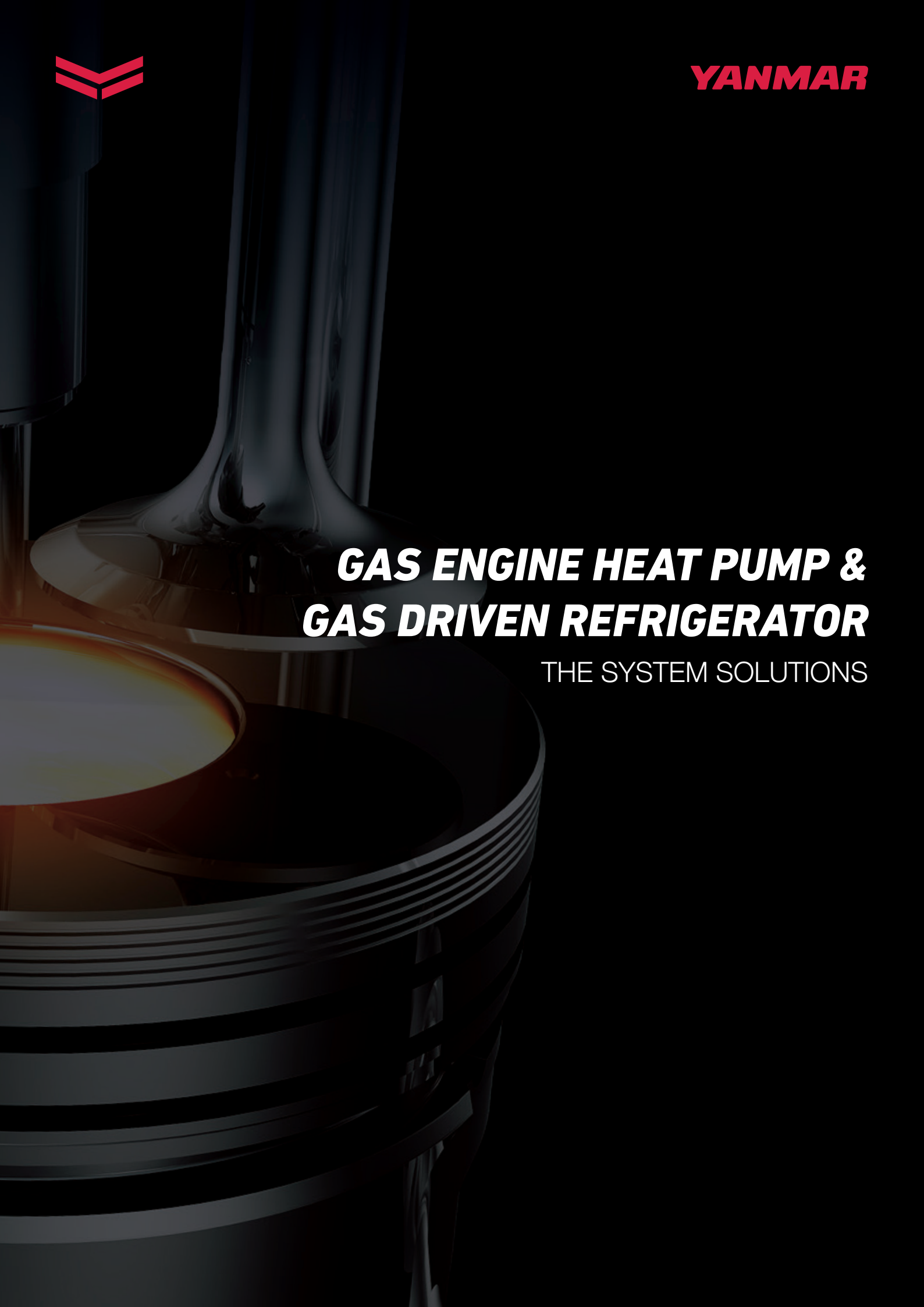
YANMAR



GAS ENGINE HEAT PUMP & GAS DRIVEN REFRIGERATOR

THE SYSTEM SOLUTIONS

A SUSTAINABLE FUTURE

At YANMAR, we're proud to have been true to our mission for more than 100 years. Since our beginnings in Japan and during our global expansion, we've always focused on providing sustainable and innovative solutions that serve people and save fuel.

Our commitment to efficiency and the environment has proven itself then and now and has led to long-term savings for our customers. For example, YANMAR Energy System has developed solutions such as our VRF, CHP and power generation systems that are characterised by their responsible use of resources. These systems can work independently, but can also be combined with each other and integrated into existing systems for even greater efficiency and cost savings.

YANMAR

LEGEND

30 % LESS DRILLING COSTS

ENERGY SAVING ORDINANCE &
RENEWABLE ENERGY HEAT ACT

NO TRANSFORMER
STATION REQUIRED

PROVEN TECHNOLOGY

SAVE ENERGY

PLUG & PLAY

SAVE ON CONSTRUCTION COSTS

FREE HOT WATER

COOLING TO 0 °C

COMPACT SOLUTION

AN ALTERNATIVE TO ELECTRICITY

RELIABILITY

PARTNERSHIP

SAFETY

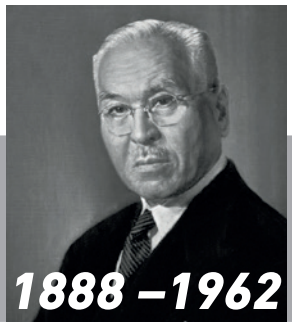
GUE > 2.25

THE HISTORY OF THE YANMAR GROUP

COMPANY PROFILE

HOW EVERYTHING BEGAN...

The developer of the first compact diesel engine worldwide



Our founder:
Magokichi Yamaoka

PRODUCT INTRODUCTIONS

Start
1933

World's first commercially deployable small diesel engine (5-6 hp)

Start
1947

Introduction of small marine engines (5-7 hp)

Start
1952

World's smallest horizontal water-cooled diesel engine (1.5-2 hp)

HISTORY OF THE GAS ENGINE HEATING PUMP

1987

First YANMAR gas engine heating pump

2003

Founding of YANMAR Energy System Co. Ltd. in Japan

2005

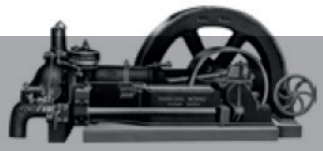
YANMAR gas engine heat pump with heat recovery

2011

Founding of YANMAR Energy System in Europe

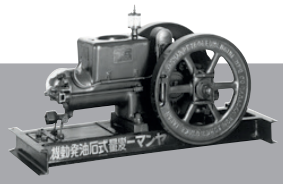
YANMAR ANNOUNCES MERGER WITH KKU GROUP IN THE ENERGY SYSTEMS SECTOR

YANMAR Energy System Co. Ltd (YES) is a subsidiary of YANMAR, one of the leading companies in the development, manufacture and distribution of gas engine heat pumps, refrigeration and CHP systems for the HVAC industry worldwide, while the Eschenfelder KKU Group (KKU) specialises in the design, manufacture and distribution of resource-saving cooling and heating systems for industry and commerce. The development and production capacities of the KKU Group enable the production of individually manufactured system solutions when standard solutions are not sufficient.



1912

Founded as Yamaoka Hatsudoki Kosakusho, production gets underway using gas engines



1921

The brand name YANMAR is adopted and the first horizontal oil engine is developed

Start
1967

First tractor with passenger seat

Start
1971

First mini-digger

Start
2000

First mini-CHP

100th ANNIVERSARY

2012

100th company anniversary of YANMAR, opening of its own training centre

2013

YANMAR produces the 250,000th gas engine heat pump

2016

YANMAR develops the world's first gas-operated chiller

2017

Development of the Brine-to-water gas engine heat pump

AREAS OF APPLICATION

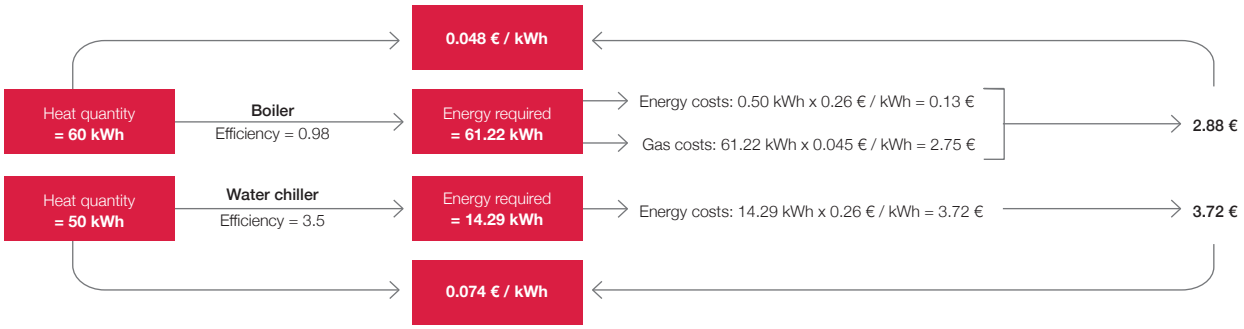
THE RIGHT SYSTEM SOLUTION FOR EVERY APPLICATION

ENERGY COMPARISON

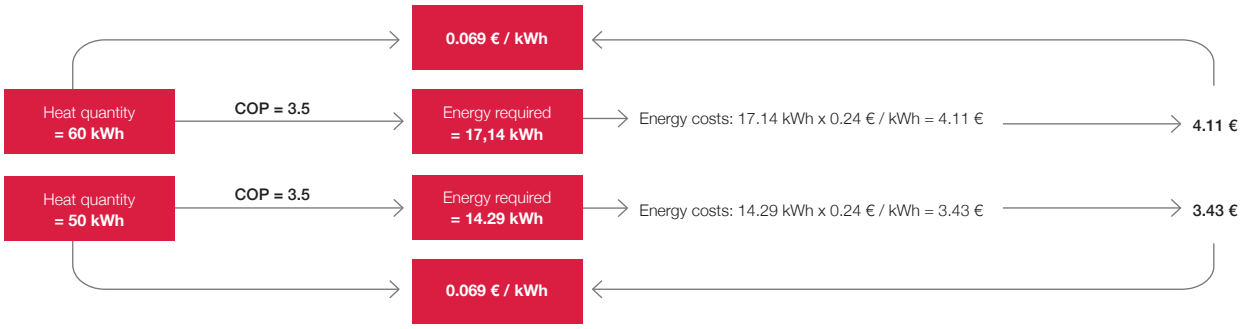
THE DIRECT ROUTE TO EFFICIENCY

By using natural gas as the primary energy source, the gas engine heat pump is far superior to other systems in its overall energy balance. The reason for this is that natural gas is delivered directly to consumers with only a little conversion loss. A further advantage that accrues from a gas engine heat pump is the increase in value of the property. Due to the stability of gas prices, both owners and tenants of properties with gas engine heat pumps benefit from low utility costs in the long term.

