WATERKOTTE heat pump innovation

Ai1 QLi

air/water heat pump

NEW!

Highly efficient due to speed adjustment via inverter technology and WATERKOTTE energy saving control.
Frost-proof installation in split-design. Optionally available with WEB interface.

- Comfort heat in winter

- Comfort cooling in summer

Comfort climate in the summer due to heat transfer via floor heating or climate modules from our product range.

Application:

+New installation or retrofit

+Retrofit also available for cooling

Power

at -12 / 35 °C monovalent: 3.9 to 8.0 kW

starting at -2 °C mono-energetic: 10.0 to 16.6 kW

at +35 / +7 °C cooling mode: 3.6 to 12.0 kW

at +35 / +18 °C cooling mode: 3.6 to 12.5 kW

E-heating: 3 x 2 kW integrated in all units

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WATERKOTTE heat pump system: Depending on design, the cooling retrofit pays for itself in savings in heating operation of up to 50 % and more compared to gas and oil!

Ai1 QLi - heating, cooling, domestic water heating for house and pool

Klemens Oskar Waterkotte was far ahead of his time when he used the first WATERKOTTE heat pump in his new house at the beginning of 1969. It was the birth of heat pump heating in private living areas, or more precisely, of heating with renewable energy.

A success from the beginning

...more economical than the least expensive heating system – at that time oil heating at a cost of less than 9 cents per litre.

Potential of the longest experience

The degree of efficiency and consumption are determined by the technical condition of the entire system, combined with the characteristic temperature behaviour of the heat source and heat sink during use through an entire heating period. As a result, information from brochures or seals of approval is inconclusive. A meaningful comparison is obtained by a field test of the system performance factor (SPF).



WATERKOTTE and the air heat pump

A look at history: Waterkotte was also a pioneer for air/water heat pumps. The idea of using outside air as a heat source is nothing new for WATERKOTTE, because air is present everywhere as a heat source.

Air heat pumps with an output rating of several hundred kilowatts - of which several are still in operation - were supplied already in the 70s for heating of open-air swimming pools. Numerous units were also supplied for heating of residential buildings.
Concerning use in residential buildings, it soon became apparent that the technology available at that time was inadequate in regard to the disproportion between air temperature as heat source and the counter-demand of heating energy.

What was lacking then - and some products still lack today - was the possibility to adapt to the extremely deviating performance requirements of an air heat pump.

Today, the availability of the so-called "inverter technology", which can change or adjust the compressor speed in a very wide range, has altered the situation for modern air heat pumps.



Ai1 Qli indoor unit: All in One

This solution offers a compressor drive consisting of a highly efficient, electronically commuted motor (EC motor).
This technology allows the required performance adjustment, for instance at a ratio of 1:6 or 16.6 % to 100 %. When using air heat pumps, this is an absolute „must"; all other solutions should be avoided at this time and age.

Why is this performance adjustment necessary?

The air temperature of the air heat pump is the same as the temperature of the heat source. Nothing influences the performance of the heat pump more than the temperature of the heat source, since it can deviate between -15 °C and +18 °C during the heating period.

The result is easy to see: When the performance of the heat pump reaches its minimum due to the outside temperature of all things, the heat requirement of the building increases to its maximum.

The result?
The heat pump, correctly dimensioned for the maximum, would be largely overdimensioned for the rest of the time, which is predominant.



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Air heat pumps without inverter technology are no longer state of the art!

WATERKOTTE air heat pumps are only available in inverter technology!

