

Planning and installation

EcoTouch Ai1 Geo

Heating station



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NOTICE

Do not release R410A into the atmosphere:

R410A is a fluorinated greenhouse gas according to Kyoto Protocol and has a global warming potential (GWP) of 2088.

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1 Safety

1.1 Intended use

Your WATERKOTTE heat pump is used for space heating and cooling, and heating of domestic water.

Project planning of the heat source system must be performed in compliance with the technical information provided by WATERKOTTE for layout of heat source systems.

Heat pump shall only be turned on after the refrigerant connections are completely filled, and the other hydraulic circuits are completely filled and vented, and all electrical connections are properly completed.

Commissioning may only be carried out by trained professionals. Damages caused by non-compliance with above mentioned items are not covered by the warranty (see enclosed Exclusion of Warranty).

NOTICE

Risk of total loss!

The device may only be switched on when the hydraulic circuits are **completely filled and vented**, and all electrical connections are properly.

1.2 Basic safety precautions

1.2.1 Keep information available

In addition to the operating manual, also furnish operating instructions in terms of Labour Protection Law and Work Equipment ordinance.

Keep all safety and operating signs on the heat pump in fully legible condition at all times. Replace damaged or illegible signs immediately.

1.2.2 Before initial use

Before initial use of your WATERKOTTE heat pump, familiarise yourself with:

- Operating and control elements of your WATERKOTTE heat pump
- Equipment of heat pump
- Operation of heat pump
- Immediate surroundings of heat pump
- Safety devices of heat pump

Before initial start, perform the following steps:

- Ensure that all safety devices are installed and function as intended.
- Check heat pump for visible damage. Remedy any detected defects immediately. Heat pump must be in perfect condition during operation!
- Ensure that only authorised personnel is in the work area of the heat pump and that no other persons are endangered when heat pump is started.
- Remove all objects and other materials that are not required for operation of

the heat pump from the work area of the heat pump.

1.2.3 Environmental protection

- Observe the regulations regarding waste avoidance and proper waste recycling or disposal when performing any kind of work on and with the heat pump.
- Ensure that particularly during installation and maintenance work, as well as when placing out of operation, pollutants such as grease, oil, refrigerant, solvent- containing cleaning fluids, etc. do not contaminate the ground or enter the sewer system!
These materials must be collected, stored, transported and disposed of in appropriate containers.

1.2.4 Modifications and repairs on the heat pump

For safety reasons, no unauthorised modifications shall be performed on the heat pump.

Thus, all intended modifications are subject to written approval by WATERKOTTE.

Use only original spare parts from WATERKOTTE.

Original spare parts are specially designed for your heat pump. Externally procured parts provide no guarantee that they are designed and manufactured in compliance with relevant usage and safety requirements.

Parts and special equipment not delivered by WATERKOTTE are not approved for use on the heat pump.

1.3 Hazards

Observe the following points to avoid life-threatening injuries and damages to the heat pump during operation:



Warning! Risk of electric shock!

Do not use water or other liquids to clean the unit!

Keep all electrical supply units locked at all times!

Any work on the electrical equipment of the heat pump shall only be performed by professional electricians!



Discharging refrigerant can cause severe personal injury (suffocation or hypothermia)!

Avoid contact with refrigerant!

Note the minimum volume of the installation room and consider the type of the refrigerant (EN 378-1).

⚠ WARNING**Risk of burns!**

During operation, surface temperatures (compressor and pressure line) can climb above 100 °C or drop below 0 °C.

Do not remove housing cover during operation!

Allow heat pump to cool down before removing cover.

⚠ WARNING**Risk of injury!**

Risk of chemical burns when skin comes in direct contact with lubricant leak.

Wear suitable clothing when performing maintenance work on the heat pump!

⚠ WARNING**Risk of injury in case of leakage in cooling circuit!**

Skin contact with refrigerant may cause freezing of tissue and frostbites. High vapour concentrations can cause headaches, dizziness, fatigue, nausea and even unconsciousness. Irregular heartbeat (arrhythmia).

Avoid contact with refrigerant! Do not expose to heat, sparks, naked light or other ignition sources!

NOTICE**Risk of total loss!**

The heat pump is not a toy!

Keep children away from the heat pump, in particular from the operating input device (touch screen). Read the accompanying technical manual.

NOTICE**Electrostatic charge!**

Electronic components can be damaged by electrostatic processes.

Ground yourself before touching electronic components.

NOTICE**Risk of total loss!**

Repeated restart of heat pump can result in total loss!

In case of heat pump failure, before restart an inspection by qualified and authorised personnel must be performed.

NOTICE

Due to test bench operation, the heat pump can have ethylene glycol residues.

NOTICE**Risk of total loss!**

The device may only be switched on when the hydraulic circuits are **completely filled and vented**, and all electrical connections are properly.

1.4 Specific types of hazards

To avoid damage to machine or life-threatening injuries during installation of machine, the following points must be observed:

- Machine parts that are improperly placed or incorrectly attached can fall down or overturn.
- Sharp-edged machine parts that are still exposed and accessible can result in injury.
- Incorrectly installed lines (e.g. insufficient bending radius) can cause smouldering and cable fires.

1.5 Operator's duty of care

National regulations must be applied and complied with when commissioning and operating this heat pump. The system operator is responsible for this.

Your WATERKOTTE heat pump has been designed and built on the basis of a risk analysis and after careful selection of standards to be observed. Thus, your heat pump is state-of-the-art and provides for maximum safety. In practice, however, this safety can only be ensured by taking all necessary measures. As operator of the heat pump it is your responsibility to plan these measures and oversee their implementation.

You must ensure that:

- The heat pump is only used as intended (see also chapter 1.1, „Intended use“).
- The heat pump is only operated in perfect, fully functional condition and safety devices are checked regularly to ensure that they are working properly.
- The operating manual is available in perfect condition at the heat pump at all times.
- The heat pump is operated, maintained and repaired only by adequately qualified and authorised personnel.
- None of the safety and warning notices on the heat pump are removed or damaged.

1.6 Other applicable documents

- Operating manual: WWPR WATERKOTTE heat pump controller.

2 Functional principle of heat pump

The heat pump is used to produce thermal energy for space heating and domestic water heating if required. The medium used as heat source (WQ) is the ground.

It is also possible to cool a building.

To utilise ground as thermal energy, for domestic water heating and cooling in your home, you need the following:

- a heat source (borehole with geothermal energy probes or groundwater extraction / discharge)
- heating system EcoTouch Ai1 Geo
- domestic hot water tank

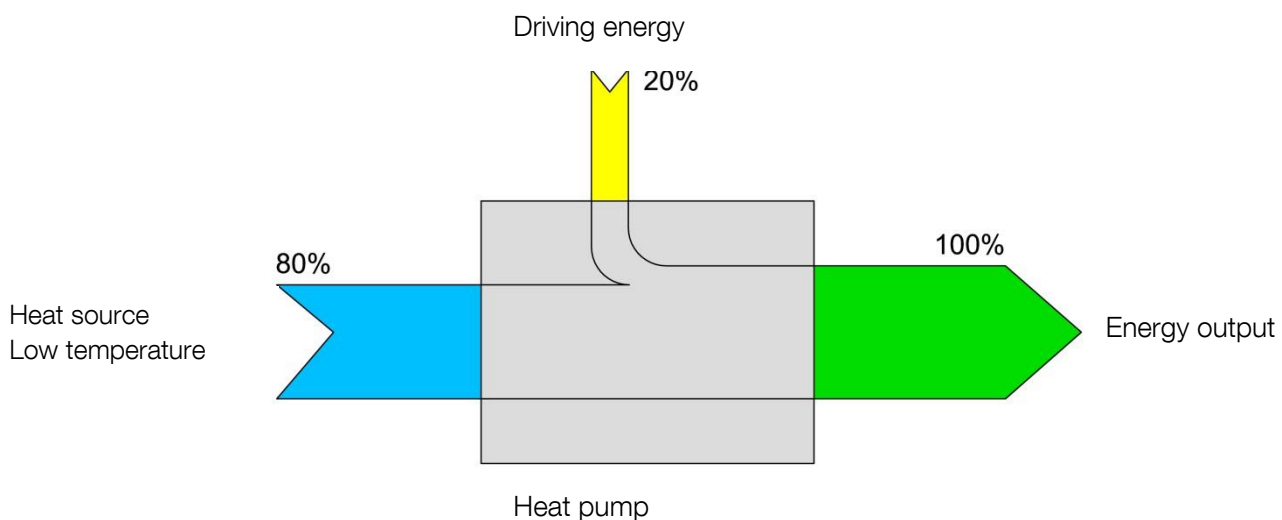


Figure 1: Energy share when using a geothermal energy pump

2.1 Description

The WATERKOTTE heating central EcoTouch Ai1 Geo uses a heat pump as heat generator. At the heat source side the medium is cooled down in the vaporizer about 3 to 4K with the help of this device. The hereby won energy is made usable for heating purposes by transport through the cooling circle up to a higher temperature level.

Heating energy is given to the medium about the liquefier at the heating side, so a temperature rise about 5K is reached.

On this way building heating and domestic water heating can be done.

Outside the heating period the heat source installation can be used as heat sink for the cooling of the building (option natural cooling).

The configuration of the heat source system must be planned in accordance with the technical information of WATERKOTTE GmbH heat source installation instructions.

3 Product description

3.1 Overview

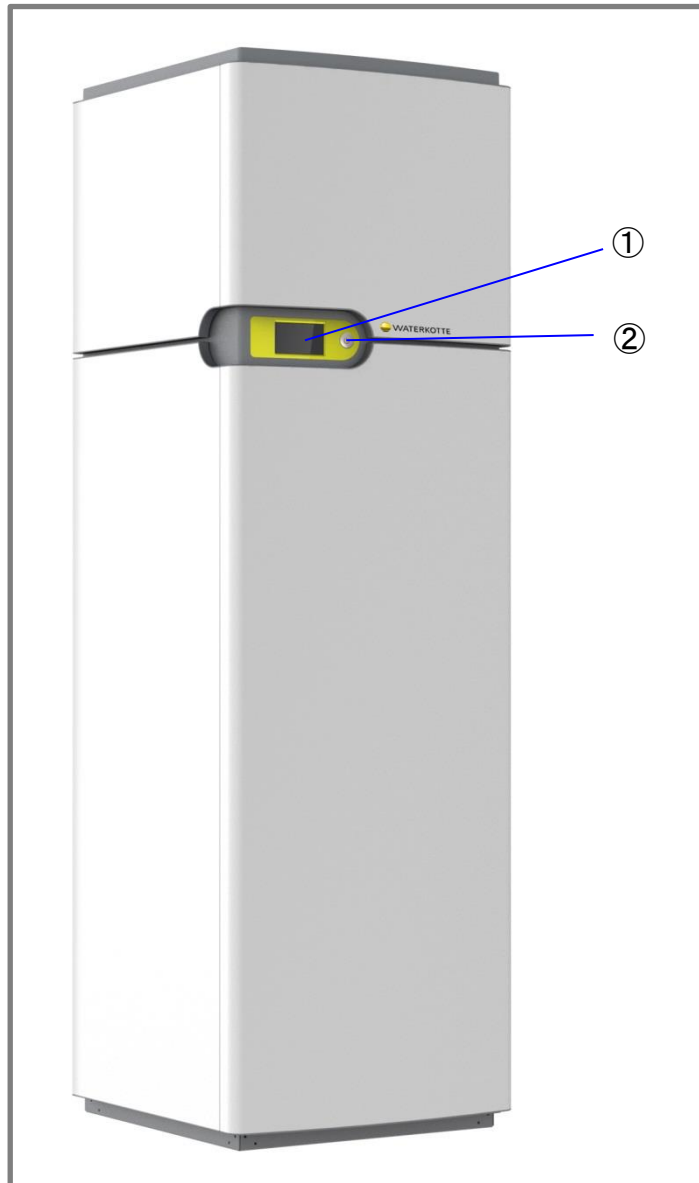


Figure 2: EcoTouch Ai1 Geo (closed)

1	Touch Display
2	ON / OFF switch

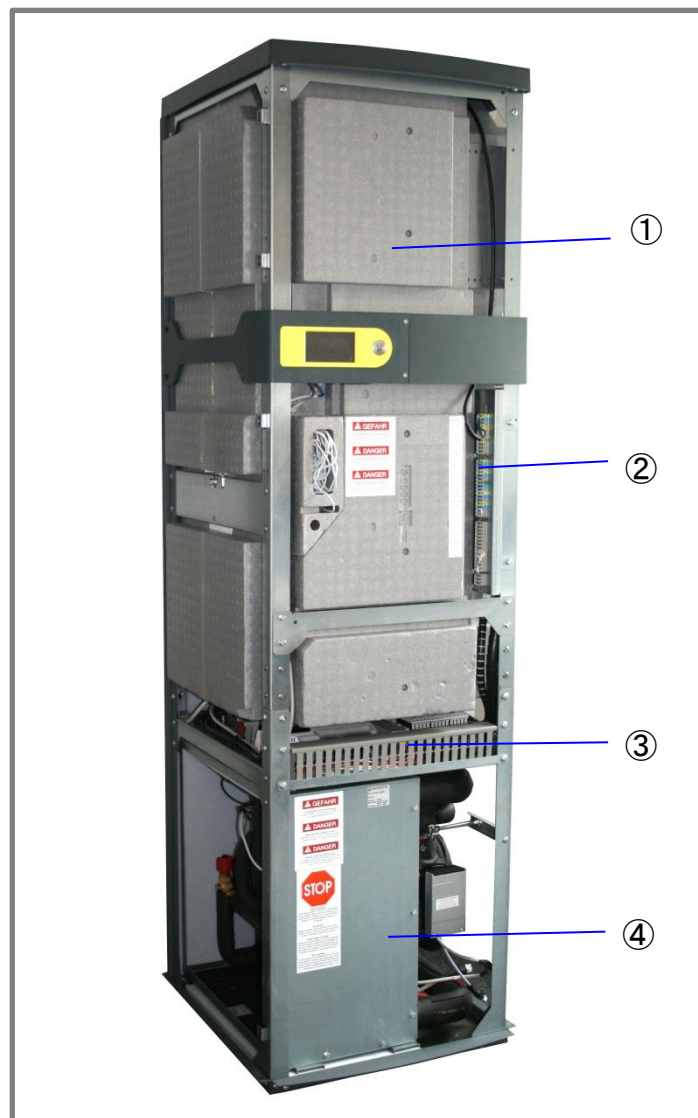
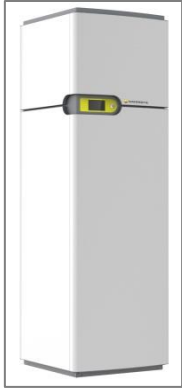


Figure 3: EcoTouch Ai1 Geo (open)

1	Tank for domestic hot water
2	Connecting terminal (400 V – series)
3	Control board (extricable)
4	Heat pump with thermobox (compressor, heat exchanger, expansion valve, ...)

4 Components and installation

4.1 Heating system EcoTouch Ai1 Geo



All components of the heating system are mounted in a protective steel plate housing which is intended for installation inside. The base frame consists of a bent, thick-walled sheet steel. Together with the rear panel frame, which also consists of a thick-walled sheet steel, it forms a unit. Side panels, cover, front and the tilt-mounted, ergonomic control panel can be removed.

All housing parts are available in high-gloss white. Sound insulation ensures low noise emissions.

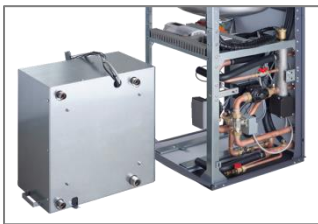
4.2 Structure



The EcoTouch Ai1 Geo series is a complete hot water heating system with integrated central hot water supply, consisting of heat generator (heat pump), heat source system, electrical heating element for start up and stand by, electrical control, domestic hot water tank made of stainless steel (204 I, insulated with integral foam), complete electrical and control engineering, touch display with Easy-Con Software, smartphone control via Easy-Con Mobile software, diagnosis system.

All hydraulic connections are placed on the back side. All modules in the framework are law vice fitted with removable, heat and sound insulated housing, color signal white (RAL 9003).

4.2.1 Heat pump module



The heat pump module includes the entire hydraulic technik.

The thermobox consisting of compressor and heat exchanger is enclosed and includes a "Silenter" for vibration damping.

This ensures low operation noise of about 43 dB (A) - 45 dB (A), depending on model.

For service purposes, the thermobox can be completely dismantled (see figure).

4.2.2 Compressor



The compressor features a fully hermetic design in approved leading scroll technology (fig. left). Evaporator and condenser are designed as soldered stainless steel plate packs with reverse flow circuits, according to state-of-the-art development, tailored to the new non-flammable safety refrigerants that will be required by law in the future. In combination with ester oil (biodegradable), this guarantees optimum lubrication conditions, low friction losses and therefore the highest possible life expectancy for the compressor according to the latest industrial research findings.

The cooling circuit is designed in accordance with the relevant safety regulations. Manufacturing quality is carried out based on ISO 9000ff, supplemented by an automated computer-monitored quality test (pressure stress and helium leak test) in addition to inspection of all parameters in a subsequent trial run.

4.3 Electrical equipment

The electrical connections are made via the internal terminal (on the construction profile). The implementation of the electrical cable is carried by the rear wall (with the strain relief).

