

# Combitherm REFRIGERATION



For Buildings & Industry From 5 - 5.000 kW Cooling Capacity



SPECIAL FEATURES

*Energy efficiency class A · Customization · Execution with low and super-low sound levels · Different colours available · Integrated systems with cooling towers, ice storage tanks and heat recovery · Execution for high ambient temperatures and aggressive air conditions · More than 35 years of experience*



**Combitherm**  
APPARATE- UND ANLAGENBAU

# Water-Cooled Chillers Germany

Operator	Automobile manufacturer, South Germany
Engineering office	Internal planning department
Year of construction	2007
Cooling capacity	3 x 2.010 kW with 18/12 °C

Three chillers with 3 screw compressors each were installed for the lubrication system circuit of the motor production of this important automobile manufacturer. The heat is rejected by means of a central cooling tower network. The chillers are equipped with a Siemens SIMATIC S7 regulation system, which has an Ethernet connection to the building management system. All data are visualised and controlled at the central data center of the plant management. The units are designed for highest reliability to ensure a smooth production.



> **Automobile industry, South Germany**

Operator	Manufacturer of solar panels
Engineering office	Pfähler + Rühl GmbH, Heilbronn
Year of construction	2006 - 2008
Cooling capacity	2 x 1.100 kW with 24/17 °C
	2 x 800 kW with 10/4 °C

The conceptual design of the solar plant's new development sets a high value on the efficiency of the cooling generation at different operating conditions. A special dehumidification mechanism was provided for summer time. A free-cooling circuit of the cooling towers is generating the cooling demanded in a quite economic and efficient way during winter and transitional time.



**Solar plant** <

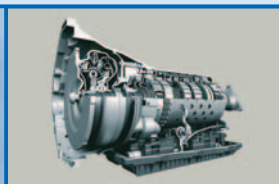


Operator	ZF Getriebe GmbH, Saarbrücken
Engineering office	ITG GmbH, St. Wendel
Year of construction	2005 and 2009
Cooling capacity	2 x 1.600 kW with 20/12 °C

The production facilities of the gear production line require chillers with high reliability and good part load efficiency. Each of the two chillers is equipped with 4 stepless-regulated screw compressors with own evaporator and condenser. Thereby each refrigerant cycle is completely redundant. In addition to the chillers, 8 glycol coolers were supplied. They reject the production heat in an efficient way by means of free-cooling at low ambient air temperatures.



> **Manufacturing plant of the ZF Getriebe GmbH**



Operator	Software company, South Germany
Engineering office	Air 2000 GmbH, Obertshausen
Year of construction	2006
Cooling capacity	6 x 540 kW with 15/9 °C

The task for the new administration building of this well-known software company was to heat and cool the offices in a very economic way. Six air-handling systems ensure the fresh air supply of the different departments. Each air-handling unit disposes of a combined heat-pump/chiller, using the exhaust air as and when required as heat source or to reject the waste heat. The patented process is working extremely energy-efficient.



**Software development** <

# Water-Cooled Chillers International

Operator	TYCO Electronics, Czech
Engineering office	Internal planning department
Year of construction	1997 - 2009
Cooling capacity	Total: 8 machines
	2.000 kW with 20/13 °C

The production of electronical parts at TYCO in the Czech Republic was enlarged step by step over several years. From the beginning, Combitherm had the co-responsibility for the control technology and hydraulical system of the cooling generation. The BMS-programming is based on Siemens S7, the chillers and glycol coolers were adapted successively to the expansion.



**TYCO Electronics production plant**



Operator	NATO, Europe
Engineering office	IB Fuchs, Austria
Year of construction	2007 and 2008
Cooling capacity	860 kW each with 10/6 °C

The simulators for the training of the Eurofighter pilots have a comparatively high heat load in combination with demanding availability claims. Combitherm supplied water chillers with screw compressors and 4 independent refrigeration cycles for several air bases in Europe. All installations are equipped with free-cooling and heat recovery to secure an optimum of efficiency.



**NATO air bases**



Operator	GlaxoSmithKline, Belgium
Year of construction	1997
Cooling capacity	45 kW with -12/-20 °C

The pharmaceutical production needs a compliance of several specific parameters. The whole system process is detailed defined to the point of the refrigeration equipment. Special cooling brine is used; all parts getting in contact with the product are made of stainless steel. There are specific customers prescriptions for nearly each utilized component.



