KWT

VIESMANN Group

Heat pumps up to 2000 kW

KWT: Heat pumps, refrigeration technology and primary sources for efficient energy utilisation

KWT has great potential for developing heat pump technology as it has more than 30 years' experience in this sector and has recently joined the Viessmann Group.

Since the company was established in 1979, the engineers at KWT AG have spearheaded development in the efficient utilisation of cooling and heating energy. Company founder, Kurt Trüssel, has made a particular study of the energy contained in the waste heat from refrigeration systems. KWT continues to work intensively on making best use of the economically viable synergies of cooling and heating in refrigeration units. The company also recognises the demand for smaller heat pumps for domestic use.

KWT became established as one of the leading suppliers of heat pumps, refrigeration technology and primary energy sources, as well as efficient combinations of the above, by pursuing intensive further development and becoming involved in geothermal probe technology. Continuous growth has been brought about through increasing demand from a host of different sectors, the high quality of our products and close proximity to customers. Recent integration into the Viessmann Group has been a significant step for the company in targeting European and Asian markets.

Standardised solutions for international markets

The global sales activities of the Viessmann Group ensure further growth and create new opportunities, even within KWT. While special heat pumps with functions specially tailored for the customer used to be a cornerstone of the industry, the internationalisation of the market in Europe has brought new demands for increasingly affordable, standardised solutions.

The new test bed for up to 750 kW output, which complies with EHPA Quality Label standards, assures quality and enables the continuous further development of refrigeration technology using all available options. The transfer of knowledge within the Viessmann Group creates useful synergies. This gives customers a high level of security, reliability and the certainty that they will receive a product that suits their needs.

KWT head office in Worb, in the canton of Bern, Switzerland

KWT strives to reach the highest possible level of efficiency in its use of natural heat. In doing so, it aims for the longest possible service life for the entire system, which is usually the more economical solution. The application of new technologies and refrigerants is also a challenge for KWT. To respond to this, the company has already started using natural refrigerants such as CO_2 and propane. Last, but not least, the economical and efficient utilisation of waste heat at particularly high temperatures is an additional area where powerful heat pumps can be used.

Minergie standards at head office

At KWT's head office in Worb, near Bern in Switzerland, ecological construction and the "Minergie" standards have been implemented. The installation of heat pumps with a natural cooling function ensures a pleasant room ambience with a minimal energy demand.

On the roof of the company's building, a certified photovoltaic system with 372 kW output exports up to 305 MWh p.a. to the grid and makes a sustainable contribution to reducing CO_2 emissions.

Heating with renewable energy from the environment – even in higher output ranges

Natural heat is an advanced and cost effective alternative to fossil fuels. It is available free of charge and offers independence from oil and gas.

Heat pumps should be your first choice if your priorities are both to save on heating costs and to generate heat in an environmentally responsible way. After all, the energy a heat pump uses is free and available in unlimited supply from the environment. Only electrical power is required to drive the heat pumps.

This makes you independent of fossil fuels, and in addition, actively contributes towards reducing CO_2 emissions and protecting the climate. With a heat pump, up to 80 percent of the total energy demand is taken from nature, in a highly effective and environmentally responsible manner. Only 20 to 30 percent electrical energy needs to be invested. The principle is as simple as it is ingenious: The solar energy stored in the ambient air, in the ground or in groundwater is used to efficiently heat domestic hot water and heating water.

Added value through cooling function and dual mode systems

With its high output, a KWT heat pump is designed for larger residential complexes and commercial operations. In addition, with slight adjustments, it can also be used to cool the living space in summer. The idea that a heat pump only suits new build projects has been long disproved. On the contrary, if an existing conventional oil or gas heating system is replaced with a heat pump as part of a modernisation project, there will be significant savings on heating bills and lower emissions at the same time (for example compared to a dual mode system).

Recovering environmental energy

Various natural sources are suited to heat recovery using a heat pump:

- Groundwater
- Geothermal probes
- Energy piles
- River or lake water
- Air
- Waste water and other waste heat

Not all these heat sources can be used everywhere. It is therefore necessary to consult the relevant authorities before making a decision, and discuss the technical options with KWT.

KWT heat pumps are designed for larger residential complexes and commercial operations (Pictured below: Herrbrugg High School)


VIESMANN

Vitocal 300-G/-W Pro: Brine/water and water/water heat pumps

Standardised control concept and optimised dimensions perfectly complement Viessmann system design.

With the Vitocal 300-G/-W Pro heat pumps, Viessmann extends the company's range of standard heat pumps up to 290 kW. The Pro series features all the characteristics of the highly efficient Vitocal 300-G series. With seven output sizes, most requirements of residential and commercial buildings can be reliably met. Standardising these appliances enables quick and comprehensive engineering, as well as providing transparent calculation parameters. Higher output levels can be achieved by linking up to five Vitocal 300 Pro heat pumps in a single cascade.

Pre-assembled electrical equipment
The electrical equipment is already integrated inside the heat pump casing as standard. Factory-fitted contactors for fail-safe primary and secondary pumps, as well as protection for the compressor, guarantee straightforward installation and the safe and rapid integration of the heat pump into the system.

