Experience Better Living.

R290

Project planning handbook

Version 17/12/2024

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Table of contents

1 Foreword

For the Dimplex specialist,

More efficiency, more climate protection, more independence, more quality of life: the heat pump is the heating system of the future.

As a leading international manufacturer of efficient and comfortable solutions for heating and ventilation, Dimplex continues to be the perfect partner in the heat pump sector.

Our experience and expertise is based on the aspiration to constantly develop new ideas and drive innovation in technology and design. Our aim is to create products that are energy-efficient, always in tune with the times and make buildings a cosy home or pleasant place to work.

Dimplex has been a driver of innovation for over 40 years. Durable products and reliable service are our claim. We offer a broad portfolio in the areas of electric heating, cooling, domestic hot water and ventilation. Our focus is not on new products, but above all on intelligent system solutions.

Sustainability is one of the defining pillars of our corporate philosophy. With our teams and the outstanding technological expertise of our parent company Glen Dimplex Group - itself also a global leader in intelligent electric heating - we will drive forward climate protection through sustainable system solutions. We are firmly convinced that the future belongs to electric heating and cooling, thanks to a constantly increasing proportion of green electricity from renewable sources.

We want to shape the future of heating together with you and be a strong service partner at your side - for system solutions in the field of new build and refurbishment. As part of our comprehensive range of services, we have created the first online version of the heat pump handbook with the following new features:

- Design of heat pumps with single-stage or stepless control
- Clear presentation of the areas of application and connection options for all available circulation pumps
- Supplementary information on the M / M Flex heat pump system and the air circuit of the LI 16I-TUR air-to-water heat pump, etc.
- Notes on lightning protection
- Supplementary solutions for condensate drainage
- Updated integration schemes
- Update of the heat source brine and water design tables incl. pump assignments
- New allocation tables for hydraulic components including domestic hot water preparation
- Water quality: Update VDI 2035 "Prevention of damage in domestic hot water heating systems" with regard to the formation of stones in heating systems

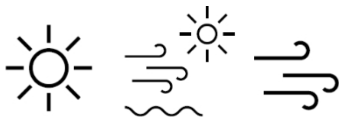
2 Why a heat pump?

We are already living in the midst of change and the switch to renewable energies is progressing faster than ever. Between 1990 and 2021, their share of the energy sources used in Germany increased steadily from 1.3 % to 19.7 %. Since then, the switch to renewable energies has gained significant momentum. As a result, their share of electricity production is also growing. Today, more than 40 % of the electricity generated can already be obtained from renewables, and the trend is rising sharply: by 2030, 80 % of electricity generation is expected to be renewable. Electricity is therefore the energy source of our future - whether with your own PV system on the roof, with wind farms in the North Sea or with hydropower: energy from renewable sources is produced in the form of electricity.

We still need the largest share of energy for heating and cooling, domestic hot water preparation and ventilation, in all buildings from small to large, from flats to supermarkets and factories. For this, we need smart, networkable solutions that can utilise green electricity as efficiently as possible.

More system. More efficiency. From a single source.

No other manufacturer offers a comparable, cleverly coordinated product range: Dimplex has everything you need to benefit from the energy transition in heating, cooling and air conditioning - and to be sustainable in the long term.



The heating market is facing the biggest change in its history. From 2024, only heat generators that run on at least 65% renewable energy will be allowed to be installed. The time of fossil fuelled domestic hot water preparation is finally over - we are becoming independent of oil and gas imports. Dimplex offers you all the solutions you need.

The energy sources of our future: wind, sun and water.

Climate change is no longer a scenario, but a reality. And reducing CO_2 emissions is no longer an option, but simply a necessity: within the EU, they are therefore to be reduced by 55% by 2030. The EU wants to achieve climate neutrality by 2050 - in Germany, this target has already been set for 2045. As we consume the most energy in the building sector, heating and hot water production must also become CO_2-free.

We are becoming climate-neutral - with energy from renewable sources.

The best energy? The one that is not consumed at all. The days of thoughtless consumption are over: saving energy is becoming sexy; but above all, only energy efficiency increases the long-term value of property. No wonder more and more passive and low-energy houses are being built. Even entire communities are using smart means to reduce their energy consumption - and become self-sufficient.

**We want to cleverly store and distribute energy generated from renewable sources - and
for more efficiency.**

2.1 The future is electric: heating, cooling, air.

Perfectly combined. For new builds and refurbishments.

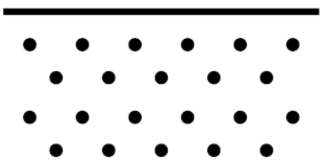
1. Heat pumps
2. Control and regulation devices
3. Ventilation (centralised/decentralised)
4. domestic hot water appliances
5. electr. heating systems
6. Fan convectors

2.2 What does the heat pump do?

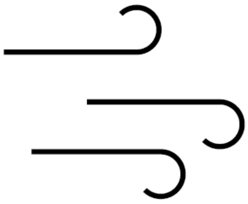
2.2.1 Utilising environmental energy

Whether air, groundwater or ground - the heat energy comes from outside and is transported into the house via the heat pump. And regardless of the season: Dimplex heat pumps operate from +35 to -22 °C. Reversible appliances can also be used for cooling in summer.

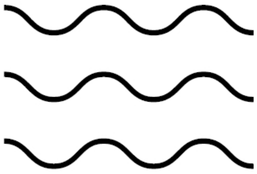
Three heat sources



Earth



Air

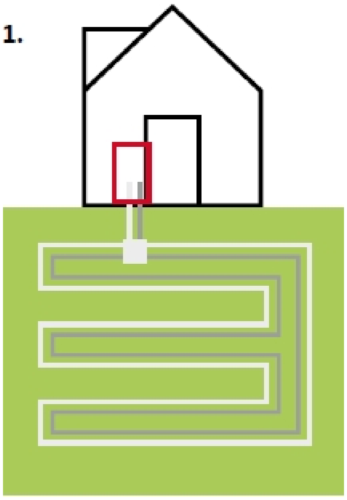


Water

Three types of heat pump

Brine/water
Heat pumps

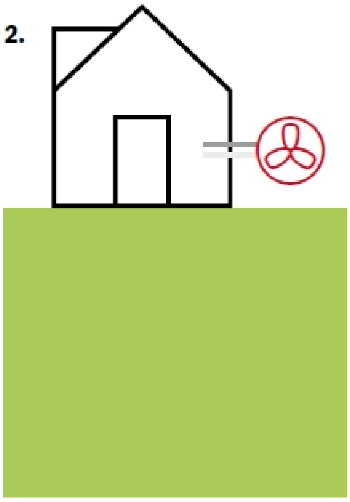
1.



obtain the energy via ground collectors or geothermal probes

Air/water
Heat pumps

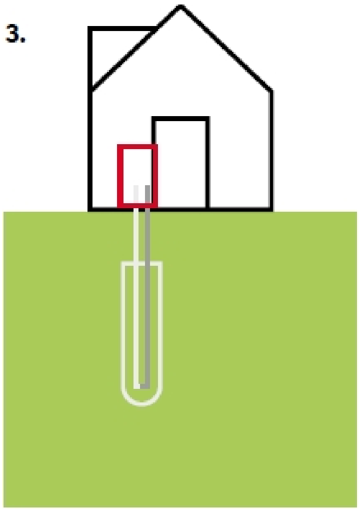
2.



use the outside air as Energy source - down to -22 °C

Water/water
Heat pumps

3.



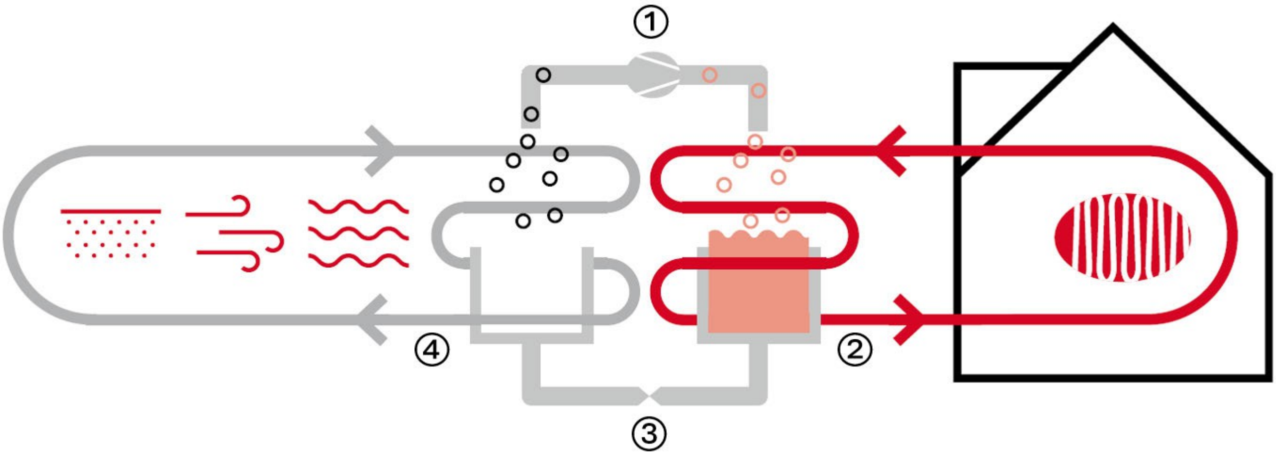
draw environmental energy directly from the groundwater

The refrigerant circuit

The core of the heat pump is the refrigerant circuit, where the heat is recovered:

In the first **heat exchanger**, the absorbed environmental energy (ground, air or groundwater) is transferred to the liquid refrigerant, which **evaporates** as a result. The temperature of the gaseous refrigerant is then further increased in the **compressor** - this requires electricity.

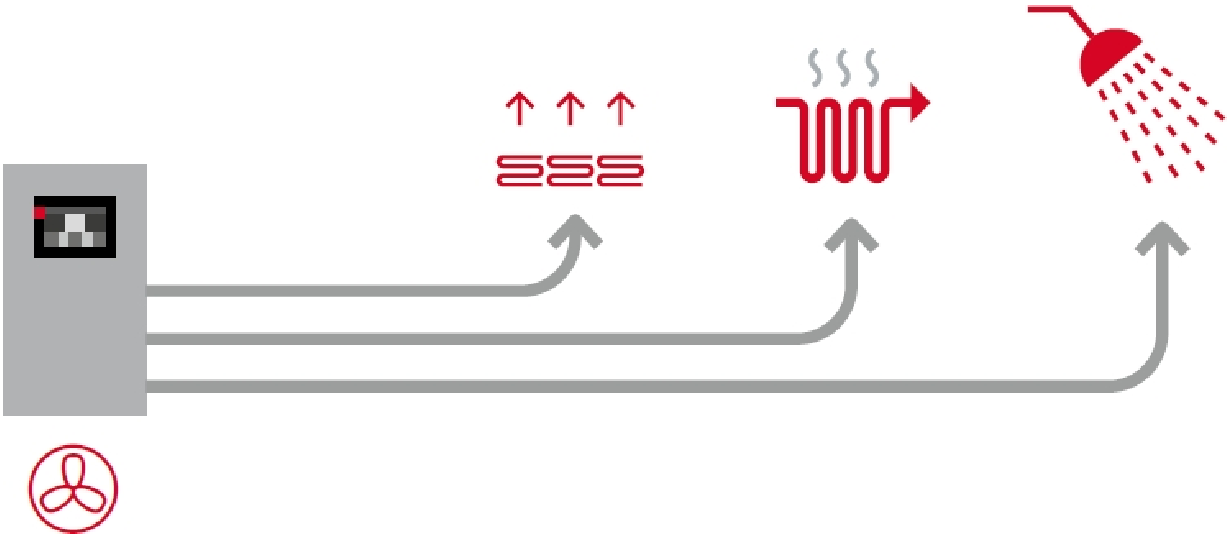
In the second **heat exchanger**, the condenser, the hot refrigerant gas **condenses** and releases the heat energy to the distribution system. After a further reduction in pressure and temperature through the **expansion valve**, the refrigerant can pass through the circuit again.



1. compressor
2. condenser
3. Relax
4. evaporate

The utilisation options

A **water-based heat distribution system distributes** the heat throughout the house via panel heating or radiators. When the heat pump is running, it usually supplies more energy than is needed at the moment. This surplus can be stored temporarily in the form of hot water in a **domestic hot water storage tank** - and then used at any time, for example for showering. This means that the heat pump does not have to switch on (and then off again) at the slightest heat demand, which further increases its efficiency and has a positive effect on its service life.



2.3 Refrigerants and F-gas Regulation

Status: 16/05/2024

2.3.1 Statement on the current F-Gas Regulation

Regulation (EU) No. 517/2014, the so-called F-Gas Regulation

In order to limit global climate change and thus the rise in temperature to 2 °C, the use of fluorinated greenhouse gases (F-gases) is to be drastically restricted. This was agreed at international level in 2016 in the Kigali Amendment, an addendum to the Montreal Protocol. This means that the amount of available F-gases with a high GWP is to be artificially limited by means of legal requirements. The European Union is leading the way here. The so-called F-Gas Regulation from 2014 already provides for a gradual reduction in the availability of particularly climate-damaging F-gases. By 2030, the average GWP value of the total quantity of F-gases placed on the market each year is to be just 21% of the same value in 2015. The European Union is using the phase-down process as an instrument to incentivise the increased use of natural refrigerants by reducing the availability of F-gases and the associated price increases.

Effects on the heat pump market

Regulation (EU) 2024/573 of 7 February 2024 includes a whole series of bans on use in different stages, starting from 2025 until 2035. The regulation distinguishes between air conditioning systems, refrigerating systems and heat pumps for systems that have a refrigeration circuit.
The following type- and performance-related prohibitions of use are listed for heat pumps in Annex IV in accordance with Article 11(1).

Split heat pumps:

Performance	date	Refrigerant ban	Exception for safety requirements
<12 kW	01.01.2027	>150 GWP	No GWP limit
	01.01.2035	All F-gases	No GWP limit
>12 kW	01.01.2029	>750 GWP	No GWP limit
	01.01.2033	>150 GWP	No GWP limit

Monobloc heat pumps:

Performance	date	Refrigerant ban	Exception for safety requirements
<12 kW	01.01.2027	>150 GWP	<750 GWP
	01.01.2032	All F-gases	<750 GWP
>12 kW until <50 kW	01.01.2027	>150 GWP	<750 GWP
>50 kW	01.01.2030	>150 GWP	<750 GWP

The exceptions for safety requirements have not yet been defined.

Glen Dimplex Deutschland GmbH heat pumps currently comply with the requirements of the new F-Gas Regulation. Depending on their design and performance, all heat pumps manufactured by Glen Dimplex Deutschland GmbH can be approved for use with the refrigerant used up to the date of entry into force of the top respective

The product may be placed on the market after the end of the prohibition of use and may continue to be operated beyond that until the end of its life cycle.

Service / Maintenance

Article 13 - *Control of use* describes the maintenance prohibitions for technical installations. The following applies to

heat pumps:
Heat pumps that have already been installed can continue to be operated and repaired. The only
Exceptions are heat pumps that use a refrigerant with a GWP of more than 2500. The current F-Gas Regulation stipulates that repairs to the refrigeration circuit of heat pumps will no longer be permitted from 2032, even with recycled or reclaimed refrigerant. Functioning heat pumps may continue to be operated beyond this date.

Glen Dimplex Deutschland GmbH does not currently have any heat pumps with a GWP > 2500 in its range.

Synthetic refrigerants such as R410 or R32 are only reduced in their total available quantity. This quantity restriction has already taken place in the past. Use for repair purposes is still permitted and has no effect on warranty claims. As the refrigerant circuits of heat pumps are hermetically sealed ex works, cases in which a refrigerant can escape are extremely rare. In these cases, there will always be enough refrigerant available and there are no maintenance or repair bans.

Wording of the F-Gas Regulation: https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=OJ:L_202400573

2.4 Planning and Installation aids

- Explanation of terms & FAQ
- The path to the heat pump
- Energy content of different fuels
- CO2 factors for energy sources
- Pipeline dimensioner

2.4.1 Explanation of terms & FAQ

Explanation of terms

Term	Explanation
Switch-off point	Operating point in partially parallel or alternative operation at which the heat pump reaches an operating limit and switches off [based on VDI 4650 Sheet 1].
Switch-off temperature	outside temperature corresponding to the switch-off point [VDI 4650 Sheet 1].
Defrost end	Control routine for removing frost and ice on evaporators of air-to-water heat pumps by adding heat. Air-to-water heat pumps with circuit reversal are characterised by on-demand, fast and energy-efficient defrosting.

Term	Explanation
Calculated seasonal performance factor (Seasonal Coefficient of Performance, SCOP)	Calculated ratio of the useful heat emitted per year by an electric heat pump in relation to the energy used to drive the compressor, auxiliary drives and control [based on VDI 4650 Sheet 1].
Bivalent-alternative operation	Operating mode in which the heat pump supplies all the heating energy up to a defined output and in which the heat pump switches off when the heating load is higher, whereby the second heat pump, which is supplied with a different final energy (e.g. B. heating oil) operated heat generators takes over the required heat output
Bivalent-parallel operation	Operating mode in which the heat pump supplies all the heating energy up to a defined output and in which the second heat pump, which uses a different final energy source (e.g. heating oil), is used for a higher heating load. heat generator, so that both heat generators operate in parallel.
Bivalent-renewable operation	The bivalent-renewable operating mode enables the integration of renewable heat generators such as wood or solar thermal energy. If energy from renewable sources is available, the heat pump is switched off and the current heating, hot water or swimming pool requirement is supplied from the regenerative storage tank.
Bivalent-partially parallel operation	Operating mode in which the heat pump supplies all of the heat up to a defined output and in which the second heat pump uses a different final energy source (e.g. heating oil) if the heat load is higher. The second heat generator is switched on so that both heat generators operate in parallel and the second heat generator fully supplies the required heat load when the heat pump reaches one of its operating values
bivalence point	Operating point with the highest output that can still be provided by the heat pump alone
Bivalence temperature	outside temperature corresponding to the bivalence point [VDI 4650 Sheet 1].
Carnot coefficient of performance (COP)	The ideal comparative process of all heat work processes is the Carnot process. This ideal (imaginary) process results in the theoretical degree of efficiency or, in comparison with the heat pump, the theoretically highest coefficient of performance (COP). The Carnot coefficient of performance only uses the pure temperature difference between the hot and the colder side.
COP (coefficient of performance)	Ratio of the useful heat flow of an electric heat pump delivered under certain operating conditions, in relation to the electrical power used to drive the compressor, the Auxiliary drives and control in accordance with DIN EN 14 511 [based on VDI 4650 Sheet 1].
Efficiency	Measure of energy quality, which describes the ratio of benefit to cost

Term	Explanation
EnEV	In Germany, the Energy Saving Ordinance (EnEV) regulates measures to save energy in buildings. In addition to basic requirements for new buildings, deadlines are also set for the replacement of outdated heating technology.
Utility company shut-off times	The use of special heat pump tariffs from the respective local utility company requires a supply of electrical energy that can be switched off by the utility company. For example, the power supply can be interrupted for 3 x 2 hours within 24 hours. Therefore, the daily heating work (daily heat quantity) must be applied within the time in which electrical energy is available.
Fixed-speed heat pump	Heat pump with on/off operation, in which the adjustment to the heating load takes place in cyclical operation (heat pump without capacity control)
Measured seasonal performance factor (SPF)	Ratio of the useful heat emitted by an electric heat pump during the year, determined using measuring devices, to the electrical energy used to drive the compressor, auxiliary drives and control, which is also measured.
SG Ready / Smart Grid	The "SG Ready" label is awarded by the BWP to heat pump series whose control technology enables the individual heat pump to be integrated into a *smart grid*. All Dimplex heat pumps currently available have been awarded this label

FAQ

Heat pumps in existing buildings

Is my house suitable for a heat pump?

Heat pumps can be used in refurbishment projects without any problems. Dimplex also offers a suitable heat pump solution for the vast majority of unrenovated or partially renovated existing buildings.

How do I know what flow temperature my heating system needs?

Use the heating season for a simple test: Reduce the flow temperature of your existing heating system with the heating thermostats turned up fully. If it then becomes too warm, the flow temperature at the heat generator can be reduced to increase efficiency. If flow temperatures of up to 55°C are only required even at sub-zero temperatures, the building can be converted to a heat pump without increasing the size of the radiators. If it is too cold in some rooms, you can use this to determine which radiators should be replaced.

Can I install a heat pump even if I don't have underfloor heating?

It's a widespread rumour that heat pumps always need underfloor heating - but that doesn't mean it's true. In most cases, Dimplex heat pumps also work with existing radiators. As a rule, the radiators in many existing houses are oversized anyway. Practice shows that the appropriate room temperature can be achieved even with lower flow temperatures.

Does my house have to be renovated before I can install a heat pump?

Basically, the less energy required to create a comfortable indoor climate, the better. It is therefore always reasonable to carry out refurbishment measures to reduce heating energy requirements. This applies to all heating systems, not just heat pumps. However, it is not absolutely necessary to comprehensively renovate houses in order for them to be suitable for the use of heat pumps. It is true that the lower the heat losses, the more efficiently a heat pump works. However, the required flow temperature is decisive for their use.

What are the advantages of combining the heat pump with a photovoltaic system?

Heat pumps and photovoltaic systems are ideal partners. A PV system further improves the already very good ecological balance of the heat pump. What's more, with a solar power system you can significantly minimise your energy costs in conjunction with a heat pump - at times even down to zero.

2.4.2 The path to the heat pump

Converting the heating - step by step

1. Heating load determination:

The specialist company determines the heating load and the suitability of the radiators in each room of your building. A rough estimate can be made beforehand based on previous consumption. Heat pumps should be designed for a maximum flow temperature of 55°C. Every degree less flow temperature saves bar money!

2. Suitability test for radiators

The heating load calculation determines whether the existing radiators are sufficiently dimensioned. If the size is not sufficient, it is possible to either select larger radiators or install Dimplex heat pump radiators. The latter can even cool in conjunction with a heat pump and thus ensure a cosy atmosphere in summer.

3. Selection of heat pump

With the information about the building heating load, the specialist company can quickly offer a suitable solution from the Dimplex portfolio thanks to the Dimplex configurator. For air-to-water heat pumps, the appropriate installation location must be determined beforehand. For brine-to-water heat pumps, the appropriate drilling site must be checked.

4. Supply and service contract

A valid supply and service contract is a prerequisite for an application for funding. This contains the expected date of implementation and is concluded subject to a condition precedent or condition subsequent. This means that it is contractually stipulated that the delivery and service obligations only come into force once the funding has been approved or that the contract expires if the funding is not approved.

5. Submit funding application

With the help of the offer, you now have clarity about the costs. The subsidy application can now be submitted. This can be done either by the installation company or our partner company for subsidy issues, PuR GmbH.

6. Start of the installation

The trained specialist installs your Dimplex heat pump. This must take place within the authorisation period of 36 months (begins with the approval of the subsidy). If the speed bonus in

the measure must be completed more quickly in order to benefit from the full subsidy.
benefit - namely before the next lower funding level comes into force.

2.4.3 Energy content of different fuels

Heating value H_i (formerly H_u)

The heating value Hi (also known as the lower heating value) is the quantity of thermal energy that is released during complete combustion if the water vapour produced during combustion escapes unused

Calorific value H_s (formerly H_o)

The calorific value Hs (also known as the upper heating value) is the quantity of thermal energy that is released during complete combustion when the water vapour produced during combustion is condensed and thus the heat of vaporisation is available for use.

Comparison of fuels

fuel	Heating value H_i	Calorific value H_s
Hard coal	8.14 kWh/kg	8.41 kWh/kg
Natural gas H	10.42 kWh/m_n^3	11.42 kWh/m_n^3
Natural gas L	8.87 kWh/m_n^3	9.76 kWh/m_n^3
Heating oil (light)	10.08 kWh/l	10.57 kWh/l
Heating oil (heavy)	10.61 kWh/l	11.27 kWh/l
Liquid gas propane	12.90 kWh/kg	14.06 kWh/kg
Liquid gas butane	12.70 kWh/kg	13.72 kWh/kg
Wood pellets	4.9 - 5.1 kWh/kg	5.3 - 5.5 kWh/kg
Logs	4.0 - 4.3 kWh/kg	4.3 - 4.6 kWh/kg
Wood chips	3.5 - 4.0 kWh/kg	3.8 - 4.3 kWh/kg

2.4.4 CO2 factors for energy sources

Source: Information sheet CO_2 -factors - Federal Office of Economics and Export Control (2001)

The factors shown in the table below are **binding** for the calculation of CO2 emissions per energy source. The factors are stored in the savings concept for all energy sources and CO2 emissions are calculated automatically.

The CO2 factors for fossil fuels correspond to the values in the UBA's "Tabular list of derived emission factors for CO2: Energy & industrial processes" from 15 April 2020. The values for biogenic fuels are derived from the UBA study "Emissions balance for renewable energy sources" from November 2019. For wood biomass, the average value of the wood types listed there is used.

The CO2 factor for electricity (energy source switch to electricity) is based on the UBA's estimate for 2020 from May. As the falling CO2 factor for electricity makes electricity efficiency measures unattractive in the long term, the double CO2 factor can be applied to these efficiency measures. This is intended to recognise the importance of these measures.

If renewable energies are already being used to provide heat or electricity, this is permitted, to use the factor for "natural gas" or "electricity (efficiency measure)".

The CO2 factors are adjusted every six months on the basis of the latest available data.

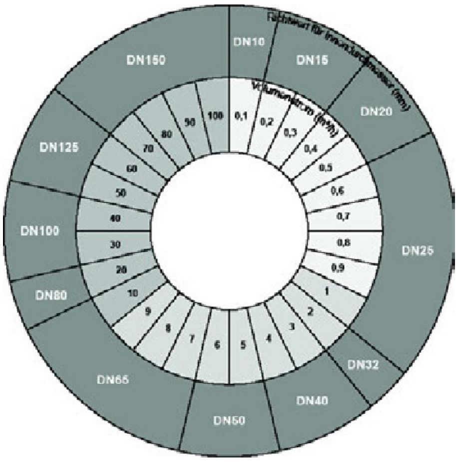
It should be noted that the factors refer to **the heating value** of the energy source. If the energy consumption is based on calorific value, this must first be converted.

Energy source	CO2 factor
Local/district heating	0.280 kgCO /kWh$_2$
Light heating oil	0,266
Heavy heating oil	0,288
Liquefied petroleum gas	0,239
Natural gas	0,201
Hard coal	0,335
Lignite	0,383
Biomass wood	0,027
Pellets	0,036
Biogas	0,152
Electricity	0,200

2.4.5 Pipeline dimensioner

In order to minimise pressure drops and thus the power requirement for circulation pumps, the pipe cross-sections must be dimensioned accordingly. The design criterion for this is the specific pressure drop per metre of pipe and the flow velocity of the medium in the pipe, in each case in relation to the nominal volume flow.
The following guide values should not be exceeded:

- dp_{max} = 120 Pa/m
- from pipes DN 10 to DN 65 w_{max} = 0.7 m/s
- from pipes DN 80 to DN 125 w_{max} = 1.2 m/s
- From pipework DN 150 w_{max} = 2.0 m/s



CAUTION

The diagram can be used to determine the approximate internal pipe diameter. The approximate design does not replace a pipe network calculation. The pressure drops determined from the pipe network calculation are also required for the design of the circulation pump.

NOTE

When using water-glycol mixtures, the pressure drop in the system increases. This must be taken into account when designing the pump.

NOTE

When using composite pipes, increased pressure drops must be expected due to the considerable reduction in cross-section at the fittings. For pipe sections with a large number of fittings, the pipe diameter should be at least one dimension larger. When designing additional pipework components (check valves, 2-way and 3-way changeover valves, etc.), the pressure drop should also be kept as low as possible.

NOTE

Special planning instructions for energy-efficient operation of heat pump systems and the Dimplex pipework dimensioner can be downloaded at: www.dimplex.de/professional/ online-planer/hydraulische-einbindungen

3 Selection and dimensioning of heat pumps

3.1 Heat pumps for the renovation market - dimensioning for existing heating systems

3.1.1 Heat demand of the house to be heated

For existing heating systems, the heat demand of the building to be heated must be redetermined, as the heat output of the existing boiler is not a measure of the heat demand. Boilers are usually oversized and would therefore lead to oversized heat pumps. The exact calculation of the heat demand is carried out according to country-specific standards (e.g. EN 12831). A rough calculation can be made from the previous energy consumption, the living space to be heated and the specific heat demand.
The heat demand can be roughly determined as follows:

Calculation for oil:	$B_a * \eta * H_u$
Q_N =	________________
	Bvh

Calculation for gas:	$B_a * \eta$
Q_N =	________________
	Bvh

Simplified calculation:	B_a
Q_N =	________________
	2500

with:

- Q_N = Heat demand building (in kW)
- B_a = Annual gas or oil consumption in kWh
- η = Degree of efficiency of gas or oil heating
- B_{vh} = Annual full utilisation hours (in h) H_u
- = Heating value of heating oil (in kWh/l)

The annual full utilisation hours depend on the type of building and the climate region. The following table shows the annual full utilisation hours for various building types in accordance with VDI 2067.

Type of building	Full utilisation hours Bvh in h/a
Detached house	2100
Apartment block	2000
Office building	1700
Hospital	2400
School (single-shift operation)	1100
School (multi-shift operation)	1300

Table: Annual full utilisation hours B_{vh} for different building types

The specific heat demand for detached and semi-detached houses built between 1980 and 1994 is around 80 W/m² . For houses built before 1980 and not yet equipped with an additional
thermal insulation measures have been carried out, it is 100 W/m² to 120 W/m² . For existing systems, the actual condition of the system must be taken into account.

> **NOTE** The heat demand of the building for the selection of a heat pump must be calculated in accordance with the country-specific standard (e.g. EN 12831). The selection of a heat pump based on previous energy consumption or guide values for the building heat requirement is not permitted. In this case, the heat pump may be significantly oversized or undersized.

3.1.2 Determination of the required flow temperature

In most oil and gas boiler systems, the boiler thermostat is set to a temperature of 70 °C to 75 °C. This high temperature is usually only required for hot water preparation. This high temperature is usually only required for domestic hot water preparation. Downstream control systems of the heating system, such as mixer and thermostatic valves, prevent the building from overheating. If a heat pump is retrofitted, it is essential to determine the actual required flow and return temperature in order to determine the correct refurbishment measures.
There are two different ways to do this:

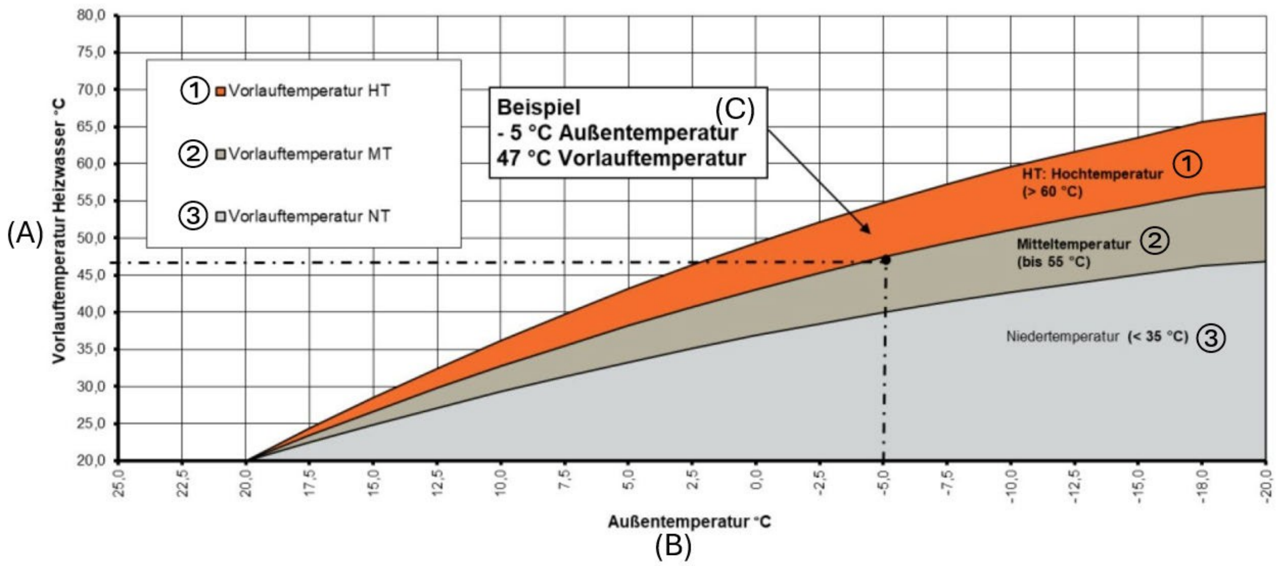
Heat demand calculation and heat demand of each room are known.
In the heating output tables for the radiators, the output is specified as a function of the flow and return temperature (see tables below). The room for which the highest temperature is required is then decisive for the maximum flow temperature in the heating centre.

Cast iron radiators										
Overall height	**mm**	980			580			430		280
Installation depth	**mm**	70	160	220	110	160	220	160	220	250
Heat output per link in W, at average water temperature T_m	**50 °C**	45	83	106	37	51	66	38	50	37
	60 °C	67	120	153	54	74	97	55	71	55
	70 °C	90	162	206	74	99	129	75	96	74
	80 °C	111	204	260	92	126	162	93	122	92

Steel radiators										
Overall height	**mm**	1000			600			450		300
Installation depth	**mm**	110	160	220	110	160	220	160	220	250
Heat output per link in W, at average water temperature T_m	**50 °C**	50	64	84	30	41	52	30	41	32
	60 °C	71	95	120	42	58	75	44	58	45
	70 °C	96	127	162	56	77	102	59	77	61
	80 °C	122	157	204	73	99	128	74	99	77

Tables: Heat output of radiator elements (at room temperature t_i =20 °C, according to DIN 4703)

Experimental determination of the system temperature actually required



(A) Flow temperature heating water °C

1. Flow temperature High temperature (> 60 °C)
2. Flow temperature Medium temperature (up to 55 °C)

(B) Outside temperature °C

(C) Example:
-5 °C outside temperature
47 °C Flow temperature

3. Low temperature flow temperature (< 35 °C)

We recommend carrying out the following steps during the heating period at different outside temperatures:

1. Set the room thermostats in rooms with high heat demand (e.g. bathroom and living room) to the highest setting (valves fully open!)
2. Reduce the flow temperature at the boiler or mixer valve until the desired room temperature of approx. 20-22°C is reached. (Note the inertia of the heating system!)
3. Note the flow and return temperature as well as the outside temperature in the table.
4. Transfer the measured values to the diagram.

Measured values	Example	1	2	3	4	5	6	7	8	9
outside temperature	-5 °C									
flow temperature	47 °C									
return temperature	40 °C									
Temp. difference	7 °C									

3.1.3 What refurbishment measures need to be taken for energy-saving heat pump operation?

low temperature
Flow temperature for all rooms max. 55 °C
If the required flow temperature is below 55 °C, no additional measures are required. Any low temperature heat pump can be used for flow temperatures up to 55 °C.

medium temperature
Flow temperature in some rooms above 55 °C
If the required flow temperature is only above 55 °C in some rooms, measures should be taken to reduce the required flow temperature. To do this, only the radiators in the affected rooms are replaced to enable the use of a low temperature heat pump.

medium temperature
Flow temperatures in almost all rooms between 55 °C and 65 °C
If temperatures between 55 °C and 65 °C are required in almost all rooms, the radiators in almost all rooms must be replaced or a decision must be made to use a medium temperature heat pump.

high temperature
Flow temperatures in almost all rooms between 65 °C and 75 °C Are flow temperatures of 65 °C to 75 °C, the entire heating system must be converted or adapted. If this conversion is not possible or not wanted, a high temperature heat pump must be used.

A reduction in heat demand through

- Replacement of windows,
- Reduction of ventilation losses,
- Insulation of storey ceilings, roof trusses or facades.

This brings savings in four different ways when renovating a heating system with a heat pump:

- By reducing the heat demand, a smaller and therefore cheaper heat pump can be installed.
- A lower heat demand leads to a reduction in the annual heating energy requirement that has to be supplied by the heat pump.
- The lower heat demand can be met with lower flow temperatures, thus improving the seasonal performance factor.
- Better thermal insulation leads to an increase in the average surface temperatures of the room-enclosing surfaces. As a result, the same level of comfort is achieved at lower room temperatures.

Example:

A residential building with a heat demand of 20 kW and an annual heating energy requirement of approx. 40,000 kWh is heated with a hot water heating system with flow temperatures of 65 °C (return 50 °C). Subsequent thermal insulation measures will reduce the heat demand by 25% to 15 kW and the annual heating energy requirement to 30,000 kWh. As a result, the average flow temperature can be lowered by approx. 10 K, which reduces energy consumption by a further 20-25%. The total energy cost saving for a heat pump heating system is then approx. 44%.

NOTE
In principle, the following applies to heat pump heating systems: every degree of temperature reduction in the flow temperature results in energy consumption savings of approx. 2.5 %.

3.1.4 Selection of the heat source (refurbishment)

In the renovation market for existing houses and landscaped gardens, it is rarely possible to install a ground heat collector, borehole heat exchanger or well system. In most cases, the only possible heat source is outside air. Air as a heat source is available everywhere and can always be used without authorisation. The expected seasonal performance factors are lower than for water and ground source systems, but the cost of developing the heat source system is lower. Please refer to the relevant chapters to find out how to dimension the heat source system for brine-to-water and water-to-water heat pumps.

3.2 Heat pumps for new systems to be built

- Determining the building heat demand
- Sizing the flow temperatures
- Selection of the heat source

3.2.1 Determining the building heat demand

The exact calculation of the maximum hourly heat demand is based on country-specific standards. An approximate calculation of the heat demand is possible using the living area A (m^2) to be heated:

Heat demand [kW] = heated area [m²] * specific heat demand [kW/m²]

= 0.01kW/m²	Passive house
= 0.025kW/m²	EnEV 2012
= 0.03 kW/m²	EnEV 2009

= 0.05 kW/m²	according to Thermal Insulation Ordinance 95 or minimum insulation standard EnEV
= 0.08 kW/m²	with normal thermal insulation of the house (from approx. 1980)
= 0.12 kW/m²	for older masonry without special thermal insulation.

Table: Estimated specific heat demand values for a single-family house

3.2.2 Sizing the flow temperatures

When designing the heat distribution system of heat pump heating systems, care must be taken to ensure that the required heat demand is transferred at the lowest possible flow temperatures, as every degree of temperature reduction in the flow temperature results in energy consumption savings of approx. 2.5 %. Large heating surfaces such as underfloor heating are ideal. In general, the required flow temperature should not exceed 55 °C to enable the use of low temperature heat pumps. If higher flow temperatures are required, medium or high temperature heat pumps must be used (see here). In order to heat buildings with the lowest possible flow temperature (low-temperature heating system) and thus in an energy-efficient manner, the consumer circuit must be designed for these system temperatures. The following heat sinks, for example, are suitable for operation with low flow temperatures:

- underfloor heating
- Fan convectors
- Radiant ceiling panels
- Ventilation coil (with large heat exchanger surface)
- Concrete core activation

A weather-compensated setting of the control is preferred in order to avoid unnecessarily high heating water temperatures during partial load operation of the heat pump. This increases energy efficiency by lowering the flow temperature when the outside temperature rises. The fixed-setpoint control of the heat pump, which is also possible, should be set for brine-to-water heat pumps with a probe system, as the temperature level of the heat source is the same all year round.

3.2.3 Selection of the heat source

The decision as to whether to use air, brine (ground heat collector, borehole heat exchanger) or water (well system) as the heat source should be made depending on the following influencing variables.

- **Investment costs** In addition to the costs for the heat pump and the heating system, the investment costs are decisively influenced by the development costs of the heat source.
- **Operating costs** The expected seasonal performance factors of the heat pump heating system have a decisive influence on the operating costs. These are primarily influenced by the type of heat pump, the average heat source temperature and the required heating flow temperatures.

NOTE The heat demand of the building for the selection of a heat pump must be calculated in accordance with the country-specific standard (e.g. EN 12831). The selection of a heat pump based on previous energy consumption or guide values for the building heat requirement is not permitted. In this case, the heat pump may be significantly oversized or undersized.

> **NOTE**
> Although the expected seasonal performance factors for air-to-water heat pumps are lower than for water and ground source systems, the cost of developing the heat source system is lower.

3.3 Additional power requirement

3.3.1 Utility company shut-off times

Most utility companies (EVU) offer a special agreement with a more favourable electricity price for heat pumps. According to the Federal Tariff Ordinance, the utility company must be able to switch off and block heat pumps during peak loads in the supply grid. During shut-off times, the heat pump system is not available to generate heat for the house. Energy must therefore be supplied during the heat pump release times, which means that the heat pump or the second heat generator must be dimensioned accordingly larger.

Dimensioning The calculated heat requirement values for heating and domestic hot water preparation must be added together. In monovalent operation without If switching on an additional 2nd heat generator during the shut-off time is not required, the sum of the heat requirement values must be multiplied by the dimensioning factor f and the heat pump must be dimensioned accordingly larger. In the case of monoenergetic or bivalent systems, the second heat generator can also provide the additional output required.

Calculation basis:

$$f = \frac{24h}{Freigabedauer} = \frac{24h}{24h - Sperrdauer}$$

Shut-off period (total)	Dimensioning factor
2 h	1,1
4 h	1,2
6 h	1,3

Table: Dimensioning factor f to take shut-off times into account

Due to the large number of grid operators, utility blocks are used in very different ways. They range from fixed daily blocks to sporadic, load-dependent blocks that are only used sporadically during peak loads in the grid.

> **NOTE**
> In practice, oversized heat pumps with short runtimes often deliver poorer performance factors. It is therefore reasonable to cover at least part of the higher theoretical power requirement with utility blocks via the second heat generator. The heat pump can cover the additional heat demand for a large part of the year, as the heat pump only needs to be supported by a second heat generator when outside temperatures are low and the heat demand is high.

> **NOTE**
> As soon as a signal for blocking the heat pump is set, the signal must be active for at least 10 minutes. Once the signal has been cancelled, it must not be reactivated for at least 10 minutes.

In general, in solidly built houses, especially with underfloor heating, the existing heat storage capacity is sufficient to bridge the maximum shut-off time of two hours with only a slight loss of comfort, so that switching on the second heat generator (e.g. boiler) during the shut-off time can be dispensed with. However, increasing the output of the heat pump or the second heat generator is necessary due to the required reheating of the storage masses.

3.3.2 domestic hot water preparation

The demand for hot water in buildings is heavily dependent on usage behaviour.

For normal comfort requirements, an average daily hot water requirement of 1.45 kWh per person can be estimated. At a storage temperature of 60 °C, this corresponds to 25 litres of water per person. On average, an additional heat output of the heat pump of 0.2 kW per person must be taken into account for the domestic hot water.

Simplified procedure

In detached and semi-detached houses with standard sanitary equipment, the required storage tank size and the required heat output can be determined using a simplified procedure.

This value is doubled for the storage design for up to approx. 10 people - this gives the required Minimum storage volume. This minimum volume is converted to the actual storage temperature.

> **NOTE** Dimensioning should be based on the maximum possible number of people and should also take into account special user habits (e.g. whirlpool).

If domestic hot water preparation is carried out at the design point of the heat pump by means of a flange heater, it is not necessary to add the additional energy consumption for domestic hot water preparation to the heating demand.

Circulation pipes
Circulation pipes increase the heat demand for hot water heating on the system side. The additional requirement depends on the length of the circulation pipe and the quality of the pipe insulation and must be taken into account accordingly. If circulation cannot be dispensed with due to long pipe runs, a circulation pump should be used, which is activated by a flow sensor when required. The heat demand for the circulation pipework can be considerable.

> **NOTE**
> According to Energy Saving Ordinance §12 (4), circulation pumps in hot water systems must be equipped with automatic on/off devices.

The area-related heat loss of the drinking water distribution depends on the usable area and the type and position of the circulation used. With a usable area of 100 to 150 m² and distribution within the thermal envelope, the area-related heat losses according to EnEV are as follows:

n (with circulation) = 9.8 [kWh/m² a] n

(without circulation) = 4.2 [kWh/m² a]

3.3.3 Swimming pool water heating

Outdoor pool

The heat demand for heating swimming pool water in an outdoor pool depends heavily on the usage habits. In terms of size, it can correspond to the heat demand of a residential building and must be calculated separately in such cases. However, if there is only occasional heat up in summer (non-heating time), the heat demand may not need to be taken into account. The approximate determination of the heat demand depends on the wind position of the pool, the pool temperature, the climatic conditions, the period of use and whether the pool surface is covered.

	Water temperature		
	20 °C	**24 °C**	**28 °C**
with cover [1]	100 W/m²	150 W/m²	200 W/m²
without cover Position protected	200 W/m²	400 W/m²	600 W/m²
without cover Position partially protected	300 W/m²	500 W/m²	700 W/m²
unprotected without cover (strong wind)	450 W/m²	800 W/m²	1000 W/m²

1 Reduced values for pools with covers only apply to private swimming pools used for up to 2 hours per day

Table: Reference values for the heat demand of outdoor pools for use from May to September

For the initial heating of the pool to a temperature of over 20 °C, a quantity of thermal energy of approx. 12 kWh/m³ pool content is required. Depending on the size of the pool and the installed heat output, heating times of one to three days are required.

Indoor swimming pool

- Space heating
  Room heating is generally provided by radiator or underfloor heating and/or a heating register in the dehumidification/ventilation system. In both cases, a heat requirement calculation - depending on the technical solution - is necessary.
- Swimming pool water heating
  The heat demand depends on the pool water temperature, the temperature difference between the pool water and room temperature and the use of the swimming pool.

room temperature	Water temperature		
	20 °C	24 °C	28 °C
23 °C	90 W/m²	165 W/m²	265 W/m²
25 °C	65 W/m²	140 W/m²	240 W/m²
28 °C	20 W/m²	100 W/m²	195 W/m²

Table: Reference values for the heat demand of indoor swimming pools

These benefits can be reduced by up to 50% for private swimming pools that are covered and used for a maximum of 2 hours per day.

> **NOTE**
> When using a brine-to-water heat pump for swimming pool preparation, the heat source must be designed for the higher number of annual full utilisation hours.

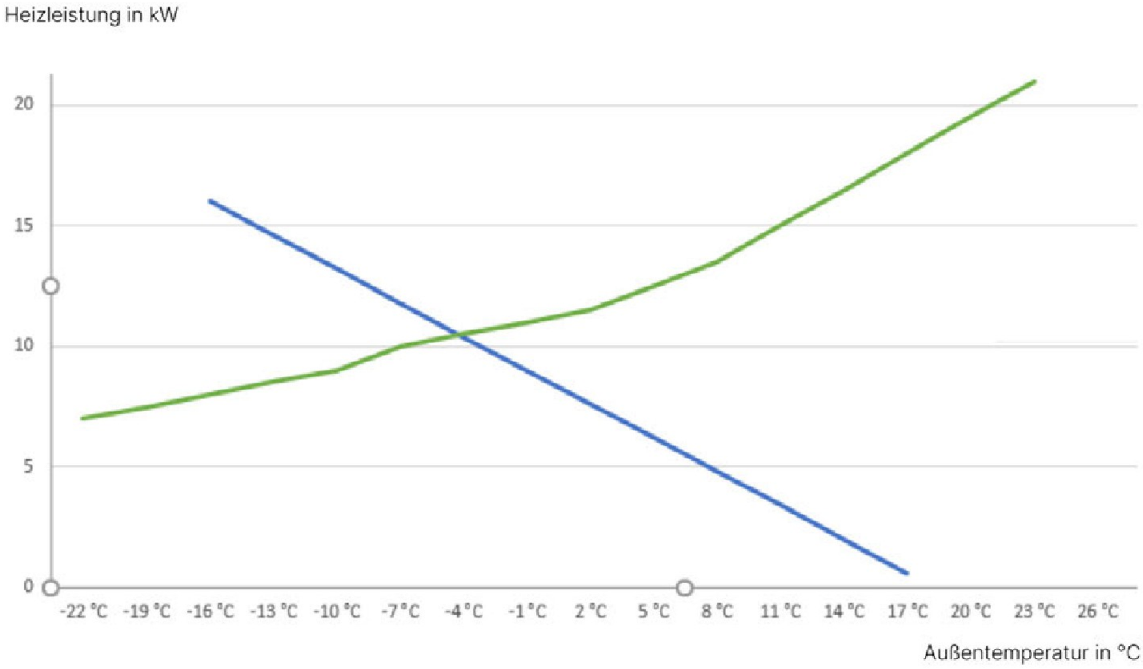
> **NOTE**
> If a swimming pool is heated all year round, a separate swimming pool heat pump is recommended for high heat demand.

3.3.4 Determining the heat pump output

Heat pump with one performance level (fixed speed)

Fixed-speed heat pumps are controlled by switching the compressor on and off. The refrigeration circuit, including the heat exchanger surfaces, is optimised for the full capacity of the compressor. Operating advantages are particularly evident in systems with a high heat demand at approx. 2°C, e.g. in bivalent systems or systems with high storage masses, e.g. open underfloor heating systems, as the compressor is operated at maximum efficiency even when the heat demand is high.

Oversizing in conjunction with a lack of storage masses leads to short runtimes, the machine clocks. This behaviour is more pronounced during the transition period.



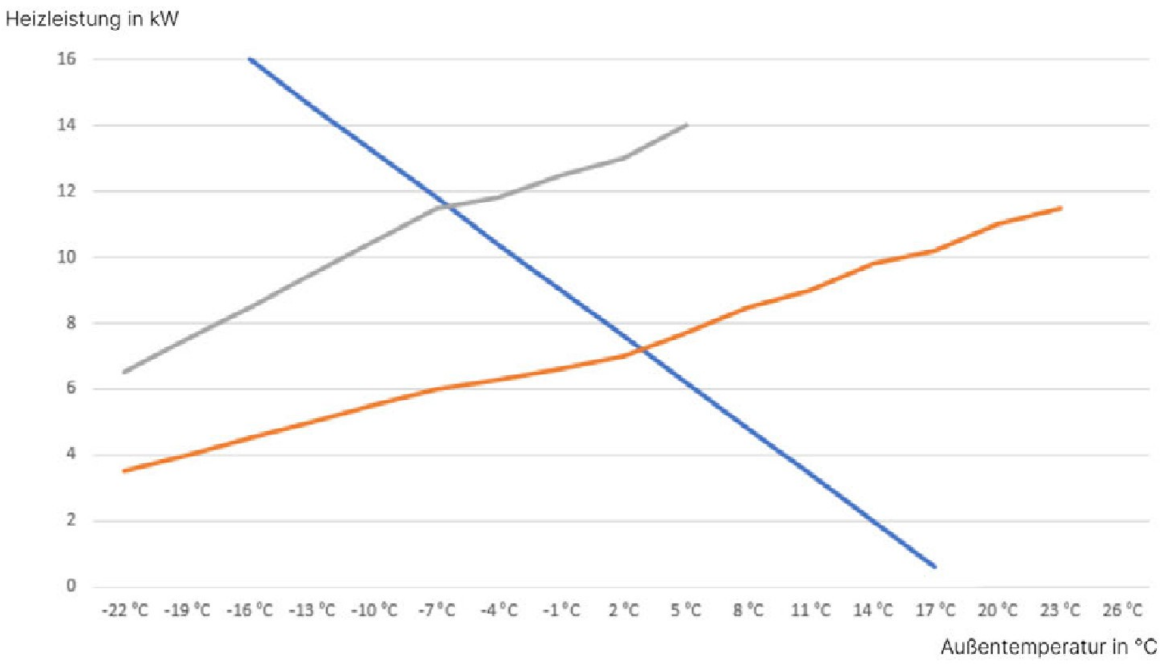
1 Figure: Heat pump performance curve with one performance level (fixed speed)

- Heat output characteristic
- Fixed-speed characteristic curve

Performance-controlled heat pumps with two performance levels (staged control)

Stage-controlled heat pumps are controlled by switching two compressors on and off. The refrigeration circuit, including the heat exchanger surfaces, is optimised for operation with one compressor, as one compressor can often cover over 80% of the annual heat output. At low outside temperatures, additional capacity is available by switching on the second compressor. At higher outside temperatures, only the capacity of one compressor is available.

Oversizing (e.g. monovalent design) is less critical, as this simply increases the proportion of more efficient single-compressor operation. Ideally, the heat pump covers the heat demand of the building at an outside temperature of approx. 2°C with the output of one compressor. In bivalent systems, the bivalence point should be below 0°C.



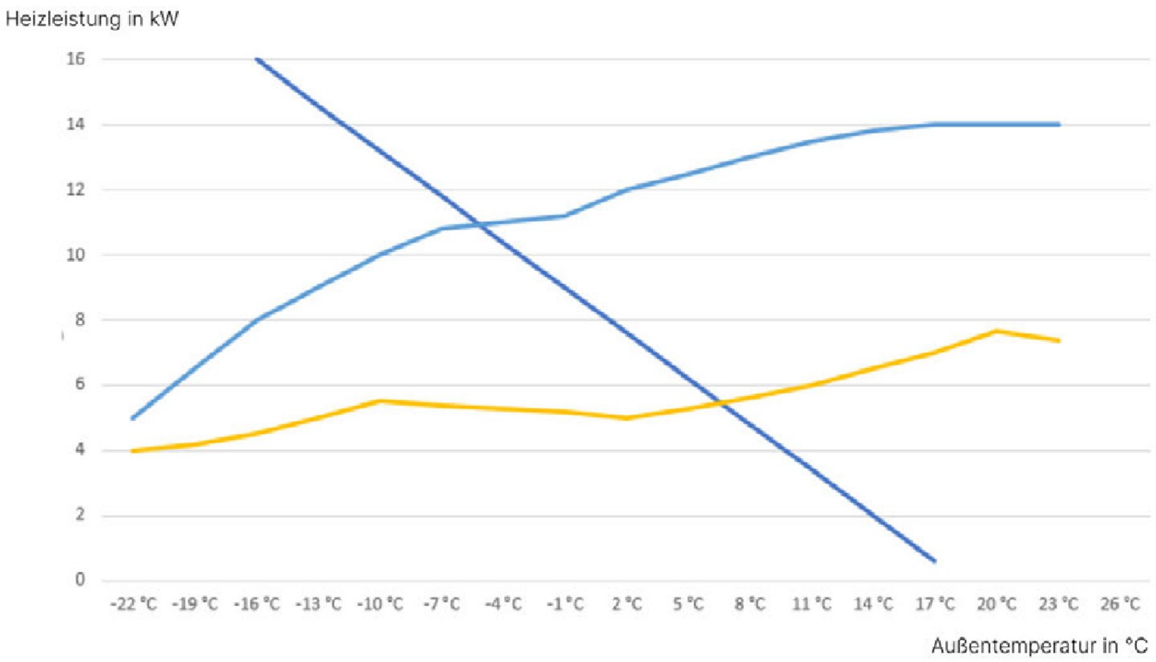
2 Figure: Heat output curves for heat pumps with two performance levels (stepped control)

- **Heat output characteristic**
- **Performance level 1 (2-stage)**
- **Performance level 2 (2-stage)**

Power-controlled heat pumps with inverter

With infinitely variable inverter heat pumps, the compressor output is controlled via the frequency. The refrigeration circuit, including the heat exchanger surfaces, is optimised for partial load operation with the aim of achieving a high seasonal performance factor. Ideally, the system is dimensioned so that the control range of the inverter is sufficient to enable continuous operation of the heat pump between approx. -7°C and +7°C outside temperature. Only at lower outside temperatures is it necessary to support the heat pump with a second heat generator. At higher outside temperatures, outside the control range, the control is carried out by switching off the compressor (analogue Fix-Speed).

Oversizing means that the inverter is increasingly operated outside its control range, which in turn leads to increased cycling and thus to control behaviour similar to a fixed-speed heat pump, control by switching on and off.



3 Figure: Heat output curves of power-controlled heat pumps with inverter

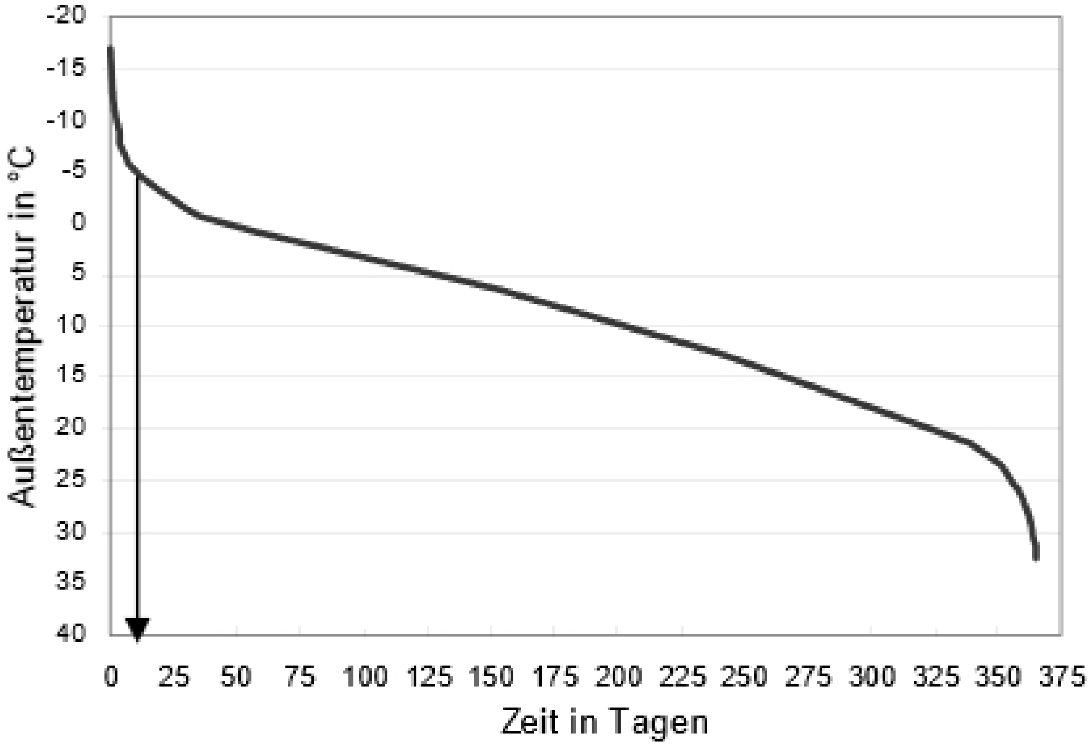
- **Heat output characteristic**
- **Minimum power curve (variable)**
- **Maximum power curve (variable)**

Air-to-water heat pump (monoenergetic operation)

Air-to-water heat pumps are predominantly operated as monoenergetic systems. Depending on the climate zone, the heat pump should fully cover the heat demand from -2 °C to approx. -5 °C outside temperature (bivalence point). At low temperatures and high heat demand, an electrically operated heat generator is switched on as required. The dimensioning of the heat pump output influences the amount of investment and the amount of annual heating costs, especially in monoenergetic systems. The higher the heat pump output, the higher the investment in the heat pump and the lower the annual heating costs. Experience has shown that a heat pump output that intersects the heating characteristic curve at a limit temperature (or bivalence point) of approx. -5 °C should be aimed for. According to VDI 4650 DIN 4701 T10, this design results in a 2% share of the 2nd heat generator (e.g. heating element) in a bivalent-parallel system. The following figure shows, for example, the annual characteristic curve of the outside temperature in Essen. According to this, there are less than 10 days a year with an outside temperature of below -5 °C.

- A monovalent design of air-to-water heat pumps is permissible
- The system should be hydraulically optimised so that there is no permanent cycle operation (buffer tank size, hydraulic balancing, heating curve setting,...)
- Oversizing for safety reasons or due to utility company blocks should be avoided

With a monovalent heat pump, care must be taken to ensure that sufficient storage masses prevent the heat pump from cycling. This can be achieved by increasing the buffer volume or by utilising the storage masses of the underfloor heating. Hydraulic balancing and the correct setting of the heating curve are essential. The ideal combination is with intelligent room temperature control, which controls the system temperature to the actual heat demand and thus contributes to longer runtimes of the heat pump, among other things.

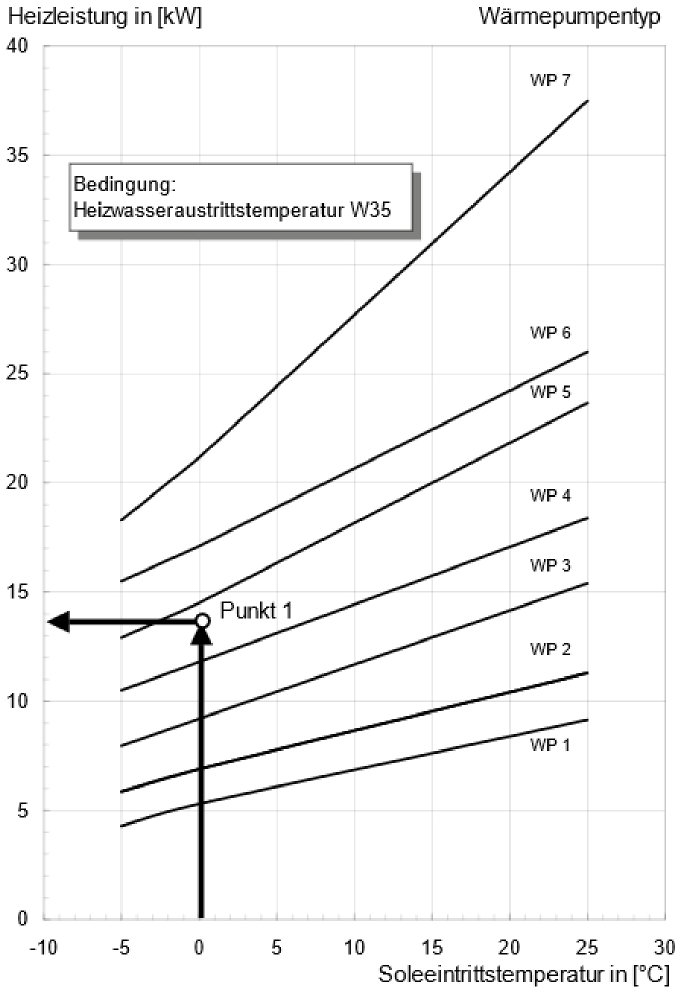


4 Figure: Annual duration characteristic curve: Number of days on which the outside temperature is below the specified value

Design of brine-to-water and water-to-water heat pumps (monovalent operation)

The figure below shows the heat output curves of brine-to-water heat pumps. The heat pump whose heat output is above the intersection of the required total heat demand and the available heat source temperature must be selected.

Building data:		
• Monovalent operating mode (heat pump only)		
• Heating system with maximum flow temperatures of 35 °C		
• Shut-off time 6 h (factor f from this table)		
• Heat demand heating		**10.6 kW**
Calculation:		
Required heat output of the heat pump		
= heat demand heating x factor f		
= 10.6 kW x 1.3 =		**13.8 kW**



5 Figure: Heat output curves of brine-to-water heat pumps with different heat outputs for flow temperatures of 35 °C

With a total heat demand of 13.8 kW and a minimum brine temperature of 0 °C, the output curve of heat pump 5 must be selected with a maximum required flow temperature of 35 °C. This delivers 14.5 kW under the above-mentioned boundary conditions. This delivers a heat output of 14.5 kW under the top boundary conditions.

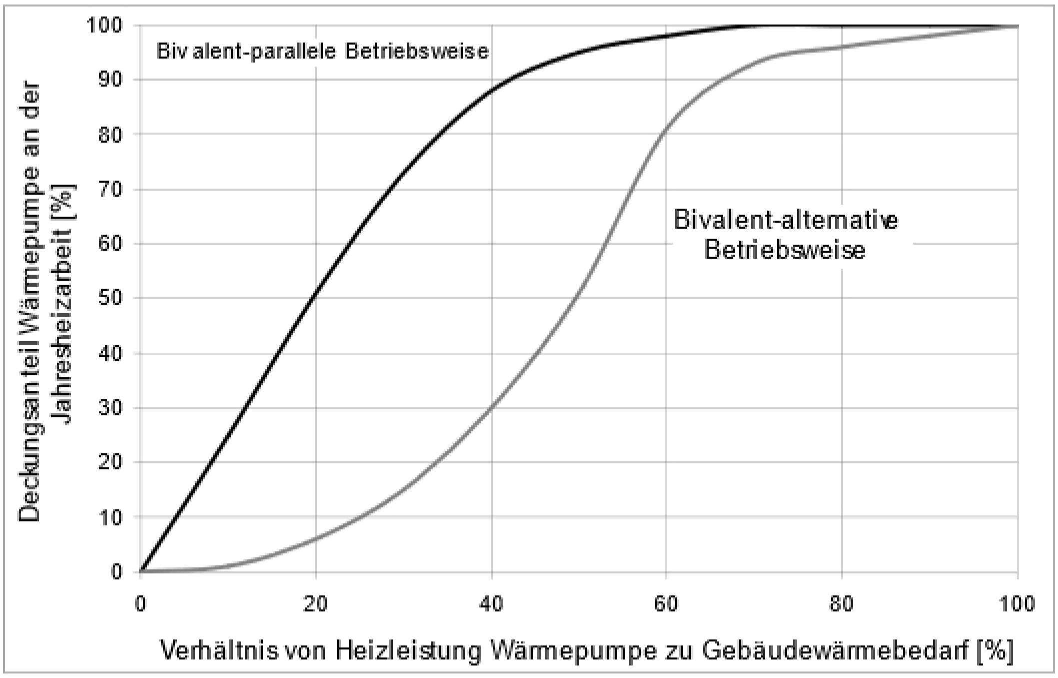
Design of brine-to-water and water-to-water heat pumps (monoenergetic operation)

Monoenergetic brine/water or water/water heat pump systems are equipped with a second, also electrically operated heat generator, e.g. a buffer tank with electric immersion heater. Monoenergetic brine-to-water or water-to-water heat pump systems should only b e planned in exceptional cases if a very large output surcharge is required due to shut-off times or if a heat pump with a significantly higher output compared to the total heat requirement would have to be selected due to the range. In addition, monoenergetic operation is suitable for the first heating period if the construction drying period falls in autumn or winter.

Design of air-to-water heat pumps (bivalent operation - hybrid systems)

In bivalent-parallel operation (old buildings and/or hybrid systems), a 2nd heat generator (fossil: oil or gas boiler; renewable: pellet stove, solar thermal) supports the heat pump from the bivalence point. Below the bivalence point, both heat generators **can** be operated in parallel.

In existing buildings with classic (cast iron) radiators as a heat distribution system, heating flow temperatures of 50 °C and more are sometimes possible. If it is not possible to optimise the heat distribution system, **bivalent-alternative** operation of heat pumps and boilers is recommended, as air-to-water heat pumps in particular have significantly better coefficients of performance at higher outside temperatures. At low outside temperatures (see bivalence point), the 2nd heat generator takes over the heating of the building.



6 Figure: Coverage of a heat pump in different operating modes according to EN 12831
The diagram shows an example of the coverage share of a heat pump for the bivalent-parallel and bivalent-alternative operating modes as a function of the building heat demand for an example building.

NOTE Experience shows that with bivalent systems in renovation projects, the existing oil or gas boiler is taken out of service after a few years for a variety of reasons. The design should therefore always be analogous to the monoenergetic system (bivalence point - 2 °C to approx. -5 °C).
°C) and the buffer tank must be integrated into the flow.

Design of brine-to-water and water-to-water heat pumps (bivalent operation)

In principle, the same relationships apply to bivalent operation of water-to-water and brine-to-water heat pumps as for air-to-water heat pumps. Depending on the heat source system, the other dimensioning factors of the heat source (abstraction capacity of the heat pump, full utilisation hours) must be taken into account and adapted.

Construction drying/stratification drying

Depending on the construction method, a certain amount of water is used for mortar, plaster, plaster and wallpaper during house construction, which only evaporates slowly from the building structure. Rain can also increase the humidity in the building. The high level of moisture in the entire structure increases the heat demand of the house during the first two heating periods.

Construction drying should be carried out with special, on-site devices. If the heat output of the heat pump is limited and the building is dried out in autumn or winter, an additional electric immersion heater or a backup heater must be installed in accordance with VDI 4645. This is particularly important for brine-to-water heat pumps in order to compensate for the increased heat demand and to relieve the heat source.

> **NOTE** With brine-to-water heat pumps, the increased compressor running times can lead to supercooling of the heat source and thus to a safety shutdown of the heat pump.

3.3.5 General notes on the hydraulic connection of heat pumps

Heating-side connection
The connection on the heating side must be carried out by specialised personnel using personal protective equipment. The respective connection sizes and thread types can be found in the device information for the heat pump. When connecting to the heat pump, the transitions must be counter-locked with a spanner. Empty pipes must be sealed after installation on the heat pump.

Before connecting the heat pump on the heating water side, the heating system must be flushed to remove any impurities, residues of sealing material or similar. An accumulation of residues in the condenser can lead to total failure of the heat pump.
Once the heating system has been installed, it must be filled, purged and depressurised. The following must be observed when filling the system:

- the filling and supplementary water must be of drinking water quality (colourless, clear, without deposits) and pre-filtered (pore size max. 5 µm). For more notes, see here.
- Furthermore, the installation and operating instructions for components used on site (e.g. pumps, valves, storage tanks, etc.) must be observed.

3.3.6 General notes on the electrical connection of heat pumps

- Circuit breaker and residual current device (RCD)
- Cable laying
- Design, project planning and installation of surge protection / lightning protection
- Electrical connection of heat pumps (general)

Circuit breaker and residual current device (RCD)

The size and type of circuit breaker required can be found in the documentation supplied (electrical documentation, device information, instructions) or on the rating plate of the respective heat pump. The use of a miniature circuit breaker with a different tripping characteristic or a higher tripping value is not permitted.

Depending on the operating conditions and the installation environment, the use of an upstream RCD may be necessary. The information and boundary conditions for the use of a residual current circuit breaker can be found in the generally applicable VDE regulations. If a residual current circuit breaker is installed, it must at least correspond to the RCD type specified in the device information or the electrical documentation for the heat pump.

Cable laying

The ambient conditions (e.g. indoor or outdoor installation, wet room, etc.) are decisive for the electrical installation to be carried out in accordance with the regulations. A suitable cable type must be used in accordance with these requirements and attention must be paid to the correct cable routing.

NOTE The electrical documentation for the heat pump contains recommendations for the selection of cables, which may need to be adapted in accordance with the above-mentioned boundary conditions.

Design, project planning and installation of surge protection / lightning protection

In times of digitalisation, home comfort and networked building technology, the lightning and surge protection of residential buildings is also of immense importance. The use of surge protection measures must be taken into account in all new residential buildings and when modifying or extending electrical installations. The design, project planning and installation of surge protection / lightning protection is the responsibility of the planner or installer.
The following parts of the DIN VDE 0100 standard regulate this:

-443: WHEN surge protection measures must be provided in installations and buildings.

-534: HOW the arresters are to be selected, fitted and installed in the electrical system.

According to the technical interpretation of these standards, it is possible to differentiate between mandatory and recommended measures for surge protection in residential buildings.

Measures are currently mandatory for power supply lines entering the home. DIN VDE 0100-443 does not require surge protection measures for Internet, telephone and broadband cable lines, but only recommends them. However, a safe and effective surge protection concept can only be achieved if surge arresters are used for all incoming electrical lines and therefore also for communication lines.

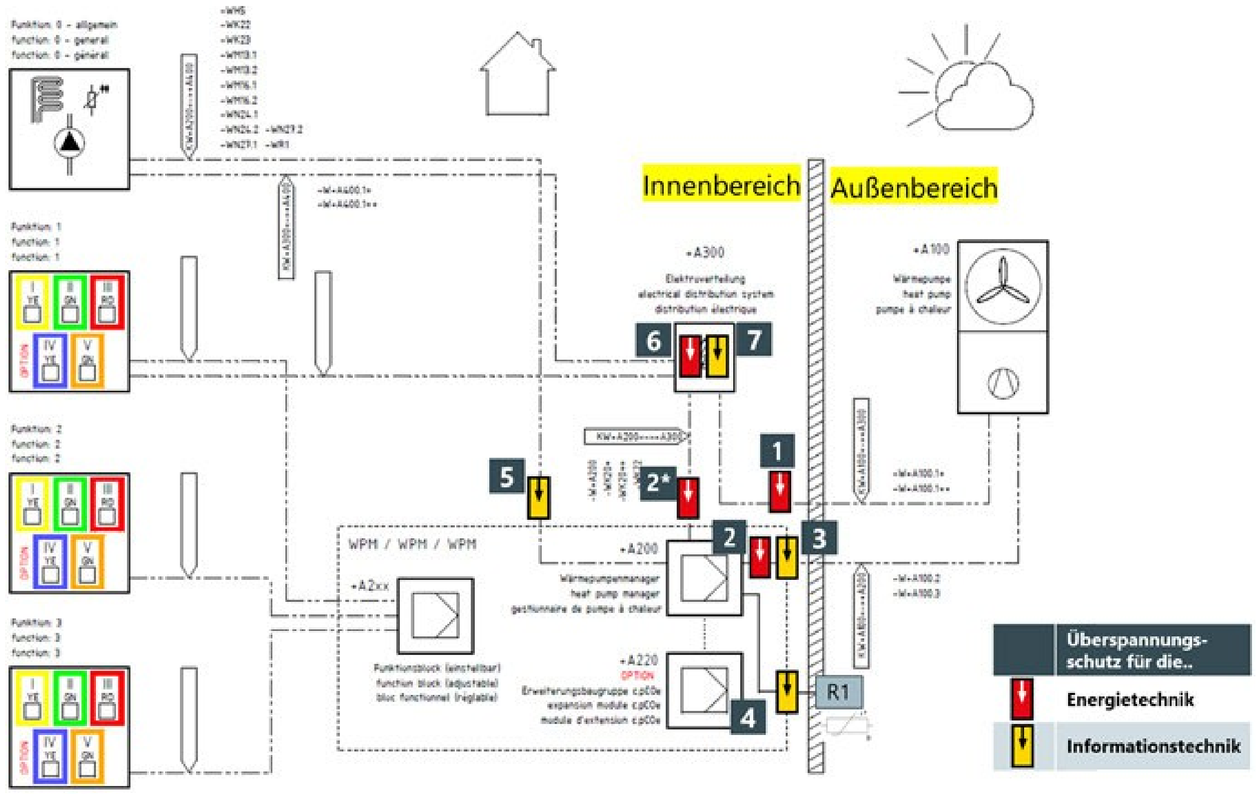
A surge arrester is therefore required at the building entrance for each of these lines (power supply, telephone line and broadband cable). In the case of high-quality, sensitive end devices or if the system component requires special protection (e.g. heat pump), it is important to check whether further surge protection measures are required. This is because, despite a surge arrester already installed at the building entrance, coupling can cause damage to end devices or system parts that are more than 10 metres away from the last surge protective device due to their pipe length. The installation of additional surge protection devices ensures voltage limitation in accordance with the insulation strength of the electrical or electronic devices and prevents damage to sensitive devices.

The aspect of pipe length can also be found in DIN VDE 0100-534. The standard refers to the so-called "effective protective range of surge protective devices". As in other standards, this is specified as 10 metres. This means that the effectiveness of the surge protective device installed in the infeed may no longer be sufficient after 10 metres.

It is therefore advisable to check whether further protective measures are required. These should be installed as close as possible to the device to be protected (e.g. heat pump) or in the last upstream sub-distribution board. Additional overvoltage protection is therefore particularly recommended for heat pump components if

- the pipe length to sensitive terminal devices or system parts is more than 10 metres,
- there are cross-building pipes to external system components (e.g. outdoor unit heat pump),
- loops in the installation (e.g. when laying high/ low voltage current, WLAN routers),
- there are other or tall buildings (e.g. churches or tower blocks) in the vicinity.

Coordinate the measures for downstream surge arresters with the owner and adapt them to the individual protection requirements of the building or the owner. These requirements/recommendations apply exclusively to buildings without an external lightning protection system. A possible lightning and surge protection concept for the contactor of all components of a heat pump system is shown in the following illustration.



7 Illustration: Lightning and surge protection concept using the example of System M / M Flex

	No.	Plan / Designation	Surge protection for …
Recommendation[+1] (1-5)	1	-W+A100.1* or W+A100.1**.	Supply cable 230/400V
	2	-W+A100.2	Control voltage cable (outdoor area)
	2*	-W+A200	Control voltage cable (indoor area) - for pipe lengths > 10m
	3	W+A100.3	Com. cable
	4	R1	Outdoor temperature sensor NTC
	5	e.g. +WN24.2 (or others)	Ethernet interfaces/RJ45 technology (e.g. controller, app, etc.)
Compulsory[+2]	6	+A300	Main distribution board / meter panel 400VAC
	7	+A300	Main distribution frame / telephone / telecoms
[+1] According to DIN VDE 0100-443/-534, additional overvoltage protection should be installed for pipe lengths > 10 metres.			
[+2] according to DIN VDE 0100-443/-534, 6 & 7 overvoltage protection is mandatory - does not fall within the scope of action of the installer/refrigeration system builder			

Additional information, data sheets and planning documents on the subject of lightning protection can be found at www.dehn.de, for example.

Legend for figure above

Electrical connection of heat pumps (general)

The heat pump is connected to the power supply using a standard 5-core cable. The cable must be provided by the customer and the cable cross-section must be selected in accordance with the power consumption of the heat pump (see attachment device information) and the relevant VDE (EN) and VNB regulations.
In the power supply for the heat pump, an all-pole switch off with at least 3 mm contact opening distance (e.g. utility company blocking contactor, power contactor) and a 3-pole automatic circuit breaker with common tripping of all outer conductors must be provided (tripping current according to the device information of the respective heat pump).
The relevant components in the heat pump contain internal overload protection. When connecting,

the clockwise rotating field of the load supply must be ensured.

Phase sequence: L1, L2, L3.

> **CAUTION**
> When connecting the mains cables, ensure that the rotating field is clockwise (if the rotating field is incorrect, the heat pump will not deliver any power, will be very noisy and may cause compressor damage).

- The control voltage is supplied via the heat pump manager. For this purpose, a 3-pole cable must be laid in accordance with the electrical documentation. Further information on wiring the heat pump manager can be found in its operating instructions.
- A shielded communication cable (J-Y(ST)Y ..LG) (provided by the customer - not included in the scope of supply of the heat pump) connects the heat pump manager to the WPIO controller installed in the heat pump. For more detailed instructions, please refer to the operating instructions for the heat pump manager and the electrical documentation.

> **NOTE**
> The communication cable is essential for the function of air-to-water heat pumps installed outdoors. It must be shielded and laid separately from the mains cable.

4 Air-to-water heat pump

4.1 Heat source Air

Application range of the air-to-water heat pump:

The compact unit or the outdoor unit of a split heat pump is set up outdoors on a solid base (e.g. foundation, paving slabs), taking into account the composition of the ground, and installed over thermally insulated district heating pipe or refrigerant pipes are connected to the heating system or the indoor unit in accordance with the laws (e.g. GEG). The following must be observed:

- Consider space requirements
- Direction of the air circuit, prevent air short circuit
- Consider icing in the blow-out direction (paths, terraces)
- Ensure condensate drainage even in frosty conditions
- Take sound propagation into account
- Safety clearances and installation location for maintenance access in accordance with the instructions for use
- Consider wind loads
- For roof installation, load-bearing capacity of the building and sound decoupling (solid-borne noise)

It is not possible to make a general statement about the operating limits of air-to-water heat pumps. These may differ due to different components in the heat pump or different refrigerants and can be found in the device information. The availability of outside air as a heat source is unlimited. Areas of application in relation to the heat source temperature of various heat pumps are, e.g:

- Outside air from -22 °C to +35 °C

CAUTION
The air drawn in must not contain ammonia. The use of exhaust air from animal stables is therefore not permitted.

NOTE
Use of the heat pump in dusty and corrosive air is not recommended. This also applies to use in the vicinity of exhaust air ducts or in the vicinity of flammable substances.
When heat pumps are used near the sea, the high salt content of the air can lead to increased corrosion. The use of heat pumps is safe from a distance of 12 km from the sea with a maximum salt content of 3.5 %.

There are two influences under which the minimum distance to the sea can be reduced.

• If the heat pump is installed on the rear side of the building facing away from the sea, this halves the Required minimum distance
• The following **calculation formula** can be used for waters **with a low salt content**.
Minimum distance = 12 km x (salinity in %) / 3.5

For example, with a salinity of 1.5 % (average salinity of the Baltic Sea), this would result in a minimum distance of 5.14 km, which is reduced to 2.5 km if the heat pump is located on the side of the building facing away from the sea.

> **CAUTION**
> The intake and air outlet area must not be restricted or obstructed. Installation in troughs or courtyards is not permitted.

Utilisation options

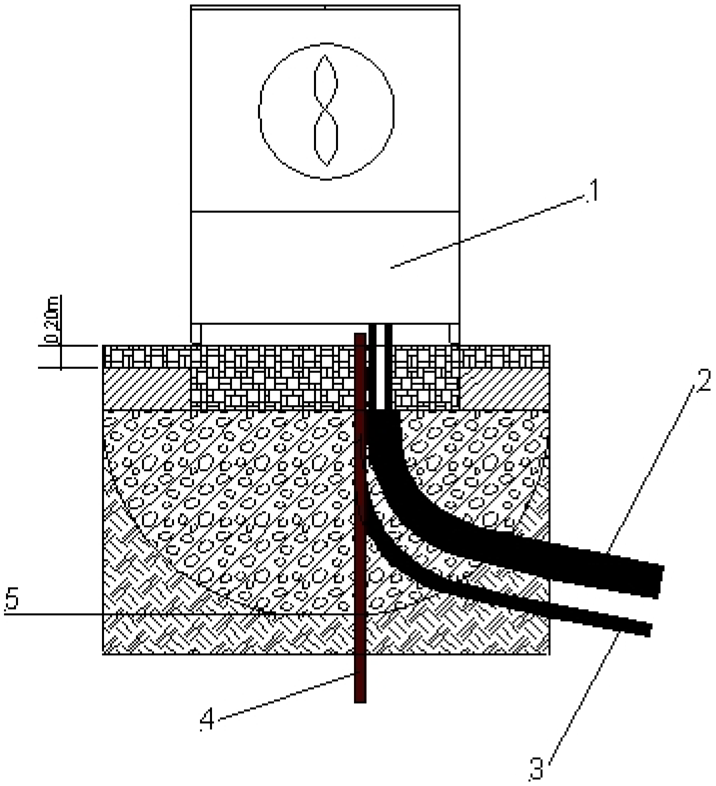
- monoenergetic
- Bivalent-parallel (or partially parallel)
- Bivalent-alternative
- Bivalent-renewable

buffer tank
The integration of the air-to-water heat pump requires a serien buffer tank in the heat pump flow to ensure defrosting of the evaporator (finned heat exchanger) by reversing the circuit. In addition, the installation of a serien buffer tank extends the runtimes of the heat pump when the heat demand is low (see here).

- Condensate drain (general information)

4.1.1 Condensate drain (general information)

The condensate that accumulates during the defrosting phase must be drained in a short, direct and frost-protected way. To ensure proper drainage, the heat pump must be levelled. The diameter of the drain pipe for the condensate produced must be at least 50 mm and must be drained in a frost-protected manner. The defrost end takes place several times a day as required. More than 1.5 litres of condensate can be produced per kilowatt of heat output per day (foundation plan heat pump with condensate drain). In some cases, it may be necessary to use pipe trace heating/condensate drain heating, especially if the heat pump is installed on the roof of a building. In order to minimise the power requirement of the pipe trace heating system, the pipe section laid in the frost area should be as short as possible. Ideally, the pipe trace heating should be connected to the electrical system of the heat pump (parallel to the nozzle ring heater or directly to the heat pump manager - special accessories KAH 150), but it is also possible to connect it on site using a self-regulating heating tape with frost protection thermostat.



1 heat pump
2 Heating flow and return (insulated)
3 Electric wires (empty conduit)
4 condensate drain
5 Frost line

8 Illustration: Foundation plan for heat pump with condensate drain

Condensate drain heater KAH 1115 / KAH 2040

Possible applications

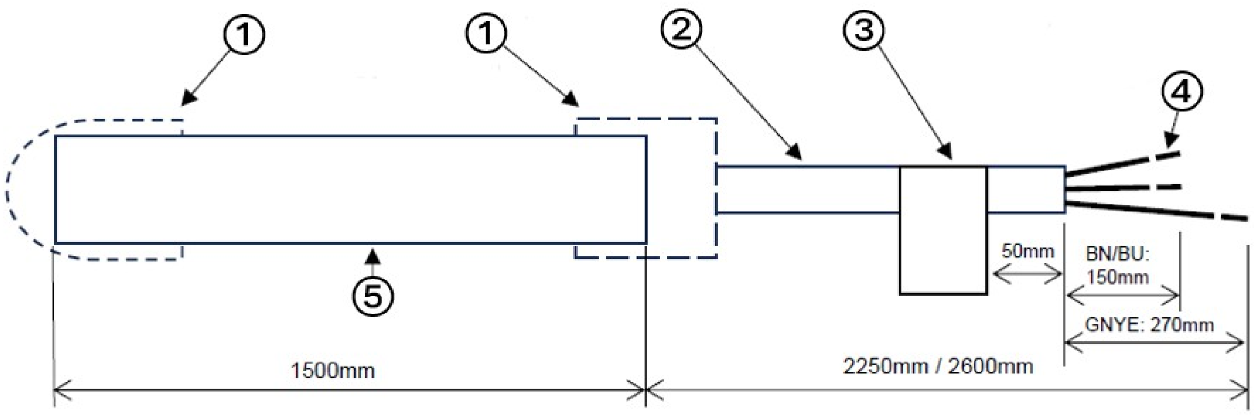
Order code	Item no.	For device type
KAH 1115	383050	LA 1118CP
		LA 1525CP
KAH 2040	383060	LA XXXXCP
		LA XXXXCP
		LA XXXXCP

Technical data

Heat conductor: Self-regulating heating cable FT (Bartec)	
Order number:	FT225-1410P
Outer sheath:	Polyolefin (black)
Heat output at +10°C	25 W/m (230V AC)
Length of heating cable:	1500 mm

Heat conductor: Self-regulating heating cable FT (Bartec)	
Temperature range:	-55°C to +85°C
Dimensions:	11.8mm x 5.8mm
Max. protective braid resistance:	<18.2 Ω/km
Certification:	CE, UKCA RoHS
PTC thermistor: Connection cable	
Cable dimension:	3G0.75mm²
Ladder structure:	Fine stranded, copper
Length PTC thermistor:	KAH 1115 = 2250 mm; KAH 2040 = 2600 mm
Wire colour:	BN, BU, GNYE
Outer sheath:	Black (max. Ø10mm)
Temperature range:	-25°C to +80°C
Field of application:	Outdoor use
nominal voltage:	230V
Insulation voltage:	2kV
Resistant to:	Dripping water, UV
Certification:	CE, UKCA RoHS

Structure

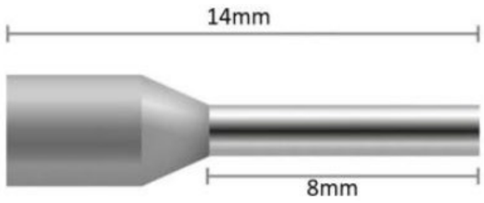


① Mounting kit 07-58C2-00009DXX

② Cable 3G0.75mm²

③ Cable labelling

④ 3x wire end ferrule 0.75mm² (reference: DIN 46228-4) without adhesive



⑤ Heating tape FT225-1410P

4.2 Air-to-water heat pumps for outdoor installation

4.2.1 Heating-side connection

The connection to the heating system in the house must be made with two thermally insulated pipes in accordance with laws (e.g. GEG). We recommend prefabricated heating water connection cables, consisting of two flexible pipes for flow and return in a jacket pipe with integrated thermal insulation made of PE foam, including a prefabricated 90° bend for quick and easy connection to the heat pump. The jacket pipe is laid frost-free in the ground and routed through a wall opening into the boiler room or technical room at ground level. Cost-intensive damage to the pipework can be avoided in advance if there are no deep-rooted plants in the area of the connecting pipes.

> **NOTE**
> Adjust the pipe trench depth according to the terrain utilisation! Ensure load class SWL 60 in the loaded trafficable area.

The distance between the heat pump and the heating distribution in the building should be kept as small as possible. The use of elbows and elbows should be minimised, as any additional pressure drop caused by this reduces the efficiency of the overall system.

The maximum length (connecting lines (electrical and hydraulic) from the heat pump installed outside to the heating distribution in the building) should not exceed 40 metres and must be in accordance with the applicable technical guidelines.

PE pipes:
The pipe cross-sections must be dimensioned and designed depending on the heat pump output and total pipe length. Typical PE pipes are e.g. PE-X, PE 80/100, which are used for underground installation. Usually insulated with an outer jacket. If the PE pipes are laid above ground, suitable contactor protection against UV radiation must also be ensured.

Copper pipework:
The use of copper pipe with a cross-section of ≥ 35 mm is recommended. The use of smaller cross-sections (e.g. CU-28 mm) results in high pressure drops (example: the pressure drop when laying 2 m of copper pipe with a cross-section of 28 mm corresponds to 8 m of laid copper pipe with a cross-section of 35 mm).

> **NOTE**
> The distance between the building and the heat pump has an influence on the pressure drop and the heat losses of the connecting pipes and must be taken into account when designing the circulation pump and the insulation thicknesses.

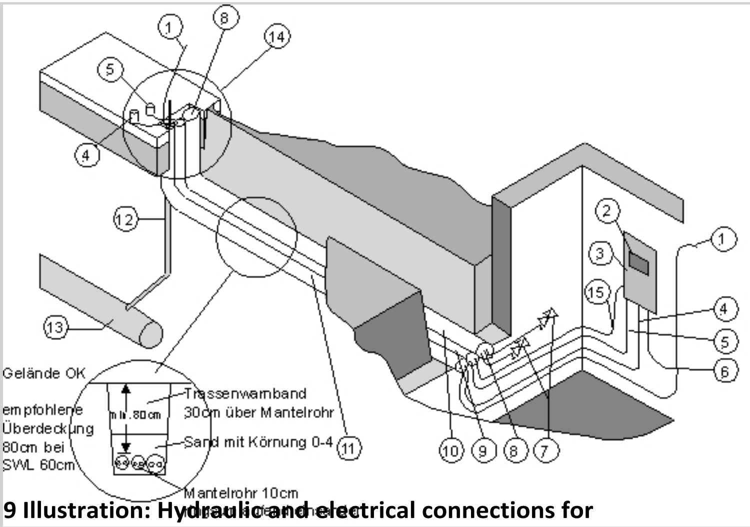
The heat pump connections are routed downwards or out of the side of the appliance. The position of the heating cables and the condensate drain can be found in the respective foundation plans in the dimensional drawings (see installation and operating instructions).

> **NOTE**
> To make installation easier, it is recommended that if insulated district heating pipes are used, these should end at the base frame of the heat pump and the connection to the heat pump should be made using flexible hoses (e.g. stainless steel corrugated flexible pipe, insulated).

The pipe is fed into the building with insulation and a jacket pipe. The building can be sealed with a heating water connection cable adapted to the heating water connection pipe.

- Direct implementation in dry areas
- Sealing collar against non-pressing water (DIN 18337)
- Wall sealing flange against pressing water (DIN 18336)

> **NOTE** In the case of brick walls, the house entries must be sealed against water ingress with a bituminous protective coating. To seal against pressing water, the house lead-through (flange) must also be stabilised with a casing pipe.

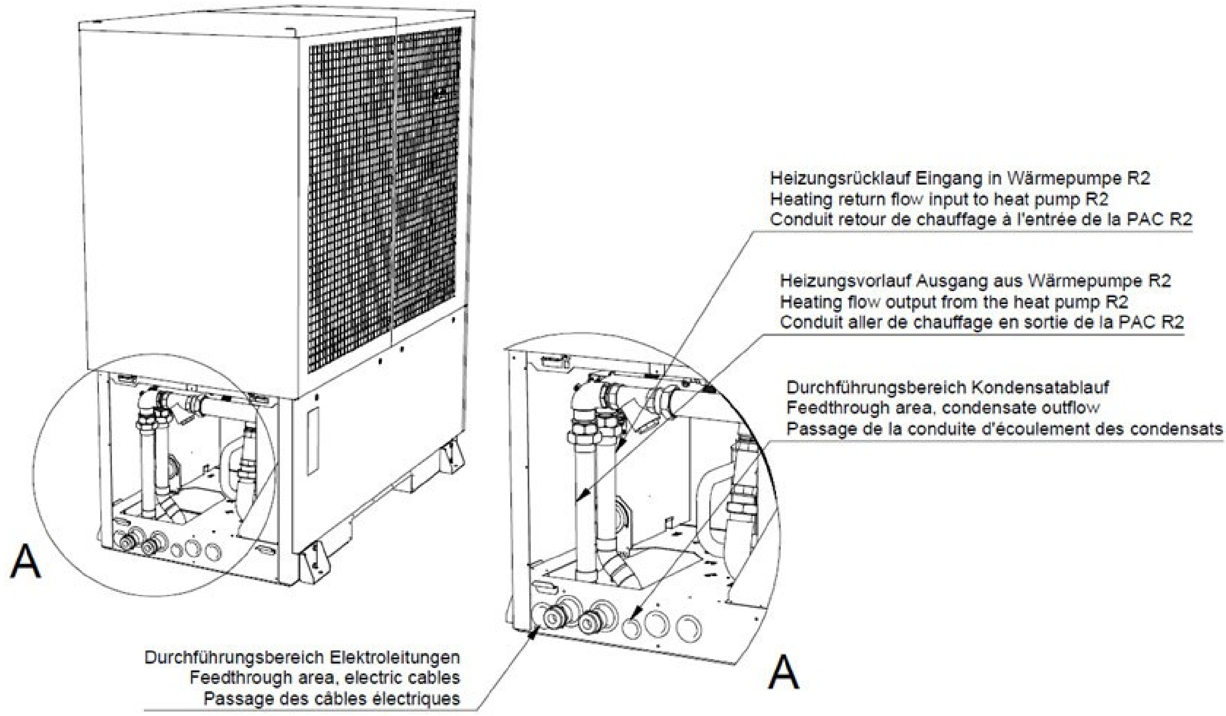


9 Illustration: Hydraulic and electrical connections for underground installation

Legend:

1. Load current cable heat pump Control
2. panel heat pump controller heat pump
3. manager WPM Control cable
4. controller/heat pump 24 V
Control cable control/heat pump 230 V
5. Electrical supply line (230 V) for the heat
pump manager Shut-off and draining
6. device Heating water connection cable
Wall ducts for electrical connection
7. cables Wall ducts for heating
connection cables
8. KG pipes (at least DN 70) for
9. electrical connections control/ heat
pump
10. Condensate drain Rainwater
drain/drainage Foundation of the heat
11. pump (note different foundation plans for
the heat pumps) Communication line
12.
13.
14.
15.

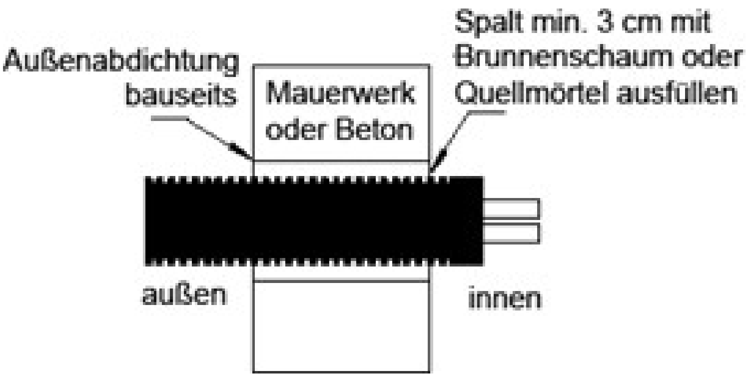
> **NOTE**
> For air-to-water heat pumps in the (S)-TU series, the hydraulic connection can be routed either downwards or to the side (special accessories RBS required). If the heat pump is installed close to walls, the heating water connection cable and the electrical connection cables can be routed above ground into the building.



10 Illustration: Hydraulic and electrical connections for side connection

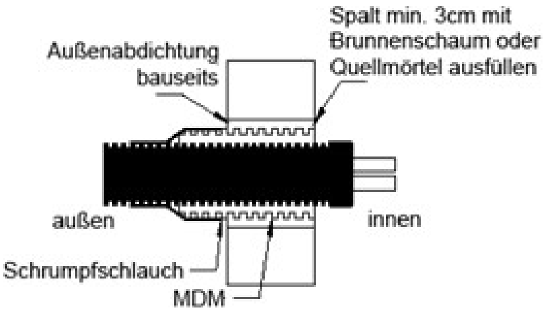
4.2.2 Wall bushing

Direct implementation in a dry area:

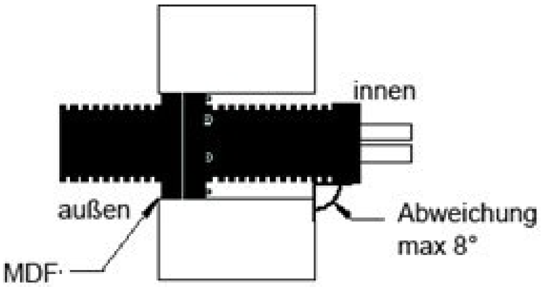


11 Figure: Sketch of direct wall duct

Indirect feed-through with sealing collar against non-pressing water



12 Figure: Sketch of wall penetration non-pressing water Flange against pressing water



13 Figure: Sketch of wall penetration for pressurised water

A filling and draining device must be provided in the building for the heating water supply and return shortly after the heating water connections enter the building (approx. 0.8 m below ground level). For buildings at ground level, provide an appropriately thermally insulated shaft or enable drainage by compressed air.

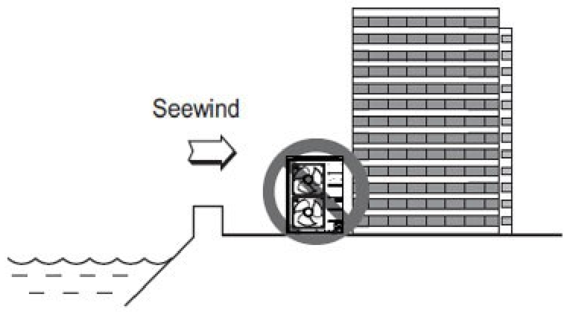
4.2.3 Installation in coastal areas

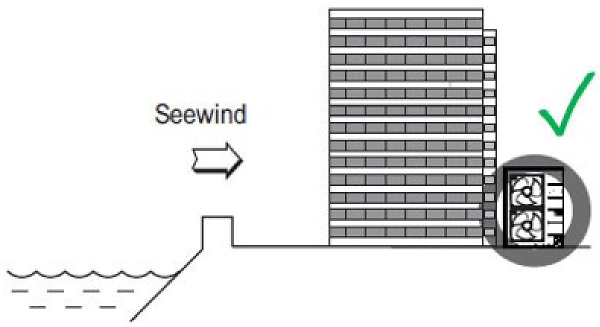
If installed near the sea, the high salt concentration can lead to increased corrosion. The maintenance intervals may need to be adapted to local conditions. Responsibility for the installation of the heat pump lies with the specialist company installing the system.
Local conditions such as building regulations, static loading of the structure, wind loads, etc. must be taken into account.

> **NOTE**
> If the outdoor unit is installed in a coastal area, a direct sea breeze must be avoided.

Case 1:

If the outdoor unit is installed in a coastal area, a direct sea breeze should be avoided. Install the outdoor unit against the direction of the sea breeze.

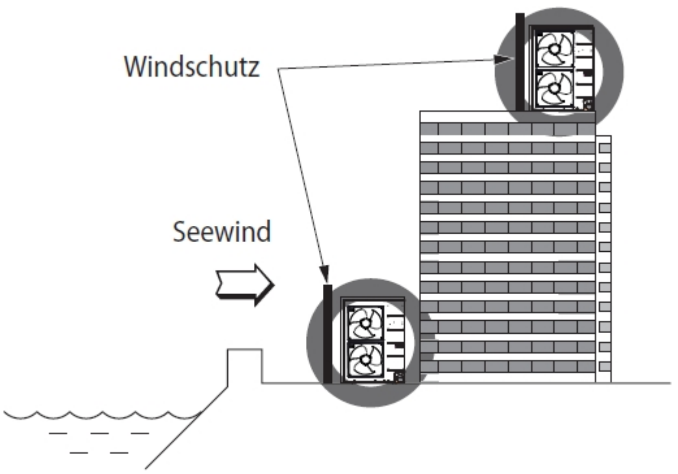




Case 2:

If the outdoor unit is installed in the direction of the sea wind, erect a windbreak to intercept the sea wind:

- The windbreak should be sturdy enough to absorb the sea wind, for example made of concrete
- The height and width of the draft shield should be at least 150% of the outdoor unit
- A distance of at least 700 mm from the outdoor unit should be maintained to ensure sufficient air flow



NOTE
Dust and salt contamination on the heat exchanger and fan should be cleaned regularly (at least once a year) with running water.

NOTE
The use of heat pumps is safe from a distance of 12 km from the sea with a maximum salt content of 3.5 %

If the heat pump is installed on the rear side of a building facing away from the sea, the required minimum distance is halved. For bodies of water with a low salt content, the following calculation formula be applied:

Minimum distance =	**12 km x salinity in %**

	3,5 %

The minimum distance would therefore be 5.14 km for an installation on the Baltic Sea with a salinity of 1.5%, for example, which is reduced to 2.5 km if the heat pump is located at the rear of the building facing away from the sea.

Salt content

The actual salt content depends on the installation location and must be determined on site:

Average salinity of the North Sea:	3,5 %
Average salinity of the Baltic Sea:	1,8 % - 0,3 % (Decrease in salinity from west to east)

4.2.4 General requirements for heat pumps installed outdoors

The heat pump must always be installed on a permanently level, smooth and horizontal surface. The frame should be flush with the floor all round to ensure adequate soundproofing, prevent water-bearing parts from cooling down and protect the interior of the appliance from small animals. If this is not the case, additional insulating measures may be necessary. To prevent small animals from entering the interior of the appliance, it is necessary, for example, to seal the connection opening in the base plate.

Furthermore, the heat pump should be set up so that the air discharge direction of the fan is at right angles to the main wind direction in order to enable fault-free defrosting of the evaporator under high wind loads.

CAUTION
The heat pump is generally designed for installation at ground level. In the event of deviating conditions (e.g. installation on a platform, flat roof, etc.) or increased risk of tipping (exposed position, high wind loads, etc.), an additional anti-tipping device must be provided.

For installations on a foundation with direct contact to the building, vibration decoupling must be ensured so that solid-borne noise is not transmitted into the building. It must be checked whether lightning protection is required and, if necessary, this must be provided. During installation, the conditions at the installation site, such as local building regulations, static load on the building, wind loads, lightning protection, etc. must be taken into account.

NOTE
Installation close to walls can lead to increased dirt accumulation due to the air flow in the intake and air outlet area. The colder outside air should be discharged in such a way that it does not increase heat loss in neighbouring heated rooms. Furthermore, physical influences on the building must be taken into account. There should be no windows or doors in the fan's discharge area.

CAUTION
Installation in troughs or courtyards is not permitted, as the cooled air collects on the ground and is sucked in again by the heat pump during prolonged operation.

Minimum distances

Security area

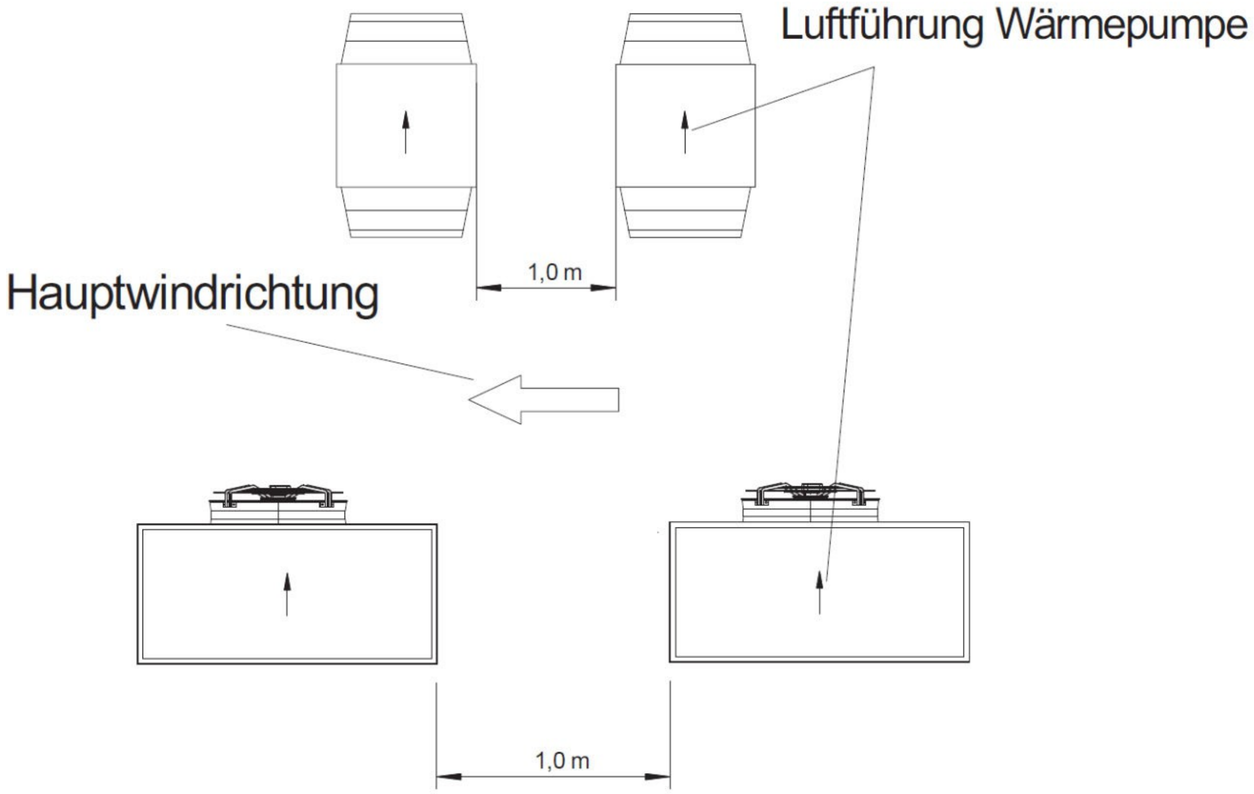
For heat pumps with the flammable refrigerant propane (R290), the safety zone must be observed. The safety areas for the respective heat pumps can be found in the installation instructions.

Maintenance area

It must be possible to carry out maintenance work without any problems. The minimum distances for the various heat pumps can be found in the installation instructions.

Parallel installation

If several heat pumps are installed in parallel, it must be ensured that the air circuit of all heat pumps is the same. In addition, a minimum distance must be maintained between the individual heat pumps. This is necessary to prevent an air short circuit between the individual heat pumps. In addition, the minimum distances for maintenance work must be taken into account in the respective installation instructions. A minimum distance of 1.0 m must be maintained between the individual heat pumps.



4.3 Air-to-water heat pump for indoor installation

Development costs for indoor installation

- Air circuit (e.g. ducts)
- Wall openings

- condensate drain

General
An air-to-water heat pump should be installed in a separate room (e.g. technical room) and not in the living area of a building. In extreme cases, colder outside air of up to -25 °C is channelled through the heat pump. In rooms with high humidity (e.g. utility rooms), this can lead to condensation forming at wall openings and air duct connections and thus to structural damage in the long term. If the room humidity is above 50% and the outside temperature is below 0°C, condensation cannot be ruled out despite good thermal insulation. Unheated and frost-free rooms, e.g. cellars and garages, are therefore more suitable.

It should also be noted:

- Sufficiently dimension the air ducts, take into account the compression available to the fan.
- Provide wall openings, avoid short-circuit currents from the exhaust air to the supply air.
- Place the intake and discharge openings on as different sides of the building as possible; if arranged on the same side of the building, provide a distance of at least 2 metres.
- Condensate removal
- sound propagation

> **NOTE**
> For increased sound insulation requirements, the air outlet should be positioned over a 90° bend or an installation in a corner with straight air ducts is recommended. The deflection bonnet (LUH), available as an accessory, reduces the sound pressure level in the discharge direction by approx. 3 dB(A).

If the heat pump is installed on an upper floor, the load-bearing capacity of the ceiling must be checked. If installed on a wooden ceiling, the structure-borne sound decoupling and the statics must be considered separately.

> **NOTE**
> If the heat pump is installed above occupied rooms, on-site measures must be taken to decouple structure-borne noise.

air circuit
For efficient and trouble-free operation, an air-to-water heat pump installed indoors must be supplied with a sufficiently large air volume flow. This depends primarily on the heat output of the heat pump and is between 2500 and 9000 m³/h (see installation and operating instructions). The minimum dimensions for the air duct must be observed. The air circuit from the intake via the heat pump to the air outlet should be designed to be as flow-optimised as possible in order to avoid unnecessary air resistance.

- Requirements for the installation room for indoor installation
- Condensate drain for indoor installation
- Air-side connection for indoor installation
- Air ducts and accessories
- Project planning for air ducts

4.3.1 Requirements for the installation room for indoor installation

Development costs for indoor installation

- Air circuit (e.g. ducts)
- Wall openings

- condensate drain

General

An air-to-water heat pump should be installed in a separate room (e.g. technical room) and not in the living area of a building. In extreme cases, colder outside air of up to -25 °C is channelled through the heat pump. In rooms with high humidity (e.g. utility rooms), this can lead to condensation forming at wall openings and air duct connections and thus to structural damage in the long term. If the room humidity is above 50% and the outside temperature is below 0°C, condensation cannot be ruled out despite good thermal insulation. Unheated and frost-free rooms, e.g. cellars and garages, are therefore more suitable.

It should also be noted:

- Sufficiently dimension the air ducts, take into account the compression available to the fan.
- Provide wall openings, avoid short-circuit currents from the exhaust air to the supply air.
- Place the intake and discharge openings on as different sides of the building as possible; if located on the same side of the building, ensure a distance of at least 2 metres.
- Condensate removal
- sound propagation

> **NOTE**
> For increased sound insulation requirements, the air outlet should be positioned over a 90° bend or an installation in a corner with straight air ducts is recommended. The deflection bonnet (LUH), available as an accessory, reduces the sound pressure level in the discharge direction by approx. 3 dB(A).

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air circuit

For efficient and trouble-free operation, an air-to-water heat pump installed indoors must be supplied with a sufficiently large air volume flow. This depends primarily on the heat output of the heat pump and is between 2500 and 9000 m^3/h (see installation and operating instructions). The minimum dimensions for the air duct must be observed. The air circuit from the intake via the heat pump to the air outlet should be designed to be as flow-optimised as possible in order to avoid unnecessary air resistance.

> **NOTE**
> The heat pump must not be operated without an air circuit, as there is a risk of injury from rotating parts (fan).

Ventilation

If possible, the room in which the heat pump is installed should be ventilated with outside air to keep the relative humidity low and prevent the formation of condensation. Condensation can form on colder parts, particularly during construction drying and commissioning.

4.3.2 Condensate drain for indoor installation

The condensate that accumulates during operation must be drained away frost-free. To ensure proper drainage, the heat pump must be levelled.

The condensate water pipe must have a diameter of at least 50 mm and must be routed into the sewer with frost protection. Do not discharge condensate directly into septic tanks and pits.

The aggressive vapours and a condensate line that is not installed frost-free can destroy the evaporator.

4.3.3 Air-side connection for indoor installation

Caution
The intake and air outlet area must not be restricted or blocked.

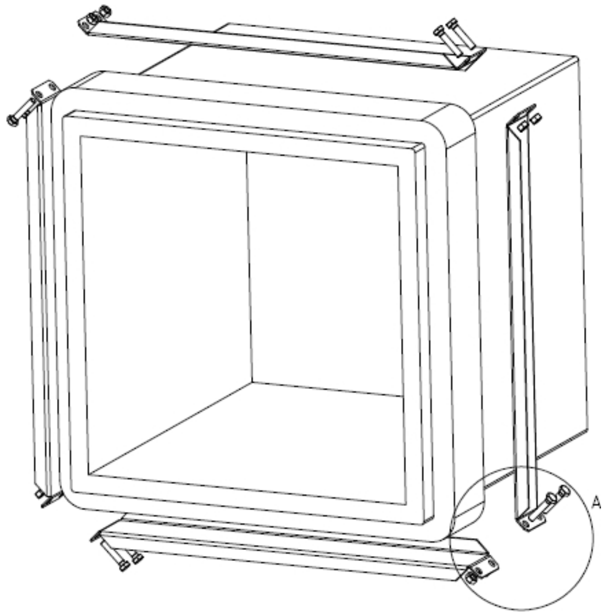
Caution
The heat pump may only be operated with attached air ducts.

The air ducts made of glass fibre lightweight concrete offered as **accessories** are moisture-resistant and open to diffusion.

The following components are available:

- https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3311435781/Luftkan+le+and+accessories#air-duct-straight-(LKL)
- https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3311435781/Air+ducts+and+accessories#Air+duct-90%C2%B0-Bend-(LKB)
- https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3311435781/Air+duct+and+accessories#connection+kit-f%C3%BCr-air+duct%C3%A4le-(VSLK)
- https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3311435781/Air+ducts+and+accessories#Closing-frame-set-air-duct-(ARLK)
- https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3311435781/Air+channels+and+accessories#Sealing+collars-f%C3%BCr--suction+and+discharge--(DMK)

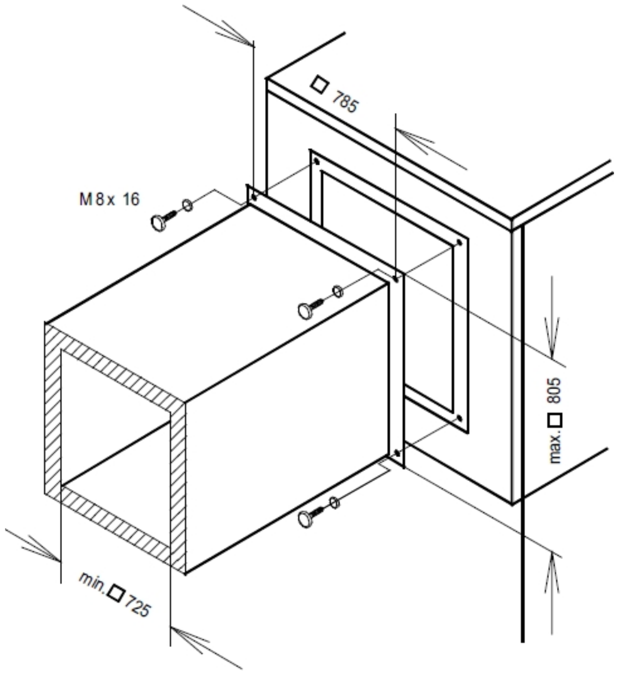
The sealing collar is used to seal the air ducts on the heat pump. The air ducts themselves are not screwed directly to the heat pump. When ready for operation, only the rubber seal touches the heat pump. This ensures easy assembly and disassembly of the heat pump on the one hand and good structure-borne sound decoupling on the other.



Connection of on-site air duct

If an air duct other than the one available as an accessory is used, the external and internal dimensions specified in the sketch must be observed. In addition, suitable vibration decoupling and duct insulation must be ensured.

When using flange-mounted air ducts, one connecting stub each on the intake and exhaust side of the evaporator is attached to the threaded holes provided using 4 M8x16 hexagon head screws. Make sure that both air duct stubs only come into contact with the insulation and not with the outer sheet metal.



4.3.4 Air ducts and accessories

Straight air duct (LKL)

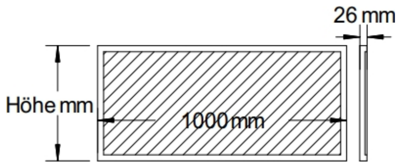
Optimised air duct, suitable for the air circuit of air-to-water heat pumps installed indoors Technical data

Order ID.	Item no.	Short text	For device type	Length	Width x height	Weight
LKL 500A	364620	Straight air duct - 500	LIK 8	1000 mm	500 x 500 mm	23 kg

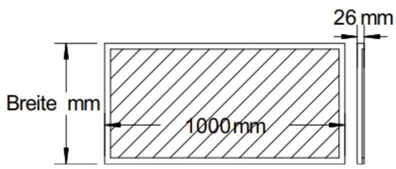
Order ID.	Item no.	Short text	For device type	Length	Width x height	Weight
LKL 600A	364630	Straight air duct - 600	LI 12TU - air outlet LIK 12TU - air outlet LI 16I-TUR - air outlet	1000 mm	600 x 600 mm	28 kg
LKL 800A	364650	Straight air duct - 800	LI 1422C LI 1826C LI 12TU - Suction LIK 12TU - Suction LI 16I-TUR - Suction	1000 mm	769 x 769 mm	34 kg

scope of supply

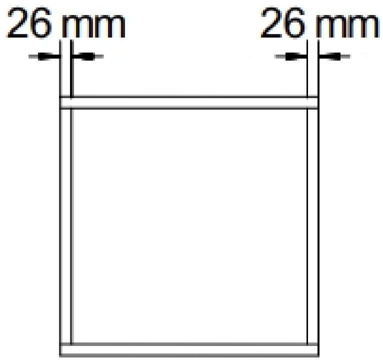
2x side panel (glass fibre concrete)



2 x upper and lower part (glass fibre concrete)



2 x cover frame (metal)



1x multi-strength adhesive

1x assembly instructions

Further notes

The glass fibre channel and the multi-strength adhesive can be painted over with standard emulsion paint.

The channel can be shortened without any problems. We recommend shortening the glass fibre concrete parts before actually bonding the individual parts together.

Individual air ducts can be connected with a sealing collar (special accessories - not included in the scope of supply). This ensures that the air ducts are evenly sealed to each other and prevents condensation from forming at the joint.

Air duct 90° bend (LKB)

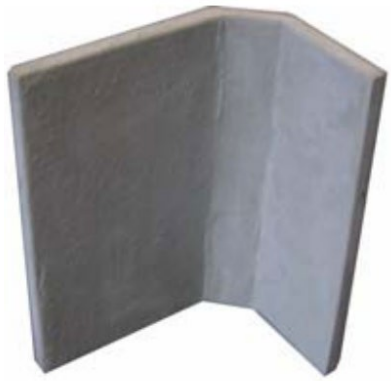
Optimised air duct bend, suitable for the air circuit of air-to-water heat pumps installed indoors Technical data

Order ID.	Item no.	Short text	For device type	Length	Width x height	Weight
LKB 500A	366140	Air duct 90° bend	LIK 8	800 mm	500 x 500 mm	17 kg
LKB 600A	366150	Air duct 90° bend	LI 12TU - air outlet LIK 12TU - air outlet LI 16I-TUR - air outlet	1100 mm	600 x 600 mm	25 kg
LKB 800A	366170	Air duct 90° bend	LI 1422C LI 1826C	1319 mm	769 x 769 mm	36 kg

scope of supply

1x side panel (glass fibre concrete)
Long folding side panel

1x side panel (glass fibre concrete)
Short side panel



2 x upper and lower part (glass fibre concrete)

2 x cover frame (metal)

1x multi-strength adhesive

1x assembly instructions

Further notes

The glass fibre duct sheet and the multi-strength adhesive can be painted over with standard emulsion paint.

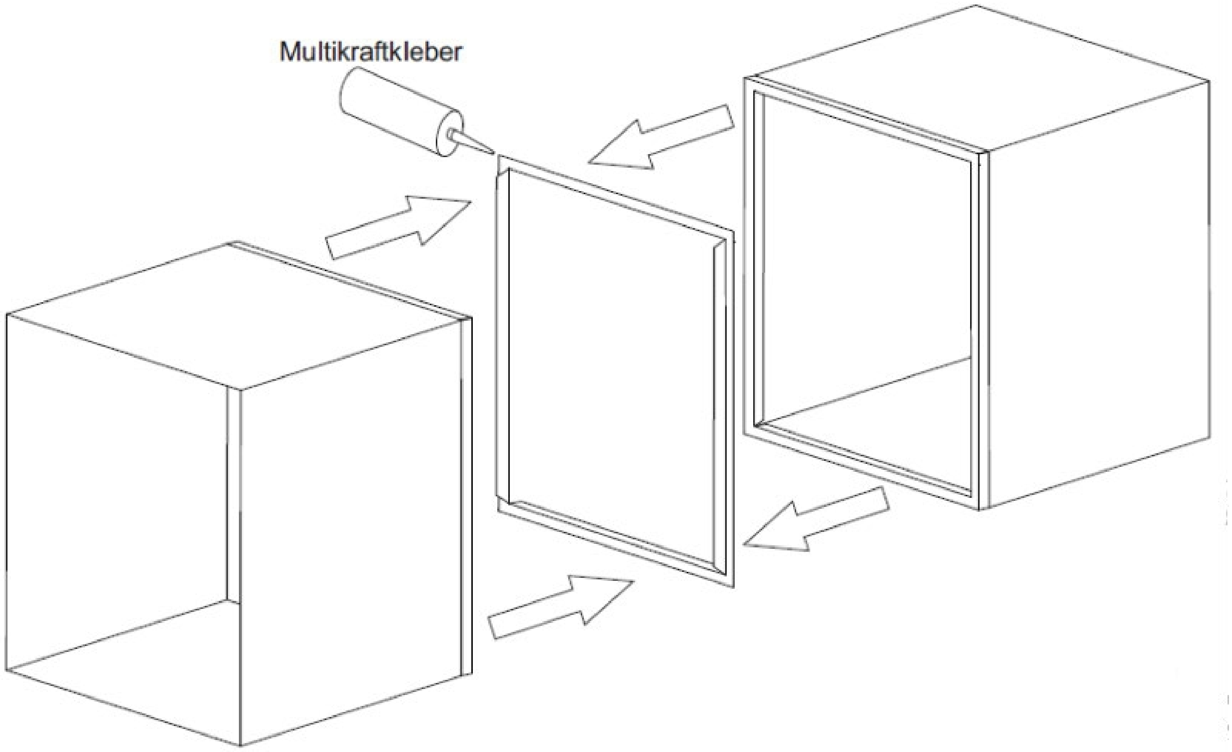
The ends of the arch can easily be shortened. We recommend shortening the glass fibre concrete parts before the individual parts are actually glued together.

Individual air ducts can be connected with a sealing collar (special accessories - not included in the scope of supply). This ensures that the air ducts are evenly sealed to each other and prevents condensation from forming at the butt joint.

Connection kit for air ducts (VSLK)

Mounting set to connect two air ducts (straight or curved version) together for easy installation. Technical data

Order identifier	Item no.	For device type	Width x height	Weight
VSLK 500	367670	Air ducts 500	500 x 500 x 50 mm	2.0 kg
VSLK 600	367680	Air ducts 600	600 x 600 x 50 mm	2.2 kg
VSLK 800	367700	Air ducts 800	769 x 769 x 50 mm	2.8 kg



If a section of trunking needs to be extended for structural reasons, the connection can be made using two or more trunking sections (LKL/LKB). These are each fitted with a metal plug-in frame on the open side.

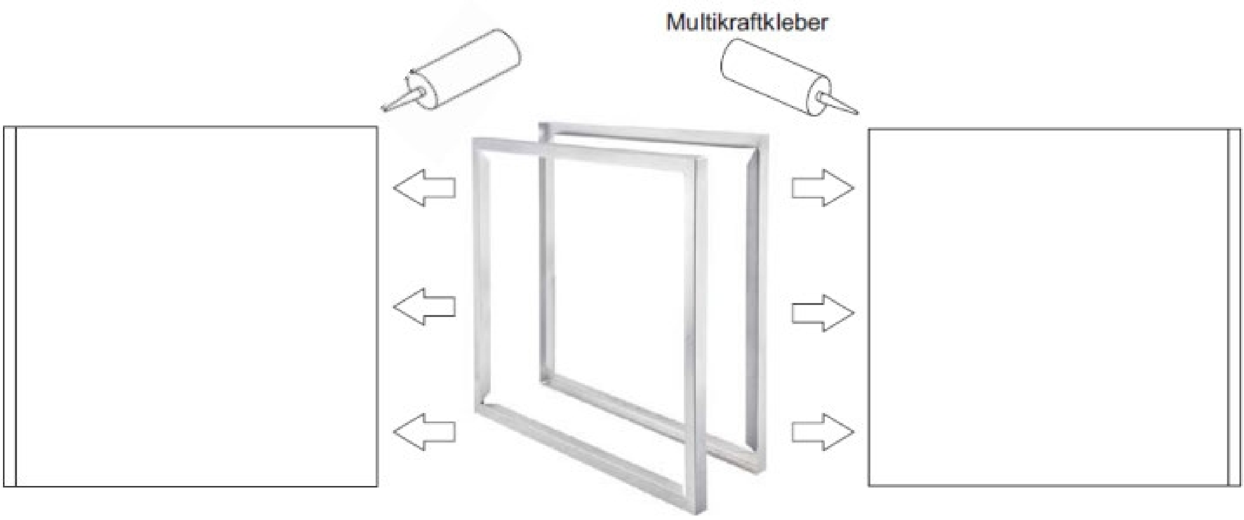
The connection is made using a VSLK plug-in frame to avoid air turbulence and thus pressure drops. The parts are sealed to each other by a multi-strength adhesive applied between the metal frames. Curing time approx. 15 minutes.

To prevent condensation, the joint can also be additionally taped with a steam-resistant insulating tape (e.g. Armaflex).

End frame set air duct (ARLK)

End frame set for closing the cut edges when an air duct is to be divided Technical data

Order identifier	Item no.	For device type	Width x height	Weight
ARLK 500	370260	Air ducts 500	500 x 500 x 25 mm	2.5 kg
ARLK 600	370270	Air ducts 600	600 x 600 x 25mm	2.8 kg
ARLK 800	370290	Air ducts 800	769 x 769 x 25mm	3.5 kg



Existing air ducts can be divided and adapted on site using the ARLK processing set, which is also available as an accessory. The resulting cut edges are coated with multi-strength adhesive and edged with the galvanised U-profile. The channel sections are connected to each other using the VSLK set.

The trunking parts can be cut to size using standard woodworking tools such as circular saws or jigsaws. Carbide or diamond-tipped tools are recommended.

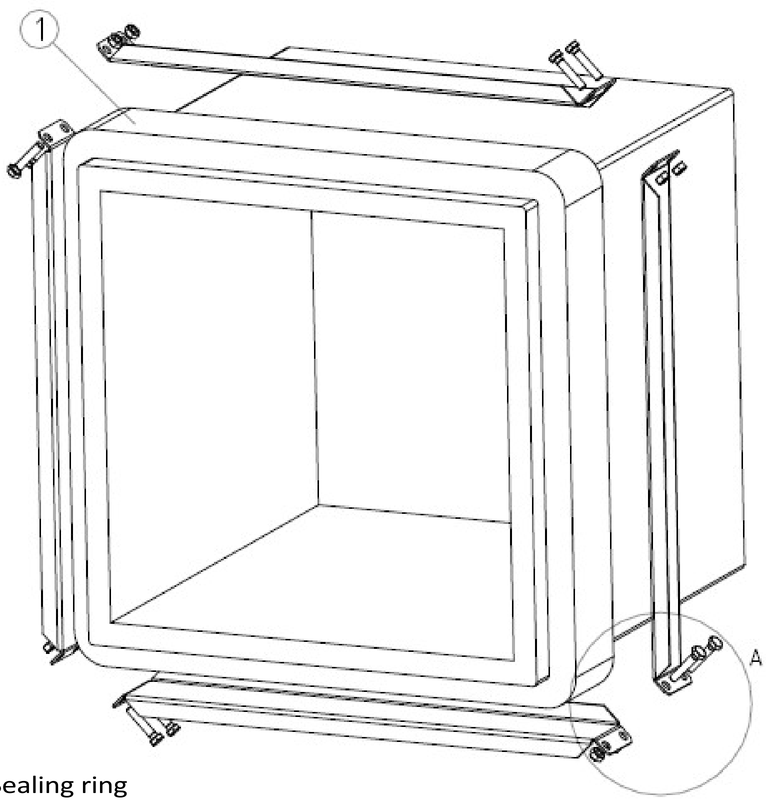
Sealing collars for intake and exhaust side (DMK)

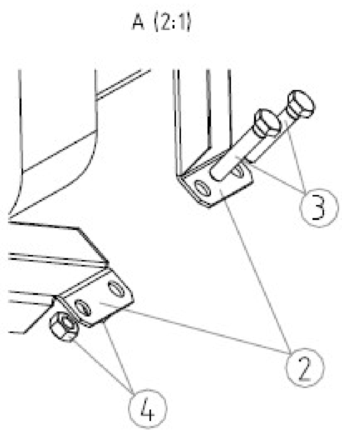
Circumferential rubber seals for vibration-free connection of the air ducts on the intake and/or exhaust side of the heat pump

Technical data

Order identifier	Item no.	PU	For device type	Weight
DMK 500-1	340260	1	Air ducts 500	4.0 kg
DMK 600	340270	2	Air ducts 600	9.0 kg
DMK 600-1	356120	1	Air ducts 600	4.5 kg
DMK 800	340290	2	Air ducts 800	12.0 kg
DMK 800-1	356140	1	Air ducts 800	6.0 kg

Layout sketch





Sealing ring

② Sheet metal strut

③ M8x40 screw

④ Nut M8

The sealing collar is used to seal the air duct to the heat pump. The air duct itself is not screwed directly to the heat pump.

When ready for operation, only the rubber seal is in contact with the heat pump. On the one hand, this ensures easy installation and removal of the heat pump and, on the other hand, good structure-borne noise decoupling is achieved.

To make installation as easy as possible, the installation instructions for the air ducts should be observed and the installation dimensions in the Project planning handbook should be adhered to.

Rain guard for heat pump (RSG)

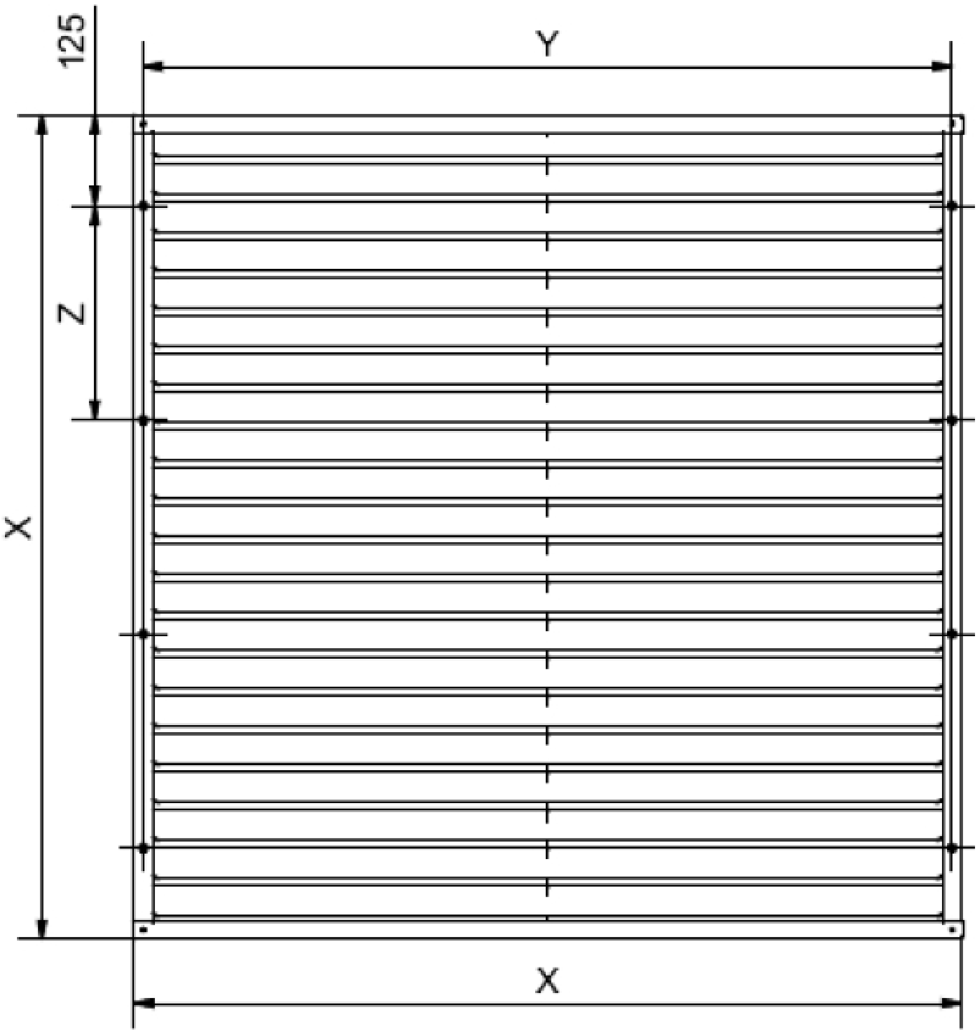
The rain guard serves as a visual cover for wall openings above ground level and to protect the air duct from the weather.

It is attached to the outside of the house wall and can therefore be used regardless of the type of air circuit.

Dimensioned

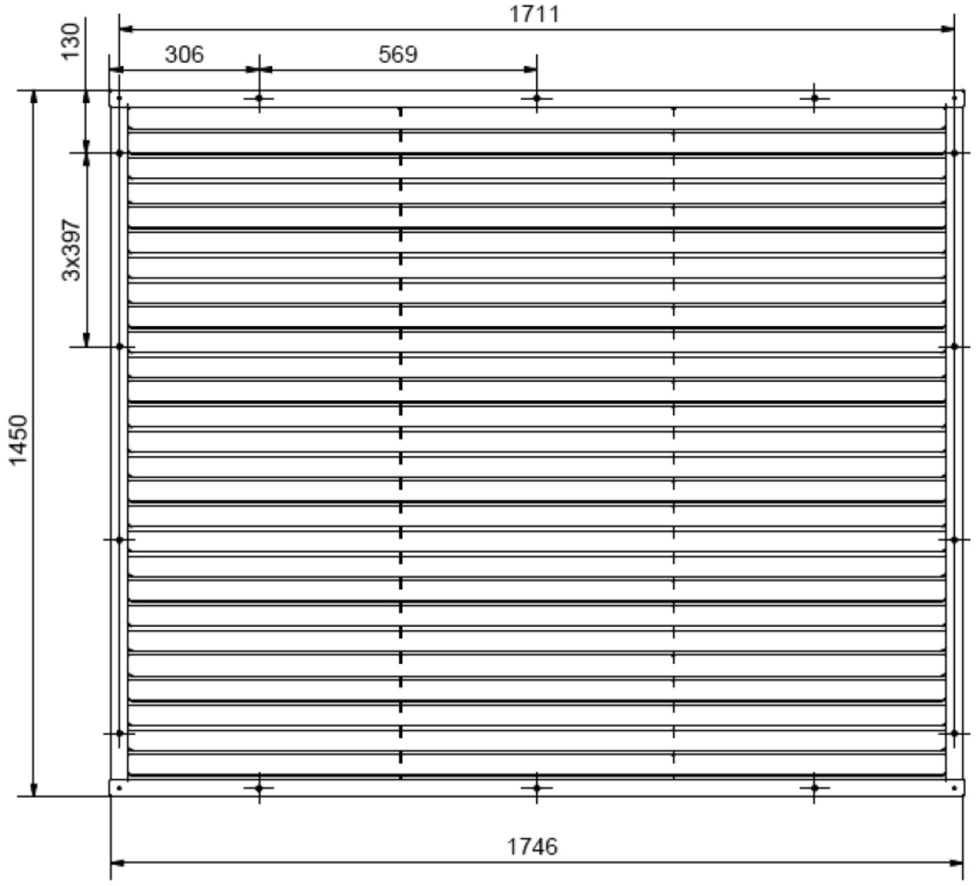
drawing RSG 500-

900:



Size	X	Y	Z
RSG 500	650	625	400
RSG 600	750	725	500
RSG 700	840	815	590
RSG 800	920	895	2x 335
RSG 900	1128	1103	3x 293

RSG 1500:



Additional work

To protect against small animals and leaves, an additional wire mesh can be fitted between the wall and the rain guard. The free cross-section of the grille must be at least 80%. Any necessary anti-burglary protection must be provided by the customer.

4.3.5 Project planning for air ducts

Pressure drop of air ducts Noise reduction

through air ducts Air intake or air outlet via

light wells Insulation of wall openings

Pressure drop of air ducts

When planning the air circuit (air intake and air outlet), ensure that the maximum pressure drop of the individual components does not exceed the free compression value specified in the device information (see installation and operating instructions).

Cross-sectional areas that are too small or frequent deflections (e.g. weather protection grilles, corner ducts) result in unacceptably high pressure drops and lead to inefficient or even fault-prone operation.

The air inlet and air outlet can be installed either via a light well or wall opening with rain guard.

Air duct component	pressure drop
Straight air duct	1 Pa/m
Air duct bend 90 °	4 Pa/pc
rain guard	5 Pa
Light well intake	5 Pa
Light well air outlet	7-10 Pa

NOTE
The maximum permissible pressure drop depends on the type of heat pump. For larger pressure drops in the air duct system, a support fan must be installed on site.

Maximum permissible pressure drop heat pumps

heat pump	Max. permissible pressure drop
LIK 8TES	25 Pa
LIK 12TU	25 Pa
LI 12TU	25 Pa
LI 16I-TUR	25 Pa
LI 1422C	25 Pa
LI 1826C	25 Pa

CAUTION
In the event of deviations from the standard integration or the use of air duct components p r o v i d e d by the customer, compliance with the above criteria must be checked and ensured.

Sound reduction through air ducts

The internal insulation made of mineral wool and laminated glass fibre fleece prevents condensation from forming and significantly reduces sound radiation at the weather protection grille on the outlet side of the air duct.

Air duct component	Reduction of sound pressure
Straight air duct	~ 1 dB(A) per linear metre
Air duct bend	~ 2 to 3 dB(A) per sheet

Air intake or air outlet via light wells

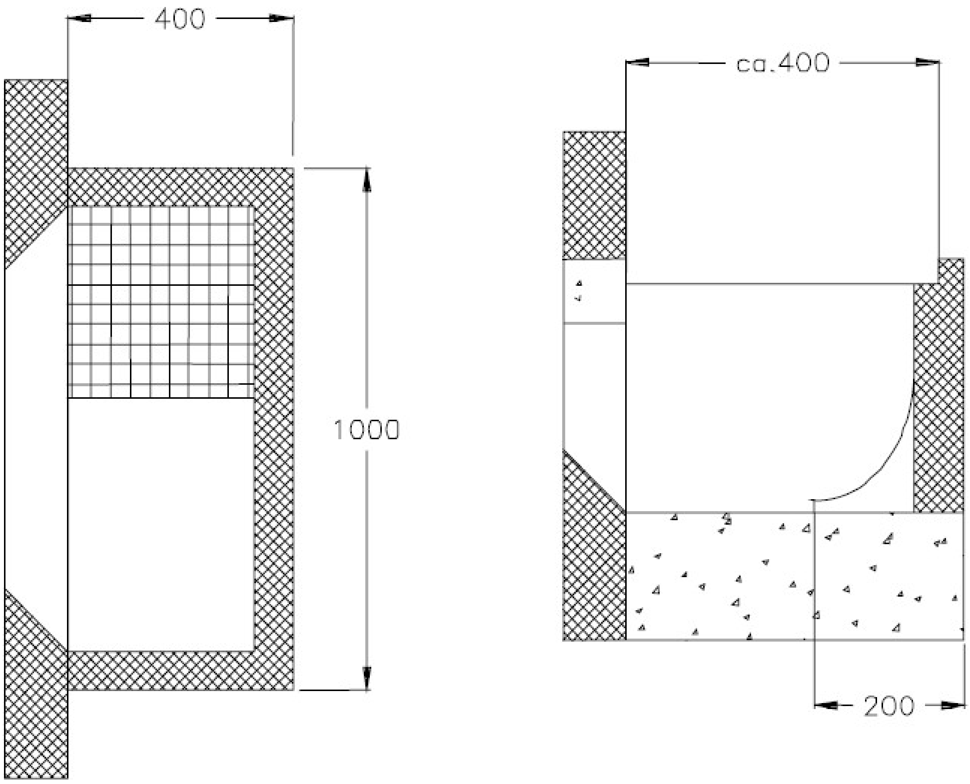
If the wall ducts of the air ducts at the intake or air outlet are below ground level, it is recommended that the air circuit is routed via flow-optimised plastic light wells.

An air baffle must be used for concrete shafts.

The light well on the outlet side should be fitted with a sound-absorbing lining. Weather-resistant mineral fibre boards with a density of approx. 70 kg/m³ or open-cell foam (e.g. melamine resin foam) are suitable for this purpose.