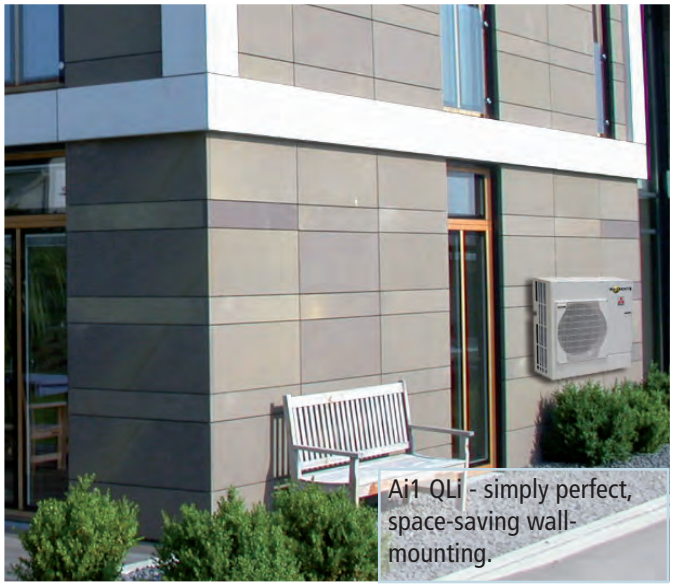
In combination with the WATERKOTTE energy saving control, they can be optimally adjusted to any situation. This results in:
- a significant increase in efficiency,
- extremely fast defrosting,
- domestic water heating under all conditions,
- reverse mode for air conditioning at full capacity.

Extensive testing

The winter of 2009/2010, with its extremely low outside temperatures, presented a unique opportunity to subject the initial more than 100 installations of our new development to a field test. Result: Our development proved to be a complete 100 % success.

Design

The WATERKOTTE air heat pump is a concept in split design. The majority of the cooling technology is in the outdoor unit, while the indoor part contains all hydraulic components and the electrical control.
Concerning refrigeration, the outdoor and indoor units are connected via a prefabricated, insulated pair of tubes.



Ai1 QLi - simply perfect, space-saving wall-mounting.

The length of the connection should not significantly exceed the range of 25 m. The refrigerant connection is easy to perform by means of solderless connectors that are provided.

Different solutions for the indoor unit, according to requirement

1. **Ai1 QLi**, all in one, is the most popular complete heating and air conditioning system for new buildings and retrofits, including indirect domestic water heating with 250 l storage tank underneath.
2. **Ai2 QLi,** all in two, is the design with indirect domestic



water heating for an added storage tank if larger quantities of domestic hot water are required (see WATERKOTTE product range).



3. **WP QLi**, same as above, but without domestic water heating.

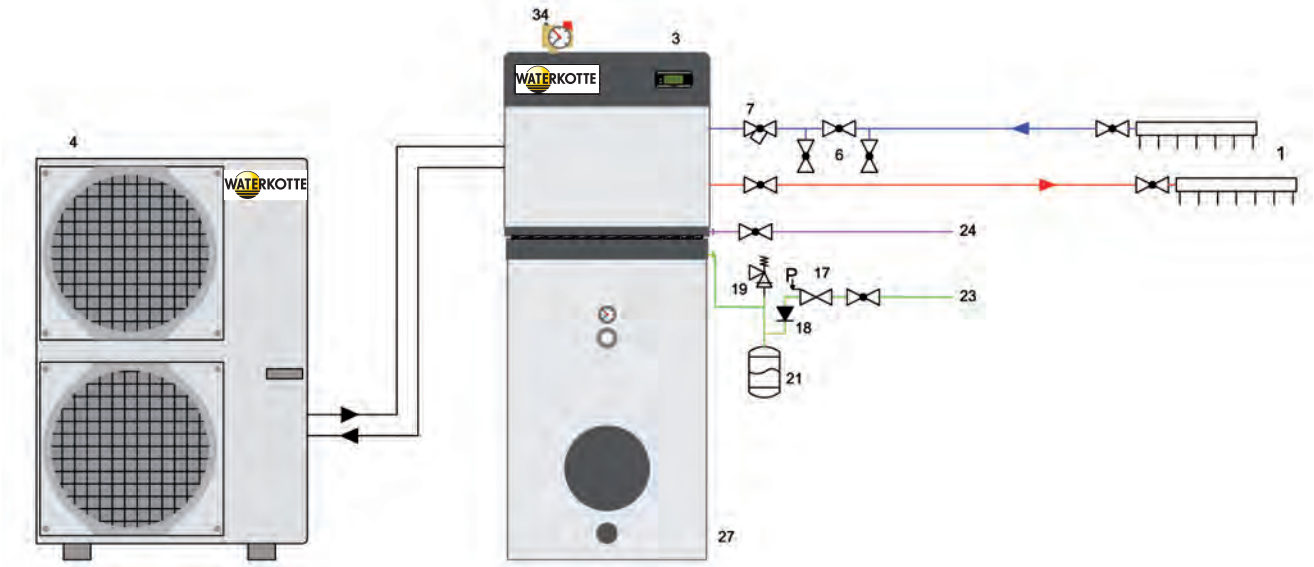
4. **WP QLi K**, cascade unit, for increased performance (up to 56 kW), to be connected with up to 4 outdoor units. It includes heat exchanger, electrical controls, one circulation pump per outdoor unit, a joint air separator with automatic air diverter, type-tested safety valve and filling pressure gauge as well as 3 x 2 kW E-heating.