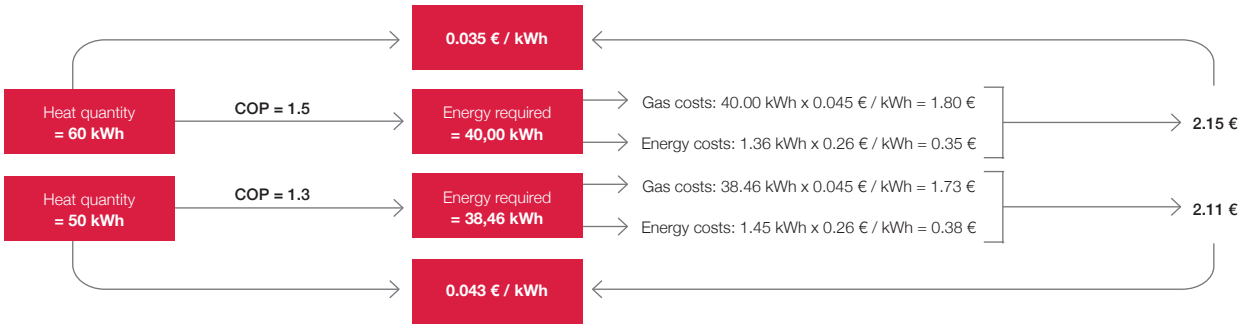
BOILER + ELECTRIC CHILLER

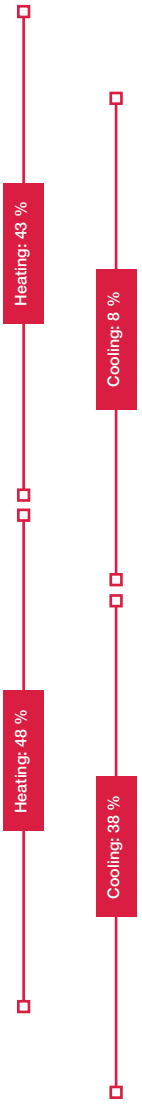


L / W ELECTRIC HEAT PUMP



L / W GAS ENGINE HEAT PUMP





3D ANIMATION

AIR-TO-WATER SYSTEM WITH HYDROBOX

THE TRANSFORMATION ARTIST

AIR-TO-WATER SYSTEM / HYDROBOX

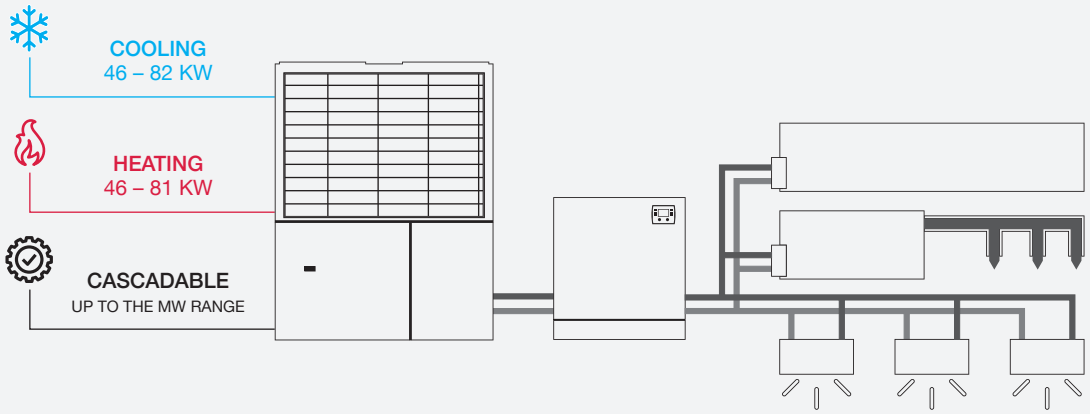
In conjunction with the Hydrobox, the gas engine heat pump can be connected to water-guided systems. With the Hydrobox, the gas engine heat pump becomes a real all-rounder. This combination ensures that the heating and cooling capacity at a water temperature range of +6 °C to max. +50 °C is reliably transferred to a water network and can be used for both new and existing buildings. The temperatures provided by the Hydrobox make it suitable for industrial as well as commercial and process applications.

HYDROBOX

The Hydrobox installed in the interior area transfers the required heating and cooling capacity as a link to the water-guided heating and cooling system.

HEAT PUMP MANAGER

The heat pump manager is a control extension to the Hydrobox internal controller. While this controls the primary side up to the buffer tank, the heat pump manager takes over the secondary side, that is the control of up to six heating and cooling circuits.



OVERVIEW OF KEY FACTS

- ✓ Simultaneous heating and cooling with integrated heat recovery
- ✓ Power adjustment by means of modulating operation
- ✓ Meets all requirements of energy laws
- ✓ High efficiency due to use of condensing technology
- ✓ Lower operating costs compared to boilers and electric chillers
- ✓ Low noise emissions
- ✓ Eligible for subsidies and exempt from energy tax
- ✓ Engine waste heat can be recovered and reused in cooling mode, allowing simultaneous cooling and heating e.g. for water heating (heat recovery optional)
- ✓ Cascadable up to the MW range
- ✓ No frost protection measures necessary for the lines between the gas engine heat pump (outdoor unit) and Hydrobox (indoor unit)
- ✓ Optionally, a complete input of parameters is possible via remote monitoring
- ✓ No heating interruption in defrost mode

DATA PROCESSING CENTRE

MAXIMUM SUPPLY SECURITY IN LARGE CITIES

CHALLENGE

COOLING FOR AN URBAN
DATA PROCESSING CENTRE

In order to be able to reliably supply its 600,000 inhabitants with gas and water in the future, a city in the Ruhr region built a modern data processing centre with a powerful IT system. In addition to its supply networks, this is where the entire urban drainage network is also controlled from. All the higher are the requirements for operational safety as a result. This applies in particular to the cooling of the server rooms – a critical component for the functioning of the data processing centre.

In addition to maximum reliability, the public utilities also demanded the most energy-efficient, cost-saving technology possible. Together with the planning office responsible for the entire building services, our experts developed a tailor-made concept for the customer that meets all these requirements in a superb fashion.

SOLUTION

REDUNDANCY AND EFFICIENCY

Three gas engine heat pumps are currently available. The systems transfer their cooling capacity via Hydroboxes to a generously dimensioned buffer storage tank, which can provide the required cooling energy for at least 24 hours, even without additional cooling. This cooling network in turn supplies the conditioning cabinets and circulating air cooling cassettes in the server and equipment rooms. The waste heat from the engine is fed into a buffer tank for space heating via heat recovery (HR).

A total of 210 kW cooling capacity and 90 kW HR heating capacity are provided. According to the (n+1) principle, one unit serves as a reserve in case of an emergency. In future expansion stages, the number should rise to five units (4+1).

RESULT

ALWAYS ONLINE AND SAVING AT THE SAME TIME

The overall system reliably supplies the new data processing centre for the municipal gas, water and sewerage networks with the cooling required for trouble-free operation. Instead of electricity, it uses natural gas as a primary energy source that burns very efficiently and thus achieves an energy saving of around 35 % compared to a conventional solution.

At the same time, the public utilities are saving a lot of money by noticeably relieving the transformer station and the emergency power system. The heat for heating the data processing centre comes virtually free of charge – a fact that the city's citizens can be just as happy about as its treasurer.

OVERVIEW:

Products:	3 x Gas engine heat pump 3 x Engine HR 3 x Hydrobox
Cooling capacity:	210 kW
Heating capacity:	90 kW (Engine HR)
Building area:	5,000 m²
Assembly time:	10 months
Completion:	April 2016
Savings of:	Approx. 35 % vs. Electric chiller

OFFICE ADMINISTRATION

DOSB E.V. – FRANKFURT AM MAIN

LONG-TERM COMMITMENT TO SPORT

CHALLENGE

LEADING BY EXAMPLE

The German Olympic Sports Confederation (DOSB) not only represents the interests of top athletes, but also those of around 27 million members in sports clubs. The DOSB pursues an all-round sustainable approach. One of its declared aims is to ensure that people play sports in a healthy environment and in an environmentally compatible manner. With this in mind, the club attached particular importance to efficient air-conditioning technology in its new “Haus des Deutschen Sports” in Frankfurt am Main.

SOLUTION

INTELLIGENT EFFICIENCY

With a total cooling and heating capacity of 334 and 337 kW respectively, the installed system ensures comfort at all times. At its heart are two YANMAR gas engine heat pumps together with Hydroboxes. One unit primarily covers the cooling demand and is additionally equipped with an engine heat recovery system, the other mainly covers the heating demand.

The intelligent hydraulics allows rapid switching between operating modes, so that both units can act in concert if required. Peak cooling loads in the technical room are absorbed by two further Hydroboxes as an interface to the building’s water network. This means that an additional boiler is only required for peak heating loads and water heating.

RESULT

FIT FOR THE FUTURE

Located in the green belt of southern Frankfurt, the “Haus des Deutschen Sports” offers DOSB employees bright offices and welcomes visitors in a spacious reception area. Its modern energy system also impresses right down the line: The renewable energy requirements are met or significantly exceeded. All units on the roof are also enclosed by soundproof walls, so that the DOSB benefits from a system that operates extremely quietly in addition to its low operating and maintenance costs.

OVERVIEW:

Products:	2 x Gas engine heat pump 1 x Engine HR 2 x Hydrobox
Cooling capacity:	334 kW
Heating capacity:	337 kW
Building area:	1,100 m²
Assembly time:	1 year
Savings of:	40 % vs. Electric heat pump

GÜNZBURG DISTRICT COURT

A BAVARIAN FLAGSHIP PROJECT

CHALLENGE

ECONOMY AND ECOLOGY FOR THE DISTRICT COURT

Where the proverbial mills of justice are in operation, heat is always produced – by the employees and visitors to the court, but also by its numerous office computers. This circumstance weighs all the more heavily if the courthouse is a contemporary, excellently thermally insulated passive construction.

The new building of the district court in Günzburg, Swabia, demonstrates how the highest demands on indoor climate and energy efficiency can be combined in all seasons. Here, highly efficient YANMAR gas engine heat pumps transport heat into or out of the building as required.

RESULT

A BUILDING WITH EXEMPLARY CHARACTER

The State Building Authority deliberately planned the new district court building as an administrative building with a flagship function for the state of Bavaria – among other things, innovative concrete core activation is used here for air conditioning. The modern heat pump system more than meets the high demands for economy and environmental protection and is therefore the ideal solution for this model project.

SOLUTION

OUTSTANDING EFFICIENCY AND FLEXIBILITY

The new building for the Günzburg District Court comprises 2,850 m² of floor space. The task for the company that was commissioned was to realize cost-effective and resource-conserving cooling and heat generation. The installed solution consists of two gas engine heat pumps with one Hydrobox each and provides a total heating and cooling capacity of 106 and 90 kW respectively. In addition, the engine waste heat from the two units can be recovered in order to simultaneously obtain the required useful heat in cooling mode. In this way, the natural gas energy source is optimally utilised.

OVERVIEW:

Products:	2 x Gas engine heat pump 2 x Hydrobox
Cooling capacity:	90 kW
Heating capacity:	106 kW
Air volumes:	12,000 m³/h
Building area:	4,000 m²
Savings of:	42 % vs. Electric heat pump & boiler

BORUSSIA DORTMUND FANWORLD

ENERGY-EFFICIENT COOLING AND HEAT GENERATION

CHALLENGE

ENERGY-EFFICIENT
COOLING AND HEAT GENERATION

The aim of the new 2,000 m² Borussia Dortmund Fan World building was to find a generation system that would provide the necessary cooling and heating energy for the premises in an energy-efficient and reliable manner. In addition, the system had to be able to cope with the great challenge of immediately dissipating the waste heat from several hundred football fans at football matches, especially in summer.