It should also be noted:

- The minimum cross-sections of the ducts must at least correspond to the dimensions of the air ducts used
- Sealing the transition between the light well and wall opening (see **Insulating wall openings**)
- Cover with grating (anti-burglary protection)
- Provide a drain for condensate
- A wire mesh (mesh size > 0.8 cm) should also be installed to protect against small animals and leaves. become.
- Provide protection against snow build-up

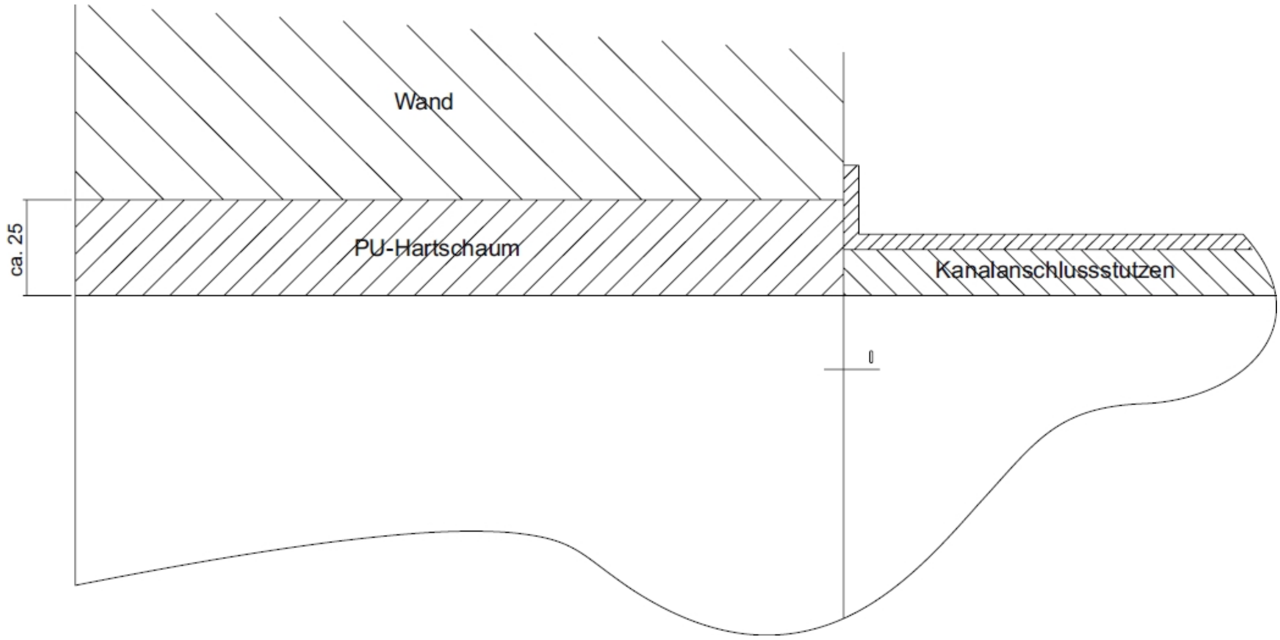


Insulating wall openings

The necessary wall openings must be made on site. They must be clad with thermal insulation on the inside to prevent the masonry from cooling down or condensation forming.

The example for the design of a wall opening shows insulation using diffusion-tight rigid foam (insulation thickness 25 mm - e.g. polyurethane foam). The transition between the wall insulation and the air duct (outer wall side) must h a v e an airtight connection.

In unfavourable weather conditions (e.g. driving rain), penetrating water must be drained to the outside by means of a slope.



NOTE
To prevent condensation forming on the masonry and the resulting mould growth, the air circuit must be thermally insulated right up to the outer edge of the building envelope.

4.4 Air-to-water heat pumps in split design

4.4.1 Requirements for the minimum installation area (R32)

Heat pumps operated with the refrigerant R32 are devices that fulfil the requirements of
of EN 378-1_4:2016 must be installed. With regard to the standard, it must be ensured that the installation room is of sufficient size so that the limit values for toxicity and flammability are not exceeded indoors.

When considering the minimum installation area of the room, the filling quantity of the system is decisive. Please note that extending the connection lines of the appliance may result in a change in the filling quantity of the system. You should therefore check whether the installation room is suitable, even if a higher refrigerant fill quantity is taken into account. An installation room is any room that contains components containing refrigerant (indoor unit, outdoor unit, refrigerant lines) or into which refrigerant can be released.
Several rooms with suitable openings (which are not closed) can be
The rooms that have a common ventilation supply, return or exhaust air system that does not contain the evaporator or condenser are to be treated as a single room.

During installation work, care should always be taken to ensure that the refrigerant lines are kept to a necessary minimum.

To check the required installation conditions, proceed as follows:
Determination of the refrigerant fill quantity:
Please note that a different refrigerant fill quantity may be necessary due to the extension of the connection pipes.

Check the tables for the respective heat pump to see whether the installation conditions are sufficient for operating the heat pump.

4.4.2 Limit values toxicity and flammability (R32)

If the refrigerant fill quantity is below 1.842 kg, the toxicity limit value is decisive for the installation conditions.

The filling quantity is toxicity limit value x room volume.

The toxicity limit **v a l u e** corresponds to the ATEL/ODL values or the practical limit value, **whichever is higher**.

R32 ATEL/ODL:	0,30
R32 Practical limit: Concentration limit	0,061
(toxicity):	R32 = 1 x (0. 3) = 0. 3kg per 1m³ volume

NOTE
The installer must ensure a room volume of 1 m³ per 0.3 kg of R32 refrigerant.

NOTE
If the refrigerant fill quantity of the system exceeds 1.842 kg, the flammability limit value is decisive for the installation conditions. It should be noted that, in contrast to the limit value for toxicity, this is the room area.

4.4.3 Heating-side connection (split)

Before the connections on the heating water side of the heat pump are made, the heating system must be flushed to remove any impurities, residues of sealing material or similar.

CAUTION
An accumulation of residues in the condenser can lead to total failure of the heat pump.

Once the heating system has been installed, it must be filled, purged and depressurised. The following must be observed when filling the system:

- Untreated filling and supplementary water must be of drinking water quality (colourless, clear, without deposits)
- The filling and supplementary water must be pre-filtered (pore size max. 5 µm).

Stone formation in hot water heating systems cannot be avoided, but is negligible in systems with flow temperatures below 60 °C. At high flow temperatures and especially in bivalent systems in the high output range (combination heat pump + boiler), stone formation can also occur.

flow temperatures of 60 °C and more can be achieved. The filling and supplementary water should therefore fulfil the following guide values in accordance with VDI 2035 - Sheet 1.

See: **Water quality in heating systems**

Water quality in heating systems

4.4.4 Connection of refrigerant pipes (R32)

CAUTION
Work with the refrigerant R32 may only be carried out by experienced and adequately trained personnel.

CAUTION
Incorrect installation, maintenance or repair of this appliance may increase the risk of property damage or injury.

When installing the refrigerant pipes, certain requirements must be met with regard to pipe length and elevation.

During installation work, no foreign substances may enter the refrigerant lines and no oxygen may enter the refrigerant circuit. The connection lines must be evacuated. The installation of pipework should be kept to a minimum.

The connections and cables must not be subjected to any mechanical stress during installation work.
The refrigerant lines must be protected from damage in order to prevent leaks and the associated
associated leakage of refrigerant. All connection points between the outdoor and indoor units must be easily accessible for maintenance and repair purposes.

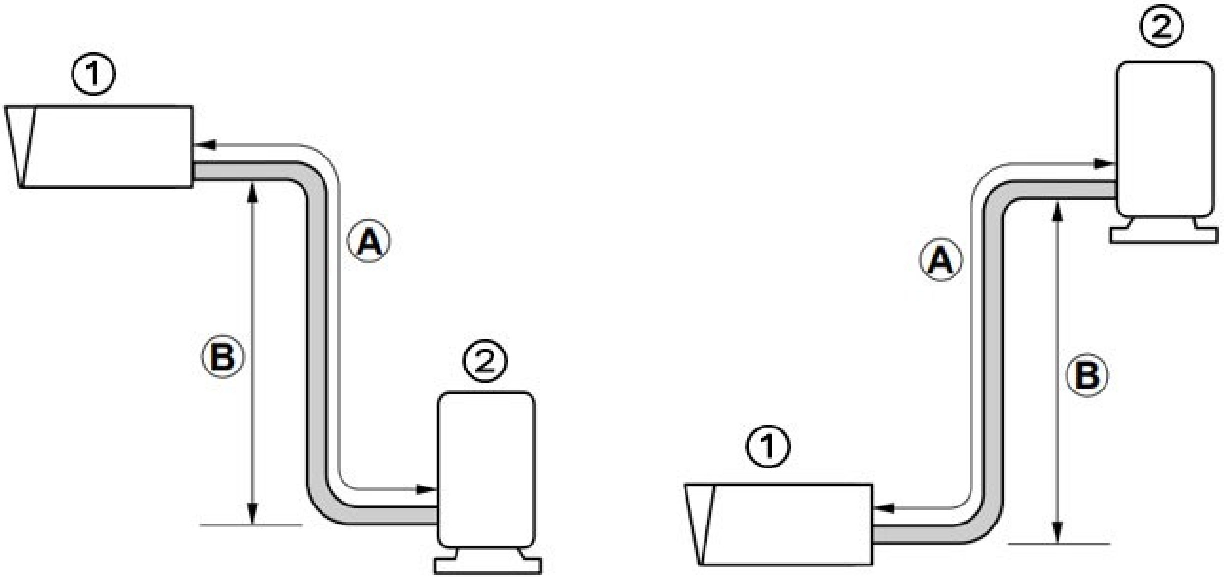
After completion of the pipe system, all pipes must be checked for leaks using suitable means. A Leakage tightness test must be carried out with dry nitrogen. During the Leakage tightness test, never apply more pressure to the system than is declared in the instructions and on the type plate.

CAUTION
Only equipment and tools intended for the product, pressure and temperatures may be used for work on the appliance.

Requirements for pipe length and elevation

The standard pipe length is 15 metres. Up to a length of 15 m, no additional refrigerant charge is required. If the pipe length is more than 15 m, the system must be charged with additional refrigerant.

NOTE
The **requirements for the minimum installation area** must be observed when filling with additional refrigerant.



① Indoor unit ② Outdoor unit

NOTE

If the indoor unit is installed higher than the outdoor unit, the installation of oil breakaway and oil lifting bends in the hot gas line must be checked separately by a refrigeration specialist if the height difference is greater than 4 metres.

CAUTION

If the filling quantity changes, document this in an easily recognisable place (e.g. filling quantity on the rating plate). Do not add more than the prescribed amount of refrigerant to the system.

5 Brine-to-water heat pump

5.1 Heat source Ground

Temperature range of the earth's surface at a depth of approx. 1 m	+3...+17 °C
Temperature range in deep layers (approx. 15 m)	+8...+12 °C
Application range of the brine-to-water heat pump	-5...+25 °C

NOTE
With commissioning by the after-sales service and a frost protection content of 30 vol-% monoethylene glycol, the lower operating limit of the high-efficiency brine-to-water heat pumps can be reduced to -10 °C can be extended.

Utilisation option

- monovalent monoenergetic
- bivalent (alternative, parallel)
- bivalent-renewable
-

NOTE
Notes on the indirect utilisation of the groundwater heat source or waste heat from cooling water with brine-to-water heat pumps and intermediate heat exchangers can be found in the chapter "Water heat source with intermediate heat exchanger".

5.1.1 Dimensioning information - heat source ground

The geothermal heat exchanger, which serves as the heat source for the brine-to-water heat pump, must be designed for the refrigeration capacity of the heat pump. This can be calculated from the heat output minus the electrical input power of the heat pump at the design point.

The basic rule for the heat source is that the power Q_0 transferred to the evaporator of the heat pump must be permanently available. The following applies:

Evaporator output Q_0 (kW$_{th}$) = heat output Q_C (kW$_{th}$) - electrical input power of the compressor P_{el} (kW)$_{el}$

> **NOTE**
> A heat pump with a higher coefficient of performance (COP) has a lower electrical power consumption for a comparable heat output and therefore a higher refrigeration capacity.

When replacing an old heat pump with a newer model, the performance of the geothermal heat exchanger should therefore be checked and, if necessary, adjusted to the new refrigeration capacity. The minimum brine temperatures and the runtimes of previous heating periods provide important information about the heat source.

- Brine temperatures are well below 0°C over a longer period of time.
  => The heat source may not be able to ensure the higher abstraction capacity of a more efficient heat pump. The installation of a second heat generator, e.g. heating element, is recommended
- The heat pump has low annual full utilisation hours
  => The heat pump appears to be oversized. Replacing it with a heat pump with a lower heat output leads to longer runtimes, lower peak extraction rates and therefore more efficient operation.

Heat is transported in the ground almost exclusively by thermal conduction, with thermal conductivity increasing with increasing water content. Just like thermal conductivity, the heat storage capacity is largely determined by the water content of the ground. The icing of the contained water leads to a significant increase in the amount of recoverable energy, as the latent heat of the water is very high at approx. 0.09 kWh/kg. Icing around the pipe coils laid in the ground is therefore not detrimental to optimum utilisation of the ground.

Dimensioning the brine circulation pump
The brine volume flow depends on the output of the heat pump and is delivered by the brine circulation pump. The circulation pump must be dimensioned so that a mass flow corresponding to the evaporator output is conveyed. Depending on the capacity, the mass flow should be selected so that a temperature spread of 2 - 3 Kelvin is achieved across the evaporator at the lowest heat source temperature. At higher brine temperatures (e.g. summer operation / domestic hot water), larger spreads may also result.

The brine flow specified in the device information of the heat pump corresponds to a temperature spread of the heat source of approx. 3 K. In addition to the volume flow, the pressure drops in the brine circuit system and the pump manufacturer's technical data must be taken into account. Pressure drops in pipes, fixtures and heat exchangers connected in series must be added.

> **NOTE**
> The pressure drop of a frost protection/water mixture (25 %) is 1.5 to 1.7 times higher compared to pure water (see also figure freezing curve), and the delivery rate of many circulation pumps is reduced by approx. 10 %.

> **NOTE**
> A detailed design of ground collectors is possible for all regions in Germany using the operating cost calculator at www.dimplex.de/betriebskostenrechner.

Maintenance instructions
To ensure safe operation of the heat pump, it must be serviced at regular intervals. The following work can also be carried out without special training:

- Cleaning the dirt filter in the heat pump's brine circuit

NOTE
Further information on heat pump maintenance can be found in the installation and operating instructions for the heat pump.

5.1.2 Construction drying

When building a house, large quantities of water are usually used for mortar, plaster, plaster and wallpaper, which only evaporates slowly from the building structure. Rain can also increase the humidity in the building. The high level of moisture in the entire structure increases the heat demand of the house during the first two heating periods.

The building should therefore be dried out in advance using special equipment provided by the customer.

If screed drying is carried out with the heat pump, it must be noted that an additional electric immersion heater or a replacement heater must be installed in the heating circuit (buffer tank) if the heat output of the heat pump is limited and the building is dried out in autumn or winter in accordance with VDI 4645. This must be taken into account, especially for brine-to-water heat pumps, in order to compensate for the increased heat demand and to relieve the heat source.

NOTE
With brine-to-water heat pumps, the increased compressor running times can lead to supercooling of the heat source and thus to a safety shutdown of the heat pump.

5.1.3 Brine liquid

brine concentration

To prevent frost damage to the evaporator of the heat pump, an antifreeze must be added to the water on the heat source side. For underground pipe coils, frost protection of -14 °C to -18 °C is required due to the temperatures occurring in the cooling circuit. A monoethylene glycol-based antifreeze is used. The brine concentration for underground installation is 25 to a maximum of 30% by volume.

A mixture of water and an antifreeze is used as the heat transfer medium in order to achieve a lower freezing point. In the vast majority of systems in Germany, Austria and Switzerland, ethanediol (ethylene glycol) is used as an antifreeze.

NOTE
Authorities are placing ever higher demands on the environmental compatibility of brine liquids. In particular, the unknown composition of added inhibitors, e.g. for corrosion protection, is viewed critically. In Germany, only heat transfer fluids containing WGK 1 additives with less than 3% by mass can be accepted. Additives of WGK 2 and 3 and substances that are not safely determined, on the other hand, may not be added below the consideration limit (according to Annex 1 AwSV) of 0.2% by mass. Suitable brine liquids are summarised in a positive list of the "Bund/ Länder Arbeitsgemeinschaft Wasser (LAWA)" and can be viewed on their website at https://www.lawa.de/Publikationen-363-Waermetraeger,-Erdwaerme-.html.

The use of pure monoethylene glycol is therefore recommended if it can be ensured that there is no permanent supply of oxygen during operation due to a closed brine circuit (e.g. AFN 824, AFN 825).

> **NOTE**
> Due to the material selection of the brine accessories, the more environmentally friendly ethylene and propylene glycol can be used in Dimplex heat pumps without corrosion inhibitors.

Name	Synonym	Chemical formula
Ethanediol	Ethylene glycol	C H O_{262}
1,2-propanediol	Propylene glycol	C H O_{382}
Ethanol	Ethyl alcohol	C H_{25} OH

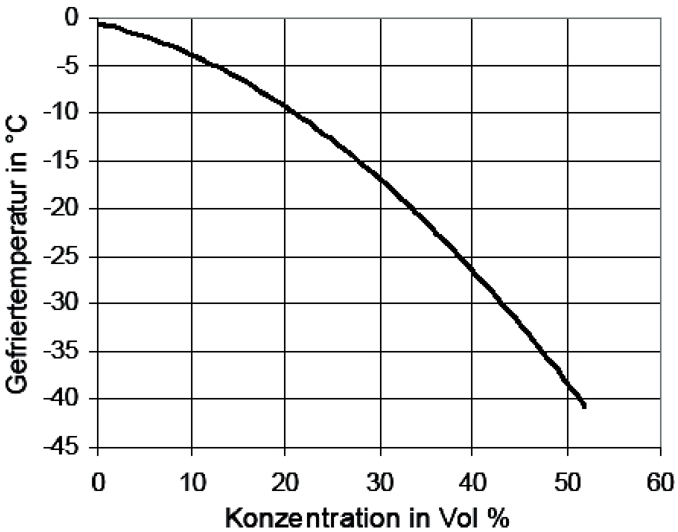
Table: Approved antifreezes recommended by Dimplex

> **NOTE**
> The performance data of the heat pumps are recorded with ethylene glycol (25 %). Propylene glycol and ethyl alcohol can also be used, but no measurements are available on the effects on performance and coefficient of performance (COP).

The following antifreezes are not approved due to a lack of long-term experience:

- "Thermera", which is produced on the basis of betaine and is not environmentally friendly.
  is undisputed.
- "Tyfo-Spezial without corrosion inhibitors", as this antifreeze attacks non-ferrous metals such as copper.
- "Tyfo Special with corrosion inhibitors", as this is not officially approved by our suppliers and is so aggressive that it leads to corrosion on the sheet metal panelling in the event of leaks.

> **NOTE**
> This list does not claim to be exhaustive.



14 Figure: Freezing curve of monoethylene glycol/water mixtures as a function of concentration Pressure protection

If heat is extracted exclusively from the ground, brine temperatures between approx. 5 °C and approx. +20 °C can occur. These temperature fluctuations result in a volume change of approx. 0.8 to 1 % of the system volume. To keep the operating pressure constant, an expansion vessel with a primary pressure of 0.5 bar and a maximum operating pressure of 3 bar must be used.

NOTE

For heat pump systems with a cooling function (reversible heat pumps), the brine-side expansion vessel must be larger than for heat pumps with a pure heating function due to the higher spread

CAUTION

A component-tested diaphragm safety valve must be installed to prevent overfilling. The discharge line of this safety valve must end in a drip tray in accordance with DIN EN 12828. A pressure gauge with min. and max. pressure labelling must be provided for pressure monitoring.

Filling the system

The system should always be filled in the following order:

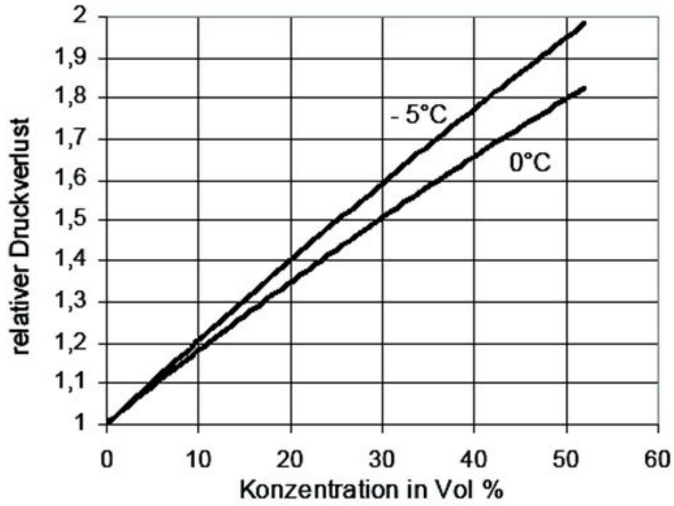
- Mixing the required antifreeze/water concentration in an external container
- Check the pre-mixed antifreeze/water concentration using an antifreeze tester for ethylene glycol
- Filling the brine circuit (max. 2.5 bar)
- Purge the system (install microbubble separator)

CAUTION

Even after prolonged operation of the brine circulation pump, filling the brine circuit with water and then adding antifreeze does not result in a homogeneous mixture. The unmixed water column freezes in the evaporator and destroys the heat pump!

Relative pressure drop

The pressure drop in the brine circuit depends on the temperature and the mixing ratio. As the temperature decreases and the proportion of monoethylene glycol increases, the pressure drop of the brine increases.



15 Figure: Relative pressure drop of monoethylene glycol/water mixtures compared to water in Dependence of the concentration at 0 °C and -5 °C

Pipe DIN 8074 (PN 12.5) [mm]	Volume per 100 m [litres]	Frost protection per 100 m [litres]	Max. Brine flow [l/h]
25 x 2,3	32,7	8,2	1100
32 x 2,9	53,1	13,3	1800
40 x 3,7	83,5	20,9	2900
50 x 4,6	130,7	32,7	4700
63 x 5,8	207,5	51,9	7200
75 x 6,9	294,2	73,6	10800
90 x 8,2	425,5	106,4	15500
110 x 10	636	159	23400
125 x 11,4	820	205	29500
140 x 12,7	1031	258	40000
160 x 12,7	1344	336	50000

Table: Total volume and amount of frost protection per 100 m of pipe for PE pipes and frost protection down to -14 °C

5.1.4 Materials in the brine cycle

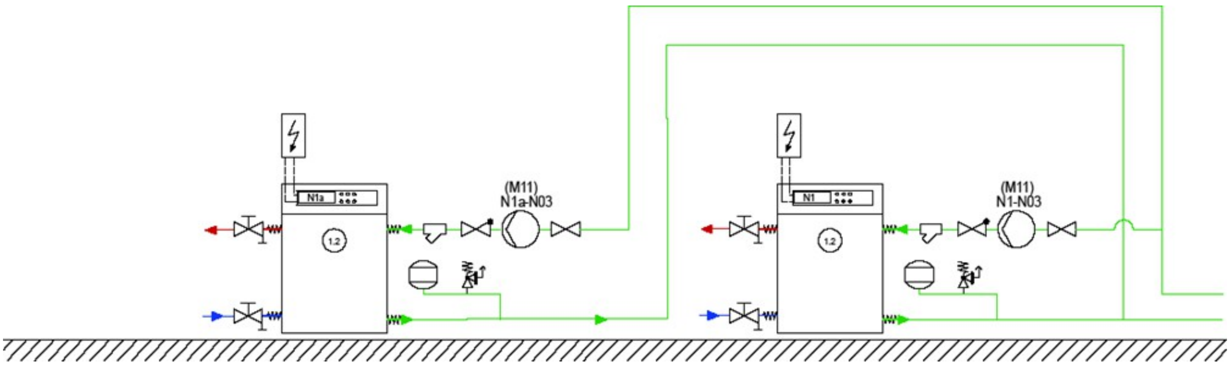
Material for ground collectors
Pipes made of PE 100 / PE-X can be used in stone-free soils. In stony soils, cross-linked polyethylene pipes (e.g. PE 100-RC / PE-X) with an external diameter of 32 mm are recommended due to their higher impact strength. For applications where higher temperatures are to be expected in the brine circuit (e.g. energy fences or waste heat recovery), PE-RT can be used. These can be used for operating temperatures of up to 70 °C.

Further materials
If other materials such as copper, brass or stainless steel are used in the brine circuit, the corrosion resistance of the materials must be checked. Corrosion can also occur due to condensation on uninsulated or insufficiently insulated pipework in the brine circuit.

> **NOTE**
> The Dimplex antifreeze AFN 824 / AFN 825 for filling the brine circuit does not contain any corrosion inhibitors.

5.1.5 Parallel connection of brine-to-water heat pumps

When brine-to-water heat pumps are connected in parallel, care must be taken to ensure that there is no flow in the brine circuit in individual heat pumps. If only one heat pump is in operation, a missing non-return valve in the brine circuit can lead to an external flow through the heat exchanger of the second heat pump. To prevent this, a non-return valve must be installed after each brine circuit pump in the flow.



16 Figure: Parallel connection of brine-to-water heat pumps

> **NOTE**
> The non-return flap behind the brine circulation pump M 11 is not included in the brine accessories package, but must be provided by the customer.

A similar incorrect flow can also occur when using a passive cooling station (PKS). In this case, a non-return flap/backflow preventer must also be installed on site after each brine circulation pump.

5.2 ground heat collector

Ground heat collectors extract seasonally stored energy from the ground below the earth's surface. In particular, the liquid/solid phase change of the water in the ground is utilised as a latent heat store in winter. The maximum abstraction capacity and the annual abstraction work are determined by the storage capacity, the heat transport properties and the thermal regeneration of the subsoil as well as the collector geometry and the operating mode of the system. With regard to the soil, the water content is a significant influencing factor.

The decisive factor for the performance of ground heat collectors is their connection to the earth's surface, as in the warmer months they are dependent on the heat input from outside air, solar radiation and precipitation.
be regenerated. The following design guide values and operating limits therefore apply exclusively to uncovered or sealed ground heat collectors that are covered by natural soil. The heat inflow from the earth's interior is less than 0.1 W/m² and therefore negligible.

NOTE
Installing a collector under terraces or buildings is not reasonable due to the lack of regeneration. The formation of ice on the collector causes heave and subsidence which can lead to cracks or damage to the building.

The most important criteria for a system decision and preliminary planning are summarised below:

- In individual cases, ground heat collectors must be notified to or authorised by the lower water authority.
- It is not permitted to build over the ground heat collector. The ground surface above of a collector system must not be sealed, as this impairs regeneration.
- Deep-rooted vegetation above a collector should be avoided. The vegetation delay over of a collector is about two weeks in an unfavourable case.
- The following minimum distances and guide dimensions are recommended:
  – between collector and buildings: 1.2 m
  – between collector and water pipes: 1.5 m
  – between collector and property boundary: 1 m
  – Installation depth of the collector: see following chapter
  – Laying distance of the collector pipes: see following chapter

NOTE
The maximum extracted energy per year in sandy soils is 30 to 50 kWh/m² and in cohesive soils is 50 to 70 kWh/m .²

NOTE
The Dimplex operating cost calculator can be found at www.dimplex.de/online-planer. With this, the Design of ground collectors in Germany possible via the postcode of the respective region.

5.2.1 Laying depth

In colder regions, soil temperatures at a depth of 1 m can reach freezing point even without heat utilisation. At a depth of 2 metres, the minimum temperature is approx. 5 °C. This temperature r i s e s with increasing depth, but the heat flow from the earth's surface decreases. Thawing of the icing in spring is not guaranteed if the installation is too deep. The installation depth should therefore be approx. 0.2 to 0.3 m below the maximum frost line. In most regions of Germany, this is 1.0 to 1.5 metres.

CAUTION
When laying ground collectors in trenches, for reasons of lateral fusing, a
Do not exceed an installation depth of 1.25 m. Risk of spillage!

5.2.2 Laying distance

When determining the laying distance d_a , it must be taken into account that the ice radii forming around the earth coils have defrosted sufficiently after a frost period to allow rainwater to seep away and prevent waterlogging. The recommended laying distances are between 0.5 and 0.8 metres, depending on the soil type and climatic region. In regions with sandy soils, a laying distance of 0.3 to 0.4 m may also be necessary.

- The longer the maximum duration of the frost period, the greater the laying distance and the area required for this.
- If the floor has poor thermal conductivity (e.g. sand), the installation distance must be reduced for the same installation area, thus increasing the total pipe length.

NOTE
In colder regions with minimum outside temperatures below -14 °C (e.g. southern Germany), an installation distance of approx. 0.8 m is required. In warmer regions with minimum outside temperatures of -12 °C and warmer, the installation distance can be reduced to approx. 0.6 m. The climate data can be found in the standard DIN/TS
12831-1 can be found.

5.2.3 Collector area and pipe length

The area required for a horizontally installed ground collector depends on the following factors:

- Refrigeration capacity of the heat pump
- Soil type and moisture content of the ground and climatic region
- Maximum length of the frost period
- Annual full utilisation hours

NOTE
The abstraction capacities are very low in low mountain areas from altitudes of approx. 900 m to 1000 m above sea level
and ground heat collectors are not recommended

NOTE
Standard values for dimensioning ground heat collectors are shown in Table 3.4.

Step 1:

Determine the heat output of the heat pump at the design point (e.g. B0/W35) Calculate the refrigeration capacity by subtracting the electrical input power at the design point from the heat output			
Q_0	=	Q_{WP} - P_{el}	Example: SI 14TU
Q_{WP}	=	Heat output of the heat pump	13.9 kW
Pel	=	electrical input power of the heat pump at the design point	2.78 kW
Q_0	=	Refrigeration capacity or abstraction capacity of the heat pump from the ground at the design point	11.12 kW

Step 2:

See Table 3.3 for the specific abstraction capacity depending on the soil type	
Soil type	Specific abstraction capacity
	for 1800 h
dry, non-cohesive soil (sand)	approx. 10 W/m
Clay / silt	approx. 19 W/m
Sandy clay	approx. 21 W/m

Step 3:

Determination of the required pipe length:
• Refrigeration capacity from 2nd step = 11.12 kW Soil type clay/silt
• Pipe length L = 11120 W / 19 W/m = 585.3 m

- => 6 circles of 100 m each are selected

Step 4:

The collector area results from the pipe length and the installation distance:

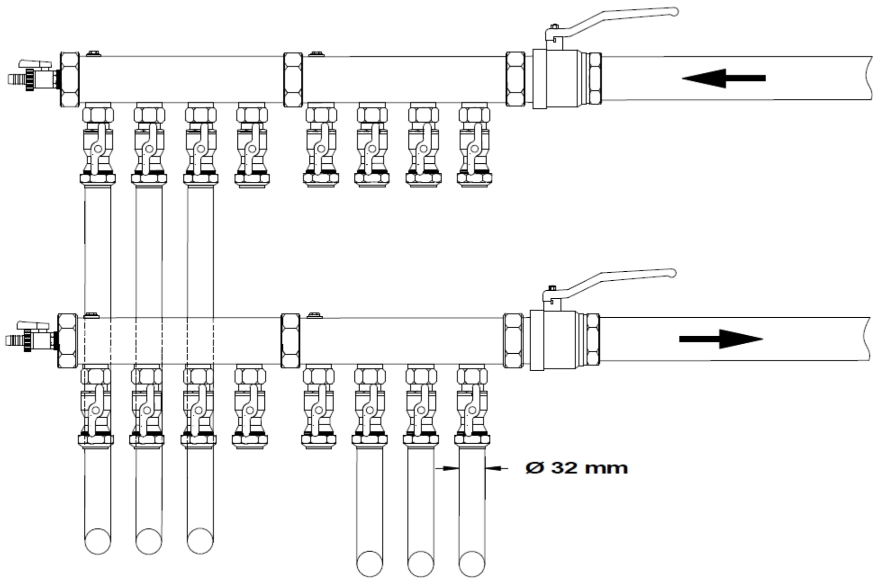
- Collector area A = L (pipe length) * b (installation distance)
- The required installation distance at a location in southern Germany is 0.8 m. 0.8 m is selected
- Collector area A = 600 m * 0.8 m = 480 m²

NOTE
In practice, the calculated minimum pipe length is rounded up to full 100 m circles.

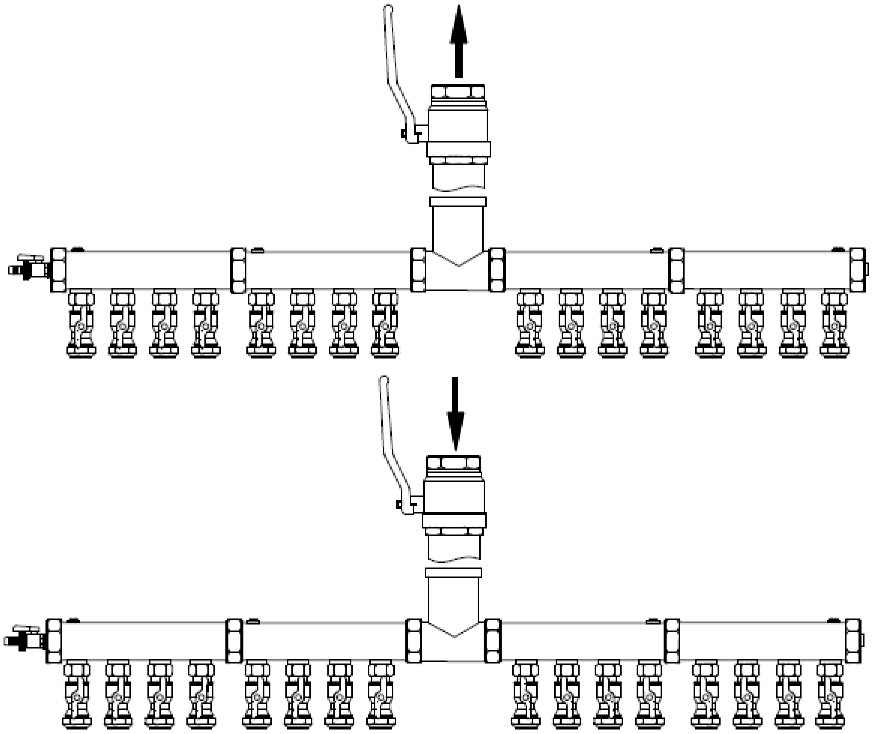
5.2.4 Laying the brine collector and brine circuit manifold

The brine circuit manifolds connect borehole heat exchangers or ground collectors easily and safely to a heat pump. A water-glycol mixture is generally used as the heat transfer fluid for transferring the geothermal heat. The brine flows in a closed circuit from the collector or probe pipes via the brine manifold to the heat pump and back to the heat source via the brine circuit manifold.

Depending on the number of brine circuits to be flowed through, the brine collector or brine circuit manifold must be installed (see the following illustrations here and here). To completely shut off individual collector or probe circuits (e.g. in the event of leaks), both the collector and the distributor are equipped with ball valves. The PE pipes of the collectors or probes can be fitted directly to the ball valves using the pre-assembled compression fittings.



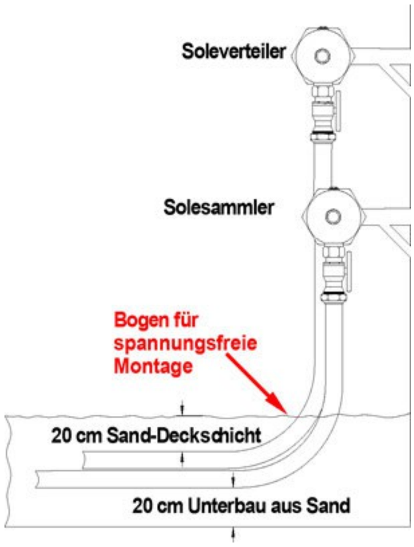
17 Illustration: Mounting brine circuit manifold up to max. 8 circuits



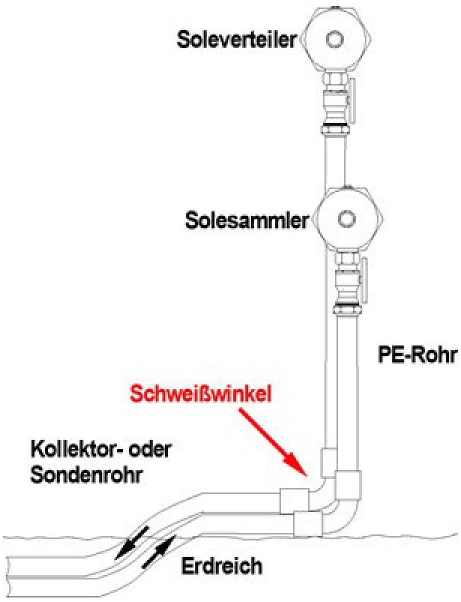
18 Illustration: Mounting brine circuit manifold for max. 16 (2 x 8) circuits

There are various points to consider when installing the brine circuit manifold:

- Mount the brine circuit manifold firmly to a shaft or building wall (e.g. using a wall bracket).
- The collector or probe pipes must be inserted into the manifold from below in a bend without tension in order to compensate for linear expansion during the summer or winter time (stress cracks).
- Ideally, the bend is produced using a welding socket.
- Outside the building, the brine circuit manifolds should be installed in accessible shafts - protected from rainwater.
- For shaft installation, it is recommended to cover or underlay the collector or probe pipes in the ground with a layer of sand approx. 20 cm thick. If a bend is welded on to compensate for linear expansion, this should be above ground level.



19 Illustration: Installation of the pipes on the brine circuit manifold



20 Illustration: Assembly of the pipework with welding angle on the brine circuit manifold

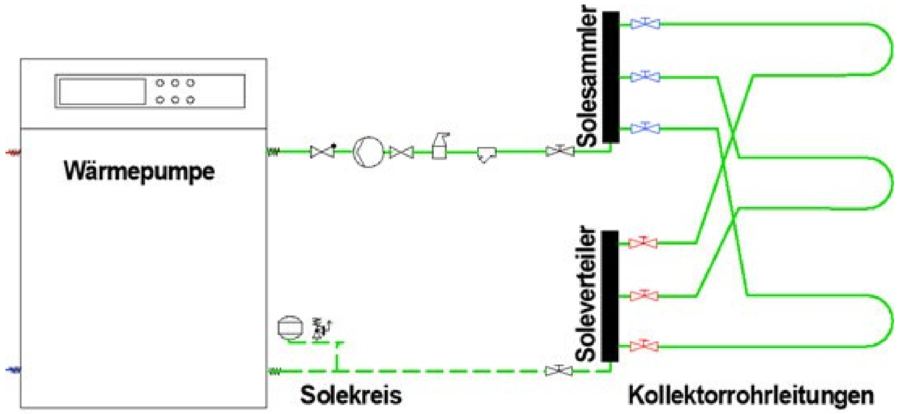
- If the brine circuit manifolds are installed inside a building, they and all pipes routed inside the house and through the house wall must be steam-resistant insulated to prevent condensation.
- The collector pipe should not be longer than 100 m per collector circuit; for DN 32 probe pipes, the collector pipe should not be longer than 100 m.
  max. depth of 80 m must not be exceeded - observe pressure drop.
- Hand-tighten all screw connections on the brine collector and distributor. Then tighten to a tightening torque of 60 to a maximum of 70 Nm. Do not damage the coupling nuts when tightening.
- Coat the coupling nut between the brine circuit manifold or brine collector and the ball valve (compression fitting) with a grease paste to prevent moisture from penetrating.

> **NOTE**
> No hydraulic balancing is required when installing brine circuits of equal length (Tichelmann principle).

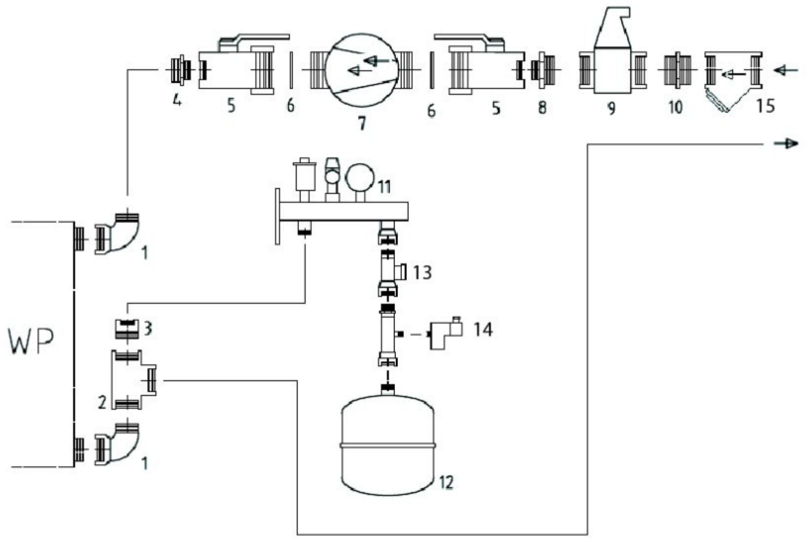
5.2.5 Installation of the brine circuit

- The individual brine circuits must be hydraulically balanced with each other. Ideally, collector pipe coils of the same length and material properties should be laid (Tichelmann principle). Rod regulating valves (e.g. Taco setter) in the individual brine circuits mean an additional pressure drop and therefore higher power consumption of the circulation pump in the heat source circuit.
- Each brine circuit must be fitted with at least one isolating valve.
- The brine circuits must all be the same length in order to ensure an even flow and abstraction capacity of the brine circuits.
- If possible, the ground heat collectors should be installed a few months before the heating season so that the ground can settle.
- The minimum bending radii of the pipes as specified by the manufacturer must be observed.
- The filling and venting device must be installed at the highest point of the site.
- When laying the brine pipes and the intermediate circuit, care must be taken to ensure that no Form air sacs.
- All brine pipes routed in the house and through the house wall (flow and return) must be insulated in a steam-resistant manner in order to avoid heat and cold losses and prevent condensation.
- All cables carrying the brine must be made of corrosion-resistant material.
- Brine circuit manifolds and return collectors should be installed outside the house.
- When installing the brine circulation pump of the heat source system, the temperature operating ranges of the pump in the installation instructions must be observed. The pump head must be positioned so that no condensate can flow into the plenum box. If the pump is installed in a building, it must be steam-resistant to prevent condensate and ice formation. Sound insulation measures may also be necessary.
- The laying distance between pipes carrying brine and water pipes, sewers and buildings should be at least 1.2 - 1.5 metres to avoid frost damage. If this laying distance cannot be maintained for structural reasons, the pipes in this area must be adequately insulated.
- Ground heat collectors must not be built over and the surface must not be sealed.
- The main breather with micro-bubble separator should be located at the highest point of the brine circuit.
  The brine accessories can be installed both inside and outside the building.

> **NOTE**
> Due to their design, high-efficiency brine circulation pumps must be installed in a frost-free and dry location.



21 Illustration: Heat pump circuit heat source side



fixtures

Legend

1. Elbow
2. T-piece
3. Reducing nipple Double
4. nipple Pump connection
5. tap Sealing Circulation
6. pump Double nipple
7. Main breather Double
8. nipple Vessel
9. connection group with
10. quick air vent, safety
    valve, pressure gauge
11. Expansion vessel Shut-
    off cap valve Low
    pressure pressostat
    Filter insert
12.
13.
14.
15.

NOTE
All pipework sections and installations in the brine circuit must be fitted with diffusion-tight, fully bonded insulation, as the temperature falls below the dew point here. The functionality of the individual components must not be restricted.

NOTE
The dirt trap (mesh size 0.6 mm) included in the scope of supply of the heat pump protects the evaporator of the heat pump. This must be installed directly in the pipework upstream of the heat pump and must be cleaned for the first time after the brine circulation pump has been flushed for 24 hours.

NOTE
To prevent moisture from penetrating the insulation, insulation materials that cannot absorb moisture should be used. In addition, the joints must be glued in such a way that no moisture can reach the colder side (e.g. brine pipe) of the insulation.

5.2.6 Standard dimensioning of ground heat collectors

The dimensioning table below is based on the following assumptions:

- PE pipe (brine circuits): Pipe DIN 8074 32 x 2.9 mm - PE 100 (PN 12.5)
- PE supply pipe between heat pump and brine circuit in accordance with DIN 8074:
- Nominal pressure PN 12.5 (12.5 bar)
- Specific abstraction capacity of the ground approx. 25 W/m^2 at 0.8 m installation distance
- Brine concentration min. 25 % to max. 30 % Antifreeze (glycol-based)
- Pressure expansion vessel: 0.5 - 0.7 bar primary pressure

NOTE
The design of the brine circulation pumps only applies to section lengths up to a maximum of 100 metres and the specified
Number of brine circuits!

An increase in the number of brine circuits and a shortening of the section lengths is not critical with regard to pressure drops if all other parameters remain unchanged. If the general conditions differ (e.g. specific abstraction capacity, brine concentration), a new dimensioning of the permissible total pipe length for the supply and return between the heat pump and brine circuit manifold is required.

The required quantities of antifreeze here refer to the specified wall thicknesses. For thinner walls, the amount of water and frost protection must be increased and adjusted so that the minimum brine concentration of 25% by volume is achieved.

CAUTION
When filling the heat source system, a large amount of air enters the pipework with the brine. It is therefore necessary to flush the individual collector circuits thoroughly after filling. Flushing should take place over an open container. Check the heat source system, clean dirt traps and ventilate if necessary, especially during the first period after commissioning.

Technical data					
Heat pump (HP)	Nominal power consumption (B0/W35)	Grundfos circulation pump	Wilo circulation pump	Minimum volume flow	Cooling capacity
	kW			m³/h	kW
SIW 6TES	1,26	UPM Geo 25-85	xx	1,3	4,6
SIW 8TES	1,61	UPM Geo 25-85	xx	1,5	6,2
SIK 8TES	1,61	UPM Geo 25-85	xx	1,5	6,2
SIK 11TES	2,13	UPMXL Geo 25-125	xx	2,2	8,5
SI 6TU	1,30	UPM Geo 25-85	Yonos Para HF 25/10*	1,5	5,0
SI 8TU	1,67	UPM Geo 25-85	Yonos Para HF 25/10*	1,9	6,43
SI 11TU	2,22	UPMXL Geo 25-125	Yonos Para HF 25/10*	2,6	8,68
SI 14TU	2,78	UPMXL Geo 25-125	Yonos Para HF 25/10*	3,4	11,12
SI 18TU	3,70	Magna Geo 32-100	Yonos Para HF 30/10*	4,3	13,8
SI 22TU	5,10	Magna Geo 32-100	Yonos Para HF 30/12*	5,5	17,97
SIH 20TE	4,86	Magna3 40-120F	Yonos Para HF 30/12*	5,1	17,0
SI 26TU	5,45	xx	Stratos Para 30/1-12	6,5	22,0
SI 35TU	7,25	Magna3 32-120F	xx	8,0	28,0
SI 50TU	10,45	Magna3 40-120F	xx	12,4	39,0
SI 75TU	15,31	Magna3 65-120F	xx	18,3	59,0
SI 90TU	18,50	Magna3 65-120F	xx	17,6	70,0
SIH 90TU	18,85	Magna3 65-120F	xx	20,5	70,0
SI 130TU	29,50	Magna3 65-150F	xx	27,1	106,4
Reversible heat pumps - with collectors only HEATING !!!					
SI 35TUR	7,40	Magna3 32-120F	xx	8,2	27,0
SI 50TUR	10,80	Magna3 40-120F	xx	12,2	37,5

Technical data				
Heat pump (HP)	Pipe length collector at 20W/m2	Pressure expansion vessel	Max. Length of brine circuit manifold (SVT)	Brine circuits
	m	l	m	
SIW 6TES	232	8	20,0	3
SIW 8TES	310	8	25,0	4
SIK 8TES	310	8	20,0	4
SIK 11TES	424	12	10,0	5
SI 6TU	250	8	20,0	3
SI 8TU	322	12	10,0	4
SI 11TU	434	12	10,0	5
SI 14TU	556	18	20,0	6
SI 18TU	690	18	60,0	7
SI 22TU	899	18	80,0	9
SIH 20TE	850	18	100,0	9
SI 26TU	1100	18	100,0	12
SI 35TU	1400	18	120,0	15
SI 50TU	1950	25	75,0	20
SI 75TU	2950	40	120,0	32
SI 90TU	3500	50	200,0	35
SIH 90TU	3500	50	200,0	38
SI 130TU	5320	50	140,0	55
Reversible heat pumps - with collectors only HEATING !!!				
SI 35TUR	1350	18	100,0	16
SI 50TUR	1875	25	75,0	20

	Permissible total pipe length for flow and return between HP and SVT				
Heat pump (HP)	32 x 2,9	40 x 3,7	50 x 4,6	63 x 5,7	75 x 6,8
	m	m	m	m	m
SIW 6TES	20	45	120		
SIW 8TES		25	70		
SIK 8TES		20	65		
SIK 11TES		10	70		
SI 6TU	20	100			
SI 8TU	10	35	100		
SI 11TU		10	70		
SI 14TU			20	70	
SI 18TU			100	300	
SI 22TU			80	270	
SIH 20TE			100	300	
SI 26TU			100	300	
SI 35TU				130	360
SI 50TU					75
SI 75TU					
SI 90TU					
SIH 90TU					
SI 130TU					
Reversible heat pumps - with collectors only HEATING !!!					
SI 35TUR				130	360
SI 50TUR					75

Heat pump (HP)	90 x 8,2	110 x 10	125 x 11,4	140 x 12,7
	m	m	m	m
SIW 6TES				
SIW 8TES				
SIK 8TES				
SIK 11TES				
SI 6TU				
SI 8TU				
SI 11TU				
SI 14TU				
SI 18TU				
SI 22TU				
SIH 20TE				
SI 26TU				
SI 35TU				
SI 50TU	180			
SI 75TU	120	300		
SI 90TU	50	200	320	
SIH 90TU	50	200	320	
SI 130TU			130	280
Reversible heat pumps - with collectors only HEATING !!!				
SI 35TUR				
SI 50TUR	180			

	Pressure drops		
Heat pump (HP)	evaporator	Pipe capacity WP-SVT	
	Pa	mWS (100m)	Pa
SIW 6TES	15000	3,7	11100
SIW 8TES	11500	3,7	13875
SIK 8TES	16000	6,2	18600
SIK 11TES	13000	3,7	5550
SI 6TU	8700	4,7	14100
SI 8TU	11000	4,7	7050
SI 11TU	14000	3,7	5550
SI 14TU	14000	4,7	14100
SI 18TU	21500	1,6	14400
SI 22TU	34000	2,7	32400
SIH 20TE	11000	3,0	45000
SI 26TU	12000	2,7	40500
SI 35TU	20600	2,6	46800
SI 50TU	14300	2,2	24750
SI 75TU	32000	1,8	32400
SI 90TU	13000	1,3	39000
SIH 90TU	18300	1,3	39000
SI 130TU	19300	1,2	25200
Reversible heat pumps - with collectors only HEATING !!!			
SI 35TUR	12600	2,6	39000
SI 50TUR	22500	2,3	25875

Heat pump (HP)	brine circuit manifold	Collector	Total pressure drop	Total pressure loss
	Pa	Pa	Pa	mWS
SIW 6TES	10000	7800	43900	4,4
SIW 8TES	10000	7800	43175	4,3
SIK 8TES	10000	7800	52400	5,2
SIK 11TES	10000	7800	36350	3,6
SI 6TU	10000	7800	40600	4,1
SI 8TU	10000	7800	35850	3,6
SI 11TU	10000	7800	37350	3,7
SI 14TU	10000	7800	45900	4,6
SI 18TU	10000	7800	53700	5,4
SI 22TU	10000	7800	84200	8,4
SIH 20TE	10000	7800	73800	7,4
SI 26TU	10000	7800	70300	7,0
SI 35TU	10000	7800	85200	8,5
SI 50TU	10000	7800	56850	5,7
SI 75TU	10000	7800	82200	8,2
SI 90TU	10000	7800	69800	7,0
SIH 90TU	10000	7800	75100	7,5
SI 130TU	10000	7800	62300	6,2
Reversible heat pumps - with collectors only HEATING !!!				
SI 35TUR	10000	7800	69400	6,9
SI 50TUR	10000	7800	66175	6,6

Table: Dimensioning table for brine-to-water heat pumps for a specific abstraction capacity of the ground of 20 W/m² Ground heat collector. (Assumptions: Brine concentration 25 volume % antifreeze, 100 m section length of the individual brine circuits, pipes made of PE 100 (PN12.5), 32 x 2.9 mm according to DIN 8074 and 8075.

- Pump component "Brine accessory package SZB"

Notes:

- Collector length 100 m; DN 32 x 2.9
- Volume flow per collector: 0.6 m /h³

- Mixing factor water - glycol: 1.5
- Collector pressure drop: 0.52 mWS (water)
- Collector pressure drop: 0.78 mWS (glycol)
- Abstraction capacity of the ground: 20 W/m2[2]

5.3 borehole heat exchangers

The most common type of probe, the double U pipe, consists of U-shaped pipe loops bundled in pairs. Single U-probes consisting of only one tube loop and coaxial probes consisting of an inner and outer tube are less common.

In a geothermal probe system, a heat exchanger system is installed in deep boreholes of usually 20 m to 100 m into the ground. The pipe material used is almost exclusively PE 100, PE 100-RC and PE-X (PE: polyethylene).

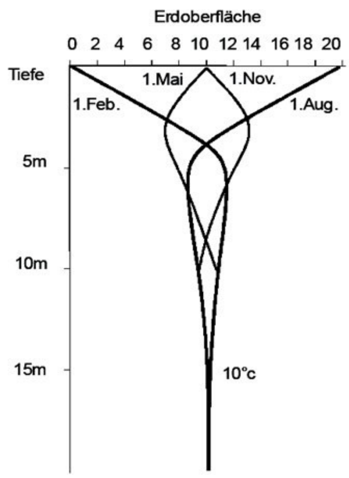
The most important criteria for a system decision and preliminary planning are summarised below:

- Borehole heat exchangers up to 100 m drilling depth are subject to approval by the lower water authority, drilling depths over 100 m are subject to approval by the mining authority.
- The probe may only be built over for frost-free operation.
- Required access width for the drilling rig: at least 1.5 m for caterpillars or 2.5 m for lorries
- Required working area for drilling equipment, rinsing tank, etc.: at least 6 m × 5 m for crawlers, at least 8 m × 5 m for lorries

However, the exact dimensioning depends on the geological and hydrogeological conditions, which are generally unknown to the installer. The installation should therefore be entrusted to a drilling company certified by the International Heat Pump Association with a seal of approval or authorised in accordance with DVGW W120. In Germany, VDI-4640 sheets 1 and 2 must be observed. Drillings from a depth of 100 m are subject to mining law (BBergG) and must be authorised in advance by the responsible authority.

Earth temperatures
From a depth of approx. 15 metres, the ground temperature is 10 °C all year round.

NOTE
The heat extraction causes the temperatures in the probe to drop. The design should be such that do not result in permanent brine outlet temperatures below 0 °C.



23 Figure: Illustration of the temperatur und and as a function of a seasonal mean temperature value at the earth's surface

5.3.1 Design of borehole heat exchangers

Borehole heat exchangers must always be designed by geothermal planning offices. An approximate calculation of geothermal probes, even in the low output range, is not permitted. This is necessary as the abstraction capacity depends on the composition of the ground and the water-bearing layers. These factors can only be clarified on site by a contractor.

> **NOTE**
> The legal requirements of the individual countries must be taken into account when planning and designing geothermal probes.

The long-term, mathematical simulation of load profiles makes it possible to recognise long-term effects and take them into account in project planning. For example, using the probe in summer for passive cooling has a positive influence on regeneration.

> **NOTE**
> In general, when designing probe systems as a heat source, it is important to ensure that the size of the probe system is selected depending on the annual heat requirement of the building. Particular attention must be paid to this issue in the case of bivalent systems. The abstraction capacity of the probe system is usually designed for an annual heat pump runtime of 1800 to 2400 hours. However, as the runtime of the heat pump increases with bivalent systems, the probe system must also be increased accordingly.

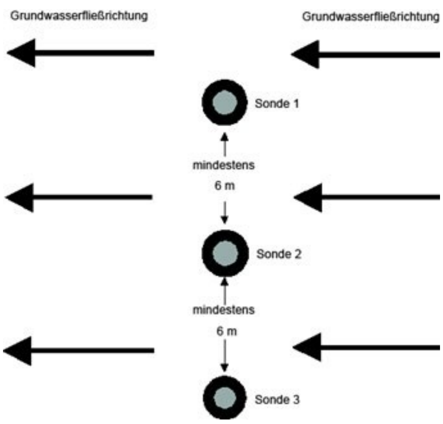
5.3.2 Drilling the borehole

The distance between the individual probes should be at least 6 metres to minimise mutual interference and ensure regeneration in summer. If several probes are required, they should not be arranged in parallel but at right angles to the flow direction of ground water.

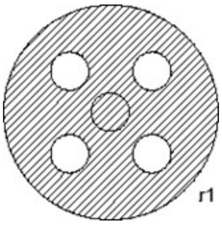
The following additional minimum distances are recommended:

- between the probe and buildings: 2 m (the statics must not be impaired).
- between probe and water pipes: 2 m to 3 m (regulated differently locally)
- between connecting pipes and water pipes: 1.5 m
- Distances to neighbouring properties vary from country to country (recommendation VDI 4640 Sheet 2, distance between borehole heat exchangers 6 m, distance to the neighbour's borehole heat exchanger 10 m, exceptions are possible in consultation with the neighbours).

> **NOTE**
> The same rules apply for the brine concentration, materials used, arrangement of the distribution shaft, installation of the pump and expansion vessel as for a geothermal collector system.



24 Figure: Arrangement and minimum spacing of probes depending on the flow direction of ground water The following figure shows a cross-section of a double U pipe, as is commonly used for heat pumps. For this type of probe, a borehole with a radius of r_1 is drilled first. Four probe tubes and a backfill tube are inserted into it and the borehole is filled with a cement-bentonite
mixture is backfilled. The probe fluid flows down two probe tubes and up the other two. The pipes are connected to a probe base at the lower end to create a closed probe circuit.



25 Figure: Probe cross-section of a double U pipe with backfill pipe

> **NOTE**
> When using brine accessories or heat pumps with an integrated brine circulation pump, the pressure drops of the probe must be determined and compared with the free compression of the brine circulation pump. To avoid unnecessarily large pressure drops, DN 40 pipes should be used for probe depths of more than 80 metres.

5.3.3 Filling of geothermal probes

As with ground collectors, ground probes are generally filled with a 25 to 30% glycol solution by volume. This means that brine inlet temperatures of - 5°C can easily be achieved in the heat pump. However, the glycol content protects the heat pump from freezing.
In some cases, however, it may also be necessary to operate the geothermal probe with pure water without frost protection. In this case, the brine inlet temperature must not fall below 0 °C, as otherwise the water in the brine pipe may freeze and damage it. For this reason, various points must be observed when operating geothermal probes with water:

- A water-to-water heat pump is used instead of a brine-to-water heat pump
- In this case, the minimum brine outlet temperature must not be less than 4 °C
- The transmission capacity of the probe is reduced due to the higher temperatures. The number of probes required roughly doubles compared to a ground probe with water-glycol.
- The primary pressure of the brine expansion vessel must be reduced from 2.5 bar to 0.5 - 0.7 bar.

5.4 Accessories for the heat source Ground

5.4.1 Installation instructions for connecting the heat source circuit

Temperatures of below -15 °C are sometimes present on the brine pipes during heat pump operation. For this reason, both brine pipes inside the building must be diffusion-tightly insulated, as otherwise condensation would occur.

The wall penetrations into the building should be insulated with well foam or cold-resistant pipe penetrations. All pipe penetrations through walls and ceilings must be insulated against structure-borne noise.

The vibrations caused by the compressor (oscillating movement) during operation of the heat pump are largely compensated for by the internal vibration decoupling. Under unfavourable installation conditions, residual vibrations may still occur, which can then be transmitted via the piping as solid-borne noise. In this case, wall clamps for fastening the brine pipework should not be positioned too close to the heat pump during installation in order to avoid a connection that is too rigid. Cooling pipe clamps also prevent structural damage caused by condensation. In particularly difficult cases, this can be remedied by installing expansion joints as close as possible to the heat pump.

5.4.2 Brine packages and accessories

The following brine accessory packs including circulation pump are available for utilising the brine heat source.

Brine accessory pack	heat pump	Circulation pump
SZB 140E	SI 6TU - SI 14TU	Yonos Para HF 25/10
SZB 180E	SI 18TU	Yonos Para HF 30/10
SZB 220E	SI 22TU / SIH 20TE	Yonos Para HF 30/12
SZB SIW	SIW 6 - SIW 8TES	UPM 25-85
Integrated in the heat pump	SIK 8 - SIK 11TES	UPM 25-85 (SIK 8TES)* UPM 25-125 (SIK 11TES)*
SZB 40G-18	SI 26TU	Stratos Para 30/1-12*.
SZB 40F-18	SI 35TU / SI 35TUR	Magna3 32-120F*
SZB 65F-25	SI 50TU / SI 50TUR	Magna3 40-120F*
SZB 65F-35	SI 75TU	Magna3 65-120F*
SZB 65F-50	SI 90TU / SIH 90TU	Magna3 65-120F*
SZB 80F-50	SI 130TU	Magna3 65-150F*

Table: Brine accessory packages for various heat pumps

- In the scope of supply of the heat pump

5.4.3 Pump assignments 2-compressor brine-to-water heat pumps

brine-to-water heat pump		SI 26TU	SI 35TU	SI 35TUR	SI 50TU	SI 50TUR
heat generation circuit						
Nominal connection diameter	inch	G 1 ½"AG	G 1 ½"AG	G 1 ½"AG	Rp 1 ½"	Rp 2 ½"
Heating water flow rate V_{HW}	m³/h	4,4	6,0	5,7	8,6	8,4
Pressure drop Δp_{HW}	Pa	7500	9800	9700	5200	5000
Pump M16		Stratos Para 30/1-12	Stratos Para 30/1-12	Stratos Para 30/1-12	Stratos Para 30/1-12	Magna3 40-80 F
Installation length	mm	180	180	180	220	220
Signal	0-10V PWM	0-10V	0-10V	0-10V	0-10V	0-10V
free compression fP	m	11,2	9,0	9,2	5,8	5,3
Pump M16	Art. no. GDD	PP 32-100G	PP 32-100G	PP 32-100G	PP 32-100G	PP 40-80F
Heat source circuit						
Nominal connection diameter	inch	G 1 ½"AG	G 1 ½"AG	G 1 ½"AG	Rp 2 ½"	Rp 2 ½"
Brine flow V_{BW}	m³/h	6,5	8,0	8,2	12,4	12,2
Pressure drop Δp_{BW}	Pa	12000	20600	12600	14300	22500
Pump M11		Stratos Para 30/1-12	Magna3 32-120 F	Magna3 32-120 F	Magna3 40-120 F	Magna3 40-120 F
Installation length	mm	180	220	220	250	250

Signal	**0-10V PWM**	0-10V	0-10V	0-10V	0-10V	0-10V
free compression fP	**m**	8,2	7,0	5,4	7,0	4,3
Pump M11	**Art. no. GDD**	PP 32-100G	PP 32-120F	PP 32-120F	PP 40-120F	PP 40-120F

brine-to-water heat pump		SI 75TU	SIH 90TU	SI 90TU	SI 130TU
heat generation circuit					
Nominal connection diameter	inch	Rp 2"	Rp 2"	R 2 ½"	R 2 ½"
Heating water flow rate V_{HW}	m³/h	12,4	15,5	15,0	16,0
Pressure drop Δp_{HW}	Pa	13200	15100	11000	15000
Pump M16		Magna3 40-80 F	Magna3 50-120F	Magna3 65-80F	Magna3 65-80F
Installation length	mm	220	280	340	340
Signal	0-10V PWM	0-10V	0-10V	0-10V	0-10V
free compression fP	m	3,5	6,5	6,1	5,4
Pump M16	Art. no. GDD	PP 40-80F	PP 50-120F	PP 65-80F	PP 65-80F
Heat source circuit					
Nominal connection diameter	inch	Rp 2 ½"	Rp 3"	R 2 ½"	R 3"
Brine flow V_{BW}	*m³/h*	18,3	20,5	20,0	31,5
Pressure drop Δp_{BW}	Pa	32000	18300	19000	35000
Pump M11		Magna3 65-120 F	Magna3 65-120 F	Magna3 65-120 F	Magna3 65-150 F
Installation length	mm	340	340	340	340
Signal	0-10V PWM	0-10V	0-10V	0-10V	0-10V

free compression fP	**m**	6,0	7,0	7,0	7,5
Pump M11	**Art. no. GDD**	PP 65-120F	PP 65-120F	PP 65-120F	PP 65-150F

Table: Overview table of 2-compressor brine-to-water heat pumps with generation circuit and brine circulation pumps for B7/W35 for standard systems (in the delivery circuit of the heat pump)

5.4.4 Brine accessory packages for 2-compressor brine-to-water heat pumps PP 65-80F

Brine accessory pack SZB	Art. no. SZB	40G-18	40F-18	65F-25	65F-35	65F-50	80F-50
expansion vessel	Litres	18 litres	18 litres	25 litres	35 litres	50 litres	50 litres
Pump (separate)	Nominal diameter	G2"	DN 32F	DN 40F	DN 65F	DN 65F	DN 65F
heat pump	Nominal diameter	G 1 1/2"	G 1 1/2"	Rp 2 1/2"	Rp 2 1/2"	Rp 2 1/2"	Rp 3"
Purge valve	Nominal diameter	1 1/2"	1 1/2"	DN 50F	DN 65F	DN 65F	DN 80F
Barrier	Nominal diameter	1 1/2"	1 1/2"	DN 50F	DN 65F	DN 65F	DN 80F
SMF (separate)	Nominal diameter	1 1/2"	1 1/2"	2 1/2"	2 1/2"	2 1/2"	3"

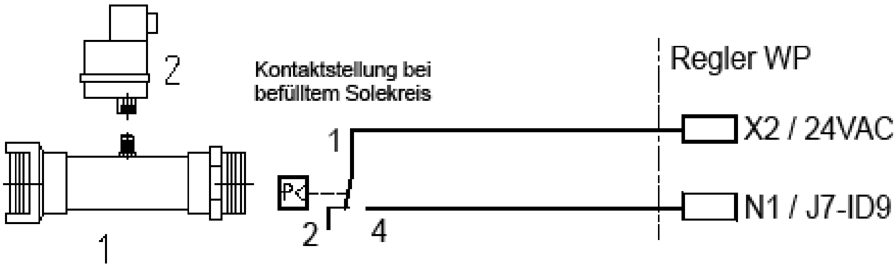
Table: Overview table of brine accessory packages for 2-compressor brine-to-water heat pumps

NOTE
The brine accessory packs SZB 40G-18 to SZB 80F-50 contain an electronically controlled brine circulation pump, which can/must be controlled by the heat pump manager via a 0 - 10 V signal.

CAUTION
For borehole heat exchangers, the free compressions specified in the device information must be observed (max. probe depth for DN 32 is 80 m).

Brine liquid shortage and leakage
In order to detect a possible lack of liquid or a leak in the brine circuit or to fulfil official requirements, the "brine low-pressure pressostat", which is available as special accessories, can be installed in the brine circuit. In the event of a pressure drop, this sends a signal to the heat pump manager, which blocks the brine-to-water heat pump.

NOTE
The low-pressure pressostat must be type-tested in accordance with AwSV and TRwS 779.



1. Pipe section with internal and external thread
2. Pressure switch with plug and plug seal

26 Illustration: Brine low-pressure pressostat (design and wiring)

CAUTION
The pressurised expansion vessels included in the brine package are designed for double U pipes. When using other technologies to tap into the ground as a heat source (e.g. Geokoax probes), the probe volume can be significantly larger. In this case, the expansion vessel must be recalculated.

The primary pressure of the brine expansion vessel must be reduced from 2.5 bar to 0.5 - 0.7 bar.

The pipe section shown in the sketch must be installed between the cap valve and the expansion vessel in the brine circuit. The pressure switch must be connected to the connecting stub on the pipe section. The low-pressure pressostat can be easily installed or removed and checked for function using the lockable cap valve. When testing the function of the low-pressure pressure switch, keep the drain cock open until the pressure switch blocks the heat pump manager and thus the heat pump via a digital signal due to the pressure drop in the brine circuit. Collect the brine liquid in a suitable container. If the low-pressure pressostat does not block the heat pump when a pressure drop is detected, the sensor must be checked for function and replaced if necessary. Once the check has been completed, refill the brine circuit with the collected brine fluid. Then check the brine circuit f o r leaks and the function of the heat pump.

5.5 Other heat source systems for utilising geothermal energy

As an alternative to ground collectors, other types of heat source systems such as geothermal baskets, trench collectors, energy piles, spiral collectors, etc. are also available. These heat source systems must be designed in accordance with the manufacturer's or supplier's specifications. The manufacturer must guarantee the long-term function of the system in accordance with the following specifications:

- Minimum permissible brine temperature
- Refrigeration capacity and brine flow of the heat pump used
- Operating hours of heat pumps per year

In addition, the following information must be provided:

- Pressure drop at the specified brine flow for designing the brine circulation pump
- Possible influences on the vegetation
- Installation instructions

NOTE
Experience shows that the abstraction capacities of classic ground heat collectors differ only insignificantly from other systems, as the energy stored in 1 m^3 of ground is limited to approx. 50 to 70 kWh/a.

Possible optimisations of the abstraction capacities depend primarily on the climatic conditions and the type of soil and not on the type of heat source system.

5.6 Water as a heat source with Intermediate heat exchanger

- Tapping into the heat source of water in the event of contamination
- Extension of the temperature operating range

5.6.1 Tapping into the heat source of water in the event of contamination

For indirect utilisation of the water heat source, brine-to-water heat pumps can be operated via an intermediate circuit with an additional stainless steel heat exchanger. For this purpose, an additional heat exchanger is installed in the heat source circuit of the heat pump and the intermediate circuit is filled with monoethylene glycol.

The external stainless steel heat exchanger makes it possible to utilise groundwater as a heat source even in areas with high levels of water contamination. In areas with a year-round water temperature below 13 °C, it is not necessary to analyse the water for corrosion.

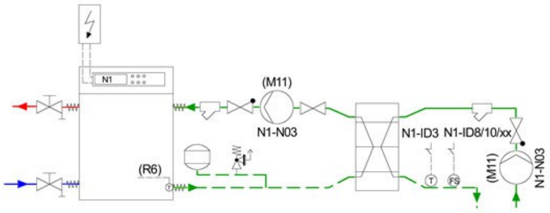
CAUTION
If the limit values for iron (Fe up to 0.2 mg/l) or manganese (Mn up to 0.1 mg/l) are exceeded, there is a risk of clogging of the heat source system. This also applies to the use of stainless steel heat exchangers.

NOTE
An online planner is available at www.dimplex.de/betriebskostenrechner, which makes this possible, calculate the seasonal performance factor including intermediate heat exchanger.

Various package solutions are available, consisting of heat pump, heat exchanger, suitable brine accessories and a safety thermostat as freeze protection for the heat pump. In this case, the heat output of the heat pumps is specified differently at the operating point B7/W35. This corresponds to a brine inlet temperature of 7 °C with an assumed water temperature of 10 °C and a gradient or spread across the heat exchanger of 3 K.

Order code	Heat pump	Heat exchanger	Brine accessories	Brine pump	Heat output with B7/W35	COP for B7/W35
WSI 27TU	SI 22TU	WTE 20	ZKP 40G-18	Stratos Para 30/1-12	27 kW	5,1
WSI 32TU	SI 26TU	WTE 30	ZKP 40G-18	Stratos Para 30/1-12	32 kW	5,1
WSI 45TU	SI 35TU	WTE 40	ZKP 40F-18	Magna3 40-80F	45 kW	5,2
WSI 65TU	SI 50TU	WTE 50	ZKP 65F-25	Magna3 65-80F	65 kW	4,9
WSI 90TU	SI 75TU	WTE 75	ZKP 65F-25	Magna3 65-100F	90 kW	5,1
WSI 110TU	SI 90TU	WTE 100	ZKP 65F-25	Magna3 65-100F	110 kW	5,1
WSI 150TU	SI 130TU	WTE 130	ZKP 80F-25	Magna3 65-150F	150 kW	5,0
WSIH 26TE	SIH 20TE	WTE 20	SZB 220E	Yonos Para HF 30/12	26 kW	5,0
WSIH 110TU	SIH 90TU	WTE 100	ZKP 80F-25	Magna3 65-100F	110 kW	5,1

Table: Heat pump packages with intermediate heat exchanger



27 Illustration: Heat pump with intermediate heat exchanger

The flow rate switch in the primary circuit (FS) prevents the heat pump from switching on if there is no volume flow from the cooling or groundwater pump.

The intermediate heat exchanger circuit must be filled with antifreeze (of at least -14 °C) for brine-to-water heat pumps.

The brine circuit must be designed in the same way as conventional ground collectors or borehole heat exchangers with a circulation pump and safety fittings. The circulation pump must be dimensioned so that it does not freeze in the intermediate heat exchanger.

When using a brine-to-water heat pump, temperatures below 0 °C may occur in the secondary circuit. To contactor the intermediate heat exchanger, it must be protected by an additional frost protection thermostat (T). This must be installed at the water outlet of the primary circuit to prevent the heat exchanger from freezing. If the thermostat is switched off, the heat pump is blocked via the digital input ID3 of the heat pump manager. The thermostat should also be forwarded as a fault message to any existing Building management system in order to prevent the heat pump from cycling. The switch-off point of the thermostat (e.g. 4 °C) depends on the on-site system configuration, the measurement tolerances and hysteresis.

The maximum permissible flow temperatures on the heat source side of a brine-to-water heat pump are 25 °C. To prevent the heat pump from switching off due to excessive brine inlet temperatures, there are various options that are described in the following chapter.

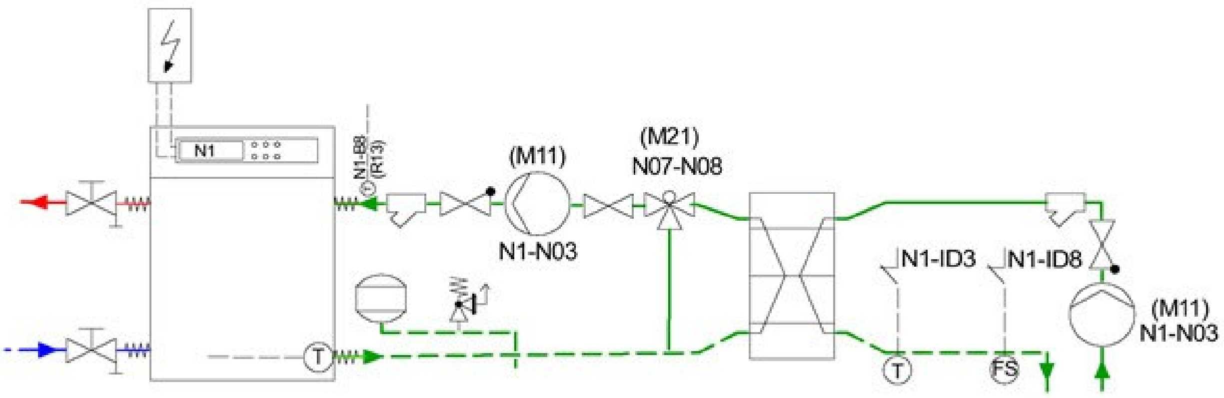
> **CAUTION**
> The terminal assignment of the heat pump manager in the respective installation instructions must be observed!

> **NOTE**
> When using a brine-to-water heat pump with an intermediate heat exchanger, the water flow in the primary circuit must be at least 10 % higher than that of the secondary circuit.

5.6.2 Extension of the temperature operating range

If the heat source temperatures fluctuate, the use of a brine-to-water heat pump is recommended, as minimum brine outlet temperatures of -9 °C are possible here. In comparison, water-to-water heat pumps switch off from a minimum water outlet temperature of 4 °C. The maximum brine inlet temperature is 25 °C for both brine-to-water and water-to-water heat pumps. Exceeding or falling below the operating limits can be prevented in various ways.

> **NOTE**
> The SI 26-75TU brine-to-water heat pumps can also be operated with higher brine temperatures. Further information can be found in the device information for the respective heat pump.



28 Illustration: Heat pump with thermostatically controlled 3-way valve in brine circuit M21 (to be provided by customer)

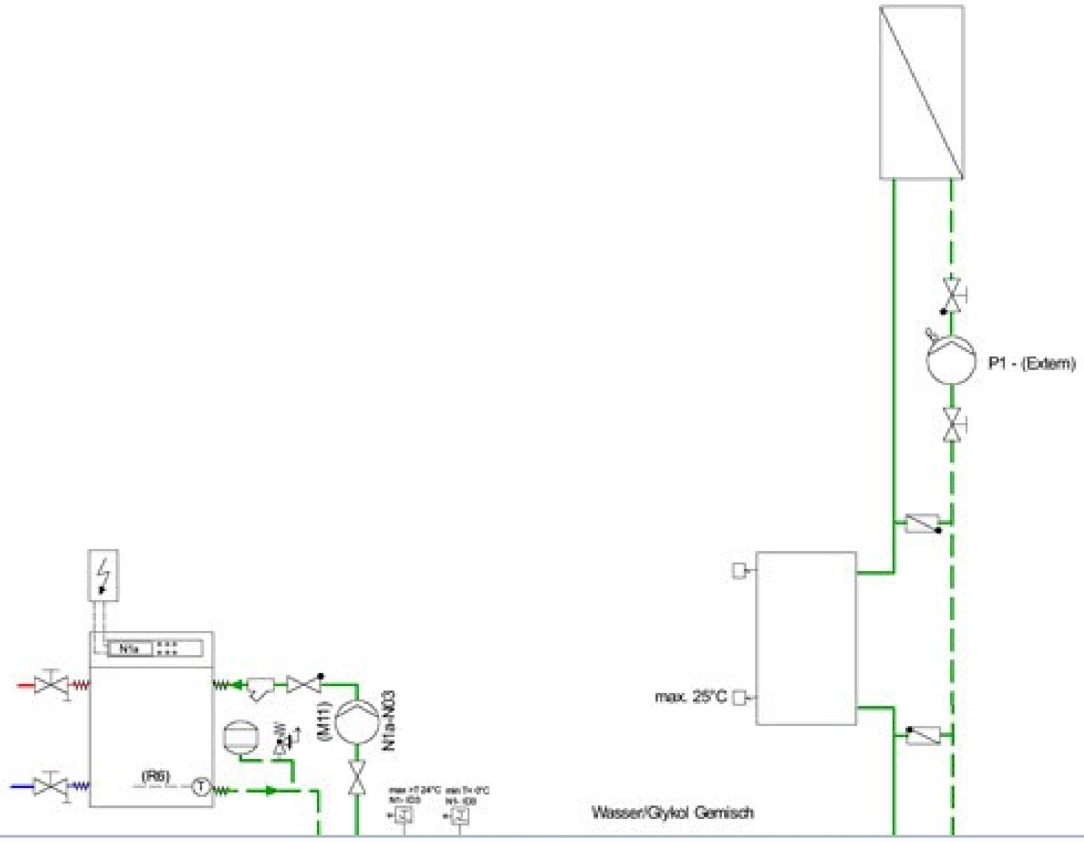
Variant 1 - Heat pump with 3-way valve

A thermostatically controlled 3-way valve is installed in the brine circuit. If the brine inlet temperature rises above 25 °C, a partial volume flow of the brine return is added to the brine flow via the mixer. The mixer is controlled by an external control unit.

Variant 2 - Heat pump with buffer tank in the brine circuit

Variant 2 provides for the use of a buffer tank in the brine circuit (see figure below). The buffer tank is loaded via pump P1 by an external controller. From a minimum temperature of 3 °C in the buffer tank, the pump is activated and loads it. From a maximum temperature of 24 °C, pump P1 switches off. The heat pump manager controls the heat source pump (primary circulating pump M11) in the brine circuit. If a temperature of 3 °C below or a temperature of 25 °C is reached at the temperature sensor (R6), the heat pump manager switches off the heat source pump. The brine circuit must be filled with glycol of at least 25 vol.%.

> **NOTE**
> At low brine temperatures in the buffer tank and in the pipework, condensate may form on the buffer tank. For this reason, it must be fitted with diffusion-tight insulation on site.



> **NOTE**
> If a steel buffer tank (ST 37) is used in conjunction with an antifreeze, it must be treated with corrosion inhibitors.

5.7 Absorber systems as a heat source (indirect utilisation of air or solar energy)

Temperature range of the brine	-15...+ 50 °C
Application range of the brine-to-water heat pump	+5...+25 °C

availability
Restrictions due to weather conditions and limited space possible.

Utilisation option

- bivalent
- monovalent in combination with an additional ground heat collector

Development costs

- Absorber system (energy roof, pipe bundle, solid absorber, energy fence, energy tower, energy stack, etc.)
- Brine based on ethylene glycol or propylene glycol in frost protection concentration
- Pipework and circulation pump
- Construction measures

Pay particular attention:

- Structural requirements
- Weather influences

Dimensioning absorber systems
When dimensioning roof absorbers, energy columns or fences, the individual designs differ considerably, so that the information guaranteed by the manufacturer must always be used for the design.
As practice shows, however, the following data can be used as a basis:

- In principle, the absorber surface should be designed according to the specified night output of the absorber.
- At air temperatures above 0 °C, rain, condensation or snow at low brine temperatures can fall onto freeze on the absorber surface, which has a negative effect on the heat flow.
- Monovalent operation is only possible in combination with geothermal heat utilisation.
- With solar energy gains in the transitional period, brine temperatures of 50 °C and more occur, which can cause the exceed the application range of the heat pump.

CAUTION
If the heat source temperature can rise above 25 °C, a temperature-controlled mixer must be provided, which mixes a partial volume flow of the cooling water return with the cooling water flow at temperatures above 25 °C. (see chapter "Extension of the temperature range")

brine concentration

For roof absorbers, energy fences, etc., frost protection of - 25 °C is required due to the low outside temperatures. The brine concentration for this system is 40%. As the brine concentration increases, increased pressure drops must be taken into account when designing the brine circulation pump.

Filling the system:

The system is filled as described in the "Brine liquid" chapter.

Design of the expansion vessel:

In absorber-only operation, the brine temperatures fluctuate between approx. -15 °C and approx. +50 °C. Due to these temperature fluctuations, an expansion vessel is required for the heat source system. The primary pressure must be adapted to the height of the system. The maximum overpressure is 2.5 bar.

Air-loaded absorber

brine concentration:	approx. 40%
Relative pressure drop	approx. 1.8

NOTE

The lower operating limit can be extended to -10 °C for commissioning by the after-sales service and a frost protection content of 30% monoethylene glycol.

6 Water-to-water heat pump

6.1 Heat source Groundwater

If the appropriate boundary conditions are met, thermal energy generation via groundwater can be a very efficient form of thermal utilisation of the subsurface for heating and/or cooling purposes. When planning, constructing and operating well systems for the thermal utilisation of the subsurface, the water law requirements and the respective state-specific regulations must be observed. With regard to the efficiency of the system and groundwater protection, groundwater close to the surface with a free water table (same groundwater-bearing layer) should primarily be used for thermal utilisation.

Special protective measures are required when utilising deeper groundwater levels. The planning and execution of well installations must be carried out by relevant planning offices or appropriately qualified specialised companies in the well construction trade. The recommendations of guideline VDI 4640 sheet 2 must be observed. Information on the yield of the groundwater reservoir and the chemical composition of the groundwater is absolutely essential. A test borehole is recommended for assessment purposes, which can later be developed into a well. The manufacturer's recommendations for the quality of the well water must be observed (see here). If the water quality does not meet the manufacturer's specifications, either a heat pump model with a suitable evaporator (stainless steel heat exchanger) or an intermediate circuit with a screwed stainless steel plate heat exchanger (see here and here) can be used. The evaporator must be protected against frost damage, for example by temperature monitoring or by an intermediate circuit that is operated with an antifreeze mixture. The manufacturer's specifications must be observed. The intermediate circuit requires additional energy to operate the brine pump and reduces the heat source temperature by around 3 K, which leads to a reduced performance factor.

For small systems, groundwater is a rather difficult heat source to assess if there is no experience with systems in the immediate vicinity, as the effort involved in drilling a test well is very high. The test borehole cannot be used if it does not prove to be suitable. For large systems, the costs for a test drilling and a pumping test are of lesser importance; greater depths (up to 50 m) are also economically justifiable here. The most important criteria for a system decision and preliminary planning are summarised below:

- Authorisation in accordance with the Water Resources Act (WHG) by the lower water authority
- Distance between suction and absorption wells: at least 15 m in the direction of groundwater flow
- Recommended minimum distance from boreholes to existing buildings: 2 m
- The stability of buildings must not be jeopardised.

Temperature range of the groundwater	7...12 °C
Application range of the water-to-water heat pump	7...25 °C
Guide value for the amount of water required	min. 2 m³ /h for 10 kW heat output or min. 220 l/h for 1 kW evaporator output

availability

- All year round

Utilisation option

- monovalent
- monoenergetic
- bivalent-alternative (alternative, parallel, partially parallel)
- bivalent-renewable renewable

Development costs

- Authorisation procedure (lower water authority)
- Extraction wells / absorption wells with airtight closure of the well heads
- Water quality (water analysis)
- pipework
- Well pump
- Earthworks / construction work

Maintenance instructions To ensure safe operation of the heat pump, it must be serviced at regular intervals. The following work can also be carried out without special training:

- Cleaning the inside of the heat pump
- Cleaning the primary circuit (dirt trap, HEPA filter,...)

In addition, the tightness of the heat pump and the functionality of the refrigerant circuit must be checked at regular intervals.

NOTE
Further information and country-specific standards on Leakage tightness tests for heat pumps can be found at www.glendimplex.de/wartungsvertraege.

NOTE Further information on heat pump maintenance can be found in the installation instructions for the heat pump.

Work on refrigerant-carrying components may only be carried out by appropriately trained and instructed personnel.

6.1.1 Dimensioning information - Heat source water

The heat source of the water-to-water heat pump must be designed for the refrigeration capacity of the heat pump. This can be calculated from the heat output minus the electrical input power of the heat pump at the design point. The basic rule for the heat source is that the power Q_0 transferred to the evaporator of the heat pump must be available. The following applies: Evaporator output Q_0 (kW$_{th}$) = heat output Q_C (kW$_{th}$) - electrical input power of the compressor P_{el} (kW)$_{el}$

> **NOTE** A heat pump with a higher coefficient of performance (COP) has a lower electrical power consumption for a comparable heat output and therefore a higher refrigeration capacity.

When replacing an old heat pump with a newer model, the output of the heat source must therefore be checked and, if necessary, adjusted to the new refrigeration capacity.

Dimensioning the well pump

The water volume flow depends on the output of the heat pump and is delivered by the well pump. Depending on the output, the mass flow should be selected so that at the lowest heat source temperature (7 °C) there is a temperature spread of 2 - 3 Kelvin over the evaporator. The water flow specified in the device information of the heat pump corresponds to a temperature spread of the heat source of approx. 3 K. In addition to the volume flow, the pressure drops in the well system and the pump manufacturer's technical data must be taken into account. Pressure drops in pipes, fixtures and heat exchangers connected in series must be added.

> **CAUTION**
> When sizing the well pump, observe the back pressure** in the extraction well to avoid bearing damage to the well pump. The decisive factor for the design of the well pump is the water level in the well and not the depth at which the well pump is located!

differential between the highest point of the well system and the water level (gauge) in the well (manometer). **Temperature difference heat source groundwater**

The Water Resources Act (WHG) defines the difference between the inlet and outlet temperature of a water-to-water heat pump. These values are defined as follows:

- Permissible temperature change of the water to be discharged compared to the extraction temperature of the groundwater: +/- 6 K
- Minimum temperature of the water to be discharged: 5 °C
- Maximum temperature of the water to be discharged: 20 °C

6.1.2 Tapping the groundwater as a heat source

From a well depth of 8 to 10 metres, groundwater as a heat source is suitable for monovalent heat pump operation, as its temperature fluctuates only slightly (7-12 °C) throughout the year. Heat extraction from groundwater must always be authorised by the responsible water authority. This is generally granted outside of water protection zones, but is subject to certain conditions, such as a maximum extraction quantity or a water analysis. The withdrawal quantity depends on the heat output. The table below contains the required withdrawal quantities for the W10/W35 operating point. The planning and installation of the well system with extraction and absorption wells should be entrusted to a drilling company certified by the International Heat Pump Association with a seal of approval or authorised in accordance with DVGW W120. In Germany, VDI 4640 sheets 1 and 2 must be observed.

Heat pump	Stainless steel spiral heat exchanger	Well pump (recommended for standard)	Circulation pump for poor water quality and use of an intermediate circuit with plate heat exchanger	Compression well pump[2]	cold water - Heat pump throughput	Heat output heat pump e	Heat pump refrigeration capacity	Pressure loss evaporator	Fountain knife off	motor protection
				bar	**m /h³**	**kW**	**kW**	**Pa**	**inch**	**A**
WI 10TU	**x**	UWE 200-95	not required [1]	1,55	2,2	9,6	8,0	6200	4	1,4
WI 14TU	**x**	Grundfos SP 3A-3	not required [1]	1,4	3,1	13.3	11,1	14000	4	1,4
WI 18TU	**x**	Grundfos SP 5A-3	not required [1]	1,5	4.0	17,1	14,2	15200	4	1,4
WI 22TU	**x**	Grundfos SP 5A-3	not required [1]	1,2	5,3	22,3	18,5	21400	4	1,4
WI 35TU		Grundfos SP 8A-3	WSI 32TU (SI 26TU with Stratos Para 30/1-12)	1,3	8,2	35,6	30,0	22000	4	on site
WI 45TU		Grundfos SP 14A-3	WSI 45TU (SI 35TU with Magna3 40-80F)	1,7	10,0	46,2	38,0	37000	4	on site
WI 65TU		Grundfos SP 14A-3	WSI 65TU (SI 50TU with Magna3 65-80F)	1,15	16,0	68,5	58,0	25000	6	on site
WI 95TU		Grundfos SP 30-2	WSI 90TU (SI 75TU with Magna3 65-100F)	1,75	23,2	99,0	82,0	55000	6	on site
WI 120TU		Grundfos SP 30-2	WSI 110TU (SI 90TU with Magna3 65-100F)	1,54	27,7	118,5	98,3	21500	6	on site

Heat pump	Stainless steel spiral heat exchanger	Well pump (recommended for standard)	Circulation pump for poor water quality and use of an intermediate circuit with plate heat exchanger	Compression well pump²	cold water - Heat pump throughput	Heat output heat pump e	Heat pump refrigeration capacity	Pressure loss evaporator	Fountain knife off	motor protection
WIH 120TU		Grundfos SP 30-2	WSIH 110TU (SIH 90TU with Magna3 65-100F)	1,55	28,1	122,5	100,0	30800	6	on site
WI 180TU		Grundfos SP 46-2	WSI 150TU (SI 130TU with Magna3 65-150F)	1,7	42,1	177,0	144,5	41500	8	on site

Table: Dimensioning table of the minimum required well pumps for water-to-water heat pumps at W10/W35 for standard systems with sealed wells. The well pump must be finalised in consultation with the well constructor.

[1] Stainless steel spiral heat exchanger as standard!

[2] Observe the back pressure of the well system to avoid bearing damage to the well pump!

NOTE The motor protection switch installed in the WI 10 - WI 22TU heat pumps must be set to the nominal data of the well pump used during installation.
be set.

Caution If a different well pump is used with the WI 10 - WI 22TU heat pumps, the motor protection switch must be checked on site and replaced if necessary.
replace.

6.2 Requirements for the water quality

Regardless of the legal regulations, the groundwater must not contain any settleable substances and the iron (<0.20 mg/l) and manganese (<0.10 mg/l) limit values must be observed to prevent the heat source system from clogging. Experience has shown that contamination with grain sizes over 1 mm can easily lead to damage, especially in the case of organic components. Granular material (fine sand) does not settle if the specified water flow is maintained. The dirt trap (mesh size 0.6 mm) included in the scope of supply of the heat pump protects the evaporator of the heat pump and must be installed directly at the inlet of the heat pump.

> **CAUTION**
> The finest colloidal contaminants, which cause the water to become cloudy, often have a sticky effect and can coat the evaporator, thereby impairing heat transfer. These contaminants cannot be removed by filters at an economically justifiable cost.

The use of surface water or saline waters is not permitted. Initial notes on the possible use of groundwater can be obtained from the local water supply companies.

1. **Water-to-water heat pumps with welded stainless steel spiral heat exchanger (table below)** A water analysis for corrosion of the evaporator is not required if the annual average groundwater temperature is below 13 °C. In this case, only the limit values for iron and manganese must be observed (sooting). In this case, only the limit values for iron and manganese must be observed (sooting). For temperatures above 13 °C (e.g. waste heat recovery), a water analysis must be carried out in accordance with the table below and the resistance of the heat pump's stainless steel evaporator must be verified. If a characteristic in the "Stainless steel" column is negative "-" or two characteristics are "0", the analysis is to be assessed as "Negative".
2. **Water-to-water heat pumps with copper-brazed stainless steel plate heat exchanger** Regardless of the legal requirements, a water analysis must be carried out in accordance with the table below in order to prove the resistance of the copper-brazed evaporator of the heat pump. If one characteristic in the "Copper" column is negative "-" or two characteristics are "0", the analysis must be assessed as "Negative".

> **NOTE** If the required water quality is not achieved or cannot be permanently guaranteed, it is recommended to use a brine-to-water heat pump with intermediate circuit.

Assessment characteristic	Concentration range (mg/l)	Copper	Stainless steel> 13 °C	Assessment characteristic	Concentration range (mg/l)	Copper	Stainless steel > 13 °C
settleable substances (organic)		0	0	**Oxygen**	< 2 > 2	+ 0	+ +
Ammonia NH3	< 2 2 to 20 > 20	+ 0 -	+ + 0	**Hydrogen sulphide (H2S)**	< 0,05 > 0,05	+ -	+ 0
Chloride	< 300 > 300	+ 0	+ 0	**HCO3- / SO_4^{-2}**	< 1 > 1	0 +	0 +
electrical conductivity	< 10 µS/cm 10 to 500 µS/cm > 500 µS/cm	0 + -	0 + 0	**Hydrogen carbonate (HCO3-)**	< 70 70 to 300 > 300	0 + 0	+ + 0
Iron (Fe) dissolved	< 0,2 > 0,2	+ 0	+ 0	**Aluminium (Al) dissolved**	< 0,2 > 0,2	+ 0	+ +
Free (aggressive) carbonic acid	<5 5 to 20 > 20	+ 0 -	+ + 0	**SULFATE**	up to 70 70 to 300 >300	+ 0 -	+ + 0
MANGAN (Mn) dissolved	< 0,1 > 0,1	+ 0	+ 0	**SULPHITE (SO3), free**	< 1	+	+
NITRATE (NO_3) solved	< 100 > 100	+ 0	+ +	**Chlorine gas (Cl2)**	< 1 1. to 5. > 5	+ 0 -	+ + 0
PH value	< 7,5 7.5 to 9 > 9	0 + 0	0 + +				

Table: Resistance of copper-brazed or welded stainless steel plate heat exchangers to water constituents "+" normally good resistance; "0" corrosion problems can arise, especially if several factors are rated 0; "-" use should be avoided; [< less than, > greater than]

NOTE
Check the well system regularly for incrustations, clogging and deposits and take countermeasures if necessary.

Even if the limit values for the water quality specified in the table above are adhered to, constant deposits of iron, manganese and limescale can impair the performance of the heat pump, up to and including complete failure of the well and heat pump system. The well system must therefore be checked regularly and the well pump system cleaned if necessary.

6.3 Tapping into the heat source

6.3.1 Direct utilisation of water with consistently good quality

Water with temperatures between 7 °C and 25 °C can be used directly with a water-to-water heat pump if the compatibility of the groundwater, cooling water or waste water has been verified as shown in this table. If the water quality is assessed as negative or if the water quality is variable, a heat pump with an intermediate circuit (see here ff) must be used.

Groundwater as a heat source

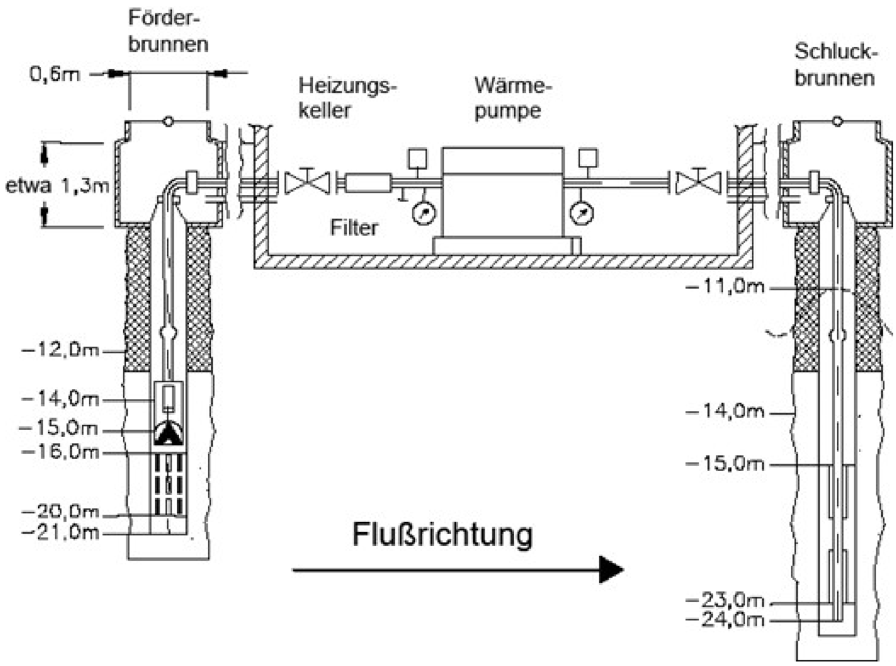
Extraction well The groundwater, which serves as the heat source for the heat pump, is extracted from the ground via an extraction well. The well capacity must ensure continuous extraction for the minimum water flow rate of the heat pump.

Absorption well The groundwater cooled by the heat pump is returned to the ground via an absorption well. This must be drilled at least 15 metres downstream of the extraction well in the flow direction of ground water in order to prevent a "flow short circuit". The absorption well must be able to absorb the same amount of water as the extraction well can supply.

> **NOTE**
> The planning and construction of the wells, on which the functional safety of the system depends, must be left to an experienced well builder.

> **NOTE** Before commissioning the heat pump, a test run of the primary pump must be carried out for 48 hours to ensure that the minimum volume flow on the heat source side can be permanently guaranteed. This must be confirmed if commissioning is required.

> **NOTE** You can find more information about geothermal energy at www.glendimplex.de/foerderung/erdwaerme-service



30 Illustration: Example of integration of the water-to-water heat pump with delivery and absorption wells

> **NOTE** The flow and return of the well system must be fitted with diffusion-tight, fully bonded insulation in the building to prevent condensation from forming

Heat source Waste heat from cooling water

Temperature range
When using water with temperatures between 8...25 °C, it must first be clarified whether the cooling water is available in sufficient quality and quantity and to what extent the heat generated by the heat pump can be utilised. If compatibility of the cooling or waste water is permanently ensured according to this table, a water-to-water heat pump can be used.

> **Caution** If the heat source temperature can rise above 25 °C, a temperature-controlled mixer must be provided, which mixes a partial volume flow of the cooling water outlet with the cooling water at temperatures above 25 °C.

6.3.2 Indirect use of water as a heat source

If the compatibility of the water cannot be proven or if there is a risk that the quality of the water may change, an intermediate heat exchanger must be installed upstream to protect the heat pump. The intermediate circuit increases operational reliability, especially if a brine-to-water heat pump is used and the secondary circuit is therefore filled with brine. A water-to-water heat pump with an intermediate heat exchanger should only be used if the use of brine as a heat transfer medium is not permitted and permanent water temperatures above 10 °C (e.g. waste heat from production processes) can be guaranteed.

NOTE As a rule, brine-to-water heat pumps should be used to extend the temperature operating range downwards and thus increase operational reliability. For water-to-water heat pumps, the lower operating limit is already reached at an outlet temperature of 4 °C.

6.3.3 Project planning recommendation for groundwater / intermediate circuit heat exchanger

Brine heat pump with intermediate circuit heat exchanger (WSI packages)
(groundwater utilisation, closed system)
The minimum brine outlet temperature must be set to > 1°C. A thermostat must be provided in the heat source circuit to switch off the heat pump in the event of a fault (start-up thermostat within the scope of supply of the WSI packages).

Water-to-water heat pump with intermediate circuit heat exchanger
(groundwater utilisation, open system)
Installation of a flow rate switch is recommended, as there may be delays until sufficient groundwater is pumped or the volume flow may drop abruptly during operation.

Water-to-water heat pump with stainless steel spiral heat exchanger for groundwater
(groundwater utilisation, open system)
A stainless steel spiral heat exchanger ("Spirec") ensures greater reliability of the heat pump system.
given. The use of a flow rate switch (DFS) further increases operational safety.

6.3.4 Heat exchanger (system separator) to contactor the heat pump

The external heat exchanger must be planned according to the heat pump used, the existing temperature level and the water quality. In the simplest case, the heat exchanger consists of PE pipes that are laid directly in the heat source and therefore does not require an additional heat source pump. This cost-effective alternative can be used if the volume of the heat source is sufficiently large (e.g. wastewater basin, flowing water).
Otherwise, bolted plate heat exchangers must be used.
The heat exchanger is configured depending on the following parameters:

- Water quality
- temperature operating range
- Refrigeration capacity of the heat pump type used
- Water flow primary and secondary circuit

NOTE When using aggressive liquids such as sea or process water, titanium plate heat exchangers must be used.

Depending on the software version of the heat pump control, the freeze protection of a brine-to-water heat pump can be adjusted. If the default value is raised from -8 °C to +4 °C, the heat pump is already switched off at brine outlet temperatures below +4 °C.

Installing the heat exchangers For optimum heat transfer, the heat exchangers must be connected using the counterflow principle. Furthermore, they must be protected from contactors. To do this, before the

A dirt trap with a mesh size of approx. 0.6 mm must be installed at the inlet of the heat exchanger. Compensators should be used to reduce the transmission of solid-borne noise and vibrations (e.g. heat source pump...).

Heat exchanger maintenance Depending on the degree of contamination of the water, the heat exchanger can become dirty, which reduces its transfer capacity. To prevent this, regular cleaning should be carried out. For example, the so-called CIP (Cleaning-In-Place) process is used. This involves rinsing the heat exchanger on site with a weak acid, such as formic, citric or acetic acid, to remove deposits.

heat pump		WI 35TU	WI 45TU	WI 65TU	WI 95TU	WIH 120TU	WI 120TU	WI 180TU
Connection of heat generation circuit	**inch**	1 ½"	1 ½"	1 ½"	2"	2"	2 ½"	2 ½"
Heating water flow rate V_{HW}	*m³/h*	5,9	7,9	11,5	16,9	21,2	20,6	22,2
Pressure drop Δp_{HW}	**Pa**	10000	17900	9200	24500	25000	36000	36000
M16 generator circuit pump		Stratos Para 30/1-12**.	Stratos Para 30/1-12**.	Magna3 40-80 F	Magna3 40-120 F	Magna3 50-120 F	Magna3 65-80F	Magna3 65-80F
Installation length	**mm**	180	180	220	250	280	340	340
Input signal		0-10V	0-10V	0-10V	0-10V	0-10V	0-10V	0-10V
free compression fP	**m**	9,0	6,2	5,0	3,5	3,2	2,5	2,0
Heat source connection	**inch**	1 ½"	1 ½"	2 ½"	2 ½"	3"	2 ½"	3"
Heat source flow rate VBW	*m³/h*	7,6	10	14	23	28,1	27,7	42,1
Pressure drop Δp_{BW}	**Pa**	22000	37000	25000	55000	30820	21500	41500
Well pump M11*		Grundfos SP8A-3	Grundfos SP14A-3	Grundfos SP14A-3	Grundfos SP30-2	Grundfos SP30-2	Grundfos SP30-2	Grundfos SP46-2
free compression fP	**m**	10,5	13,3	11,5	12,0	11,7	13,4	13,3

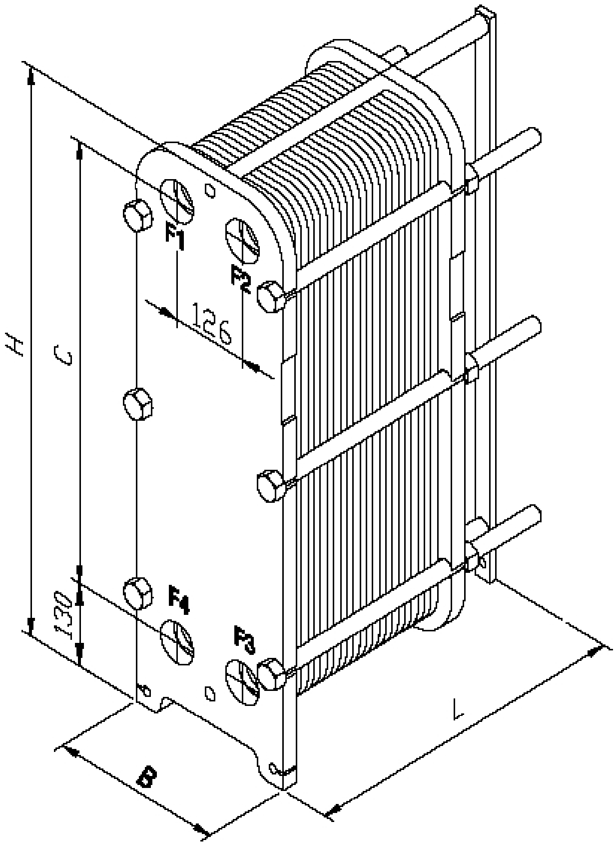
Table: Overview table of 2-compressor water-to-water heat pumps with generator circuit pumps (within the scope of supply of the heat pump) and the minimum well pumps required for W10/W35 for standard systems with sealed wells. The well pump must b e finalised in consultation with the well constructor.

- Proposal for well pump ** Control with 0 - 10V input signal mandatory

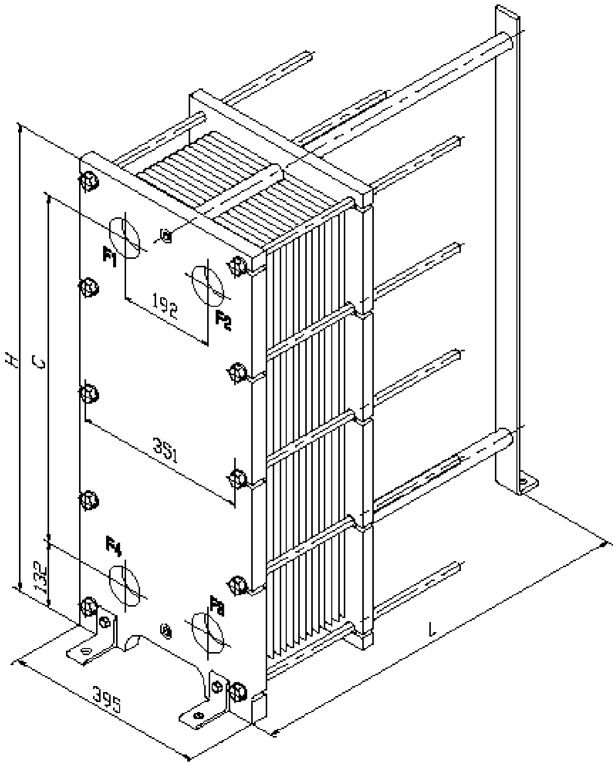
NOTE It is recommended that the heat exchanger is checked for contamination every two years at the latest.

- Stainless steel plate heat exchanger WTE 50 to WTE 130
- Stainless steel plate heat exchanger WTE 20 to WTE 40

Stainless steel plate heat exchanger WTE 50 to WTE 130



31 Illustration: WTE 50 - WTE 100



32 Illustration: WTE 130

Device information Stainless steel plate heat exchanger

Dimensions and weights	Unit	WTE 50	WTE 75
Number of discs		33	51
Effective area	m^2	4,65	7,35
Volume	dm^3	11	17
Height [H]	mm	896	896
Width [B]	mm	283	283
Depth [L]	mm	437	537
Net weight	kg	136	150
Gross weight	kg	147	167
Accessories		SZB 500	SZB 750

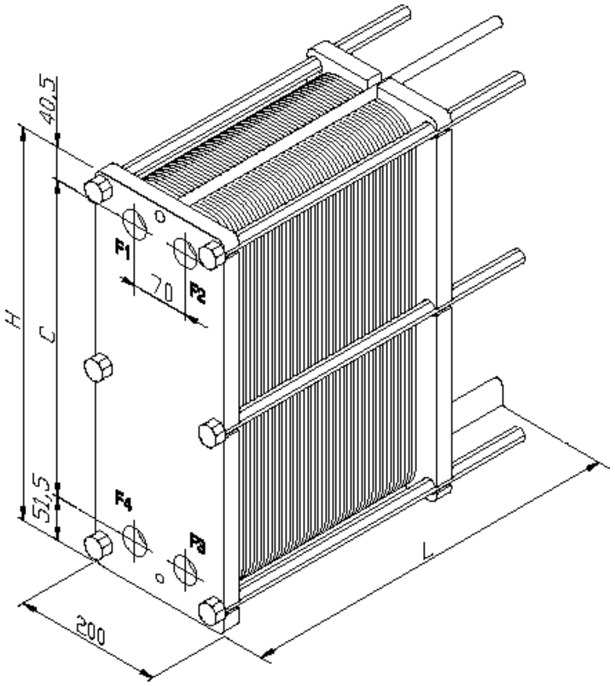
	Unit	WTE 50		WTE 75	
		Secondary	Primary	Secondary	Primary
Quantity	m³/h	12,8	12,8	20,4	20,4
Inlet temperature	°C	5,00	10,00	5,00	10,00
Outlet temperature	°C	7,67	7,00	7,64	7,00
pressure drop	Pa	38910	36400	38830	35380
Transmitted power	kW	40		63	
Inlet nozzle		F1	F3	F1	F3
Outlet nozzle		F4	F2	F4	F2
Secondary connections		DN 50 (2" EXTERNAL THREAD)			
Primary connections		DN 50 (2" EXTERNAL THREAD)			
Sheet material		0.4 mm AISI 316			
Sealing material		NITRILE HT HANG ON (H) / 140			

Dimensions and weights	Unit	WTE 100	WTE 130
Number of discs		62	52
Effective area	m²	9,00	11,14
Volume	dm³	21	31
Height [H]	mm	896	946
Width [B]	mm	283	395
Depth [L]	mm	537	443
Net weight	kg	160	253
Gross weight	kg	171	284
Accessories		SZB 100	SZB 1300

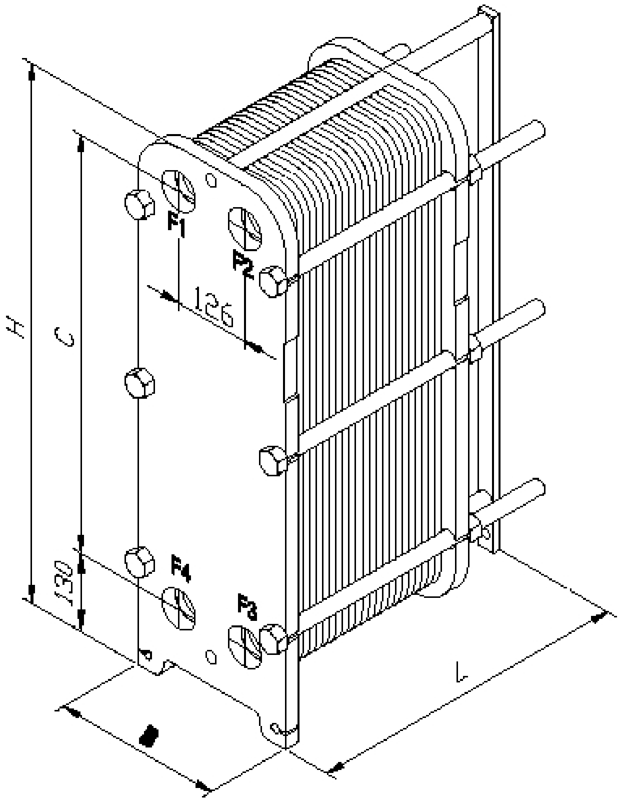
		WTE 100		WTE 130	
		Secondary	**Primary**	**Secondary**	**Primary**
Quantity	m³/h	24,0	24,8	33,8	33,8
Inlet temperature	°C	5,00	10,00	5,00	10,00
Outlet temperature	°C	7,75	7,00	7,65	7,00
pressure drop	Pa	39770	38960	40190	36720
Transmitted power	kW	77		105	
Inlet nozzle		F1	F3	F1	F3
Outlet nozzle		F4	F2	F4	F2
Secondary connections				DN 65 (flange)	
Primary connections				DN 65 (flange)	
Sheet material					
Sealing material					

Table: Technical data for screwed stainless steel plate heat exchangers WTE 50 - WTE 130

Stainless steel plate heat exchanger WTE 20 to WTE 40



33 Illustration: WTE 20 - WTE 37



34 Illustration: WTE 40

Device information Stainless steel plate heat exchanger

Dimensions and weights	Unit	WTE 20	WTE 30	WTE 37	WTE 40
Number of discs		34	43	50	28
Effective area	m^2	2,69	3,44	4,03	3,90
Volume	dm^3	7	9	11	9
Height [H]	mm	748	748	748	896
Width [B]	mm	200	200	200	283
Depth [L]	mm	270	320	420	437
Net weight	kg	67	71	76	132
Gross weight	kg	74	80	87	143
Accessories		SZB 250	SZB 300	SZB 400	SZB 400

Table: Technical data for screwed stainless steel plate heat exchangers WTE 20 - WTE 40

		WTE 20		WTE 30		WTE 37		WTE 40	
		Secondary	**Primary**	**Secondary**	**Primary**	**Secondary**	**Primary**	**Secondary**	**Primary**
Quantity	m^3/h	4,5	5,8	7,0	8,0	8,5	9,3	11,0	11,0
Inlet temperature	°C	5,00	10,00	5,00	10,00	5,00	10,00	5,00	10,00
Outlet temperature	°C	8,41	7,00	8,07	7,00	7,92	7,00	7,58	7,00
pressure drop	Pa	23740	30220	32110	37750	36630	37720	37610	32960
Transmitted power	kW	18		25		29		33	
Inlet nozzle		F1	F3	F1	F3	F1	F3	F1	F3
Outlet nozzle		F4	F2	F4	F2	F4	F2	F4	F2
Secondary connections		DN 32 (1 1/4" AG)						DN 50 (2" EXTERNAL THREAD)	
Primary connections		DN 32 (1 1/4" AG)						DN 50 (2" EXTERNAL THREAD)	
Sheet material		0.5 mm AISI 316						0.4 mm AISI 316	
Sealing material		NITRILE HT HANG ON (H) / 140							

Table: Technical data for screwed stainless steel plate heat exchangers WTE 20 - WTE 40 II

7 Noise emissions from heat pumps

Every noise source, be it a heat pump, a car or an aeroplane, emits a certain amount of sound. This causes the air around the noise source to vibrate and the pressure spreads out in waves. This pressure wave causes the eardrum to vibrate when it reaches the human ear, which then triggers the process of hearing.

Sound field quantities are used to describe this so-called airborne sound. Two of these are sound pressure and sound power. The sound power is a theoretical quantity typical of a sound source. It can be calculated from measurements. The sound power is the total sound energy radiation in all directions. Sound pressure is the change in air pressure as a result of the air caused to vibrate by the sound source. The greater the change in air pressure, the louder the sound is perceived. The sound pressure is what is perceived at the ear of a listener or the microphone of a measuring device.

Physically, sound is the propagation of pressure and density fluctuations in a gas, liquid or solid. Sound is generally perceived by humans in the form of airborne sound as noise, tone or even a bang, i.e. it is heard. Pressure changes in a range from $2*10^{-5}$ Pa to 20 Pa can
can be detected by the human ear. These pressure changes correspond to vibrations with frequencies of
20 Hz to 20 kHz and represent the audible sound or the human hearing range. The individual tones are derived from the frequencies. Frequencies above the audible range are called ultrasound, frequencies below are called infrasound.

The sound radiation of noise or sound sources is specified or measured as a level in decibels (dB). This is a reference value, whereby the value 0 dB roughly represents the hearing limit. A doubling of the level, e.g. by a second sound source with the same sound radiation, corresponds to an increase of +3 dB. For the average human ear, an increase of +10 dB is necessary so that a sound is perceived as twice as loud.

7.1 Explanation of terms Sound

7.1.1 solid-borne noise

Mechanical vibrations are introduced into bodies such as machines and parts of buildings as well as liquids, transmitted in them and finally partially radiated elsewhere as airborne sound.

7.1.2 Airborne sound

Sound sources (bodies excited to vibrate) generate mechanical vibrations in the air that propagate like waves and are perceived by the human ear.

7.1.3 sound pressure

In acoustics, **sound pressure** is the measurable level caused by a sound source at a certain distance. The closer you are to the sound source, the greater the sound pressure level measured and vice versa.

7.1.4 Switching pressure level

The **sound pressure level** is therefore a measurable, distance- and direction-dependent variable that is decisive, for example, for compliance with the immission requirements according to TA-Lärm.

7.1.5 sound power level

The total change in air pressure emitted by a sound source in all directions is referred to as **sound power** or **sound power level**. As the distance from the sound source increases, the sound power is distributed over an ever-increasing area.

If the total sound power emitted is considered and related to the enveloping surface at a certain distance, the value always remains the same. As the sound power emitted in all directions cannot be measured exactly, the sound power must be calculated from the measured sound pressure at a certain distance.

The **sound power level** is therefore a sound source-specific, distance- and direction-independent quantity that can only be determined by calculation. The emitted sound power level can be used to compare sound sources with each other.

7.1.6 Acoustic emission

The total sound emitted by a sound source (sound event) is referred to as **sound emission**. Emissions from sound sources are usually specified as sound power levels.

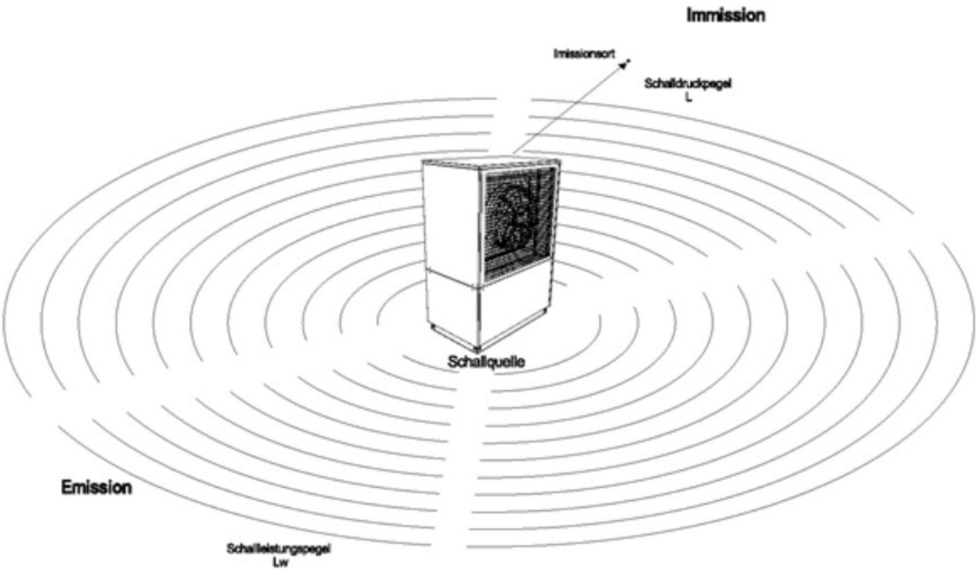
7.1.7 Sound immission

The effect of sound on a specific location is called **sound immission**. Sound immissions can be measured as sound pressure levels.

7.1.8 noise immission

Noise immissions are measured in dB(A), which are sound level values related to the sensitivity of human hearing. Noise is defined as sound that can disturb, endanger, significantly disadvantage or annoy neighbours or third parties. Standard values for noise at immission points outside buildings are defined in DIN 18005 "Noise protection in urban development" or in **the "Technical Instructions for Protection against Noise" (TA-Lärm).**

7.1.9 Relationship between emission and immission



7.2 Immission guide value according to TA Noise

https://www.verwaltungsvorschriften-im-internet.de/bsvwvbund_26081998_IG19980826.htm

7.2.1 6.1 Immission guide values for immission locations outside buildings

The immission guide values for the rating level for immission locations outside buildings are as follows

No.	Area category	Time of day	Reference value
a)	in industrial areas		70 dB(A)
b)	in industrial estates	tags:	65 dB(A)
		at night:	50 dB(A)
c)	in urban areas	tags:	63 dB(A)
		at night:	45 dB(A)
d)	in core areas, village areas and mixed areas	tags:	60 dB(A)
		at night:	45 dB(A)
e)	in general residential areas and small housing estates	tags:	55 dB(A)
		at night:	40 dB(A)
f)	in purely residential areas	tags:	50 dB(A)
		at night:	35 dB(A)
g)	in spa areas, for hospitals and nursing homes	tags:	45 dB(A)

No.	Area category	Time of day	Reference value
		at night:	35 dB(A)

Individual short-term noise peaks may not exceed the immission guide values by more than 30 dB(A) during the day and by more than 20 dB(A) at night.

7.2.2 6.2 Immission guide values for immission locations inside buildings

In the case of noise transmission within buildings or solid-borne noise transmission, the immission guide values for the rating level for non-operational rooms requiring protection in accordance with DIN 4109, November 1989 edition, irrespective of the location of the building in one of the areas listed under letters a to g in section 6.1, are as follows

tags	35 dB(A)
at night	25 dB(A).

Individual short-term noise peaks may not exceed the immission guide values by more than 10 dB(A). Further requirements under building law remain unaffected.

7.2.3 6.4 Assessment periods

The immission guide values according to number 6.1 refer to the following times:

tags	06.00 - 22.00 hrs
at night	22.00 - 06.00 hrs.

7.3 Sound propagation from heat pumps

7.3.1 Sound propagation in general

The sound power is distributed over a larger area as the distance increases, so that the sound pressure level decreases as the distance increases. Furthermore, the value of the sound pressure level at a certain point depends on the sound propagation.

The following properties of the environment have an influence on sound propagation:

- Shadowing by massive obstacles such as buildings, walls or terrain formations
- Reflections on hard surfaces, such as plaster and glass facades of buildings or the asphalt and stone surface of floors
- Reduction of noise propagation through sound-absorbing surfaces, such as bark mulch or similar.
- Increase or decrease due to humidity and air temperature or the respective direction of the wind

7.3.2 Sound propagation for outdoor installation

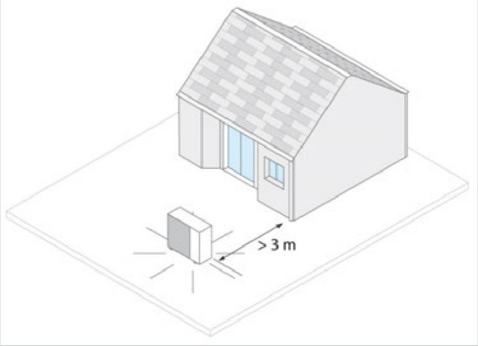
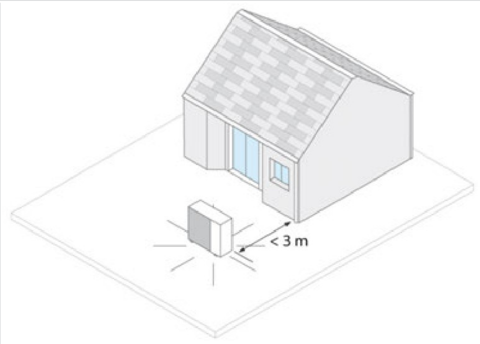
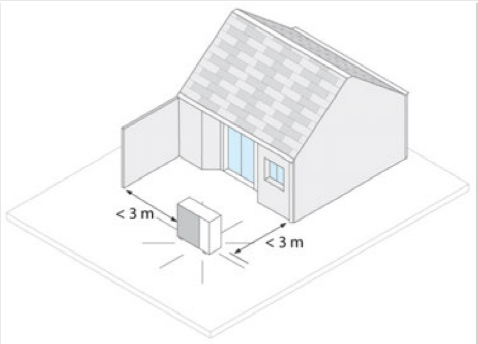
Structure-borne sound decoupling is only necessary if the foundation of the heat pump is in direct contact with the building. Flexible hoses make it easier to connect the heat pump to the heating system and at the same time prevent possible vibration transmission.

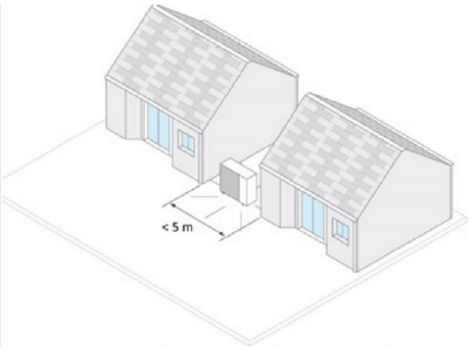
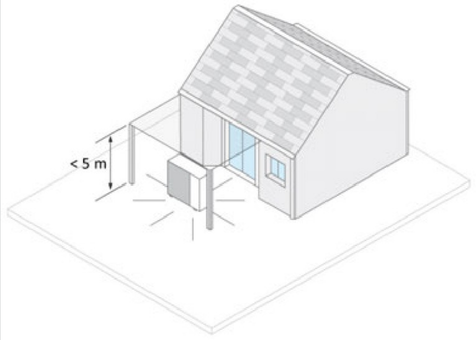
In addition, most externally installed heat pumps also have a vibration-decoupled compressor base plate.

When installing heat pumps outdoors, sound propagation must be taken into account. Avoid blowing the air directly onto terraces, balconies, etc. Direct blowing onto house walls etc. should also be avoided, as this can lead to an increase in the sound pressure level. Structural obstacles can reduce sound propagation. If possible, the outlet side should be orientated towards the street.

Installation situations with sound immission assessment Outdoor installation

Source: Schallrechner | Bundesverband Wärmepumpe (BWP) e.V. (waermepumpe.de)

	WP free-standing, no wall closer than 3 m	+3 dB(A)
	WP on a wall, distance to the appliance up to 3 m	+6 dB(A)
	WP in a corner, distance to the appliance up to 3 m in each case	+9 dB(A)

	WP between two walls, distance between the walls up to 5 m	+9 dB(A)
	HP under a canopy, height of the canopy up to 5m	+9 dB(A)

7.3.3 Sound propagation for indoor installation

Like any boiler, the heat pump should be connected via isolating screw connections. Pressure, temperature and ageing-resistant, elastic hoses should be used for the connection between the heat pump and the heating supply and return due to the vibration transmissions to be avoided.

In addition, most heat pumps have a vibration-decoupled compressor base plate. The compressor is installed on a separate base plate, which is mounted on rubber buffers to decouple structure-borne noise.

Furthermore, the heat pump should be installed on the SYL 250 Sylomer strips, which are available as special accessories, to reduce solid-borne noise transmission.

In addition, the use of **air ducts and bends** reduces sound emissions at the air outlet, as the internal insulation made of mineral wool and laminated glass fibre fleece not only prevents condensation, but also significantly reduces sound radiation at the air duct's weather protection grille.

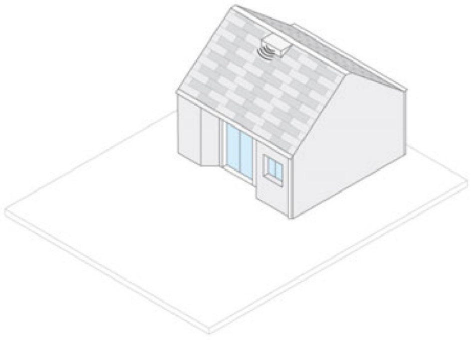
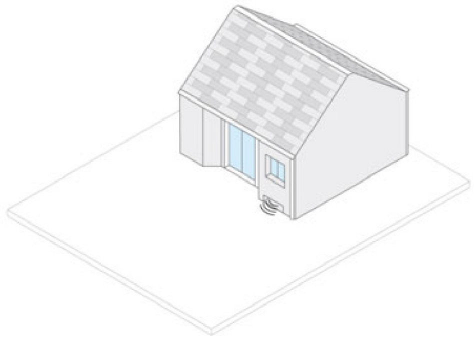
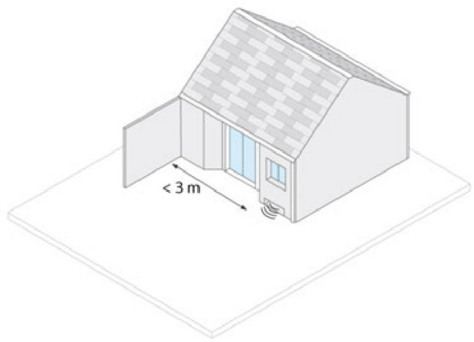
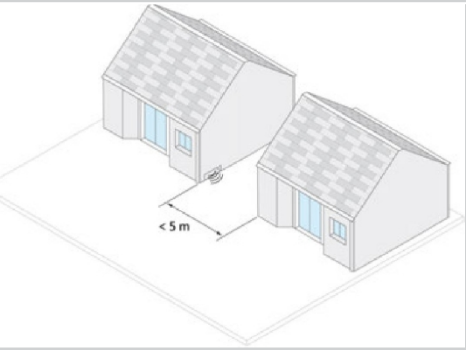
As a guideline:

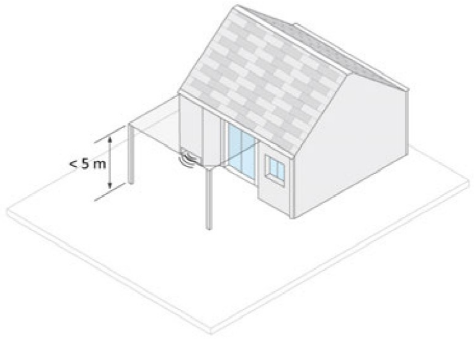
Air duct component	Reduction of sound pressure
Straight air duct	~ 1 dB(A) per linear metre
Air duct bend	~ 2 to 3 dB(A) per sheet

https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3314221123/Project+planning+of+air+ducts#Sound+reduction+through+air%C3%A4ducts

Installation situations with sound immission assessment Indoor installation

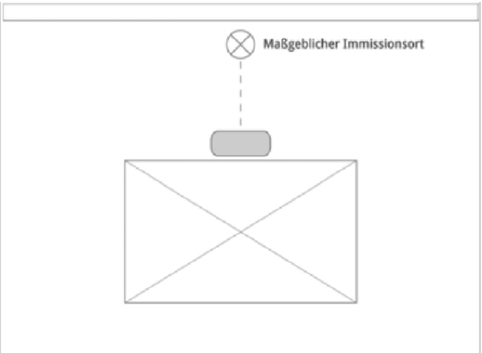
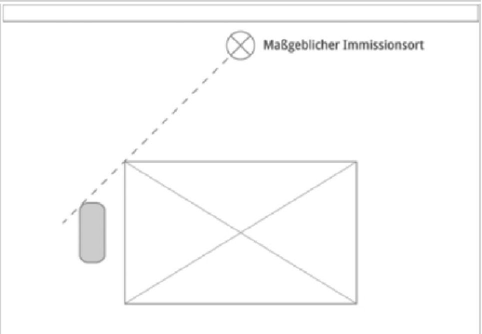
Source: Schallrechner | Bundesverband Wärmepumpe (BWP) e.V. (waermepumpe.de)

	Air outlet routed over the roof, no wall closer than 3 m	+3 dB(A)
	Air outlet on a wall, distance to the device up to 3 m	+6 dB(A)
	Air outlet in a corner, distance to the device up to 3 m in each case	+9 dB(A)
	Air outlet between two walls, distance between the walls up to 5 m	+9 dB(A)

	Air outlet under a canopy, height of the canopy up to 5m	+9 dB(A)

7.3.4 Shielding

If the heat pump is installed in such a way that the building itself has a shielding effect against the relevant immission location, the following levels can be deducted from the rating level in accordance with the LAI guidelines:

	For installation in front of the house with visual contact to the relevant immission location	0 dB(A)
	When installed next to the house, if the heat pump is not visible from the relevant immission **location***	5 dB(A)
	When installed behind the house (viewed from the relevant immission location)*	15 dB(A)

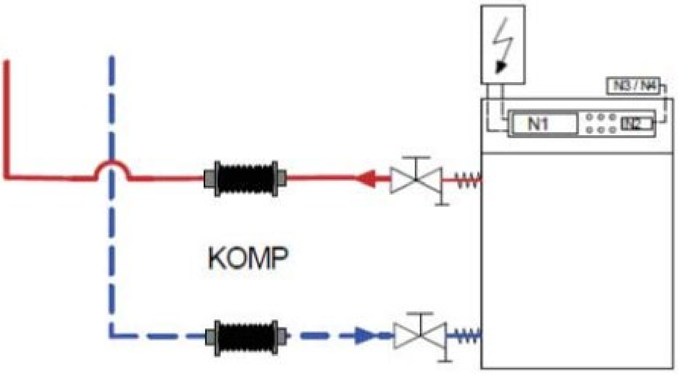
***In both cases, it must be checked whether a different immission location is relevant (neighbouring building on a different side of the building).**

Apart from the intrinsic shielding of sound-emitting buildings, no shielding needs to be taken into account.

DI ≤ -15 dB for the side of the building facing away from the place of immission may only be used if there is no reflective surface opposite it (e.g. wall of a building).

7.4 Vibration decoupling through expansion joints

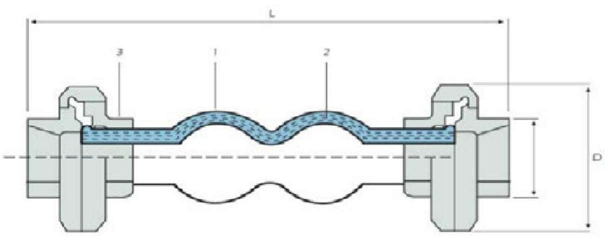
Double bellows rubber expansion joints are used to decouple the heat pump and heating system. The expansion joints absorb vibrations and movements caused by pumps, compressors, fittings, etc., reduce noise and equalise stresses (axial and lateral differences) from installation inaccuracies.



To ensure the functionality of the expansion joints and to avoid shortening their service life due to additional stresses, a few rules must be observed:

- Expansion joints must be installed that their position and movement are not hindered
- During assembly and after installation, ensure that no displacements or twisting (torsion) are transferred to the bellows.
- Protect the bellows from damage caused by external mechanical, thermal or chemical influences
- Bellows shafts must be free of impurities

7.4.1 Double bellows expansion joints KOMP



Expansion joints	DN25	DN32	DN40	DN50
Bellows material (1)	Synthetic rubber			
Material reinforcement (2)	Nylon reinforcement			
Material connections (3)	Grey cast iron			
Length L [mm]	175	186	186	200

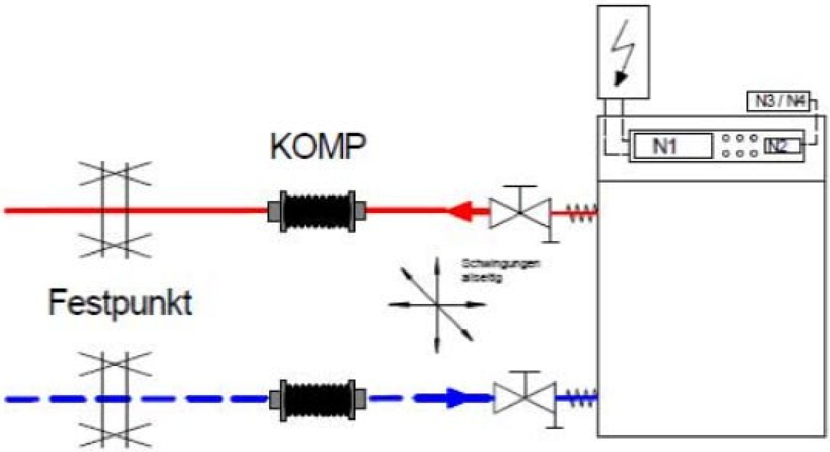
Expansion joints	DN25	DN32	DN40	DN50
Nominal diameter [mm]	25	32	40	50
Diameter D [mm]	62	72	81	93
Net weight / piece [kg]	0,81	1,13	2,30	3,04
Stroke: Compression (X-) [mm]	22			
Stroke: Elongation (X+) [mm]	6			
Stroke: Lateral movement (Y) [mm]	22			
Angular stroke: [degrees]	45			
max. pressure [kg/cm²]	10			
Operating temperature [°C]	-10 - 110			

Assembly

Caution
The double bellows expansion joints must be installed in the heating flow and return as close as possible to the heat pump (vibrating unit) to prevent other parts from vibrating.

They can be installed horizontally or vertically. Horizontal installation is preferable!

The pipe section must be fixed directly behind the expansion joint using a fixed point (e.g. pipe clamps) to absorb expansion and vibrations. The installation is carried out without pre-tensioning. No pipe weight must be placed on the expansion joint.



7.5 Sound calculator | bwp Bundesverband Wärmepumpe e.V.

https://www.waermepumpe.de/schallrechner/
The noise calculator enables the assessment of the noise immission of air-to-water heat pumps in accordance with TA Lärm during daytime operation at times of increased sensitivity and during the night. The calculation is used to estimate the noise immission at rooms requiring protection (relevant immission points) in neighbouring buildings.

properties or the determination of the necessary distance of the heat pump. The results are based on the approximate forecast procedure of TA Lärm dated 1 June 2017 and therefore cannot replace an individual noise report in the event of a neighbourhood dispute.

All device data are manufacturer's specifications. The responsibility for the accuracy of the information lies with the respective company.

Noise-reduced operation can lead to a reduction in the performance of the heat pump.

7.5.1 Example of a sound calculation:

Air-to-water heat pump LA 1118CP at a distance of 8m in a general residential area with installation close to walls (<3m) and visual contact with the relevant immission location:

Bundesverband Wärmepumpe e.V.

Schallberechnung

Generelle Angaben	
Name:	Max Mustermann
Adresse:	Am Goldenen Feld 18, 95326 Kulmbach
Telefon:	+49 9221 709 100
E-Mail:	info@glendimplex.de

Angaben zur Luft-Wärmepumpe	
Hersteller:	Dimplex
Modell:	LA 1118CP
Schallleistung nach ErP:	49 dB(A)
Max. Schallleistungspegel im Tagbetrieb	59 dB(A)
Max. Schallleistungspegel im schallreduzierten Betrieb	48.00 dB(A)
Tonhaltigkeit:	nicht hörbar

Immissionsrichtwert gemäß TA Lärm	
Empfindlichkeitsstufe:	allgemeines Wohngebiet / Kleinsiedlungsgebiet

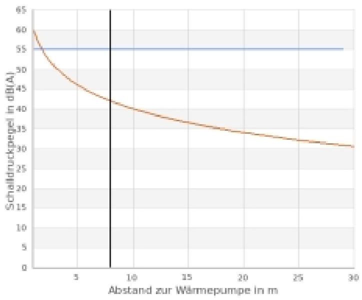
Aufstellung	
Raumwinkelmaß K0:	+6 dB(A) WP an einer Wand, Abstand zum Gerät bis zu 3 m
Distanz (s) Quelle - Empfänger:	8 m
Abschirmung:	Sichtkontakt: DI = 0 dB(A)

Der Immissionsrichtwert wird sowohl im Tag- als auch im Nachtbetrieb um mindestens 6 dB(A) unterschritten. Die Anlage ist nicht relevant nach TA Lärm 3.2.1.

Tagbetrieb

Beurteilungspegel Lr: 41.9 dB(A)

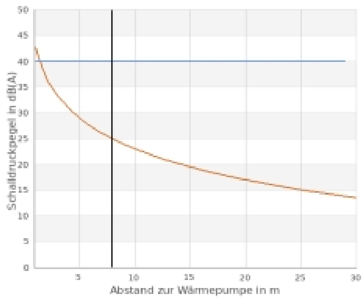
Unterschreitung des Immissionsrichtwertes der TA Lärm um 13.1 dB(A)



Nachtbetrieb (mit Schallreduzierung

Beurteilungspegel Lr: 24.9 dB(A)

Unterschreitung des Immissionsrichtwertes der TA Lärm um 15.1 dB(A)



Beurteilungspegel nach TA Lärm
Grenzwert (Immissionsrichtwert) nach TA Lärm

Eine Dämpfung durch die Richtwirkung der Quelle wurde nicht berücksichtigt.
Die Vorbelastung wurde nicht einbezogen, das Ergebnis wird als Differenz zur Gesamtbelastung ausgewiesen.
Bei sämtlichen Gerätedaten handelt es sich um Herstellerangaben. Die Verantwortung für die Richtigkeit der Angaben liegt beim jeweiligen Unternehmen.
Der schallreduzierte Betrieb kann zu einer Leistungsreduzierung der Wärmepumpe führen.

The immission guide value is undercut by at least 6 dB(A) in both day and night operation. The system is not relevant according to TA Lärm 3.2.1.

8 Domestic hot water preparation with heat pumps

8.1 Country-specific requirements for drinking water quality

8.1.1 Germany

DVGW sheet W 551 and the 3-litre rule DIN 1988-200

8.1.2 DVGW sheet W 551

The 3-litre rule from DVGW worksheet W 551 is used to define small and large systems and as a specification for the construction of drinking water installations.

DVGW worksheet W 551 defines construction and operating requirements for systems for the provision of hygienically safe hot drinking water with special consideration and measures to reduce legionella growth in drinking water systems.

A distinction is made between small systems and large systems.

Part of the definition for differentiating between large and small systems is the so-called 3-litre rule.

Irrespective of the existence of a large-scale system, according to the Drinking Water Ordinance, every operator of water supply systems (including drinking water installations in buildings) is responsible for ensuring that no pathogens are distributed in harmful concentrations through the drinking water (§ 4 TrinkwV 2001).

