



caring for the environment



Integrated heating and cooling solutions  
with Absorption Heat Pumps  
powered by natural gas and renewable energies

ROBUR

The reasons for choosing  
Robur heating and cooling systems

## 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 caring 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 good, 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 S.p.A. Chairman

## ROBUR AWARDS AND CERTIFICATIONS

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- 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 Pumps, 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 gas-fired heat pumps as part of the "Impresa Ambiente" Prize  
- Special mention in Enterprise Prize for Innovation promoted by Confindustria
- 2008** - ROBUR Test Laboratories accredited by California Energy Commission - CEC  
- Gas Absorption Heat Pumps 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** - Robur is Coordinator of the HEAT4U Project (7th Framework Programme for Research and Technological Development promoted by European Commission). 14 among the most important European organizations in the energy, industrial, and research fields are involved. The challenge for this project, which shall continue through to 2014, is to implement the gas absorption heat pump technology, currently used for heating light commercial buildings, also in the area of single-family detached residential homes
- 2012** - Gas Absorption Heat Pumps are tested by Engler-Bunte-Institut (EBI) of the Karlsruher Institut fuer Technologie (KIT)
- 2013** - Gas Absorption Heat Pumps are tested by the Cetiat Laboratory in Lyon (EN ISO 17025).

# REASONS FOR A CHOICE

## Key points of Robur strategy since 1991

| CRITERIA                                       | HVAC TECHNOLOGIES                       |  |   |   |           |             |                                      |
|--|---|--|---|---|-----------|-------------|--------------------------------------|
|  | CONDENSING BOILER + SOLAR <sup>TH</sup> | HYBRID BOILER +EHP                               | AIR/WATER SOURCE EHP                                  | GROUND SOURCE EHP                                     | MICRO-CHP | FUELL CELLS | GAS ABSORPTION HEAT PUMPS + RES GAHP |
| <b>Use of RES</b>                              | Approx. 10-15%                          | Only partial use of RES <sup>(1) (2)</sup>       | YES <sup>(1) (2)</sup>                                | YES <sup>(1)</sup>                                    | NO        | NO          | Up to 40%                            |
| <b>Proven Reliability</b>                      | YES                                     | YES  | YES   | YES   | NO        | NO          | YES                                  |
| <b>Use of available grid</b>                   | YES                                     | YES  | 300k EHP = 1GW (one extra power plant) <sup>(3)</sup> | 300k EHP = 1GW (one extra power plant) <sup>(3)</sup> | YES       | YES         | YES                                  |
| <b>Environmental sustainability</b>            | YES                                     | Refrigerant global warming impact <sup>(4)</sup> | Refrigerant global warming impact <sup>(4)</sup>      | Refrigerant global warming impact <sup>(4)</sup>      | YES       | YES         | YES                                  |
| <b>Integrated solution (heating + cooling)</b> | NO                                      | YES  | YES   | YES   | NO        | NO          | YES                                  |
| <b>Sustainability without subsidies</b>        | YES                                     | YES  | YES   | Partial <sup>(5)</sup>                                | NO        | NO          | YES                                  |

|                                  |                         |                             |
|----------------------------------|-------------------------|-----------------------------|
| Limited compliance with criteria | Compliant with criteria | NOT compliant with criteria |
|----------------------------------|-------------------------|-----------------------------|

**NOTE:** Efficiency on primary energy (NCV).

<sup>(1)</sup> Efficiency on primary energy decreases below 100% when water outlet temperature is above 50 °C.

<sup>(2)</sup> Efficiency on primary energy decreases below 100% when outdoor temperature is below 0 °C.

<sup>(3)</sup> Large scale deployment of EHP requires the upgrade of distribution grid.

<sup>(4)</sup> EU restrictions are limiting harmful refrigerants.

<sup>(5)</sup> Profitable only in cold climates.

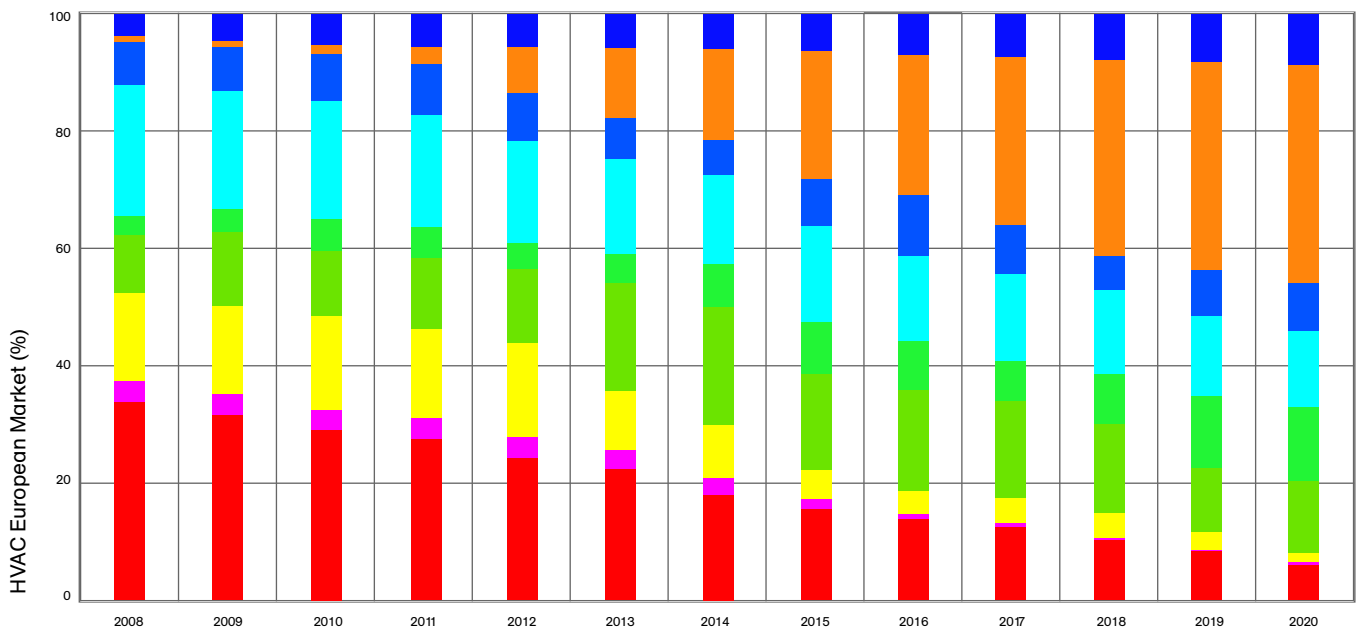
# A SCENARIO CONFIRMED BY RESEARCH INSTITUTES

## Report BSRIA: HVAC scenario over the next 10 years

In the '90s Robur made the choice to develop the absorption technology for the

HVAC market. This choice has been farsighted, as confirmed also by one of BSRIA's outlooks

on the HVAC market for the 10 years to come.



- Heat Recovery Ventilation
- Gas Powered Alternatives (including gas absorption heat pumps, combustion engine heat pumps, CHP and fuel cells)
- VRFs
- Minisplits
- Solar thermal
- Heat pumps
- Water pumps
- Commercial boilers
- Domestic boilers

Source: Report 25093/1 BSRIA 2009 (based on 2008 data)

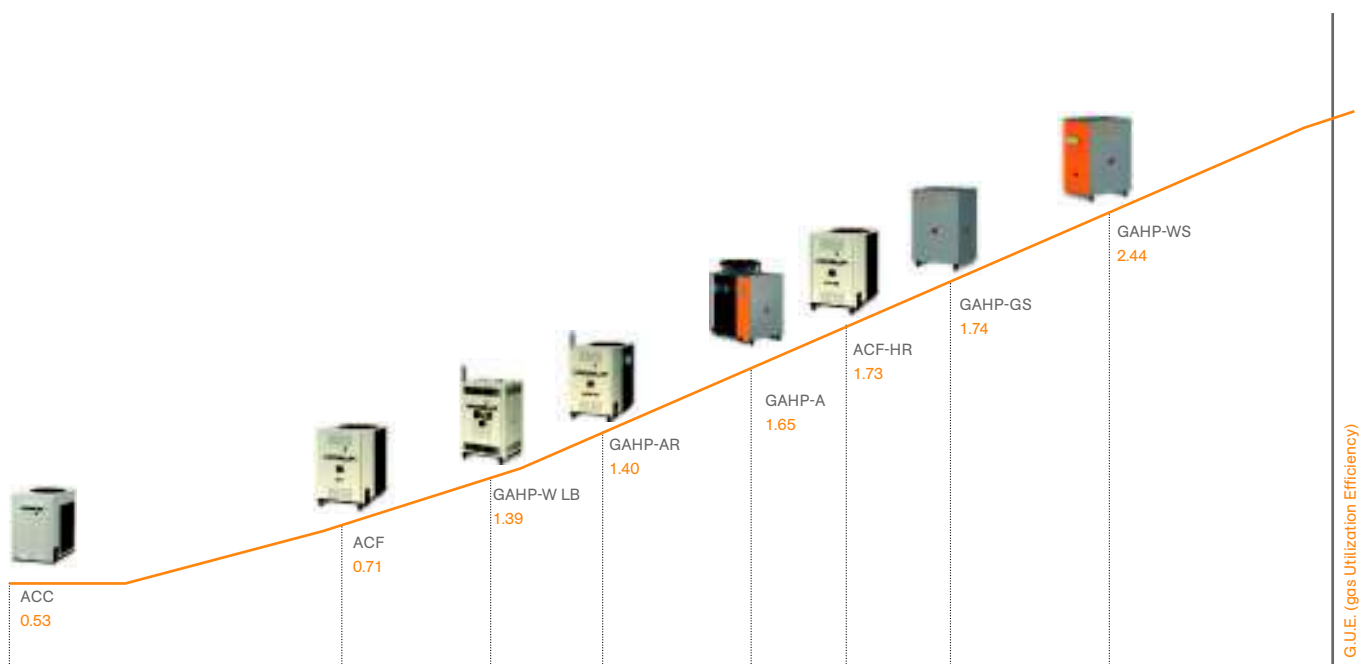
**NOTE:**

Indicated data represent market Value (not Volume) of a "Gas favoured" scenario, which was developed alongside a set of different scenarios as part of the "Scenario Planning

Project 52093/1" by BSRIA. Overall trend biased towards Germany and UK, due to more available information on those countries at the time of the "Scenario Planning Project".

# ABSORPTION TECHNOLOGY EFFICIENCY EVOLUTION

A key technology with a great potential for innovation



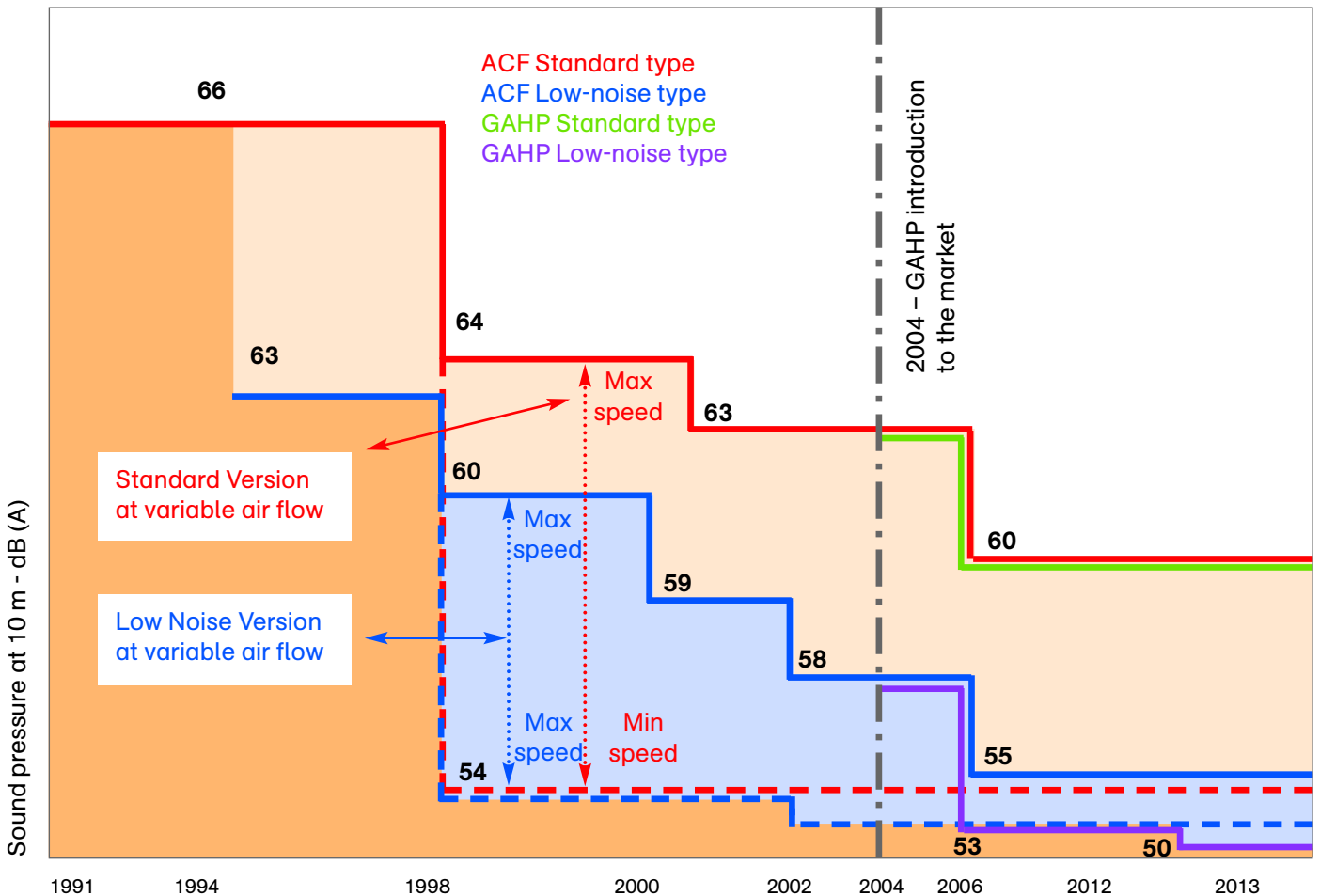
- 1968 **ACC** Gas absorption chiller.  
ARKLA (Arkansas Louisiana Gas Co.) introduces the first water-ammonia absorption units, with 300,000 pieces sold.
- 1991 Robur Corporation was established to acquire absorption technology from Dometic, a company of Electrolux group.
- 1998 **ACF** The gas efficiency 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 or 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 173%.
- 2005 **GAHP-WS and GS** High efficiency Gas Absorption Heat Pump for simultaneous production of hot and cold water, ideal for geothermal systems and process applications.
- 2008 Modulating and condensing Gas Absorption Heat Pumps.  
**E<sup>3</sup> Solution** Hydronic heating system with modulating condensing Gas Absorption Heat Pumps.

# ROBUR CONTINUOUS IMPROVEMENT

Robur's 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 emissions, which have been constantly reduced over years. The development of the Heat4U Project has already provided a positive leverage

even on the present range of air-source **GAHP A S** (low noise version) appliances currently available on the market, which benefits today of a further step ahead in the reduction of sound pressure and power consumption.