SOLUTION

AN OPTIMAL ENERGY SYSTEM

In the new Borussia Dortmund Fan World, cooling and heating are provided by three split air-to-water systems, which can be switched to the two operating modes in a ratio of 2:1. The energy system consists of a combination of outdoor units, Hydroboxes and heat exchanger stations. In one of the outdoor units, which is the first to be switched on when cooling is required, there is an additional plate heat exchanger for decoupling the engine heat in order to provide the heating power required in transition periods.

In addition, energy for hot water preparation can be obtained from the engine heat recovery system. The ventilation system combined with static heating surfaces, door air curtains and ceiling recirculation units in the interior of the building ensures energy-efficient and resource-saving cooling and heating.

RESULT

OPTIMAL USE OF VALUABLE ENERGY

The customer was more than satisfied with the energy system that was installed. And it's no wonder: with the YANMAR gas engine heat pumps they benefit permanently from low energy costs and at the same time conserve natural resources. The requirements of the renewable energy laws are also fully met.

OVERVIEW:

Products:	3 x Gas engine heat pump 1 x Engine HR 3 x Hydrobox
Cooling capacity:	231 kW
Heating capacity:	255 kW (plus 30 kW engine HR)
Building area:	2,000 m²
Assembly time:	4 weeks
Completion:	August 2014
Savings of:	Approx. 42 %

PODUFAL-WIEHOFSKY - LÖHNE

ARCHITECTURE THAT SETS A PRECEDENT

CHALLENGE

NEW LIFE IN OLD SCHOOL WALLS

Low birth rates and people leaving the countryside force many towns to close their schools. The same applies to Löhne in East Westphalia-Lippe. The town had already abandoned its primary school in Wittel in 2012. But it was only three years before the architecture and engineering firm was able to win them over with a convincing concept for sustainable further use.

The new user of the building erected in the 1960's thus turned out to be the engineering office itself. Isabel and Robert Wiehofsky as managing directors, and their staff, needed space for further growth – and the former school offered plenty of it. With YANMAR Energy System Europe, they had a partner with extensive experience in building modernisation at their side for their challenging project.

SOLUTION

TOP MARKS FOR EFFICIENCY AND COMFORT

With a usable floor space of 900 m², the building fabric of the old school was still good, but its energy efficiency corresponded to its year of construction. In addition to the complex insulation of the entire building shell, the emphasis was thus on the installation of a modern energy system with a YANMAR gas engine heat pump at its heart.

In combination with a Hydrobox and an integrated engine heat recovery system, the highly efficient unit delivers 42 kW each of cooling and heating capacity to two buffer storage tanks. These feed ceiling-mounted radiant panels in the individual rooms so that the employees and guests of the office enjoy a comfortable indoor climate at any time of the day or year.

RESULT

A CHARMING GEM

Individual offices in the teachers' room and map room, an open-plan office in the former gymnasium with a lounge in the former changing room – the old school building has been transformed into both a charming and contemporary company headquarters. Thanks to the high efficiency of YANMAR's gas engine heat pump, the general engineering office takes care of its own budget and the environment. The fact that the building also offers sockets for e-bikes and electric cars is the icing on the cake.

OVERVIEW

Products:	1 x Gas engine heat pump 1 x Hydrobox 1 x Heat pump manager
Cooling capacity:	42 kW
Heating capacity:	42 kW

OFFICE ADMINISTRATION

GRAFSCHAFTER VOLKSBANK - NORDHORN

A THOROUGHLY HARMONIOUS ENSEMBLE

CHALLENGE

CONNECTING OLD AND NEW

As a cooperative bank, Grafschafter Volksbank feels committed to its customers and members, but also to its employees and its location. The expansion of its headquarters in Nordhorn is of great importance for southern Emsland due to the ensemble approach. A partner with overall responsibility, once again made use of modern technology from YANMAR. The result is also impressive in terms of economy and environmental protection.

SOLUTION

AN OPTIMAL ENERGY SYSTEM

The central office building was completely renovated and connected to two former residential buildings and a new building to form one unit. Also in terms of building technology: The more than 3,000 m^2 of usable floor space is supplied by a system whose foundation is formed by three YANMAR gas engine heat pumps. A heat pump provides the heating and cooling capacity for the ventilation and air-conditioning technology, its engine waste heat is also used to heat the supply air in dehumidification mode. The other two heat pumps supply the buffer tanks of the heating and cooling system via Hydroboxes. In transition times, they can easily work in different operating modes.

RESULT

IDEAL BUSINESS CLIMATE AND OUTSTANDING RESOURCE CONSERVATION

An exposed concrete building, two town villas and a new building as a connecting element – the new headquarters of Grafschafter Volksbank is an architectural gem. The trend-setting building technology is just as impressive. The requirements of the renewable energy laws are more than fulfilled thanks to the highly efficient heat pumps operated using natural gas. As a result, the gas consumption for heating and cooling the old central office building, for example, has been reduced by almost two thirds to approx. 111,000 kWh/a. This corresponds to an annual saving of 10,000 euros!

OVERVIEW

Products:	3 x Gas engine heat pump 1 x Engine HR 2 x Hydrobox 3 x AHU-DX kit
Cooling capacity:	255 kW
Heating capacity:	285 kW (plus. 30 kW engine HR)
Floor space:	3,000 m^2
Savings of:	37 % vs. Electric heat pump & electric chiller

THE ASH - COLOGNE

RENEWABLE ENERGY REQUIREMENTS AS A SIDE DISH

CHALLENGE

A BARBECUE RESTAURANT – A GAS LINE

It's all happening at apeiron GmbH's "The ASH - The American Steak House". So hot that the power supply on the site would have been overtaxed if it had been realised conventionally, not least because of the high cooling and heating load, such as the open kitchen layout, the lava stone grill, several fireplaces in a room for more than 300 guests, and the large window areas. The solution: modern YANMAR technology!

RESULT

ENERGY EFFICIENCY FOR GOURMETS

By combining low-cost natural gas and engine heat recovery, operating costs could be reduced by up to 50 % compared to an electrically operated heat pump, and the CO_2 balance is up to 10 % friendlier. As a result, Kent Hahne's American Steak House saves up to 7,500 euros annually and protects the environment.

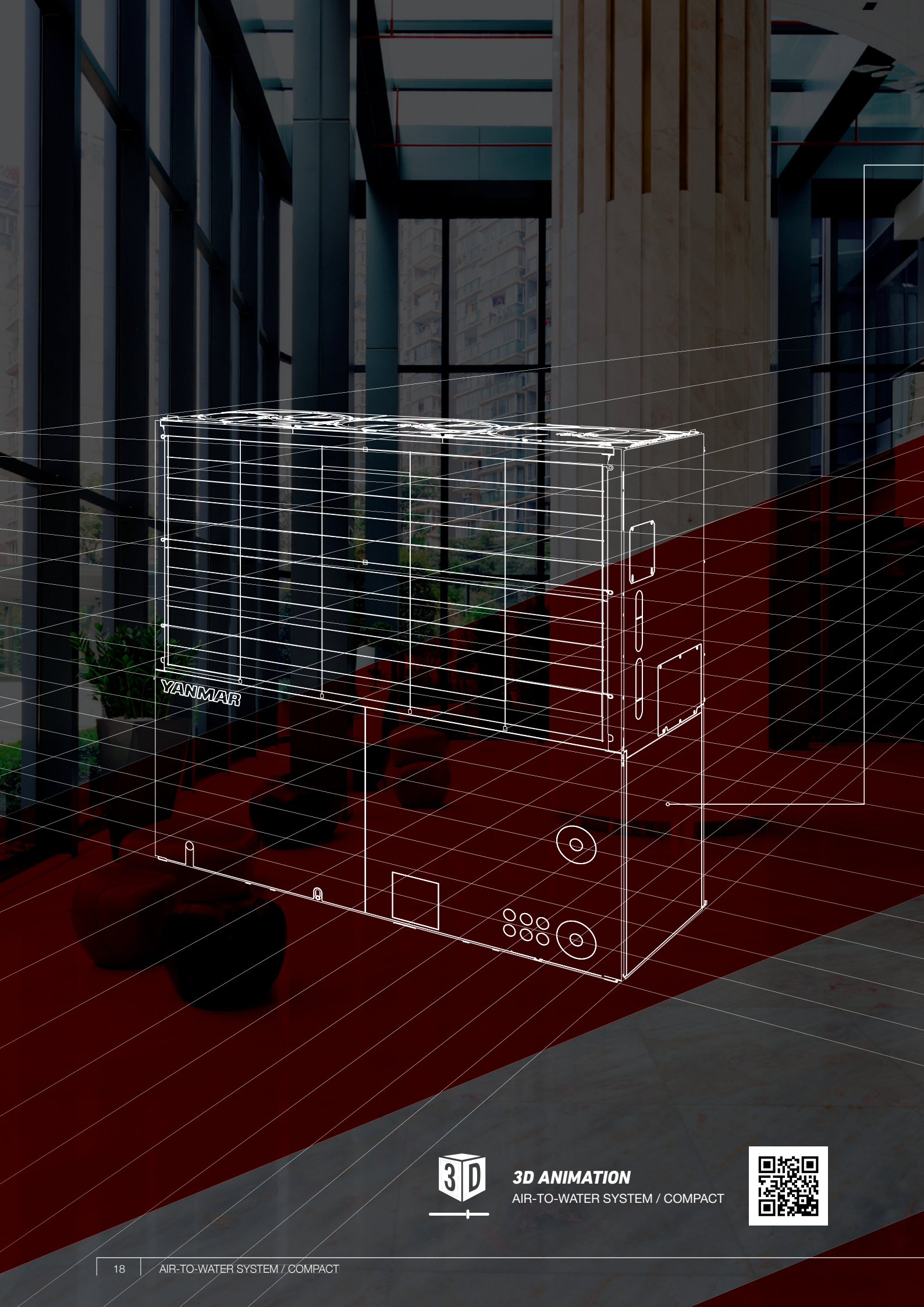
SOLUTION

HEATING & COOLING WITH
GAS ENGINE HEAT PUMPS

Two gas engine heat pumps provide the necessary heating and cooling capacity, which is fed into two buffer storage tanks via one Hydrobox each. The highly efficiently controlled pumps inside the Hydroboxes take over the transport or supply up to the buffer tank on the primary side. The through valves for cooling or heating are controlled directly by the Hydroboxes. The integrated engine heat recovery system also heats the service water for the kitchen up to 65 °C. Thanks to this donated energy, operating costs and emissions of climate-damaging CO2 are also reduced. And the renewable energy laws are, by the way, exceeded.

