



caring for the environment



THE FLAME THAT COOLS

Gas absorption chillers powered by natural gas

Gas absorption chillers

5 Good Reasons



Natural Gas

Direct use of primary energy

Robur absorption chillers GA ACF are directly activated by natural gas or LPG to produce cold water through absorption thermodynamic cycle.

Robur technology converts into cooling the energy content of locally available natural gas or LPG resources.



Absorption chillers skip all the steps of the process of power generation and distribution.

1



Extremely low electrical consumption

Savings up to 86% of electricity demand compared to traditional electrical system, Robur absorption chillers are highly beneficial in any situation where power supply is a concern.

Particularly effective in peak shaving of seasonal power demand.

Robur chillers dramatically reduce the need for local power generation capacity in isolated off-grid applications.

Robur chillers provide a reliable and stable air conditioning performance even where electrical supply may suffer from outages or instability.

Robur chillers GA ACF powered with natural gas or LPG provide savings in operating costs frequently in excess of 50% in comparison with electric chiller powered with diesel generator (depending on local energy prices).

2



A cost effective solution

Robur absorption technology saves on electricity costs.

Extremely attractive where power supply is expensive compared to natural gas or LPG.

For 1 kWh (3.4 kBTU) of cooling capacity delivered to the user, Robur absorption units require only 0.15 m³ of natural gas (or 0.11 kg of LPG) with a negligible consumption of less than 0.046 kWh of electricity.

3



Environmental-friendly refrigerant and energy

Robur absorption chiller uses a **natural refrigerant** (ammonia) with **no greenhouse effect** (Global Warming Potential, GWP = 0) and **no impact on the ozone layer** (Ozone Depletion Potential, ODP = 0).

No use of Fluorinated or Chlorinated refrigerants, noxious for the environment and under progressive banning worldwide.

Robur technology is based on a **maintenance-free sealed circuit design** and a completely welded construction, with no need for refrigerant drainage, re-filling or tip-up throughout the whole life of the units.

Natural gas is a clean source of energy, respectful of the environment. The direct use of natural gas in Robur absorption units **dramatically reduces overall carbon emissions**.

4



No impact on infrastructures

Robur chillers drastically reduce the installation costs for local electrical infrastructure (transformers, distribution boards, cables, etc).

Deployment of the absorption technology would imply **benefits on strategic infrastructures**, avoiding large-scale investments into new power plants and upgrade of existing power grids.

5

Gas absorption chillers

Other interesting Key Features



Patented and proven technology

Robur absorption technology has been continuously developed over the last 50 years, starting from **original patents** (including some of **Albert Einstein**, among others).



Modular approach

The **modular approach** provides operational flexibility and further reliability, managing from 17 to 1000 kW (58 kBTU/h to 3,4 MBTU/h).

Robur controllers are able to manage multiple units and different models simultaneously.

Robur modular approach:

- delivers a tailored system design;
- maximizes operational efficiency;
- allows spreading investments over time;
- ensures intrinsic redundancy.



High reliability and stable performance

Over 400.000 water-ammonia absorption chillers have been installed worldwide. The absorption cycle is **substantially static**, with no moving parts, therefore **extremely reliable**.

The sealed circuit design provides **stable performance** due to:

- no need of vacuum pump and no crystallization (in comparison with Lithium Bromide technology);
- no loss of refrigerant that prevents efficiency decay (in comparison with electric chillers).



No water consumption, no cooling towers, no demi water systems

Compared to other existing sorption technologies (Lithium Bromide), Robur water-ammonia absorption cycle is intrinsically suitable for a high temperature lift, allowing a direct exchange with outdoor air, **with no need for cooling towers and the relevant water consumption**: Robur absorption technology is the **winning solution where water is a valuable resource**.

No water consumption also means no cost at all for water chemical additives or treatments and further reduction in electrical power consumption (no cooling tower fans and no cooling water circulation pumps). All this implies simple installation and easy operation.

Gas absorption chillers

We have a Solution for Every Need!



Standard - Cooling with low electricity consumption

Saving up to 86% of electricity compared to a traditional electrical system, thanks to the prevalent use of natural gas.



Free Hot Water

HR - Large production of free hot water, while cooling

GA ACF-HR is a gas absorption chiller-heater for cooling and simultaneous free production of domestic hot water up to 75 °C, thanks to heat recovery.

For 1 kWh (3.4 kBTU) of natural gas equivalent used, while delivering 0.7 kWh (2.4 kBTU) of chilled water, every unit delivers also 0.8 kWh (2.8 kBTU) of free energy for DHW, with a peak efficiency (GUE) of 155 %.



HT - Wide operational range for outdoor temperature

Robur can provide absorption units dedicated to hot climates (HT - High Temperature version), with steady performance over an extended operational range for outdoor temperature, up to more than 50 °C.