# ABSORPTION HEAT PUMP POWERED BY GAS AND RENEWABLE ENERGY SOURCES GAHP (Gas Absorption Heat Pump)

The perfect blend of the two most common heating technologies

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

able to recover renewable energy in the form of heat from air, water and ground sources. 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 (in reversible versions).



|  |  |
|--|--|
| <p><b>ADVANTAGES</b><br/><b>Condensing boiler</b></p> <ul style="list-style-type: none"> <li>• Natural gas fired</li> <li>• DHW supply</li> <li>• Only 1/10 of electricity consumption in comparison to electrical heat pumps</li> </ul> | <p><b>ADVANTAGES</b><br/><b>Electric heat pump</b></p> <ul style="list-style-type: none"> <li>• Use of renewable source energy with efficiency over 100% (Gross calorific value)</li> <li>• Cooling mode also available</li> </ul> |
| <p><b>MINUS</b><br/><b>Condensing boiler</b></p> <ul style="list-style-type: none"> <li>• No use of renewable energy</li> <li>• Efficiency lower than 100% (Gross Calorific Value)</li> </ul>  | <p><b>MINUS</b><br/><b>Electric heat pump</b></p> <ul style="list-style-type: none"> <li>• High electrical consumption</li> <li>• Use of HFC refrigerants</li> <li>• Limited operational range</li> </ul>                          |



# 4 GOOD REASONS

FOR CHOOSING GAS ABSORPTION HEAT PUMPS  
POWERED BY GAS AND RENEWABLE ENERGY SOURCES



**ENVIRONMENTAL FRIENDLY**

**COST AND ENERGY  
SAVINGS**



**INCREASE IN PROPERTY VALUE**

**THE IDEAL INTEGRATION INTO  
EXISTING OR NEW INSTALLATIONS**



# ROBUR GAHP ARE ENVIRONMENTAL FRIENDLY

using natural gas + renewable energy sources <sup>(1)</sup>

**8,028<sup>(2)</sup>** Gas Absorption Heat Pumps with Self-Sustainable Renewable Energy save **12,845 TEP** every year and the emissions of **33,718 Tons of CO<sub>2</sub>**, which is equivalent to the emissions of **16,056 green cars** or those absorbed by **4,808,772 trees** covering a surface of **67,835,518 sqm**.

Each Robur gas absorption heat pump:

- adds **1 kW** of natural gas to **0.5 kW of renewable energy<sup>(3)</sup>**. This renewable energy is 24-hours-a-day available, **thus avoiding unnecessary integration systems** and/or

unnecessary heat rejection (e.g. solar panels in summer).

- saves **every year 4.2 Tons of CO<sub>2</sub> emissions<sup>(4)</sup>**, which are equivalent to those absorbed by 599 trees<sup>(5)</sup> or those produced by 2 green cars<sup>(6)</sup>; **every year 1.6 TOE are saved.**

- is the best solution to the problem of global warming due to greenhouse gases, using a natural refrigerant **with GWP (Global Warming Potential) = 0.**

(1) All data are tested and certified by ENEA for Italy, DVGW Forschungsstelle and VDE for Germany, California Energy Commission for USA. Assuming that the specific heating capacity is 38.3 kW with only 25.2 kW of gas input thanks to the use of renewable energy.

(2) Updated on 28<sup>th</sup> Feb. 2013.

(3) With solar thermal, to produce 0.5 kW, approx. 1m<sup>2</sup> of collectors is necessary.

(4) Each GAHP can save 2.165 m<sup>3</sup> of natural gas every year (1 m<sup>3</sup> of natural gas produces 1.94 Kg of CO<sub>2</sub>), assuming 1,000 hours of operation per year.

(5) 1,000 square meters of forest in the Ticino Natural Park absorb 500 kg of CO<sub>2</sub> per year, assuming that one tree occupies 14 square meters. Source: LifeGate.

(6) Assuming that a car covers 15,000 km per year and produces 140 g CO<sub>2</sub> per km. Source: ACEA European Automobile Manufacturers Association.

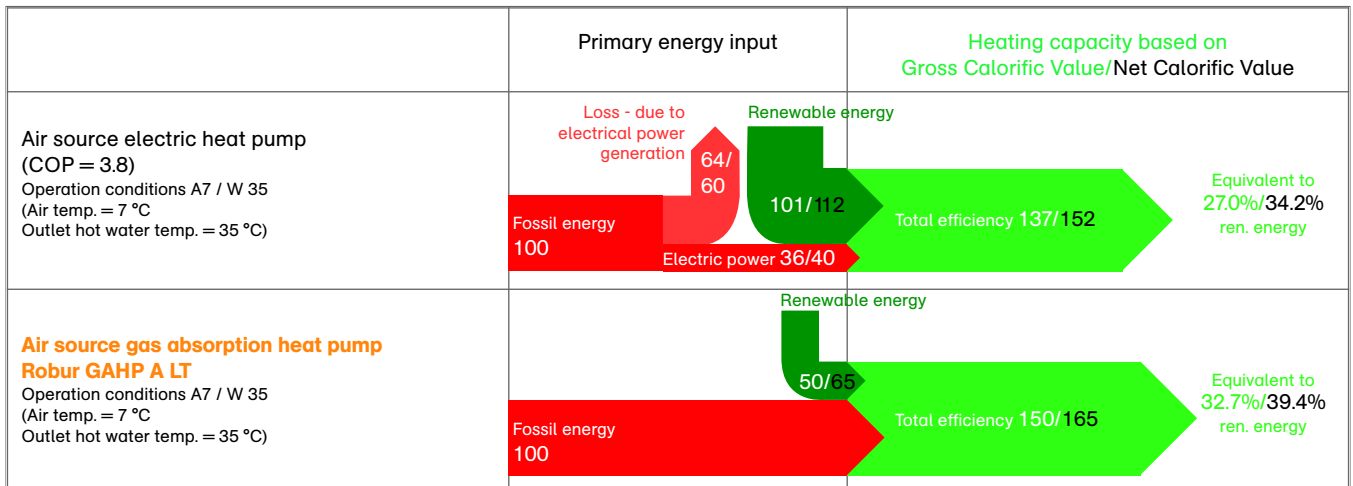
## Efficiency and use of renewable energy in heat pumps

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 very minor electrical consumption.

The advantage is high 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 are shown between electric heat pumps and Robur absorption heat pumps. The energy balance based on primary energy highlights the higher efficiency of Robur gas

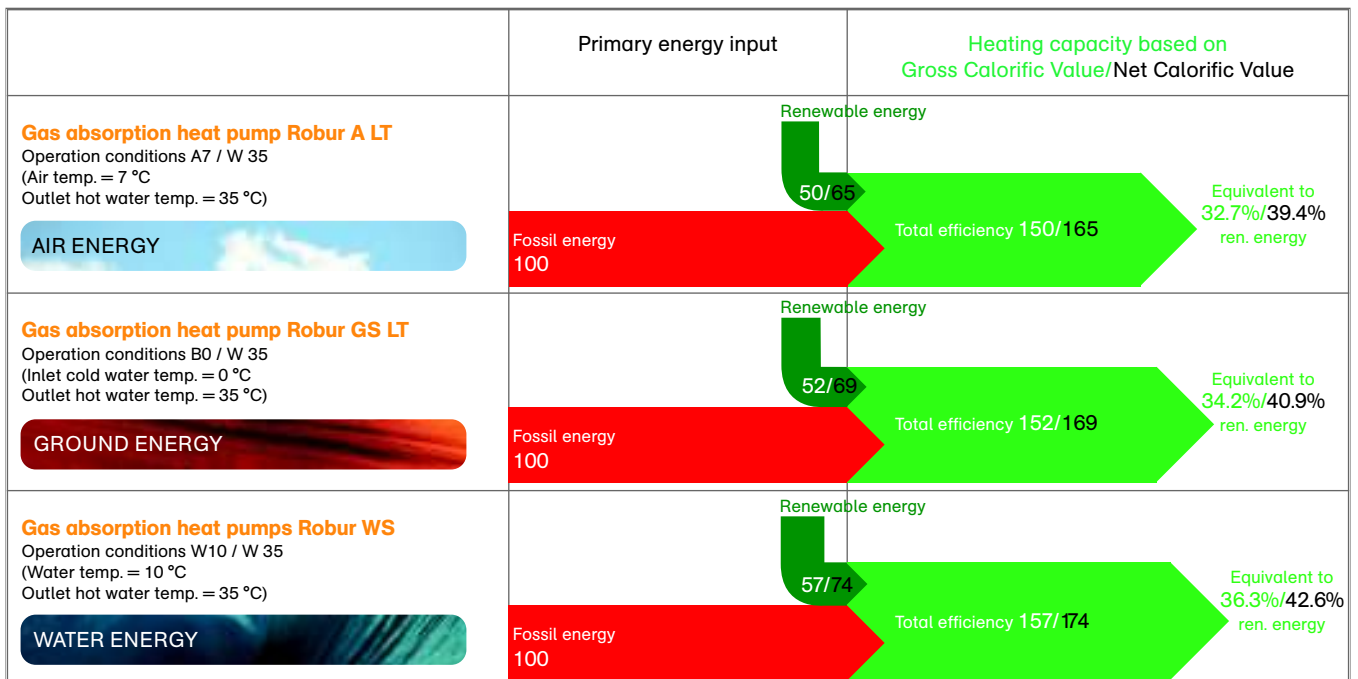
absorption heat pumps in comparison to the electrical ones (COP of 3.8). In spite of seemingly higher use of renewable energy by electric heat pumps, electric power generation requires higher use of primary energy upstream. A Robur gas absorption heat pump, instead, uses primary energy directly (natural gas or LPG).

FIG. A: AIR SOURCE GAS ABSORPTION HEAT PUMP VS. ELECTRIC HEAT PUMP



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

FIG. B: EFFICIENCY AND RENEWABLE ENERGY UTILIZATION IN GAS ABSORPTION HEAT PUMPS (GAHP)



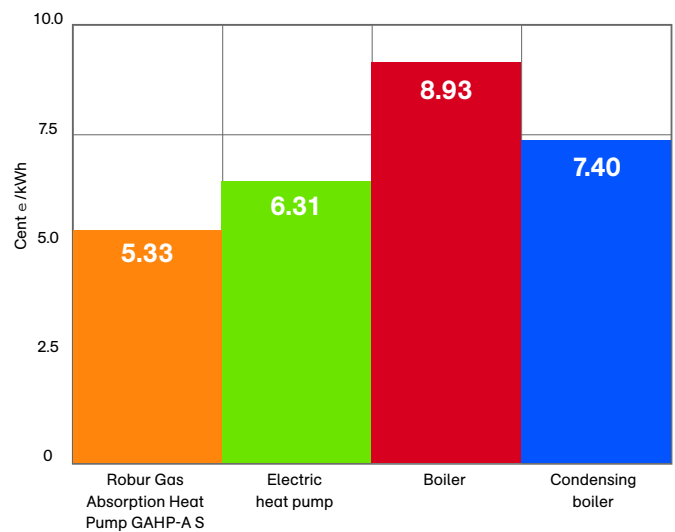
## SAVING COST AND ENERGY



GAHP technology can provide significant savings, up to 40%, on heating costs every year, in comparison to the best condensing boilers, making GAHP a smart and beneficial investment, with a payback time of 2 to 4 years.

Cost per kWh of 3 different technologies, considering:

- natural gas cost equivalent to 0.76 €/m<sup>3</sup>;
- electric power cost equivalent to 0.24 €/kWh;
- air source gas absorption heat pump Robur GAHP-A S - G.U.E. equivalent to 165%;
- air source electric heat pump - COP equivalent to 3.8;
- boiler with efficiency equivalent to 90%;
- condensing boiler with efficiency equivalent to 108%.

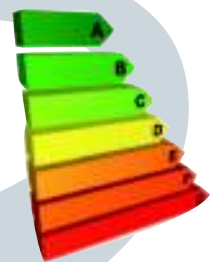


## INCREASING PROPERTY VALUE



GAHP's 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.



## IDEAL INTEGRATION

of new installations or existing buildings

Ensuring energy and cost savings while respecting the environment,  
GAHPs are the best choice for integration into existing buildings.

### Efficiency in heat generation



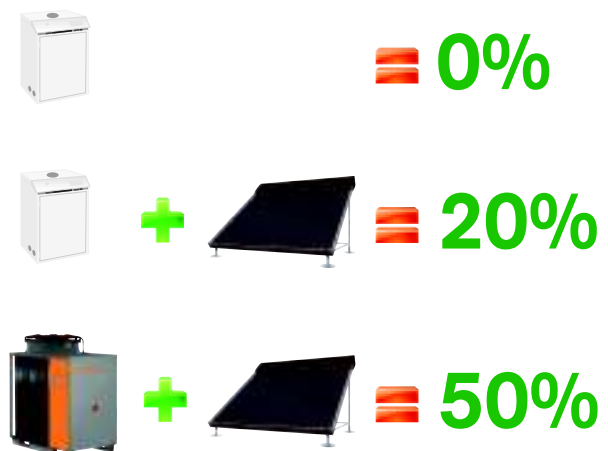
GAHP's are the ideal integration with boilers. With heating efficiencies of 40% higher than the best condensing boilers, the system ensures remarkable savings on overall heating operational costs.

GAHP's 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 energies -besides solar energy, air, ground or water-source- (side fig.);
- 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.

### % renewable energy utilization



## Robur absorption technology powered by gas

| OPERATION                            | APPLI<br>CATIONS                                       | REN.<br>ENERGY<br>RATE% <sup>(1)</sup> | INSTAL-<br>LATION    | HEATING<br>CAPACITY<br>G.C.V./N.C.V.<br>(%) | OUTLET<br>TEMPERATURE<br>HEATING SYSTEM |       | MIN. OUTLET WATER<br>TEMPERATURE SYSTEM |                |
|--------------------------------------|--|--|----------------------|---|---|-------|---|----------------|
|                                      |  |  |                      |   | MAX                                     | MIN   | PROBES                                  | COLD<br>SYSTEM |
| Heating<br>or<br>heating and DHW     | Floor heating<br>system or<br>fan coils<br>(low temp.) | Air - 39.4%                            | OUTDOOR              | 150/165                                     | 55 (70) <sup>(2)</sup> °C               | 30 °C |   |                |
|                                      |  | Ground - 40.9%                         | OUTDOOR<br>or INDOOR | 152/169                                     |   | 30 °C | -10 °C                                  |                |
|                                      |  | Water - 42.6%                          |                      | 157/174                                     |   | 30 °C | 3 °C                                    |                |
|                                      | Radiators<br>(high temp.)                              | Air - 34.2%                            | OUTDOOR              | 138/152                                     | 65 (70) <sup>(2)</sup> °C               | 40 °C |   |                |
|                                      |  | Ground - 32.9%                         | OUTDOOR<br>or INDOOR | 135/149                                     |   | 40 °C | -5 °C                                   |                |
|                                      |  | Water - 39.4%                          |                      | 157/165                                     |   | 30 °C | 3 °C                                    |                |
| Simultaneous<br>heating and cooling  | Process<br>applications                                | Water                                  | OUTDOOR<br>or INDOOR | 220/244                                     | 55 (70) <sup>(2)</sup> °C               | 30 °C | 3 °C                                    |                |
| Alternative heating<br>and cooling * | Floor heating<br>system or<br>fan coils                | Air - 33.3%                            | OUTDOOR              | 135/150                                     | 60 °C                                   | 30 °C |   | 3 °C           |
| Cooling **                           | Indoor   |  | OUTDOOR              |   |   |       |   | 3 °C           |
|                                      | Heat recovery<br>in summer                             |  | OUTDOOR              |   | 75 °C                                   |       |   | 3 °C           |
|                                      | Process<br>applications                                |  | OUTDOOR              |   |   |       |   | 3 °C           |
|                                      | Hot climates   |  | OUTDOOR              |   |   |       |   | 5 °C           |
| Industrial<br>refrigeration          | Low<br>temperature                                     |  | OUTDOOR              |   |   |       |   | -10 °C         |
| Boilers for<br>integration           | Low or high<br>temperature                             |  | OUTDOOR<br>or INDOOR |   | 80 °C                                   | 25 °C |   |                |

<sup>(1)</sup> Based on NCV - outlet hot water at 50 °C for HT type and 35 °C for LT type.

<sup>(2)</sup> Max temperature for DHW production.

<sup>(3)</sup> Min. ambient temperature for indoor type 0 °C.

<sup>(4)</sup> Max. temperature outdoor air in heating operation 35 °C.

LT= Low temperature - HT= High temperature

\* The appliance is able to produce hot water for DHW operation when integrating other appliances.