Proven and reliable technology
The control philosophy was adopted from the Vitocal series for detached and two-family houses. Here too, the Refrigerant Cycle Diagnostic System (RCD) checks efficiency continuously and safeguards the efficient and reliable function at any operating point through the interaction between the electronic expansion valve (EEV) and the extensive sensor technology. The Vitotronic 200 regulates up to three heating circuits, and thanks to its natural cooling function ensures pleasant ambient conditions on hot summer days. With the optional addition of a Vitocom 300 communication module, a comprehensive range of settings and system optimisations can be undertaken from anywhere via internet or mobile phone.

Space efficient design
The hermetically sealed design with new scroll technology and the R410A refrigerant both significantly reduce the space required for siting these appliances. At only 88 cm wide, with clearance at the bottom to facilitate lifting and removable casing panels, the appliance is very easy to handle.

Unique water/water version
Only the Vitocal 300-W Pro series, with its stainless steel tubular evaporator, provides a reliable solution for the direct use of groundwater without an extra intermediate circuit. The benefits of low installation costs and maximum efficiency are therefore felt immediately.

Series with PLC based Vitotronic
All output sizes are also available with a PLC (programmable logic control) based control unit. Communication options such as Modbus/BACnet or LAN in particular enable an even more targeted integration in BMS systems. The PLC based control also allows management of re-coolers and control of up to three heating/cooling circuits.

Easy-to-operate Vitotronic control unit with plain text and graphic display

Boiler room in Manisa (Turkey)

Vitocal 300-G Pro
type BW 302.B150

Vitocal 300-G Pro
type BW 302.B120

Take advantage of these benefits:

- Brine/water heat pump, single and two-stage
  Heating output: 89 to 240 kW; maximum 1200 kW (as cascade)
- Water/water heat pump, single and two-stage
  Heating output: 112 to 290 kW; maximum 1450 kW (as cascade)
- Low operating costs through high coefficients of performance: COP (COP = coefficient of performance) to EN 14511 up to 4.8 (brine 0 °C/water 35 °C) and up to 6 (water 10 °C/water 35 °C)
- Maximum flow temperature 60 °C (brine 5 °C) for all sizes
- Low noise and vibration emissions through sound-optimised appliance design
- Low running costs with the highest level of efficiency at any operating point through the innovative RCD (Refrigerant Cycle Diagnostic) system with electronic expansion valve (EEV)
- Easy-to-operate Vitotronic control unit with plain text and graphic display
- Ready-to-use connection for fail-safe primary and secondary pumps
- Electronic soft starter for lower starting current and less power drawn from the mains
- Water/water version with stainless steel tubular evaporator for operation without intermediate circuit
- Required installation opening only 855 mm wide
- Exceptionally quiet operation for this output range
- Series with PLC based Vitotronic for better integration in BMS systems

Vitocal 300-G Pro brine/water heat pump

Vitocal 300-G Pro	Type	BW 301.B090	BW 301.B120	BW 302.B090	BW 302.B120
Output data (to EN 14511, B0/W35 °C, 5 K spread)					
Rated heating output	kW	93	121	89.4	117.7
Cooling capacity	kW	74.5	96.4	72	93.8
Power consumption	kW	19.5	24.8	18.3	24.4
Coefficient of performance ε (COP) in heating mode		4.77	4.83	4.88	4.8
Dimensions					
Length	mm	1343	1343	1343	1343
Width	mm	911	911	911	911
Height	mm	1650	1650	1650	1650
Weight	kg	700	800	705	810
Number of compressors	pce	1	1	2	2

Vitocal 300-G Pro	Type	BW 302.B150	BW 302.B180	BW 302.B250
Output data (to EN 14511, B0/W35 °C, 5 K spread)				
Rated heating output	kW	145	180	240
Cooling capacity	kW	117	145.4	191.4
Power consumption	kW	31.5	39.2	50.4
Coefficient of performance ε (COP) in heating mode		4.6	4.6	4.76
Dimensions				
Length	mm	1932	1932	1932
Width	mm	911	911	911
Height	mm	1650	1650	1650
Weight	kg	1130	1190	1300
Number of compressors	pce	2	2	2

Vitocal 300-W Pro water/water heat pump

Vitocal 300-W Pro	Type	WW 301.B125	WW 301.B155	WW 302.B125	WW 302.B155
Output data (to EN 14511, W10/W35 °C, 5 K spread)					
Rated heating output	kW	116	140.1	112.1	145.1
Cooling capacity	kW	102	120	94.2	121.6
Power consumption	kW	20.2	24.2	18.6	24.4
Coefficient of performance ε (COP) in heating mode		5.74	5.79	6.0	5.94
Dimensions					
Length	mm	1932	1932	1932	1932
Width	mm	911	911	911	911
Height	mm	1650	1650	1650	1650
Weight	kg	1015	1055	1035	1060
Number of compressors	pce	1	1	2	2

Vitocal 300-W Pro	Type	WW 302.B200	WW 302.B250	WW 302.B300
Output data (to EN 14511, W10/W35 °C, 5 K spread)				
Rated heating output	kW	186	240	290
Cooling capacity	kW	157	199	244
Power consumption	kW	32.1	42.1	49.5
Coefficient of performance ε (COP) in heating mode		5.9	5.7	5.8
Dimensions				
Length	mm	2521	2521	2521
Width	mm	911	911	911
Height	mm	1650	1650	1650
Weight	kg	1330	1380	1425
Number of compressors	pce	2	2	2


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Vitocal 350-G Pro: Brine/water heat pump

The new Vitocal 350-G Pro extends the heat pump output range from 27 to 197 kW, with flow temperatures up to 73 °C.