OVERVIEW

Products:	2 x Gas engine heat pump 2 x Engine HR 2 x Hydrobox
Cooling capacity:	156 kW
Heating capacity:	132 kW (plus. 60 kW engine HR)
Air volumes:	12,000 m³/h
Building area:	3.000 m²
Savings of:	Approx. 7,500 € per year



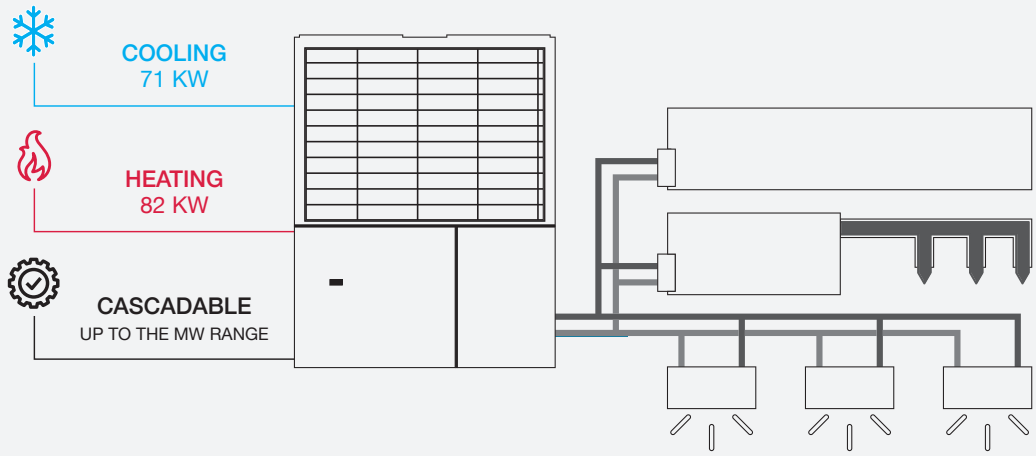
3D ANIMATION

AIR-TO-WATER SYSTEM / COMPACT

THE INNOVATOR

AIR-TO-WATER SYSTEM / COMPACT

With the compact gas engine heat pump with integrated heat exchanger, refrigerant-conducting lines in the building are no longer necessary. The system enables heating and cooling capacity in a water temperature range from +5 °C to +55 °C to be transferred directly to a water network – both for new and existing buildings.



OVERVIEW OF KEY FACTS

- ✓ Engine waste heat can be recovered and reused in cooling mode (engine heat recovery optional)
- ✓ Simultaneous heating and cooling (using engine heat recovery)
- ✓ Direct connection to water-bearing systems
- ✓ Low refrigerant charge (only in the gas engine heat pump)
- ✓ Cascadable up to the MW range
- ✓ Gas prices are lower in comparison to electricity prices
- ✓ Meets all requirements of the renewable energy laws
- ✓ High efficiency due to the use of condensing technology
- ✓ Lower noise emission than electric cold water generators
- ✓ Eligible for subsidies and exempt from energy tax
- ✓ Simple and cost-effective installation
- ✓ High efficiency in partial load range

H4 HOTEL - BORUSSIA MÖNCHENGLADBACH

ACCOMMODATION IN THE SPIRIT OF FOOTBALL

CHALLENGE

A HOTEL FOR BORUSSIA IN NIEDERRHEIN

Borussia Mönchengladbach is not only one of the oldest, but also one of the most successful clubs in the German Bundesliga. In 2004, the move from the traditional Bökelberg to Borussia Park opened a new chapter in the club's history.

At this generously dimensioned location, the "foals" have since been able to exploit significantly better training conditions – and offer their visitors extra comfort and service. Since January 2019, this has included a new hotel with 131 rooms and suites as well as a fitness area and executive lounge, operated by the renowned company H-Hotels AG. The air conditioning system installed by YANMAR ensures that guests can enjoy an atmosphere at premier league level.

SOLUTION

EFFICIENT PERFORMANCE FOR MAXIMUM COMFORT

The air-to-water system planned by our experts works with four highly efficient YANMAR gas engine heat pumps in a compact design. The units provide a total of 284 kW cooling and 268 kW heating capacity for securing the base load.

Thanks to the integrated heat exchangers, around 120 kW of engine heat can be used for hot water preparation, so that the energy content of the natural gas is utilised with maximum efficiency. A water chiller or boiler only needs to be switched on to absorb peak loads.

RESULT

EXCEPTIONAL COST EFFECTIVENESS AND CONSERVATION OF RESOURCES

With our system based on gas engine heat pumps, the H4 Hotel in Borussia Park enjoys many benefits. In addition to a high level of supply security, these include above all the low operating costs, not least a result of its high resource efficiency. Of course, the requirements of the renewable energies laws are also easily met. Hotel guests can enjoy the first-class air conditioning as well as the interior design, which is completely in the spirit of football.

OVERVIEW

Products:	4 x Gas engine heat pump 4 x Engine HR
Cooling capacity:	284 kW
Heating capacity:	268 kW
Heat recovery capacity:	268 kW
Building area:	15,000 m²
Completion:	December 2018

INNOVATION CAMPUS - ESCHBORN

CAMPUS OF INNOVATION

CHALLENGE

SUSTAINABILITY FOR MENTAL LABOURERS

Once upon a time little more than a green meadow just outside Frankfurt, Eschborn is now one of the most important office centres in the Rhine-Main metropolis. Numerous international companies have their headquarters here and benefit from its favourable location and excellent infrastructure.

Two companies have now had two modern office buildings built in the south of Eschborn, within sight of global players such as Vodafone and Samsung. The project “Innovation Campus Eschborn” was directed by Gertler Estates, the very property developer who played a key role in driving Eschborn’s transformation right from the start. With YANMAR Energy System as a partner, it was ensured that the new buildings would meet the highest standards in terms of air-conditioning technology.

SOLUTION

INTELLIGENCE & EFFICIENCY

One company provides 6,000 m² of usable floor space in its 7-storey new building and 4,500 m² in its 6-storey new building for the other company. Both buildings are equipped with powerful air-conditioning technology, with a total of 11 state-of-the-art YANMAR gas engine heat pumps at their heart.

In total, the systems provide 781 kW cooling capacity and 715 kW heating capacity, which are supplied to the static heating and heating/cooling ceilings as well as to the cooling and heating registers of the ventilation/air-conditioning technology. In addition to its high performance and efficiency, the system is characterised by its flexibility: Skilful cascading of the gas engine heat pumps makes simultaneous heating and cooling easy, for example in transition periods.

RESULT

A 100 % FORWARD-LOOKING APPROACH

The standards that will be applied to the two new buildings are already indicated by the intended award of the seal of the German Sustainable Building Council (DGNB).

With modern YANMAR gas engine heat pumps, you're ideally positioned: They create a comfortable indoor climate all year round and also allow savings of 35 % compared to conventional solutions. It almost goes without saying that the requirements of the renewable energy laws are met.

OVERVIEW	
Products:	11 x Gas engine heat pump
Cooling capacity:	781 kW
Heating capacity:	715 kW
Building area:	Approx. 10,500 m²
Assembly time:	15 months
Savings of:	35 % vs. Electric heat pump & electric chiller

3D ANIMATION

BRINE-TO-WATER / WATER-TO-WATER

THE ENERGY EFFICIENCY CHAMPION

BRINE-TO-WATER / WATER-TO-WATER GAS ENGINE HEAT PUMP

The brine-to-water or water-to-water gas engine heat pump combines the outstanding properties of a gas engine heat pump with the energetic advantages of a conventional brine-to-water or water-to-water heat pump.

The engine can heat and cool at the same time and also heats service water by recovering engine heat. The earth-sourced, groundwater or industrial waste heat can be used as a heat source.

SAVE ENERGY

NO TRANSFORMER STATION REQUIRED

PLUG & PLAY

30 % LESS DRILLING COSTS

SAVE ON CONSTRUCTION COSTS

FREE HOT WATER

GUE > 2.25

ENERGY SAVING ORDINANCE & RENEWABLE ENERGY HEAT ACT

OVERVIEW OF KEY FACTS

- ✓ Simultaneous heating and cooling with year-round service water heating through engine heat recovery
- ✓ Low refrigerant charge (only in the gas engine heat pump)
- ✓ Gas prices are lower in comparison to electricity prices
- ✓ Meets all requirements of the renewable energy laws
- ✓ Lower CO_2 emissions than boiler and electric heat pump
- ✓ High efficiency due to use of condensing technology
- ✓ High efficiency in partial load range
- ✓ Saves 20–30 % drilling costs

HOTEL

LIGHTHOUSE HOTEL - BÜSUM

ENJOY THE OCEAN

CHALLENGE

ATTRACTIVE GEOTHERMAL HEAT AT THE NORTH SEA

Maximum comfort and water on all sides? Büsum has this, without even having to leave solid ground. With the Lighthouse Hotel & Spa, a real gem has been created: Located directly between the North Sea and Museumshafen, the hotel offers its guests all the amenities of a modern 4-star superior hotel.

This special place directly at the dyke became available after the town vacated its old spa house. The Heimathafen Hotels Group took the opportunity to build a contemporary building using modern geothermal technology without any externally visible fittings. The experts from YANMAR Energy System Europe were on board as expert partners.

SOLUTION

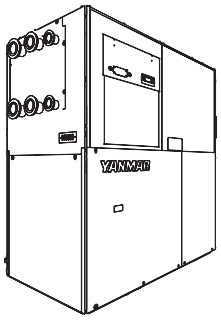
HIGH PERFORMANCE TECHNOLOGY IN A BRACING CLIMATE

Firm ground also plays an important role in the air conditioning of the Lighthouse Hotel & Spa. Geothermal boreholes down to a depth of 110 metres deliver around 10 °C of warm brine all year round. Two YANMAR gas engine heat pumps extract thermal heat for the hotel or discharge excess space heating into the ground – so it can be reused for heating on cool days.

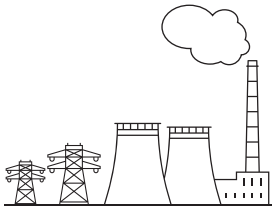
With a total output of around 120 kW cooling and 260 kW heating, the system effortlessly covers the basic requirements for heating and cooling. In addition, it feeds the engine heat of the two gas engine heat pumps into the service water heating system. At the same time, it supports the RMB/YANMAR combined heat and power unit that is also installed.

GAS ENGINE BRINE-TO-WATER HEAT PUMP

ELECTRIC BRINE-TO-WATER HEAT PUMP



GAS ENGINE BRINE-TO-WATER HEAT PUMP		ELECTRIC BRINE-TO-WATER HEAT PUMP
126 + 31 (incl. engine HR)	OUTPUT (kW)	157
2.2	COP	5.0
4.5	ENERGY PRICE (cent / kWh)	24
5,000	OPERATING TIME (h / a)	5,000
12,890	ENERGY COSTS (€ / a)	37,680
24,790 (66)	SAVING / AT (€ (%) / a)	



RESULT

A CLEAR LOOK INTO THE FUTURE

In a charming location, the Lighthouse Hotel & Spa, with a total of 111 rooms and suites, offers a rich wellness offer and, last but not least, several restaurants and bars. In all these areas, YANMAR's gas engine heat pump technology ensures the highest level of indoor air comfort at all times. Another advantage: The use of gas as a primary energy source creates autonomy from the weak local electrical infrastructure. And, last but not least, attractive state subsidies can be used thanks to this resource-saving technology.

OVERVIEW

Products:	2 x Gas engine heat pump
Cooling capacity:	120 kW
Heating capacity:	2 x 130 kW (incl. engine HR)
Assembly time:	Approx. 10 months
Completion:	August 2019
Savings of:	54 %

3D ANIMATION

AIR-TO-AIR SYSTEM WITH AHU KIT

THE AIR CREATOR

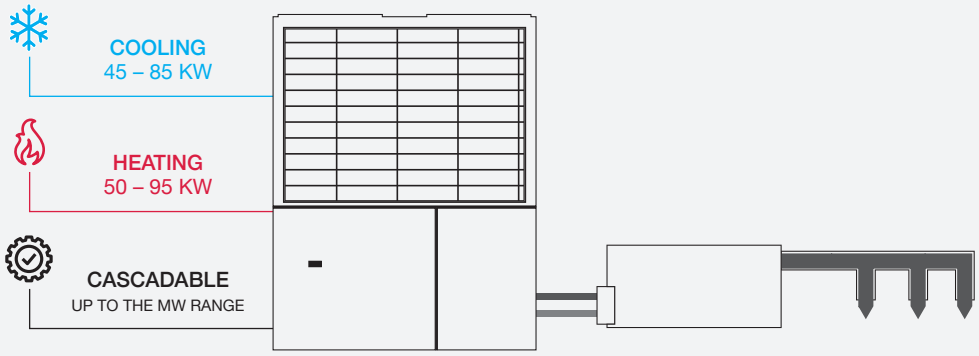
AIR-TO-AIR SYSTEM / AHU KIT

The gas engine heat pump also forms a strong duo in combination with a central ventilation unit. The gas engine heat pump can be connected to a ventilation system via the AHU kit.