\*\* The appliance can produce hot water for heating and DHW production when integrating other appliances.

| OUTDOOR AIR TEMPERATURE |                       | ROBUR UNIT                                       | HIGHER CAPACITY (SAME UNITS)                               | COMPLETE SOLUTIONS   | OTHERS FUNCTIONS WITH MULTIPLE UNITS (INCLUDING MIN. 1 UNIT PER TYPE)  |
|-------------------------|-----------------------|--|--|----------------------|--|
| MAX                     | MIN                   |  |  |                      |  |
| 40 °C                   | -20 °C                | Heat pump <b>GAHP-A LT</b> (p. 16)               | <b>RTA - RTAY</b> (p.18)                                   | <b>E³ A</b> (p. 44)  |  |
| 45 °C                   | -15 °C <sup>(3)</sup> | Heat pump <b>GAHP-GS LT</b> (p. 26)              | <b>RTGS</b> (p. 29)  | <b>E³ GS</b> (p. 44) |  |
|                         | -15 °C <sup>(3)</sup> | Heat pump <b>GAHP-WS</b> (p. 30)                 | <b>RTWS</b> (p. 33)  | <b>E³ WS</b> (p. 44) |  |
| 40 °C                   | -20 °C                | Heat pump <b>GAHP-A HT</b> (p. 16)               | <b>RTA - RTAY</b> (p. 18)                                  | <b>E³ A</b> (p. 44)  |  |
| 45 °C                   | -15 °C <sup>(3)</sup> | Heat pump <b>GAHP-GS HT</b> (p. 26)              | <b>RTGS</b> (p. 29)  | <b>E³ GS</b> (p. 44) |  |
|                         | -15 °C <sup>(3)</sup> | Heat pump <b>GAHP-WS</b> (p. 30)                 | <b>RTWS</b> (p. 33)  | <b>E³ WS</b> (p. 44) |  |
| 45 °C                   | -15 °C <sup>(3)</sup> | Heat pump <b>GAHP-WS</b> (p. 30)                 | <b>RTWS</b> (p. 33)  |                      |  |
| 45 °C <sup>(4)</sup>    | -20 °C                | Heat pump <b>GAHP-AR</b> (p. 20)                 | <b>RTAR - RTCR</b> (p. 23)                                 |                      | <b>RTAH</b> (p. 24)<br><b>RTRH</b> (p. 23)<br><b>RTYR/RTRC</b> (p. 24)   |
| 45 °C                   | 0 °C                  | Chiller <b>ACF</b> (p. 37)                       | <b>RTCF</b> (p. 38)  |                      | <b>RTCR</b> (p. 23)<br><b>RTYF</b> (p. 39)<br><b>RTRC</b> (p. 24)  |
| 45 °C                   | 0 °C                  | Chiller with heat recovery <b>ACF HR</b> (p. 34) | <b>RTCF-HR</b> (p. 35)                                     |                      | <b>RTAH</b> (p. 24)<br><b>RTHY</b> (p. 36)<br><b>RTRH</b> (p. 23)  |
| 45 °C                   | -12 °C                | Chiller <b>ACF TK</b> (p. 40)                    | <b>RTCF-TK</b><br><b>RTCF-HT</b><br><b>RTCF-LB</b> (p. 41) |                      |  |
| 52 °C                   | 0 °C                  | Chiller <b>ACF HT</b> (p. 40)                    |  |                      |  |
| 45 °C                   | 0 °C                  | Chiller <b>ACF LB</b> (p. 40)                    |  |                      | <b>RTAY</b> (p. 19)<br><b>RTHY</b> (p. 36)<br><b>RTYF</b> (p. 39)<br><b>RTYR/RTRC</b> (p. 24)<br><b>RTRH</b> (p. 23) |
| 45 °C                   | -20 °C                | Boiler <b>AY 120</b> (p. 42)                     | <b>RTY</b> (p. 43)   |                      |  |

**RTAH:** Heating, cooling and cooling with heat recovery and DHW production during cooling operation.  
**RTAY:** Heating and DHW production.  
**RTCR:** Heating or cooling.  
**RTHY:** Heating, cooling and DHW production with heat recovery.

**RTRC:** Heating, cooling and DHW production with use of renewable energy.  
**RTRH:** Heating, cooling with heat recovery and DHW production all year long.  
**RTYF:** Heating, cooling and DHW production.  
**RTYR:** Heating, cooling and DHW production with use of renewable energy.

Condensing absorption heat pump  
powered by gas and **air source renewable energy**.  
For high efficiency heating.

## GAHP-A

- **Up to 39.4% utilisation of air source renewable energy. Designed to exceed peak efficiencies (G.U.E.) of 165%<sup>(1)</sup>**, guaranteeing reductions in annual heating costs and in CO<sub>2</sub> emissions compared to the best condensing boilers.

<sup>(1)</sup> **Equivalent to COP 4.13 on energy conversion factor of 2.5.**

- **Increases the total efficiency of the heating system** when it is combined or integrated with boilers with a lower energy performance.
- The most beneficial heating system to **enhance the energy qualification** of buildings with a considerable promotion of the building's energy classification with the consequent increase in the value of the building.
- All data are tested by certificates and approvals from ENEA for Italy, DVGW Forschungsstelle and VDE for Germany, California Energy Commission for USA.

**39.4%** renewable energy

**165%** heating efficiency

**Increase** in property value



Please also refer to planning manual.  
Pdf download under [www.robur.com](http://www.robur.com)

Find more <http://www.robur.com/products/pro-solutions/pro-gahp-line-a-series/description.html>



- Ensures efficiency levels in excess of 145% even at -7 °C, so it is also used in especially cold climates. It thus avoids activating back-up systems (boilers and electrical heaters), which reduce the seasonal performance coefficients and hence increase consumption.

- With a GAHP-A, every year 4.4 Tons of CO<sub>2</sub>, emissions are saved, which are equivalent to those absorbed by 604 trees or those produced by 2 green cars; every year 2 TOE are saved.

**-4.4** Tons of CO<sub>2</sub> per unit

**Outdoor** installation

**Applications**

- Ideal for heating and DHW production in residential, industrial, commercial, accommodation and tertiary

utilities, for upgrading or integrating existing systems.

- For **outdoor installation**.

**The models**

- **HT**: for the production of water at high temperature (for retrofitted radiator systems).
- **LT**: optimized to produce hot

water at low temperature (new systems with radiant panels or fan coils).

- Available also in low-noise version.



Residential application



Light commercial application with fan coils and ceiling splits

|   |  |                   | GAHP-A HT <sup>(1)</sup> | GAHP-A LT <sup>(1)</sup> |
|---|--|-------------------|--------------------------|--------------------------|
| <b>HEATING OPERATION MODE <sup>(2)</sup></b>                      |  |                   |                          |                          |
| Working point A7/W35  | G.U.E. (gas utilization efficiency) <sup>(3)</sup> | %                 | --                       | 165                      |
|   | heating capacity                                   | kW                | --                       | 41.7                     |
| Working point A7/W50  | G.U.E. (gas utilization efficiency)                | %                 | 152                      | --                       |
|   | heating capacity                                   | kW                | 38.3                     | --                       |
| Nominal water flow rate ( $\Delta T = 10\text{ }^\circ\text{C}$ ) |  | m <sup>3</sup> /h | 3.0                      | 3.0                      |
| Nominal water pressure loss (outlet water at 50 °C)               |  | kPa               | 43                       | 43                       |
| Maximum outlet water temperature heating/DHW                      |  | °C                | 65/70                    | 55/70                    |
| Maximum inlet water temperature heating/DHW                       |  | °C                | 55/60                    | 45/60                    |
| Outdoor operating temperature (dry bulb)                          | max  | °C                | 40                       | 40                       |
|   | min  | °C                | -20                      | -20                      |
| <b>BURNER CHARACTERISTICS</b>                                     |  |                   |                          |                          |
| Thermal input (actual)  |  | kW                | 25.2                     | 25.2                     |
| Gas consumption (actual)  | natural gas G20 <sup>(4)</sup>                     | m <sup>3</sup> /h | 2.67                     | 2.67                     |
|   | LPG G30/G31 <sup>(5)</sup>                         | kg/h              | 1.99/1.96                | 1.99/1.96                |
| <b>ELECTRICAL CHARACTERISTICS</b>                                 |  |                   |                          |                          |
| Voltage   |  |                   | 230 V – 50 Hz            |                          |
| Nominal electrical power <sup>(6)</sup>                           | standard version                                   | kW                | 0.90                     | 0.90                     |
|   | low noise version - fan max/min speed              | kW                | 0.77/0.50                | 0.77/0.50                |
| <b>INSTALLATION DETAILS</b>                                       |  |                   |                          |                          |
| Operational weight standard/low noise version                     |  | kg                | 390/400                  | 390/400                  |
| Sound power L <sub>w</sub> <sup>(7)</sup>                         | standard version                                   | dB(A)             | 82.1                     | 82.1                     |
|   | low noise version - fan max/min speed              | dB(A)             | 75.3/72.3                | 75.3/72.3                |
| Sound pressure L <sub>p</sub> at 5 metres <sup>(8)</sup>          | standard version                                   | dB(A)             | 60.1                     | 60.1                     |
|   | low noise version - fan max/min speed              | dB(A)             | 53.3/50.3                | 53.3/50.3                |
| Connections   | water  | " F               | 1 1/4                    | 1 1/4                    |
|   | gas  | " F               | 3/4                      | 3/4                      |
|   | exhaust flue pipe                                  | mm                | 80                       | 80                       |
| Residual flue pressure  |  | Pa                | 80                       | 80                       |
| Electrical degree of protection                                   |  | IP                | X5D                      | X5D                      |

<sup>(1)</sup> HT: for the production of water at high temperature (for retrofitted radiator systems);  
 LT: optimized to produce hot water at low temperature (new systems with radiant panels or fan coils).  
<sup>(2)</sup> Nominal conditions according to EN 12309-2.  
<sup>(3)</sup> Equivalent to COP 4.13 on energy conversion factor of 2.5.

<sup>(4)</sup> N.C.V. 34.02MJ/m<sup>3</sup> (9.45 kWh/m<sup>3</sup>) at 15 °C - 1013mbar.  
<sup>(5)</sup> N.C.V. 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.  
<sup>(6)</sup> ± 10% depending on the power supply voltage and on the tolerance of the electrical motors power consumption.  
<sup>(7)</sup> Sound power values measured according to EN ISO 9614  
<sup>(8)</sup> Free field, at the front, direction factor 2.

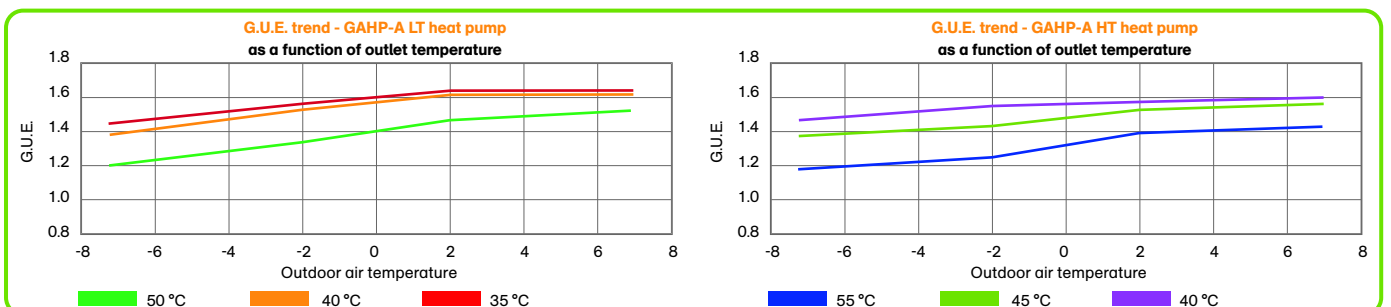


## Heating solutions and DHW production

with high efficiency air source heat pumps

| Model     | Heating capacity heating/DHW kW | Average seasonal efficiency <sup>(1)</sup> % | Size w/d/h <sup>(2)</sup> mm | Weight kg |
|-----------|---------------------------------|--|------------------------------|-----------|
| GAHP-A LT | 41.70                           | 165.3  | 848/1,258/1,281              | 390       |
| RTA LT    | 83.40                           | 165.3  | 2,314/1,245/1,400            | 888       |
|           | 125.10                          | 165.3  | 3,610/1,245/1,400            | 1,331     |
|           | 166.80                          | 165.3  | 4,936/1,245/1,400            | 1,774     |
|           | 208.50                          | 165.3  | 6,490/1,245/1,400            | 2,227     |
| GAHP-A HT | 38.30                           | 158.1  | 848/1,258/1,281              | 390       |
| RTA HT    | 76.60                           | 158.1  | 2,314/1,245/1,400            | 888       |
|           | 114.90                          | 158.1  | 3,610/1,245/1,400            | 1,331     |
|           | 153.20                          | 158.1  | 4,936/1,245/1,400            | 1,774     |
|           | 191.50                          | 158.1  | 6,490/1,245/1,400            | 2,227     |

Please see side page (p.19)





## Solutions for heating and DHW production

with high efficiency air source heat pumps + condensing boilers

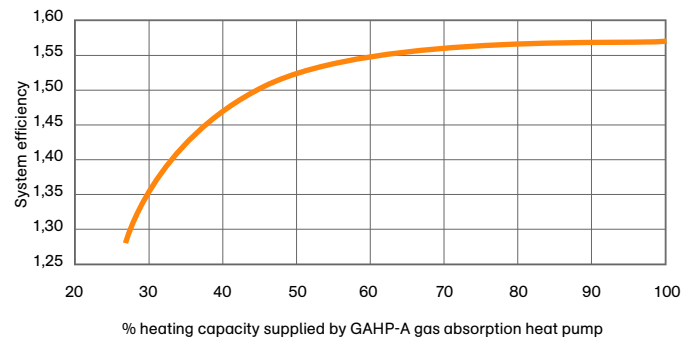
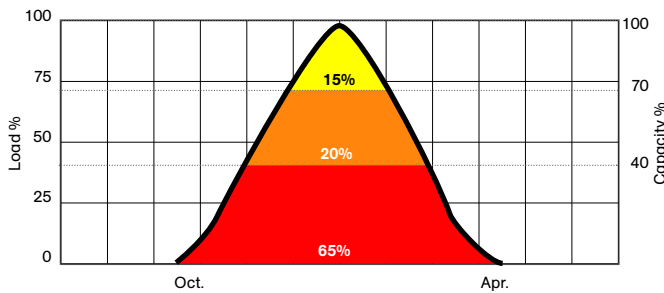
| Model   | Heating capacity heating/DHW kW | Average seasonal efficiency <sup>(1)</sup> % | Size w/d/h <sup>(2)</sup> mm | Weight kg |
|---------|---------------------------------|--|------------------------------|-----------|
| RTAY LT | 76.10                           | 158.6  | 2,314/1,245/1,400            | 624       |
|         | 110.50                          | 154.5  | 2,314/1,245/1,400            | 729       |
|         | 144.90                          | 136.6  | 3,382/1,245/1,400            | 891       |
|         | 179.30                          | 130.8  | 3,382/1,245/1,400            | 975       |
|         | 177.80                          | 164.4  | 3,382/1,245/1,400            | 1,069     |
|         | 152.20                          | 158.6  | 3,382/1,245/1,400            | 1,175     |
|         | 186.60                          | 151.6  | 3,382/1,245/1,400            | 1,351     |
|         | 221.00                          | 145.5  | 4,936/1,245/1,400            | 1,435     |
|         | 159.50                          | 165.1  | 4,936/1,245/1,400            | 1,530     |
|         | 193.90                          | 162.8  | 4,936/1,245/1,400            | 1,635     |
|         | 228.30                          | 158.6  | 4,936/1,245/1,400            | 1,745     |
|         | 262.70                          | 153.9  | 6,490/1,245/1,400            | 1,908     |
|         | 201.20                          | 165.3  | 6,490/1,245/1,400            | 1,993     |
|         | 235.60                          | 164.4  | 6,490/1,245/1,400            | 2,098     |
|         | 270.00                          | 162.0  | 6,490/1,245/1,400            | 2,218     |
|         | 304.40                          | 158.6  | 6,490/1,245/1,400            | 2,302     |
| RTAY HT | 72.70                           | 150.7  | 2,314/1,245/1,400            | 624       |
|         | 107.10                          | 139.4  | 2,314/1,245/1,400            | 729       |
|         | 111.00                          | 131.5  | 3,382/1,245/1,400            | 891       |
|         | 141.50                          | 126.1  | 3,382/1,245/1,400            | 975       |
|         | 145.40                          | 154.1  | 3,382/1,245/1,400            | 1,069     |
|         | 149.30                          | 150.7  | 3,382/1,245/1,400            | 1,175     |
|         | 175.90                          | 144.9  | 3,382/1,245/1,400            | 1,351     |
|         | 179.80                          | 139.4  | 4,936/1,245/1,400            | 1,435     |
|         | 183.70                          | 154.3  | 4,936/1,245/1,400            | 1,530     |
|         | 187.60                          | 153.5  | 4,936/1,245/1,400            | 1,635     |
|         | 214.20                          | 150.7  | 4,936/1,245/1,400            | 1,745     |
|         | 218.10                          | 146.7  | 4,936/1,245/1,400            | 1,908     |
|         | 222.00                          | 154.3  | 6,490/1,245/1,400            | 1,993     |
|         | 252.50                          | 154.1  | 6,490/1,245/1,400            | 2,098     |
|         | 256.40                          | 152.9  | 6,490/1,245/1,400            | 2,218     |
|         | 290.80                          | 150.7  | 6,490/1,245/1,400            | 2,302     |

HT: for the production of water at high temperature (for retrofitted radiator systems);  
 LT: optimized to produce hot water at low temperature (new systems with radiant panels or fan coils).