Ai1 QLi - system configurations

Ai1 QLi

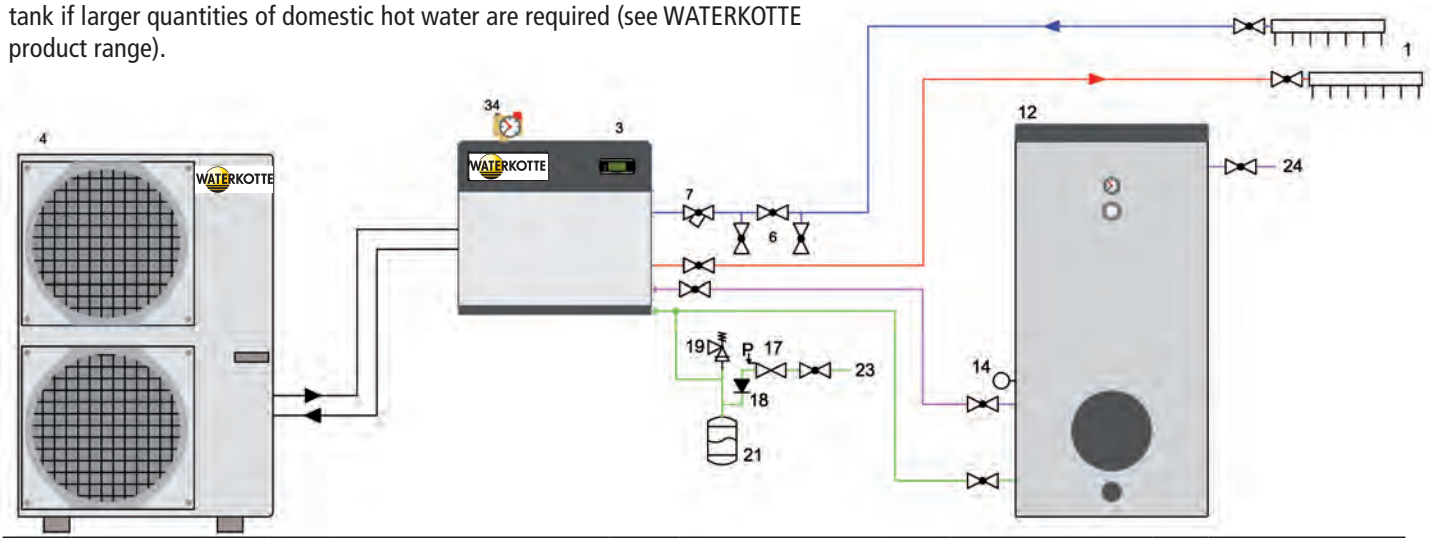
All in one is the most popular complete system for new buildings and retrofit for heating and air conditioning, including indirect domestic water heating with 250 l storage tank underneath for heated domestic water.