The internal terminal connects the entire sensor, all queries, all relay outputs, digital circuit, the compressor and the electrical heating element. The WATERKOTTE WWPR-controller is supplied with a control panel mounted on the 24 VAC transformer.

An integrated web interface is available for remote monitoring via the Internet.

4.3.1 Electrical resistance heating

Located in the heating flow, power 6 kW. Used to support initial heating in the winter and during the standby function; automatic or independent control via the built-in mechanical thermostats.

4.3.2 Domestic hot water heating system

Consisting of: heating circulation pump (speed-controlled / energy class A), air separator with automat. air diverter, connections for heating flow and return are fitted externally to facilitate installation in the rear panel frame.

4.3.3 Natural cooling

The components of the natural cooling are factory fitted.

4.3.4 Heat source

Consisting of: heating circulation pump speed-controlled / energy class A, connections for heating flow and return are fitted externally to facilitate installation in the rear panel frame.

4.3.5 Electronic heat pump control

The heat pump control (control panel is pictured) is included in the delivery scope of the WATERKOTTE heat pump.

Use in other than WATERKOTTE heat pumps will void any warranty claim.

The control is used to control and monitor heating systems that are operated with WATERKOTTE compact heat pumps according to technical guidelines of WATERKOTTE Wärmepumpen GmbH.

The following tasks are performed: everything to do with regulation (depending on the external temperature with pilot room guidance), control, monitoring, self-diagnosis, saving of data in cases of breakdown.

NOTICE

WATERKOTTE explicitly states that function warranty will become void if used on systems not approved by WATERKOTTE. Any liability for consequential damages due to incorrect function within these systems shall be explicitly excluded.

Info: Technical details, operation and warning messages (see *Operating manual for Heat pump control*).

4.3.6 Sensors

The control's sensor system consists of: Pressure transmitter for evaporation and condensation pressure, sensors for temperature detection in all circuits, external wall sensor in accessories kit, pilot room sensor and hot water sensor (optional).

4.3.7 COP counter

A WATERKOTTE COP counter is already integrated in the heat pump control. For additional information, please refer to *Operating manual for Heat pump control*.

4.3.8 Options

Mixer accessories: sensor, additional control module.

Expansion kit: for pool heating, thermal use of solar energy, mixer circuits.

Pool accessories: sensor, 3-way-valve, additional control module.

Buffer tank: standard tank.

Heat source accessories: heat exchanger for ground water, flow rate monitoring, antifreeze concentrate, heat source distributor.

Solar accessories: sensor, additional control module, heat exchanger, solar collectors.

Heating: underfloor heating system, underfloor heating head station, distribution cabinet, convectors.

Heat pump accessories: Digital soft starter (for retrofitting at 3 x 400V compressor design).

4.4 Hydraulic equipment

4.4.1 Domestic water heating technology

Heat exchanger made in high vacuum solder technology that works for indirect water heating up to 60°C.

4.4.2 Domestic hot water tank (not DS 5018)

In system-specific design, volume 204 l, operating pressure 10 bar. tank made of stainless steel, insulated with Neopor RG, (heat loss < 80 W at 60 °C). Connections for cold and hot water in the rear. An automatic legionella protection circuit ensures hygienic quality of drinking water.

Note: Accessories as fittings, additions and security group and expansion vessel are not included. They are optionally available.

4.4.3 Heat transfer medium

The unit may only operate with heat transfer media approved by Waterkotte. These are Water-Glycol-mixes:

- 25 Vol. % Waterkotte-Ethylen-Glycol or
- 33 Vol. % Waterkotte-Propylen-Glycol

4.4.4 Use of passive Cooling

The heat source circulation and the heat use circulation are connected hydraulically. Therefore, both systems run with the same heat transfer medium.

5 Transport

For easy transport the heat pump will be supplied in three packaging: hot water tank , heat pump unit and housing.

- Exercise particular caution when transporting the units. Since the unit weighs 208 kg up to 225 kg at least two people are required for transport. Do not use the packaging straps to carry the unit. Wear protective gloves for unpacking and transporting the unit to prevent hand injuries from cooling fins or other parts.
- Observe the transport information on the packaging.
- Observe the specified storage requirements.
- The units may not be stacked.
- Machine may only be lifted at the provided attachment points, ref. to photo: Pos. 1 und Pos. 2.

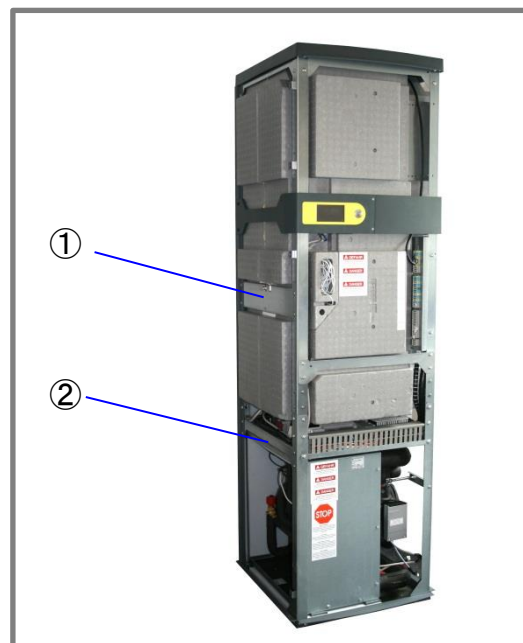


Figure 4: Attachment points (left side)

- Machine may only be transported in upright position.
- Ensure proper disposal of packaging materials. Packaging materials, such as nails or other metal or wooden parts, may cause injuries.
- Please also read chapter "General safety information".

5.1 Transport to installation site

Units of the EcoTouch Ai1 Geo series are delivered ready-to-connect with separate metal cladding. For transport purposes, the metal cladding and the heat pump are delivered in one carton on a palette. During transport it must be ensured that appropriate means of transport are used (lift truck, transport rollers, handcart).

Even at the installation site the devices are mounted above each other.

NOTICE

Unit must be transported upright!
Transport in tilted position (45°) is permitted only temporarily during insertion.
Horizontal transport results in oil displacement in compressor and can cause damage during start-up.

NOTICE

After carton is removed or opened it is not permitted to tilt the unit by applying pressure to the pipelines or housing enclosure; this could result in bent housing parts and pipelines.

6 Installation

- Installation of the heat pump must be performed on a flat and horizontal surface.
- We recommend a concrete base.

Recommendation:

- Wall clearance left, right and on top must be at least 400 mm.
- Wall clearance in rear must be at least 200 mm.
- Wall clearance in front: at least 1.000 mm

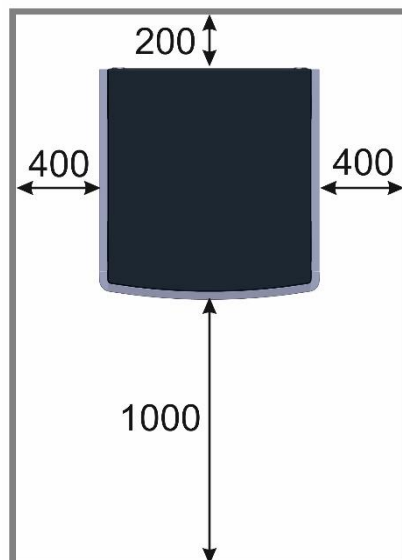


Figure 5: Recommendation - wall clearances

6.1 Environmental conditions for installation

The room must be dry. Room temperature should be between +10 °C and +30 °C.

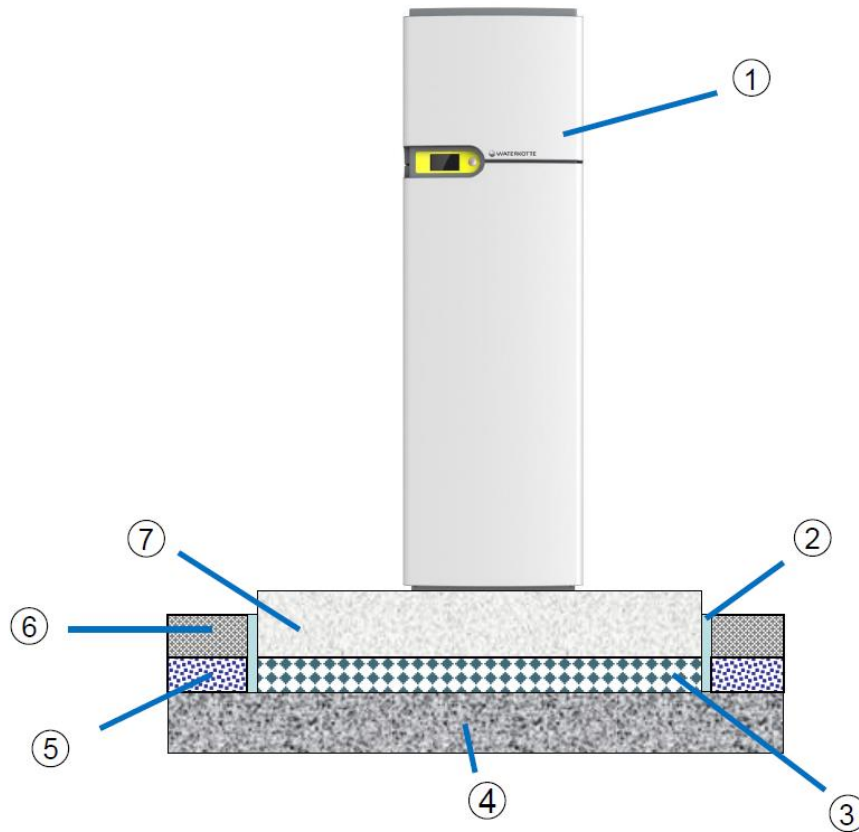
To facilitate maintenance, the use of a base plate is recommended. The housing frame is to be completely supported. If support is only provided at points, operating noise increases. To compensate for minor unevenness, we recommend use of an approx. 10 mm thick rubber mat. Acoustics in installation rooms with rigid walls can noticeably increase operating noise.

Counter measure: acoustic insulation of one of the opposite wall or ceiling surfaces.

6.2 Creating the foundation and installing heat pump

- with best possible structure-borne noise insulation

6.2.1 Installation of heat pumps



1	Heat pump
2	Insulation strip (polyethylen / PE)
3	Insulation material (3 layer, polyurethan rubber)
4	Supporting subsurface
5	Insulation material
6	Screed
7	Concrete plinth

Dimensions concrete plinth (mm)

Series	Width	x	Depth	x	High
ECOTouch Ai1 Geo	850	x	880	x	150

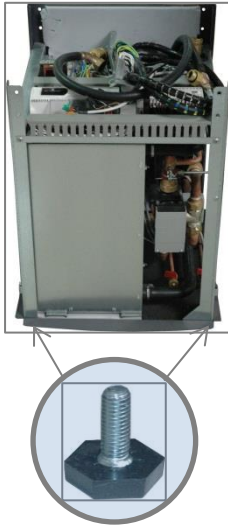
7 Installation of heat pump and domestic hot water tank

7.1 Connection accessories

Item No	Description	EcoTouch Ai1 Geo
Z13122	Outdoor wall mounted sensor (accessories box heat pump)	1
Z18595	Screw (fillister head) (M8 x 16 ISO 7380 galvanized) for fixing of the construction	16
Z20223	Screw for Wüplast W1423 4x12 galvanized, cross slot	2
Z13679	Gasket 30.5 x 19.5 x 2 mm Klingersil for 1", connection of the tank	2
Z14872	Gasket 38 x 27.5 x 2 mm Teadit TF1570 for 1 1/4"	4
Z13113	Allen screw M 6 x 16 DIN 933 8.8 galvanized (mounting of the 400 V / 230 V terminal)	2
Z13113	Allen screw M 6 x 16 DIN 933 8.8 galvanized (mounting of the 230 V terminal)	2
Z20240	Installation manual EcoTouch Ai1 Geo	1
Z20432	WWPR manual	1
Z15312	Installation document: Acceptance and Installation Data	1
Z20086	Removing Tool (for the removing of the housing)	1
Z13683	Bleeder (upper part, (shut-off device already mounted on the tube), for installation by connecting the upper tank connection.	1

7.2 Installation

7.2.1 Installation of the heat pump module



- Transport the heat pump module to the intended site. Align the heat pump module in a horizontal position. To do this, use the set screws for height adjustment (under the corners of the unit), width across flats 30 mm

7.2.2 Preparation of the assembly

After completion of assembly the supply lines have to be accessible. Arrange them as follows:

- Place the connecting tubes (1) of the tank at the side of the unit (right)
- Place the terminal strip (2) for the electric connection and the connection of the display (3) at the front of the unit (right), see photo.



Arrangement of hoses and cables before assembly

7.2.3 Assembly of the heat pump



Put the domestic hot water tank on the heat pump module in a way that steel profiles engage with each other and aligned the rear walls clean. Retain the construction at every steel profile and on the rear wall with the enclosed 16-lowing screws (fillister head) (M8 self-locking, Z18595).

Note: To mount the tank module two people are needed. The tank module weighs at least 65 kg.

Tip: To simplify installation, first install the screws on the rear panel.

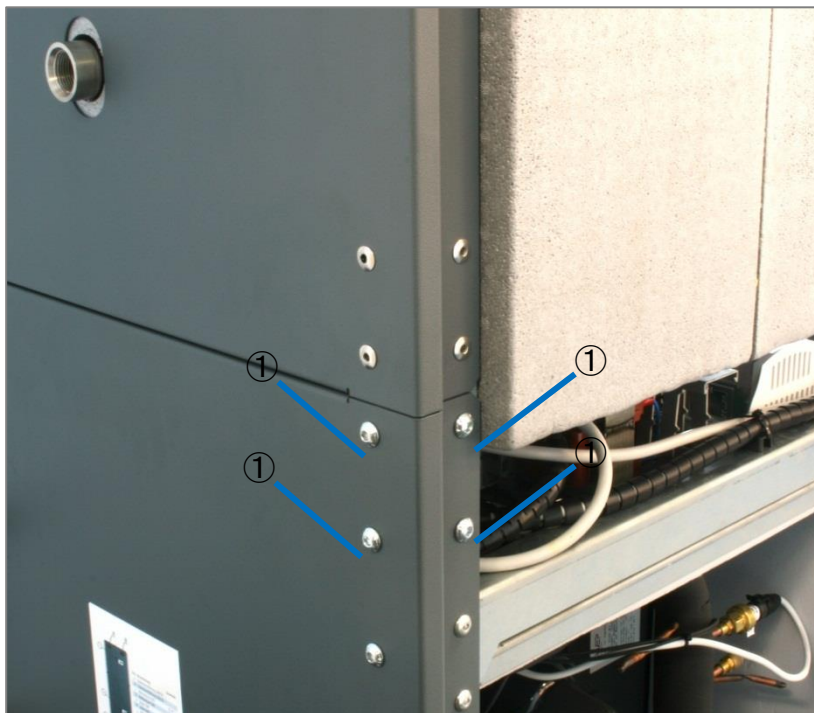


Figure 6: Rear panel retained with screws (Pos. 1)

7.2.4 Connection tube of the tank (at the top)

The upper tube connection can not be directed through the insulation with an installed bleeder. Therefore, the upper part of the bleeder has to be mounted finally.

Procedure:

- Remove the yellow plug
- Install the tube connection at the hot water tank.
- Then fit the top of the bleeder (Z13683) on the tee of the connection tube (see pointing arrow).
- Use the supplied gasket (Z13679).

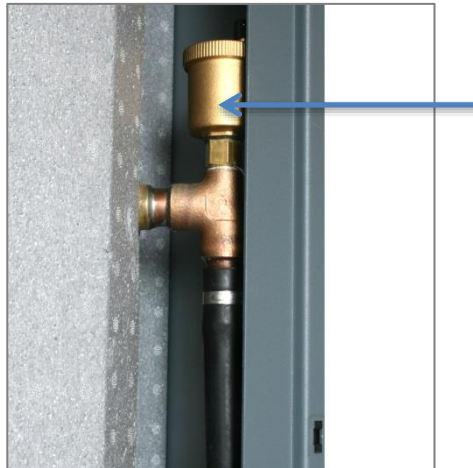


Figure 7: Connection tube (at the top) with bleeder

7.2.5 Connection tube of the tank (bottom)

The lower connection tube has no bleeder. Remove the yellow plug and mount the tube connection at the hot water tank. Use the supplied gaskets (Z13679).

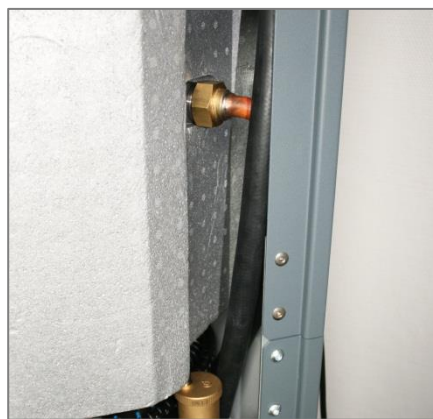


Figure 8: Lower connection tube

7.2.6 Installation of the connection terminal

The terminals are installed on a mounting plate. Fix the mounting plate to the structural frame at the front of the heat pump (screws Z13113).

Note the different mounting positions for the 230 V and 400 V variants (see figure 9).