AHU KIT

The air handling unit kit forms the interface between a higher-level controller of a ventilation system or building management system (BCS) and a Yanmar gas engine heat pump.

- ✓ Self-explanatory simple operation
- ✓ Web connection via Modbus or optionally via Ethernet
- ✓ Modbus connection for BCS systems already available, BACnet optional
- ✓ Clear display of operating states and setpoints or actual values
- ✓ All main functions are preset
- ✓ Cascade connection of up to eight gas engine heat pumps



- ✓ Low electrical power consumption, thus relieving the load on the power grids
- ✓ Transformer stations or emergency power systems may be dimensioned smaller or can be omitted completely
- ✓ Meets all requirements of the renewable energy laws
- ✓ Cascades are easy to create and promote operational safety
- ✓ Lower CO_2 emissions compared to boilers and electric chillers
- ✓ Universal use for heating, cooling and dehumidifying, as well as post-heating via the engine HR
- ✓ Up to 85 kW cooling capacity and 95 kW heating capacity via a single-circuit register
- ✓ Power adjustment by means of modulation
- ✓ Engine waste heat can be recovered and reused in cooling mode
- ✓ No frost protection measures necessary
- ✓ Direct heating and cooling transfer from refrigerant to air, thus hardly any conversion losses
- ✓ No heating interruption in defrost mode

LUFTHANSA - FRANKFURT

AIR-CONDITIONING TECHNOLOGY FOR LUFTHANSA

CHALLENGE

A JUMBO-SIZED WORKSHOP

In order to fly, good landing gear is also required that can safely bear a commercial aircraft's weight – several hundred tons on a Boeing 747. Lufthansa is bundling the necessary maintenance work in its wheel workshop in Frankfurt am Main's Osthafen area. Under the leadership of Klebl GmbH and with the engineering office KD-Plan as a partner for the building services, this is where a jumbo-sized workshop has been created: Up to 32,000 tyres and 6,000 brakes are inspected, repaired and, if necessary, replaced every year in an area of around 15,000 m². Thanks to modern YANMAR heat pump technology, mechanics can carry out their highly responsible work at pleasant temperatures.

RESULT

A MODEST GIANT

With its new workshop, Lufthansa has sufficient capacity for wheel maintenance and can also offer this service to third parties. Europe's biggest airline is benefiting from YANMAR technology several times over: In this way, all requirements of the renewable energy laws are met, while at the same time the company saves considerably on energy costs. Last but not least, the electrical network has been greatly relieved – anyway, the low transformer power available would have made it very difficult to locate the workshop there.

SOLUTION

RELIABLE AND HIGH-PERFORMANCE

As big as two football pitches, the new wheel workshop is a challenge for air conditioning technology. This is overcome by a total of 24 modern YANMAR gas engine heat pumps with a total output of 2.0 MW heating and 1.8 MW cooling. The system has been designed with maximum reliability in mind to ensure optimum air conditioning at all times of the day and year. Depending on the required heating or cooling capacity and air volume, up to three gas engine heat pumps are connected to each of the 12 ventilation systems. The largest of these units circulates 41,000 m³ of air per hour, while the smallest still circulates 12,000 m³.

OVERVIEW

Products:	24 x Gas engine heat pump 16 x AHU kit
Cooling capacity:	1.8 MW
Heating capacity:	2.0 MW
Air volumes:	Approx. 320,000 m³/h
Building area:	Approx. 15,000 m²
Savings of:	Approx. 40 % vs. Electric heat pump & electric chiller

SHOP APPLICATION

ROLLER - GELSENKIRCHEN

THE COMPETITIVE ADVANTAGE OF COMFORT

CHALLENGE

A PERFECT CLIMATE FOR FURNITURE SHOPPING

Gelsenkirchen is home to premier league football, important industrial companies – and clever ideas. Such as offering furniture to take away at low prices, without having to wait for delivery. What in 1969 represented a revolution in the German furniture trade was at the same time the starting gun for Roller's success story.

Today, the furniture discounter offers its range in almost 150 marketplaces. Of course, there's also a branch opposite its Gelsenkirchen company headquarters. At the end of 2017, the ventilation and air-conditioning technology was renewed to ensure a pleasant shopping atmosphere even on hot summer days. The modernisation was realised in a proven partnership with YANMAR Energy System Europe.

SOLUTION

STRONG PERFORMANCE, USED IMMEDIATELY

The new ventilation and air-conditioning technology should be able to heat and cool the sales areas without overloading the capacity of the house electrical connection. These demands are perfectly met by three modern YANMAR gas engine heat pumps including AHU kits. Their cooling capacity of up to 255 kW and heating capacity of up to 240 kW mean sufficient reserves for particularly hot or frosty days. By installing the gas engine heat pumps in the immediate vicinity of the AHU, the output is also transmitted without any diversion via a technical centre.

RESULT

COMFORT AND EFFICIENCY FOR THE FUTURE

Roller in Gelsenkirchen benefits several times over from its gas engine heat pump system, installed in just four weeks. Thus the furniture market scores points owing to its guaranteed comfort in its competition for customers. Because it uses gas instead of electricity, it's also air-conditioned particularly cheaply and reliably – without a costly transformer station that a solution using electric heat pumps would have required. And finally, the branch is ideally equipped for the future: The system coped with the extreme summer of 2018 with ease.

OVERVIEW

Products:	3 x Gas engine heat pump 3 x AHU kit
Cooling capacity:	255 kW
Heating capacity:	240 kW
Assembly time:	4 weeks
Completion:	December 2017
Competition:	Electric chiller

ZALANDO LOGISTICS CENTRE – LAHR

EUROPE'S LARGESTGAS ENGINE HEAT PUMP PROJECT

CHALLENGE

130,000 m² LOGISTICAL AREA

Time is money! Nowhere is this statement more true than in logistics. The new logistics centre for the mail-order company Zalando in Lahr ensures that customers in the tri-border region of Germany, France and Switzerland receive their orders as quickly as possible. Located close to Lahr airport and one of the most important European road arteries, tens of thousands of parcels can be dispatched from here every day.

No less impressive is the task of heating, cooling and dehumidifying this area of 130,000 m² – reliably and with a low consumption of resources. As a result, the developer brought experts from YANMAR on board as partners for an efficient energy system.

SOLUTION

HIGH PERFORMANCE,
DISTRIBUTED ACCORDING TO DEMAND

Due to its impressive size, the logistics centre required a tailor-made concept for heating, cooling and air conditioning. Our experts thus designed a comprehensive air-to-air system consisting of 81 YANMAR gas engine heat pumps and AHU kits in combination with 25 air handling units.

The system is not only distinguished by its performance values of 6 MW cooling and 6.5 MW heating. It also offers a high degree of flexibility: In conjunction with the respective ventilation units, it's ensured that optimum working and storage conditions prevail at all times in every area of the four logistics halls.

5.5 MW COOLING / 6.0 MW HEATING OUTPUT

81GAS ENGINE HEAT PUMPS

RESULT

THE PERFECT SYSTEM FOR HIGH DEMANDS

With the new logistics centre in Lahr, Zalando has built one of the largest facilities of its kind in Europe. The advantages of the air conditioning system installed here are also impressive: Based on the highly efficient gas engine heat pump technology, it offers maximum economy and fail-safe operation and easily meets all requirements of the renewable energy laws. A good reason for Zalando to rejoice – and an important building block for securing market success.

OVERVIEW

Products:	81 x Gas engine heat pump 41 x AHU kit 25 x Ventilation system 100 x VRF indoor unit
Cooling capacity:	5.5 MW
Heating capacity:	6.0 MW
Air volumes:	934,035 m^3/h
Building area:	130,000 m^2
Assembly time:	10 months
Completion:	November 2016
Savings of:	Approx. 38 % vs. Electric heat pump

OFFICE ADMINISTRATION

AO-HEADQUARTERS - BERGHEIM

READY, STEADY, GO!

CHALLENGE

A CUSTOMER WHO STEPS ON THE GAS

To only sell household appliances online appeared to be a risky business idea at the turn of the millennium. Thus it stands to reason that the British company AO attributes its foundation to a wager in a pub. Bet won: Today, AO is one of the best-known companies in Great Britain and also wants to make big inroads into the continent.

AO's new European headquarters in Bergheim in the Rhineland, barely 20 km from Cologne, comprises a central warehouse with 36,000 m² of distribution space and an administration building with 5,000 m² of space. In YANMAR Energy System, the dynamic British team, together with logistics specialist ProLogis as the client and Goldbeck as the general contractor, found the perfect partner for the air conditioning of their European head office.

SOLUTION

HIGH PERFORMANCE AND FLEXIBILITY

No less than eight YANMAR gas engine heat pumps ensure that the five floors and two intermediate floors offer perfect working conditions at any time of year – in the offices as well as in the spacious canteen.

A total of 543 kW cooling capacity and 608 kW heating capacity is available. They are distributed by 97 Euro grid cassettes and two ventilation systems in conjunction with two air handling units which move more than 23,500 m³/h of air through the building. At the explicit request of AO, the system was designed to a maximum of 20 °C room temperature and up to 35 °C outside temperature. Another indication that the British company does not want to do things by halves.

RESULT

A SYSTEM WORTH CHECKING OUT

AO's declared goal is to become the best online electrical retailer in Europe. The company already has the best air-conditioning technology: With highly efficient gas engine heat pumps, it makes optimum use of the primary energy source natural gas, achieves high reliability in operation and meets all the requirements of the renewable energy laws. Let's go, AO!

OVERVIEW

Products:	8 x Gas engine heat pump 2 x AHU kit 97 x VRF indoor unit
Cooling capacity:	543 kW
Heating capacity:	608 kW
Air volumes:	Approx. 23,500 m³/h
Building area:	Approx. 5,000 m²
Assembly time:	10 months
Completion:	November 2016
Savings of:	Approx. 41 % vs. Electric heat pump

METRO - MARL

TRANSHIPMENT POINT FOR THE WEST

CHALLENGE

LOGISTICS IN XXL FORMAT

Time and efficiency in goods handling are important success factors – especially for the Metro Group. In order to further optimise the efficiency of its logistics, the globally successful wholesale and retail group built a new logistics centre in Marl. The location scores points particularly owing to its direct connection to the dense motorway network of the Ruhr area.

Two building complexes with a total area of 235,000 m 2 accommodate the new central warehouses for the Real SB-Warenhäuser and for the “Cash & Carry” wholesale markets. The centre will be built and rented by a developer. The general contractor has already successfully realised several demanding projects using YANMAR Energy System. So too in Marl.

RESULT

AN EXAMPLE OF FUTURE-PROOFING

In the new Marl logistics centre, Metro can handle more than 20,000 items efficiently. The company benefits not only from the high cost-effectiveness of gas engine heat pumps, but also from a comprehensive LED lighting system. The gold certification of the German Sustainable Building Council (DGNB) proves that the impressive building complex also meets the highest standards in terms of resource conservation.