1	Underfloor heating	17	Pressure regulator	23	Domestic cold water
3	Indoor module	18	Backflow preventer	24	Domestic hot water
4	Outdoor module	19	Safety valve	27	250 l domestic hot water storage tank
6	Flushing connection (initial filling)	21	MET accd. to DVGW	34	Safety group
7	Ball valve filter				

Ai2 QLi

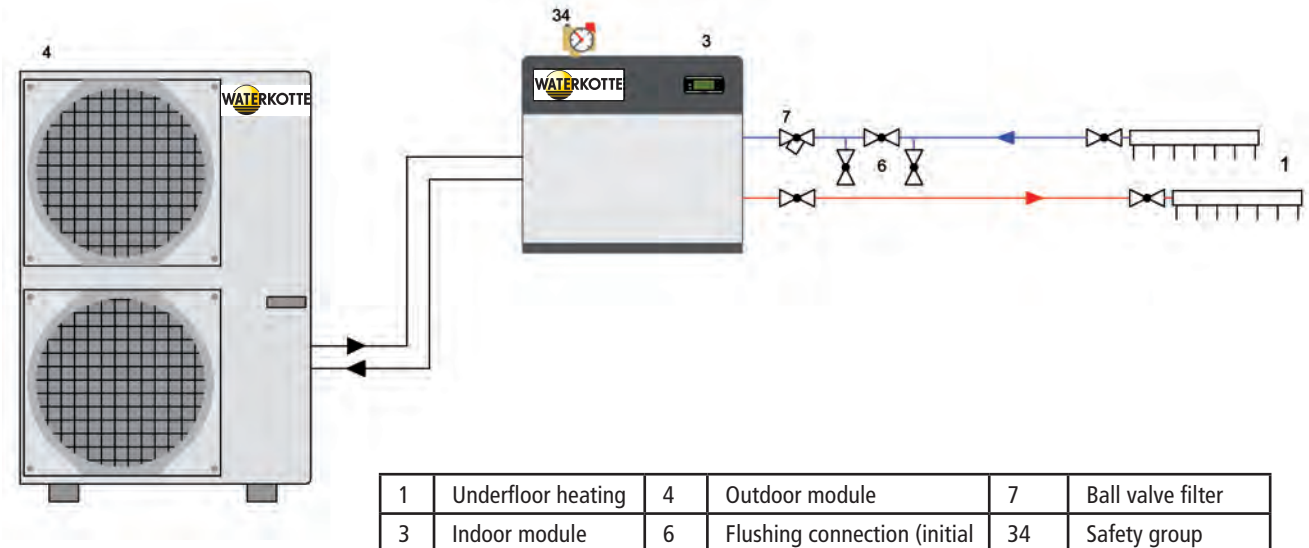
All in two is the design with indirect domestic water heating for an added storage tank if larger quantities of domestic hot water are required (see WATERKOTTE product range).



1	Underfloor heating	6	Flushing connection (initial filling)	17	Pressure regulator	21	MET accd. to DVGW	34	Safety group
3	Indoor module	7	Ball valve filter	18	Backflow preventer	23	Domestic cold water		
4	Outdoor module	12	OTS storage tank	19	Safety valve	24	Domestic hot water		