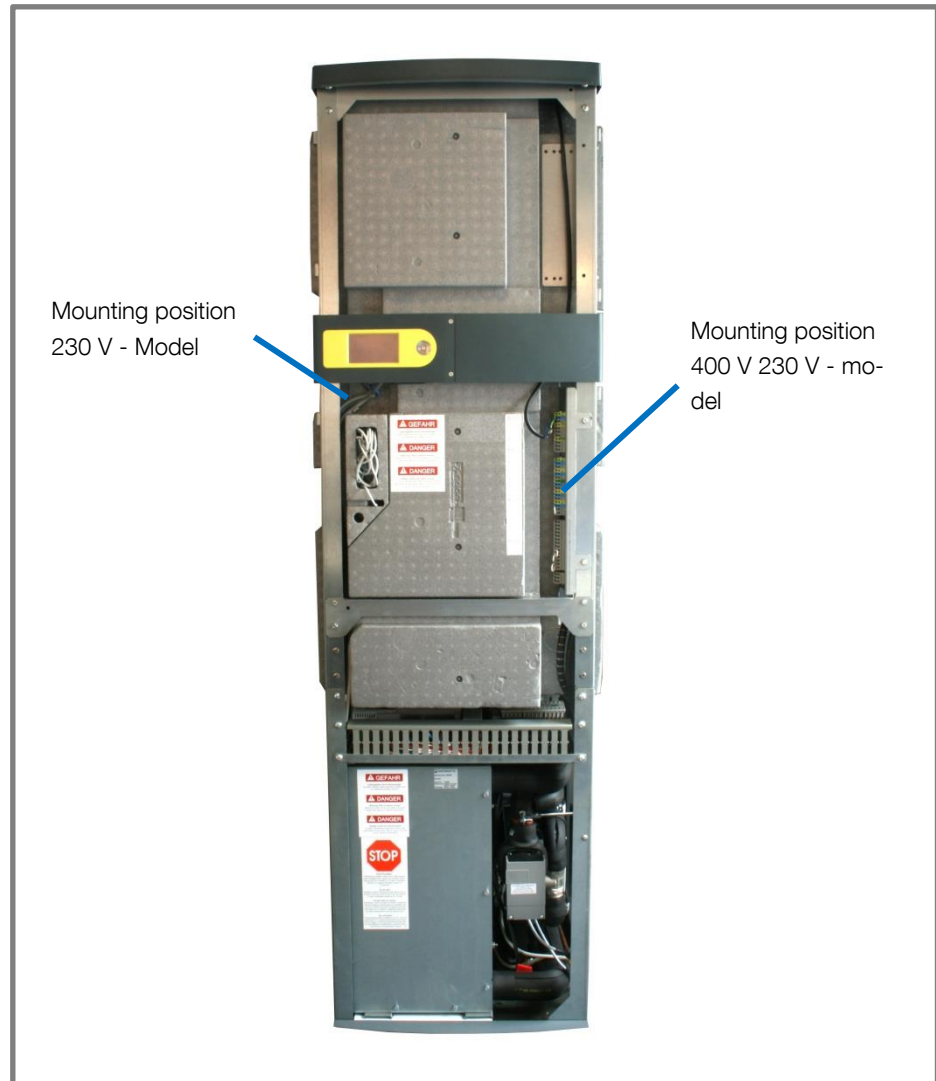


Figure 9: Mounting positions

7.2.7 Connection terminal (400 V / 230 V)



The cable ends are wired to the terminal strip. It is fixed to the storage module beforehand during installation. From there, factory-connected cables run to the electrical control panel.

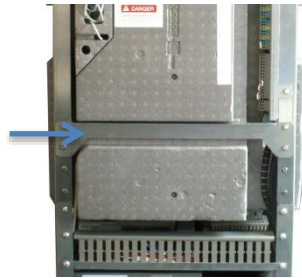
It is not necessary to work on the electrical panel to connect the external electrical wiring.

7.2.8 Connection terminal compressor and e-heater (230 V)



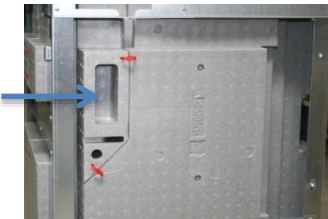
Mounting position see chap. 7.2.6.

The connection terminal (230 V items) has to be mounted at the heat pump, see arrow. Therefore, you have to remove the isolation bloc. The terminal positions are described in chapter 9.4.

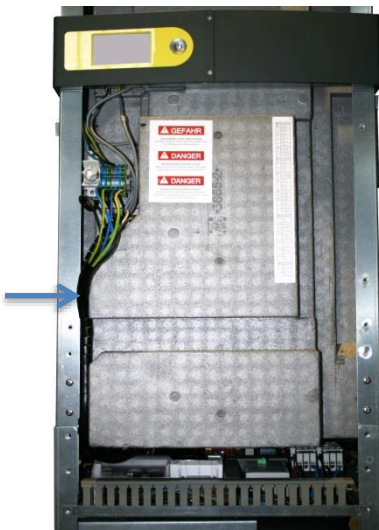


Procedure:

- Remove the construction bar.



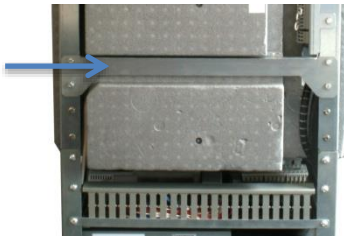
- Remove the isolation bloc. It is no longer needed.



- Lay the connection line next to the construction, see photo.



- Fit the connection terminal at the construction with two screws.



- Fit the construction bar.

7.2.9 Installation of the temperature sensor

The supplied temperature sensor must be inserted into the immersion sleeve of the domestic hot water tank.

Procedure:

- Remove the insulation of the hot water tank (400 V heat pump), see figure 10.

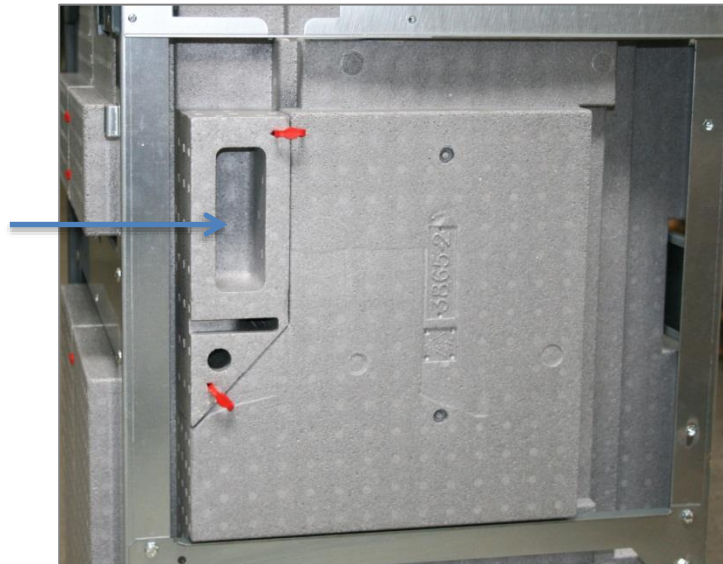


Figure 10: Remove this insulation (see pointing arrow)

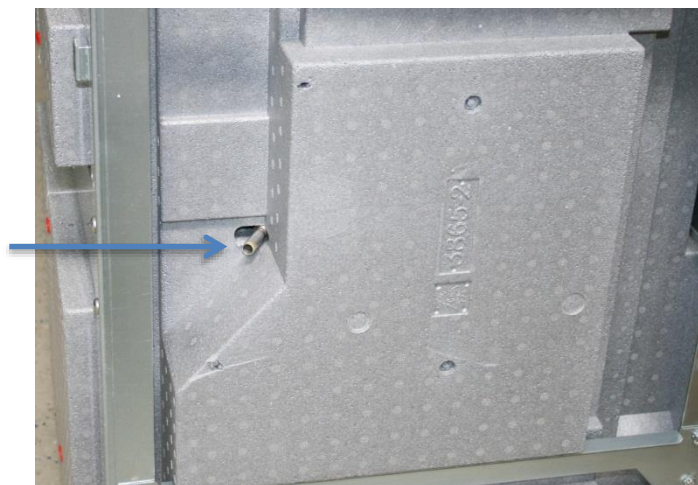


Figure 11: Immersion sleeve (see pointing arrow)

- The temperature sensor has a clamping strap to secure positioning in the immersion sleeve. Before installing bend the clamping strap in the correct position (see figure 12).

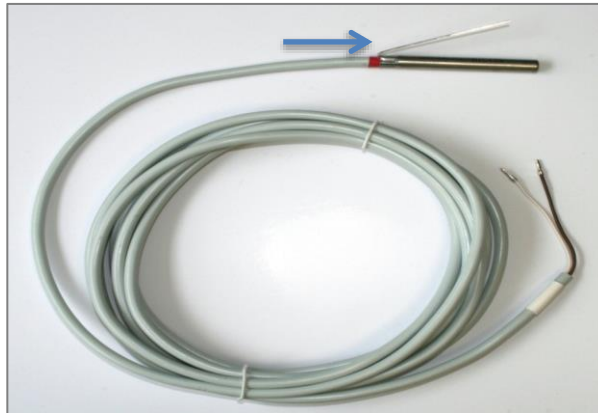


Figure 12: Temperature sensor with clamping strap (see pointing arrow)

- Then push the temperature sensor into the clamping strap of the hot water tank to the end position (see Figure 14).



Figure 13: Clamping strap with temperature sensor of the hot water tank



Figure 14: Temperaturfühler bis zum Anschlag eingeschoben

- Connect the temperature sensor to the connection terminal (terminal configuration see chap. 9). Finally, assemble the insulating and fix it with the retaining clips.

7.2.10 Installation of the Touch Display

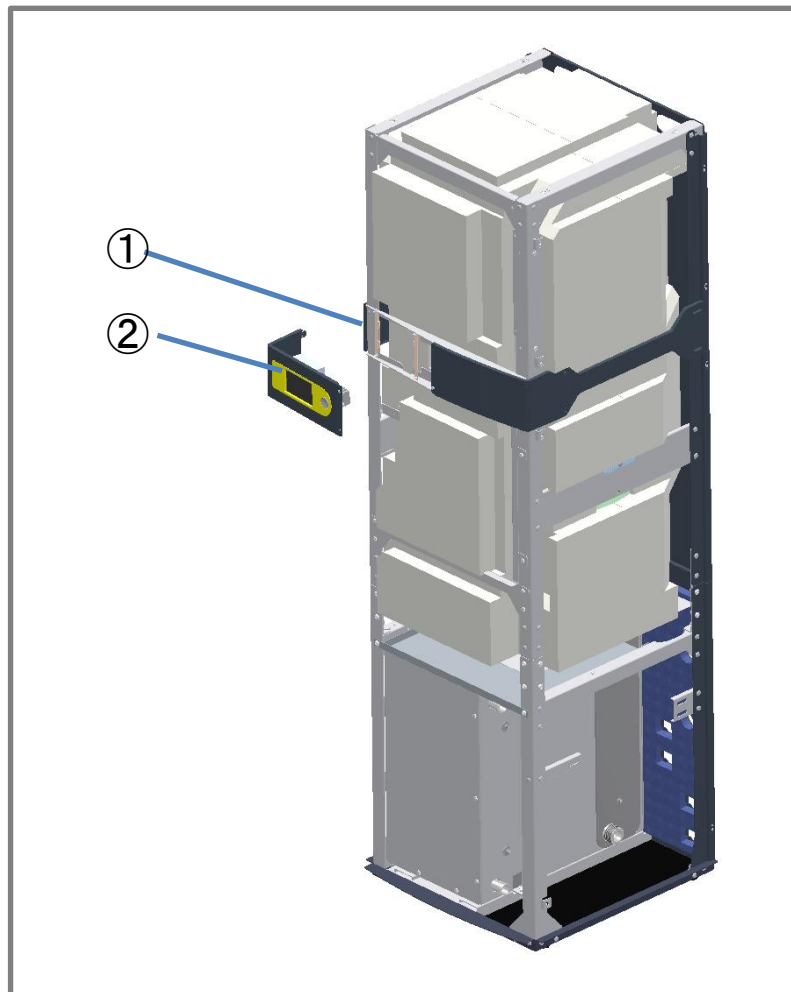


Figure 15: Installation of the Touch Display

The touch panel (2) is attached before installing the housing parts.

Procedure:

- Plug the connector of the prefabricated cable into the sockets on the back of the touch panel.
- Connect the power switch to the cord (X4). Attach the cable to the left steel profile (cable ties are included).
- Slide the tabs of the touch panel in the recordings (1) of the heat pump frame (on the left).
- Fix the frame of the touch panel with two screws (Z20223).

7.2.11 Installation of the housing

To avoid damage, the delivered housing parts are not installed.

After preparation of all connections, mount the housing parts to the intended positions (insert and press). Note the order of assembly (see illustration).

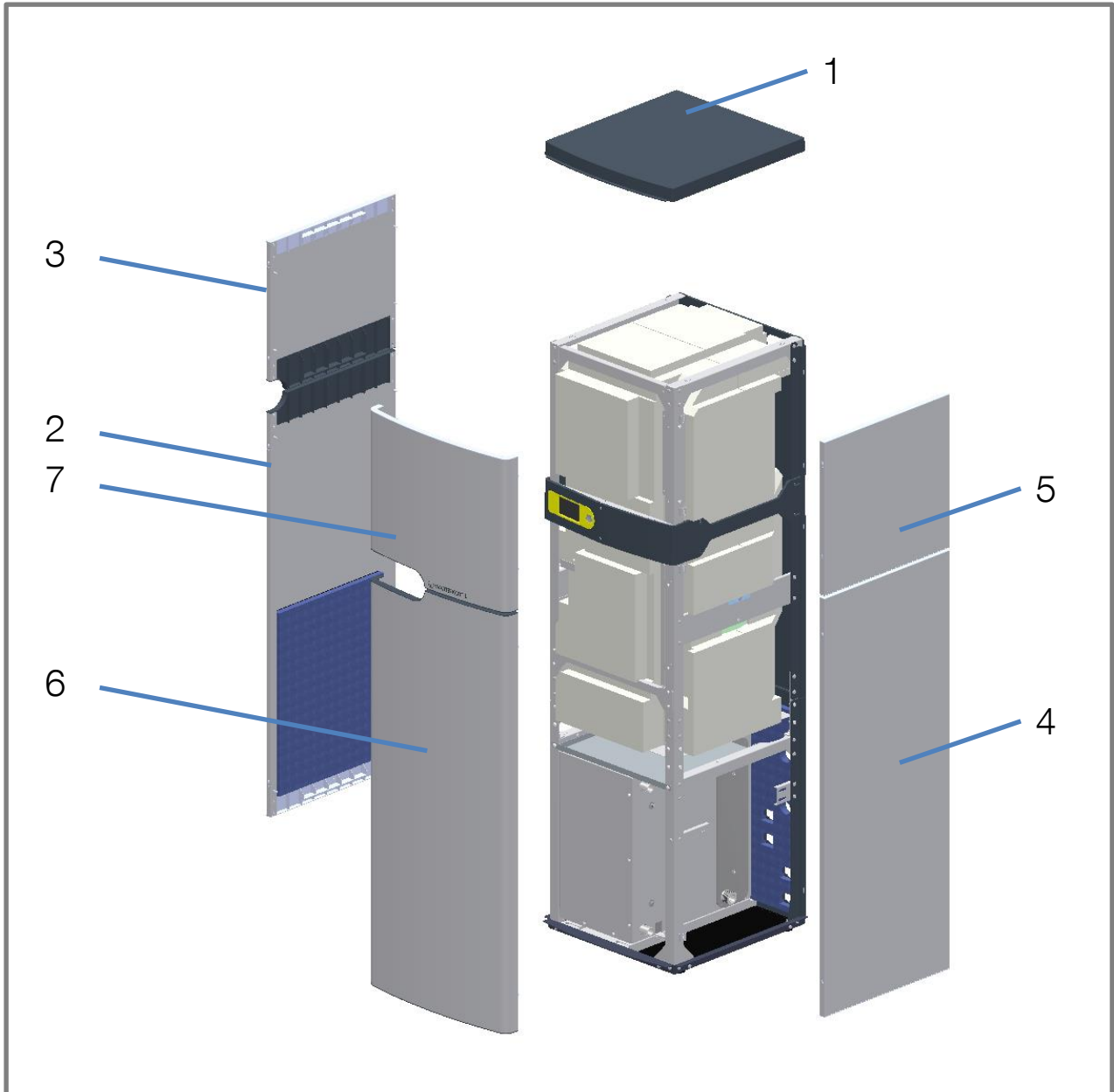


Figure 16: Order of assembly of the housing parts

7.2.12 Removing the housing



A disassembly tool is delivered with the heat pump. Use this tool to avoid damage while you are removing the housing parts.