Overview of small and large systems

Type of building.	Storage volume	Line volume	Requirements for building	Definition of	pipe volume
One- and two-family house	no matter	no matter	-	Small system	-
other building	<400 litres	≤3 litres	-	Small system	All pipes **≤3** litres
other building	>400 litres	≤3 litres	-	Large system	All pipes **≤3** litres
other building	>400 litres	>3 litres	Installation of circulation	Large system	All pipes **≤3** litres
other building	<400 litres	>3 litres	Installation of circulation	Large system	All pipes **≤3** litres

Small systems

Small systems are defined in DVGW worksheet W 551 as storage domestic hot water heaters and centralised flow domestic hot water heaters in:

- single-family houses and two-family houses - regardless of the content of the domestic hot water preparation and the Contents of the pipework,
- Systems with domestic hot water heaters with a capacity of less than or equal to 400 litres and a capacity of less than or equal to 3 litres in each pipe between the outlet of the domestic hot water heater and the tapping point. This does not take into account any circulation pipework.

Demarcation

- Volume of the drinking water storage tank < 400 litres (does not apply to detached and semi-detached houses)
- Pipe volume[1)] < 3 litres
- The user must be informed about health risks when operating at low temperatures

Building requirement

- It must be possible to reach an outlet temperature of > 60 °C at the drinking water storage tank

Operating requirement

no specifications for the operating temperature, but:

- Recommendation > 60 °C at the outlet of the drinking water storage tank
- Temperatures < 50 °C should be avoided

If required (after a longer standstill): thermal disinfection[2)] recommended

Summary

- For small systems, we recommend setting the temperature controller on the DHW cylinder to 60 °C.
- However, operating temperatures below 50 °C should be avoided in any case.
- When using low temperature heat pumps, the reheating in the domestic hot water cylinder should be carried out by an electric auxiliary heater for reasons of economy.

Large systems

Large systems are storage domestic hot water heaters and centralised flow domestic hot water heaters, e.g. in:

- residential buildings,
- Hotels,
- Nursing homes
- Hospitals
- Baths
- Sports and industrial facilities
- Campsites
- Swimming pools
- Systems with domestic hot water heaters and a capacity > 400 l and/or > 3 litres in each pipe between the outlet of the domestic hot water heater and the tapping point

Demarcation

- Volume of the drinking water storage tank > 400 litres (does not apply to detached and semi-detached houses) or
- Pipe volume[1)] > 3 litres

Building requirement

- It must be possible to heat up the drinking water storage tank completely (mixing device may be required for this)
- **A circulation pipe is required** for pipe volumes[1)] > 3 litres

Operating requirement

- Outlet temperature at the drinking water storage tank > 60 °C; short-term, operationally-related undershoots are permissible (e.g. withdrawal)
- Operating temperature of the entire system permanently > 55 °C.
  Therefore: drop in temperature stratification up to the connection point of the circulation pipe in the DHW cylinder < 5 K)
- Daily 1x complete heat up of the drinking water storage tank > 60°C

Summary

For large systems, either the water must be heated to at least 60 °C at the hot water outlet of the cylinder. Alternatively, it is also permissible to replace the entire cylinder volume (usable volume) within 72 hours.

Domestic hot water preparation with heat pump and DFM 1988-1

1) "Pipe volume" refers to the content of a pipe from the domestic hot water preparation system to the tapping point, excluding the content of the return to the domestic hot water preparation system via a circulation pipe. The individual pipe sections are considered, not the total volume of the pipe system.

2) At least 70 °C is required for thermal disinfection. This temperature does not necessarily have to be provided by the domestic hot water preparation system. External auxiliary heating is also possible.

8.1.3 DIN 1988-200

Extract from DIN 1988-200 chapter 9.7.2.3

Centralised domestic hot water preparation with high consumption

"Central domestic hot water heaters - storage tanks or flow-through systems with downstream pipe volumes > 3 litres must be planned and constructed in such a way that a domestic hot water temperature greater than or equal to 60 °C is possible at the outlet of the domestic hot water heater and 55 °C at the inlet of the circulation pipe into the domestic hot water heater."

"The controller temperature on the domestic hot water preparation system must be set to 60 °C. **If a water exchange in the DHW installation for DHW hot water is ensured within 3 days during operation, operating temperatures can be set to greater than or equal to 50 °C. Operating temperatures < 50 °C should be avoided.** The operator must be informed about the possible health risk (legionella proliferation) during commissioning and familiarisation."

NOTE In accordance with DIN 1988-200, chapter 9.1 General:
For hygienic reasons, a temperature of at least 60°C must be maintained at the water outlet of the domestic hot water preparation system with circulation. In circulating drinking water installations, a temperature drop of 5 K must not be exceeded....
.... Domestic hot water preparations with high water exchange are an exception...

Domestic hot water preparation with heat pump and DFM 1988-1

8.1.4 Legionella

Explanation

Legionella are motile rod-shaped bacteria that are found in surface water and soil all over the world. They are therefore also found in groundwater and in the drinking water supplied by water supply companies.

Legionella multiply very slowly at temperatures up to around 20 °C.

Legionella multiply particularly quickly at temperatures between 30 °C and 45 °C.

From 50 °C there is hardly any reproduction and from 55 °C they slowly begin to die. Higher temperatures shorten the dieback period.

There is a particular risk of an increased number of pathogens in drinking water if the water in the pipework or in the storage tank is not moved for several days at temperatures between 25 °C and 55 °C.

Legionella infections only occur through aerosols, i.e. water-air mixtures that enter the lungs by inhalation, for example when showering.

There is no health risk from drinking, nor is human-to-human transmission possible.

Planning measures

The following measures against legionella growth in drinking water must be taken into account during planning:

- Provide domestic hot water preparation as close as possible to the tapping point,
- Keep pipework routes as short as possible,
- Do not oversize domestic hot water cylinders and pipework,
- Avoidance of rarely used supply lines.

8.2 Determining the hot water requirement in buildings (according to VDI 4645)

A **detailed** and a **simplified procedure** are available for the dimensioning of drinking water storage tanks.

The **simplified procedure** is only permitted for detached and semi-detached houses and applies to **a maximum** occupancy **of ten people**.

If an increased domestic hot water demand is expected, the **detailed method** should always be used. A calculation example for both methods is explained in the following section:

The required storage size can then be determined on the basis of the calculated demand.

8.2.1 Simplified procedure for determining domestic hot water preparation

Determination of requirements

In detached and semi-detached houses with normal sanitary facilities, the required storage tank size and the required heat output can be determined using a simplified procedure:

A daily requirement of 25 litres at 60°C is assumed per person. This corresponds to a quantity of thermal energy of around 1.45 kWh per person per day. This value is doubled in order to roughly take into account the storage losses, distribution losses and the usual load profiles

Determination of the storage volume

The required storage volume must be determined from the total drinking water requirement. This minimum volume is converted to the actual storage temperature:

$$V_{DP60} = n \times 25$$

$$V_{SP,min} = 2 \times V_{DP60} \times \frac{\vartheta_{Ref} - \vartheta_{KW}}{\vartheta_{soll} - \vartheta_{KW}}$$

The point is:

V_{DP60} = Domestic hot water volume at 60°C [l] n

= Number of persons

$VSP_{,min}$ = Minimum storage volume [l]

$_{Ref}$ ϑ= Reference temperature [°C]

(60°C) ϑ_{KW} = Cold water temperature

[°C] ϑ_{soll} = Storage tank set

temperature [°C]

Calculation example Simplified procedure

Storage volume for 4 people á 25 litres per person, a cold water temperature of 10°C and a set temperature of 50°C

$$V_{DP60} = n \times 25$$

$$V_{DP60} = 4 \times 25l$$

$$V_{DP60} = 100l$$

$$V_{SP,min} = 2 \times V_{DP60} \times \frac{\vartheta_{Ref} - \vartheta_{KW}}{\vartheta_{soll} - \vartheta_{KW}}$$

$$V_{SP,min} = 2 \times 100l \times \frac{60°C - 10°C}{50°C - 10°C}$$

$$V_{SP,min} = 2 \times 100l \times \frac{60°C - 10°C}{50°C - 10°C}$$

$$\mathbf{V_{SP,min} = 250l}$$

→ The minimum storage volume is 250 litres

8.2.2 Detailed procedure for determining domestic hot water preparation

Determination of requirements

In practice, there are various approaches to determining requirements:

For residential buildings, the design is often carried out in accordance with DIN 4708-2 using the so-called N_L number (performance index of a normal dwelling). **However,** this design and dimensioning method, which is valid for boilers**, cannot usually be used for heat pump systems**, as N_L figures for the storage tanks are available for the flow temperatures used in heat pump operation.

It is therefore reasonable to carry out the design based on the required quantities of thermal energy. Several mutually influencing factors must be taken into account:

- the daily requirement
- the peak demand
- the expected losses
- the heat output of the heat pump available in addition to the heating operation, taking into account existing auxiliary heaters

Depending on the storage tank concept, the **required capacity for domestic hot water preparation** must be available during the reference period in the form of stored domestic hot water, stored heating water or as heat output from the heat generator(s).

For the design, the **maximum daily DHW heating requirement** and the corresponding consumption behaviour must first be determined.

In addition to real consumption values, average consumption profiles can also be used for this calculation. These are shown in DIN EN 15 450 as examples for three user groups, they can be individually extended and are shown **in VDI 4645 in attachment J**.

The reference period with the greatest energy consumption for domestic hot water preparation is determined from the tap profile. A separate consideration of simultaneity factors is not necessary. The quantity of thermal energy to be allocated to the reference period with the greatest energy consumption for domestic hot water preparation serves as the basis for **determining the required storage tank size** and is calculated as follows:

$$Q_{DPB} = n_{NE} \times Q_{DPB,NE}$$

The point is:

Q_{DPB} = Energy consumption for domestic hot water preparation during the selected reference period [kWh]

n_{NE} = Number of utilisation units with the same profile

$Q_{DP,NE}$ = Energy consumption for the domestic hot water preparation of a utilisation unit during the selected reference period [kWh].

Determination of the storage volume

The required amount of domestic hot water must be calculated from the total energy consumption during the selected reference period:

The point is:

$$V_{DPB} = \frac{Q_{DPB}}{c_w \times (\vartheta_{soll} - \vartheta_{KW})}$$

V_{DPB} = Required domestic hot water volume during the selected reference period [litres]

Q_{DPB} = Energy consumption for domestic hot water preparation during the selected reference period [kWh]

c_w = specific heat capacity (for water: 1.163 Wh/(l - K))

$_{soll}$ ϑ= Storage tank set temperature [°C]

$_{KW}$ ϑ= Cold water temperature [°C]

The following losses must also be taken into account when dimensioning the storage tank size:

- **Shift behaviour during tapping or reloading**
  Depending on the storage principle, 15% to 20% of the calculated storage volume can be assumed as a surcharge for unusable storage volume due to mixing
- **Losses via circulation lines**
  The losses in the circulation pipes must be determined on a property-specific basis. They require an additional storage volume. Alternatively, the circulation losses can also be used in accordance with the EnEV certificate.

For **pipe losses without circulation**, it is recommended to assume losses of **1 kWh** of heat per day and utilisation unit:

$$V_{Zirk} = \frac{Q_{Zirk}}{c_w \times (\vartheta_{soll} - \vartheta_{Zirk,RL})}$$

The point is:

V_{Zirk} = Volume of domestic hot water required to equalise the circulation losses [l]

Q_{Zirk} = Circulation losses [kWh]

c_w = specific heat capacity (for water: 1.163 Wh/(l - K))

$_{soll}$ ϑ= Storage tank set temperature [°C]

$\vartheta Circ_{,RL}$ = Return temperature of the circulation pipe [°C]

Required storage volume:

$$V_{Sp,min} = (V_{DPB} + V_{Zirk}) \times f_{TWE}$$

The point is:

$_{VSp,min}$ = Minimum storage volume [l]

V_{DPB} = Required domestic hot water volume during the selected reference period [litres]

V_{Zirk} = Volume of domestic hot water required to equalise the circulation losses [l]

f_{TWE} = Surcharge for the assumption of mixing losses when storing the drinking water*

*with **f_{TWE}** = 1.15 for 15 % mixing loss when storing the drinking water
and **f_{TWE}** = 1.20 for 15 % mixing losses and 5 % surcharge for heat transfer when storing the heating water.

→ A storage tank with at least the required volume $V_{Sp,min}$ is selected from the manufacturer's specifications.

Calculation example Detailed procedure

Given is an apartment block with ten residential units with identical fittings. Each residential unit has normal sanitary facilities with a shower.

Domestic hot water demand

The profile from **Table J3** is selected for this example. The reference period with the greatest energy consumption is the period from 20:30 to 21:30.

21	20:30	0,735			Geschirr-spülen	45	10
22	21:15	0,105			wenig		25
23	21:30	1,400			Duschen		40
Q_{DPB} in kWh		**5,845**	**5,740**	**2,24**			
t_{DPB} in hh:mm		**14:30**	**14:15**	**01:00**			
					100,2 l bei 60°C		

During this period, **2.24 kWh** is required for domestic hot water preparation for each residential unit. Over the entire day, **5.845 kWh** are required per residential unit.

The **total energy consumption during the reference period** with the highest energy consumption is determined as follows:

$$Q_{DPB} = n_{NE} \times Q_{DPB,NE}$$

$$Q_{DPB} = 10 \times 2{,}24 \text{ kWh}$$

$$Q_{DPB} = 22{,}4 \text{ kWh}$$

The point is:

Q_{DPB} = Energy consumption for domestic hot water preparation during the selected reference period [kWh]

n_{NE} = Number of utilisation units with the same profile

$Q_{DP,NE}$ = Energy consumption for the domestic hot water preparation of a utilisation unit during the selected reference period [kWh].

The **total energy consumption for the day** is determined as follows:

$$Q_{DP} = n_{NE} \times Q_{DP,NE}$$

$$Q_{DP} = 10 \times 5{,}845\ \mathrm{kWh}$$

$$Q_{DP} = 58{,}45\ \mathrm{kWh}$$

The point is:

Q_{DP} = daily energy consumption for domestic hot water preparation [kWh]

n_{NE} = Number of utilisation units with the same profile

$Q_{DP,NE}$ = daily energy consumption for the domestic hot water preparation of a utilisation unit [kWh]

Determination of the storage volume

The **required amount of domestic hot water** must be calculated from the total energy consumption during the selected reference period:

$$V_{DPB} = \frac{Q_{DPB}}{c_w \times (\vartheta_{soll} - \vartheta_{KW})}$$

$$V_{DPB} = \frac{22{,}4\ \mathrm{kWh}}{1{,}163\,\frac{\mathrm{Wh}}{\mathrm{kg}\ \times \mathrm{K}} \times (60°\mathrm{C} - 10°\mathrm{C})}$$

$$V_{DPB} = 385\ \mathrm{l}$$

The point is:

V_{DPB} = Required domestic hot water volume during the selected reference period [litres]

Q_{DPB} = Energy consumption for domestic hot water preparation during the selected reference period [kWh]

c_w = specific heat capacity (for water: 1.163 Wh/(l - K))

$_{soll}\vartheta$= Storage tank set temperature [°C]

$_{KW}\vartheta$= Cold water temperature [°C]

When dimensioning the storage tank size, the losses listed below must also be taken into account:

Storage efficiency

(Shift behaviour during tapping/recharging)

For this **example, an allowance of 15 % is** applied **for unusable storage volume** (storage efficiency) due to mixing.

Losses via circulation pipe

In this example, the losses of the circulation pipe **Q_{Zirk}** were taken from the calculations for the energy certificate in accordance with the EnEV and amount to 6.2 kWh/24 hours. In relation to the duration of the reference period with the highest energy consumption of 1 h, they are to be taken into account at 0.26 kWh.

$$V_{Zirk} = \frac{Q_{Zirk}}{c_w \times (\vartheta_{soll} - \vartheta_{Zirk,RL})}$$

$$V_{Zirk} = \frac{0{,}26\ \frac{kWh}{24\ h}}{1{,}163\ \frac{Wh}{kg\ \times K} \times (60°C - 55°C)}$$

$$V_{Zirk} = 44{,}7\ \frac{l}{24\ h} \approx 45\ l$$

The point is:

V_{Zirk} = Volume of domestic hot water required to equalise the circulation losses [l]

Q_{Zirk} = Circulation losses [kWh]

c_w = specific heat capacity (for water: 1.163 Wh/(l - K))

$_{soll}$ ϑ= Storage tank set temperature [°C]

$\vartheta Circ_{RL}$ = Return temperature of the circulation pipe [°C]

Required storage volume

$$V_{Sp,min} = (V_{DPB} + V_{Zirk}) \times f_{TWE}$$

$$V_{Sp,min} = (385\ l + 45\ l) \times 1{,}15$$

$$V_{Sp,min} 495\ l$$

The point is:

$_{VSp,min}$ = Minimum storage volume [l]

V_{DPB} = Required domestic hot water volume during the selected reference period [litres]

V_{Zirk} = Volume of domestic hot water required to equalise the circulation losses [l]

f_{TWE} = Surcharge for the assumption of mixing losses when storing the drinking water*

→ A storage tank with a capacity of 500 litres of domestic hot water is selected (WWSP 556)

Attachment J Tapping profiles (VDI 4645)

Note: This attachment is based on Regulation (EU) No 814/2013, Annex III.

Average tapping profile

The average tapping profile is given in Table J2 to Table J4; each tapping type given here is based on the volume assumptions given in Table J1.

The cold water temperature is set at 10 °C.

Table J1

Volume assumption

Tap type	Energy in kWh	Volume in litres	Desired value for Δϑ in K	Tapping time with specified mass flow in l/min			
				at 3.5 l/min	at 5.5 l/min	at 7.5 l/min	at 9.0 l/min
Little	0,105	3	30	0,9	0,5	0,4	0,3

Floor	0,105	3	30	0,9	0,5	0,4	0,3
Cleaning	0,105	2	45	0,6	0,4	0,3	0,2
Dishwashing, little	0,315	6	45	1,7	1,1	0,8	0,7
Dishwashing, medium	0,420	8	45	2,3	1,5	1,1	0,9
Dishwashing, more	0,735	14	45	4,0	2,5	1,9	1,6
"A lot"	0,525	15	30	4,3	2,7	2,0	1,7
Showers	1,400	40	30	11,4	7,3	5,3	4,4
Bathing	3,605	103	30	29,4	18,7	13,7	11,4

Table J2

Average tapping profile of a single person (36 litres at 60 °C)

No.	Time of day hh:mm	Energy tapping process in kWh	Reference period for partial storage systems		Tap type	Desired value for Δθ (to be achieved during sampling) in K	Minimum value of for the start of energy utilisation counting in °C
1	07:00	0,105			little		25
2	07:30	0,105			little		25
3	08:30	0,105			little		25
4	09:30	0,105			little		25
5	11:30	0,105			little		25
6	11:45	0,105			little		25
7	12:45	0,315			Dishwashing	50	0
8	18:00	0,105			little		25
9	18:15	0,105			Cleaning		45
10	20:30	0,420			Dishwashing	50	0
11	21:30	0,525			much		45
Q_{DPB} in kWh		**2,1**	**1,78**	**0,945**			
t_{DPB} in hh:mm		**14:30**	**09:00**	**01:00**			
					36 litres at 60°C		

Table J3

Average tapping profile of a family, including showers (100 litres at 60 °C)

No.	Time of day hh:mm	Energy tapping process in kWh	Reference period for partial storage systems		Tap type	Desired value for $\Delta\theta$ (to be achieved during sampling) in K	Minimum value of for the start of energy utilisation counting in °C
1	07:00	0,105			little		25
2	07:15	1,400			Showers		40
3	07:30	0,105			little		25
4	08:01	0,105			little		25
5	08:15	0,105			little		25
6	08:30	0,105			little		25
7	08:45	0,105			little		25
8	09:00	0,105			little		25
9	09:30	0,105			little		25
10	10:30	0,105			Floor	30	10
11	11:30	0,105			little		25
12	11:45	0,105			little		25
13	12:45	0,315			Dishwashing	45	10
14	14:30	0,105			little		25
15	15:30	0,105			little		25
16	16:30	0,105			little		25
17	18:00	0,105			little		25
18	18:15	0,105			Cleaning		40
19	18:30	0,105			Cleaning		40
20	19:00	0,105			little		25
21	20:30	0,735			Dishwashing	45	10
22	21:15	0,105			little		25
23	21:30	1,400			Showers		40
Q_{DPB} in kWh		**5,845**	**5,740**	**2,24**			

No.	Time of day hh:mm	Energy tapping process in kWh	Reference period for partial storage systems		Tap type	Desired value for Δθ (to be achieved during sampling) in K	Minimum value of for the start of energy utilisation counting in °C
t_{DPB} in hh:mm		14:30	14:15	01:00			
					100.2 litres at 60°C		

Table J4

Average consumption profile for a family of three, including bathing and showering (200 litres at 60 °C)

No.	Time of day hh:mm	Energy tapping process in kWh	Reference period for partial storage systems		Tap type	Desired value for Δθ (to be achieved during sampling) in K	Minimum value of for the start of energy utilisation counting in °C
1	07:00	0,105			little		25
2	07:05	1,400			Shower		40
3	07:30	0,105			little		25
4	07:45	0,105			little		25
5	08:05	3,605			Bathroom	30	10
6	08:25	0,105			little		25
7	08:30	0,105			little		25
8	08:45	0,105			little		25
9	09:00	0,105			little		25
10	09:30	0,105			little		25
11	10:30	0,105			Floor	30	10
12	11:30	0,105			little		25
13	11:45	0,105			little		25
14	12:45	0,315			Dishwashing	45	10
15	14:30	0,105			little		25
16	15:30	0,105			little		25

No.	Time of day hh:mm	Energy tapping process in kWh	Reference period for partial storage systems		Tap type	Desired value for Δθ (to be achieved during sampling) in K	Minimum value of for the start of energy utilisation counting in °C
17	16:30	0,105			little		25
18	18:00	0,105			little		25
19	18:15	0,105			clean		40
20	18:30	0,105			clean		40
21	19:00	0,105			little		25
22	20:30	0,735			Dishwashing	45	10
23	21:00	3,605			Bathroom	30	10
24	21:30	0,105			little		25
Q_{DPB} in kWh		**11,655**	**11,445**	**4,445**			
t_{DPB} in hh:mm		**14:30**	**13:55**	**01:00**			
					199.8 litres at 60°C		

8.3 Domestic hot water preparation with heat pump and domestic hot water cylinder

8.3.1 Domestic hot water cylinder design guide / system overview

The table shows the allocation of domestic hot water circulating pumps and storage tanks to the individual heat pumps, where 45 °C hot water temperature is reached in 1. compressor heat pump operation. (Maximum temperatures of the heat sources: Air: 25 °C, brine: 10 °C, water 10 °C,
maximum pipe length between heat pump and storage tank 10 m).

The maximum hot water temperature that can be reached in pure heat pump operation depends on:

- the heat output (heat output) of the heat pump
- of the heat exchanger surface installed in the storage tank
- the volume flow as a function of the pressure drop and flow rate of the circulation pump.

NOTE Higher temperatures can be achieved by using larger heat exchanger surfaces in the cylinder, by increasing the volume flow or by targeted reheating using a heating element or a 2nd heat generator

NOTE The following system overview provides an overview of the possible combinations of heat pump and domestic hot water cylinder.
The actual size of the domestic hot water cylinder depends on the required hot water demand and must be calculated and determined individually.
The hydraulic integration of the domestic hot water cylinder can be realised either via a charging pump or a reversing valve.

heat pump	Item no.	Domestic hot water tank	Charging pump	reversing valve
Air-to-water heat pumps Outdoor installation				
System M				
M Flex 0609HBC M	381080	MDHW 232 MDHW 335 WWSP 229 WWSP 335	Already integrated in indoor unit	
M Flex 0916HBC	381090	MDHW 232 MDHW 335 WWSP 335 WWSP 442	Already integrated in indoor unit	
Compact Plus 04-06 kW	~	NOTE With System M heat pumps, the domestic hot water cylinders including pump hydraulics are already integrated as standard depending on the configuration		
Comfort Plus 09-16 kW	~			
Comfort Plus Cooling 09-16 kW	~			
System S				
LIA 0608HXCF M	380080	WWSP 229 WWSP 335	-	VSW LAK
LIA 0911HXCF M	380090	WWSP 229 WWSP 335	-	VSW LAK
LIA 1316HXCF	380140	WWSP 335	-	VSW LA
LIA 1316HXCF M	380100	WWSP 335	-	VSW LA
LIA 0608HWCF M	380020	Integrated in indoor unit		
LIA 0911HWCF M	380030	Integrated in indoor unit		
LIA 0608BWCF M	380050	Integrated in Hydrotower		
LIA 0911BWCF M	380060	Integrated in Hydrotower		
LIA 1316BWCF	380130	Integrated in Hydrotower		
LIA 1316BWCF M	380070	Integrated in Hydrotower		
System E				

heat pump	Item no.	Domestic hot water tank	Charging pump	reversing valve
LA 1118CP	380800	WWSP 335 WWSP 442 WWSP 556	UP 75-32PK UPH 90-32	DWV 32
LA 1118BWCP	381910	Integrated in Hydrotower		
System C				
LA 33TPR	378690	WWSP 442 WWSP 556 WWSP 770	UPH 90-32	DWV 32
LA 60P-TUR	377770	WWSP 770 **2x** WWSP 556	UPE 120-32K	DWV 50
LA S-TU/S-TU-R				
LA 9S-TUR	372970	WWSP 335 WWSP 442 PWS 332	UP 75-25PK	DWV 25
LA 0712C	381110	WWSP 335 WWSP 442 PWS 332	UP 75-25PK	DWV 25
LA 1118C	381150	WWSP 335 WWSP 442 PWS 332	UP 75-25PK	DWV 25
HPL 9S-TUW	373040	Integrated in Hydrotower		
LA 0712BW	381120	Integrated in Hydrotower		
LA 1118BW	381160	Integrated in Hydrotower		
HPL 9S-TURW	373120	Integrated in Hydrotower		
LA 0712BWC	381130	Integrated in Hydrotower		
LA 1118BWC	381170	Integrated in Hydrotower		
LA TU-2/TBS				
LA 1422C	380320	WWSP 442 WWSP 556 WWSP 770	UPH 90-32	DWV 32
LA 35TBS	378460	WWSP 442 WWSP 556 WWSP 770	UPH 90-32	DWV 32
LA 40TU-2	376680	WWSP 556 WWSP 770	UPH 90-32	DWV 40

heat pump	Item no.	Domestic hot water tank	Charging pump	reversing valve
LA 3860	381870	WWSP 770 **2x** WWSP 556	UPE 120-32K	DWV 50
LA 60S-TU	378450	WWSP 770 **2x** WWSP 556	UPE 120-32K	DWV 50
LA 60S-TUR	374620	WWSP 770 **2x** WWSP 556	UPE 120-32K	DWV 50
Indoor installation of air-to-water heat pumps				
LIK 8TES	366030	WWSP 335 WWSP 442	UP 75-25PK	DWV 25
LIK 12TU	372830	WWSP 335 WWSP 442 WWSP 556	UP 75-25PK	DWV 25
LI 12TU	364070	WWSP 335 WWSP 442	UP 75-25PK	DWV 25
LI 16I-TUR	378680	WWSP 335 WWSP 442 WWSP 556	UPH 90-25	DWV 25
LI 1422C	380300	WWSP 335 WWSP 442 WWSP 556 WWSP 770	UPH 90-32	DWV 32
LI 1826C	380310	WWSP 442 WWSP 556 WWSP 770	UPH 90-32	DWV 32
Brine-to-water heat pump, indoor installation				
SIW 6TES	371570	Integrated in heat pump		
SIW 8TES	371580	Integrated in heat pump		
SIK 8TES	372300	WWSP 229 WWSP 335 WWSP 442 PWS 332	UP 75-25PK	DWV 25
SIK 11TES	372310	WWSP 335 WWSP 442 PWS 332	UP 75-25PK	DWV 25

heat pump	Item no.	Domestic hot water tank	Charging pump	reversing valve
SI 6TU	364080	WWSP 229 WWSP 335 WWSP 442 PWS 332	UP 75-25PK	DWV 25
SI 8TU	364090	WWSP 229 WWSP 335 WWSP 442 PWS 332	UP 75-25PK	DWV 25
SI 11TU	364100	WWSP 229 WWSP 335 WWSP 442 PWS 332	UP 75-25PK	DWV 25
SI 14TU	364110	WWSP 335 WWSP 442 WWSP 556	UP 75-25PK	DWV 32
SI 18TU	364120	WWSP 442 WWSP 556	UPH 90-32	DWV 32
SI 22TU	362340	WWSP 556 WWSP 770	UPH 90-32	DWV 32
SI 26TU	368440	WWSP 442 WWSP 556 WWSP 770	UPH 90-32	DWV 40
SI 35TU	368450	WWSP 556 WWSP 770	UPE 100-32K	DWV 40
SI 50TU	368460	WWSP 556 WWSP 770	UPE 120-32K	DWV 50
SI 75TU	368470	WWSP 770	UPH 80-40F	DWV 50
SI 90TU	369950	**2x** WWSP 770	UPH 80-40F	DWV 50
SI 130TU	369960	**2x** WWSP 770	UPH 80-40F	DWV 50
SIH 20TE	352970	WWSP 442 WWSP 556	UPH 90-32	DWV 32
SIH 90TU	368350	**2x** WWSP 770	UPH 80-40F	DWV 50
SI 35TUR	374870	WWSP 556 WWSP 770	UPE 100-32K	DWV 40
SI 50TUR	374880	WWSP 556 WWSP 770	UPE 120-32K	DWV 50

Water-to-water heat pump, indoor installation

heat pump	Item no.	Domestic hot water tank	Charging pump	reversing valve
WI 10TU	364190	WWSP 229 WWSP 335 WWSP 442 WWSP 556 PWS 332	UP 75-25PK	DWV 25
WI 14TU	364200	WWSP 335 WWSP 442 WWSP 556 PWS 332	UP 75-25PK	DWV 32
WI 18TU	364210	WWSP 442 WWSP 556	UP 75-32PK	DWV 32
WI 22TU	364220	WWSP 556 WWSP 770	UPH 90-32	DWV 32
WI 35TU	368520	WWSP 556 WWSP 770	UPH 90-32	DWV 32
WI 45TU	368530	WWSP 556 WWSP 770	UPE 100-32K	DWV 40
WI 65TU	368540	WWSP 770	UPE 120-32K	DWV 50
WI 95TU	368550	**2x** WWSP 770	UPH 80-40F	-
WI 120TU	371530	**2x** WWSP 770	UPH 80-40F	-
WIH 120TU	368360	**2x** WWSP 770	UPH 80-40F	-

8.3.2 Requirements for the domestic hot water cylinder

General

The standard continuous outputs specified by various storage tank manufacturers are not a suitable criterion for the selection of a storage tank for heat pump operation. The size of the heat exchanger surfaces, the design, the arrangement of the heat exchangers in the storage tank, the standard continuous output, the flow and the arrangement of the thermostat or sensor are decisive for the selection of the storage tank.

The following criteria must be taken into account:

- Reheating due to stand losses without tapping (coverage of standing losses - static condition).
- The domestic hot water cylinder selected must be capable of storing the heat pump's heat output even at maximum heat source temperature (e.g. air +35 °C).
- When a circulation pipe is operated, the cylinder temperature is lowered. The circulation pump should be controlled as required.
- The defined tap quantities must also be achieved during a shut-off time, i.e. without reheating by the heat pump.

- Targeted reheating via a flange heater is only possible in conjunction with a temperature sensor inserted into the domestic hot water cylinder.

Caution If domestic hot water preparation is carried out via a heat generation circuit filled with antifreeze (e.g. glycol) (e.g. holiday home), suitable protective measures must be taken to safeguard the DHW circuit in the event of a leak. This can be done by using glycol that is suitable for use in the food sector or by using double-walled safety heat exchangers.

The domestic hot water cylinders are used to heat drinking water, e.g. also for sanitary use. Heating takes place indirectly via a built-in smooth tube heat exchanger through which heating water flows.

Installation

- Assembly and installation must be carried out by an authorised specialist company!
- They must be installed in a frost-protected room with short pipe runs.
- The DIN 4753 enamelled storage tanks are suitable for normal drinking water. Mixed installation is permitted. The relevant regulations must be observed when connecting the heating system. Furthermore, the regulations applicable to the local drinking water supply must be observed when connecting to the drinking water supply.
- The connection must be made in accordance with DIN 1988 and DIN 4753 Part 1. All connection sockets that are not required must be sealed with plugs.
- Before connecting the heating water pipes, the smooth tube heat exchanger must be flushed with water.
- The operating pressures specified on the rating plate must not be exceeded. It may be necessary to fit a pressure reducer.
- Electrical inserts may only be connected by authorised electricians in accordance with the relevant wiring diagram. The regulations of the utility company and VDE must be observed.

Construction

The cylinders are manufactured in a cylindrical design in accordance with DIN 4753 Part 1. The heating surface consists of a welded-in, helically bent pipe coil, or a finned tube heat exchanger in the case of direct domestic hot water preparation. All connections are led out of the cylinder on one side.

Corrosion protection

Enamelled cylinders are protected by a tested enamel coating on the entire inner surface in accordance with DIN 4753 Part 3. In conjunction with the additionally installed magnesium sacrificial anode, this guarantees reliable corrosion protection.

NOTE
According to the DVGW, the magnesium sacrificial anode must be checked by a specialist for the first time after 2 years and then at appropriate intervals and replaced if necessary. Depending on the drinking water quality (conductivity), it is advisable to check the sacrificial anode at shorter intervals. If the anode (33 mm) has degraded to a diameter of 10-15 mm, replacement is recommended.

As an alternative to the magnesium anode, an impressed current anode (Correx anode) can also be used. This should be used if the magnesium sacrificial anode degrades too quickly, the water smells unpleasant or too many air bubbles form when water is drawn from the tap. The

External current anode (titanium anode) must be connected directly to a voltage source (230 V~) and is maintenance-free.

water hardness

Depending on the location/region, drinking water contains more or less lime. Hard water is water with a high lime content. There are different hardness levels, which are measured in degrees of German hardness (°dH).

Hardness level soft:	less than 1.5 millimoles of calcium carbonate per litre (corresponds to < 8.4
Hardness level	°dH) 1.5 to 2.5 millimoles of calcium carbonate per litre (corresponds to 8.4
medium: Hardness	to 14 °dH) more than 2.5 millimoles of calcium carbonate per litre
level hard:	(corresponds to > 14 °dH)

In Switzerland, the term "French degrees of hardness" is used. This corresponds to

1°dH	=	1.79° frH
1°frH	=	0.56° frH

When using electric flange heaters for general reheating to temperatures above 50 °C, we recommend installing a decalcification system for water from hardness level III with a hardness > 14°d.H. (hard and very hard water).

commissioning

Before commissioning, check that the water supply is open and the cylinder is full. The first filling and commissioning must be carried out by an authorised specialist company. The function and tightness of the entire system, including the parts installed at the manufacturer's factory, must be checked.

Cleaning and care

The required cleaning intervals vary depending on the water quality and the storage tank temperature. We recommend cleaning the cylinder and checking the system once a year. The smooth enamelled surface prevents limescale from settling as far as possible and enables quick cleaning, e.g. using a water jet. Large limescale deposits may only be broken up with a wooden stick before rinsing. Sharp-edged, metallic objects must not be used for cleaning under any circumstances.

The function of the safety valve must be checked at regular intervals. Annual maintenance by a specialised company is recommended.

Thermal insulation and cladding

For storage tanks with a nominal capacity of up to 500 litres, the thermal insulation is made of high-quality PU (Polyurethane) rigid foam that is foamed directly onto the cylinder wall. For storage tanks larger than 500 litres, the thermal insulation is removable and consists of PE (polyethylene) or PS (polystyrene) foam with a foil jacket.

Regulation

The storage tanks are supplied as standard with an **NTC-10 sensor** incl. 5 m connection cable, which is connected directly to the heat pump manager as sensor R3 and plugged into the immersion sleeve on the storage tank, ensuring good heat transfer.

The temperature setting, time-controlled charging and, if necessary, reheating by means of a flange heater are carried out by the heat pump manager. When setting the domestic hot water set temperature, the hysteresis must be taken into account.

Note. The hysteresis is subtracted from the setpoint specification and determines the switch-on point of the heat generator. For example, setpoint 50 °C - hysteresis 7 K results in a switch-on temperature of 43 °C and a switch-off temperature of 50 °C.

Functional description (WPM Touch) Domestic hot water:

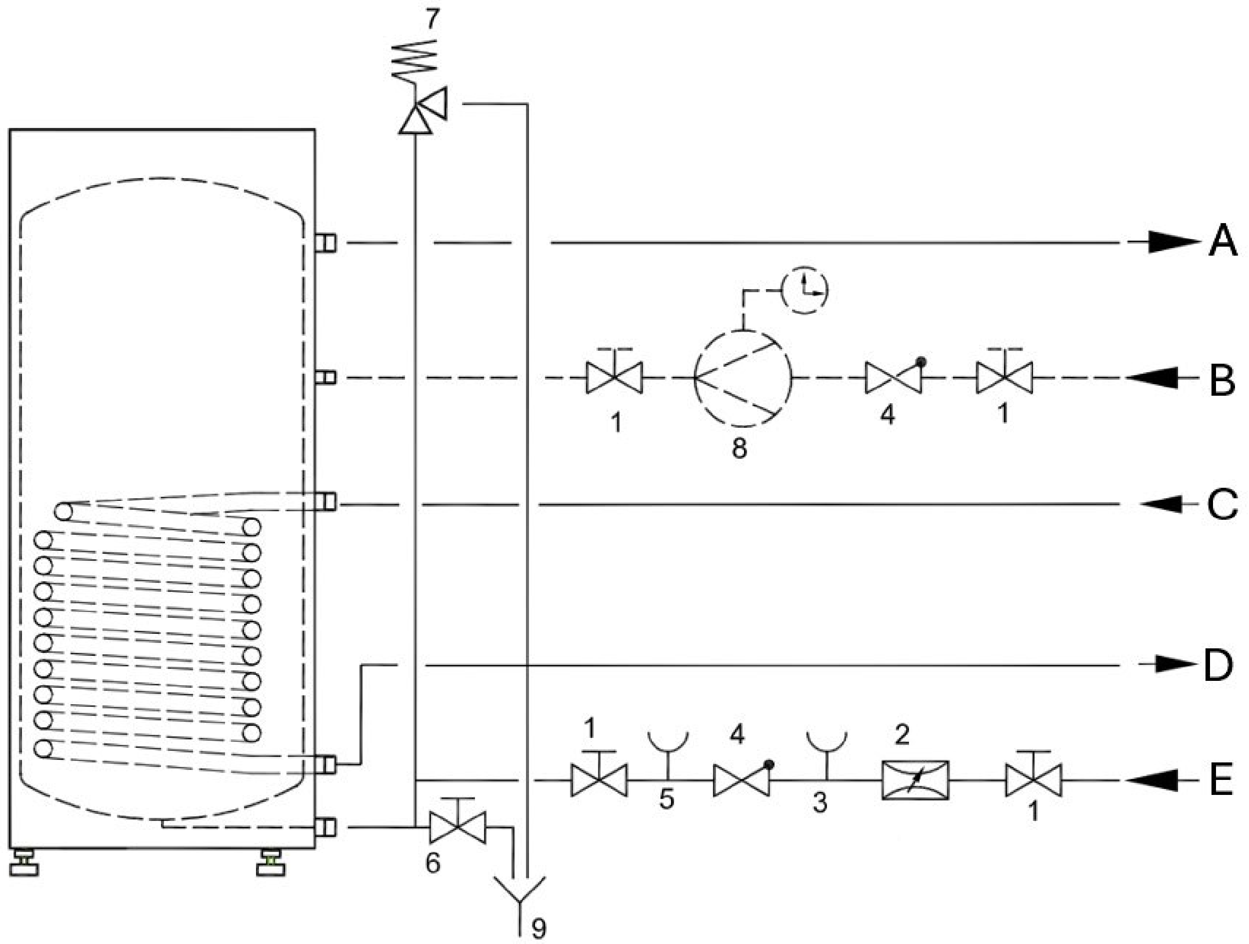
Domestic hot water function +A420 / hot water

Functional description (WPM Econ) Domestic hot water:

Function +A420 / domestic hot water

8.3.3 Domestic hot water cylinder connection

WWSP domestic hot water cylinder connection diagram



1 isolating valve

2 Pressure reducing valve

3 Test valve

4 Backflow preventer

5 Pressure gauge connection piece

A Domestic hot water

B Circulation (if required)

C Heating water flow

D Heating water return

E Cold water connection according to DIN 1988

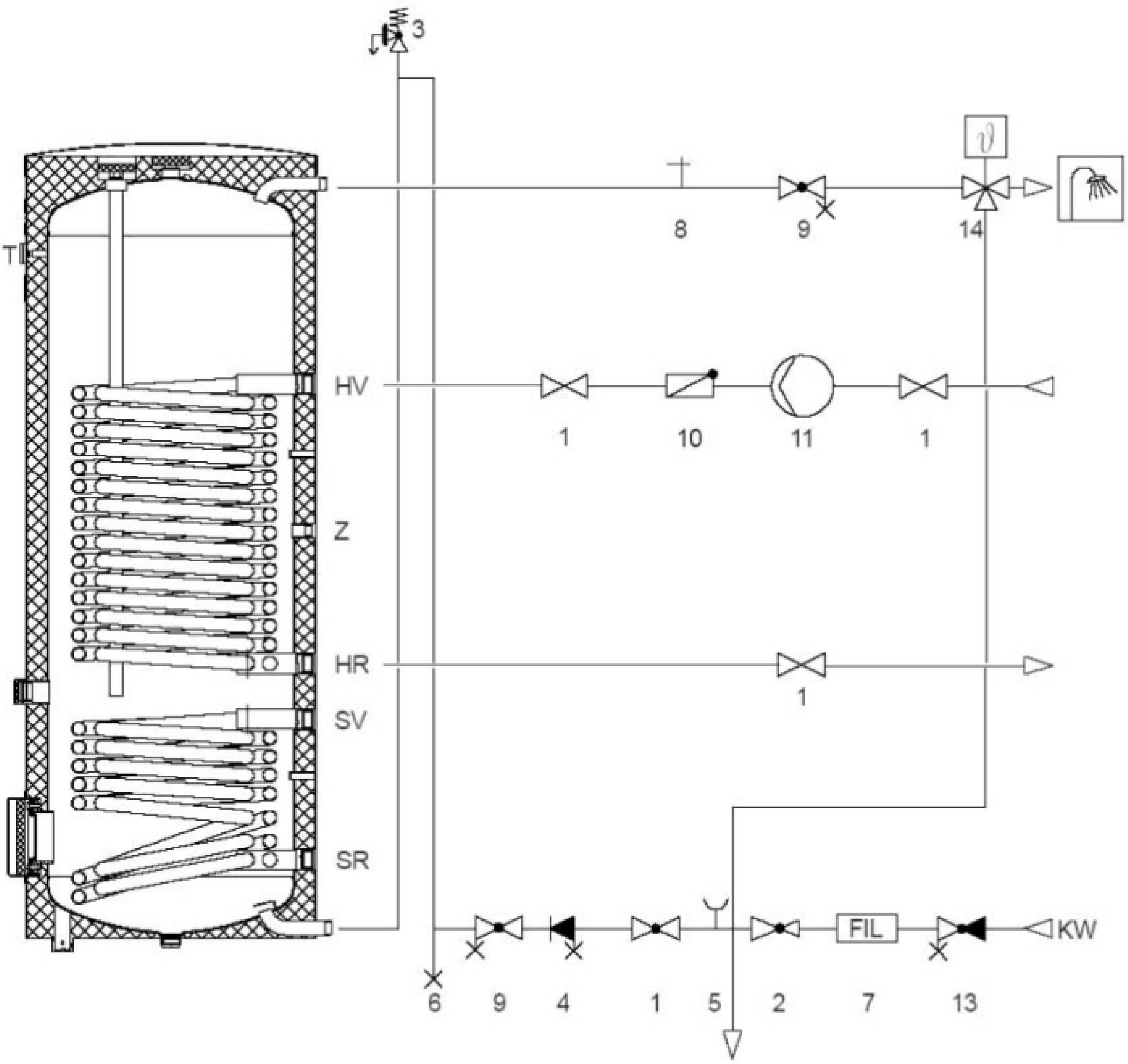
6 Drain valve

7 Safety valve

8 circulation pump

9 Drain

Connection diagram for domestic hot water cylinder with solar WWSP SOL



1 isolating valve

2 Pressure reducing valve

3 Safety valve

4 Backflow preventer with drainage

5 Pressure gauge connection piece

KW Cold water

Z Circulation (only if required) SV Solar

flow

SR Return Solar T

Thermometer

6 Outlet valve

7 Filters

8 Ventilation and purge

9 isolating valve

10 Non-return flap

11 Storage tank charging pump

12 circulation pump
(time-interruptible operation)

13 Globe valve with non-return valve

14 Scald protection in accordance with DIN 806-2 and DVGW-W551

15 Backflow preventer

HV Flow heating HR

Return heating

General

The cold water connection must be made in accordance with DIN 1988 and DIN 4573 Part 1. All connection lines should be connected using screw fittings.

As a circulation pipe causes high standby losses, it should only be connected to a widely branched drinking water network. If circulation is required, it must be equipped with an automatic device to interrupt circulation.

All connection pipes including fittings (except cold water connection) must be protected against heat loss in accordance with the German Energy Saving Ordinance (EnEV). Poorly insulated or uninsulated connection pipes lead to an energy loss that is many times greater than the energy loss of the storage tank.

A check valve must always be provided in the heating water connection to prevent uncontrolled heating up or cooling down of the storage tank.

The blow-off line of the safety valve in the cold water supply line must always remain open. The operational readiness of the safety valve must be checked from time to time by priming it

drainage

A drainage option for the storage tank must be provided on site in the cold water connection pipe.

Pressure reducing valve

If the maximum mains pressure can exceed the permissible operating pressure of 10 bar, a pressure reducing valve in the connection line is mandatory. However, in order to minimise noise generation, the line pressure within buildings should be reduced to an operationally permissible level in accordance with DIN 4709. Depending on the type of building, a pressure reducing valve in the storage tank inlet may be reasonable for this reason.

Safety valve

The system must be equipped with a component-tested safety valve that cannot be shut off from the storage tank. No constrictions, such as dirt traps, may be installed between the storage tank and the safety valve.

When the storage tank is heated up, water must flow (drip) out of the safety valve to compensate for the expansion of the water or to prevent an excessive increase in pressure.

The drain line of the safety valve must flow freely, without any constriction, via a drainage device. The safety valve must be installed in an easily accessible and observable location so that it can be ventilated during operation. A sign should be affixed near or on the valve itself with the words: "Water may escape from the discharge pipe during heating! Do not close!" must be attached.

Only component-tested, spring-loaded diaphragm safety valves may be used.

The blow-off line must be at least the same size as the safety valve outlet cross-section. If more than two bends or a length greater than 2 m are required for compelling reasons, the entire blow-off pipe must be one nominal size larger. More than three bends and a length of 4 metres are not permitted. The discharge line downstream of the collecting funnel must have at least twice the cross-section of the valve inlet. The safety valve must be set so that the permissible operating pressure of 10 bar is not exceeded.

Check valve, test valve

To prevent the heated water from flowing back into the cold water pipe, a check valve (backflow preventer) must be installed. The function can be checked by closing the first isolating valve in the direction of flow and opening the test valve. Except for the water in the short pipe section, no water may flow out of the cold water pipe.

Isolating valves

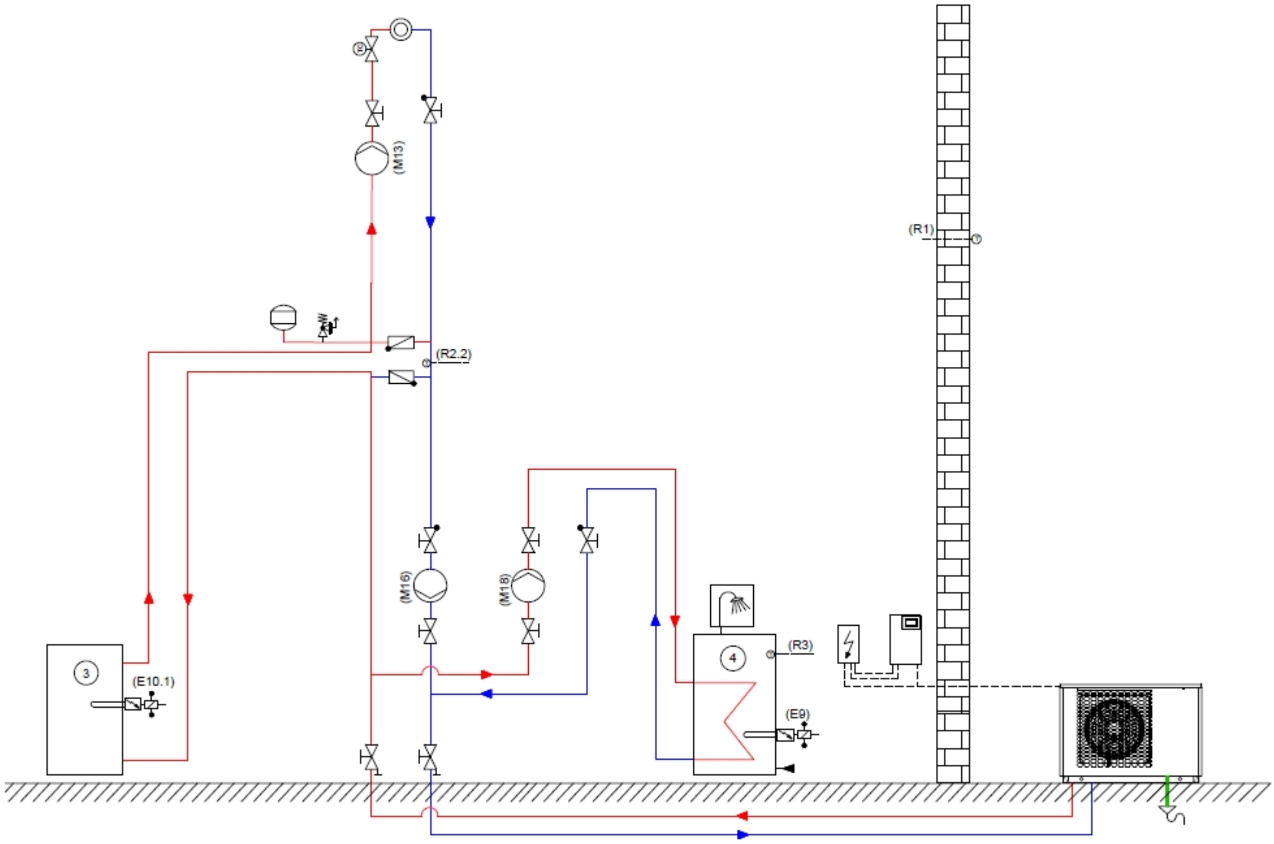
Isolating valves must be installed on the storage tank shown in Fig. 6.1 on p. 8 in the cold and hot water connections as well as the heating water flow and return.

8.3.4 Hydraulic integration of domestic hot water cylinders

Domestic hot water preparation via circulation pump

One pump is used for heating and one for domestic hot water preparation.

> **NOTE**
> Incorrect circulation must be prevented by a tightly closing non-return flap.



Advantages

- Pumps can be designed for optimum water flow, taking into account different pressure drops

Disadvantages

- 2 reversing valves are usually more expensive than a 3-way reversing valve
- Non-return valves can become leaky due to soiling, which leads to incorrect circulation (higher energy consumption and lower drinking water temperature).

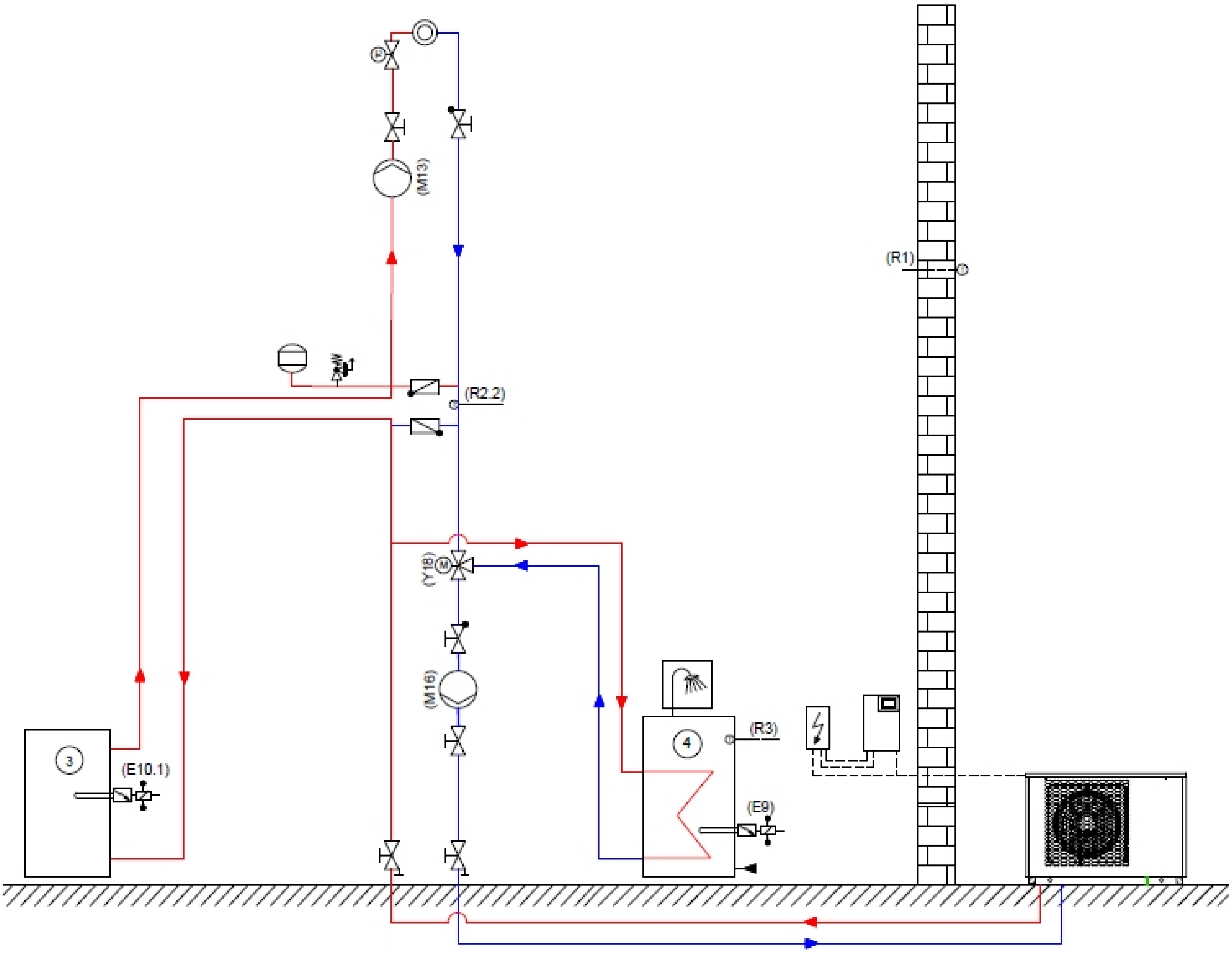
Controller settings

The following settings must be made in the "Settings" menu at installer level:

- M16 for heating → "yes"
- M16 for domestic hot water → "no"

Domestic hot water preparation via 3-way reversing valve

One pump is used for heating and domestic hot water preparation. Domestic hot water preparation takes place via a 3-way reversing valve. The valve is controlled via output (M18)



Advantages

- A high-efficiency circulation pump for heating and domestic hot water preparation
- 3-way reversing valve cheaper than 2 high-efficiency circulators
- Heating and domestic hot water consumer circuits are clearly separated
- Incorrect circulation is excluded

Disadvantages

- Different pressure drops in the consumer circuits result in different water flows
- the additional pressure drop of the 3-way reversing valve must be taken into account when dimensioning the pump

Controller settings

The following settings must be made in the "Settings" menu at installer level:

- M16 for heating → "yes"
- M16 for domestic hot water → "yes"

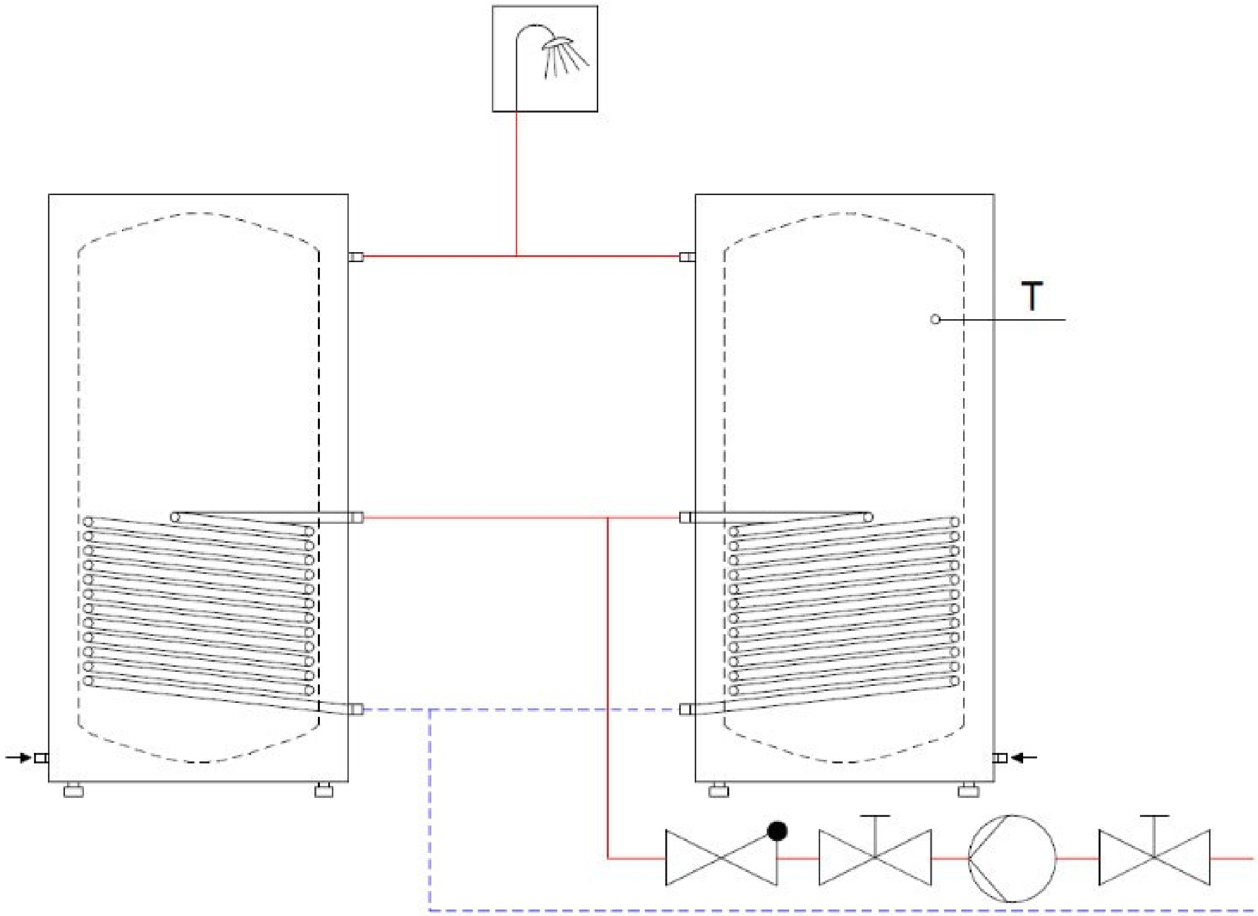
NOTE
When using M13, "M16 function M13" must be selected as the setting

Combination of several domestic hot water cylinders

If there is a high water demand and the heat pump output required as a result, the heat exchanger surface required for this can be realised by connecting the heat exchanger surfaces of domestic hot water cylinders in parallel or in series.

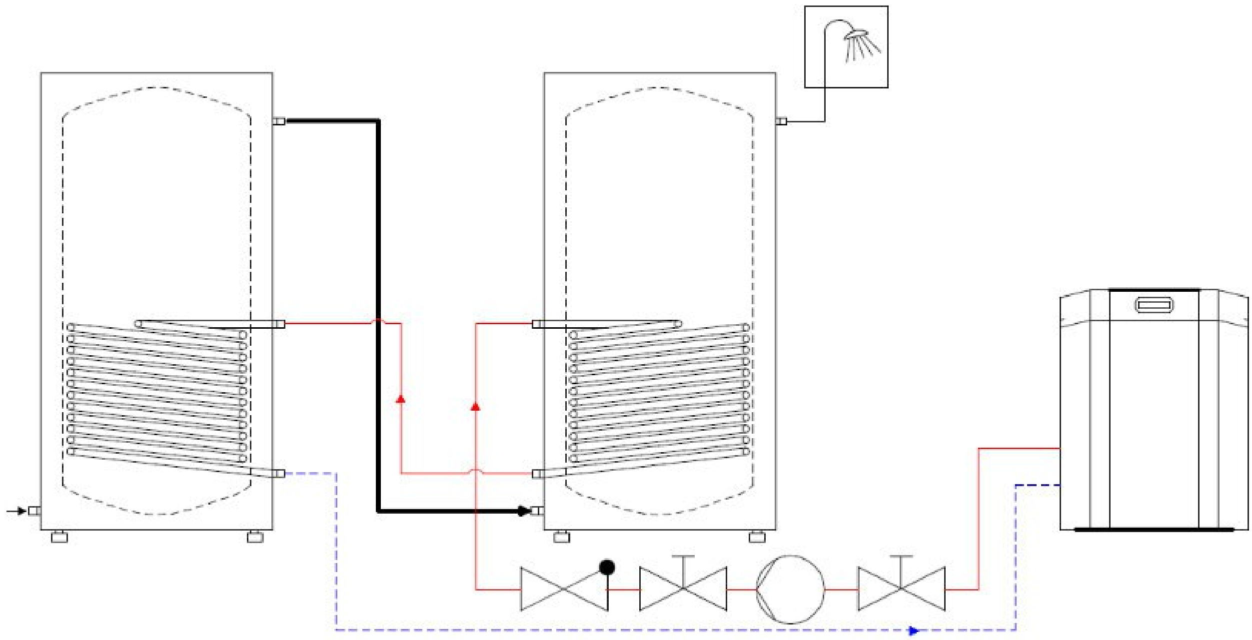
parallel connection

The **parallel connection** is only possible with identically constructed domestic hot water cylinders. When connecting the heat exchangers and the hot water connection, the pipework from the T-piece to both cylinders must have the same pipe diameter and length (Tichelmann principle) in order to evenly distribute the volume flows for charging and discharging with identical pressure drops.



Series connection

When **connecting** domestic hot water cylinders **in series**, it must be taken into account that the heating water is first fed through the cylinder from which the hot drinking water is drawn. In addition, the higher pressure drops compared to parallel connection must be taken into account when designing the domestic hot water circulating pump.



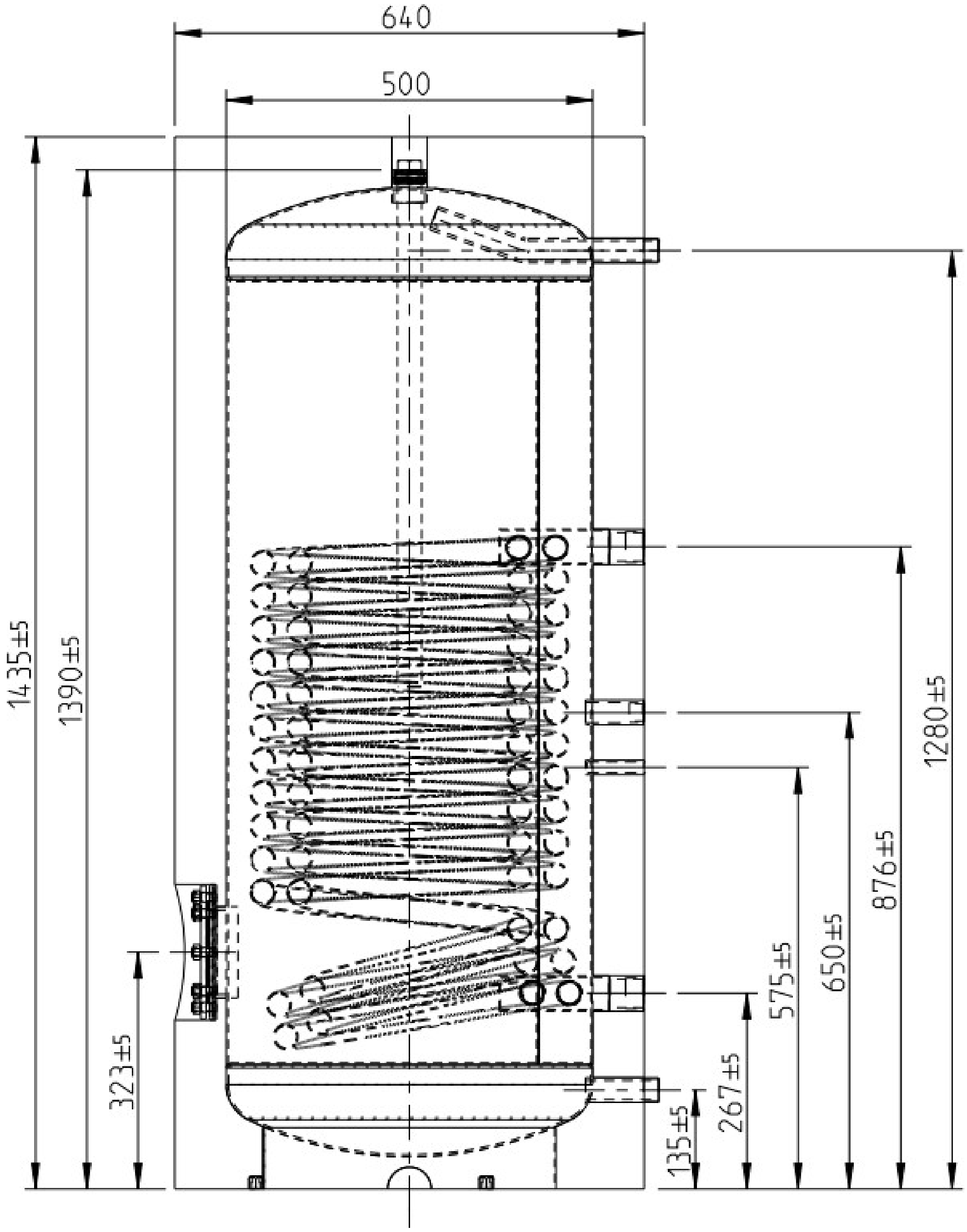
8.3.5 WWSP 229

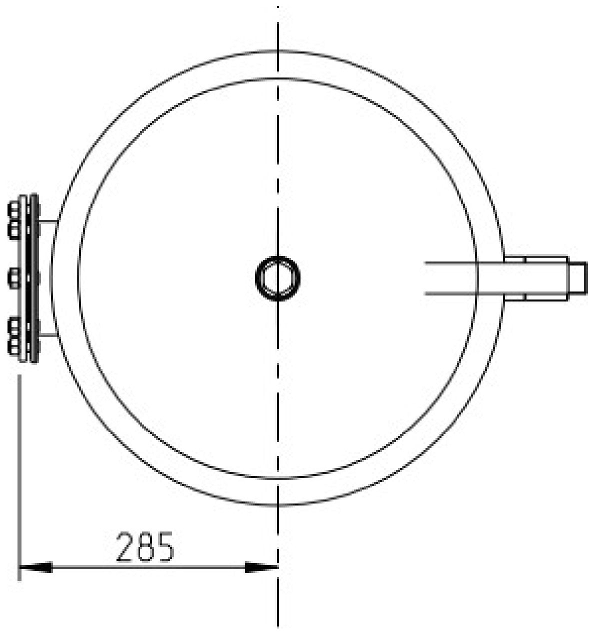
Technical data

Technical data	Unit	WWSP 229
Nominal content	Litres	237
Useful capacity	Litres	212
Heat exchanger surface	m²	2,9
Height	mm	1433
Width	mm	640
Depth	mm	650
tilt dimension	mm	1580
Permissible operating temperature of heating water	°C	110
Permissible operating pressure heating water	bar	10
Permissible operating temperature domestic hot water	°C	95
Permissible operating pressure domestic hot water	bar	10
Connections		
cold water	inch	R 1"
domestic hot water	inch	R 1"

Technical data	Unit	WWSP 229
circulation	inch	G 3/4" FEMALE THREAD
Heating water flow	inch	G 1 1/4" FEMALE THREAD
Heating water return	inch	G 1 1/4" FEMALE THREAD
Flange	-	DN 110 (TK 150) 8 hole
Anode diameter	mm	33
Anode length	mm	685
Anode connection thread	inch	G 1 1/4" FEMALE THREAD

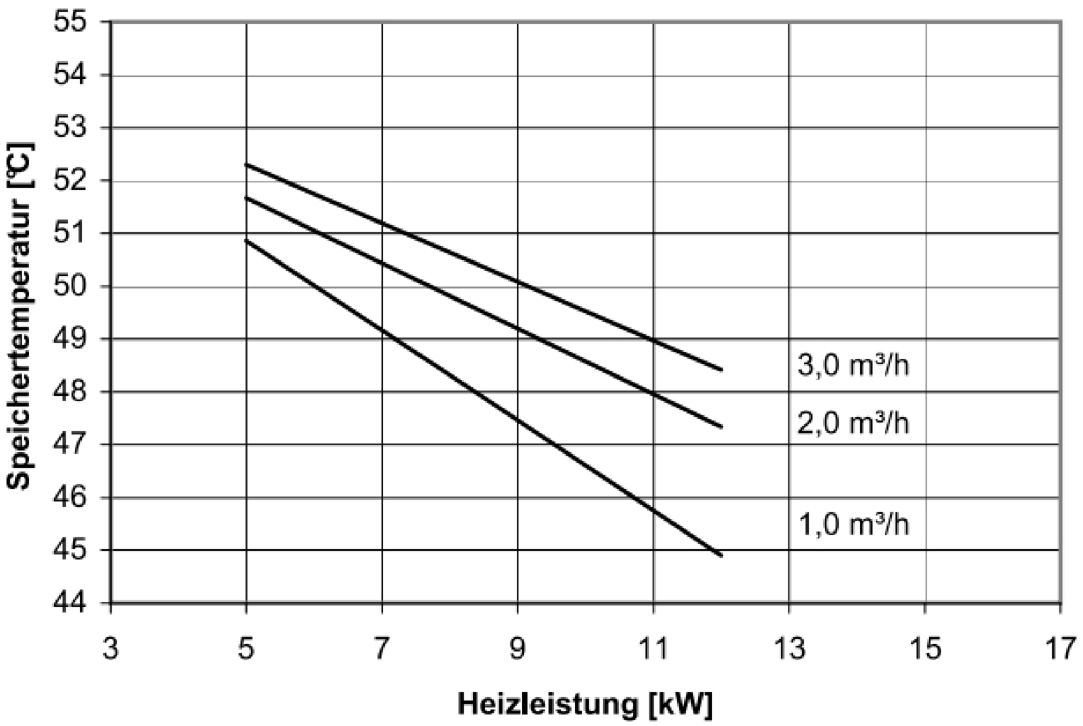
Dimensioned drawing



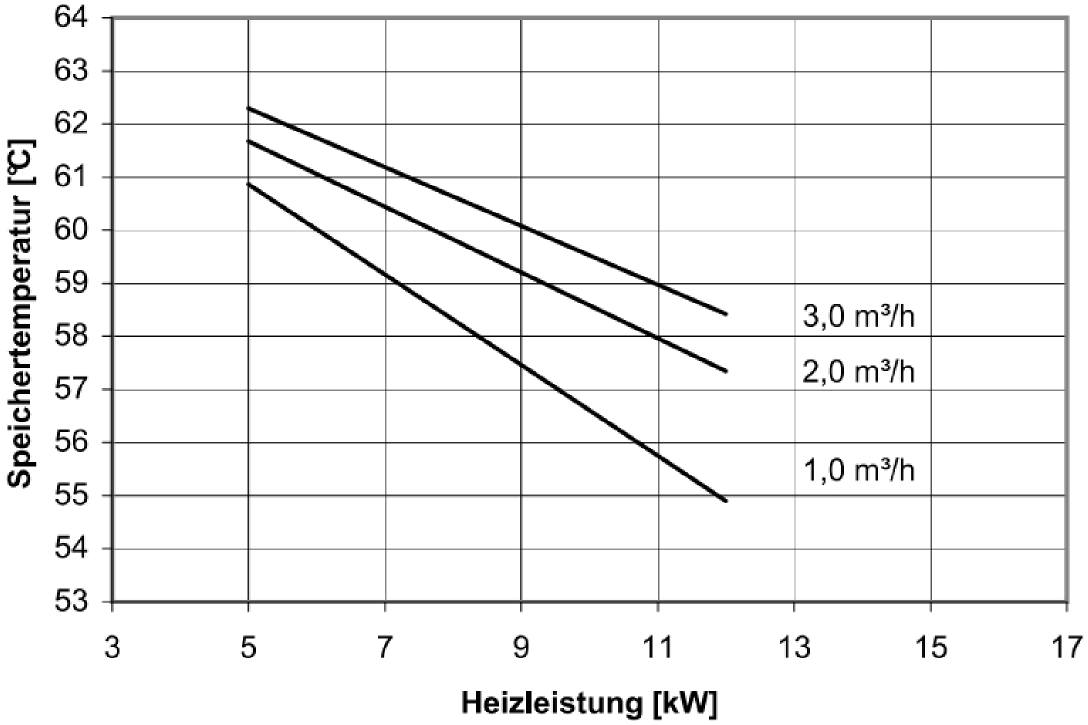


Storage tank temperature diagram

Achievable storage tank temperatures at 55 °C flow temperature

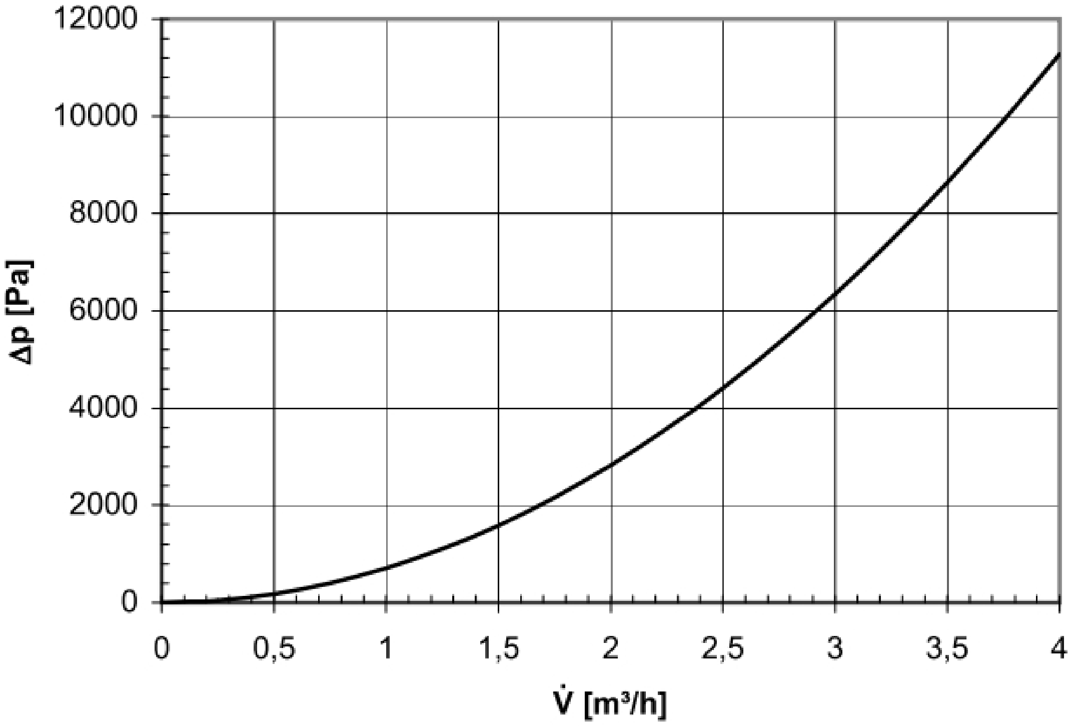


Achievable storage tank temperatures at 65 °C flow temperature



Pressure loss diagram for domestic hot water cylinders:

(twater = 20 °C, pwater = 2 bar)



https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3286499332/connection+domestic hot water cylinder#connection-scheme-hot-water-cylinder-WWSP

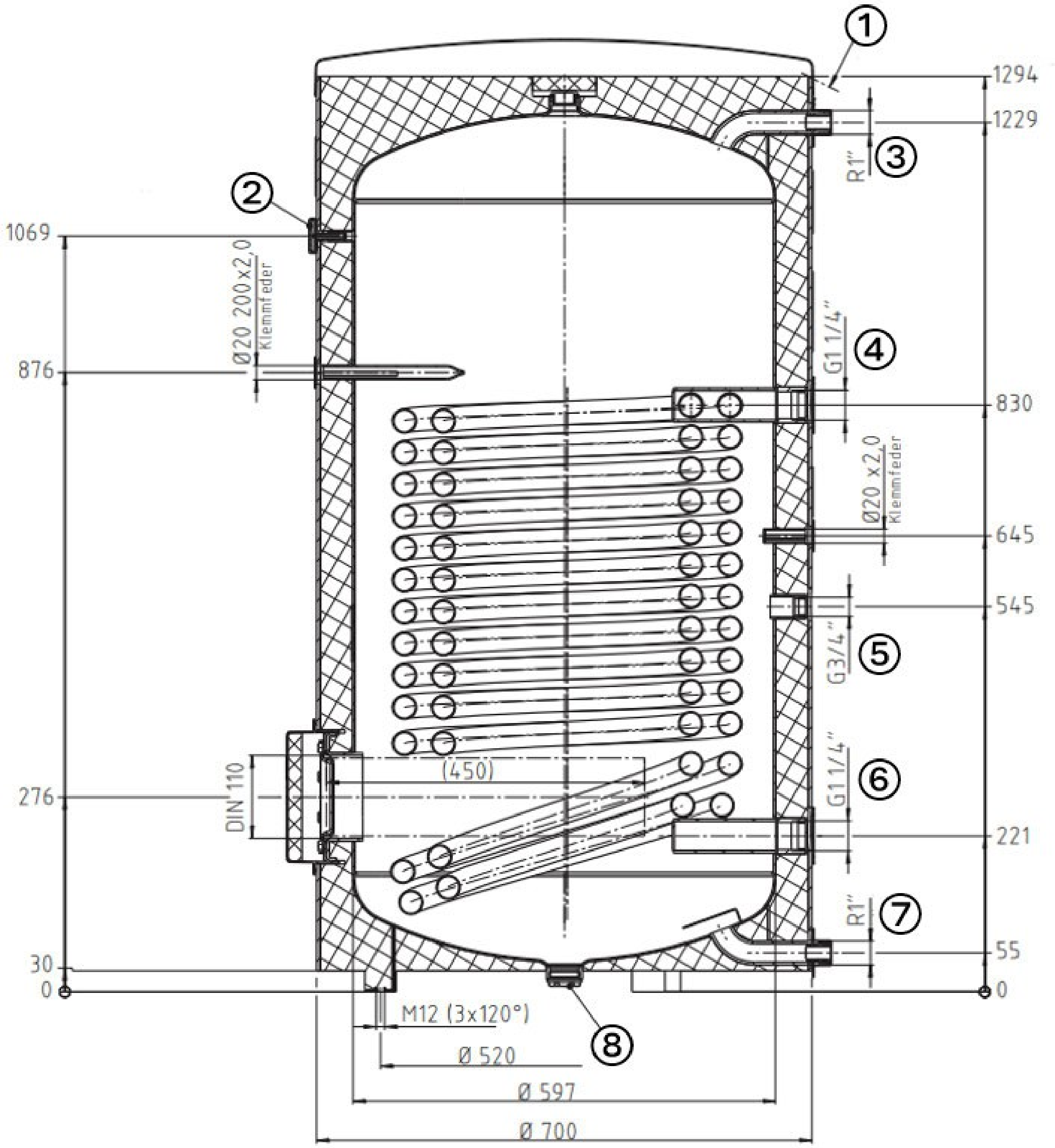
8.3.6 WWSP 335

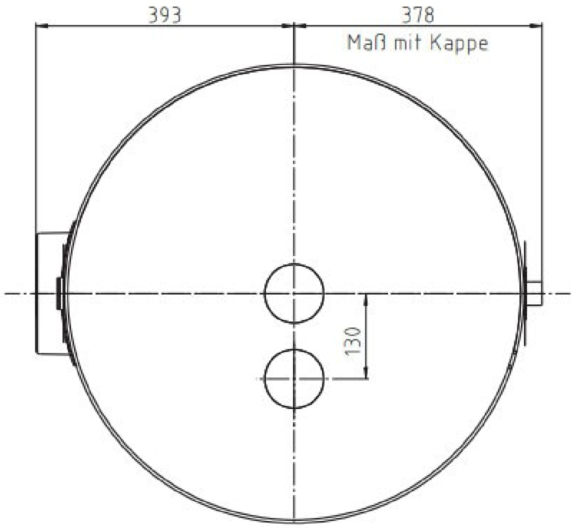
Technical data

Technical data	Unit	WWSP 335
Nominal content	Litres	300
Useful capacity	Litres	273
Heat exchanger surface	m²	3,5
Heat exchanger content	Litres	24
Height	mm	1350
Width	mm	710
Depth	mm	700
Diameter	mm	700
Height without insulation	mm	-
Width without insulation	mm	-
Depth without insulation	mm	-
Diameter without insulation	mm	-
tilt dimension	mm	1438
Permissible operating temperature of heating water	°C	110
Permissible operating pressure heating water	bar	10
Permissible operating temperature domestic hot water	°C	95
Permissible operating pressure domestic hot water	bar	10
Heat loss (room temperature 20 °C; storage tank temperature 65 °C)	kWh/24h	1,66
Energy efficiency class	-/W	B (69 W)
Storage weight (net)	kg	125
Connections		
cold water	inch	R 1"
domestic hot water	inch	R 1"
circulation	inch	G 3/4" FEMALE THREAD

Technical data	Unit	WWSP 335
Heating water flow	inch	G 1 1/4" FEMALE THREAD
Heating water return	inch	G 1 1/4" FEMALE THREAD
Flange	-	DN 110 (TK 150) 8 hole
Anode diameter	mm	33
Anode length	mm	750
Anode connection thread	inch	G 1 1/4" FEMALE THREAD
Immersion sleeve 1.	-	Ø 20 x 200 mm
Connection heights		
cold water	mm	55
domestic hot water	mm	1229
Circulation 1.	mm	545
Circulation 2	mm	-
Sleeve for electric heating element (CEHK)	mm	-
Heating water flow	mm	830
Heating water return	mm	221
Flange	mm	276
Anode	mm	1229 (top)
Immersion sleeve 1.	mm	645
Immersion sleeve 2	mm	876

Dimensioned drawing





① Tilt dimension without tank cover R: 1438mm

② Thermometer

③ Domestic hot water

④ Heating flow

⑤ Circulation

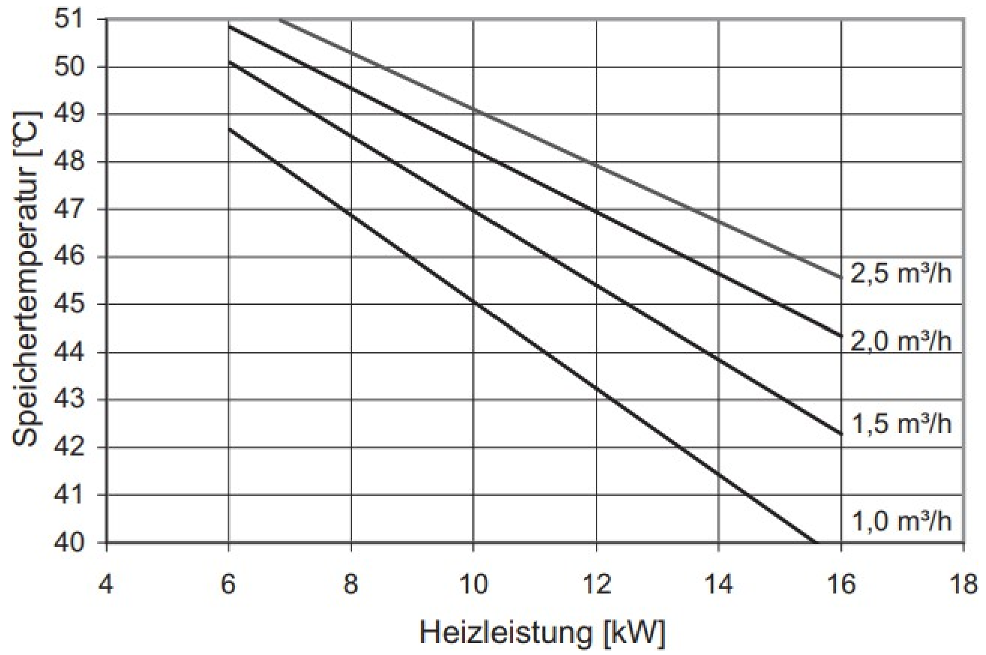
⑥ Heating return

⑦ Cold water

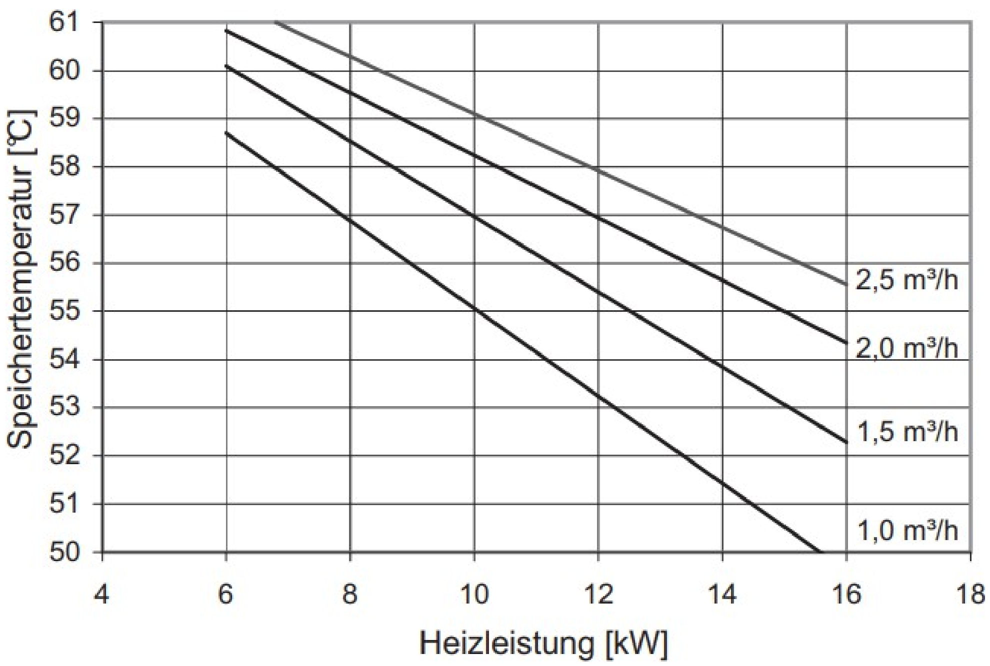
⑧ Plug 11/4"

Storage tank temperature diagram

Achievable storage tank temperatures at 55 °C flow temperature

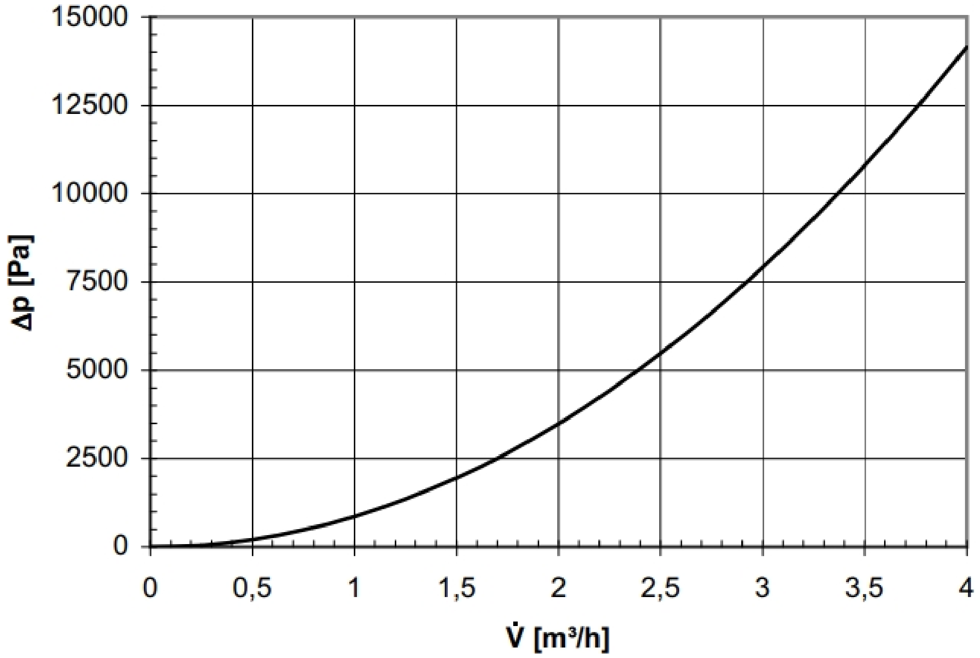


Achievable storage tank temperatures at 65 °C flow temperature



Pressure loss diagram for domestic hot water cylinders:

(twater = 20 °C, pwater = 2 bar)



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connection+domestic hot water cylinder#connection-scheme-hot-water-cylinder-WWSP

8.3.7 WWSP 442

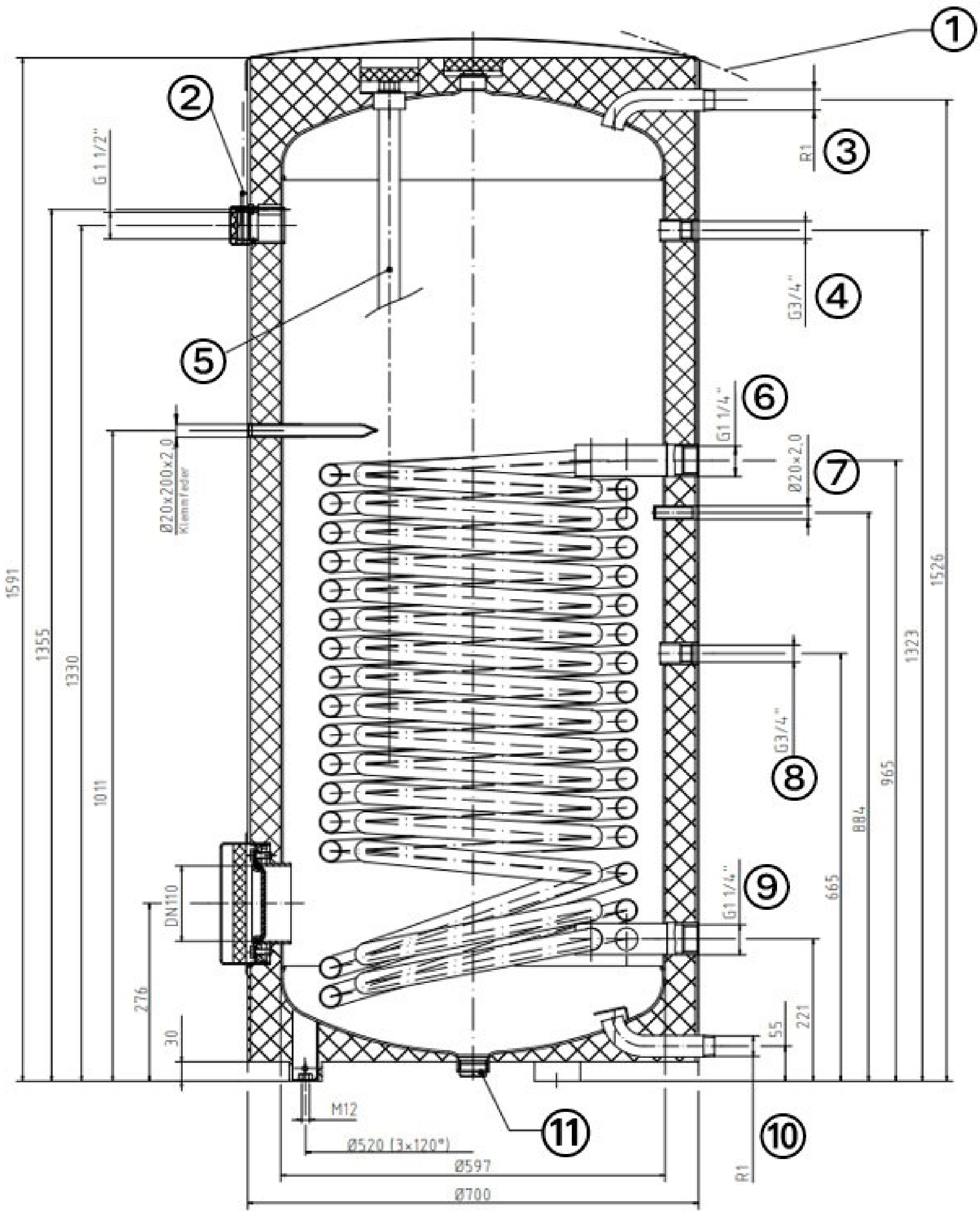
Technical data

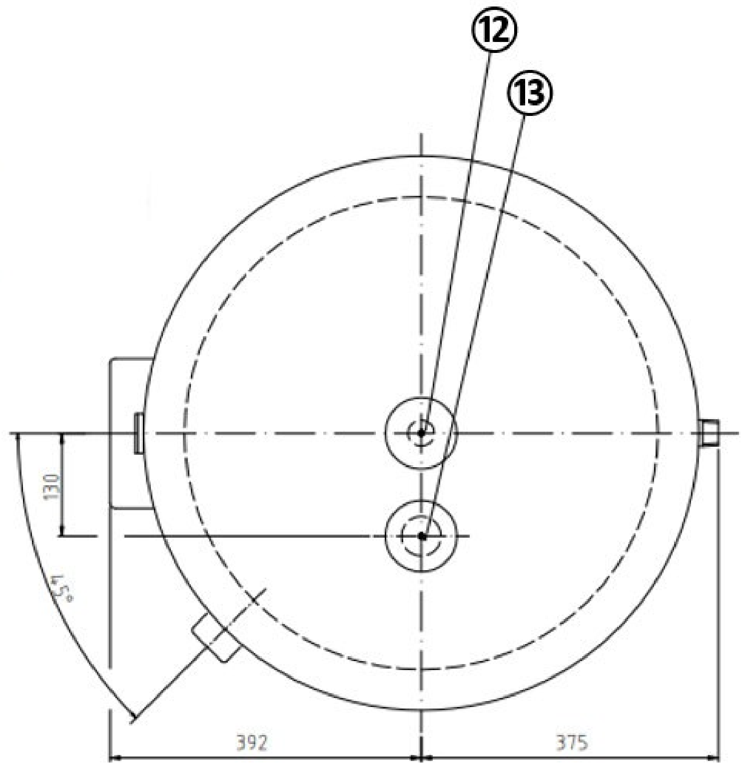
Technical data	Unit	WWSP 442
Nominal content	Litres	400
Useful capacity	Litres	353
Heat exchanger surface	m^2	4,2
Heat exchanger content	Litres	29
Height	mm	1598
Width	mm	710
Depth	mm	700
Diameter	mm	700
Height without insulation	mm	-
Width without insulation	mm	-
Depth without insulation	mm	-
Diameter without insulation	mm	-

Technical data	Unit	WWSP 442
tilt dimension	mm	1715
Permissible operating temperature of heating water	°C	110
Permissible operating pressure heating water	bar	10
Permissible operating temperature domestic hot water	°C	95
Permissible operating pressure domestic hot water	bar	10
Heat loss (room temperature 20 °C; storage tank temperature 65 °C)	kWh/24h	1,99
Energy efficiency class	-/W	C (83 W)
Storage weight (net)	kg	159
Connections		
cold water	inch	R 1"
domestic hot water	inch	R 1"
circulation	inch	G 3/4" female thread (2x)
Heating water flow	inch	G 1 1/4" FEMALE THREAD
Heating water return	inch	G 1 1/4" FEMALE THREAD
Flange	-	DN 110 (TK 150) 8 hole
Anode diameter	mm	33
Anode length	mm	850
Anode connection thread	inch	G 1 1/4" FEMALE THREAD
Immersion sleeve 1.	-	Ø 20 x 200 mm
Connection heights		
cold water	mm	55
domestic hot water	mm	1526
Circulation 1.	mm	665
Circulation 2	mm	1323
Sleeve for electric heating element (CEHK)	mm	1330
Heating water flow	mm	965
Heating water return	mm	221
Flange	mm	276
Anode	mm	1526 (top)

Technical data	Unit	WWSP 442
Immersion sleeve 1.	mm	884
Immersion sleeve 2	mm	1011

Dimensioned drawing





① Tilt dimension without tank cover R: 1711mm

② Thermometer

③ Domestic hot water

④ Circulation

⑤ Anode 11/4"

⑥ Heating flow

⑦ Sensors

⑧ Circulation

⑨ Heating return

⑩ Cold water

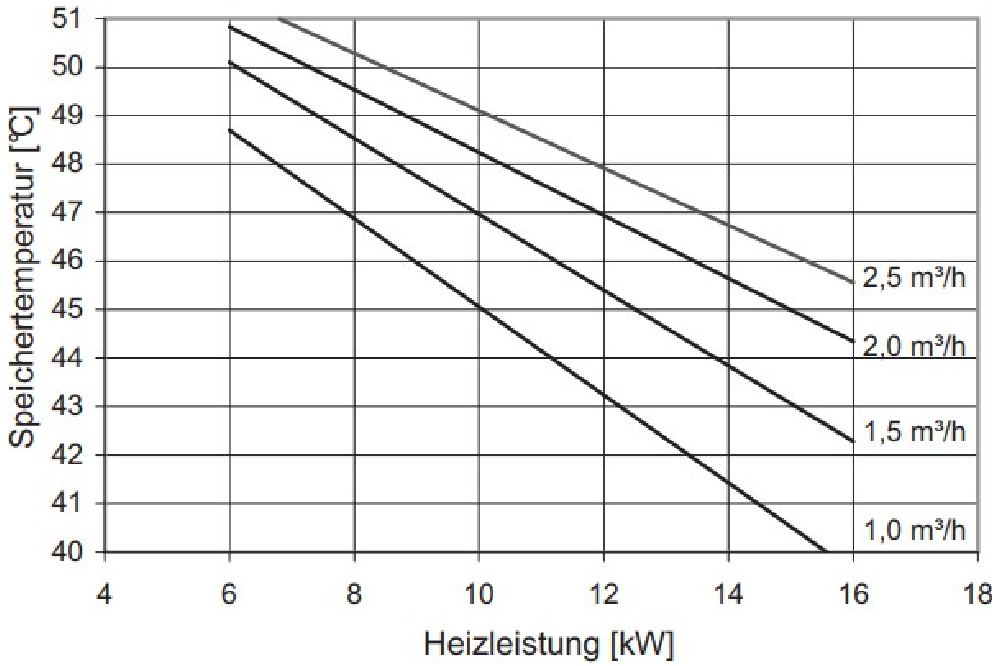
⑪ Plug 11/4"

⑫ Plug 1"

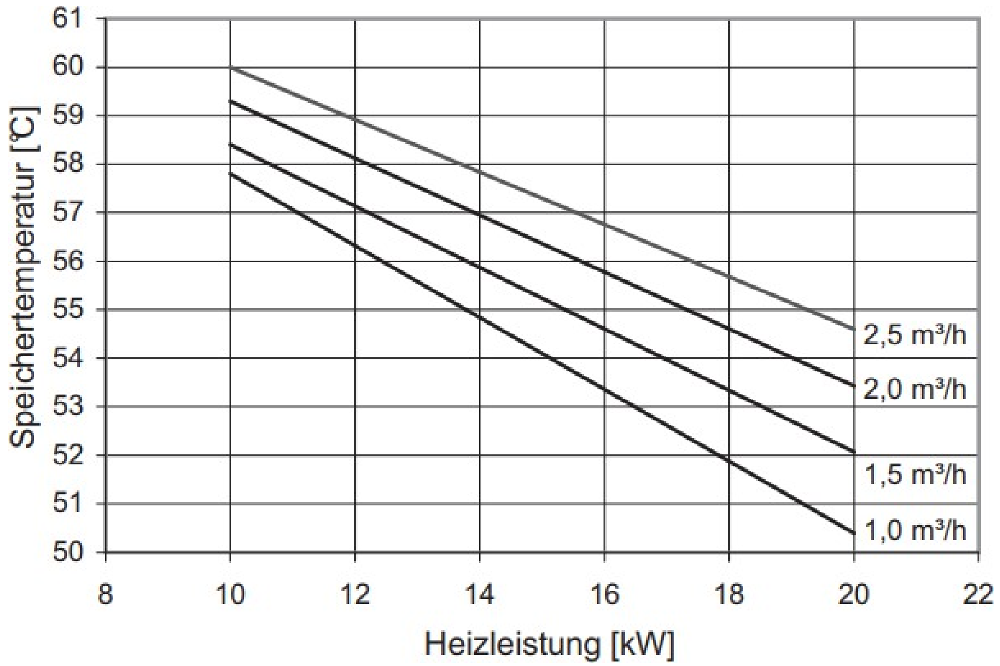
⑬ Anode Ø33 insulated

Storage tank temperature diagram

Achievable storage tank temperatures at 55 °C flow temperature

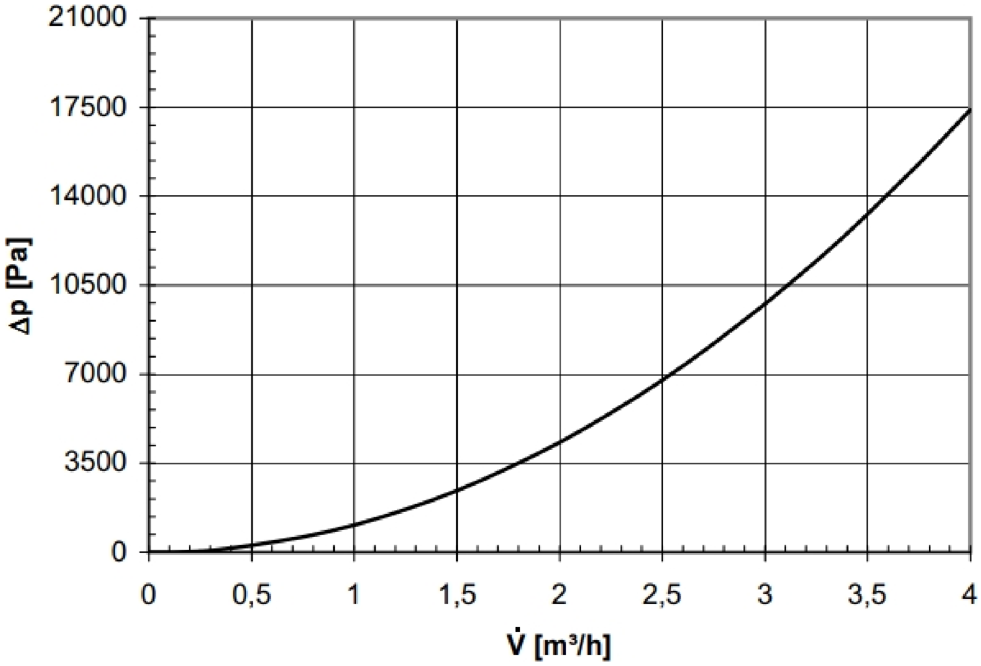


Achievable storage tank temperatures at 65 °C flow temperature



Pressure loss diagram for domestic hot water cylinders:

(twater = 20 °C, pwater = 2 bar)



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8.3.8 WWSP 556

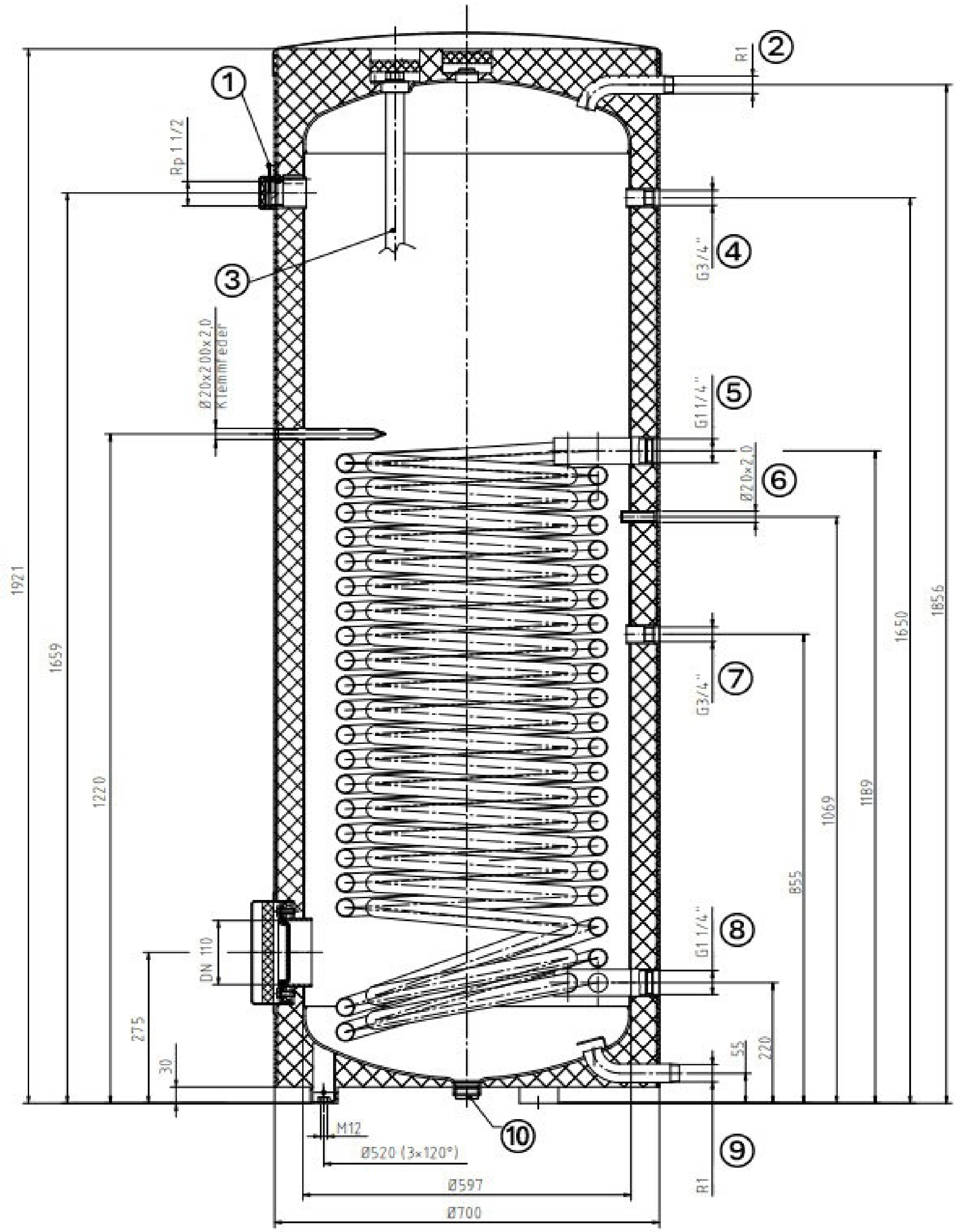
Technical data

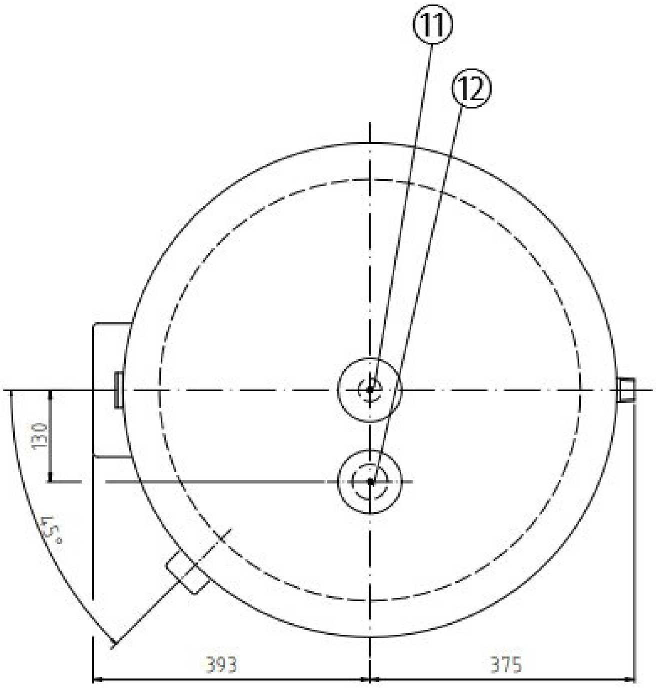
Technical data	Unit	WWSP 556
Nominal content	Litres	500
Useful capacity	Litres	433
Heat exchanger surface	m²	5,65
Heat exchanger content	Litres	42
Height	mm	1925
Width	mm	710
Depth	mm	700
Diameter	mm	700
Height without insulation	mm	-
Width without insulation	mm	-
Depth without insulation	mm	-
Diameter without insulation	mm	-

Technical data	Unit	WWSP 556
tilt dimension	mm	2050
Permissible operating temperature of heating water	°C	110
Permissible operating pressure heating water	bar	10
Permissible operating temperature domestic hot water	°C	95
Permissible operating pressure domestic hot water	bar	10
Heat loss (room temperature 20 °C; storage tank temperature 65 °C)	kWh/24h	2,26
Energy efficiency class	-/W	C (94 W)
Storage weight (net)	kg	180
Connections		
cold water	inch	R 1"
domestic hot water	inch	R 1"
circulation	inch	G 3/4" female thread (2x)
Heating water flow	inch	G 1 1/4" FEMALE THREAD
Heating water return	inch	G 1 1/4" FEMALE THREAD
Flange	-	DN 110 (TK 150) 8 hole
Anode diameter	mm	33
Anode length	mm	1100
Anode connection thread	inch	G 1 1/4" FEMALE THREAD
Immersion sleeve 1.	-	Ø 20 x 200 mm
Connection heights		
cold water	mm	55
domestic hot water	mm	1856
Circulation 1.	mm	855
Circulation 2	mm	1650
Sleeve for electric heating element (CEHK)	mm	1659
Heating water flow	mm	1189
Heating water return	mm	220
Flange	mm	275
Anode	mm	1856 (top)

Technical data	Unit	WWSP 556
Immersion sleeve 1.	mm	1069
Immersion sleeve 2	mm	1220

Dimensioned drawing





Thermometer

② Domestic hot water

③ Anode 11/4"

④ Circulation

⑤ Heating flow

⑥ Sensors

⑦ Circulation

⑧ Heating return

⑨ Cold water

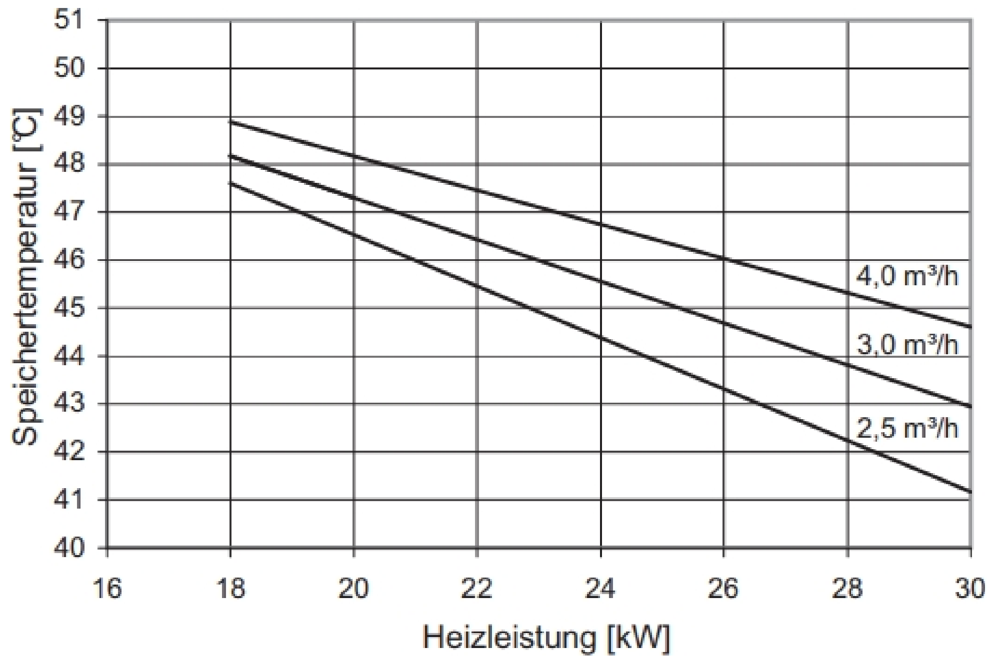
⑩ Plug 11/4"

⑪ Plug 1"

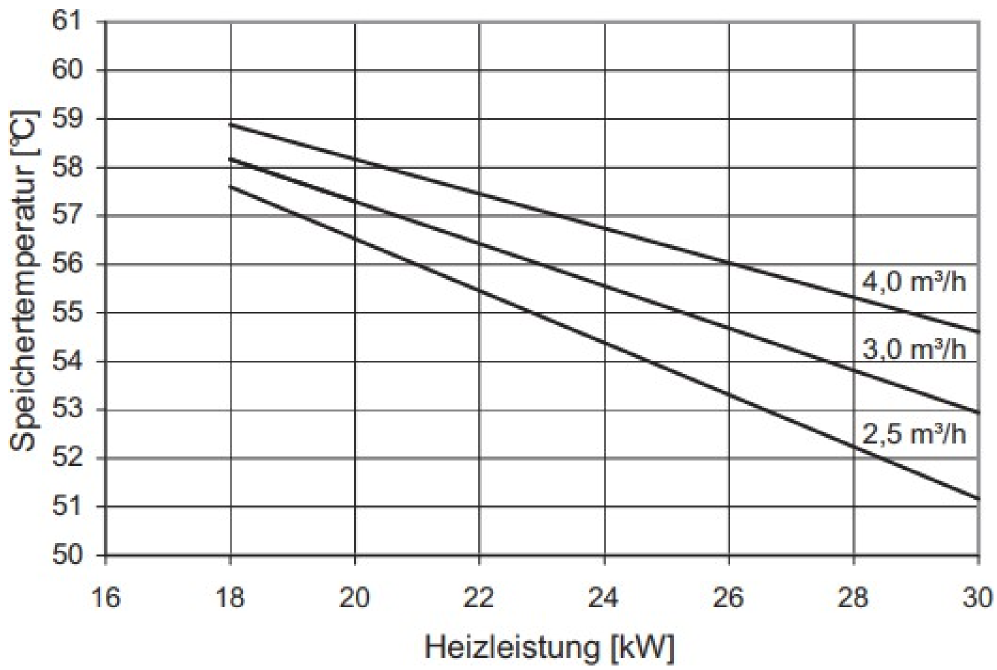
⑫ Anode Ø33 insulated

Storage tank temperature diagram

Achievable storage tank temperatures at 55 °C flow temperature

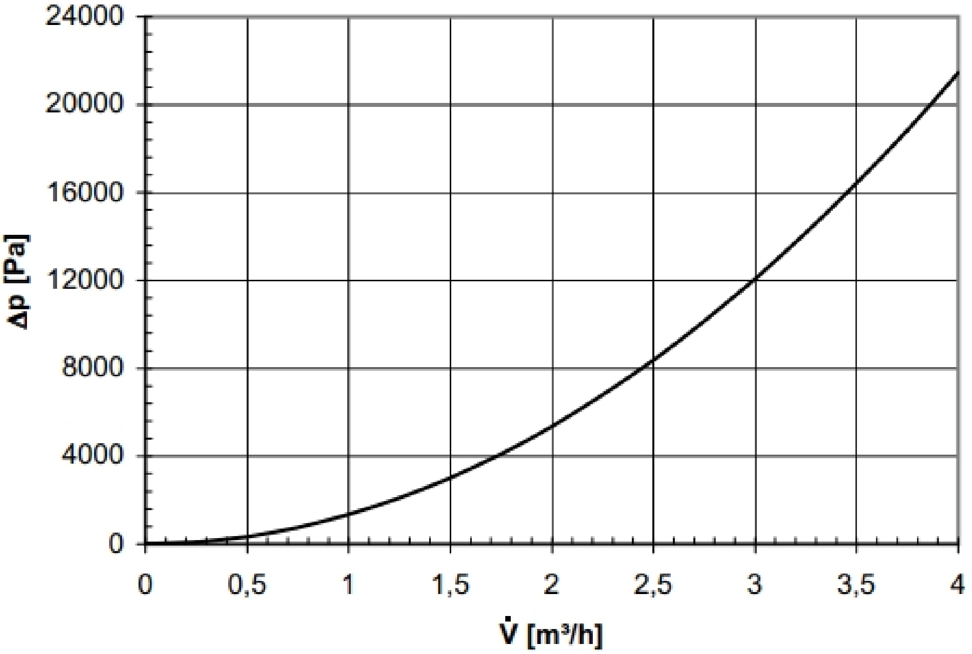


Achievable storage tank temperatures at 65 °C flow temperature



Pressure loss diagram for domestic hot water cylinders:

(twater = 20 °C, pwater = 2 bar)



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8.3.9 WWSP 770

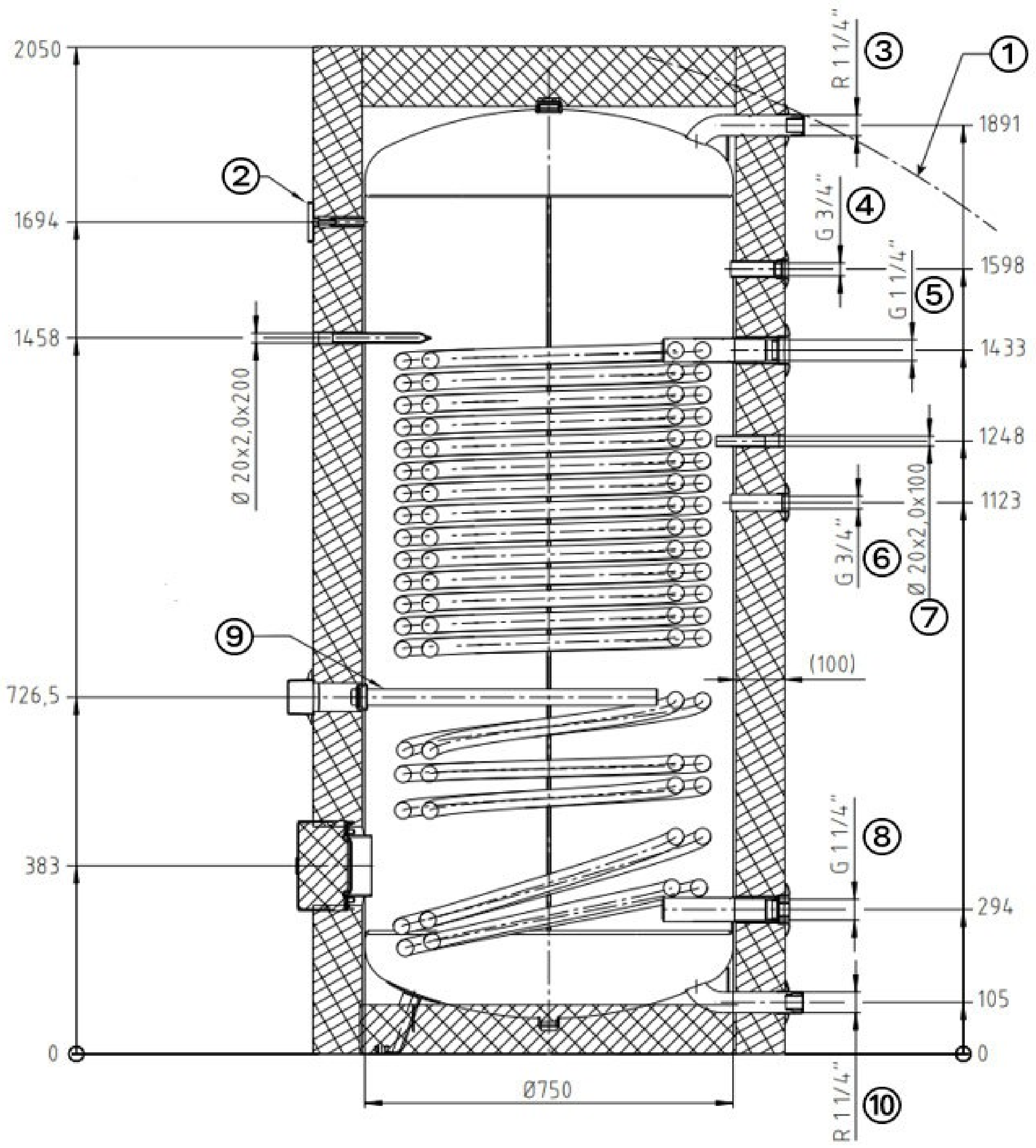
Technical data

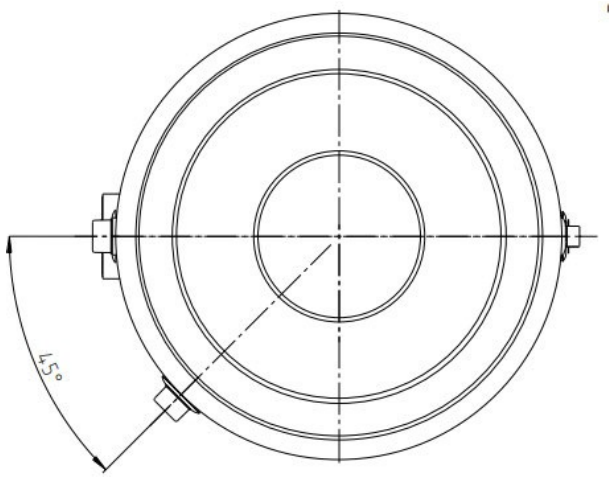
Technical data	Unit	WWSP 770
Nominal content	Litres	700
Useful capacity	Litres	691
Heat exchanger surface	m^2	7,00
Heat exchanger content	Litres	49
Height	mm	2050
Width	mm	1000
Depth	mm	1000
Diameter	mm	1000
Height without insulation	mm	1900
Width without insulation	mm	790
Depth without insulation	mm	750
Diameter without insulation	mm	750

Technical data	Unit	WWSP 770
tilt dimension	mm	2107 (without D.)
Permissible operating temperature of heating water	°C	110
Permissible operating pressure heating water	bar	10
Permissible operating temperature domestic hot water	°C	95
Permissible operating pressure domestic hot water	bar	10
Heat loss (room temperature 20 °C; storage tank temperature 65 °C)	kWh/24h	3,00
Energy efficiency class	-/W	C (125 W)
Storage weight (net)	kg	247
Connections		
cold water	inch	R 11/4"
domestic hot water	inch	R 11/4"
circulation	inch	G 3/4" female thread (2x)
Heating water flow	inch	G 1 1/4" FEMALE THREAD
Heating water return	inch	G 1 1/4" FEMALE THREAD
Flange	-	DN 110 (TK 150) 8 hole
Anode diameter	mm	33
Anode length	mm	590
Anode connection thread	inch	G 1 1/4" FEMALE THREAD
Immersion sleeve 1.	-	Ø 20 x 200 mm
Connection heights		
cold water	mm	105
domestic hot water	mm	1891
Circulation 1.	mm	1123
Circulation 2	mm	1598
Sleeve for electric heating element (CEHK)	mm	1676
Heating water flow	mm	1433
Heating water return	mm	294
Flange	mm	383
Anode	mm	727 (lateral)

Technical data	Unit	WWSP 770
Immersion sleeve 1.	mm	1123
Immersion sleeve 2	mm	1458

Dimensioned drawing





① Tilt dimension (without insulation): 2107 mm

② Thermometer

③ Domestic hot water

④ Circulation

⑤ Heating flow

⑥ Circulation

⑦ Sensors

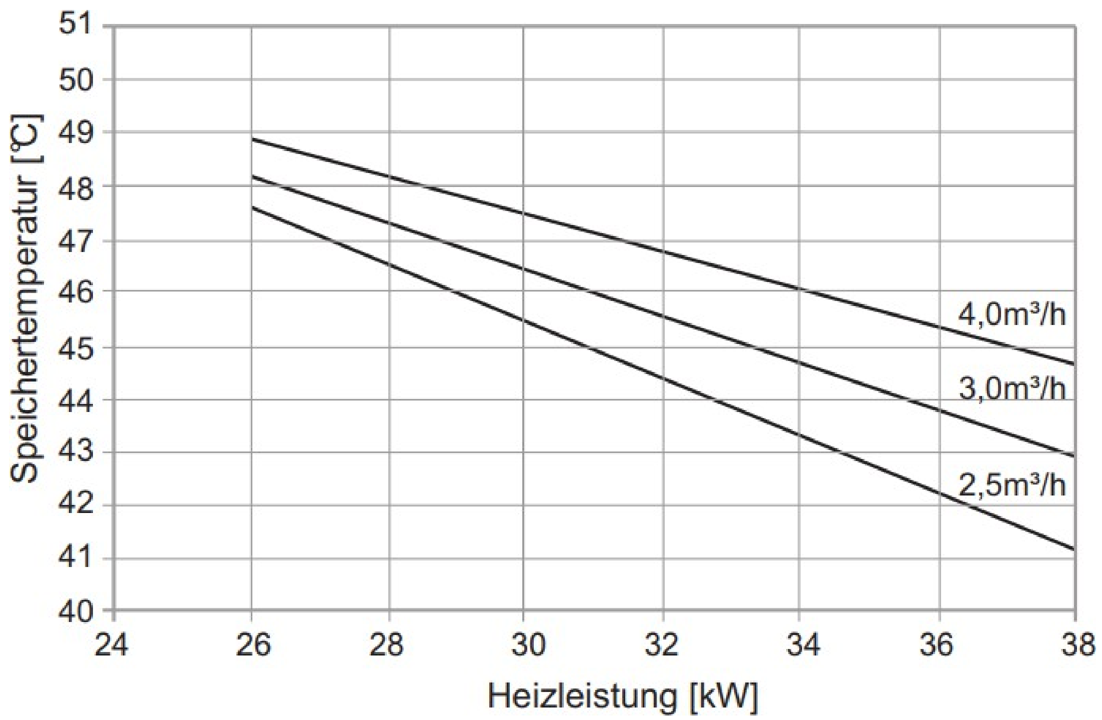
⑧ Heating return

⑨ Anode 11/4" x 590

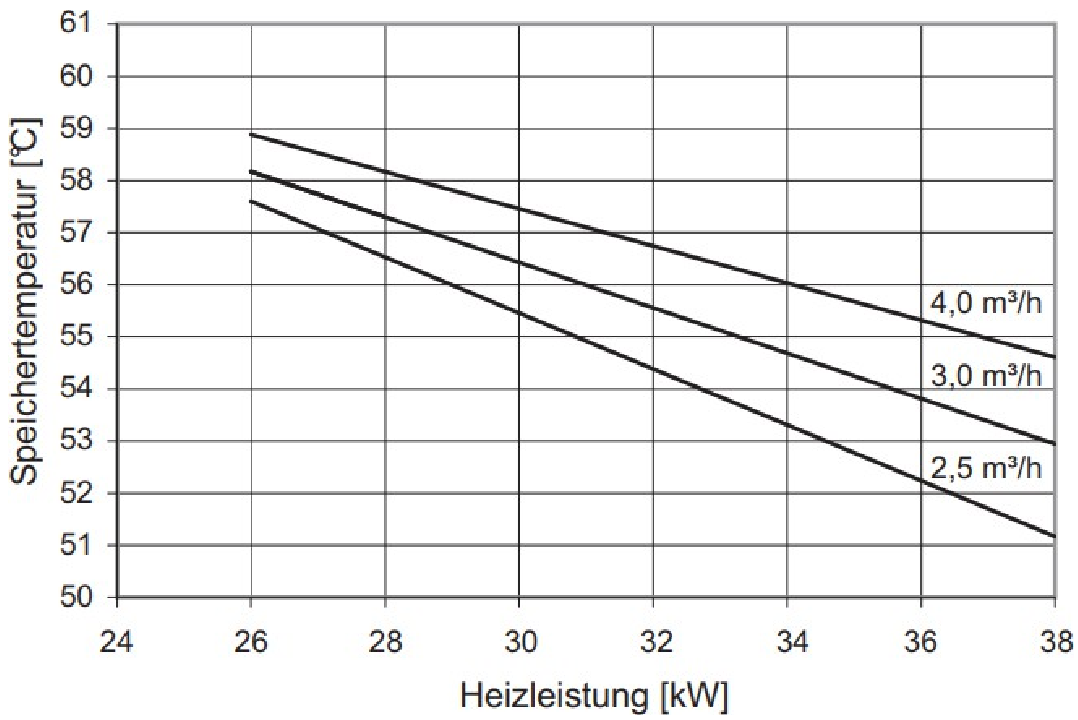
⑩ Cold water

Storage tank temperature diagram

Achievable storage tank temperatures at 55 °C flow temperature

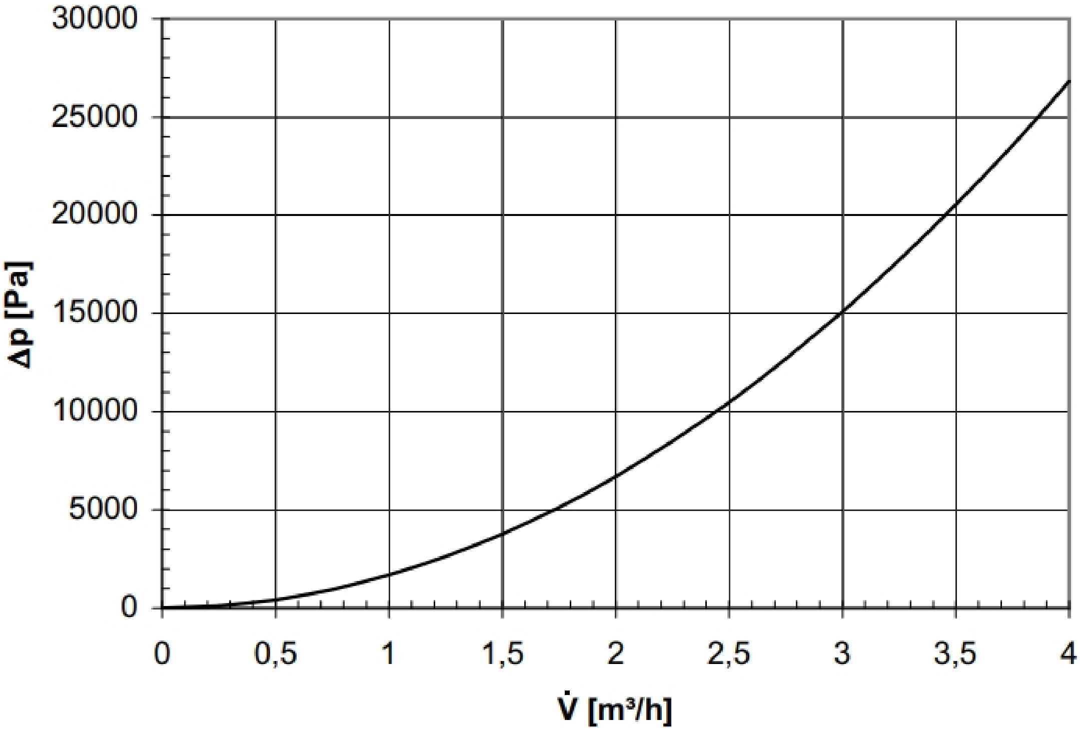


Achievable storage tank temperatures at 65 °C flow temperature



Pressure loss diagram for domestic hot water cylinders:

(twater = 20 °C, pwater = 2 bar)



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connection+domestic hot water cylinder#connection-scheme-hot-water-cylinder-WWSP

8.3.10 WWSP 432 SOL

Technical data

Technical data	Unit	WWSP 432 SOL
Nominal content	Litres	363
Useful capacity	Litres	346
Heat exchanger surface heating water	m²	3,2
Solar heat exchanger surface	m²	1,3
Height	mm	1631
Diameter	mm	700
Storage weight (packed)	kg	182
Connections		
Solar flow	inch	1 1/4" FEMALE THREAD

Technical data	Unit	WWSP 432 SOL
Return solar	inch	1 1/4" FEMALE THREAD
cold water	inch	1" EXTERNAL THREAD
domestic hot water	inch	1" EXTERNAL THREAD
circulation	inch	3/4" FEMALE THREAD
Heating water flow	inch	1 1/4" FEMALE THREAD
Heating water return	inch	1 1/4" FEMALE THREAD
Flange	-	DN 110 (TK 150) 8 hole
Sensor sleeve	mm	Ø20x2x60
Anode diameter	mm	33
Anode length	mm	750
Anode connection thread	inch	1 1/4" FEMALE THREAD
Permissible operating temperature of heating water	°C	110
Permissible operating overpressure heating water	bar	10
Permissible operating temperature drinking water	°C	95
Permissible operating overpressure drinking water	bar	10
Permissible operating temperature Solar	°C	110
Permissible operating overpressure Solar	bar	10

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8.3.11 WWSP 540 SOL

Technical data

Technical data	Unit	WWSP 540 SOL
Nominal content	Litres	448
Useful capacity	Litres	427
Heat exchanger surface heating water	m^2	4,0
Solar heat exchanger surface	m^2	1,6
Height	mm	1961
Diameter	mm	700
Storage weight (packed)	kg	218

Technical data	Unit	WWSP 540 SOL
Connections		
Solar flow	inch	1 1/4" FEMALE THREAD
Return solar	inch	1 1/4" FEMALE THREAD
cold water	inch	1" EXTERNAL THREAD
domestic hot water	inch	1" EXTERNAL THREAD
circulation	inch	3/4" FEMALE THREAD
Heating water flow	inch	1 1/4" FEMALE THREAD
Heating water return	inch	1 1/4" FEMALE THREAD
Flange	-	DN 110 (TK 150) 8 hole
Sensor sleeve	mm	Ø20x2x60
Anode diameter	mm	33
Anode length	mm	1060
Anode connection thread	inch	1 1/4" FEMALE THREAD
Permissible operating temperature of heating water	°C	110
Permissible operating overpressure heating water	bar	10
Permissible operating temperature drinking water	°C	95
Permissible operating overpressure drinking water	bar	10
Permissible operating temperature Solar	°C	110
Permissible operating overpressure Solar	bar	10

https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3286499332/ Connection+domestic hot water cylinder#Connection-scheme-hot-water-cylinder-with-solar-WWSP-SOL

8.3.12 Flange heater FLH(U)

Function

Flange heater for domestic hot water cylinders for reheating and thermal disinfection.

As the main heating system for electrically heated domestic hot water preparations, flange heaters are maintenance-free. It is only reasonable to remove scale from the radiators at certain intervals if the water is very calcareous.

The user can preselect the desired temperature on the control knob. The heating is automatically switched on by the temperature controller during the heating-up time (set by the responsible utility company) and switched off again once the desired storage tank water temperature has been reached.

If the water temperature drops, e.g. due to water withdrawal or natural cooling, the appliance heater switches on again until the preselected storage tank water temperature is reached.

Technical data

		FLH 25M	FLH 60	FLHU 70	FLH 90
Rated power	kW	2,5	6,0	2,0 / 2,7 / 4,0	9,0
nominal voltage	V	~230	3 ~ 400	3 ~ 400	3 ~ 400
Number of radiators	-	1	3	3	3
Switching group	kW	2,5	6,0	2,0 / 2,7 / 4,0	9,0
Immersion depth	mm	370	370	370	450
Heated length	mm	265	265	265	345
Horizontal mounting option	-	x	x	x	x
Flange Ø	mm	180	180	180	180
DVGW/KTW-Authorisation	-	x	x	x	x
VDE test mark	-	x	x	x	x

Operation and temperature setting

The water temperature in the cylinder can be adjusted to suit your hot water requirements using the temperature selector or the three marked main settings.

This enables **energy-efficient** operation of the built-in heating system:

The temperature control knob on the electric heater has four marked main levels to aid adjustment:

Position: ✶ Frost protection for the storage tank

Position: ◁ approx. **40°C**, lukewarm storage water

Position: --ca . **60°C**, moderately hot storage water.
This position is recommended to prevent **accidental scalding** with excessively hot water.
With this setting, the appliance operates particularly economically. Heat losses are low and scale formation is largely avoided.
Low standby energy consumption.

Position: ---approx. **85°C**, hot storage water.

> ⚠ **CAUTION**
> The left stop of the control knob does not correspond to a zero position or does not result in the appliance heating being switched off.

Installation and safety instructions

During operation, the electric heating element and sensor protection tube must be completely surrounded by water. The thermally induced water flow must not be obstructed.

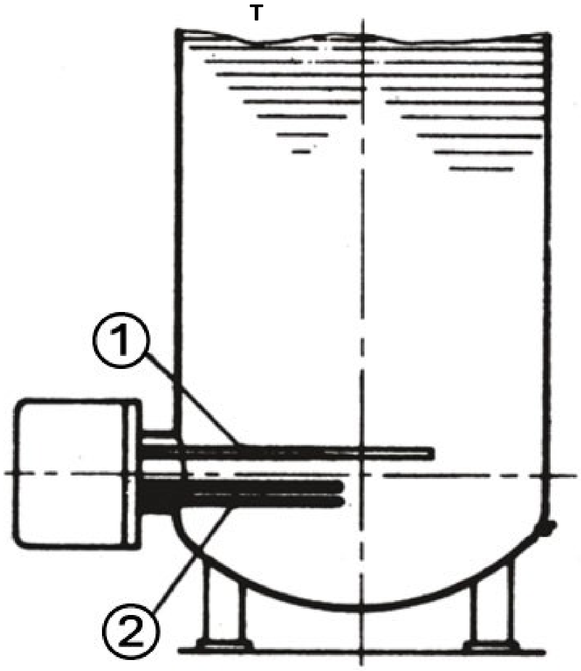
The built-in heater is equipped with a safety temperature limiter, which switches off further heating of the appliance at a maximum water temperature of 95°C. In accordance with the DIN EN 60335-2-21 standard, the maximum water temperature may be +20°C higher (→115°C) and therefore also has an influence on all the following "components".

> **NOTE**
> It must be ensured that water can drip from the drain pipe of the pressure relief device and that this pipe is left open to the atmosphere; the pressure relief device must be operated regularly to remove limescale deposits and to ensure that it is not blocked; a drain pipe connected to the pressure relief device must be installed with a continuous downward slope in a frost-free environment.

Care must be taken to ensure that the connection components (connection pipes, safety valve combinations, etc.) can withstand temperatures of 115°C (in accordance with the standard) in the event of a malfunction of the temperature controller and that the consequences of damage are avoided. Assembly and installation may only be carried out by authorised and qualified personnel.

Installation position

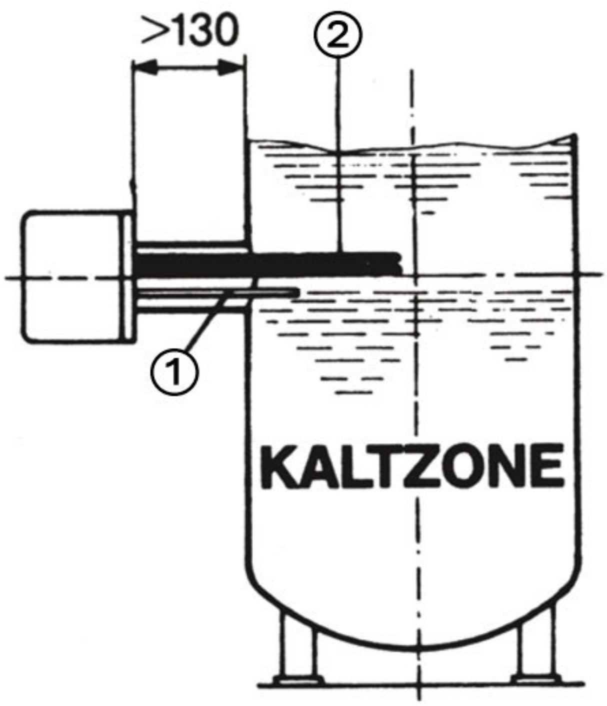
CORRECT



① Temperature controller

② Radiator

WRONG



Flange frame too long and welded in too high.

Temperature controller under radiator

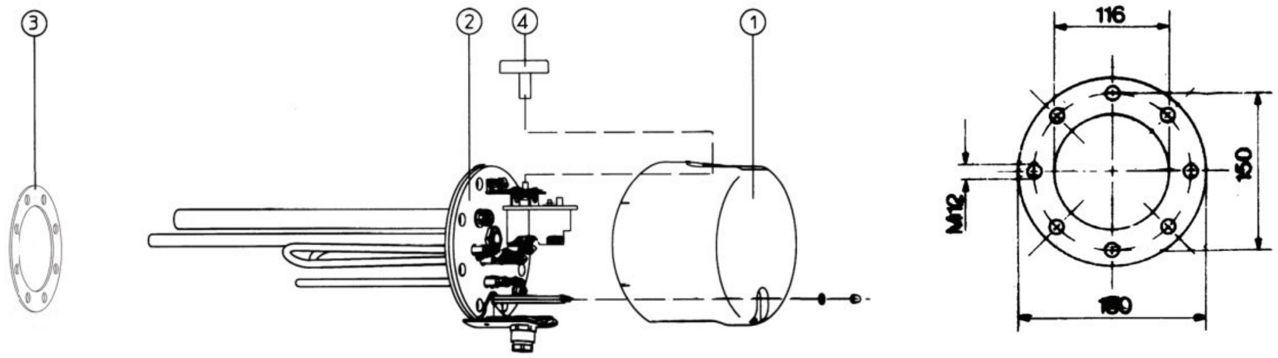
The flange frame must not be longer than max. 110 mm so that the temperature sensor and radiator still protrude sufficiently into the boiler.