WP QLi

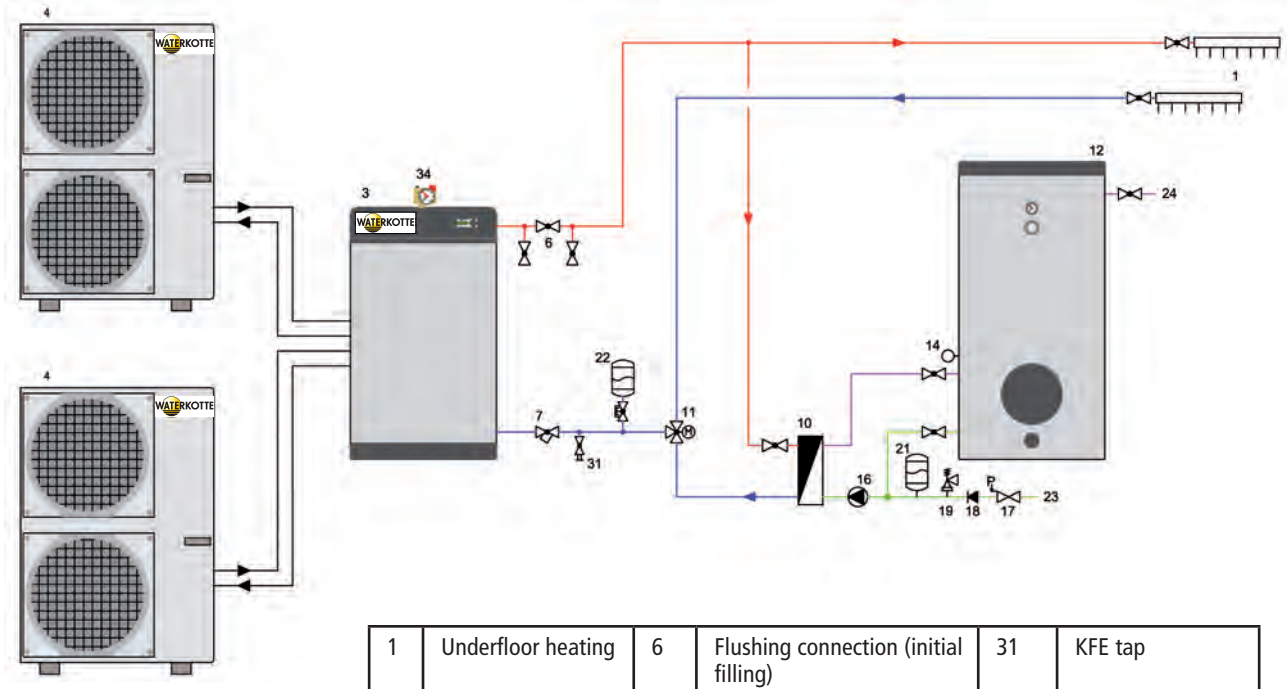
same as Ai2 QLi, but without domestic water heating.



1	Underfloor heating	4	Outdoor module	7	Ball valve filter
3	Indoor module	6	Flushing connection (initial filling)	34	Safety group

WP QLi K

Cascade unit, for increased performance (up to 56 kW), to be connected with up to 4 outdoor units. It includes heat exchanger, electrical controls, one circulation pump per outdoor unit, a joint air separator with automatic air diverter, type-tested safety valve and filling pressure gauge as well as 3 x 2 kW E-heating.

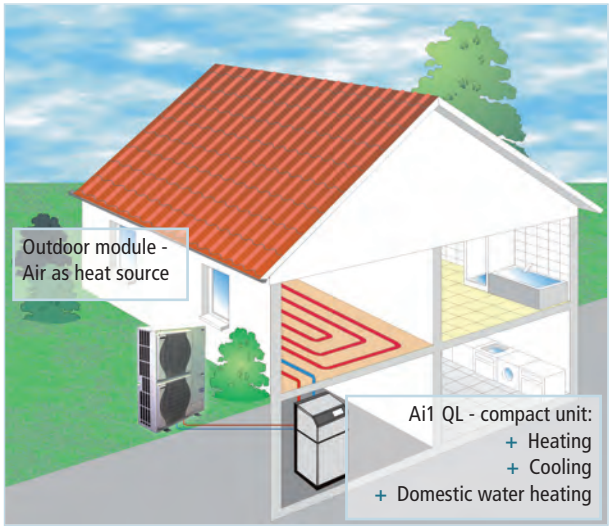


1	Underfloor heating	6	Flushing connection (initial filling)	31	KFE tap
3	Indoor module	7	Ball valve filter	34	Safety group
4	Outdoor module	22	MET with cap valve		

