m³) at 15 °C - 1013 mbar.

⁽³⁾ NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.

⁽⁴⁾ Data measured at +30 °C outdoor temperature.

⁽⁵⁾ ± 10% depending on the power supply voltage and on the tolerance of the electrical motors power consumption.

⁽⁶⁾ Lw sound power standard version dB(A) 79.6 and low noise version dB(A) 75.0. Sound power values measured according to EN ISO 9614.

Note: For multiple units, please contact the Robur sales network. For any further information about heat recovery systems, please see planning manual.

Solutions for cooling and free DHW production



with chiller-heaters with heat recovery

| Model | Units | Cooling capacity kW | Heating capacity with heat recovery up to ⁽¹⁾ kW | Size w/d/h mm | Weight kg |
|----------|----------|------------------------|--|-------------------|--------------|
| RTC F HR | 2 ACF HR | 35.86 | 64.00 | 2,314/1,245/1,400 | 916 |
| | 3 ACF HR | 53.79 | 96.00 | 3,610/1,245/1,400 | 1,373 |
| | 4 ACF HR | 71.72 | 128.00 | 4,936/1,245/1,400 | 1,830 |
| | 5 ACF HR | 89.65 | 160.00 | 6,490/1,245/1,400 | 2,297 |

* Data refer to standard version, 4 pipes version and without circulators. Available with or without circulators, in standard or low noise version. Please contact Robur Sales Network.

⁽¹⁾ For further information regarding heating capacity of the recovery system under different operating conditions, please refer to planning manual.

Solutions for heating and cooling with DHW production all over the year, for free in cooling mode



with chiller-heaters with heat recovery + condensing boilers

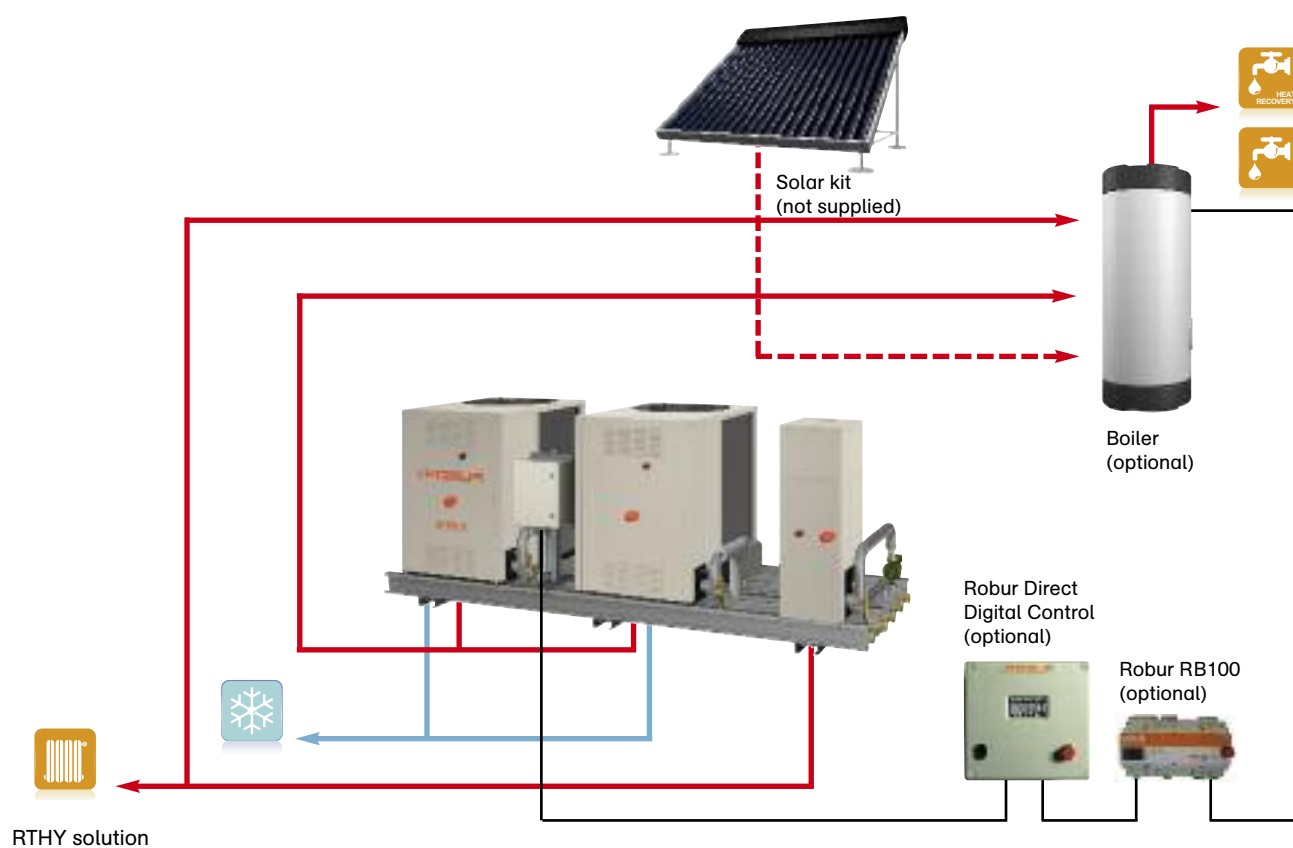


| Model | Units | Heating capacity heating/DHW kW | Cooling capacity kW | Heating capacity with heat recovery up to ⁽¹⁾ kW | Size w/d/h mm ⁽²⁾ | Weight kg |
|-------|-----------------|---------------------------------|---------------------|---|------------------------------|-----------|
| RTHY | 1 ACF-HR + 1 AY | 34.40 | 17.93 | 32.00 | 2,314/1,245/1,400 | 628 |
| | 1 ACF-HR + 2 AY | 68.80 | 17.93 | 32.00 | 2,314/1,245/1,400 | 733 |
| | 1 ACF-HR + 3 AY | 103.20 | 17.93 | 32.00 | 3,382/1,245/1,400 | 895 |
| | 1 ACF-HR + 4 AY | 137.60 | 17.93 | 32.00 | 3,382/1,245/1,400 | 979 |
| | 2 ACF-HR + 1 AY | 34.40 | 35.86 | 64.00 | 3,382/1,245/1,400 | 1,077 |
| | 2 ACF-HR + 2 AY | 68.80 | 35.86 | 64.00 | 3,382/1,245/1,400 | 1,183 |
| | 2 ACF-HR + 3 AY | 103.20 | 35.86 | 64.00 | 4,936/1,245/1,400 | 1,359 |
| | 2 ACF-HR + 4 AY | 137.60 | 35.86 | 64.00 | 4,936/1,245/1,400 | 1,443 |
| | 3 ACF-HR + 1 AY | 34.40 | 53.79 | 96.00 | 4,936/1,245/1,400 | 1,542 |
| | 3 ACF-HR + 2 AY | 68.80 | 53.79 | 96.00 | 4,936/1,245/1,400 | 1,647 |
| | 3 ACF-HR + 3 AY | 103.20 | 53.79 | 96.00 | 4,936/1,245/1,400 | 1,757 |
| | 3 ACF-HR + 4 AY | 137.60 | 53.79 | 96.00 | 6,490/1,245/1,400 | 1,920 |
| | 4 ACF-HR + 1 AY | 34.40 | 71.72 | 128.00 | 6,490/1,245/1,400 | 2,009 |
| | 4 ACF-HR + 2 AY | 68.80 | 71.72 | 128.00 | 6,490/1,245/1,400 | 2,114 |
| | 4 ACF-HR + 3 AY | 103.20 | 71.72 | 128.00 | 6,490/1,245/1,400 | 2,234 |
| | 4 ACF-HR + 4 AY | 137.60 | 71.72 | 128.00 | 6,490/1,245/1,400 | 2,318 |