• 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.

<sup>(1)</sup> Average efficiency on residential buildings; for LT version with outlet water 35 °C; for HT version 60 °C with climate curve.

<sup>(2)</sup> Size does not include exhaust flue pipe.



Energy supplied in winter by gas absorption heat pumps -covering an installed capacity of 30%- is approx. 50% of the overall seasonal load.

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. Remarkable is the increase in efficiency up to 45% (highest slope of the curve).

- Energy supplied by boilers = 15%
- Energy supplied by heat pumps or by boilers = 20%
- Energy supplied by heat pumps = 65%

Reversible absorption heat pump  
powered by gas and air source renewable energy.  
For high efficiency heating and cooling.

## GAHP-AR

- **Up to 33.3% utilisation of air source renewable energy.** Designed to exceed peak efficiencies (GUE) of 150%<sup>(1)</sup>, reductions in annual heating costs and in CO<sub>2</sub> emissions compared to the best condensing boilers.

<sup>(1)</sup> Equivalent to COP 3.75 on energy conversion factor of 2.5.

- The most beneficial heating system to enhance the energy qualification of buildings, because it permits a considerable promotion of the building's energy classification with the consequent increase in the value of the building.

**33.3%** renewable energy

**150%** heating efficiency

**Increase** in property value



Please also refer to planning manual.  
Pdf download under [www.robur.com](http://www.robur.com)

Find more <http://www.robur.com/products/pro-solutions/pro-gahp-line-ar-series/description.html>

- **Ensures efficiency levels in excess of 130% even at -7 °C.** so it is also used in especially cold climates. No back-up systems are required.
- **Reduces electricity requirements up to 86%** compared to traditional electrical systems, thanks to the prevalent use of natural gas.
- With a GAHP-AR, every year **3.4 Tons of CO<sub>2</sub> emissions are saved**, which are equivalent to those absorbed by 457 trees or those produced by 2 green cars; every year 1.6 TOE are saved.

**-3.4** Tons of CO<sub>2</sub>  
per unit

**Outdoor** installation

#### Applications

- Ideal for heating and cooling industrial, commercial, accommodation and tertiary utilities, for refurbishment and retrofitting.
- For **outdoor installation**.
- Available also in standard and low noise version.



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

**HEATING OPERATION MODE <sup>(1)</sup>**

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

**COOLING OPERATION MODE <sup>(1)</sup>**

|  |                                  |                   |      |
|--|----------------------------------|-------------------|------|
| Working point A35/W7   | GUE (gas utilization efficiency) | %                 | 67   |
|  | cooling capacity                 | kW                | 16.9 |
| Nominal water flow rate ( $\Delta T = 5\text{ }^\circ\text{C}$ ) |                                  | m <sup>3</sup> /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                | 45/6 |
| Ambient operating temperature (dry bulb) max/min                 |                                  | °C                | 45/0 |

**BURNER CHARACTERISTICS**

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

**ELECTRICAL CHARACTERISTICS**

|   |                   |               |      |
|---|-------------------|---------------|------|
| Voltage                                 |                   | 230 V – 50 Hz |      |
| Nominal electrical power <sup>(5)</sup> | standard version  | kW            | 0.9  |
|   | low noise version | kW            | 0.93 |

**INSTALLATION DETAILS**

|  |                   |       |      |
|--|-------------------|-------|------|
| Operational Weight                           | standard version  | kg    | 380  |
|  | low noise version | kg    | 390  |
| Sound power Lw <sup>(6)</sup>                | standard version  | dB(A) | 82.1 |
|  | low noise version | dB(A) | 76.1 |
| Sound pressure Lp at 5 metres <sup>(7)</sup> | standard version  | dB(A) | 60.1 |
|  | low noise version | dB(A) | 54.1 |
| Connections                                  | water             | " F   | 11/4 |
|  | gas               | " F   | 3/4  |
|  | flue exhaust pipe | mm    | 80   |
| Electrical degree of protection              |                   | IP    | X5D  |

<sup>(1)</sup> Nominal conditions according to EN 12309-2.

<sup>(2)</sup> Equivalent to COP 3.75 on energy conversion factor of 2.5.

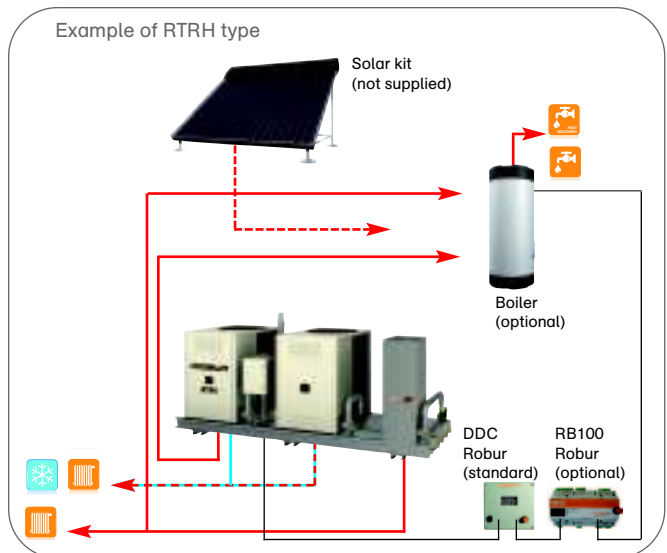
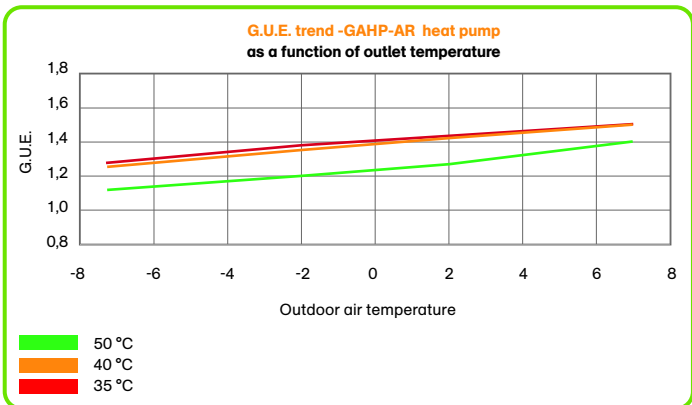
<sup>(3)</sup> NCV 34.02 MJ/m<sup>3</sup> (9,45 kWh/m<sup>3</sup>) at 15 °C - 1013 mbar.

<sup>(4)</sup> NCV 46.34 MJ/kg (12,87 kWh/kg) at 15 °C - 1013 mbar.

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

<sup>(6)</sup> Sound power values measured according to EN ISO 9614.

<sup>(7)</sup> Free field, at the front, direction factor 2.





## Solutions for heating or cooling

with high efficiency air source reversible heat pumps



| Model   | Heating capacity kW | Cooling capacity kW | Average winter efficiency <sup>(1)</sup> % | Size w/d/h <sup>(2)</sup> mm | Weight kg |
|---------|---------------------|---------------------|--|------------------------------|-----------|
| GAHP-AR | 37.80               | 16.90               | 146.8                                      | 850/1,230/1,290              | 380       |
| RTAR    | 75.60               | 33.80               | 146.8                                      | 2,314/1,245/1,400            | 886       |
|         | 113.40              | 50.70               | 146.8                                      | 3,610/1,245/1,400            | 1,328     |
|         | 151.20              | 67.60               | 146.8                                      | 4,936/1,245/1,400            | 1,770     |
|         | 189.00              | 84.50               | 146.8                                      | 6,490/1,245/1,400            | 2,222     |
| RTCR    | 37.80               | 34.62               | 146.8                                      | 2,314/1,245/1,400            | 854       |
|         | 37.8                | 52.34               | 146.8                                      | 3,610/1,245/1,400            | 1,264     |
|         | 37.8                | 70.06               | 146.8                                      | 4,936/1,245/1,400            | 1,674     |
|         | 37.8                | 87.78               | 146.8                                      | 6,490/1,245/1,400            | 2,094     |
|         | 75.6                | 51.52               | 146.8                                      | 3,610/1,245/1,400            | 1,296     |
|         | 75.6                | 69.24               | 146.8                                      | 4,936/1,245/1,400            | 1,706     |
|         | 75.6                | 86.96               | 146.8                                      | 6,490/1,245/1,400            | 2,126     |
|         | 113.4               | 68.42               | 146.8                                      | 4,936/1,245/1,400            | 1,738     |
|         | 113.4               | 86.14               | 146.8                                      | 6,490/1,245/1,400            | 2,158     |
|         | 151.2               | 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.

<sup>(1)</sup> Average efficiency on residential buildings; with outlet water 60 °C with climate curve.  
<sup>(2)</sup> 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

+ condensing boilers + chillers with heat recovery



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

<sup>(1)</sup> For further data, please refer to Planning Manual.  
<sup>(2)</sup> Size does not include exhaust flue pipe.

Solutions for heating, cooling and DHW production



with reversible air source heat pumps + condensing boilers



| Model  | Heating capacity heating/DHW kW | Cooling capacity kW | Average winter efficiency <sup>(1)</sup> % | Size w/d/h <sup>(2)</sup> mm | Weight kg |
|--------|---------------------------------|---------------------|--|------------------------------|-----------|
| RTYR   | 72.20                           | 16.90               | 142.9                                      | 2,314/1,245/1,400            | 623       |
|        | 106.60                          | 16.90               | 133.6                                      | 2,314/1,245/1,400            | 728       |
|        | 110.00                          | 33.80               | 146.3                                      | 3,382/1,245/1,400            | 1,067     |
|        | 141.00                          | 16.90               | 126.9                                      | 3,382/1,245/1,400            | 890       |
|        | 144.40                          | 33.80               | 142.9                                      | 3,382/1,245/1,400            | 1,173     |
|        | 147.80                          | 50.70               | 146.7                                      | 4,936/1,245/1,400            | 1,527     |
|        | 175.40                          | 16.90               | 122.4                                      | 3,382/1,245/1,400            | 974       |
|        | 178.80                          | 33.80               | 138.1                                      | 4,936/1,245/1,400            | 1,349     |
|        | 182.20                          | 50.70               | 145.7                                      | 4,936/1,245/1,400            | 1,632     |
|        | 185.60                          | 67.60               | 146.8                                      | 6,490/1,245/1,400            | 1,989     |
|        | 213.20                          | 33.80               | 133.6                                      | 4,936/1,245/1,400            | 1,433     |
|        | 216.60                          | 50.70               | 142.9                                      | 4,936/1,245/1,400            | 1,742     |
|        | 220.00                          | 67.60               | 146.3                                      | 6,490/1,245/1,400            | 2,094     |
|        | 251.00                          | 50.70               | 139.6                                      | 6,490/1,245/1,400            | 1,905     |
|        | 254.40                          | 67.60               | 145.0                                      | 6,490/1,245/1,400            | 2,214     |
|        | 288.80                          | 67.60               | 142.9                                      | 6,490/1,245/1,400            | 2,298     |
| RTRC   | 72.20                           | 34.62               | 142.9                                      | 3,382/1,245/1,400            | 1,035     |
|        | 72.20                           | 52.34               | 142.9                                      | 4,936/1,245/1,400            | 1,463     |
|        | 72.20                           | 70.06               | 142.9                                      | 6,490/1,245/1,400            | 1,893     |
|        | 106.60                          | 34.62               | 133.6                                      | 3,382/1,245/1,400            | 1,141     |
|        | 106.60                          | 52.34               | 133.6                                      | 4,936/1,245/1,400            | 1,568     |
|        | 106.60                          | 70.06               | 133.6                                      | 6,490/1,245/1,400            | 1,998     |
|        | 110.00                          | 51.52               | 146.3                                      | 4,936/1,245/1,400            | 1,495     |
|        | 110.00                          | 69.24               | 146.3                                      | 6,490/1,245/1,400            | 1,925     |
|        | 141.00                          | 34.62               | 126.9                                      | 4,936/1,245/1,400            | 1,317     |
|        | 141.00                          | 52.34               | 126.9                                      | 4,936/1,245/1,400            | 1,678     |
|        | 141.00                          | 70.06               | 126.9                                      | 6,490/1,245/1,400            | 2,118     |
|        | 144.40                          | 51.52               | 142.9                                      | 4,936/1,245/1,400            | 1,600     |
|        | 144.40                          | 69.24               | 142.9                                      | 6,490/1,245/1,400            | 2,030     |
|        | 147.80                          | 68.42               | 146.7                                      | 6,490/1,245/1,400            | 1,957     |
|        | 175.40                          | 34.62               | 122.4                                      | 4,936/1,245/1,400            | 1,401     |
|        | 175.40                          | 52.34               | 122.4                                      | 6,490/1,245/1,400            | 1,841     |
|        | 175.40                          | 70.06               | 122.4                                      | 6,490/1,245/1,400            | 2,202     |
|        | 178.80                          | 51.52               | 138.1                                      | 4,936/1,245/1,400            | 1,710     |
|        | 178.80                          | 69.24               | 138.1                                      | 6,490/1,245/1,400            | 2,150     |
|        | 182.20                          | 68.42               | 145.7                                      | 6,490/1,245/1,400            | 2,062     |
| 213.20 | 51.52                           | 133.6               | 6,490/1,245/1,400                          | 1,873                        |           |
| 213.20 | 69.24                           | 133.6               | 6,490/1,245/1,400                          | 2,234                        |           |
| 216.60 | 68.42                           | 142.9               | 6,490/1,245/1,400                          | 2,182                        |           |
| 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.