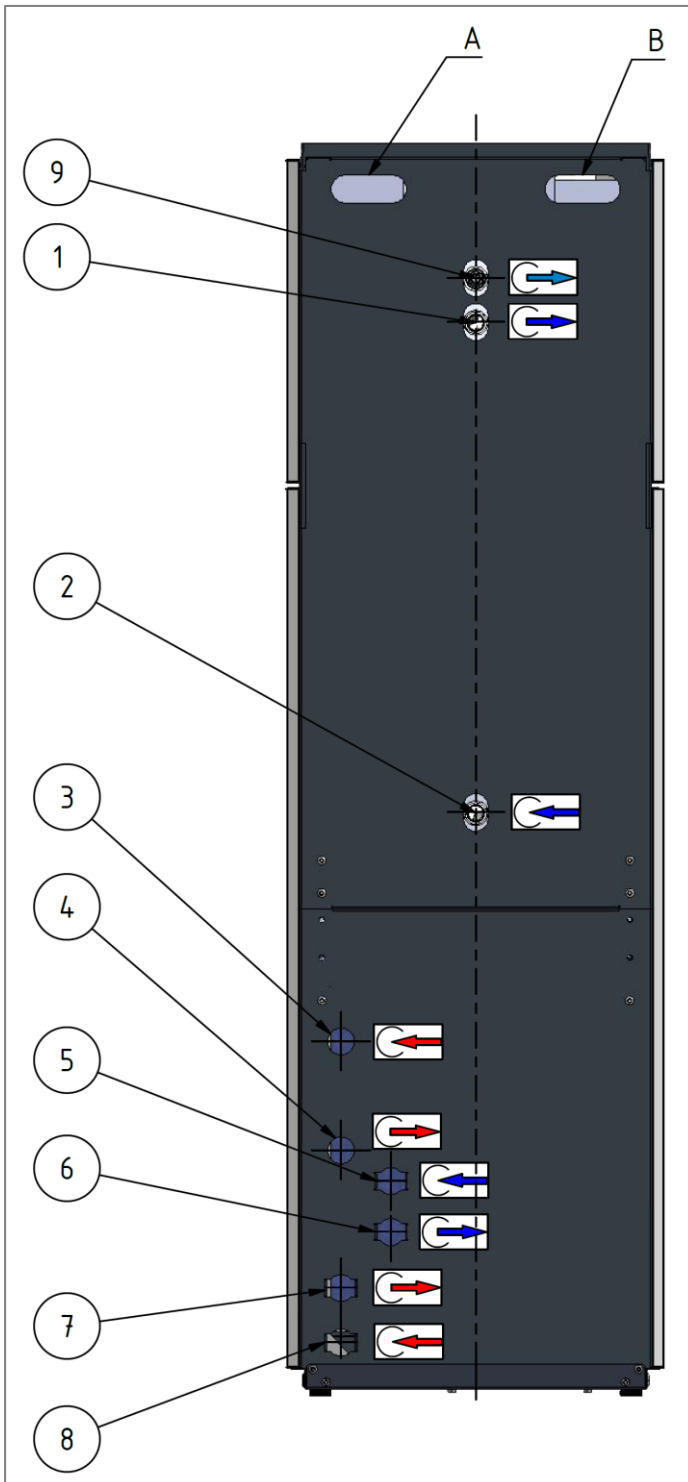
The housing parts are removed in reverse order of assembly (see figure 16).

Procedure:

- Keep enough clearance with the tool to the upper and lower metal edge. So you can't damage the retaining bolts (see Figure).
- The removal tool is driven with moderate force, by hand, into the gap between the front and side panel.

8 Installation and connection

8.1 Overview (rear side)



Pos.	Description	Thread
A	Raccords connections (400 V) for compressors, electrical heating element, sensor etc.	
B	Raccords connections (230 V) for compressors and electrical heating element	
1	Hot water OUT	G ¾" i
2	Cold water IN	G ¾" i
3	Solaire IN	G ¾" i
4	Solaire OUT / Membrane expansion tank	G ¾" i
5	Heat source IN (heat pump entry)	G 1¼" a flat sealing, gasket: Z14872
6	Heat source OUT (heat pump exit)	G 1¼" a flachdichtend, Dichtung: Z14872
7	Heating flow	G 1¼" a flat sealing, gasket: Z14872
8	Heating return	G 1¼" a flat sealing, gasket: Z14872
9	Special connection for pressure relief valve (UK)	G ¾" i

8.2 Dimensions (EcoTouch Ai1 Geo)

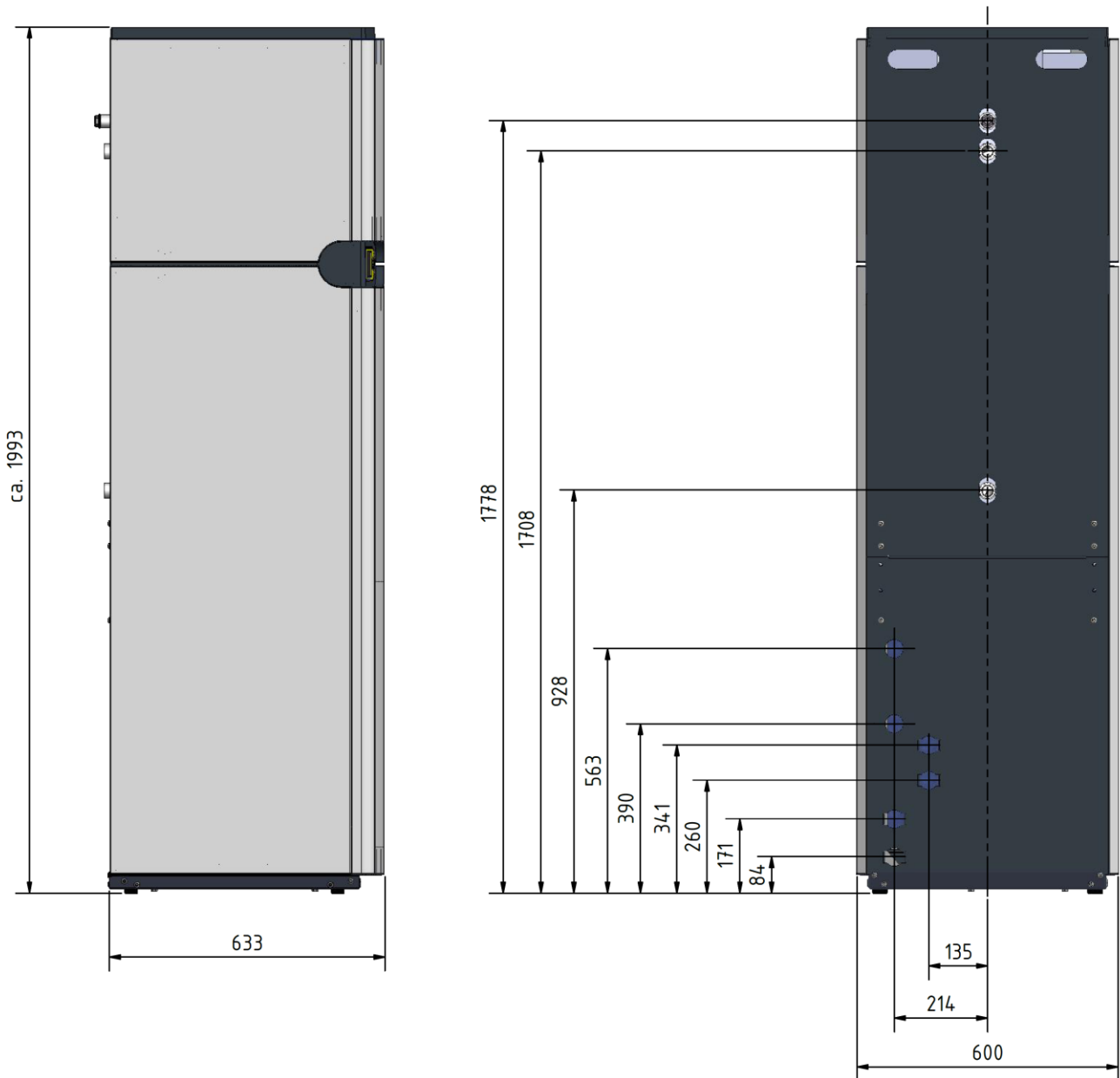


Figure 17: Connections in mm, EcoTouch Ai1 Geo (rear side)

8.3 Installation water side

Installation to the heating system (flow and return) as well as hot and cold water must be performed in accordance with the connection diagrams. In doing so, the guidelines of the applicable drinking water ordinance (according to DVGW) must be observed.

NOTICE

In the case of the stainless steel tanks, the water quality must be taken into account that the chloride content is less than 250 ppm and the maximum operating temperature must not exceed 90 °C. Heat pump with underfloor heating

8.3.1 Water quality (stainless steel tank)

NOTICE

Corrosion protection: In the case of the stainless steel tanks, the water quality must be taken into account that the chloride content is less than 250 ppm and the maximum operating temperature must not exceed 90 °C Heat pump with under-floor heating, (see table, below).

Maximum operating temperature	90 °C
Conductivity	max. 1250 $\mu\text{s}/\text{cm}$ at 25 °C
Saturation index	-1,0 bis +0,8 at 80 °C
pH	6,0 to 8,5
Chloride	< 250 mg/l at 65 °C

8.4 Connection to heating system

The connected systems should be technically clean and free from air. **Steel pipes** and other **steel components** in the water circuit shall **not be used** when connecting diffusion-open surface heating system. In exceptional cases an effective corrosion inhibitor must be added and a dirt trap (0.8 mm mesh) connected before entry into the unit. The system must then be marked accordingly and the maintenance instructions of the supplier must be followed strictly. Designation for inlet and outlet must be observed. When there is danger of frost, add antifreeze to protect against formation of ice.

To ensure tension-free connection of the heat pump, a flexible connection is required!

Tip:

We recommend the use of external shut-off devices (ball valves) at all connections. Thus, if service is required, only the minimum amount of heat transfer medium has to be drained from the system and time-consuming venting measures can be avoided.

In factory default setting, the pipe ends are closed with plastic caps. When connection is performed, these caps must be removed and the connecting unions screwed on with suitable gasket.

To tighten the screw connections, resistance at the cap must be provided with suitable tool!

NOTICE

To prevent corrosion and scale formation in the heating system (circulating pumps, radiators, etc.), the heating water must be treated according to VDI 2035 (e.g. with corrosion inhibitor).

- To find the volume flow at heating side for the corresponding heat pump, please refer to the performance table (chapter 18), **(5K spread)**.
- The heating connections (1 1/4") feature an external pipe thread for flat-sealing connections with union nut and insert.

In the heat pump is installed:

- An air separator with 6 kW electrical resistance heating.

8.4.1 On-site installations (pressure expansion vessel and safety fitting)



Cap valve with sealing device

A pressure expansion vessel and a safety fitting (filling pressure gauge / safety valve) must be installed on site for Ai1 models (for connection diagram, see section 18). If you use the solar outlet for this purpose, a cap valve must also be installed so that the heating insert can also be replaced in the event of maintenance or repair. If a solar system is also installed, use a T-piece.

A second pressure expansion vessel must be connected if, for example, a charging tank (for domestic hot water preparation with the WATERKOTTE water heater) or a buffer storage tank (for heating) is planned.

8.4.2 Installations provided by customer

NOTICE

An expansion tank and a safety group (manometer, relief valve) have to be installed by customer. Mounting position see diagram (chap. 17).

A second pressure expansion tank must be connected if, for instance, a compact condensing boiler (for domestic hot water production with the WATERKOTTE water heater) or a buffer tank (for heating) is planned.

8.4.3 Heat pump with underfloor heating

- The use of steel pipes and other steel components is not permitted in the heating circuit of underfloor heating systems. Use stainless steel, copper, brass or plastic - such as PE - for instance.
- In case of single room control, a buffer tank (corrosion-free) and a differential pressure overflow valve must be installed in the heating system (see diagrams). 200 litre buffer tank (enamelled or stainless steel) should be sufficient for this series.
- When the living space controlled by single room control is less than 1/3, a buffer tank is not required if the remaining 2/3 floor circuits remain open.

8.4.4 Heat pump with radiators (natural cooling not possible)

- On systems with steel radiators an effective corrosion inhibitor must be added and a dirt trap (0.8 mm mesh) connected before entry into the unit. The system must then be marked accordingly and the maintenance instructions of the supplier must be followed strictly.
- Heating systems with radiators require the installation of a buffer tank (connected in parallel) (see diagrams). The size of the tank must be calculated. The heat pump control regulates the temperature of the buffer tank. **After the tank, the components (circulation pump, mixing valve ...) must be controlled with an optional WATERKOTTE mixing control.**
- If the formation of deposits is to be expected (e.g. strong contamination) based on water quality, cleaning must be performed in regular intervals. Cleaning can be performed by flushing.

Procedure:

The plate heat exchanger is to be flushed with a suitable cleaning agent in counter-flow direction. If chemicals are used for cleaning, please ensure that they are compatible to stainless steel, copper or nickel. Failure to comply can result in destruction of plate heat exchanger!

8.4.5 Heat pump with swimming pool

(to operate with additional electrical module)

The following components are required for heating a swimming pool:)

- 1x 3-way motor ball valve (F10454)
- 1 x swimming pool sensor with immersion sleeve (Z14783 and Z13344)
- swimming pool upgrade kit:
 - P11108 only pool
 - P1159 pool, mixer and solar)

8.5 Connection to heat source

The following can be used as heat source:

- **The ground**, by connection to a horizontal geothermal absorber (e.g. PE-pipe 20x2) or a vertical geothermal absorber (geothermal probes).
- **The groundwater**, by connection to a well system, using an accessories kit available from WATERKOTTE to monitor the flow at heat source side and separation heat exchanger (heat source side).
- The layout of the heat source system must be according to the WATERKOTTE dimensioning information.
- Refer to the performance table to find the volume flow for the corresponding heat pump.
- The heat source connections (1¼") feature an external pipe thread for flat-sealing connections with union nut and insert.
- The heat pump is equipped with a 12 l pressure expansion tank.

A circulation class A pump is installed at heat source side.

Optional equipment, energy class A pumps: The circulation pumps are offered with internally coated housing (plastic).

Type (pump:

Heat pump type / circulation pump	Heat source	Heating
Heat source pump energy class A	Para 20/8-757 (infinitely variable)	Para 20/8-75 (infinitely variable)

- To prevent **formation of condensation**, the heat source lines inside the house must have **diffusion-tight insulation**.
- In case of water glycol systems, it is not permitted to use steel pipes and other steel components in the water circuit. Use stainless steel, copper, brass or plastic - such as PE - for instance.
Steel pipes and other steel components should also be avoided in groundwater systems.

8.5.1 Residual head

Residual head, heating side (B0/W35):

Heat pump		EcoTouch Ai1 Geo 5006.5	EcoTouch Ai1 Geo 5008.5	EcoTouch Ai1 Geo 5010.5	EcoTouch Ai1 Geo 5013.5
Flow rate ΔT 5K	m ³ /h	1,0	1,4	1,8	2,4
Pump (class A)		Para 20/8-75	Para 20/8-75	Para 20/8-75	Para 20/8-75
Residual head ΔT 5K	mWS	8,1	6,6	5,5	3,8

Residual head, heat source side (B0/W35):

Heat pump		EcoTouch Ai1 Geo 5006.5	EcoTouch Ai1 Geo 5008.5	EcoTouch Ai1 Geo 5010.5	EcoTouch Ai1 Geo 5013.5
Flow rate ΔT 4K	m ³ /h	1,1	1,5	2,0	2,5
Pump (class A)		Para 20/8-75	Para 20/8-75	Para 20/8-75	Para 20/8-75
Residual head ΔT 4K	mWS	7,9	6,2	4,6	2,3

Residual head, heating side (W10//B8/4//W35):

Heat pump		EcoTouch Ai1 Geo 5006.5	EcoTouch Ai1 Geo 5008.5	EcoTouch Ai1 Geo 5010.5	EcoTouch Ai1 Geo 5013.5
Flow rate ΔT 5K	m ³ /h	1,4	1,8	2,4	3,0
Pump (class A)		Para 20/8-75	Para 20/8-75	Para 20/8-75	Para 20/8-75
Residual head ΔT 5K	mWS	5,4	5,0	3,2	1,6

Residual head**, medium circle, heat source side (W10//B8/4//W35):

Heat pump		EcoTouch Ai1 Geo 5006.5	EcoTouch Ai1 Geo 5008.5	EcoTouch Ai1 Geo 5010.5	EcoTouch Ai1 Geo 5013.5
Flow rate ΔT 4K	m ³ /h	1,4	1,9	2,6	2,6*
Pump (class A)		Para 20/8-75	Para 20/8-75	Para 20/8-75	Para 20/8-75
Residual head ΔT 4K	mWS	6,3	4,6	2,4	2,4

* ΔT 5,0 K:

** medium circle (15% Ethylen-Glykol and 85% water)

8.5.2 Water glycol systems

Since the EcoTouch Ai1 Geo is already equipped with a heat source pump, the heat source system can be directly connected to the heat pump. There is no need for an additional heat source module. To prevent frost damage, the heat source system must be filled with about 30 % WATERKOTTE ethylene glycol (freezing point at about -15 °C). The heat source system must be properly filled with the operating media and vented.

8.5.3 Groundwater heat source

For groundwater heat pumps the installation of a separation heat exchanger is absolutely essential to avoid direct damage to the heat pump. The intermediate circuit must be filled with about 15 % ethylene glycol. The following WATERKOTTE accessories are required for groundwater application:

- Filter
- Flow monitoring
- Separating heat exchanger

8.5.4 Groundwater quality

When using groundwater, the following limits (see table and diagram) must be observed. If limits are exceeded, a separation heat exchanger is used.

The soldered plate heat exchanger consists of embossed stainless steel plates 1.4401 or AISI 316. You must therefore take the corrosion behaviour of stainless steel and the solder material, copper, into account.