• Data refer to standard version, 6 pipes version and without circulators. Available with or without circulators, in standard or low noise versions, 4 or 6 pipes. Please contact Robur Sales Network.

⁽¹⁾ For further information regarding heating capacity of the recovery system under different operating conditions, please refer to planning manual.

⁽²⁾ Size does not include exhaust flue pipe.





NATURAL GAS COOLING

GA ACF

Cooling with low electric energy consumption.

Absorption chiller powered by natural gas

GA ACF

Advantages

- Saving up to 86% of electricity compared with a traditional electric system, thanks to the prevalent use of natural gas.
- It is eligible for national and local incentive programs all over Europe.
- Use of natural refrigerants not subject to normal constraints and phase-out (F-Gas Regulation exempt).

- Independent and modular, it ensures continuity of service for cooling only as and when needed. Thanks to the use of an almost static refrigeration cycle, the performance levels remain unchanged over time and regular refill and disposal of refrigerant is not required.

Applications

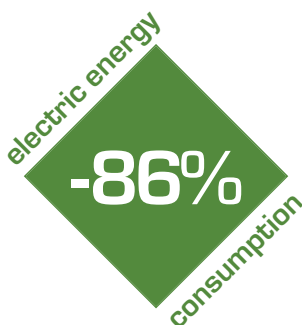
- Ideal for space cooling where electric energy is not available.
- Outdoor installation.

Versions

- Available in standard or low noise version.

- Available also in:

- pre-assembled units for higher capacity, combined with chillers and/or Robur boilers (p. 28-34-48);
- integrated outdoor package with condensing boiler Gitié ACAY (p. 56).



Please also refer to planning manual. Pdf download at www.robur.com

COOLING OPERATION MODE ⁽¹⁾

| | | | | |
|--|-----|---|-------------------|-----------|
| Working point A35/W7 | | GUE (gas utilization efficiency) | % | 71 |
| | | cooling capacity | kW | 17.72 |
| Nominal water flow rate ($\Delta T = 5,5\text{ }^{\circ}\text{C}$) | | | m ³ /h | 2.77 |
| Nominal water pressure loss | | | kPa | 29 |
| Minimum outlet water temperature | | | °C | 3 |
| Inlet water temperature | max | | °C | 45 |
| | min | | °C | 8 |
| Ambient operating temperature | max | | °C | 45 |
| | min | | °C | 0 |

BURNER CHARACTERISTICS

| | | | | |
|--------------------------|--------------------------------|--|-------------------|------|
| Thermal input (actual) | | | kW | 25.0 |
| Gas consumption (actual) | natural gas G20 ⁽²⁾ | | m ³ /h | 2.65 |
| | LPG G30/G31 ⁽³⁾ | | kg/h | 1.94 |

ELECTRICAL CHARACTERISTICS

| | | | | |
|--|-------------------|--|---------------|------|
| Voltage | | | 230 V – 50 Hz | |
| Nominal electrical power ⁽⁴⁾⁽⁵⁾ | standard version | | kW | 0.82 |
| | low noise version | | kW | 0.87 |

INSTALLATION DETAILS

| | | | | |
|--|-------------------|--|--------|-------|
| Operational Weight | standard version | | kg | 360 |
| | low noise version | | kg | 360 |
| Sound pressure Lp at 5 metres ⁽⁶⁾ Free field, at the front, direction factor 2 | standard version | | dB(A) | 57.6 |
| | low noise version | | dB (A) | 53.0 |
| Connections | water | | " F | 1 1/4 |
| | gas | | " F | 3/4 |
| Electrical degree of protection | | | IP | X5D |
| Standard version size | width | | mm | 850 |
| | depth | | mm | 1,230 |
| | height | | mm | 1,445 |
| Low noise version size | width | | mm | 850 |
| | depth | | mm | 1,230 |
| | height | | mm | 1,545 |

⁽¹⁾ As per calculation methods of EN12309.⁽²⁾ NCV 34.02 MJ/m³ (9.45 kWh/m³) at 15 °C - 1013 mbar.⁽³⁾ NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.⁽⁴⁾ Data measured at +30 °C outdoor temperature.⁽⁵⁾ ± 10% depending on the power supply voltage and on the tolerance of the electrical motors power consumption.⁽⁶⁾ Lw sound power standard version dB(A) 79.6 and low noise version dB(A) 75.0. Sound power values measured according to EN ISO 9614.**Solutions for cooling****with gas absorption chillers**

| Model | Units | Cooling capacity kW | Size w/d/h mm | Weight kg |
|-------|-------|------------------------|-------------------|--------------|
| RTCF | 2 ACF | 35.44 | 2,314/1,245/1,400 | 822 |
| | 3 ACF | 53.16 | 3,610/1,245/1,400 | 1,232 |
| | 4 ACF | 70.88 | 4,936/1,245/1,400 | 1,642 |
| | 5 ACF | 88.60 | 6,490/1,245/1,400 | 2,062 |

• Data refer to standard version, 2 pipes version and without circulators. Available with or without circulators, in standard or low noise versions. Please contact Robur Sales Network.