The built-in heater must be installed as far down as possible in the boiler in order to heat the entire boiler contents evenly. A minimum distance (installation length + 100 mm) must be maintained in front of the boiler flange for installation etc.

Scale formation impairs the function. If the water has a high limescale content, appropriate precautions must be taken, such as lowering the temperature, installing a water softener or removing the scale.

CAUTION
When installing, make sure that the heating elements are located below the immersion tube.

Installing the built-in heating



In addition to the applicable legal regulations, the connection conditions of the local electricity and water companies must be complied with.

1. Remove the protective cap, pos. 1.
2. Install the heating flange, item 2, with sealing, item 3, in the boiler. During installation, the sensor protection tube of the temperature controller must be positioned above the tubular heating elements (see installation instructions).
3. Fasten the heating flange, item 2, with flange screws M 12 (max. torque 22 Nm). Tighten the flange screws crosswise. Check the radiator screw connection and retighten to a torque of 2-3 Nm if necessary.
4. Make the electrical connection according to the wiring diagram. Ensure that the electric cable is strain-relieved.

CAUTION
When installing, make sure that the heating elements are located below the immersion tube.

5. Fit the protective cap and secure with a nut, attach the enclosed control knob, item 4.

CAUTION
The storage tank must be filled with water before commissioning.

Note on corrosion protection

In the case of enamelled boilers (third-party products), appropriate anode protection must be provided on the boiler side in accordance with the manufacturer's specifications.

The protective anodes of the tank should be replaced when more than 3/4 of the material has degraded. (First check after approx. 2 years of operation).

When combining with CrNi (NIRO) tanks or CrNi heat exchangers and installations in plastic-coated tanks, the following measures are required: Disconnect the protective current leakage resistor (PAW) to ensure insulated installation of the radiator.

electrical connection

> ⚠ **CAUTION**
> The electrical connection must always be made in accordance with the type-specific wiring diagram (terminal diagram in the housing cover).

> ⚠ **CAUTION**
> Ensure the correct connection voltage! All touchable metal parts of the container must be included in the protective measure

A disconnector (1 or 3-pole) with a 3 mm contact opening width must be provided in the electrical supply line. Automatic circuit breakers (slow-blow) are also permissible as disconnecting devices.

The connection cable must be inserted into the built-in heater through the supplied screw connection and secured against being pulled out and twisted by means of a strain relief device.

> **NOTE**
> For electrical contact protection with enamelled domestic hot water storage tanks, it is necessary that the heating inserts are only used in water heaters in which the water inlet and outlet are made of metal and are connected to the protective conductor terminal

Version with contactor control

During installation, VDE-approved contactors must be used, which are installed on site, e.g. in a control cabinet or in an electrical distribution system. Separate contactors must be used for the safety temperature limiter and the temperature controller.

The contactors must be labelled to indicate their safety function for the water heater (flange heater). (TR and STB).

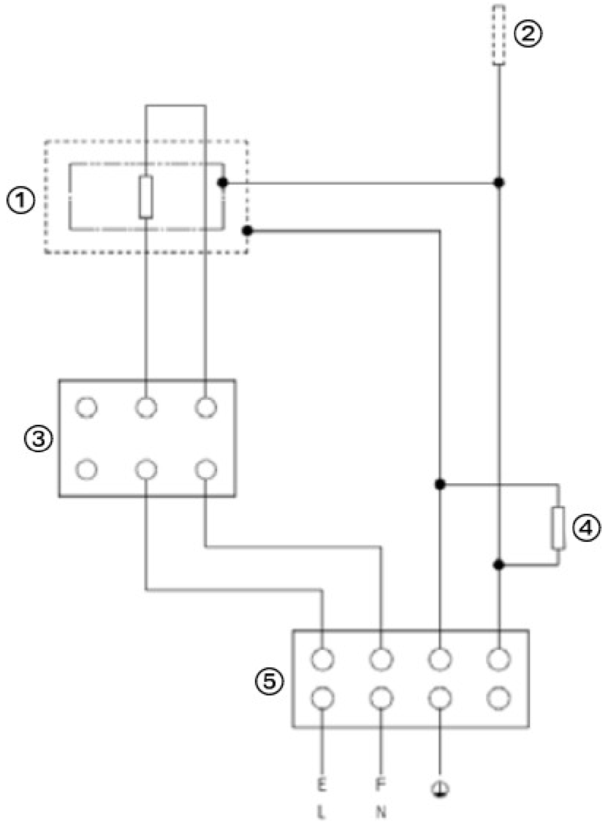
The performance data for the selection of contactors can be found in the table (Technical data section) under the "Switching group" columns. The STB contactor must be designed for the total power of the switching groups. After installation, the contactors must be checked for proper function.

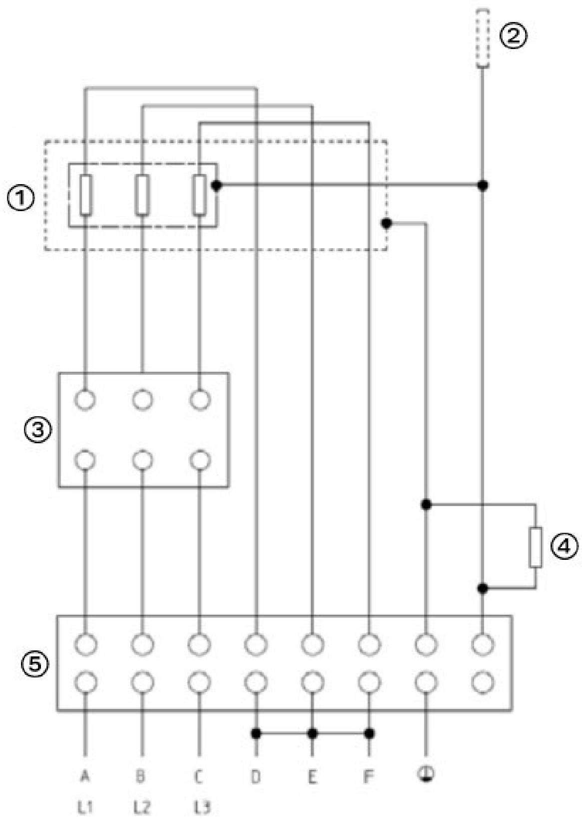
Electrical connection diagram

FLH 25M - 1/N/PE ~230 V, 50

HzFLH 60 - 3/PE ~400 V, 50 Hz

FLH 90 - 3/PE ~400 V, 50 Hz





① Potential flange

② Potential heating elements + FSR

③ TR+STB 3-pole

④ PAW

⑤ Terminal strip

8.3.13 Domestic hot water charging pumps

Highly efficient circulation pumps, can be used for the domestic hot water charging circuit:

- UP 75-25PK
- UP 75-32PK
- UPH 90-25
- UPH 90-32
- UPE 100-32K
- UPE 120-32K

Technical information on the individual product pages.

	Order code	Item no.	Nominal diameter	Funding level
	UP 75-25PK	376740	DN25	max. 7.5 m
	UP 75-32PK	376750	DN32	max. 7.5 m
	UPH 90-25	370410	DN25	max. 9.0 m
	UPH 90-32	370420	DN32	max. 9.0 m
	UPE 100-32K	374730	DN32	max. 10.0 m
	UPE 120-32K	374740	DN32	max. 11.5 m

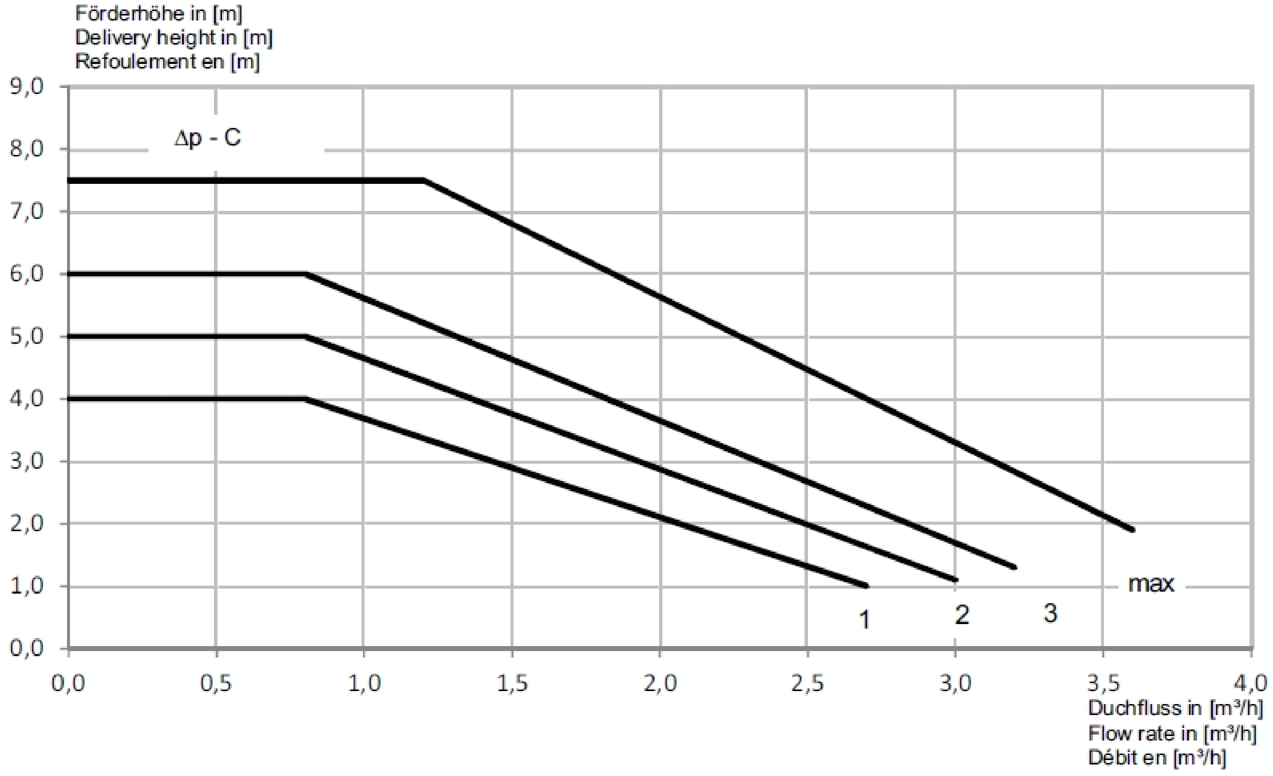
UP 75-25PK

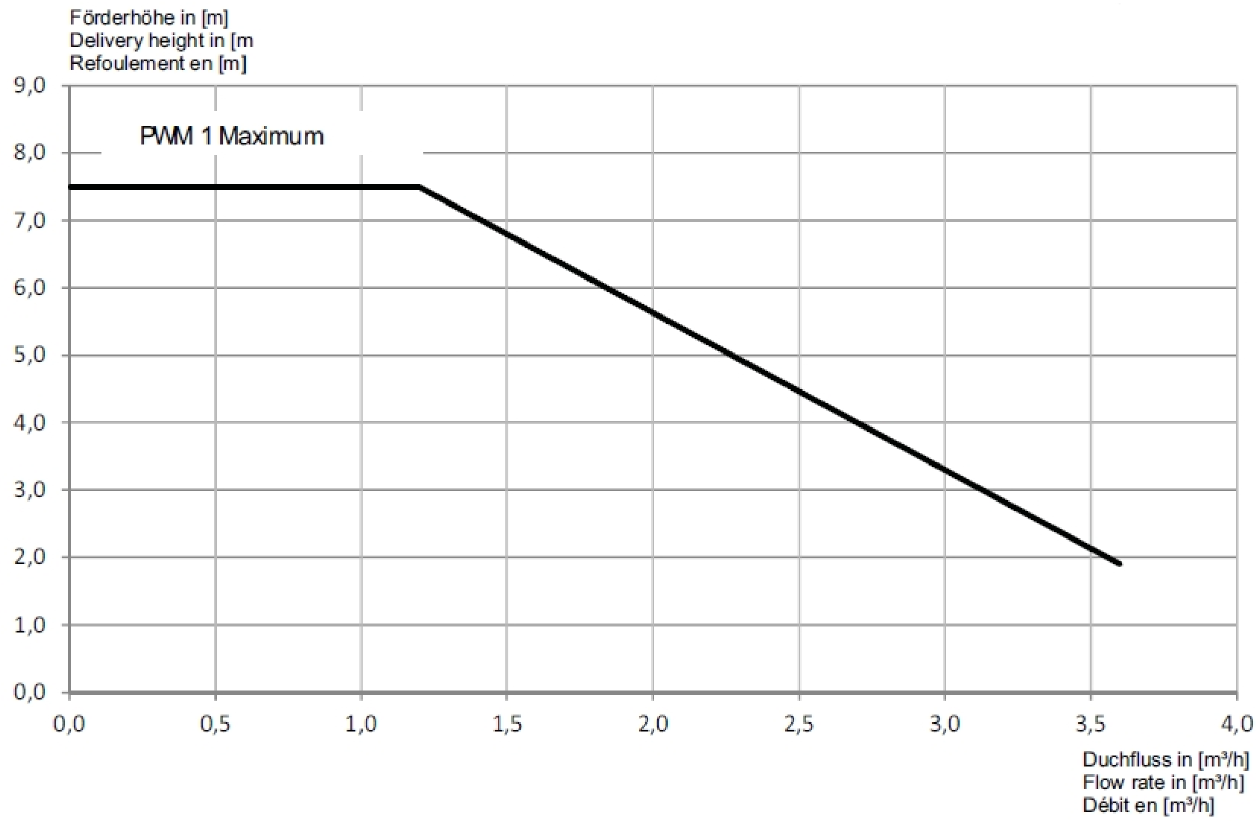
The high-efficiency pumps in the series are used to circulate liquids (no oils and oil-containing liquids, no foodstuffs) in:

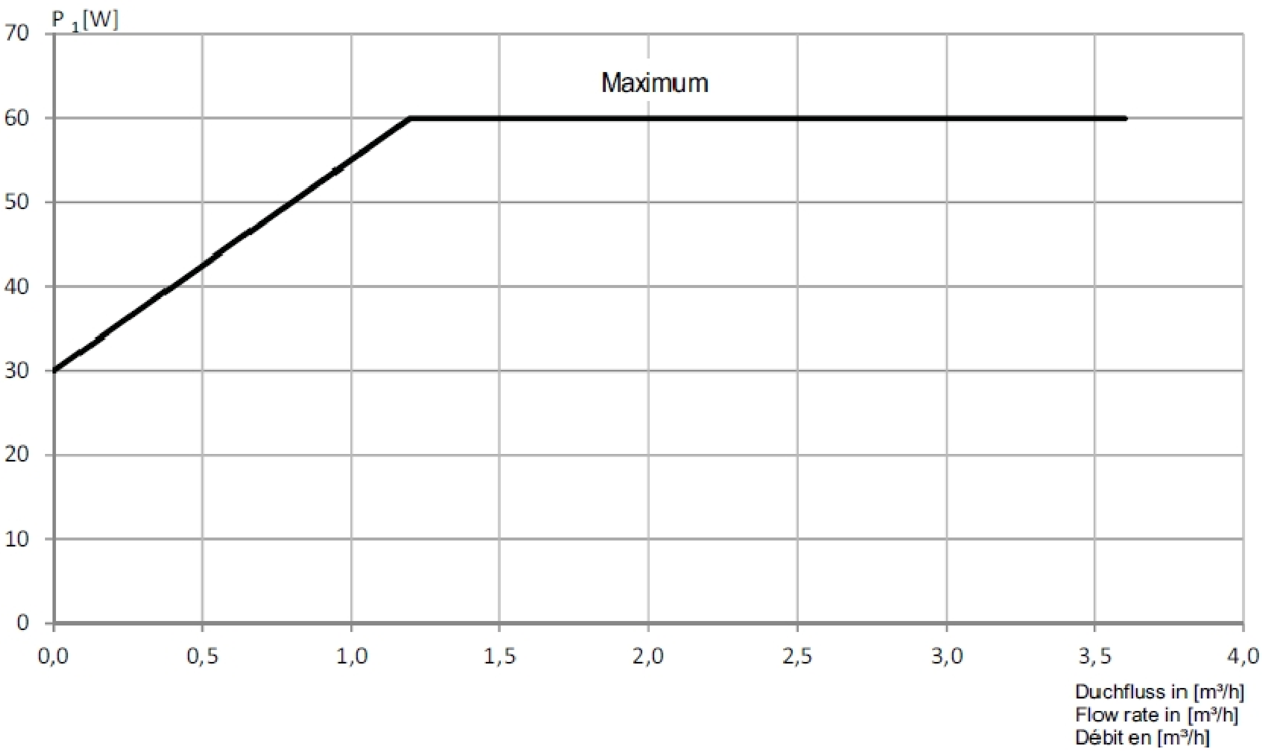
- Domestic hot water heating systems
- Air conditioning, cooling and chilled water circuits
- Heat pumps, brine circuits up to +2 °C
- closed industrial circulation systems Approved pumped media are heating water in accordance with VDI 2035, water-glycol mixtures in a mixing ratio of 1:1.

NOTE
If glycol is added, the delivery data of the pump must be corrected according to the higher viscosity.

Diagrams/characteristic curve

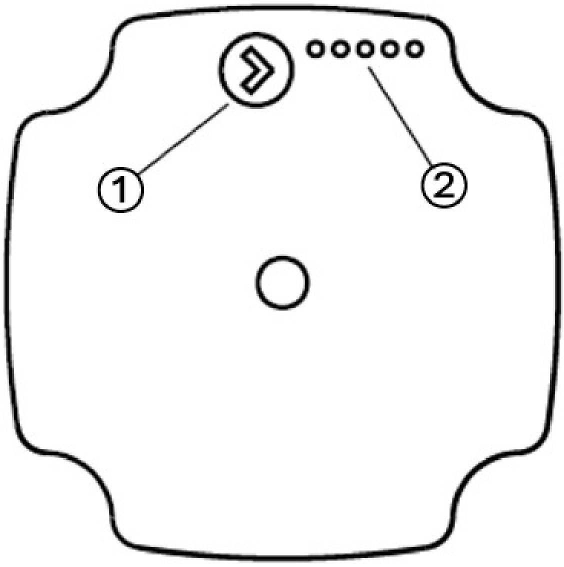



Förderhöhe in [m]
Delivery height in [m
Refoulement en [m]
PWM 1 Maximum
9,0
8,0
7,0
6,0
5,0
4,0
3,0
2,0
1,0
0,0
0,0
0,5
1,0
1,5
2,0
2,5
3,0
3,5
4,0
Duchfluss in [m³/h]
Flow rate in [m³/h]
Débit en [m³/h]


P 1 [W]
Maximum
70
60
50
40
30
20
10
0
0,0
0,5
1,0
1,5
2,0
2,5
3,0
3,5
4,0
Duchfluss in [m³/h]
Flow rate in [m³/h]
Débit en [m³/h]

Functional description of

the control panel



① Push button

② LEDs

- The following is displayed on the control panel: Display mode (during operation)
  - Operating status
  - Alarm status
- Setting mode (after pressing the button).

During operation, the display is in display mode. Pressing the button changes the view (operating status or alarm status) or switches to setting mode.

Display mode

In display mode, either the operating status or the alarm status is displayed.

Operating status

If the pump is in operation, LED1 lights up green. The four other LEDs show the current power consumption (P1) according to the following table. When the pump is running, the active LEDs light up permanently in display mode. In this way, the display mode can be distinguished from the setting mode. In setting mode, the active LEDs flash. If the pump is switched off via the external PWM signal, the green LED1 flashes. The other LEDs do not light up.

Display	Meaning	Power in % related to P1,max
Green LED (flashing)	Standby (only externally controlled)	0
Green LED and 1 yellow LED	Low delivery rate	0-25
Green LED and 2 yellow LEDs	Low average delivery rate	25-50
Green LED and 3 yellow LEDs	High average delivery rate	50-75
Green LED and 4 yellow LEDs	High conveying capacity	75-100

Alarm status

If one or more faults occur, LED1 lights up red. If an alarm is present, the yellow LEDs indicate the cause of the fault according to the following table. If several faults are present at the same time, the LEDs indicate the fault with the highest priority. The priority is shown in the table below.

If there is no longer an alarm, the display returns to the operating status.

Display	Meaning	Mode of operation	Countermeasure
Red LED and 1 yellow LED (LED 5)	Rotor blocked	The pump attempts to to restart every 1.33 s.	Wait or Unblock the pump.
Red LED and 1 yellow LED (LED 4)	Supply voltage too low	The pump was switched off because the supply voltage was too low.	Check the power supply
Red LED and 1 yellow LED (LED 3)	Electrical fault	The pump was switched off due to a serious fault.	Check the power supply / Replace the pump.

scope of supply

- Pump complete
- Installation and operating instructions
- 2 x flat gasket
- Coupling relay
- Signal cable for PWM (1.5 m)
- Load cable 230 V (1.5 m)

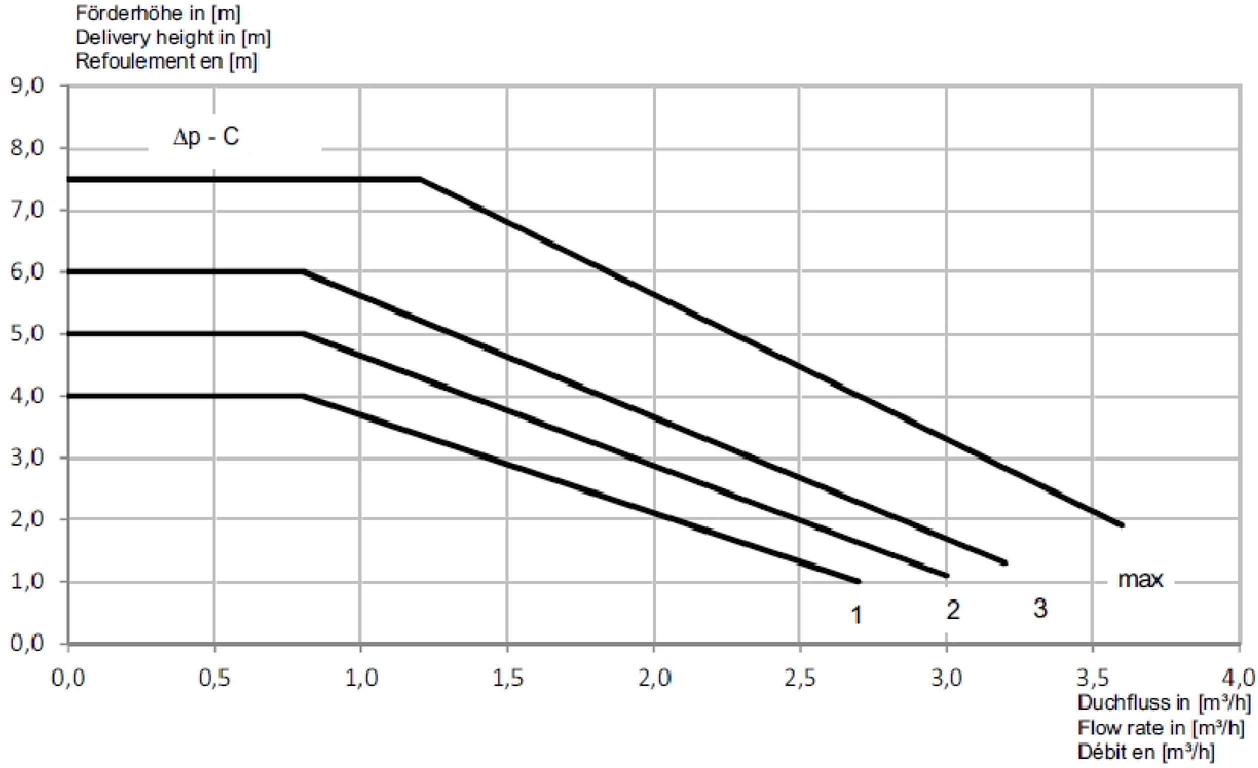
UP 75-32PK

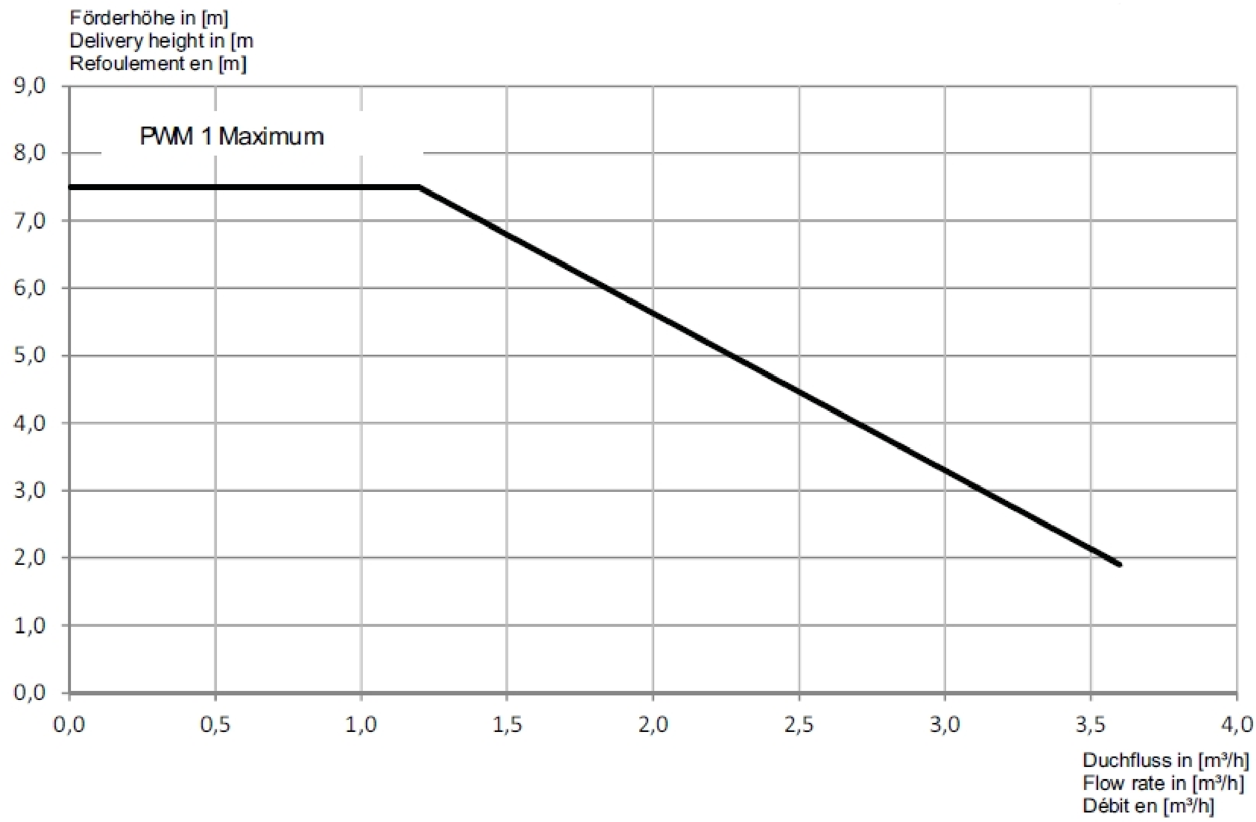
The high-efficiency pumps in the series are used to circulate liquids (no oils and oil-containing liquids, no foodstuffs) in:

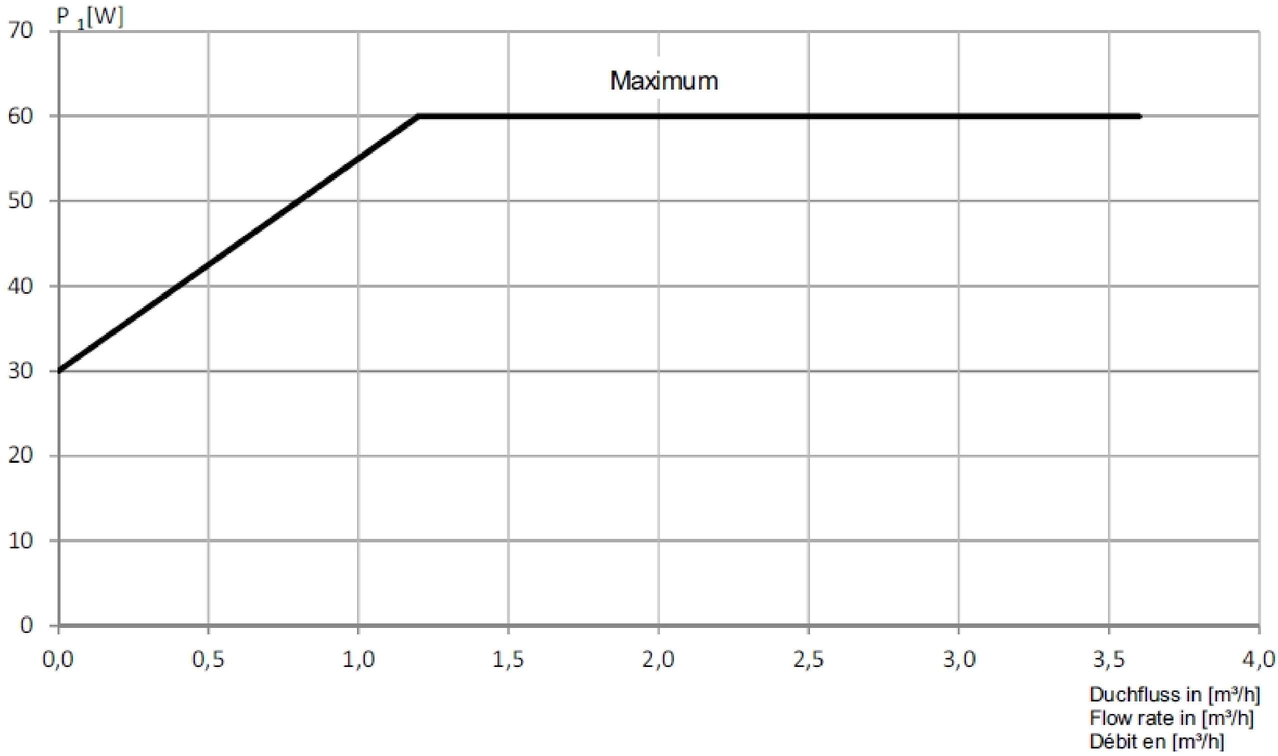
- Domestic hot water heating systems
- Air conditioning, cooling and chilled water circuits
- Heat pumps, brine circuits up to +2 °C
- closed industrial circulation systems Approved pumped media are heating water in accordance with VDI 2035, water-glycol mixtures in a mixing ratio of 1:1.

NOTE
If glycol is added, the delivery data of the pump must be corrected according to the higher viscosity.

Diagrams/characteristic curve

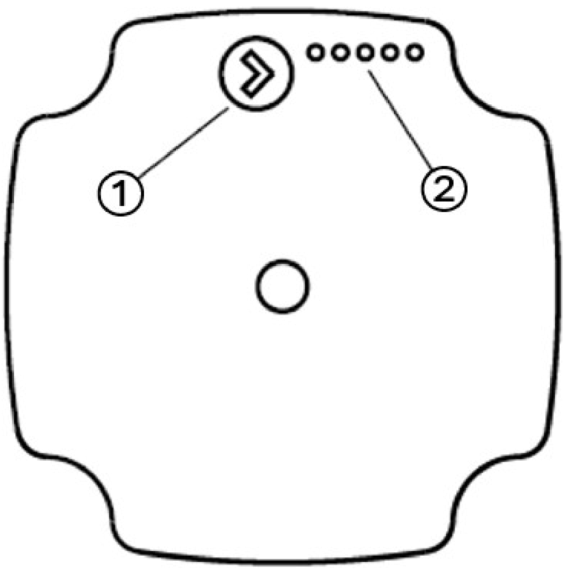






Functional description of

the control panel



① Push button

② LEDs

- The following is displayed on the control panel: Display mode (during operation)
  - Operating status
  - Alarm status
- Setting mode (after pressing the button).

During operation, the display is in display mode. Pressing the button changes the view (operating status or alarm status) or switches to setting mode.

Display mode

In display mode, either the operating status or the alarm status is displayed.

Operating status

If the pump is in operation, LED1 lights up green. The four other LEDs show the current power consumption (P1) according to the following table. When the pump is running, the active LEDs light up permanently in display mode. In this way, the display mode can be distinguished from the setting mode. In setting mode, the active LEDs flash. If the pump is switched off via the external PWM signal, the green LED1 flashes. The other LEDs do not light up.

Display	Meaning	Power in % related to P1,max
Green LED (flashing)	Standby (only externally controlled)	0
Green LED and 1 yellow LED	Low delivery rate	0-25
Green LED and 2 yellow LEDs	Low average delivery rate	25-50
Green LED and 3 yellow LEDs	High average delivery rate	50-75
Green LED and 4 yellow LEDs	High conveying capacity	75-100

Alarm status

If one or more faults occur, LED1 lights up red. If there is an alarm, the yellow LEDs indicate the cause of the fault according to the following table. If several faults are present at the same time, the LEDs indicate the fault with the highest priority. The priority is shown in the table below.

If there is no longer an alarm, the display returns to the operating status.

Display	Meaning	Mode of operation	Countermeasure
Red LED and 1 yellow LED (LED 5)	Rotor blocked	The pump attempts to to restart every 1.33 s.	Wait or Unblock the pump.
Red LED and 1 yellow LED (LED 4)	Supply voltage too low	The pump was switched off because the supply voltage was too low.	Check the power supply
Red LED and 1 yellow LED (LED 3)	Electrical fault	The pump was switched off due to a serious fault.	Check the power supply / Replace the pump.

scope of supply

- Pump complete
- Installation and operating instructions
- 2 x flat gasket
- Coupling relay
- Signal cable for PWM (1.5 m)
- Load cable 230 V (1.5 m)

UPH 90-25

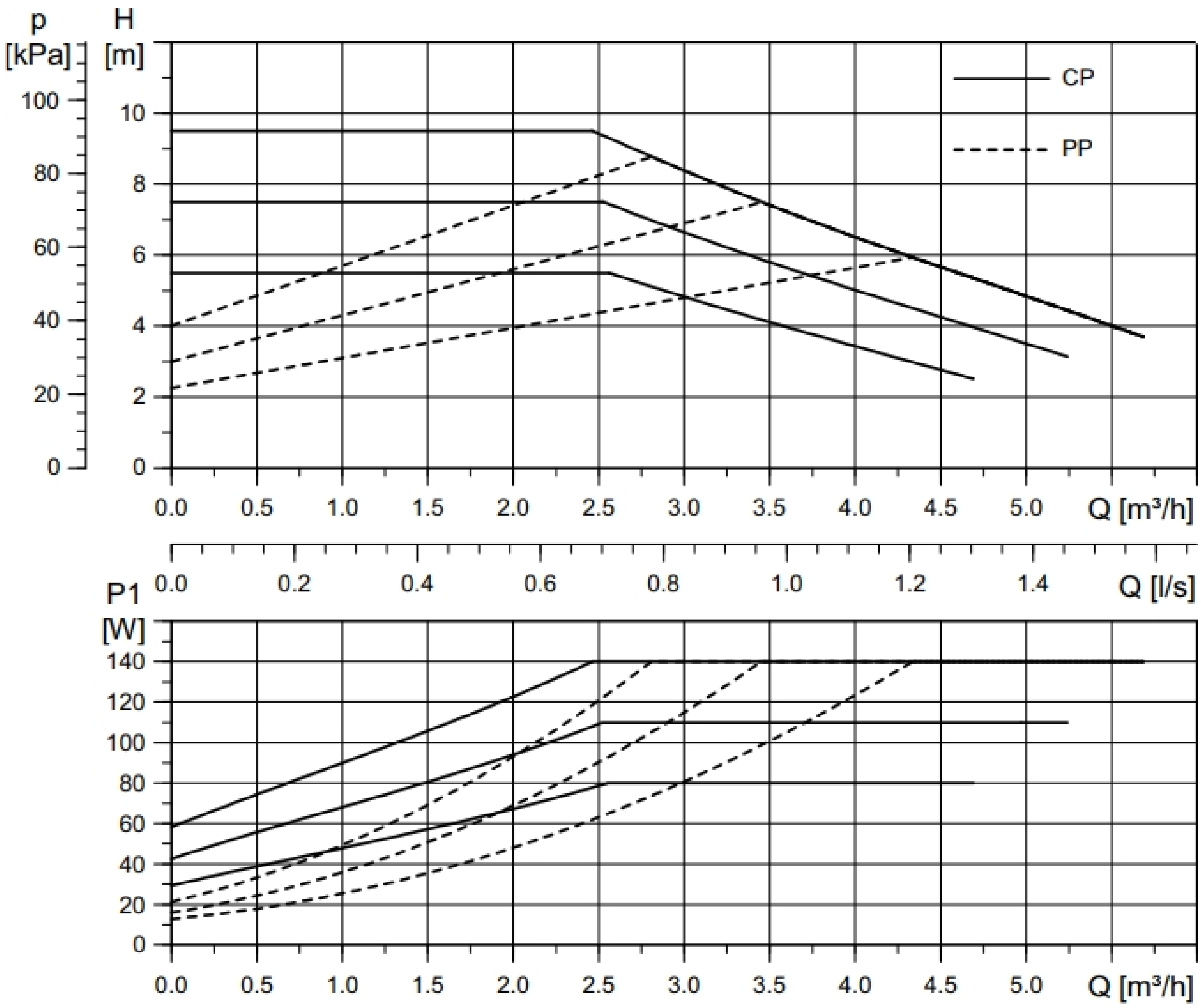
The high-efficiency pumps in the series are used to circulate liquids (no oils and oil-containing liquids, no foodstuffs) in:

- Domestic hot water heating systems

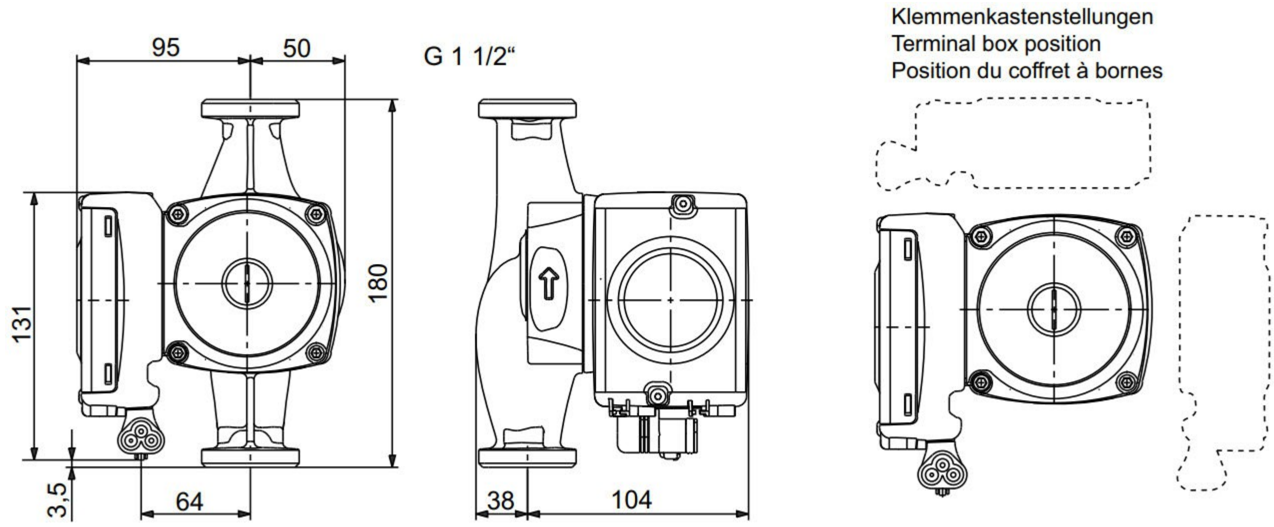
- Air conditioning, cooling and chilled water circuits
- Heat pumps, brine circuits up to +2 °C
- closed industrial circulation systems
- Primary circuits of brine-to-water heat pumps containing media with antifreeze (e.g. glycol or ethanol) down to min. -10°C

CAUTION
Risk of damage to property!
Impermissible pumped liquids can destroy the pump

Diagrams/characteristic curve



Dimension drawing



Characteristic curve

preselection Control

types

The pump allows the setting of 6 preset speed levels, each:

- Three proportional pressure stages (PP)
- Three constant pressure stages (CP)

Setting the characteristic curve

III II I	**Flashes quickly**	**PP1**
III II I	**Flashes quickly**	**PP2**
III II I	**Flashes quickly**	**PP3**
III II I	**Flashes slowly**	**CP1**
III II I	**Flashes slowly**	**CP2**
III II I	**Flashes slowly**	**CP3**

Press the buttons on the electronics box of the pump for 2 seconds

- Pump goes into setting mode
- LED starts to flash

The setting changes each time the button is pressed

- LEDs 1-2 and 4 are permanently on, i.e. the characteristic curve and the control mode can be changed.

Flashing mode by pressing the button again

- Fast flashing = proportional pressure line
- Slow flashing = constant pressure line

If the button is not pressed for 10 seconds

- Settings are adopted
- Pump returns to operating mode

Only one LED is permanently on (LED 1/2/3).

- Pump is in operating mode and runs with the preset characteristic curve

scope of supply

- Pump complete
- Installation and operating instructions
- 2 x flat gasket
- Coupling relay

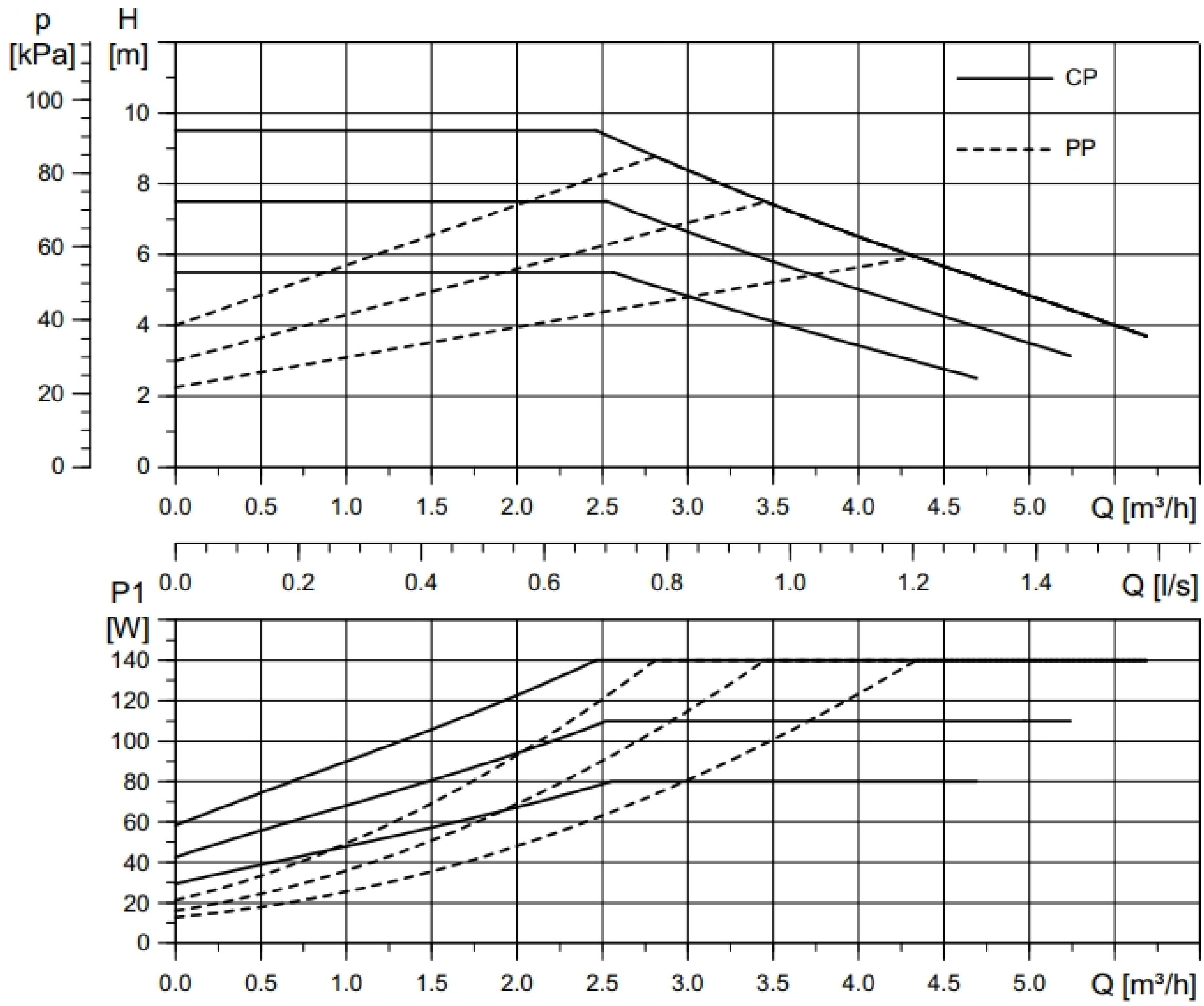
UPH 90-32

The high-efficiency pumps in the series are used to circulate liquids (no oils and oil-containing liquids, no foodstuffs) in:

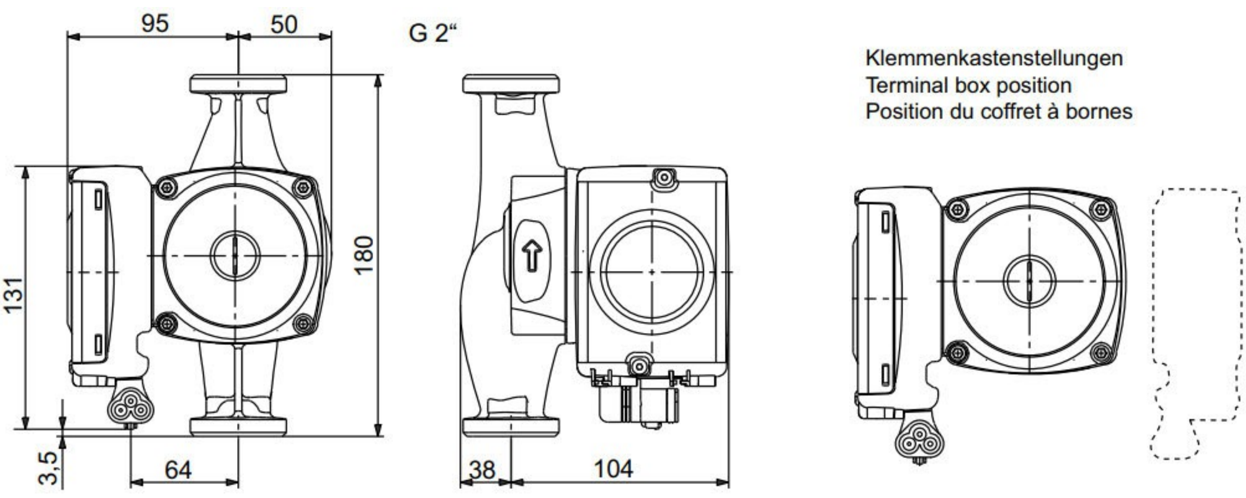
- Domestic hot water heating systems
- Air conditioning, cooling and chilled water circuits
- Heat pumps, brine circuits up to +2 °C
- closed industrial circulation systems
- Primary circuits of brine-to-water heat pumps containing media with antifreeze (e.g. glycol or ethanol) down to min. -10°C

CAUTION
Risk of damage to property!
Impermissible pumped liquids can destroy the pump

Diagrams/characteristic curve



Dimension drawing



Characteristic curve

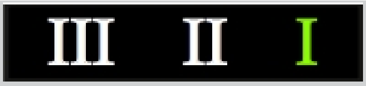
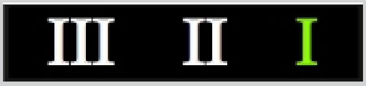
preselection Control

types

The pump allows the setting of 6 preset speed levels, each:

- Three proportional pressure stages (PP)
- Three constant pressure stages (CP)

Setting the characteristic curve

	**Flashes quickly**	**PP1**
	**Flashes quickly**	**PP2**
	**Flashes quickly**	**PP3**
	**Flashes slowly**	**CP1**
	**Flashes slowly**	**CP2**
	**Flashes slowly**	**CP3**

Press the buttons on the electronics box of the pump for 2 seconds

- Pump goes into setting mode
- LED starts to flash

The setting changes each time the button is pressed

- LEDs 1-2 and 4 are permanently on, i.e. the characteristic curve and the control mode can be changed.

Flashing mode by pressing the button again

- Fast flashing = proportional pressure line
- Slow flashing = constant pressure line

If the button is not pressed for 10 seconds

- Settings are adopted
- Pump returns to operating mode

Only one LED is permanently on (LED 1/2/3).

- Pump is in operating mode and runs with the preset characteristic curve

scope of supply

- Pump complete
- Installation and operating instructions
- 2 x flat gasket

- Coupling relay

UPE 100-32K

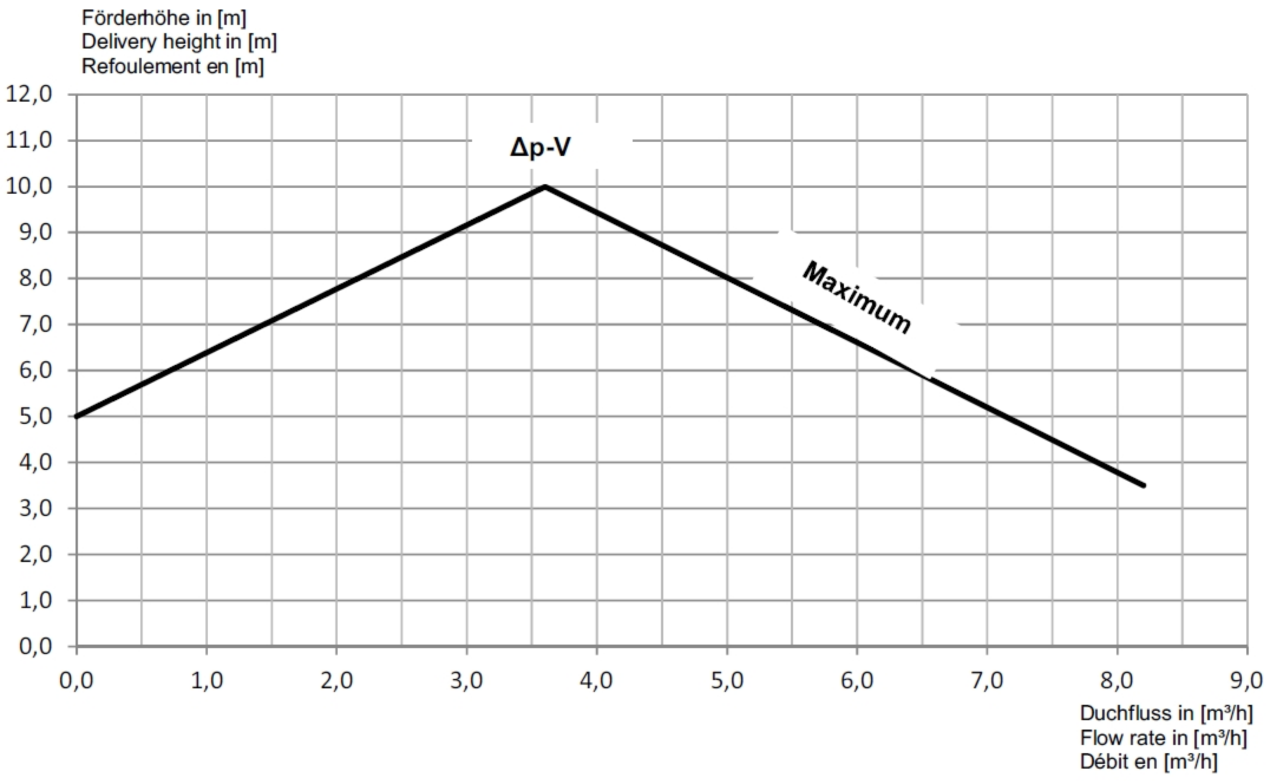
The high-efficiency pumps in the series are used to circulate liquids (no oils and oil-containing liquids, no foodstuffs) in:

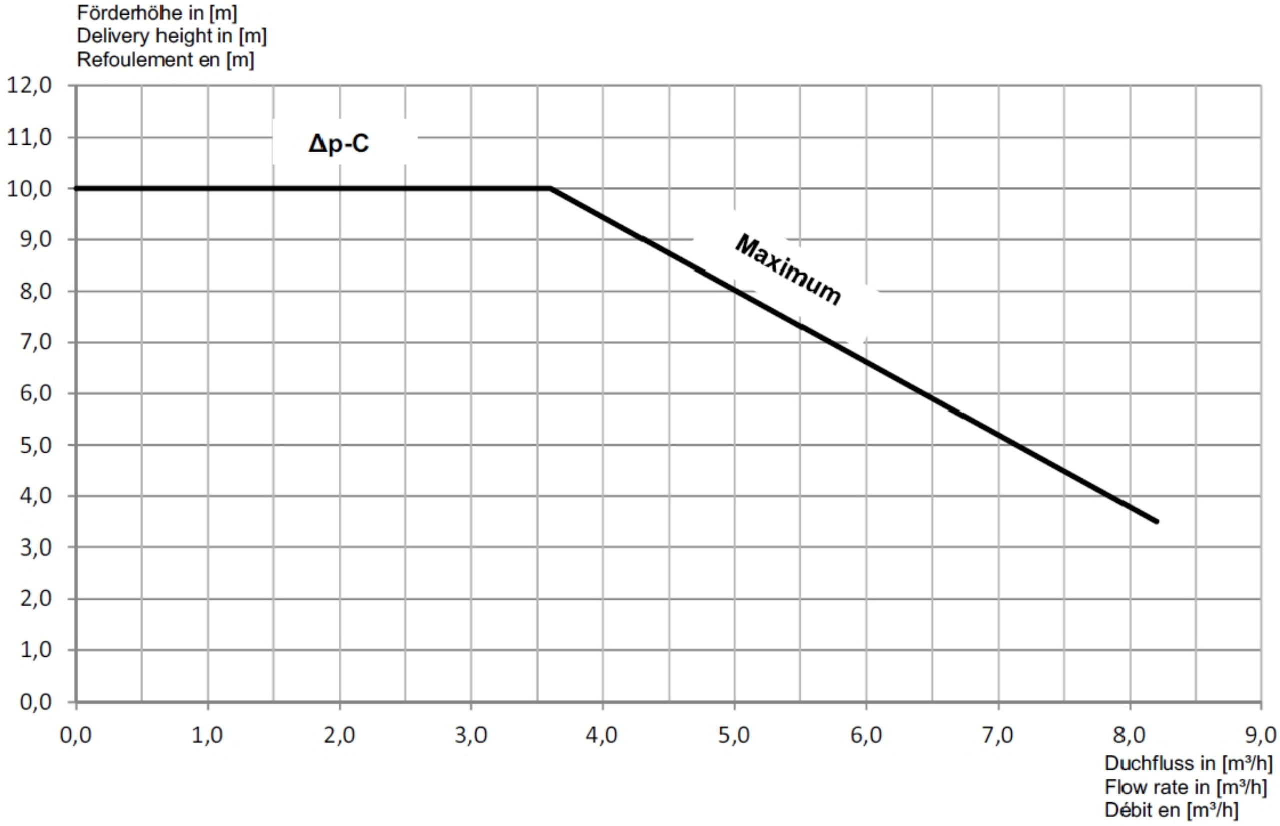
- Domestic hot water heating systems
- Air conditioning, cooling and chilled water circuits
- Heat pumps, brine circuits up to +2 °C
- closed industrial circulation systems

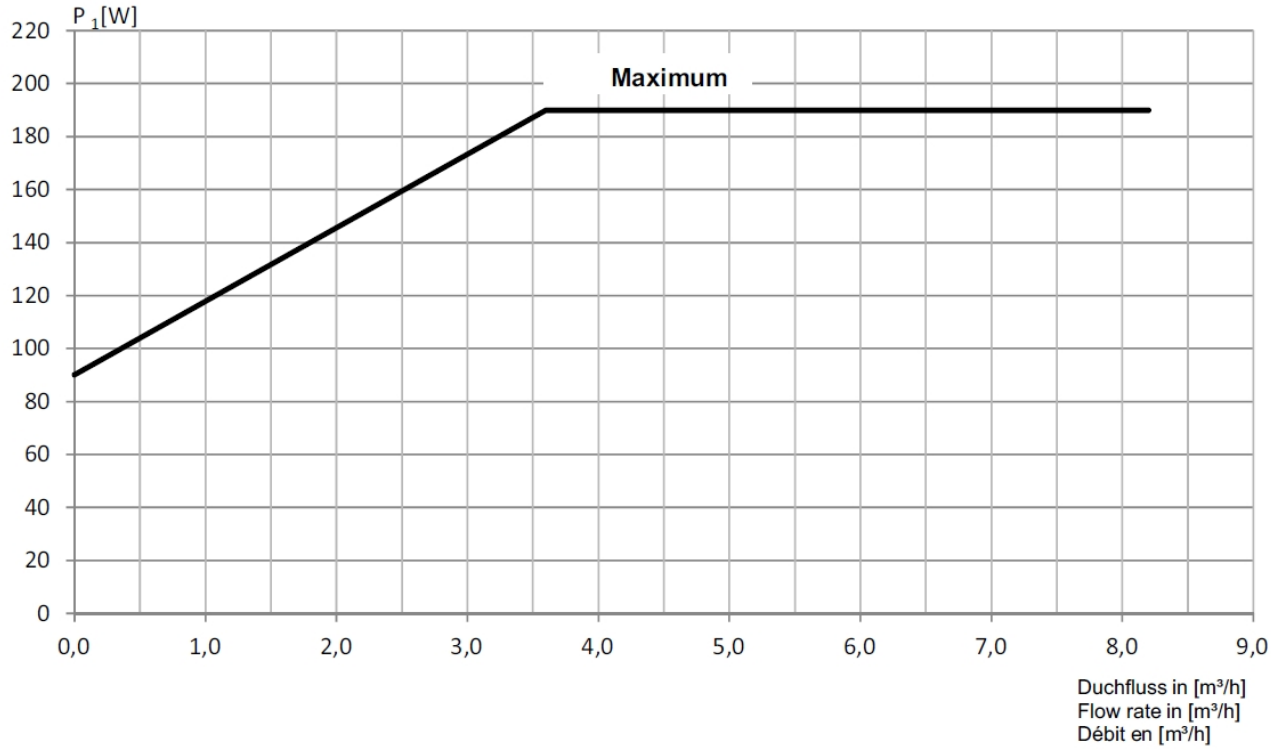
Approved pumped media are heating water in accordance with VDI 2035, water-glycol mixtures in a mixing ratio of 1:1.

> **NOTE**
> If glycol is added, the delivery data of the pump must be corrected according to the higher viscosity.

Diagrams/characteristic curve




Förderhöhe in [m]
Delivery height in [m]
Refoulement en [m]
Δp-C
Maximum
12,0
11,0
10,0
9,0
8,0
7,0
6,0
5,0
4,0
3,0
2,0
1,0
0,0
0,0
1,0
2,0
3,0
4,0
5,0
6,0
7,0
8,0
9,0
Duchfluss in [m³/h]
Flow rate in [m³/h]
Débit en [m³/h]


P 1 [W]
Maximum
220
200
180
160
140
120
100
80
60
40
20
0
0,0
1,0
2,0
3,0
4,0
5,0
6,0
7,0
8,0
9,0
Duchfluss in [m³/h]
Flow rate in [m³/h]
Débit en [m³/h]

Functional description

The UPE high-efficiency pump is a series of glandless pumps with integrated electronic control that enables the pump's performance to be automatically adapted to the system's variable load conditions.

This ensures optimum efficiency of the system in all operating and load conditions and maximises energy savings on the pump side.

The control module, which enables up to three types of automatic power adjustment depending on the pump type, is located on the motor housing in an axial design:

Control type
1) Constant speed levels
2) Δp-c
3) Δp-v
4) Speed adjustment via PWM signal

The main advantages of electronic control are

- Energy savings with simultaneous reduction in operating costs,
- Reduction of flow noise,
- Saving on overflow valves, e.g. in static heating circuits

Differential pressure control types

The selectable control types are

- Δp-c:
  The electronics keep the differential pressure generated by the pump constant over the permissible flow rate range at the set differential pressure setpoint HS up to the maximum characteristic curve.
- Δp-v:
  The electronics change the differential pressure setpoint value to be maintained by the pump linearly between ½Hs and Hs. The differential pressure setpoint value H decreases or increases with the flow rate.

> **NOTE**
> The minimum and maximum setting values for the delivery head for control types Δp-c and Δp-v depend on the pump type and can be read in the characteristic curve.
> If the delivery head setpoint value set on the red button falls below the minimum setpoint value, the pump runs at the minimum setpoint value Hmin in the corresponding control mode.
> If the delivery head setpoint value set on the red button exceeds the maximum setting value, the pump runs at the maximum setting value Hmax.

scope of supply

- Pump complete
- Installation and operating instructions
- 2 x flat gasket
- Coupling relay

UPE 120-32K

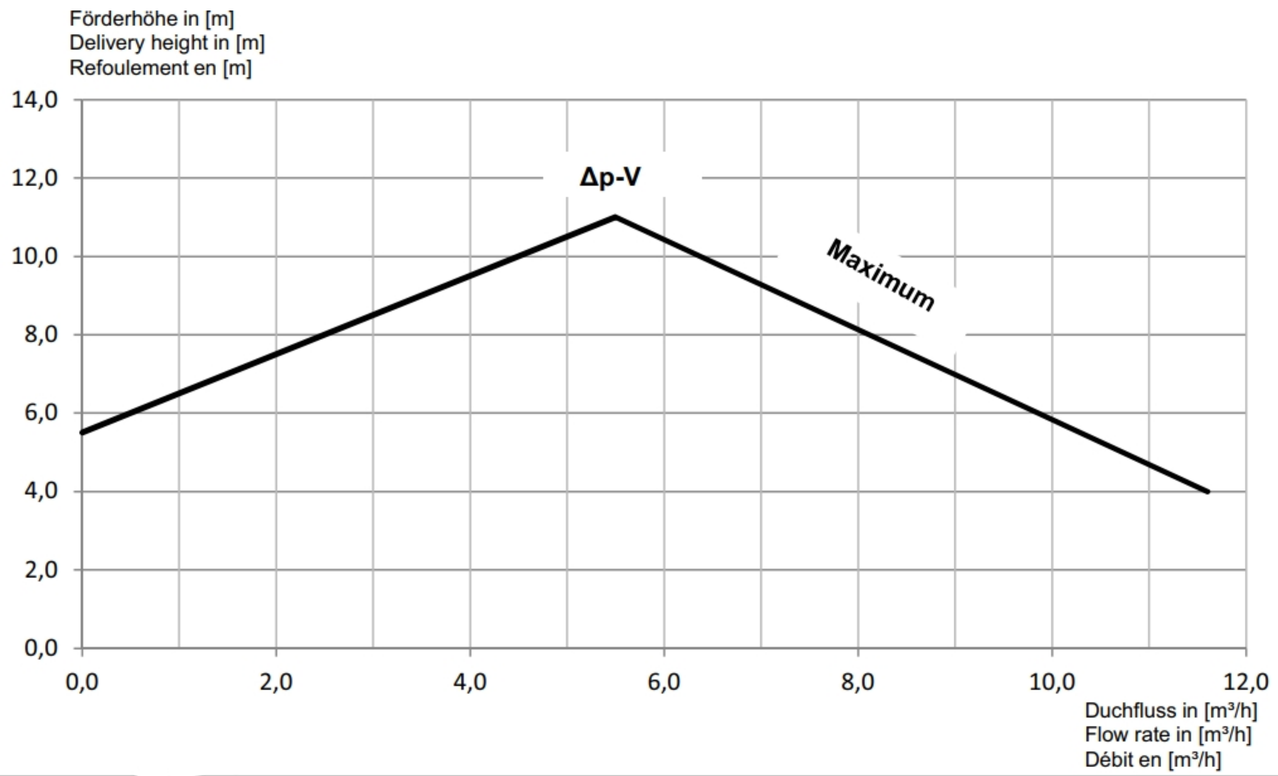
The high-efficiency pumps in the series are used to circulate liquids (no oils and oil-containing liquids, no foodstuffs) in:

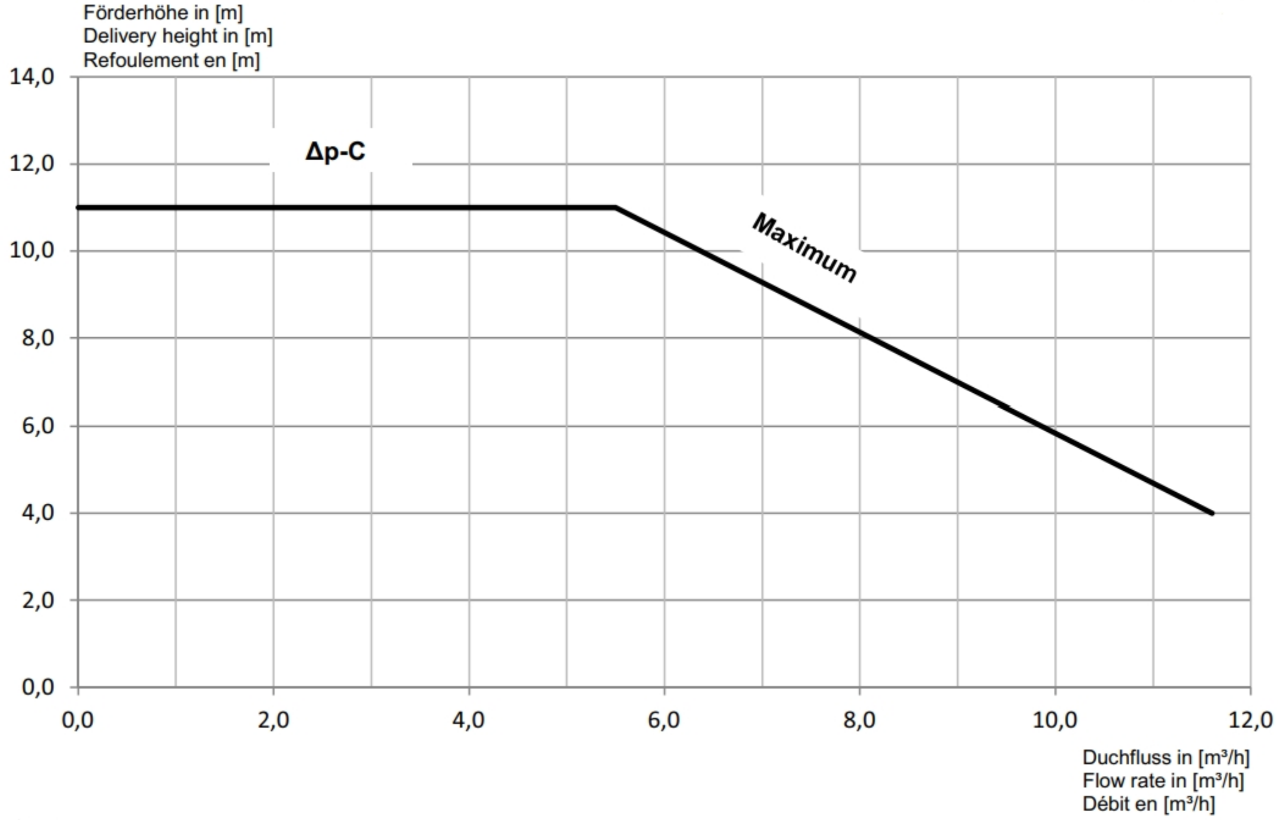
- Domestic hot water heating systems
- Air conditioning, cooling and chilled water circuits
- Heat pumps, brine circuits up to +2 °C
- closed industrial circulation systems

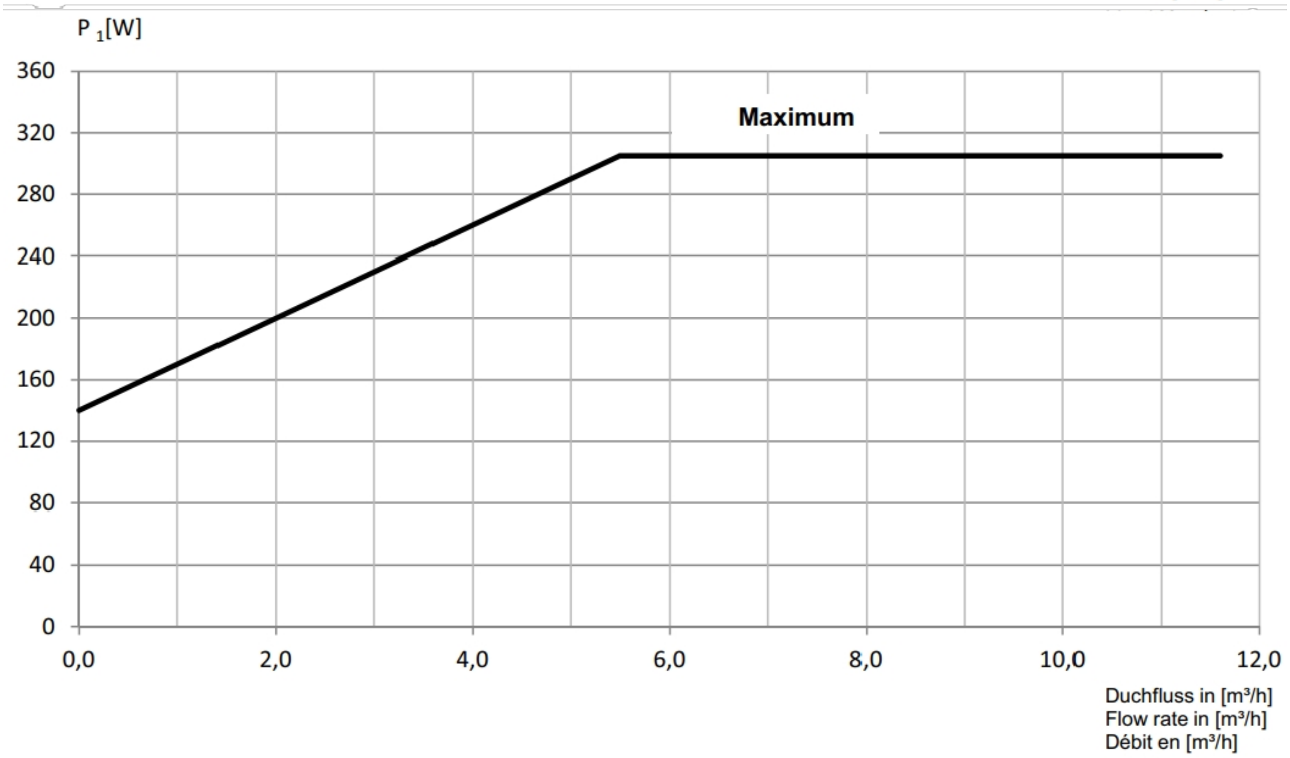
Approved pumped media are heating water in accordance with VDI 2035, water-glycol mixtures in a mixing ratio of 1:1.

NOTE
If glycol is added, the delivery data of the pump must be corrected according to the higher viscosity.

Diagrams/characteristic curve




Förderhöhe in [m]
Delivery height in [m]
Refoulement en [m]
14,0
12,0
10,0
8,0
6,0
4,0
2,0
0,0
Δp-C
Maximum
0,0
2,0
4,0
6,0
8,0
10,0
12,0
Duchfluss in [m³/h]
Flow rate in [m³/h]
Débit en [m³/h]


P 1[W]
360
320
280
240
200
160
120
80
40
0
Maximum
0,0
2,0
4,0
6,0
8,0
10,0
12,0
Duchfluss in [m³/h]
Flow rate in [m³/h]
Débit en [m³/h]

Functional description

The UPE high-efficiency pump is a series of glandless pumps with integrated electronic control that enables the pump's performance to be automatically adapted to the system's variable load conditions.

This ensures the optimum efficiency of the system in all operating and load conditions and maximises energy savings on the pump side.

The control module is located on the motor housing in an axial design and enables up to three types of automatic power adjustment, depending on the pump type:

Control type
1) Constant speed levels
2) Δp-c
3) Δp-v
4) Speed adjustment via PWM signal

The main advantages of electronic control are

- Energy savings with simultaneous reduction in operating costs,
- Reduction of flow noise,
- Saving on overflow valves, e.g. in static heating circuits

Differential pressure control types

The selectable control types are

- Δp-c:
  The electronics keep the differential pressure generated by the pump constant over the permissible flow rate range at the set differential pressure setpoint HS up to the maximum characteristic curve.
- Δp-v:
  The electronics change the differential pressure setpoint value to be maintained by the pump linearly between ½Hs and Hs. The differential pressure setpoint value H decreases or increases with the flow rate.

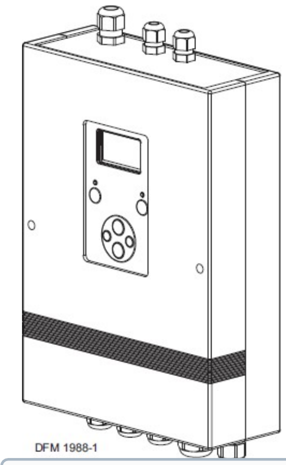
NOTE
The minimum and maximum setting values for the delivery head for control types Δp-c and Δp-v depend on the pump type and can be read in the characteristic curve.
If the delivery head setpoint value set on the red button falls below the minimum setpoint value, the pump runs at the minimum setpoint value Hmin in the corresponding control mode.
If the delivery head setpoint value set on the red button exceeds the maximum setting value, the pump runs at the maximum setting value Hmax.

scope of supply

- Pump complete
- Installation and operating instructions
- 2 x flat gasket
- Coupling relay

8.4 Domestic hot water preparation with heat pump and DFM 1988- 1.

8.4.1 Table of contents



The **DFM 1988-1 flow meter** is a measuring and control device used to record the tapped quantity of a centralised domestic hot water preparation system at the cold water inlet. In accordance with DIN 1988-200, this allows the cylinder temperature to be lowered when the water exchange rate is high, thus enabling the domestic hot water cylinder to be heated more efficiently, e.g. with a heat pump.

The DFM 1988-1 is only approved in conjunction with the **WWSP domestic hot water cylinder** with additional socket for an electric immersion heater (CEHK - upper third of the cylinder), which is included in the scope of supply.

The control of a flange heater (FLH - usually in the lower third of the storage tank) is not recommended for energy reasons.

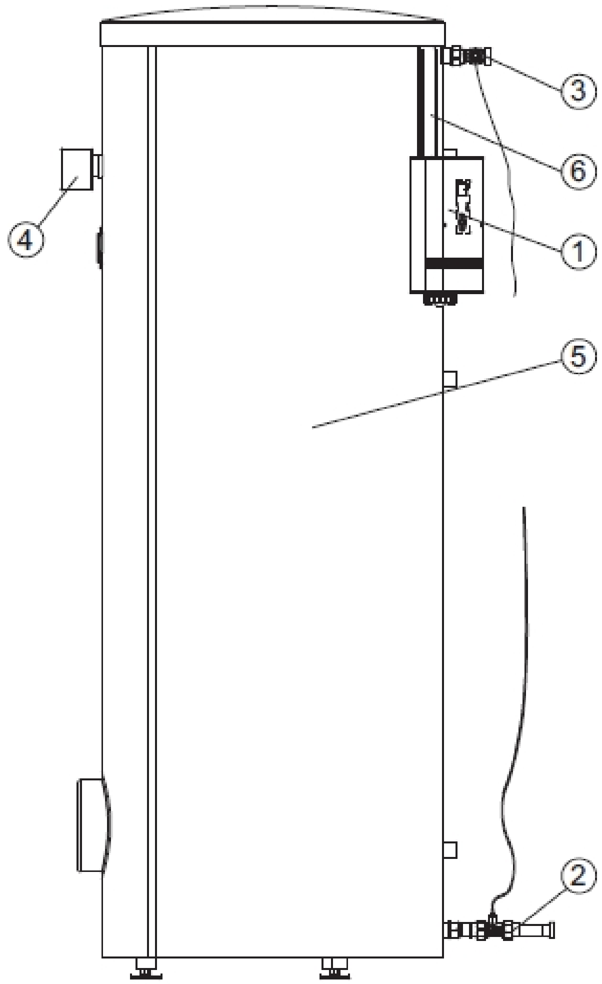
NOTE

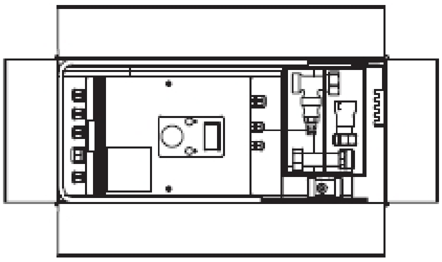
The system operator must ensure the function of the electrical auxiliary heating and the DFM 1988-1 through regular inspections.

We recommend at least 1 x per year

When operating two domestic hot water cylinders in parallel, they must be set up in such a way that one cylinder can be shut off and emptied if necessary when water consumption is low. During commissioning, hydraulic balancing is required so that the same flow is displayed at both storage tanks when tapping.

8.4.2 scope of supply





1x DFM 1988-1 electronic module with pre-mounted NTC 10 temperature sensor, 1.2 m load connection cable for srew-in heating element (storage tank installation)
and plug adapter for connection to the heat pump manager

② 1x turbine sensor with connection screw fittings for direct installation on the cold water inlet of the domestic hot water cylinder incl. stabilisation section and
Cable with plug for electrical connection to the electronic module

③ 1x connection screw fitting with immersion sleeve for direct installation of the temperature sensor

④ 1x CEHK 60 (6 kW - 3~,N,PE) srew-in heating element 400 V - without leakage resistance)

⑤ 1x domestic hot water cylinder (depending on configuration WWSP 442, (WWSP 556 or WWSP 770)

⑥ 1x support plate for direct mounting on the domestic hot water cylinder incl. 4 mounting screws (accessories pack)

⑦ 1x DFM 1988-1 installation and operating instructions

8.4.3 Assignment of heat pump / DFM 1988-1 - System overview

The following heat pumps achieve under the conditions below in pure heat pump operation a max.
Hot water outlet temperature of 55 °C

(the list also includes heat pumps that are no longer available)

	WWSP 442	WWSP 556	WWSP 770	Exchanger area min.	Source temperature		Volume flow	Domestic hot water charging pump*
Useful capacity:	400l	500l	700l		min.	max.		
Air-to-water heat pump Outdoor installation								
LA 1118C	1	1	1	5,7 m²	-7 °C	35 °C	1.5 m³/h	UP 75-25PK
LA 1118CP	-	1	1	5,7 m²	-7 °C	35 °C	1.8 m³/h	UP 75-25PK
LA 1422C	-	1	1	5,7 m²	-7 °C	35 °C	1.95 m³/h	UP 75-25PK
LA 22TBS	1	1	1	4,2 m²	-7 °C	35 °C	3.3 m³/h	UPH 90-32
LA 28TBS	1	1	1	4,2 m²	-7 °C	35 °C	4.6 m³/h	UPH 90-32
LA 35TBS	1	1	1	5,7 m²	-7 °C	35 °C	3.1 m³/h	UPH 90-32
LA 33TPR	1	1	1	5,7 m²	-7 °C	35 °C	2.8 m³/h	UPH 90-32
LA 60S-TU	-	2	1	7,0 m²	-7 °C	35 °C	5.0 m³/h	UP 120-32PK
LA 60S-TUR	-	2	1	7,0 m²	-7 °C	35 °C	5.0 m³/h	UP 120-32PK
LA 60P-TUR	-	2	1	7,0 m²	-7 °C	35 °C	5.8 m³/h	UP 120-32PK
Air-to-water heat pump, indoor installation								
LI 1422C	-	1	1	5,7 m²	-7 °C	35 °C	1.95 m³/h	UP 75-25PK
LI 1826C	1	1	1	5,7 m²	-7 °C	35 °C	3.0 m³/h	UP 75-25PK
brine-to-water heat pump								
SIK 14TES	1	1	-	4,2 m²	0 °C	20 °C	2.2 m³/h	UP 75-25PK
SI 14TU	1	1	-	4,2 m²	0 °C	20 °C	2.4 m³/h	UP 75-25PK
SI 18TU	1	1	1	4,2 m²	0 °C	20 °C	3.0 m³/h	UP 75-25PK
SI 22TU	-	1	1	5,7 m²	0 °C	20 °C	4.0 m³/h	UPH 90-32
SI 26TU	-	1	1	5,7 m²	0 °C	20 °C	4.5 m³/h	UPH 90-32
SI 35TU	-	1	1	5,7 m²	0 °C	20 °C	6.1 m³/h	UPE 100-32K
SI 50TU	-	1	1	5,7 m²	0 °C	20 °C	8.8 m³/h	UP 120-32PK
SI 75TU	-	2	1	7,0 m²	0 °C	20 °C	12.7 m³/h	UP 120-32PK
SI 90TU	-	2	1	7,0 m²	0 °C	20 °C	15.1 m³/h	UPH 80-40F
SI 130TU	-	3	2	14,0 m²	0 °C	20 °C	17.2 m³/h	UPH 80-40F
SIH 20TE	1	1	1	4,2 m²	0 °C	20 °C	3.7 m³/h	UPH 90-32
SIH 90TU	-	2	2	9,0 m²	0 °C	20 °C	15.4 m³/h	UPH 80-40F
SI 35TUR	-	1	1	5,7 m²	0°C	20°C	5.9 m³/h	UPE 100-32K

SI 50TUR	-	1	1	5,7 m²	0°C	20°C	8.4 m³/h	UP 120-32PK
SI 70TUR	-	2	1	7,0 m²	0 °C	20 °C	12.1 m³/h	UPH 80-40F
SI 85TUR	-	2	1	7,0 m²	0 °C	20 °C	14.1 m³/h	UPH 80-40F
SI 130TUR+	-	1	1	5,7 m²	0 °C	20 °C	19.0 m³/h	UPH 80-40F
water-to-water heat pump								
WI 14TU	-	1	-	4,2 m²	7 °C	20 °C	2.3 m³/h	UP 75-25PK
WI 18TU	1	1	-	4,2 m²	7 °C	20 °C	2.9 m³/h	UP 75-25PK
WI 22TU	-	1	1	5,7 m²	7 °C	20 °C	3.8 m³/h	UPH 90-32
WI 35TU	-	1	1	5,7 m²	7 °C	20 °C	6.1 m³/h	UPH 90-32
WI 45TU	-	1	1	5,7 m²	7 °C	20 °C	7.9 m³/h	UPE 100-32K
WI 65TU	-	2	1	7,0 m²	7 °C	20 °C	12.1 m³/h	UP 120-32PK
WI 95TU	-	2	1	7,0 m²	7 °C	20 °C	17.0 m³/h	UPH 80-40F
WI 120TU	-	3	2	14,0 m²	7 °C	20 °C	20.6 m³/h	UPH 80-40F
WI 180TU	-	4	3	20,0 m²	7 °C	20 °C	22.2 m³/h	UPH 80-40F
WIH 120TU	-	3	2	14,0 m²	7 °C	20 °C	21.2 m³/h	UPH 80-40F

*Alternative switching between heating and DHW with 3-way reversing valve DWV 32, DWV 40, DWV 50

The hot water temperature displayed by the heat pump manager may deviate from the hot water outlet temperature depending on the positioning of the sensor.

11.06.2024
The following heat pumps have been added:

- LA 1422C
- LI 1422C
- LI 1826C
- LA 60P-TUR

8.4.4 Functional description DFM 1988-1

General information

In addition to needs-based planning of the drinking water installation and the selection of the right materials and products, proper operation is crucial in order to maintain good drinking water quality in the installation.

Proper operation begins with the initial filling of the system with drinking water. From this point onwards, regular replacement of the drinking water, i.e. sufficient consumption, must always be ensured in order to keep the water "fresh". If drinking water stagnates in the pipework,
there is a risk that existing bacteria will multiply excessively or that materials from the pipes will accumulate in the water.

This also means that in buildings in which the drinking water installation has been filled but is still no consumers use the tapping point, the water exchange or water hygiene must be ensured by other means.

In addition, the applicable standards and laws must be taken into account at the time the system is created.

Functional description DFM 1988-1

In accordance with DIN 1988-200 (scope of application for buildings and properties)**, the cylinder temperature may be lowered when the water exchange rate is high**, thus enabling more efficient heating of the domestic hot water cylinder with the heat pump.

The DFM 1988-1 flow meter is a measuring and control device used to measure the tap volume of a central DHW cylinder at the cold water inlet. In large systems, apartment blocks, blocks of flats or where there are increased hygiene requirements, it enables the tap quantity of a central domestic hot water cylinder to be measured at the cold water inlet and the setpoint value to be increased for the period in which the water exchange is too low.

NOTE
The flow meter does not fulfil the requirement of DVGW guideline W 551 for a permanent 60 °C at the outlet of the domestic hot water cylinder, but that of DIN 1988-200 in systems with increased water exchange. The DIN was created after the guideline and represents the more up-to-date status.
of the technology.

Functionality

If the requirement for drinking water installations for a complete replacement of the hot drinking water in the storage tank within 72 hours is not met, a switching output on the electronic unit of the DFM 1988-1 is used to control a second heat generator (electric immersion heater).
which enables heating up to a hot water temperature of more than 60 °C. The switching output for the second heat generator is active until the switch-off temperature of 62 °C is reached. Switching back on takes place at a temperature of 60 °C. The increased setpoint is maintained until
until the required water exchange has taken place within 72 hours.

CAUTION
The system must be dimensioned by the installer (storage tank size, tap volume, number of people) in such a way that the required water exchange is generally achieved within 3 days.

The DFM 1988-1 is used for fusing in order to automatically increase the domestic hot water to temperatures greater than or equal to 60 °C if the water exchange is too low.

NOTE
The heat pump system - consisting of heat pump and storage tank - must always be designed in such a way that 55 °C is reached in pure heat pump operation under normal conditions.

When operating as intended with high water exchange, the DFM 1988-1 does not generate any additional energy consumption for the heating element in the domestic hot water cylinder, as the heat pump generates a hot water temperature of 55 °C.

If a water exchange in the drinking water installation for hot drinking water is ensured within 3 days during operation, operating temperatures of ≥ 55 °C can be set.

Operating temperatures < 50 °C must be avoided.

In circulating drinking water installations, a temperature drop of 5 K between the outlet from the storage tank and the return temperature to the storage tank must not be exceeded.

CAUTION
The operator must be informed of the possible health risk (legionella growth) during commissioning.
The instruction must be recorded on the commissioning report with the operator's signature.

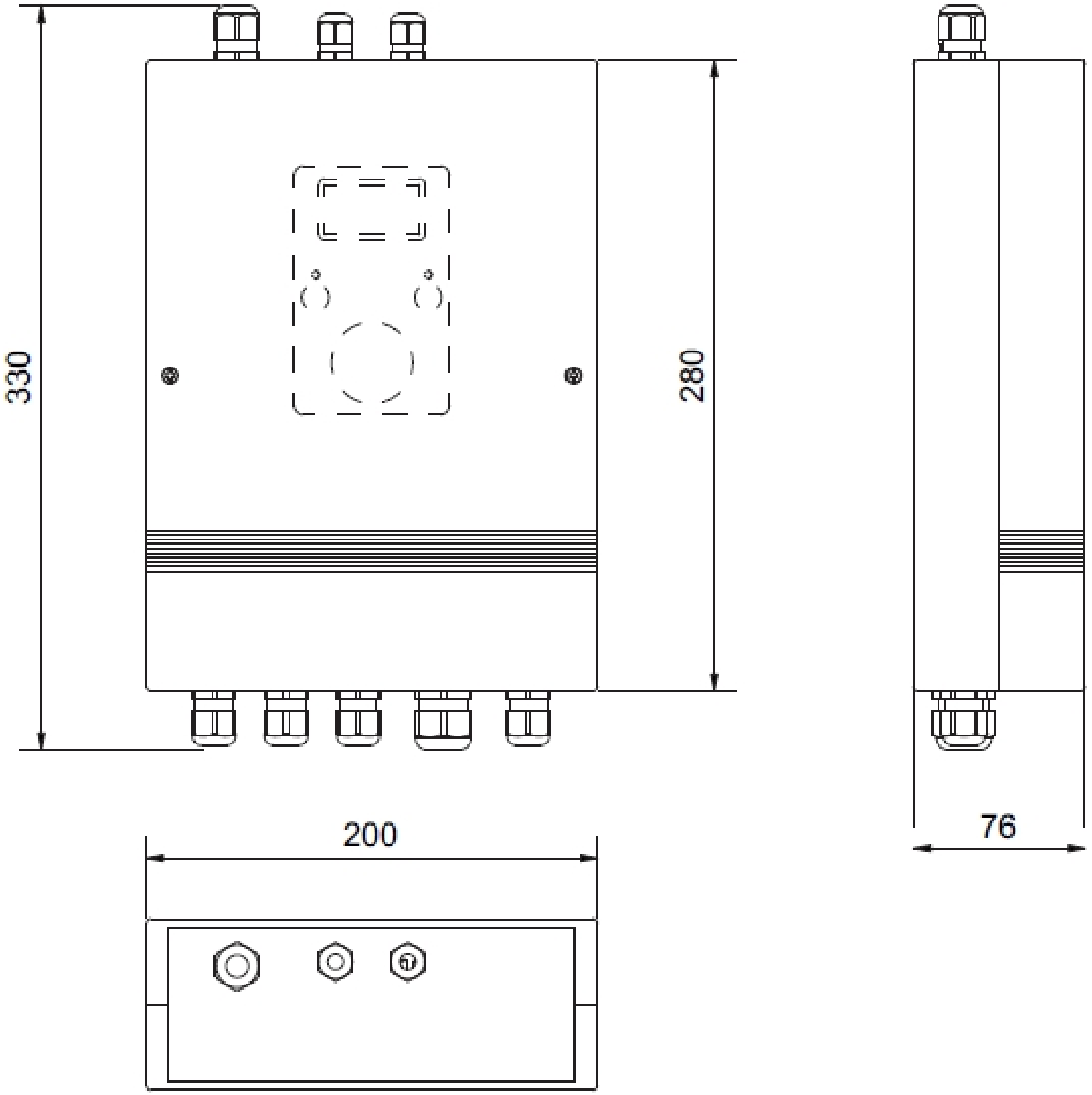
8.4.5 Technical data DFM 1988-1

Device information

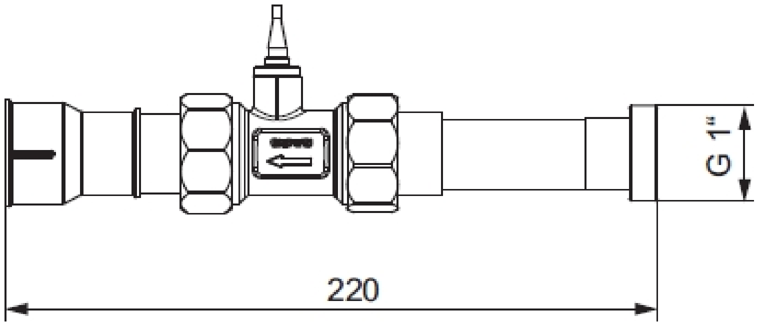
Performance data	
Power supply DFM 1988-1	~230 V, 50 Hz (L/N/PE)
CEHK heating element power supply	~400 V, 50 Hz (3L/N/PE)
Switching capacity signalling contact and circulation pump	230 V 1 A, max. 100 W
Degree of protection electronic unit DFM 1988-1 (EN 60529)	IP 20
Pressure drop max.	0.33 bar at 60 l/min
Volume flow Measuring range (maximum)	1.0 - 50 l/min (60 l/min)
Measuring accuracy	at 1 l/min 15-20 %. from 5 l/min approx. 5 %
Medium temperature	0 - 90 °C
ambient temperature	0 - 40 °C
Storage temperature	0 - 70 °C
Hydraulic cold water connection	Rp 1"
Hydraulic connection for domestic hot water	Rp 1"
Nominal pressure soldering assembly with sensor and immersion tube	6 bar
Sensor characteristic	NTC-10 (Carel characteristic curve)

dimensions

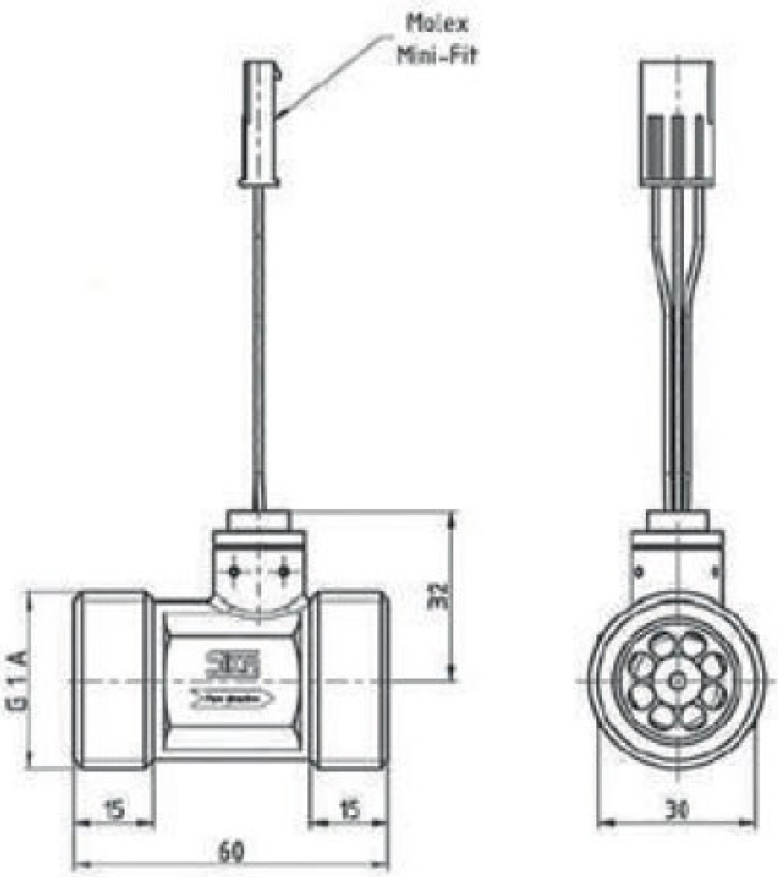
Dimensions electronic unit DFM 1988-1



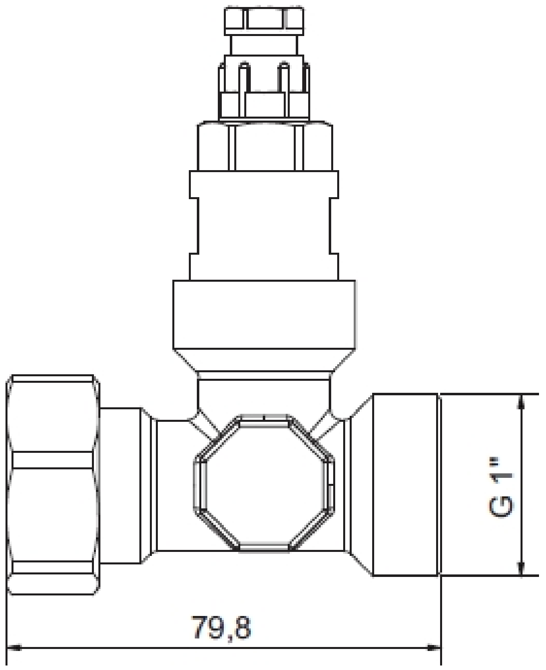
Cold water connection dimensions



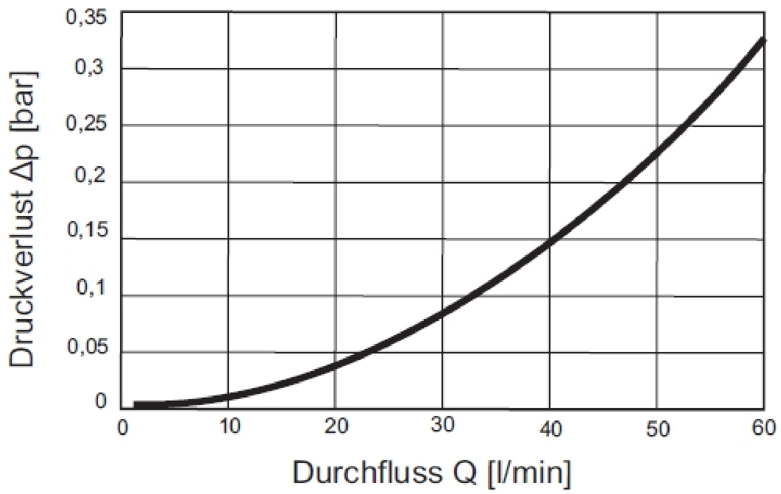
Turbine sensor dimensions



Thermowell fitting dimensions (hot water connection)

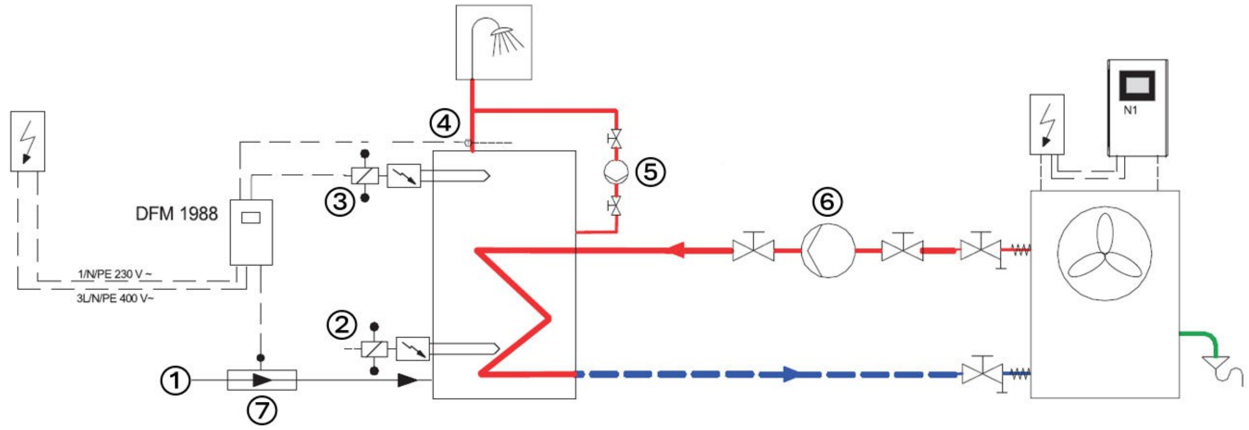


Pressure loss curve turbine sensor



8.4.6 Hydraulic connection DFM 1988-1

Hydraulic integration diagram for heat pump with DFM



① Cold water inlet

② Flange heater

③ CEHK immersion heater

④ DHW temperature

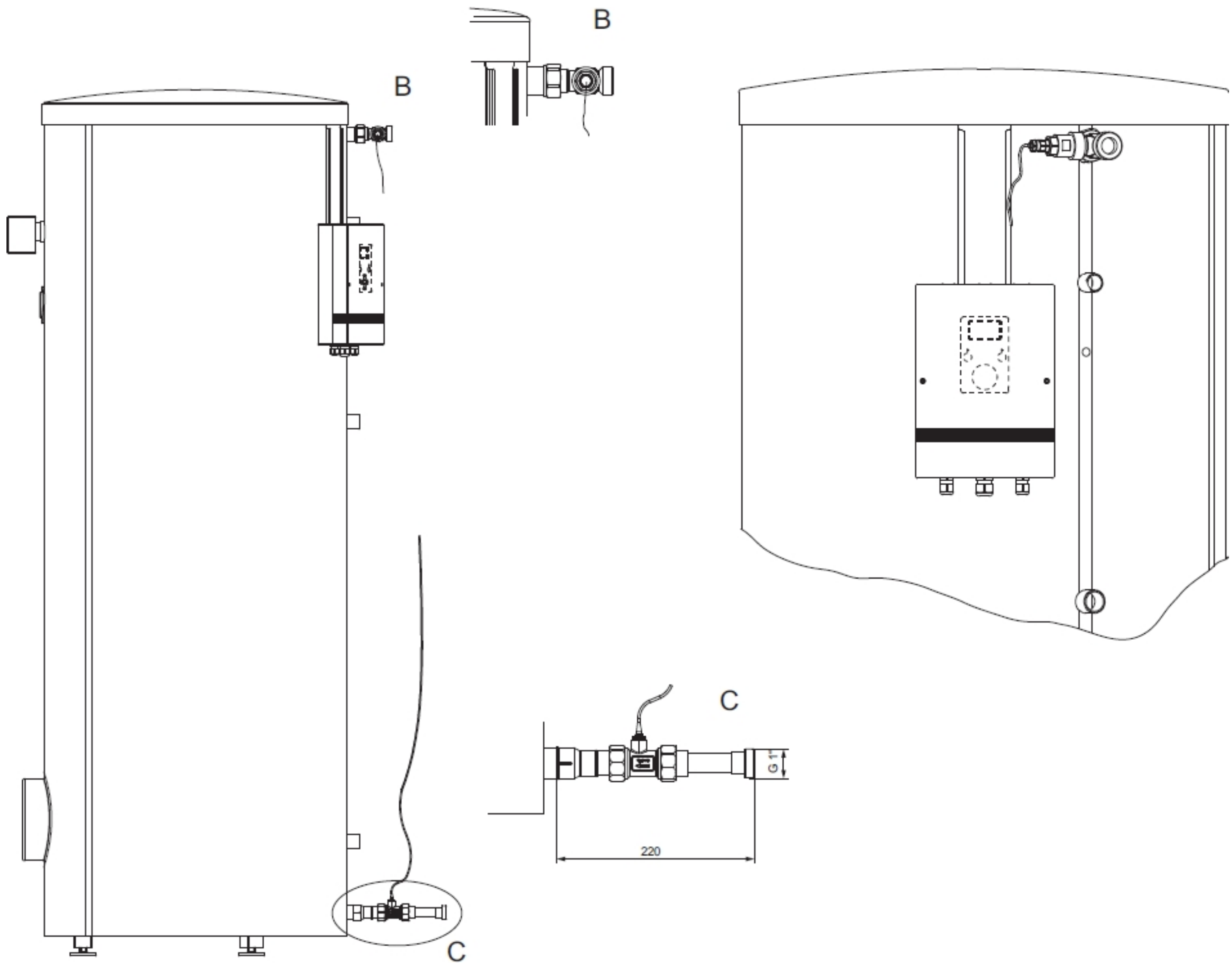
sensor

⑤ Circulation pump

⑥ Domestic hot water circulating pump (M18)

⑦ Sensor

Hydraulic integration of flow meter and temperature sensor



> **NOTE**
> The **turbine sensor (C)** must be installed in the cold water inlet of the storage tank during the hydraulic installation; the same applies to the **pipe section (B)** with the immersion sleeve for the temperature sensor at the hot water outlet.
> The turbine sensor can be electrically connected to the electronic unit of the DFM 1988-1 at a later date using a pre-configured plug connector.

Mounting the turbine sensor - Cold water inlet

The connection set for the cold water inlet consists of three individual components

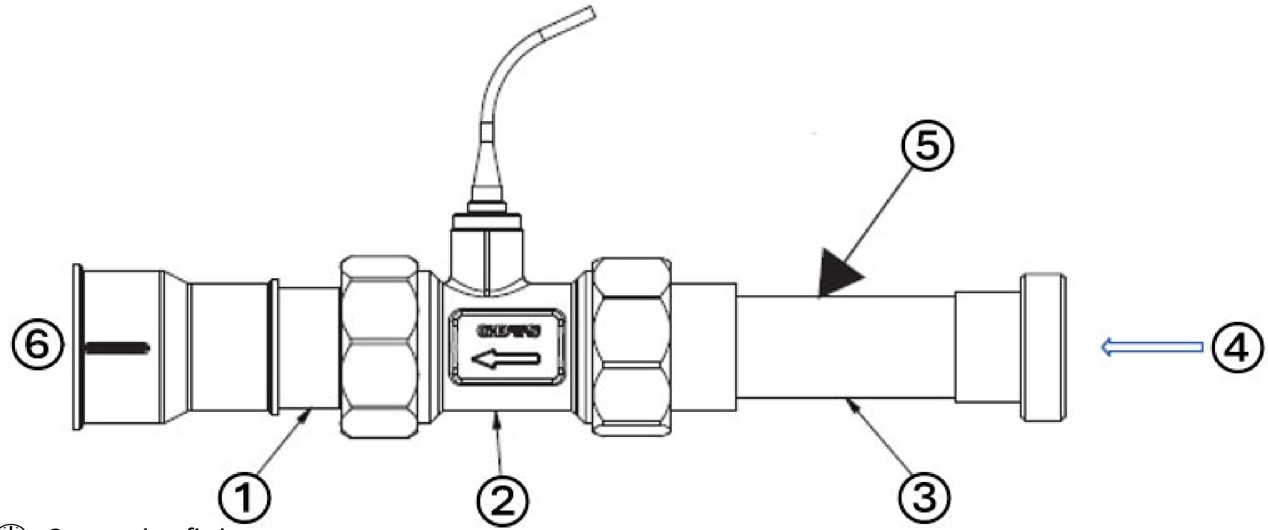
- Connection fitting,
- Turbine sensor
- Calming route.

When installing the connection fitting (cold water inlet) and the calming section on the sensor, ensure that the electric cable is not damaged or kinked.

The **turbine sensor (C)** is preconfigured for direct connection to the cold water inlet of the storage tank. The pre-assembled connection fittings enable simple integration into the hot water circuit.

> **CAUTION**
> Observe the flow direction of the **turbine sensor (C)** in the cold water inlet. The arrow on the outside of the brass pipe must point in the direction of the domestic hot water cylinder.

When installing the **turbine sensor (C)**, the direction of flow must be observed. The arrow on the outside of the pipe must point in the direction of the storage tank.



① Connection fitting

② Turbine sensor

③ Calming section

④ Cold water inlet

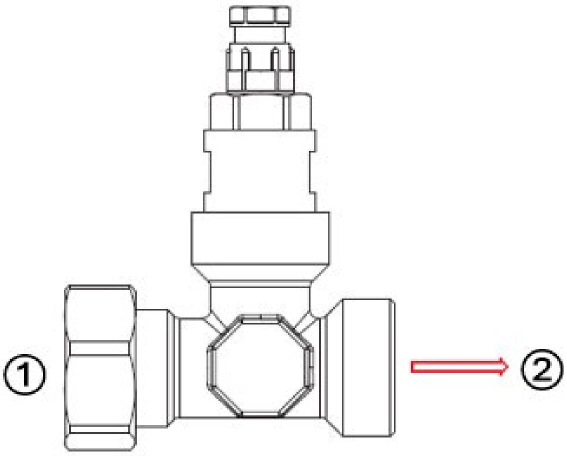
⑤ Calming distance min. 100 mm

⑥ Domestic hot water cylinder

Installing the fitting for the temperature sensor - hot water outlet

The preconfigured pipe section for the temperature sensor (B) must be installed directly at the hot water outlet of the storage tank.

Once the pipe section has been installed, the pre-wired temperature sensor must be fitted into the immersion sleeve provided for this purpose. The pipe section including the immersion sleeve must then be insulated to prevent incorrect measurements and unnecessary energy consumption.



① Domestic hot water cylinder page

② Domestic hot water flow

NOTE
The temperature sensor at the hot water outlet must be insulated. An uninsulated hot water outlet sensor can lead to increased power consumption.

Once the installation work has been completed, the domestic hot water cylinder can be connected to the drinking water pipe.

Then check all connections for leaks and retighten if necessary.

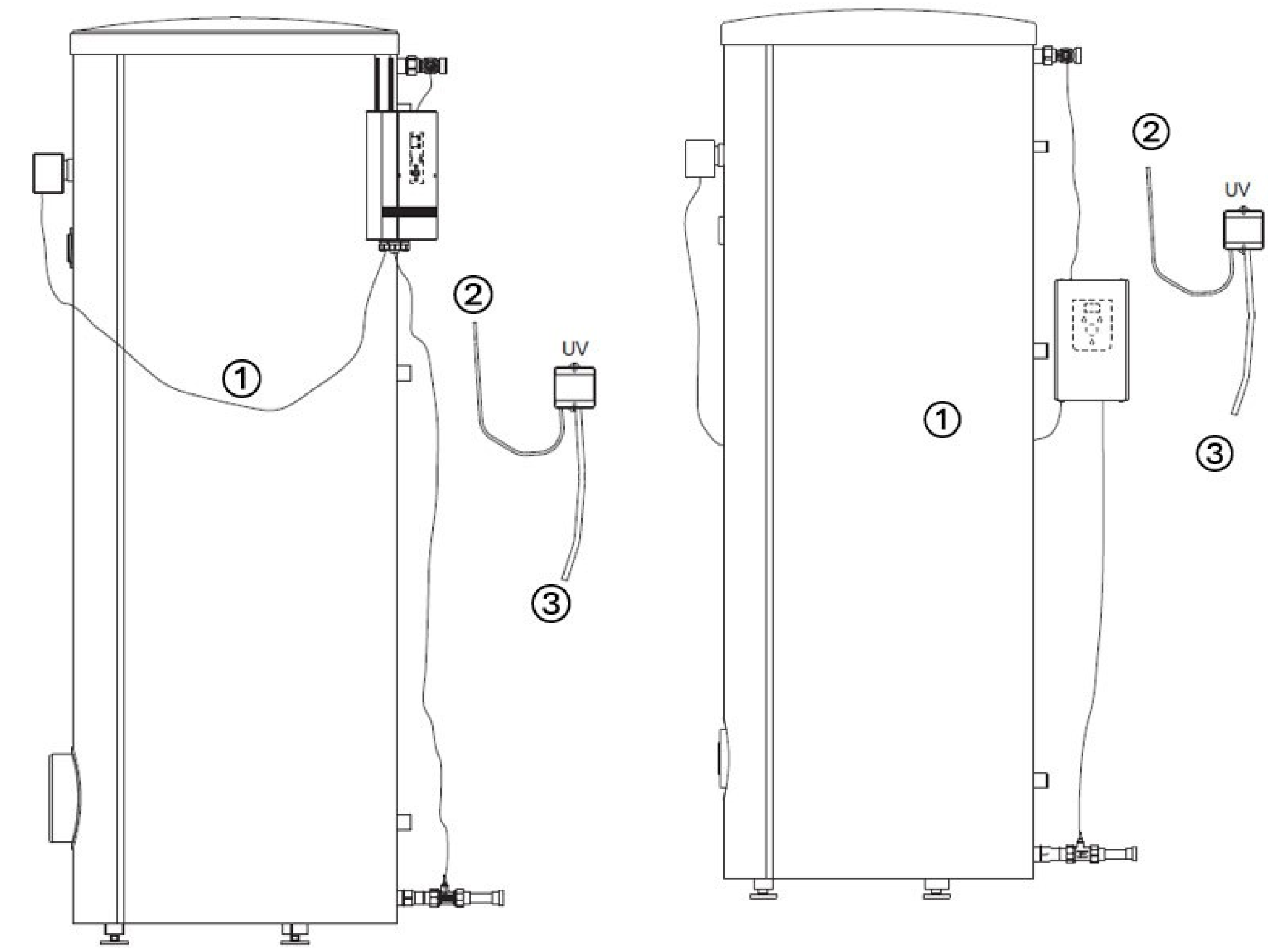
Purge the storage tank completely. The cylinder must be completely filled with water and must not contain any air bubbles. We recommend a venting device on the upper connection of the domestic hot water cylinder (cylinder head - next to the sacrificial anode).

CAUTION
Air bubbles in the storage tank lead to inaccuracies in temperature measurement and unnecessary energy losses.

Mounting the electrical unit

There are two ways to mount the electronic unit of the DFM 1988-1:

Wall mountingMounting on the storage tank



Load 400 V~DFM 1988-CEHK

② 230 V mains voltage DFM 1988-1

③ 400 V mains voltage CEHK srew-in heating element

8.5 Domestic hot water preparation with the domestic hot water heat pump

8.5.1 Table of contents

8.5.2 The DHW series of domestic hot water heat pumps from Dimplex

A domestic hot water heat pump is one of the most efficient solutions for domestic hot water preparation in both new and existing buildings. It can cover the hot water requirements of a detached house all year round, independently of an existing heating system. It recovers up to 70 % of the energy required for heat up from the ambient air or the waste heat present in the room air.

The domestic hot water heat pumps from Dimplex combine comfort and efficiency. The most important advantages of the DHW series at a glance:

- **Simply efficient heating**: Domestic hot water preparation from waste heat.
- **Simply store intelligently**: Use your own PV energy for domestic hot water.
- **Simply look good**: Compact dimensions and modern design for the installation room.
- **Easy to set up**: Thanks to low tilt dimensions, even low cellar rooms are suitable as installation locations.

8.5.3 Assortment overview:

Order code	Item no.	Tapping profile	Useful capacity	refrigerant	
DHW 100PW	382550	M	100 l	R290	
DWH 250P	380820	L	250 l	R290	

Order code	Item no.	Tapping profile	Useful capacity	refrigerant	
DHW 301P(+)	382070	XL	270 l	R290	

Functional description of domestic hot water heat pumpWater-side connection, condensate drain and water quality

8.5.4 Functional description of domestic hot water heat pump

The domestic hot water heat pump essentially consists of the domestic hot water cylinder, the components of the refrigerant, air and water circuit and all the control, regulation and monitoring equipment required for automatic operation.

The domestic hot water heat pump utilises the heat from the intake air for domestic hot water preparation, with the addition of electrical energy. The appliances are equipped with an electric heater as standard.

The temperature of the air drawn in from the heat source and the hot water temperature are decisive for the energy consumption and the heating time for domestic hot water preparation. For this reason, an air duct system can be connected to the standard connection piece of the domestic hot water heat pump for targeted waste heat recovery.

To ensure effective heat pump operation, a short circuit between the air drawn in and the air blown out must be avoided. One possible variant is, for example, the use of an elbow on the discharge side.

As the extract air temperature falls, the heat pump heating output decreases and the heating time increases. For economical operation, the air intake temperature should not permanently fall below 15 °C

Functions of the electric heater

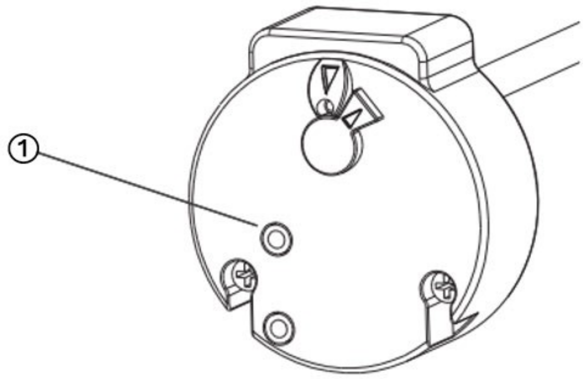
- **Auxiliary heating**
  With the "Turbo" setting, domestic hot water preparation with the support of the electric heating.
- **Emergency heating**
  In the event of a fault in the heat pump, the electric heating system can maintain the hot water supply.
- **Preventive thermal disinfection**
  Water temperatures above 60 °C (up to 65 °C) can be set on the control panel keypad in the "Legionella" menu item. be programmed.
- **reheating**
  Water temperatures above 60 °C are achieved with the electric heater.

Safety and control equipment

The domestic hot water heat pumps are equipped with the following safety devices:

High pressure switch (HD)
The high pressure switch protects the heat pump against impermissibly high operating pressure in the refrigerant circuit. In the event of a fault, the pressure switch switches off the heat pump. The heat pump is switched on again with a time delay after the pressure in the refrigerant circuit has been reduced.

Safety temperature limiter for electric heating (STB)
The STB prevents the generation of impermissibly high temperatures in the domestic hot water cylinder. If the set switching value (99 °C) is exceeded, the electric heating is switched off. The electric heating can only be switched on again when the hot water temperature has dropped to ≤ 87 °C and the reset button on the STB (under the flange cover) is then pressed (may only be carried out by qualified personnel!).



① Reset button (87°C) of the safety temperature limiter (STB)

8.5.5 Water-side connection, condensate drain and water quality

Water-side connection

It is essential to install a safety assembly in the cold water inlet.

This safety group must comply with the national standards and conform to DIN 1988, Part 2; DIN 4753, Part 1 and DIN EN 1488.

The safety group must be installed as close as possible to the cold water inlet of the appliance and the water flow must not be obstructed by fittings (valve, pressure reducer, etc.).

The drain outlet of the safety group must be installed in a frost-free environment and have a downward gradient.

The discharge outlet of the safety group must be designed in accordance with the DTU regulations (Standardised Technical Documents) and must never be blocked. It must be connected via a funnel (at least 20 mm of free air) to a vertical discharge pipe with a diameter at least equal to that of the appliance's connection pipe.

If the pressure in the cold water inlet is more than 5 bar, a pressure reducing valve must be installed upstream of the safety group on the flow of the main system (a pressure of 3 to 4 bar is recommended).

It is recommended to install an isolation valve upstream of the safety group. For

systems:

- with small diameter pipes,
- with ceramic ball valve

valves to prevent pressure surges or an expansion vessel adapted to the system must be installed as close as possible to the shut-off valves.

NOTE
Depending on the materials used for the hot water circuit, incompatibilities can lead to corrosion-related damage.

It is therefore essential that the appliance is connected to copper hot water pipes with a cast iron or steel connection or with dielectric connections that avoid galvanic link cables (e.g. iron/copper).

Rinse the supply line thoroughly before connecting the appliance to the sanitary installation so that no metal parts or other foreign bodies are introduced into the appliance.

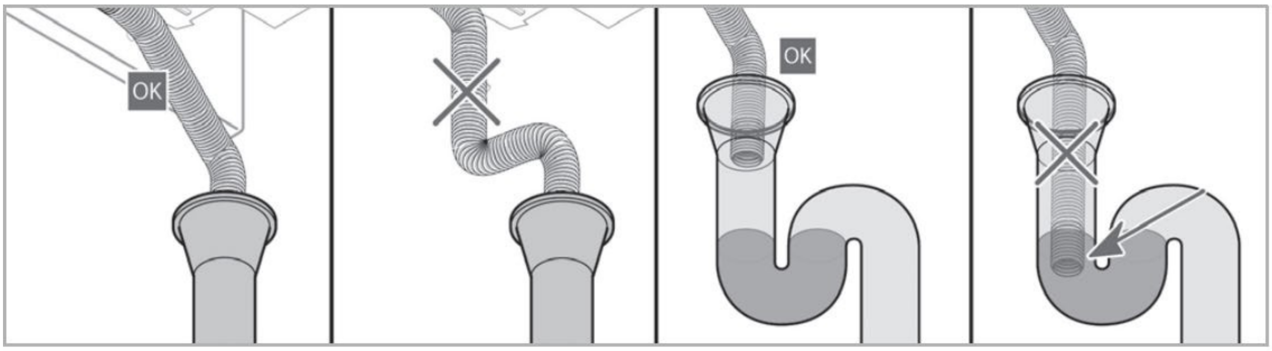
The standards applicable at the installation location must be complied with, in particular with regard to sanitary conditions and pressure safety conditions.

NOTE
The maximum domestic hot water temperature at the tapping points must not exceed 60 °C under any circumstances. Suitable thermostatic mixers must be installed in the domestic hot water flow to eliminate any risk of scalding.

NOTE
We strongly advise against using a circulation pipe. Connecting a circulation pipe increases the runtime of the heat pump and thus generates higher energy costs.

Condensate drainage

The condensate produced must not be drained directly into a drain via the condensate hose, but must flow through a siphon filled with water. Do not use a socket connection. Do not bend the hose.



Water quality

The appliance works with water that must have a minimum hardness of between 6.5 °dH and 17 °dH. If the water is particularly hard (total hardness >14 °dH), we recommend using a water softener. Failure to comply with the above conditions will invalidate the warranty on the use of the storage tank (the values apply to a water temperature of 20 °C).

Specific resistance	2200 V.cm < R < 4500 V.cm	
water hardness	>1.6 l eq.	>6.5 °dH < 17°dH

Specific resistance	2200 V.cm < R < 4500 V.cm	
Free CO_2	<15 mg/l	-
Calcium (Ca^{++})	>1.6 l eq.	>4.5 °dH
Sulphates (SO_4^{--})	<2 l eq.	>5.6 °dH
Chlorides (Cl^-)	<2 l eq.	>5.6 °dH
Sulphates and chlorides (SO_4^{--} + Cl^-)	< 3 l eq.	>5.6 °dH

Sacrificial anode

The storage tank has a magnesium sacrificial anode.

Check these for wear at regular intervals (at least once a year). Replace if necessary

Measured value < 0.3 A: Sacrificial anode exhausted

8.5.6 Selection guide for domestic hot water heat pumps

Group and centralised supply

domestic hot water heat pump

order code			DHW 100PW	DHW 250P	DHW 301P	DHW 301P+
			100 litres	**250 litres**	**300 litres**	
		Item no.				
One room	**One tap**	Sink unit				
		HWB				
		Washbasin				
		Shower				
		Tub				
		Washbasin + shower				
	Multiple taps	Washbasin + bath	✓			
		Washbasin + shower + tub	✓			
Several rooms	**Centralised supply**	up to 5 pers.		✓	✓	✓
		up to 8 pers.				

Integration of solar thermal energy				✓
Integration of photovoltaics	✓		✓	✓

8.5.7 DHW 100PW

Contents

Technical data

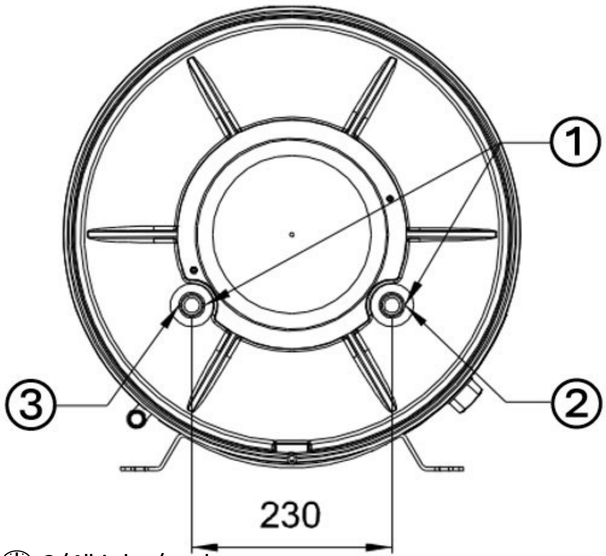
Heat pump output		
Useful capacity	l	100
Maximum power (HP* + additional heating)	W	1350
Air temperature range	°C	-7 to +35
Hot water temperature* with heat pump	°C	30 to 55
Power consumption of the heat pump, max.*	W	350
air flow rate	m³/h	90 to 160
Indoor sound power level**	dB(A)	41,2
External sound power level**	dB(A)	55,8
refrigerant	-/kg	R 290 / 0,1
GWP value (CO2 equivalent)	kg	0.3 kg CO2
Ventilation connection type	-	Outside or ambient air
Standard data EN 16147		

Heat pump output		
Withdrawal cycle	-	M
COP* (outside air +7 °C)	-	2,38
Power consumption in standby mode	W	16
Reference hot water temperature	°C	53,6
Heating time	-	6 h 48 min
Energy efficiency class	-	A
Seasonal energy efficiency	%	99
Vmax	l	141,7
COP* (room air +15 °C)	-	2,7
Dimensions and connections		
dimensions	mm	520 x 1290
Unladen weight	kg	47
Air connection diameter (intake/outlet side)	mm	125/80
Air duct length, max.	m	5
KW and DHW connection diameter	inch	R 3/4"
power supply	V/Hz/A	230 V/50 Hz/10 A
degree of protection	-	IPX4
Circuit breaker (curve D)	A	10
Storage tank		
Materials and contactor	-	Enamelled steel
Operating pressure, max.	MPa	0.6 (6 bar)
Condensate flow rate, max.	l/h	0,12
Power integrated electrical auxiliary heating (safety = 87 °C)	W	1000
Temperature with electric auxiliary heating, max.	°C	65

*DHW = domestic hot water
*WP = heat pump
*KW = cold water
*COP = coefficient of performance (COP)
**Sound pressure tested in an anechoic chamber

dimensions

View from below

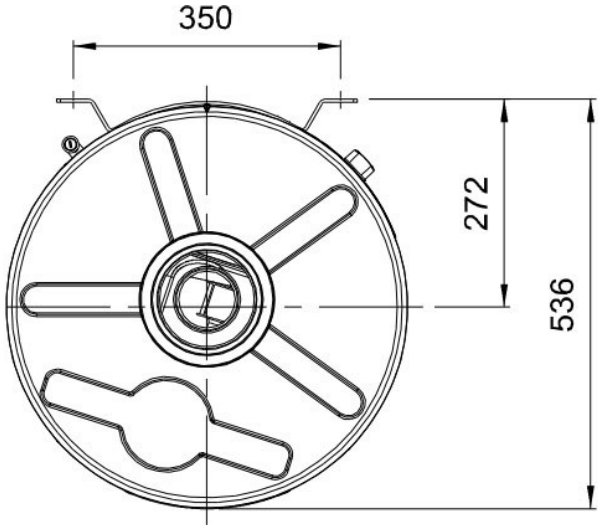


① 3/4" inlet/outlet

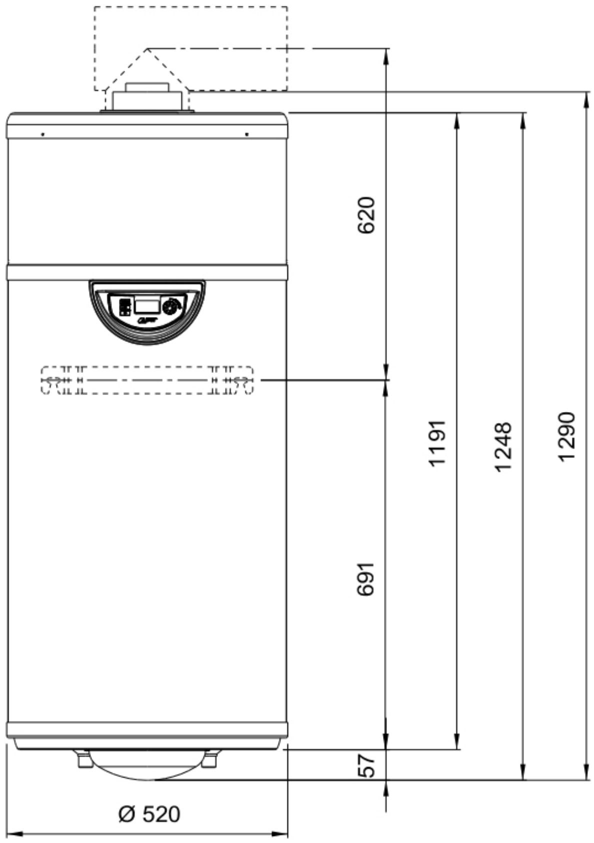
② Cold water

③ Domestic hot water

View from top



Side view



installation location

The following applies to the choice of device location:

- Install the domestic hot water heat pump in a frost-free and dry room.
- Observe the minimum distance to the ceiling to prevent air short circuits.
- Furthermore, the installation and air intake must not be carried out in rooms where there is a risk of explosion due to gases, vapours or dust.
- Without an air duct, the appliance must be installed in a room of at least 20 m^3.
- Pay attention to thermal bridges, especially if the room cooled by the discharge air is directly adjacent to a heated room.
- Use a water drain (with siphon) for the accumulating condensate.
- The air drawn in must not be excessively contaminated or heavily laden with dust.

It is prohibited to mount the appliance as follows:

- Outdoors
- In rooms that are exposed to frost or where the temperature is below 7 °C, even when the appliance is in operation
- In very humid rooms with the release of high vapour concentrations
- In rooms where there is a risk of explosion due to gases, vapours or dust
- In the vicinity of bedrooms due to heat pump operation (noise development)
- Near a flue gas outlet (minimum distance 0.6 m)

It is prohibited to operate the appliance as follows:

- With solvent-containing or explosive exhaust air
- With exhaust air containing grease, dust or sticky aerosols
- If extractor bonnets are connected to the ventilation system

(Wall) mounting

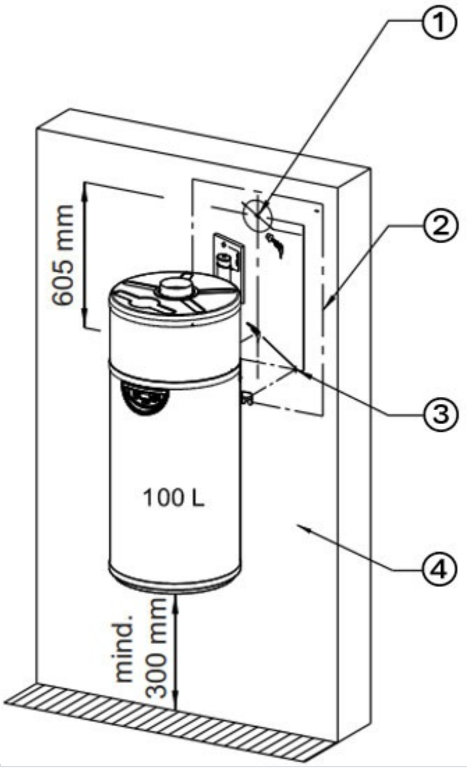
NOTE
The wall must be stable enough to bear the entire weight of an appliance completely filled with water (filled with 100 litres of water = 148 kg). Use suitable dowels and screws depending on the wall material.

NOTE
To ensure trouble-free operation and for maintenance and repair work, maintain a minimum distance of 0.3 m to the left and right and 0.3 m from the ceiling to the appliance.

NOTE
Maintain a minimum distance of 0.3 m under the appliance for access to the anode and the second heat generator.

Install domestic hot water heat pump:

- Mount the domestic hot water heat pump on the wall mounting bracket and align it vertically.
- Tighten the screws.



Drilling axles Ø 132 mm for the concentric channel

② Drilling template supplied

③ Drill axles on the wall mounting bracket

④ Load-bearing wall

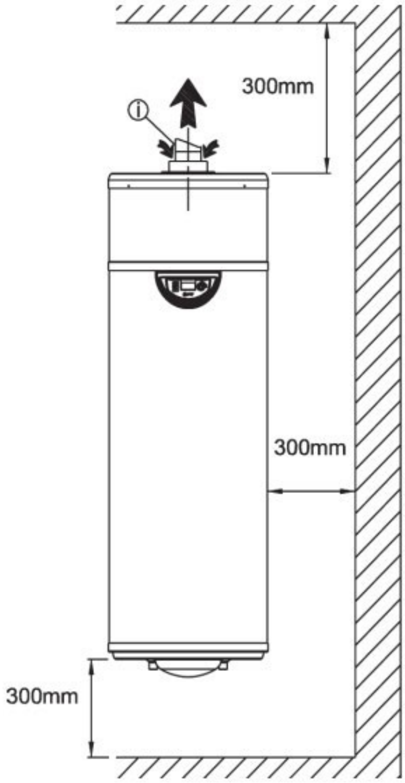
> **NOTE**
> The appliance must be installed vertically. Otherwise, condensate may overflow and cause water damage.

Air-side connection

The detailed connection descriptions can be found in the installation and operating instructions

Air intake and exhaust in unheated rooms Without air duct

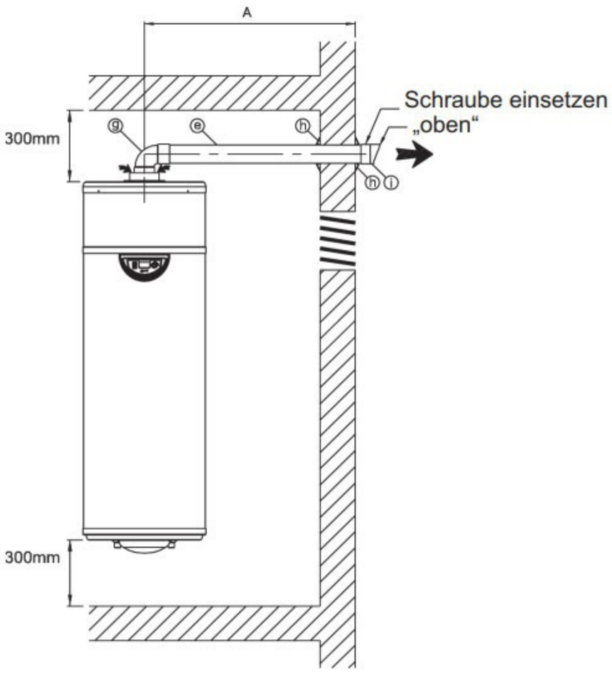
> **NOTE**
> Without an air duct, the appliance must be installed in a room of at least 20 m³.



> **NOTE**
> For safety reasons, the Ø 80 mm connection piece supplied must be attached to the air outlet of the appliance with a screw.

Pos.	Designation
i	Spigot Ø80 mm

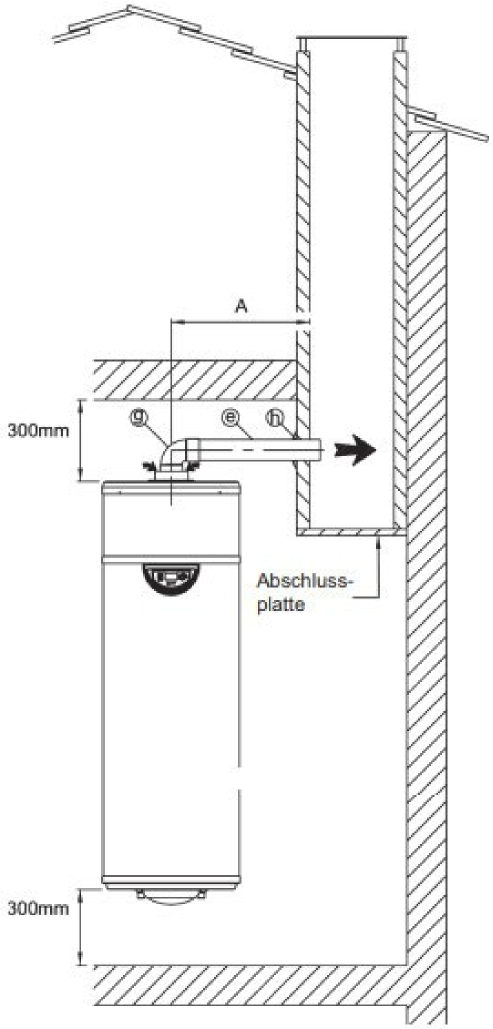
Air discharge into a neighbouring room or to the outside with PVC pipe Ø 80 mm



> **NOTE**
> For this type of installation, provide PVC elbow Ø 80 mm and PVC pipe Ø 80 mm on site. Insulate this type of installation due to the accumulation of condensate

Pos.	Designation
e	PVC pipe Ø 80 mm (on site)
g	PVC bend Ø 80 mm (on site)
h	Wall seal Ø 80 mm
i	Spigot Ø 80 mm

Air discharge to the outside through an extractor

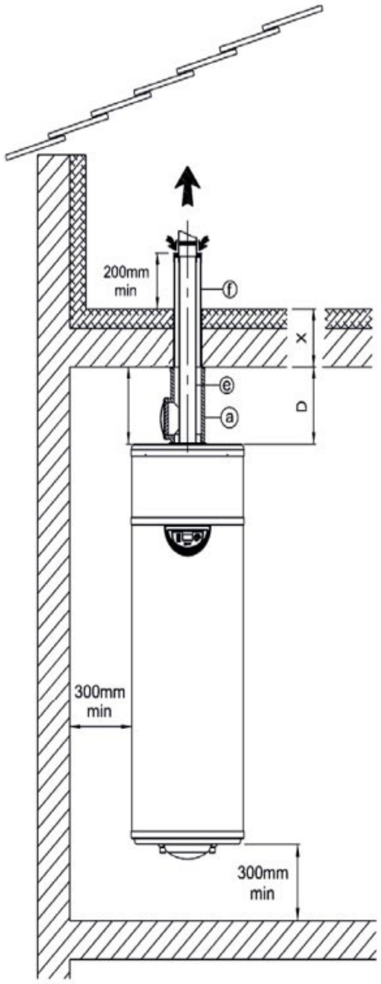


> **NOTE**
> For this type of installation, provide PVC elbow Ø 80 mm and PVC pipe Ø 80 mm on site. Insulate this type of installation due to the accumulation of condensate

> **NOTE**
> No chimney is permitted as a flue!

Pos.	Designation
e	PVC pipe Ø 80 mm (on site)
g	PVC bend Ø 80 mm (on site)
h	Wall seal Ø 80 mm

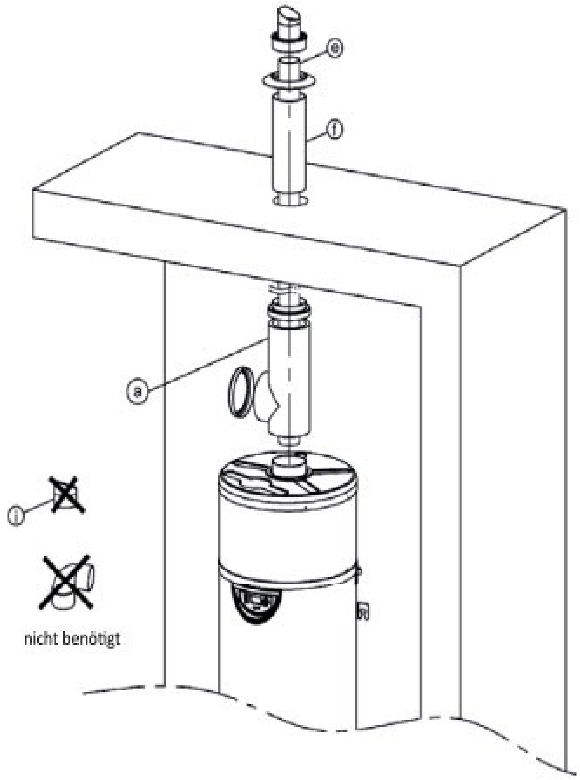
Air circuit into a neighbouring room with vertical air ducts



> **NOTE**
> Do not glue the round end cover to the PVC pipe Ø 125 mm.

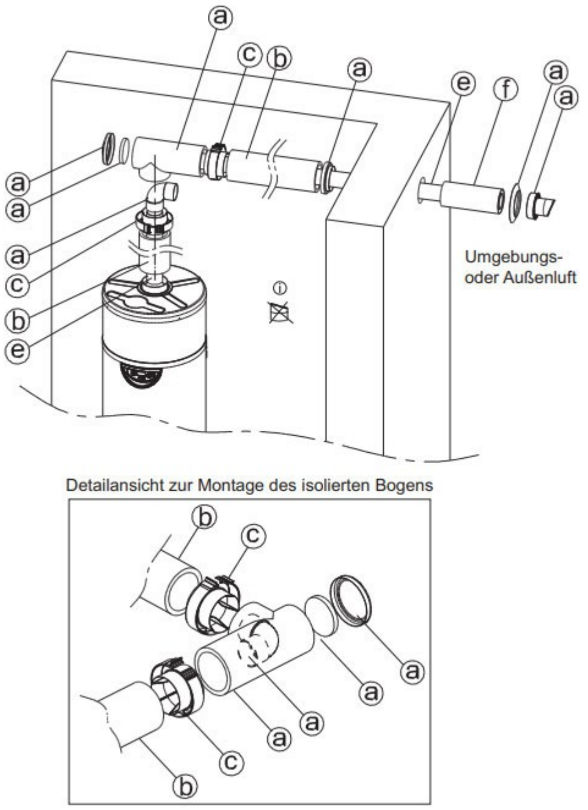
> **NOTE**
> The minimum cutting height for the insulated T-piece Ø 125 mm is 220 mm.