SOLUTION

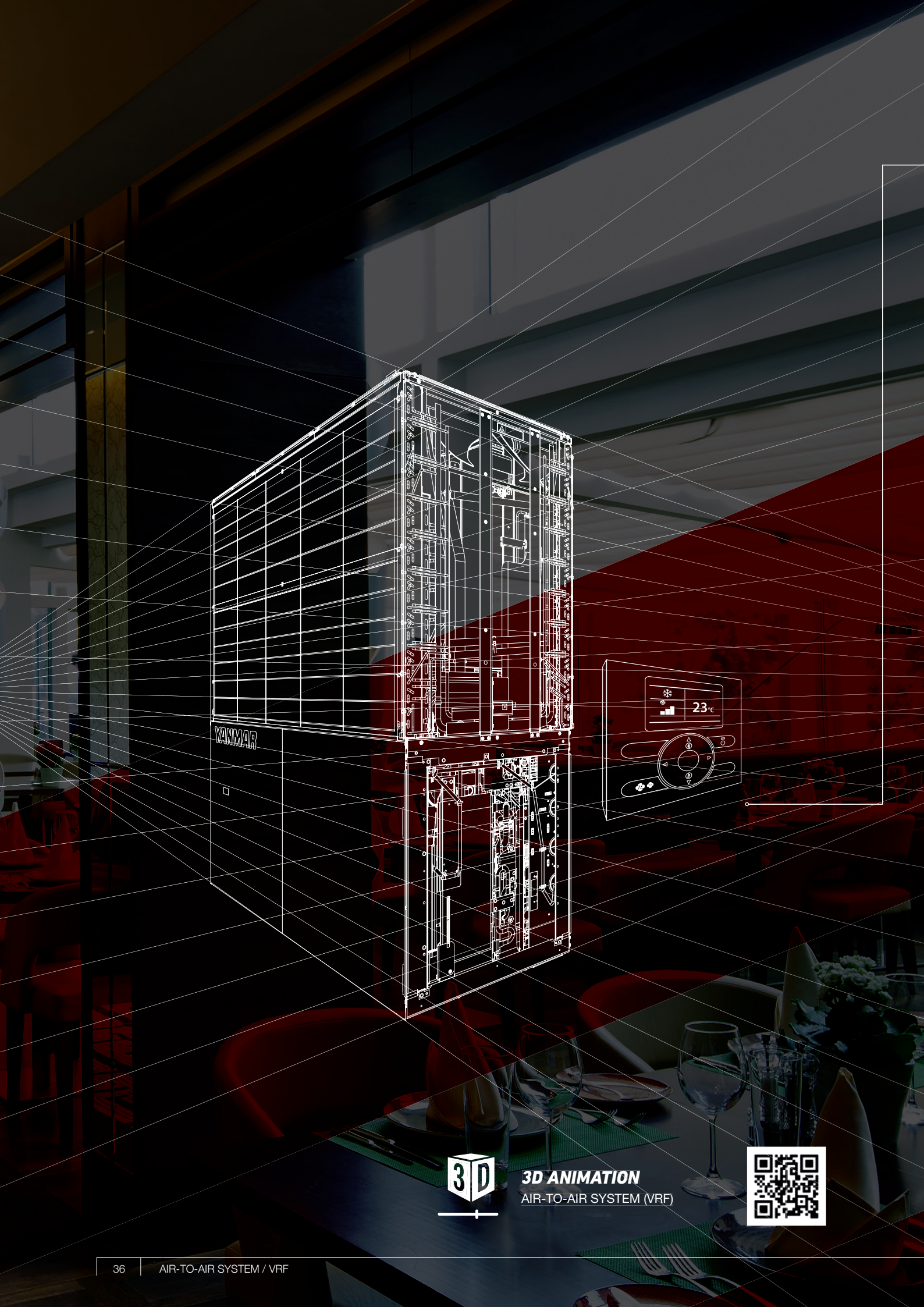
SPEED, EFFICIENCY, PERFORMANCE

Completed in just 12 months, the new logistics centre comprises not only the actual storage and handling areas but also several office cubes including canteens, kitchens and changing rooms. The climate system developed and implemented by YANMAR Energy System ensures a comfortable indoor climate at any time of year across an area of 10,000 m².

Eight state-of-the-art YANMAR gas engine heat pumps are used – half of which operate in a highly flexible 3-pipe system. The systems provide a total cooling and heating capacity of 507 kW and 570 kW respectively. Several AHU kits and more than 50 indoor units bring this capacity into the ventilation systems or to the individual office and functional areas.

OVERVIEW

Products:	8 x Gas engine heat pump
Cooling capacity:	507 kW
Heating capacity:	570 kW
Air volumes:	Approx. 48,000 m³/h divided up into 10 ventilation systems
Assembly time:	Approx. 1 year
Completion:	March 2018
Competition:	Electric heat pumps



3D ANIMATION
AIR-TO-AIR SYSTEM (VRF)

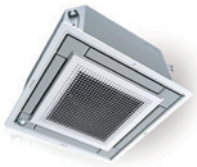
THE MULTI-TALENT

AIR-TO-AIR SYSTEM (VRF)

Together with the VRF indoor units, the gas engine heat pump offers airy comfort in record time. Instead of water, refrigerant is used as an energy carrier in this system. The advantage here is that the variable refrigerant mass flow achieves maximum efficiency with minimum energy loss. Heating, cooling and dehumidification take place immediately and without loss of time.

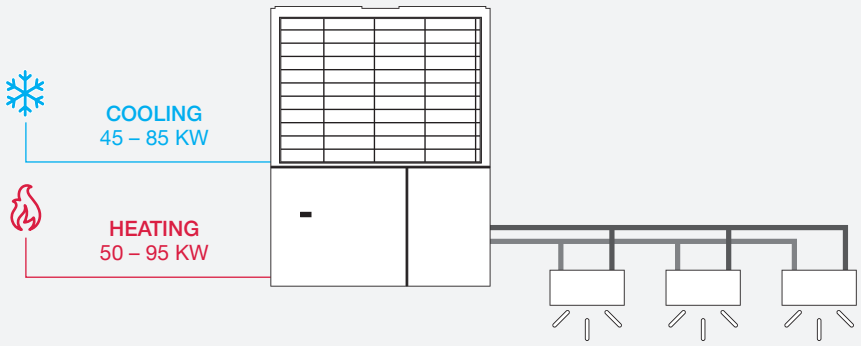
DUCT AIR CONDITIONER

The complete range of duct units from 5.6 to 28.0 kW offers sufficient power for applications of any size. Ideal for large spaces thanks to the installation of external air ducts.



CEILING MOUNTED CASSETTE UNITS

The optional sensors (motion sensor or infrared sensor) can save up to 27 % of energy costs by intelligently distributing the temperature and switching off the unit when the room is not in use.



OVERVIEW OF KEY FACTS

- ✓ Power adjustment by means of modulation
- ✓ Up to 48 indoor units of different design types can be connected to one gas engine heat pump
- ✓ Full gas engine heat pump capacity up to 85 kW cooling and 95 kW heating capacity
- ✓ Refrigerant circulates in the pipe network to the indoor units and transfers the heating and cooling capacity directly to the room to be tempered.
- ✓ Individual room and higher-level control possible
- ✓ No frost protection measures necessary
- ✓ Use of primary energy
- ✓ Low electrical power consumption, thus relieving the load on the power grids
- ✓ Meets all requirements of the renewable energy laws
- ✓ High efficiency due to use of condensing technology
- ✓ Lower noise emissions
- ✓ Eligible for subsidies and exempt from energy tax

LOGISTICS PARK - BIEBESHEIM

THE PERFECT ENERGY CONCEPT

CHALLENGE

ENERGY-EFFICIENT AIR-CONDITIONING FOR A HUGE PROJECT

Even very large buildings can be effortlessly cooled, heated and ventilated with YANMAR gas engine heat pumps. The Rhein-Main Logistics Park in Biebesheim provides striking proof of this. With 14 YANMAR gas engine heat pumps and various halls, storage, social and office spaces, this project was the largest one in Germany to use efficient technology at the time of its construction.

Grieshaber Logistics Group AG offers its customers from the pharmaceutical industry high-quality logistics and value-added services based on wholesale and manufacturing licences over 25,000 m² of space. In the process, the Rhein-Main Logistics Park acts as a national central warehouse and international distribution platform.

SOLUTION

A HIGH PERFORMANCE SYSTEM

Our experts developed an energy-efficient and resource-saving overall concept for this extensive complex. The YANMAR gas engine heat pumps were combined with, among others, duct units and central ventilation units for a pleasant indoor climate.

The entire energy system can be configured and monitored in a few simple steps by connecting it to the central monitoring and control unit. In this way, various desired temperatures can be specified, which are set by the installed duct units and continuously monitored by room sensors. In the huge warehouses, our gas engine heat pumps can demonstrate their valuable advantages – their use of highly efficient utilisation of free environmental heat with simultaneous engine heat recovery – to the full.

RESULT

A CONCEPT THAT MEETS THE HIGHEST REQUIREMENTS

Heating and cooling capacity in the megawatt range for a precisely adjusted indoor climate, but, for all its complexity, easy and clear in its control system: With their comprehensive system concept, our experts succeeded in fulfilling all of the customer's wishes right down the line. In particular, this includes their demand for the best possible energy efficiency. And of course the current requirements of the renewable energy laws were also complied with.

OVERVIEW

Products:	14 x Gas engine heat pump 3 x AHU kit 2 x Ventilation system 40 x Indoor unit
Cooling capacity:	1.15 MW
Heating capacity:	1.29 MW
Building area:	25,000 m² hall, 210 m² office
Assembly time:	4 months
Completion:	June 2014
Savings of:	Approx. 35 % vs. Electric heat pump

JUST FIT - BERGHEIM

AN IDEAL CLIMATE FOR FITNESS AND WELLNESS

CHALLENGE

LOTS OF SPORTY WASTE HEAT AND A SAUNA

With a high-quality range of fitness and wellness products, Just Fit has successfully established itself in a highly competitive market. The company opened its 21st fitness club in Bergheim. Here, body and health-conscious visitors can find a variety of options for training or relaxation on three levels. As there are a lot of bodies moving around and a sauna area too, it relies on the effective interaction of ventilation and heating or cooling. With heat pump technology from YANMAR, the fitness club ensures that the atmosphere in its premises always meets its own quality standards.

RESULT

FIT FOR THE FUTURE -
EVEN WITH ENERGY SAVING

The fitness club benefits several times over from the use of a highly efficient gas engine heat pump in combination with a combined heat and power unit: Compared to a system with electric heat pumps and gas condensing boilers, it achieves savings of approx. 44 % and easily manages with the existing transformer output – even though all of the treadmills, cross-trainers and ergometers come with TV and internet!

SOLUTION

HEATING AND COOLING WITH THE
GAS ENGINE HEAT PUMP

In the “Just Fit 21”, a total area of 3,000 m², distributed among other things over two large exercise bike and course rooms, a weights area and a multifunction training area, is air-conditioned. This task is taken care of by a system with a YANMAR gas engine heat pump as its central component. The gas engine heat pump supplies heating and cooling for a total of 13 circulating air cassettes as required and also feeds the basic cooling via the room air system by means of a AHU kit. The engine waste heat can also be used via an integrated heat exchanger to heat the fitness club’s service water.