Solutions for heating, DHW production and cooling

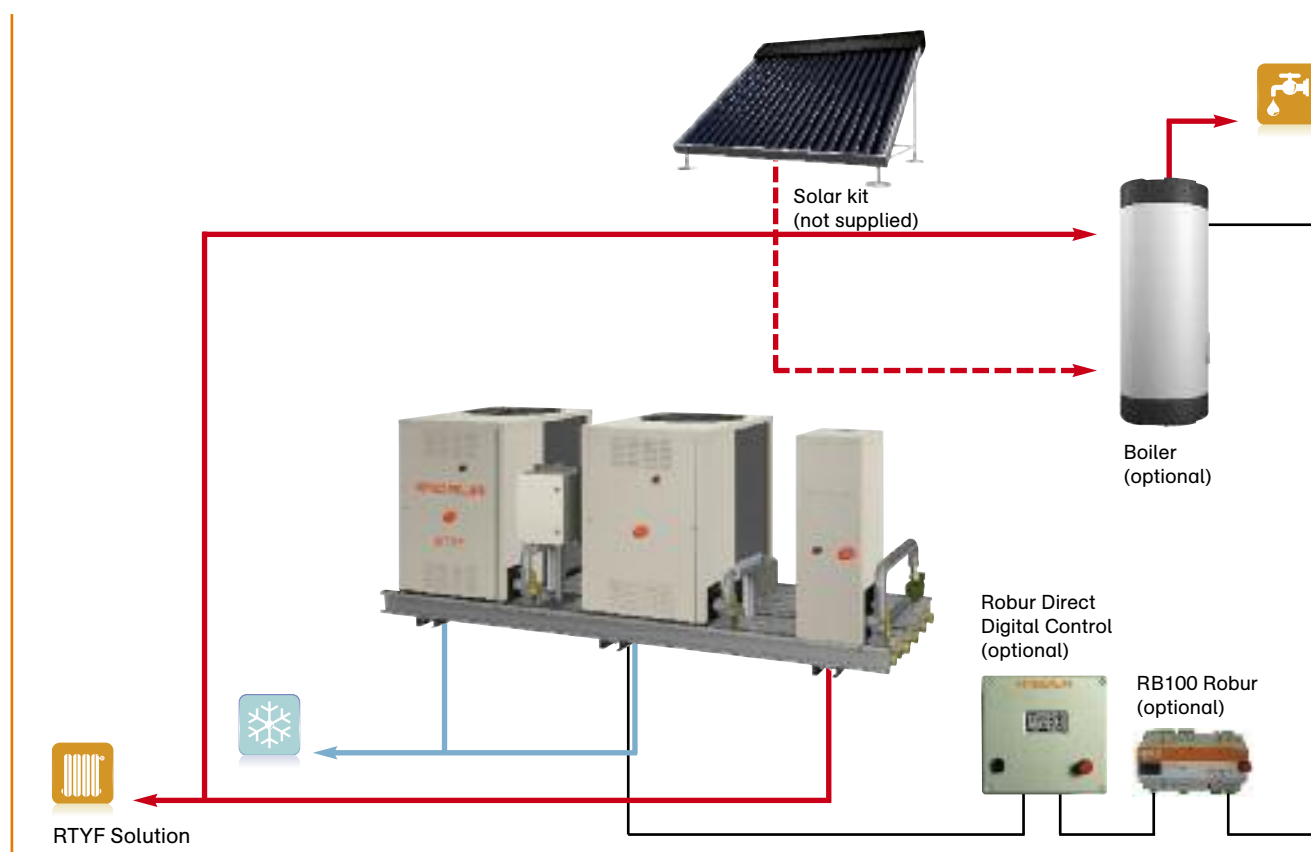


with gas absorption chillers + condensing boilers



| Model | Units | Heating capacity heating/DHW kW | Cooling capacity kW | Size w/d/h mm | Weight kg |
|-------|--------------|------------------------------------|------------------------|-------------------|--------------|
| RTYF | 1 ACF + 2 AY | 68.80 | 17.72 | 2,314/1,245/1,400 | 676 |
| | 1 ACF + 3 AY | 103.20 | 17.72 | 3,382/1,245/1,400 | 828 |
| | 1 ACF + 4 AY | 137.60 | 17.72 | 3,382/1,245/1,400 | 912 |
| | 2 ACF + 1 AY | 34.40 | 35.44 | 3,382/1,245/1,400 | 973 |
| | 2 ACF + 2 AY | 68.80 | 35.44 | 3,382/1,245/1,400 | 1,079 |
| | 2 ACF + 3 AY | 103.20 | 35.44 | 4,936/1,245/1,400 | 1,245 |
| | 2 ACF + 4 AY | 137.60 | 35.44 | 4,936/1,245/1,400 | 1,329 |
| | 3 ACF + 1 AY | 34.40 | 53.16 | 4,936/1,245/1,400 | 1,391 |
| | 3 ACF + 2 AY | 68.80 | 53.16 | 4,936/1,245/1,400 | 1,496 |
| | 3 ACF + 3 AY | 103.20 | 53.16 | 4,936/1,245/1,400 | 1,596 |
| | 3 ACF + 4 AY | 137.60 | 53.16 | 6,490/1,245/1,400 | 1,759 |
| | 4 ACF + 1 AY | 34.40 | 70.88 | 6,490/1,245/1,400 | 1,811 |
| | 4 ACF + 2 AY | 68.80 | 70.88 | 6,490/1,245/1,400 | 1,916 |
| | 4 ACF + 3 AY | 103.20 | 70.88 | 6,490/1,245/1,400 | 2,026 |
| | 4 ACF + 4 AY | 137.60 | 70.88 | 6,490/1,245/1,400 | 2,110 |

* Data refer to standard version, 4 pipes version and without circulators. Available with or without circulators, standard or low noise versions. Please contact Robur Sales Network.





Cooling in process applications, cooling in hot climates and refrigeration with low electric energy consumption.

Absorption chiller powered by natural gas

GA ACF Special Versions

Advantages

- Saving up to 86% of electricity compared with a traditional electrical system, thanks to the prevalent use of natural gas.
- It is eligible for national and local incentive programs all over Europe.
- Use of natural refrigerants not subject to normal constraints and phase-out (F-Gas Regulation exempt).
- Independent and modular, it ensures continuity of service for cooling only as and when needed. Thanks to the use of an almost static refrigeration cycle, the performance levels remain unchanged over time and regular refill and disposal of refrigerant is not required.

Applications TK Version

- Cooling in process applications. (e.g. in greenhouses for the intensive cultivation of mushrooms, rooms for maturing of cheese, etc).
- Cooling of controlled temperature rooms all year round (e.g. data reading rooms, computer rooms, laboratories).
- Cooling of rooms with high heat gains that require cooling even during cold seasons.

Applications HT Version

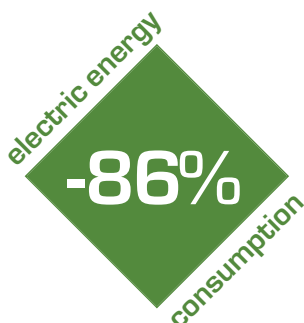
- Cooling of residential, commercial and industrial environments with an external air temperature up to 50 °C.

Applications LB Version

- Refrigeration where it is necessary to maintain temperatures inside the room in compliance with health and hygiene regulations.
- Refrigeration of cold rooms and counters for food preservation.
- Process refrigeration in systems requiring negative fluid temperatures.