Pos.	Designation
a	**Air connection set** Ø 80 mm/125 mm, length 975 mm (air duct stub; wall seal Ø 125 mm; round end cover; insulated T-piece Ø 125 mm; cover for insulated T-piece; insulated pipe Ø 125 mm, length 85 cm; PVC pipe Ø 125 mm, length 500 mm (item f); PVC pipe Ø 80 mm, length 100 cm; PVC bend Ø 80 mm; connecting sleeve for insulated pipe Ø 125 mm; connecting sleeve for PVC pipe Ø 80 mm
i	Spigot Ø 80 mm

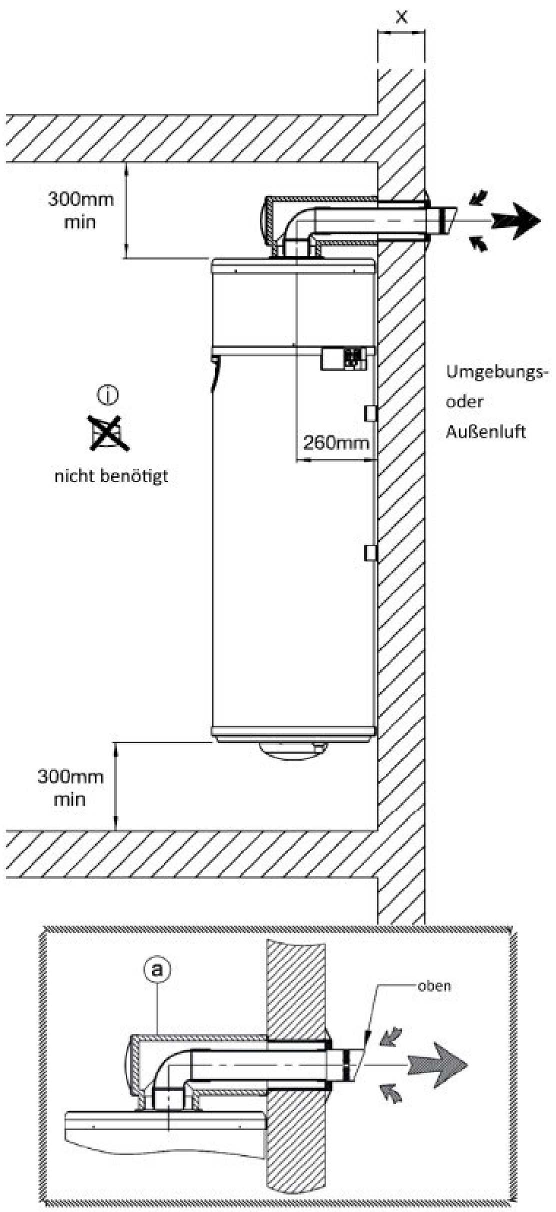

e
f
a
i
nicht benötigt

Connection to the air exhaust and intake of ambient or outside air Installation with

horizontal or rear ducts Ø 80 mm/125 mm

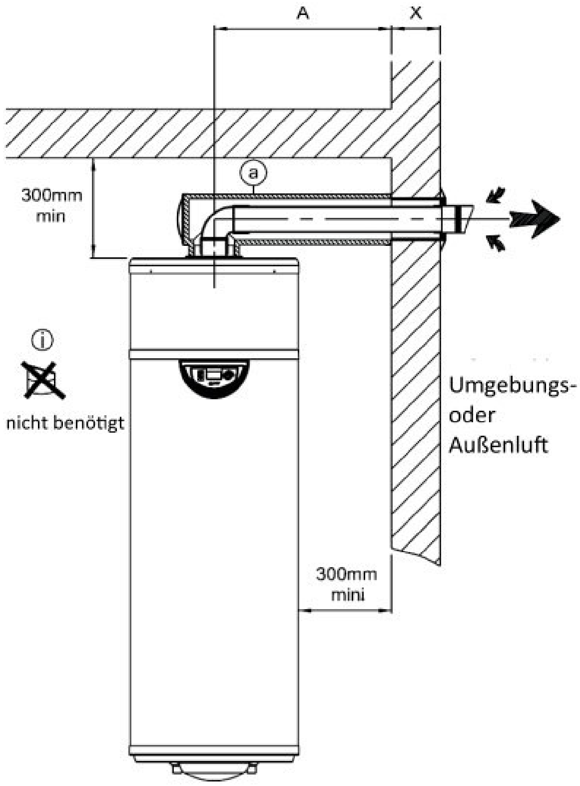


Pos.	Designation
a	**Air connection set** Ø 80 mm/125 mm, length 975 mm (air duct stub; wall seal Ø 125 mm; round end cover; insulated T-piece Ø 125 mm; cover for insulated T-piece; insulated pipe Ø 125 mm, length 85 cm; PVC pipe Ø 125 mm, length 500 mm (item f); PVC pipe Ø 80 mm, length 100 cm; PVC bend Ø 80 mm; connecting sleeve for insulated pipe Ø 125 mm; connecting sleeve for PVC pipe Ø 80 mm
b, c, e	**Extension set** DHW (insulated pipe Ø 125 mm, length 200 cm (item b); PVC pipe Ø 80 mm, length 200 cm (item e); connecting sleeve for insulated pipe Ø 125 mm, (item c); connecting sleeve for PVC pipe Ø 80 mm)
i	Spigot Ø 80 mm



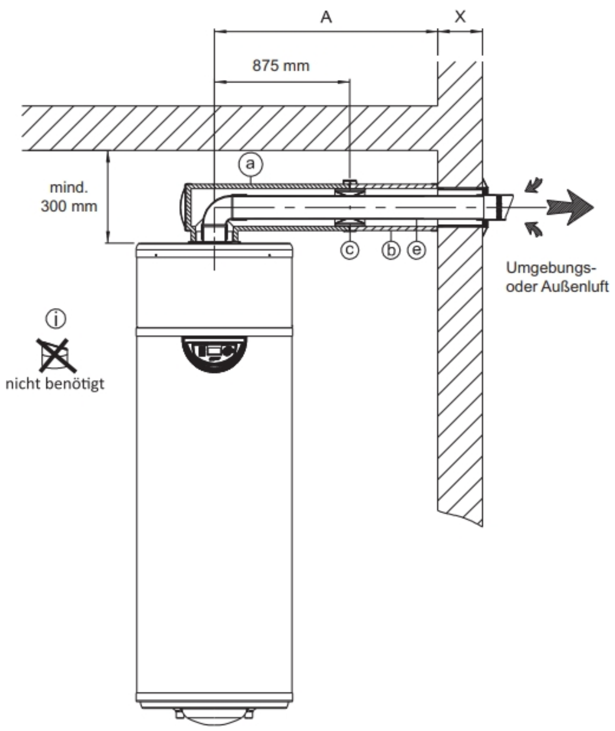
Pos.	Designation
a	**Air connection set** Ø 80 mm/125 mm, length 975 mm (air duct stub; wall seal Ø 125 mm; round end cover; insulated T-piece Ø 125 mm; cover for insulated T-piece; insulated pipe Ø 125 mm, length 85 cm; PVC pipe Ø 125 mm, length 500 mm (item f); PVC pipe Ø 80 mm, length 100 cm; PVC bend Ø 80 mm; connecting sleeve for insulated pipe Ø 125 mm; connecting sleeve for PVC pipe Ø 80 mm

Installation with horizontal air ducts



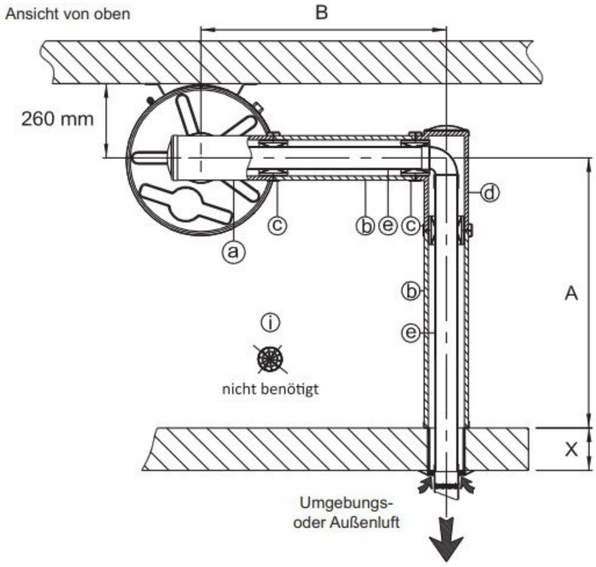
Pos.	Designation
a	**Air connection set** Ø 80 mm/125 mm, length 975 mm (air duct stub; wall seal Ø 125 mm; round end cover; insulated T-piece Ø 125 mm; cover for insulated T-piece; insulated pipe Ø 125 mm, length 85 cm; PVC pipe Ø 125 mm, length 500 mm (item f); PVC pipe Ø 80 mm, length 100 cm; PVC bend Ø 80 mm; connecting sleeve for insulated pipe Ø 125 mm; connecting sleeve for PVC pipe Ø 80 mm

Installation with horizontal air ducts and extension



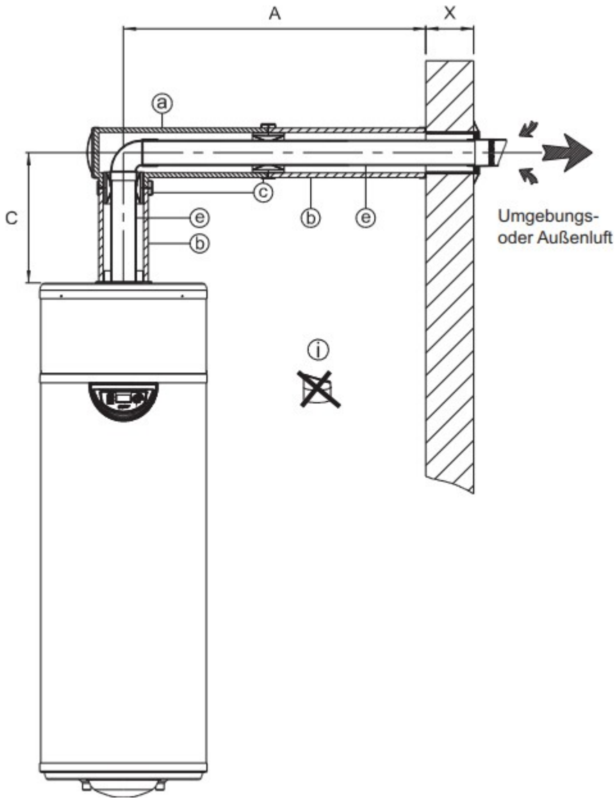
Pos.	Designation
a	**Air connection set** Ø 80 mm/125 mm, length 975 mm (air duct stub; wall seal Ø 125 mm; round end cover; insulated T-piece Ø 125 mm; cover for insulated T-piece; insulated pipe Ø 125 mm, length 85 cm; PVC pipe Ø 125 mm, length 500 mm (item f); PVC pipe Ø 80 mm, length 100 cm; PVC bend Ø 80 mm; connecting sleeve for insulated pipe Ø 125 mm; connecting sleeve for PVC pipe Ø 80 mm
b, c, e	**Extension set** DHW (insulated pipe Ø 125 mm, length 200 cm (item b); PVC pipe Ø 80 mm, length 200 cm (item e); connecting sleeve for insulated pipe Ø 125 mm, (item c); connecting sleeve for PVC pipe Ø 80 mm)

Installation with horizontal air ducts and curved outlet



Pos.	Designation
a	**Air connection set** Ø 80 mm/125 mm, length 975 mm (air duct stub; wall seal Ø 125 mm; round end cover; insulated T-piece Ø 125 mm; cover for insulated T-piece; insulated pipe Ø 125 mm, length 85 cm; PVC pipe Ø 125 mm, length 500 mm (item f); PVC pipe Ø 80 mm, length 100 cm; PVC bend Ø 80 mm; connecting sleeve for insulated pipe Ø 125 mm; connecting sleeve for PVC pipe Ø 80 mm
b, c, e	**Extension set** DHW (insulated pipe Ø 125 mm, length 200 cm (item b); PVC pipe Ø 80 mm, length 200 cm (item e); connecting sleeve for insulated pipe Ø 125 mm, (item c); connecting sleeve for PVC pipe Ø 80 mm)
d	**Insulated bend Ø 80/125 for air duct (included in the air connection)** (insulated T-piece Ø 125 mm; PVC bend Ø 80 mm; cover for insulated T-piece)

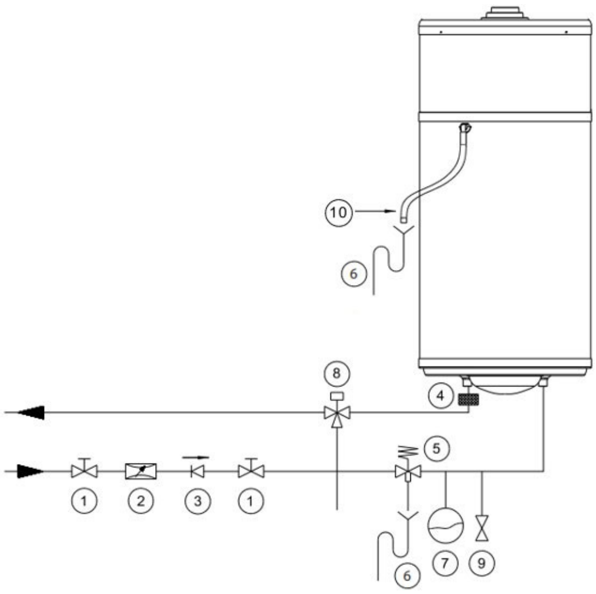
Installation with horizontal air ducts above the appliance



Pos.	Designation
a	**Air connection set** Ø 80 mm/125 mm, length 975 mm (air duct stub; wall seal Ø 125 mm; round end cover; insulated T-piece Ø 125 mm; cover for insulated T-piece; insulated pipe Ø 125 mm, length 85 cm; PVC pipe Ø 125 mm, length 500 mm (item f); PVC pipe Ø 80 mm, length 100 cm; PVC bend Ø 80 mm; connecting sleeve for insulated pipe Ø 125 mm; connecting sleeve for PVC pipe Ø 80 mm
b, c, e	**Extension set** DHW (insulated pipe Ø 125 mm, length 200 cm (item b); PVC pipe Ø 80 mm, length 200 cm (item e); connecting sleeve for insulated pipe Ø 125 mm, (item c); connecting sleeve for PVC pipe Ø 80 mm)

Water-side connection

Water-side connection, condensate drain and water quality



① Isolation valve*

② Pressure reducing valve*

③ Non-return flap*

④ Insulating dielectric sleeve*

⑤ Membrane safety group

⑥ Drain siphon*

⑦ Expansion vessel*

⑧ Thermostat mixer (scalding protection)*

⑨ Drain valve*

⑩ Condensate drain

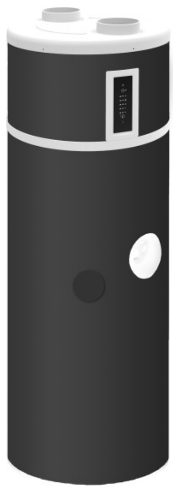
*Not included in the scope of supply

Use the following materials for the hot water circuit:

- Copper
- Stainless steel
- brass
- Plastic

8.5.8 DHW 250P

Contents



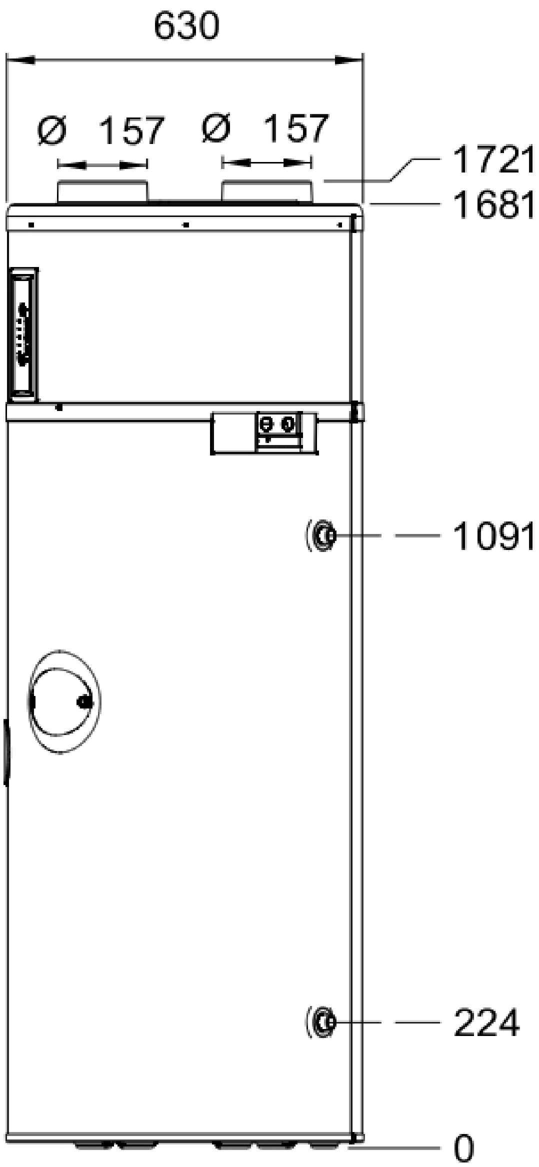
Technical data

Heat pump output		
Nominal volume	l	250
Maximum output (HP* + auxiliary heating)	W	1900
Air temperature range	°C	5 to 35 °C
Domestic hot water temperature with heat pump	°C	40 to 60 °C
Power consumption of the heat pump, max.	W	700
Sound pressure level at 1 m**	dB(A)	37
refrigerant	-/kg	R290 / 0.150
GWP value (CO2 equivalent)	kg	0.45 kg CO2
Ventilation connection type	-	Indoor air
Standard data EN 16147		
Withdrawal cycle	-	l
COP*	-	3,2

Heat pump output		
Electrical reserve power	W	32
Reference hot water temperature	°C	53,8
Heating time	-	8 h 00 min
Energy efficiency class	-	A+
Seasonal energy efficiency	%	133
Vmax	l	321
V40 td	l	2713
Dimensions and connections		
dimensions	mm	630 x 1721
Unladen weight	kg	82
KW and DHW connection diameter	inch	R 3/4"
power supply	V/Hz/A	230 V/50 Hz/8 A
degree of protection	-	IPX1
Circuit breaker (curve D)	A	13
Frequency band***	MHz	868 - 868,6
HR performance***	dBm	10,65
Storage tank		
Materials and contactor	-	Enamelled steel
Operating pressure, max.	MPa	0.6 (6 bar)
Condensate flow rate, max.	l/h	0,3
Power integrated electrical auxiliary heating (safety = 85 °C)	W	1200
Temperature with electric auxiliary heating, max.	°C	70

*DHW = domestic hot water
*WP = heat pump
*KW = cold water
*COP = coefficient of performance (COP)
**Sound pressure tested in an anechoic chamber
*** For equipment with radio option

dimensions



installation location

> **NOTE**
> Please note during installation: The appliance must not be set up near a permanent flame or any other source of ignition. The appliance must be set up in such a way that mechanical damage is avoided

It is prohibited to set up the appliance as follows:

- outdoors,
- in rooms that are exposed to frost or where the temperature is below 7 °C, even when the appliance is in operation,
- in very humid rooms with the release of a considerable amount of vapour (e.g. bathrooms),

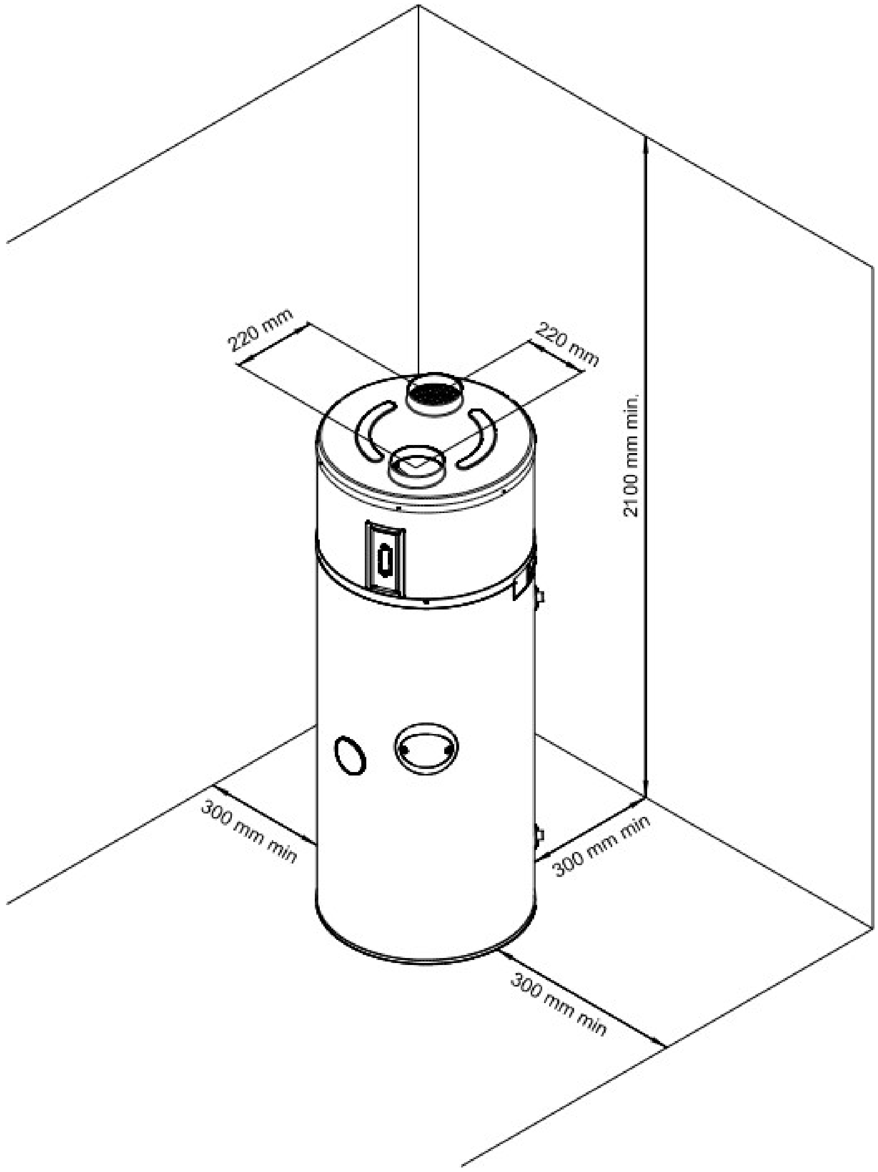
- in rooms where there is a risk of explosion due to the presence of gases, vapours or dust.
- To ensure acoustic comfort, avoid installing the unit near bedrooms.

It is prohibited,

- operate the appliance with intake air containing solvents or explosive substances,
- grease, dust or aerosol-containing intake air,
- Connect extractor bonnets to the ventilation system,
- Use air that contains boiler combustion products

NOTE
The floor must have sufficient strength (weight of the domestic hot water heat pump, filled with 250 litres of water = 335 kg).

To ensure normal operation of the domestic hot water heat pump and to facilitate maintenance work, a minimum clearance around the appliance and a minimum ceiling height for removing the appliance bonnet must be maintained:



NOTE
The appliance must be installed vertically. Otherwise, condensate may overflow and cause water damage.

Air-side connection

The device is intended for use without an air duct.

When using an air duct for intake, a total length of 2 m with a maximum of two 90° elbows is permissible.

If these regulations are not complied with, the manufacturer's warranty is no longer valid.

Without an air duct, the appliance must be installed in an unheated room (at least 20 m²), separate from neighbouring heated rooms.

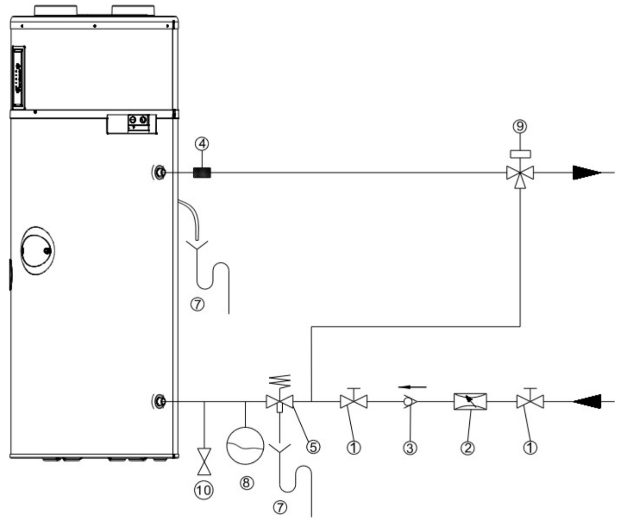
If the clear height under the ceiling above the appliance is less than 60 cm, we recommend installing an elbow at the air outlet and directing it to the rear or to the sides.

The domestic hot water heat pump can also be used in unheated workshops and garages if **the top parameters** are complied with.

The domestic hot water heat pump enables the dehumidification and cooling of rooms such as laundry rooms and storage rooms.

Water-side connection

Water-side connection, condensate drain and water quality



① Isolation valve

② Pressure reducing valve

③ Non-return flap

④ Dielectric insulation sleeve, optional (not included in the scope of supply)

⑤ Safety module (SVK 825) (not included in the scope of supply)

⑦ Siphon drain

⑧ Expansion vessel

⑨ Thermostat mixer

⑩ Drain valve

Use the following materials for the hot water circuit:

- Copper
- Stainless steel
- brass
- Plastic

8.5.9 DHW 301P(+)

Contents

Technical data

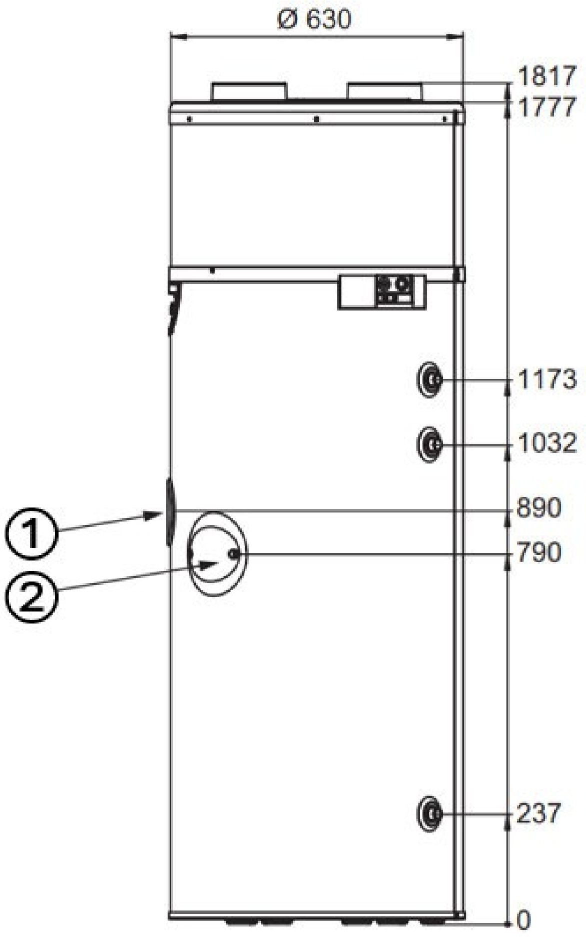
Heat pump output			
Useful capacity	l	270	265
Maximum power (heat pump* + additional heating) Air	W	1900	
temperature range Hot water temperature* with	°C	-7 to +45	
heat pump Heat pump power consumption,	°C	30 to 60	
max.* Air flow rate	W	700	
Sound power level inside**	m³/h	320 to 400	
Sound power level outside**	dB(A)	49,8	
Refrigerant	dB(A)	37,9	
GWP value (CO2 equivalent) Air	-/kg	R290 / 0,15	
connection type **Standard data EN**	kg	0.45 kg CO2	
16147 Extraction cycle	-	Outside or ambient air (at least 20 m³)	
COP* (outside air +7 °C)			
Power consumption in standby mode			
	-	XL	
	-	3,1	3,05
	W	25	

Reference hot water temperature	°C	53,8	
Heating time	-	10 h 24 min	10 h 27 min
Energy efficiency class	-	A+	
Seasonal energy efficiency	%	129	125
Vmax	l	349,3	
V40 td	l	353	372
COP* (room air +15 °C)	-	3,51	
Q(elec)	kWh	6,02	6,24
Dimensions and connections			
dimensions	mm	630 x 1817	
Unladen weight	kg	83	93
Air connection diameter (intake/outlet side)	mm	160	
Air duct length, max.	m	Flexible pipe: 6 m Smooth pipe: 12 m (intake and air outlet)	
KW and DHW connection diameter	inch	R 3/4"	
power supply	V/Hz/A	230 V/50 Hz/8 A	
degree of protection	-	IPX4	
Circuit breaker (curve D)	A	8	
tilt dimension	mm	1890	
Area/connection additional heat exchanger	m²/inch	-	0.9 / Rp 1"
Storage tank			
Materials and contactor	-	Enamelled steel with sacrificial anode	
Operating pressure, max.	MPa	0.6 (6 bar)	
Condensate flow rate, max.	l/h	0,3	
Power integrated electrical auxiliary heating (safety = 87 °C)	W	1200	
Temperature with electric auxiliary heating, max.	°C	65	70

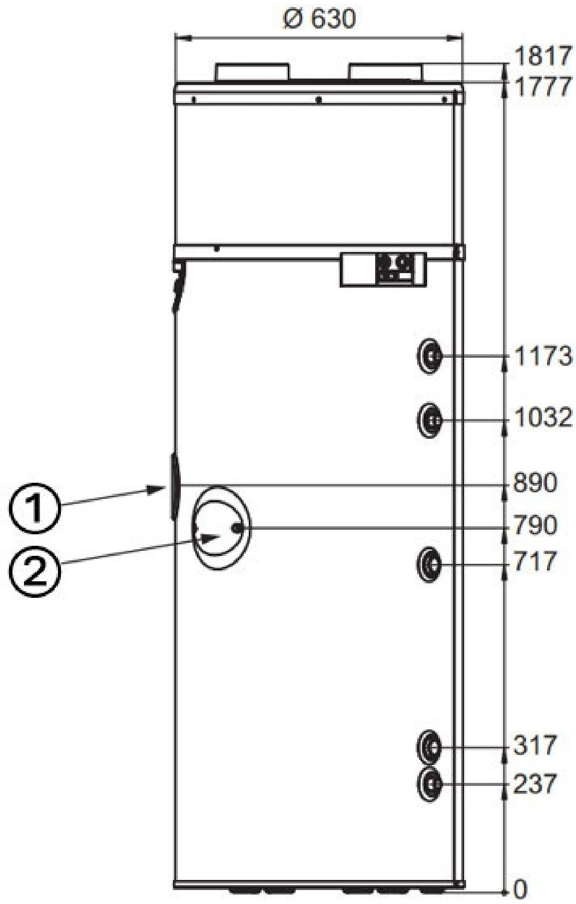
*DHW = domestic hot water
*WP = heat pump
*KW = cold water
*COP = coefficient of performance (COP)
**Sound pressure tested in an anechoic chamber

dimensions

DHW 301P



DHW 301P+



① Magnesium anode

② Second heat generator

installation location

NOTE
Please note during installation: The appliance must not be set up near a permanent flame or any other source of ignition. The appliance must be set up in such a way that mechanical damage is avoided

The following applies to the choice of device location:

- The domestic hot water heat pump must be installed in a frost-free and dry room.
- Without an air duct, the appliance must be installed in a room of at least 20 m³.
- Room height min. 2.20 m with bend for intake or air outlet to prevent air short circuit.
- Furthermore, the installation and air intake must not be carried out in rooms where there is a risk of explosion due to gases, vapours or dust.

- Pay attention to thermal bridges, especially if the room cooled by the discharged air is directly adjacent to a heated room.
- A water drain (with siphon) must be provided for the condensate that accumulates.
- The air drawn in must not be excessively contaminated or heavily laden with dust.

It is prohibited to set up the appliance as follows:

- Outdoors.
- In rooms that are exposed to frost or where the temperature is below 7 °C, even when the appliance is in operation.
- In very humid rooms with release of high vapour concentrations.
- In rooms where there is a risk of explosion due to the presence of gases, vapours or dust.
- Due to heat pump operation (noise emission), installation in the vicinity of bedrooms should be avoided.
- Do not install the air intake opening near a flue gas outlet (minimum distance 0.6 m).
- Operate the appliance with intake air containing solvents or explosive substances.
- suck in air containing grease, dust or aerosols.
- Connect extractor bonnets to the air supply.

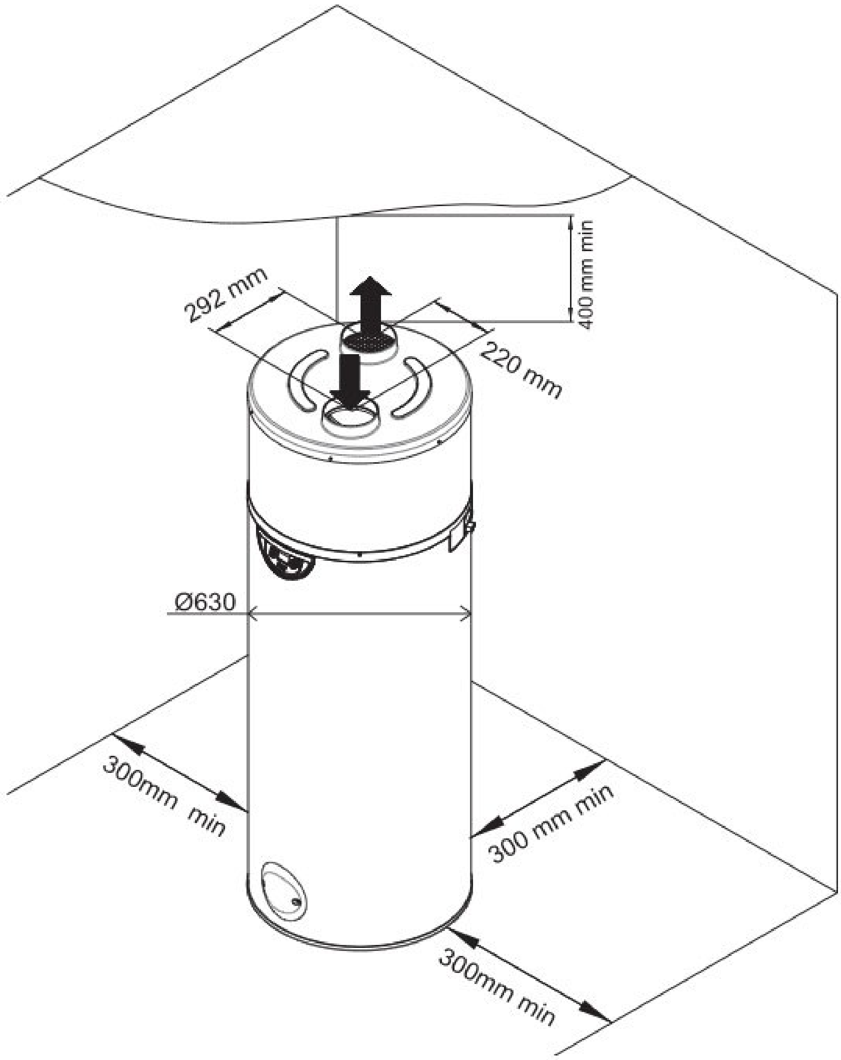
NOTE
The appliance must be installed in a frost and dust-free location.

NOTE
The floor must have sufficient strength (weight of the domestic hot water heat pump, filled with 270 litres of water = 335 kg).

For trouble-free operation, as well as for maintenance and repair work, a minimum distance of 0.3 m to the left and right and 0.4 m from the ceiling to the appliance is required (see illustration).

The connection to the domestic hot water heat pump is made (optionally) with EPP air ducts NW 160 mm inside, 190 mm outside, which must not exceed a total length of 12 m (rigid pipe) or 6 m (flexible pipe).

If air ducts are not used, a 90° EPP elbow can be used on the outlet side for sound-optimised operation.



NOTE
The appliance must be installed vertically. Otherwise, condensate may overflow and cause water damage.

Air-side connection

Without air duct

Without an air duct, the appliance must be installed in a room of at least 20 m³.

If the clear height under the ceiling above the appliance is less than 60 cm, we recommend installing an elbow at the air outlet and directing it to the rear or to the sides.

The domestic hot water heat pump can also be used in unheated workshops and garages if the parameters listed in chapter 7 "Installation location" are complied with.

The domestic hot water heat pump enables the dehumidification and cooling of rooms such as laundry rooms and storage rooms.

Intake or air outlet via air duct inside buildings

The air duct can be used to either draw air into a neighbouring room (e.g. from the laundry room to dehumidify it) or blow it out (e.g. into the storage room to cool it).

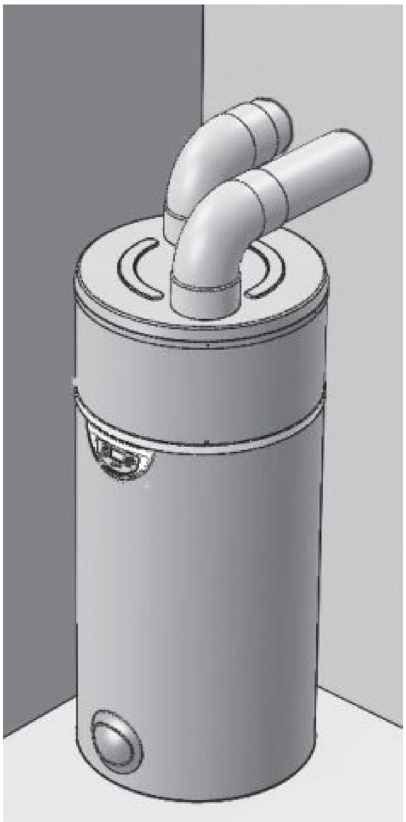
Two air ducts can also be connected as an option in order to draw in or blow out air from two different rooms.

Intake or air outlet of outside air

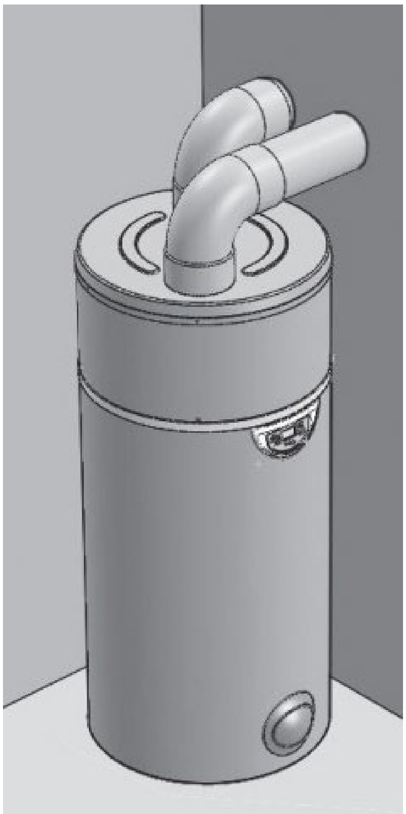
The domestic hot water heat pump can be used in an air temperature range from -7 °C to max. +45 °C. The domestic hot water heat pump extracts heat energy from the outside air. It is therefore essential to run air ducts for the intake and outlet to the outside in order to avoid frost damage in the air outlet during the winter months

Air duct connection

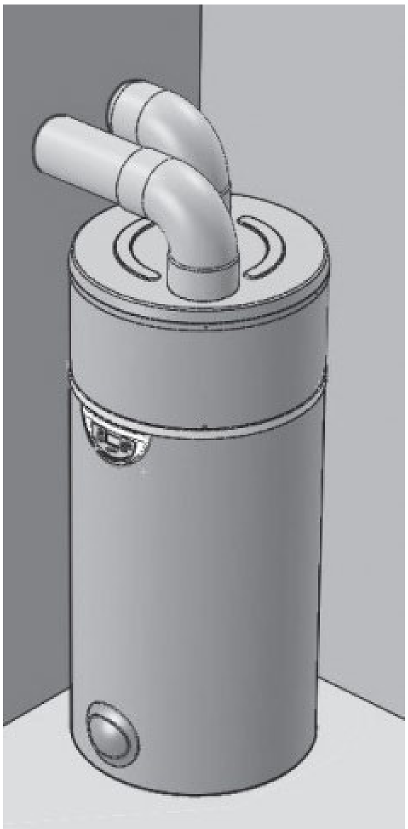
Rear air duct connection



Air duct connection right



Air duct connection left



NOTE
Total length max. at Ø 160:
6 m for flexible pipe, 12 m for smooth pipe, 1 bend = 1 equivalent metre

The domestic hot water heat pump must be connected using air ducts with an internal diameter of 160 mm. With 90° bends made of cellular foam (EPP) Ø 160 mm, the position of the ducts connected to the appliance can be aligned in all directions (360°).

Accessories

Ventilation pipe, straight, Ø 160 mm - Length 1 m

The ventilation pipe (IS R 160 - 370650) is made of cellular foam (EPP), is semi-rigid, lightweight and thermally insulating.

90° bend, Ø 160 mm

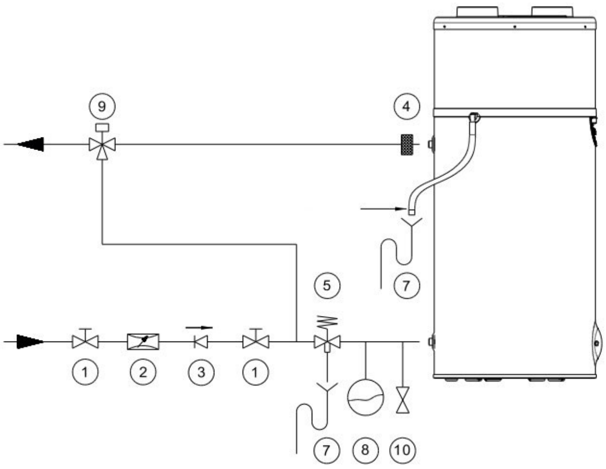
The bends (IS BG 160-90 - 370660) are made of cellular foam (EPP), are semi-rigid, lightweight and thermal insulating.

Connection sleeve

They are connected using a connection port 3 (IS VM 160 - 370670).

Water-side connection

Water-side connection, condensate drain and water quality

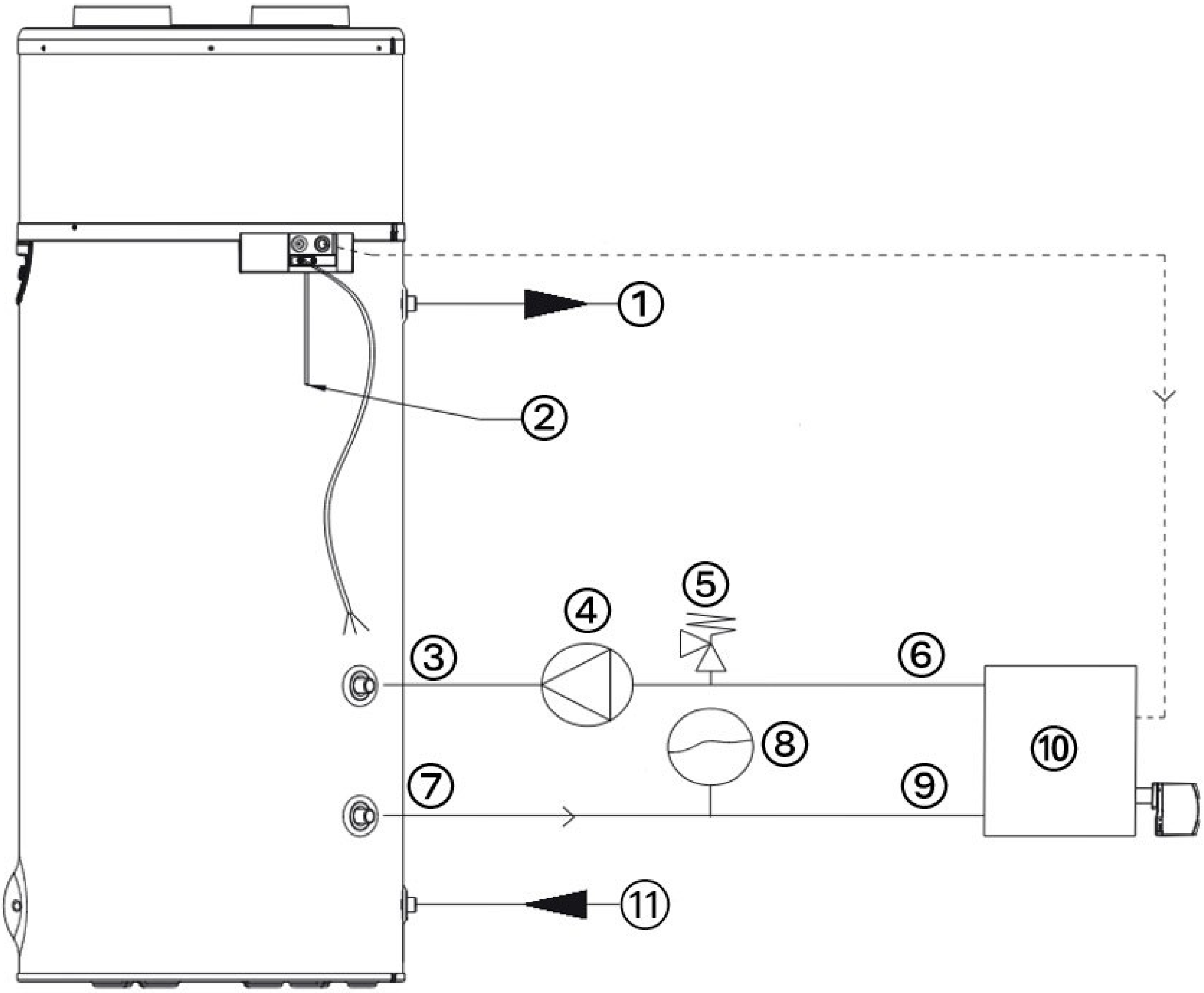


① Isolation valve
② Pressure reducing valve
③ Non-return flap
④ Insulating dielectric sleeve, optional
⑤ Membrane safety group
⑦ Drain siphon
⑧ Expansion vessel
⑨ Thermostat mixer (scalding protection)
⑩ Drain valve

Use the following materials for the hot water circuit:

- Copper
- Stainless steel
- brass
- Plastic

Installation of a second heat generator (DHW 301P+ only)



① Domestic hot water

② Holder for water sensor or Aquastat for the boiler

③ DHW inlet

④ Circulation pump 2nd heat generator

⑤ Pressure relief valve

⑥ Boiler drain

⑦ DHW procedure

⑧ Expansion vessel

⑨ Boiler inlet

⑩ Boiler

⑪ Cold water

It is possible to control the second heat generator via the potential-free contact of the domestic hot water heat pump (see installation instructions) or via the controller of the 2nd heat generator using a domestic hot water sensor. This sensor is located on the back of the storage tank.

> **NOTE**
> Do not connect 230 V to the output of the 2nd heat generator! (Destruction of the circuit board)

Further information (electrical connection, adjusting the fan speed) can be found in the installation and operating instructions.

8.6 Electric Domestic hot water preparation

8.6.1 Table of contents

The following section provides an overview of the most important domestic hot water preparation and supply systems and describes the advantages, possibilities and limitations of the individual systems.

A basic distinction is made between

- **Centralised domestic hot water preparation**, e.g. of a house with several residential units,
- **Decentralised water preparation**, i.e. individual or group supply.

Supply types Electric domestic hot water preparation

8.6.2 Terms for electrical domestic hot water preparation

Heating up time

The heating time is the time required to heat water in storage tanks or boiling water appliances to a certain temperature. The heating time depends on the heat output, the tank capacity and the desired temperature increase.

Standby power consumption

Energy consumption, stated in kWh per 24 hours. The specified energy is required to maintain the contents of a domestic hot water cylinder at a water temperature of

65 °C at an ambient temperature of 20 °C without drawing water. The standby power consumption is a measure of the thermal insulation and energy-saving design of the domestic hot water preparation system.

Bare wire heating system

Bare wire heating coils placed directly in the water for instantaneous water heaters. The low-mass heating coils ensure rapid heat dissipation. The movement of the heating coil within the radiator reduces the build-up of limescale on the coil.

Pressure differential, pressure drop

Difference between two pressures in the drinking water system.

flow rate

Volume of water that flows through a certain opening per unit of time (usually given in litres/min).

Flow rate limiter

Component inserted into the water inlet to limit the water flow.

Single-circuit design

A domestic hot water cylinder in electric single-circuit design keeps the set temperature constant and automatically reheats with the connected output each time water is drawn off, if necessary. The output depends on the appliance size and connection variant.

Switch-on volume flow

Minimum flow rate required for switching on an instantaneous water heater.

Enamelling

Protective coating for steel containers of water storage tanks and domestic hot water cylinders. Enamel is a special silicate glass that is fused onto the metal tank as a thin layer. It is hard, impact-resistant, temperature-resistant, physiologically harmless and neutral to all pipework materials.

Energy-saving position

Marking on the temperature selector knob of the domestic hot water cylinder. This temperature setting (approx. 60 °C) offers the user economical and energy-saving operation. At higher temperatures, the appliance can become more calcified and the standby energy consumption increases.

flow pressure

Static overpressure at a measuring point in the drinking water system when water is flowing. The flow pressure corresponds to the static pressure minus the pressure drop.

Frost protection position

Temperature setting on the temperature selector knob. The heating of the domestic hot water cylinder switches on automatically when the water temperature in the cylinder drops below approx. 7 °C (see installation instructions for the appliance). This automatic function protects the cylinder, but not the water pipes, from frost damage.

Legionella

Legionella

Conductivity

Is a measure of the sum of all ions dissolved in water, which enable a current flow in the water according to their mobility. Due to the temperature dependence of this mobility, the electrical conductivity is measured at a reference temperature or converted to this temperature.

When installing bare-wire instantaneous water heaters, this value must be requested from the water supply company and compliance with the limit value must be ensured. The limit value can be found on the type plate of the instantaneous water heater.

A direct conversion of water hardness into conductivity is not possible.

Drinking water 100 - 1,000 µS/cm

pipe volume

Describes the contents of a pipe from the domestic hot water preparation to the tapping point. This does not take into account the content of the return to the domestic hot water preparation via a circulation pipe. The individual pipe sections are considered, not the total volume of the pipe system.

Air detection

Protective device for instantaneous water heaters, which switches off the heater output for a short time in the event of air bubbles in the water supply line, thus preventing damage to the bare-wire heating system.

Minimum flow pressure

Required static overpressure at the water connection point of an instantaneous water heater or an extraction fitting at a certain flow rate.

Low tariff

A discounted electricity tariff offered by the energy supplier that applies exclusively to certain consumers during specified periods.

PU thermal insulation

Thermal insulation made of rigid polyurethane foam to minimise heat loss (standby energy consumption), foamed directly onto the container or placed as two half-shells around the container.

Backflow preventer

Backflow preventers are fittings or valves that automatically prevent water from flowing back into the drinking water system.

Protective anode

Contactor against corrosion in enamelled domestic hot water cylinders. The anode is electrically connected to the inner tank. A current flows from the protective anode to possible defects in the enamel in accordance with the electrochemical voltage series. This anode current prevents corrosion of the container at damaged areas in the enamel. The anode current is generated by the dissolution of the protective anode. It is therefore necessary to check the protective anode regularly.

Safety pressure limiter

Safety switch that is used with bare wire heating systems and disconnects all poles of the appliance from the mains in the event of impermissibly high pressure. The appliance may only be put back into operation after the cause of the fault has been rectified by a specialist.

Safety valve

Closed, pressure-resistant domestic hot water preparations may only be installed in conjunction with a safety valve combination. The safety valve protects the inner tank of the domestic hot water cylinder from impermissibly high pressure. If the internal pressure exceeds a certain maximum value, the valve opens and discharges the excess pressure (expansion water when heated). The function of the safety valve must be checked at regular intervals.

Dynamic pressure

Back pressure occurs when the water flowing into the tank cannot flow out at the same rate. In the case of open, unpressurised domestic hot water preparations, the back pressure must not exceed 1 bar when the water valve is fully open. The water inlet can be limited by a flow rate limiter or a throttle valve.

thermal disinfection

During thermal disinfection, the water temperature is set so that it is ≥ 70 °C at all points in the drinking water installation for at least 3 minutes to combat legionella (DVGW sheet W 551). This must be checked and documented.

Thermostatic fitting

Is installed after the water outlet of the storage tank and ensures a constant outlet temperature by adding cold water via a bypass pipe.

Thermostatic taps are rather unsuitable for use in conjunction with instantaneous water heaters, as the hot water volume may fall below the minimum flow rate of the instantaneous water heater and thus lead to the appliance switching off.

Dry-running protection

Safety device that triggers permanently if the heating of a storage tank that is not filled with water is switched on.

Overtemperature protection

Safety switch that permanently disconnects the domestic hot water appliances from the mains supply in the event of an impermissibly high temperature.

Scald protection

Temperature limiter as scalding protection and child safety device, for example for electronic instantaneous water heaters.

water hardness

Depending on its origin, drinking water contains more or less lime. Hard water is very calcareous water. There are different hardness levels, which are measured in degrees of German hardness (°dH).

Hardness level I: 0 - 7° dH = soft water Hardness level II: 8

- 14° dH = normal water hardness Hardness level III: 15 -

21° dH = hard water Hardness level IV: greater than 21°

dH = very hard water

A descaling system is recommended for water hardness greater than 14° dH in conjunction with electric domestic hot water preparations.

degree of efficiency

The degree of efficiency of an appliance is the ratio between the power output and the power input. The power output is always slightly less than the energy consumed.

Circulation pipe

Circulation pipes provide greater convenience for centralised domestic hot water preparation. Intermittent circulation at the tapping points means that hot water is immediately available, but there are corresponding circulation losses. To limit the losses, the circulation pump must be controlled by a thermostat and timer in accordance with the Energy Saving Act.

With long pipes, decentralised domestic hot water preparation is preferable to a centralised supply.

Dual-circuit design

Electrical circuit variant of universal domestic hot water cylinders. The tank contents are heated up with the basic heating during the low tariff period (e.g. at night) over a defined period of time.

If additional hot water is required, e.g. during the day, the cylinder contents can be heated at the standard rate using a rapid heating function.

8.6.3 Supply types Electric domestic hot water preparation

Centralised domestic hot water preparation

With centralised domestic hot water preparation, the water is heated in a domestic hot water cylinder at a central point, e.g. in the basement of the building, and is routed to the relevant tapping points via supply pipes.

Such domestic hot water appliances are under constant water pressure. For this reason, only pressurised (closed) appliances are suitable for this application. Several tapping points can be provided and operated in parallel.

Due to the heat losses in the pipes, long connecting pipes between the central domestic hot water cylinder and the tapping points should be avoided as far as possible.

In addition to the hot water demand, losses during storage must also be taken into account. Nevertheless, centralised domestic hot water preparation systems offer the following advantages:

- Provision/storage of large quantities of water
- High hot water comfort
- Lower connected load for heat generators

- Can be combined with different energy sources.

Particularly suitable devices are

- **Domestic hot water heat pumps**
- Domestic hot water storage tank

Circulation pipes

Circulation pipes increase the heat demand for domestic hot water heating on the system side.

The additional requirement depends on the length of the circulation pipe and the quality of the pipe insulation and must be taken into account accordingly.

> **NOTE**
> The maximum heat loss up to the last tap should not exceed 3 Kelvin!

If circulation cannot be dispensed with due to long pipe runs, a circulation pump should be used, which is activated by a flow sensor when required.

The heat demand for the circulation pipework can be considerable. The area-related heat loss of the drinking water distribution depends on the usable area and the type and location of the circulation used.

With a usable area of 100 to 150 m² and distribution within the thermal envelope, the area-related heat losses according to EnEV double from 4.2 [kWh/m²a] without circulation to 9.8 [kWh/m²a] with circulation.

Decentralised domestic hot water preparation

With decentralised domestic hot water preparation, the hot water is heated in the immediate vicinity of the tapping points. The short pipework between the domestic hot water preparation system and the tapping point enables particularly fast availability with low heat losses.

The planner of a decentralised domestic hot water preparation system benefits from the following advantages:

- water heating close to the point of use and short pipe runs,
- Low losses, as there is hardly any standby energy consumption,
- No losses due to circulation,
- Connection to existing cold water connection, therefore ideal for refurbishment,
- low investment costs,
- Simple installation and low space requirement.

Decentralised group supply

With group supply, hot water is heated for several tapping points at one point. For example, a shower and a washbasin in the bathroom can be supplied together.

Particularly suitable devices are

- Instantaneous water heaters from 18 kW,
- Closed domestic hot water wall-mounted storage tank.

Decentralised individual supply

Each tapping point is supplied by a separate domestic hot water preparation system. Open domestic hot water preparations are often used for this type of supply, e.g. unpressurised small storage tanks.

NOTE
Open domestic hot water preparations are permanently connected to t h e atmosphere and are therefore not under water pipe pressure. Such appliances may only be operated with special open fittings.

Particularly suitable devices are

- Small instantaneous water heater,
- Small unpressurised storage tanks as under-sink or over-sink versions.

Of course, an individual supply can also b e realised with a closed domestic hot water preparation unit. In this case, it is also possible to use a standard, pressure-resistant tap.

8.6.4 Determining the hot water requirement (electrical domestic hot water preparation)

The expected hot water requirement for the intended application depends heavily on the number of people and their daily hot water needs and thus determines the selection of a suitable hot water heater.

It is therefore advisable to draw on experience and take individual bathing and showering habits into account

The following tables can be used to determine the hot water requirement for domestic and small commercial installations. (The values given refer to a domestic hot water outlet temperature of 60
°C or 45 °C with a cold water inlet temperature of 10 °C).

Intended use/ tapping point	typical Dispensing quantity	Preferred outlet temperature	Required hot water volume for 60 °C setting
Hand basin	2 to 5 litres	37 °C	1 to 3 litres
Washbasin	10 to 15 litres	37 °C	5 to 8 litres
Sink	10 to 20 litres	45 °C	7 to 14 litres
Shower	30 to 50 litres	37 °C	16 to 27 litres
Tub	150 to 180 litres	40 °C	90 to 108 litres

	Set hot water temperature		Required energy
	60 °C	**45 °C**	
Average values in the household	20 litres	30 litres	1.2 kWh
Low demand[1] , e.g. commuters	10 to 20 litres	15 to 30 litres	0.6 to 1.2 kWh
Medium requirements[1] , e.g. family	20 to 40 litres	30 to 60 litres	1.2 to 2.4 kWh
High demand[1] , e.g. small businesses	40 to 80 litres	60 to 120 litres	2.4 to 4.8 kWh

(1) Values according to VDI 2067, Sheet 4

8.6.5 Selection guide for electrical domestic hot water preparation

Individual and group care

Small storage tank

order code			ACK 5 U	ACK 5 O	ACK 10 2U	ACK 10 2O
			5 litres		10 litres	
		Item no.	339590	339580	361850	361870
One room	**One tap**	Sink unit	✓	✓	✓	✓
		HWB	✓	✓		
		Washbasin	✓	✓	✓	✓
		Shower				
		Tub				
		Washbasin + shower				
	Multiple taps	Washbasin + bath				
		Washbasin + shower + tub				
Several rooms	**Centralised supply**	up to 5 pers.				
		up to 8 pers.				
Integration of solar thermal energy						
Integration of photovoltaics						

Small instantaneous water heater

order code			IHW 35	IHW 55
			3.5 kW	5.5 kW
		Item no.	379790	379800
One room	**One tap**	Sink unit		✓
		HWB	✓	✓
		Washbasin		✓
		Shower		
		Tub		

		Washbasin + shower		
	Multiple taps	Washbasin + tub		
		Washbasin + shower + tub		
Several rooms	**Centralised supply**	up to 5 pers.		
		up to 8 pers.		
Integration of solar thermal energy				
Integration of photovoltaics				

Instantaneous water heater

order code			**DEE 1521**	**DEE 2127**
			15 / 18 / 21 kW	21 / 24 / 27 kW
		Item no.	381350	381360
One room	**One tap**	Sink unit		
		HWB		
		Washbasin		
		Shower		
		Tub		
		Washbasin + shower		
	Multiple taps	Washbasin + tub		
		Washbasin + shower + tub		
Several rooms	**Centralised supply**	up to 5 pers.		
		up to 8 pers.		
Integration of solar thermal energy			✓	✓
Integration of photovoltaics				

Group and centralised supply

Wall storage

order code			DHWE 50S	DHWE 51SZ	DHWE 80S	DHWE 81SZ	DHWE 100S	DHWE 101SZ
			50 litres		80 litres		100 litres	
		Item no.	373270	374590	373280	374600	373290	374610
One room	**One tap**	Sink unit						
		HWB						
		Washbasin						
		Shower	✓					
		Tub			✓	✓	✓	✓
		Washbasin + shower			✓	✓		
	Multiple taps	Washbasin + bath			✓	✓	✓	✓
		Washbasin + shower + tub					✓	✓
Several rooms	**Centralised supply**	up to 5 pers.						
		up to 8 pers.						
Integration of solar thermal energy								
Integration of photovoltaics								

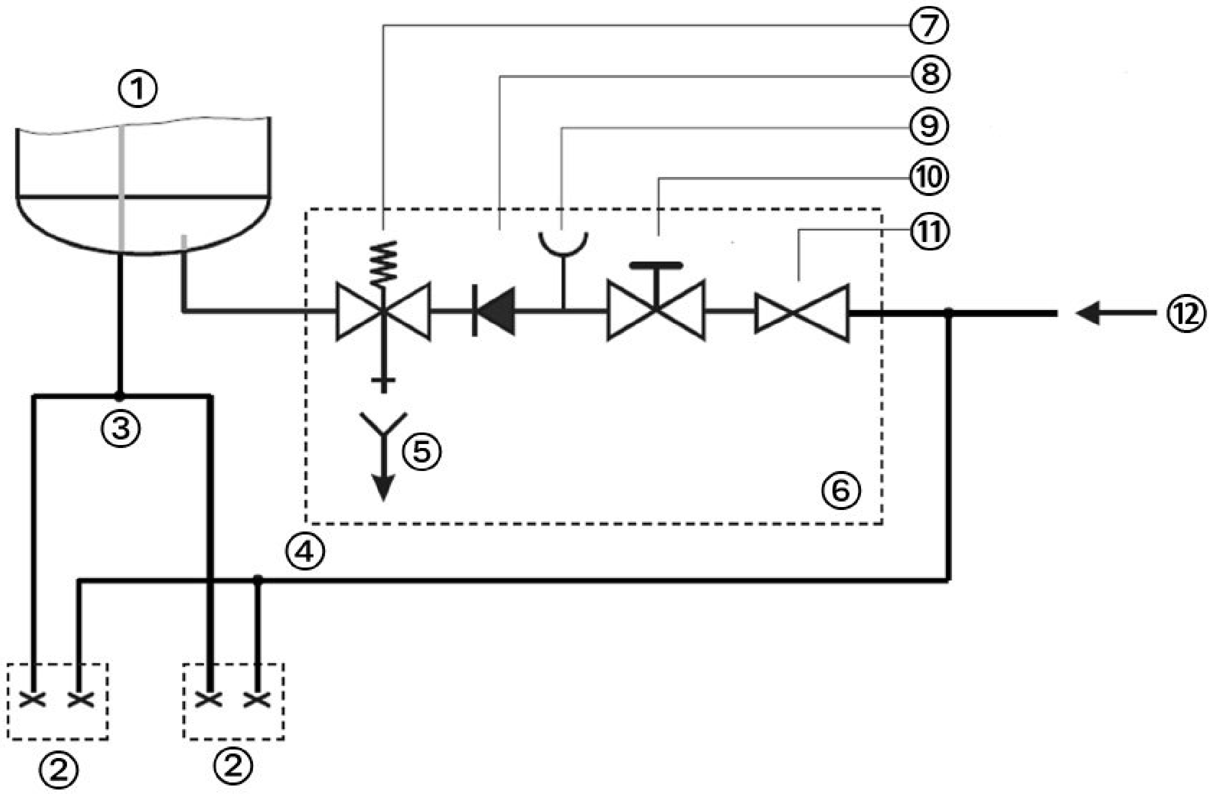
Stand storage

order code			ACS 200Z	ACS 300Z
			200 litres	300 litres
		Item no.	339640	339650
One room	**One tap**	Sink unit		
		HWB		
		Washbasin		
		Shower		
		Tub		
		Washbasin + shower		

	Multiple taps	Washbasin + tub		
		Washbasin + shower + tub		
Several rooms	**Centralised supply**	up to 5 pers.	✓	
		up to 8 pers.		✓
Integration of solar thermal energy				
Integration of photovoltaics				

8.6.6 Operating modes for electrical domestic hot water preparation

Closed (pressure-resistant)



① Domestic hot water cylinder

② Tap point

③ Domestic hot water

④ Cold water

⑦ Safety valve

⑧ Backflow preventer

⑨ Test socket

⑩ Isolating valve

⑤ Siphon

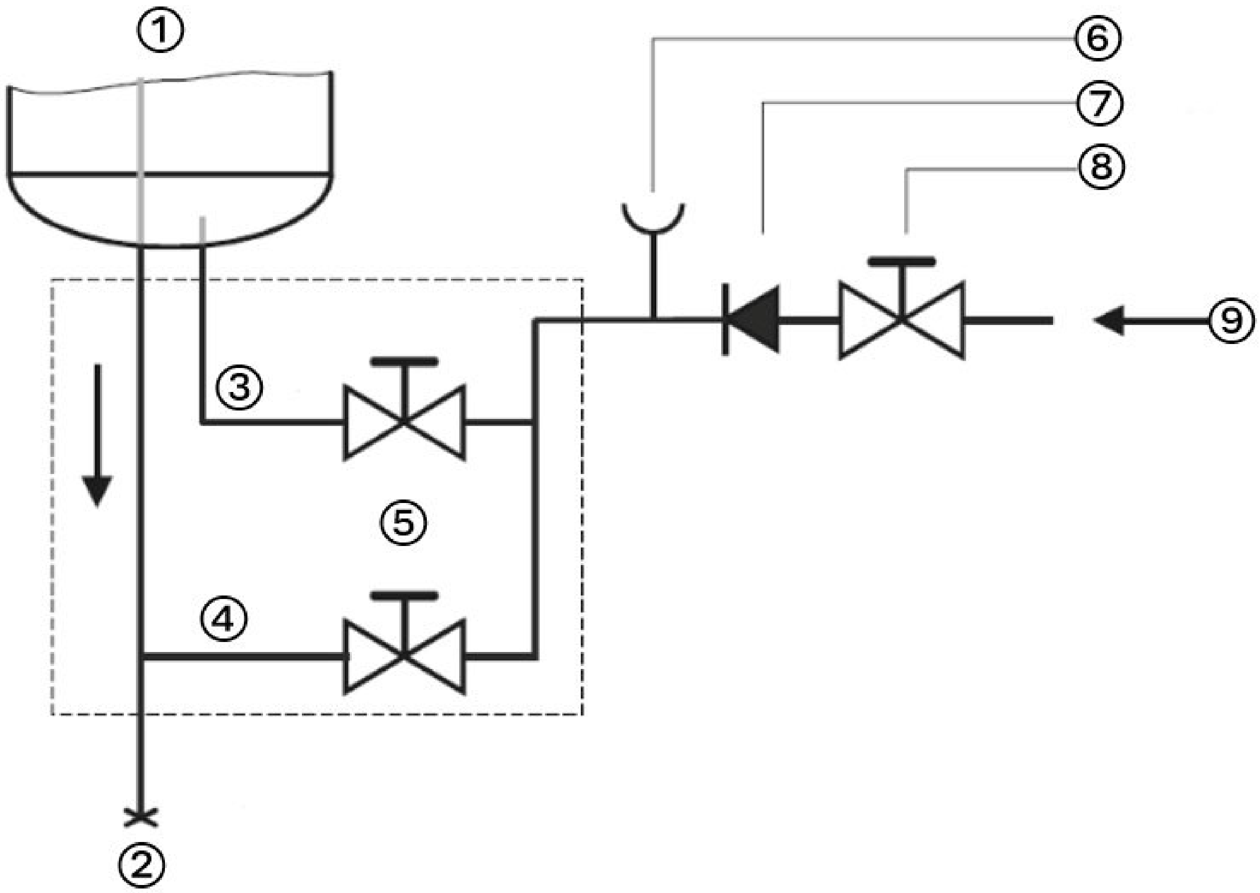
⑥ Safety group

⑪ Pressure reducer

⑫ Cold water inlet

Open (unpressurised) operation

> **NOTE**
> Unpressurised operation can only ever be carried out at one tap.



① Domestic hot water cylinder

② Outlet

③ Domestic hot water

④ Cold water

⑤ Fitting

⑥ Discharge nozzle

⑦ Backflow preventer

⑧ Isolating valve

⑨ Cold water inlet

8.6.7 Operation in wet rooms (protected areas)

Electrical appliances that are operated in rooms with a bathtub or shower must have special protection against the ingress of water and humidity, depending on where they are installed.

NOTE
The provisions listed below do not claim to be exhaustive. They are merely an excerpt from DIN VDE 0100-701 (as of 2008-10) and consider it exclusively from the point of view of electrical domestic hot water preparation.

Use of electric domestic hot water preparation in the protected area

The following minimum requirements must be met:

- The power supply must be via a residual current circuit breaker with a trigger value of 30 mA.
- The domestic hot water preparations must comply with at least degree of protection IP X4.

The following also applies for use in the protected area:

Protection area 0

- Corresponds to the inside of the bath or shower tray.
- Not applicable for showers without bath

Use in protection zone 0

Electric domestic hot water preparations must not be installed in this area.

Protection area 1.

- Applies up to a height of 2.25 m from the floor.
- Ends at the outer edges of the bath or shower tray.
- Ends at the inner edge of masonry trays.
- For showers without a tray, ends after a radius of 1.2 m in relation to the fixed water outlet on the wall or ceiling.

Use in protection area 1.

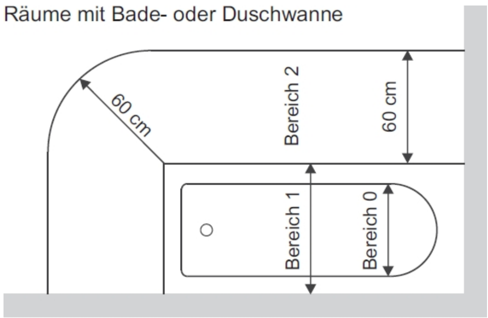
Electric domestic hot water preparations with minimum protection class IP X4 may be used if they are permanently connected and permanently installed.

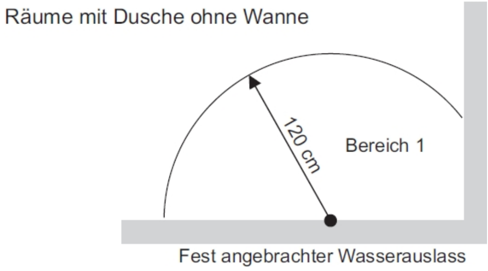
Approved Dimplex domestic hot water preparations are:

- DEE, DES instantaneous water heater,
- DHWE domestic hot water cylinder.

Protection area 2

- Applies up to a height of 2.25 m from the floor.
- Ends 60 cm from the outer edges of the bath or shower tray





Use in protection area 2

Electric domestic hot water preparations with minimum protection class IP X4 may be used if they are permanently installed.

Approved Dimplex domestic hot water preparations are:

- DEE, DES instantaneous water heater,
- DHWE domestic hot water cylinder,
- IHW small instantaneous water heater,
- ACK small memory.

Increased protection requirements

Higher degrees of protection may be required for commercial use.

In all cases where water jets are likely to occur, at least IP X5 is required.

8.6.8 Small storage tank ACK

Utilisation

The small storage tank is only suitable for one tap. The appliance should be installed as close to this as possible. The appliance may only be used for heating domestic hot water and similar purposes within closed and frost-free rooms.

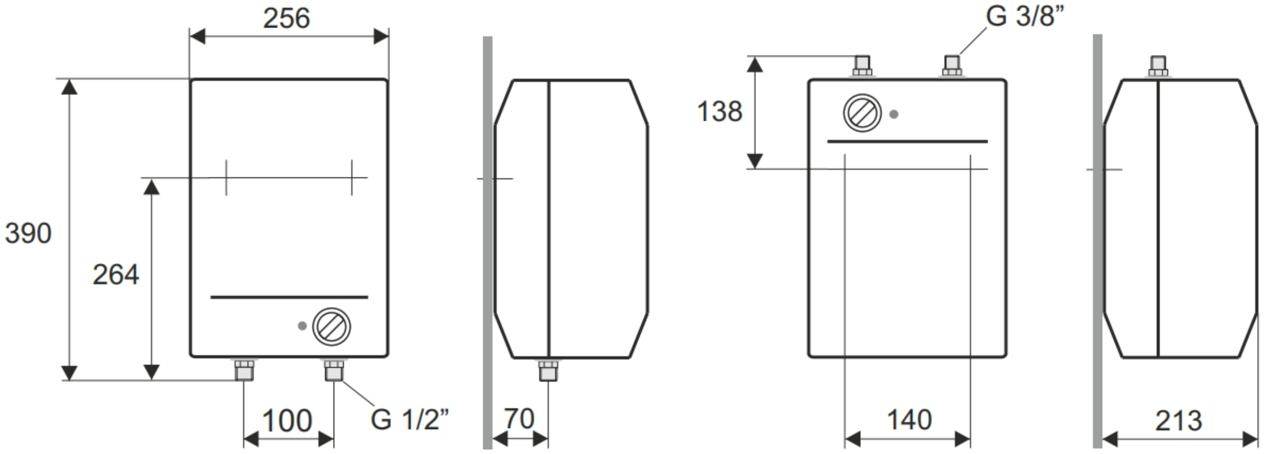
Technical data

description	**Unit**	**ACK 5U**	**ACK 5O**	**ACK 10 2U**	**ACK 10 2O**
Type of assembly	-	Under table	Over table	Under table	Over table
Installation location	-	Vertical on the wall			

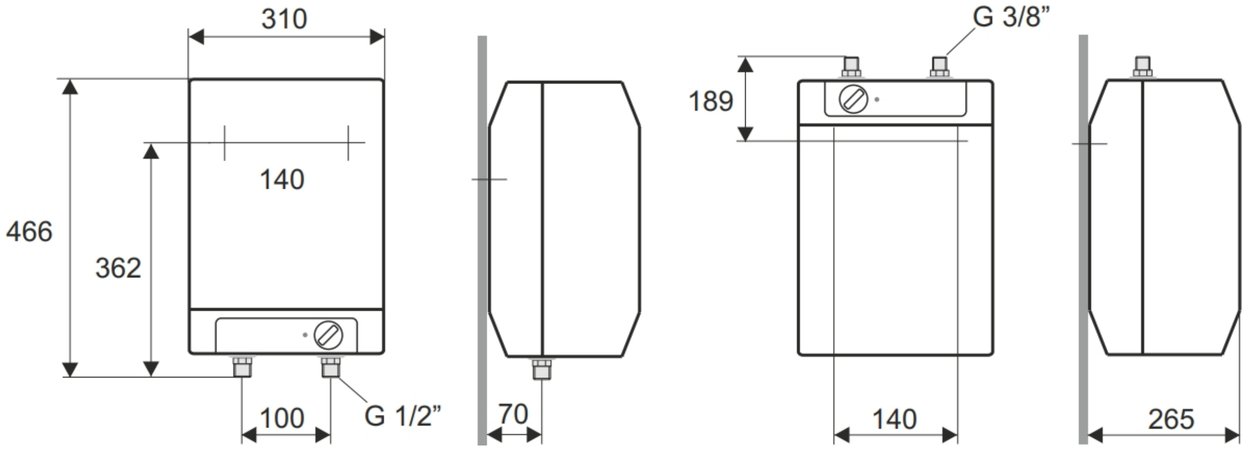
Type of construction	-	Unpressurised domestic hot water cylinder			
Nominal volume	Litres	5	5	10	10
Water connection spigot	inch	3/8	1/2	3/8	1/2
Permissible operating pressure	MPa (bar)	0			
Mixed water volume at 40 °C	Litres	9		17,5	
Heat loss at 65 °C	kWh/24h	0,29		0,40	
Load profile	-	XXS			
Energy efficiency class according to (EU) 812/2013	-	A			
Energy efficiency (ŋwh) according to (EU) 812/2013	%	35			
Annual energy consumption	kWh	525			
Rated power	kW	2,0			
nominal voltage	V	230			
Mains frequency	Hz	50			
electrical connection	1/N/PE	Mains cable (0.6 m) with plug			
Protection class	-	I (with protective conductor)			
degree of protection	-	IP 24 (splash-proof)			
Dimensions W x H x D	mm	256 x 390 x 213		310 x 466 x 265	
Unladen weight	kg	3,5		4,4	
Weight filled	kg	8,5		14,4	
Temperature setting range	°C	10 - 75			

Dimensioned drawing

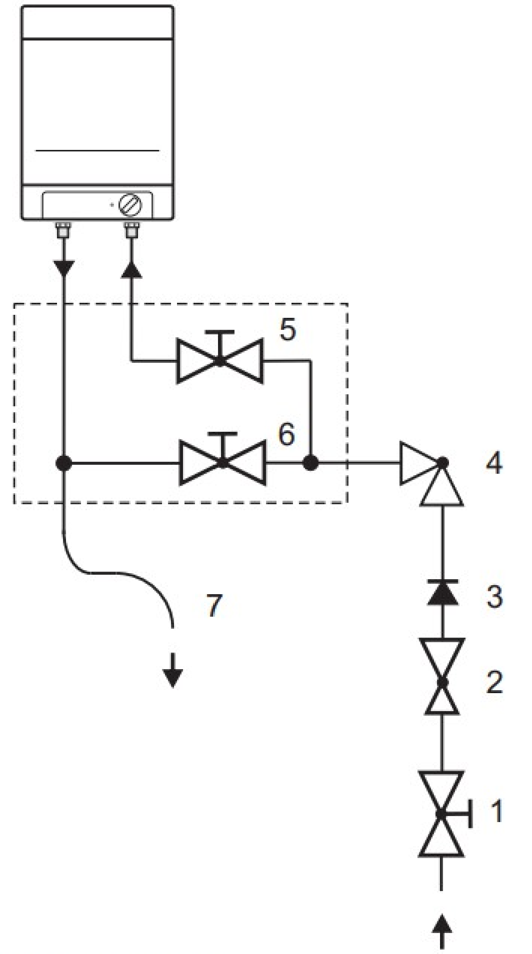
Models ACK 5O + ACK 5U



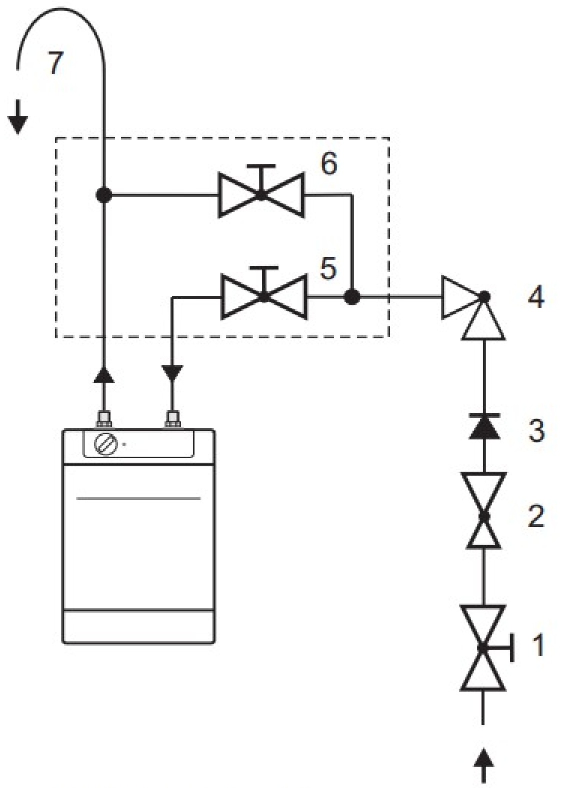
Models ACK 10 2O + ACK 10 2U



Water connection



Übertischinstallation



Untertischinstallation

Isolating valve

② Pressure reducer

③ Backflow preventer

④ Angle valve

⑤ Hot water valve

⑥ Cold water valve

⑦ Outlet

> **NOTE**
> The regulations of the water supply company as well as DIN EN 806, DIN EN 1717 and DIN 1988 must be complied with.

- When the domestic hot water valve is fully open or the temperature control valve is in the "hot water" position the pressure drop must not exceed 0.2 bar.
- No device that could cause an increase in pressure in the domestic hot water cylinder may be attached to the outlet pipe of the tap.
- If the pressure in the water supply system is higher than 5 bar, a pressure reducing valve must be installed upstream of the fitting.

CAUTION
The domestic hot water cylinder is only suitable for unpressurised continuous operation. Water may therefore only be tapped at one point.

- Only use a non-pressurised mixing valve for open small storage tanks

8.6.9 IHW small instantaneous water heater

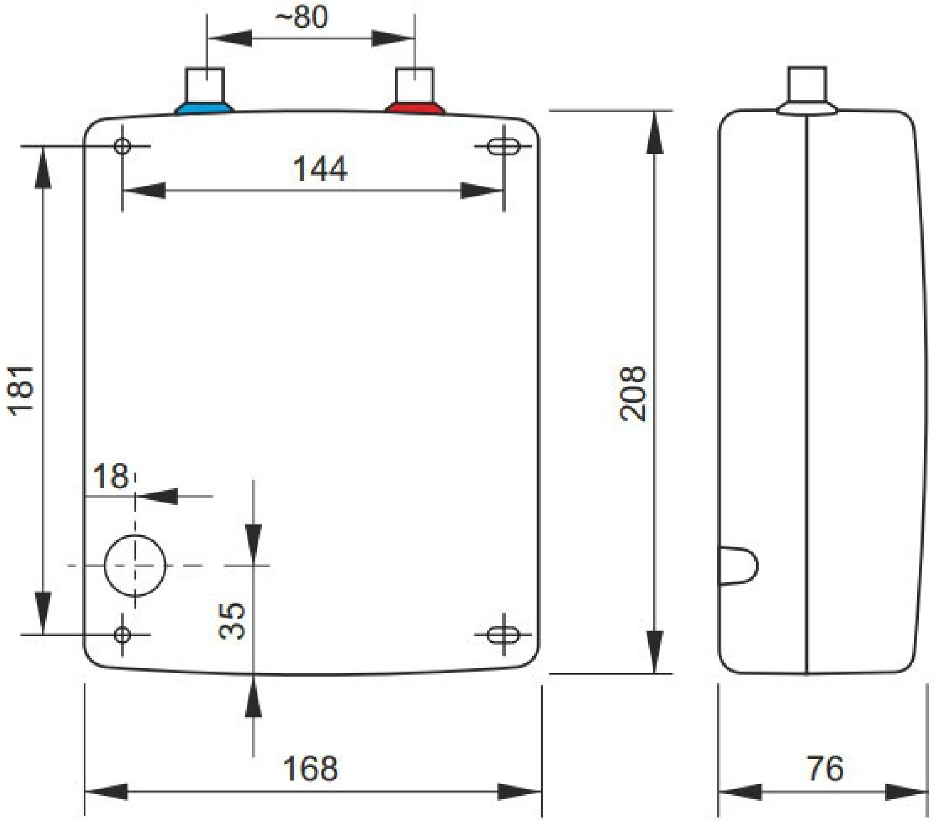
Utilisation

The instantaneous water heater is only suitable for one tap. The appliance should be installed as close to this as possible. The appliance may only be used for heating drinking water in the home and for similar purposes within closed and frost-free rooms.

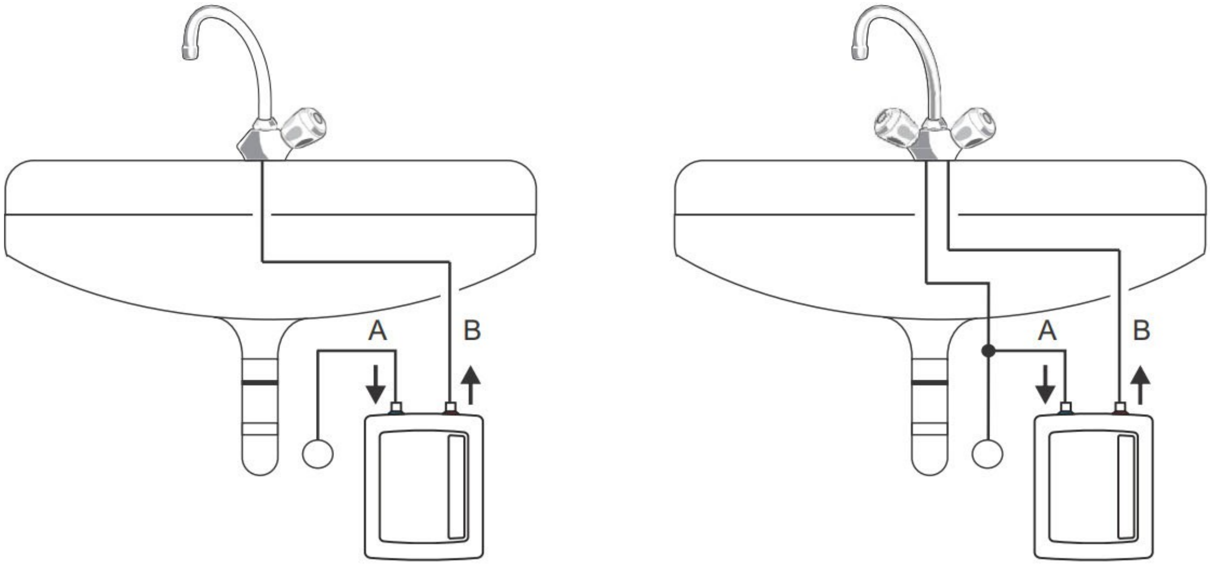
description	Unit	IHW 35	IHW 55
Type of assembly	-	Under-counter or over-counter	
Installation location	-	Vertical on the wall	
Type of construction	-	Small instantaneous water heater	
Water connection spigot	inch	3/8	
Permissible operating pressure	MPa (bar)	0,6 (6)	
Minimum flow pressure	MPa	0,12	
Switch-on volume	l/min	1,2	2,0
Temperature increase 30 K	l/min	1,7	2,6
Load profile	-	XXS	XS
Energy efficiency class according to (EU) 812/2013	-	A	
Energy efficiency (ŋwh) according to (EU) 812/2013	%	39	
Annual energy consumption	kWh	471	466
Rated power	kW	3,5	5,5
nominal voltage	V	230	
Mains frequency	Hz	50	
Rated current	A	15,2	23,9
Specific water resistance at 15 °C	Ohm/cm	1100	
electrical connection	1/N/PE	Mains cable (0.6 m) with plug	Fixed connection
Protection class	-	I (with protective conductor)	
degree of protection	-	IP 25 (protected against water jets)	
Dimensions W x H x D	mm	170 x 225 x 75	

Weight	kg	1,2

Dimensioned drawing



Connection diagram



A: Cold water inlet B:

Hot water inlet

8.6.10 DHWE S / DHWE SZ wall-mounted storage tank

Technical data DHWE S

description	Unit	DHWE 50 S	DHWE 80 S	DHWE 100 S
Installation location	-	Vertical on the wall		
Type of construction	-	Open or closed domestic hot water cylinder		
Inlet and outlet connection thread	inch	1/2		
Drain connection	inch	3/8		
Mixed water volume at 40 °C	Litres	66	116	137
Heating time from 10 °C to 75 °C (2 kW)	minutes	98	157	196
Nominal volume	Litres	50	80	100
Permissible operating pressure	MPa (bar)	0,6 (6)		
Load profile	-	M	M	L
Energy efficiency class according to (EU) 812/2013	-	B	B	C
Energy efficiency (ŋwh) according to (EU) 812/2013	%	40		
Annual energy consumption	kWh	1257	1266	2464
Set temperature	°C	57		
electrical connection	1/N/PE	Fixed connection		
nominal voltage	V	230		
Mains frequency	Hz	50		
Power consumption	kW	2,0		
Protection class	-	I (with protective conductor)		
degree of protection	-	IP 24 (splash-proof)		
Container	-	Steel, enamelled, with magnesium protective anode		
Colour	-	White (RAL 9010) with black control panel		
thermal insulation	-	PU foam 40 mm (min.)		
Dimensions W x H x D	mm	500 x 610 x 512	500 x 830 x 512	500 x 975 x 512
Weight empty / weight filled	kg	28 / 78	34 / 114	39 / 139

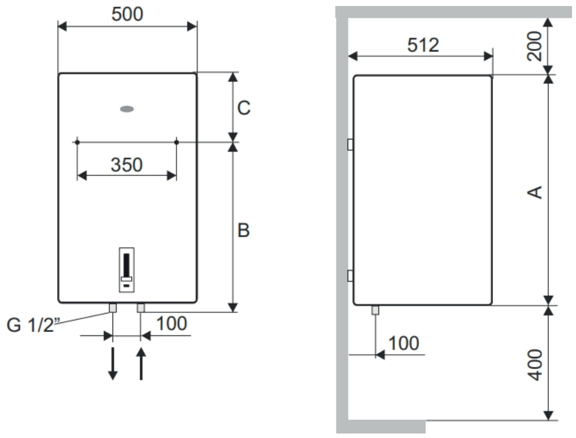
Weekly nominal power consumption with intelligent control	kWh	23,05	24,54	48,04
Weekly nominal power consumption without intelligent control	kWh	26,75	28,50	55,83
Temperature settings	°C	15 / 25 / 35 / 45 / 57 / 65 / 75		
Overheating protection	-	Yes		
Protection against dry operation	-	Yes		

Technical data DHWE SZ

description	Unit	DHWE 51 SZ	DHWE 81 SZ	DHWE 101 SZ
Installation location	-	Vertical on the wall		
Type of construction	-	Open or closed domestic hot water cylinder		
Inlet and outlet connection thread	inch	1/2		
Drain connection	inch	3/8		
Mixed water volume at 40 °C	Litres	66	116	137
Heating time from 10 °C to 75 °C (2 kW)	minutes	98	157	196
Nominal volume	Litres	50	80	100
Permissible operating pressure	MPa (bar)	0,6 (6)		
Load profile	-	M	M	L
Energy efficiency class according to (EU) 812/2013	-	B	B	C
Energy efficiency (ŋwh) according to (EU) 812/2013	%	40		
Annual energy consumption	kWh	1257	1266	2464
Set temperature	°C	57		
electrical connection	-	1/N/PE / 2/N/PE / 3/N/PE		
nominal voltage	V	230 / 400		
Mains frequency	Hz	50		
Power consumption	kW	2 / 4 / 6		
Protection class	-	I (with protective conductor)		
degree of protection	-	IP 24 (splash-proof)		
Container	-	Steel, enamelled, with magnesium protective anode		
Colour	-	White (RAL 9010) with black control panel		
thermal insulation	-	PU foam 40 mm (min.)		

Dimensions W x H x D	mm	500 x 610 x 512	500 x 830 x 512	500 x 1005 x 512
Weight empty / weight filled	kg	30 / 80	36 / 116	41 / 141
Weekly nominal power consumption with intelligent control	kWh	23,05	24,51	48,04
Weekly nominal power consumption without intelligent control	kWh	26,75	28,50	55,83
Temperature settings	°C	15 / 25 / 35 / 45 / 57 / 65 / 75		
Overheating protection	-	Yes		
Protection against dry operation	-	Yes		

Dimensioned drawing

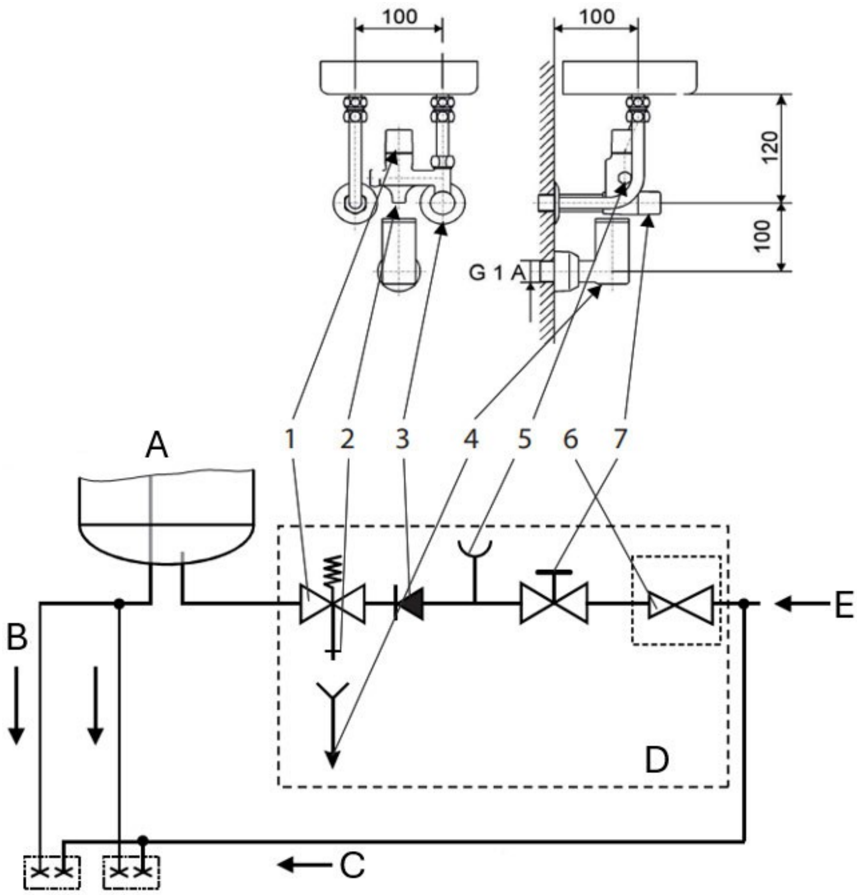


Type	A	B	C
DHWE 50 S / 51 SZ	610	400	240
DHWE 80 S / 81 SZ	830	600	260
DHWE 100 S / 101 SZ	975	750	255

Water connection

Water connection in a closed system

Closed, i.e. pressurised, domestic hot water cylinders and piping systems can supply several taps.



1 Safety valve

2 Drain pipe safety group

3 Backflow preventer

4 Drain siphon

5 Test socket

6 Pressure reducer (optional)

7 isolating valve

A Domestic hot water cylinder

B Hot water drain

C Cold water inlet

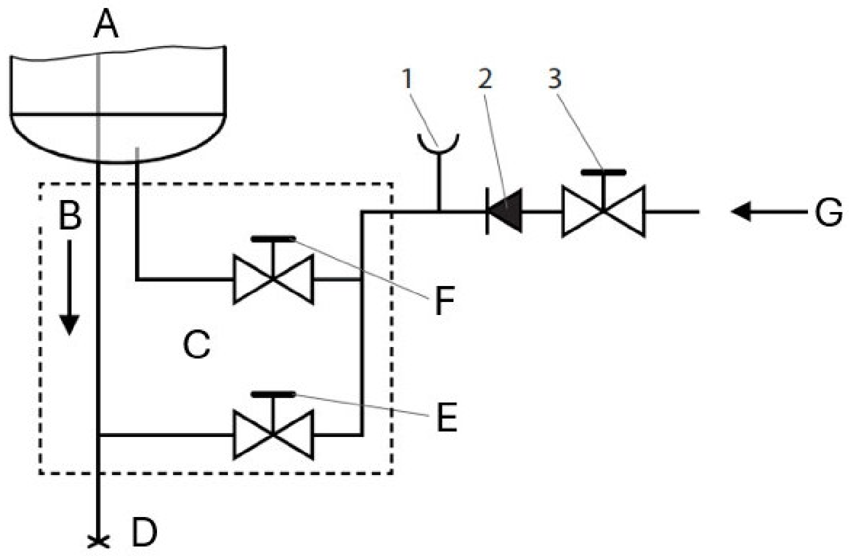
D Safety group

E Cold water inlet

- The domestic hot water cylinder must be installed upstream of the tapping point (mixer tap / tap).
- Only pressure-resistant fittings may be used
- A type-tested safety group in accordance with DIN 1988 must be installed in the cold water inlet.
- If the line pressure exceeds 0.5 MPa (5 bar), a safety group with pressure reducer must be used
- To ensure unobstructed drainage, the drain siphon of the safety group must be installed at a slight downward angle in a frost-free environment
- If the water in the storage tank is heated, its volume expands. As a result, the outlet of the safety group begins to drip. The drain must therefore be open, i.e. it must not have a fixed connection to a pipe system.
- No isolating valves, constrictions or strainers may be installed between the safety group and the storage tank
- It is essential to provide a backflow preventer to ensure that the water cannot flow back from the domestic hot water cylinder into the water supply system
- The domestic hot water cylinder must be filled with water before connecting to the mains supply.

Water connection in open system

Water can only be tapped at one point during unpressurised flow operation.



1 Discharge nozzle

2 Backflow preventer

3 isolating valve

A Domestic hot water cylinder

B Hot water drain

C Fitting

D Swivel spout

E Cold water valve blue

F Cold water valve red

G Cold water inlet

- Only fittings for open domestic hot water cylinders may be used
- This fitting is installed in the cold water inlet of the domestic hot water cylinder
- It is essential to provide a backflow preventer to ensure that the water cannot flow back from the domestic hot water cylinder into the water supply system
- The installation of a drainage nozzle is recommended
- It is essential to fill the domestic hot water cylinder with water before connecting it to the power supply
- If the water in the appliance is heated, its volume expands. As a result, the outlet pipe of the tap begins to drip. This behaviour is functional. Tightening the two valves on the tap cannot prevent this dripping behaviour

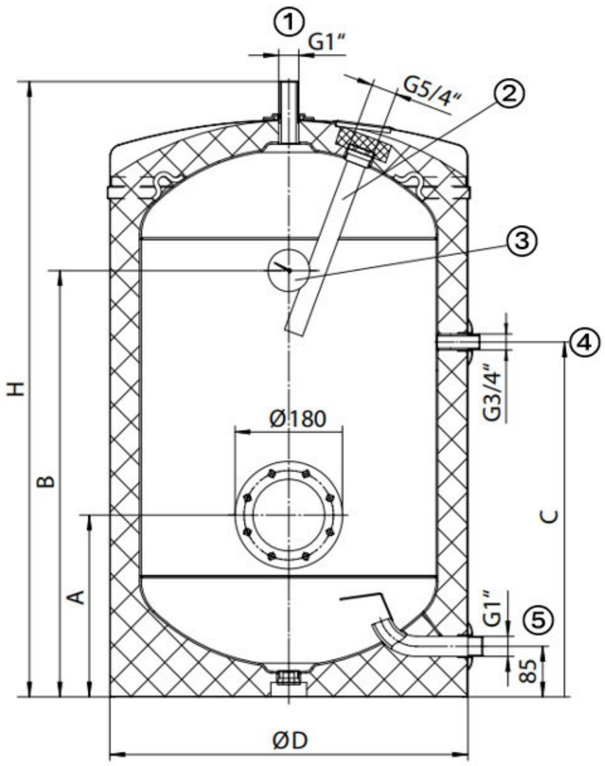
8.6.11 Floor-standing storage unit ACS Z

Technical data

description	Unit	ACS 200 Z	ACS 300 Z
Installation location	-	Floor mounting	
Type of construction	-	Closed domestic hot water cylinder for single or dual-circuit operation	
Inlet and outlet connection thread	inch	G1	
Circulation pipe connection thread	inch	3/4	
Container	-	Steel, enamelled, with magnesium protective anode	
Mixed water volume at 40 °C	Litres	304	456
Nominal volume	Litres	200	300
Standby energy consumption at 65 °C	kWh/24h	1,7	2,1
Permissible operating pressure	MPa (bar)	0,6 (6)	

Load profile	-	M	L
Energy efficiency class according to (EU) 812/2013	-	C	
Energy efficiency (ŋwh) according to (EU) 812/2013	%	38	39
Annual energy consumption	kWh	1373	2696
Set temperature	°C	65	
nominal voltage	V	230 / 400	
Rated power	kW	2 / 3 / 4 / 6	
electrical connection	-	1/N/PE / 2/N/PE / 3/N/PE	
Protection class	-	I (with protective conductor)	
degree of protection	-	IP 24 (splash-proof)	
Dimensions D x H	mm	600 x 1340	600 x 1797
Gross empty weight	kg	102	136
Temperature control range	°C	25 - 80	
Overheating protection	-	Yes	
Protection against dry operation	-	Yes	

Dimensioned drawing



	ACS 200 Z	ACS 300 Z
H	1340	1797
ØD	600	600
A	305	305
B	1050	1507
C	748	1028
Anode length	Ø33 x 300	Ø33 x 350
tilt dimension	1400	1835

NOTE
For service work, e.g. on the magnesium anode, a distance of 500 mm from the top edge of the appliance to the ceiling must be maintained.

① Domestic hot water

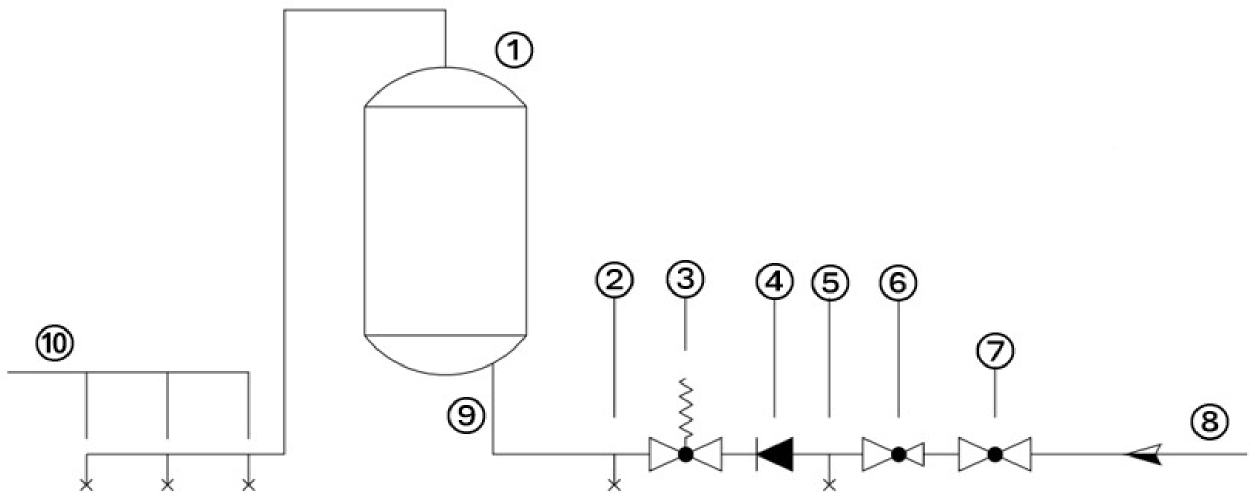
② Magnesium anode

③ Thermometer

④ Circulation

⑤ Cold water

Water connection



① Domestic hot water

② Drain valve

③ Safety valve

④ Backflow preventer

⑤ Test valve

⑥ Possibly pressure reducer

⑦ Isolating valve

⑧ Cold water inlet

⑨ Cold water

⑩ Utility fitting

8.6.12 Instantaneous water heater DEE

Technical data

Naming	Unit	DEE 1521			DEE 2127		
		15	18	21	21	24	27
Rated power	kW	15	18	21	21	24	27
nominal voltage	V	3~ 400			3~ 400		
Fuse / circuit breaker	A	25	25	32	32	40	40
Minimum cable cross-section[1)]	mm²	4	4	4	4	6	6
Mixed water at rated output with temperature increase of							
12 °C to 38 °C (without flow limiter)	l/min	8,1	9,8	11,6	11,6	13,0	14,6
12 °C to 38 °C (with flow limiter)	l/min	5,0	7,6	7,6	7,6	9,4	9,4
12 °C to 60 °C	l/min	4,4	5,3	6,2	6,2	7,1	7,9
Minimum volume flow during commissioning[2)]	l/min	2,5			2,5		
Minimum pressure for commissioning[3)]	MPa (bar)	0,04 (0,4)			0,04 (0,4)		

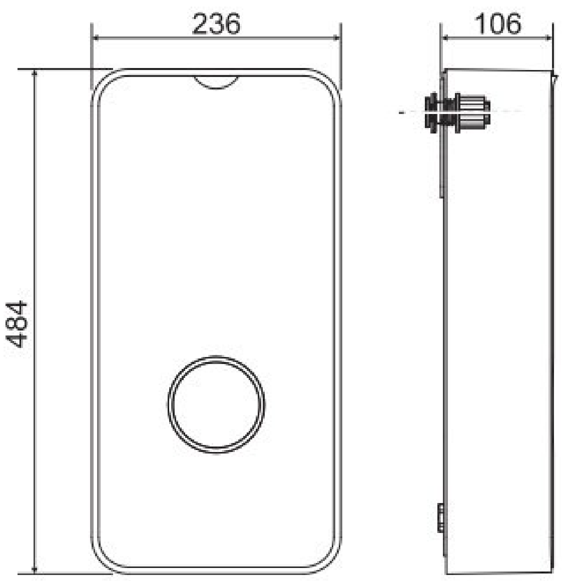
Area of application Water with a specific electrical resistance of 15 °C	Ωcm	≥1300		≥1300	
nominal pressure	MPa (bar)	1,0 (10)		1,0 (10)	
Maximum permissible inlet temperature	°C	55		55	
Flow limiter	l/min Colour	5,0 (Orange)	7,6 (White)	7,6 (White)	9,4 (Yellow)
Maximum mains impedance at the connection point	Ω	0,170		0,117	
Product data on energy consumption					
Specified load profile	-	S		S	
Energy efficiency class of domestic hot water preparation	-	A		A	
Energy efficiency of domestic hot water preparation	%	39		39	
Annual energy consumption	kWh	476		476	

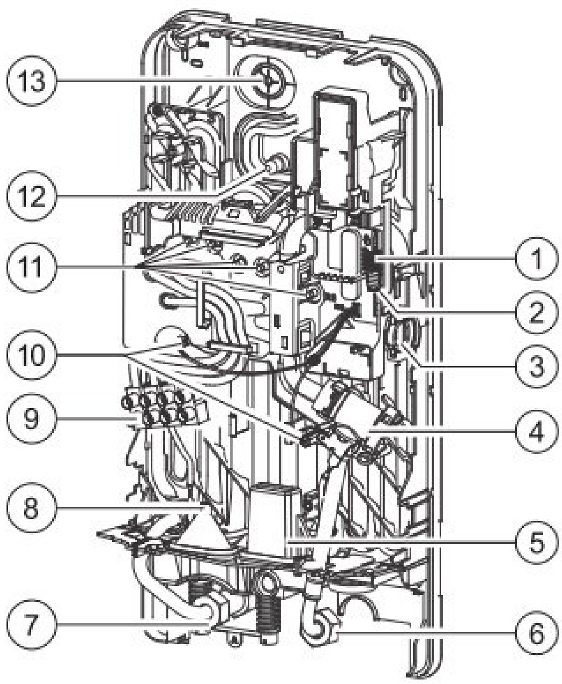
[1] Depending on the installation, a larger cable cross-section may be required.

[2] When commissioning the appliance for the first time, the minimum flow rate must be 3.5 l/min.

[3] The pressure drop in the water fitting is added to this value.

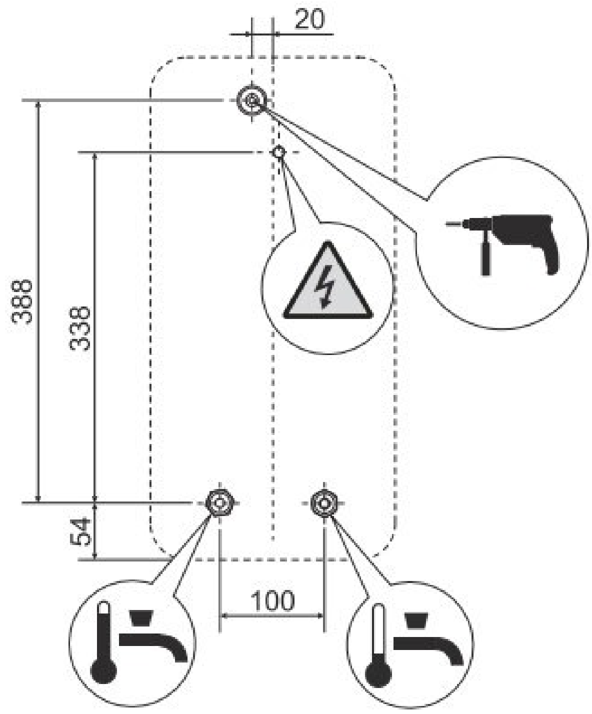
Dimensioned drawing





1 Jumpers (device configuration)

2 Reset button



3 Volume flow meter

4 Water filter and flow limiter

5 Feeding the mains cable

6 Cold water inlet ½"

7 Hot water outlet ½"

8 Cable entry at the bottom

9 Clamp

10 Temperature sensors

11 Heating resistors

12 Cable entry at the top

13 Mounting position

9 Integration of the heat pump into the heating system

9.1 Hydraulic Requirements

With the hydraulic integration of a heat pump, it is important to ensure that the heat pump only ever has to generate the actual temperature level required in order to increase efficiency. The aim is to feed the temperature level generated by the heat pump into the heating system without mixing it.

NOTE
With pure heat pump operation, a mixed heating circuit is only necessary if two different temperature levels, e.g. for underfloor and radiator heating, need to be supplied.

To prevent the mixing of different temperature levels, heating operation is interrupted during a hot water demand and the heat pump is operated at the higher flow temperatures required for domestic hot water preparation.

The following basic requirements must be met:

- Ensuring frost protection
- Fusing the minimum heating water flow rate
- Ensuring the minimum runtime

Furthermore, when setting the setpoint or heating curve, care must be taken to ensure that living comfort is maintained, but that the setpoint or heating curve is not set higher than absolutely necessary.

NOTE
The efficiency of the heat pump heating system decreases by up to 2.5 % for every Kelvin higher flow temperature.

In order to heat the building with the lowest possible flow temperature, the heat distribution system must be designed for this flow temperature. The following examples are suitable for operation with a low flow temperature:

- underfloor heating
- Concrete core activation
- Fan convectors
- Low-temperature radiators
- Ventilation coil with enlarged heat exchanger area

NOTE
In rooms with a bathtub or shower (sanitary areas), additional heating must be installed in conjunction with underfloor heating. This can be realised, for example, with an electric radiator (e.g. towel dryer).

9.2 Ensuring frost protection

For heat pumps that are located outdoors or have outside air flowing through them, measures must be taken to prevent the heating water in the heat pump from freezing during downtimes or faults.

If the temperature falls below a minimum level at the frost protection sensor (flow sensor) of the heat pump, the heating and auxiliary circulating pumps are automatically activated to ensure frost protection.

In monoenergetic or bivalent systems, the second heat generator is released in the event of a fault in the heat pump to ensure frost protection.

> **CAUTION**
> In heating systems with utility company shut-off times, the supply line for the heat pump manager must be connected to continuous voltage (L/N/PE~230 V, 50 Hz) and must therefore be tapped before the utility company shut-off contactor or connected to the household current.

> **CAUTION**
> To ensure the frost protection function of the heat pump, the heat pump manager must not be de-energised and the heat pump must be flowing.

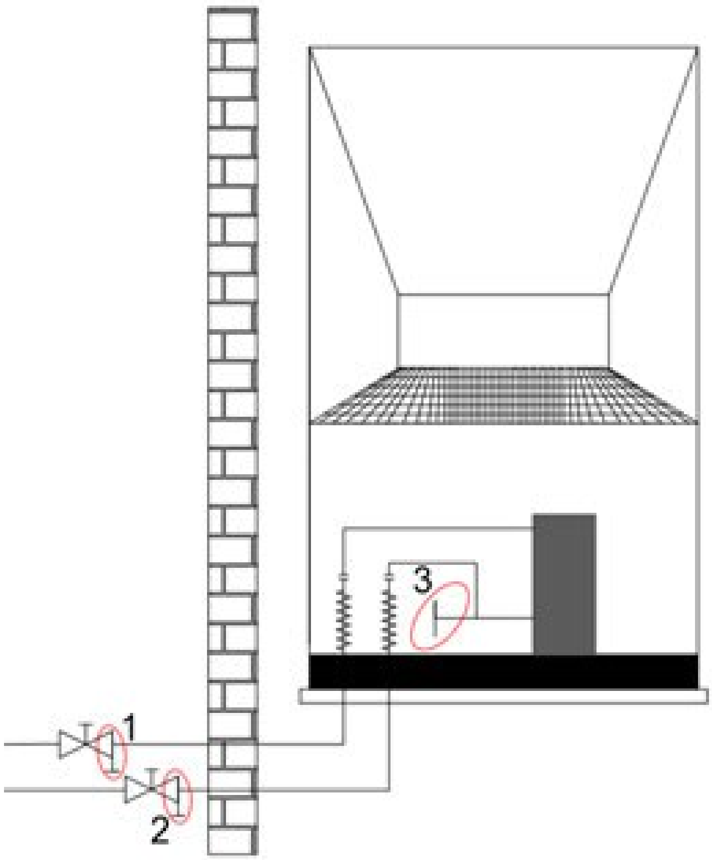
9.2.1 Frost protection by means of a water-glycol mixture

For heat pump systems where a power failure cannot be detected (e.g. holiday home), the heating system must be filled with suitable frost protection.

> **NOTE**
> If the heat pump is operated with a water-glycol mixture with a glycol content of 25%, the efficiency for heating and cooling deteriorates by approx. 15%.

In permanently occupied buildings, the use of antifreeze in the heating water is not recommended, as frost protection is largely ensured by the control of the heat pump and the antifreeze reduces the efficiency of the heating system.

9.2.2 Manual drainage



Manual drainage must be provided for heat pumps that are installed where there is a risk of frost. If the heat pump is shut down or in the event of a power failure, the heat pump and the

35 Figure: Circuit diagram for the installation of frost-prone heat pumps

Heating water connection cable (flow and return) must be drained and, if necessary, blown out.

> ⚠ **CAUTION**
> The hydraulic integration must be carried out in such a way that the heat pump - and thus the integrated sensors - always h a v e a flow through them, even with special integrations or bivalent operation.

9.3 Fusing the heating water flow rate

To ensure reliable operation of the heat pump, the **minimum heating water flow** specified in the device information must be ensured in all operating statuses. The circulation pump must be dimensioned so that the water flow through the heat pump is ensured at maximum pressure drop in the system (almost all heating circuits closed).

The specified minimum heating water flow rate must be ensured on the system side regardless of the switching value of an installed flow rate switch and must not be undercut in any operating status. A built-in flow rate switch is only used to switch off the heat pump in the event of an unusual drop in the heating water flow rate and not for monitoring and fusing the required minimum heating water flow rate.

> **CAUTION**
> For heating system design temperatures below 30 °C in the flow (e.g. concrete core activation), the maximum volume flow with 5 K spread at A7/ W35 must be used for air-to-water heat pumps.

The required temperature spread can be determined in two ways:

- **Calculating the temperature spread**
- **Temperature spread as a function of the heat source temperature**

When determining the heating water flow rate in the heat generation circuit of the heat pump, various points must be taken into account. For example, the minimum heating water flow rate must be ensured in all operating statuses.

> **NOTE**
> With regulated pumps, particular care must be taken to ensure that they are set to a constant speed and that internal pump control functions do not lead to a brief drop in the volume flow (e.g. pump standstill due to deaeration function when air bubbles are detected).

A higher volume flow must be provided for lower flow temperatures. The following spreads are recommended at the design point:

- 35°C: approx. 5 K spread, but under no circumstances below the minimum heating water flow rate
- 45°C: approx. 7 K spread, but never below the minimum heating water flow rate
- 55°C: max. 10 K spread, but never below the minimum heating water flow rate
- 65°C: max. 10 K spread, but under no circumstances below the minimum heating water flow rate

For systems with extremely low system temperatures (return temperatures $\leq$ 25°C), a maximum spread of 5 K must be specified at the design point. Systems for heating and cooling must be designed for the highest required water flow (heating water or cooling water flow).

9.3.1 Calculating the temperature spread

- Determining the instantaneous heat output of the heat pump from the heat output curves at average heat source temperature
- Calculation of the required spread using the minimum heating water flow rate specified in the device information

> **NOTE**
> Table values for the required temperature spread depending on the heat source temperature can be found here.

Example air-to-water heat pump:

Heat output Q_{WP} = 10.9 kW at A10/W35

Specific heat capacity of water: 1.163 Wh/kg K

Required minimum heating water flow rate: e.g. V = 1000 l/h = 1000 kg/h

Required spread:

$$\Delta T = \frac{10900\ W\ kg\ K\ h}{1{,}163\ Wh \cdot 1000\ kg} = 9{,}4\ K$$

9.3.2 Temperature spread as a function of the heat source temperature

For heat pumps that are not speed-controlled (fixed-speed / without inverter), especially when the heat source is outside air, the heat output generated by the heat pump is highly dependent on the current heat source temperature. The maximum temperature spread depending on the heat source temperature can be found in the following tables.

air-to-water heat pump

Heat source temperature		Max. Temperature spread in 1. compressor operation between flow and return of the heat pump	
from	**until**	**Heat pump with 1 compressor**	**Heat pump with 2 compressors**
-20 °C	-15 °C	4K	2K
-14 °C	-10 °C	5K	2,5K
-9 °C	-5 °C	6K	3K
-4 °C	0° C	7K	3,5K
1 °C	5 °C	8K	4K
6 °C	10 °C	9K	4,5K
11 °C	15 °C	10K	5K
16 °C	20 °C	11K	5,5K
21 °C	25 °C	12K	6K
26 °C	30 °C	13K	6,5K
31 °C	35 °C	14K	7K

Table: Heat source: Outside air

brine-to-water heat pump

Heat source temperature		Max. Temperature spread in 1. compressor operation between flow and return of the heat pump	
from	**until**	**Heat pump with 1 compressor**	**Heat pump with 2 compressors**
-5° C	0 °C	5 K	10K
1 °C	5 °C	6 K	11K
6 °C	9 °C	6 K	12K
10 °C	14 °C	7 K	13K
15 °C	20 °C	7 K	14K
21 °C	25 °C	8 K	15K

Table: Heat source: Ground

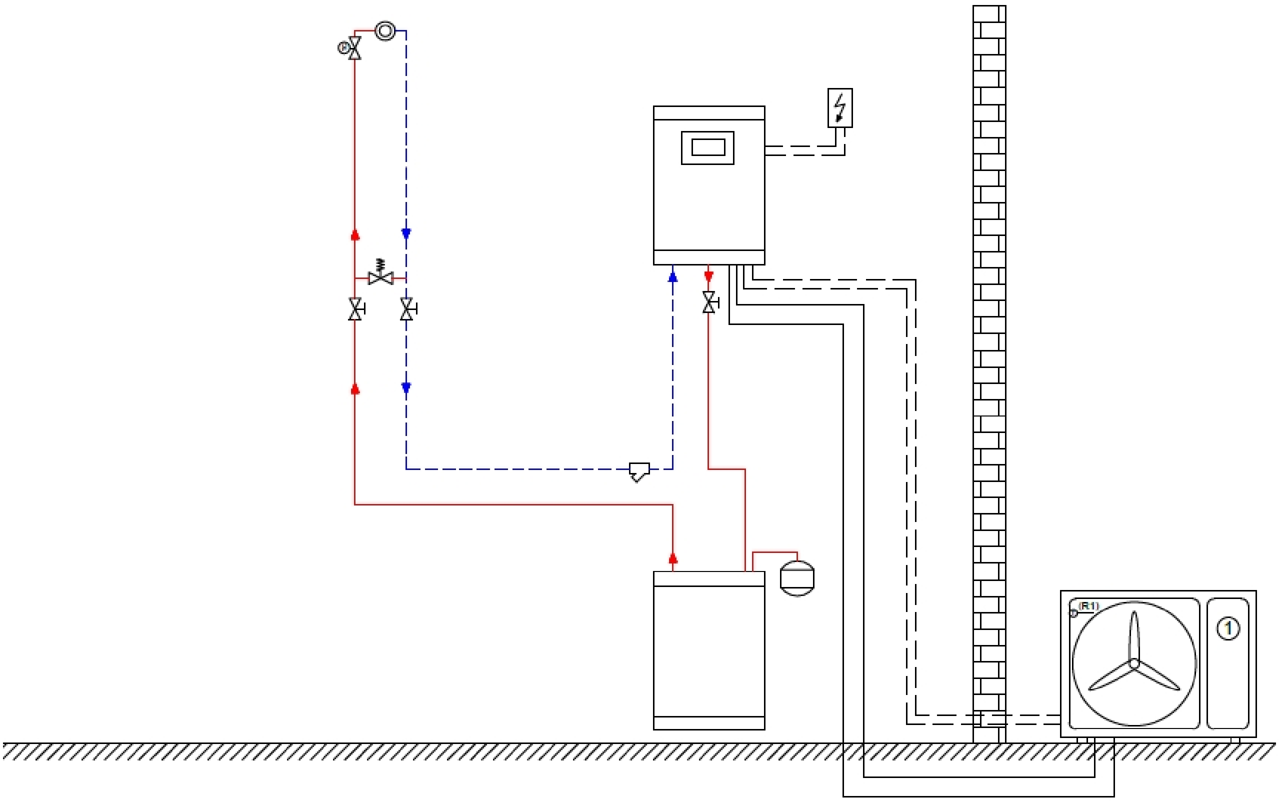
water-to-water heat pump

Heat source temperature		Max. Temperature spread in 1. compressor operation between flow and return of the heat pump	
from	**until**	**Heat pump with 1 compressor**	**Heat pump with 2 compressors**
7° C	12 °C	5 K	10K
13 °C	18 °C	6 K	11K
19 °C	25 °C	6 K	12K

Table: Heat source: Groundwater

9.3.3 Overflow valve

In systems with one heating circuit, a common heat circulating pump (M13) can be used to flow through the heat pump and the heating system.



36 Hydraulic integration proposal Overflow valve

The use of room temperature controllers results in fluctuating volume flows in the consumer circuit. An overflow valve installed in the heat generation circuit - downstream of the uncontrolled heat circulating pump (M13) - must compensate for these volume flow changes.

If the pressure drop in the consumer circuit increases (e.g. due to valves contacting), a partial volume flow is channelled via the overflow valve and ensures the minimum heating water flow through the heat pump.

> **NOTE**
> Circulation pumps with a constant speed (volume flow) must be used in conjunction with an overflow valve.

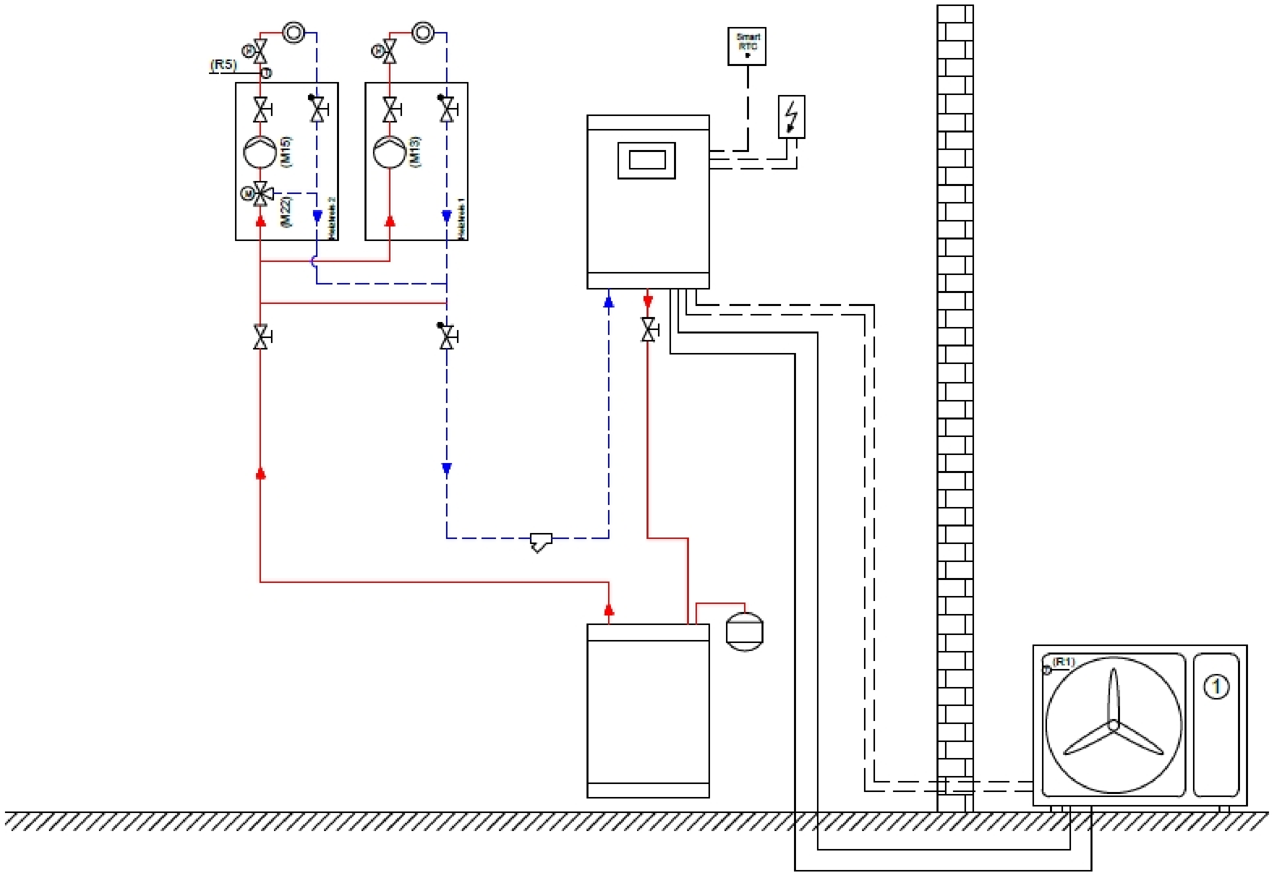
Overflow valve setting

- To set the overflow valve, all control elements (actuators, thermostatic valves...) of the Heating circuits closed so that the most unfavourable operating status for the water flow is present.
- The overflow valve must be opened wide enough to achieve the specified maximum temperature spread between the heating flow and return at the current heat source temperature. The temperature spread should be measured as close as possible to the heat pump.

> **NOTE**
> An overflow valve that is closed too far does not ensure the minimum heating water flow rate through the heat pump.
> If the overflow valve is opened too far, the flow through individual heating circuits may be insufficient.

9.3.4 Differential pressureless manifold [DDV]

By hydraulically decoupling the heat generation circuit from the consumer circuit, the minimum heating water flow rate is ensured by the heat pump in all operating statuses. The heat circulating pump (M13) ensures the minimum heating water flow of the heat pump in all operating statuses without the need for manual settings. Differing volume flows in the generator and consumer circuits are equalised via the differential pressureless manifold [DV]. The pipe cross-section of the differential pressureless manifold [DDV] should have the same diameter as the flow and return of the heating system.

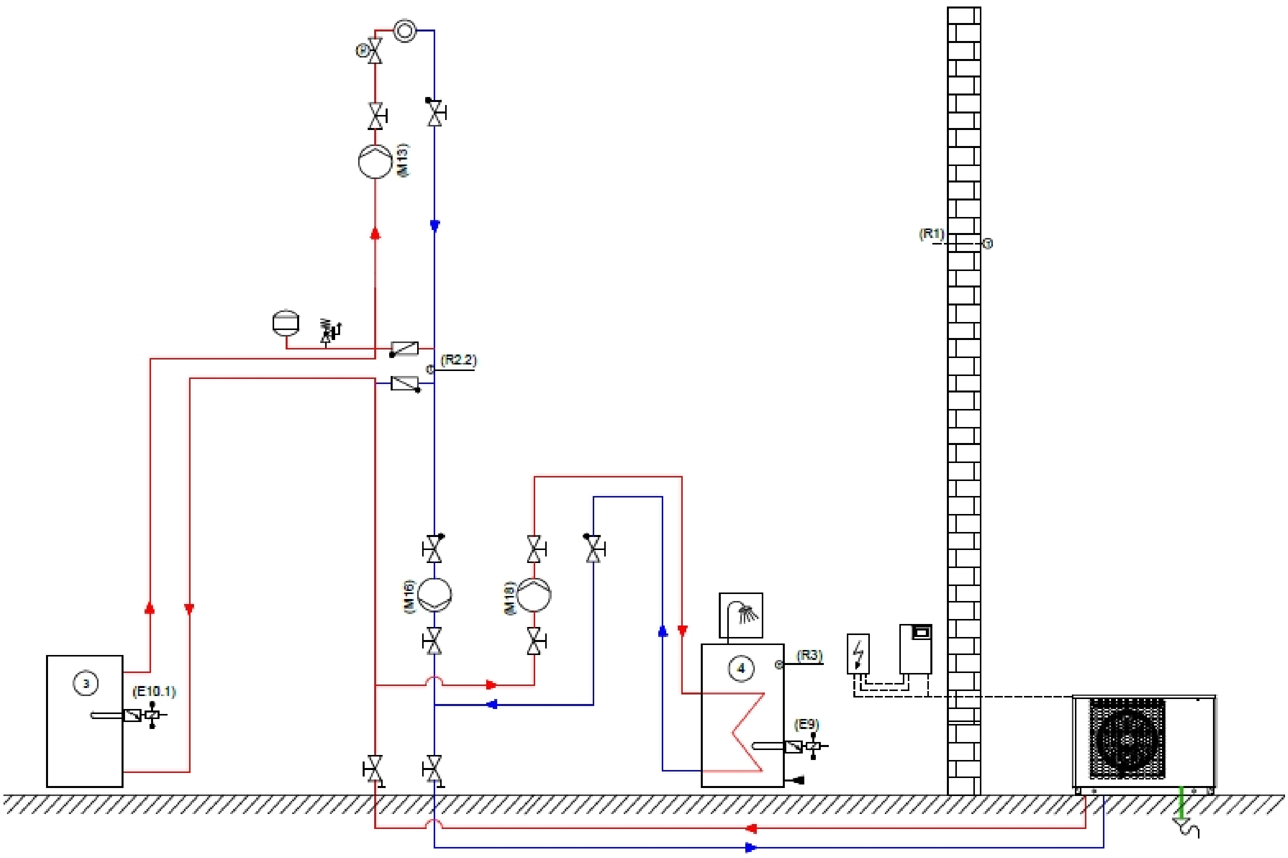


37 Hydraulic integration proposal Differential pressureless manifold [DDV]

> **NOTE**
> If the volume flow in the consumer circuit is higher than in the heat generation circuit, the maximum flow temperature of the heat pump in the heating circuits is no longer reached.

9.3.5 Double differential pressureless manifold [DDV]

The double differential pressureless manifold [DDV] enables the minimum heating water flow rate of the heat pump to be ensured in combination with a serien buffer tank without compromising o n efficiency. With one differential pressureless manifold upstream and one downstream of the serien buffer tank, the generator and consumer circuits are decoupled. In addition, each differential pressureless manifold [DDV] is equipped with a check valve.



38 Hydraulic integration proposal Double differential pressureless manifold [DDV]
Advantages of the double differential pressureless manifold:

- Hydraulic decoupling of the generator and consumer circuit
- More efficient pump control
- Reduction of mixing losses compared to other bindings
- Operation of the circulation pump (M16) in the heat generation circuit only when the heat pump is running to avoid unnecessary runtimes
- Ensuring the minimum runtimes of the compressor and during defrost end in all operating situations through complete flow through the serien buffer tank
- Compact and space-saving dimensions possible due to smaller buffer volumes

> **NOTE**
> Hydraulic integration with a double differential pressureless manifold [DDV] offers maximum flexibility, operational reliability and efficiency.

9.4 Water quality in heating systems

9.4.1 Stone formation

Stone formation in heating systems cannot be avoided, but is negligible in systems with flow temperatures of less than 60 °C. With high temperature heat pumps and especially with bivalent systems in the high output range (combination heat pump + boiler), flow temperatures of 60 °C and can no longer be achieved. Softening is the preferred method for preventing scale formation, as it permanently removes alkaline earths (calcium and magnesium ions) from the heating system.

The following values for the water quality of heating and cooling water must be observed and checked during an on-site check:

- Degree of hardness
- Conductivity
- pH value
- filterable substances

The following (limit) values must be complied with:

- Maximum hardness of the filling and supplementary water 11°dH
- For fully demineralised water (demineralised water) (low-salt), the conductance must not exceed 100 µS/cm
- For partially demineralised water (saline), the conductance must not exceed 500 µS/cm
- The pH value must be between 7.5 - 9
- The limit value for filterable substances in the heating water is < 30 mg/l

CAUTION
When using **fully demineralised water**, ensure that the pH value does not fall below the minimum permissible value o f 8.2. If the value falls below this, the heat pump may be destroyed

If necessary, for example in the case of bivalent systems, the specifications listed in the following table must also be taken into account, or the exact guide values for filling and supplementary water and the total hardness can be taken from the table in accordance with VDI 2035 - Sheet 1.

NOTE
The specific volume of a heating system must be determined before filling the system.

The so-called saturation index SI is used to assess whether a water has a tendency to dissolve or separate lime. It indicates whether the pH value corresponds to the pH neutral point or by how much this is undercut by an excess of acid or exceeded by a deficit of carbonic acid. If the saturation index is below 0, the water is aggressive and tends to corrode. If the saturation index is above 0, the water is limescale-removing.

NOTE
The saturation index SI should be between - 0.2 < 0 < 0.2

Total heating capacity in kW	**Total alkaline earths in mol/m³ (total hardness in °dH)**		
	≤20	>20 to ≤50	>50
	Specific system volume in litres/kW heat output(1)		
≤50 specific water content 2nd heat generator > 0.3 k per kW(2)	none	≤3,0 (16,8)	<0,05 (0,3)

≤50 specific water content 2nd heat generators > 0.3 k per kW(2) (e.g. circulating water heaters) and Systems with electric heating elements	≤3,0 (16,8)	≤1,5 (8,4)	
>50 kW to ≤200 kW	≤2,0 (11,2)	≤1,0 (5,6)	
>200 kW to ≤600 kW	≤1,5 (8,4)	<0,05 (0,3)	
>600 kW	<0,05 (0,3)		
Heating water, dependent on heating capacity			
Operating mode:	Electrical conductivity in µS/cm		
Low salt(3):	>10 to ≤100		
Salty:	>100 to ≤1500		
	Appearance		
	clear, free from sedimenting substances		

(1) To calculate the specific system volume, the smallest individual heating output must be used for systems with several heat generators.

(2) For systems with several heat generators with different specific water contents, the smallest specific water content is decisive.

(3) Full softening is recommended for systems with aluminium alloys.

CAUTION
Failure to comply with the specified limit values for the heating water may result in material damage.
- The minimum permissible pH value of 7.5 must be observed
- The specified limit values for water quality must be ensured.

9.4.2 Corrosion

For systems with an above-average specific system volume of 50 litres/kW, VDI 2035 recommends the use of partially/fully demineralised water.

CAUTION
When using **fully demineralised water,** ensure that the pH value does not fall below the minimum permissible value o f 8.2. If the value falls below this, the heat pump may be destroyed

These measures (e.g. pH stabiliser) are taken to adjust the pH value of the heating water in order to minimise the risk of corrosion in the heat pump and in the heating system.

Irrespective of legal requirements, the following limit values for various substances in the heating water used must not be exceeded or fallen below in order to ensure safe operation of the heat pump. For this purpose, a water analysis must be carried out before commissioning the system.

to be carried out. If the water analysis results in a "-" for a maximum of one indicator or a "-" for a maximum of two indicators "o", the analysis is to be assessed as negative.

Assessment characteristic	Concentration range (mg/l or ppm)	Stainless steel	Copper
Bicarbonate (HCO3)	<70	+	o
	70-300	+	+
	>300	+	o/+
Sulphates (SO4)	<70	+	+
	70-300	+	o/-
	>300	o	-
Hydrogen carbonate (HCO3-/SO4-)	>1,0	+	+
	<1,0	+	o/-
Electrical conductivity	<10 µS/cm	+	o
	10 - 500 µS/cm	+	+
	>500 µS/cm	+	o
pH value	<6,0	o	o
	6,0-7,5	o/+	o
	7,5-9,0	+	+
	>9,0	+	o
Ammonium (NH4+)	<2	+	+
	2-200	+	o
	>200	+	-
Chloride ions (Cl-)	<150	+	+
	>150	o	o/+
Chlorine (Cl2)	<0,5	+	+
	1-5	+	o
	>5	o/+	o/-
Hydrogen sulphide (H2S)	<0,05	+	+
	>0,05	+	o/-
Carbon dioxide (CO2)	<5	+	+
	5-20	+	o
	>20	+	-

Assessment characteristic	Concentration range (mg/l or ppm)	Stainless steel	Copper
Nitrates (NO3)	<100	+	+
	>100	+	o
Iron (Fe)	<0,2	+	+
	>0,2	+	o
Aluminium (Al)	<0,2	+	+
	>0,2	+	o
Manganese (Mn)	>0,1	+	+
	<0,1	+	o
Saturation index	>-0,2	+	+
	<0,2	+	+

Resistance of copper-brazed or welded stainless steel plate heat exchangers to water constituents:

Notes

- "+" = normally good resistance
- "o" = Corrosion problems can occur, especially if several factors are rated "o"
- "-" = refrain from use

NOTE
The water quality should be checked again after 4 to 6 weeks, as it may change due to chemical reactions during the first few weeks of operation.

9.5 buffer tank

For heat pump heating systems, a serien buffer tank is recommended in order to ensure that the heat pump is always available in all operating statuses.
Ensure **a minimum runtime of the heat pump of 6 minutes.**

Air-to-water heat pumps with defrost end via circuit reversal extract the defrost energy from the heating system. To ensure defrosting, a serien buffer tank must be installed in the flow of air-to-water heat pumps, into which the srew-in heating element is installed in monoenergetic systems.

For air-to-water heat pumps with integrated pipe heating, it is possible to install the buffer tank in the return.

NOTE
When commissioning air-to-water heat pumps, the heating water must be preheated to the lower operating limit of at least 18 °C to ensure defrosting.

CAUTION
If a **srew-in heating element** is installed in a buffer tank, it must be protected as a heat generator in accordance with DIN EN 12828 and equipped with a non-shut-off expansion vessel and a type-tested safety valve.

For brine-to-water heat pumps and water-to-water heat pumps, the buffer tank can be installed in the flow or, in the case of purely monovalent operation, also in the return.

Serien buffer tanks are operated at the temperature level required by the heating system. They are not used to bridge shut-off times but to ensure the minimum runtime of the heat pump.

In buildings of heavy construction or generally when using panel heating systems, the inertia compensates for any shut-off times.

Time functions in the heat pump manager offer the option of programming a raise of the return temperature in advance for fixed shut-off times. This serves to compensate for shut-off times.

NOTE
Recommended volume of the serien buffer tank approx. 10 % of the heating water flow rate of the heat pump per hour. For heat pumps with two performance levels, a volume of approx. 8 % is sufficient, but should not exceed 30 % of the heating water flow rate per hour.

Example: Heating water flow rate 0.9 m^3 /h corresponds to a recommended buffer volume of 90 litres

Oversized buffer tanks lead to longer compressor runtimes. For heat pumps with two performance levels, this can lead to unnecessarily short runtimes for the second compressor.

CAUTION
Buffer tanks are not enamelled and must therefore never be used for heating domestic hot water.

9.5.1 Buffer tank overview

NOTE
The PSW 100 - PSW 500 buffer tanks are suitable for cooling applications up to +5°C. Due to the low flow temperatures - especially with dynamic cooling - condensation may occur. The sockets for immersion heaters or flanges and all heating water connections must be fitted with diffusion-tight insulation.