Based on the compressors with piston technology available for these output ranges, this heat pump has all the hallmarks of a powerful and efficient unit. In addition, the newly developed frame casing is easy to install and transport. The anti-vibration cladding (supplied separately) fits exactly and reduces the handling weight by around 200 kg.

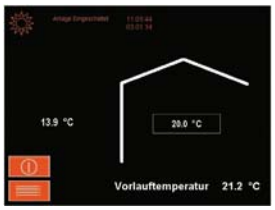
Equipment to meet customer needs
The electrical equipment is fully integrated inside the heat pump casing as standard. Connections via contactors for circulation pumps are pre-fitted and easily accessible. Optional function extensions can be readily integrated with prefabricated elements or, for made-to-order products, can be ordered ex works. The integral part-winding start-up function ensures low starting currents. These can be improved even further if necessary through the use of electronic soft starters.

Reliable technology and simple operation
Lying at the heart of the refrigerant circuit are German-manufactured semi-hermetic piston compressors. Depending on the output, two or three compressors are integrated into the refrigerant circuit by way of a compound connection. This makes optimum efficiency and operation possible even under partial load conditions. Efficiency is supported by electronic injection valves which are self-closing with zero current to ensure maximum safety if there is a power failure, for example. Additionally, the hermetically sealed design with reduced threaded connections and the absence of safety valves in the refrigerant circuit guarantee tightness and a long service life. For optimal control of the system and refrigerant circuit, the Vitocal 350-G Pro is equipped with a PLC-assisted Vitotronic. The intuitive, full graphic touchscreen is generously sized for this output range. The full colour mode makes differences in function and operation quickly recognisable.

Remote monitoring and communication
The control unit boasts numerous communication options, from a simple analogue modem to LAN-supported systems. Modbus technology and BACnet can be used and can make the system rapidly accessible via remote maintenance and communication over the internet, for example.

Optimised appliance construction for quiet operation
As is the case for all heat pumps, the compressors emit noise in the 50 to 60 Hz range. Due to the high quality construction of the frame and anti-vibration casing components, it has been possible to keep this noise within the casing. Vibrations on the base support are barely perceptible as the 3-D anti-vibration construction is specifically designed to dissipate oscillations. With sound power levels of, for instance, 65 dB (A) for the 197 kW heat pump, its values stand up well by comparison with other products in this market segment.

DHW heating
The Vitocal 350-G Pro series achieves high flow temperatures of up to 73 °C, making it suitable for hygiene-compliant domestic hot water heating. The special temperature maintaining facility guarantees hot inlet temperatures downstream of the loading system at all times, even during the loading cycle.



Easy-to-use PLC-based Vitotronic with touchscreen

Vitocal 350-G Pro
type BW 352.A156

Vitocal 350-G Pro
type BW 352 A156, internal view
showing additional options

Take advantage of these benefits:

- Brine/water heat pump, two-stage
  Heating output: 27 to 197 kW
- High flow temperatures up to 73 °C
- Low operating costs through high coefficients of performance: COP to EN 14511 up to 4.4 (brine 0 °C/water 35 °C)
- Viable under partial load conditions due to the use of two or three compressors with an equal output
- Low noise and vibration emissions through sound-optimised appliance design
- Intuitive use of the control unit via touchscreen with schematics
- Possibility of factory pre-installation for products made especially for particular projects
- Provided with standard part-winding start-up system for low starting currents or fitted with an optional electronic soft starter
- Traditional cooling/heating function with buffer cylinder
- PLC-supported Vitotronic with Modbus and BACnet communication interface

Vitocal 350-G Pro brine/water heat pump

Vitocal 350-G Pro	Type	BW 352.A027/ BW 352.A027SA	BW 352.A034/ BW352.A034SA	BW 352.A056/ BW 352.A056SA	BW352.A076/ BW352.A076SA	BW 352.A097/ BW 352.A097SA
Output data (to EN 14511, B0/W35 °C, 5 K spread)						
Rated heating output	kW	27.2	34.3	56.1	76	96.9
Cooling capacity	kW	20.8	26.4	43.2	58.8	74.6
Power consumption	kW	6.4	7.9	12.8	17.3	21.9
Coefficient of performance ε (COP) in heating mode		4.2	4.4	4.4	4.4	4.4
Output data (to EN 14511, W10/W35 °C, 5 K spread)						
Rated heating output	kW	37.1	47.8	78.6	106	134.1
Cooling capacity	kW	29.7	39	64.2	85.9	109.6
Power consumption	kW	7.4	8.8	14.5	19.6	24.6
Coefficient of performance ε (COP) in heating mode		5	5.4	5.4	5.4	5.5
Dimensions						
Length	mm	1848	1848	1848	2153	2153
Width (values in brackets excl. anti-vibration casing)	mm	820 (750)	820 (750)	820 (750)	911 (850)	911 (850)
Height	mm	1450	1450	1450	1650	1650
Number of compressors	pce	2	2	2	2	2