Water content+ specific values	Unit	Plate heat exchanger, copper-soldered(standard)	Plate heat exchanger, nickel-soldered(optional)
pH-value		7 - 9 (under observation SI Index)	6 - 10
Repletion-Index SI (delta pH-value)		-0,2 < 0 < +0,2	No definition
Total hardness	°dH	6 - 15	6 - 15
Conductivity	µS/cm	10...500	No definition
Filterable solid	mg/l	<30	<30
Chloride	mg/l	See chart next page, over 100°C no admit of chlorid	
Free chlor	mg/l	<0,5	<0,5
Hydrogen sulphide(H ₂ S)	mg/l	<0,05	No definition
Ammoniak (NH ₃ /NH ₄ ⁺)	mg/l	<2	No definition
Sulfat	mg/l	<100	<300
Hydrogen carbonat	mg/l	<300	No definition
Hydrogen carbonat / sulfat	mg/l	>1,0	No definition
Sulfid	mg/l	<1	<5
Nitrat	mg/l	<100	No definition
Nitrit	mg/l	<0,1	No definition
Iron, dissolved	mg/l	<0,2	No definition
Mangan	mg/l	<0,1	No definition
Free aggressive carbonit acid	mg/l	<20	No definition

Table 1: Corrosion resistance of brazed plate heat exchangers to water ingredients

The values above are reference values which can vary under certain operating conditions. If you have any questions, please call us at: Tel. :(+49) (0) 2323 93760.

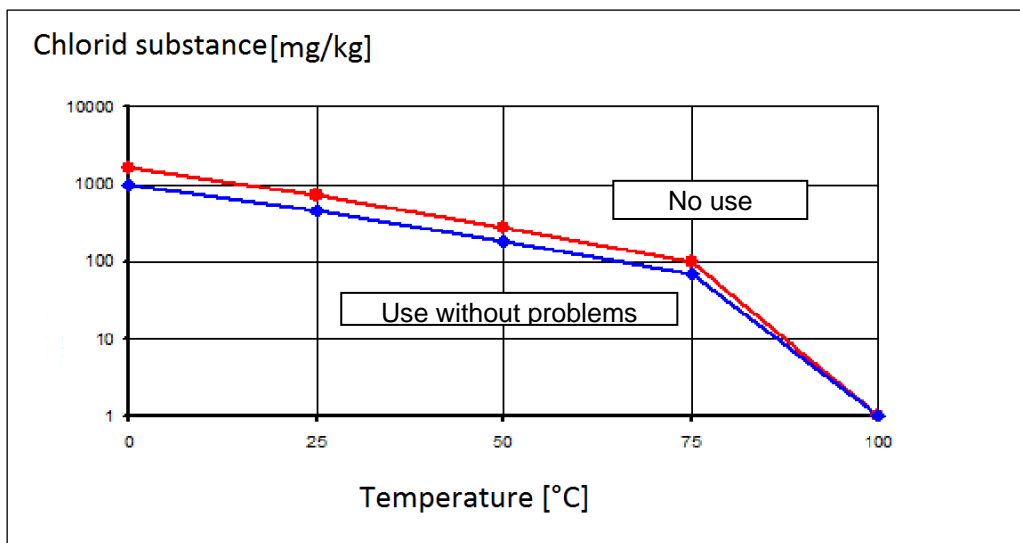


Illustration 18: All dimensions in mm, EcoTouch DS 5018 Ai (rear side)

8.5.5 Natural cooling

By use of natural cooling the whole plant is to be filled with water/ethylene-glycol mixture (freezing point -15°C).

Heating- and heat source installation aren't hydraulically separated.

To simplify the ventilation of the installation, the heat source- and heating installation should be filled and ventilated separately.

8.5.6 Water-Glycol mixture in the installation

Ground water plants with cooling: Minimum 15 % WATERKOTTE ethylene-glycol in the heating plant and the separating heat exchanger – vaporizer circle.

Ground water plants without cooling: Minimum 15 % WATERKOTTE ethylene-glycol in the separating heat exchanger – vaporizer circle.

Earth plants with cooling: Minimum 25 % WATERKOTTE ethylene-glycol in the heating- and heat source circle.

Earth plants without cooling: Minimum 25 % WATERKOTTE ethylene-glycol in the heat source circle.

NOTICE

If cooling is not wanted or not possible, the heating- and heat source circles in the installations must be separated hydraulically. For that the ball valve No. 18 must be closed and for safety reasons the two way motor ball valve No. 17 disconnected electrically.

Additionally a pressure expansion tank and a safety fitting are to set in at the heat source side (see scheme).

8.5.7 Flow monitoring



When using water as heat source, the evaporator of the heat pump can be destroyed by ice formation due to lack of water (frost damage). Repeated switching on of heat pump in an improper forced manner may easily result in total loss. For this reason, we specify a reliable protective measure against lack of water.

The protective measure consists of two devices that function independently of one another:

- a) Temperature limit by controller: For this purpose, the controller is configured for operating mode "Heat source water" This solution allows that:
 - a warning is generated if value drops below +1 °C and
 - operation is interrupted when value drops below -1 °C.
- b) Because the measure mentioned under a) cannot react quick enough in case of sudden lack of water, an additional low water safety device must be provided.

A low water safety device consists of a float-type volume display with adjustable limit indicator (limit indicator is a Reed contact).

Function:

The heat pump control switches the compressor on with a time delay to "pump heat source". The start of the compressor is only enabled if the minimum water volume is present during the lead time and the limit indicator did not respond. This device remains active during the entire operation of the heat pump. If water volume drops below the permissible level during operation, the heat pump is shut down. This device provides maximum security because it virtually covers all risks, such as filter contamination, evaporator contamination, overloaded well, etc.

Damages caused by freezing of evaporator result in exclusion of warranty!

8.5.7.1 Filter

To prevent contamination, the media inlets of the evaporator and heat exchanger must be equipped with a filter (0.8 mm mesh). Contamination in the heat exchanger can cause corrosion and - in some applications - freezing of the heat exchanger!

8.5.7.2 Cleaning

If the formation of deposits is to be expected (e.g. severe contamination) based on water quality, cleaning must be performed in regular intervals. Cleaning can be performed by flushing. The plate heat exchanger is to be flushed with a suitable cleaning agent in counter-flow direction.

NOTICE

If chemicals are used for cleaning, please ensure that they are compatible with stainless steel or copper. **Failure to comply can result in destruction of plate heat exchanger!**

9 Electrical work



Before carrying out electrical work:

- Warning! Risk of electric shock!
Install circuit breakers for personal protection.
- Any work on the electrical equipment of the machine shall only be performed by professional electricians!
- For the power lines, use standard cables of sufficient capacity. Otherwise there is a risk of short circuits, overheating or fire.
- When installing power lines, do not apply tension to the cables. Loosened connections pose a risk of cables slipping from terminals or breaking; this can result in overheating or fire.
- Should it be necessary, disconnect all feed lines from the house fuse box.

NOTICE

Risk of total loss!

The device may only be switched on when the hydraulic circuits are **completely filled and vented**, and all electrical connections are properly.

9.1 Electrical installation

Follow the wiring diagram!

The installation must be performed by an accredited professional. He is also responsible for the proper installation according to regulations and initial commissioning.

For electrical installation, the regulations of VDE/EN as well as of EVU must be observed.

For wiring, standard lines must be used.

Mains connection cable, if not connected to fixed installation:
Type H05VV-F.

Connection cables 230 / 400 V and remote cables / sensor cables must be installed with separate cables.

Minimum diameter of connection cables 1.5 mm².

Attention: Terminals in connection terminal max. 4 mm². Vacant terminals may not be used as support terminals for additional wiring.

Please note:

- All plug connections used in the heat pump control may **not be connected or disconnected under voltage** – disconnect mains voltage.
- Before accessing connection terminals, **all power supply circuits** must be interrupted.
- The relay circuit board (WWPR) may only be connected or removed by **professionals**.
- Install and remove relay circuit board only in **voltage-free state**.

- All connections performed directly at the plug connections of the relay circuit board must be established with **flexible lines**; if necessary, intermediate terminals must be used.
- We recommend the use of an earth leakage circuit breaker (RCD), not exceeding 30 mA.
- Replacement of mains connection cables may only be performed by customer service or a similarly qualified person.

NOTICE

If variable speed pumps are operated (electronic frequency control), you have to add a separation or coupling relays for inductive or capacitive loads (AC3 / 16 A / 230 V). In no case, the variable-speed pumps are directly wired to the relay of the heat pump. The installation is carried out on site by a qualified electrician. For further inquiries, we advise you gladly.

9.2 Electrical heat generator for startup and standby

9.2.1 Initial heating of buildings during winter months

Humid, cold building condition represents a deficiency due to neglected drying measures. As a result, the initial heat requirement is significantly higher.

The reason for this: The mass of the building must reach the required temperature. Turning on the heat results immediately in a considerable evaporation in screed, masonry and ceilings.

About 1 kWh heat is required per kg water. As a result of the construction humidity, the K-factor of the external walls can rise to twice its value. The increased heat requirement for ventilation, particularly if interior is not finished yet, must be added.

In the process it is possible that power requirement and energy consumption exceed the standard value by 100 %. Since the situation mentioned happens quite frequently, the heat pump is equipped with an additional electrical heat generator (EWE).

The additional energy consumption must be attributed to construction costs and not to heating costs.

What must be considered when heat pump functions as heat generator?

When a heat pump uses **groundwater as heat source**, the extended runtime is without consequence if the performance of the drawing well and return well is secured. In this case, the support by the electrical heat generator is not even necessary, as long as the fact that room temperature is reached only slowly is of no concern.

When using a heat pump with **geothermal heat source**, there are concerns about the excessive demand of the heat source under the conditions stated. There is always a risk when the heat pump has to work in permanent mode for days. The heat source cannot regenerate itself continuously; in unfavourable cases the ground can be subject to frost action in areas with horizontal withdrawal.

9.2.2 Startup of electrical heat generator (EWE)

The EWE is an additional device with many uses, operation without heat pump (compressor automat switched off):

After the heating circuit has been filled and vented, the EWE can be operated; the WWPR controller must be parameterised accordingly.

At the domestic distribution a check must be performed to ensure that the automats are switched on and the electrical counter rotates accordingly. Due to safety reasons, a label placed on the controller cover must refer to the temporary solution, i.e. „Electrical heat generator temporarily activated“.

The operating mode described above also corresponds to standby mode as reassuring option for total failure!

Before commissioning of the heat pump, the special condition described above must be reversed.

9.2.3 Parallel operation: Heat pump and electrical heat generator

The settings have to be configured by the user (refer to WWPR manual). This means that the electrical heat generator is automatically connected (automats switched on at domestic distribution) if heat output is insufficient. This also applies if a malfunction occurs at the heat pump.

If the limit of the flow temperature „Heat source“ is set to an according value, e.g. $-6\text{ }^{\circ}\text{C}$, the EWE also automatically connects when value drops below this limit, thus relieving the heat source.

9.2.4 Heat generator, thermostat settings

The thermostat of the heat generator is permanent adjusted to $75\text{ }^{\circ}\text{C}$.

9.3 Installation instructions for external sensor

The **external sensor** must always be installed vertically (even if temporary), with cable entry pointing downward. Next, screw connection must be tightened enough to allow sealing insertion of cable and to prevent water from entering the housing.

When performing temporary installation, sensor might have to be mounted on board, which is fastened to a wall (outdoor).

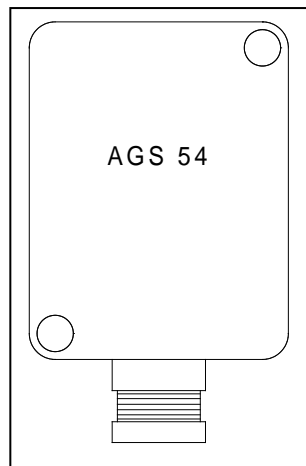


Figure 19: Installation position of external sensor

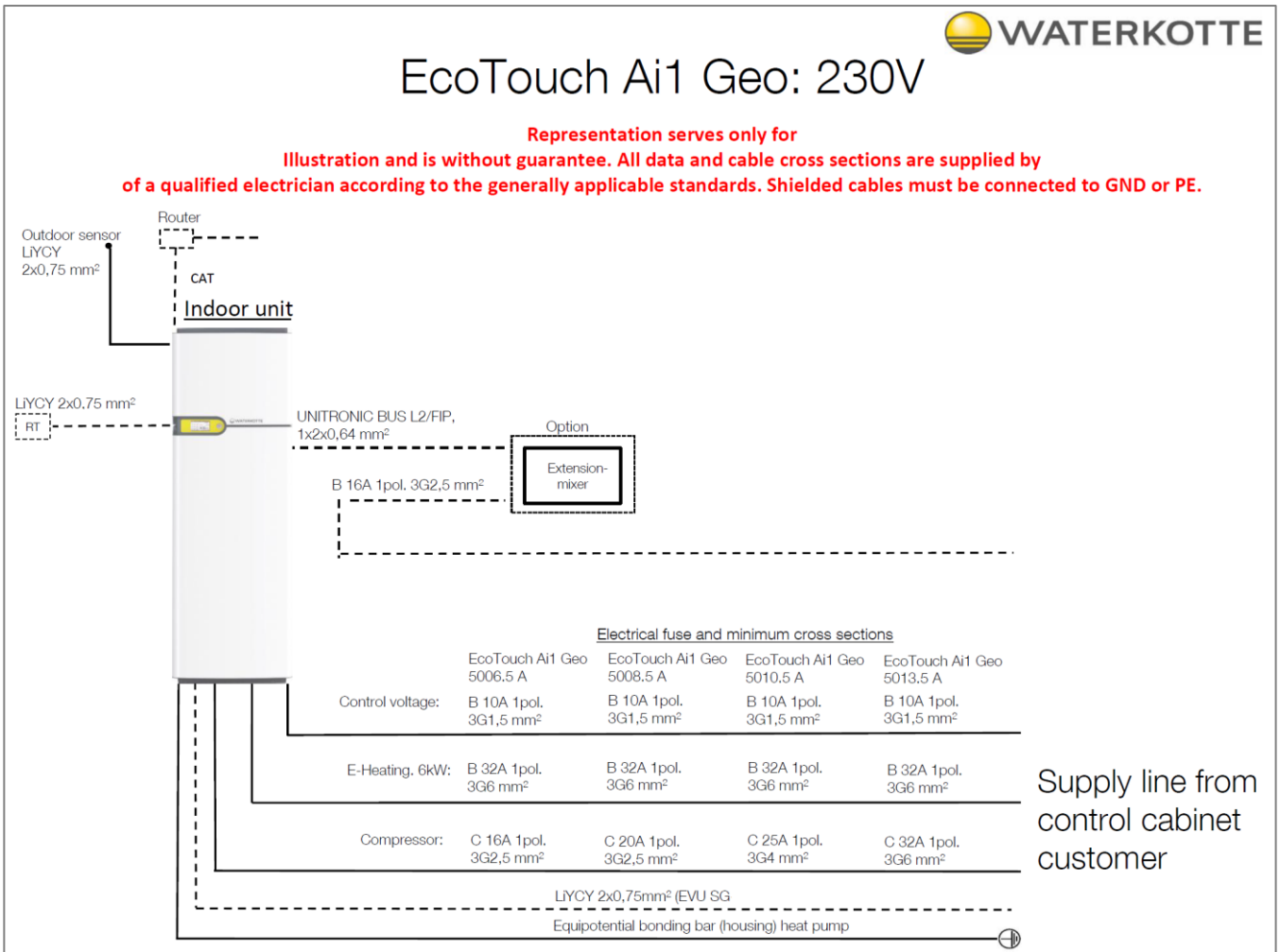
9.3.1 Cabling

EcoTouch Ai1 Geo

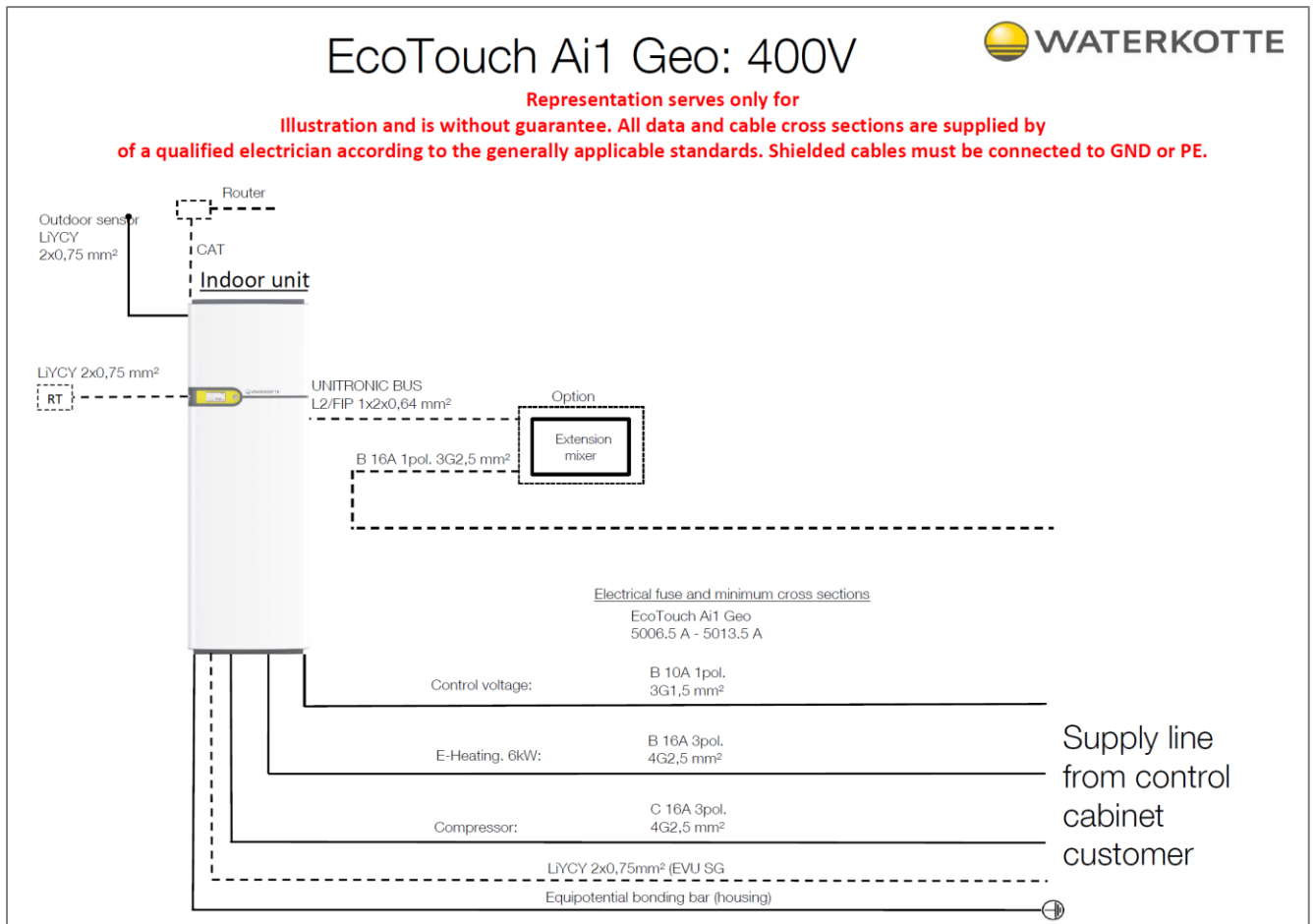


You can use the cable entry for electrical wiring to the heat pump via two openings on the top of the unit (rear side). The cables are routed in a recess of tank isolation to the front of the unit. There is a mounting plate for fixing the cable. Using the supplied cable ties you can fix the cable and realise a strain relief.