**Pharmaceutical plant of GSK**



Operator	Perkins Engines Company Ltd., Engl.
Engineering office	Maschinenfabrik
	Alfing Kessler GmbH, Aalen
Year of construction	2008
Cooling capacity	450 kW with +35/24 °C

The hardening shop for the crankshaft production requires chilled water on a comparatively high level. This implies a special design of the water chillers. The cooling is mainly effected by means of glycol coolers, the mechanical cooling is only activated in summer time. Everything from the colouring to the part labelling was performed according to the customer's request.



**Hardening shop of Perkins Engines Company Ltd.**



# Air-Cooled Chillers Germany

Operator	DHU-Arzneimittel GmbH, Karlsruhe
Engineering office	fc-ingenieure GmbH, Karlsruhe
Year of construction	2005
Cooling capacity	2 x 950 kW at 10/5 °C

Air-cooled compressor-condenser units in split version including heat recovery with separate plate evaporators inside the building. Therefore an antifreeze protection for the evaporators is not necessary. The both units dispose of a high weather resistance protection.

## > Production plant of DHU-Pharmaceutical



Operator	Automobile manufacturer, South Germany
Engineering office	Internal planning department
Year of construction	2008
Cooling capacity	3 x 750 kW with 12/6 °C

The engine test bench is cooled by means of three packaged water chillers while the cooling requirement is alternating in short cycles. The chillers are extremely quiet to reduce the total sound emission within the plant. The sound power level at each operating condition is less than 55 dB(A) in 5 m distance. To save place, the pump station is integrated in the weather casing of the



compressors. Profibus DP and Ethernet effect the communication with the building management system.

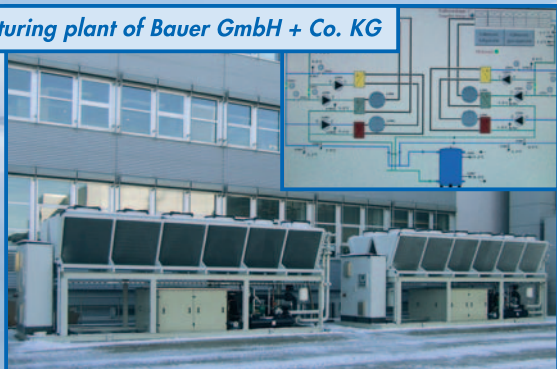


## Automobile industry, South Germany <

Operator	Bauer GmbH + Co. KG, Welzheim
Engineering office	gecon engineering and consulting GmbH, Göppingen
Year of construction	2008
Cooling capacity	2 x 735 kW with 16/10 °C

Delivery of 2 water chillers including the complete pump station and the free-cooling device. The whole installation is controlled by a central BMS panel with Siemens SIMATIC S7 and visualised at a coloured touch panel. In case of a failure at the central panel, the system can be controlled self-contained from each unit.

## > Manufacturing plant of Bauer GmbH + Co. KG



Operator	Ferrero OHGmbH, Stadtallendorf
Year of construction	2007 - 2009
Cooling capacity	170 kW with -18/-22 °C
	400 kW with 4/-6 °C
	162 kW with -18/-21 °C

In Stadtallendorf the Ferrero group is producing all world-famous candies like Mon Chérie, Nutella or the "Kinder"-product line. Combitherm is supporting several production processes with brine chillers at different temperature levels. As standard all units are equipped with Siemens S7 and a modem for remote data monitoring.



## Candy production at Ferrero <

# Air-Cooled Chillers International

Operator	POSCO Qwangyang, South Korea
Year of construction	2006
Cooling capacity	400 kW at 12/6 °C

POSCO Steel is operating one of the world's largest steel mills. Refrigeration on a very precise temperature level is required for an innovative production process. Highest priority was layed on the corrosion protection to resist the aggressive air in the steel mill. The very sensitive condenser fins are coated with a special epoxy layer.