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

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



with reversible air source heat pumps + chillers with heat recovery

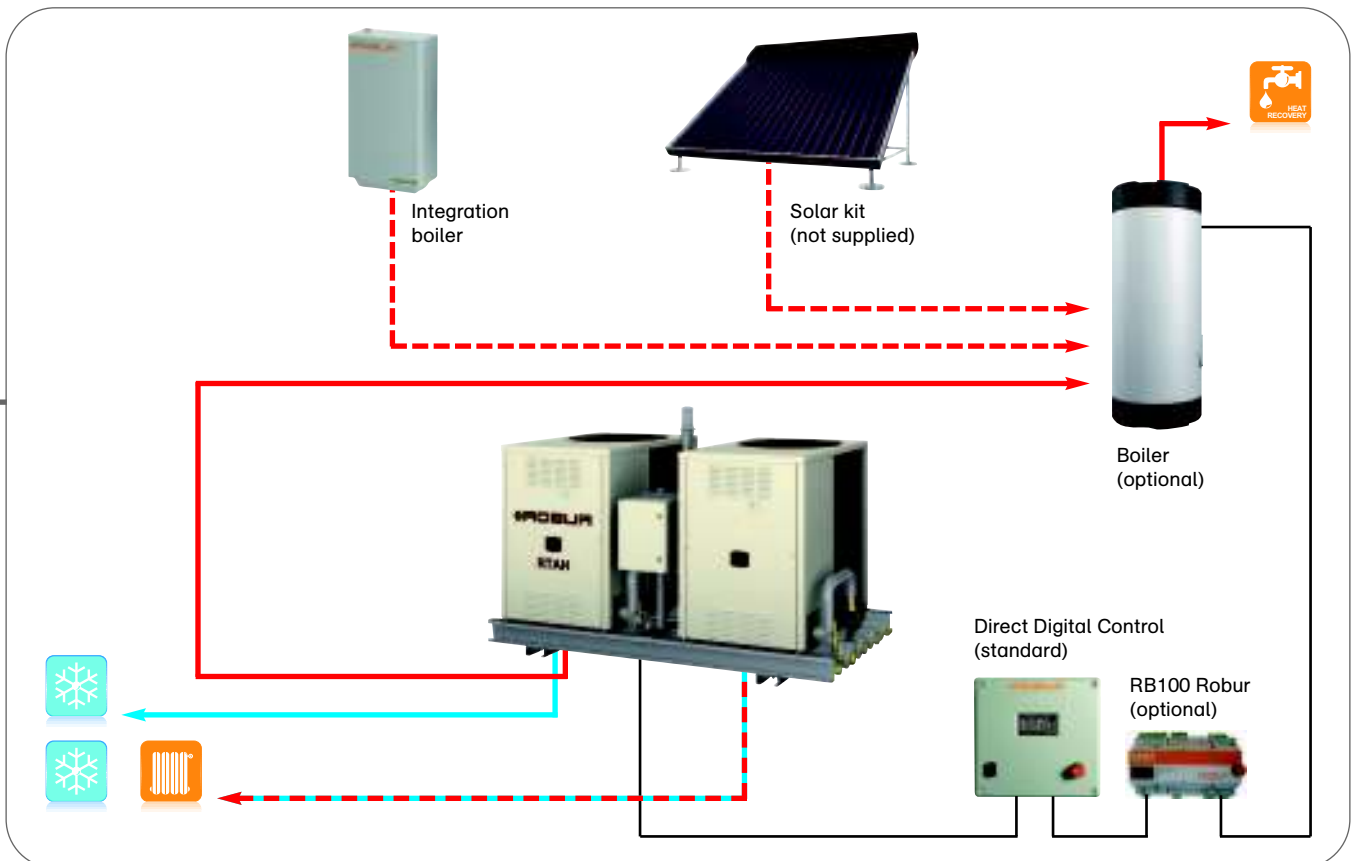
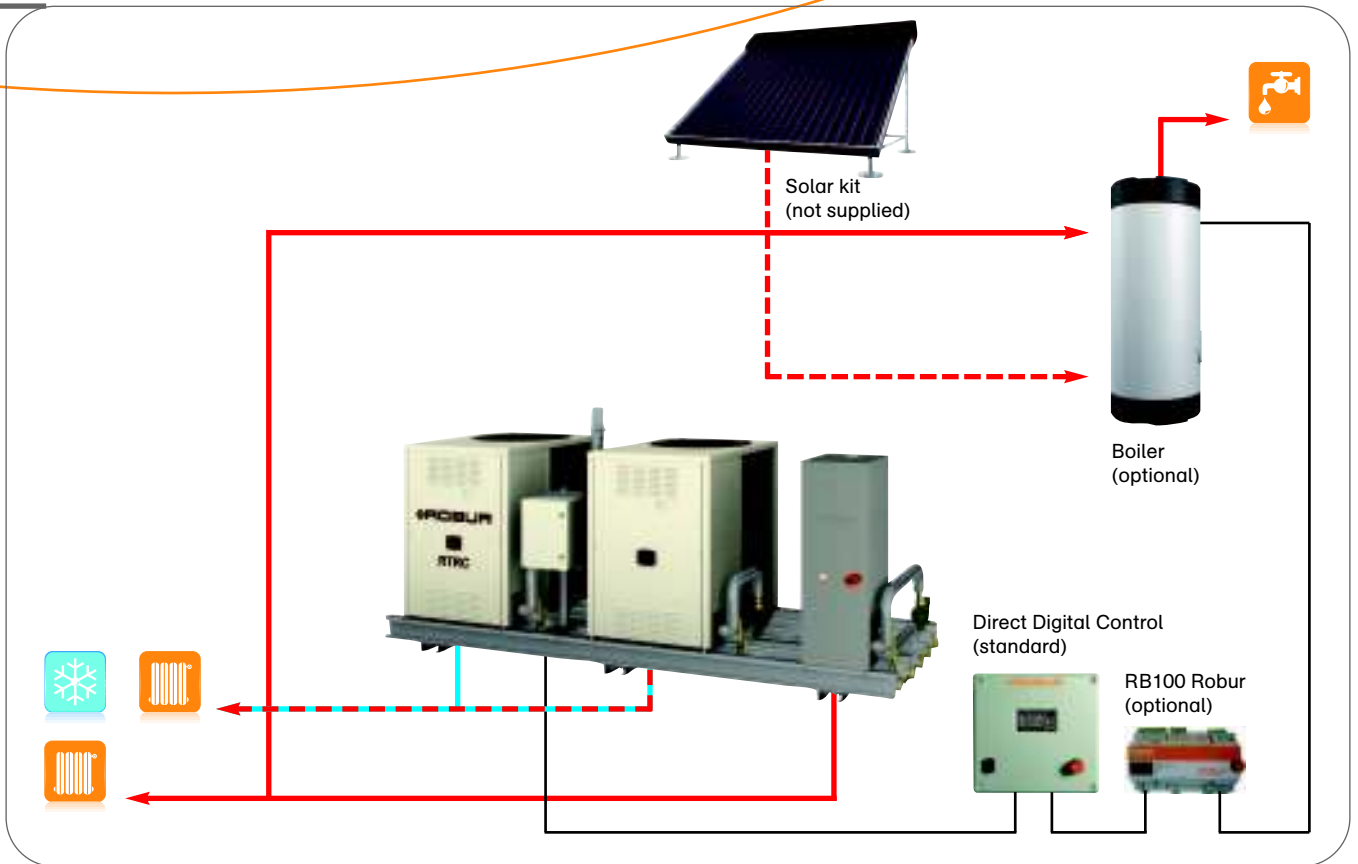


| Model | Heating capacity heating/DHW kW | Cooling capacity kW | Heating capacity recovered up to <sup>(1)</sup> kW | Average winter efficiency <sup>(2)</sup> % | Size w/d/h <sup>(3)</sup> mm | Weight kg |
|-------|---------------------------------|---------------------|--|--|------------------------------|-----------|
| RTAH  | 37.80                           | 34.83               | 32.00  | 146.8                                      | 2,314/1,245/1,400            | 906       |
|       | 37.80                           | 52.76               | 64.00  | 146.8                                      | 3,610/1,245/1,400            | 1,358     |
|       | 37.80                           | 70.69               | 96.00  | 146.8                                      | 4,936/1,245/1,400            | 1,810     |
|       | 37.80                           | 88.62               | 128.00   | 146.8                                      | 6,490/1,245/1,400            | 2,272     |
|       | 75.60                           | 51.73               | 32.00  | 146.8                                      | 3,382/1,245/1,400            | 1,358     |
|       | 75.60                           | 69.66               | 64.00  | 146.8                                      | 4,936/1,245/1,400            | 1,810     |
|       | 75.60                           | 87.59               | 96.00  | 146.8                                      | 6,490/1,245/1,400            | 2,272     |
|       | 113.40                          | 68.63               | 32.00  | 146.8                                      | 3,610/1,245/1,400            | 1,810     |
|       | 113.40                          | 86.56               | 64.00  | 146.8                                      | 4,936/1,245/1,400            | 2,272     |
|       | 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.

<sup>(1)</sup> For further data, please refer to Planning Manual.  
<sup>(2)</sup> Average efficiency on residential buildings; outlet water 60 °C with climate curve.  
<sup>(3)</sup> Size does not include exhaust flue pipe.





Condensing absorption heat pump powered by gas and **ground source renewable energy**. For high efficiency heating.

## GAHP-GS

- **Up to 40.9% utilisation of ground source renewable energy, exceeding peak efficiencies of 169%<sup>(1)</sup>**, reductions in annual heating costs and in CO<sub>2</sub> emissions compared to condensing boilers.

<sup>(1)</sup> **Equivalent to COP 4.23 on energy conversion factor of 2.5.**

- The most beneficial heating system to enhance the energy qualification of buildings, because it permits a considerable promotion of the building's energy classification with the consequent increase in the value of the building.
- All data are tested by certificates and approvals from ENEA for Italy, DVGW Forschungsstelle and VDE for Germany, California Energy Commission for USA.

**40.9%** renewable energy

**169%** heating efficiency

**Increase** in property value



Please also refer to planning manual.  
Pdf download under [www.robur.com](http://www.robur.com)

Find more <http://www.robur.com/products/pro-solutions/pro-gahp-line-gs-series/description.html>

- Reduction in investment costs for geothermal loops **can be higher than 50%** in comparison to EHP.
- In case of contemporary use, **external sources are not required**, thus reducing installation and operational costs.
- **It reduces electricity consumption** thanks to the prevalent use of gas.
- With a GAHP-GS, every year **5.1 Tons of CO<sub>2</sub> emissions are saved**, which are equivalent to those absorbed by 714 trees or those produced by 2 green cars; every year 2.2 TOE are saved.

**50%** Reduction in investment costs for geothermal loops

**-5.1** Tons of CO<sub>2</sub> per unit

#### Applications

- Ideal for heating industrial, commercial, accommodation and tertiary utilities in geothermal applications.
- Ability to supply cooling as free-cooling mode (unit off) or in geothermal applications with active cooling (unit on).
- Ideal for upgrading or integrating existing systems.
- For outdoor and indoor installation.

#### The models

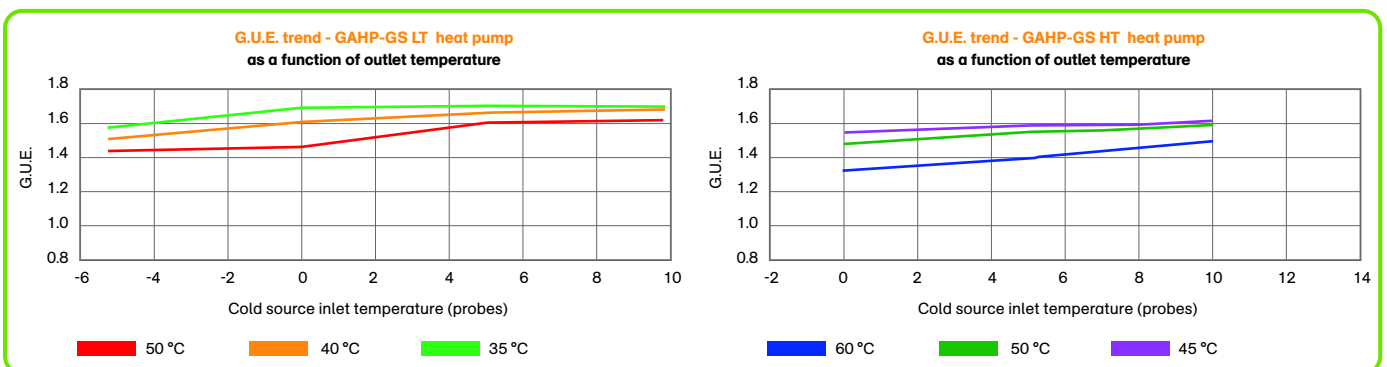
- **HT:** for the production of water at high temperature (retrofitted radiator systems);
- **LT:** optimized to produce hot water at low temperature (new systems with radiant panels or fan coils).



|   |  | GAHP-GS GAHP-GS   |                     |
|---|--|-------------------|---------------------|
| HEATING OPERATION MODE <sup>(2)</sup>                               |  | HT <sup>(1)</sup> | LT <sup>(1)</sup>   |
| Working point B0/W35  | G.U.E. (gas utilization efficiency) <sup>(3)</sup> | %                 | - - 169             |
|   | heating capacity                                   | kW                | - - 42.6            |
|   | capacity recovered from renewable source           | kW                | - - 17.0            |
| Working point B0/W50  | G.U.E. (gas utilization efficiency)                | %                 | 149 - -             |
|   | heating capacity                                   | kW                | 37.6 - -            |
|   | capacity recovered from renewable source           | kW                | 12.6 - -            |
| Nominal water flow rate ( $\Delta T = 10\text{ }^{\circ}\text{C}$ ) |  | m <sup>3</sup> /h | 3.17 3.25           |
| Nominal water pressure loss (outlet water at 50 °C)                 |  | kPa               | 49 49               |
| Maximum outlet water temperature for heating/DHW                    |  | °C                | 65/70 55/70         |
| Maximum inlet water temperature for heating/DHW                     |  | °C                | 55/60 45/60         |
| <b>BURNER CHARACTERISTICS</b>                                       |  |                   |                     |
| Thermal input (actual)  |  | kW                | 25.2 25.2           |
| Gas consumption (actual)  | natural gas G20 <sup>(4)</sup>                     | m <sup>3</sup> /h | 2.67 2.67           |
|   | LPG G31/G30 <sup>(5)</sup>                         | kg/h              | 1.99/1.96 1.99/1.96 |
| <b>ELECTRICAL CHARACTERISTICS</b>                                   |  |                   |                     |
| Voltage   |  | 230 V – 50 Hz     |                     |
| Nominal electrical power <sup>(6)</sup>                             |  | kW                | 0.41 0.41           |
| <b>INSTALLATION DETAILS</b>   |  |                   |                     |
| Operational Weight  |  | kg                | 300 300             |
| Sound power Lw <sup>(7)</sup>                                       |  | dB(A)             | 70.4 70.4           |
| Sound pressure Lp at 5 metres <sup>(8)</sup>                        |  | dB(A)             | 48.4 48.4           |
| Connections   | water  | " F               | 1 1/4 1 1/4         |
|   | gas  | " F               | 3/4 3/4             |
|   | flue exhaust pipe                                  | mm                | 80 80               |
| Residual flue pressure  |  | Pa                | 80 80               |
| Electrical degree of protection                                     |  | IP                | X5D X5D             |

<sup>(1)</sup> HT: for the production of water at high temperature (for retrofitted radiator systems);  
 LT: optimized to produce hot water at low temperature (new systems with radiant panels or fan coils).  
<sup>(2)</sup> Nominal conditions according to EN 12309-2.  
<sup>(3)</sup> Equivalent to COP 4.23 on energy conversion factor of 2.5.  
<sup>(4)</sup> NCV 34.02 MJ/m<sup>3</sup> (9.45 kWh/m<sup>3</sup>) at 15 °C - 1013 mbar.