TK - Cooling in industrial process applications

Robur can provide absorption units (TK - Technological version) for cooling in process applications (e.g. greenhouses, maturing of cheese, etc), cooling of controlled temperature rooms (e.g. data center, server rooms, laboratories) and space cooling even during the cold season.



LB - Negative temperature

Robur can also provide special versions (LB - Low Brine version) to produce chilled water at negative temperatures (down to -10 °C).

This offers the opportunity to use the LB version in industrial processes or refrigeration applications, for example in the food industry. Negative temperatures consent easy and cost effective “peak-shaving” solutions for cooling demand, through ice-storage systems.

GA ACF (5 TR module): gas absorption chiller

Cooling with low electric energy consumption.
Ideal for space cooling where electric energy is not available.



COOLING OPERATION MODE ⁽¹⁾

Working point A35/W7	G.U.E. (gas utilization efficiency)	%	71
	cooling capacity	kW - kBTU/h	17.7/60.5
Nominal water flow rate ($\Delta T = 5,5 \text{ }^\circ\text{C}$)		m^3/h	2.77
Nominal water pressure loss		kPa	29
Minimum outlet water temperature		$^\circ\text{C}$	3
Inlet water temperature max/min		$^\circ\text{C}$	45/7.5
Ambient operating temperature max/min		$^\circ\text{C}$	45/0

BURNER CHARACTERISTICS

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

ELECTRICAL CHARACTERISTICS

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

INSTALLATION DETAILS

Operational weight		kg	360
Sound pressure L_p at 5 metres ⁽⁶⁾	standard version	dB(A)	60.1
Free field, at the front, direction factor 2	low noise version	dB (A)	54.1
Connections	water	"	1 1/4 F
	gas	"	3/4 F
Electrical degree of protection		IP	X5D
Standard version size	width	mm	850
	depth	mm	1,230
	height	mm	1,445
	low noise version height	mm	1,545

⁽¹⁾ As per calculation methods of EN12309-2.

⁽²⁾ NCV 34.02 MJ/m³ (9.45 kWh/m³) at 15 $^\circ\text{C}$ - 1013 mbar.

⁽³⁾ NCV 46.34 MJ/kg (12.87 kWh/kg) at 15 $^\circ\text{C}$ - 1013 mbar.

⁽⁴⁾ Data measured at +30 $^\circ\text{C}$ outdoor temperature

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

⁽⁶⁾ Lw sound power standard version dB(A) 82.1 and low noise version dB(A) 76.1. Sound power values measured according to EN ISO 9614.

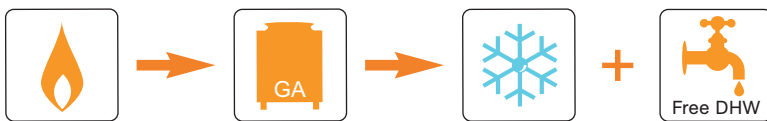
Note: For multiple units, please contact the Robur sales network.



GA ACF-HR (5 TR module): absorption chiller-heater powered by natural gas with heat recovery

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

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



COOLING OPERATION MODE ⁽¹⁾

Working point A35/W7	G.U.E. (gas utilization efficiency)	%	72
	cooling capacity with heat recovery	kW - kBTU/h	17.9/61.2
Nominal water flow rate ($\Delta T = 5.5\text{ °C}$)		m ³ /h	2.77
Nominal water capacity pressure loss		kPa	29
Minimum outlet water temperature		°C	3
Inlet water temperature	max	°C	45
	min	°C	7.5
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
		kBTU/h	up to 109.2
Nominal water flow rate		l/h	1,000
Hot water inlet temperature	max	°C	75
	min	°C	10

BURNER CHARACTERISTICS

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

ELECTRICAL CHARACTERISTICS

Voltage			230 V – 50 Hz
Nominal electrical power ⁽⁴⁾⁽⁵⁾	standard version	kW	0.84
	low noise version	kW	0.87

INSTALLATION DETAILS

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

⁽¹⁾ As per calculation methods of EN12309.

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

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

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

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

motors power consumption.

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

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

GA ACF-HT (5 TR module): gas absorption chillers

Cooling in hot climates.

Ideal for cooling of residential, commercial and industrial environments with an external air temperature up to 50 °C.



COOLING OPERATION MODE ⁽¹⁾

	G.U.E. (gas utilization efficiency)	%	68
Working point A35/W7	cooling capacity	kW - kBTU/h	17.1/60.5
Nominal water flow rate ($\Delta T = 5.5$ °C)		m ³ /h	2.67
Nominal water pressure loss		kPa	27
Minimum outlet water temperature		°C	5
Inlet water temperature max/min		°C	45/7.5
Ambient operating temperature max/min		°C	50/0
Sound pressure Lp at 5 metres ⁽²⁾ - standard version - Free field, at the front, direction factor 2		dB(A)	60.1

BURNER CHARACTERISTICS

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

ELECTRICAL CHARACTERISTICS

Voltage		230 V – 50 Hz
Nominal electrical power ⁽⁵⁾⁽⁶⁾ - standard version		kW 0.84/0.87

INSTALLATION DETAILS

Operational weight - standard version		kg	380
Standard version size	width	mm	850
	depth	mm	1,230
	height	mm	1,445

⁽¹⁾ As per calculation methods of EN12309-2.