Versions

- Available in low noise or standard versions.
 - Available with pre-assembled units with higher capacity.
- (p. 51)



3 Versions

- Process applications
- Climates up to 50 °C
- Refrigeration

Please also refer to planning manual. Pdf download at www.robur.com

GA ACF TK GA ACF HT GA ACF LB

COOLING OPERATION MODE ⁽¹⁾

| | | | | | |
|--|----------------------------------|-------------------|-----------|-----------|----------------------|
| Working point A35/W7 | GUE (gas utilization efficiency) | % | 71 | 68 | 53 |
| | cooling capacity | kW | 17.72 | 17.12 | 13.30 ⁽²⁾ |
| Nominal water flow rate ($\Delta T = 5.5^\circ\text{C}$) | | m ³ /h | 2.77 | 2.67 | 2.60 |
| Nominal water pressure loss | | kPa | 29 | 29 | 42 |
| Minimum outlet water temperature | | °C | 3 | 5 | -10 |
| Inlet water temperature max/min | | °C | 45/8 | 45/8 | 45/-7 |
| Ambient operating temperature max/min | | °C | 45/-12 | 50/0 | 45/0 |
| Sound pressure Lp at 5 metres ⁽³⁾ - standard/low noise version - Free field, at the front, direction factor 2 | | dB(A) | 57.6/53.0 | 57.6/53.0 | 57.6/53.0 |

BURNER CHARACTERISTICS

| | | | | | |
|--------------------------|--------------------------------|-------------------|------|------|------|
| Thermal input (actual) | | kW | 25.0 | 25.0 | 25.0 |
| Gas consumption (actual) | natural gas G20 ⁽⁴⁾ | m ³ /h | 2.65 | 2.65 | 2.65 |
| | LPG G30/G31 ⁽⁵⁾ | kg/h | 1.94 | 1.94 | 1.94 |

ELECTRICAL CHARACTERISTICS

| | | | | | |
|---|--------------------------|----|---------------|-----------|-----------|
| Operational weight | standard version | kg | 380 | 380 | 380 |
| | low noise version | kg | 380 | 380 | 380 |
| Voltage | | | 230 V - 50 Hz | | |
| Nominal electrical power ⁽⁶⁾⁽⁷⁾ - standard version | | kW | 0.82/0.87 | 0.82/0.87 | 0.82/0.87 |
| Standard version size | width | mm | 850 | 850 | 850 |
| | depth | mm | 1,230 | 1,230 | 1,230 |
| | standard version height | mm | 1,290 | 1,290 | 1,290 |
| | low noise version height | mm | 1,540 | 1,540 | 1,540 |

⁽¹⁾ As per calculation methods of EN12309.

⁽²⁾ Working point A35/W-5.

⁽³⁾ Lw sound power ACF-TK, ACF-HT and ACF-LB standard version dB(A) 79.6; ACF-TK, ACF-HT and ACF-LB low noise version dB(A) 75.0. Sound power values measured according to EN ISO 9614.

⁽⁴⁾ NCV 34.02 MJ/m³ (9.45 kWh/m³) at 15 °C - 1013 mbar.

⁽⁵⁾ NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.

⁽⁶⁾ A reduction in the fan revolutions (air flow) is envisaged for ambient operating temperatures of less than 33 °C. This leads to a further reduction in electricity consumption levels.

⁽⁷⁾ ± 10% depending on the power supply voltage and on the tolerance of the electrical engines.

Chillers for cooling in process applications



| Model | Units | Cooling capacity kW | Size w/d/h mm | Weight kg |
|---------|----------|------------------------|-------------------|--------------|
| RTCF TK | 2 ACF TK | 35.44 | 2,314/1,245/1,400 | 856 |
| | 3 ACF TK | 53.16 | 3,610/1,245/1,400 | 1,283 |
| | 4 ACF TK | 70.88 | 4,936/1,245/1,400 | 1,710 |
| | 5 ACF TK | 88.60 | 6,490/1,245/1,400 | 2,147 |

Chillers for cooling in hot climates



| Model | Units | Cooling capacity kW | Size w/d/h mm | Weight kg |
|---------|----------|------------------------|-------------------|--------------|
| RTCF HT | 2 ACF HT | 34.24 | 2,314/1,245/1,400 | 856 |
| | 3 ACF HT | 51.36 | 3,610/1,245/1,400 | 1,283 |
| | 4 ACF HT | 68.48 | 4,936/1,245/1,400 | 1,710 |
| | 5 ACF HT | 85.60 | 6,490/1,245/1,400 | 2,147 |

Chillers for refrigeration at negative temperatures



| Model | Units | Cooling capacity kW | Size w/d/h mm | Weight kg |
|---------|----------|------------------------|-------------------|--------------|
| RTCF LB | 2 ACF LB | 26.60 | 2,314/1,245/1,400 | 856 |
| | 3 ACF LB | 39.90 | 3,610/1,245/1,400 | 1,283 |
| | 4 ACF LB | 53.20 | 4,936/1,245/1,400 | 1,710 |
| | 5 ACF LB | 66.50 | 6,490/1,245/1,400 | 2,147 |

* Data refer to standard version, without circulators. Available with or without circulators, standard or low noise versions. Please contact Robur Sales Network.



Ideal for integrating Robur gas absorption solutions.
Heating and hot water production up to 80 °C.

Condensing boiler for outdoor installation

AY Condensing

Advantages

- Ideal integration to Robur gas absorption chillers and heat pumps for heating and production of hot water up to 80 °C.
- Ideal complement to:
 - provide peak power when climatic or economic conditions demand it;
 - complete the heating of domestic hot water production;
 - support them in supply to the AHU.

- It is eligible for national and local incentive programs all over Europe.
- Can be hydraulically and electrically coupled in one modular solution operating in cascade.

Versions

- Available also in preassembled units for higher capacity, combined with chillers and/or Robur boilers (p. 29-36-46-49-53).



ELIGIBLE

for national and local
incentive programs
all over Europe

Please also refer to planning manual. Pdf download at www.robur.com

AY Condensing CONDENSING BOILER

| | | AY 00-120 | |
|---|---------------------------------|---------------|-------|
| Energy class ErP | | A | |
| Nominal heating input | | kW | 34.9 |
| Nominal heating capacity ⁽¹⁾ | | kW | 34.4 |
| Gas consumption | natural gas G20 | m³/h | 3.69 |
| | LPG G30/G31 | kg/h | 2.75 |
| Efficiency | 100% of the load ⁽²⁾ | % | 104.6 |
| | 100% of the load ⁽¹⁾ | % | 98.6 |
| Water flow rate ($\Delta T = 10\text{ °C}$) | | l/h | 2,950 |
| Water pressure loss | | kPa | 40 |
| Maximum operating pressure | | bar | 3 |
| Voltage | | 230 V – 50 Hz | |
| Nominal electrical power ⁽³⁾ | | kW | 0.18 |
| Ambient temperature operating range | | -20/45 °C | |
| Connections | water | " F | 1 1/4 |
| | gas | " M | 3/4 |
| Size ⁽⁴⁾ | width | mm | 410 |
| | depth | mm | 530 |
| | height | mm | 1,280 |

⁽¹⁾ Characteristics under nominal conditions: water delivery 80 °C and water return 60 °C.
⁽²⁾ Characteristics under nominal conditions: water delivery 50 °C and water return 30 °C.