Order code	Item no.	EEK	For device type	Immersion heater option	Ø x height [mm]	Weight [kg]
Floor-standing buffer tank						
PSW 100	351090	B		2 sockets 11/2" (up to CTHK 634)	512 x 850	32
PSW 200	339830	B		3 sockets 11/2" (up to CTHK 634)	600 x 1300	60
PSW 500	339210	C		3 sockets 11/2" (up to CTHK 635)	700 x 1950	115

Order code	Item no.	EEK	For device type	Immersion heater option	Ø x height [mm]	Weight [kg]
BTH 1000	382090	C		6 sockets 11/2" (up to CTHK 636)	1000 x 2055	126
BTHC 1000	381980	C		6 sockets 11/2" (up to CTHK 636)	1000 x 2060	168
Wall-mounted buffer tank						
PSP 50E	372890	B	HP < 10 kW LIA...HWCF	-	380 x 370 x 400	25
PSP 50W	381900	C	LIA...HXCF LIA...HWCF	-	435 x 660 x 390	18,5

9.5.2 Accessories:

Immersion heater CTHK

only for PSW500:

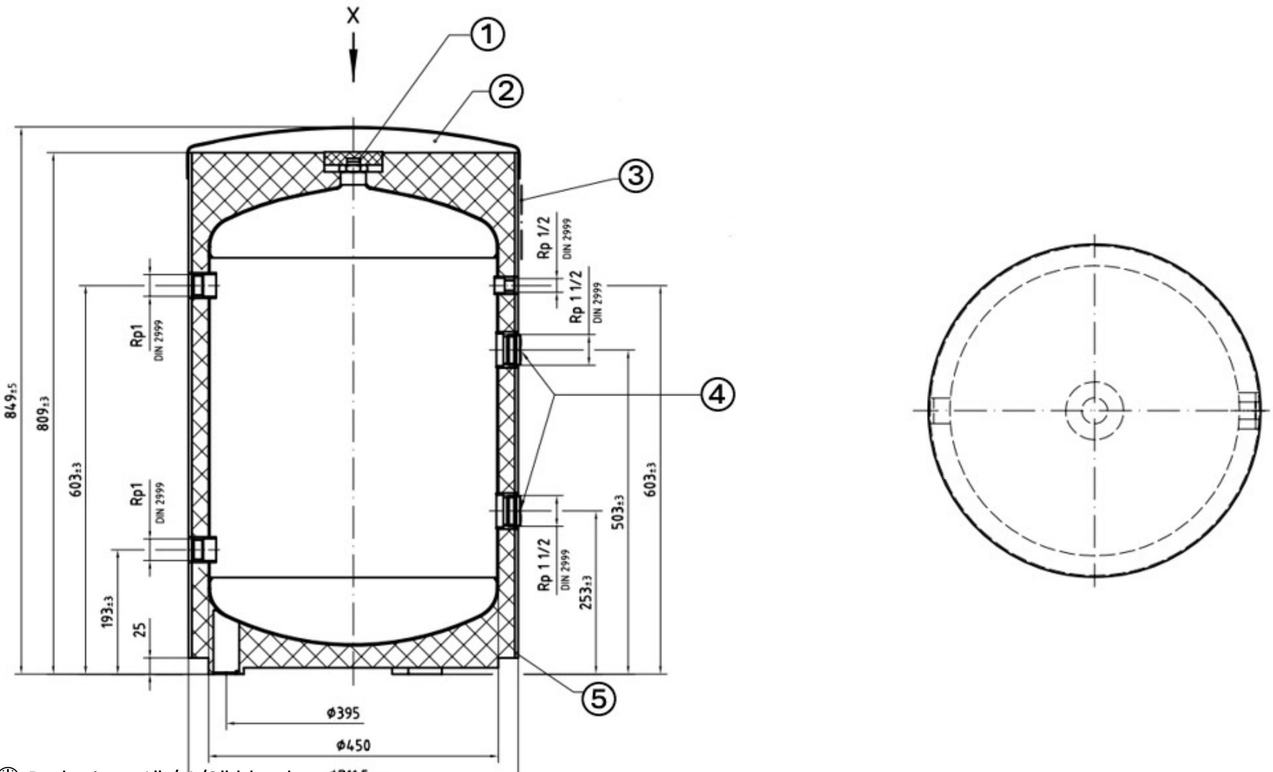
RWT 500

9.5.3 PSW 100 buffer tank

Dimensions and weights	Unit	PSW 100
Nominal content	l	100
Diameter	mm	512
Height	mm	850
Width	mm	-
Depth	mm	-
Heating water return	inch	1" FEMALE THREAD
Heating water flow	inch	1" FEMALE THREAD
Permissible operating overpressure	bar	3
Maximum storage tank temperature	°C	95
Levelling feet (adjustable)	Piece	
Heating element inserts 1 ½" female thread	Quantity	2
Max. heat output per heating element	kW	4,5
Flange DN 180	Quantity	
Heat loss*	kWh/24h	1,8

Dimensions and weights	Unit	PSW 100
Weight	kg	55

*Room temperature 20°C; storage tank temperature 65°C



① Red. piece 1" / 1/2" bleeder valve

② Tank cover

③ Type plate installation note (position according to customer's choice, 3-language version)

④ Plug 1 1/2" w. O-ring

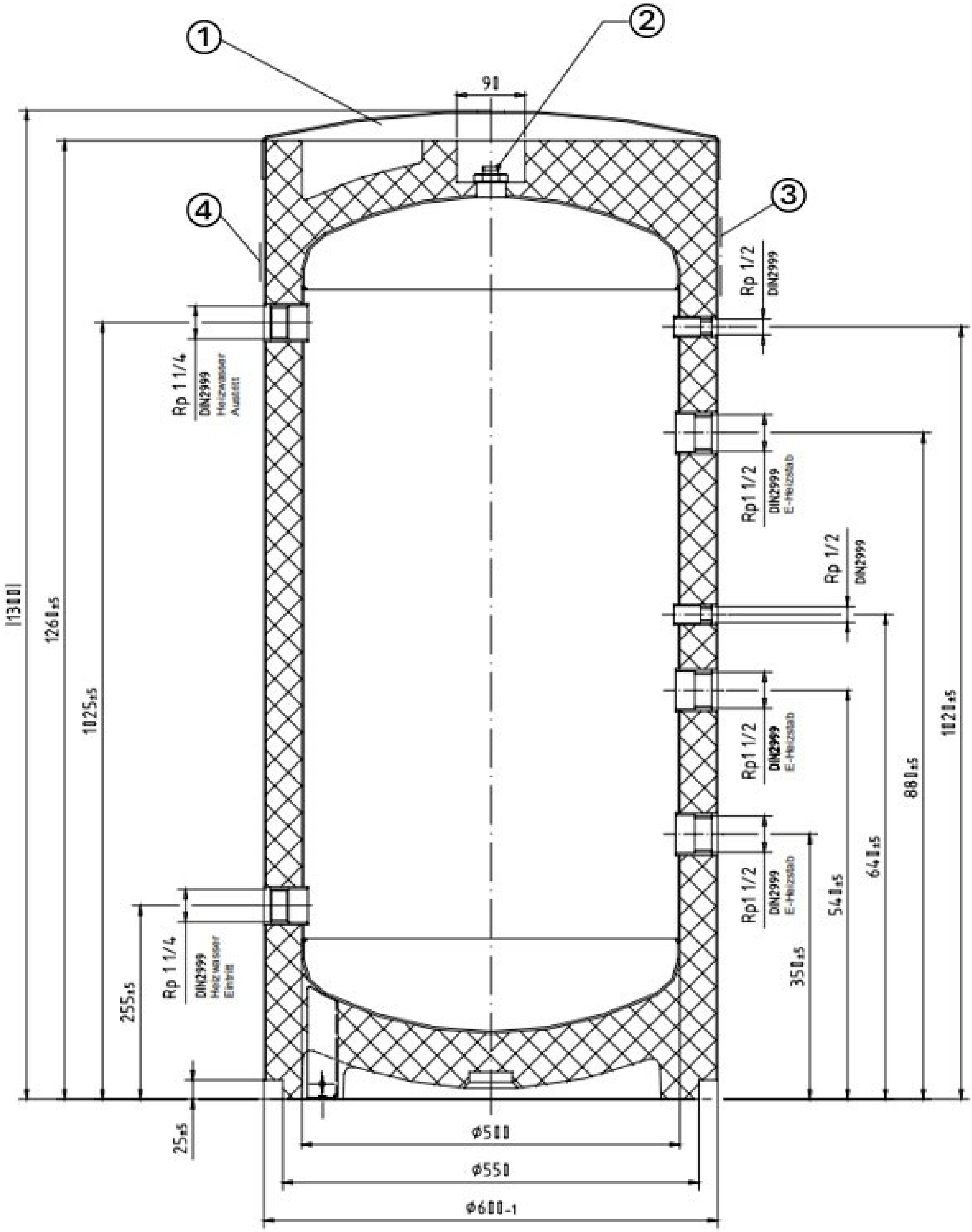
⑤ Foil jacket

9.5.4 PSW 200 buffer tank

Dimensions and weights	Unit	PSW 200
Nominal content	l	200
Diameter	mm	600
Height	mm	1300
Width	mm	-
Depth	mm	-
Heating water return	inch	1 1/4" FEMALE THREAD

Dimensions and weights	Unit	PSW 200
Heating water flow	inch	1 1/4" FEMALE THREAD
Permissible operating overpressure	bar	3
Maximum storage tank temperature	°C	95
Levelling feet (adjustable)	Piece	3
Heating element inserts 1 ½" female thread	Quantity	3
Max. heat output per heating element	kW	6,0
Flange DN 180	Quantity	-
Heat loss*	kWh/24h	2,1
Weight	kg	60

*Room temperature 20°C; storage tank temperature 65°C



① Tank cover

② Red. piece 1" / 1/2" bleeder valve

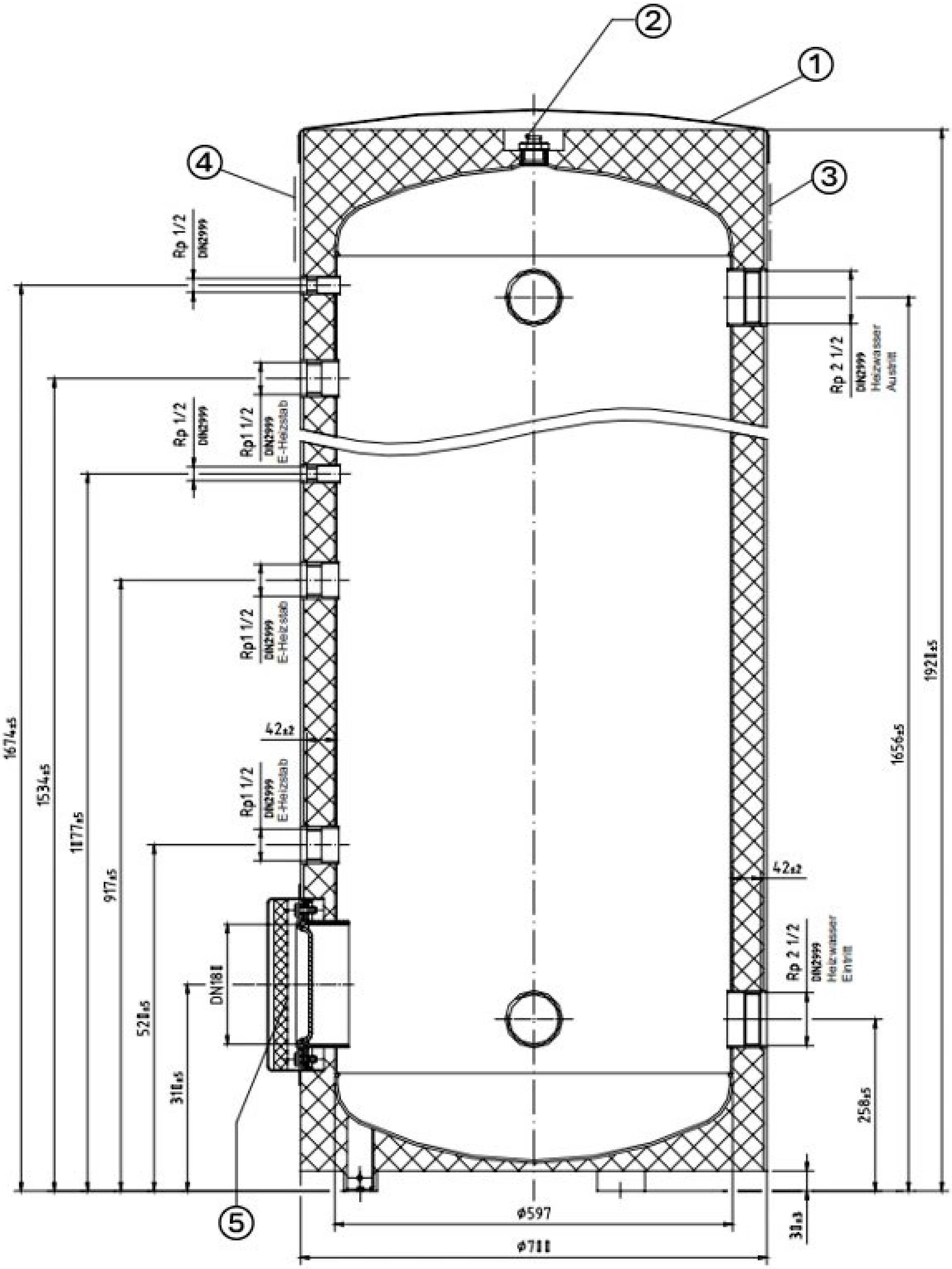
③ Installation note

④ Type plate

9.5.5 PSW 500 buffer tank

Dimensions and weights	Unit	PSW 500
Nominal content	l	500
Diameter	mm	700
Height	mm	1950
Width	mm	-
Depth	mm	-
Heating water return	inch	2 x 2 1/2"
Heating water flow	inch	2 x 2 1/2"
Permissible operating overpressure	bar	3
Maximum storage tank temperature	°C	95
Levelling feet (adjustable)	Piece	3
Heating element inserts 1 ½" female thread	Quantity	3
Max. heat output per heating element	kW	7,5
Flange DN 180	Quantity	1**
Heat loss*	kWh/24h	3,2
Weight	kg	115

*Room temperature 20°C; storage tank temperature 65°C
for the use of a **finned tube heat exchanger RWT 500



① Tank cover
② Red. piece 1" / 1/2" bleeder valve
③ Installation note
④ Type plate

⑤ Blind flange / sealing / insulation / flange cover

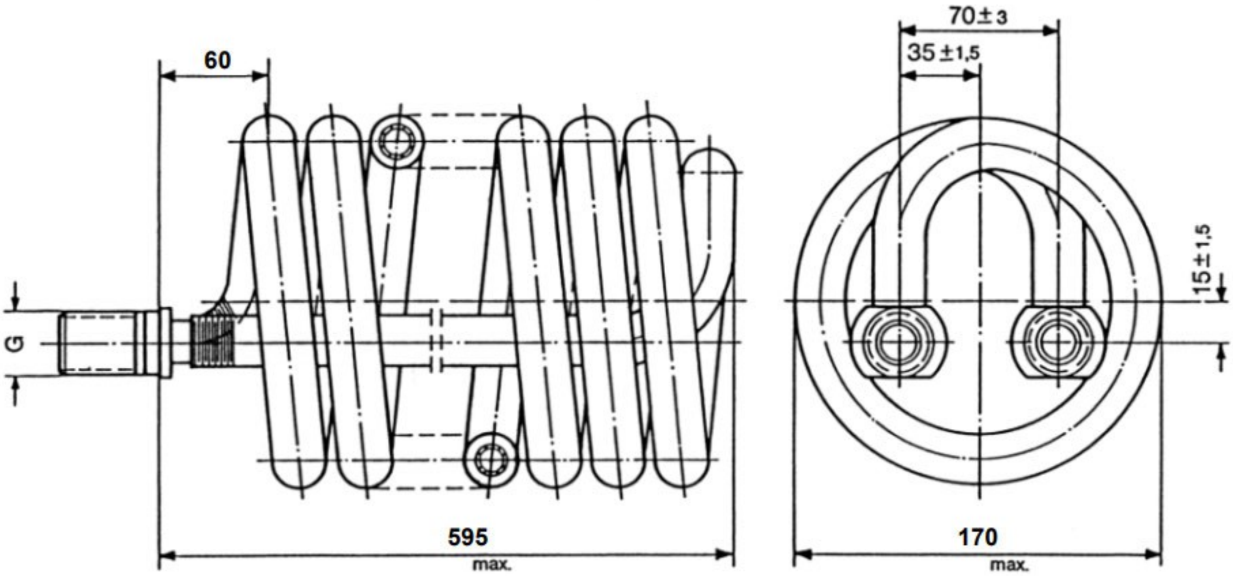
PSW500 accessories:

RWT 500

9.5.6 RWT 500

The RWT finned tube heat exchanger is designed for installation in the PSW 500 buffer tank and is used to heat heating water using additional heat sources.

Water or mixtures of water and glycol commonly used in solar heating systems can be used as a heating medium in conjunction with heat pumps, boilers, district heating systems and solar heating systems.

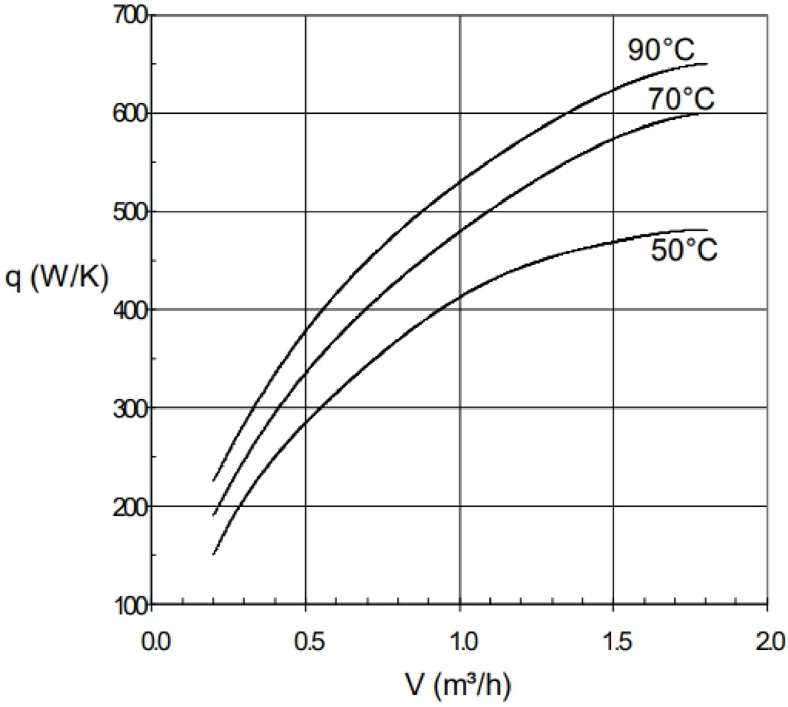


Power calculation

The transferred power Q with water as the heating medium is calculated using the following formula in conjunction with diagram 1:

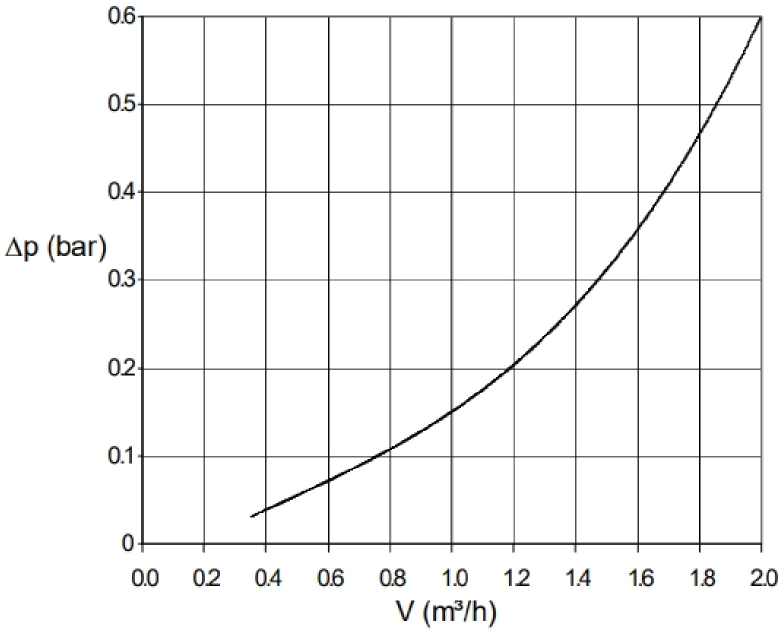
Q = q (t1-ts)

Q:	Power to be transmitted	[W]
q:	Power per 1K temperature difference	[W/K]
t1:	Heating water temperature at the inlet of the finned tube heat exchanger	[°C]
ts:	Average cylinder water temperature in the area of the exchanger	[°C]
V:	Heating water volume flow	[m³/h]



39 Diagram 1: Transmitted power

The pressure drop Dp for water in the heat exchanger is determined from diagram 2.



40 Diagram 2: Pressure drop

Operation with heating media commonly used in solar thermal systems (mixtures of water and glycol, index "G") reduces the output is increased by the factor f1, the pressure drop is increased by the factor f2:

QG = f1 x q (t1-ts)

ΔpG = f2 x Δp

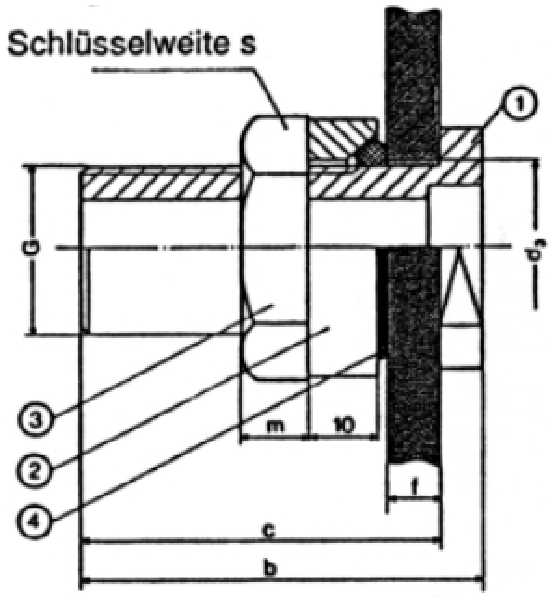
Factors for different mixing ratios with monoethylene glycol are

	f1	f2
25%	0,90	1,20
40%	0,85	1,35

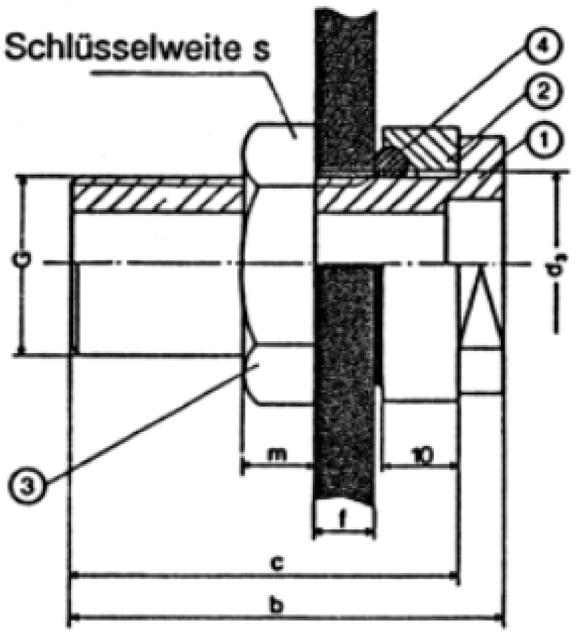
Installation:

- Before installing the finned tube heat exchanger, the buffer must be emptied if necessary.
- The black plastic cover in the lower front area of the buffer must be removed.
- The blind flange plate underneath must be loosened by loosening the surrounding screws and removed with sealing.
- The sealing surface on the buffer must be cleaned of sealing residue.
- The finned tube heat exchanger must be mounted in the flange plate. It can be secured in the flange plate in various ways (see diagram 2). External sealing is primarily recommended.

External sealing



Internal sealing



External sealing is recommended as a priority.

Connecting stub

② Disc

③ Hexagon nut

④ O-ring sealing

- The pre-assembled installation kit is screwed into the buffer in place of the removed blind flange plate. The enclosed new sealing must be used.
- After filling the buffer, check the tightness of the screw connections.

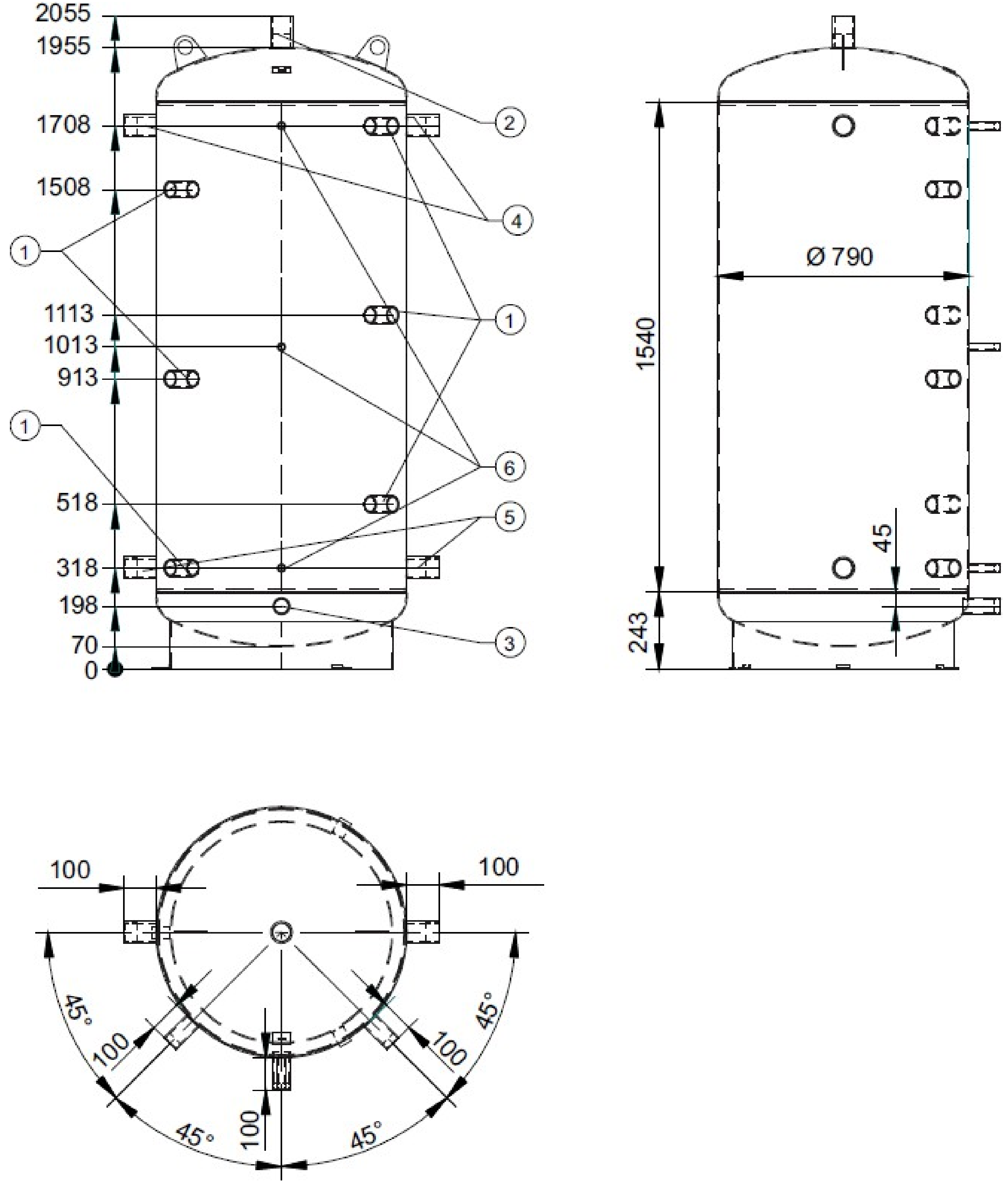
9.5.7 BTH 1000 / BTHC 1000 buffer tank

BTH 1000 Floor-standing buffer tank 1000 litres for heating operation

BTHC 1000 Floor-standing buffer tank 1000L for cooling and heating applications

Dimensions and weights	Unit	BTH 1000 / BTHC 1000
Nominal content	l	1000
Useful capacity	l	870
Tilt dimension without thermal insulation	mm	2250
Complete height	mm	2055
Diameter without thermal insulation	mm	790
Diameter with thermal insulation	mm	1000
Insulation thickness Thermal insulation	mm	25
Insulation thickness Thermal insulation	mm	100
Net weight	kg	120
Heat loss*	kWh/24h	3,36
Permissible operating temperature of heating water	°C	95
Permissible operating overpressure heating water	bar	3
Test pressure	bar	3,9

*Room temperature 20°C; storage tank temperature 65°C



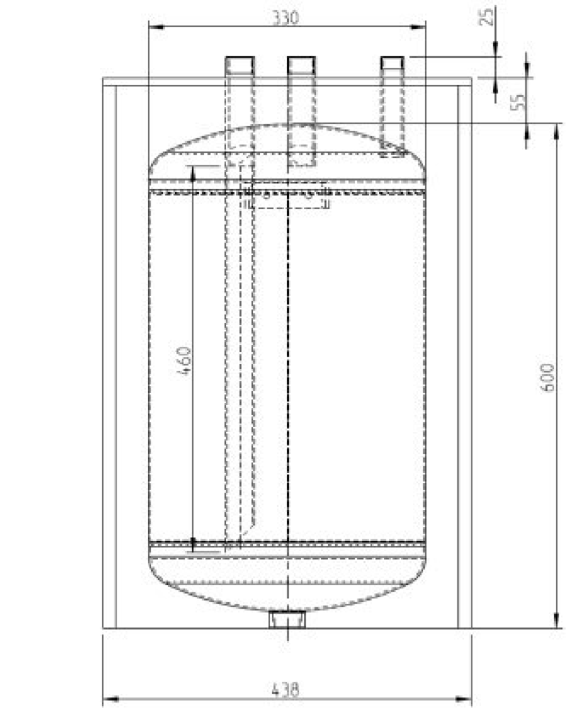
Connections		
①	Heating element inserts	1 1/2" FEMALE THREAD
②	Connection for purge	G 1 ½" FEMALE THREAD

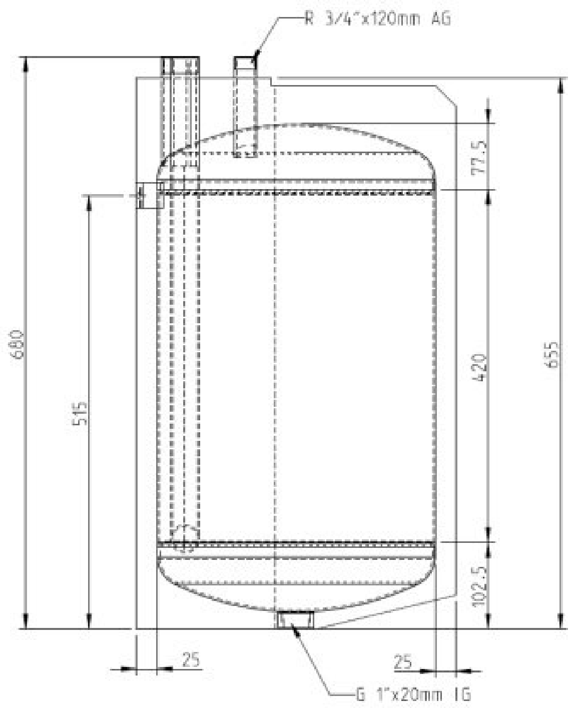
Connections		
③	Connection for drainage	G 1 ½" FEMALE THREAD
④	Heating water flow	G 2" FEMALE THREAD
⑤	Heating water return	G 2" FEMALE THREAD
⑥	immersion sleeve*	Rp ½"

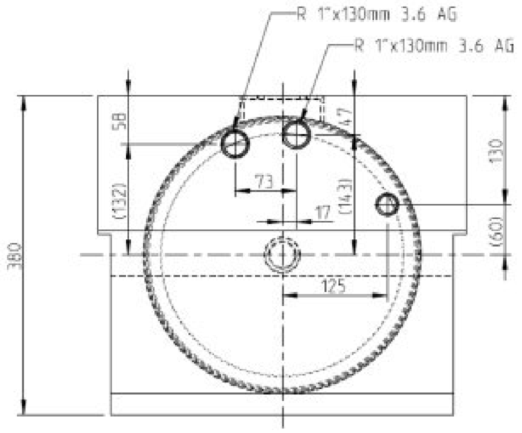
*Immersion sleeves (3x) enclosed with the storage tank

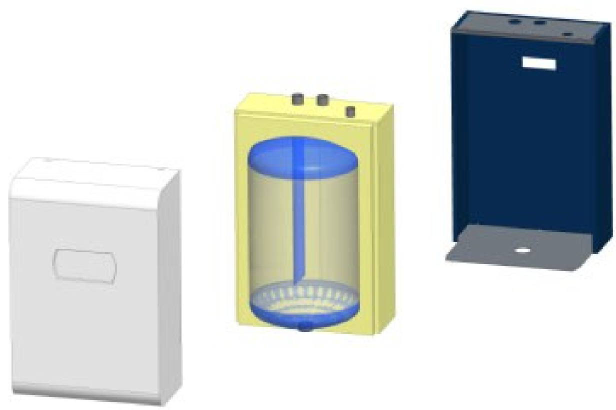
9.5.8 PSP 50E buffer tank

Dimensions and weights	Unit	PSP 50E
Nominal content	l	50
Diameter	mm	-
Height	mm	680
Width	mm	438
Depth	mm	380
Heating water return	inch	R 1"
Heating water flow	inch	R 1"
Expansion vessel connection	inch	R 3/4"
Permissible operating overpressure	bar	3
Maximum storage tank temperature	°C	95
Weight	kg	25







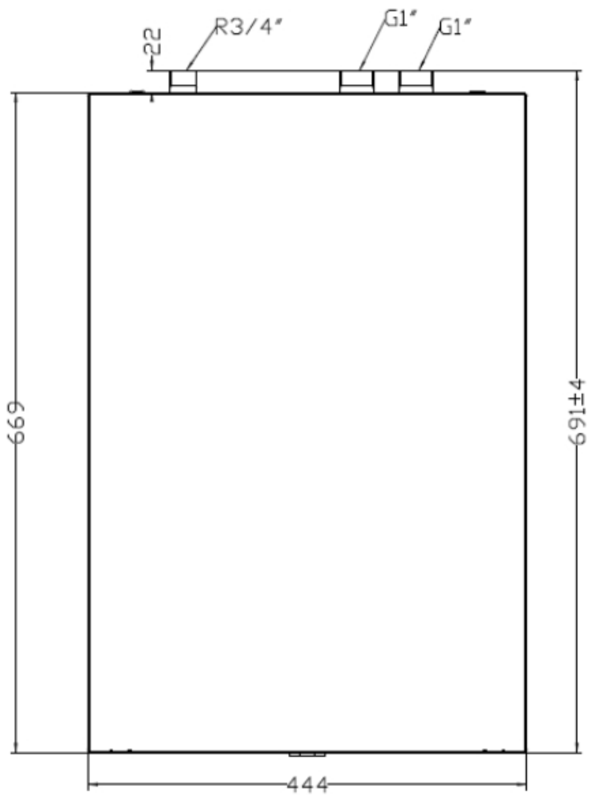


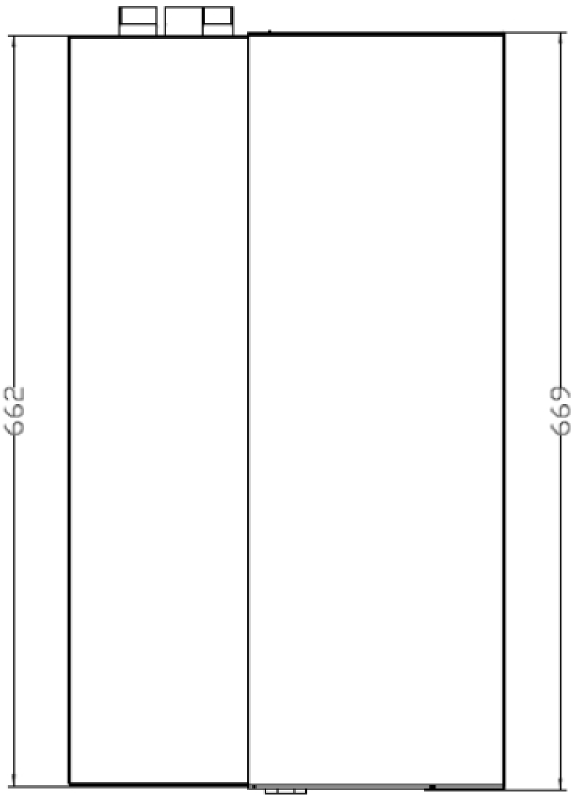
9.5.9 PSP 50W buffer tank

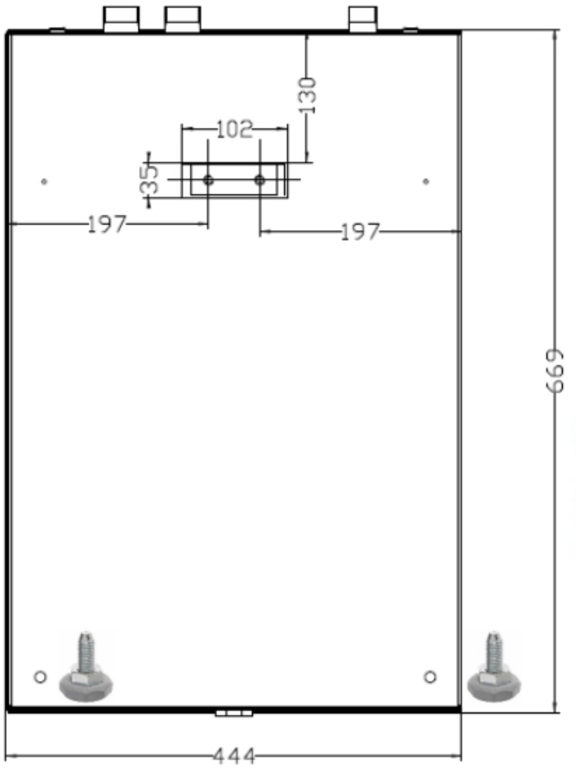
Dimensions and weights	Unit	PSP 50E
Nominal content	l	50
Diameter	mm	-
Height	mm	680
Width	mm	444
Depth	mm	384
Heating water return	inch	G 1"

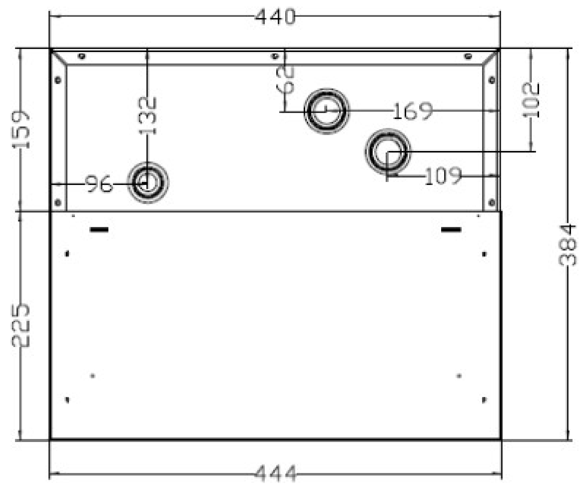
Dimensions and weights	Unit	PSP 50E
Heating water flow	inch	G 1"
Expansion vessel connection	inch	R 3/4"
Permissible operating overpressure	bar	3
Maximum storage tank temperature	°C	95
Heat loss*	kWh/24h	0,91
Weight	kg	16

*Room temperature 20°C; storage tank temperature 65°C

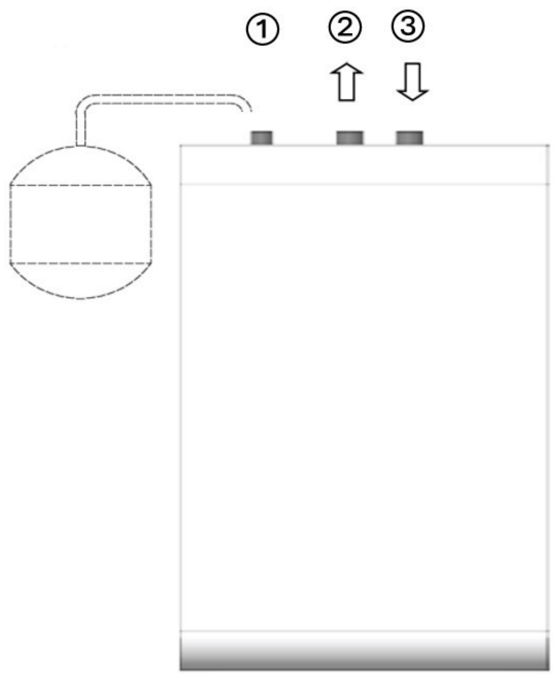








Hydraulic connection



① Expansion vessel connection

② Heating return

③ Heating flow

9.5.10 Immersion heater CTHK

The CTHK 630 to CTHK 636 srew-in heating elements are designed for installation in heating buffer tanks.

They are maintenance-free as main and auxiliary heating for (electrically) heated storage tanks. If the water is very calcareous, it is reasonable to remove scale from the radiators at certain intervals.

The user can preselect the desired maximum temperature using the rotary control. The heating is automatically switched on by the temperature controller (or controller of the heat generator) during the heating-up time (specified by the responsible utility company) and switched off again once the desired storage tank water temperature has been reached. If the water temperature drops, e.g. due to a heating request or natural cooling, the srew-in heating element switches on again until the preselected storage tank water temperature is reached.

NOTE
The lower the storage tank water temperature is selected, the more economical the heat generator will be. It is therefore advisable to set the continuously adjustable temperature only as high as is required for the actual hot or storage water demand. A positive side effect is that this not only saves electrical energy, but also prevents limescale deposits in the cylinder as far as possible! In addition, in conjunction with the heat pump manager (WPM), unnecessary switching on of the srew-in heating element can be avoided by setting the limit temperature (bivalence point).

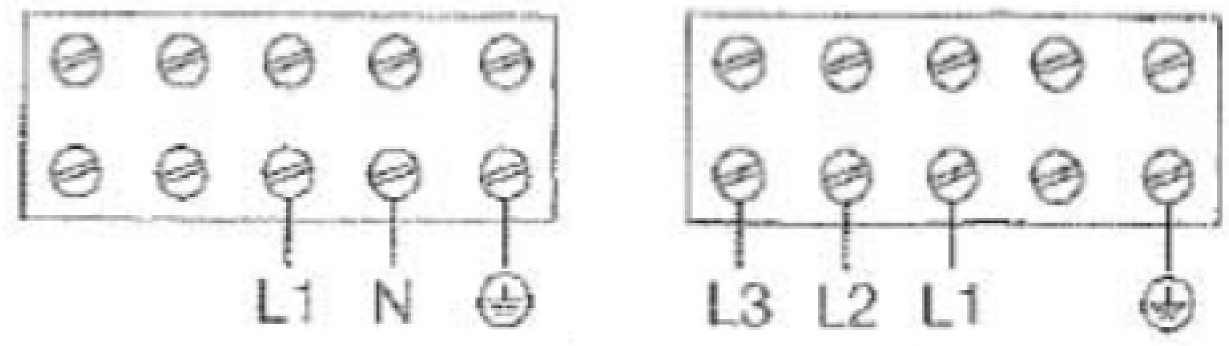
Technical data

Type	Rated power [kW]	Rated voltage [V]	HK on pay	Switching on [kW]	Immersion depth [mm]	Unheated length	Mon-days horizontal right	Connection	VDE test mark
CTHK 630	4,5	~230	1	4,5	400	95	x	R 1 1/2"	x
CTHK 631	2,0	~230	1	2,0	250	95	x	R 1 1/2"	x
CTHK 632	2,9	3~400	3	2,9	250	95	x	R 1 1/2"	x
CTHK 633	4,5	3~400	3	4,5	350	110	x	R 1 1/2"	x
CTHK 634	6,0	3~400	3	6,0	450	110	x	R 1 1/2"	x
CTHK 635	7,5	3~400	3	7,5	550	110	x	R 1 1/2"	x
CTHK 636	9,0	3~400	3	9,0	650	110	x	R 1 1/2"	x

electrical connection

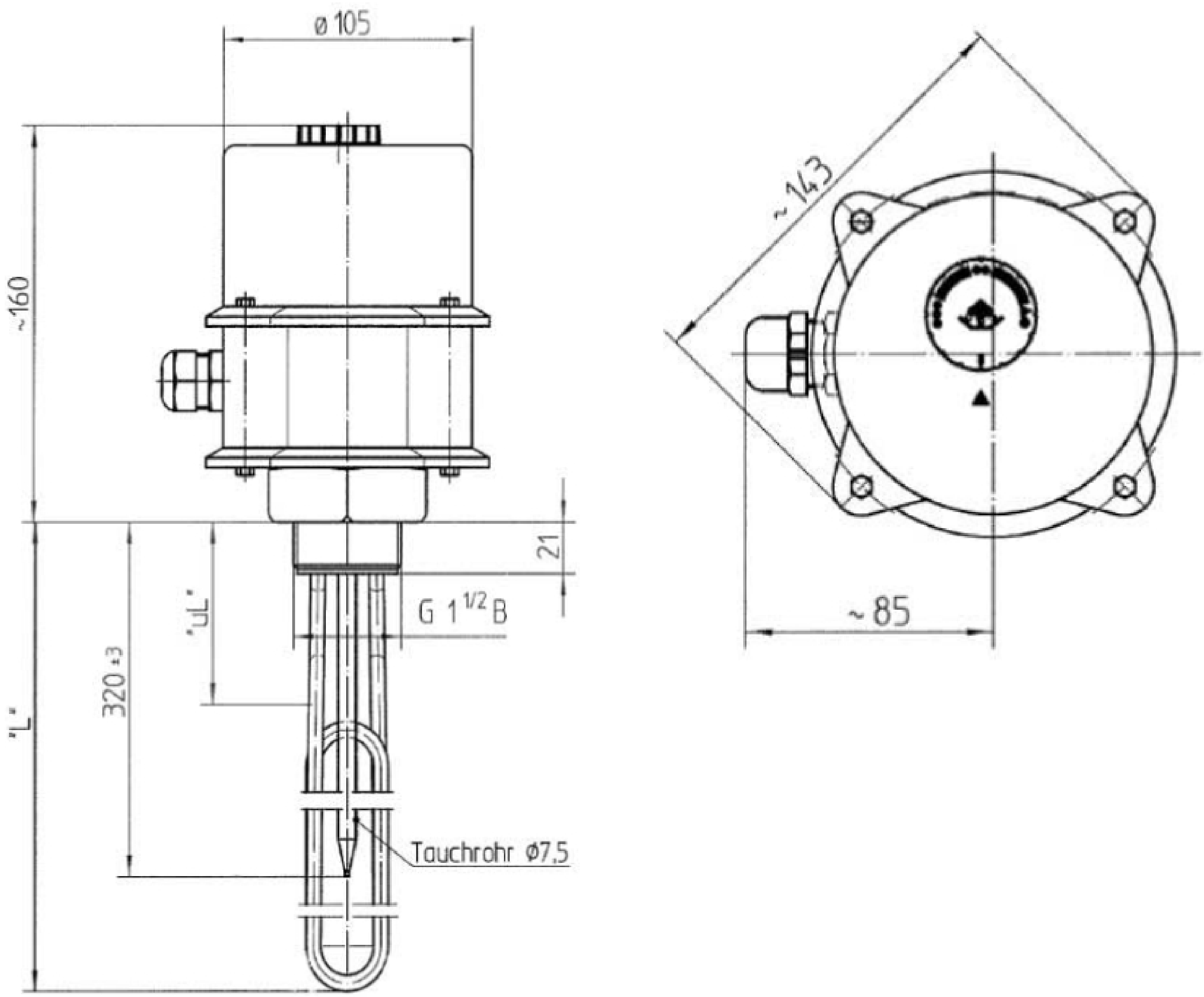
1~230V: Type CTHK 630 and CTHK 631

3~400V: Type CTHK 632 to CTHK 636



> **CAUTION**
> The storage tank must be filled with water before electrical commissioning.

Layout sketch



9.6 Hydro-Tower (HWK 332HC)

9.6.1 Table of contents

9.6.2 Possible applications HWK 332HC

Order code	For device type
HWK 332HC	LA 1118CP
	LA 1422C

NOTE
The required expansion vessel and the associated pressure gauge are not included in the scope of supply but must be ordered separately.

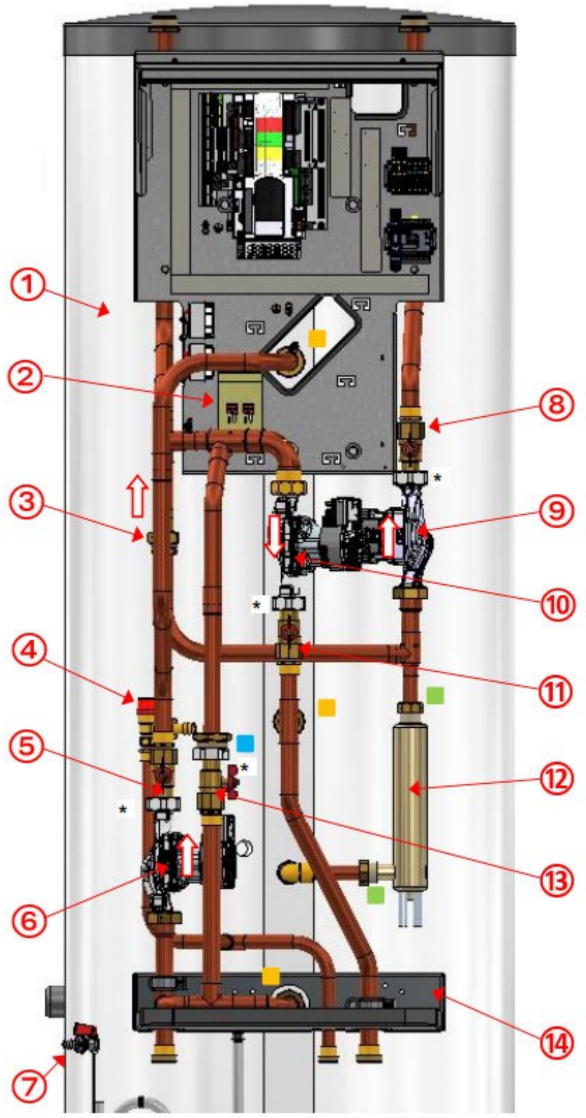
The Hydro-Tower HWK 332HC forms the interface between a non-reversible heat pump and the heat distribution in the building.

The Hydro-Tower contains all the hydraulic components required between heat generation and heat distribution with an unmixed heating circuit. A differential pressureless manifold [DDV] in combination with a buffer tank results in an energetically optimised hydraulic system.
Integration of the heat generator and heat distribution.

9.6.3 General properties

- Low installation effort
- Good accessibility of all components
- Ready for connection, contains all essential components including pumps, shut-off valves, safety technology and heat pump manager
- Integrated 300 litre domestic hot water cylinder
- Integrated buffer tank reduces cycling of the heat pump, thus increasing the efficiency of the system
- The infinitely variable circulation pump in the heating circuit enables demand-dependent output adjustment.
- Optional immersion heater up to max. 6 kW
- Switchable pipe heating (2/4/6 kW) for central heating backup.

9.6.4 Basic device HWK 332HC



① Combo tank

② Minigrip bag with link cables is supplied with switch box

③ RSV

④ Safety valve

⑤ Ball valve

⑥ Circulation pump (M18)

⑦ Filling and emptying tap

⑧ Ball valve

⑨ Circulation pump (M13)

⑩ Circulation pump (M16)

⑪ Ball valve

⑫ Electric heating

⑬ Ball valve

⑭ Storage mounting bracket

Hydraulic components

- Double differential pressureless manifold [DDV]
- Buffer tank 100 litres
- Unmixed heating circuit incl. circulation pump (self-regulating - 3/4 stages), shut-off valves and non-return device
- Primary circuit heat generator incl. circulation pump (PWM input signal), shut-offs
- 2nd heat generator electric tubular heating, heat output from 2, 4 to 6 kW, protected by safety temperature limiter
- 300 litre domestic hot water cylinder incl. domestic hot water circulating pump

Safety equipment:

- Safety valve, response pressure 3 bar
- Connection of an additional expansion vessel possible

9.6.5 Device information HWK 332HC

Type and order code		HWK 332HC
1. design		
Execution		Hydro-Tower with WPM and double differential pressureless manifold [DDV]
Degree of protection according to EN 60529		IP 20
installation location		Inside
2. technical data		
Heat generator		external
buffer tank		
Nominal content	Litres	100
Permissible operating temperature	°C	85
Maximum operating overpressure	bar	3,0
Electric pipe heating	kW	2, 4 or 6[1]
Immersion heater (optional)	kW	to 3
domestic hot water cylinder		
Useful capacity	Litres	277
Heat exchanger surface	m^2	3,15
Permissible operating temperature	°C	95
Permissible operating pressure	bar	10,0
immersion heater	kW	1,5
Set pressure safety valve	bar	3,0
Sound power level	dB(A)	42
Sound pressure level at a distance of 1 m	dB(A)	35

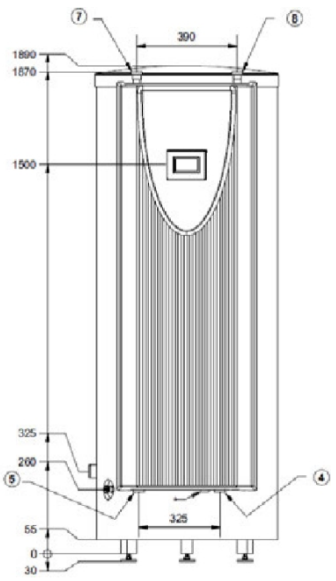
3. dimensions, connections and weight		
device dimensions[2]	H x W x L mm	1920 x 740 x 950
tilt dimension	mm	2000
Device connections		
for heat generators	inch	1 1/4" EXTERNAL THREAD/FL
unmixed heating circuit	inch	1 1/4" EXTERNAL THREAD/FL
for domestic hot water	inch	1" EXTERNAL THREAD
for circulation pipe	inch	3/4" FEMALE THREAD
for diaphragm expansion vessel	inch	1" EXTERNAL THREAD/FL
Anode diameter	mm	33
Anode length	mm	690
Anode connection thread	inch	1 1/4" FEMALE THREAD
Weight of the transport unit(s) incl. packaging	kg	215
4. electrical connection		
Control voltage Fusing		1~/N/PE 230 V (50 Hz) / C13 A
Supply voltage / fusing	(SPmax= 7.5 kW)	1~/N/PE 230 V (50 Hz) / B35 A 3~/N/PE 400 V (50 Hz) / B20 A
5. safety regulations		
Complies with European safety regulations		see CE declaration of conformity
6 Other model features		
Water in the appliance protected against freezing[4]		Yes

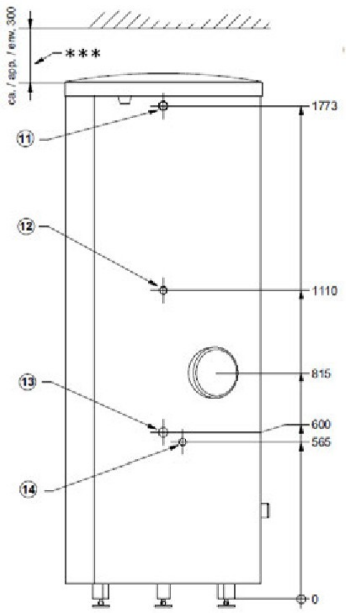
1. Delivery state 6 kW
2. Please note that more space is required for pipe connection, operation and maintenance
3. see CE declaration of conformity
4. the heat circulating pump and the heat pump controller must always be ready for operation

9.6.6 Dimensioned drawing HWK 332HC

Front view

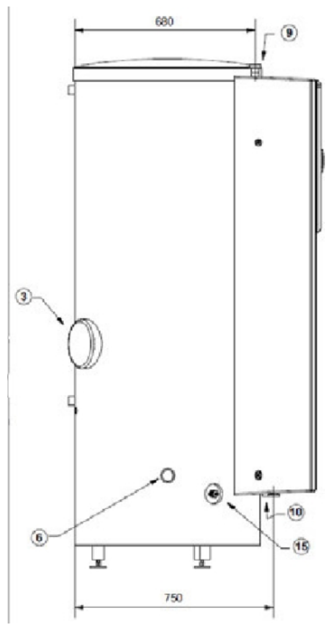
Rear view



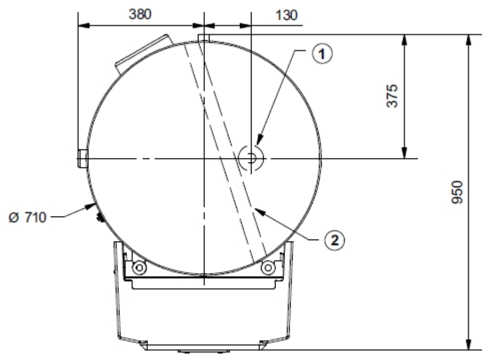


***Space required for anode replacement

Side view



Top view



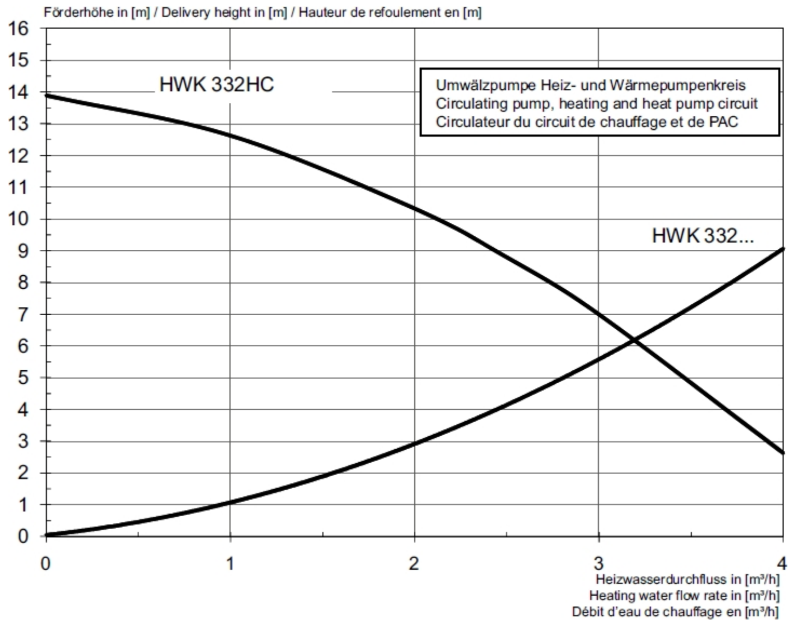
Legend

(1) Protective anode
(2) Cable duct under the top of the storage cover cap
(3) Electric heating element 1.5 kW
(4) Return to the heat pump G 1 1/4" external thread, flat-sealing
(5) Flow to heat pump G 1 1/4" external thread, flat-sealing
(6) G 1 1/2" (female thread) for optional immersion heater connection
(7) Heating water return G 1 1/4" external thread, flat-sealing
(8) Heating water flow G 1 1/4" external thread, flat-sealing

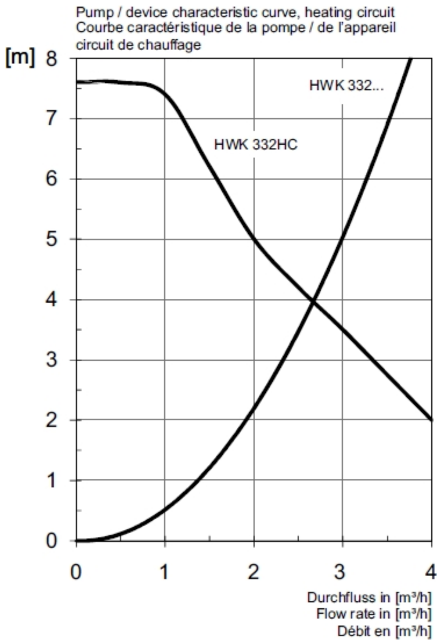
(9) Cable entry from the top
(10) Cable entry from below
(11) Domestic hot water outlet R 1" (external thread)
(12) Circulation pipe G 3/4" (female thread)
(13) Cold water inlet R1" (external thread)
(14) Empty conduit Ø22 (cable bushing)
(15) Fill and drain tap 1/2" (incl. hose nozzle)

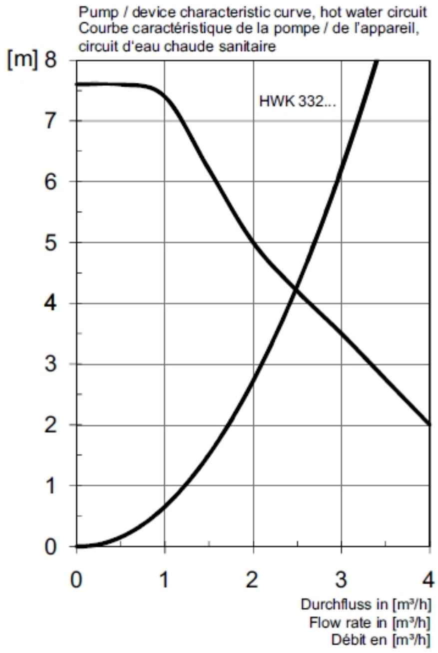
9.6.7 Characteristic curves HWK 332HC

Pump/device characteristic curve (heating and heat pump circuit in operation)

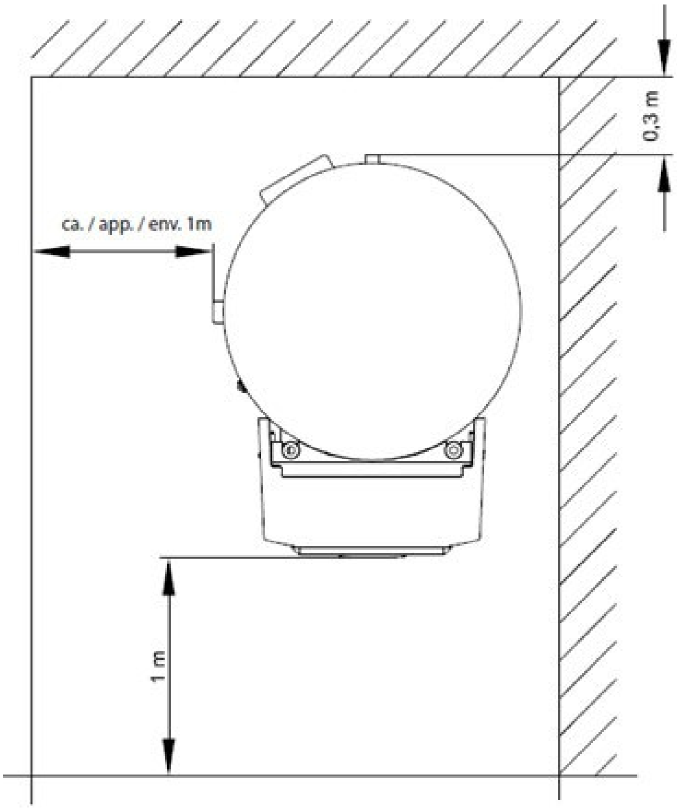


Pump/device characteristic curve heating circuitPump/device characteristic curve hot water circuit





9.6.8 Installation conditions HWK 332HC



The appliance must be installed in a frost-free and dry room on a level, smooth and horizontal surface. The Hydro-Tower must be set up in such a way that maintenance work can be carried out from the operator side without any problems. This is guaranteed if a distance of 1 m is maintained at the front. The required height of the installation room must take into account the space required (approx. 30 cm see dimensional drawing) for changing the protective anode. The installation must be carried out in a frost-protected room and via short pipework.

Assembly and installation must be carried out by an authorised specialist company.

If the Hydro Tower is installed on an upper floor, the load-bearing capacity of the ceiling must be checked and vibration decoupling must be planned very carefully for acoustic reasons. Installation on a wooden ceiling should be rejected.

The following connections must be made to the Hydro-Tower:

- Flow/return heat pump
- Flow/return heating system

- Safety valve drain
- power supply
- Hot water pipe
- Circulation pipe
- Cold water pipe

Heating-side connection

The connections on the heating side of the Hydro-Tower are fitted with a 1 1/4" flat-sealing external thread. When connecting, a spanner must be used to hold the transitions.

Before the connections on the heating water side are made, the heating system must be flushed to remove any impurities, residues of sealing material or similar. An accumulation of residues in the condenser can lead to total failure of the heat pump.

It is possible to connect a second or third heating circuit (VTB manifold bar accessory). For this extension, the heat circulating pump (M13) in the HWK must be removed and replaced with a suitable fitting (centre distance 180 mm).

The following pre-wired heating circuit modules (heating or heating/cooling (C)) can be connected to the HWK 332HC:

- Unmixed heating circuits: MHU(C) 25 with pump
- Mixed heating circuits: MHM(C) 25 with pump
- MHMC 25Flex without pump with fitting 180 mm

The heating circuits are installed on site outside the Hydro-Tower.

9.7 Hydraulic tower (HPK 300)

9.7.1 Table of contents

9.7.2 Possible applications HPK 300

Order code	For device type
HPK 300	LA 1826C, LA 35TBS
	LA 33TPR
	SI 18TU - SI 35TU
	WI 18TU - WI 35TU

> **NOTE**
> The required expansion vessel and the associated pressure gauge are not included in the scope of supply but must be ordered separately.

The HPK 300 hydraulic tower forms the interface between a non-reversible heat pump and the heating network in the building.

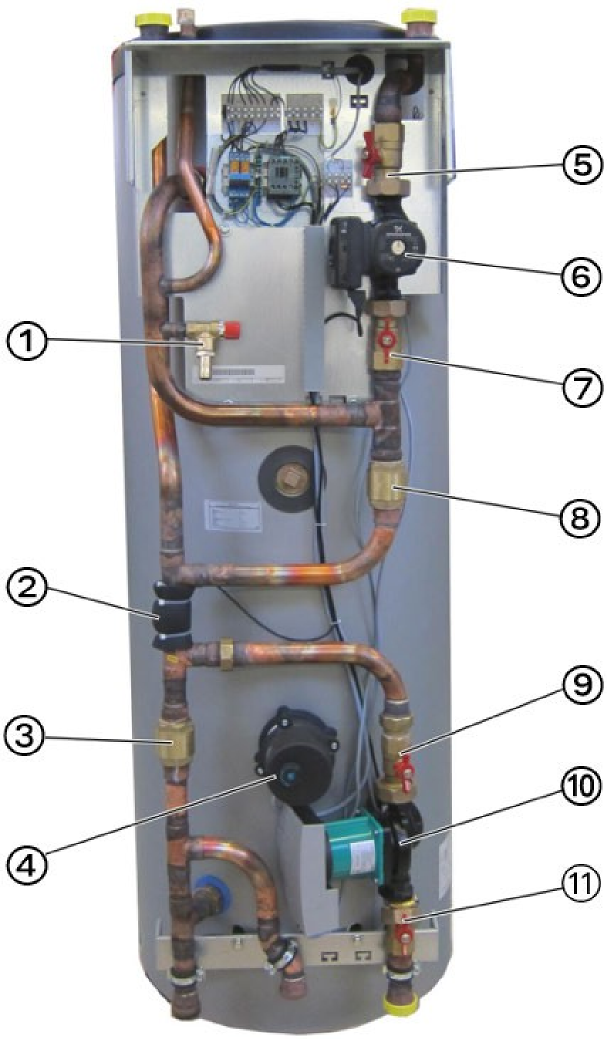
The hydraulic tower contains all the hydraulic components required between heat generation and heat distribution with an unmixed heating circuit. A differential pressureless manifold [DDV] in combination with a buffer tank results in an energetically optimised hydraulic integration
of the heat generator and the heat consumers.

Suitable for volume flows up to max. 8 m³/h in heating operation only

9.7.3 General properties

- Low installation effort
- Good accessibility of all components
- Ready for connection, contains all essential components including pumps, shut-off valves and safety technology
- Integrated buffer tank reduces cycling of the heat pump, thus increasing the efficiency of the system
- The high-efficiency circulation pump in the heating circuit enables demand-dependent output adjustment by means of fixed speed levels.
- Immersion heater 6 kW for monoenergetic operation
- Optional 2nd immersion heater (up to max. 6 kW)
- The circulation pump in the heat generation circuit is controlled via the heat pump manager

9.7.4 Basic device HPK 300



Diaphragm safety valve

② Sensor NTC-015 WP00 1.5m (R2.2)

③ Check valve 1 1/2" PN 16 NBR MS

④ Immersion heater CTHK 634

⑤ Ball valve 1¼" female thread and flange

⑥ Circulation pump (M13)

⑦ Ball valve 1¼" female thread and flange

⑧ Check valve 1 1/2" PN 16 NBR MS

⑨ Ball valve 1¼" female thread and flange

⑩ Circulation pump (M16)

⑪ Ball valve 1¼" female thread and flange

Hydraulic component:

- Double differential pressureless manifold [DDV]
- Buffer tank 300 litres
- Unmixed heating circuit incl. controlled circulation pump (3 stages each Δp-c / Δp-v)
- Primary circuit heat generator incl. circulation pump, shut-off valves
- 2nd heat generator electric immersion heater, heat output of 6 kW, protected by safety temperature limiter

Safety equipment:

- Safety valve, response pressure 2.5 bar
- Connection of an additional expansion vessel possible

Domestic hot water preparation accessories

Domestic hot water module for HPK 300

9.7.5 Device information HPK 300

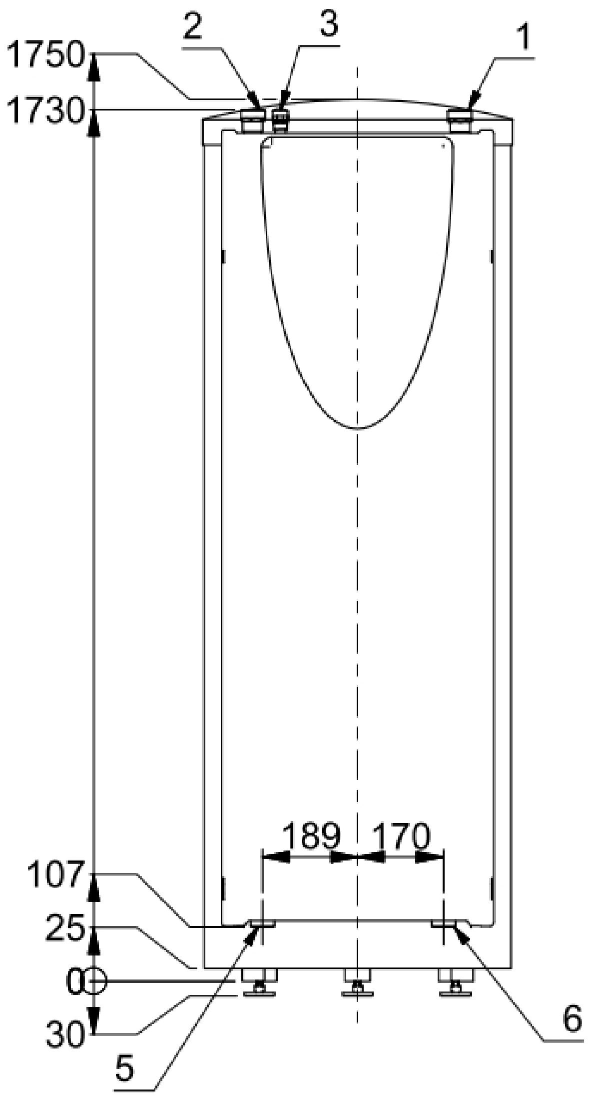
Type and order code		HPK 300
1. design		
Execution		Hydraulic tower with double differential pressureless manifold [DDV]
Degree of protection according to EN 60529		IP 20
installation location		Indoors (frost-free)
2. technical data		
Heat generator		external
buffer tank		
Nominal content	Litres	300
Permissible operating temperature	°C	85
Maximum operating overpressure	bar	2,0
Electric pipe heating	kW	6
Immersion heater (optional)	kW	up to 6
Circulation pump power consumption	W	up to 450
Set pressure safety valve	bar	2,5
3. dimensions, connections and weight		
Device dimensions1	H x W x L mm	1780 x 820 x 600
tilt dimension	mm	1830
Device connections		
for heat generation circuit	inch	R 1 1/2"
unmixed heating circuit	inch	R 1 1/2"
for domestic hot water (optionally available)2	inch	G 1 1/2"
for diaphragm expansion vessel	inch	R 3/4"
Immersion heater connection	inch	Rp 1 1/2"
Weight of the transport unit(s) incl. packaging	kg	110

Type and order code	HPK 300
4. electrical connection	
Supply voltage / fusing (ΣPmax= 6 kW) (as delivered)	3~/N/PE 400 V (50 Hz) / B10A
Supply voltage / fusing (ΣPmax= 12 kW) (with optional immersion heater)	3~/N/PE 400 V (50 Hz) / B20 A
5. other model features	
Water in the appliance protected against freezing[3]	Yes

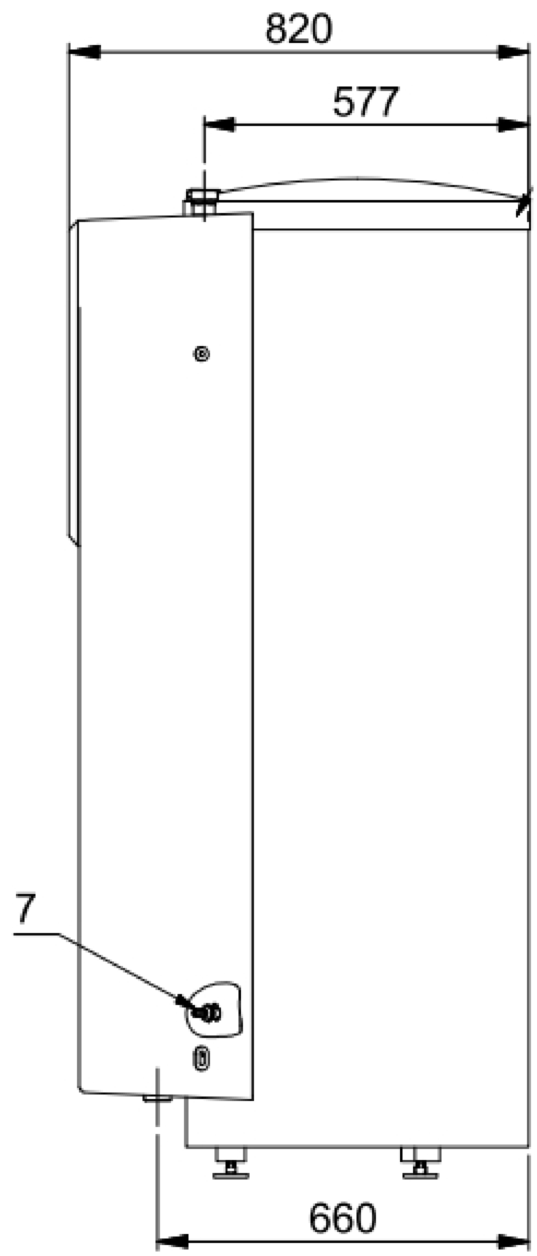
1. Please note that more space is required for pipe connection, operation and maintenance
2. The hydraulic tower can be optionally extended with a 3-way reversing valve for domestic hot water preparation. The domestic hot water module WWM HPK required for this is available as an extension set (note pressure drops and heating water flow rate)
3. The heat circulating pump and the heat pump controller must always be ready for operation.

9.7.6 Dimensional drawing HPK 300

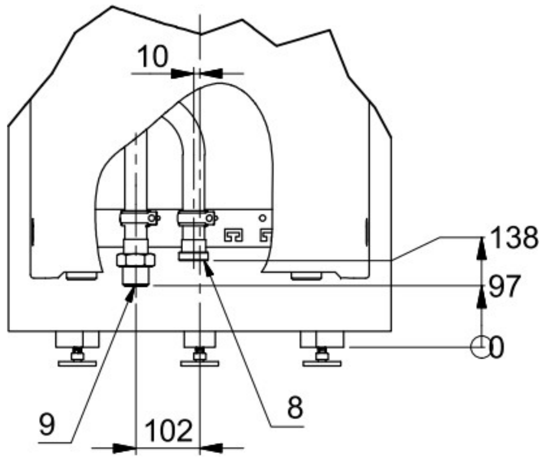
Front view



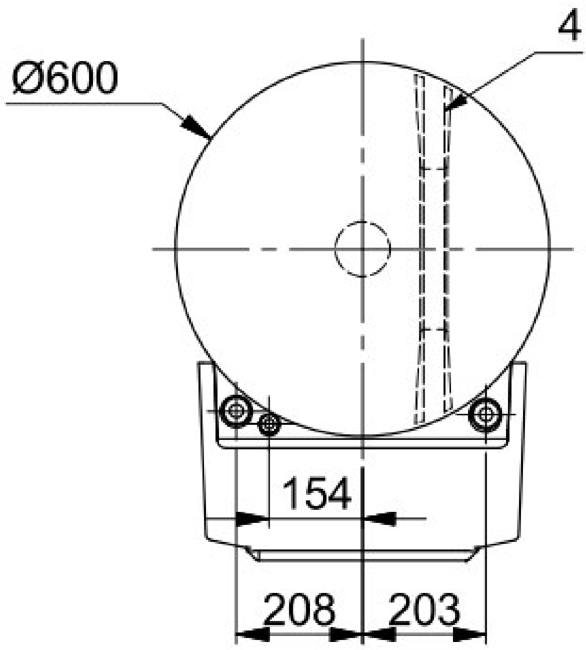
Side view



Connection diagram for optional hot water set



Top view

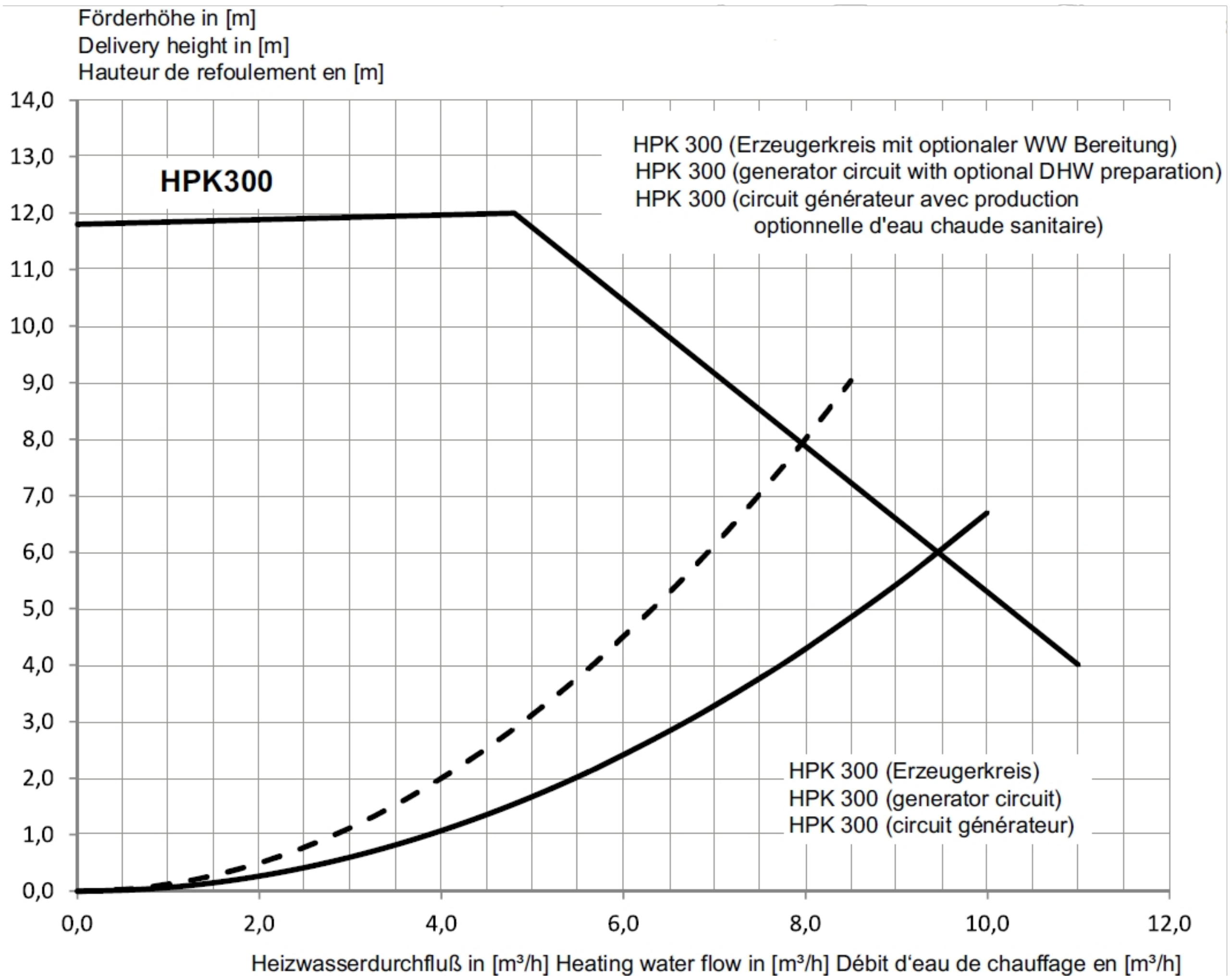


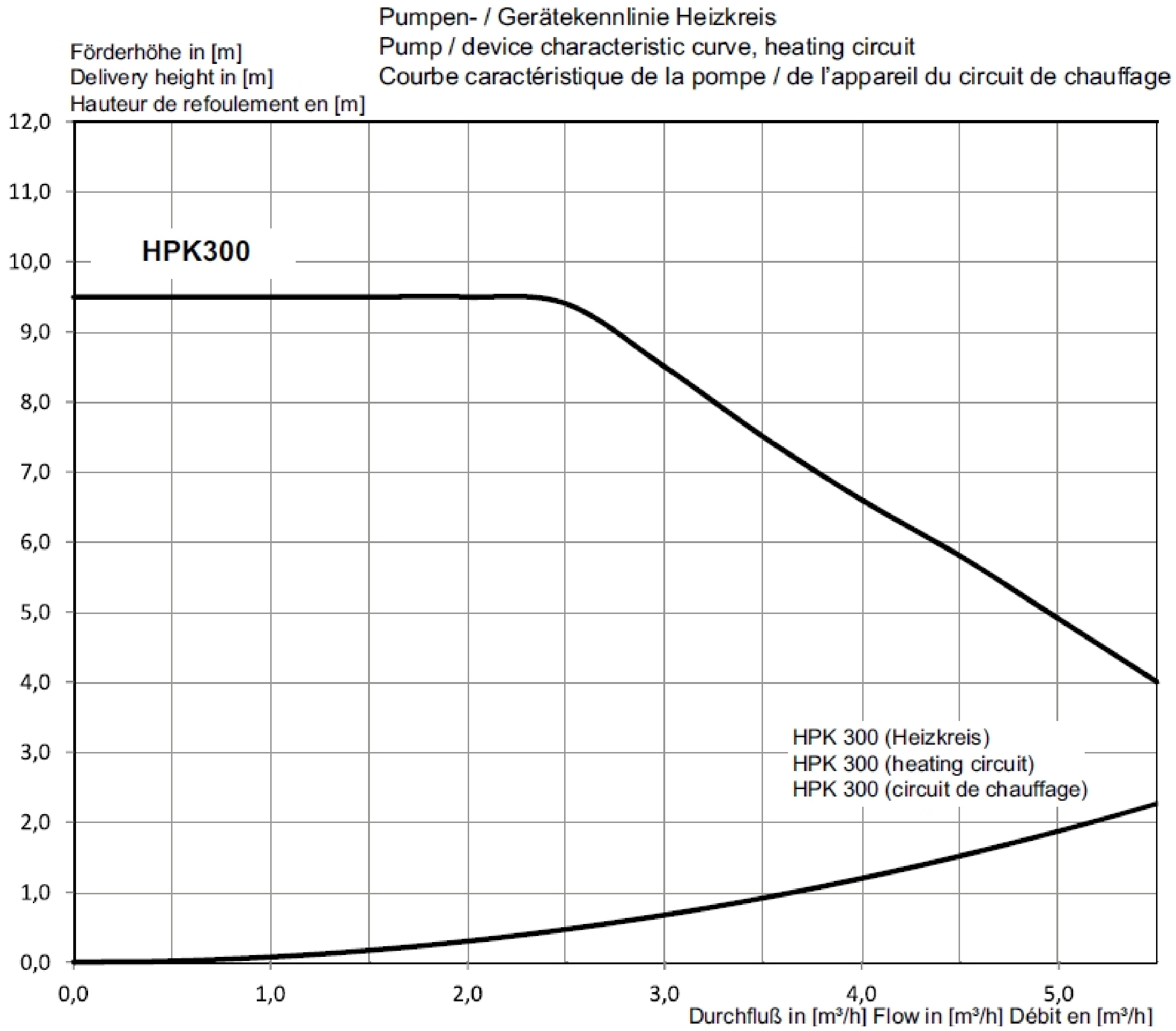
Legend

① Flow from storage tank output 1 1/2" external thread
② Return to storage tank input 1 1/2" external thread
③ Expansion vessel connection 3/4" external thread (closed)
④ Implementation area for electric wires
⑤ Flow HP input in storage tank 1 1/2" external thread
⑥ Return HP output from storage tank 1 1/2" external thread
⑦ Fill and drain tap 1/2" (incl. loop spout)
⑧ DHW flow output from storage tank G 1 1/2" (closed)
⑨ DHW return input in storage tank G 1 1/2" (assembly optional)

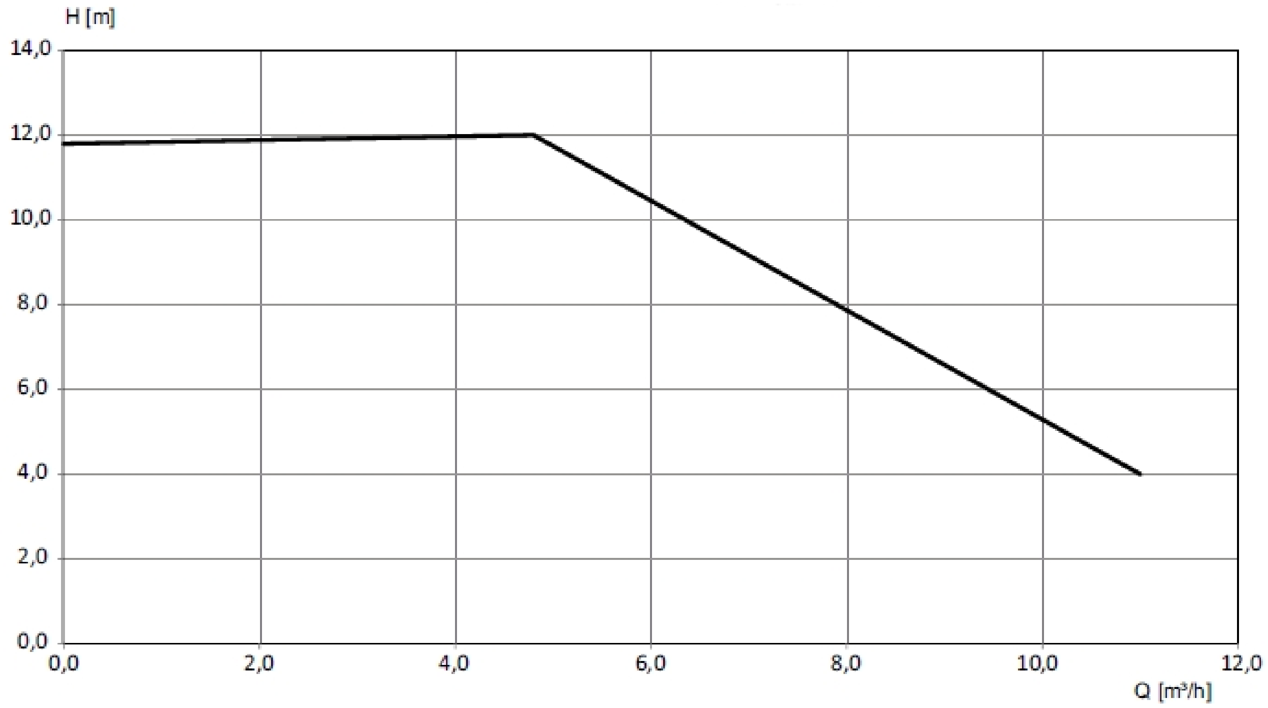
9.7.7 Characteristic curves HPK 300

Pump/device characteristic curve (heating and heat generation circuit in operation)

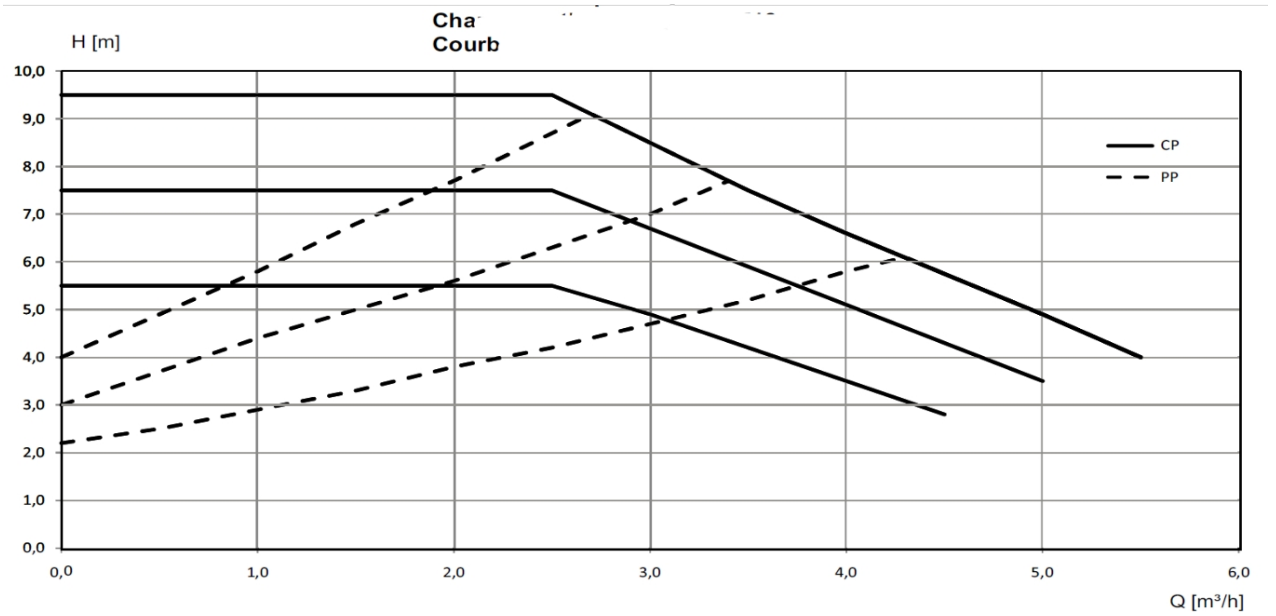



Pumpen- / Gerätekennlinie Heizkreis
Pump / device characteristic curve, heating circuit
Courbe caractéristique de la pompe / de l'appareil du circuit de chauffage
Förderhöhe in [m]
Delivery height in [m]
Hauteur de refoulement en [m]
12,0
11,0
10,0
9,0
8,0
7,0
6,0
5,0
4,0
3,0
2,0
1,0
0,0
HPK300
HPK 300 (Heizkreis)
HPK 300 (heating circuit)
HPK 300 (circuit de chauffage)
0,0
1,0
2,0
3,0
4,0
5,0
Durchfluß in [m³/h] Flow in [m³/h] Débit en [m³/h]

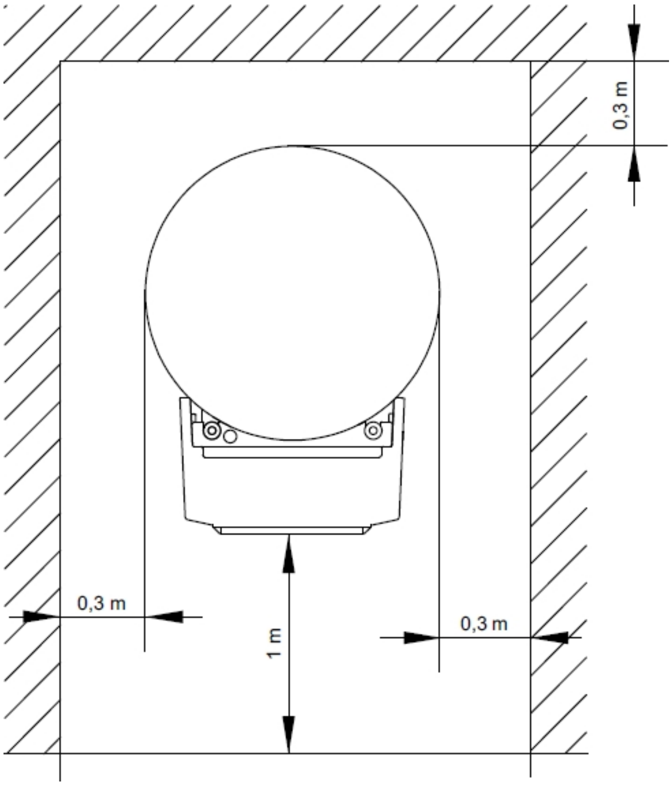
Pump characteristic curve heat generation circuit (M16)



Pump characteristic heating circuit (M13)



9.7.8 Installation conditions HPK 300



The appliance must be installed in a frost-free and dry room on a level, smooth and horizontal surface. The hydraulic tower must be set up so that maintenance work can be carried out easily from the operator side. This is guaranteed if a distance of 1 m is maintained at the front. For the required height of the installation room, the space requirement (approx. 30 cm
see dimensional drawing) to utilise the vent valve in the storage tank. The installation must be carried out in a frost-protected room and via short pipework.

Assembly and installation must be carried out by an authorised specialist company.

If the hydraulic tower is installed on an upper floor, the load-bearing capacity of the ceiling must be checked and the vibration decoupling must be planned very carefully for acoustic reasons. Installation on a wooden ceiling should be rejected.

The following connections must be made to the hydraulic tower.

- Flow/return heat pump
- Flow/return heating system
- Safety valve drain
- power supply
- Flow / return domestic hot water (optional)

Heating-side connection

The connections on the heating side of the hydraulic tower are fitted with 1 1/2" external threads. When connecting, a spanner must be used to hold the transitions. A ¾" dimensionally stable plastic hose (internal diameter approx. 19 mm) must be fixed to the hose nozzle of the safety valve, e.g. with a pipe clamp, and routed to the outside in the area behind the heat pump return.

Before the connections on the heating water side are made, the heating system must be flushed to remove any impurities, residues of sealing material or similar. An accumulation of residues in the condenser can lead to total failure of the heat pump. For systems with a heating water flow that can be shut off due to radiators or thermostatic valves, the infinitely variable circulation pump adjusts the delivery head as required. The first filling and commissioning must be carried out by an authorised specialist company. The function and tightness of the entire system, including the parts installed in the manufacturer's factory, must be checked.

The buffer tank and heating network must be filled via the filling and draining tap on the hydraulic tower. The storage tank is purged via the vent valve (upper cover cap) of the storage tank.

Appropriate venting devices must be provided on site in the heating circuit. Heating connection pipes to the heat pump can also be routed under the rear of the storage tank if necessary.

> **CAUTION**
> It is possible to connect a second or third heating circuit. For this extension, the heat circulating pump (M13) in the HPK must be removed and replaced with a suitable fitting (centre distance 180 mm). The heating circuits are then installed on site outside the HPK.

> **NOTE**
> For pipes over 10 m in length, the free compressions specified in the device information must be observed.

A **"Domestic hot water preparation" accessory set** is available for domestic hot water preparation. This set consists of a 3-way reversing valve and pre-assembled pipework for easy installation in the
Hydraulic tower.

> **NOTE**
> Note the pressure drops of the HPK 300 with additional domestic hot water preparation.

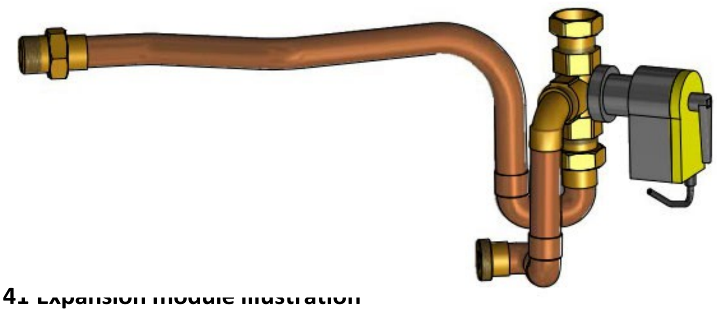
Domestic hot water preparation can also be carried out externally using an additional M18 domestic hot water circulating pump.

> **NOTE**
> If domestic hot water preparation is carried out with an additional M18 domestic hot water circulating pump, a check valve must be installed in the hydraulics of the hot water circuit.

9.7.9 Domestic hot water module for HPK 300

The WWM HPK domestic hot water module is an assembly for connecting a domestic hot water cylinder to the HPK 300 hydraulic tower

- The ball valve is not suitable for Ex zones.
- The ball valve as a complete unit does not have drinking water approval.
- When using water-glycol mixtures, it is recommended not to exceed a maximum concentration of 50% glycol.

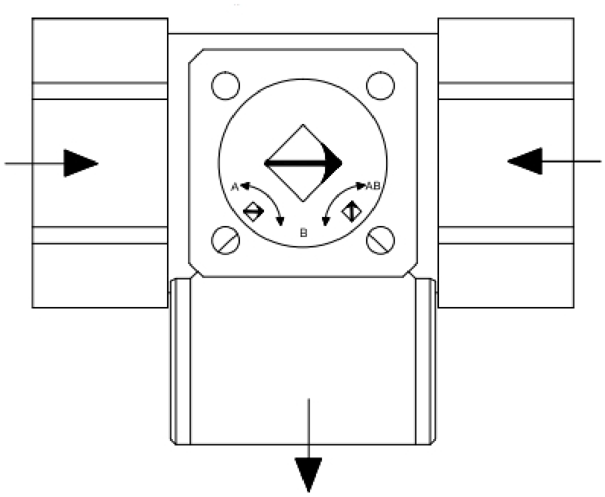


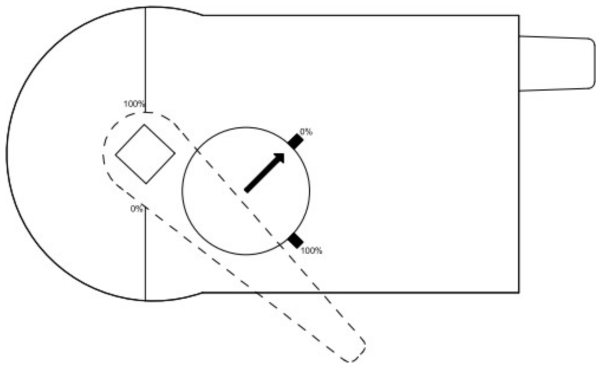
41 Expansion module illustration

Adjustment of actuator and 3-way ball valve

Basic setting 3-way ball valve "Heating operation"

Basic setting for actuator "Heating operation"



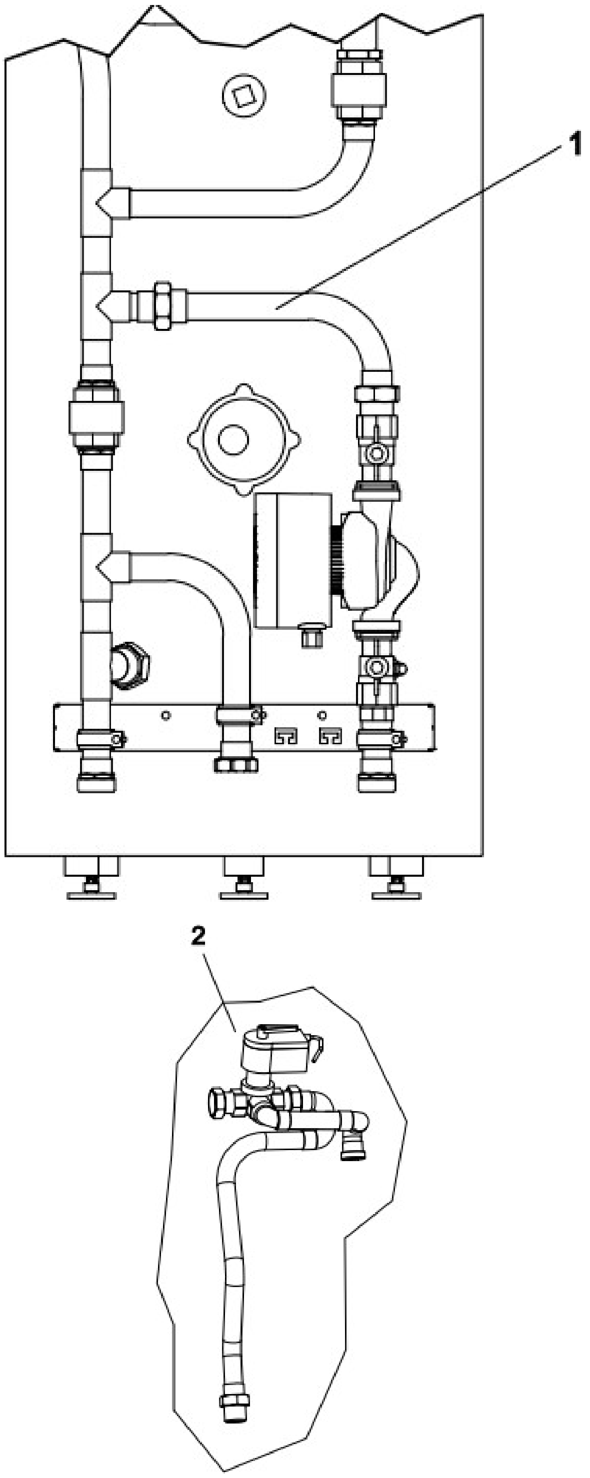


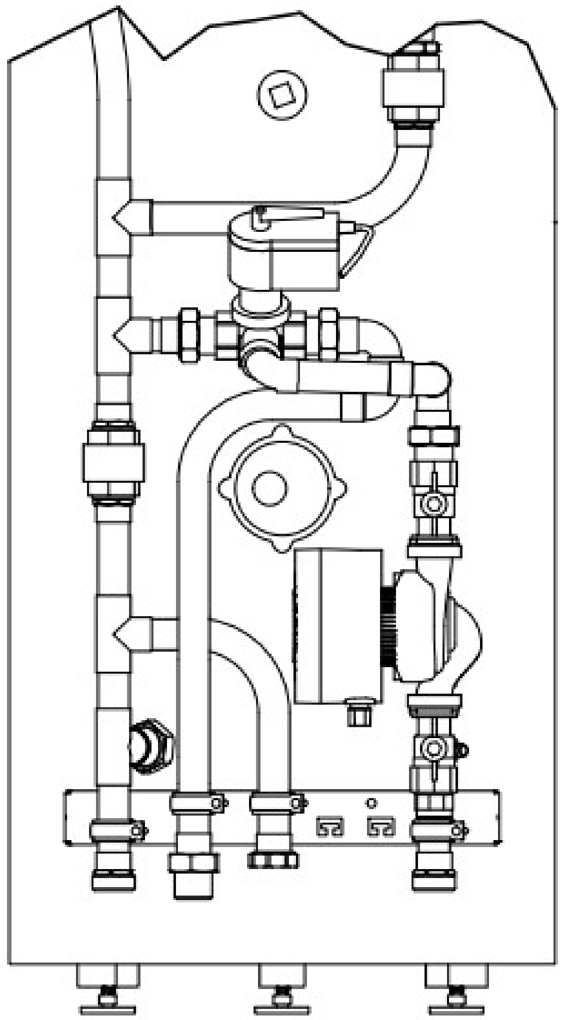
Assembly instructions

- The fitting must be installed in the pipework free from mechanical stresses
- The fitting must not be used as a fixed point; it is supported by the pipework
- The fitting and the pipework must be free of dirt, welding beads, etc.
- When dismantling the valve, the pipework must be depressurised, the medium cooled down and the system drained.

Delivery condition HPK 300

HPK 300 with built-in extension unit WWM HPK





Installation

- Switch off voltage
- Close and drain the isolation valves
- Remove pipe (1)
- Replace pipe with DHW module (2)
- Connect the motor according to the wiring diagram (see wiring diagram)
- Fill the HPK 300 and check for leaks
- Checking the flow direction

electrical connection

> **CAUTION**
> Always de-energise the appliances before carrying out any electrical work.

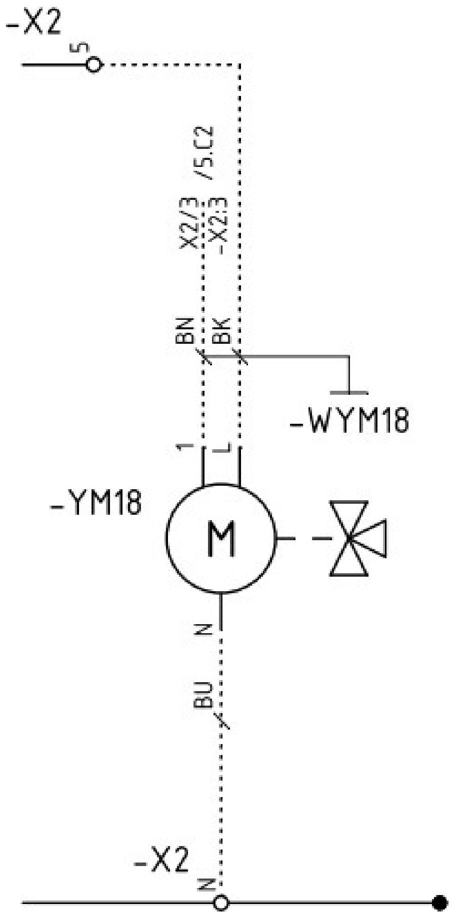
> **CAUTION**
> The electrical wiring may only be carried out by an authorised person. The relevant guidelines must be observed.

> **CAUTION**
> The operating mode switch must be set to AUTO after installing the actuator. Failure to do so will result in undesirable operating status of the heat pump.

2-point control

The black cable is always live

- The axle rotates clockwise, with tension on the brown cable, the ball valve is closed.
- The axle rotates anti-clockwise without tension on the brown cable.



42 Connection diagram 2-point control

9.7.10 Electrical connection HPK 300

Power is supplied via a commercially available cable (3~/N/PE 5-wire).

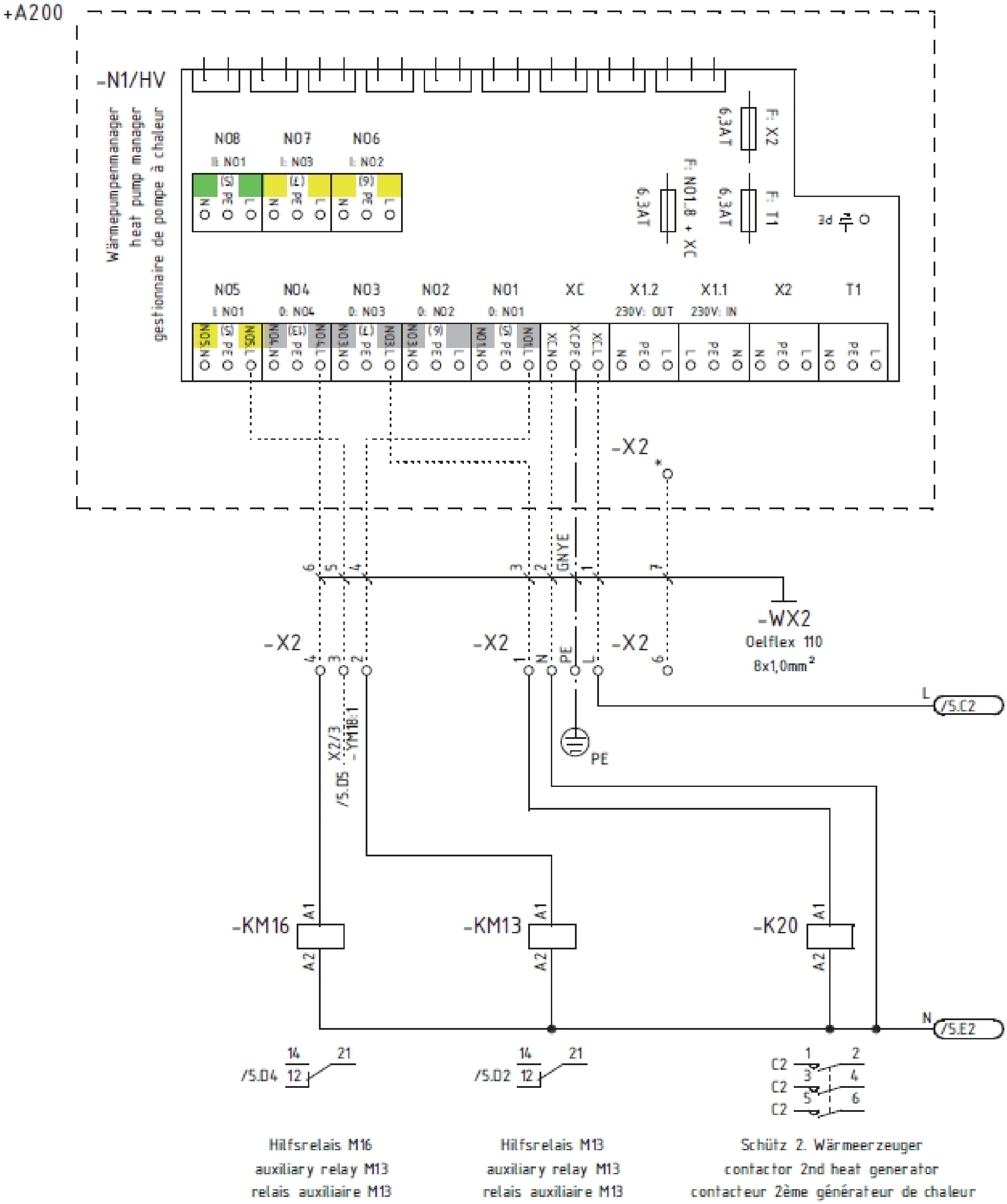
For detailed instructions on connecting external components and the function of the heat pump manager, please refer to the device connection diagram and the electrical documentation.

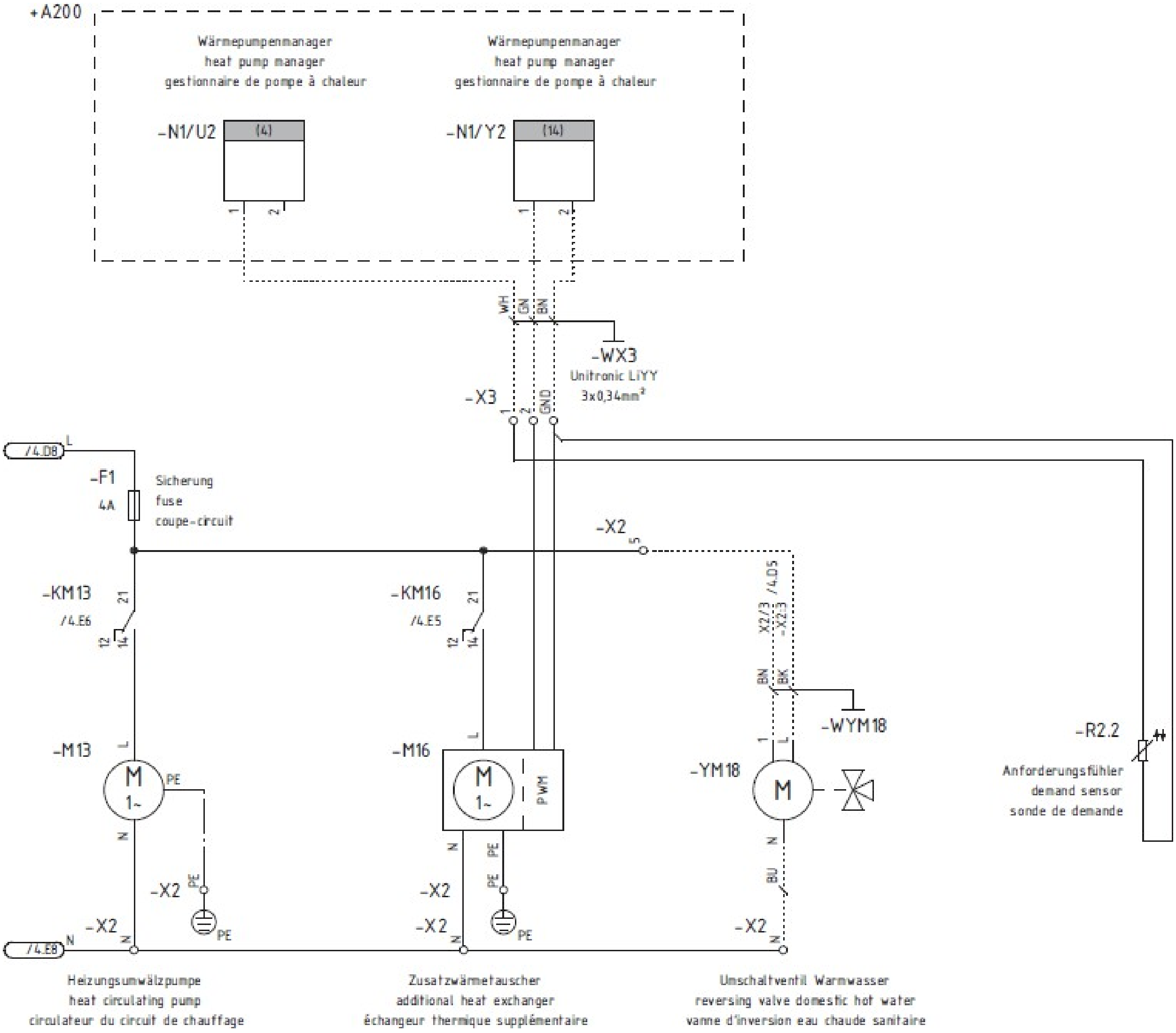
In the power supply for the hydraulic tower, an all-pole switch off with at least 3 mm contact opening distance (e.g. utility company blocking contactor, power contactor) and an all-pole automatic circuit breaker with common tripping of all phase conductors must be provided (tripping current according to device information).

The power supply for the pumps is provided by the WPM. The prepared connecting cables must be connected to the WPM in accordance with the electrical documentation. The 2nd heat generator has a heat output of 6 kW. The regulations of the energy supplier and the national guidelines must be observed (VDE)

When using an optional immersion heater (with 1½" external thread) in the buffer tank, the existing contactor can also be used (parallel connection up to max. 6 kW). The immersion heater used must have an integrated safety temperature limiter. The electrical
Please refer to the enclosed electrical documentation for information on integrating the immersion heater. The electrical connection cables can only be fed to the "hydraulic tower" from the top. A cable duct is incorporated in the PU foam in the head area of the storage tank (under its top cover), which makes it possible to lay the electric wires under the top cover (from the back of the storage tank to the front connection side).

Electrical connection to WPM Touch

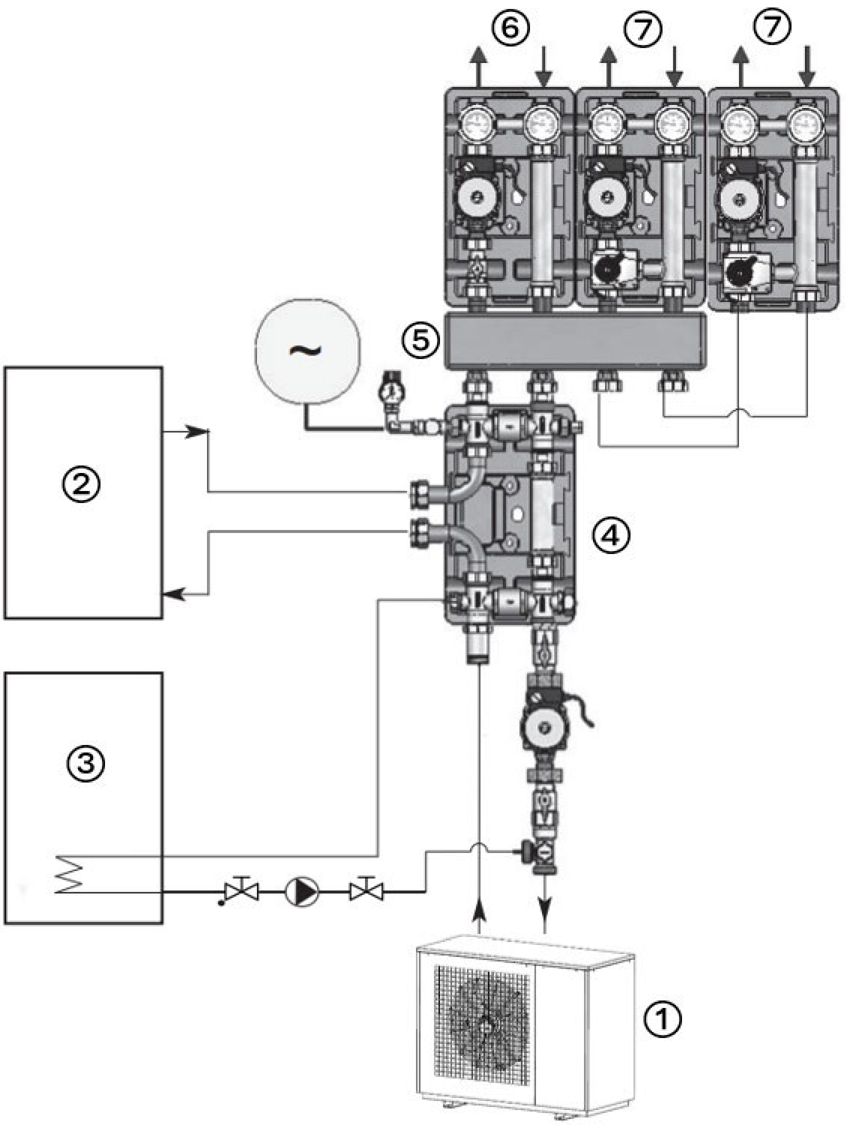




9.8 Assemblies/modules Distribution system Domestic hot water

The domestic hot water distribution system consists of coordinated individual components that can be combined in different ways depending on the requirements. The maximum permissible heating water flow rate of each individual component must be taken into account during project planning.

9.8.1 Assembly example:



① Heat pump

② Serien buffer tank

③ Domestic hot water cylinder

④ Double differential pressureless manifold [DDV]

⑤ Manifold bar (VTB)

⑥ Module unmixed heating circuit (WWM)

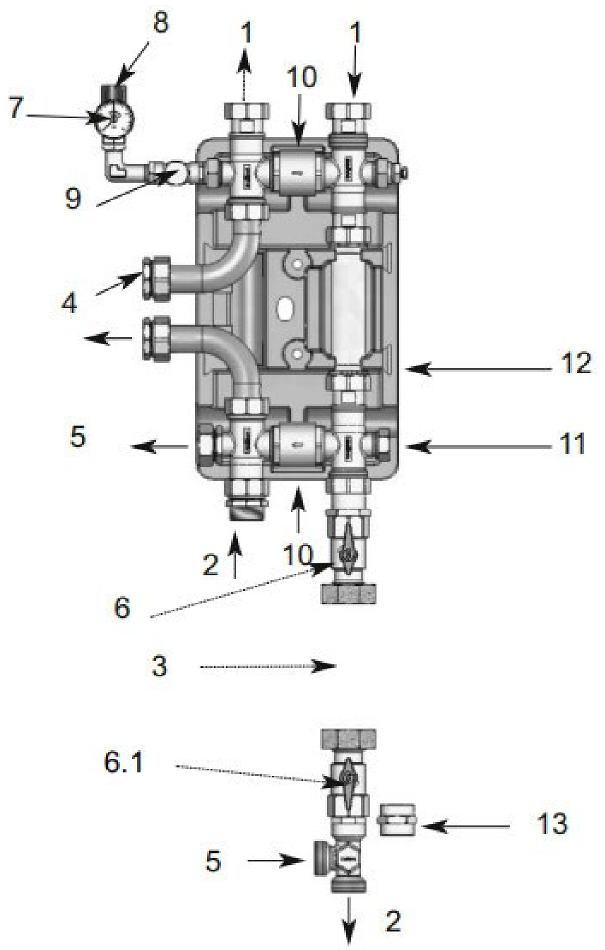
⑦ Mixed heating circuit module (MMH)

9.8.2 DDV 25

https://dimplex.atlassian.net/wiki/spaces/PRO/pages/2982890548/ fusing+of+the+heating-water-flow-rate#double-differential-pressureless-manifold [DDV]

Order code		Item no.	For device type	Recommended volume flow	Maximum volume flow
	DDV 25	358390	Air outside Air inside max. 15 kW up to SI 18TU up to SIH 20TU up to WI 22TU	2.0 m³/h	3.0 m³/h

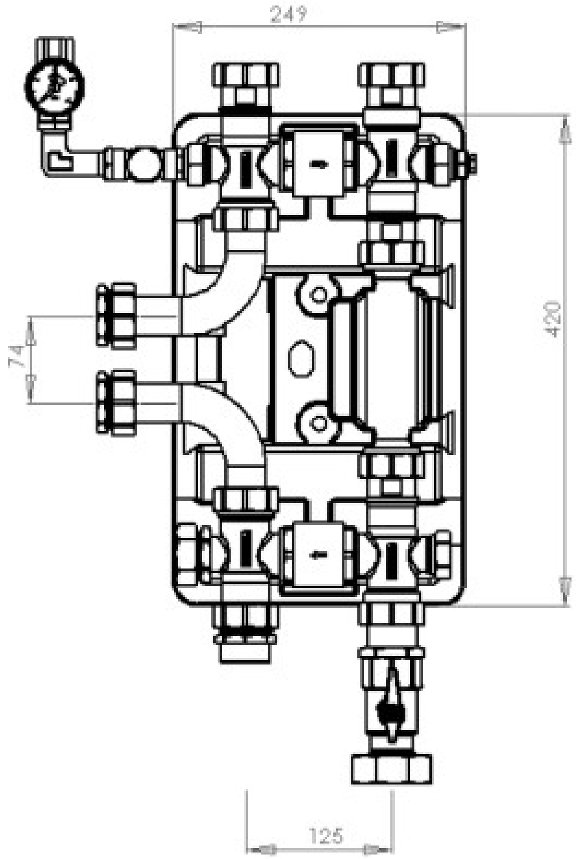
Scope of supply DDV 25



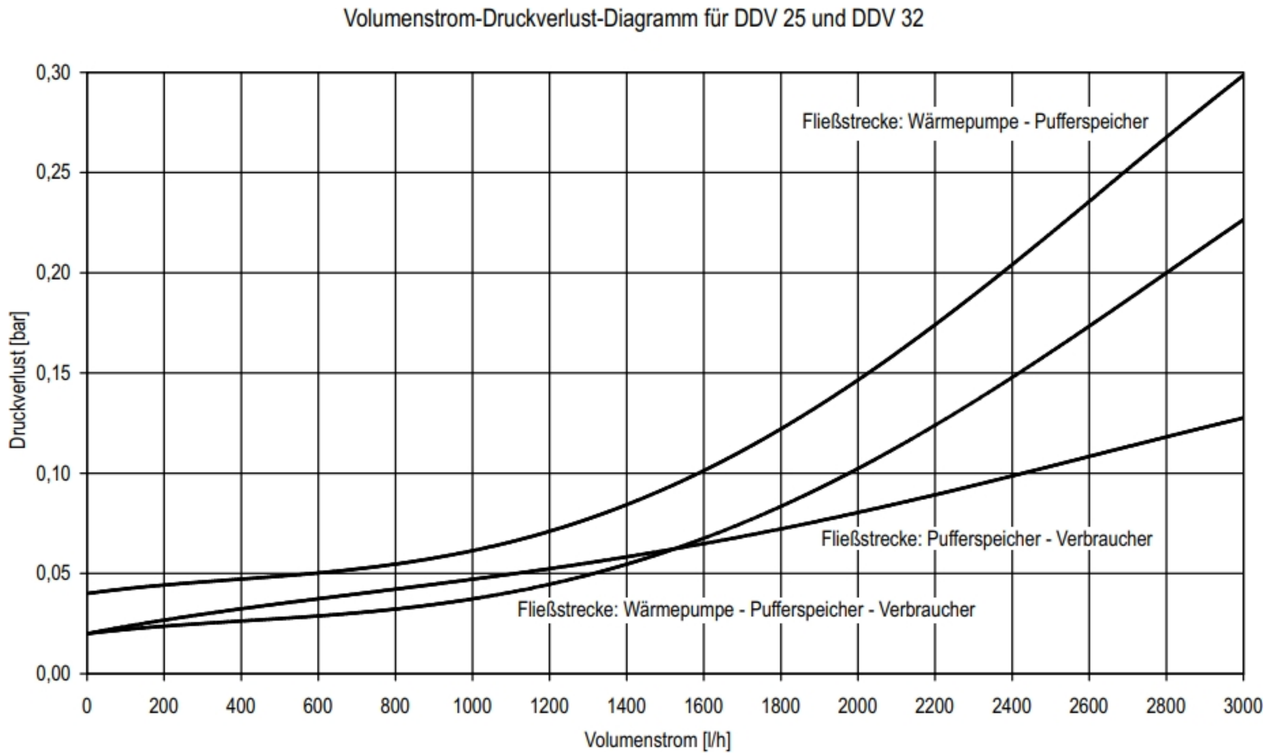
1. Connections heating circuits 1 1/2" female
2. thread Connections heat pump 1 1/4"
3. external thread
Positioning of main circuit circulation pump
4. DN 25 (not included in the scope of supply)
5. Buffer tank connections 1 1/4" female thread
6. Domestic hot water cylinder connections 1 1/4" external thread Isolation valve 1" 6.1)
Isolation valve 1" with non-return valve
7. Pressure gauge Safety valve
8. 3/4" female thread
9. T-piece for mounting the expansion vessel 3/4" external thread
10. check valve
11. Immersion sleeve for return sensor (observe sensor characteristic)
12. Insulation
13. double nipple 1"

Return sensor NTC 10 is enclosed with the DDV!!!

Dimensions DDV 25



Volume flow pressure drop diagram DDV 25

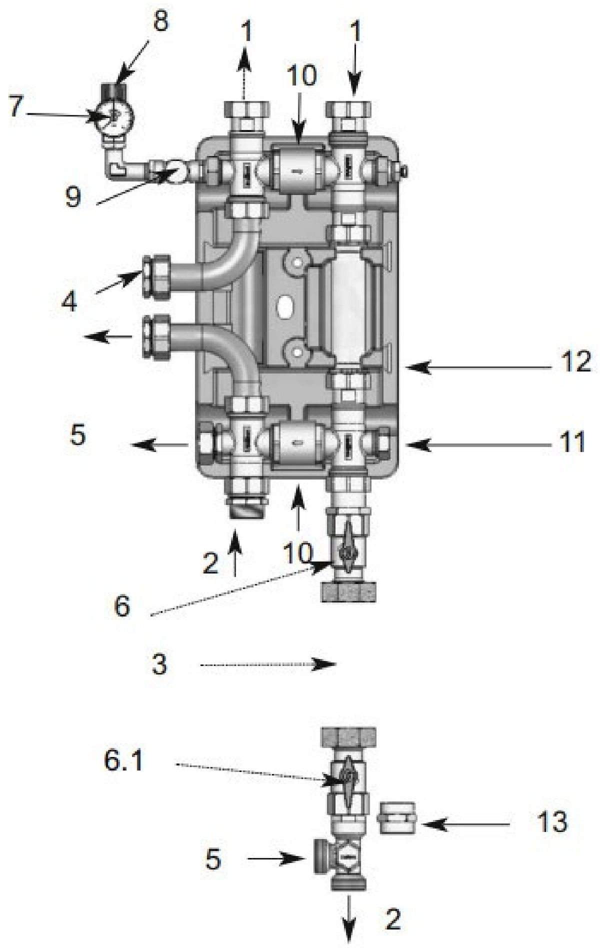


9.8.3 DDV 32

https://dimplex.atlassian.net/wiki/spaces/PRO/pages/2982890548/ fusing+of+the+heating-water-flow-rate#double-differential-pressureless-manifold [DDV]

Order code		Item no.	For device type	Recommended volume flow	Maximum volume flow
	DDV 32	348450	Air outside Air inside max. 30 kW to SI 22TU to WI 22TU	2.5 m³/h	3.5 m³/h

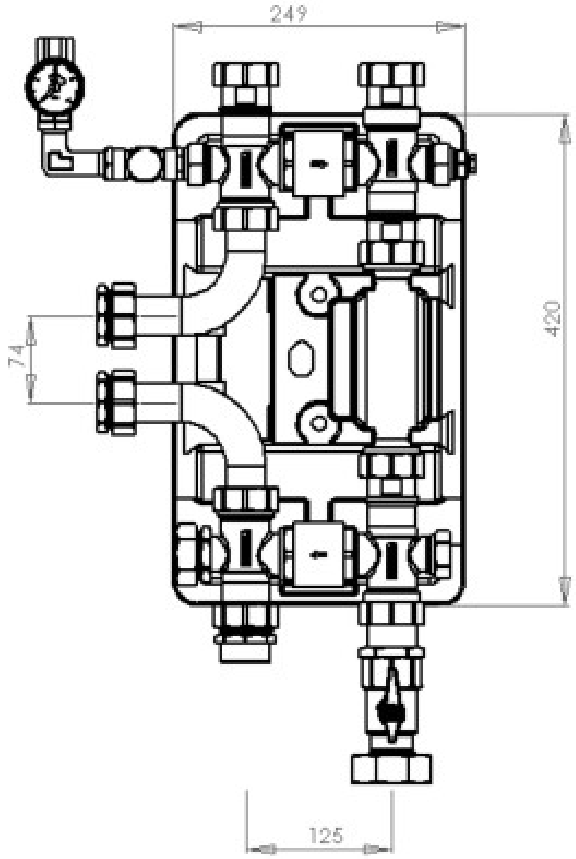
Scope of supply DDV 32



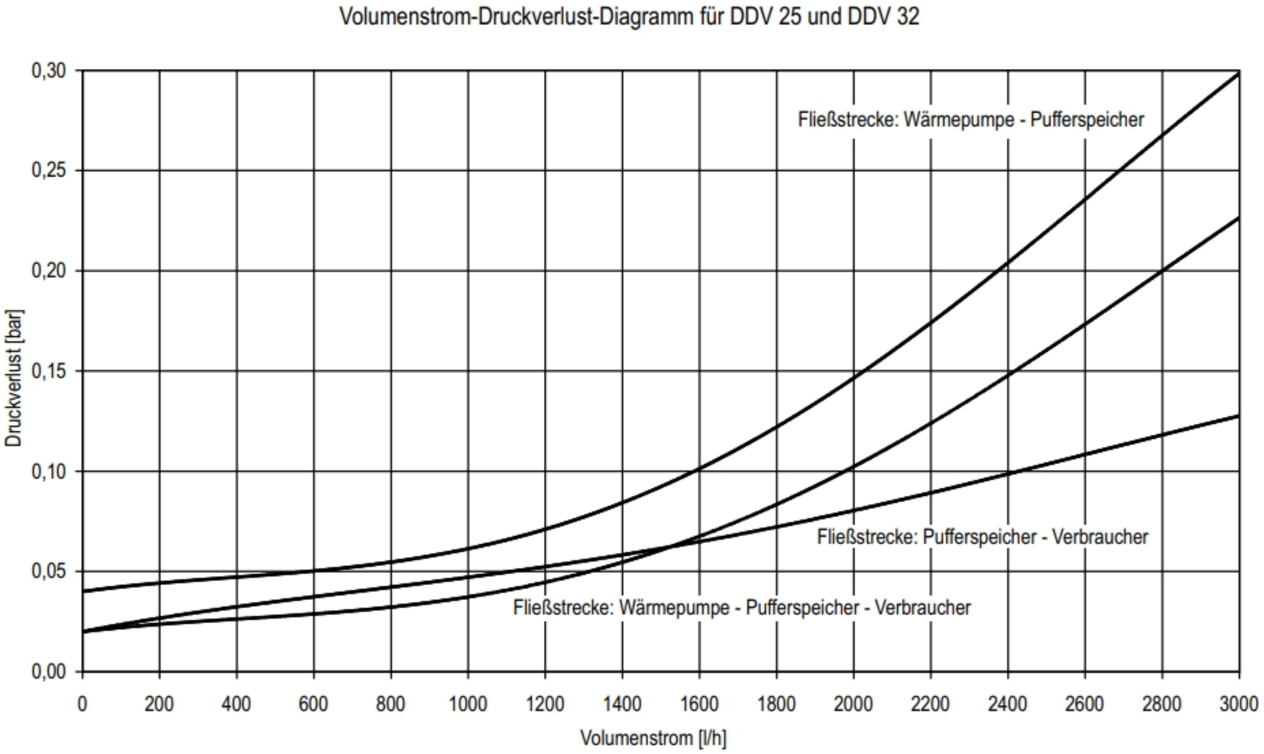
1. Connections heating circuits 1 1/2" female
2. thread Connections heat pump 1 1/4"
3. external thread
Location of main circuit circulation pump DN
4. 32 (not included in the scope of supply) Buffer
5. tank connections 1 1/4" female thread
Domestic hot water cylinder connections 1
6. 1/4" external thread
7. Isolation valve 1 1/4" 6.1) Isolation valve 1 1/4" with non-
8. return valve
Pressure gauge Safety valve
9. 3/4" female thread
T-piece for mounting the expansion vessel 3/4"
10. external thread
11. check valve
Immersion sleeve for return sensor (observe sensor
12. characteristic)
13. Insulation double nipple
1 1/4"

Return sensor NTC 10 is enclosed with the DDV!!!