## > Steel facility of POSCO steel



Operator	Qbik Rennwegcenter Vienna,
	Austria
Engineering office	Krebs Ingenieure GmbH, Ditzingen
Year of construction	2007 - 2008
Cooling capacity	2 x 490 kW at 19/13 °C

The Rennwegcenter in Vienna was renovated from the base and increased in the architectural value. The offices were additionally air-conditioned by means of air-cooling units. The provided temperature level is relatively high to ensure an improved convenience combined with high operating efficiency. The construction was realised in several steps. Due to the location in the city center, the air-cooled conden-

sers had to be very quiet, the compressors are inside the building and connected with split connection pipes to the condenser outside.



## Office building in Vienna <

Operator	European Commission Bruxelles,
	Belgium
Year of construction	2000
Cooling capacity	150 kW at 12/6 °C
	with free cooling

Refrigeration supply of the communication devices of the European Commission. Three completely separated refrigeration circuits in the machine guarantee highest availability in accordance to the corresponding security standards of the EC-administration. With regard to the close office and conference rooms of the EC representatives the sound emission of the unit is limited at a very low level.

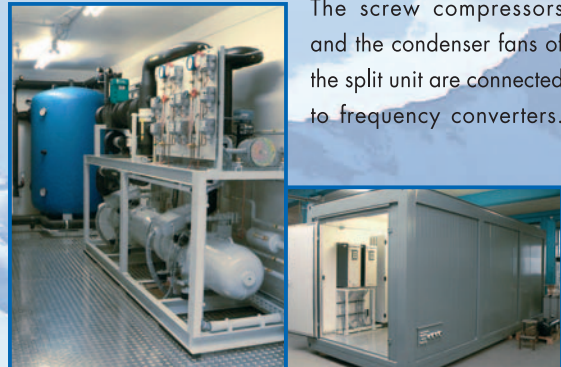
## > EC administration building



Operator	International magazine publisher,
	Central Europe
Engineering office	Rentschler und Riedesser Ingenieur-
	gesellschaft mbH, Filderstadt
Year of construction	2008
Cooling capacity	240 kW at 16/10 °C

To optimize the journalistic workflow approximately 200 editor offices were retrofitted with a/c units, each with individual control. As there was no engineering room available, the whole equipment including refrigeration, control and hydraulic technology was integrated in a container solution and installed on the building's roof.

The screw compressors and the condenser fans of the split unit are connected to frequency converters.



## Editor offices of an international publisher <

# DX Air Conditioning Systems

Operator	Airbus Aircabin GmbH, Laupheim
Engineering office	zieher technic ingenieurbüro, Ulm
Year of construction	2006
Cooling capacity	2 x 500 kW at 36 °C

The plant in Laupheim is producing the interior of the Airbus aircrafts. Two air handling units have to cool the fresh air down to +18 °C. Beside a wide control range the economic efficiency has high priority. Totally 4 screw compressors with direct expansion evaporators in the air units assure the least power consumption possible.



> **Component plant of Airbus Aircabin GmbH**

Operator	Manufacturer of electronic systems, South Germany
Engineering office	Pfähler + Rühl GmbH, Heilbronn
Year of construction	2009
Cooling capacity	2 x 660 kW at 35 °C

Direct expansion unit to dehumidify external air by means of a multistage evaporator system. To fulfil the requirement of max. 6 g water per kg air, the temperature is cooled down to +8 °C. Afterwards the integrated heat recovery system is reheating the air up to the desired temperature level. The heat recovery is effected with no further energy consumption.



**Production plant for electronical parts** <

Operator	Beru Electronic GmbH, Kandel
Year of construction	2005
Cooling capacity	120 kW at 28 °C

The waste heat from the factory is warming up the machinery hall during summer time. This is a permanent burden for the employees as well as the machines in operation. The air conditioning system with its industrial DX-evaporators mounted at the ceiling reduces the peak heat load and cares for tolerable temperatures.



> **Machinery hall of Beru Electronic**

Operator	Bahrain Defence, Bahrain
Year of construction	2009
Cooling capacity	4 x 150 kW at 45 °C

Four air-conditioning units in container design provide the hangar of the Royal Flight Bahrain with pre-cooled fresh air. The unit's outlet temperature is on a level of +5 °C controlled by a stepless screw compressor. Each unit has a two-step high-pressure blower, which is able to cool the hangar itself or the Jumbo Jets of the Royal Family. The blower has a pressure capacity of more than 5.000 Pa. The external air is filtered and pressed into the internal air system of the aircraft by means of a flexible air duct connection.