⁽³⁾ $\pm 10\%$ depending on the power supply voltage and on the tolerance of the electrical motors power consumption.

⁽⁴⁾ Size does not include exhaust flue pipe.

Solutions for heating and DHW production



with condensing boilers

| Model | Units | Heating capacity heating/DHW kW | Size w/d/h ⁽¹⁾ mm | Weight kg |
|-------|-------|------------------------------------|---------------------------------|--------------|
| RTY | 2 AY | 68.80 | 1,828/1,245/1,400 | 310 |
| | 3 AY | 103.20 | 1,828/1,245/1,400 | 415 |
| | 4 AY | 137.60 | 2,314/1,245/1,400 | 506 |
| | 5 AY | 172.00 | 2,314/1,245/1,400 | 645 |

• Multiple pre-assembled links RTY are available with or without circulators. On request, AY00-120 units can be pre-assembled with other units (gas heat pumps, gas chillers) to create multiple assemblies configured on demand for heating, cooling and DHW production. For multiple units, please contact the Robur Sales Network.

⁽¹⁾ Size does not include exhaust flue pipe.



High efficiency heating, cooling and domestic hot water production.
Supplied with the main system components.

Complete system

E³

Advantages

- Supplied with the main system components⁽¹⁾:
 - generation system: absorption heat pumps powered by natural gas and renewable energies;
 - distribution system: electronic controlled high efficiency modulating pumps;
 - control system: (Comfort Control Panel) managing the whole generation and distribution systems.

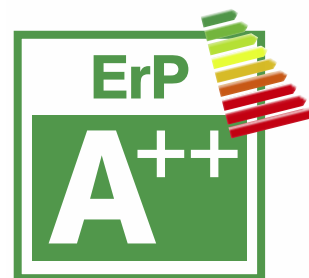
- Available in 13 pre-designed configurations to meet every installation requirements.
- It is eligible for national and local incentive programs all over Europe.

⁽¹⁾ E³ is a package for heating and hot water production.

Versions

- E³ A: heating system including one or more absorption heat pumps powered by natural gas and **air-source** renewable energy (GAHP-A p. 26).
- E³ GS: heating system including one or more absorption heat pumps powered by natural gas and **ground-source** renewable energy (GAHP-GS p. 38).
- E³ WS: heating system including one or more absorption heat pumps powered by natural gas and **water-source** renewable energy (GAHP-WS p. 41).

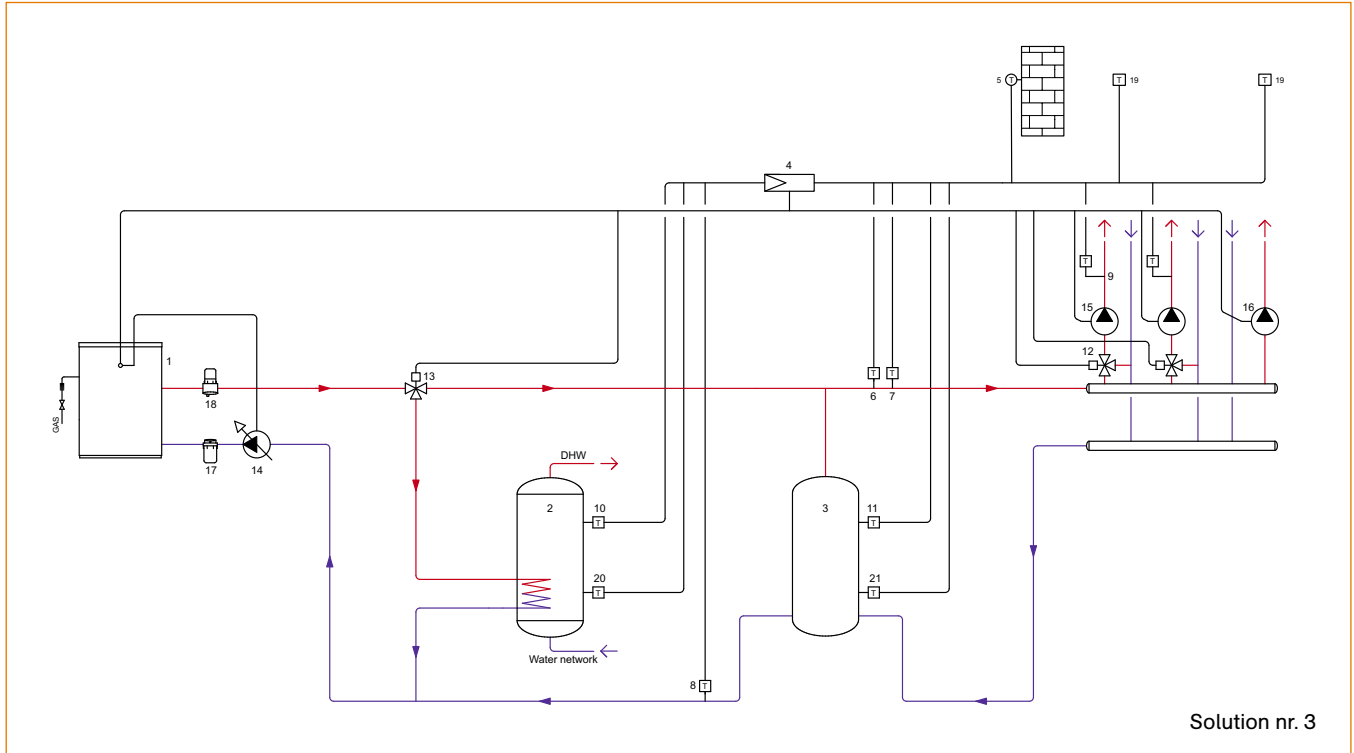
E³ solutions can reach A++ energy class.