⁽²⁾ Lw sound power ACF-HT standard version dB(A) 82.1. Sound power values measured according to EN ISO 9614.

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

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

⁽⁵⁾ 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.

⁽⁶⁾ ± 10% depending on the power supply voltage and on the tolerance of the electrical engines.



Chillers for cooling in hot climates

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

GA ACF-LB (5 TR module): gas absorption chillers

Refrigeration at negative temperatures.

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



COOLING OPERATION MODE ⁽¹⁾

	G.U.E. (gas utilization efficiency)	%	53
Working point A35/W7	cooling capacity - working point A35/W-5	kW - kBTU/h	13.3/45,4
Nominal water flow rate ($\Delta T = 5.5\text{ }^{\circ}\text{C}$)		m^3/h	2.60
Nominal water pressure loss		kPa	42
Minimum outlet water temperature		$^{\circ}\text{C}$	-10
Inlet water temperature max/min		$^{\circ}\text{C}$	45/-7
Ambient operating temperature max/min		$^{\circ}\text{C}$	45/0
Sound pressure L_p at 5 metres ⁽²⁾ - standard version - Free field, at the front, direction factor 2		dB(A)	60.1

BURNER CHARACTERISTICS

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

ELECTRICAL CHARACTERISTICS

Voltage		230 V – 50 Hz	
Nominal electrical power ⁽⁵⁾⁽⁶⁾ - standard version		kW	0.84/0.87

INSTALLATION DETAILS

Operational weight - standard version		kg	380
Standard version size	width	mm	850
	depth	mm	1,230
	height	mm	1,445

⁽¹⁾ As per calculation methods of EN12309-2.

⁽²⁾ Lw sound power ACF-LB standard version dB(A) 82.1. Sound power values measured according to EN ISO 9614.

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

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

⁽⁵⁾ 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.

⁽⁶⁾ ± 10% depending on the power supply voltage and on the tolerance of the electrical engines.



Chillers for refrigeration at negative temperatures

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

GA ACF-TK (5 TR module): gas absorption chillers

Cooling in process applications.

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



COOLING OPERATION MODE ⁽¹⁾

	G.U.E. (gas utilization efficiency)	%	71
Working point A35/W7	cooling capacity	kW - kBTU/h	17.7/60.5
Nominal water flow rate ($\Delta T = 5.5 \text{ }^\circ\text{C}$)		m^3/h	2.77
Nominal water pressure loss		kPa	29
Minimum outlet water temperature		$^\circ\text{C}$	3
Inlet water temperature max/min		$^\circ\text{C}$	45/7.5
Ambient operating temperature max/min		$^\circ\text{C}$	45/-12
Sound pressure L_p at 5 metres ⁽²⁾ - standard version - Free field, at the front, direction factor 2		dB(A)	60.1

BURNER CHARACTERISTICS

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

ELECTRICAL CHARACTERISTICS

Voltage		230 V – 50 Hz
Nominal electrical power ⁽⁵⁾⁽⁶⁾ - standard version		kW 0.84/0.87

INSTALLATION DETAILS

Operational weight - standard version		kg	380
Standard version size	width	mm	850
	depth	mm	1,230
	height	mm	1,445

⁽¹⁾ As per calculation methods of EN12309-2.

⁽²⁾ Lw sound power ACF-TK standard version dB(A) 82.1. Sound power values measured according to EN ISO 9614.

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

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

⁽⁵⁾ 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.

⁽⁶⁾ ± 10% depending on the power supply voltage and on the tolerance of the electrical engines.



Chillers for cooling in process applications

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

Direct Digital Control - DDC

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

- Control up to 48 different modules.
- Monitoring of all units parameters.
- Set point control with sliding temperature, thanks to the weather curve function with optional outdoor probe.
- ModBus communication protocol support for interface with Building Management Systems (such as BMS, SCADA, etc.).



Summary of absorption chiller technology advantages

- **Direct use of natural gas;**
- **Easy of installation** and operation;
- **Low electrical consumption:** 1/10 of an equivalent electrical chiller.
- **Sealed circuit,** no tip-up, no drain, extremely simple maintenance;
- **Natural refrigerant:** no CFC, HCFC, HFC;
- **Substantially no moving components:** very high reliability.



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Mission

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

Vision

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

Distributor



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