Dimensions DDV 32



Volume flow pressure drop diagram DDV 32

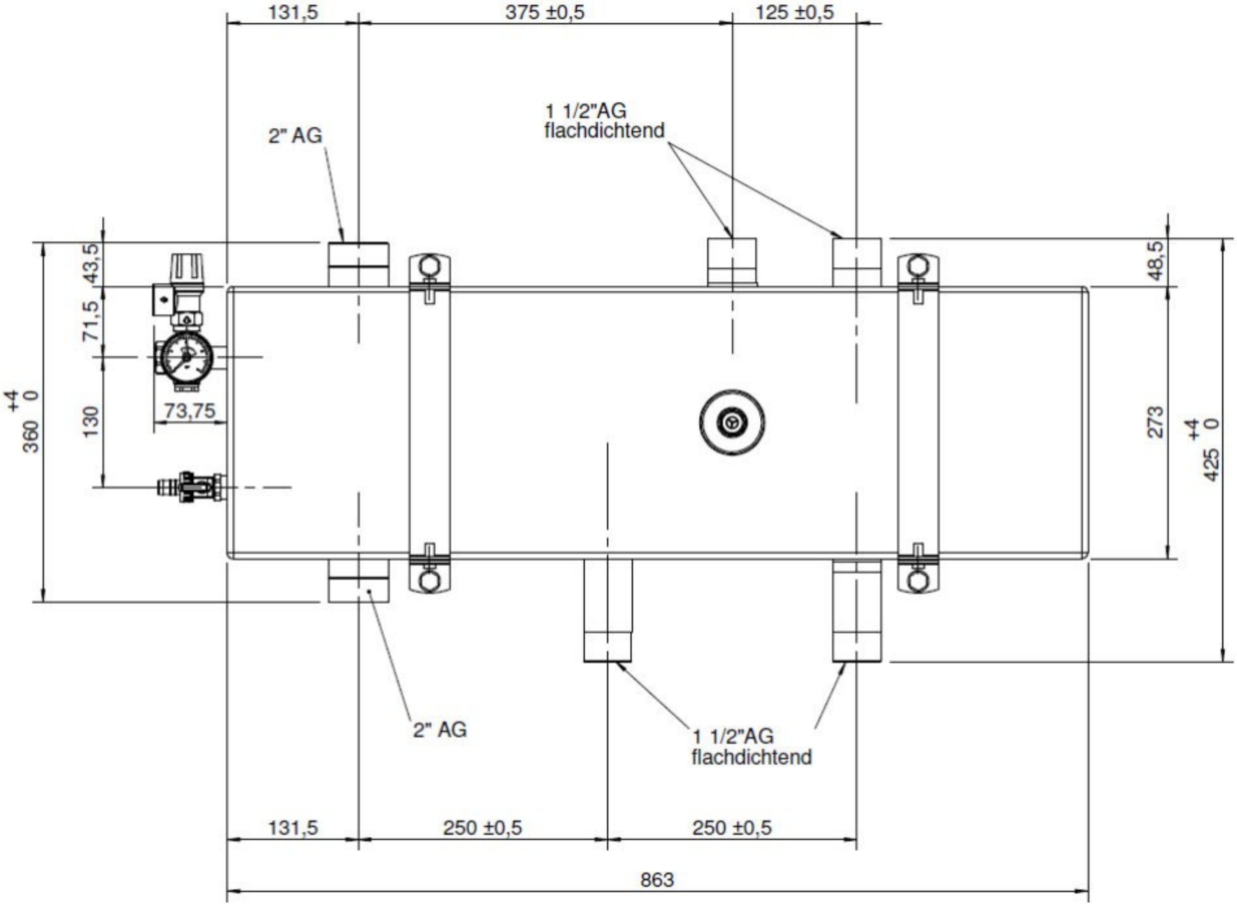


9.8.4 DDV 40

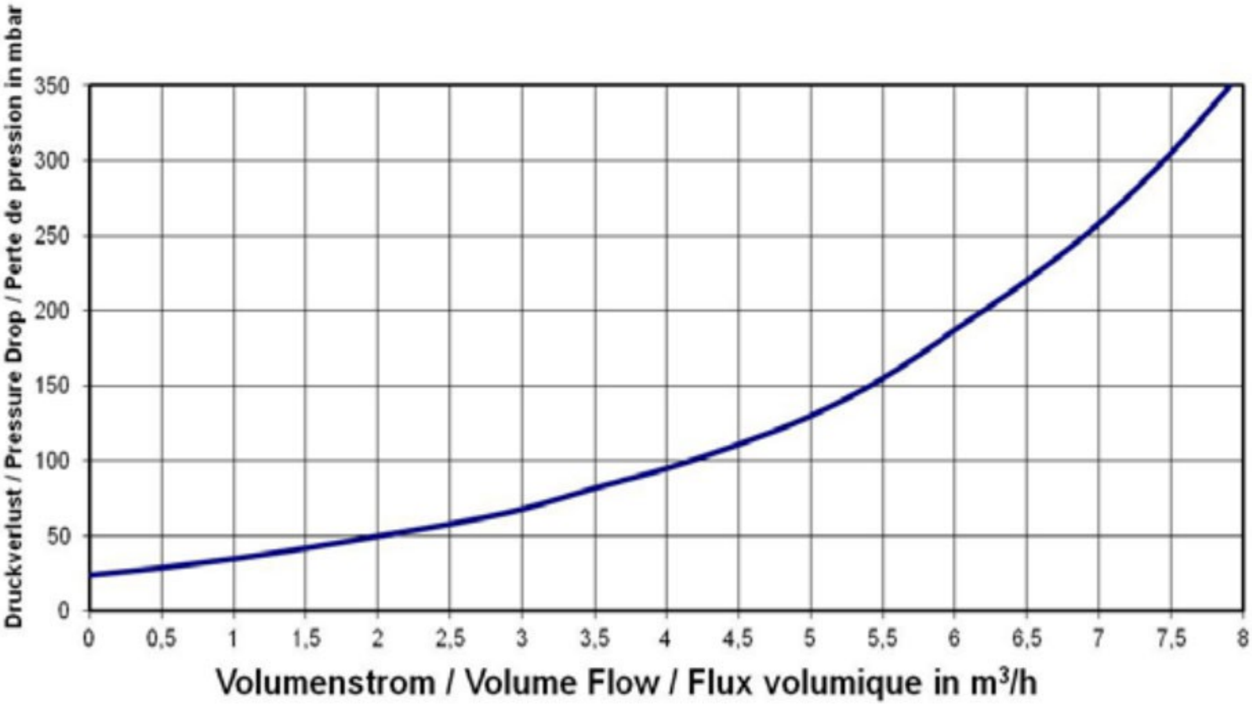
https://dimplex.atlassian.net/wiki/spaces/PRO/pages/2982890548/ fusing+of+the+heating-water-flow-rate#double-differential-pressureless-manifold [DDV]

Order code		Item no.	For device type	Recommended volume flow	Maximum volume flow
	DDV 40	367720	LA 40TU-2 SI 26-35TU(R) WI 35TU	5.0 m³/h	7.5 m³/h

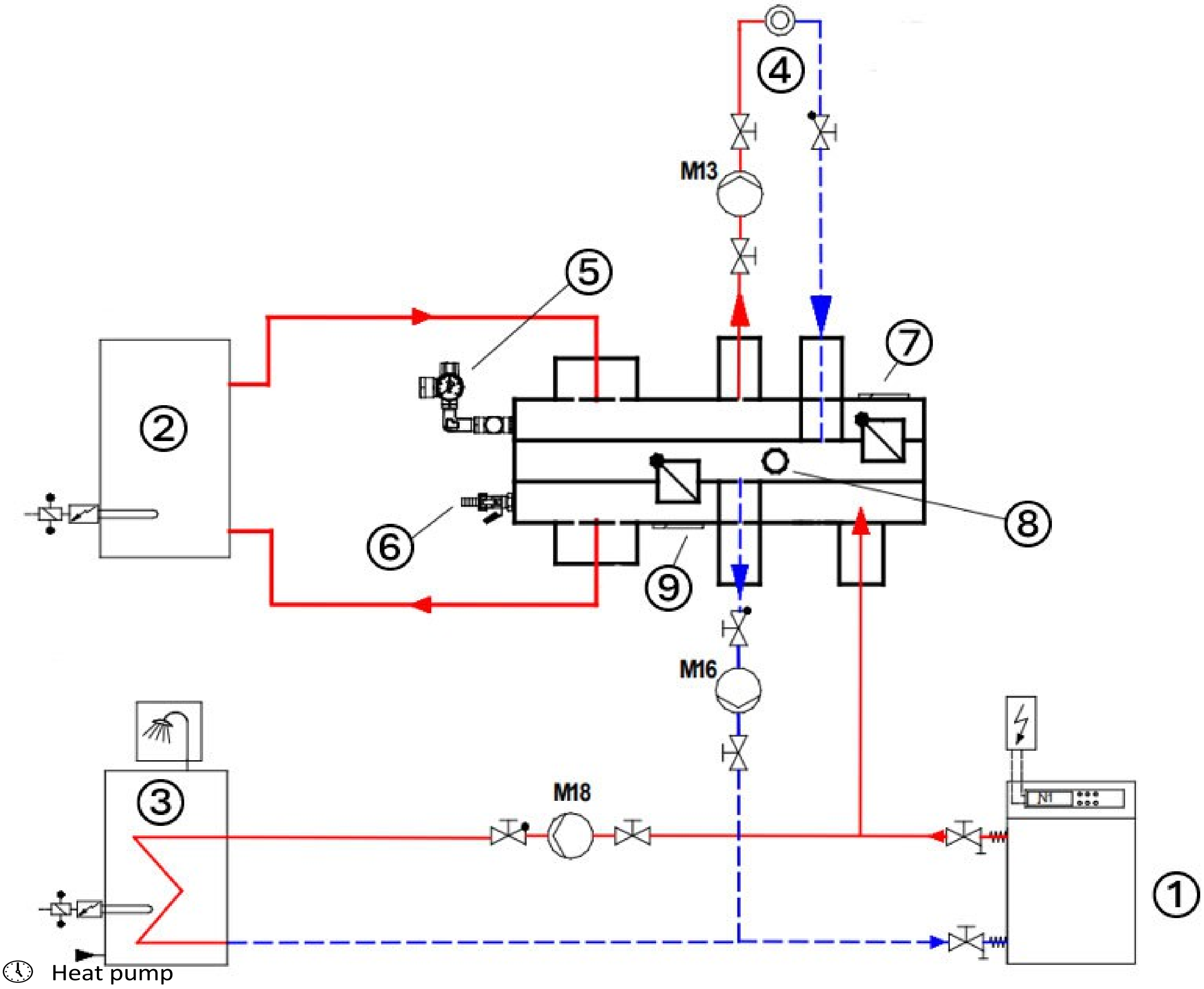
Dimensions DDV 40



Volume flow pressure drop diagram DDV 40



Hydraulic integration



① Heat pump

② Serien buffer tank

③ Domestic hot water cylinder

④ Heating circuit

⑤ Safety valve 3 bar with pressure gauge and MAG connection

⑥ KFE ball valve

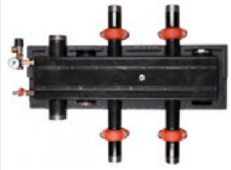
⑦ Blanking plug for non-return flap

⑧ Immersion sleeve for sensor

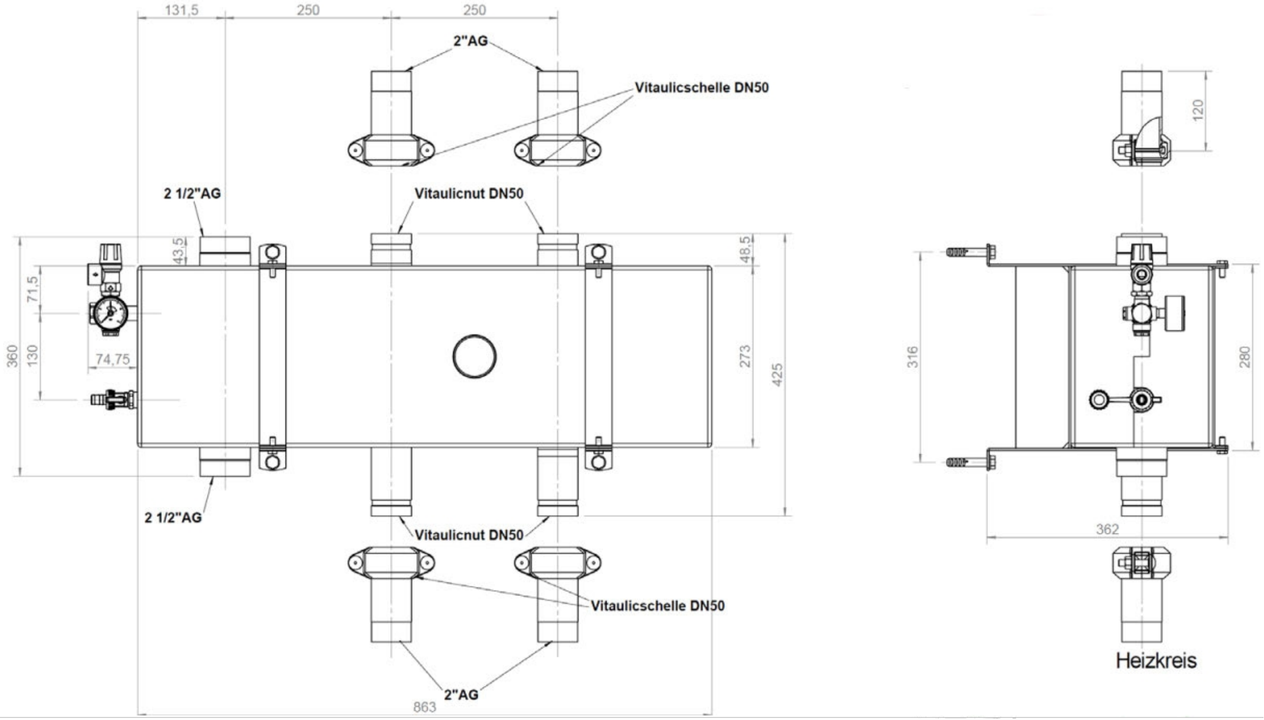
⑨ Blanking plug

9.8.5 DDV 50

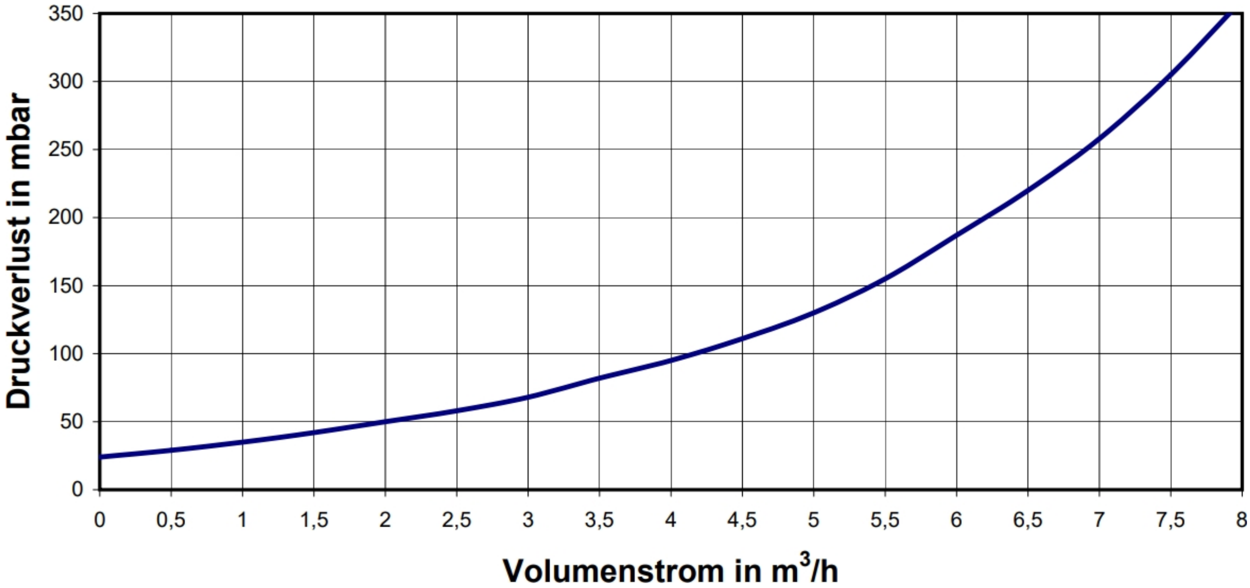
https://dimplex.atlassian.net/wiki/spaces/PRO/pages/2982890548/ fusing+of+the+heating-water-flow-rate#double-differential-pressureless-manifold [DDV]

Order code		Item no.	For device type	Recommended volume flow	Maximum volume flow
	DDV 50	364240	LA 40TU-2 LA 3860 LA 60S-TU SI 35-75TU(R) WI 45-65TU	7.5 m³/h	9.0 m³/h

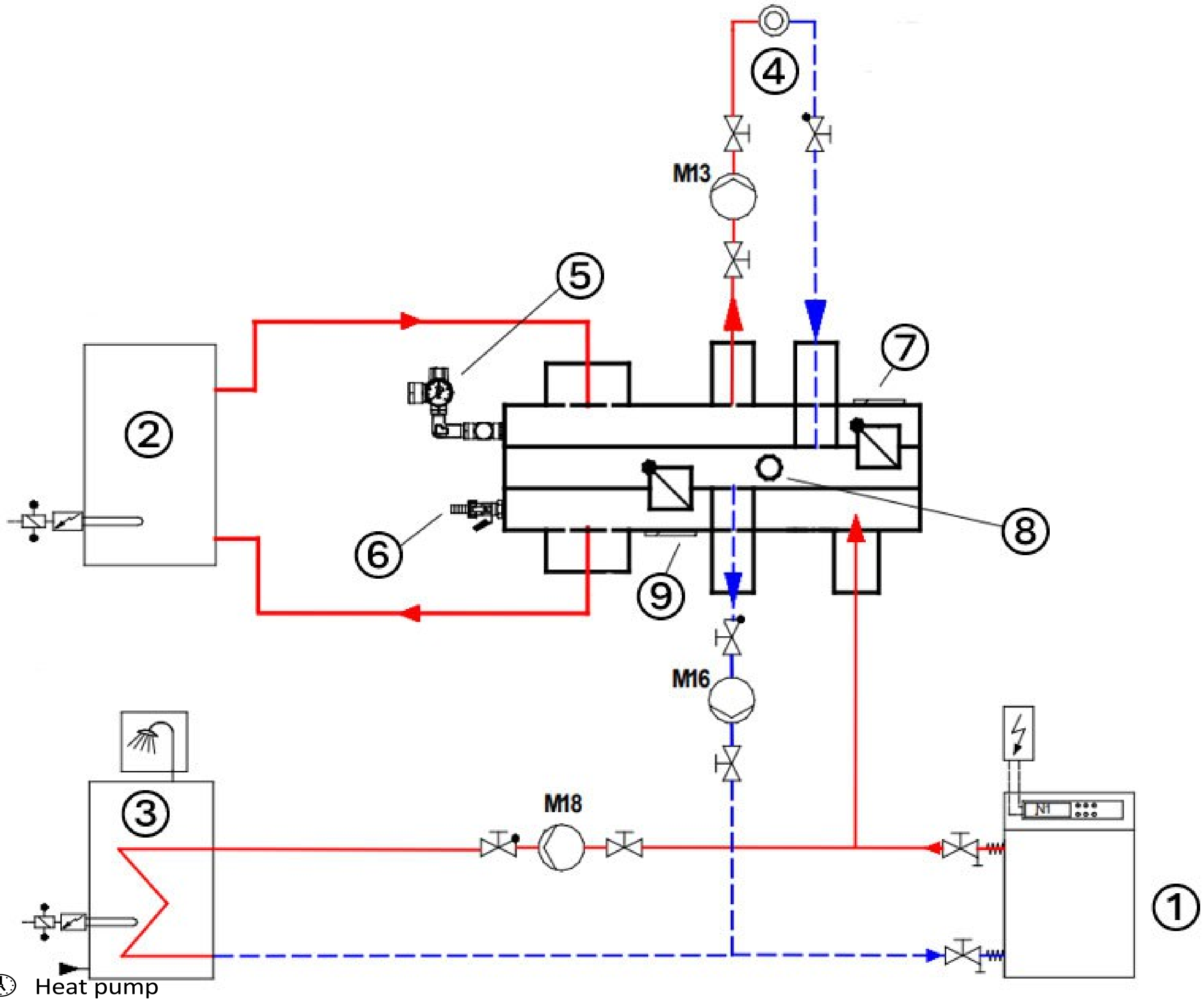
Dimensions DDV 50



Volume flow pressure drop diagram DDV 50



Hydraulic integration



① Heat pump

② Serien buffer tank

③ Domestic hot water cylinder

④ Heating circuit

⑤ Safety valve 3 bar with pressure gauge and MAG connection

⑥ KFE ball valve

⑦ Blanking plug for non-return flap

⑧ Immersion sleeve for sensor

⑨ Blanking plug

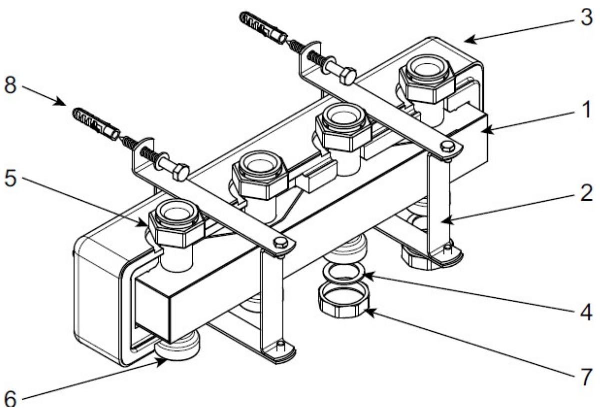
9.8.6 VTB 25-2

Order code		Item no.	Dimensions	Recommended volume flow	Maximum volume flow
	VTB 25-2	376360	545 x 178 x 192	2.0 m^3/h	3.0 m^3/h

Technical data VTB 25-2

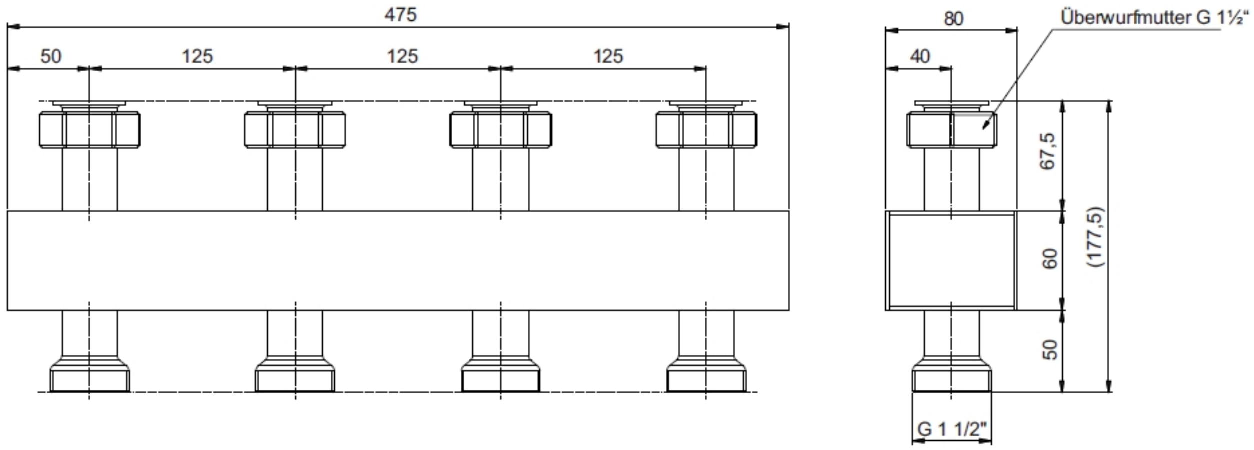
	VTB 25-2
Max. Volume flow	3.0 m^3/h
Connection of heating circuits	G 1 ½" coupling nut
Heat pump circuit connection	G 1 ½" external thread
Spigot spacing	125 mm
Max. Operating pressure	4 bar
Max. Operating temperature	110 °C
Water content distributor	1,9 l

Scope of supply VTB 25-2

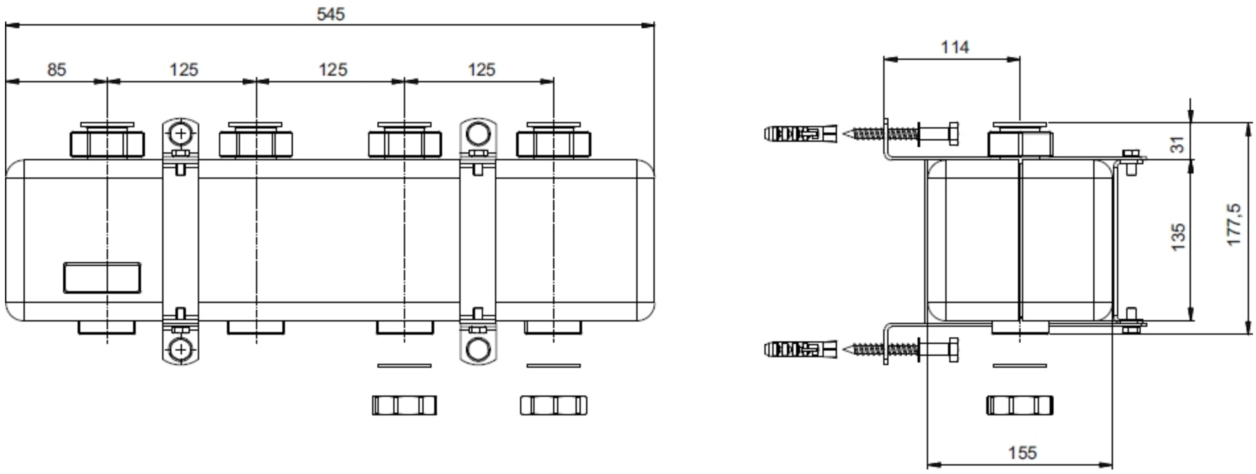


1. Manifold bar 125 mm nozzle spacing
2. Finished insulation in accordance with EnEV, 35 mm EPP foam
3. Wall bracket
4. Sealing rings
5. 1 ½" coupling nut for heating circuit connection
6. G 1 ½" threaded connection for heat pump circuit
7. Sealing cap 1 ½"
8. Fastening and mounting material

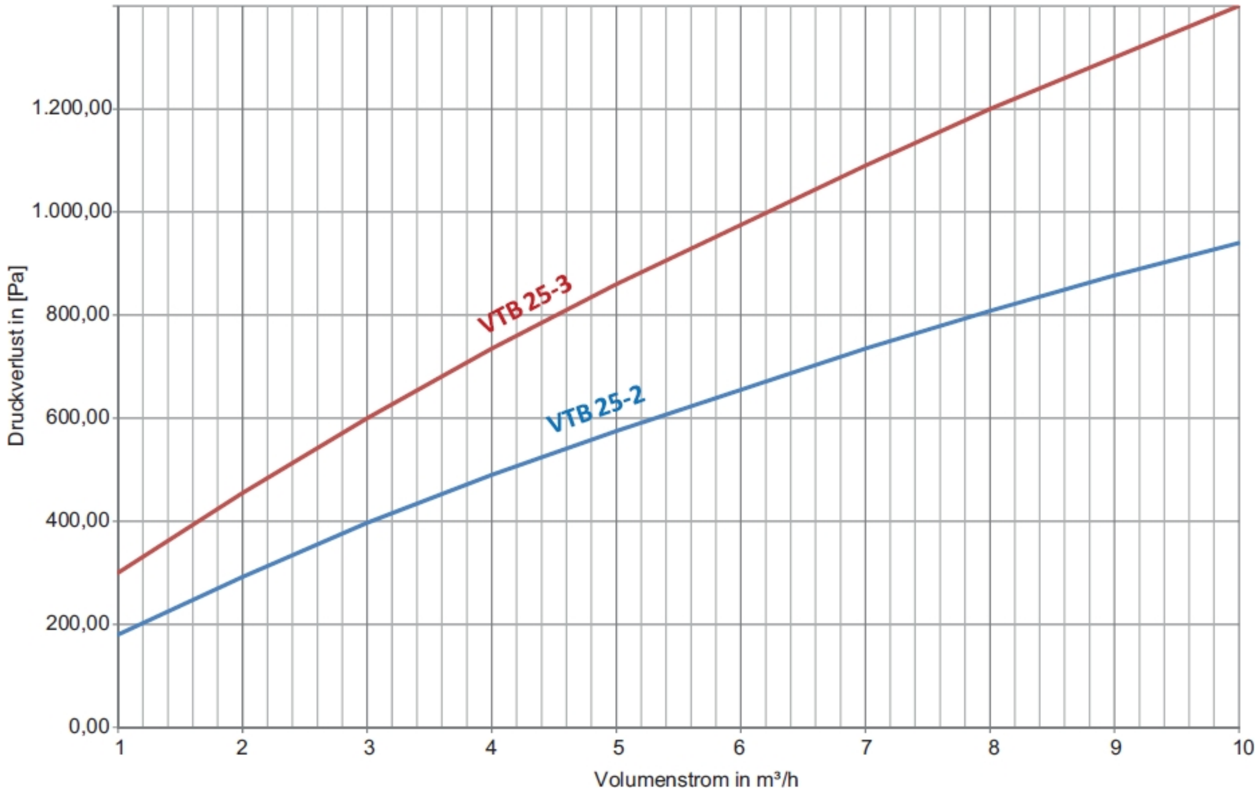
Dimensioned drawing VTB 25-2



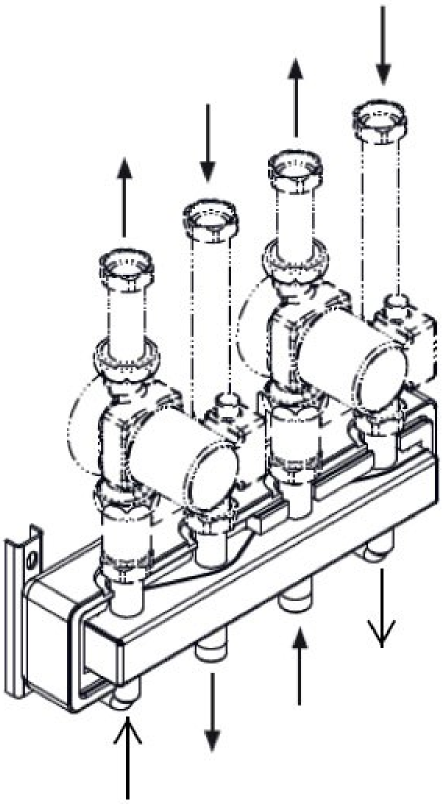
With insulation:

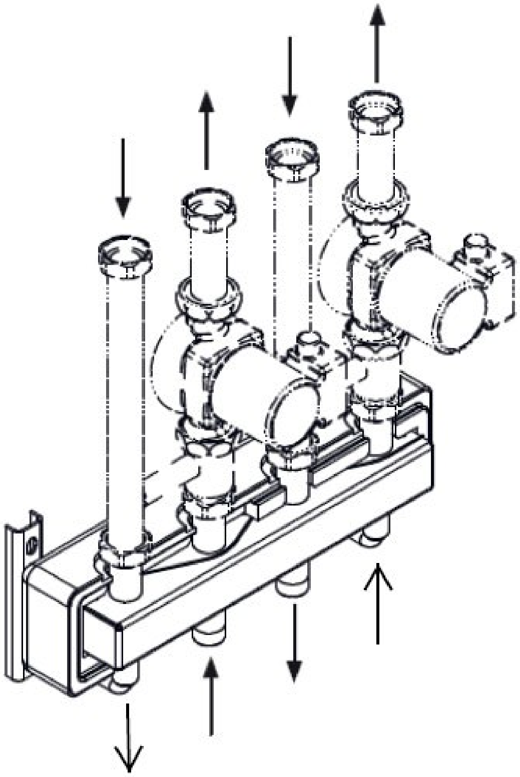


Pressure drop VTB 25-2



Connection change display





9.8.7 VTB 25-3

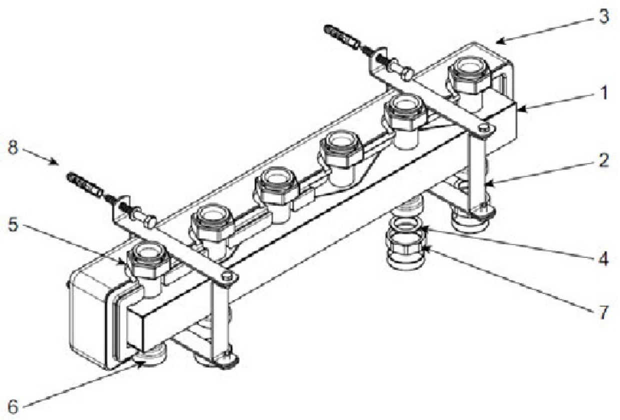
Order code		Item no.	Dimensions	Recommended volume flow	Maximum volume flow
	VTB 25-3	376370	795 x 178 x 192	2.0 m³/h	3.0 m³/h

Technical data VTB 25-3

	VTB 25-3
Max. Volume flow	3.0 m³/h
Connection of heating circuits	G 1 ½" coupling nut
Heat pump circuit connection	G 1 ½" external thread
Spigot spacing	125 mm
Max. Operating pressure	4 bar
Max. Operating temperature	110 °C

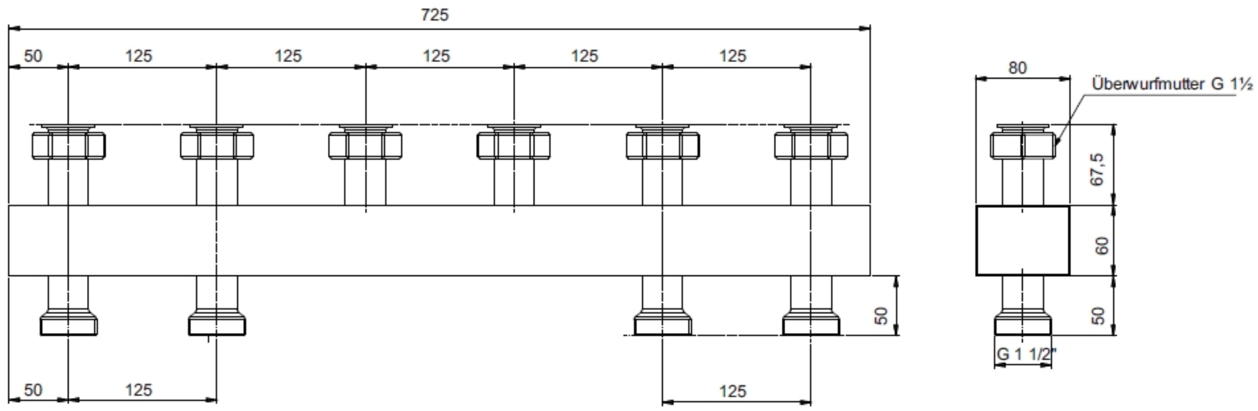
	VTB 25-3
Water content distributor	3,0 l

Scope of supply VTB 25-3

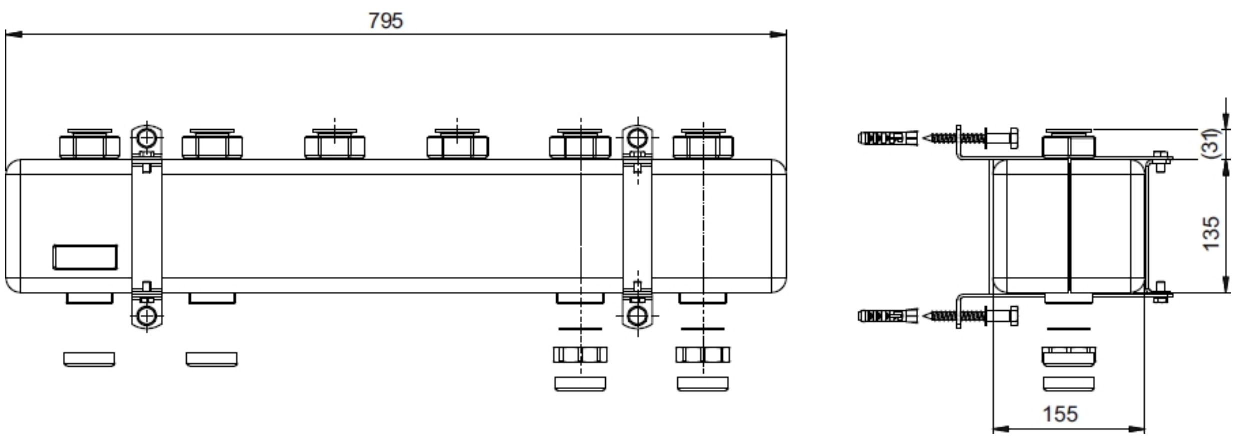


1. Manifold bar 125 mm nozzle spacing
2. Finished insulation in accordance with EnEV, 35 mm EPP foam
3. Wall bracket
4. Sealing rings
5. 1 ½" coupling nut for heating circuit connection
6. G 1 ½" threaded connection for heat pump circuit
7. Sealing cap 1 ½"
8. Fastening and mounting material

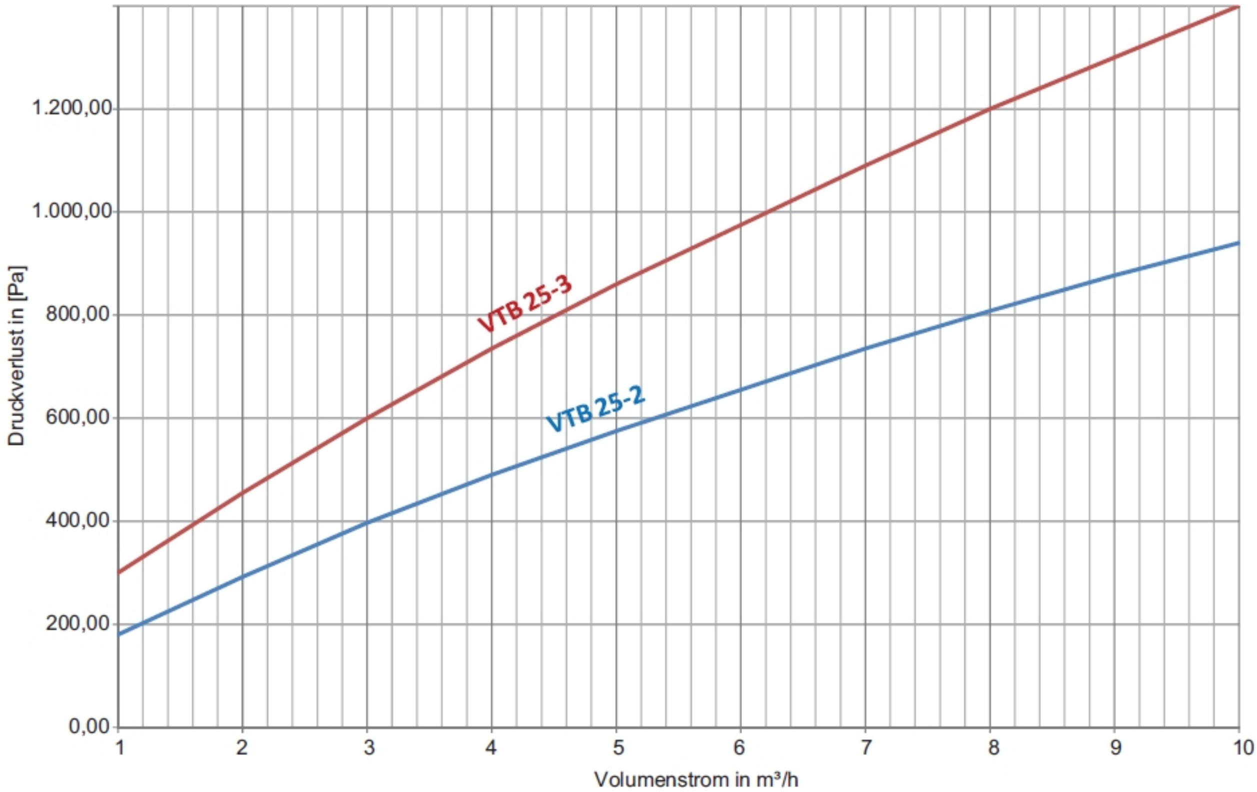
Dimensioned drawing VTB 25-3



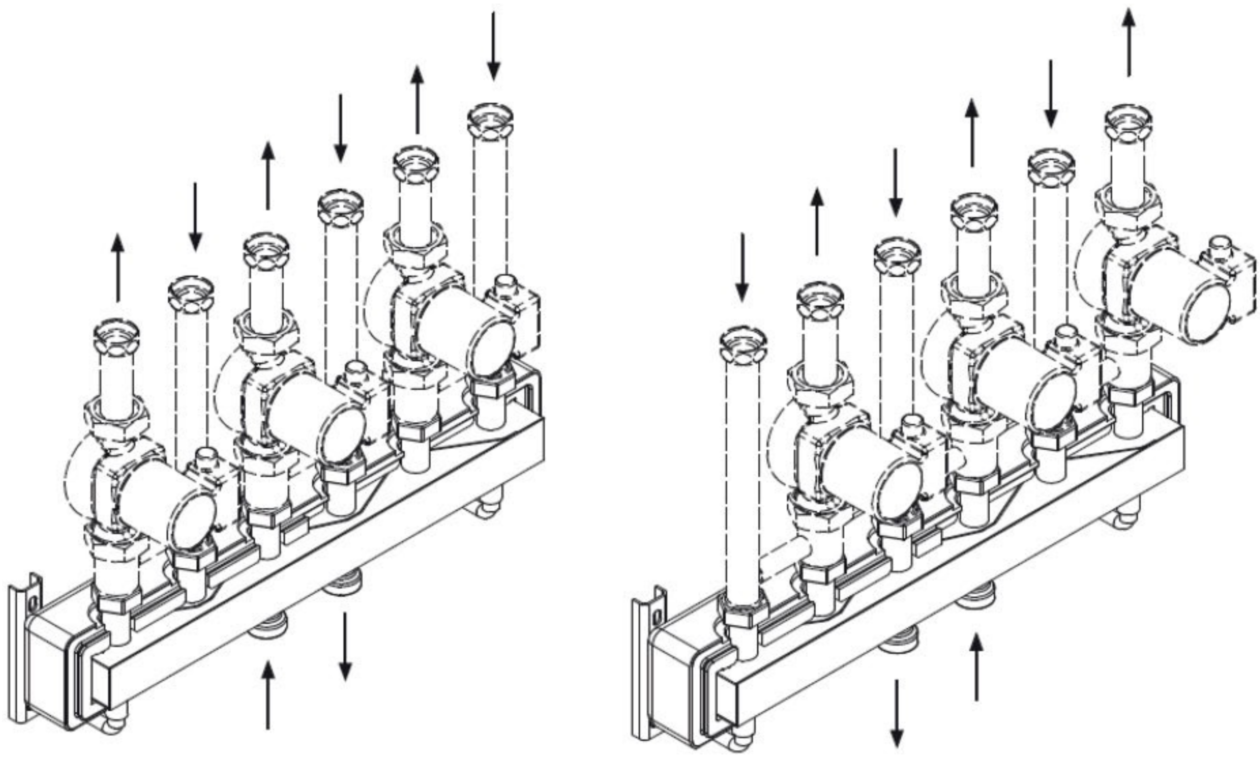
With insulation:



Pressure drop VTB 25-3



Connection change display



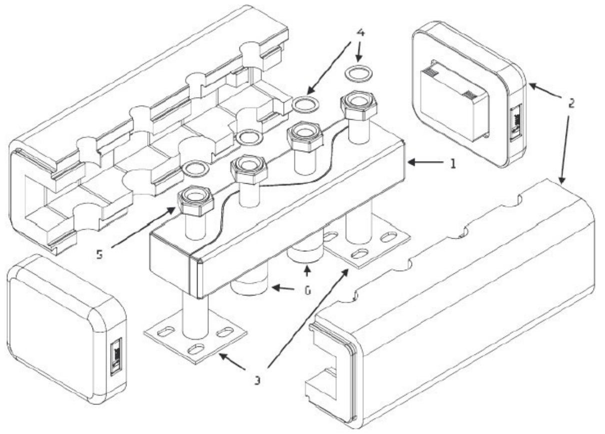
9.8.8 VTB 32-2

Order code		Item no.	Dimensions	Recommended volume flow	Maximum volume flow
	VTB 32-2	374920	650 x 237 x 225	- m³/h	6.5 m³/h

Technical data VTB 32-2

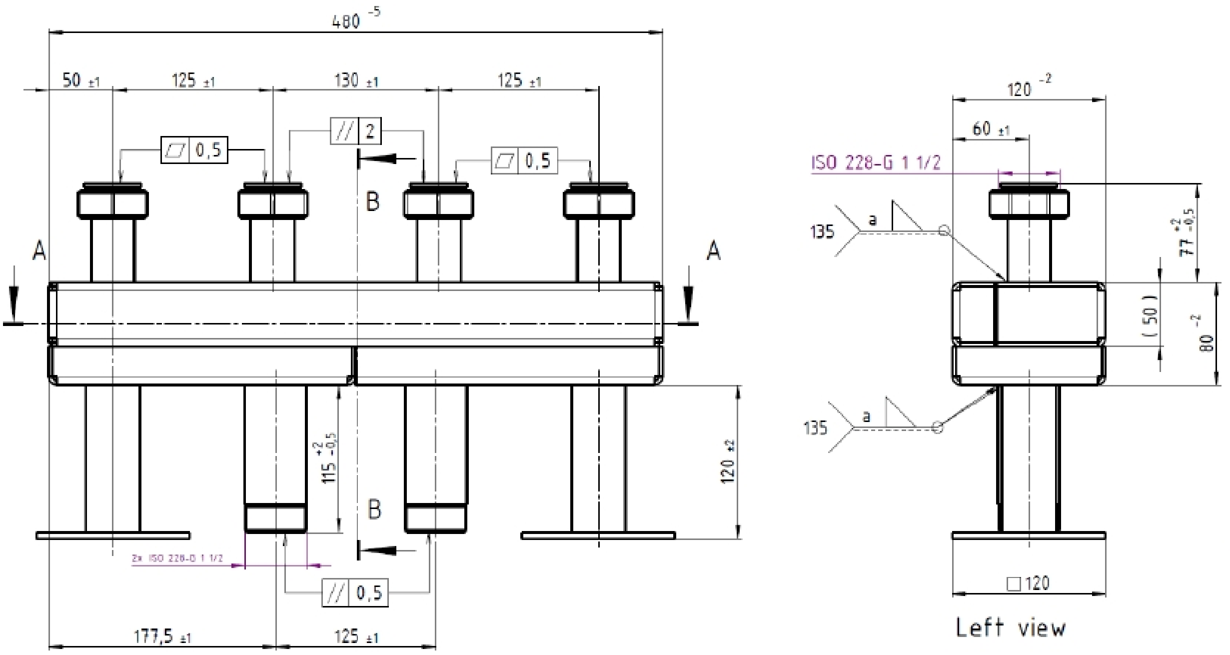
	VTB 32-2
Max. Volume flow	6.5 m³/h
Connection of heating circuits	G 1 ½" coupling nut
Heat pump circuit connection	G 1 ½" external thread
Spigot spacing	125 mm
Max. operating pressure	4 bar
Max. Operating temperature	110 °C

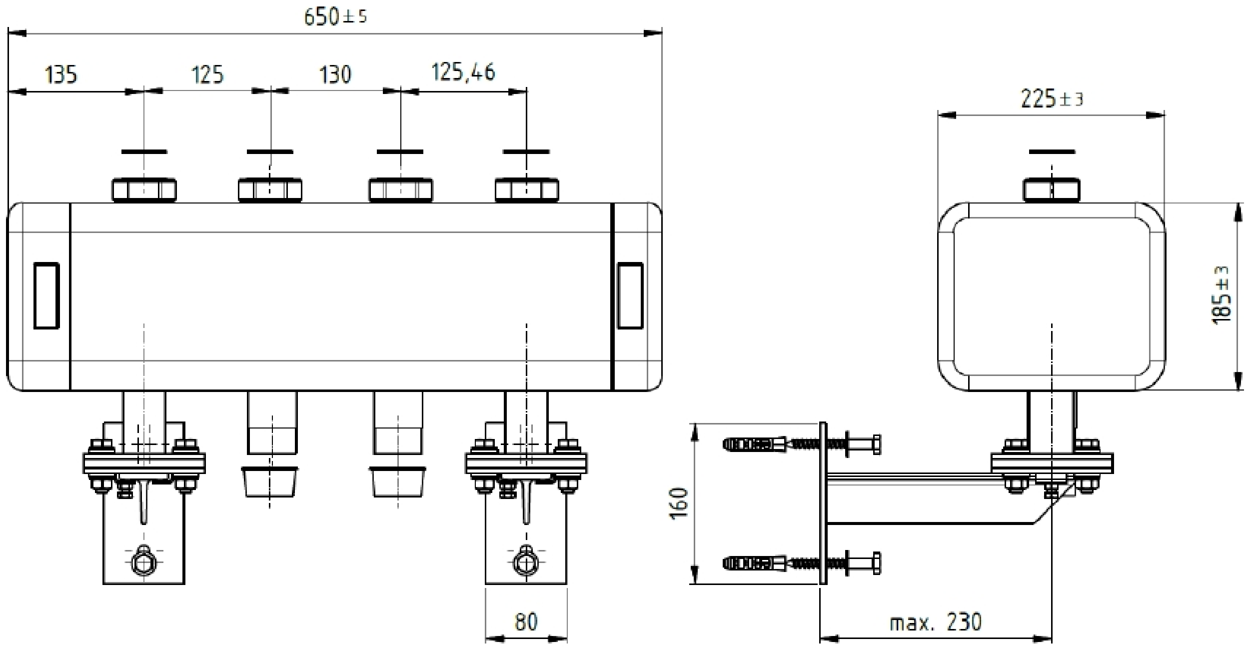
Scope of supply VTB 32-2



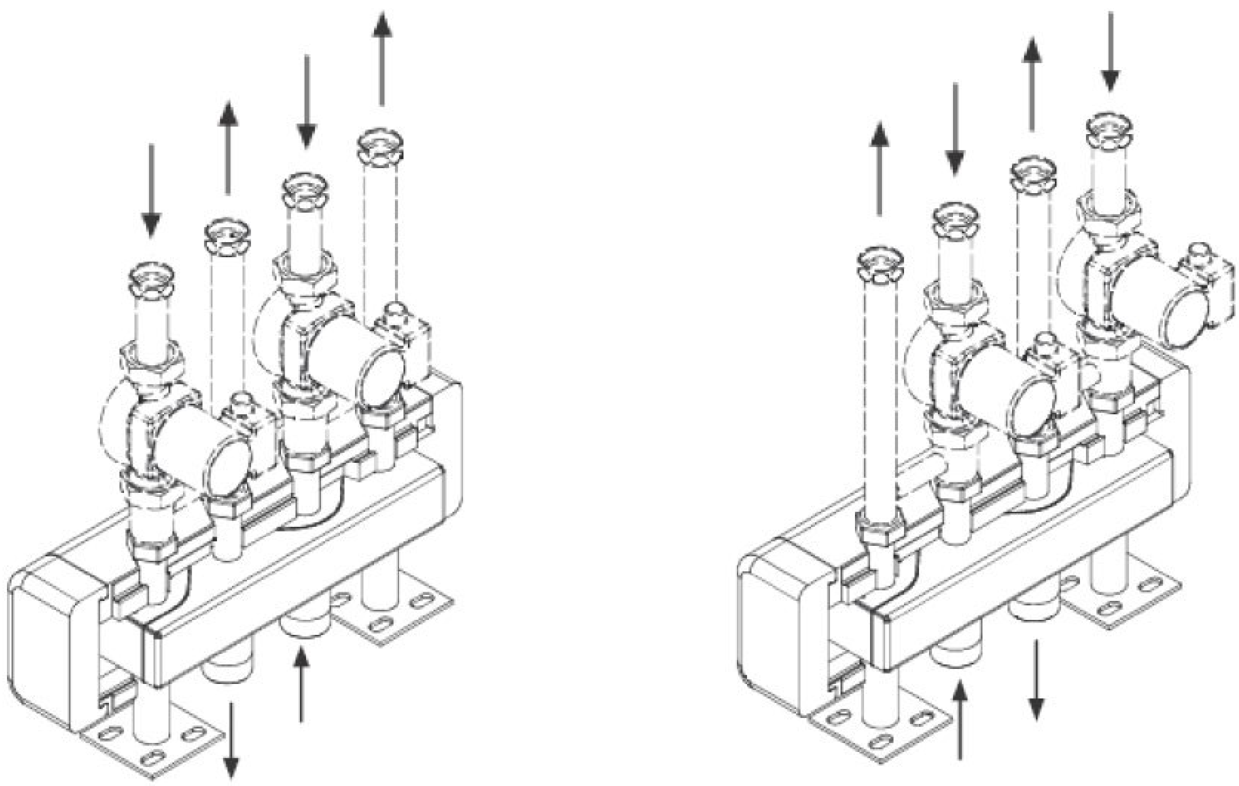
1. Manifold bar 125 mm nozzle spacing
2. Finished insulation in accordance with EnEV, 35 mm EPP foam
3. Console holder for wall or floor console
4. Sealing rings
5. 1 ½" coupling nut for heating circuit connection
6. G 1 ½" threaded connection for heat pump circuit
7. Wall bracket
8. Fastening and mounting material

Dimensioned drawing VTB 32-2





Connection change display



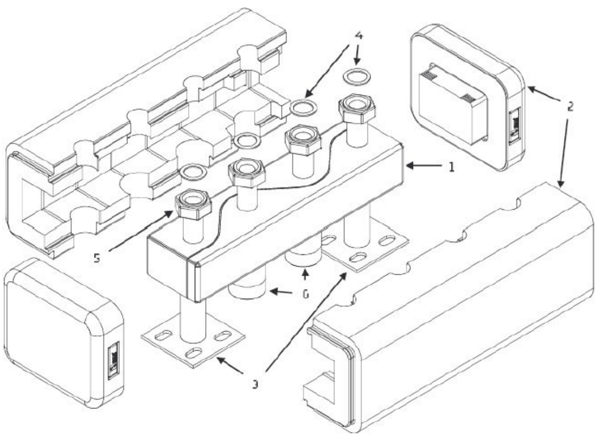
9.8.9 VTB 32-3

Order code		Item no.	Dimensions	Recommended volume flow	Maximum volume flow
	VTB 32-3	374930	905 x 237 x 225	- m³/h	6.5 m³/h

Technical data VTB 32-2

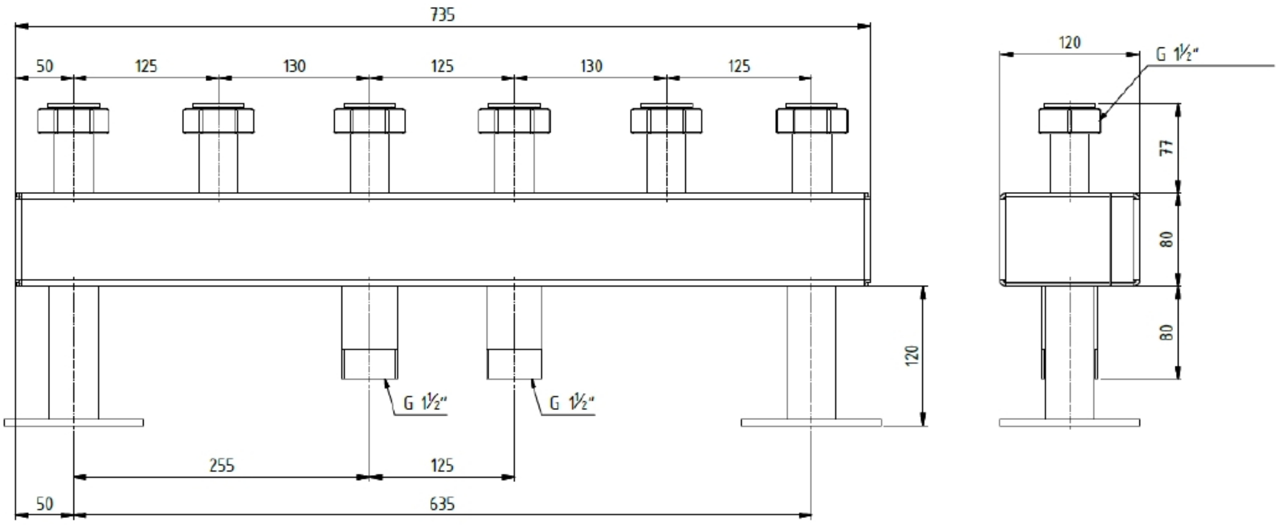
	VTB 32-3
Max. Volume flow	6.5 m³/h
Connection of heating circuits	G 1 ½" coupling nut
Heat pump circuit connection	G 1 ½" external thread
Spigot spacing	125 mm
Max. Operating pressure	4 bar
Max. Operating temperature	110 °C

Scope of supply VTB 32-2

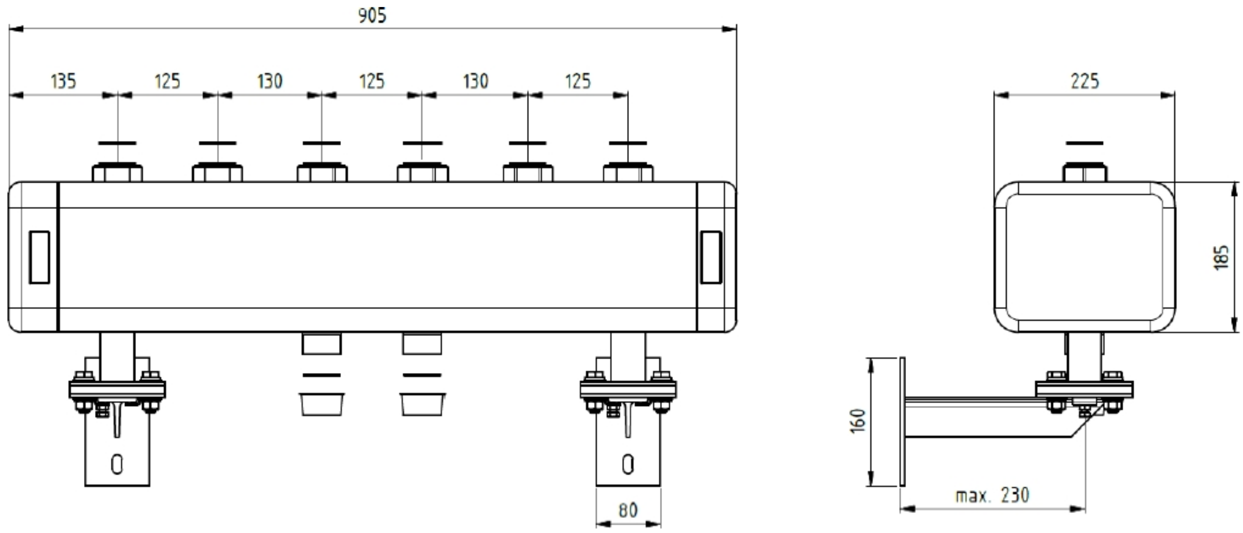


1. Manifold bar 125 mm nozzle spacing
2. Finished insulation in accordance with EnEV, 35 mm EPP foam
3. Console holder for wall or floor console
4. Sealing rings
5. 1 ½" coupling nut for heating circuit connection
6. G 1 ½" threaded connection for heat pump circuit
7. Wall bracket
8. Fastening and mounting material

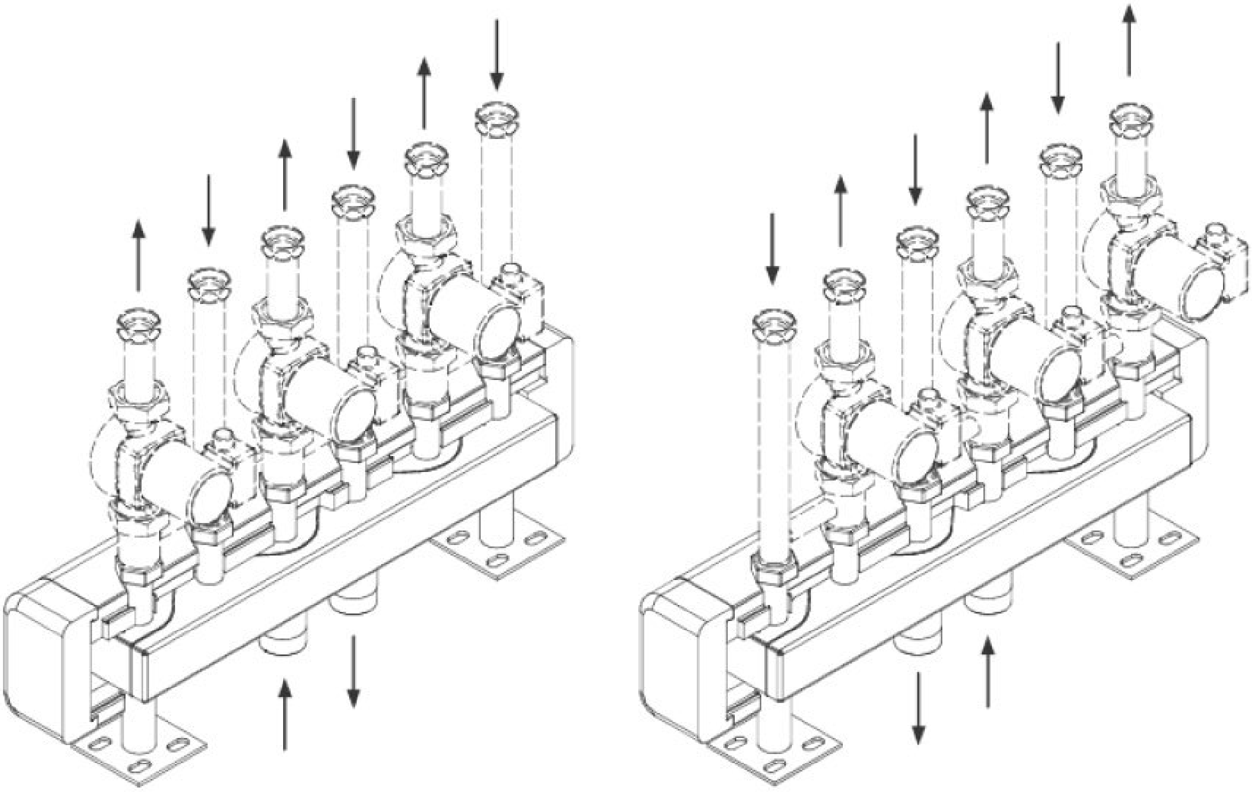
Dimensioned drawing VTB 32-2



With insulation:

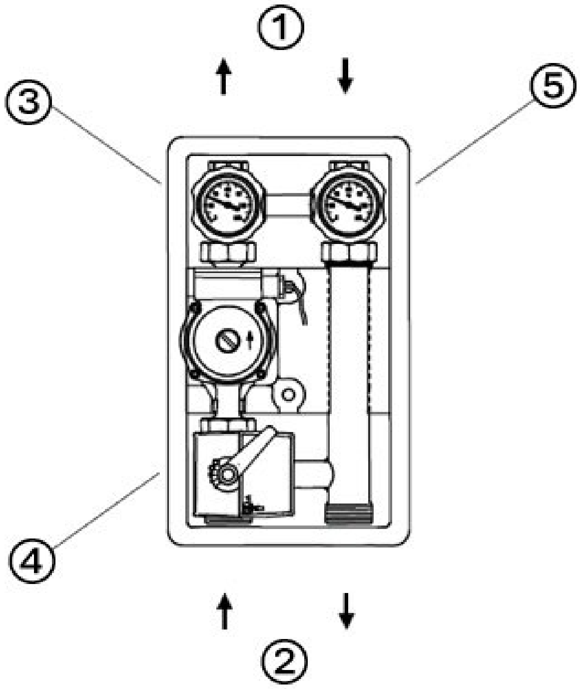


Connection change display



9.8.10 MMH 25

Order code		Item no.	Dimensions	Recommended volume flow	Maximum volume flow
	MMH 25	348640	250 x 420 x 250	1.8 m³/h	2.5 m³/h

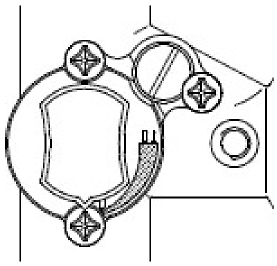


① 1" FEMALE THREAD

② 1 ½" external thread, flat-sealing

③ Ball valve flow with red thermometer

④ Mixer with bypass:
open
NO contact



⑤ Ball valve return with blue thermometer and integrated gravity brake:

Turn the handle to the right:

- 0° - Ball valve open, gravity brake in function
  45° - ball valve and gravity brake open 90° - ball
- valve closed
-

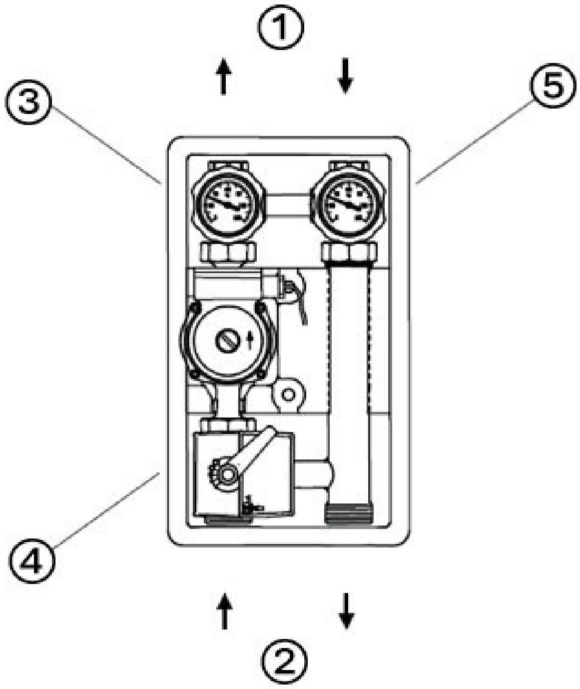
Temperature sensor enclosed. Can be fastened with cable ties.

Actuator already pre-assembled. Please refer to the separate documents for the electrical wiring! Supplied without pump!

Suitable for almost all pump makes DN 25, AA = 180 mm.

9.8.11 MMH 32

Order code		Item no.	Dimensions	Recommended volume flow	Maximum volume flow
	MMH 32	367790	250 x 420 x 250	1.8 m³/h	2.5 m³/h

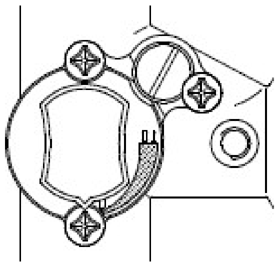


① 1 1/4" FEMALE THREAD

② 1 ½" external thread, flat-sealing

③ Ball valve flow with red thermometer

④ Mixer with bypass:
open
NO contact



⑤ Ball valve return with blue thermometer and integrated gravity brake:

Turn the handle to the right:

- 0° - Ball valve open, gravity brake in function
  45° - ball valve and gravity brake open 90° - ball
- valve closed
-

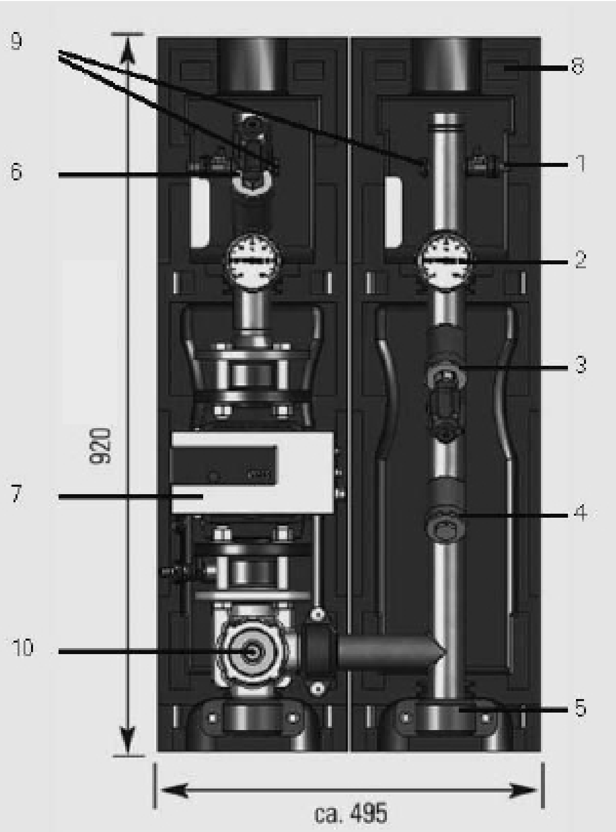
Temperature sensor enclosed. Can be fastened with cable ties.

Actuator already pre-assembled. Please refer to the separate documents for the electrical wiring! Supplied without pump!

Suitable for almost all pump makes DN 32, AA = 180 mm.

9.8.12 MMH 50

Order code		Item no.	For device type	Recommended volume flow	Maximum volume flow
	MMH 50	364260	DDV 50	8.0 m³/h	12.0 m³/h



① KFE tap

② Thermometer (display 0-120 °C)

③ Barrier

④ Dirt traps

⑤ Victaulic clamp

⑥ Barrier with zip

⑦ Pump (not included in the scope of supply)

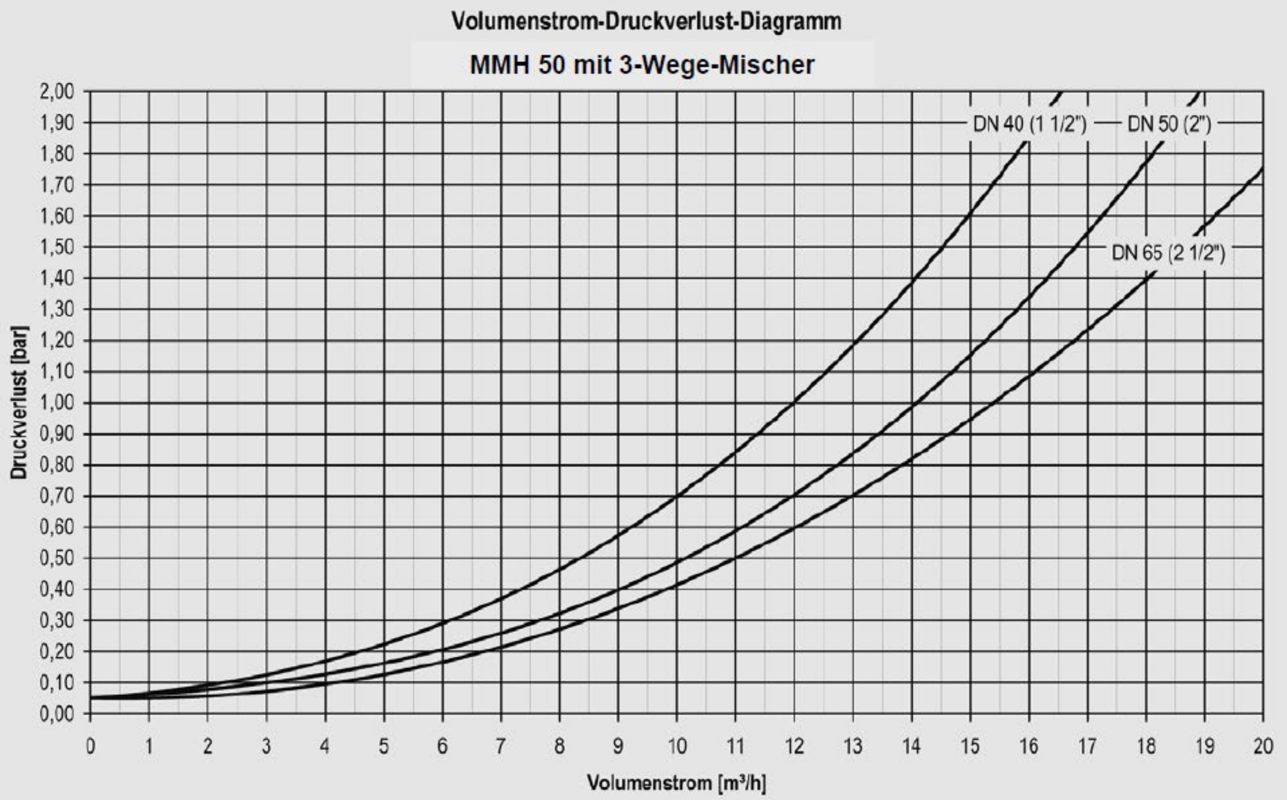
⑧ EPS insulation

⑨ Additional 1/2" connection (2xVL ; 2xRL)

⑩ Mixer

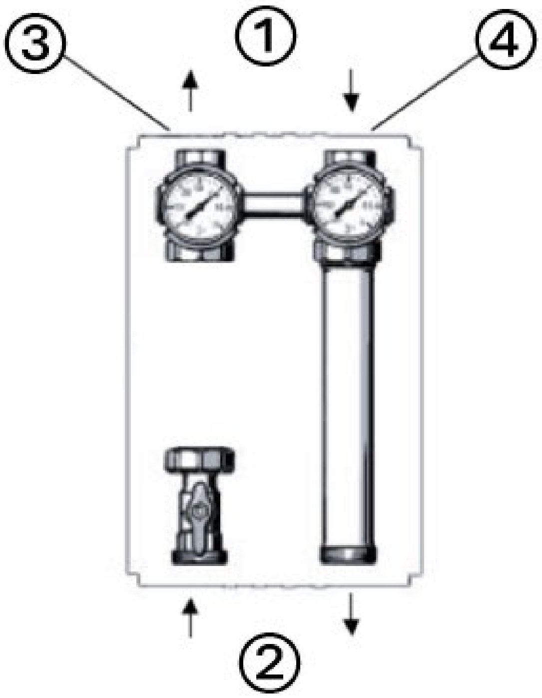
The group is completely pre-assembled and tested and can be connected to the manifold using the Victaulic couplings supplied. Various adapters are available for other connection types.

Volume flow-pressure drop diagram MMH 50



9.8.13 WWM 25

Order code		Item no.	Dimensions	Recommended volume flow	Maximum volume flow
	WWM 25	346600	250 x 420 x 250	1.8 m³/h	2.5 m³/h



① 1" FEMALE THREAD

② 1 ½" external thread, flat-sealing

③ 3-way ball valve flow with red thermometer and integrated gravity brake

Turn the handle to the right:

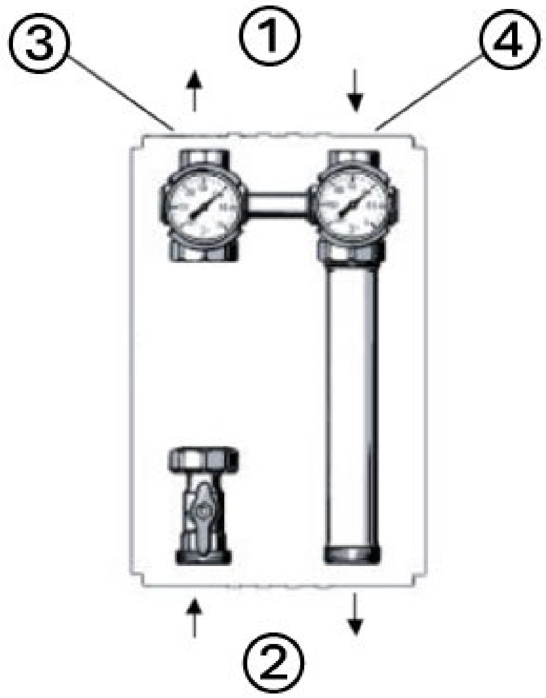
- 0° - Ball valve open, gravity brake in function
- 45° - Ball valve and gravity brake open
- 90° - Ball valve closed

④ 3-way ball valve return with blue thermometer

Sup **makes DN 25, centre distance = 180 mm.**

9.8.14 WWM 32

Order code		Item no.	Dimensions	Recommended volume flow	Maximum volume flow
	WWM 32	367800	250 x 420 x 250	2.5 m³/h	3.5 m³/h



① 1 1/4" FEMALE THREAD

② 1 ½" external thread, flat-sealing

③ 3-way ball valve flow with red thermometer and integrated gravity brake

Turn the handle to the right:

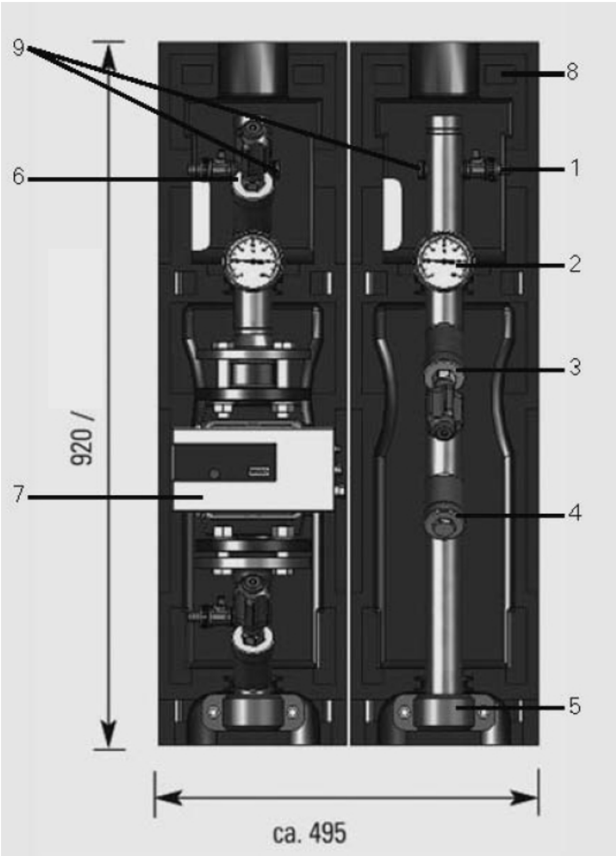
- 0° - Ball valve open, gravity brake in function
- 45° - Ball valve and gravity brake open
- 90° - Ball valve closed

④ 3-way ball valve return with blue thermometer

Sup **makes DN 32, centre distance 180 mm.**

9.8.15 WWM 50

Order code		Item no.	For device type	Recommended volume flow	Maximum volume flow
	WWM 50	364250	DDV 50	8.0 m³/h	12.0 m³/h



① KFE tap

② Thermometer (display 0-120 °C)

③ Barrier

④ Dirt traps

⑤ Victaulic clamp

⑥ Barrier with zip

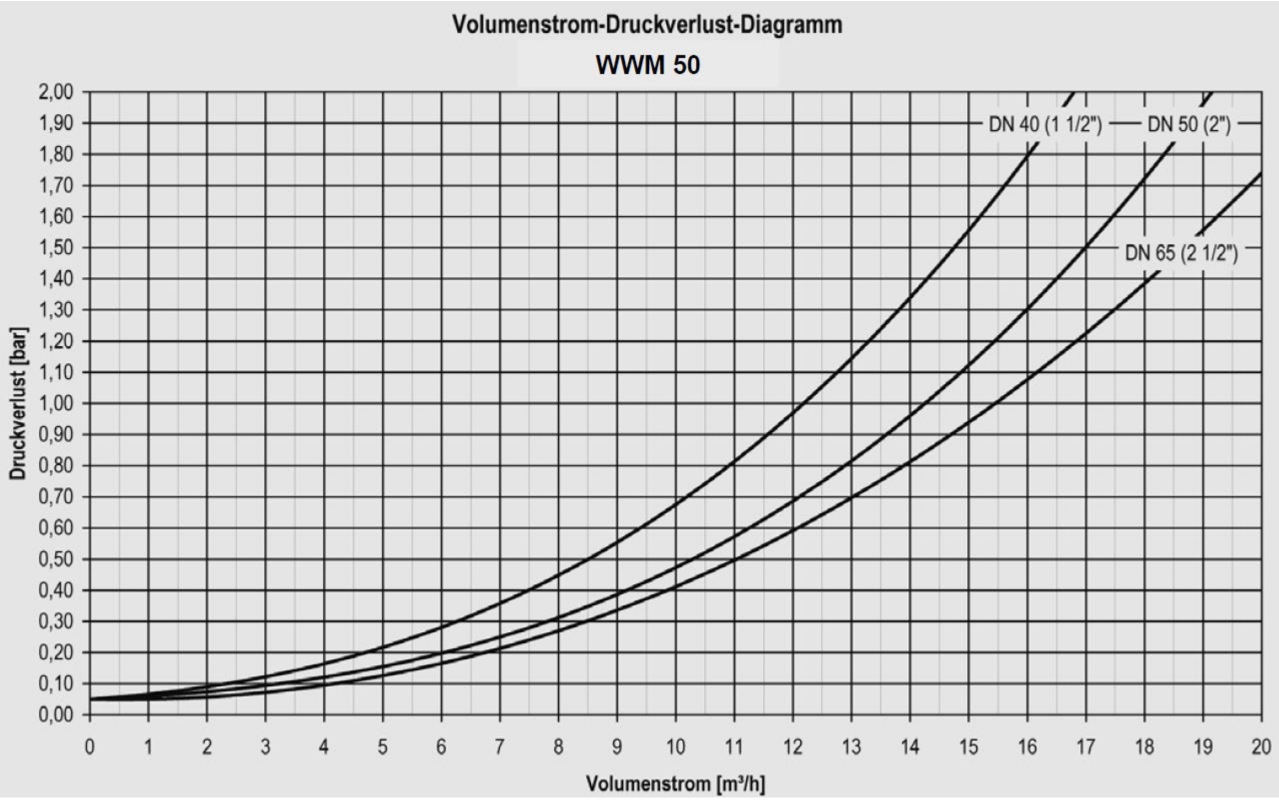
⑦ Pump (not included in the scope of supply)

⑧ EPS insulation

⑨ Additional 1/2" connection (2xVL ; 2xRL9

The group is completely pre-assembled and tested and can be connected to the manifold using the Victaulic couplings supplied. Various adapters are available for other connection types.

Volume flow pressure drop diagram WWM 50



10 heat pump manager

The Dimplex heat pumps are supplied with different controllers depending on the heat pump type. You can find an overview of the controllers and operating display here:
Controller/operating display overview - Project planning handbook - Dimplex (atlassian.net)

10.1 WPM Econ

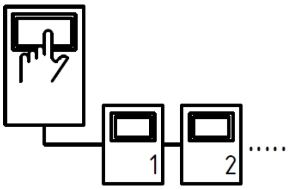
Wall-mounted or integrated heat pump manager with LC display or touch display

10.2 WPM Touch

Wall-mounted or integrated heat pump manager with touch display

10.3 WPM Touch Master

Wall-mounted master controller with touch display for the parallel connection of heat pumps



10.4 Overview Controller/operating display

heat pump	Item no.	Controller	Display
Air-to-water heat pumps Outdoor installation			
System M			
Compact Plus 04-06 kW	~	pCO OEM (WPM Touch)	pGDx (touch display)
Comfort Plus 09-16 kW	~	pCO OEM (WPM Touch)	pGDx (touch display)
Comfort Plus Cooling 09-16 kW	~	pCO OEM (WPM Touch)	pGDx (touch display)
M Flex 0609HBC M	381080	pCO OEM (WPM Touch)	pGDx (touch display)
M Flex 0916HBC	381090	pCO OEM (WPM Touch)	pGDx (touch display)
System S			
LIA 0608HXCF M	380080	pCO OEM (WPM Touch)	pGDx (touch display)
LIA 0911HXCF M	380090	pCO OEM (WPM Touch)	pGDx (touch display)
LIA 1316HXCF	380140	pCO OEM (WPM Touch)	pGDx (touch display)
LIA 1316HXCF M	380100	pCO OEM (WPM Touch)	pGDx (touch display)
LIA 0608HWCF M	380020	pCO OEM (WPM Touch)	pGDx (touch display)
LIA 0911HWCF M	380030	pCO OEM (WPM Touch)	pGDx (touch display)
LIA 0608BWCF M	380050	pCO OEM (WPM Touch)	pGDx (touch display)
LIA 0911BWCF M	380060	pCO OEM (WPM Touch)	pGDx (touch display)
LIA 1316BWCF	380130	pCO OEM (WPM Touch)	pGDx (touch display)
LIA 1316BWCF M	380070	pCO OEM (WPM Touch)	pGDx (touch display)
System E			
LA 1118CP	380800	pCO OEM (WPM Touch)	pGDx (touch display)

heat pump	Item no.	Controller	Display
LA 1118BWCP	381910	pCO OEM (WPM Touch)	pGDx (touch display)
System C			
LA 33TPR	378690	pCO OEM (WPM Touch)	pGDx (touch display)
LA 60P-TUR	377770	pCO OEM (WPM Touch)	pGDx (touch display)
LA S-TU/S-TU-R			
LA 9S-TUR	372970	pCO OEM (WPM Touch)	pGDx (touch display)
LA 0712C	381110	pCO OEM (WPM Touch)	pGDx (touch display)
LA 1118C	381150	pCO OEM (WPM Touch)	pGDx (touch display)
HPL 9S-TUW	373040	pCO5 (WPM Econ5)	pGDx (touch display)
LA 0712BW	381120	pCO5 (WPM Econ5)	pGDx (touch display)
LA 1118BW	381160	pCO5 (WPM Econ5)	pGDx (touch display)
HPL 9S-TURW	373120	pCO5 (WPM Econ5)	pGDx (touch display)
LA 0712BWC	381130	pCO5 (WPM Econ5)	pGDx (touch display)
LA 1118BWC	381170	pCO5 (WPM Econ5)	pGDx (touch display)
LA TU-2/TBS			
LA 1422C	380320	pCO OEM (WPM Touch)	pGDx (touch display)
LA 35TBS	378460	pCO OEM (WPM Touch)	pGDx (touch display)
LA 40TU-2	376680	pCO5 (WPM Econ5Plus)	pGD0 (LC display)
LA 3860	381870	pCO OEM (WPM Touch)	pGDx (touch display)
LA 60S-TU	378450	pCO OEM (WPM Touch)	pGDx (touch display)
LA 60S-TUR	374620	pCO OEM (WPM Touch)	pGDx (touch display)
Indoor installation of air-to-water heat pumps			
LIK 8TES	366030	pCO5 (WPM Econ5)	pGDx (touch display)
LIK 12TU	372830	pCO5 (WPM Econ5)	pGDx (touch display)
LI 12TU	364070	pCO5 (WPM Econ5)	pGDx (touch display)
LI 16I-TUR	378680	pCO OEM (WPM Touch)	pGDx (touch display)
LI 1422C	380300	pCO OEM (WPM Touch)	pGDx (touch display)
LI 1826C	380310	pCO OEM (WPM Touch)	pGDx (touch display)
Brine-to-water heat pump, indoor installation			
SIW 6TES	371570	pCO5 (WPM Econ5)	pGDx (touch display)

heat pump	Item no.	Controller	Display
SIW 8TES	371580	pCO5 (WPM Econ5)	pGDx (touch display)
SIK 8TES	372300	pCO5 (WPM Econ5)	pGDx (touch display)
SIK 11TES	372310	pCO5 (WPM Econ5)	pGDx (touch display)
SI 6TU	364080	pCO5 (WPM Econ5Plus)	pGDx (touch display)
SI 8TU	364090	pCO5 (WPM Econ5Plus)	pGDx (touch display)
SI 11TU	364100	pCO5 (WPM Econ5Plus)	pGDx (touch display)
SI 14TU	364110	pCO5 (WPM Econ5Plus)	pGDx (touch display)
SI 18TU	364120	pCO5 (WPM Econ5Plus)	pGDx (touch display)
SI 22TU	362340	pCO5 (WPM Econ5Plus)	pGDx (touch display)
SI 26TU	368440	pCO5 (WPM Econ5Plus)	pGDx (touch display)
SI 35TU	368450	pCO5 (WPM Econ5Plus)	pGDx (touch display)
SI 50TU	368460	pCO5 (WPM Econ5Plus)	pGDx (touch display)
SI 75TU	368470	pCO5 (WPM Econ5Plus)	pGDx (touch display)
SI 90TU	369950	pCO5 (WPM Econ5Plus)	pGDx (touch display)
SI 130TU	369960	pCO5 (WPM Econ5Plus)	pGD0 (LC display)
SIH 20TE	352970	pCO5 (WPM Econ5)	pGDx (touch display)
SIH 90TU	368350	pCO5 (WPM Econ5Plus)	pGD0 (LC display)
SI 35TUR	374870	pCO5 (WPM Econ5)	pGDx (touch display)
SI 50TUR	374880	pCO5 (WPM Econ5)	pGDx (touch display)
Water-to-water heat pump, indoor installation			
WI 10TU	364190	pCO5 (WPM Econ5Plus)	pGDx (touch display)
WI 14TU	364200	pCO5 (WPM Econ5Plus)	pGDx (touch display)
WI 18TU	364210	pCO5 (WPM Econ5Plus)	pGDx (touch display)
WI 22TU	364220	pCO5 (WPM Econ5Plus)	pGDx (touch display)
WI 35TU	368520	pCO5 (WPM Econ5Plus)	pGDx (touch display)
WI 45TU	368530	pCO5 (WPM Econ5Plus)	pGDx (touch display)
WI 65TU	368540	pCO5 (WPM Econ5Plus)	pGDx (touch display)
WI 95TU	368550	pCO5 (WPM Econ5Plus)	pGDx (touch display)
WI 120TU	371530	pCO5 (WPM Econ5Plus)	pGDx (touch display)
WIH 120TU	368360	pCO5 (WPM Econ5Plus)	pGD0 (LC display)

10.5 WPM Econ

10.5.1 WPM Econ5 / WPM Econ5Plus

Wall-mounted or integrated heat pump manager with LC display or touch display

- Overview of controller functions (pCO5)
- Functional description (WPM)
- Operation/operator display (WPM)
- Temperature sensor (WPM)
- Electrical connection work (WPM Econ5 / Econ5Plus)
- Circuit diagram WPM Econ5Plus

10.5.2 Overview of controller functions (pCO5)

The heat pump manager is essential for the operation of the heat pump system and is included in the scope of supply. It controls a bivalent, monovalent or monoenergetic heating system and monitors the safety devices of the refrigeration circuit. Depending on the heat pump type, the heat pump manager is installed in the casing of the heat pump or the Hydro-Tower or is supplied with the heat pump as a wall-mounted controller and takes over the control of the generator and distribution circuits.

Function overview:

- Fulfilment of the requirements of the utility company (EVU) e.g. utility block, switch cycle block, see TAB (Technical Connection Conditions)
- Switch-on delay on mains voltage recovery or cancellation of a utility company shut-off time (10 s to 200 s)
- The compressors of the heat pump are switched on a maximum of three times per hour
- Switching off the heat pump due to utility company blocking signals with the option of switching on the 2nd heat generator (e.g. peak load boiler)
- Energy-efficient defrost management for air-to-water heat pumps with self-adapting defrost cycle time
- Monitoring and securing the refrigeration circuit in accordance with DIN 8901 and DIN EN 378
- Recognising the optimum operating mode in each case, with the largest possible proportion of heat pumps
- Frost protection function
- Automatic, outdoor temperature-dependent operating mode switchover winter - summer - cooling
- Return temperature-controlled regulation of heating and cooling operation via outside temperature, adjustable fixed-setpoint or room temperature
- Smart RTC+ individual room control with up to 10 room temperature controllers per heating circuit possible
- Control of up to 3 consumer circuits (heating and cooling circuits)
- Dew point-dependent flow temperature control depending on the room temperature and humidity in cooling operation

- Optional dew point monitoring in cooling operation
- Requirement priorities
    - domestic hot water preparation
    - Heating/cooling operation
    - Swimming pool preparation
- Control of a 2nd heat generator (oil or gas boiler or electric auxiliary heating)
- Release of a 2nd heat generator for bivalent operation (oil and gas boiler) incl. control of the associated mixer or 0-10 V setpoint specification
- Control of a mixer for the bivalent utilisation of a renewable heat source (solid fuel boiler, solar thermal)
- Special program for 2nd heat generators to ensure minimum running times (oil boiler) or minimum charging times (central storage tank)
- Control of a flange heater for targeted reheating of the domestic hot water with adjustable time programs and for thermal disinfection
- Control of a domestic hot water circulation pump via pulse or time programs
- Control of circulation pumps in the generator and consumer circuit via an optional 0-10V or PWM signal
- Recording the quantity of thermal energy and operating hours (not suitable for heating cost billing)
- User group-dependent operating concept
- 10x alarm memory with date and time and error description
- Interface for connecting further communication options for LAN, KNX, Modbus RTU, Modbus TCP, BACnet/IP, MQTT optional accessories required
- Heating function program (DIN EN 1264-4), standardised or customisable program for targeted dry heating of the screed with storage of the start and completion time
- Remote control for the heat pump manager via Dimplex Home app for iOS, Android and Windows (special accessories NWPM Touch card)
- SG-Ready function, e.g. for using load-variable electricity tariffs in the smart grid

10.5.3 Functional description (WPM)

- Blocking of requests (WPM)
- Domestic hot water preparation (WPM)
- 2nd heat generator (WPM)
- Renewable (WPM)
- Power control (WPM)
- Hysteresis (WPM)

Blocking of requests (WPM)

Various statuses and settings can lead to the blocking of a heat pump request. The blocks shown reset themselves automatically, are cancelled after processing or can be ended.

system control

In the "Special functions - System control" menu, it is possible to activate system control for all pump and mixer outputs. The system control for circulation pumps is automatically cancelled after 24 hours. The mixers are run "Open" for the set mixer runtime and then "Closed" again. A manual reset is possible by deactivating the outputs in the system control.

```
Anzeige: Systemkontrolle
         Sperre
```

Pump flow

A pump advance between 10 and 420 seconds can be set in the "Settings - Pump control" menu. A pump flow is activated when a request is pending before switching on a compressor in order to flush the return sensor R2/R2.1 again. If the return temperature detected after the pump advance is below the hysteresis, a pending request is processed. If If the hysteresis is reached during the pump flow, the original request is cancelled.

Anzeige: Pumpenvorlauf
Sperre

minimum pause time

To ensure sufficient pressure equalisation in the refrigeration circuit and to contactor the heat pump, it can take up to 5 minutes for the compressor to switch on again. The heat pump starts after the minimum pause time has elapsed in order to fulfil a pending request. The minimum pause time cannot be bypassed.

Anzeige: Mindeststandzeit
Sperre

line load

The grid switch-on load is a requirement of the energy supply companies. This can last up to 200 seconds after voltage recovery or after a utility block. The line load cannot be bypassed.

Anzeige: Netzbelastung
Sperre

switch cycle block

According to the connection conditions of the energy supply companies, a heat pump compressor may only switch on 3 times per hour. The heat pump manager will only allow the compressor to switch on every 20 minutes at most.

It is possible to bypass the switch cycle block for test purposes. This can be done in the menu "Special functions - Quick start", the value must be set to "Yes". The switch cycle block is then ignored once and the value is automatically reset to "No".

In the "Settings - Heat pump - Switch cycle block" menu, this can be set from "fixed" to "flexible". In the case of 2-compressor heat pumps, this has the effect of switching on the 2nd compressor more quickly for domestic hot water and swimming pool preparation and after a utility block, if possible.

Anzeige: Schaltspielsperre
Sperre

renewable

The "Bivalent-renewable" operating mode was selected in the preconfiguration. The "Block renewable" is active, as the temperature detected by sensor R13 in the storage tank renewable has an excess temperature by the set amount in order to process the current demand (heating, domestic hot water or swimming pool).

Anzeige: Regenerativ
Sperre

UTILITY COMPANY

There is a "utility link block" or link cable A1 (ID3) is not inserted.

The heat pump starts after the utility company shut-off time has expired. The utility block is specified by the energy supply company and lasts up to two hours, depending on the energy supply company. Activation or deactivation is carried out by the energy supply company.

Various disable functions can be triggered for bivalent systems via the utility company disable contactor ID3.
The setting is made in the "Settings - 2nd heat generator" menu.

Anzeige: EVU
Sperre

Performance level 3 only

- In monovalent and monoenergetic heat pump heating systems, the heat pump, the immersion heater and the flange and pipe heating are always blocked during a utility block, even in performance level 3
- In the case of bivalent heat pump heating systems, the oil or gas boiler is always in operation during a utility block in performance level 3.

Permanent

- In monovalent and monoenergetic heat pump heating systems, the heat pump, immersion heater and flange and pipe heating are always blocked during a utility block
- In the case of bivalent heat pump heating systems, the oil or gas boiler is enabled during a utility block in the event of a heat demand or domestic hot water preparation.

Limit temperature dependent

- In monovalent and monoenergetic heat pump heating systems, the heat pump, immersion heater and flange and pipe heating are always blocked during a utility block
- In bivalent heat pump heating systems, the oil or gas boiler is always enabled below the set limit temperature during the utility block for a heat request or domestic hot water preparation.

> **NOTE**
> During a utility block, frost protection must be ensured by operating the heat circulating pumps, as the heat pump must not start. The heat pump manager must not be blocked!

External block

There is an "External block" or link cable A2 (ID4) is not inserted.

In the "Settings - System" menu, the ID4 input can be assigned one of the following functions:

- frost protection
- Domestic hot water block
- Holidays
- Summer

be assigned.

Anzeige: Extern
Sperre

NOTE
If the External "frost protection" block is activated, the heat pump switches off. The return temperature is set to the minimum return temperature for frost monitoring as in "Summer" operating mode.

operating mode	Summer / external block	Automatic
Brine-to-water or water-to-water heat pump	10 °C	15 °C
air-to-water heat pump	15°C	18°C

Domestic hot water preparation (WPM)

For domestic hot water preparation, domestic hot water cylinders with sufficiently large heat exchange surfaces must be used, which are capable of permanently transferring the maximum heat output of the heat pump.

Control is via a sensor (R3) installed in the domestic hot water cylinder, which is connected to the heat pump manager.

The achievable temperatures in pure heat pump operation are below the maximum flow temperature of the heat pump.

For higher hot water temperatures, the heat pump manager offers the option of controlling a flange heater.

Alternatively, it can be controlled via a thermostat. In this application, targeted reheating via a flange heater is not possible.

Basic heating

A domestic hot water request is recognised if the current ***domestic hot water temperature < domestic hot water set temperature - hysteresis hot water***.

A hot water request is terminated when the domestic hot water set temperature or the heat source-dependent determined WP maximum temperature is reached.

NOTE
Domestic hot water preparation can be interrupted by a defrosting process or by the high pressure protection programme.

Menu	Submenu	Setting value
preconfiguration	domestic hot water preparation	Yes with sensor
preconfiguration	flange heater	No

Achievable hot water temperatures

The maximum hot water temperature that can be reached in pure heat pump operation depends on:

- the heat output of the heat pump
- the heat exchanger surface installed in the storage tank and
- the volume flow as a function of the pressure drop and flow rate of the circulation pump.

Heat source-dependent hot water temperatures

The heat pump manager automatically determines the maximum possible hot water temperature, which is referred to as the heat pump maximum temperature.

WP maximum temperature depends on the current temperature of the existing heat source air, brine or water. In order to always achieve the maximum possible hot water temperature, the permissible range of the heat source temperature is divided into temperature ranges.

Each range has a specific maximum heat pump temperature; the default value for each maximum heat pump is 65 °C.

If the high pressure switch responds during domestic hot water preparation with the heat pump, the current heat source temperature is recorded and the corresponding heat pump maximum temperature is determined as follows:
1 K is subtracted from the currently measured hot water temperature and saved as the HP maximum temperature.

reheating

Reheating means that the heat pump takes over domestic hot water preparation until the maximum heat pump temperature is reached. Another heat generator then takes over domestic hot water preparation until the desired domestic hot water set temperature is reached. Reheating is only active if the desired set temperature is greater than the current maximum DHW temperature.

Reheating is started when

- the hot water temperature is above the maximum temperature that can be achieved with the heat pump.

If the hot water temperature falls below the domestic hot water set temperature during reheating - hysteresis DHW, reheating is stopped and basic heating via the heat pump is started.

The selection of the respective heat generator for hot water generation depends on the operating mode of the heat pump heating system, the configurations and the current status of the system.

Reheating must be enabled in the *"Settings - Domestic hot water reheating"* menu.

Menu	Submenu	Setting value
preconfiguration	domestic hot water preparation	Yes with sensor
preconfiguration	flange heater	Yes
Settings	Domestic hot water reheating	Yes

thermal disinfection

A start time is specified for thermal disinfection. When thermal disinfection is started, an attempt is made to reach the set temperature immediately. The selection of the hot water generator used for this depends on the operating mode of the heat pump heating system, the
configurations and the current status of the system. Thermal disinfection is ended when the set temperature has been reached.

To enable the thermal disinfection setting menu, a bivalent heating system must be selected in the preconfiguration. and/or flange heater must be set to "Yes".

NOTE
If the set temperature has not been reached after 4 hours, thermal disinfection is cancelled. The set start time can be activated or deactivated individually for each weekday.

block

A domestic hot water block can be set for two different times and weekdays in the *"Settings - Domestic hot water - Block"* menu. Despite a domestic hot water block, a minimum hot water temperature can be set for comfort purposes. The minimum domestic hot water temperature is always maintained during a hot water block. A hot water request is made when the temperature falls below the minimum hot water temperature hysteresis.

2nd heat generator (WPM)

Control of immersion heaters

Auxiliary electric heaters are used in monoenergetic systems. These are switched on or off depending on the heat demand if the operating mode
"Monoenergetic" is selected and the temperature falls below the set limit temperature.

Control of pipe heating

An electric pipe heating system can be used in monoenergetic systems. The electric pipe heating is selected in the "*Preconfiguration - Electric heating - Pipe heating heating/DHW/DHW*" and switched on or off as required in heating, domestic hot water or swimming pool mode.

Constantly controlled boiler

With this type of boiler, the boiler water is always heated up to a fixed set temperature (e.g. 70 °C) when enabled by the heat pump manager. The set temperature must be set high enough so that domestic hot water preparation can also be carried out via the boiler if required. The mixer is controlled by the heat pump manager, which requests the boiler as required and adds enough hot boiler water to reach the desired return setpoint or hot water temperature. The boiler is requested via the 2nd heat generator output of the heat pump manager and the operating mode of the 2nd heat generator is set.
heat generator must be coded to "constant".

Gliding controlled boiler

In contrast to a constantly controlled boiler, the gliding controlled boiler directly supplies the heating water temperature corresponding to the outside temperature. The 3-way reversing valve has no control function, but only the task of passing the heating water flow past the boiler circuit or through the boiler, depending on the operating mode.

In pure heat pump operation, the heating water is routed past the boiler in order to avoid losses due to heat radiation from the boiler. If a weather-compensated burner control system is already installed, the voltage supply to the burner control system must be switched off for heat pump operation only.
be interrupted. For this purpose, the control of the boiler must be connected to the 2nd heat generator output of the heat pump manager and the operating mode of the 2nd heat generator must be coded to "gliding". The characteristic curve of the burner control is set accordingly for the heat pump manager.

Special program for older boilers and central storage systems

If the second heat generator has been requested and the so-called special program has been activated in the "*Settings - 2nd heat generator*" menu, the 2nd heat generator remains in operation for at least 30 hours. If the heat demand decreases during this time, the second heat generator goes into "standby mode" (2nd heat generator energised, but mixer CLOSED). It is only switched off completely if there is no demand on the second heat generator for 30 hours.
2nd heat generator is present.

This function can be used for bivalent systems as follows:

1. For older oil or gas boilers, to prevent corrosion damage due to frequent drops below the dew point.
2. For central storage systems, to ensure that the storage tank is charged for the following day regardless of the current heat demand.

Bivalent-parallel

The "Parallel limit temperature" is defined in the "*Settings - 2nd heat generator"*. If the temperature falls below the limit temperature in parallel, the heat pump and the 2nd heat generator are requested in parallel if required.

Bivalent-alternative

The "Alternative limit temperature" is defined in the *"Settings - 2nd heat generator"*. If the temperature falls below the alternative limit temperature, the heat pump is blocked and the 2nd heat generator is enabled for heating and domestic hot water preparation.

> **NOTE**
> If alternative rather than parallel operation is required, the alternative and parallel limit temperatures must have the same value.

Renewable (WPM)

When integrating a renewable heat source (e.g. solar, wood), this must be prioritised over the operation of the heat pump. For this purpose, the preconfiguration is coded to bivalent-renewable. As long as the renewable storage tank is colder, the system behaves like a monoenergetic system.
The sensor of the renewable storage tank is connected to the analogue input N1-B8. The mixer outputs of the bivalent mixer are active.

> **NOTE**
> For heat pumps without an integrated flow sensor, this must be retrofitted (N1-B5).

Basic function:

The temperature in the renewable storage tank is recorded and compared with the flow temperature of the corresponding requirement (domestic hot water, heating or swimming pool). If the temperature is above the conditions listed below, the heat pump is blocked, the renewable storage tank is used as a 2nd heat generator and the bivalent mixer is activated accordingly.

Block due to heating request:

If the temperature in the storage tank is 2-20 K higher than the current flow temperature, the heat pump is blocked if there is a heating requirement. It is only enabled again when the difference between the renewable storage tank and the flow is less than half the switching value.

> **NOTE**
> For solar integration, the adjustable excess temperature should be set to the maximum value to prevent the heat pump from cycling.

Block due to hot water request:

If the temperature in the storage tank is 2-5 K higher than the current hot water temperature, the heat pump is blocked if there is a hot water demand. It is only enabled again when the difference between the renewable storage tank and domestic hot water is less than half the switching value.

Block due to swimming pool request:

If the temperature in the storage tank is higher than 35 °C (value can be set in the menu - Settings - 2nd heat generator excess temperature of 10-50 °C), the heat pump is blocked if there is a swimming pool requirement. It is only released when the temperature in the parallel buffer is 5 K below the switching temperature again. As soon as one of the three blocks described is present, the heat pump is blocked; the display shows: Heat pump waiting, block BR. The 2nd heat generator output is not activated.

Mixer control:

If there is no block via bivalent-renewable, the mixer is controlled for duration CLOSED.

If there is a bivalent-renewable block due to domestic hot water or a swimming pool, the mixer is permanently OPEN.

If there is a bivalent-renewable block due to heating, the mixer control becomes active.

Power control (WPM)

The heat pump manager defines a maximum of 3 performance levels L1, L2 and L3, which it switches depending on the heat demand. As heat demand increases, the system switches to the next higher level, while
If the heat demand falls, the system switches to the next lower performance level. L1:

Heat pump runs with one compressor

L2: Heat pump runs with two compressors

L3: Heat pump running and 2nd heat generator active (not for monovalent systems)

- After commissioning or after a power failure, the heat pump manager always starts in performance level L1.
- The performance levels are not redefined during defrost end, swimming pool water preparation, hot water request or during a utility company block.

Heat pumps with one compressor

Criteria for switching:

- from L1 to L3 if the heat pump manager demands "more heat" for longer than 60 min and at the same time the outside temperature is below the limit temperature of the 2nd heat generator for longer than 60 minutes
- from L3 to L1 if the heating controller calls for "less heat" for longer than 15 minutes or the limit temperature is exceeded.

Heat pumps with two compressors

Criteria for switching:

- from L1 to L2 if the heat pump manager requests "more heat" for longer than 25 min,
- from L2 to L3 if the heat pump manager demands "more heat" for longer than 60 min and at the same time the outside temperature is below the limit temperature for longer than 60 minutes,
- from L3 to L2 or L1 if the heat pump manager requests "less heat" for longer than 15 min or the limit temperature is exceeded,
- from L2 to L1 if the heat pump manager calls for "less heat" for longer than 15 min.

In performance level L1, a compressor of the heat pump is switched on or off according to the "more" or "less" signals from the heat pump manager. In stage L2, one compressor of the heat pump runs continuously to cover the base load. The second compressor is switched on or off according to the "more" or "less" signals from the heat pump manager. In stage L3, both compressors run continuously to cover the increased base load, the second heat generator is controlled. Only one compressor runs at a time during the defrost end.

performance level	Heat pump with one compressor	Heat pump with two compressors
Level L1	Only one compressor cycling	Only one compressor cycling
Level L2	-	1 compressor base load, 1 compressor cycling
Level L3	a compressor and second heat generator, if necessary	Both compressors and second heat generator
defrost	Compressor running	a compressor is running
Domestic hot water heating	Compressor running	run on depending on the outside temperature or two compressors
Swimming pool water heating	Compressor running	run on depending on the outside temperature or two compressors

High temperature air-to-water heat pumps

At outside temperatures above 10 °C, only 1. compressor is generally running. If the outside temperature is below 10 °C and the flow temperature is higher than 50 °C, both compressors are enabled:

The 1st compressor is switched on first, followed shortly afterwards by the 2nd compressor. If the request disappears or a block becomes active, both compressors are switched off together.

With regard to the performance level, the high temperature heat pump behaves like a 1. compressor heat pump in this temperature range, regardless of the selection in the Configuration menu, i.e. there is no performance level 2.

If the above conditions for switching to performance level 3 are met, the 2nd heat generator is enabled.

Hysteresis (WPM)

In the "*Settings*" menu, the so-called hysteresis can be set for various requirements. The hysteresis forms a "neutral zone" around the corresponding set temperature. If the current temperature is lower than the set temperature reduced by the hysteresis, a request is recognised. This remains until the current temperature has exceeded the upper limit of the neutral zone. This results in a switching cycle around the setpoint.

Return set temperature hysteresis

A hysteresis around the return set temperature can be set for the heating request.

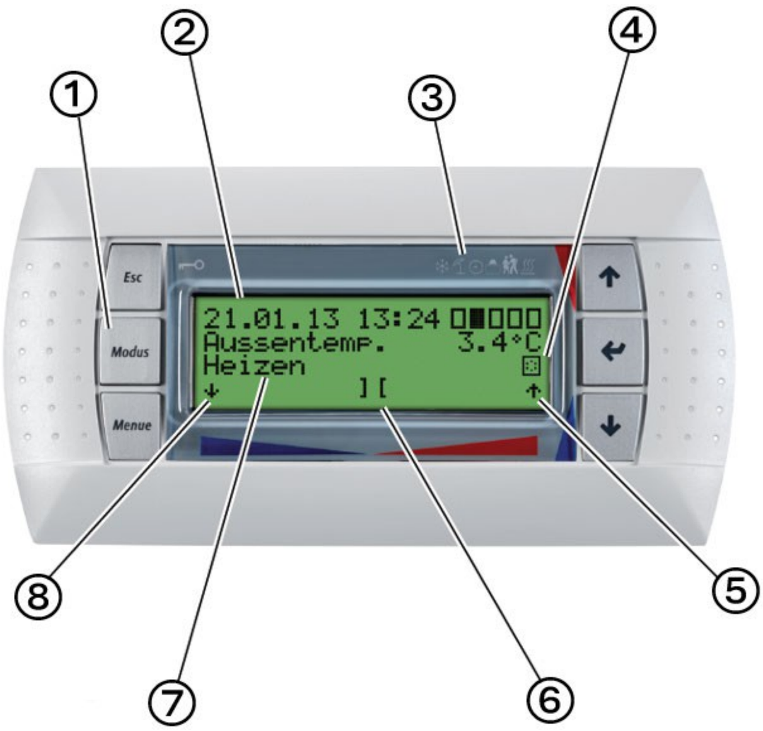
If the hysteresis is large, the heat pump runs for longer, whereby the temperature fluctuations in the return are correspondingly large. If the hysteresis is small, the compressor running times are reduced and the temperature fluctuations are smaller.

> **NOTE**
> For panel heating systems with relatively flat characteristic curves, a hysteresis of approx. 1 K should be set, as too large a hysteresis can prevent the heat pump from switching on.

10.5.4 Operation/operator display (WPM)

LC display with button operation (pGD0)

- The heat pump manager is operated using 6 push buttons: ESC, Mode, Menu ↑, ↓, ←. Depending on the current display (standard or menu), different functions are assigned to these buttons.
- The operating status of the heat pump and heating system is shown in plain text on the 4 x 20 character LC display (heat pump manager WPM 2007 plus). 6 different operating modes can be selected:
  Cooling, summer, winter, party, holiday, 2nd heat generator, automatic.
- The menu consists of 3 main levels:
  Settings, Operating data, History



Operating button

② 4 × 20 character display; backlit

③ Operating mode symbols

④ Other heat generators (as symbols)

⑤ Raise active

⑥ warmer/colder; room setpoint, fixed value temperature (line 4)

⑦ Status display WP (line 1, 2, 3)

⑧ Lowering active Touch

display (pGDx) Home

view

43 Home screen with language and user selection

Access to the display and control unit is gained by selecting the desired user group and then confirming the red login symbol.

- Operator
- Specialist
- Service

Depending on the selected user group, a password may need to be entered to gain access.

NOTE

If no language and user selection is possible, the touch display is still in start mode.

Display and control unit

44 Operator view

The display and control unit can be used to make the settings and view the displays required for operation. The settings and displays are divided into different user groups.

- Operator
- Specialist
- Service

Access to the user groups is selected via the start screen. Depending on the user group and setting value, there are different options for changing the value.

Main menu

The main menu consists of 5 operating levels. Access to the individual operating levels is granted depending on the selected user group. The red symbol takes you back to the home screen with login.

	At home	System status, operating mode, settings for the operator
	Analytics	System data, operating data, Runtimes, quantities of thermal energy, inputs and outputs
	Settings	Date and time, language and region, screen, Home app
	Installation	Initial heating programs, system setup, function locks, EasyOn
	Home view	Login

At home

All the displays and settings required by the operator are clearly displayed in the "At home" menu. In particular, the operating mode, set temperatures and weekly profiles can be easily changed here.

45 View at home

Analytics

The "Analytics" menu displays all current and historical quantities of thermal energy, runtimes and operating data, as well as the states of the inputs and outputs are made available.

46 Analytics overview

Settings

In the "Settings" menu, all system parameters as well as those relevant for the display and accessories are set.
Settings made.

47 Overview of settings

Installation

In the "Installation" menu, an initial heating program can be activated after successful commissioning or the guided commissioning "EasyOn" can be restarted.

48 Installation overview

Login

A password must be entered to access the specialist and service area. The password is requested after selection of the user group and subsequent confirmation of the login symbol.

49 Selection of the user group

50 Password entry for the expert

Once you have successfully entered the password and confirmed it by pressing the Enter key, you will automatically be taken to the specialist's homepage.

51 Home Specialist

10.5.5 Temperature sensor (WPM)

Depending on the heat pump type, the following temperature sensors are already installed or must be installed additionally:

NTC-2 sensor:

- Outdoor temperature sensor (R1)

NTC-10 sensor

- 1., 2. and 3. heating circuit temperature sensor (R2, R5 and R13)
- Flow sensor (R9), as frost protection sensor for air-to-water heat pumps
- Outlet temperature heat source for brine-to-water and water-to-water heat pumps
- Hot water temperature sensor (R3)
- Regenerative storage tank temperature sensor (R13)

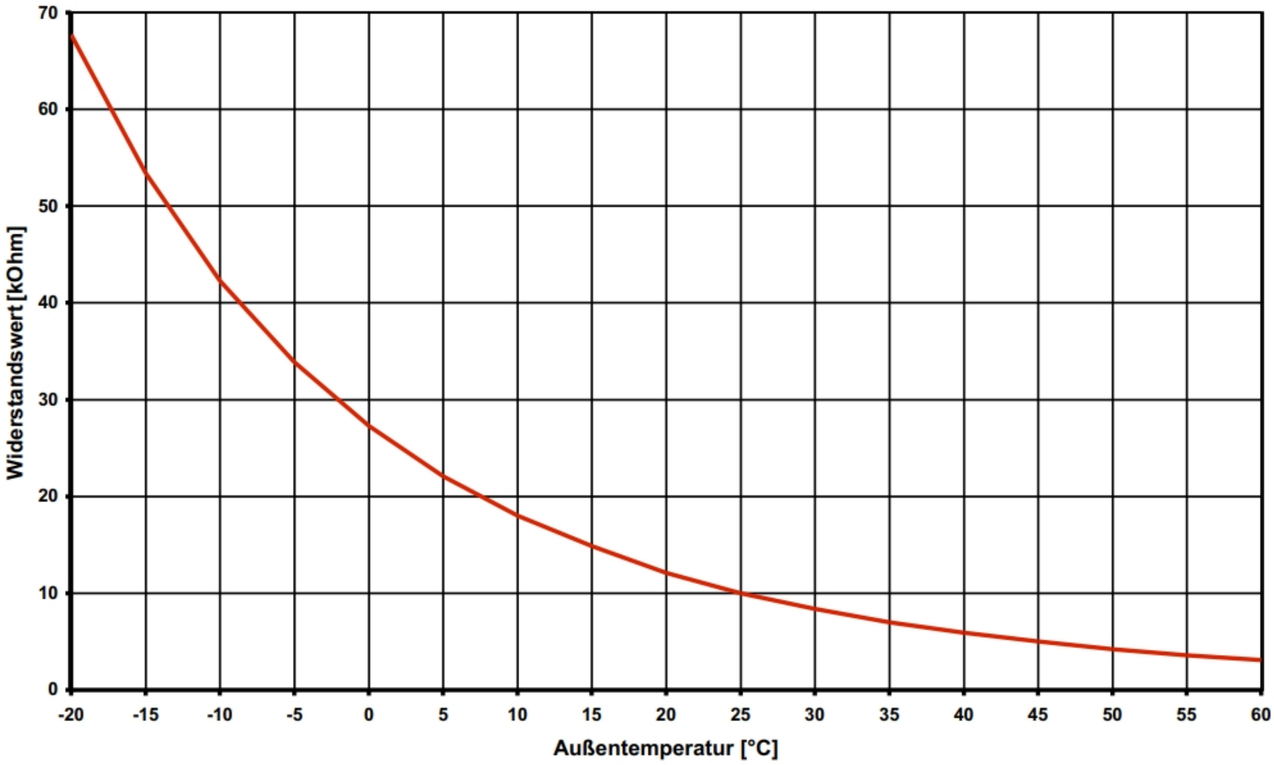
Sensor characteristics

Temperature in °C	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55	60
NTC-2 in kΩ	14,6	11,4	8,9	7,1	5,6	4,5	3,7	2,9	2,4	2,0	1,7	1,4	1,1	1,0	0,8	0,7	0,6
NTC-10 in kΩ	67,7	53,4	42,3	33,9	27,3	22,1	18,0	14,9	12,1	10,0	8,4	7,0	5,9	5,0	4,2	3,6	3,1

Heating controller with removable control panel

52 Removable control panel

The temperature sensors to be connected to the heating controller with removable control panel must correspond to the sensor characteristic shown in the illustration. The only exception is the outdoor temperature sensor included in the scope of supply of the heat pump.



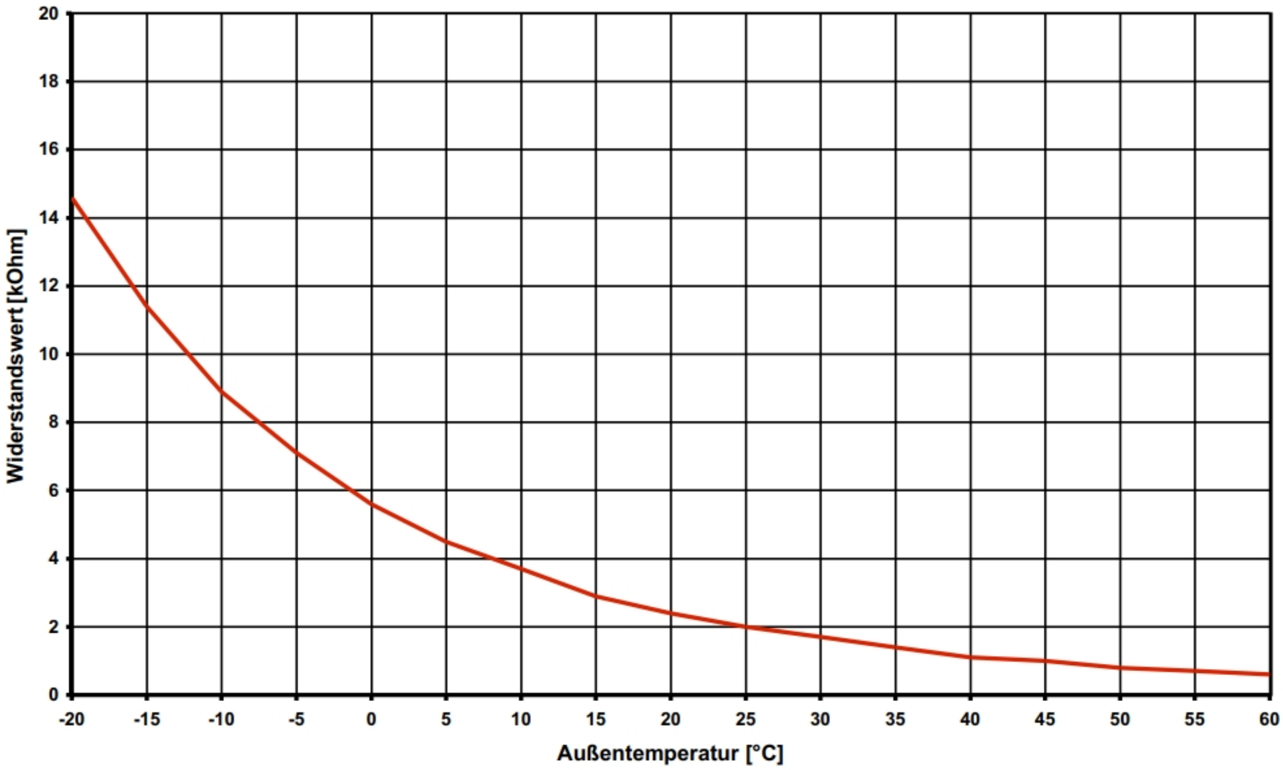
53 Sensor characteristic NTC-10 for connection to the heating controller

The only exception is the outdoor temperature sensor (NTC-2) included in the scope of supply of the heat pump

Mounting the outdoor temperature sensor

The temperature sensor must be installed in such a way that all weather influences are recorded and the measured value is not falsified.

- on the outside wall, preferably on the north or north-west side
- Do not install in a "protected position" (e.g. in a recess in the wall or under the balcony)
- Do not install near windows, doors, exhaust air openings, outdoor lights or heat pumps
- Do not expose to direct sunlight at any time of the year



54 Sensor characteristic NTC-2 according to DIN 44574

Sensor cable dimensioning parameters	
conductor material	Cu
cable length	50 m
ambient temperature	35 °C
Laying method	B2 (DIN VDE 0298-4 / IEC 60364-5-52)
external diameter	4-8 mm

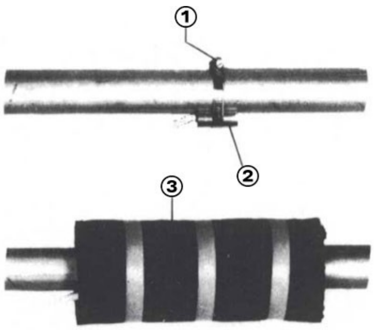
Mounting the contact sensors

It is only necessary to install the contact sensors if they are included in the scope of supply of the heat pump but are not installed.

The contact sensors can be mounted as pipe contact sensors or inserted into the immersion sleeve of the compact manifold.

Mounting as pipe system sensor:

- Clean paint, rust and scale from the heating pipe
- Coat the cleaned surface with heat-conducting paste (apply a thin layer)
- Fasten sensor with hose clip (tighten well, loose sensors lead to malfunctions) and insulate thermally



① Hose clip

② Contact sensor

③ Thermal insulation

Hydraulic distribution system

The double differential pressureless manifold [DDV] acts as an interface between the heat pump, the heating distribution system, the buffer tank and possibly also the domestic hot water cylinder. Instead of many individual components, a compact system is used to simplify installation.

Double differential pressureless manifold [DDV]
The return sensor must be installed in the immersion sleeve of the differential pressureless manifold so that the heating circuit pumps of the generator and consumer circuits can flow through it.

10.5.6 Electrical connection work (WPM Econ5 / Econ5Plus)

General

All electrical connection work may only be carried out by an electrician or a specialist for defined activities in compliance with the

- Assembly and operating instructions
- Country-specific installation regulations e.g. VDE 0100
- technical connection conditions of the energy supplier and supply network operators (e.g. TAB) and
- local conditions

be carried out.

To ensure the frost protection function, the heat pump manager may only be de-energised for a short time and the heat pump must be flowing.
On the heat pump, all supply lines must be fed into the junction box through the free membranes provided for this purpose.

Electrical connection work WPM Econ5

F2 Load fuse for plug-in terminals J12; J13 J21 5x20 / 4.0 AT

F3 Load fuse for plug-in terminals J15 to J18 and J22 5x20 / 4.0 AT

F2.1 Heat pump fuse N1

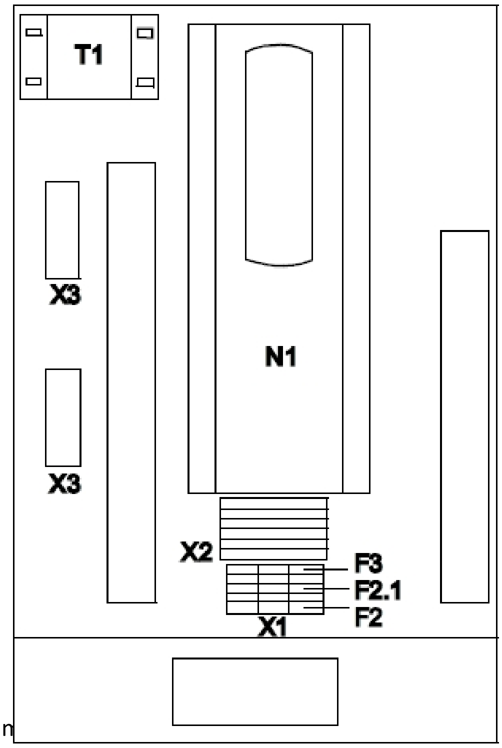
Controller

T1 Safety transformer 230 / 24 V AC X1

Terminal strip power supply

X2 Terminal strip voltage = 230 V AC

X3 Terminal strip extra low voltage < 25 V AC



1. The up to 5-core electrical supply cable for the power section of the heat pump is routed from the heat pump's electricity meter via the utility company blocking contactor (if required) to the heat pump (for supply voltage, see heat pump instructions). In the power supply for the heat pump, an all-pole switch off with at least 3 mm contact opening distance (e.g. utility company blocking contactor, contactor), as well as an all-pole automatic circuit breaker with comn current and characteristics according to device information).
2. The three-core electrical supply cable for the heat pump manager (heating controller N1) is routed into the heat pump (devices with integrated controller) or to the subsequent installation location of the heat pump manager (WPM). The supply line (L/N/PE~230 V, 50 Hz) for the WPM must be at continuous voltage and for this reason must be tapped before the utility company blocking contactor or connected to the household current, as otherwise important protective functions will be out of operation during the utility block.
3. The utility company blocking contactor (K22) with 3 main contacts (1/3/5 // 2/4/6) and one auxiliary contact (NO contact 13/14) must be designed according to the heat pump output and provided by the customer. The NO contact of the utility company blocking contactor (13/14) is looped from terminal strip X3/G to plug terminal N1-J5/ID3. CAUTION! Extra low voltage!
4. The contactor (K20) for the immersion heater (E10) in monoenergetic systems (HG 2) must be designed according to the heater output and provided by the customer. The control (230 V AC) is carried out from the heat pump manager via terminals X1/N and N1-J13-NO4.
5. The contactor (K21) for the flange heater (E9) in the domestic hot water cylinder must be designed according to the radiator output and provided by the customer. The control (230 V AC) is carried out from the WPM via terminals X1/N and N1/J13-NO5.
6. The contactors for points 3;4;5 are installed in the electrical distribution system. The mains cables for the radiators must be designed and fused in accordance with DIN VDE 0100.
7. The heat circulating pump (M13) is connected to terminals X1/N and N1/J13-NO5.
8. The domestic hot water circulating pump (M18) is connected to terminals X1/N and N1/J13-NO6.
9. In air-to-water heat pumps for outdoor installation, the return sensor is integrated and is routed to the heat pump manager via the control cable. When using a differential pressureless [DDV] manifold, the return sensor can be installed in the immersion sleeve in the manifold or as a contact sensor at the outlet of the buffer. The individual wires are connected to terminals N1-J2/U2 and to X3/GND.
10. The external sensor (R1) is connected to terminals X3/GND (Ground) and N1/J2-U1.

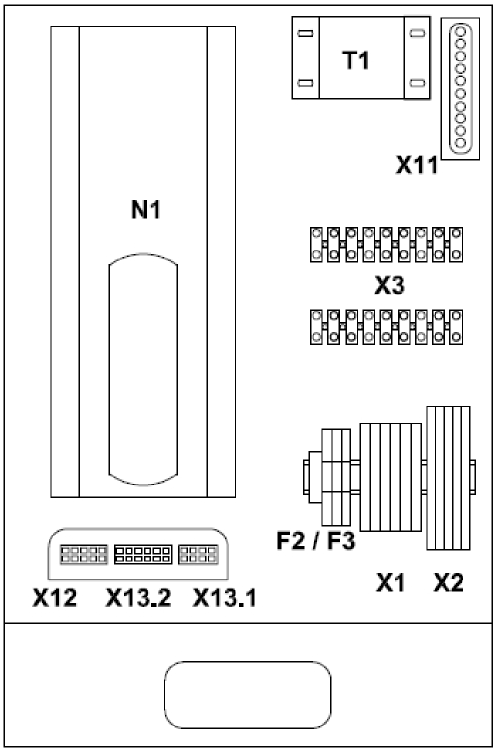
11. The domestic hot water sensor (R3) is installed in the domestic hot water cylinder and is connected to terminals X3/GND (Ground) and N1/J2-U3.

> **NOTE**
> When using three-phase pumps, a power contactor can be controlled with the 230 V output signal of the heat pump manager. Sensor cables can be extended up to 50 m in compliance with the dimensioning parameters.

> **NOTE**
> Further information on wiring the heat pump manager can be found in the electrical documentation.

> **CAUTION**
> The communication cable is essential for the operation of air/water heat pumps installed outdoors. It must be shielded and laid separately from load lines. It is connected to N1-J25. For further information, see electrical documentation.

Electrical connection work WPM Econ5Plus



F2 Load fuse for plug-in terminals J12; J13 J21 5x20 / 4.0 AT

F3 Load fuse for plug-in terminals J15 to J18 and J22 5x20 / 4.0 AT

N1 Controller

T1 Safety transformer 230 / 24 V AC X1

Terminal strip power supply

X2 Terminal strip voltage = 230 V AC

X3 Terminal strip extra low voltage < 25 V AC

X11 Module connection plug

X12 Plug connecting cable controller - heat pump 230 V AC X13.1 Plug

connecting cable controller - heat pump < 25 V AC X13.2 Plug

connecting cable controller - heat pump < 25 V AC

1. The up to 5-core electrical supply cable for the power section of the heat pump is routed from the heat pump's electricity meter via the utility company blocking contactor (if required) to the heat pump (for supply voltage, see heat pump instructions). In the power supply for the heat pump, an all-pole switch off with at least 3 mm contact opening distance (e.g. utility company blocking contactor, contactor), as well as an all-pole automatic circuit breaker with common tripping of all phase conductors (tripping current and characteristics according to device information).

2. The three-core electrical supply cable for the heat pump manager (heating controller N1) is routed into the heat pump (devices with integrated controller) or to the subsequent installation location of the heat pump manager (WPM). The supply line (L/N/PE~230 V, 50 Hz) for the WPM must be at continuous voltage and for this reason must be tapped before the utility company blocking contactor or connected to the household current, as otherwise important protective functions will be out of operation during the utility block.
3. The utility company blocking contactor (K22) with 3 main contacts (1/3/5 // 2/4/6) and one auxiliary contact (NO contact 13/14) must be designed according to the heat pump output and provided by the customer. The NO contact of the utility company blocking contactor (13/14) is looped from terminal strip X3/G to plug terminal N1-J5/ID3. CAUTION! Extra low voltage!
4. The contactor (K20) for the immersion heater (E10) in monoenergetic systems (HG 2) must be designed according to the heater output and provided by the customer. The control (230 V AC) is carried out from the heat pump manager via terminals X1/N and N1-X2/K20.
5. The contactor (K21) for the flange heater (E9) in the domestic hot water cylinder must be designed according to the radiator output and provided by the customer. The control (230 V AC) is carried out from the WPM via terminals X2/N and N1-X2/K21.
6. The contactors for points 3;4;5 are installed in the electrical distribution system. The mains cables for the radiators must be designed and fused in accordance with DIN VDE 0100.
7. The heat circulating pump (M13) is connected to terminals X2/N and N1-X2/M13.
8. The domestic hot water circulating pump (M18) is connected to terminals X2/N and N1-X2/M18.
9. In air-to-water heat pumps for outdoor installation, the return sensor is integrated and is routed to the heat pump manager via the control cable. Only when using a double differential pressureless manifold must the return sensor be installed in the immersion sleeve in the manifold. The individual wires are then connected to terminals X3/GND and X3/R2.1. The link cable A-R2, which is located between X3/U2 and X3/1 on delivery, must then be moved to terminals X3/1 and X3/2.
10. The external sensor (R1) is connected to terminals X3/GND (Ground) and N1-X3/R1.
11. The domestic hot water sensor (R3) is installed in the domestic hot water cylinder and is connected to terminals X3/GND (Ground) and N1-X3/R3.

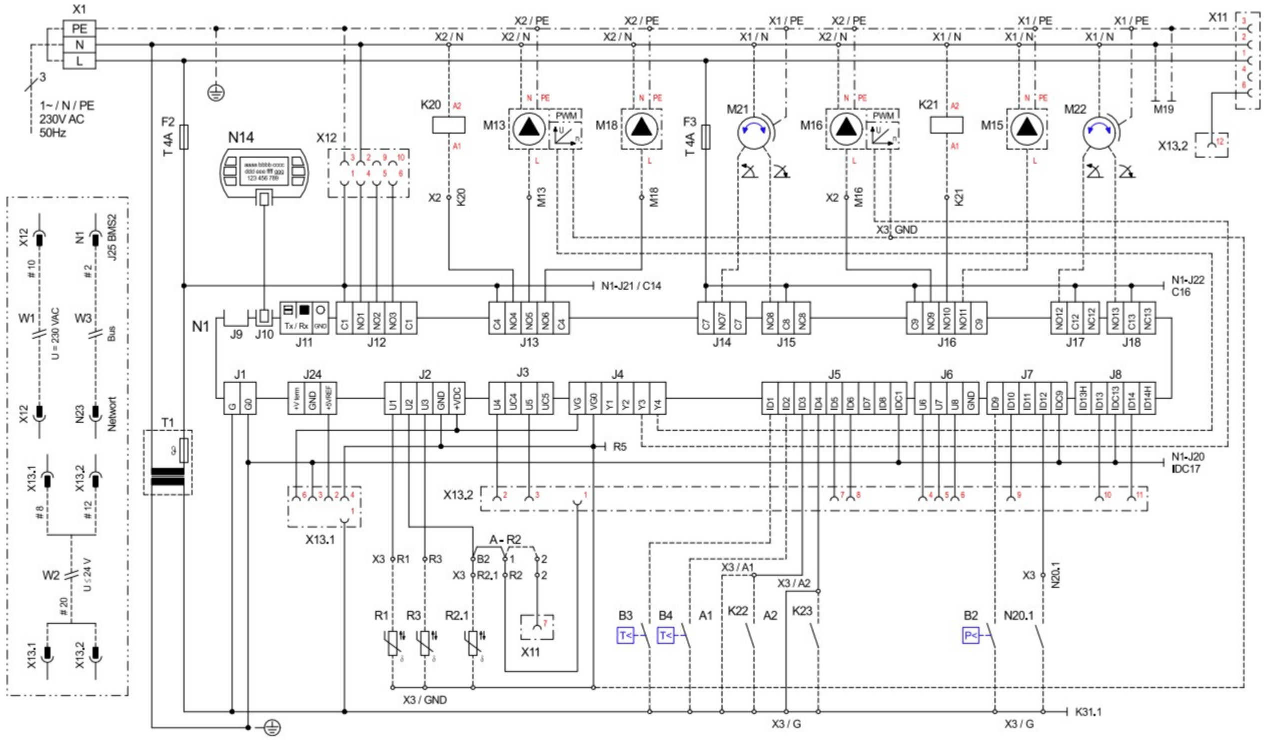
CAUTION

The control cable is a functionally essential accessory for air-to-water heat pumps installed outdoors. The control cable and mains cable must be laid separately. An on-site extension of the control cable is not permitted.

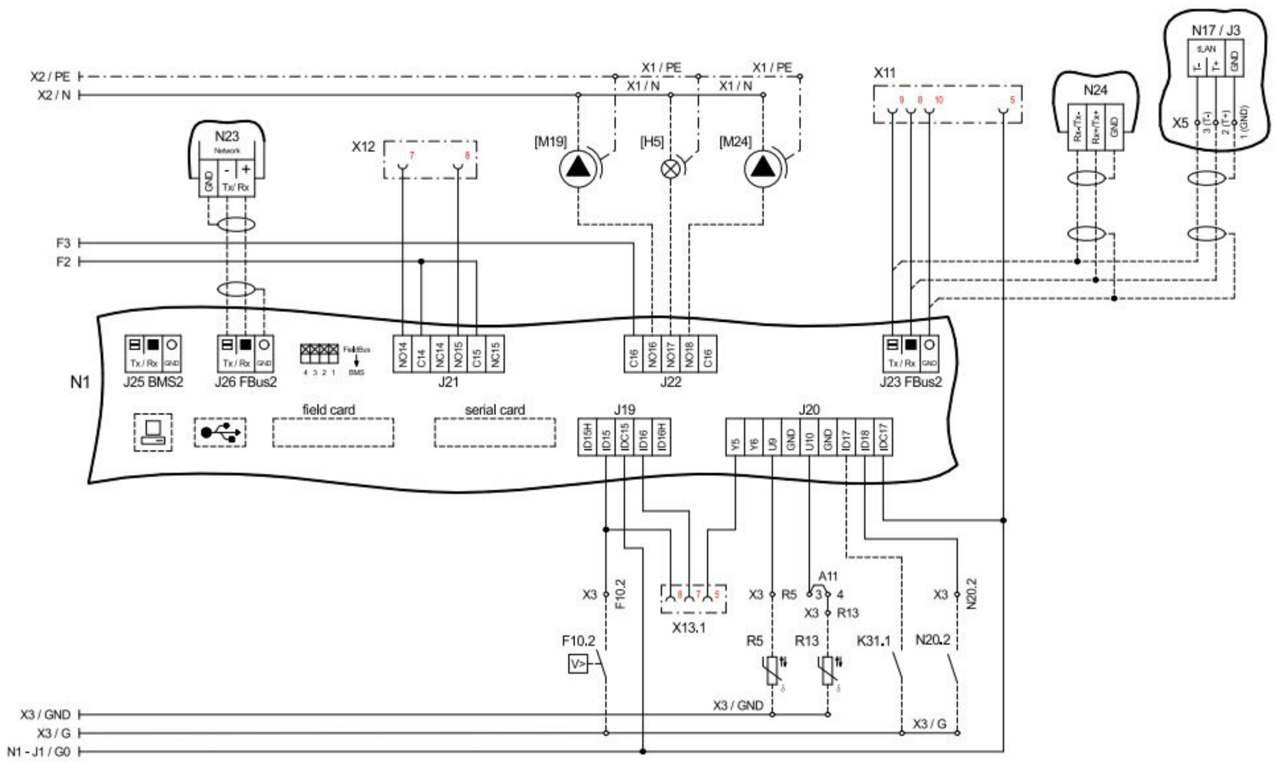
NOTE

When using three-phase pumps, a power contactor can be controlled with the 230 V output signal of the heat pump manager. Sensor cables can be extended up to 40 m with 2 x 0.75 mm cables.

10.5.7 Circuit diagram WPM Econ5Plus



55 Connection diagram of the wall-mounted heat pump manager WPM Econ5Plus



56 Connection diagram for additional function of the wall-mounted heat pump manager WPM Econ5Plus

Legend for circuit diagram

No.	Designation
A	**Link cables**
A1	Utility link cable: must be inserted if there is no utility block contactor (contact open = utility block).
A2	Link cable block: must be removed if the input is used (input open = WP blocked)
A11	Solar link cable: if a solar module is used, the link cable must be removed and the terminals connected to the solar module.
A-R2	Link cable return sensor: - must be relocated if DDV is used. New terminal points: X3/1 and X3/2
B	**Auxiliary switch**
B2*	Pressure switch low pressure brine
B3*	Domestic hot water thermostat
B4*	Swimming pool water thermostat
E	**Heating, cooling and auxiliary units**
E9*	Electric flange heater (domestic hot water)
E10*	2nd heat generator
F	**Security organisations**
F2	Load fuse N1 for plug-in terminals J12; J13 and J21, 5x20 / 4.0 AT
F3	Load fuse N1 for plug-in terminals J15 to J18 and J22, 5x20 / 4.0 AT
F4	Pressure switch - high pressure
F5	Pressure switch - low pressure
F6	Brine limit protection thermostat
F7	Safety temperature monitor
F10	flow rate switch
F10.2*	Flow rate switch secondary circuit
F21.1	Load fuse N17, 5x20 / 4.0 AT
F23	Motor protection M1 / M11
[H5]*	Remote fault indicator light
K	**Contactors, relays, contacts**
K1	Contactor compressor 1.

No.	Designation
K1.1	Compressor 1. starting contactor
K1.2	Time relay compressor 1.
K2	Contactor (relay) Fan 1.
K3	Contactor compressor 2
K3.1	Compressor 2 starting contactor
K3.2	Time relay compressor 2
K4	Contactor fan 2
K5	Primary pump contactor - M11
K6	Primary pump contactor 2- M20
K8	Contactor / Relay auxiliary heater
K9	Coupling relay 230V/24V for defrost end or brine limit protection
K20*	2nd heat generator contactor E10
K21*	Electrical flange heater contactor (domestic hot water) E9
K22*	Utility company blocking contactor
K23*	Auxiliary relay for disable contactor
K28*	External switching operating mode cooling
K31.1	Domestic hot water circulation requirement
M	**Motors**
M1	Compressor 1.
M2	fan
M3	Compressor 2
M13*	heat circulating pump
M14*	Heat circulating pump 1. heating circuit 1.
M15*	Heat circulating pump 2nd / 3rd heating circuit
M16*	auxiliary circulating pump
M17*	cooling circulating pump
M18*	domestic hot water circulating pump
[M19]*	Swimming pool water circulation pump
[M20]*	Heating pump 3rd heating circuit
M21*	Mixer main circuit or 3rd heating circuit

No.	Designation
M22*	Mixer 2nd heating circuit
[M24]	Domestic hot water circulation pump
N	**Control elements**
N1	controller
N3	Indoor climate - Station1
N4	Indoor climate - Station2
N5	dew point monitor
N9	room temperature controller
N14	control panel
N17.1	General cooling" module
N17.2	Active cooling" module
N20	thermal energy meter
N23	Control of electronic expansion valve
N24	Smart - RTC
R	**Sensors, resistors**
R1*	external sensor
R2	return sensor
R2.1	Return sensor in the double differential pressureless manifold [DDV]
R3*	domestic hot water sensor
R4	Cooling water return sensor
R5*	Sensor 2nd heating circuit
R6	brine limit protection sensor
R7	Coding resistor
R8	Cooling frost protection sensor
R9	Flow sensor (frost protection sensor)
R13*	3rd heating circuit sensor / renewable sensor / room sensor
R20*	Swimming pool sensor
R25	Low pressure pressure sensor
R26	High pressure pressure sensor
T	**Transformer**

No.	Designation
T1	Safety transformer 230 / 24 V AC
W1*	Connecting cable heat pump - manager = 230 V
W2*	Connection cable heat pump - manager < 25 V
W3*	Bus line N1 <->
X	**Terminals, distributors, plugs**
X1	Terminal strip power supply
X2	Terminal strip voltage = 230 V AC
X3	Terminal strip extra low voltage < 25 V AC
X5	Bus distribution terminals
X11	Connector Module connection
X12	Plug connecting cable controller - heat pump 230 V AC
X13.1	Plug connecting cable controller - heat pump < 25 V AC
X13.2	Plug connecting cable controller - heat pump < 25 V AC
X14	Controller - heat pump connector plug
Y	**Valves**
Y1	4-way reversing valve
Y12*	Reversing valve heating circuit

*Components are to be provided by the customer

Terminal assignment heat pump manager

CAUTION
Extra low voltage is applied to the plug-in terminals J1 to J11, J20, J21, J23 and terminal strip X3 of the heating controller N1. Under no circumstances should a higher voltage be applied here.

No.	Designation
N1	**Heating controller**
N1-J1	Power supply (24 V AC / 50 Hz)
N1-J2-U1	External sensor - R1
N1-J2-U2	Return sensor - R2
N1-J2-U3	Domestic hot water sensor - R3
N1-J3-U4	Coding - R7
N1-J3-U5	Heating flow or frost protection sensor - R9

No.	Designation
N1-J4-Y1	Speed fan thermostat domestic
N1-J5-ID1	hot water - B3
N1-J5-ID2	Swimming pool water thermostat - B4
N1-J5-ID3	Energy supplier lockout
N1-J5-ID4	block
N1-J5-ID5	Fan / primary pump fault - M2 / M11
N1-J5-ID6	Compressor fault - M1 / M3
N1-J6-U6	2nd heating circuit sensor - R5 / Low pressure sensor - R25 / Heat source inlet - R24 Brine limit
N1-J6-U7	protection sensor - R6 / Defrost end sensor - R12
N1-J6-U8	Frost protection sensor Sensor 3rd heating circuit / renewable sensor - R13 / high pressure pressure
N1-J7-ID9	sensor - R26 Pressure switch low pressure brine - B2
N1-J7-ID10	Hot gas thermostat - F7
N1-J8-ID13H	High pressure pressure switch - 230V AC - F4
N1-J8-ID13	High pressure pressure switch - 24V AC - F4
N1-J8-ID14	Low pressure pressure pressure switch - 24V
N1-J8-ID14H	AC - F5 Low pressure pressure pressure switch
N1-J10	- 230V AC - F5 Remote control - N10 / control
N1-J11	panel - N14 pLAN - Connection
N1-J12-NO1	Compressor 1 -
N1-J13-NO2	M1 Compressor 2
N1-J12-NO3	- M3
N1-J13-NO4	Primary pump - M11 / Fan - M2
N1-J13-NO5	2nd heat generator (E10) Heating
N1-J13-NO6	circulating pump - M13 Domestic hot
N1-J14-NO7	water circulating pump - M18 Mixer 3rd
N1-J15-NO8	heating circuit Open - M21 Mixer 3rd
N1-J16-NO9	heating circuit Closed - M21 Auxiliary
N1-J16-NO10	circulating pump - M16 Domestic hot
N1-J16-NO11	water circulating pump - E9
N1-J17-NO12	Heat circulating pump 2nd/3rd heating circuit - M15
	Mixer 2nd heating circuit Open - M22

No.	Designation
N1-J18-NO13	Mixer 2nd heating circuit closed - M22
N1-J20-U9	Sensor 2nd heating circuit - R5
N1-J20-U10	Sensor 3rd heating circuit - R13
N1-J20-ID17	Thermal energy meter pulse input 1
N1-J20-ID18	Thermal energy meter pulse input 2
N1-J21-NO14	4-way reversing valve - Y1
N1-J21-NO15	Nozzle ring heater - E4
N1-J22-NO17	Remote fault indicator - H5
N1-J21-NO16	Swimming pool circulating pump - M19
N1-J22-NO18	Domestic hot water circulation pump - M24
N1-J23	RS485 interface for expansion modules
N1-J26	RS485 interface for EVD

10.6 WPM Touch

10.6.1 WPM Touch

Wall-mounted or integrated heat pump manager with touch display

- Overview of controller functions (pCO OEM)
- Functional description (WPM Touch)
- Operation/operator display (WPM Touch)
- Temperature sensor (WPM Touch)
- Electrical connection work (WPM Touch)
- WPM Touch function blocks
- WPM Touch cable assignment

10.6.2 Overview of controller functions (pCO OEM)

The heat pump manager is essential for the operation of the heat pump system and is included in the scope of supply. It controls a bivalent, monovalent or monoenergetic heating system and monitors the safety devices of the refrigeration circuit. Depending on the heat pump type, the heat pump manager is installed in the casing of the heat pump or the Hydro-Tower or is supplied with the heat pump as a wall-mounted controller and takes over the control of the generator and distribution circuits.

Function overview:

- Fulfilment of the requirements of the utility company (EVU) e.g. utility block, switch cycle block, see TAB (Technical Connection Conditions)
- Switch-on delay on mains voltage recovery or cancellation of a utility company shut-off time (10 s to 200 s)
- The compressors of the heat pump are switched on a maximum of three times per hour
- Switching off the heat pump due to utility company blocking signals with the option of switching on the 2nd heat generator (e.g. peak load boiler)
- Energy-efficient defrost management for air-to-water heat pumps with self-adapting defrost cycle time
- Monitoring and securing the refrigeration circuit in accordance with DIN 8901 and DIN EN 378
- Recognising the optimum operating mode in each case, with the largest possible proportion of heat pumps
- Frost protection function
- Automatic, outdoor temperature-dependent operating mode switchover winter - summer - cooling
- Return temperature-controlled regulation of heating and cooling operation via outside temperature, adjustable fixed-setpoint or room temperature
- Smart RTC+ individual room control with up to 10 room temperature controllers per heating circuit possible
- Control of up to 3 consumer circuits (heating and cooling circuits)
- Dew point-dependent flow temperature control depending on the room temperature and humidity in cooling operation
- Optional dew point monitoring in cooling operation
- Requirement priorities
  - domestic hot water preparation
  - Heating/cooling operation
  - Swimming pool preparation
- Control of a 2nd heat generator (oil or gas boiler or electric auxiliary heating)
- Release of a 2nd heat generator for bivalent operation (oil and gas boiler) incl. control of the associated mixer or 0-10 V setpoint specification
- Control of a mixer for the bivalent utilisation of a renewable heat source (solid fuel boiler, solar thermal energy)
- Special program for 2nd heat generators to ensure minimum running times (oil boiler) or minimum charging times (central storage tank)
- Control of a flange heater for targeted reheating of the domestic hot water with adjustable time programs and for thermal disinfection
- Control of a domestic hot water circulation pump via pulse or time programs
- Control of circulation pumps in the generator and consumer circuit via an optional 0-10V or PWM signal
- Recording the quantity of thermal energy and operating hours (not suitable for heating cost billing)
- User group-dependent operating concept
- 10x alarm memory with date and time and error description
- Interface for connecting further communication options for LAN, KNX, Modbus RTU, Modbus TCP, BACnet/IP, MQTT optional accessories required
- Heating function program (DIN EN 1264-4), standardised or customisable program for targeted dry heating of the screed with storage of the start and completion time
- Remote control for the heat pump manager via Dimplex Home app for iOS, Android and Windows (special accessories NWPM Touch card)

- SG-Ready function, e.g. for using load-variable electricity tariffs in the smart grid

10.6.3 Functional description (WPM Touch)

- Blocking the requests
- 2nd heat generator
- renewable
- domestic hot water
- SG Ready/Smart Grid/own power utilisation
- Power control
- hysteresis
- Control of the circulation pumps
- Cooling
- Room temperature control
- Building management system
- Solar
- Controllable consumption device according to §14a EnWG

Blocking the requests

Various statuses and settings can lead to the blocking of a heat pump request. The blocks shown reset themselves automatically or are cancelled after processing.

Warm up

The warm-up block prevents the compressor from switching on. This involves warming up the oil to a minimum temperature to ensure that it is lubricated when the compressor is started.

line load

The grid switch-on load is a requirement of the energy supply companies. This can last up to 200 seconds after voltage recovery or after a utility block. The line load cannot be bypassed.

minimum pause time

To ensure sufficient pressure equalisation in the refrigeration circuit and to contactor the heat pump, it can take up to 5 minutes for the compressor to switch on again. The heat pump starts after the minimum pause time has elapsed in order to fulfil a pending request. The minimum pause time cannot be bypassed.

switch cycle block

According to the connection conditions of the energy supply companies, the heat pump may only be switched on 3 times per hour. The heat pump manager will therefore only allow it to be switched on every 20 minutes at most.

2nd heat generator

Control of immersion heaters

Additional electric heaters are used in monoenergetic systems. These are switched on or off depending on the heat demand when the immersion heater is selected in EasyOn "*Heating*" and the temperature falls below the set limit temperature.

Control of pipe heating

Electric pipe heating can be used in monoenergetic systems. The electric pipe heater the immersion heater is selected in EasyOn "*Heating*" and switched on or off as required.

System parameters

Anlagen-parameter → 2.Wärme-erzeuger

limit temperature

The outside temperature at which the heat pump just covers the heat demand is called limit temperature 2. Heat generator or also called bivalence point. This point is characterised through the transition from pure heat pump operation to bivalent operation together with immersion heaters or boilers.

The theoretical bivalence point may deviate from the optimum. Particularly in the transitional periods (colder nights, warmer days), a lower bivalence point can reduce energy consumption in line with the operator's wishes and habits. For this reason, the heat pump manager can be set to a limit temperature for enabling the 2nd heat generator can be set in the menu.