ELIGIBLE

for national and local incentive programs all over Europe

Please also refer to planning manual. Pdf download at www.robur.com



| Solutions | Description | ErP |
|---|---|-----|
| E ³ A air-water - Solution 1 FE3A000001 | Single-zone heating system with compensation of the outlet temperature (climate curve) | A+ |
| E ³ A air-water - Solution 2 FE3A000002 | Multi-zone heating system with compensation of the outlet temperature (climate curve) | A+ |
| E ³ A air-water - Solution 3 FE3A000003 | Multi-zone heating system with compensation of the outlet temperature (climate curve) and domestic hot water production | A+ |
| E ³ A air-water - Solution 4 FE3A000004 | Multi-zone heating system with compensation of the outlet temperature (climate curve), domestic hot water production, integration with solar panels | A+ |
| E ³ A air-water - Solution 5 FE3A000005 | Multi-zone heating system with compensation of the outlet temperature (climate curve), domestic hot water production, integration with solar panel, back-up boiler | A++ |
| E ³ A air-water - Solution 6 FE3A000006 | Modular unit and multi-zone heating system with compensation of the outlet temperature (climate curve), domestic hot water production, integration with solar panel, back-up boiler | A++ |
| E ³ GS ground-source - Solution 7 FE3GS00007 | Single-zone heating system with compensation of the outlet temperature (climate curve) | A++ |
| E ³ GS ground-source - Solution 8 FE3GS00008 | Multi-zone heating system with compensation of the outlet temperature (climate curve) | A++ |
| E ³ GS ground-source - Solution 9 FE3GS00009 | Multi-zone heating system with compensation of the outlet temperature (climate curve) and domestic hot water production | A++ |
| E ³ GS ground-source - Solution 10 FE3GS00010 | Multi-zone heating system with compensation of the outlet temperature (climate curve), domestic hot water production, integration with solar panels | A++ |
| E ³ GS ground-source - Solution 11 FE3GS00011 | Multi-zone heating system with compensation of the outlet temperature (climate curve), domestic hot water production, integration with solar panel, back-up boiler | A++ |
| E ³ GS ground-source - Solution 12 FE3GS00012 | Multi-zone heating system with compensation of the outlet temperature (climate curve), domestic hot water production, integration with solar panel, back-up boiler, free-cooling | A++ |
| E ³ GS ground-source - Solution 13 FE3GS00013 | Modular unit and multi-zone heating system with compensation of the outlet temperature (climate curve), domestic hot water production, integration with solar panel, back-up boiler, free cooling | A++ |

The gas heat absorption heat pumps above mentioned for the E³ solutions are:

- Solutions from 1 to 6: low-noise GAHP-A;
- Solutions from 7 to 13: GAHP-GS, valid also with the absorption heat pumps powered by natural gas and water renewable energy source GAHP-WS.



High efficiency heating, domestic hot water production up to 80 °C and cooling with low electric energy consumption.

Gitié Trivalent Integrated Outdoor Package

with absorption heat pump powered by natural gas and air-source renewable energy

Gitié is the perfect blend of two winning technologies: the air-source absorption heat pump and the condensing boiler, both powered by natural gas.

Gitié can provide up to 3 services:

- high efficiency heating;
- hot water production up to 80 °C;
- cooling with low electric energy consumption.

Advantages

- Gitié, integrated, preassembled and custom-made in the manufacturing plant, is a fully plug-'n-play system. This can facilitate correct installation, avoiding the complexity of the integration on field of solar thermal systems.

- Gitié is the all-in-one solution replacing a boiler + solar thermal system using air-source renewable energy available 24-hours-a-day. For each kW of natural gas equivalent used, Gitié adds 0.5 kW of renewable energy.
- Gitié capital cost is convenient and it provides up to 40% of running cost savings if

compared with similar solutions.

- It is eligible for national and local incentive programs all over Europe.
- Use of natural refrigerants not subject to normal constraints and phase-out (F-Gas Regulation exempt).

A CHOICE SMARTER THAN solar systems



ELIGIBLE

for national and local incentive programs all over Europe

Please also refer to planning manual. Pdf download at www.robur.com

AIR-SOURCE RENEWABLE ENERGY

Air is enough for heating, domestic hot water production and cooling

Gitié

Applications

- Ideal for residential, industrial, commercial and hospitality facilities.
- Suitable for both new and existing buildings as it's for fitting in heating systems with low temperature (radiant heating or fan coils) or high temperature (radiators) distribution systems.
- Outdoor installation.

Versions

- Available in standard or low noise version, 2 and 4 pipes, with or without modulating circulators.



Models

• Gitié AHAY



- Integrated outdoor package comprising of:
 - air-source gas absorption heat pump GAHP-A (p. 26);
 - condensing boiler (p. 52).

• Gitié ARAY



- Trivalent integrated outdoor package comprising of:
 - air-source reversible gas absorption heat pump GAHP-AR (p. 32);
 - condensing boiler (p. 52).

• Gitié ACAY



- Trivalent integrated outdoor package comprising of:
 - gas absorption chiller ACF (p. 47);
 - condensing boiler (p. 52).



Components and accessories

Standard configuration

- 4-pipe service plate for water and gas connections.
- Electrical box for:
 - external control systems connections (like room thermostats, timers etc.);
 - Direct Digital Control (optional) connection;
 - water pumps connection.
- Steel rail.

Low noise version

With low-noise fan unit and a special sound-proof insulated casing. Ideal for installations where noise reduction is required.

Hydraulic kit

- **2 pipes (KIT /2 C0):**
 - Single water loop;
 - Two motorized and factory wired check valves to optimize the efficiency of the system
- **2 pipes with circulators (KIT /2 C1):**
 - Single water loop with circulators;
 - Two high efficiency and factory wired circulators (ErP Directive) to optimize the water flow and efficiency of the system.
- **4 pipes with circulators (KIT /4 C1):**
 - Two independent water loops with circulators;
 - Two high efficiency and factory wired circulators (ErP Directive) to optimize the water flow of the system.

Accessories

- Direct Digital Control for a smart system management.
- RoburBox100 for a smart control interface of cooling and domestic hot production management (Direct Digital Control required).
- Outdoor temperature probe.
- CAN BUS cable.
- High efficiency circulators (ErP Directive) with increased pressure head.
- Vibration dampers.
- Gas/LPG conversion kit.

Sample solution

Gitié ARAY - Trivalent integrated outdoor package

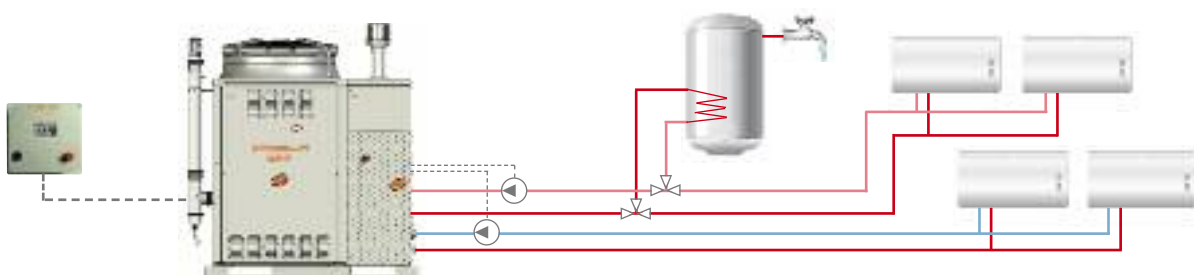
comprising of air-source reversible gas absorption heat pump + condensing boiler



HEATING, COOLING AND DOMESTIC HOT WATER PRODUCTION

4-pipe version

- **Nominal heating capacity 75.7 kW.** Hot water production up to 60 °C, DHW up to 80 °C
- **Nominal heating capacity 16.9 kW.** Cold water production down to 3°C
- Two different hydronic loops: one for heating or cooling and one for DHW production or heating integration