Heating, cooling and domestic water heating for house and pool

Advantages of the Ai1 concept

As the series description states, the Ai1 includes all the required installation technology, such as the circulating pump, air separator, air diverter, safety valve, filling pressure gauge, changeover valve and domestic water heat exchanger.
This All in One concept results in a sustainable reduction of installation and costs.



How does the WATERKOTTE air/water heat pump work?

A module set up outside, which contains only refrigerant, draws the air over a cooler and in the process takes energy from the air. The conversion to heating energy takes place in the Ai1 module, which is set up in a place secure from frost, such as the basement. After that, the Ai1 module handles everything automatically: the required heat for floor heating or also radiators, domestic water with 250 l storage tank.



Characteristics of all Ai1 QL systems are:

+ The typically high degree of efficiency with an SPF greater than 3,0, including domestic water heating.
+ Split design without water-carrying installation for outdoor areas with a risk of freezing.
+ The system can be installed by a specialist securely and quickly without soldering.
+ Automatic operation with the WATERKOTTE energy saving control.

Heat transfer to the rooms

For new buildings and complete restorations in northern regions, professionally carried out floor heating is the optimal solution. In southern, warmer regions, increased humidity prevents the use of floor heating for the purpose of air conditioning during the summer months.



Thus, all types without heat transfer through floor heating offer a comprehensive range of air conditioner modules (see WATERKOTTE product range).
In heating mode it is thus possible to come close to the temperature level of floor heating.

In addition, these air conditioner modules are characterised by the following features:
- fans with EC motor drive, 40 % reduction in energy consumption,
- extremely low noise level,
- installed air circulation filter for improved air hygiene, if necessary with electrostatic allergy filter.

WEB interface (option)

Beautiful new world: The WEB interface turns your cell phone into a remote control for your heat pump!
The reliable telecontrol software with service interface provides all required control functions.

Support for the technical planner

The units are usually dimensioned according to heating load. When retrofitting air conditioning, however, the cooling load can also be decisive for dimensioning.

A high degree of efficiency and high flexibility are ensured precisely because the supply of all consumers takes place hydraulically (in contrast to so-called VRF systems), and even subsequent corrections can be performed easily if necessary.

The following must be prepared from the beginning:
- hydraulic diagram,
- electrical diagram,
- and control diagram.

Technical data Ai1 QLi, Ai2 QLi, & WP QLi		5004.5.Pi	5006.5Pi	5007.5Pi	5008.5Pi	5011.5Pi	5014.5Pi
Heat output (A7/W35)	kW	4.1	6.0	7,0	8.0	11.2	14.0
Heat output (A2/W35)	kW	4.1	5.0	6,8	7.5	10.5	11.5
Cooling power (A35/W18)	kW	3.6	5.0	6,0	7.1	10.0	12.5
Power consumption of heat pump**	W	120	120	120	120	120	120
Heating water flow rate, (A2/W35) (Δt=5K)	m³/h	0.7	0.9	1,2	1.3	1.8	2.0
Air volume flow	m³/h	2100	2100	3300	3300	6600	6600
Fan motor, max. power consumption	W	40	40	86	86	2x 60	2x 60
Operating limits		A-15/W45 ; A-5/W55					
Compressor		Full hermetic, speed adjustment					
Refrigerant		R410A (pre-filled)					
Refrigerant volume	kg	2.5	2.5	3,5	3.5	5.0	5.0
Sound pressure level at 1 m distance outdoor module)	dB(A)	46	46	48	48	51	52
Sound pressure level at 5 m distance (outdoor module)	dB(A)	32	32	34	34	37	38