9.4 Cable list EcoTouch Ai1 Geo (1x 230 V)

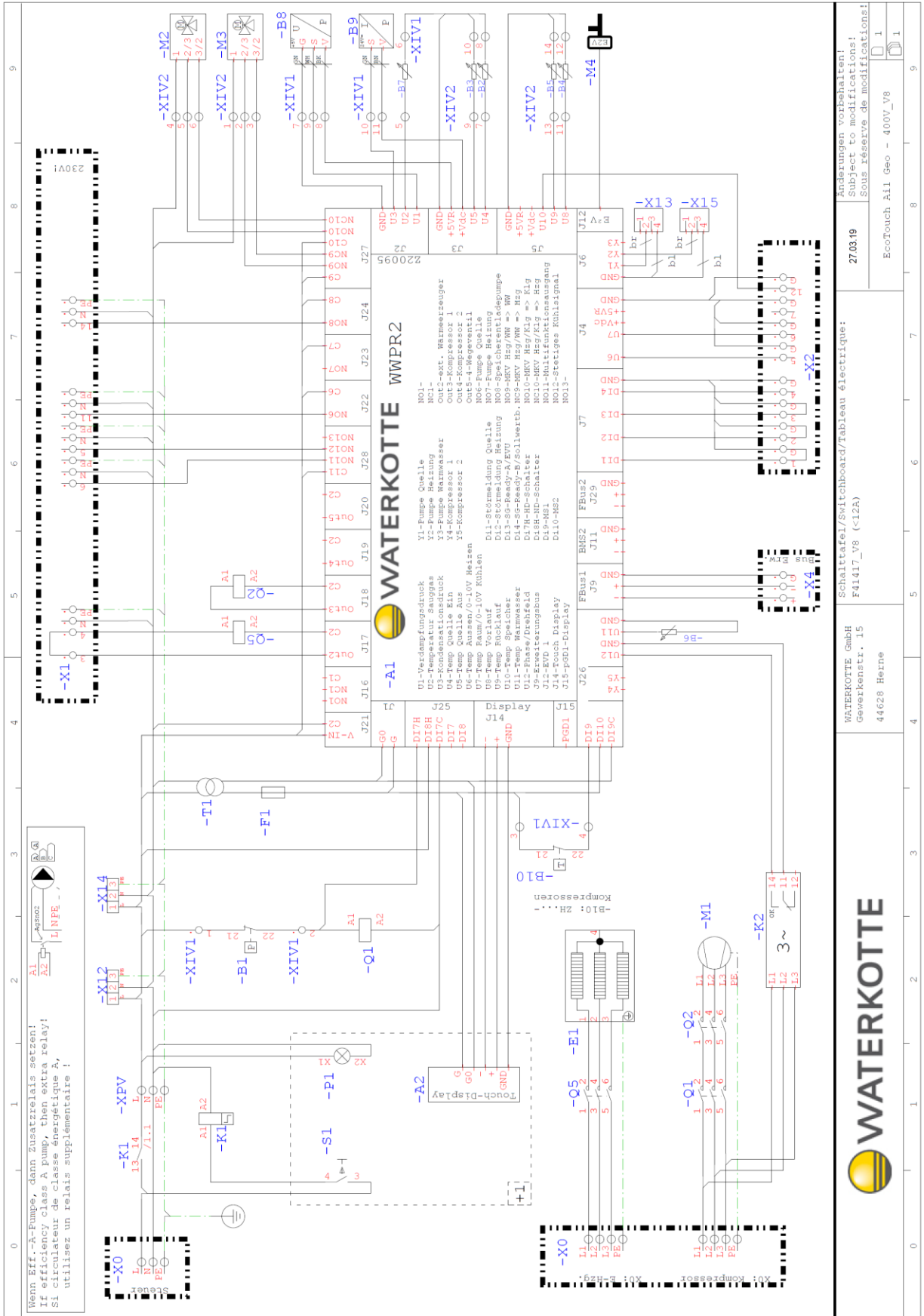


9.5 Cable list EcoTouch Ai1 Geo (3x 400 V)

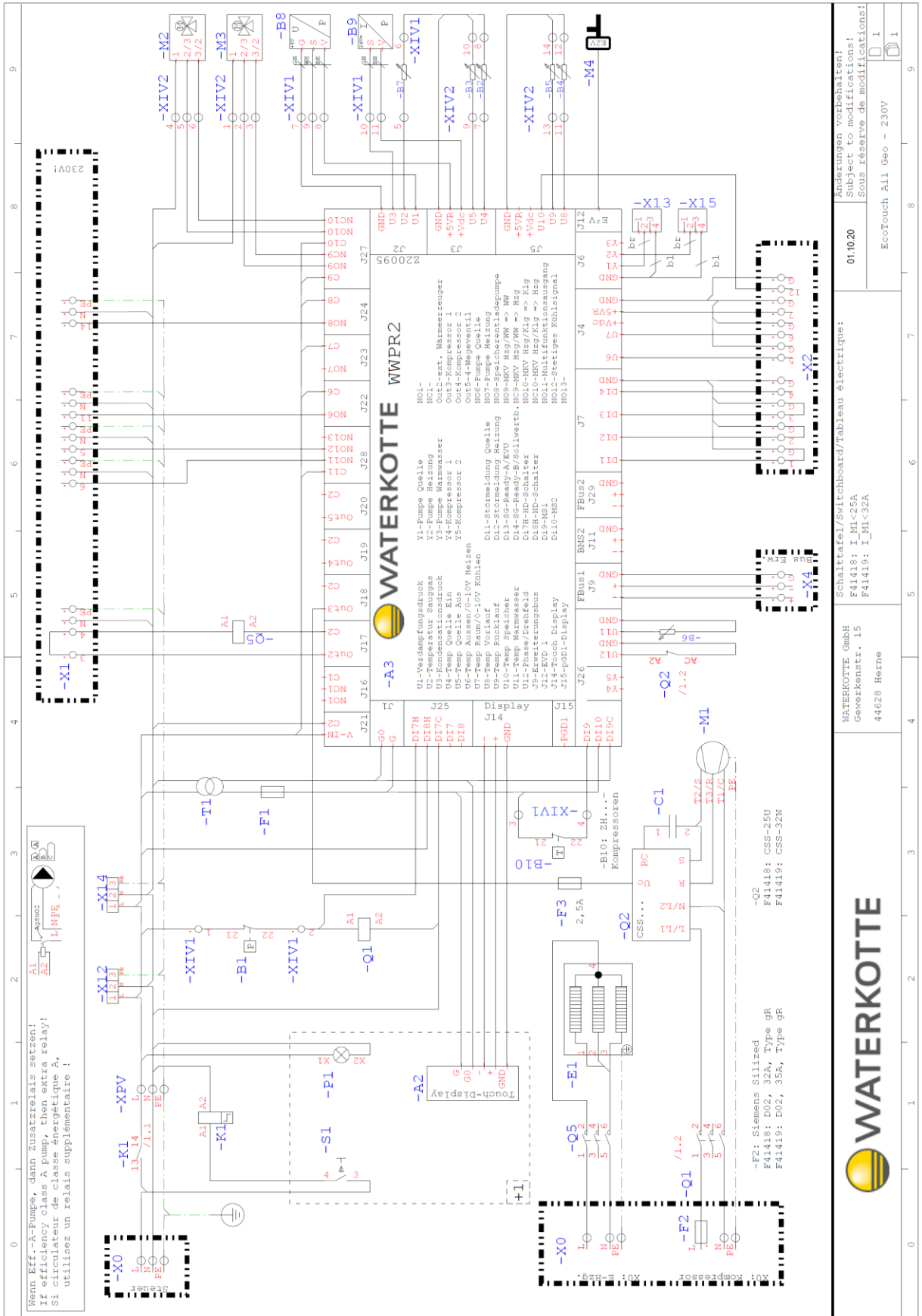


9.6 Electrical connections

9.6.1 Electrical switchboard EcoTouch Ai1 Geo (3x 400 V)



9.6.2 Electrical switchboard EcoTouch Ai1 Geo (1x 230 V)



9.6.3 Connections

	D	GB	F
X0 400 V / 230 V			
⊕	Steuerleitung	Control line	Circuit de commande
N	Steuerleitung	Control line	Circuit de commande
L1	Steuerleitung	Control line	Circuit de commande
⊕	Elektroheizeinsatz	E-heater	Résistance électrique
L3	Elektroheizeinsatz	E-heater	Résistance électrique
L2	Elektroheizeinsatz	E-heater	Résistance électrique
L1	Elektroheizeinsatz	E-heater	Résistance électrique
⊕	Kompressor	Compressor	Compresseur
L3	Kompressor	Compressor	Compresseur
L2	Kompressor	Compressor	Compresseur
L1	Kompressor	Compressor	Compresseur
X1 230 V			
⊕	Speicherpumpe	Tank pump	Circulateur du ballon
N	Speicherpumpe	Tank pump	Circulateur du ballon
14	Speicherpumpe	Tank pump	Circulateur du ballon
⊕	Pumpe Warmwasser	Hot water pump	Circulateur ECS
N*	Pumpe Warmwasser	Hot water pump	Circulateur ECS
13*	Pumpe Warmwasser	Hot water pump	Circulateur ECS
⊕	Pumpe Quelle	Source pump	Circulateur source de chaleur
N	Pumpe Quelle	Source pump	Circulateur source de chaleur
11	Pumpe Quelle	Source pump	Circulateur source de chaleur
⊕	Sammelstörung	Collective fault	Panne collective
N	Sammelstörung	Collective fault	Panne collective
6	Sammelstörung	Collective fault	Panne collective
⊕	Kühlsignal	Cooling signal	Commande rafraîchissement
N	Kühlsignal	Cooling signal	Commande rafraîchissement
5	Kühlsignal	Cooling signal	Commande rafraîchissement
⊕	Ext. Wärmeerzeuger	External heating system	Chauffage externe
N	Ext. Wärmeerzeuger	External heating system	Chauffage externe
4	Ext. Wärmeerz. (int.)	Ext. heating system (int.)	Chauffage externe (int.)
3	Ext. Wärmeerz. (ext.)	Ext. heating system (ext.)	Chauffage externe (ext.)
⊕*	Steuerleitung*	Control signal*	Signal de commande*
N*	Steuerleitung*	Control signal*	Signal de commande*
1*	Steuerleitung*	Control signal*	Signal de commande*
X2 Signale			
GND	GND	GND	GND
12	Temperatur Pufferspeicher	Temp.: Hot water buffer tank	Température ballon tampon
GND*	GND*	GND*	GND*
7*	Temp. Warmwasser*	Temp.: Hot water*	Température ECS*
GND	GND	GND	GND
6	Temp. Raum	Room temperature	Température pièce
GND	GND	GND	GND
5	Temperatur Außen	Outdoor temp.	Température extérieure
GND	GND	GND	GND
4	Ext. Sollwertbeeinflussung/ SG Ready B	External control of set point / SG Ready B	Influence externe de consigne / SG Ready B
GND	GND	GND	GND
3	Ext. Abschaltung / SG Ready A	External switch off / SG Ready A	Coupure externe / SG Ready A
GND	GND	GND	GND
2	Störung: Heizung/ Sicherheitstemperaturbegrenzer	Fault: heating / safety temperature limiter	Panne: chauffage / limiteur de température de sécurité
GND	GND	GND	GND
1	Störung: Quelle	Fault: source	Panne: source
X4 Bus			
GND	BUS-Erweiterung	BUS expansion	Extension de BUS
TX-	BUS-Erweiterung	BUS expansion	Extension de BUS
TX+	BUS-Erweiterung	BUS expansion	Extension de BUS

*nur EcoTouch DS 5018

10 WWPR controller

Deutsch	Englisch	Französisch
U1 – Verdampfungsdruck	U1 – Evaporation pressure	U1 – Pression evaporation
U2 – Temp. Sauggas	U2 – Temp. suction gas	U2 – Temp. gaz aspire
U3 – Kondensationsdruck	U3 – Condensation pressure	U3 – Pression condensation
U4 – Temp. Quelle Ein	U4 – Temp. source entrance	U4 – Temp. entrée captage
U5 – Temp. Quelle Aus	U5 – Temp. source exit	U5 – Temp. sortie captage
U6 – Temp. Außen / 0-10V Heizen	U6 – Temp. outdoor / 0-10V heating	U6 – Temp. exter / 0-10V chauffage
U7 – Temp. Raum / 0-10V Kühlen	U7 – Temp. room / 0-10V cooling	U7 – Temp. pièce / 0-10V rafraîchissement
U8 – Temp. Vorlauf	U8 – Temp. flow	U8 – Temp. départ chauffage
U9 – Temp. Rücklauf	U9 – Temp. return	U9 – Temp. retour chauffage
U10 – Temp. Speicher	U10 – Temp. buffer	U10 – Temp. ballon tampon
U11 – Temp. Warmwasser	U11 – Temp. hot water	U11 – Temp. ECS
U12 – Phase / Drehfeld	U12 – Phase / Rotary field	U12 – Panne phase
J9 – Erweiterungsbus	J9 – Extension bus	J9 – Bus d'extension
J12 – EVD1	J12 – EVD1	J12 – EVD1
J14 – Touch Display	J14 – Touch Display	J14 – Touch Display
J15 – pgD1-Display	J15 – pgD1-Display	J15 – pgD1-Display
Y1 – Pumpe Quelle	Y1 – Pump source	Y1 – Pompe captage
Y2 – Pumpe Heizung	Y2 – Pump heating	Y2 – Pompe chauffage
Y3 – Pumpe Warmwasser	Y3 – Pump hot water	Y3 – Pompe ECS
Y4 – Kompressor 1	Y4 – Compressor 1	Y4 – Compresseur 1
Y5 – Kompressor 2	Y5 – Compressor 2	Y5 – Compresseur 2
Di1 – Störmeldung Quelle	Di1 – Failure message source	Di1 – Message de panne captage
Di2 – Störmeldung Heizung	Di2 – Failure message heating	Di2 – Message de panne chauffage
Di3 – SG-Ready-A / EVU	Di3 – SG-Ready-A / EVU	Di3 – SG-Ready-A / Coupure externe
Di4 – SG-Ready-B / Sollwertbeeinflussung	Di4 – SG-Ready-B / Setpoint influence	Di4 – SG-Ready-B / Valeur consigne
Di7 – HD-Schalter	Di7 – HP-Switch	Di7 – Interrupteur HP
Di8 – ND-Schalter	Di8 – LP-Switch	Di8 – Interrupteur BP
Di9 – MS1	Di9 – Motor protection MS1	Di9 – Protection moteur MS1
Di10 – MS2	Di10 – Motor protection MS2	Di10 – Protection moteur MS2
NO1 –	NO1 –	NO1 –
NC1 –	NC1 –	NC1 –
Out2 – Ext. Wärmeerzeuger	Out2 – Ext. heat generator	Out2 – Producteur de chaleur ext.
Out3 – Kompressor 1	Out3 – Compressor 1	Out3 – Compresseur 1
Out4 – Kompressor 2	Out4 – Compressor 2	Out4 – Compresseur 2
Out5 – 4-Wege-Ventil	Out5 – 4-way-valve	Out5 – Vanne-4-voies
NO6 – Pumpe Quelle	NO6 – Pump source	NO6 – Pompe captage
NO7 – Pumpe Heizung	NO7 – Pump heating	NO7 – Pompe chauffage
NO8 – Speicherentladepumpe	NO8 – Buffer unloading pump	NO8 – Pompe décharge ballon
NO9 – MKV Hzg/WW => WW	NO9 – MBV Htg/HW => HW	NO9 – Vanne Ch/ECS => ECS
NC9 – MKV Hzg/WW => Hzg	NC9 – MBV Htg/HW => Htg	NC9 – Vanne Ch/ECS => Ch
NO10 – MKV Hzg/Klg => Klg	NO10 – MBV Htg/Cool => Cool	NO10 – Vanne Ch/Rafr => Rafr
NC10 – MKV Hzg/Klg => Hzg	NC10 – MBV Htg/Cool => Htg	NC10 – Vanne Ch/Rafr => Ch
NO11 – Multifunktionsausgang	NO11 – Multifunctional exit	NO11 – Sortie multifonction
NO12 – Stetiges Kühlsignal	NO12 – Continuous cooling signal	NO12 – Signal rafraîchissement constant
NO13 –	NO13 –	NO13 –