Gitié AHAY Gitié ARAY Gitié ACAY

HEATING MODE ⁽¹⁾

| Energy class ErP (55 °C operation) | | A++ | A+ | A |
|---|-----|-------|--------------------|--------------------|
| Heating capacity - gas absorption heat pump (A7/W35) | kW | 41.3 | -- | -- |
| GUE gas utilization efficiency - gas absorption heat pump (A7/W35) | % | 164 | -- | -- |
| Heating capacity - reversible gas absorption heat pump (A7/W35) | kW | -- | 37.8 | -- |
| GUE gas utilization efficiency - reversible gas absorption heat pump (A7/W35) | % | -- | 150 | -- |
| Heating capacity - condensing boiler (acqua 80/60 °C) | kW | 34.4 | 34.4 | 34.4 |
| Efficiency - condensing boiler (50/30 °C) | % | 104.6 | 104.6 | 104.6 |
| Maximum outlet water temperature heating/DHW | °C | 65/80 | 60/80 | 80/80 |
| Maximum inlet water temperature heating/DHW | °C | 55/70 | 50/70 | 70/70 |
| Outdoor operating temperature (dry bulb) | max | °C | 40 | 45 |
| | min | °C | -15 ⁽²⁾ | -20 ⁽²⁾ |

COOLING MODE

| | | | | |
|--|-----|----|------|-------|
| Cooling capacity (A35/W7) | kW | -- | 16.9 | 17.72 |
| GUE gas utilization efficiency | % | -- | 67 | 71 |
| Minimum outlet water temperature | °C | -- | 3 | 3 |
| Inlet water temperature max/min | °C | -- | 45/6 | 45/6 |
| Outdoor operating temperature (dry bulb) | max | °C | -- | 45 |
| | min | °C | -- | 0 |

BURNER CHARACTERISTICS

| | | | | |
|--------------------------|--------------------------------|------|------|------|
| Thermal input (actual) | kW | 60.1 | 60.1 | 59.9 |
| Gas consumption (actual) | natural gas G20 ⁽³⁾ | m³/h | 6.36 | 6.36 |
| | LPG G30/G31 ⁽⁴⁾ | kg/h | 4.71 | 4.71 |

ELECTRICAL CHARACTERISTICS

| | | | | |
|--|--|---------------|-----------|------|
| Voltage | | 230 V – 50 Hz | | |
| Nominal electrical power ⁽⁵⁾⁽⁶⁾ | standard version ⁽⁷⁾ | kW | 1.02 | 1.02 |
| | low noise version ⁽⁸⁾ - max/min speed | kW | 0.95/0.68 | 1.01 |

INSTALLATION DATA

| | | | | | |
|--|--|-------|---------|---------|---------|
| Weight | standard version ⁽⁷⁾ | kg | 490/515 | 480/505 | 440/465 |
| | low noise version | kg | 500/525 | 490/515 | 460/485 |
| Sound pressure Lp at 5 metres ⁽⁹⁾ Free field, at the front, direction factor 2 | standard version ⁽⁷⁾ | dB(A) | 57.6 | 57.6 | 57.6 |
| | low noise version ⁽⁸⁾ - max/min speed | dB(A) | 52.0 | 53.0 | 53.0 |
| | low noise version ⁽⁸⁾ - max/min speed ⁽¹⁰⁾ | dB(A) | 49.0 | -- | -- |
| Connections | water outlet/inlet (4 pipes version) | " F | 1 1/4 | 1 1/4 | 1 1/4 |
| | water outlet/inlet (2 pipes version) | " F | 1 1/2 | 1 1/2 | 1 1/2 |
| | gas | " M | 3/4 | 3/4 | 3/4 |
| | exhaust pipe - gas absorption heat pump | mm | 80 | 80 | -- |
| | exhaust pipe - condensing boiler | mm | 80 | 80 | 80 |
| IP Class | | IP | X5D | X5D | X5D |
| Size ⁽¹¹⁾ | width | mm | 1,356 | 1,356 | 1,356 |
| | depth | mm | 1,234 | 1,234 | 1,234 |
| | standard version height | mm | 1,279 | 1,279 | 1,279 |
| | low noise version height | mm | 1,508 | 1,508 | 1,508 |

⁽¹⁾ Nominal conditions according to EN 12309.⁽²⁾ Available also for lower temperature.⁽³⁾ NCV 34.02 MJ/m³ (9.45 kWh/m³) at 15 °C - 1013 mbar.⁽⁴⁾ NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.⁽⁵⁾ ± 10% tolerance depending on the electric voltage and engine consumption.⁽⁶⁾ Version with circulators: 280 W extra.⁽⁷⁾ Gitié AHAY standard version: A+ energy class.⁽⁸⁾ Low noise version with high efficiency modulating fan for lower noise emission.⁽⁹⁾ Lw sound power AHAY standard version dB(A) 79.6, low noise version with max speed fan dB(A) 74.0, with min speed fan dB(A) 71.0. Lw sound power ARAY standard version dB(A) 79.6, low noise version dB(A) 75.0. Lw sound power ACAY standard version dB(A) 79.6, low noise version dB(A) 75.0. Sound power values measured according to EN ISO 9614.⁽¹⁰⁾ Sound pressure data (AHAY low noise version with min speed fan) at partial load by suppliers.⁽¹¹⁾ Size does not including exhaust pipe.

Control systems

A single device to adjust, control and manage the Robur absorption and the Robur gas boilers operation.

Direct Digital Control - DDC

Direct Digital Control is supplied as optional.

Operation

- Management of up to 16 modules (individual or pre-assembled) connected on the same hydraulic circuit and up to 48 modules, if connected to

two panels extra.

- Monitoring of all units parameters.
- Set point control with sliding temperature, thanks to the climate curve function with optional outdoor probe.
- Mod-Bus communication protocol support for interface

with building management systems (such as BMS, SCADA, etc.).



CCI is the interface panel, alternative to the DDC, for the modulation management of Robur absorption units.

Comfort Control Interface - CCI

Comfort Control Interface, supplied as optional, for the modulation management of Robur GAHP-A, GAHP-GS and GAHP-WS units.

Operation

- The CCI panel can control and modulate the power output up

to a maximum of three units. Combined with an external electronic regulator, it can supply heating and DHW.

- Monitoring of all units parameters.
- Mod-Bus communication protocol support for interface with building management

systems (such as BMS, SCADA, etc.).



The heart of the regulation system of the 13 E³ Robur solutions.

Comfort Control Panel - CCP

The Comfort Control Panel is supplied as standard for the 13 E³ Robur solutions.

Operation

- Up to 3 E³ heat pumps and boilers with climatic curve.
- Anti-legionella cycle.

- 3-way valve management for switching heating and DHW.
- Secondary distribution to different zones and DHW production.



RB100 is an interface panel, supplied as standard, for the system management of Robur absorption units and gas boilers.

Robur Box 100 - RB100

The RB100 control interface is fitted with Direct Digital Control (DDC).