Vitocal 350-G Pro	Type	BW 352.A114/ BW 352.A114SA	BW 352.A132/ BW 352.A132SA	BW 352.A156/ BW 352.A156SA	BW 353.A172/ BW 353.A172SA	BW 353.A198/ BW 353.A198SA
Output data (to EN 14511, B0/W35 °C, 5 K spread)						
Rated heating output	kW	114.2	131.9	155	170.2	197
Cooling capacity	kW	88.4	101.5	119.2	132	153.3
Power consumption	kW	25.9	30.4	36.3	38.4	45.7
Coefficient of performance ε (COP) in heating mode		4.4	4.3	4.3	4.4	4.4
Output data (to EN 14511, W10/W35 °C, 5 K spread)						
Rated heating output	kW	158	181.9	214.4	237	274.2
Cooling capacity	kW	129	148	173.8	193.5	222.8
Power consumption	kW	29	34.1	40.7	44.2	52
Coefficient of performance ε (COP) in heating mode		5.4	5.3	5.3	5.4	5.3
Dimensions						
Length	mm	2153	2153	2153	2816	2816
Width (values in brackets excl. anti-vibration casing)	mm	911 (850)	911 (850)	911 (850)	911 (850)	911 (850)
Height	mm	1650	1650	1650	1650	1650
Number of compressors	pce	2	2	2	3	3

Types BW 352.A027SA to BW 353.A198SA come fitted as standard with electronic soft starters with integral rotary field control


VIESMANN
VITOCROSSAL200

Heat pumps for every application with any type of heat source

With technical expertise, outstanding manufacturing ability and many years of experience, KWT is the heat pump manufacturer of choice for every special application.

KWT works together with its clients to develop solutions that are based on more than 30 years' experience, that will meet practical, everyday needs, and that will overcome any and every challenge. All deadlines and costs arranged can be relied upon, with no unpleasant surprises.

All systems are designed and built based on our customers' performance definitions. All heat pumps and geothermal probes demonstrate this performance on the test bed and in practice.

Always the perfect solution
Subject to situation and order, KWT builds tailored heat pump systems for every application: water/water, brine/water and air/water. The output spectrum of the systems ranges from 15 to 2000 kW and can be extended if required, for example with a cascade of several heat pumps.

It is also possible to implement a dual mode heating system. Here, the heat pump provides the standard supply to heat domestic hot water and heating water. To absorb peak loads, for example when temperatures are extremely low, an oil or gas condensing boiler is automatically activated.

KWT heat pumps are made to measure and can even be installed under difficult conditions where space is tight. All materials and processes used are certified, and were awarded the ISO 9001 quality seal as long ago as 1996.

Intelligent control concepts
Advanced building services demand integral control solutions that are capable of communicating with other systems. KWT control systems offer the customer maximum functionality, combined with an open system architecture that can communicate with the systems most widely available on the market.

A KWT control system can regulate ventilation and heating assemblies as well as DHW heating, access energy meters and measure energy usage via M BUS. This is visualised clearly for the user on the display.

With their winningly sophisticated control philosophy, KWT control systems are very easy to operate

A dual mode system, comprising a KWT heat pump and a Viessmann gas condensing boiler, supplies the Bonner Werkstätten with heat

Brine/water heat pumps

KWT brine/water heat pump with a heating output of 290 kW

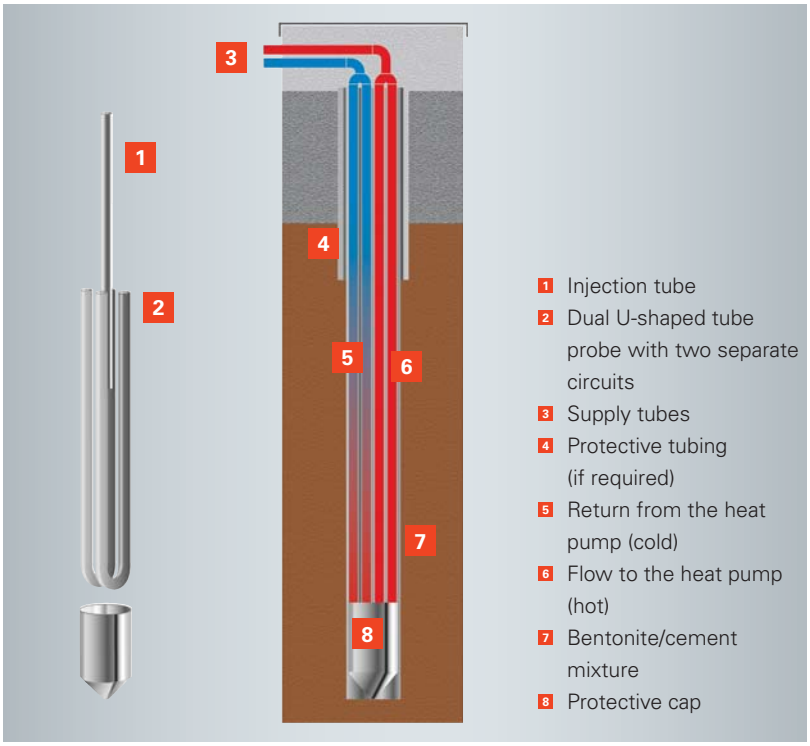
Using heat from the ground with geothermal probes
A stable and highly durable heat source

KWT brine/water heat pumps are built around expertise and quality.

Geothermal probes are durable, maintenance-free heat sources. In conjunction with heat pumps, they provide energy for heating, and are also the ideal heat exchanger for natural cooling. In both cases, KWT brine/water heat pumps utilise the constant temperature in the ground.