OVERVIEW

Products:	1 x Gas engine heat pump 13 x VRF indoor unit 1 x AHU kit
Cooling capacity:	85 kW
Heating capacity:	95 kW (plus 30 kW engine HR)
Air volumes:	12,000 m³/h
Building area:	3,000 m²
Competition:	Electric heat pump & boiler

SPARKASSE - LIPPSTADT

COST-EFFECTIVENESS FOR EXPERTS

CHALLENGE

READY FOR GROWING CHALLENGES

The Sparkasse Lippstadt bank can look back on more than 175 years of history. As a partner to the people and the economy, it is today the leading financial services provider in the Lippstadt, Warstein and Rüthen region. Among its 24 branch offices, the headquarters in Lippstadt offers the widest range of services. In order to offer its customers the best possible service and to be able to further expand its offering, Sparkasse Lippstadt decided to convert and expand its head office. The basis for this was a detailed energy concept aimed at maximum economic efficiency, which was essentially based on gas engine heat pump technology.

SOLUTION

HIGH-PERFORMANCE AND INDIVIDUALLY CONTROLLABLE

The air-conditioning technology in the renovated and extended head office works with two YANMAR gas engine heat pumps. Their total output of 127 kW cooling or 143 kW heating is distributed in a 2-pipe VRF system in the three-storey building complex. A total of 41 Euro grid cassettes bring the cooling or heating into the individual rooms – including offices and business premises as well as a spacious seminar, conference and event area. Here, users have the option of individual room control; a touch controller has been installed for convenient higher-level control.

RESULT

EFFICIENTLY INTO THE FUTURE

With the renovated, converted and extended main office, the Sparkasse Lippstadt has a modern business headquarters that fulfils all of its current and future wishes. This applies in particular to the outstanding energy efficiency of its cooling, heating and air-conditioning system. In addition to demanding economic tar-gets, the requirements of the renewable energy laws could also be implemented without any problems.

OVERVIEW

Products:	2 x Gas engine heat pump 41 x VRF indoor unit
Cooling capacity:	127 kW
Heating capacity:	143 kW
Air volumes:	10,000 m^3/h
Assembly time:	6 months

AMAZON - DORTMUND

EFFICIENCY CHAMPIONS BY AIR

CHALLENGE

AN OVERSIZED LOGISTICS CENTRE

In Germany, online trading is still growing at double-digit rates. This is where, in addition to selection and service, delivery times are a decisive competitive factor. The mail order company and service provider Amazon is continuously expanding its infrastructure as a result. The company chose Dortmund as the location for its 32nd logistics centre in Europe – with excellent transport connections and located on the edge of Germany's largest metropolitan area.

The logistics complex was built under the management of Goldbeck as general contractor. Together with YANMAR Energy System, the company has already successfully implemented several major projects. In this case, too, we were the partner of choice – and in addition to our usual technical capabilities, we also demonstrated our ability to think unconventionally for the benefit of the customer.

SOLUTION

MAXIMUM EFFICIENCY
ALREADY DURING INSTALLATION

This was made necessary by the imposing dimensions of the building. The complex of five hall sections covers an area of 50,000 m^2 , is a total of 316 metres long, 157 metres wide and 14 metres high. In order to place the 35 YANMAR gas engine heat pumps plus 20 ventilation systems from system partner DencoHappel on the hall roof, even a crane with a very long boom would have had to be moved several times – an extremely time-consuming and uneconomical way of working.

Instead, an efficient and spectacular solution was chosen: The individual units were picked up by a helicopter by hook and set down again at a height of 14 metres. On average, this took only three minutes and the entire set-up took less than 12 hours instead of several days!

RESULT

PURE LOGISTICAL POWER

With its new logistics centre in Dortmund, Amazon has an extremely efficient location in the growing mail order business. The powerful air-conditioning technology ensures an excellent room atmosphere: The YANMAR gas engine heat pumps together produce up to 3.3 MW heating and 3.0 MW cooling capacity, while 136 YANMAR fan coils circulate up to 540,000 m³ of air per hour.

The key economic figures for this major project are also impressive. In the first year alone, 27 million euros will be invested in the site. For the city, the new centre also means 1,000 new jobs, a figure that experience has shown can double over time.

OVERVIEW

Products:	35 x Gas engine heat pump 136 x VRF indoor unit
Cooling capacity:	3.0 MW
Heating capacity:	3.3 MW
Building area:	50,000 m²
Assembly time:	7 months
Savings of:	Approx. 40 %
Competition:	Electric heat pump
System partner:	DencoHappel

3D ANIMATION
REFRIGERATION

THE COOLEST WAY TO MAKE MONEY

GAS DRIVEN REFRIGERATOR

Reliable cooling performance is a key factor in many industries – not only when temperatures rise outside. Industrial and commercial enterprises of all sizes benefit from the advantages of YANMAR gas driven refrigerator.

These compact units draw their power directly from the low-cost primary energy source natural gas. In this way, they avoid financial and energy losses in the generation and supply of electricity. At the same time, their waste heat can be used for a variety of applications such as evaporator defrosting and service water heating.

Compared to conventional electrical units, energy savings of more than 50 % are possible. A further plus: a reassuring independence from power grids that are susceptible to faults.

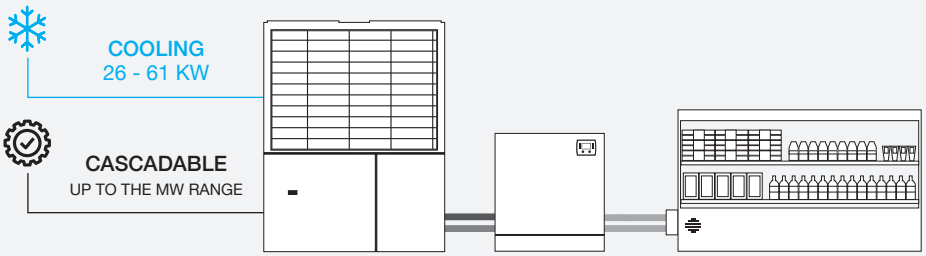
SAVE ENERGY

NO TRANSFORMER STATION REQUIRED

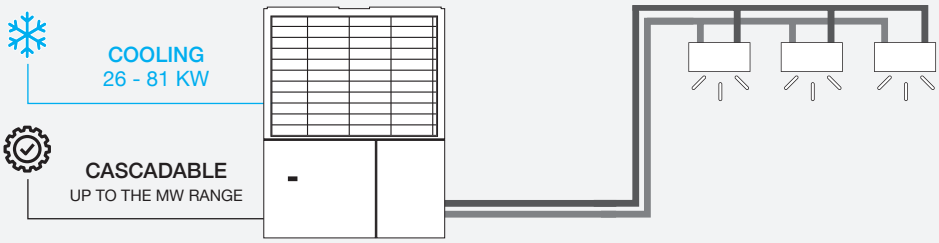
PLUG & PLAY

SAVE ON CONSTRUCTION COSTS

BRINE:
CLEAN AND EFFICIENT.



COMMERCIAL COOLING
WITH DIRECT EVAPORATOR



OVERVIEW OF KEY FACTS

- ✓ Cooling with integrated heat recovery
- ✓ Power adjustment by means of modulating operation
- ✓ Lower operating costs compared to electric chillers
- ✓ Lower noise emissions
- ✓ Lower CO_2 emissions
- ✓ Optionally, a complete input of parameters is possible via remote monitoring

MARGARETENHOF FRUIT FARM - OEVERICH COUNTY

THE COOLEST WAY TO MAKE MONEY

CHALLENGE

FRESH FRUIT AT ANY TIME

When by August at the latest tractor trains roll through the region between the Rhine and Eifel, they've loaded valuable freight: Tons of fruit, sometimes sweeter, sometimes more sour – but in any case juicy and crunchy. In order to keep it that way until their sale, local companies depend on the reliable cooling of their storage rooms. So far, this has been a typical domain of the electric cooling generator.

With the business expansion of the Margaretenhof fruit farm in Oeverich county, our experts had the opportunity for the first time to impressively demonstrate the performance and cost-effectiveness of gas chillers in this sector as well.

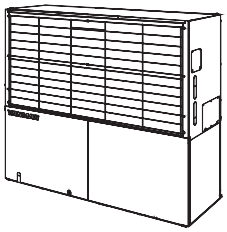
SOLUTION

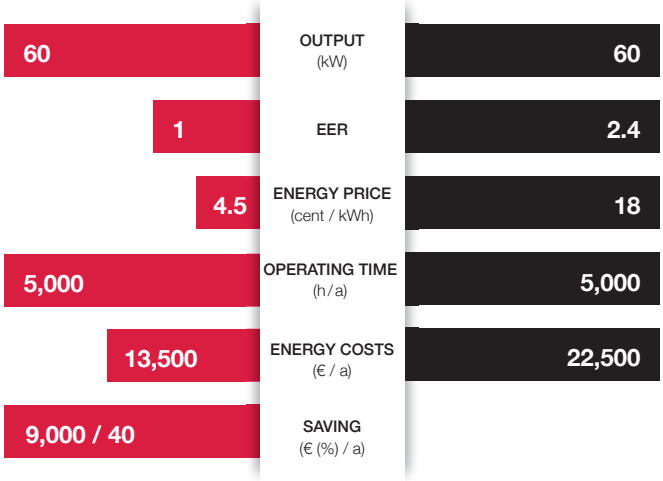
COMMERCIAL COOLING WITH GAS CHILLERS

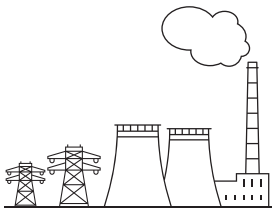
As part of the expansion of an existing warehouse, Margaretenhof fruit farm set up four new cold stores for apples and pears with a total volume of 2,600 m^3. Each room is cooled to a temperature a few degrees above zero by a direct-evaporating evaporator package together with a glycol-conducting defrost register; the specially designed evaporators are started up by means of electronically controlled expansion valves.

The total cooling capacity of 120 kW is provided by two YANMAR gas chillers, which are also equipped with an engine heat recovery system. The modern units have sufficient reserves to quickly cool the rooms down to the target temperature directly after charging, but they also operate very efficiently in continuous operation with only a low cooling load.

GAS DRIVEN REFRIGERATOR | **ELECTRIC CHILLER**







Without considering the heat recovery for defrosting/heating -> energy cost savings for the gas chiller of more than 54 % are possible!

RESULT

EXCEPTIONAL COST-EFFECTIVENESS AND RELIABILITY

In close cooperation with a partner an innovative commercial cooling system was realised, which pays for itself in only two years compared to a conventional electric cooling system.

This is where, in addition to the high efficiency of gas as an energy source, the engine heat recovery system also pays off: The engine heat, which is virtually free of charge, can thus be used not only for regular defrosting of the evaporators, but also for heating the considerable quantities of service water for the harvest hands. The Margaretenhof fruit farm also benefits from other important advantages: Gas-operated cooling is particularly fail-safe compared to electric cooling and the local power grid is noticeably relieved.