11 Pipe & instrumentation / measurement & control technology

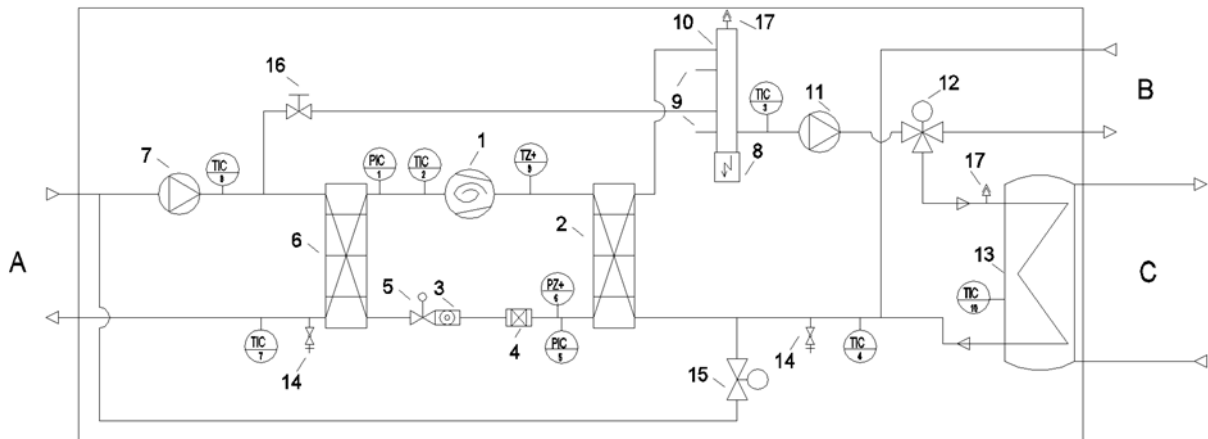


Figure 20: EcoTouch Ai1 1Geo temperature and pressure sensors, pictures refer to DIN 19227 Page 1

MSR-No.	Instrumentation	Component
PIC/1	Measurement of pressure readout in the controller display and control in the electrical switchboard.	Pressure transmitter ND
TIC/2	Measurement of temperature, readout in the controller display and control in the electrical switchboard.	NTC 10K, gauge: suction gas overheating
TIC/3	Measurement of temperature, readout in the controller display and control in the electrical switchboard.	NTC 10K, gauge: condenser OUT = Heating flow
TIC/4	Measurement of temperature, readout in the controller display and control in the electrical switchboard.	NTC 10K, gauge: condenser IN = Heating return
PIC/5	Measurement of pressure readout in the controller display and control in the electrical switchboard	Pressure transmitter HD
PZ+/6	Safety pressure relief valve.	Safety pressure switch
TIC/7	Measurement of temperature, readout in the controller display and control in the electrical switchboard.	NTC 10K, gauge: heat source IN Vd
TIC/8	Measurement of temperature, readout in the controller display and control in the electrical switchboard.1	NTC 10K, gauge: heat source OUT Vd
TZ+/9	Safety pressure gas temperature sensor.	Safety pressure gas temperature sensor.
TIC/10	Measurement of temperature, readout in the controller display and control in the electrical switchboard.	NTC 10K, gauge: domestic hot water

12 Hydraulic diagramm EcoTouch Ai1 Geo

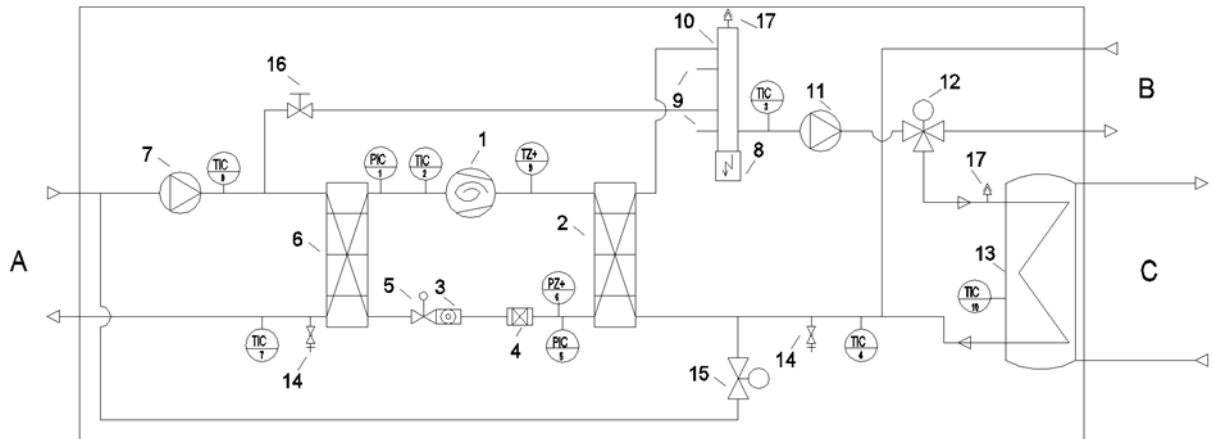


Figure 21: Heat pump EcoTouch Ai1 Geo

No.	Description
01	Compressor
02	Condenser
03	Refrigerant inspection glass
04	Refrigerant filter
05	Expansion valve
06	Evaporator
07	Circulation pump (heat source)
08	6 kW electronical heating element
09	Solaire connections
10	Air separator (heating)
11	Circulation pump (heating)
12	3-way motor ball valve
13	Domestic hot water tank
14	Fill and drain valve
15	2 - way motor ball valve
16	Ball valve 1/2"
17	Automatic ventilation valve
A	Heat source
B	Heating
C	Domestic hot water

13 Commissioning

NOTICE

During commissioning of machine, anticipate the following specific risks:

Risk of total loss!

- Faulty connections can cause unexpected startup of machine / uncontrolled machine operation.
- Mix up of connections causes motor to run in wrong direction; this could damage the machine.
- Incorrectly wired connections can destroy electrical / electronic components.
- Electrostatic processes / power failure can pose a risk for electronic components and also result in software errors.

To avoid damage to machine or injuries during commissioning of machine, the following points must be observed:

- Commissioning of machine shall only be performed by qualified persons, in compliance with safety instructions.
- Activate all safety devices and emergency-stop switches prior to commissioning.
- Check motor for correct direction of rotation prior to commissioning.
- Also read chapter 1.2

13.1 Pre-startup checks

Before starting the heat pump, check the requirements according to the following checklist.

<input type="checkbox"/>	All electrical feed lines in the corresponding cross-sections are wired to the terminals, as per connection plan.
<input type="checkbox"/>	Main Switch is in „OFF“ position.
<input type="checkbox"/>	The fuses in the fuse box are in compliance with the specifications in the connection plan (LS switch, type C for compressor feed line!).
<input type="checkbox"/>	The hydraulic connections for heat source, space heating and domestic hot water are connected.
<input type="checkbox"/>	The hydraulic systems are filled with operating media and properly vented.
<input type="checkbox"/>	Shut-off devices are open.

- When commissioning the heat pump, it is mandatory to measure the pour point of the heat source medium with a calibrated refractometer. On this basis, the minimum heat source outlet temperature must be set in the basic settings of the control. If the heat source outlet temperature is set too low (in relation to the measured pour point), the warranty and guarantee for damage caused by an insufficient pour point will be excluded. For systems that are operated without antifreeze, the minimum heat source outlet temperature must be at least +3 °C. The respective operating mode must be set in the control unit.

- Before operation, check if all plates, fuses and other protective devices are properly installed. Components that are rotating, hot or under high voltage can cause injuries.
- Do not touch switch with wet hands. This poses a risk of electric shock.
- The unit must be grounded. Do not connect the ground wire to gas or water lines, lightning rods or telephone grounding lines. Improperly grounded unit poses a risk of electric shock.
- Use circuit breakers (ground fault interrupter). Failure of unit or fire may result from circuit breaker when capacity exceeds specifications.
- Do not touch refrigerant tubes with bare hands during operation. The refrigerant tubes are hot or cold, depending on condition of flowing refrigerant. Contact with tubes poses a risk of burns or frostbite.

13.2 Initial start-up of the machine



Figure 22: ON / OFF switch (see pointing arrow)
Switch lights => Power on (normal operation)

The initial start of the heat pump is performed by a qualified WATERKOTTE system partner. After all checks have been conducted, proceed as follows:

1. Switch OFF main switch and all circuit breakers (control voltage, compressor and electrical heating element).
2. Switch ON circuit breaker for control voltage.
3. Switch ON main circuit breaker at the unit.
4. Now perform controller setting according to WWPR operating manual
5. Switch ON the circuit breaker of the compressor. Wait for compressor to start.
6. Check rotating field of compressor - with correct rotating field and voltage on all three phases, there is no message on display.
7. If the message **F016 failure phase rotating field** appears on the display, check first, whether all three phases have voltage. If this is the case, interchange two phases at the terminal blocks in the terminal to reverse the rotating field.

8. Finally, switch ON the circuit breaker for electric heating.

NOTICE**Risk of total loss!**

Repeated restart of heat pump can result in total loss!
In case of heat pump failure, an inspection by qualified and authorised personnel must be performed before restart.

Info: Controller settings must only be performed during initial startup of machine. This is not required for restart, since the settings have been saved (settings remain saved even in case of power failure).

Info: During initial start-up, the specified limits are often exceeded, thus numerous warning messages could appear.

For this reason, the warning messages occurring during this period can be disabled by service personnel, see *Operating manual for heat pump controller*.

After completing installation and wiring and tubing of indoor and outdoor units, check for refrigerant leaks, loose power supply or control wiring, wrong polarity, and ensure that no single phase in the power supply is disconnected.

NOTICE

Compressor will not operate unless the power supply phase connection is correct.

13.3 Control of entire operation

This heat pump is equipped with an efficient electronic control system. All necessary settings and options are described in the operating manual of the controller.

Tip: The correct use of the controller saves money. Particularly the correct settings of flow temperature, hot water temperature, heating curve and heating times can result in substantial cost savings.

13.4 Turning heat pump off

NOTICE

After finishing operation, wait at least five minutes before turning main power switch off. Otherwise, there is a risk of water leak or unit failure.

Procedure:

- Switch OFF the main switch of the heat pump.
- Turn OFF the circuit breakers: Compressor, control voltage and electrical heating element.

13.5 Taking heat pump out of operation for extended period

- see 13.4 -

14 Troubleshooting

14.1 Possible faults and solutions

14.1.1 Fault at input side (LP fault)

- Faulty extraction of water or water glycol.
- Water glycol circuit insufficiently vented.
- Water glycol pour point too high.
- Evaporator contaminated, icy.
- Refrigerant circulation interrupted (stop valve closed, filter dryer contaminated).
- Dirt trap clogged.
- Temperature of heat source too low.
- Water in condenser too cold (below 20 °C),
- Quick temperature change in condenser.
- Insufficient refrigerant (see inspection glass).
- Incorrect setting of controller parameter.
- Sensor incorrectly aligned or insufficiently attached.

14.1.2 Fault at output side (HP fault)

- Interrupted or insufficient water circulation (possibly not enough heating circuits open).
- Hot water temperature too high.
- Air in water circuit.
- Dirt trap clogged.
- Circulation pump defective or incorrect rotation direction.
- Incorrect setting of controller parameter.

14.1.3 Fault in compressor motor

- Overheating of motor winding; possible causes: Failure of a phase, mechanical failure due to lack of lubrication, lack of refrigerant, defects in refrigerant regulation, operation with incorrect refrigerant, excessive temperature of pressurised gas.

15 Safety measures

15.1 Pressure limits of compressor

The cooling circuit is protected against unacceptable excessive pressure by a type-tested pressostat. The switch interrupts the control voltage of the compressor contactor. Restart is locked by the central control unit and must be manually reset. **Manipulation of safety switches is prohibited and is a violation of UVV BG20** (accident prevention regulations for cooling devices). In any case, it will result in **exclusion of warranty**.

The high pressure pressostat is placed in the pipe of the refrigerant medium at the exit of the condenser.

Shift points (R410A):

45.0 bar OFF --- 35.0 bar ON

15.2 Motor protection against excessive temperature

Fully hermetic compressors are equipped with a bimetal switch that disconnects the power supply and connects again after cool down to protect against excessive motor temperatures; an error message is not generated.

15.3 Refrigerator oil

Use only the specified oil type (ester oil ICI Emkarate RL 32-3MAF); non-compliance will result in exclusion of warranty and certainly cause malfunctions.

NOTICE

Improper manipulation to the refrigeration cycle leads to total loss and the loss of warranty. Any work on the hydraulic circuit of the heat pump shall only be performed by skilled workers.

16 Maintenance and care

We recommend annual maintenance of the heat pump. Thus you provide the reliability and efficiency of your heat pump. For more information, please contact your WATERKOTTE service partner.

In the maintenance the technical condition of the heat pump system is checked (target-actual comparison). This provides a diagnostic measurement of the thermodynamic section ensures that the efficiency is maintained on the top.

Typical inspection:

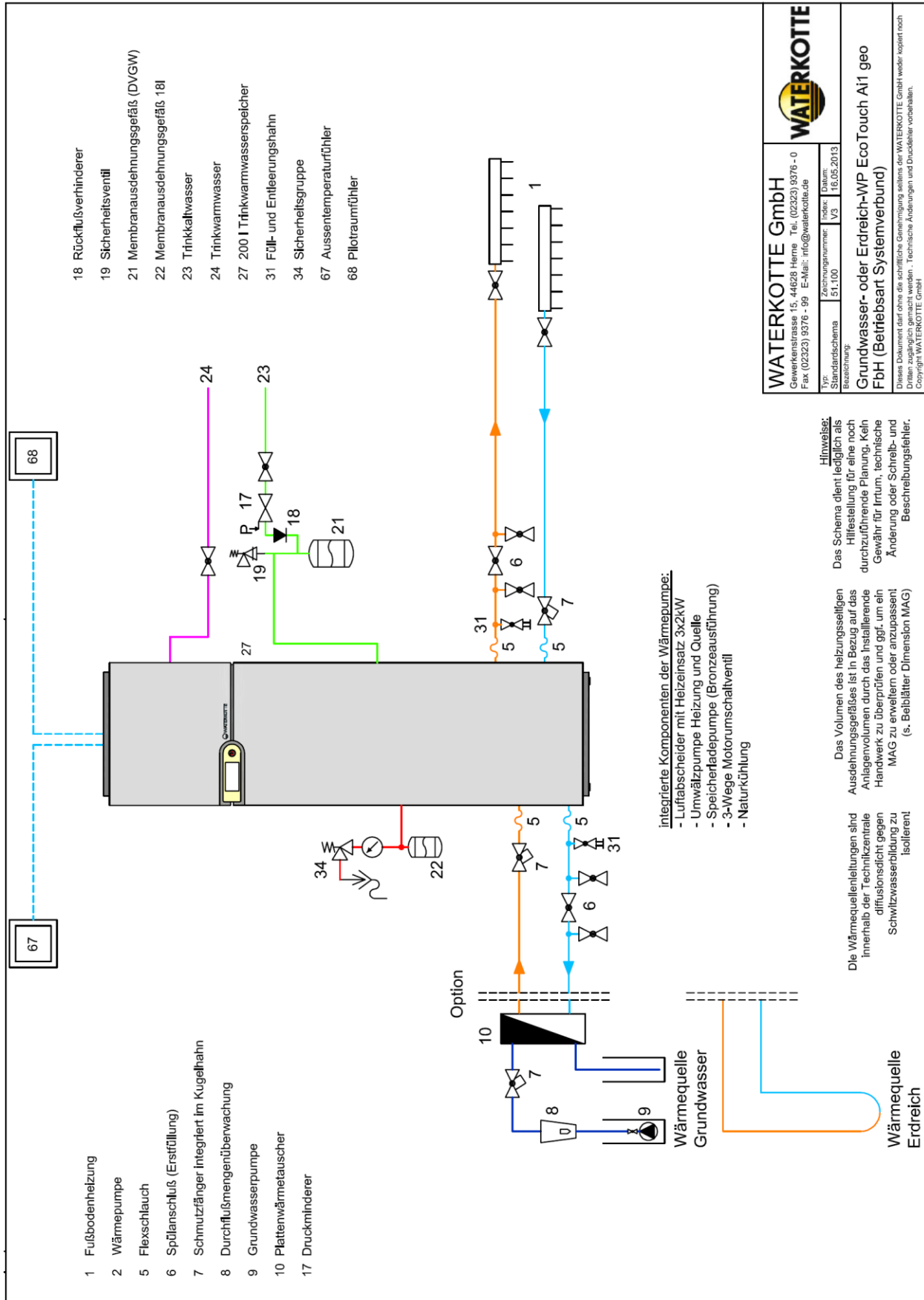
- Check heating circuit: System pressure, function of expansion tank, venting, rotation direction of pump and volume setting.
- Check water glycol circuit: Level, if necessary pressure, water glycol pour point, rotation direction of pump.
- Groundwater: Check dirt trap and clean if necessary, rot. direction of pump.
- Check cooling circuit: Screw connections, tightness, level (inspection glass), refrigerant control, diagnosis measurement log.
- Check setting of control.
- Leak test: The statutory inspection intervals depend on the refrigerant volume. For more information, see the heat pump logbook.