Optimum design
KWT brine/water heat pumps are designed and manufactured in accordance with requirements. Economical and cost effective flow temperatures of 35 to 40 °C are ideal for area heating systems. Upon demand they are equipped with the latest series of compressors or multi stage refrigerant circuits for efficient output modulation. Rotary screw compressors are ideal as the core of KWT heat pumps. Flow temperatures up to 55 °C are completely acceptable for ventilation systems. If technical conditions make flow temperatures up to 80 °C necessary, this can be achieved simply by using semi-hermetic piston compressors.

DHW heating
DHW temperatures above 60 °C are often needed. However, especially with larger heat pumps, the demand for DHW heating accounts for the lesser proportion of total output. With multi stage heat pumps or hot gas decoupling, KWT heat pumps can provide the ideal solution to meet this demand. The use of special safety heat exchangers guarantees global potable water requirements are maintained.



Geothermal probe
The geothermal probe is composed of two U-shaped tubes. In the middle of this tube bundle there is an injection tube through which a bentonite/cement mixture is pressed after the probe has been installed. The drill hole is filled from bottom to top. This guarantees the entire probe is connected with the surrounding earth, seals off any water-carrying layers from one another and protects the probe.

Geothermal probe manifold

Water/water heat pumps

KWT water/water heat pump with a heating output of 500 kW

KWT water/water heat pump

Groundwater and surface water heat sources for high efficiency

High grade components make KWT water/water heat pumps powerful and reliable.

Groundwater at 8 to 12 °C is a very rich heat source for a heat pump, as the temperature level is high all year round. However, due to fluctuating water qualities, special heat exchangers (evaporators) are usually required, if no intermediate circuits are intended.

Stainless steel tubular evaporators
KWT heat pumps for groundwater or surface water are equipped with high grade stainless steel tubular heat exchangers. The benefits are obvious – the evaporator has a large volume and generously sized surface area, so the border regions are not vulnerable to icing up. Light floating parts are simply flushed through with the medium, and aggressive chemical fluids have little destructive effect on the high grade stainless steel.

Surface water at 4 °C
The anomaly of water comes out on top. Surprisingly, below the ice on a lake, the water temperature is 4 °C and we can make use of this anomaly. Though standard water/water heat pumps cannot utilise this heat, KWT heat pumps are specially designed to do just this, and are equipped with tubular evaporators made of stainless steel 1.4401 and special de-icing circuits. This makes lake or river water at 4 °C usable after all. Especially with particularly high outputs, to use a heat source such as Lake Geneva then becomes a possibility as it can easily provide this required cooling capacity.

Modular delivery
KWT supplies heat pumps that can be divided into sectional modules for modernisation and conversion projects, or employed anywhere where the handling of large heat pumps is not a simple matter. These sectional modules are positioned on site, then connected to one another and commissioned.

Refrigerant circuit of a water/water heat pump with stainless steel tubular heat exchanger

Depending on the installation conditions, KWT heat pumps can be delivered as modules

This KWT heat pump uses waste heat to cool the data processing centre and appliance test beds at the Viessmann head office in Allendorf.

Using waste water and waste heat from production processes as heat sources

KWT special systems are built precisely in accordance with your requirements; they are reliable in operation, and have been used successfully as system components for many years.

Waste water and waste heat from industrial processes contain a great deal of energy, which is only seldom used. KWT has the necessary expertise to prevent this loss. Even for extremely low outside temperatures of minus 40 °C, ranging right up to plus 35 °C, there is a matching heat pump in the KWT range.

DHW heating
Waste water from hotels and leisure complexes is usually at a residual temperature of 25 to 35 °C. At the same time, however, such complexes also require a large amount of fresh hot water.

KWT, with its ideally suited heat pumps, is best placed to make use of this waste heat and so is the perfect partner for such projects. These heat pumps are highly efficient and supply a water temperature of 60 °C.

Utilising waste heat for heating
Heating doesn't always come first. In many branches of industry, process water has to be cooled. This is often achieved using cooling towers.

A KWT heat pump offers you a more efficient and usually more economical solution – especially when the heat extracted from this process can be re-used elsewhere.

For such application ranges, KWT develops and builds special heat pumps, which have been used successfully as system components for many years.

In the five-star Ritz Carlton Hotel in St Moritz, heat is recovered from waste water

This FEKA waste water pipe is used as a primary source for DHW heating

A KWT waste water heat pump with 150 kW output for DHW heating

Air/water
heat pumps

KWT air/water heat pump

Glycol dry coolers for an air/water heat pump

Air as the heat source; ideal in dual mode systems or to provide cooling

KWT air/water heat pumps for heating and cooling, in conjunction with conventional heat sources, are an economical solution where cooling is required.

Air is readily available as a source of heat. However, even when cooling is required, air can easily absorb the extracted heat. KWT air/water heat pumps make particularly efficient use of air temperatures down to about 5 °C, with which they can cover up to 50 % of the annual heat load.

Glycol re-coolers in wall integration version for air/water heat pumps

Design

KWT air/water heat pumps are based on a split design, comprising a dry cooler and a brine/water heat pump. The connection is made simply, using hydraulic lines that carry brine. Air/water heat pumps in this output range are operated on a dual mode basis. This means that above a defined outside temperature, a second heat source provides backup or takes over (for example the Vitocrossal 300) for more efficient heat generation. This is regulated via the integral control unit.

Heating and cooling

Air/water solutions from KWT are suitable for heating and cooling. In both cases, the highest level of efficiency is guaranteed thanks to variable speed DC fans. The special design of the air heat exchangers, with gaps twice the width of those in conventional chillers, optimises heat transfer, lowers the pressure drop of the air flow rate, reduces noise and ensures a fast and efficient defrost process.