<sup>(5)</sup> NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.  
<sup>(6)</sup> ± 10% depending on the power supply voltage and on the tolerance of the electrical motors power consumption.  
<sup>(7)</sup> Sound power values measured according to EN ISO 9614.  
<sup>(8)</sup> Free field, at the front, direction factor 2. The values refer to the maximum measured.  
 Note: The capacity above mentioned is also 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

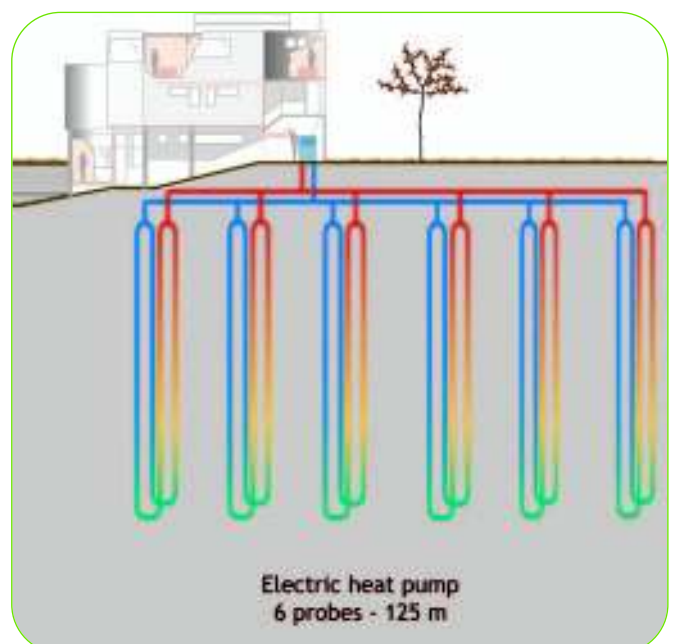
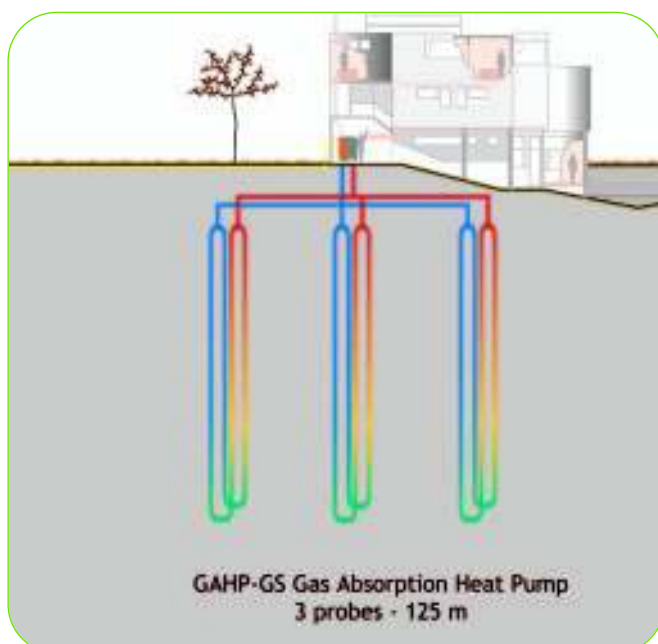
| Model      | Heating capacity kW | Capacity recovered by RES kW | Average winter efficiency <sup>(1)</sup> % | Size w/d/h <sup>(2)</sup> mm | Weight kg |
|------------|---------------------|------------------------------|--|------------------------------|-----------|
| GAHP-GS LT | 42.60               | 17.00                        | 169.1                                      | 848/690/1,278                | 300       |
| RTGS LT    | 85.20               | 34.00                        | 169.1                                      | 2,314/1,245/1,400            | 768       |
|            | 127.80              | 51.00                        | 169.1                                      | 3,610/1,245/1,400            | 1,151     |
|            | 170.40              | 68.00                        | 169.1                                      | 4,936/1,245/1,400            | 1,534     |
|            | 213.00              | 85.00                        | 169.1                                      | 6,490/1,245/1,400            | 1,927     |
| GAHP-GS HT | 37.60               | 12.60                        | 156.8                                      | 848/690/1,278                | 300       |
| RTGS HT    | 75.20               | 25.20                        | 156.8                                      | 2,314/1,245/1,400            | 768       |
|            | 112.80              | 37.80                        | 156.8                                      | 3,610/1,245/1,400            | 1,151     |
|            | 150.40              | 50.40                        | 156.8                                      | 4,936/1,245/1,400            | 1,534     |
|            | 188.00              | 63.00                        | 156.8                                      | 6,490/1,245/1,400            | 1,927     |

- HT: for the production of water at high temperature (for retrofitted radiator systems).
- LT: optimized to produce hot water at low temperature (new systems with radiant panels or fan coils).
- 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.

<sup>(1)</sup> Average efficiency on residential buildings; for LT version with outlet water 35 °C; for HT version 60 °C with climate curve.

<sup>(2)</sup> Size does not include exhaust flue pipe.

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



Example of geothermal heating system of 40 kW.  
The length of the loops depends on the type of soil and operating conditions.

Condensing absorption heat pump powered by gas and water source renewable energy. For heating and cooling or the simultaneous production of hot water up to 65 °C and cold water up to 3 °C.

## GAHP-WS

- Up to 42.6% utilisation of water source renewable energy. Designed to exceed peak efficiencies (G.U.E.) of 174%<sup>(1)</sup>, guaranteeing reductions in annual heating costs and in CO<sub>2</sub> emissions compared to the best condensing boilers.

<sup>(1)</sup> Equivalent to COP 4.35 on energy conversion factor of 2.5.

- Simultaneous production of hot and cold water, with overall efficiency of 244%.
- It permits a considerable promotion of the building's energy classification with the consequent increase in the value of the building.

**42.6%** renewable energy

**174%** heating efficiency

**Increase** in property value



Please also refer to planning manual. Pdf download under [www.robur.com](http://www.robur.com)

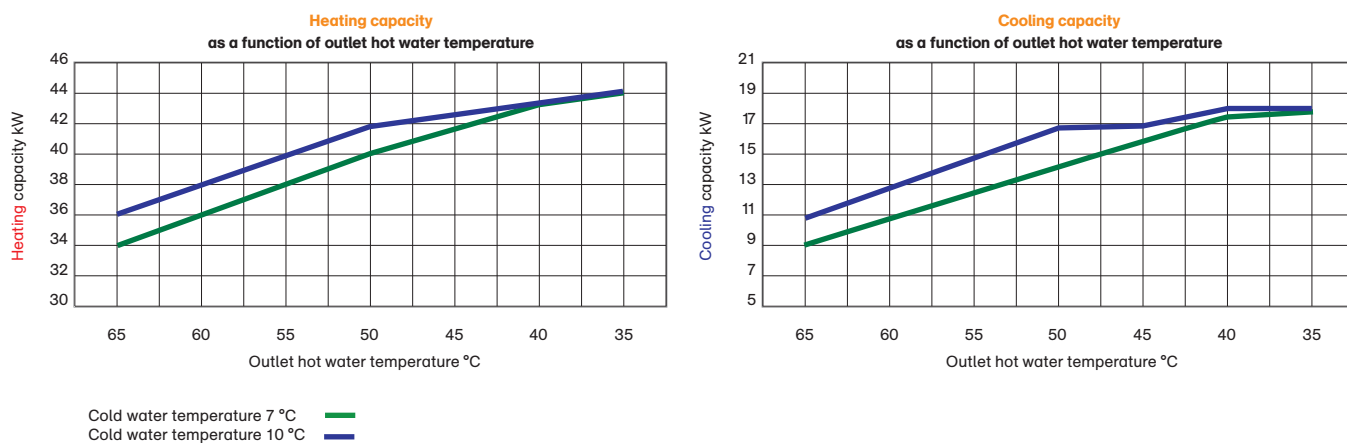
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- In case of contemporary use, external sources are not required, **thus reducing system and management costs.**
- **It reduces electricity consumption** thanks to the prevalent use of gas.
- With a GAHP-WS, every year **4.8 Tons of CO<sub>2</sub> emissions are saved**, which are equivalent to those absorbed by 678 trees or those produced by 2 green cars; every year 2 TOE are saved.

**244%** overall efficiency with simultaneous use

**-4.8** Tons of CO<sub>2</sub> per unit

Trend of heating capacity (condenser) and cooling capacity (evaporator) in function of operating temperatures of the system.



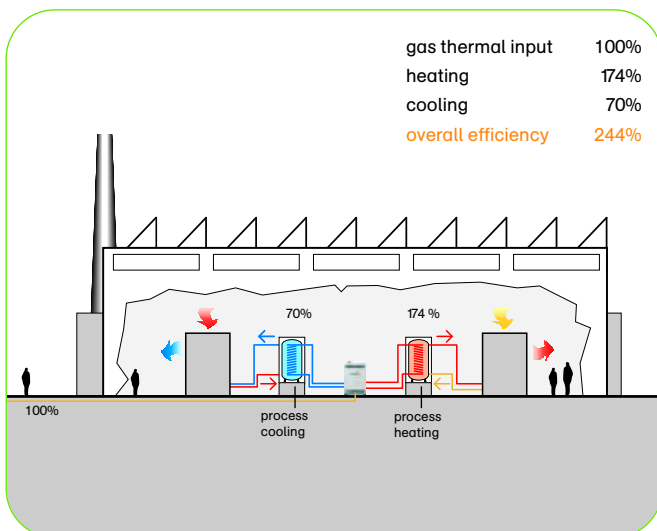
# Heating and cooling

### Applications

- Ideal for heating and DHW production. Preheating of DHW in summer in cooling operation (i.e. swimming pools).
- For new buildings and for refurbishment and retrofitting.
- For outdoor and indoor installation.



# Simultaneous production of hot and cold water



### Applications

- Simultaneous production of heating and cooling capacity, with overall efficiency of 244%<sup>(1)</sup>, recovering energy form renewable energy sources.

- Systems that simultaneously require heating and cooling (hospitals, manufacturing process or liquid-ring-based air conditioning systems).
- For outdoor and indoor installation.

<sup>(1)</sup> Equivalent to COP 6.10 on energy conversion factor of 2.5.





| HEATING OPERATION MODE <sup>(1)</sup>                               |  | GAHP-WS           |           |
|---|--|-------------------|-----------|
| Working point W10/W35   | G.U.E. (gas utilization efficiency) <sup>(2)</sup> | %                 | 174       |
|   | heating capacity                                   | kW                | 43.9      |
| Working point W10/W50   | capacity recovered from renewable source           | kW                | 17.6      |
|   | heating capacity                                   | %                 | 165       |
| Working point W10/W50   | G.U.E. (gas utilization efficiency)                | kW                | 41.6      |
|   | capacity recovered from renewable source           | kW                | 16.6      |
| Nominal water flow rate ( $\Delta T = 10\text{ }^{\circ}\text{C}$ ) |  | m <sup>3</sup> /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 W7/W35  | cooling capacity                                   | kW                | 17.6      |
|   | supplied capacity - condenser                      | kW                | 43.9      |
| Working point W7/W50  | cooling capacity                                   | kW                | 14.7      |
|   | supplied capacity - condenser                      | kW                | 39.9      |
| OPERATION WITH SIMULTANEOUS USE                                     |  |                   |           |
| Working point W10/W35 - Overall efficiency                          |  | %                 | 244       |
| Working point W10/W50 - Overall efficiency                          |  | %                 | 231       |
| BURNER CHARACTERISTICS  |  |                   |           |
| Thermal input (actual)  |  | kW                | 25.2      |
| Gas consumption (actual)  | natural gas G20 <sup>(3)</sup>                     | m <sup>3</sup> /h | 2.67      |
|   | LPG G30/G31 <sup>(4)</sup>                         | kg/h              | 1.99/1.96 |
| ELECTRICAL CHARACTERISTICS  |  |                   |           |
| Voltage   |  | 230 V – 50 Hz     |           |
| Nominal electrical power <sup>(5)</sup>                             |  | kW                | 0.41      |
| INSTALLATION DETAILS  |  |                   |           |
| Operational Weight  |  | kg                | 300       |
| Sound power L <sub>w</sub> <sup>(6)</sup>                           |  | dB(A)             | 70.4      |
| Sound pressure L <sub>p</sub> at 5 metres <sup>(7)</sup>            |  | dB(A)             | 48.4      |
| Connections   | water  | " F               | 1 1/4     |
|   | gas  | " F               | 3/4       |
|   | flue exhaust pipe                                  | mm                | 80        |

<sup>(1)</sup> Nominal conditions according to EN 12309-2.

<sup>(2)</sup> Equivalent to COP 4.35 on energy conversion factor of 2.5.

<sup>(3)</sup> NCV 34.02 MJ/m<sup>3</sup> (9,45 kWh/m<sup>3</sup>) at 15 °C - 1013 mbar.

<sup>(4)</sup> NCV 46.34 MJ/kg (12,87 kWh/kg) at 15 °C - 1013 mbar.

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

<sup>(6)</sup> Sound power values measured according to EN ISO 9614.

<sup>(7)</sup> Free field, at the front, direction factor 2. The values refer to the maximum measured.

Note: The capacity above mentioned is also the capacity available for cooling. For any further information, please refer to planning manual.

## Solutions for heating, DHW production and cooling



with high efficiency water source heat pumps

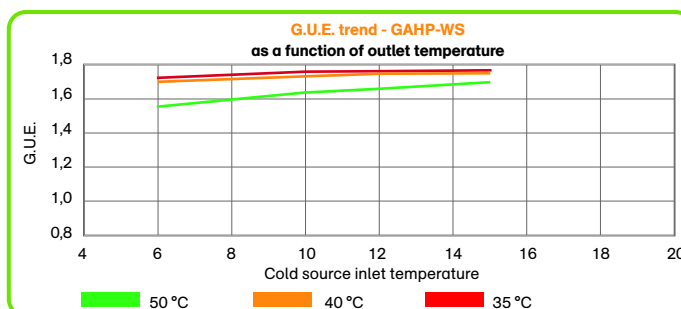


| Model   | Heating capacity heating/DHW kW | Capacity recovered by renewable energy kW | Average winter efficiency <sup>(1)</sup> % | Size w/d/h <sup>(2)</sup> mm | Weight kg |
|---------|---------------------------------|---|--|------------------------------|-----------|
| GAHP-WS | 43.90                           | 17.60                                     | 174.3                                      | 848/690/1,278                | 300       |
| RTWS    | 87.80                           | 35.20                                     | 174.3                                      | 2,314/1,245/1,400            | 768       |
|         | 131.70                          | 52.80                                     | 174.3                                      | 3,610/1,245/1,400            | 1,151     |
|         | 175.60                          | 70.40                                     | 174.3                                      | 4,936/1,245/1,400            | 1,534     |
|         | 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.

<sup>(1)</sup> Average efficiency with outlet water 60 °C with climate curve, evaporator water 10 °C.

<sup>(2)</sup> Size does not include exhaust flue pipe.



Gas absorption chiller-heater for cooling.  
 For free production of DHW in cooling operation mode.

## ACF-HR

- **Up to 199% overall efficiency with heat recovery.**
- **Production of hot water for free** during cooling operation, up to 32 kWt.
- **Saving up to 86% of electricity** compared with a traditional electrical system, thanks to the prevalent use of natural gas.
- Complete system flexibility and modularity, **ensuring continuity of service** and providing the cooling output according to seasonal demands.

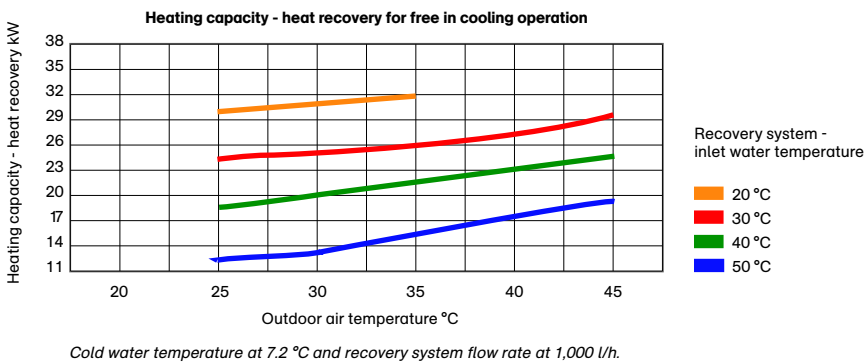
### Applications

- Cooling systems where hot water production for domestic use is required (hotels, hospitals, swimming pools, etc.) and post-heating circuits with A.H.U.
- For **outdoor installation**.