Electrical data							
Electrical power supply (380-415V, 3~, 50Hz)						•	•
Electrical power supply (220-240V, 1~, 50Hz)		•	•	•	•	•	
Starting current	A	<13	<13	<19	<19	<8 (<27)*	<10
Max. operating current	A	<13	<13	<19	<19	<8 (<27)*	<10
Customer-supplied control fuse (delay fuse)	A	16	16	25	25	16 (32)*	16
Control fuse on site	A	10					
Electrical resistance heating	kW	6 (3x2)	6 (3x2)	6 (3x2)	6 (3x2)	6 (3x2)	6 (3x2)

Storage tank model Ai1 QLi	
Content	250 l
Max. operating pressure	6 bar
Tank connections	Cold water / hot water 3/4"a
Tank (internal coating)	enamelled

Dimensions, weights, connections							
Weight of outdoor module	kg	45	45	75	75	135	135
Weight of indoor unit	kg	80					
Weight of tank (indoor unit)	kg	68					
Heating connections		Heating 1"ext.					
Dimensions of indoor unit (incl. tank) W x H x D	mm	701 x 1890 x 733					
Dimensions of indoor unit (without tank) W x H x D	mm	701 x 780 x 620					
Dimensions of outdoor unit W x H x D	mm	800x600x300		950x943x330		950x1350x330	

*apply to (V, Phase, Hz) 220-240 V, 1~, 50 Hz

**optionally available in energy class A

Technical Data WP QLi K		5022.5Pi	5028.5Pi	5033.5Pi	5042.5Pi	5056.5Pi
Heat output (A7/W35)	kW	2x11.2	2x14.0	3x11.2	3x14.0	4x14.0
Number of outdoor units		2	2	3	3	4
Cooling output A35/W7	kW	2x9.1	2x12.0	3x9.1	3x12.0	4x12.0
Power consumption of heat pump*	W	2x120	2x120	3x120	3x120	4x120
Heating water flow rate, (A2/W35) (Δt=5K)	m³/h	3.6	4.0	5.4	6.0	8.0
Air volume flow (every outdoor module)	m³/h	2x6600	2x6600	3x6600	3x6600	4x6600
Fan motor, max. power consumption (every outdoor module)	W	2x60	2x60	2x60	2x 60	2x 60
Operating limits		A-15/W45 ; A-5/W55				
Compressor		hermetically sealed, speed adjustment				
Refrigerant		R410A (pre-filled)				
Refrigerant volume	kg	2.5	2.5	3.5	5.0	5.0
Sound pressure level at 1 m distance (outdoor module)	dB(A)	46	46	48	51	52
Sound pressure level at 5 m distance (outdoor module)	dB(A)	37	38	37	38	38

Electrical data						
Electrical power supply (380-415 V, 3~, 50 Hz		•	•	•	•	•
Starting current (every outdoor unit)	A	<8	<10	<8	<10	<10
Max. operating (every outdoor unit)	A	<8	<10	<8	<10	<10
Max. operating current (complete)	A	<16	<20	<24	<30	<40
Customer-supplied control fuse	A	32	32	32	32	50
Control fuse on site	A			10		
Electrical resistance heating	kW			6 (3x2)		

Dimensions, weights, connections						
Weight of outdoor module	kg	2x 135	2x 135	3x 135	3x135	4x135
Weight of indoor unit	kg					
Heating connections		Hzg. 2" ext.				
Dimensions of indoor unit W x H x D	mm	700 x 1300 x 500				
Dimensions of outdoor unit W x H x D	mm	950 x 1350 x 330				

*optionally available in energy class A

Note:
According to law, the installation of the refrigerant system and commissioning of split air/water heat pumps is only to be performed by certified persons with proof of qualification according to §5 of the Climate Protection Regulation on Chemicals. WATERKOTTE offers according training. WATERKOTTE partners can also request support during initial installation and commissioning.

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