Tip:

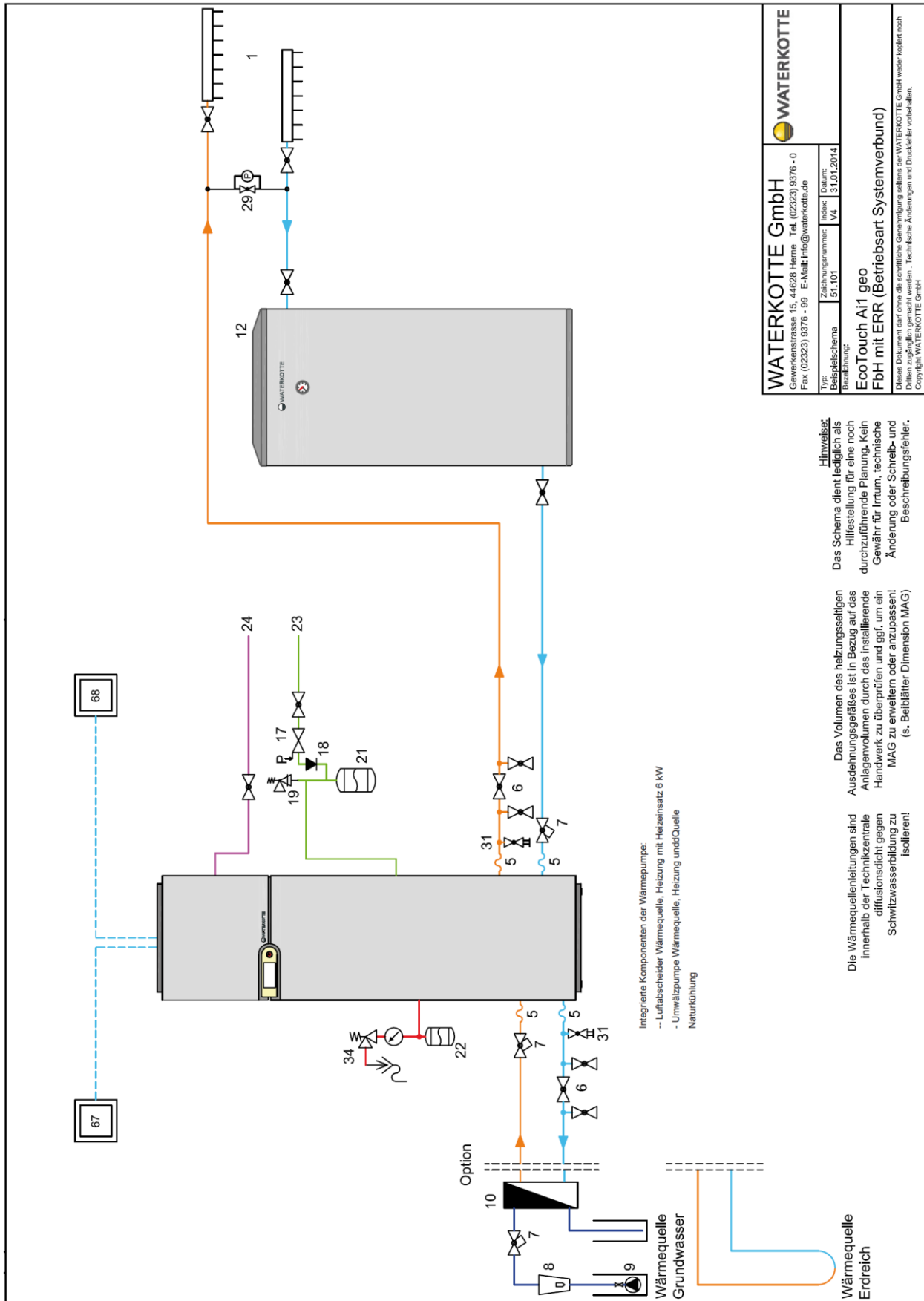
A continuous diagnosis (CD) is performed with help of the WWPR controller. If the measured values or queries are beyond the permissible range in the respective mode, the controller issues a warning.

17 Connection diagrams

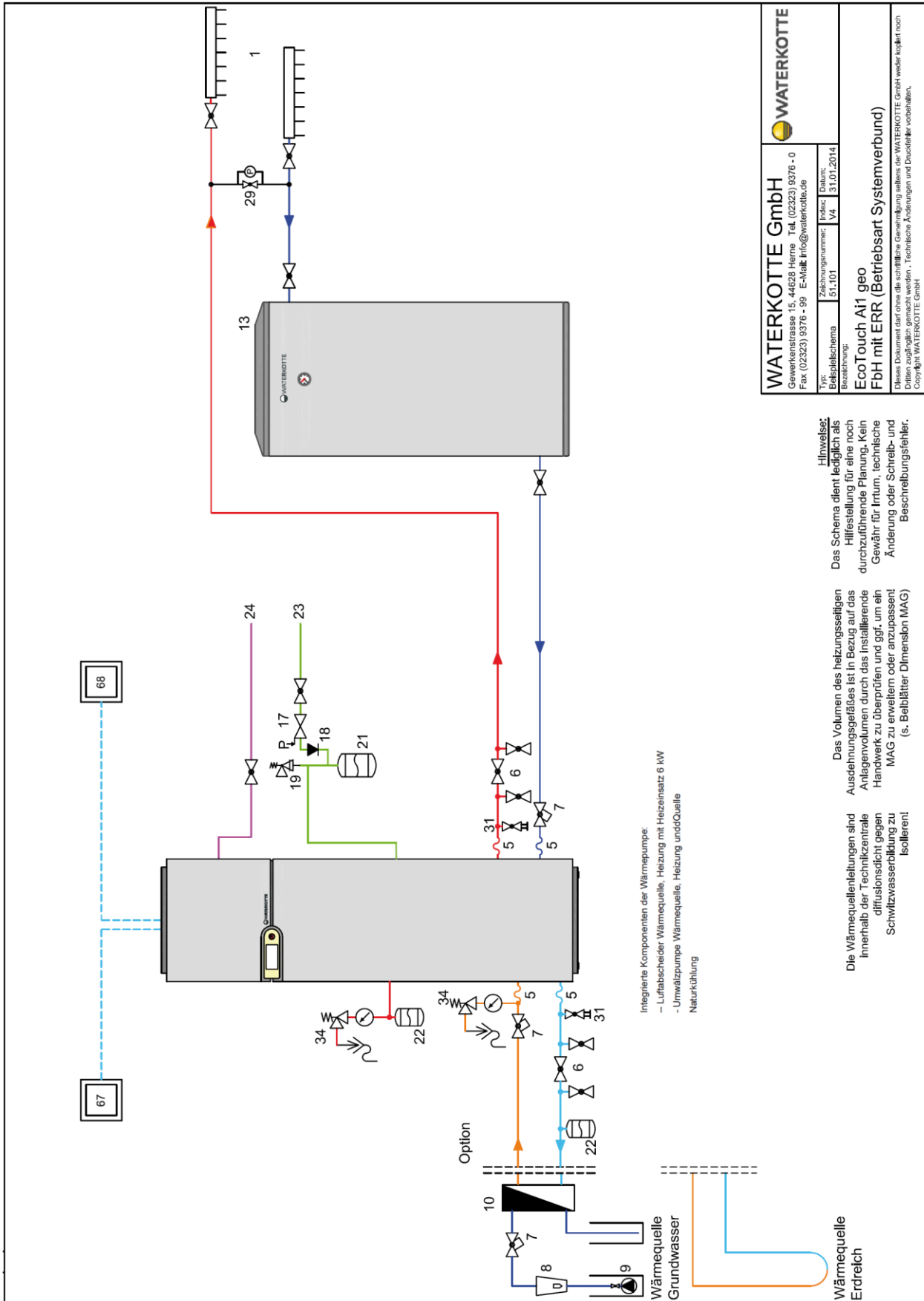
17.1 Eco Touch Ai1 Geo with underfloor heating system (integrated system)



17.2 Eco Touch Ai1 Geo with underfloor heating system and single room control (integrated system)



17.3 Eco Touch Ai1 Geo with underfloor heating system and single room control (system separation)



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Typ: Beispielschema	Zählungsschritte: 51,101	Datum: 31.01.2014	
EcoTouch Ai1 geo FbH mit ERR (Betriebsart Systemverbund)			
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17.4 Description of the parts in the connection diagram

No.	Description
1	underfloor heating system
2	heat pump
3	indoor module
4	outdoor module
5	flexible connectors
6	amature group for rinsing and bleeding
7	ball valve with integrated dirt trap
8	flow rate control
9	ground water pump
10	plate heat exchanger
11	motor-powered switch ball valve (uninterruptible)
12	optimized thermo storage (charging storage)
13	optimized thermo storage (backflow array storage)
14	temperature sensor
15	radiators or convectors
16	bronze pump
17	pressure reducer
18	backflow preventer
19	relief valve
20	valve, actuating variable 1 to 2 Kelvin
21	membrane expansion tank for potable water systems
22	membrane expansion tank with shut-off fitting
23	domestic cold water
24	domestic hot water (DHW)
25	circulation
26	potable water heater
27	250l storage for domestic hot water
28	air separator with bleeder
29	pressure bypass valve
30	pressure controlled circulation pump
31	fill and drain valve
32	circulation pump
33	air separator with bleeder, manometer and relief valve
34	safety group
35	relief valve with bleeder and manometer
36	tacosetter for hydraulic alignment
37	charging storage 250 liter
38	swimming pool
039	motor-powered mixing valve
40	membrane expansion tank solar with shut-off fitting
41	heat source module
42	heat source module natural cooling
43	motor-powered switch ball valve, uninterruptible (heating and cooling)
44	2nd heat generator
45	non-return valve
46	regulating valve
47	dirt trap
48	motor-powered switch valve

No.	Description
49	motor-powered valve
50	connections integrated tube heat exchanger
51	pool heat exchanger
52	ball valve
53	optimized thermo storage with integrated tube heat exchanger
54	vertical probe
55	charging storage 1000l - 2500l
56	thermostatic valve
57	temperature regulator
58	gravitational brake
59	Tichelmann-hydraulics enlargement set
60	Tichelmann-hydraulics basic set
61	connection set solar
62	collector temperature sensor
63	vacuum tube
64	electronical heating element
65	charging storage 400 liter with potable water heater (SET 454)
66	regulating valve
67	outdoor temperature sensor
68	reference room sensor
69	motor-powered ball valve
70	safety group with relief valve, pressure reducer, backflow preventer and membrane expansion tank with perfusion armature for potable water systems
71	215 liter plastic case
72	hopper
73	immersion pipe, copper with suction strainer, non-return valve and pump connection
74	self-priming pump WJ 301 EM with 2m cable (230 V), rated input 1100 W, connections suction-sided and pressure sided Rp1"
75	1500 mm forward flow tube with 1 1/4" cap nut with 2 seals and reducing nipple 1 1/4"a x 1"a
76	1500 mm return flow tube with 1 1/4" cap nut with 2 seals
77	air separator, safety group with manometer, bleeder, relief valve, membrane expansion tank with shut-off fitting
78	motor-powered switch ball valve (potable water heating)
79	motor-powered switch ball valve (swimming pool)
80	multiple-ply filter for poolwater cleaning
81	poolwater - disinfection system
82	ph - value control- and adjustment system
83	poolwater - drain
84	poolwater circulation pump

18 Technical data

The individual specifications and filling quantities of your heat pump system, refer to the type plate.

Performance table: EcoTouch Ai1 Geo with R410A	EcoTouch Ai1 Geo 5006.5	EcoTouch Ai1 Geo 5008.5	EcoTouch Ai1 Geo 5010.5	EcoTouch Ai1 Geo 5013.5
Groundwater source heating				
Power cons./output. W10/W35, kW ²⁾	1.3/8.1	1.6/10.5	2.1/14.1	2.8/18.0
Performance factor (COP) W10/W35 ⁴⁾	6.4	6.5	6.5	6.0
Space heating energy efficiency class / water heating energy efficiency class , load profile L ⁸⁾	A+++ / A+ ⁷⁾	A+++ / A+ ⁷⁾	A+++ / A+ ⁷⁾	A+++ / A ⁷⁾
Efficiency class of the package of space heater ^{6)/} water heating energy efficiency class, load profile L ⁸⁾	A+++ / A+ ⁷⁾	A+++ / A+ ⁷⁾	A+++ / A+ ⁷⁾	A+++ / A ⁷⁾
Groundwater flow rate, m ³ /h (Δt=3K)	2.0	2.6	3.4	4.3
Groundwater flow rate, minimum m ³ /h ¹⁾	1.0	1.3	1.7	2.2
Heating water flow rate, m ³ /h (Δt=5K)	1.4	1.8	2.4	3.0
Operating limit	W10/W63			
Heat source ground				
Power cons./output B0/W35, kW ²⁾	1.3/6.0	1.6/7.9	2.1/10.7	2.7/13.8
Performance factor (COP) B0/W35 ²⁾	4.7	4.9	5.1	5.0
Space heating energy efficiency class/ water heating energy efficiency class, load profile L ⁸⁾	A++ / A ⁷⁾	A++ / A ⁷⁾	A++ / A ⁷⁾	A++ / A ⁷⁾
Efficiency class of the package of space heater ^{6)/} water heating energy efficiency class, load profile L ⁸⁾	A++ / A ⁷⁾	A++ / A ⁷⁾	A++ / A ⁷⁾	A++ / A ⁷⁾
Heat source flow rate ³⁾ , m ³ /h (Δt=3K)	1.5	2.0	2.7	3.5
Heating water flow rate, m ³ /h (Δt=5K)	1.0	1.4	1.8	2.4
Max. power input heat source pump, W	75			
Max. power input heat pump, W	75			
Operating limit	B-5/W60 B0/W65			
Compressor	Hermetically sealed scroll			
Sound power level 9614-2 dB(A)	46,1	46,7	49,7	47,7
Electrical data for motor execution: 3x 400 V, 50 Hz (series 1x 230 V, 50 Hz)				
Starting current (unreduced), A	28 (60)	43 (83)	51,5 (108)	62 (130)
Starting current soft start, A	14 (45)	22 (45)	26 (45)	31 (45)
Max. operating current, A	4.8 (12.8)	6.2 (17.1)	7.4 (22.8)	9.7 (27.9)
Customer-supplied main fuse, compressor A	C16A (C16A)	C16A (C20A)	C16A (C25A)	C16A (C32A)
Customer-supplied control fuse, A	B10A			
Max. operating current (electrical heating) A	8.7 (26.1)			
Customer-supplied main fuse (electrical heating) A	B16A (B32A)			
Electrical heating element, kW	6			

Performance table: EcoTouch Ai1 Geo with R410A	EcoTouch Ai1 Geo 5006.5	EcoTouch Ai1 Geo 5008.5	EcoTouch Ai1 Geo 5010.5	EcoTouch Ai1 Geo 5013.5
Filling capacities, dimension, weights, connections				
Compressor volume Oil filling (l) ⁵⁾	0.74	1.24	1.24	1.24
Refrigerant volume R410A (kg)	1.80	1.80	2.20	2.20
Volume heating side (l)				
Volume heat source side (l)				
Weight: device, empty tank, with housing, kg	208	217	223	225
Weight: tank module, without housing, kg			65	
Weight: housing, (kg)			35	
Weight: hydraulic module, without housing (kg)	108	117	123	125
Connections: heat source / use	flat sealing, G 1¼ "a / G 1¼ "a			
Dimensions W x H x D, mm	600 x 1993 x 633 (+ 35 mm connections)			
Volume domestic hot water tank, (l)	204			
Connections domestic hot water tank	G ¾" i			
Operating pressure, tank (bar)	10			

¹⁾ At W10/W35 und $\Delta t=6K$. ²⁾ Tolerances as per EN 12900 and EN 14511 apply to the performance data listed.

³⁾ 70 % water + 30 % ethylen-glykol. ⁴⁾ COP as per EN14511 ⁵⁾ Type: Ester oil ICI Emkarate RL 32-3MAF ⁶⁾ standard in the 1x230 V series. ⁶⁾ When the composite label Waterkotte WWPR controller class III was considered (without room temperature sensor). ⁷⁾ Water heating energy efficiency class under average climate conditions, load profile L. ⁸⁾ Seasonal space heating energy efficiency class under average climate conditions - medium-temperature application (55 °C).



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