**Up to 32 kW**  
 DHW production for free  
 in cooling operation

**199%** overall efficiency  
 with heat recovery

**-86%** electricity  
 demand



Please also refer to planning manual.  
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**COOLING OPERATION MODE <sup>(1)</sup>**

ACF HR

|  |                                     |                   |       |
|--|-------------------------------------|-------------------|-------|
| Working point A35/W7                           | GUE (gas utilization efficiency)    | %                 | 72    |
|  | cooling capacity with heat recovery | kW                | 17.93 |
| Nominal water flow rate ( $\Delta T = 5.5$ °C) |                                     | m <sup>3</sup> /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 1,000 |
| Hot water inlet temperature                                       | max | °C  | 75          |
|   | min | °C  | 10          |

**BURNER CHARACTERISTICS**

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

**ELECTRICAL CHARACTERISTICS**

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

**INSTALLATION DETAILS**

|  |                   |       |      |
|--|-------------------|-------|------|
| Operational weight                                       | standard version  | kg    | 370  |
|  | low noise version | kg    | 390  |
| Sound power L <sub>w</sub> <sup>(6)</sup>                | standard version  | dB(A) | 82.1 |
|  | low noise version | dB(A) | 76.1 |
| Sound pressure L <sub>p</sub> at 5 metres <sup>(7)</sup> | standard version  | dB(A) | 60.1 |
|  | low noise version | dB(A) | 54.1 |
| Connections  | water             | " F   | 11/4 |
|  | gas               | " F   | 3/4  |
| Electrical degree of protection                          |                   | IP    | X5D  |

<sup>(1)</sup> Operating point under nominal conditions according to EN 12309-2.<sup>(2)</sup> NCV 34.02 MJ/m<sup>3</sup> (9.45 kWh/m<sup>3</sup>) at 15 °C - 1013 mbar.<sup>(3)</sup> NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.<sup>(4)</sup> 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.<sup>(5)</sup> ± 10% depending on the power supply voltage and on the tolerance of the electrical motors power consumption.<sup>(6)</sup> Sound power values measured according to EN ISO 9614.<sup>(7)</sup> Free field, at the front, direction factor 2. The values refer to the maximum measured.

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   | Cooling capacity kW | Heating capacity with heat recovery up to <sup>(1)</sup> kW | Size w/d/h mm     | Weight kg |
|---------|---------------------|---|-------------------|-----------|
| ACF HR  | 17.93               | 32.00   | 850/1,230/1,290   | 370       |
| RTCF HR | 35.86               | 64.00   | 2,314/1,245/1,400 | 916       |
|         | 53.79               | 96.00   | 3,610/1,245/1,400 | 1,373     |
|         | 71.72               | 128.00  | 4,936/1,245/1,400 | 1,830     |
|         | 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, for outdoor or indoor installation. Please contact Robur Sales Network

<sup>(1)</sup> 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 for free



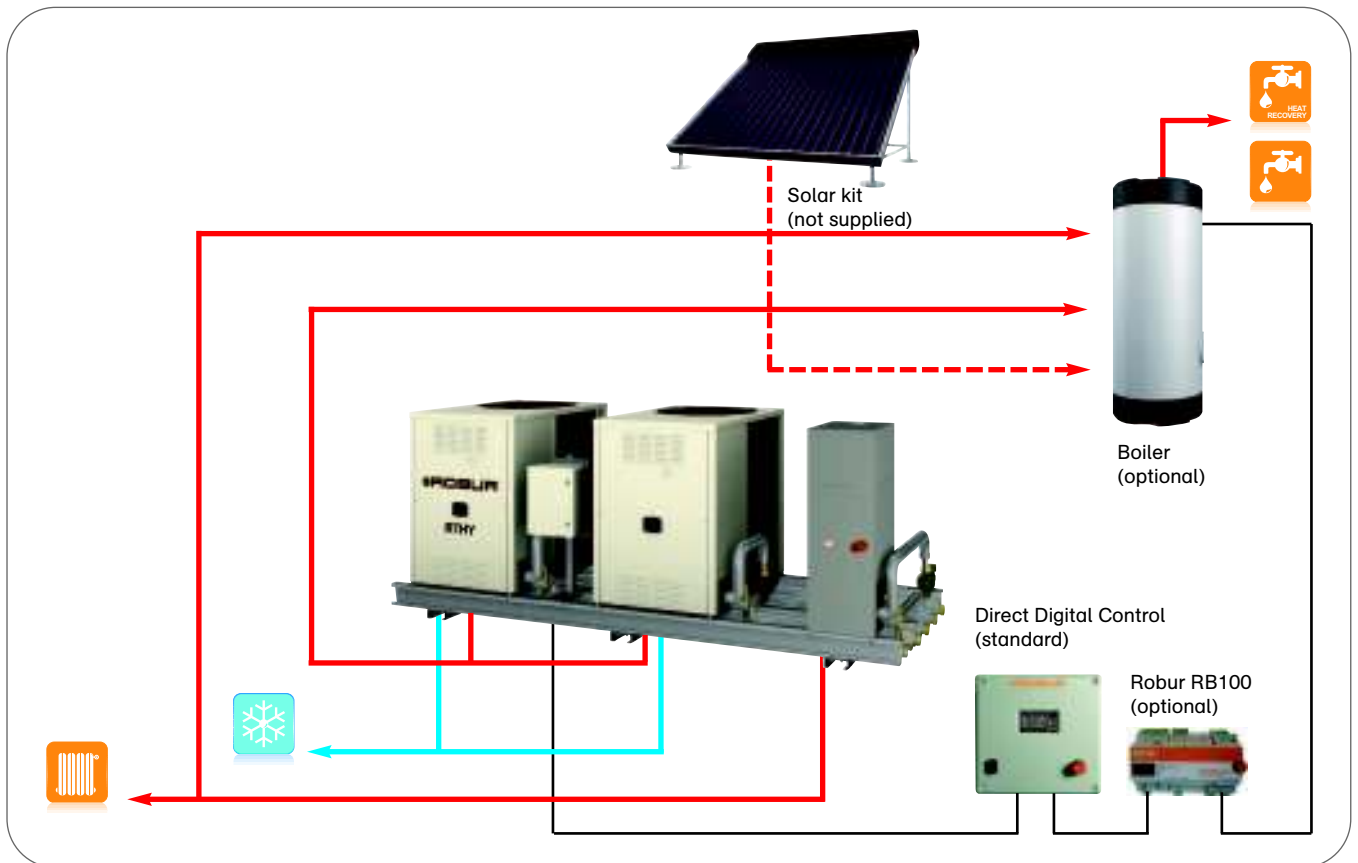
with chiller-heaters with heat recovery + condensing boilers



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

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

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



Solutions combined with Robur absorption heat pumps powered by gas are also available, such as:

• **RTAH** (p. 24): Heating, cooling with heat recovery and DHW production in cooling operation.

• **RTRH** (p. 23): Heating, cooling with heat recovery and DHW production all over year.



## Gas absorption chiller for cooling.

### ACF

- **Saving up to 86% of electricity** compared with a traditional electrical system, thanks to the prevalent use of natural gas.
  - 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**
- Cooling for commercial, accommodation and industrial use.
  - For **outdoor installation.**

**-86%** electricity demand

**Modular**



Find more <http://www.robur.com/products/pro-solutions/pro-ga-line-acf-rtcf-series/description.html>

**COOLING OPERATION MODE <sup>(1)</sup>**

|   |   |                   |       |
|---|---|-------------------|-------|
| Working point A35/W7  | <b>GUE (gas utilization efficiency)</b> | %                 | 71    |
|   | cooling capacity                        | kW                | 17.72 |
| Nominal water flow rate ( $\Delta T = 5.5 \text{ }^\circ\text{C}$ ) |   | m <sup>3</sup> /h | 2.77  |
| Nominal water 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     |

**BURNER CHARACTERISTICS**

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

**ELECTRICAL CHARACTERISTICS**

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

**INSTALLATION DETAILS**

|  |                   |        |         |
|--|-------------------|--------|---------|
| Operational Weight                                       | standard version  | kg     | 340     |
|  | low noise version | kg     | 360     |
| Sound power L <sub>w</sub> <sup>(6)</sup>                | standard version  | dB(A)  | 82.1    |
|  | low noise version | dB (A) | 76.1    |
| Sound pressure L <sub>p</sub> at 5 metres <sup>(6)</sup> | standard version  | dB(A)  | 60.1    |
|  | low noise version | dB (A) | 54.1    |
| Connections  | water             | "      | 1 1/4 F |
|  | gas               | " F    | 3/4     |
| Electrical degree of protection                          |                   | IP     | X5D     |

<sup>(1)</sup> Operating point under nominal conditions according to EN 12309-2.

<sup>(2)</sup> NCV 34.02 MJ/m<sup>3</sup> (9.45 kWh/m<sup>3</sup>) at 15 °C - 1013 mbar.

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

<sup>(4)</sup> 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.

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

<sup>(6)</sup> Sound power values measured according to EN ISO 9614.

<sup>(6)</sup> Free field, at the front, direction factor 2. The values refer to the maximum measured.

## Solutions for cooling



### with chillers

| Model | Cooling capacity<br>kW | Size<br>w/d/h mm  | Weight<br>kg |
|-------|------------------------|-------------------|--------------|
| ACF   | 17.72                  | 850/1,230/1,290   | 340          |
| RTCF  | 35.44                  | 2,314/1,245/1,400 | 822          |
|       | 53.16                  | 3,610/1,245/1,400 | 1,232        |
|       | 70.88                  | 4,936/1,245/1,400 | 1,642        |
|       | 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. Please contact Robur Sales Network.

Solutions for heating,  
DHW production and cooling

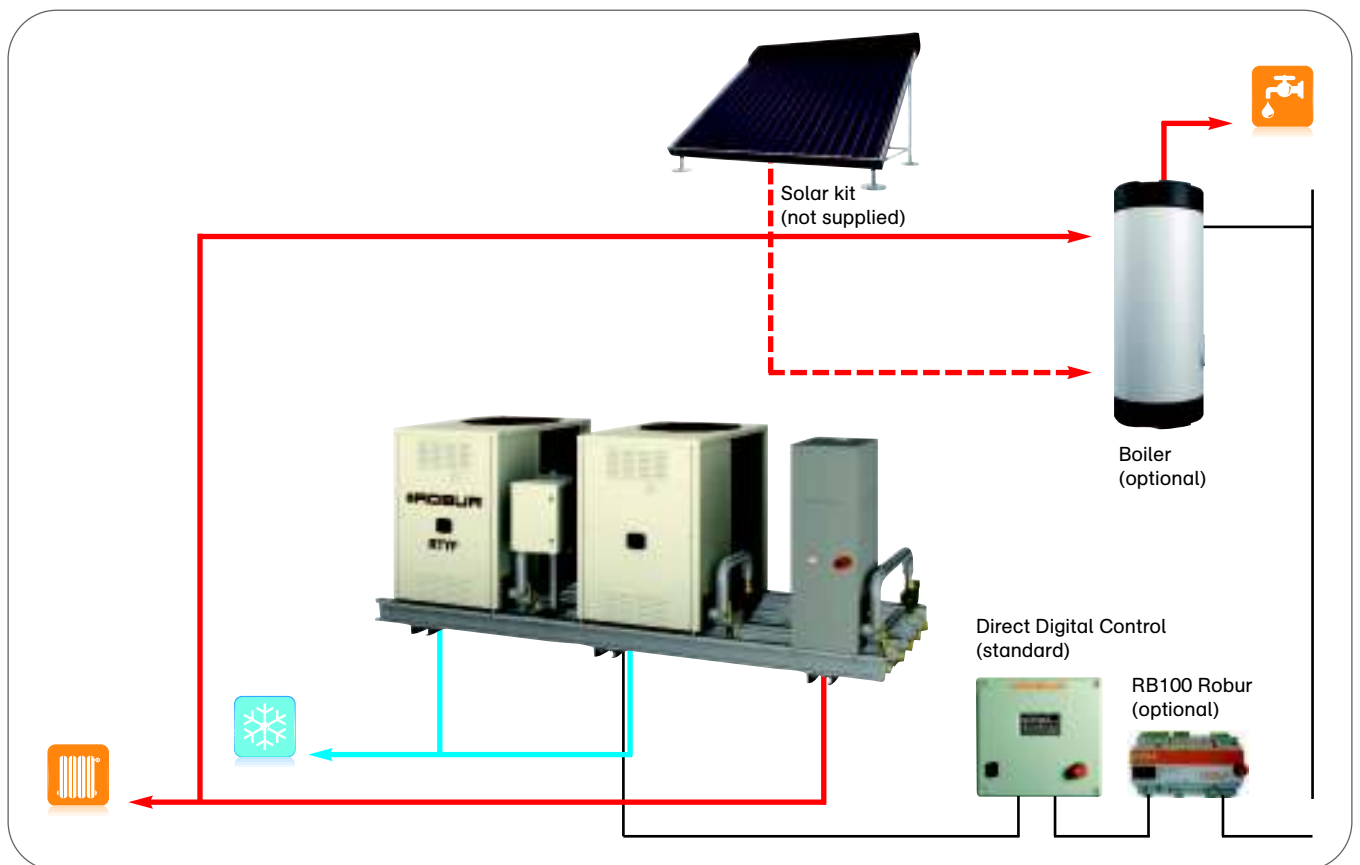


with chillers + condensing boilers



| Model | Heating capacity heating/DHW kW | Cooling capacity kW | Size w/d/h mm     | Weight kg |
|-------|---------------------------------|---------------------|-------------------|-----------|
| RTYF  | 34.40                           | 17.72               | 2,314/1,245/1,400 | 571       |
|       | 68.80                           | 17.72               | 2,314/1,245/1,400 | 676       |
|       | 103.20                          | 17.72               | 3,382/1,245/1,400 | 828       |
|       | 137.60                          | 17.72               | 3,382/1,245/1,400 | 912       |
|       | 34.40                           | 35.44               | 3,382/1,245/1,400 | 973       |
|       | 68.80                           | 35.44               | 3,382/1,245/1,400 | 1,079     |
|       | 103.20                          | 35.44               | 4,936/1,245/1,400 | 1,245     |
|       | 137.60                          | 35.44               | 4,936/1,245/1,400 | 1,329     |
|       | 34.40                           | 53.16               | 4,936/1,245/1,400 | 1,391     |
|       | 68.80                           | 53.16               | 4,936/1,245/1,400 | 1,496     |
|       | 103.20                          | 53.16               | 4,936/1,245/1,400 | 1,596     |
|       | 137.60                          | 53.16               | 6,490/1,245/1,400 | 1,759     |
|       | 34.40                           | 70.88               | 6,490/1,245/1,400 | 1,811     |
|       | 68.80                           | 70.88               | 6,490/1,245/1,400 | 1,916     |
|       | 103.20                          | 70.88               | 6,490/1,245/1,400 | 2,026     |
|       | 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.



Solutions combined with Robur absorption heat pumps powered by gas are also available, such as:

- **RTCR** (p.23): Heating or cooling.
- **RTRC** (p.24): Heating, cooling and DHW + renewable energy.



Gas absorption chiller  
for cooling in process applications,  
cooling in hot climates and refrigeration.

## ACF Special Versions

- **Saving up to 86% of electricity** compared with a traditional electrical system, thanks to the prevalent use of natural gas.
- **Independent and modular**, it ensures **constant performance** for air conditioning 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.

### TK Version applications

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

### HT Version applications

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

### LB Version applications

- Refrigeration of low temperature environments for the food industries, 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.
- Ice storage systems, for the storage of cooling energy during periods of low energy needs.