Defrosting not reversible

In the high output ranges, the reversible refrigerant circuit in particular has components such as 4-way valves that influence operational reliability and leakage protection. In this context, KWT heat pumps work with two evaporators and two condensers. Defrosting occurs independently of the heat pump, using heat from the heating water buffer cylinders or additional supercooling with an energy store. The supercooling circuit is particularly efficient, as this is where environmental energy is used in the defrosting process.

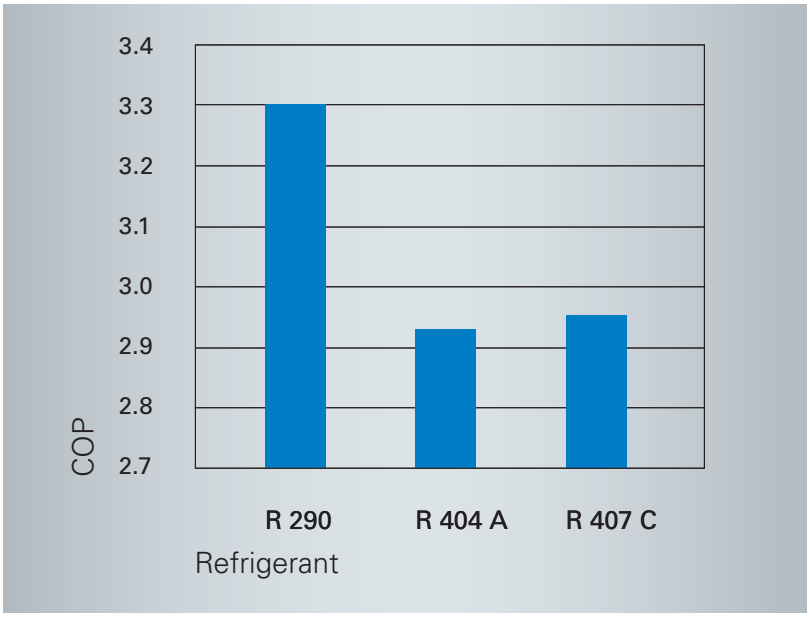
Research and development

Natural refrigerants are now an integral part of new developments.

Refrigerant R290 (propane)
KWT has been using natural refrigerants for more than ten years, even in high output applications. Alongside CO_2, R290 (propane) is receiving increasing attention. Propane is an extremely efficient refrigerant and has an excellent volumetric cooling capacity. Heat pump refrigerant circuits filled with propane are particularly suited to outdoor installation. Costly safety measures, such as those needed in an installation room, are not required. KWT uses R290 for large outdoor heat pumps up to around 300 kW.

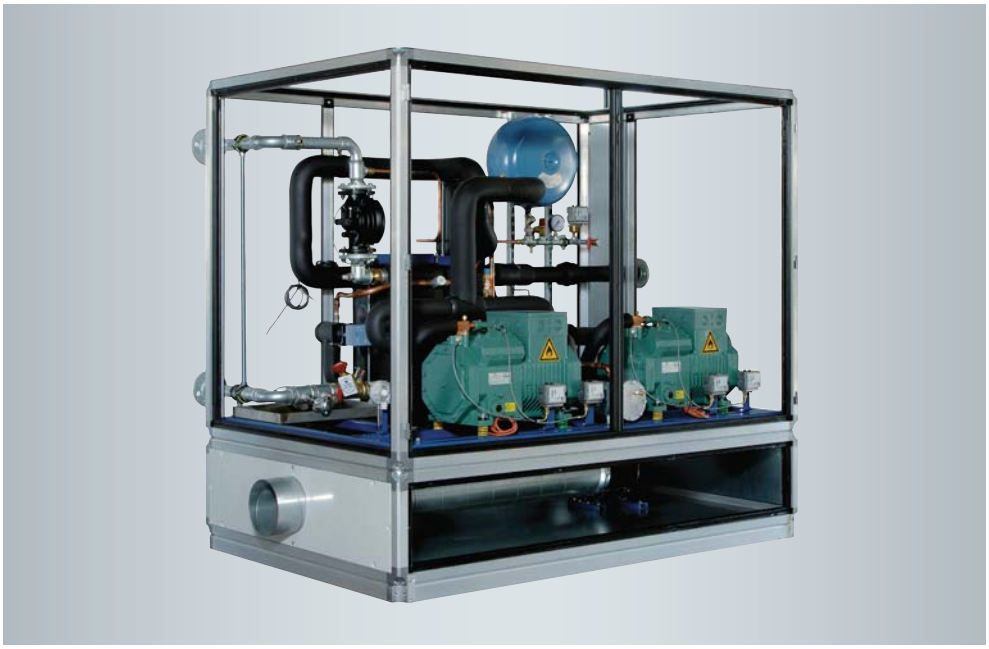
The heat pumps themselves are equipped to meet the relevant safety regulations, including explosion-proof design and refrigerant detection as standard.