**Hangar cooling in Bahrain** <



## Special Units and Systems

Operator	Climatic chamber of an international automotive manufacturer
Engineering office	GWl Geschwind Wolter Ingenieure GmbH, Bensheim
Year of construction	2004
Cooling capacity	402 kW at min. -50 °C evaporating temperature

The continuous operation test bench of an automotive supplier reproduces all global climate zones down to temperatures of -45 °C. For this test a complete car is placed in the chamber, a high performance blower is simulating the air stream. The required cooling capacity is generated with a multiscrew refrigeration system and directed into the climatic chamber by means of air evaporators.



> **Automotive climate chamber**

Operator	Motor test benches
Year of construction	1985 - 2008
Cooling capacity	2 - 100 kW with temperatures from +100 °C to -90 °C

Combitherm is supplying customized facilities in a wide field of test benches to different companies of the industrial sector in the whole world since 1980. This includes mobile and stationary hot-shock units, hydraulic devices as well as support for all kind of refrigerating processes. The application range implies motors, gears, turbo chargers, a/c for passenger cars and involvement in chemical and pharmaceutical processes.



**Test benches for industrial applications** <



Operator	Abu Dhabi Aircraft Technology, Abu Dhabi
Year of construction	2007 - 2009
Cooling capacity	3 x 300 kW with ambient temperatures up to +55 °C

Mobile aircraft air conditioner to supply pre-conditioned air to parked aircrafts in the airport area. Based on a sea-container concept, the electrical power is produced by a built-in genset, which provides a screw compressor and a stepless-controlled high-pressure blower. The surrounding air is compressed with a pressure up to 10.000 Pa into the aircraft. The capacity range of these units includes all type of aircraft up to the airbus A380.

> **Aircraft cooling Abu Dhabi**



Operator	PoolCooler for swimming pools
Year of construction	since 2005
Cooling capacity	10 kW with ambient temperature up to +60 °C

The PoolCooler was developed to heat and cool swimming pools up to a surface of 100 m². It might be integrated in existing water treatment systems without any problem. All heat exchangers have a special corrosion protection and are resistant against chlorine water and seawater. The concept is especially dedicated to extremely hot desert regions.



**Cooling swimming pools** <

# Top Performance: Cooling the Data Centers of 1&1 AG

Operator	1 & 1 Internet AG, Montabaur
Engineering office	T.P.I. Trippe + Partner Ingenieurgesellschaft mbH, Karlsruhe
Year of construction	2002 - 2007
Cooling capacity	8 x 685 kW in Karlsruhe with 15/9 °C cold water temperature
	6 x 800 kW in Baden-Baden with 11/6 °C cold water temperature

The 1 & 1 Internet AG as one of the world's largest internet provider is operating 2 large-capacity data centers in Germany, each with more than 100.000 internet servers. The installations are multiple-protected against all possible failures as these data centers are serving as hub in the World Wide Web as well. Therefore the claimed operational safety and reliability is at 100 %.

In addition to operational safety the economic efficiency of the cold production is a main parameter. Together with the power consumption of the computers the operating cost of the refrigeration system is a decisive factor for the profitability of a data center within the competition.

Several air-cooled chillers were installed and connected to 2 resp. 3 cold-water circuits to combine reliability and energy efficiency in a quite perfect way. As the data centers were built in several construction stages, this concept additionally ensured the required flexibility in adapting the installation to the actual cooling demand. Each of the packaged water chillers has 2 high efficient compact screw compressors with stepless capacity regulation for a fast adjustment of the chiller capacity to the center's load, speed-regulated fans and electronically expansion valves. Due to the restricted available space, the chillers are designed very compact with a footprint of 1 m<sup>2</sup>/100 m<sup>2</sup>.

The cooling demand is very constant during the year, which makes the usage of free-cooling devices very favourable. They chill the cold water circuit directly with the cool surrounding air at an ambient temperature of less than +13 °C. Thereby the chillers are discharged at about 70 % of the year. At ambient temperature of less than 0 °C the free-cooling system is even able to produce the refrigeration load solely. The achievable energy savings are in a scale of 30 - 40 % compared to a conventional system.



> Data centers of 1&1 AG

Distributor

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