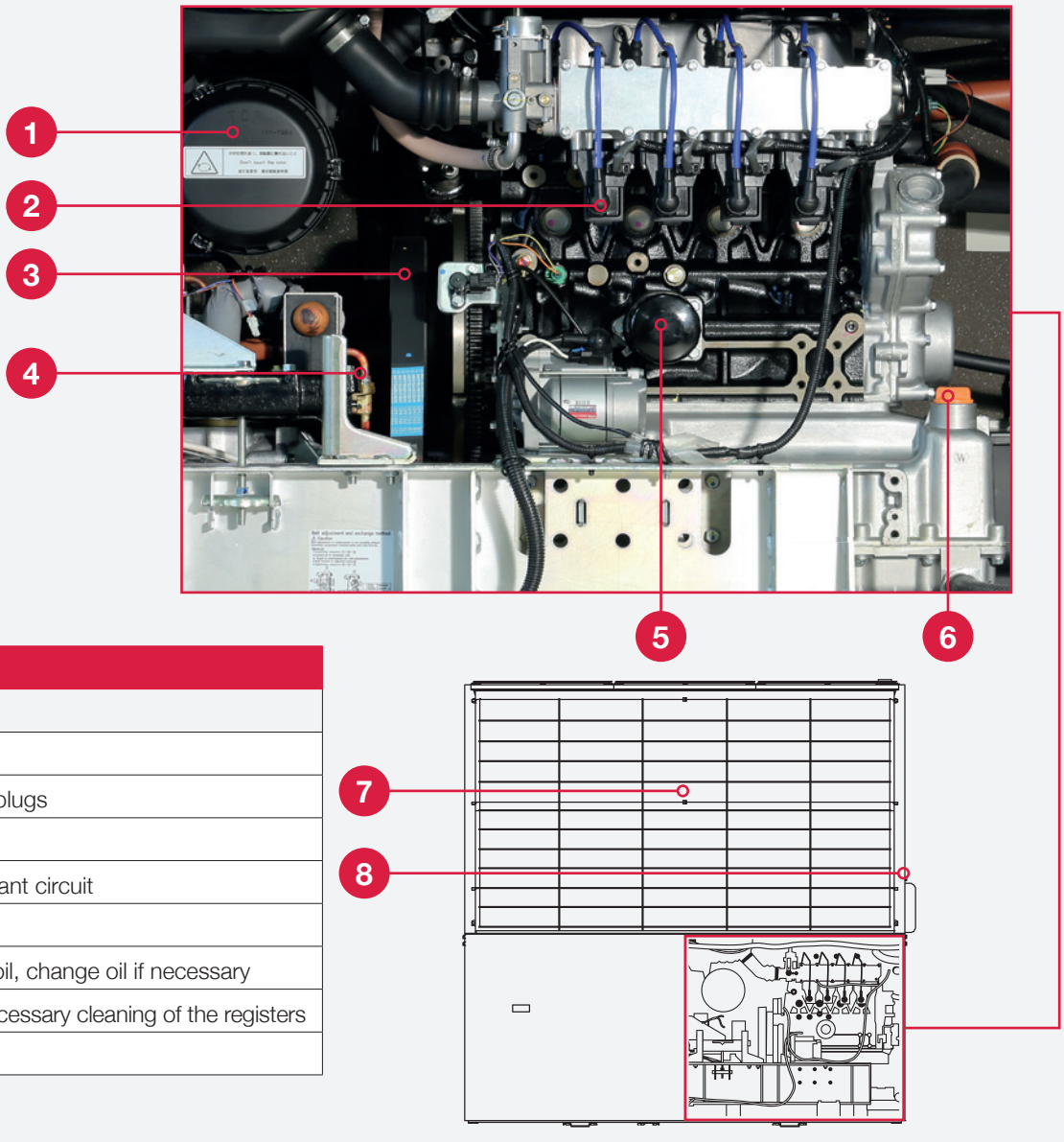
OVERVIEW

Products:	2 x Gas driven refrigerator 2 x DX cooling kit 2 x Engine HR
Cooling capacity:	120 kW
Heating capacity:	Max. 60 kW engine HR
Building area:	4 cold rooms at 88 m^2 Volume per cold room 650 m^3 Total volume 2.600 m^3
Savings of:	54 %
Competition:	Electrical commercial cooling

WAIT FOR THE TIME TO PASS

OPTIMISED ENGINE PERFORMANCE WITH LARGE MAINTENANCE INTERVALS

In addition to the annual maintenance of the entire system, engine maintenance is also carried out on YANMAR gas engine heat pumps after five years or 10,000 operating hours. The oil is changed as required or after 20,000 operating hours. A clear sign that YANMAR understands engine construction.



Description
Maintenance
1. Change air filter
2. Replace spark plugs
3. Change V-belt
4. Test the refrigerant circuit
5. Change oil filter
6. Top up engine oil, change oil if necessary
7. Inspection, if necessary cleaning of the registers
8. Check coolant

AFTER-SALES SERVICE

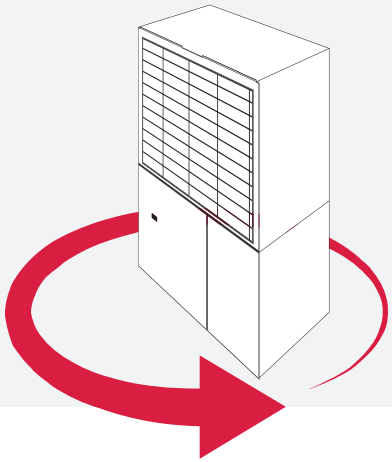
PARTS WARRANTY WITH MAINTENANCE CONTRACT

Parts warranty extension for three, four or five years from commissioning, available for YANMAR gas engine heat pumps ENCP 450-850 J, EFZP 560 J, EFZP 850 J and ECWP 710 J.

- ✓ Available for the 3rd, 4th or 5th year from the time of commissioning
- ✓ Valid until the end of the 3rd year or 15,000 operating hours
  Valid until the end of the 4th year or 20,000 operating hours
  Valid until the end of the 5th year or 25,000 operating hours
- ✓ Supply with YANMAR original parts

5 YEARS WARRANTY*

WHEN EXCHANGING YOUR EXISTING GAS ENGINE HEAT PUMP!



*2 YEARS FULL & 3 YEARS PARTS WARRANTY

Warranty for 24 months from date of delivery. Parts warranty extension for gas engine heat pumps for the third, fourth and fifth year / maximum 30,000 operating hours from delivery date.

The prerequisite for the acceptance of warranty obligations is maintenance that has been proven to have been carried out by YANMAR Energy System Europe's factory customer service or by a third, authorised or certified specialist company.

YOU WANT TO EXCHANGE, BUT NOT NOW? NO PROBLEM!

You can still take out the five-year parts warranty today. To do so, register your existing equipment with YANMAR – we'll make a note of the premium for you and contact you to find the best time for the exchange.

Talk to us – we'll be happy to advise you!

ENERGY SYSTEMS FOR TODAY AND TOMORROW

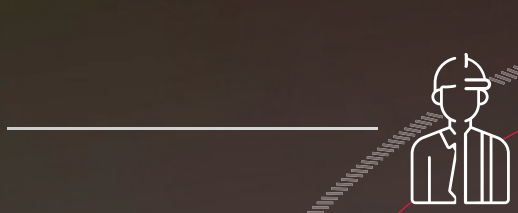
BENEFIT FROM OUR TOTAL SOLUTION!

We don't just offer products, but solutions. The claim of YANMAR Energy System Europe can be summed up in this short formula. We are the full-range supplier of refrigeration and air conditioning solutions, offering you high-quality systems plus all the associated services: Design, plant construction, technical services and full after-sales support.

The consistent bundling of all services under one roof makes us your 360° system partner who can quickly and directly implement your wishes for a powerful and efficient system. This is our special strength – and your advantage!

INDUSTRY EXPERTISE

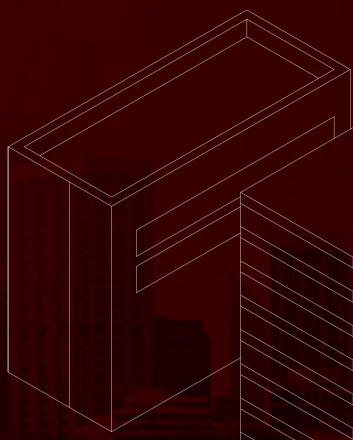
Our extensive practical experience is the perfect complement to our technical portfolio and know-how. We have been active in plant construction for over 25 years. During this time we have got to know and overcome the everyday hurdles of our industry and have built up an extensive network of partners.



TOTAL SOLUTION

IN-HOUSE MANUFACTURE

The engineers at our headquarters in Marl are constantly developing new solutions. In addition to customer-specific custom-made products, this also includes innovative components that are regularly found in our systems, such as the gas driven refrigerator.

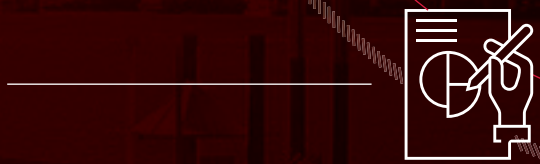


CONSULTING SKILLS

Comprehensive advice is the safest and most direct way to a system that meets all of a customer's requirements. Therefore we support you right from the start with a detailed needs analysis, economic considerations and implementation concepts among other things.

SYSTEM DESIGN

On the basis of the collected data, our experienced experts plan an energy system for you that optimally meets your requirements in terms of performance, flexibility, efficiency and profitability. Of course, they also take into account all legal requirements.



HIGH QUALITY TECHNOLOGY

Our gas engine heat pumps have proven themselves for decades through their high reliability and efficiency. They use natural gas as a clean-burning primary energy source and can be cascaded into systems of almost any size.

INSTALLATION AND COMMISSIONING

As an experienced plant constructor with a network of proven trade partners, we are also at your side in practical terms. On request, we provide additional support during installation, carry out commissioning and training future users.

AFTER-SALES SUPPORT

We will continue to support you even after commissioning. With our needs-based maintenance and service models, you can be sure that your system will operate reliably and economically throughout its entire service life.

TRAINING CENTRE

In our academy, we provide our partners in sales and the trades, as well as our own employees, with up-to-date knowledge for their success in the energy market. In this way, we ensure the high quality of our growing network through continuous education, training and further education.

CHECKLIST

FOR YOUR NEXT PROJECT

Customer/property data

Customer _____ Project title _____

Town/city _____ Period of execution _____

Gas price _____ €/kWh Electricity price _____ €/kWh

Building data

☐ New building ☐ Renovation ☐ Extension

☐ Commercial area ☐ Mixed area ☐ Residential area

☐ Shop ☐ Office/administration ☐ Hotel ☐ Warehouse / logistics

☐ Data processing centre ☐ Trade/industry ☐ Residential construction ☐ Miscellaneous

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Year of construction _____ Surface to be heated _____ m^2 Surface to be cooled _____ m^2

Heating capacity _____ kW Cooling capacity _____ kW Floor height _____ m

AHU system ☐ yes ☐ no Air flow rate _____ m^3/h Heating / cooling capacity _____ / _____ kW

Domestic hot water ☐ centralised ☐ decentralised Capacity _____ kW

System and design data

Number of heating/cooling circuits _____ / _____ units

Temperatures of heating/cooling circuits _____ / _____ °C

Which heating and cooling surfaces are used? _____

Bivalent ☐ yes ☐ no _____ System Dew point control ☐ yes ☐ no

Design temperature heating (OT) _____ °C Cooling (OT) _____ °C

Gas engine heat pump system

☐ Air-to-water system ☐ Air-to-air system (VRF) ☐ 2-pipe ☐ Yanmar controlled

☐ Air-to-air system (AHU) ☐ With heat recovery ☐ 3-pipe ☐ BCS

Installation location

☐ Outside ☐ Roof ☐ Ground level

Distance of GHP from building _____ m

Distance of GHP from neighbouring building _____ m

NOTES

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