- Availability: very good
- Volumetric cooling capacity: 1.6 x R134a
- Environmental compatibility: very good, GWP 3 (global warming potential)
- Pressure: < R410a
- Flammability: high
- Density: heavier than air
- Chemical composition: single-substance refrigerant



COP comparison
(COP = coefficient of performance)
Air/water heat pump with 150 kW where air – 8/water 35 °C

Air	– 8 °C
Evaporation	– 20 °C
Glycol return	– 12 °C
Glycol flow	– 16 °C



Heat pump with refrigerant R290

Refrigerant HFO-1234ze

New developments on the refrigerant market are tending towards easy-to-use and efficient mixtures. A particular emphasis is being placed on a low GWP. HFO-1234ze represents a potential substitute for R134a and possesses virtually identical properties. With a GWP value of 10, it is one hundred times below that of R134a and close to natural refrigerants such as R290. At the same time, HFO-1234ze permits high condensation temperatures at low pressure, making it ideal for a variety of applications. Nevertheless, It is worth noting that the HFO-1234ze only achieves 75 percent of the output of the R134a, which may result in different components being used. KWT is already carrying out research on HFO to test its suitability as a substitute for existing applications and as a new refrigerant for the next generation of heat pumps.

R718 (water) – refrigerant of the future?

The use of pure water as a refrigerant is still in its infancy. Although water has been available since time immemorial, little is known about how it acts in a refrigerant circuit. A decisive factor for high temperatures above 90 °C is the low condensation pressure of 1 bar, which necessitates evaporation below this pressure level. Thus, at an evaporation temperature of 45 °C, a pressure of around 0.1 bar and about 900 m^3/h water vapour would be required. Today's systems run with less than a tenth of this volume. The resulting size of water-based systems means that their production and use in waste heat applications, for instance, is not yet feasible.

Engineering, service and maintenance

KWT guarantees the components and assemblies in its products will work seamlessly together, and provides individual support in designing the system right through to maintenance.

For bespoke KWT heat pumps, a 24-hour service is available

Heat pumps from KWT guarantee efficient and reliable operation. Following installation, KWT engineers or Viessmann service companies commission the system, check its output and reliability, document all the work and tests carried out, and instruct the future operators.

As the only heat pump manufacturer in Switzerland with a complete value chain within its own company, KWT guarantees the components and assemblies in its products will work seamlessly together – and provides individual support in designing the system right through to maintenance. Outside Switzerland, these services are provided by Viessmann.

Service round the clock
Heat pumps designed for specific projects and other KWT systems can be monitored on a contractual basis from the KWT control centre. Any irregularities can be recognised and remedied in good time via data communication between the system and the control centre or contractual partner.

These services are particularly appropriate for large residential complexes, commercial and industrial buildings, restaurants, hotels, and communal facilities such as schools and swimming pools, etc. This, of course, also includes dual mode systems, such as a combination of heat pump plus oil or gas boiler to cover peak loads.

The results for the user are a high level of serviceability, top quality and maximum flexibility. Other building services can be integrated at any time, providing the perfect finishing touch to the range of services on offer.

Solutions – made to measure

KWT special heat pumps are also tested at operating temperature and built according to the customer's precise specifications.

Lotte World II, Korea
(construction started in 2009; projected completion in 2016)
Heating output installed: 22,200 kW
Cooling capacity installed: 20,400 kW
Number of heat pumps: 12
Special features:
720 x 200 m geothermal probes for 6 heat pumps, river water for the 6 other heat pumps; heating and cooling are largely required at the same time

Inselspital Bern, Switzerland
Cooling capacity installed: 1552 kW
Heating output installed: 1769 kW
Number of compressors: 4
Special features:
Primary source provides cooling for operating theatres, refrigeration cells, etc.; heating and cooling are required at the same time

Inntal commercial nursery, Germany
Heating output installed: 1560 kW
Cooling capacity installed: 1280 kW
Electrical output: 279 kW
Special features:
For the primary source there are 3 well systems, each with 90 m^3/h; heat is used to warm the floor of the greenhouses
Dual mode system with Viessmann boiler

Residential complex in Brissago, Lake Maggiore, Switzerland
Cooling capacity installed: 86.4 kW
Electrical output: 33.8 kW
Heating output: 120.2 kW
Special feature: Heat source is lake water

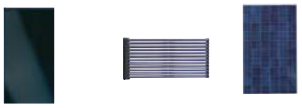
Lidl distribution centre, Weinfelden, Switzerland
Cooling capacity installed: 434 kW
Electrical output: 201 kW
Heating output: 625 kW
Special feature:
Heat source is a refrigeration unit

Residential complex, Cologne, Germany
Cooling capacity installed: 56 kW
Electrical output: 18 kW
Heating output: 74 kW
Special feature:
Dual mode system with Vitocrossal 300 gas condensing boiler, 105 kW

Keckeisen Akkumulatoren, Memmingen, Germany
Cooling capacity installed: 119 kW
Heating output: 150 kW
Special feature:
Concrete core activation and radiating ceiling plates, energy contracting

Steca Elektronik, Memmingen, Germany
Cooling capacity installed: 384 kW
Electrical output:
Heating output: 484 kW
Special feature:
Use of waste heat, energy contracting

Kiesel GmbH logistics centre, Stockstadt am Rhein, Germany
Cooling capacity installed: 284 kW
Heating output: 382 kW
Special feature:
Dual mode system with Vitoplex 300 gas condensing boiler, 1600 kW

	Boilers for oil up to 116 MW heat or up to 120 t/h steam	Boilers for gas up to 116 MW heat or up to 120 t/h steam	Solar thermal and photovoltaic
Detached houses			
Apartment buildings			
Industry/commerce/ municipal			
Local heating networks			

Individual solutions with efficient systems

The comprehensive range of products and services from Viessmann offers individual solutions with efficient systems for all energy sources and application areas. As one of the world's leading manufacturers, Viessmann offers intelligent, convenient and efficient systems for heating, air conditioning/ventilation, cooling and decentralised power generation. Viessmann products and systems are synonymous with the very highest levels of efficiency and reliability.