Operation

RB100 combined with DDC (Direct Digital Control):

- heating, DHW and cooling mode management.
- 3-way valve management for switching heating and DHW.
- Control and error alarm.



Optional control system for the system management with Robur units and third parties appliances.

Robur Box 200 - RB200

RB200 (RoburBox200) is the control interface for systems made up of Robur chiller-heater units, absorption heat pumps and third parties appliances, fitted with Direct Digital Control (DDC):




- integration of third parties appliances, i.e. in case of retrofitting of existing systems;
- control of water circulation of primary and secondary circuits;
- 3-way valve management for switching heating and DHW;

- Mod-Bus communication protocol support for interface with building management systems (such as BMS, SCADA, etc.).
- Control and error alarm.




Accessories for Robur absorption units

UNIT CONTROL AND MANAGEMENT DEVICES


| Accessory | Description | SINGLE UNIT GAHP - GA - AY | MULTIPLE UNIT GAHP - GA - AY | COMPLETE SYSTEM E ³ |
|---|--|-------------------------------|---------------------------------|-----------------------------------|
|  | DDC Direct Digital Control (n. 1 DDC for max. 16 units) | • | • | |
|  | RB100 - Robur Box 100 | • | • | |
| | RB200 - Robur Box 200 | • | • | |
|  | CCI - Comfort Control Interface for modulation management with external regulator | • | • | |
| | RSI - Integrate System Controller ⁽¹⁾ | • | • | |
| | CAN BUS cable for the connection of Robur units | • | • | • |
| | Temperature probe for DDC | • | • | |
| | Winter Kit for AY Condensing | • | • | • |

For the choice of the suitable control device, please refer to Planning Manual.




ANTIVIBRATION DAMPERS

| Accessory | Description | SINGLE UNIT GAHP - GA - AY | MULTIPLE UNIT GAHP - GA - AY | COMPLETE SYSTEM E ³ |
|---|------------------------------------|-------------------------------|---------------------------------|-----------------------------------|
|  | N. 4 spring vibration dampers kit | • | • | • |
| | N. 6 spring vibration dampers kit | | • | • |
| | N. 8 spring vibration dampers kit | | • | |
| | N. 10 spring vibration dampers kit | | • | |

CIRCULATION PUMPS

| Accessory | Description | SINGLE UNIT GAHP - GA - AY | MULTIPLE UNIT GAHP - GA - AY | COMPLETE SYSTEM E ³ |
|---|---|-------------------------------|---------------------------------|-----------------------------------|
|  | High efficiency modulating circulation pump | • | • | • |
| | Modulating system circulation pump | | | • |
| | High efficiency modulating circulation pump with increased pressure head | • | • | • |

TANKS AND BUFFERS

| Accessory | Description | SINGLE UNIT GAHP - GA - AY | MULTIPLE UNIT GAHP - GA - AY | COMPLETE SYSTEM E ³ | GITIE' |
|---|--|-------------------------------|---------------------------------|-----------------------------------|--------|
|  | 300 l buffer tank - ErP energy class C | • | • | • | • |
| | 500 l buffer tank - ErP energy class D | • | • | • | • |
| | 1,000 l buffer tank | | • | • | |
|  | 300 l DHW preparation tank with large coil (without integrated coil) - ErP energy class C | • | • | • | • |
| | 500 l DHW preparation tank with large coil (without integrated coil) - ErP energy class D | • | • | • | • |
| | 500 l DHW preparation tank with large coil (with auxiliary coil) - ErP energy class D | • | • | • | • |
| | 750 l DHW preparation tank with large coil (with auxiliary coil) | | • | • | |
|  | Hydraulic separator "Mosé" ⁽¹⁾ , for hydraulic circuit balance, complete with air discharge valve, water discharge valve and thermal insulation | • | • | • | • |

⁽¹⁾ Available while stocks last.





SYSTEM COMPONENTS

| Accessory | Description | SINGLE UNIT GAHP - GA - AY | MULTIPLE UNIT GAHP - GA - AY | COMPLETE SYSTEM E ³ | GITIE' |
|-----------|--|-------------------------------|---------------------------------|-----------------------------------|--------|
| | 230V AC actuator for ON/OFF zone valves, 90 sec. | • | • | • | • |
| | 230V AC modulating actuator for 3-way valves, 150 sec. | | | • | |
| | 3-way ball valve 1"1/4 | • | • | • | • |
| | 3-way ball valve 1"1/2 | • | • | • | • |
| | 3-way valve DN 20 Kvs 6,3 | | | • | |
| | 3-way valve DN 25 Kvs 10 | | | • | |
| | 3-way valve DN 32 Kvs 16 | | | • | |
| | Air separator filter 1"1/4 | • | | • | • |
| | Air vent filter 1"1/4 | • | | • | • |
| | Condensate discharge pump | • | | • | • |
| | Water filter collector 1"1/4 | • | | • | • |
| | Ammonia discharge kit ⁽¹⁾ | • | • | • | |
| | Flow control valve | • | | • | • |

E³ SYSTEM REGULATION

| Accessory | Description | COMPLETE SYSTEM | | |
|-----------|--|------------------|-------------------|-------------------|
| | | E ³ A | E ³ GS | E ³ WS |
| | Central communication unit ⁽²⁾ | • | • | • |
| | Room unit basic Siemens ⁽²⁾ | • | • | • |
| | Room unit cooling Siemens ⁽²⁾ | • | • | • |
| | Sender Siemens ⁽²⁾ | • | • | • |
| | Transceiver Siemens ⁽²⁾ | • | • | • |
| | External probe Siemens ⁽²⁾ | • | • | • |
| | Immersion temperature probe ⁽²⁾ | • | • | • |
| | Solar probe Siemens ⁽²⁾ | • | • | • |
| | Strap-on temperature sensor ⁽²⁾ | • | • | • |

ACCESSORIES FOR GITIE'

| Accessory | Description | Gitié AHAY | Gitié ARAY | Gitié ACAY |
|---|--|---------------|---------------|---------------|
|  | Preconfigured Direct Digital Control for a smart system management (to be ordered with the package) | • | • | • |
|  | Preconfigured RoburBox100 for a smart control interface of cooling and DHW management (Direct Digital Control required - to be ordered with the package) | • | • | • |
| | CAN BUS cable (Direct Digital Control required) | • | • | • |
| | Outdoor temperature probe | • | • | • |
| | GPL gas conversion kit | • | • | • |
|  | Kit nr. 6 anti-vibration spring mountings | • | • | • |
|  | High efficiency modulating circulators | • | • | • |
| | High efficiency modulating circulators with increased pressure head | • | • | • |

⁽¹⁾ For GAHP-GS and GAHP-WS indoor installation.

⁽²⁾ Available while stocks last.

ROBUR

wants to be a place of work:

Driven by the Progress

Moved by the Passion

Trusted by the Humanity

Led by the Justice

Guaranteed by the Quality

Inspired by the Beauty

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