Process applications

Hot climates

Refrigeration





ACF TK ACF HT ACF LB

**COOLING OPERATION MODE <sup>(1)</sup>**

|  |                                  |                   |        |       |       |
|--|----------------------------------|-------------------|--------|-------|-------|
| Working point A35/W7   | GUE (gas utilization efficiency) | %                 | 71     | 68    | 53    |
|  | cooling capacity                 | kW                | 17.72  | 17.12 | 13.30 |
| Nominal water flow rate ( $\Delta T = 5.5\text{ }^{\circ}\text{C}$ ) |                                  | m <sup>3</sup> /h | 2.77   | 2.67  | 2.60  |
| Nominal water pressure loss  |                                  | kPa               | 29     | 27    | 42    |
| Minimum outlet water temperature                                     |                                  | °C                | 3      | 5     | -10   |
| Inlet water temperature max/min                                      |                                  | °C                | 45/6   | 45/8  | 45/-5 |
| Ambient operating temperature max/min                                |                                  | °C                | 45/-12 | 50/0  | 45/0  |
| Sound power Lw <sup>(2)</sup> - standard version                     |                                  | dB(A)             | 82.1   | 82.1  | 82.1  |
| Sound pressure Lp at 5 metres <sup>(3)</sup> - standard version      |                                  | dB(A)             | 60.1   | 60.1  | 60.1  |

**BURNER CHARACTERISTICS**

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

**ELECTRICAL CHARACTERISTICS**

|   |  |    |               |      |      |
|---|--|----|---------------|------|------|
| Voltage   |  |    | 230 V – 50 Hz |      |      |
| Nominal electrical power <sup>(5)(6)</sup> - standard version |  | kW | 0.90          | 0.90 | 0.90 |

<sup>(1)</sup> Operating point under nominal conditions according to EN 12309-2.<sup>(2)</sup> Sound power values measured according to EN ISO 9614.<sup>(3)</sup> Free field, at the front, direction factor 2. The values refer to the maximum measured.<sup>(4)</sup> NCV 34.02 MJ/m<sup>3</sup> (9.45 kWh/m<sup>3</sup>) at 15 °C - 1013 mbar.<sup>(5)</sup> NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 °C - 1013 mbar.<sup>(6)</sup> 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.<sup>(7)</sup> ± 10% depending on the power supply voltage and on the tolerance of the electrical engines.**Chillers for cooling in process applications**

| Model   | Cooling capacity<br>kW | Size<br>w/d/h mm  | Weight<br>kg |
|---------|------------------------|-------------------|--------------|
| ACF TK  | 17.72                  | 850/1,230/1,290   | 350          |
| RTCF TK | 35.44                  | 2,314/1,245/1,400 | 856          |
|         | 53.16                  | 3,610/1,245/1,400 | 1,283        |
|         | 70.88                  | 4,936/1,245/1,400 | 1,710        |
|         | 88.60                  | 6,490/1,245/1,400 | 2,147        |

**Chillers for cooling in hot climates**

| Model   | Cooling capacity<br>kW | Size<br>w/d/h mm  | Weight<br>kg |
|---------|------------------------|-------------------|--------------|
| ACF HT  | 17.12                  | 850/1,230/1,290   | 350          |
| RTCF HT | 34.24                  | 2,314/1,245/1,400 | 856          |
|         | 51.36                  | 3,610/1,245/1,400 | 1,283        |
|         | 68.48                  | 4,936/1,245/1,400 | 1,710        |
|         | 85.60                  | 6,490/1,245/1,400 | 2,147        |

**Chillers for refrigeration at negative temperatures**

| Model   | Cooling capacity<br>kW | Size<br>w/d/h mm  | Weight<br>kg |
|---------|------------------------|-------------------|--------------|
| ACF LB  | 13.30                  | 850/1,230/1,290   | 350          |
| RTCF LB | 26.60                  | 2,314/1,245/1,400 | 856          |
|         | 39.90                  | 3,610/1,245/1,400 | 1,283        |
|         | 53.20                  | 4,936/1,245/1,400 | 1,710        |
|         | 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.



Condensing boiler ( ★ ★ ★ ★ ) for outdoor installation, for the production of hot water up to 80 °C.

Ideal complement to high efficiency heating systems.

## AY Condensing

- **Heating and production of hot water up to 80 °C.**
- **Ideal complement to Robur gas absorption chillers and heat pumps, in particular 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 A.H.U.
- **Controlled size** for easier, quicker, and more economic transportation, handling and installation, **outdoor installation too.**
- Can be hydraulically and electrically coupled in one modular solution operating in cascade.

4 stars boiler

Integration



Please also refer to planning manual.  
Pdf download under [www.robur.com](http://www.robur.com)

Find more [http://www.robur.com/products/pro-solutions/pro-ay\\_condensing-line/description.html](http://www.robur.com/products/pro-solutions/pro-ay_condensing-line/description.html)

|   |                                 | AY<br>00-120              |       |
|---|---------------------------------|---------------------------|-------|
| Nominal heating input                                       |                                 | kW                        | 34.9  |
| Nominal heating capacity <sup>(1)</sup>                     |                                 | kW                        | 34.4  |
| Gas consumption   | natural gas G20                 | m <sup>3</sup> /h         | 3.69  |
|   | LPG G30/G31                     | kg/h                      | 2.75  |
| Efficiency  | 100% of the load <sup>(2)</sup> |                           | 104.6 |
|   | 100% of the load <sup>(1)</sup> |                           | 98.6  |
| Water flow rate ( $\Delta T = 10\text{ }^{\circ}\text{C}$ ) |                                 | l/h                       | 2,950 |
| Water pressure loss   |                                 | kPa                       | 0.395 |
| Maximum operating pressure                                  |                                 | bar                       | 3     |
| Voltage   |                                 | 230 V – 50 Hz             |       |
| Nominal electrical power <sup>(3)</sup>                     |                                 | W                         | 185   |
| Ambient temperature operating range                         |                                 | -20/45 $^{\circ}\text{C}$ |       |
| Connections   | water                           | "                         | 1 1/4 |
|   | gas                             | "                         | 3/4   |
| Weight  |                                 | kg                        | 71    |
|   |                                 |                           |       |
| Size  | width                           | mm                        | 410   |
|   | depth                           | mm                        | 530   |
|   | height                          | mm                        | 1,280 |

<sup>(1)</sup> Characteristics under nominal conditions: water delivery 80  $^{\circ}\text{C}$  and water return 60  $^{\circ}\text{C}$ .

<sup>(2)</sup> Characteristics under nominal conditions: water delivery 50  $^{\circ}\text{C}$  and water return 30  $^{\circ}\text{C}$ .

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

## Solutions for heating and DHW production



### with condensing boilers

| Model | Heating capacity<br>heating/DHW kW | Size<br>w/d/h <sup>(2)</sup> mm | Weight<br>kg |
|-------|------------------------------------|---------------------------------|--------------|
| AY    | 34.40                              | 410/530/1,280                   | 71           |
| RTY   | 68.80                              | 1,828/1,245/1,400               | 310          |
|       | 103.20                             | 1,828/1,245/1,400               | 415          |
|       | 137.60                             | 2,314/1,245/1,400               | 506          |
|       | 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.

Solutions combined with Robur absorption heat pumps powered by gas are also available, such as:

• **RTAY** (p. 19): Heating and DHW.

• **RTHY** (p. 36): Heating, cooling and DHW with heat recovery.


• **RTRC** (p. 24): Heating, cooling and DHW with use of renewable energy.

• **RTRH** (p. 23): Heating, cooling with heat recovery and DHW production all over year.

• **RTYF** (p. 39): Heating, cooling

and DHW production.

• **RTYR** (p. 24): Heating, cooling and DHW with use of renewable energy.



The most efficient and innovative heating system with condensing gas absorption heat pumps available in air, ground and water source versions.

## Robur E<sup>3</sup>

Robur widens up its product range with E<sup>3</sup> systems, designed to obtain outstanding energy performance, **thanks to the integration of the main system components:**

- **generation system:** absorption heat pumps powered by gas and renewable energy;
- **distribution system:** electronic-controlled high efficiency modulating pumps;
- **control system:** control system (Comfort Control Panel) managing all the components and heat supply.

**E<sup>3</sup> is available in 13 predesigned configurations, specifically developed for any installation and operation,** such as heating, cooling, DHW production and integration with other systems for heat generation.

### Advantages

- Up to **40% renewable energy** (ground, water and air source).
- Up to **40% reductions in annual heating costs and in CO<sub>2</sub> emissions** compared to the best condensing boilers.
- The most beneficial heating system to enhance the energy qualification of buildings because it permits a considerable promotion of the building's energy classification with the consequent increase in the value of the building.
- **Reduction in investment costs for geothermal loops can be higher than 50%** in comparison to EHP in case of installation of E<sup>3</sup> GS.

### Versions

- E<sup>3</sup> A: heating system including one or more absorption heat pumps powered by gas and air source renewable energy (GAHP-A).
- E<sup>3</sup> GS: heating system including one or more absorption heat pumps powered by gas and ground source renewable energy (GAHP-GS).
- E<sup>3</sup> WS: heating system including one or more absorption heat pumps powered by gas and water source renewable energy (GAHP-WS).

For further information, please contact the Robur Sales Network.






**1** system only

**Several** solutions


Please also refer to planning manual. Pdf download under [www.robur.com](http://www.robur.com)

Find more <http://www.robur.com/products/pro-solutions/e3-systems/>








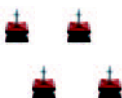
# GAHP, GA, AY, E<sup>3</sup> and Multiple Assemblies Control systems

|   | Component   |
|---|---|
|   | <p><b>Direct Digital Control</b> (supplied as standard for pre-assembled links)<br/>A single device to adjust, control and completely manage the unit's operation.<br/>Functions include:</p> <ul style="list-style-type: none"> <li>• allows the management of up to 16 modules (individual or pre-assembled) connected on the same hydraulic circuit and up to 48 modules, if connected to another two panels;</li> <li>• programming of operation in cooling and/or heating on 4 time bands with differentiated water temperatures;</li> <li>• control of the system's hot and cold inlet and outlet water temperatures;</li> <li>• cascade control with advanced algorithm;</li> <li>• set point control with sliding temperature, thanks to the climate curve function (with optional outdoor probe);</li> <li>• ability to have the system switched on and off through an external control device;</li> <li>• visual and acoustic signalling of operating alarms for each individual unit;</li> <li>• chronological display of alarms triggered;</li> <li>• designed for connection to remove signalling systems;</li> <li>• supports Mod-Bus RTU communication protocol for interface with BMS (building management systems).</li> </ul> |
|  | <p><b>RoburBox100 (system control interface)</b><br/>RB100 (RoburBox100) is the control interface for systems made up of Robur chiller-heater units and/or absorption heat pumps fitted with Direct Digital Control (DDC). The device is designed to carry out three main functions:</p> <ul style="list-style-type: none"> <li>• interface in between the DDC and any external control devices such as regulators (even centralised), electronic thermostats, clean contacts, to give them the ability to control the enabling or disabling of hydronic circuits and of setting default set points for the water temperature;</li> <li>• processing of a maximum of four requests; one for cooling, one for heating and two for DHW production;</li> <li>• interface for switching the 3-way valves, such as those for switching from cooling to heating typically located in annual cycle systems with 2-pipe water distribution.</li> </ul>  |
|  | <p><b>RoburBox200 (system control interface)</b><br/>RB200 (RoburBox200) is the control interface for systems made up of Robur chiller-heater units and/or absorption heat pumps, fitted with Direct Digital Control (DDC). On top of the same functionalities already provided by RB100, the device is designed to carry out the following additional functions:</p> <ul style="list-style-type: none"> <li>• integration of third parties appliances, i.e. in case of retrofitting of existing systems;</li> <li>• control of water circulation of primary and secondary circuits;</li> <li>• regulation of overall capacity and temperature set-point to improve overall efficiency.</li> </ul>  |
|  | <p><b>CCI Comfort Control Interface</b><br/>The CCI panel can control and modulate the power output of one or more GAHP-A, GAHP-GS and GAHP-WS, up to a maximum of three units. This in order to adjust the thermal output in accordance to the requirements coming from an external electronic regulator (0-10 Volt signal). CCI is then an interface panel, alternative to the DDC, connected to an outdoor temperature adjusting system, such as the RSI regulator for example.</p>  |
|  | <p><b>CCP (Comfort Control Panel)</b><br/>With the aim of delivering the maximum environmental comfort whilst minimizing the energy consumed, Comfort Control Panel makes it possible to integrate the operation of the entire heating system maximizing the overall efficiency. Comfort Control Panel is capable of managing:</p> <ul style="list-style-type: none"> <li>• up to 3 heat pumps E<sup>3</sup> and the load on the E<sup>3</sup> heat pumps with a climatic curve;</li> <li>• the monitoring of all units parameters and the circulation pumps as well;</li> <li>• secondary distribution to different zones and DHW production;</li> <li>• the anti-legionella cycle;</li> <li>• the integration with boilers and solar panels;</li> <li>• free-cooling;</li> <li>• the interface with a modem for remote assistance.</li> </ul>   |

# GAHP, GA, AY Line accessories

|   | Component   |
|---|---|
|  | <p><b>Outdoor temperature probe for weather curve</b><br/>This probe is to be connected to the DDC or to the RSI (Integrate System Controller) and it allows the units to operate in the weather curve mode, that is adjusting the set-point of the outlet water temperature, both in heating and cooling, not to a fixed value but in relation to the outdoor temperature, detected by this outdoor temperature probe.</p> |
|   | <p><b>CAN BUS cable connection</b><br/>For the connection between the Direct Digital Control and the Robur units.</p>   |
|   | <p><b>Circulation pump</b><br/>According to the installation characteristics and regulation settings, several different circulating pumps are made available, with fixed and modulating water flow.</p>   |
|   | <p><b>Winter kit for condensing boilers AY 00-120</b><br/>This kit extends the operation of the boiler to an outdoor temperature of -30 °C through dedicated thermo-regulating and heating devices to be fittable also on boilers already installed.</p>  |

# E<sup>3</sup> systems components

|   | Component  |
|---|--|
|   | <p><b>Zone valves complete with actuator</b><br/>Zone valve and three-way valve to be used to complete the secondary circuit.</p>  |
|  | <p><b>Air separator and sludge remover filters</b><br/>to care for the system and protect it from downtime and/or malfunctions due to the presence of excess of air or dirt.</p>   |
|  | <p><b>Mosè hydraulic separator</b><br/>to balance hydraulic circuits, complete with automatic air discharge valve, water discharge valve and insulation.</p>   |
|  | <p><b>Flow regulator valve</b><br/>to allow the correct hydraulic balance, adjusting the flow rate during heating and cooling and therefore the optimal distribution of heating and cooling energy.</p>  |
|  | <p><b>Thermal flywheel</b><br/>for hot water storage, external painted, uncoated on the inside complete with soft polyurethane insulation.</p>   |
|  | <p><b>DHW preparation tanks</b><br/>Tanks with cathodic protection, internally treated according to UNI10025, equipped by enhanced exchange coil pipe and available in the versions with or without additional coil for solar integration.</p> |
|  | <p><b>Condensation pump</b><br/>to be connected to the water condensation discharge.</p>   |
|   | <p><b>Safety valve exhaust kit for GAHP GS and WS</b><br/>Kit to duct the safety valve exhaust outdoor, to be used for GS/WS units installed indoor.</p>   |
|  | <p><b>Anti-vibration support kit</b><br/>consisting of a series of elastic rubber or spring feet to install under the unit base.</p>   |



## THE VALUE OF EXPERIENCE

### References



Open University -  
Milton Keynes, United Kingdom



Social Housing MHF Celler Bauverein -  
Celle, Germany



MFH 2 MW Project - Netherlands



Oberschleißheim - Germany



SERO Pump Systems GmbH -  
Meckesheim, Germany



School in Plaidt - Germany



Kindergarten - Oberkochen, Germany



Pastor Braune Haus - Berlin, Germany



Michael von Jung school -  
Kirchdorf, Germany



Domaine La Coquillade Hotel - France



Tambohus Inn Kro - Limfjord, Denmark



Agrifood market Alexandria - Romania





Residence Benny Farm - Canada



Golden Town Apple Products - Thornbury, Canada



Department of Sanitation - NY, USA



Southern Connecticut Gas Utility - USA



Grocon Pixel Building - Melbourne, Australia



Carrefour - Milan, Italy



Boscolo Hotel Academy -  
Tuscania (Viterbo), Italy



Engineering Department -  
Municipality of Milan, Italy



Printworks Grafiche Antiga - Treviso, Italy



Certosa of Pavia - Italy



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Holiday Inn - Mozzo (Bergamo), Italy

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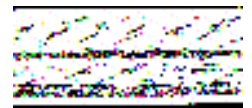
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