Our comprehensive product range offers top technology and sets new benchmarks. By focusing on using energy efficiently, we can help cut costs, save natural resources and protect the environment.

Everything from a single source
The Viessmann range offers the right products and systems for every requirement. Our heating systems can be wall mounted or floorstanding and are suitable for detached houses, large residential buildings, commercial and industrial premises or local heating networks. Whether for modernisation or new build, Viessmann is always the right partner for providing heating, cooling, steam and power.

The wide ranging expertise we have at our disposal in the Group enables us to provide our trade partners with perfect solutions. Our product portfolio is rounded off with a full range of services.

Wood combustion technology, combined heat and power generation and biogas production up to 50 MW

Heat pumps for brine, water and air

up to 2 MW

Heating system accessories

Refrigeration technology

The comprehensive Viessmann product range: Individual solutions with efficient systems for all energy sources and applications

The product range for all energy sources and output ranges

- Boilers for oil and gas up to 116 MW heat or 120 t/h steam
- Combined heat and power generation up to 50 MW_{el}
- Heat pumps up to 2 MW
- Wood combustion technology up to 50 MW
- Biogas production plants from 18 kW_{el} to 20 MW_{gas}
- Biogas upgrading plants up to 3000 m^3/h
- Solar thermal systems
- Photovoltaic
- Accessories
- Refrigeration technology

Maintenance and service

For commissioning, maintenance and troubleshooting – trade partners can always count on the Viessmann Group to provide professional support. Our team will be more than happy to talk to you on the phone or in person. Our online tools can provide you with valuable tips, and if necessary spare parts can be delivered the next morning.

Training

The Viessmann Academy offers a wide range of courses, from business management seminars to technical training, designed to keep our trade partners abreast of the very latest developments in our industry.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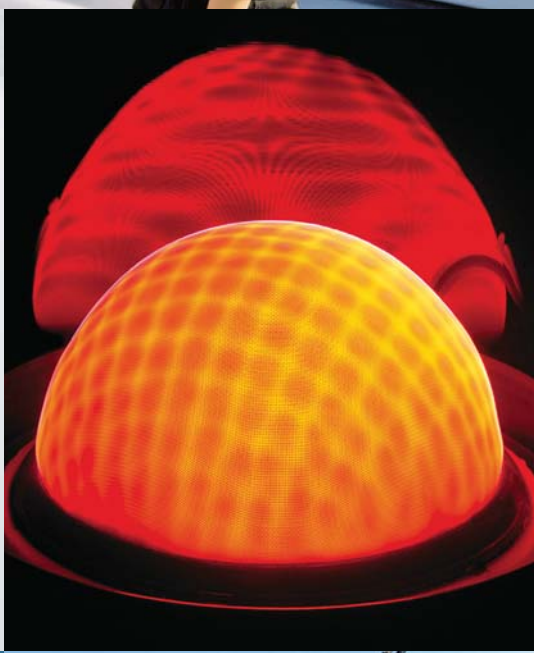


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Viessmann – climate of innovation

Viessmann is one of the world's leading manufacturers of intelligent, convenient and efficient systems for heating, air conditioning/ventilation, cooling and decentralised power generation.

As a third generation family run business, Viessmann has been supplying highly efficient and clean heating systems for many decades.

A strong brand creates trust
Together with our brand label, our key brand message is an identifying feature throughout the world. "Climate of innovation" is a promise on three levels: It is a commitment to a culture of innovation. It is also a promise of enhanced product benefits and, at the same time, an obligation to protect the environment.

Acting in a sustainable manner
For Viessmann, taking responsibility signifies a commitment to acting sustainably.

This means bringing ecology, economy and social responsibility into harmony with each other, ensuring that current needs are satisfied without compromising the quality of life for the generations to come.

We consider climate protection, environmental responsibility and resource efficiency to be key priorities throughout our company, which has more than 11,400 employees worldwide.

Example of Best Practice
With its strategic sustainability project, Viessmann demonstrates at its own head office in Allendorf (Eder) that the energy and climate policy goals set for 2050 can in fact be achieved today with commercially available technology. The results speak for themselves:

- Expansion of renewables to 60 percent
- CO_2 emissions reduced by 80 percent

The long-term goal is for the company to sustainably meet all of its own heating energy requirements.

2009/2011/2013:
German Sustainability Award for production, brand, efficiency with resources

Energy Efficiency Award 2010

Viessmann Group

Company details
- Established in: 1917
- Employees: 11,400
- Group turnover: €2.1 billion
- Export share: 55 percent
- 27 production companies in 11 countries
- Sales companies and representations in 74 countries
- 120 sales offices worldwide

The comprehensive product range from the Viessmann Group for all energy sources and output ranges
- Boilers for oil or gas
- Combined heat and power units
- Heat pumps
- Wood combustion technology
- Biogas production plants
- Biogas upgrading plants
- Solar thermal systems
- Photovoltaic systems
- Accessories
- Refrigeration technology

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Your trade partner:

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