Normally, the limit temperature is only used for monoenergetic systems with air-to-water heat pumps or used in bivalent systems in combination with boilers. With monoenergetic operation, a limit temperature of -5 °C is aimed for. The limit temperature is determined from the outdoor temperature-dependent building heat requirement and the heat pump's heat output curve.

Parameters	Setting	Setting range
Limit temperature parallel	The limit temperature of the 2nd heat generator must be selected according to the design of the heat pump heating system. Below the limit temperature, the heat pump and the 2nd heat generator run in parallel to heat the building. The 2nd heat generator is only switched on in parallel at temperatures below the set limit temperature and performance level 3. **NOTE** If parallel operation is not desired, the limit temperature must be adjusted to the limit temperature in parallel as an alternative.	*Limit temperature alternative* **... -5 °C ...** limit temperature 2nd compressor

Parameters	Setting	Setting range
Limit temperature alternative	If the temperature falls below the alternative limit temperature and performance level 3, only the 2nd heat generator is used to heat the building. The heat pump is blocked from this point onwards **NOTE** The setting value is not provided for mono-energy systems (immersion heaters, pipe heating). These systems can only be operated in parallel with the compressor.	*lower operating limit* ... **-10 °C** ... Limit temperature parallel

Constantly controlled boiler

With this type of boiler, the boiler water is always heated up to a fixed set temperature (e.g. 70 °C) when enabled by the heat pump manager. The set temperature must be set high enough so that domestic hot water preparation can also be carried out via the boiler if required. The mixer is controlled by the heat pump manager, which requests the boiler when required and heats as much hot water as necessary.
Boiler water is added so that the desired return setpoint or hot water temperature is reached. The boiler is requested via the 2nd heat generator output of the heat pump manager. The operating mode of the 2.
heat generator must be set to "constant".

Gliding controlled boiler

In contrast to a constantly controlled boiler, the gliding controlled boiler directly supplies the heating water temperature corresponding to the outside temperature. The 3-way reversing valve has no control function, but only the task of regulating the heating water flow past the boiler circuit, depending on the operating mode.
or through the boiler.

In pure heat pump operation, the heating water is routed past the boiler in order to avoid losses due to heat radiation from the boiler. If a weather-compensated burner control system is already installed, the voltage supply to the burner control system must be switched off for heat pump operation only.
be interrupted. For this purpose, the control of the boiler at the 2nd heat generator output of the
heat pump manager and set the operating mode of the 2nd heat generator to "gliding".
The characteristic curve of the burner control is set according to the heat pump manager.

Parameters	Setting	Setting range
Mode of operation	A gliding controlled 2nd heat generator has its own control and is supplied with the full volume flow when required. A constantly controlled 2nd heat generator is set to a constant temperature and the mixer control is active.	**Gliding (valve)** Constant (mixer)
Mixer runtime	Depending on the mixer used, the runtime between the OPEN and CLOSED end positions varies. To achieve optimum temperature control of the bivalent heat generator, the mixer runtime must be set.	1 ... **4 minutes** ... 6

Parameters	Setting	Setting range
Mixer hysteresis	The hysteresis of the mixer forms the neutral zone for the operation of the bivalent heat generator. If the set temperature plus hysteresis is reached, a mixer closed signal is issued. If the temperature falls below the set temperature minus hysteresis, a mixer open signal is issued	0,5 ...**2 K**

utility block

The utility company can temporarily switch off the heat pump as a condition for favourable electricity purchase tariffs. During a utility company block, the utility block on the heat pump manager is opened. For systems without a utility link cable, a link cable must be inserted at the corresponding terminal points.

With bivalent systems, there are different ways of reacting to a utility block:

Performance level 3

heat pump is blocked, the 2nd heat generator is only enabled in performance level 3.

Permanent

The 2nd heat generator is always enabled during the utility block in the event of a heat request.

Limit temperature dependent

The 1st heat pump is blocked, the 2nd heat generator is enabled below the adjustable limit temperature. For monoenergetic and monovalent systems, the 2nd heat generator is enabled during a utility block.
the 2nd heat generator is generally blocked. The utility company block setting is hidden.

NOTE
The external disable contactor must be used for an external block of heat pump operation that does not reset automatically after max. 2 hours. If the temperature falls below the minimum permissible return temperature, the heat pump is enabled even if the disable signal is present.

Parameters	Setting	Setting range
Utility block release	This setting reflects the behaviour of the 2nd heat generator during a utility block (interruption of the supply voltage). Performance level 3: The 2. Heat generator is only enabled in performance level 3 during the utility block. In monoenergetic systems, the immersion heater is always blocked. Permanent: The 2nd heat generator is enabled during the utility block. limit temp. dependent: The 2nd heat generator is switched off during the utility block released if the temperature also falls below the limit temperature.	**Performance level 3** Permanent Limit temp. dependent
Utility company block Limit temperature	Limit temperature for enabling the 2nd heat generator when setting limit temp. dependent.	-10 ... 0 °C ... +10

special program

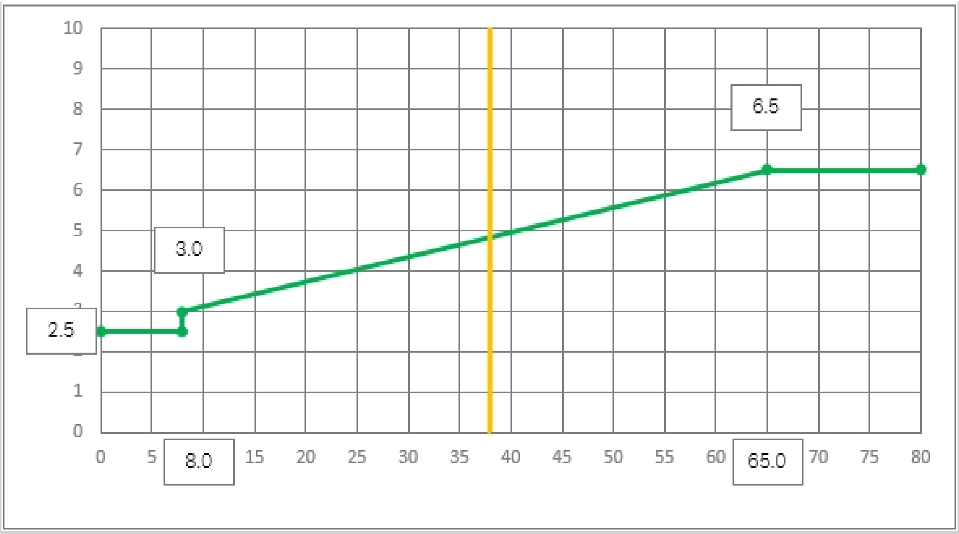
Special program for older boilers and central storage systems If the second heat generator has been requested and the special program has been activated, the 2nd heat generator remains in operation for at least 30 hours. If the heat demand decreases during this time, the 2nd heat generator goes into "standby mode" (2nd heat generator).
Heat generator energised, but mixer CLOSED). It is only switched off completely if there is no demand on the 2nd heat generator for 30 hours. This function can be used in bivalent systems as follows:

1. For older oil or gas boilers, to prevent corrosion damage due to frequent drops below the dew point.
2. For central storage systems, to ensure that the storage tank is charged for the following day regardless of the current heat demand.

Parameters	Setting	Setting range
special program	The special program is to be used with old boilers or bivalent systems with central storage tanks to prevent corrosion caused by condensation. to be prevented. When the 2nd heat generator is enabled, it remains in operation for at least the number of hours set.	0 ... **1 hour** ... 99
Pump control M16	Should the auxiliary circulating pump M16 be in operation for a bivalent requirement?	Yes / No

Setpoint specification 0-10V 2nd heat generator

If the bivalent heat generator has a 0-10V interface for setpoint specification, the heat pump manager supplies the control signal via an output. To do this, 5 key points must be matched to the specifications of the bivalent heat generator. The voltage output of the set value corresponds to the determined set temperature of the heat pump. In the case of domestic hot water/swimming pool preparation and/or reheating, the maximum setpoint is used.

Parameters	Setting	Setting range
Setpoint specification 2nd heat generator		
Minimum system temperature	Setting value of the minimum system temperature at minimum voltage.	**8 °C** ... max

Parameters	Setting	Setting range
Voltage minimum	Setting value of the minimum voltage for the minimum system temperature.	Off ... **3.0 V** ... max
Maximum voltage	Setting value of the maximum voltage for the maximum system temperature.	min ... **10.0 V**
Maximum system temperature	Setting value of the maximum system temperature at maximum voltage.	min ... **80 °C**
Burner voltage Off	Setting value for burner off. The value between the minimum voltage and voltage Off corresponds to the boiler standby. 0 V can be recognised as a cable break and therefore an error.	0 V ... **2.5 V** ... 8.0 V

renewable

When integrating a renewable heat source (e.g. solar, wood), this must be prioritised over the operation of the heat pump. To do this, the "Renewable" function is selected in EasyOn. As long as the renewable storage tank is colder, the system behaves like a monoenergetic system.
system. The sensor of the renewable storage tank is connected to the analogue input (3) of the "Renewable" function block.
connected. The mixer outputs of the bivalent mixer are active.

Basic function:

The temperature in the renewable storage tank is recorded and compared with the flow temperature of the corresponding requirement (domestic hot water, heating or swimming pool). If the temperature is above the conditions listed below, the heat pump is blocked, the renewable storage tank is used as a 2nd heat generator and the bivalent mixer is activated accordingly.

Block due to heating request:

If the temperature in the storage tank is 2-20 K higher than the current flow temperature, the heat pump is blocked if there is a heating requirement. It is only enabled again when the difference between the renewable storage tank and the flow is less than half the switching value.

> **NOTE**
> For solar integration, the adjustable excess temperature should be set to the maximum value to prevent the heat pump from cycling.

Block due to hot water request:

If the temperature in the storage tank is 2-5 K higher than the current hot water temperature, the heat pump is blocked if there is a hot water demand. It is only enabled again when the difference between the renewable storage tank and domestic hot water is less than half the switching value.

Block due to swimming pool request:

If the temperature in the storage tank is higher than 35 °C (value can be set in the menu - Settings - 2nd heat generator excess temperature of 10-50 °C), the heat pump is blocked if there is a swimming pool requirement. It is only enabled when the temperature in the parallel buffer is 5K below the switching temperature again.

Mixer control:

If there is no renewable block, the mixer is controlled continuously CLOSED.

If there is a block due to domestic hot water or a swimming pool, the mixer is permanently OPEN.

If there is a renewable block due to heating, the mixer control becomes active. System parameters

	Anlagen-parameter → Rege-nerativ	Setting range
Renewable mixer runtime	Depending on the mixer used, the runtime between the OPEN and CLOSED end positions varies. To achieve optimum temperature control of the bivalent-renewable heat generator, the mixer runtime must be set.	1 ... **4 minutes** ... 6
Renewable mixer hysteresis	The hysteresis of the mixer forms the neutral zone for operation of the bivalent-renewable heat generator. If the set temperature plus hysteresis is reached, a mixer-close signal is issued. If the temperature falls below the set temperature minus hysteresis, a mixer-open signal is triggered	0,5 ...**2 K**
Heating Temp. bivalent-renewable Heating bivalent-renewable	Temperature difference between the renewable storage tank and the flow temperature that must be exceeded in order for the HP to be blocked if a heating request is present. Comfort: A block renewable heating is only active if the temperature in the storage tank renewable is higher than the current return set temperature minus hysteresis. Energy-optimised: A block renewable heating system is independent of the return set temperature.	2 ... **10 K** ... 20 **Comfort** / Energy-Opt.
Domestic hot water Bivalent-renewable	Temperature difference between the renewable storage tank and the domestic hot water temperature that must be exceeded in order for the HP to be blocked if there is a domestic hot water demand.	2 ... **5 K** ... 50
Swimming pool Bivalent-renewable	Temperature of the renewable storage tank that must be exceeded in order for the HP to be blocked if a swimming pool is required.	10 ... **35 °C** ... 50
Pump control renewable M16	Should the auxiliary circulating pump M16 be in operation during a renewable demand?	Yes / No

domestic hot water

The heat pump manager automatically determines the maximum possible hot water temperature in heat pump mode. The desired hot water temperature can be set in the menu.

Hot water temperature - WP maximum

In order to maximise the heat pump's contribution to domestic hot water preparation, the heat pump manager automatically determines the maximum achievable hot water temperature in heat pump mode depending on the current heat source temperature. The lower the heat source temperature (e.g. outside temperature, brine temperature), the higher the achievable hot water temperature.

Domestic hot water preparation without flange heater

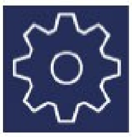
If the set domestic hot water set temperature is greater than the maximum hot water temperature that can be reached by the heat pump, domestic hot water preparation is cancelled as soon as the "WP maximum temperature" is reached.

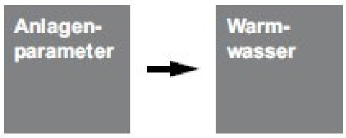
Domestic hot water preparation with flange heater

If the set domestic hot water set temperature is greater than the maximum hot water temperature that can be reached by the heat pump, domestic hot water preparation is carried out from the "WP maximum temperature" via the built-in flange heater.

> **NOTE**
> Reheating with flange heater:
> Following domestic hot water preparation with the heat pump, reheating for higher temperatures can take place in systems with flange/pipe heating or 2nd heat generator. The next hot water heating only takes place after the temperature falls below the currently valid "Heat pump maximum temperature" minus the set hysteresis. The basic heating always takes place via the operation of the heat pump.

System parameters





Parameters	Setting	Setting range
Mode of operation	A gliding controlled 2nd heat generator has its own control and is supplied with the full volume flow when required. A constantly controlled 2nd heat generator is set to a constant temperature and the mixer control is active.	**Gliding (valve)** Constant (mixer)
Mixer runtime	Depending on the mixer used, the runtime between the OPEN and CLOSED end positions varies. To achieve optimum temperature control of the bivalent heat generator, the mixer runtime must be set.	1 ... **4 minutes** ... 6

Parameters	Setting	Setting range
Mixer hysteresis	The hysteresis of the mixer forms the neutral zone for the operation of the bivalent heat generator. If the set temperature plus hysteresis is reached, a mixer closed signal is issued. If the temperature falls below the set temperature minus hysteresis, a mixer open signal is issued	0,5 ...**2 K**

SG Ready/Smart Grid/own power utilisation

It is possible to map the switching states of the SG Ready label via 2 digital inputs (see electrical documentation for the heat pump manager). These switching states can be used to utilise a photovoltaic system's own electricity.

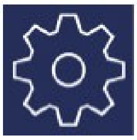
> **NOTE**
> The electrical documentation and setting instructions for the inverter or energy manager used must be observed.

Condition	Functional description
Switching state 1. *Electricity bottleneck (little electricity in the grid, expensive electricity)* The energy supply company can block the heat pump or set it to a lowered operating status for hot water, heating and swimming pool water preparation.	domestic hot water: A domestic hot water block is executed. Domestic hot water preparation takes place up to the set minimum temperature. Heating: Heating water preparation is carried out in lowered mode. The lower value set in the respective time program applies. If control via room temperature is selected, this is lowered. swimming pool: A swimming pool barrier is installed. The swimming pool is heated up to the set minimum temperature.
Switching state 2 *No electricity shortages or surpluses (the grid is balanced)* The heat pump runs in normal mode. The energy supply company does not intervene and the heat pump does not run in an automatically lowered or raised operating status for hot water, heating and swimming pool water preparation.	domestic hot water: Domestic hot water preparation takes place up to the set temperature. Any blocks that have been set are taken into account. Heating: The heating water is heated according to the currently set heating curve or room temperature. Possible lowering or raising times are taken into account. swimming pool: The swimming pool is heated according to the set temperature. Any set block and priority times are taken into account.

Condition	Functional description
Switching state 3 Surplus electricity (lots of electricity in the grid, cheap electricity) The energy supply company can set the heat pump to a raised operating status for hot, heating and swimming pool water preparation.	domestic hot water: Any programmed domestic hot water block is cancelled. Domestic hot water preparation is carried out up to the set maximum temperature or the WP Max. temperature. Heating: The heating water is heated in raised mode. If control via room temperature is selected, the control valves are opened (only for control with RTM Econ) to heat the building. as a thermal reservoir. swimming pool: Any programmed swimming pool block is cancelled. Swimming pool preparation is carried out up to the set maximum temperature or up to the WP Max. temperature. renewable: With a renewable hydraulic integration, the heat pump is given priority. The renewable storage tank is not discharged and is blocked for operation! Cooling: As PV yield and cooling are simultaneous in the summer months, there is no separate function for the cooling operating mode.

NOTE
Switching state 3 is used to utilise the electricity generated by a photovoltaic system.

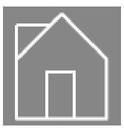
Activation of the Smart Grid function

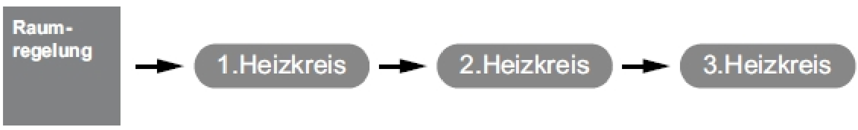


Depending on the heat pump manager, the Smart Grid function must first be activated. If this menu is not available for selection, the function is already set as standard and cannot be changed.

Parameters	Setting	Setting range
Flex input N1/J5-ID1+ID2 digital	Is the digital input ID1 + ID2 used? Which function should be assigned to this input?	**Smart Grid** thermostat performance level

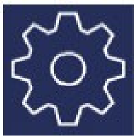
Settings for the 1st/2nd/3rd heating circuit

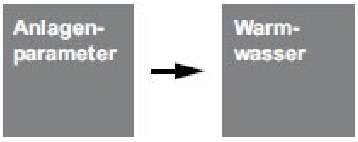




Parameters	Setting	Setting range
Weekly profile	The lower and raise values for the Smart Grid switching status can be set via the weekly profile menu for the selected heating circuit.	
lower value	The set lower value is used when using the Smart Grid switching state 1. function.	0 ... **2 K** ... 19
raise value	The set raise value is used when using the Smart Grid switching state 3 function.	0 ... **2 K** ... 19
Room control limit temperature	Below the set limit temperature, the control valves are not opened by the rooms with a lower room set temperature when Smart Grid switching status 3 is active. Example: Bedrooms - switching state 3 • Room set temperature 15 °C • Limit temperature 19 °C • Valve closed • Space is not released for an elevation Example: Bathrooms - switching state 3 • Room set temperature 22 °C • Limit temperature 19 °C • Valve open • Space is freed up for an elevation	15 ... **19 °C** ... 30

Setting for domestic hot water preparation

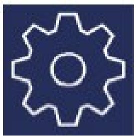




Parameters	Setting	Setting range
set temperature	Setting the desired domestic hot water set temperature.	30 ... **50 °C** ... 85
Minimum temperature	Setting the desired target domestic hot water temperature to be maintained during an active domestic hot water block or when using the Smart Grid switching state 1 function.	0 ... 10 °C ... Warmth. Set temp.
Maximum temperature	Setting the desired hot water setpoint temperature to be reached when using the Smart Grid switching state 3 function.	30 ... **60 °C** ... 85

NOTE
If domestic hot water reheating is activated with a flange heater, this is released if the domestic hot water set temperature is not reached.

Settings for swimming pool preparation



Anlagen-parameter → Schwimm-bad

Parameters	Setting	Setting range
set temperature	Setting the desired pool temperature.	30 ... **25 °C** ... 60
Minimum temperature	Setting the desired swimming pool set temperature to be maintained during an active swimming pool block or when using the Smart Grid switching state 1. function.	0 ... 10 °C ... Swimming pool setpoint temp.
Maximum temperature	Setting the desired swimming pool setpoint temperature to be reached when using the Smart Grid switching state 3 function.	30 ... **60 °C** ... 85

Power control

The heat pump manager defines a maximum of 3 performance levels L1, L2 and L3, which it switches depending on the heat demand. As heat demand increases, the system switches to the next higher level, while
If the heat demand falls, the system switches to the next lower performance level.

L1: Heat pump runs with one compressor L2: Heat
pump runs with two compressors
L3: Heat pump running and 2nd heat generator active (not for monovalent systems)

- After commissioning or after a power failure, the heat pump manager always starts in performance level L1
- The performance levels are not redefined during defrost end, swimming pool water preparation, hot water request or during a utility company block.

performance level	HP with one compressor	HP with two compressors
Level L1	Only one compressor cycling	Only one compressor cycling
Level L2	-	1 compressor base load, 1 compressor cycling
Level L3	a compressor and second heat generator, if necessary	Both compressors and second heat generator
defrost	Compressor running	a compressor is running
Domestic hot water heating	Compressor running	run on depending on the outside temperature or two compressors
Swimming pool water heating	Compressor running	run on depending on the outside temperature or two compressors

Heat pumps with one compressor

Criteria for switching:

- from L1 to L3 if the heat pump manager requests "more heat" for longer than 60 min and at the same time the outside temperature is below the limit temperature of the 2nd heat generator for longer than 60 minutes
- from L3 to L1 if the heating controller calls for "less heat" for longer than 15 minutes or the limit temperature is exceeded.

Heat pumps with two compressors

Criteria for switching:

- from L1 to L2 if the heat pump manager requests "more heat" for longer than 25 min,
- from L2 to L3 if the heat pump manager demands "more heat" for longer than 60 min and at the same time the outside temperature is below the limit temperature for longer than 60 minutes,
- from L3 to L2 or L1 if the heat pump manager requests "less heat" for longer than 15 min or the limit temperature is exceeded,
- from L2 to L1 if the heat pump manager calls for "less heat" for longer than 15 min.

In performance level L1, one compressor of the heat pump is switched on or off according to the "more" or "less" signals from the heat pump manager. In stage L2, one compressor of the heat pump runs continuously to cover the base load. The second compressor is switched on or off according to the
"more" or "less" signals from the heat pump manager. In stage L3, both compressors run continuously to cover the increased base load; the second heat generator is controlled. Only one compressor runs at a time during the defrost end.

hysteresis

In the "***Settings - System parameters***" menu, the so-called hysteresis can be set for various requirements. The hysteresis forms a "neutral zone" around the corresponding set temperature. If the current temperature is lower than the set temperature reduced by the hysteresis,
a request is recognised. This remains in place until the current temperature has exceeded the upper limit of the neutral zone. This results in a switching cycle around the setpoint.

Return set temperature hysteresis

A hysteresis around the return set temperature can be set for the heating requirement. If the hysteresis is large, the heat pump runs for longer, whereby the temperature fluctuations in the return are correspondingly large. If the hysteresis is small, the compressor running times are reduced and the temperature fluctuations are smaller.

> **NOTE**
> For panel heating systems with relatively flat characteristic curves, a hysteresis of approx. 1 K should be set, as too large a hysteresis can prevent the heat pump from switching on.

Control of the circulation pumps

The control of the heating, domestic hot water or swimming pool circulating pump determines where the heat generated by the heat pump should flow. The separate processing of different requirements enables the heat pump to always operate at the minimum possible system temperature.
to ensure energy-efficient operation. In the case of heat pumps for heating and cooling, additional cooling circulating pumps can be controlled.

NOTE
Pump assemblies with check valves ensure defined flow directions.

NOTE
In summer operating mode, the heating pump starts up for approx. 1 minute every 150 hours. This i s to prevent the heating pump from seizing up.

frost protection

Regardless of the settings of the heat circulating pump, they always run during heating, defrost end and when there is a risk of frost. In systems with several heating circuits, the 2nd/3rd heat circulating pump has the same function.

CAUTION
To ensure the frost protection function of the heat pump, the heat pump manager must not be de-energised and the heat pump must be flowing.

heat circulating pump

For the heat circulating pump (M13, M15, M20), an outdoor temperature-dependent pump optimisation is set for both heating and cooling in the "***Settings - System parameters - Pump control***" menu.

Heating pump optimisation is inactive if the temperature falls below the selected limit temperature. The heat circulating pumps are deactivated, except for domestic hot water, swimming pool water preparation and in operating mode "*Summer*", permanently in operation.

Heating pump optimisation is active if the selected limit temperature is exceeded. The heat circulating pumps continue to run for 30 minutes after switching on the mains and switching off the heat pump. If the heat circulating pumps have been switched off for longer than 40 minutes or if the return set temperature has been deliberately raised, the heat circulating pumps are activated for a 7-minute flushing time in order to return the representative temperature of the heating circuits to the return sensor (R2, R2.1).

If switching from heating to domestic hot water or swimming pool water preparation, the heat circulating pump continues to run.

The heat circulating pumps are permanently in operation when the temperatures fall below the minimum system temperatures and at temperatures below 10 °C at the frost protection sensor (R9) of the air-to-water heat pumps.

NOTE
In summer operating mode, the circulation pump runs for 1 minute every 150 hours. This prevents the shaft from seizing up.

domestic hot water circulating pump

The domestic hot water circulating pump (M18) runs during domestic hot water preparation. If a hot water request is made during heating operation, the heat circulating pump is deactivated and the domestic hot water circulating pump is activated while the heat pump is running.

swimming pool circulating pump

The swimming pool circulating pump (M19) runs during swimming pool water preparation. A running swimming pool water preparation is triggered at any time by a hot water request, by a defrosting process or by raising the heating characteristic (e.g. after night setback), but not by a heat pump manager.
"more" signal is interrupted. If the request is still pending after 60 minutes of swimming pool water preparation, the swimming pool circulating pump is deactivated for 7 minutes and the heat circulating pump is activated for a 7-minute flushing time in order to return the representative temperature of the heating circuit to the return sensor. If the heat pump manager generates a "more" signal during these 7 minutes, the heating request is processed first.

NOTE
In summer operating mode, pool preparation is not interrupted by a flushing time after 60 minutes.

auxiliary circulating pump

The auxiliary circulating pump output (M16) can be configured to achieve parallel operation of the auxiliary circulating pump with the compressor of the heat pump. One configuration
after heating, domestic hot water and swimming pool preparation is possible. It also runs if the temperature falls below the minimum system temperatures.

NOTE
In summer operating mode, the circulation pump runs for 1 minute every 150 hours. This prevents the shaft from seizing up.

Primary pump for heat source

The primary pump (M11) supplies the energy from the heat source to the heat pump

Heat pump type	primary pump
air-to-water heat pump	fan
brine-to-water heat pump	Brine circulation pump
water-to-water heat pump	Well pump

The well water or brine circulation pump always runs when the heat pump is switched on. It starts 1 minute before the compressor and switches off 1 minute after the compressor.

With air-to-water heat pumps, the fan is switched off during the defrost end.

circulation pump

If it is possible to connect a circulation pump (M24), this can be requested via a pulse input or via time programs.

If the circulation pump is requested via the pulse input, the run-on time can be set in the "***Settings - System parameters - Domestic hot water***" menu. If the request is made via a time program, this can be set for two different times and weekdays.

> **NOTE**
> A circulation pipe is a major energy guzzler. To save energy costs, circulation should be avoided. However, if this is unavoidable, it is advisable to switch off the time windows.
> to the optimum conditions. It is better to let circulation run via a pulse for a certain period of time. This function is also possible with the heat pump manager.

Cooling

Active cooling

Chiller is actively generated by reversing the process of the heat pump. The refrigeration circuit is switched from heating to cooling operation via an internal four-way reversing valve.

> **NOTE**
> When switching from heating to cooling operation, the heat pump is blocked for up to 10 minutes to allow the different pressures in the cooling circuit to equalise.

The requests are processed as follows:

- Domestic hot water before
- Cooling before
- swimming pool

During domestic hot water or swimming pool preparation, the heat pump works in the same way as in heating operation.

Passive cooling

At greater depths, groundwater and the ground are significantly colder than the ambient temperature in summer. A plate heat exchanger installed in the groundwater or brine circuit transfers the refrigeration capacity to the heating/cooling circuit. The compressor of the heat pump is not active and is therefore available for domestic hot water preparation. Parallel operation of cooling and domestic hot water preparation can be realised in the menu ***"Settings - System parameters - Domestic hot water - Parallel cooling DHW"***.

> **NOTE**
> Special requirements for hydraulic integration must be ensured for parallel operation of cooling and domestic hot water preparation.

The behaviour of the primary pump (M11), the cooling primary pump (M12) and the heat circulating pump (M13) in cooling operation can be changed under ***"Settings - System parameters - Pumps"***.

Cooling operating mode

The cooling functions are activated manually as the 6th operating mode. It is also possible to switch the "Cooling" operating mode depending on the outside temperature. External switching via input N17.1-J4-ID4 is possible.

The "Cooling" operating mode can only be activated if the cooling function (active or passive) is activated in the preconfiguration. is released.

Switch off the chiller

The following limits are provided for fusing:

- The flow temperature falls below a value of 7°C
- Triggering the dew point monitor at sensitive locations in the cooling system

- Reaching the dew point with purely silent cooling

Circulation pump in cooling operation

In a heat pump heating system, the preconfiguration of the respective heating circuits already determines which circulation pumps are activated or deactivated in which operating mode.

The heat circulating pump of heating circuit 1 (M14) is not active in cooling operation if silent cooling only is configured.

The 2nd heating/cooling circuit heat circulating pump (M15) is not active if only "Heating" has been selected.

The 3rd heating/cooling circuit heat circulating pump (M20) is not active if only "Heating" has been selected.

> **NOTE**
> Switching of heating components in heating or cooling operation can be carried out via the potential-free contact N17.2 /N04 / C4 / NC4 (e.g. room temperature controller)

Passive cooling

The cooling system can be supplied either via the existing heat circulating pump (M13) or via an additional cooling circulating pump (M17).

> **NOTE**
> The cooling circulating pump (M17) runs continuously in "Cooling" operating mode.

Depending on the hydraulic integration with passive cooling, the running behaviour of the heat circulating pump (M13) can be changed under ***"Settings - Pump control".***

Silent and dynamic cooling

Different system configurations can be realised depending on the integration scheme.

- **Dynamic cooling** (e.g. fan convectors)
  The control corresponds to a "fixed value temperature" The desired temperature is set in the Settings menu item. Return set temperature set.
- **Silent cooling** (e.g. floor, wall or ceiling cooling)
  Control is based on the "room temperature". The temperature of the room in which the room climate station 1 is connected according to the connection diagram is decisive. The desired room temperature is set in the Settings menu item.
  The maximum cooling capacity that can be transferred with silent cooling is heavily dependent on the relative humidity. High humidity reduces the maximum cooling capacity, as the flow temperature is not lowered any further when the calculated dew point is reached.
- **Combination of dynamic and silent cooling**
  Control takes place separately in two control circuits. The control of the dynamic circuit corresponds to a fixed value control (as described for dynamic cooling).
  Silent cooling is controlled according to the room temperature (as described for silent cooling) by controlling the 2nd/3rd heating circuit mixer (silent heating/cooling circuit).

> **NOTE**
> If the chiller switches off when the minimum flow temperature of 7 °C is reached, either the water flow must be increased or a higher return set temperature (e.g. 16 °C) must be set.

Room temperature control

The room temperature control specially developed for heat pump heating and cooling systems enables a high level of comfort with maximum efficiency.

The focus is on the comfort of the occupant, who sets the desired temperature in each room. The intelligent room temperature controller determines and optimises the required system temperature.
The influencing factors must be taken into account:

- external heat gains (e.g. solar radiation on the south side of the building),
- Internal heat gains (e.g. waste heat from technical appliances, chimney, etc.)
- Inertia and storage mass of the building (e.g. highly insulated houses do not cool down on colder nights)

Basics

The heat pump control determines the system temperature required to heat the individual rooms. In order to operate the system with high efficiency, the optimum return temperature is always determined.

The perceived room temperature is determined not only by the air temperature, but also by the temperature of the surfaces surrounding the room (ceiling, walls and floor). This is why intelligent room temperature control not only regulates the room temperature, but also the storage mass
of the floor.

Control behaviour

In overheating rooms, e.g. due to solar energy gains, the underfloor heating is kept at the room set temperature. As a result, the floor does not cool down despite the increased room temperature.

The self-regulating effect of the underfloor heating prevents the "warm" floor from generating additional heat.
to the room.

A slight overheating of rooms with internal or external heat gains is deliberately induced.

As soon as the heat gains cease (e.g. sunset), supercooling of the room is avoided, in contrast to a conventional controlled room temperature, as the underfloor heating is already at the level of the desired room temperature and immediately releases heat if the temperature falls below the set temperature (use of the underfloor heating as storage).

Control logic

- The room with the highest target/actual deviation is the reference room
- The permanent calculation of the return set temperature is based on the deviation from "Room temperature" to "Room set temperature"
- The greater the deviation, the faster the return set temperature is increased.

Switching behaviour of the control valves

The control valves are preferably opened in order to make optimum use of the self-regulating effect and the storage mass of the underfloor heating and to extend the runtimes of the heat pump. The valves are only closed under certain conditions.

Heat pump off

- The control valves are only closed if the floor temperature is higher than the room temperature (return temperature is higher than the room temperature and the room temperature is higher than the room set temperature).

- If the return temperature is lower than the room temperature, heat can be transferred from the room to the floor. This can dissipate heat input into the underfloor heating system (e.g. solar radiation from floor-to-ceiling windows).

Heat pump "On heating"

- The control valves are closed when the room set temperature is exceeded (room temperature is above the room set temperature + adjustable hysteresis) and the current system temperature is ≥ the current room temperature.

Heat pump "Domestic hot water or swimming pool preparation"

- When the heat circulating pumps are deactivated, all control valves are opened. This allows the reference temperature (return temperature) to be determined after the heat circulating pumps are switched on again (purge run). No heat input via the heating system is possible during domestic hot water or swimming pool preparation or when the heat circulating pumps are stopped.

Setting during commissioning

The preset values are designed for efficient and comfort-orientated operation and can be adapted to user requirements if necessary.

Maximum return temperature:
During commissioning, the default value for the maximum return temperature of 45 °C must be adapted to the existing heating system. If the underfloor heating is designed for a temperature of 35/28 °C, the return temperature should be limited to 28 °C.

Heat pump hysteresis:
In order to increase the control accuracy, the hysteresis of the heat pump should be selected between 1 K and 2 K for underfloor heating with room temperature control.

Room temperature hysteresis:
Assumed room temperature setpoint: 20 °C
Hysteresis top: 0.8 => valve contacts at 20.8 °C
Hysteresis bottom: 0.3 => valve opens at 20.3 °C

Optimisation of inertia

The inertia or responsiveness for calculating the set temperature can be influenced by two I components. The larger the I component, the slower the response to temperature fluctuations (maximum setting value: 480)

The smaller the I component, the faster the reaction to temperature fluctuations, overshoots and undershoots can occur (minimum setting value: 240)

Recommendation for setting the I component for energy-optimised operation:

- I component min: 240 max: 480 These values are recommended for energy-efficient operation, which is possible in the room with the highest temperature requirement (e.g. bathroom) even without additional control valves. The system temperature is adjusted moderately to avoid overshoots and thus ensure a uniform room temperature. With this setting, slight fluctuations in the system temperature are to be expected.

Recommendation for setting the I component in comfort mode:

- I component min: 60 max: 120 (comfort values) These values are recommended for comfort-orientated operation, which requires additional control valves in all rooms. The system temperature is adjusted more quickly. To avoid overshoots, the control valves intervene to regulate the temperature. With this setting, greater fluctuations in the system temperature are to be expected.

Room control limit temperature

The adjustable minimum room temperature prevents a heating request from rooms that should deliberately be kept at a lower temperature level (e.g. bedrooms with frequently opened windows). As soon as the set room set temperature is below 19°C (default value), this room does not become the reference room even if the room temperature is too low.

Targeted overheating with the Smart Grid function

When the Smart Grid function is active, the set room set temperature is increased by the set value. Rooms with a room set temperature < the limit temperature prevent these rooms from overheating.

Building management system

CAUTION
Dimplex accepts no responsibility for damage caused by the connection of third-party components to the heat pump. This also includes Building Management
Systems that lead to improper heat pump operation, e.g. due to impermissibly short runtimes
lead."

From software version L09, there are two options for connecting the heat pump to a Building management system:

- Transfer of the default values by means of an interface via the BMS (Building Management System). Various protocols and interfaces are available for this purpose
- Wiring of digital inputs with the option of influencing the output control on the heat pump manager. It is also possible to use digital inputs to change the operating mode from heating to cooling and to influence it via a parameterisable external block (frost protection/domestic hot water/holiday/summer)

CAUTION
In all cases, the primary pump (M11) and the secondary pump (M16) or, depending on the hydraulic integration, the heat circulating pump (M13) must always be connected to the heat pump manager. This is the only way to ensure that the pump upstream and downstream flows required for operation are maintained and the necessary safety measures are in place

BMS interface

NOTE
The Dimplex Wiki pages provide help and problem solutions for the extensions available as accessories for the heat pump manager.
Dimplex Wiki - Dimplex (atlassian.net)

The extensions available as special accessories for connection to the BMS interface:

- Modbus RTU
- Modbus TCP
- KNX
- BACnet
- MQTT

made available.

These extensions can be used to read out the operating data and history, and to make settings such as mode or setpoint specifications.

In general, it is preferable to request the heat pump in connection with Building management systems via an interface.

If such an interface is used, the following programming is suggested on the heat pump manager. Depending on the number of heating or cooling circuits, these are set to a fixed value control. The set temperature calculated by the BMS is sent to the heat pump manager as a
Fixed value temperature transmitted. The heat pump is also set to Auto, Summer and Cooling mode via the BMS.

Further information on these options can be found in the description of the respective product. Compatibility

with device series

<table>
<tr><th rowspan="2">Connection to</th><th rowspan="2">Interface</th><th rowspan="2">Item no.</th><th colspan="2">Device series</th></tr>
<tr><th>System M</th><th>All others</th></tr>
<tr><td>Dimplex Home App</td><td rowspan="4">NWPM Touch</td><td rowspan="4">378 800</td><td rowspan="2">integrated</td><td rowspan="4">optional</td></tr>
<tr><td>MQTT</td></tr>
<tr><td>Modbus TCP</td><td rowspan="2">optional</td></tr>
<tr><td>BACnet</td></tr>
<tr><td>KNX/EIB</td><td>KNX WPM</td><td>376 350</td><td>optional</td><td>optional</td></tr>
<tr><td>Modbus RTU</td><td>LWPM 410</td><td>339 410</td><td>optional</td><td>optional</td></tr>
</table>

Compressor control via digital inputs

In addition to a setpoint specification by the BMS, it is also possible to control the compressors via digital inputs.

Performance levels

The performance levels (L) are influenced via two digital inputs. The table shows an overview of the power stage switching.

performance level	Digital 1.	Digital 2
Level L1	NO contact	NC contact opened
Level L2	NC contact opened	NO contact
Level L3	NO contact	NO contact

The sequence of power level switching is as described in the Power control chapter.

It should be noted that the Building management system can increase and reduce the performance levels within the operating limits. This does not override the TAB of the energy supply companies. The set temperatures set on the heat pump manager are ignored. In extreme cases, the heat pump is only blocked via the operating limits (high and low pressure, flow and return temperature) or switched off by safety functions.

Switching the performance levels

For parallel connections of heat pumps, it is recommended to set up and programme the performance levels as a ring circuit. This means that depending on the required output, heat pump 1 is enabled with L1, then heat pump 2 with L1 and heat pump 3 with L1. If further power
heat pump 1 is enabled with L2, then heat pump 2 with L2 and heat pump 3 with L3. Switching back is carried out in the same way. First, heat pump 1 is switched to L1, heat pump 2 to L1 and then heat pump 3 to L1. This not only ensures that the compressors have the same runtimes, but also that the heat pumps are operated most effectively with this measure.

performance level	description	Compressor 1.	Compressor 2	2.heat/chiller
Level L1	Set temperature - hysteresis	on	from	from
	Set temperature + hysteresis	from	from	from
Level L2	Set temperature - hysteresis	always on	on	from

performance level	description	Compressor 1.	Compressor 2	2.heat/chiller
	Set temperature + hysteresis	always on	from	from
Level L3	Set temperature - hysteresis	always on	always on	on
	Set temperature + hysteresis	always on	always on	from

When programming the power stage switching via the Building management system, attention must be paid to the heat pump-relevant minimum pause time, switch cycle block and, if necessary, the utility block.

Frost protection is guaranteed in all cases. If the "Power level switching" and "Block external" functions are to be used, these functions must be activated by after-sales service during commissioning of the heat pump.

External block

The heat pump can be blocked or enabled for one of the following functions via a digital input:

- frost protection
    - Heat pump maintains minimum system temperatures, domestic hot water and swimming pool heating is blocked
- Domestic hot water block
    - Heat pump is enabled, minimum hot water temperature is maintained
- Holiday operating mode
    - Heat pump maintains lower value, domestic hot water is blocked
- Summer operating mode
    - Heat pumps maintain minimum system temperature, domestic hot water and swimming pool heating is enabled

External block	Condition
active	NC contact opened
inactive	NO contact

NOTE
This function is not available for controllers with colour-coded connector boards

Heating/cooling switching

In the case of heat pumps for heating and cooling, the operating mode can be switched via a digital input.

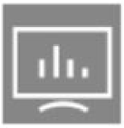
Operating mode	Condition
Heating	NC contact opened
Cooling	NO contact

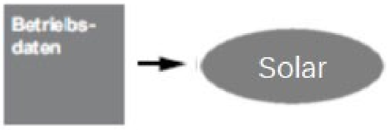
Solar

The solar thermal function is possible with the WPM Touch heat pump manager and a free function block. The following connections are required:

Component	Plug
Solar cylinder sensor (R22)	(3)
Collector sensor (R23)	(4)
Solar pump (M23)	(5)
Solar pump control signal (AO M23)	(8)

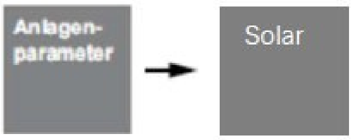
operating data





Information	description
Collector sensor (R23)	Display of the measured collector temperature.
Solar cylinder sensor (R22)	Display of the measured solar cylinder temperature.
Solar pump M23	Display of the controller output for the solar pump.

System parameters



Parameters	Setting	Setting range
Storage tank charging switch-on difference	Temperature difference between collector and storage tank at which the loading should switch on	1 ... 6 K ... 30
Maximum storage tank temperature	Maximum storage tank temperature If the drinking water has a high limescale content, it is reasonable not to set the storage tank temperature too high!	30 ... 85 °C ... 95
Collector cooling function	Before the stagnation temperature is reached, the maximum cylinder temperature is increased by 5 K in order to cool the collector via cylinder and pipework losses.	Yes No
Pump kick solar pump	Reasonable for partially shaded collector fields in order to flush the collector sensor for the current reference temperature.	Yes No
Pump kick waiting time	Period between two flushing times.	10 ... 30 min ... 60

Parameters	Setting	Setting range
Reset error	Resetting a pending error in the solar function.	Yes No

Controllable consumption device according to §14a EnWG

According to the grid operator's Technical Connection Conditions (TAB), heat pumps are considered controllable consumption devices. A separate heating electricity tariff is granted for the possibility of switching off up to a maximum of 3x2 hours per day.

The system is switched off via the disable contactor provided on the heat pump manager, which the grid operator can connect via a ripple control receiver or a timer. At the same time, a separate heating electricity meter is required for billing purposes for operation with the heat pump.

Controllable consumption devices within the meaning of Section 14a

Following the entry into force of Section 14a of the Energy Industry Act (EnWG), there are new regulations for switch offs for controllable consumption devices:

A heat pump counts as a controllable consumption device if the total heat pump heating, including auxiliary or emergency heating devices (immersion heater, flange heater, pipe heater) with a grid connection power of more than 4.2 kW is exceeded.

A separate heating current meter is not required, but is still possible at the operator's request.

Calculation rule

When limiting the curtailment of the heat pump heating, the sum of all associated electrical heat generators must be formed.

If the sum is > 4.2 kW and < 11.0 kW, a curtailment to 4.2 kW must take place.

If the sum is > 11.0 kW, the necessary curtailment is the value of the sum * 0.4.

The following table shows an example of the calculation for four different heat pump types and their possible curtailment.

heat pump	LA 1118CP	LA 60S-TU	LA 60S-TU	SI 14TU	SIK 8TES
Mode of operation	mono-energetic	mono-energetic	bivalent	mono-valent	mono-valent
Power consumption [kW] max. 1 compressor	5,6	26,4 approx. 12.0	26,4 approx. 12.0	5,4	3,3
Immersion heater [kW]	6,0	30,0	-	-	-
Flange heater [kW]	6,0	-	6,0	-	-
Total [kW]	17,6	56,4	32,4	5,4	3,3
>11.0 kW	Yes	Yes	Yes	no	no
>4.2 kW = sum x 0.4	7,0	22,6	13,0	-	-
<11.0 kW	no	no	no	Yes	Yes

heat pump	LA 1118CP	LA 60S-TU	LA 60S-TU	SI 14TU	SIK 8TES
<4.2 kW	no	no	no	no	Yes
Power limitation necessary	**Yes**	**Yes**	**Yes**	**Yes**	**no**
Maximum possible performance level (o = possible; - = not possible)					
Performance level 1.	o	o	o	-	o
Performance level 2		-	-		
Electric auxiliary heating (performance level 3)	-	-	-		

10.6.4 Operation/operator display (WPM Touch)

Touch display (pGDx)

Home view

57 Home screen with language and user selection
Access to the display and control unit is gained by selecting the desired user group and then confirming the red login symbol.

- Operator
- Specialist
- Service

Depending on the selected user group, a password may need to be entered to gain access.

> **NOTE**
> If no language and user selection is possible, the touch display is still in start mode.

Display and control unit

58 Operator view

The display and control unit can be used to make the settings and view the displays required for operation. The settings and displays are divided into different user groups.

- Operator
- Specialist
- Service

Access to the user groups is selected via the start screen. Depending on the user group and setting value, there are different options for changing the value.

Main menu

The main menu consists of 5 operating levels. Access to the individual operating levels is granted depending on the selected user group. The red symbol takes you back to the home screen with login.

	At home	System status, operating mode, settings for the operator
	Analytics	System data, operating data, Runtimes, quantities of thermal energy, inputs and outputs
	Settings	Date and time, language and region, screen, Home app
	Installation	Initial heating programs, system setup, function locks, EasyOn

	Home view	login

At home

All the displays and settings required by the operator are clearly displayed in the "At home" menu. In particular, the operating mode, set temperatures and weekly profiles can be easily changed here.

59 View at home

Analytics

The "Analytics" menu displays all current and historical quantities of thermal energy, runtimes and operating data, as well as the states of the inputs and outputs are made available.

60 Analytics overview

Settings

In the "Settings" menu, all system parameters as well as those relevant for the display and accessories are set.
Settings made.

61 Overview of settings

Installation

In the "Installation" menu, an initial heating program can be activated after successful commissioning or the guided commissioning "EasyOn" can be restarted.

62 Installation overview

Login

A password must be entered to access the specialist and service area. The password is requested after selection of the user group and subsequent confirmation of the login symbol.

63 Selection of the user group

64 Password entry for the expert

Once you have successfully entered the password and confirmed it by pressing the Enter key, you will automatically be taken to the specialist's homepage.

65 Home Specialist

10.6.5 Temperature sensor (WPM Touch)

Depending on the heat pump type, the following temperature sensors are already installed or must be installed additionally:

NTC-2 sensor:

- Outdoor temperature sensor (R1)

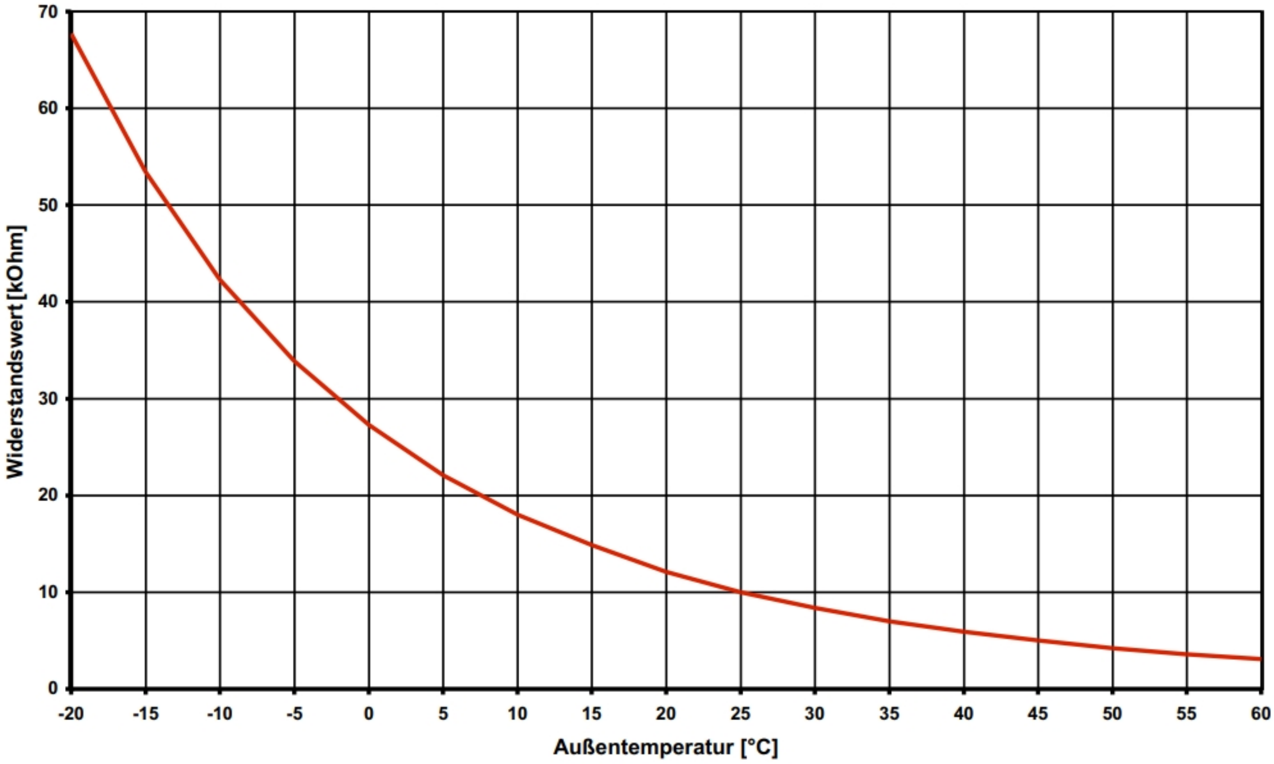
NTC-10 sensor

- 1st, 2nd and 3rd heating circuit temperature sensor (R35, R5 and R21)
- Request sensor (R2.2)
- Hot water temperature sensor (R3)
- Regenerative storage tank temperature sensor (R13)

Sensor characteristics

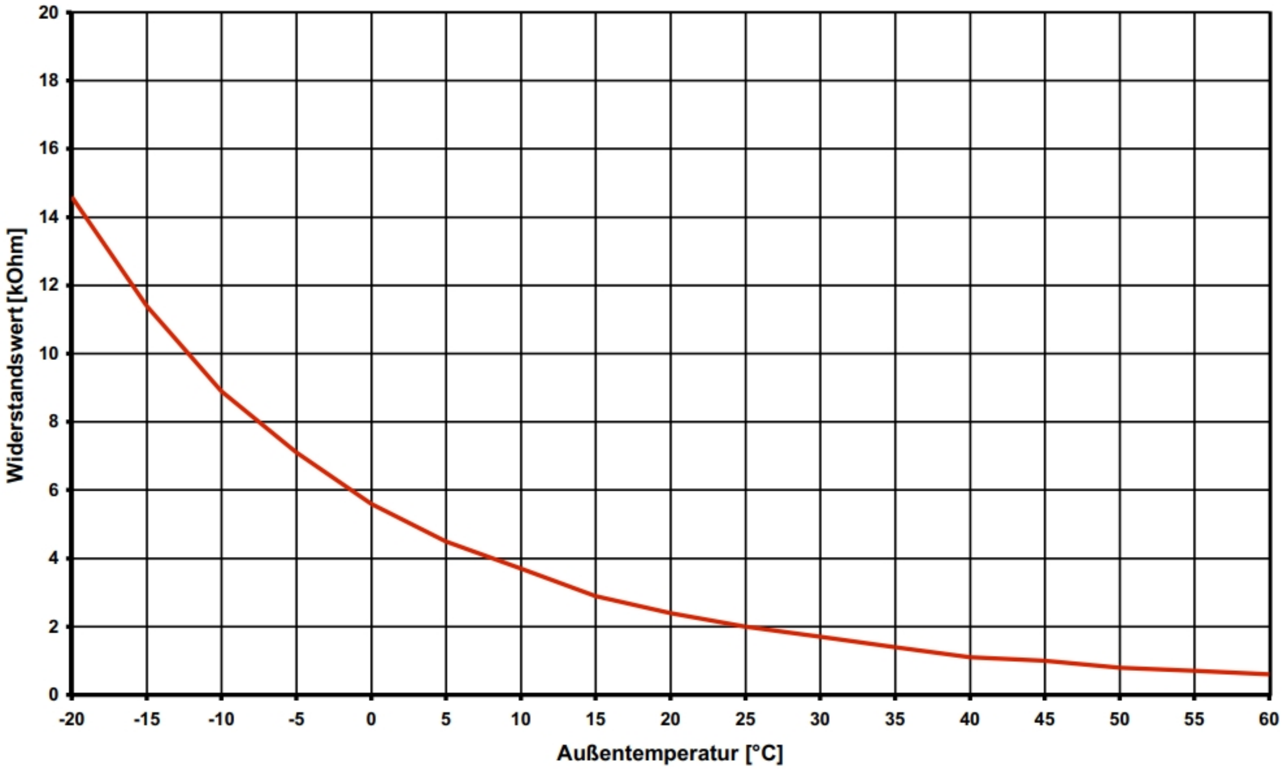
Temperature in °C	-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55	60
NTC-2 in kΩ	14,6	11,4	8,9	7,1	5,6	4,5	3,7	2,9	2,4	2,0	1,7	1,4	1,1	1,0	0,8	0,7	0,6
NTC-10 in kΩ	67,7	53,4	42,3	33,9	27,3	22,1	18,0	14,9	12,1	10,0	8,4	7,0	5,9	5,0	4,2	3,6	3,1

The temperature sensors (NTC-10) to be connected to the heat pump manager must correspond to the sensor characteristic curve shown in the figure.



66 Sensor characteristic NTC-10 for connection to the heating controller

The only exception is the outdoor temperature sensor (NTC-2) included in the scope of supply of the heat pump



67 Sensor characteristic NTC-2 according to DIN 44574

Mounting the outdoor temperature sensor

The temperature sensor must be installed in such a way that all weather influences are recorded and the measured value is not falsified.

- on the outside wall, preferably on the north or north-west side
- Do not install in a "protected position" (e.g. in a recess in the wall or under the balcony)
- Do not install near windows, doors, exhaust air openings, outdoor lights or heat pumps
- Do not expose to direct sunlight at any time of the year

Sensor cable dimensioning parameters	
conductor material	Cu
cable length	50 m
ambient temperature	35 °C
Laying method	B2 (DIN VDE 0298-4 / IEC 60364-5-52)
external diameter	4-8 mm

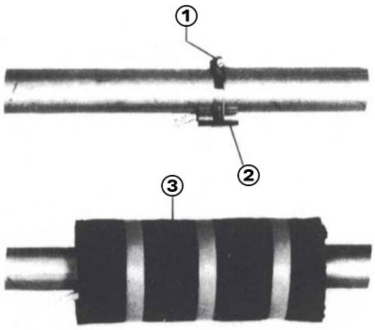
Mounting the contact sensors

It is only necessary to install the contact sensors if they are included in the scope of supply of the heat pump but are not installed.

The contact sensors can be mounted as pipe contact sensors or inserted into the immersion sleeve of the compact manifold.

Mounting as pipe system sensor:

- Clean paint, rust and scale from the heating pipe
- Coat the cleaned surface with heat-conducting paste (apply a thin layer)
- Fasten sensor with hose clip (tighten well, loose sensors lead to malfunctions) and insulate thermally



① Hose clip

② Contact sensor

③ Thermal insulation

10.6.6 Electrical connection work (WPM Touch)

Installation tutorial

https://www.youtube.com/watch?v=Vj8k9RxN3cA&list=PLvbfKjOwCCG0p9LtD2OtdPzVbslbcRB_p

General

All electrical connection work may only be carried out by an electrician or a specialist for defined activities in compliance with the

- Assembly and operating instructions
- Country-specific installation regulations e.g. VDE 0100
- technical connection conditions of the energy supplier and supply network operators (e.g. TAB) and
- local conditions

be carried out.

To ensure the frost protection function, the heat pump manager may only be de-energised for a short time and the heat pump must be flowing.
On the heat pump, all supply lines must be fed into the junction box through the free membranes provided for this purpose.

Electrical connection work

1. The up to 5-core electrical supply cable for the power section of the heat pump is routed from the heat pump's electricity meter via the utility company blocking contactor (if required) to the heat pump (for supply voltage, see heat pump instructions). An all-pole switch off with at least 3 mm contact opening distance (e.g. utility company blocking contactor, power contactor) and an all-pole automatic circuit breaker with common tripping of all phase conductors must be provided in the power supply for the heat pump (tripping current and characteristics according to device information).
2. The three-core electrical supply cable for the heat pump manager (N1) is routed to the heat pump (devices with integrated controller) or to the subsequent installation location of the heat pump manager (WPM). The supply line (L/N/PE ~230 V, 50 Hz) for the WPM must be at continuous voltage and for this reason must be tapped before the utility company blocking contactor or connected to the household current, as otherwise important protective functions will be out of operation during the utility block.
3. The utility company blocking contactor (K22) with 3 main contacts (1/3/5 / /2/4/6) and one auxiliary contact (NO contact e.g. 13/14) must be designed according to the heat pump output and provided by the customer. The NO contact of the utility company blocking contactor (13/14) is connected to connector (1) (=DI1) of function block 0 (grey). CAUTION! Extra low voltage!
4. The contactor (K20) for the immersion heater (E10) must be designed according to the heater output for monoenergetic systems (2nd heat generator) and provided by the customer. The control (230 V AC) is connected from the heat pump manager via plug (7) (=NO3) of function block 0 (grey).
5. The contactor (K21) for the flange heater (E9) in the domestic hot water cylinder must be designed according to the radiator output and provided by the customer. The control (230 V AC) is carried out from the WPM via plug (7) from the defined function block.
6. The contactors for points 3;4;5 are installed in the electrical distribution system. The mains cables for the radiators must be designed and fused in accordance with DIN VDE 0100.
7. The heat circulating pump (M13) is connected to plug (5) (230 V AC) and (8) (control signal) of function block 0 (grey).
8. The external sensor (R1) is connected to connector (3) (=U1) of function block 0 (grey).

> **NOTE**
> When using three-phase pumps, a power contactor can be controlled with the 230 V output signal of the heat pump manager. Sensor cables can be extended up to 50 m with 2 x 0.75 mm cables.

> **NOTE**
> Further information on wiring the heat pump manager can be found in the electrical documentation.

> **CAUTION**
> The communication cable is essential for the function of air-to-water heat pumps installed outdoors. It must be shielded and laid separately from the load cable. It is connected to N1-J25.
> For further information, see electrical documentation

10.6.7 WPM Touch function blocks

The basic version of the WPM Touch heat pump manager has a non-changeable pin assignment for the Function "General/1.unmixed circuit" on the function block
"grey".

Other functions can be individually assigned to three function blocks (yellow, green, red).

If these three function blocks are not sufficient, there is the option of using the **extension to add two more function blocks** (orange, blue). A maximum of five

function blocks are possible (yellow, green, red, orange, blue).

> **NOTE**
> The "Active cooling" function can only be selected for a reversible heat pump.

Overview of functions

Pin assignment	Function
General/1.unmixed circuit +A400	
A1/K22	Utility company disable contactor
A2/K23	External disable contactor
R1	Outdoor temperature sensor
R2.2	Request sensor
M13	heat circulating pump
H5	remote fault indicator
E10.1/K20	Tubular heating/immersion heater
N27.1	Smart grid green

Pin assignment	Function
Bivalent +A441	
E10.2/3	Oil/gas boiler
M26 ↑	Mixer Open
M26 ↓	Mixer Closed
AO E10.2/3	Oil/gas boiler control signal
Renewable +A442	
R13	sensor
M27 ↑	Mixer Open
M27 ↓	Mixer Closed

N27.2	Smart Grid red
M16	auxiliary circulating pump
AO M16	Control signal auxiliary circulating pump
Domestic hot water +A420	
K31	Circulation requirement
B8	thermostat
R3	domestic hot water sensor
(Y)M18	Circulation pump/reversing valve
E9/K21	flange heater
AO M18	Circulation pump control signal
1. mixed circuit +A411	
R35	sensor
M13	Circulation pump
M21 ↑	Mixer Open
M21 ↓	Mixer Closed
2.mixed circuit +A412	
R5	sensor
M15	Circulation pump
M22 ↑	Mixer Open
M22 ↓	Mixer Closed
3.mixed circuit +A413	
R21	sensor
M20	Circulation pump
M29 ↑	Mixer Open
M29 ↓	Mixer Closed

M28	Circulation pump renewable
Swimming pool+A430	
B4	thermostat
R20	domestic hot water sensor
(Y)M19	Circulation pump/reversing valve
K36	flange heater
AO M19	Circulation pump control signal
Cooling active +A451	
N5	dew point monitor
K28	Heating / cooling switching
R24.2	Primary circuit cooling return sensor
R39	Cooling demand sensor
N9/M17	Switching room thermostat / cooling circulating pump
Y12 ↑	External 4-WUV On
Y12 ↓	external 4-WUV Too
Cooling passive+A452	
N5	dew point monitor
K28	Heating / cooling switching
R11	Cooling water flow
R4	Cooling water return
M12	Primary circulating pump passive cool.
Y5/Y6	3-way or 2-way valve
M17	cooling circulating pump
Solar +A443	
R22	solar cylinder
R23	collector sensor
M23	Solar pump
AO M23	Solar pump control signal

Overview of pin assignment for fixed function block

	Steckernummer													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Funktionsblock 0	grau	grau	grau	grau	grau	grau	grau	grau	grau	grau	grau	grau	grau	grau
Funktion														
Allgemein / 1. ungemischter Kreis +A400	A1 K22	A2 K23	R1	R2.2	M13	H5	E10.2 K20	-	N27.1	N27.2	-	-	M16	M16 AO

Overview of pin assignment for flexible function block

	Steckernummer							
	1	2	3	4	5	6	7	8
Funktionsblock I	gelb	gelb	gelb	gelb	gelb	gelb	gelb	gelb
Funktionsblock II	grün	grün	grün	grün	grün	grün	grün	grün
Funktionsblock III	rot	rot	rot	rot	rot	rot	rot	rot
Funktionsblock IV (Zubehör)	orange	orange	orange	orange	orange	orange	orange	orange
Funktionsblock V (Zubehör)	blau	blau	blau	blau	blau	blau	blau	blau
Funktionen								
Warmwasser +A420	K31	B3	R3	-	(Y)M18	M24	E9/K21	M18 AO
1. gemischter Kreis +A411	-	-	R35	-	M13	M21↑	M21↓	-
2. gemischter Kreis +A412	-	-	R5	-	M15	M22↑	M22↓	-
3. gemischter Kreis +A413	-	-	R21	-	M20	M29↑	M29↓	-
Bivalent +A441	-	-	-	-	E10.2/3	M26↑	M26↓	E10.2/3 AO
Regenerativ +A442	-	-	R13	-	M28	M27↑	M27↓	-
Schwimmbad +A430	-	B4	R20	-	M19	-	K36	M19 AO
Kühlen aktiv +A451	N5	K28	R24.2	R39	N9/M17	Y12↑	Y12↓	-
Kühlen passiv +A452	N5	K28	R11	R4	M12	Y5/Y6	M17	-
Solar +443	-	-	R22	R23	M23	-	-	M23 AO

Example: Selection of pin assignment with domestic hot water function selected on the yellow function block

First select the function to be used, in this case domestic hot water, and the function block to be assigned in colour, in this case yellow. Now select the component to be connected in the domestic hot water line of the table, for example domestic hot water sensor R3. The connector to be assigned to the yellow function block is then selected in the 1st line. In this case, the domestic hot water sensor R3 must be connected to the yellow connector with the number 3. This procedure must be selected for each component to be connected.

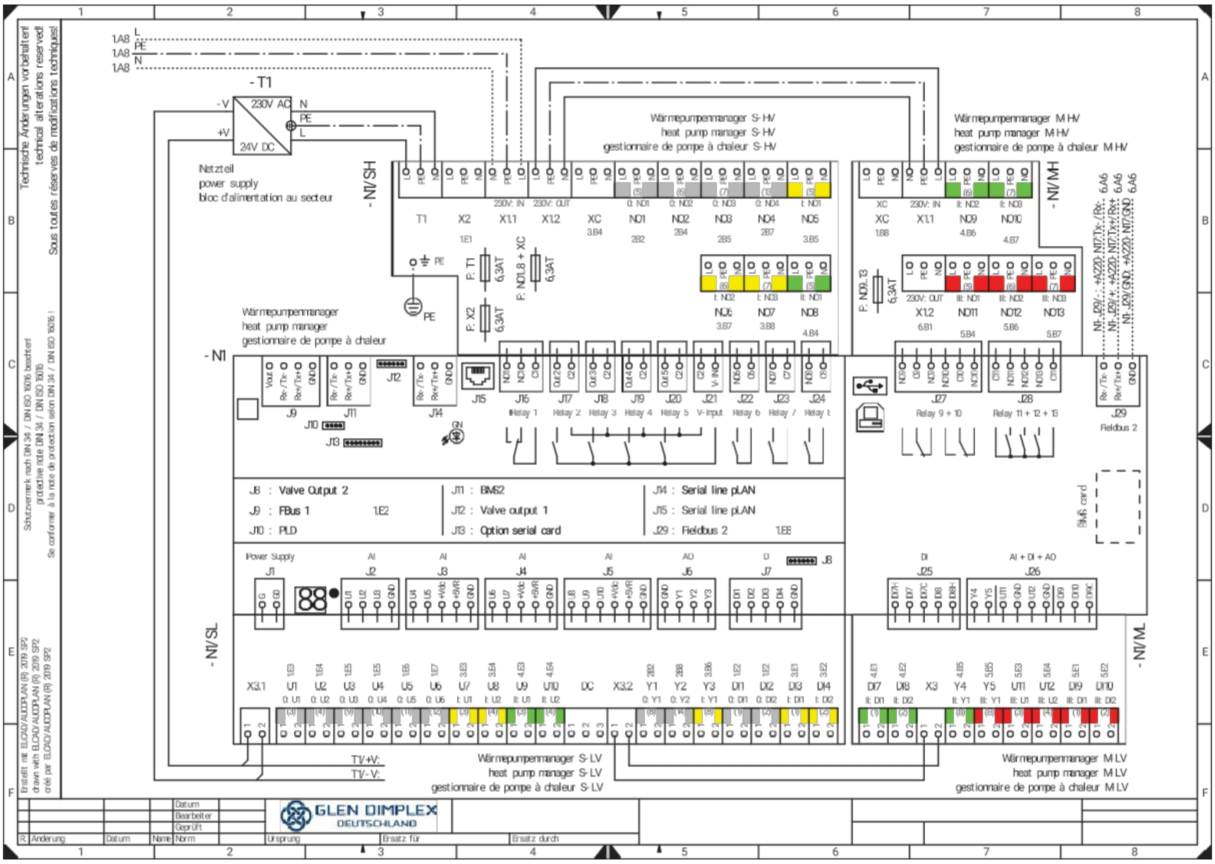
NOTE
When commissioning the system via the touch display, the function to be used is queried and set with the corresponding colour assignment.

	Steckernummer							
	1	2	3	4	5	6	7	8
Funktionsblock I	gelb	gelb	gelb	gelb	gelb	gelb	gelb	gelb
Funktionsblock II	[illegible]	[illegible]	[illegible]	grün	[illegible]	[illegible]	[illegible]	[illegible]
Funktionsblock III	[illegible]	[illegible]	[illegible]	rot	[illegible]	[illegible]	[illegible]	[illegible]
Funktionsblock IV (Zubehör)	[illegible]	[illegible]	[illegible]	orange	[illegible]	[illegible]	[illegible]	[illegible]
Funktionsblock V (Zubehör)	[illegible]	[illegible]	[illegible]	blau	[illegible]	[illegible]	[illegible]	[illegible]
Funktionen								
Warmwasser +A420	K31	B3	R3	-	(Y)M18	M24	E9/K21	M18 AO
1. gemischter Kreis +A411	-	-	R35	-	M13	M21 ↑	M21 ↓	-

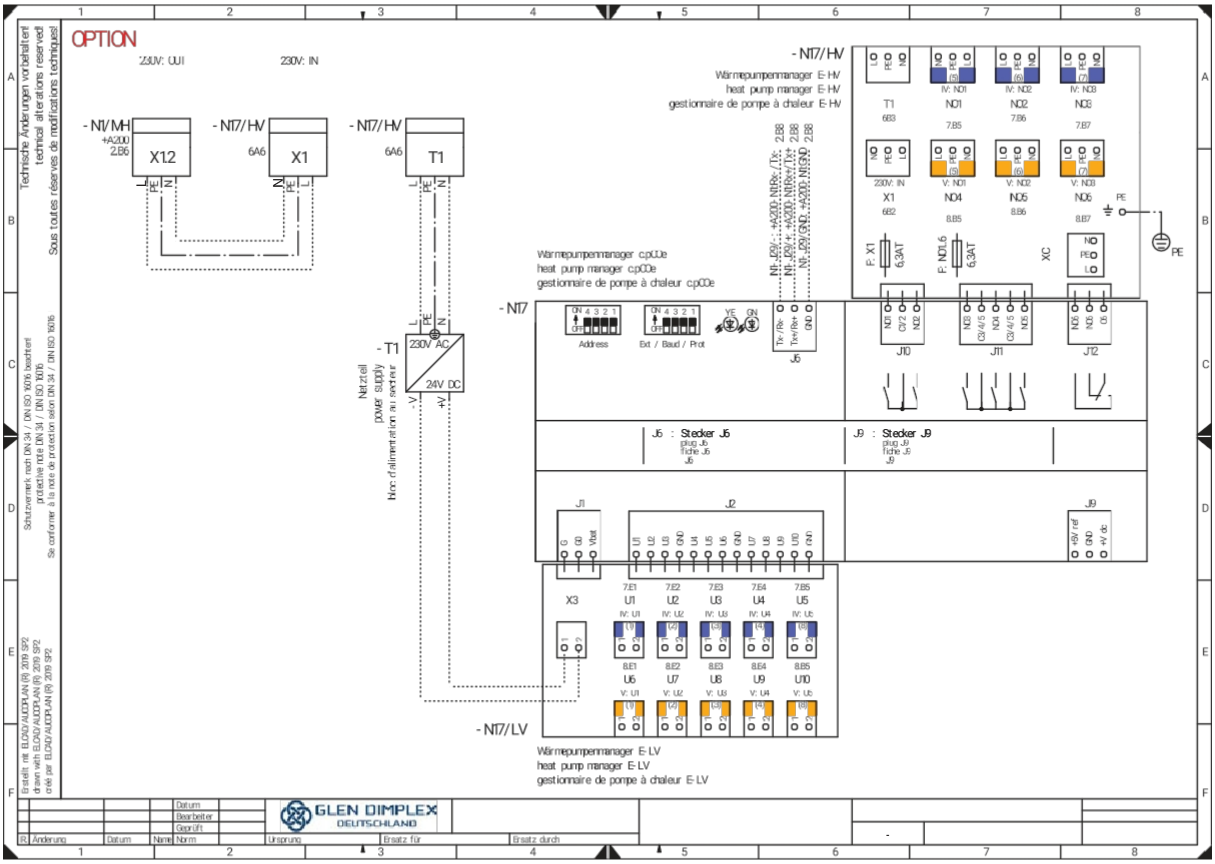
NOTE
The detailed electrical documentation can be found in the accessories pack of the respective heat pump

NOTE
Communication and control voltage cables must be laid between the wall-mounted heat pump manager and the heat pump

Plug overview Basic function:



Plug function extension (WPM Touch +2)



Associated cable assignments:

Function +A400 / general / 1st circuit unmixed

Function +A411 / 1st circuit mixed

Function +A412 / 2nd circuit mixed

function +A413 / 3rd circuit mixed

function +A420 / Domestic hot

water function +A430 / Swimming

pool function +A441 / Bivalent

function +A442 / Renewable

function +A443 / Solar

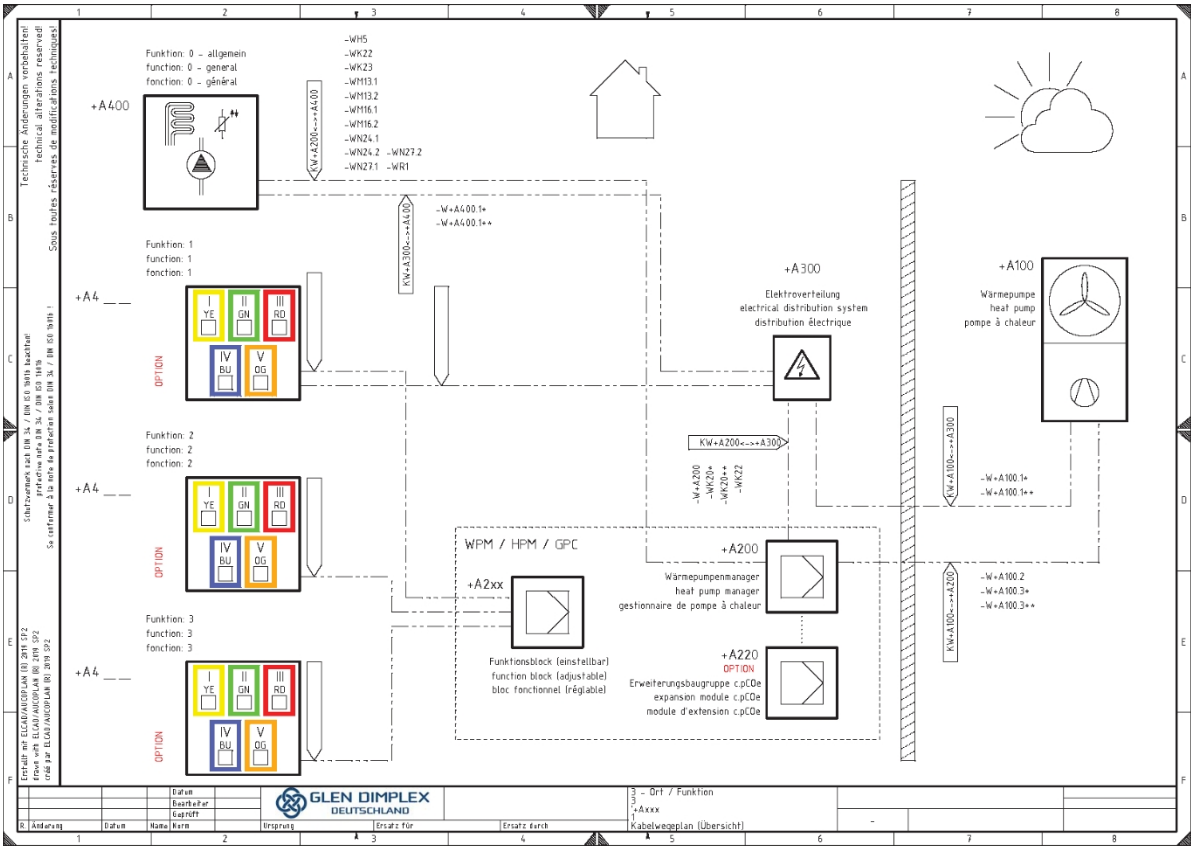
Function +A451 / Cooling active

Function +A452 / Cooling passive

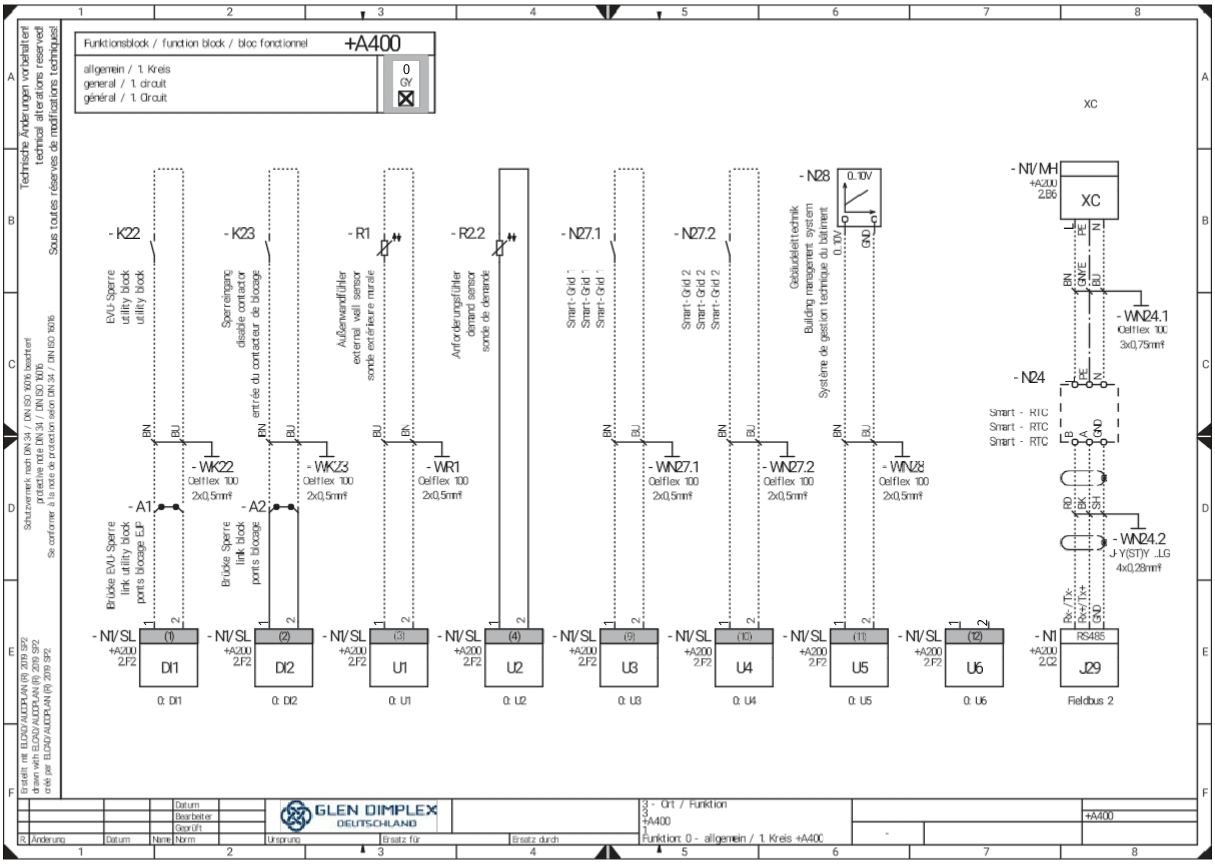
10.6.8 WPM Touch cable assignment

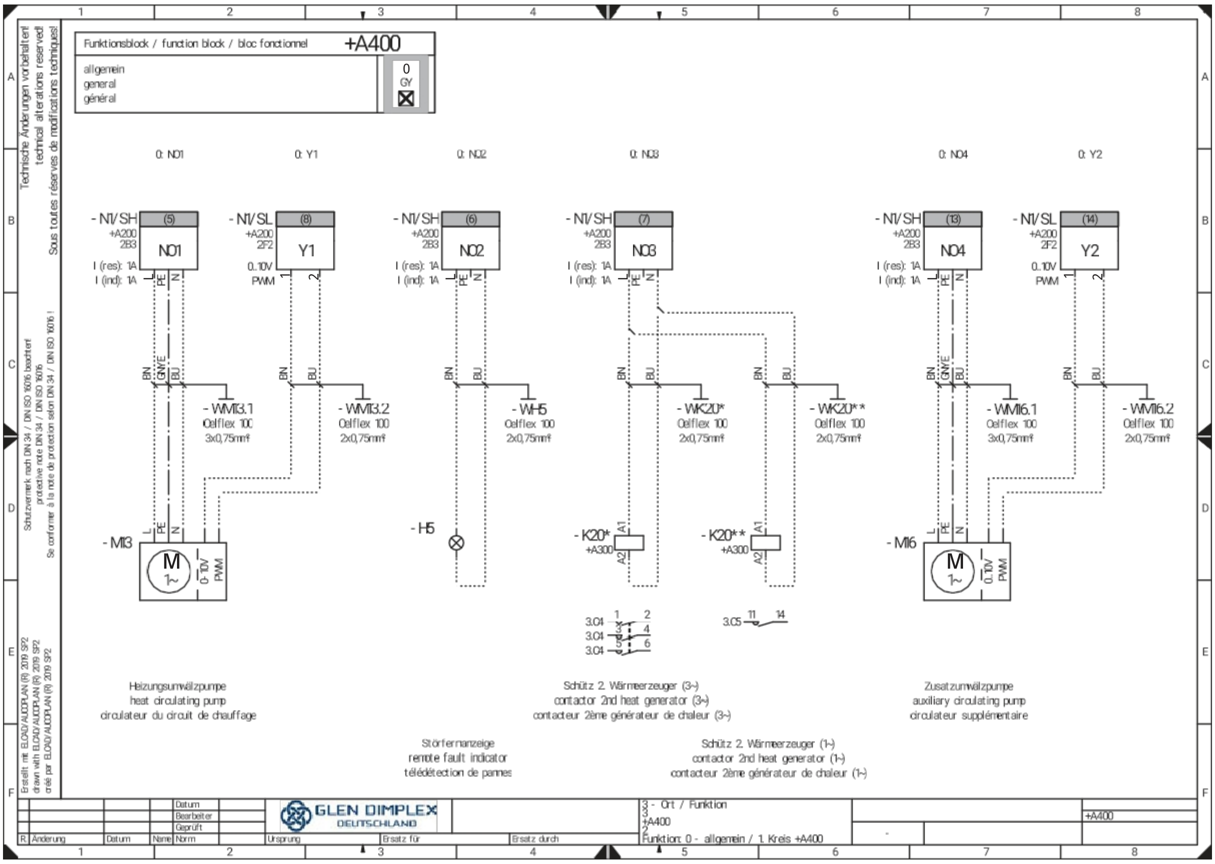
- Function +A400 / general / 1. circuit unmixed
- Function +A411 / 1. circuit mixed
- Function +A412 / 2nd circuit mixed
- Function +A413 / 3rd circuit mixed
- Function +A420 / domestic hot water
- Function +A430 / swimming pool
- Function +A441 / Bivalent
- Function +A442 / renewable
- Function +A443 / Solar
- Function +A451 / Cooling active
- Function +A452 / Cooling passive

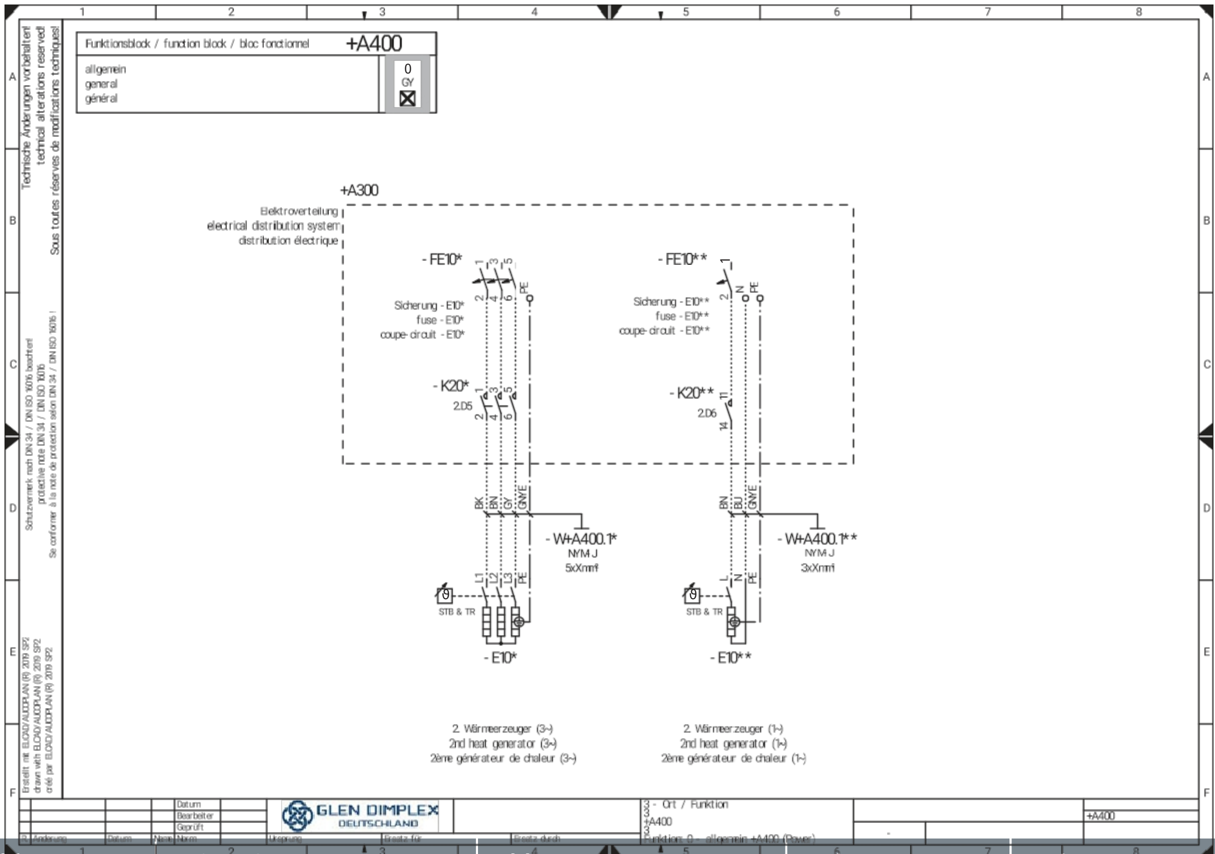
Cable routing plan



Function +A400 / general / 1. circuit unmixed




Funktionsblock / function block / bloc fonctionnel
+A400
allgemein
general
général
-N1/SH
N01
Y1
N02
N03
N04
Y2
-WM13.1
-WM13.2
-WH5
-WK20*
-WK20**
-WM16.1
-WM16.2
Oelflex 100
-M13
-H5
-K20*
-K20**
-M16
Heizungsumwälzpumpe
heat circulating pump
circulateur du circuit de chauffage
Störfernanzeige
remote fault indicator
télédétection de pannes
Schütz 2. Wärmeerzeuger (3~)
contactor 2nd heat generator (3~)
contacteur 2ème générateur de chaleur (3~)
Schütz 2. Wärmeerzeuger (1~)
contactor 2nd heat generator (1~)
contacteur 2ème générateur de chaleur (1~)
Zusatzumwälzpumpe
auxiliary circulating pump
circulateur supplémentaire
GLEN DIMPLEX DEUTSCHLAND
Funktion: 0 - allgemein / 1. Kreis +A400

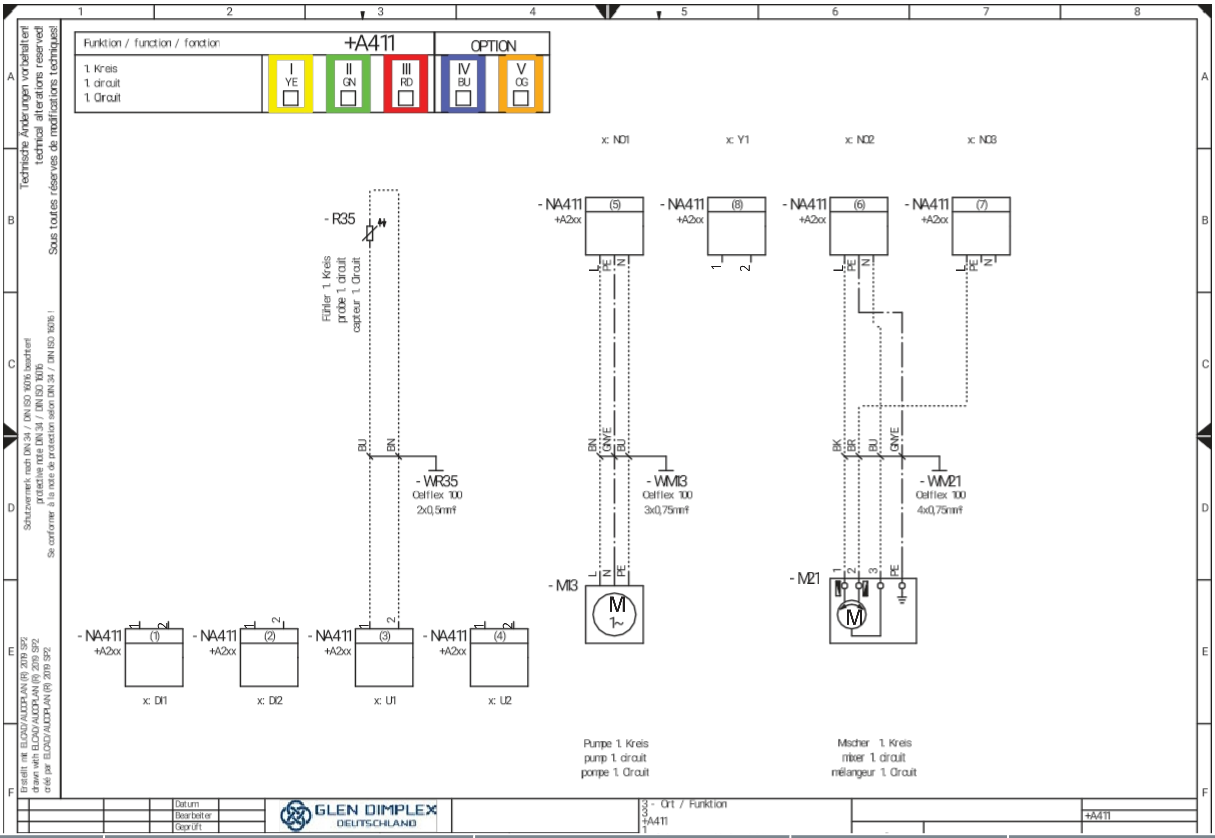


Cables	Designation	Cable type	Goal 1.	Goal 2
-W+A200	Control voltage cable	Installation cable: NYM-J 3 x 1.5mm²	+A200-N1/SH Heat pump manager S-HV	+A300-F+A200 Heat pump manager fuse
-W+A400.1*.	Cable supply voltage (3~)	Installation cable: NYM-J 5 x Xmm²	+A300-K20* 2nd heat generator contactor	+A400-E10* 2nd heat generator (3~)
-W+A400.1**	Cable supply voltage (1~)	Installation cable: NYM-J 3 x Xmm²	+A300-K20** 2nd heat generator contactor	+A400-E10** 2nd heat generator (1~)
-WH5	Cable -H5	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A200-H5 remote fault indicator	+A400-N1/SH Heat pump manager S-HV
-WK20*	Cable -K20 (3~)	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A200-N1/SH Heat pump manager S-HV	+A300-K20* 2nd heat generator contactor

Cables	Designation	Cable type	Goal 1.	Goal 2
-WK20**	Cable -K20 (1~)	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A200-N1/SH Heat pump manager S-HV	+A300-K20** Contactor 2. heat generator (1~)
-WK22	Cable -K22	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A200-N1/SL Heat pump manager S-LV	+A300-K22 utility block
-WK23	Cable -K23	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A200-K23 disable contactor	+A400-N1/SL Heat pump manager S-LV
-WM13.1.	Cable supply voltage -M13	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A200-M13 Heating circulation pump	+A400-N1/SH Heat pump manager S-HV
-WM13.2	Control voltage cable -M13	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A200-M13 Heating circulation pump	+A400-N1/SL Heat pump manager S-LV
-WM16.1.	Cable supply voltage -M13	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A200-M16 Additional circulation pump	+A400-N1/SH Heat pump manager S-HV
-WM16.2	Control voltage cable -M13	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A200-M16 Additional circulation pump	+A400-N1/SL Heat pump manager S-LV
-WN24.1.	Cable supply voltage -N24	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A200-N24 Smart - RTC	+A400-N1/MH Heat pump manager M-HV
-WN24.2	Cable communication -N24	Data cable; shielded: J-Y(ST)Y ..LG 4 x 0.28mm²	+A200-N24 Smart - RTC	+A400-N1 Heat pump manager
-WN27.1.	Cable -N27.1	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A200-N27.1 Smart Grid 1.	+A400-N1/SL Heat pump manager S-LV
-WN27.2	Cable -N27.2	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A200-N27.2 Smart Grid 2	+A400-N1/SL Heat pump manager S-LV
-WN28	Cable -N28	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A200-N28 Building control technology	+A400-N1/SL Heat pump manager S-LV

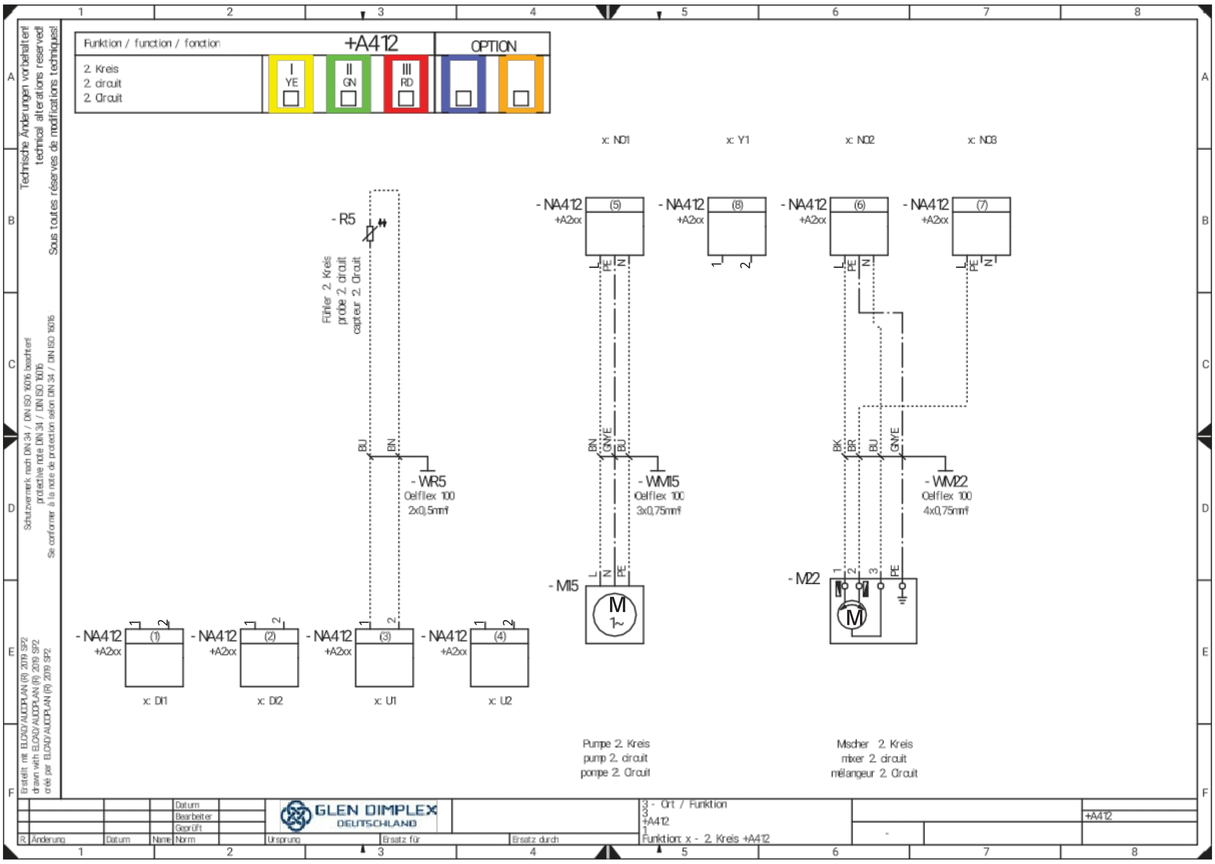
Cables	Designation	Cable type	Goal 1.	Goal 2
-WR1	Cable -R1	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A200-R1 External wall sensor	+A400-N1/SL Heat pump manager S-LV

Function +A411 / 1. circuit mixed



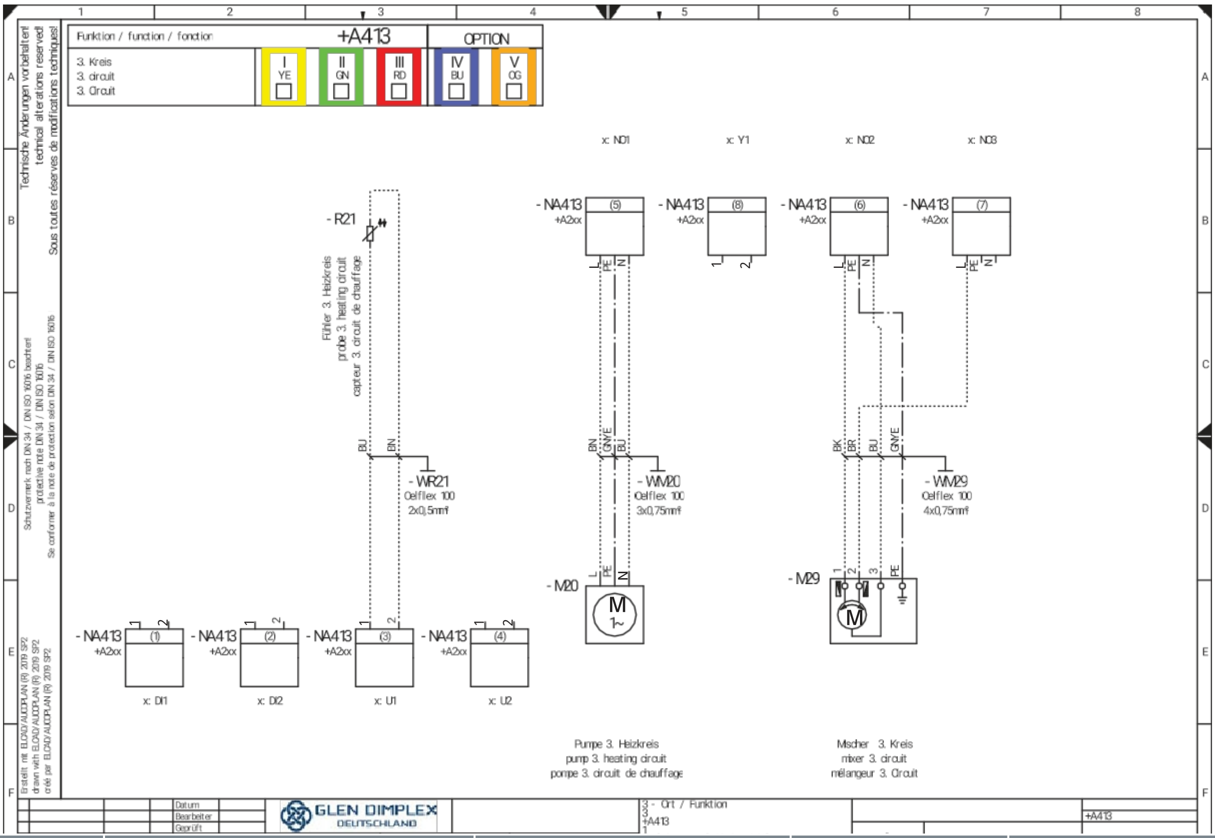
Cables	Designation	Cable type	Goal 1.	Goal 2
-WM13	Cable supply voltage -M13	PVC control cable; coloured: Oelflex 100	+A2xx-NA411 Function block 1. circle	+A411-M13 Pump 1. circle
-WM21	Cable -M21	PVC control cable; coloured: Oelflex 100	+A2xx-NA411 Function block 1. circle	+A411-M21 mixer 1. circle
-WR35	Cable -R35	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA411 Function block 1. circle	+A411-R35 sensor 1. circle

Function +A412 / 2nd circuit mixed



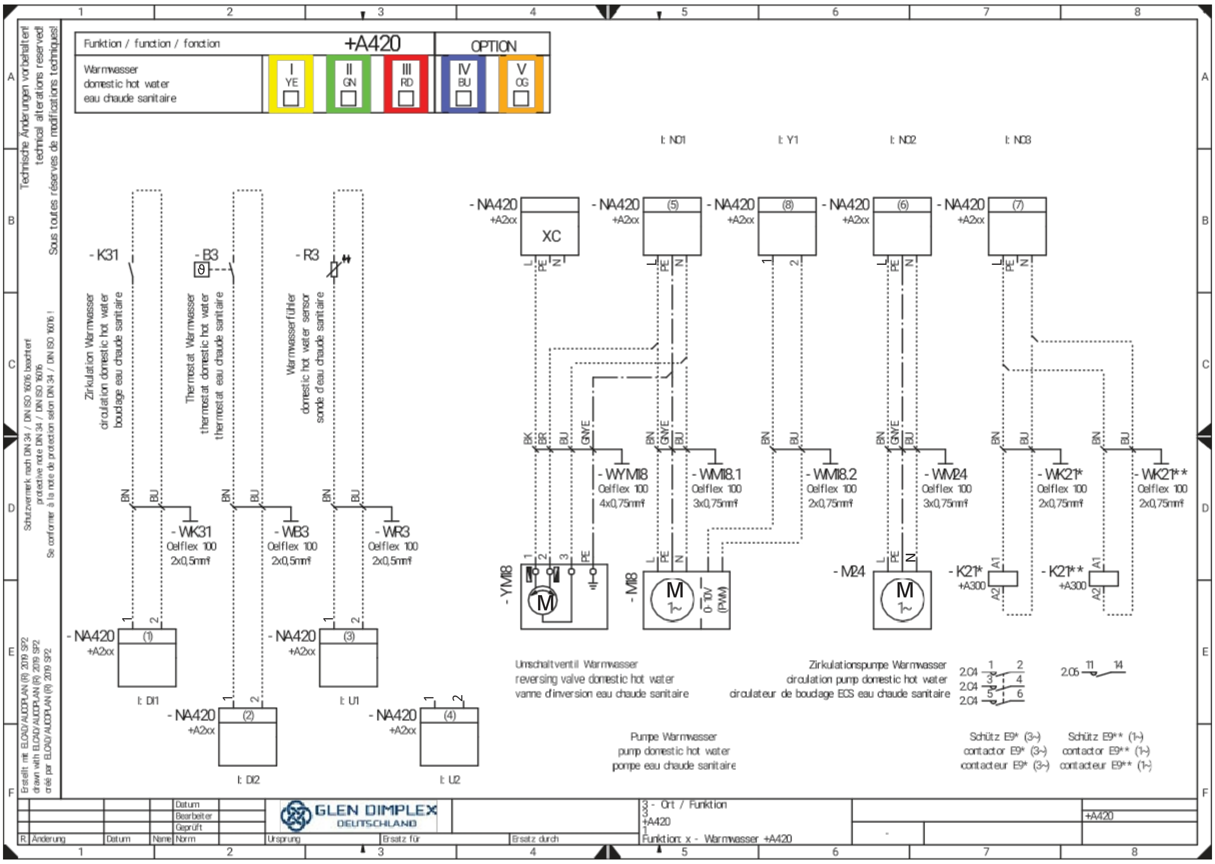
Cables	Designation	Cable type	Goal 1.	Goal 2
-WM15	Cable supply voltage -M15	PVC control cable; coloured: Oelflex 100	+A2xx-NA412 Function block 2nd circle	+A411-M15 Pump 2nd circle
-WM22	Cable -M22	PVC control cable; coloured: Oelflex 100	+A2xx-NA412 Function block 2nd circle	+A411-M22 mixer 2nd circle
-WR5	Cable -R5	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA412 Function block 2nd circle	+A411-R5 sensor 2nd circle

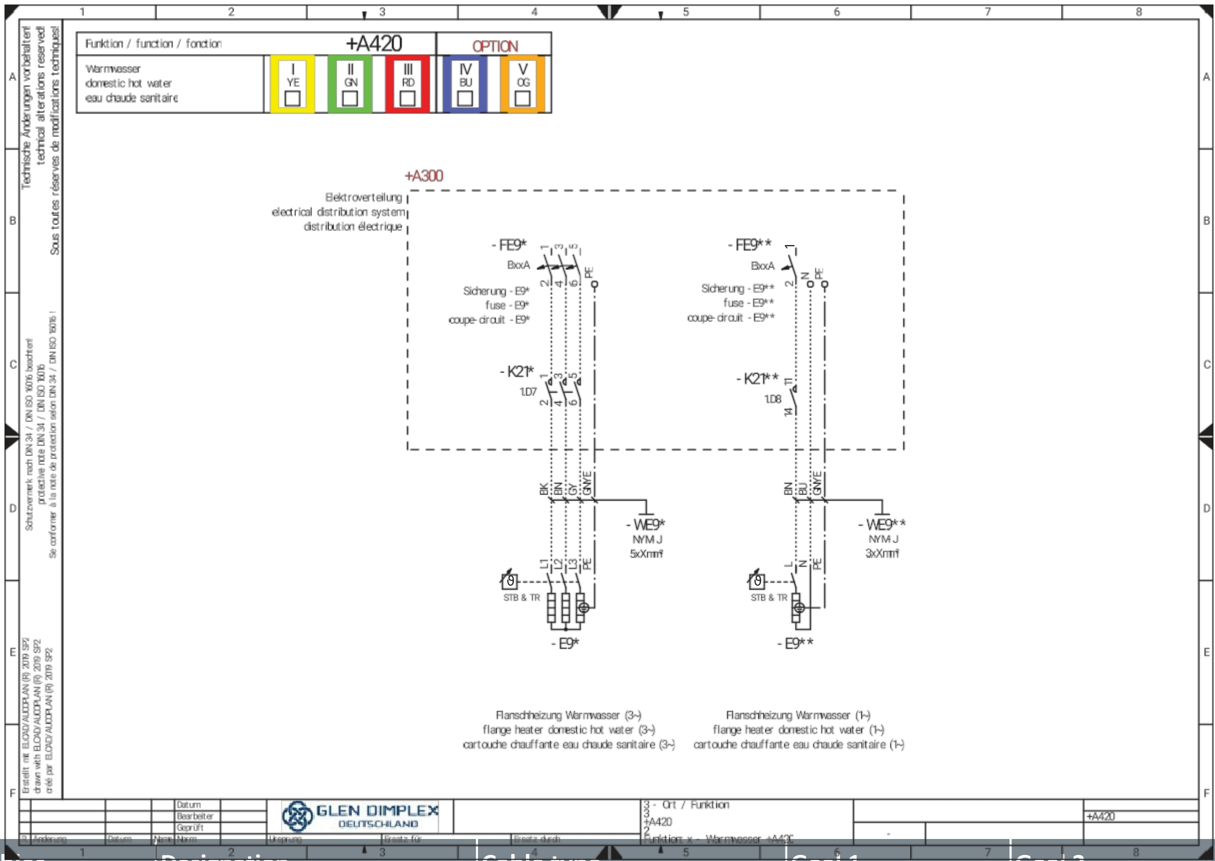
Function +A413 / 3rd circuit mixed



Cables	Designation	Cable type	Goal 1.	Goal 2
-WM20	Cable supply voltage -M20	PVC control cable; coloured: Oelflex 100	+A2xx-NA413 Function block 3rd circle	+A411-M20 Pump 3rd circle
-WM29	Cable -M29	PVC control cable; coloured: Oelflex 100	+A2xx-NA413 Function block 3rd circle	+A411-M29 mixer 3rd circle
-WR21	Cable -R21	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA413 Function block 3rd circle	+A411-R21 sensor 3rd circle

Function +A420 / **Domestic** hot water **Function description domestic hot water WPM Touch:** Domestic hot water

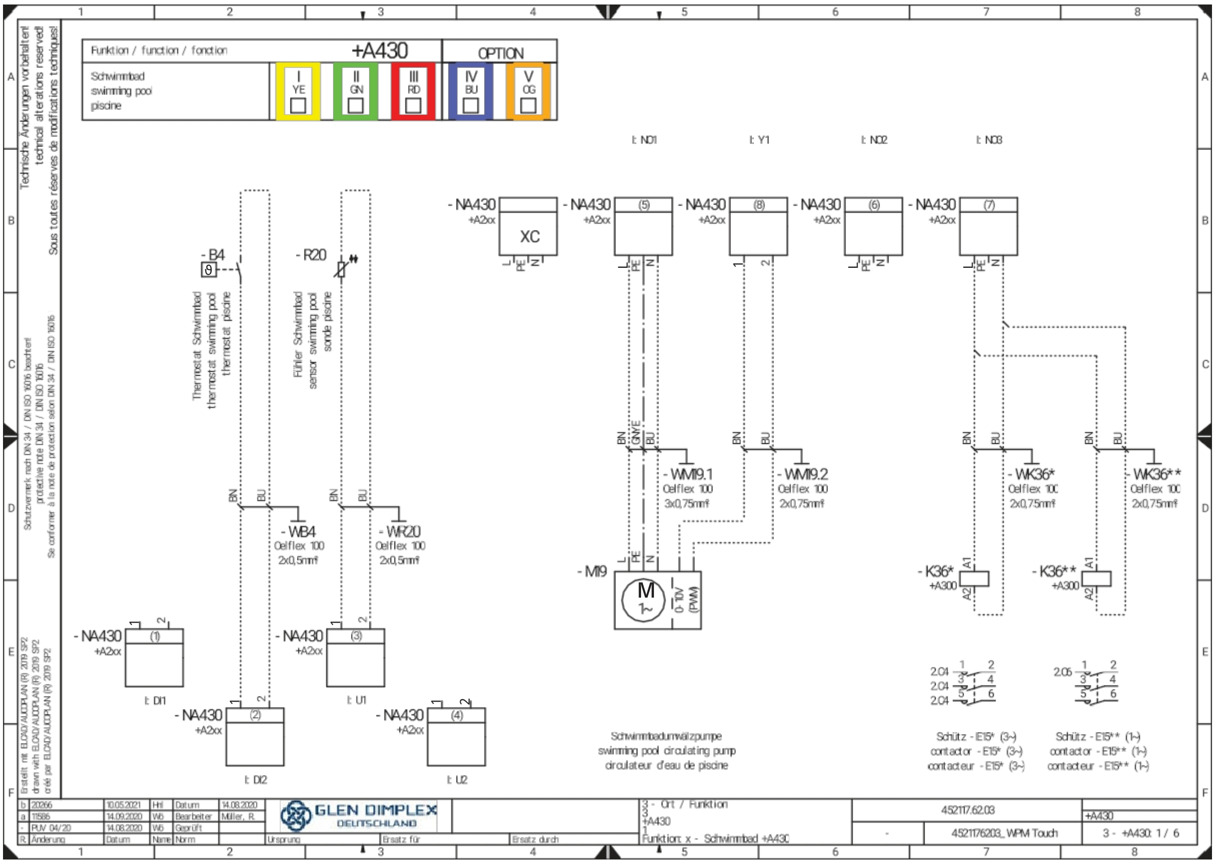


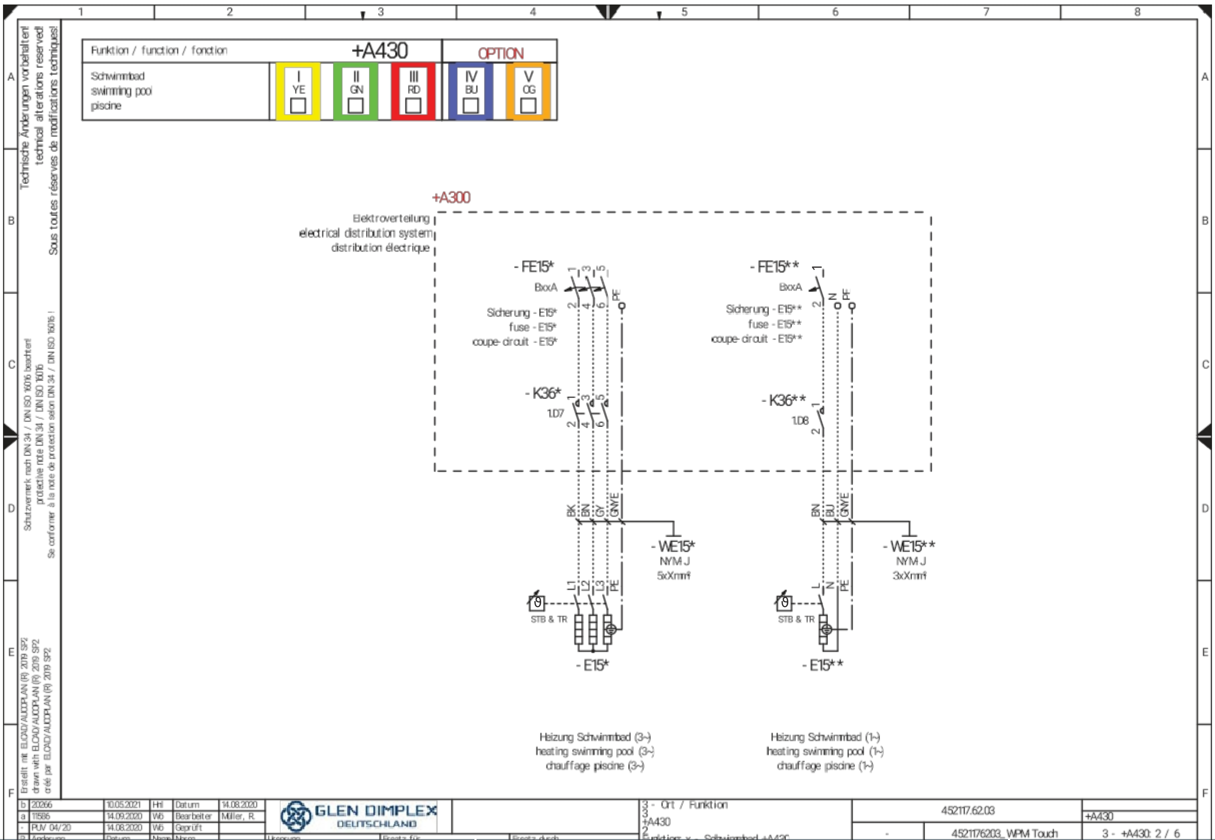


Cables	Designation	Cable type	Goal 1.	Goal 2
-WB3	Cable -B3	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA420 Domestic hot water function block	+A420-B3 Domestic hot water thermostat
-WE9*	Cable supply voltage (3~)	Installation cable: NYM-J 5 x Xmm²	+A300-K21* Contactor E9* (3~)	+A420-E9* Flange heater domestic hot water (3~)
-WE9**	Cable supply voltage (1~)	Installation cable: NYM-J 3 x Xmm²	+A300-K21** Contactor E9** (1~)	+A420-E9** Flange heater domestic hot water (1~)
-WK21*	Cable -K21*	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A2xx-NA420 Domestic hot water function block	+A300-K21* Contactor E9* (3~)
-WK21**	Cable -K21**	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A2xx-NA420 Domestic hot water function block	+A300-K21** Contactor E9** (1~)

Cables	Designation	Cable type	Goal 1.	Goal 2
-WK31	Cable -K31	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA420 Domestic hot water function block	+A420-K31 Domestic hot water circulation
-WK36	Cable -K36	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A2xx-NA430 Swimming pool function block	+A300-K36 Contactor flange heater -E8.1
-WM18.1.	Cable supply voltage -M18	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A2xx-NA420 Domestic hot water function block	+A420-M18 Domestic hot water pump
-WM18.2	Control voltage cable -M18	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A2xx-NA420 Domestic hot water function block	+A420-M18 Domestic hot water pump
-WM24	Cable -M24	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A2xx-NA420 Domestic hot water function block	+A420-M24 Domestic hot water circulation pump
-WR3	Cable -B3	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA420 Domestic hot water function block	+A420-R3 domestic hot water sensor
-WYM18	Cable supply voltage -YM18	PVC control cable; coloured: Oelflex 100 4 x 0.75mm²	+A2xx-NA420 Domestic hot water function block	+A420-YM18 Domestic hot water reversing valve

Function +A430 / swimming pool





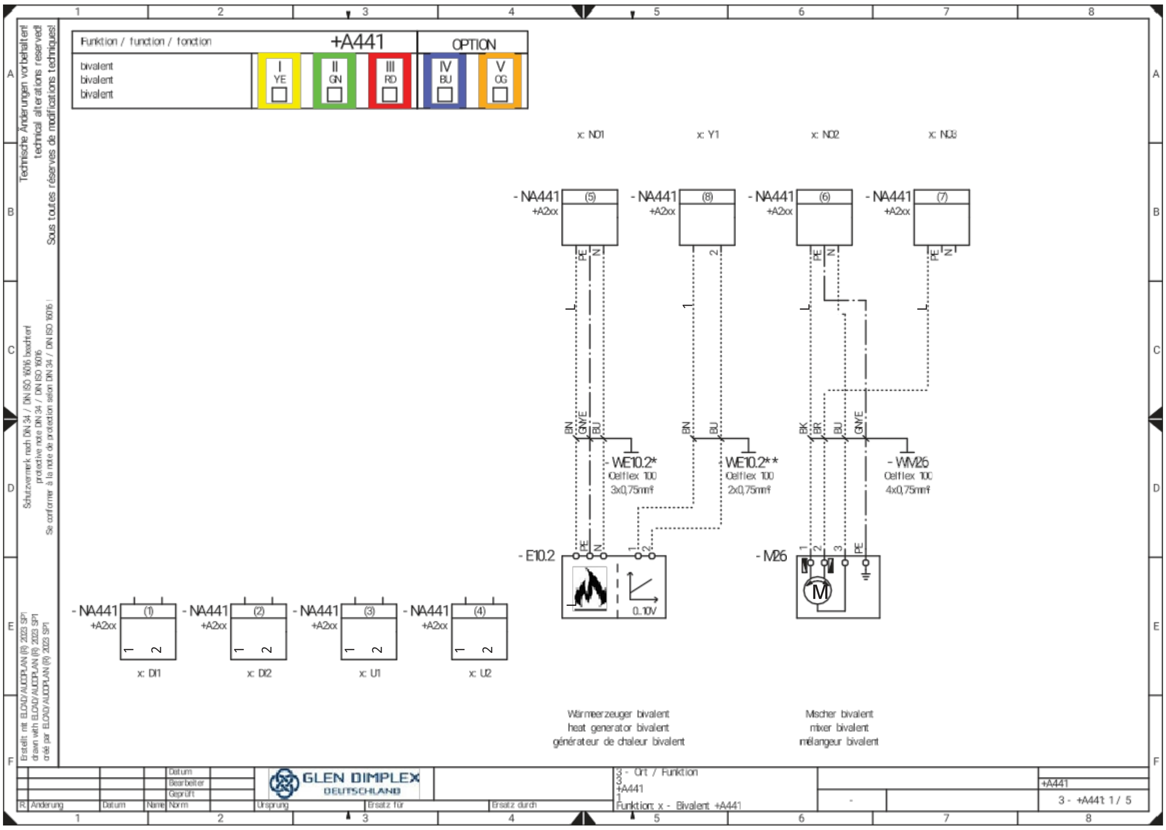
Cables	Designation	Cable type	Goal 1.	Goal 2
-WB4	Cable -B4	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA430 Swimming pool function block	+A430-B4 Swimming pool thermostat
-WE15*	Cable E15* (3~)	Installation cable: NYM-J 5 x Xmm²	+A300-K36* Contactor -E15* (3~)	+A430-E15* Swimming pool heating (3~)
-WE15**	Cable E15** (1~)	Installation cable: NYM-J 3 x Xmm²	+A300-K36** Contactor -E15**	+A430-E15** Heating swimming pool (1~)
-WK21*	Cable -K21*	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A2xx-NA420 Domestic hot water function block	+A300-K21* Contactor E9* (3~)
-WK21**	Cable -K21**	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A2xx-NA420 Domestic hot water function block	+A300-K21** Contactor E9** (1~)

Cables	Designation	Cable type	Goal 1.	Goal 2
-WK36*	Cable -K36*	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A2xx-NA430 Swimming pool function block	+A300-K36** Contactor -E15**
-WK36**	Cable -K36**	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A2xx-NA430 Swimming pool function block	+A300-K36** Contactor -E15**
-WM19.1.	Mains cable -M19.1	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A2xx-NA430 Swimming pool function block	+A430-M19 Swimming pool circulation pump
-WM19.2	Control cable -M19	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A2xx-NA430 Swimming pool function block	+A430-M19 Swimming pool circulation pump
-WR20	Cable -R20	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA430 Swimming pool function block	+A430-R20 Swimming pool sensor

Function +A441 / Bivalent

Functional description 2nd heat generator WPM Touch:

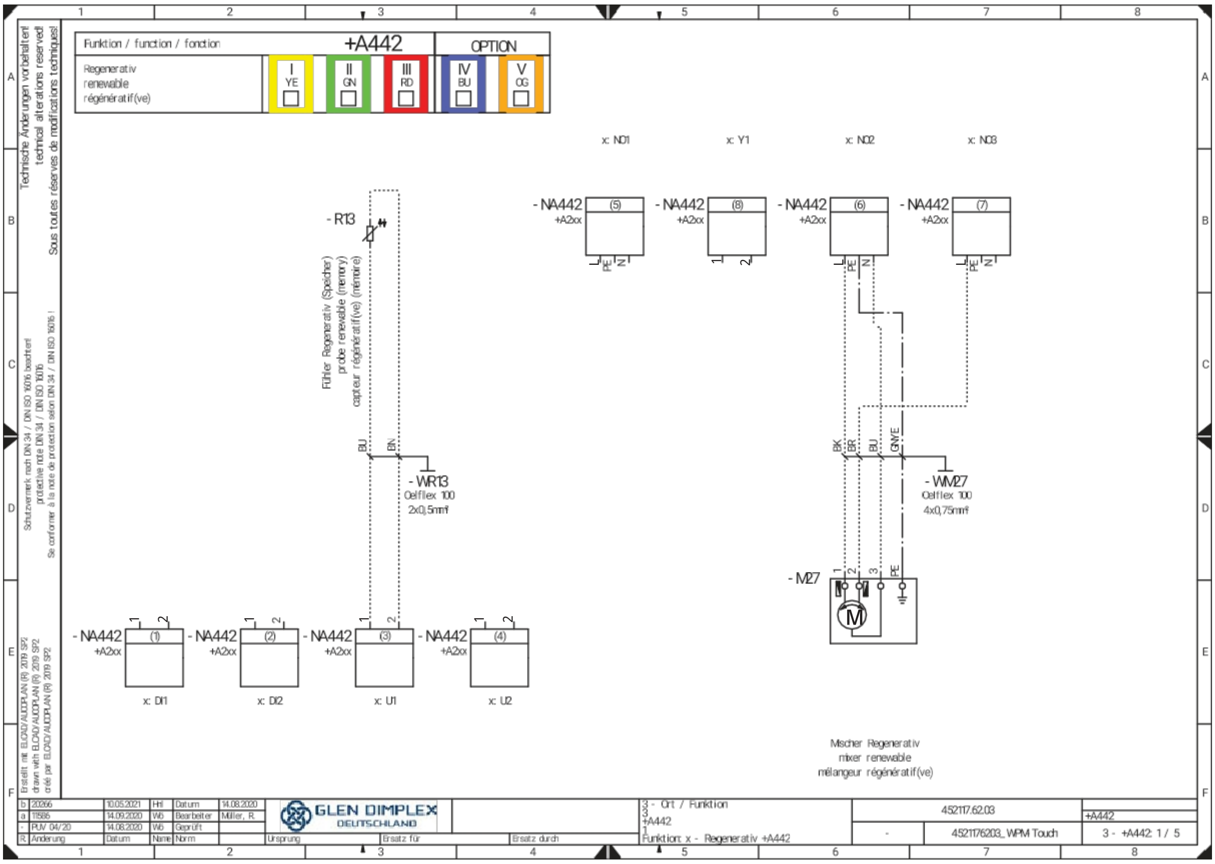
2nd heat generator



Cables	Designation	Cable type	Goal 1.	Goal 2
-WE10.2*	Cable -E10.2	PVC control cable; coloured: Oelflex 100	+A2xx-NA441 Function block bivalent	+A441-E10.2 heat generator bivalent
-WE10.2**	Tax output -E10.2	PVC control cable; coloured: Oelflex 100	+A2xx-NA441 Function block bivalent	+A441-E10.2 heat generator bivalent
-WM26	Cable -M26	PVC control cable; coloured: Oelflex 100 4 x 0.75mm²	+A2xx-NA441 Function block bivalent	+A441-M26 Mixer bivalent

Function +A442 / Renewable **Function description**

Renewable WPM Touch: Renewable

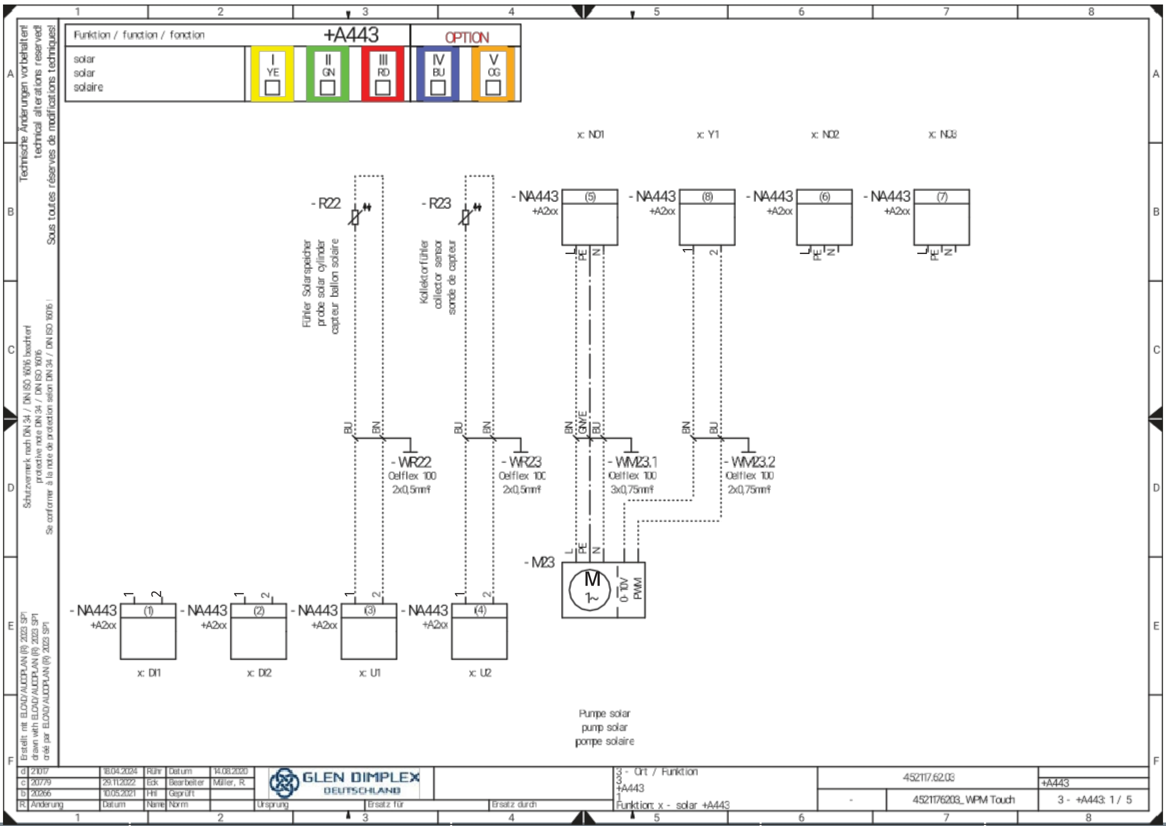


Cables	Designation	Cable type	Goal 1.	Goal 2
-WM27	Cable -M27	PVC control cable; coloured: Oelflex 100 4 x 0.75mm²	+A2xx-NA442 Renewable function block	+A441-E10.2 Mixer renewable
-WR13	Cable -R13	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA442 Renewable function block	+A441-M26 Renewable sensor (thermal reservoir)

Function +A443 / Solar **Function description**

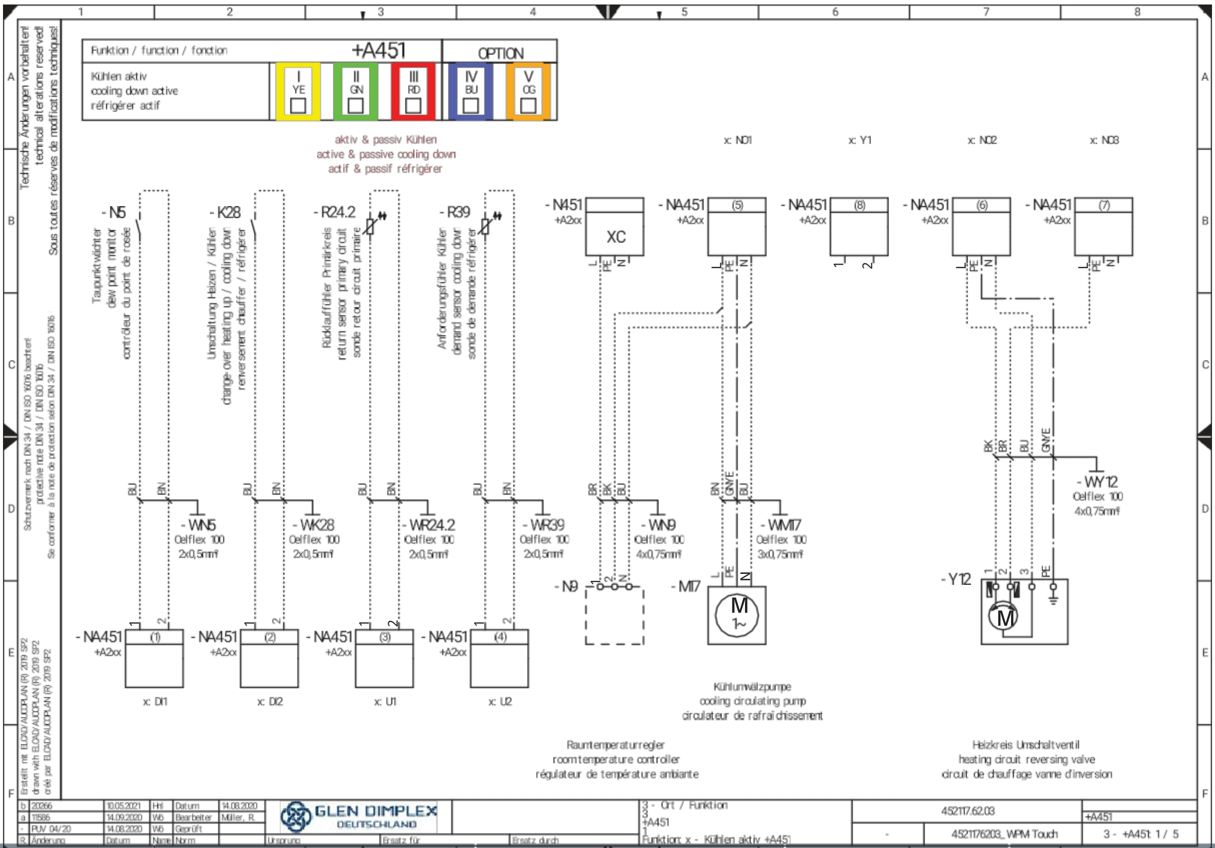
Solar WPM Touch

https://dimplex.atlassian.net/wiki/x/CQBNw



Cables	Designation	Cable type	Goal 1.	Goal 2
-WM23.1.	M23 mains cable	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A2xx-M23 Solar pump	+A443-NA443 Function block solar
-WM23.2	Control cable -M23	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A2xx-M23 Solar pump	+A443-NA443 Function block solar
-WR22	Cable -R22	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA443 Function block solar	+A443-R22 Solar cylinder sensor
-WR23	Cable -R23	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA443 Function block solar	+A443-R23 collector sensor

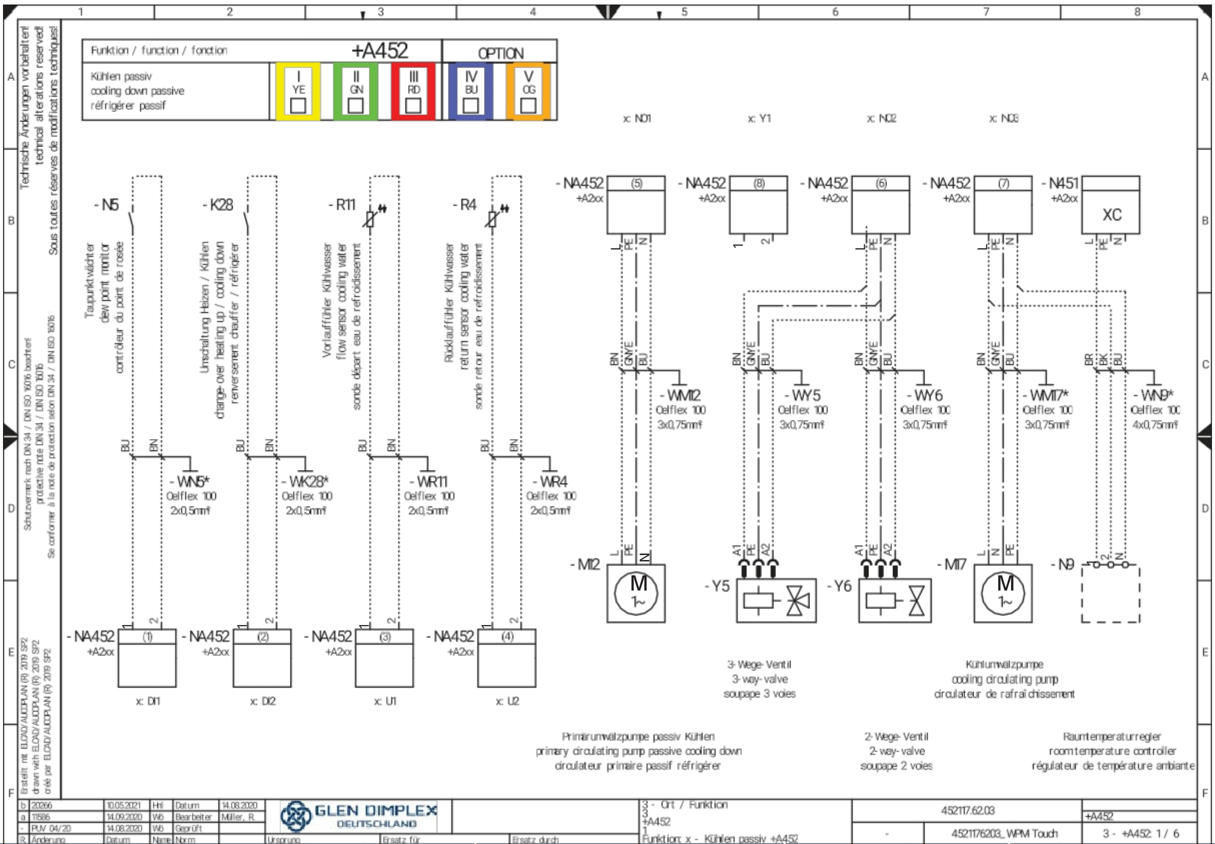
Function +A451 / Cooling active



Cables	Designation	Cable type	Goal 1.	Goal 2
-WK28	Cable -K28	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA451 Connection terminals Cooling function cooling active	+A451-K28 Switching Heating /
-WM17	Cable -M17	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A2xx-NA451 Cooling function block active	+A451-M17 cooling circulating pump
-WN5	Cable -N5	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA451 Connection terminals Cooling function active	+A451-N5 Dew point monitor
-WN9	Cable -N9	PVC control cable; coloured: Oelflex 100 4 x 0.75mm²	+A2xx-NA451 Connection terminals Cooling function active	+A451-N9 Room temperature controller

Cables	Designation	Cable type	Goal 1.	Goal 2
-WR24.2	Cable -R24.2	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA451 Cooling function block active	+A451-R24.2 Primary circuit return sensor
-WR39	Cable -R39	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA451 Cooling function block active	+A451-R39 Cooling demand sensor
-WY12	Cable -Y12	PVC control cable; coloured: Oelflex 100 4 x 0.75mm²	+A2xx-NA451 Cooling function block active	+A451-Y12 Heating circuit reversing valve

Function +A452 / Cooling passive



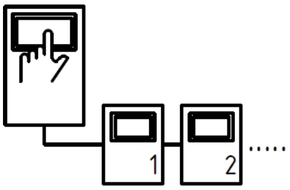
Cables	Designation	Cable type	Goal 1.	Goal 2
-WK28*	Cable -K28	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA452 Passive cooling function block	+A452-K28 Switching heating / cooling

Cables	Designation	Cable type	Goal 1.	Goal 2
-WM12	Cable -M12	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A2xx-NA452 Function block cooling passive	+A452-M12 Primary circulating pump passive cooling
-WM17*	Cable -M17	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A2xx-NA452 Function block cooling passive	+A452-M17 cooling circulating pump
-WM17.2	Control voltage cable -M17	PVC control cable; coloured: Oelflex 100 2 x 0.75mm²	+A2xx-NA452 Passive cooling function block	+A452-M17 cooling circulating pump
-WN5*	Cable -N5	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA452 Passive cooling function block	+A452-N5 dew point monitor
-WN9*	Cable -N9	PVC control cable; coloured: Oelflex 100 4 x 0.75mm²	+A2xx-N451 Cooling function block active	+A452-N9 Room temperature controller
-WR4	Cable -R4	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA452 Passive cooling function block	+A452-R4 Cooling water return sensor
-WR11	Cable -R11	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA452 Passive cooling function block	+A452-R11 Cooling water flow sensor
-WY5	Cable -Y5	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A2xx-NA452 Passive cooling function block	+A452-Y5 3-way valve
-WY6	Cable -Y6	PVC control cable; coloured: Oelflex 100 3 x 0.75mm²	+A2xx-NA452 Passive cooling function block	+A452-Y6 2-way valve

10.7 WPM Touch Master

10.7.1 WPM Touch Master

Wall-mounted master controller with touch display for the parallel connection of heat pumps



- WPM Touch Master function overview
- Functional description WPM Touch Master
- Electrical connection work Master controller
- WPM Touch Master function blocks
- Cable assignment WPM Touch Master

10.7.2 WPM Touch Master function overview

The heat pump master controller offers all the advantages of the existing Dimplex touch display and adds many other useful functions. Up to 14 heat pumps can be controlled in a parallel connection, and a combination of reversible and non-reversible heat pumps is also possible. The WPM Touch Master combines the centralised control of heating, cooling, domestic hot water and swimming pool preparation and is particularly user-friendly. Operation is simplified by the graphical touch interface.

Function overview:

- Parallel connection of up to 14 heat pumps possible
- Control of monovalent, monoenergetic or bivalent systems with up to 29 performance levels (28 compressors, 2nd heat generator), taking into account an even utilisation of the compressors.
- Control of up to three central heating circuits possible. Additional mixed heating circuits can be controlled via the individual heat pumps
- Centralised switching of winter, summer and cooling operating modes
- Automatic operating mode switching via an automatic limit temperature system for winter, summer and cooling

- Centralised recording of the outdoor temperature value via the sensor from the master and transmission to the heat pump managers of the individual heat pumps
- Control of the heat pump managers of the individual heat pumps with different priorities. In the case of a combination of different heat pump types (air/brine heat pumps), prioritisation is based on the outside temperature
- Centralised and decentralised configuration of domestic hot water and swimming pool preparation possible

NOTE
A hydraulic concept coordinated by the Dimplex project planning department is required for the use of a master controller.

NOTE
Commissioning of the master controller must always be carried out by our factory customer service.

10.7.3 Functional description WPM Touch Master

The master controller takes over the switching on and off of up to 14 individual heat pumps with heat pump manager, the control of up to 3 heating/cooling circuits and domestic hot water heat pumps.
and swimming pool preparation. In monoenergetic or bivalent systems, the master controller controls the switching on of the second heat generator in addition to requesting the compressors.
The request for the compressors and switching on the 2nd heat generator is realised via a power stage circuit. There are as many performance levels as there are compressors in parallel operation, up to a maximum of 28. With an additional heat generator for bivalent or monoenergetic operation, a maximum of 29 performance levels are available. The heat pump manager of the individual heat pumps takes over control of the compressor, domestic hot water and swimming pool circulating pump, as well as the primary pump
(fan / brine circulation pump / well water pump). Also the control and control of the auxiliary circulating pump which increases the heating water flow rate.

Prioritisation

To ensure the most efficient operation of the heat pump heating system, the master controller controls the heat pump managers of the individual heat pumps with different priorities. When different heat pump types are combined, the different heat pumps are controlled depending on the outside temperature:

- Preferential use of air-to-water heat pumps above an adjustable limit temperature
- Preferential use of brine-to-water or water-to-water heat pumps below an adjustable outside temperature
- In order to achieve the most uniform distribution of runtimes possible, the master controller prioritises starting the compressor with the lowest runtime. The master controller receives feedback from the individual heat pumps, recognises a request from blocked heat pumps and shifts the priorities for optimum utilisation.

Heating and cooling circuits

The master controller also takes control of the mixers for the 2nd or 3rd heating/cooling circuit or, in bivalent operation, the bivalent mixer. Additional mixed heating circuits (maximum 28) can be controlled via the mixers by the respective heat pump managers of the individual heat pumps.
can take place. The setpoint is specified on the heat pump manager of the respective heat pump and is not possible via the master controller.

Domestic hot water and swimming pool preparation

Domestic hot water and swimming pool preparation can be configured centrally or decentrally. This setting must be matched to the hydraulic integration and affects both the control of the circulation pumps and the evaluation of the temperature sensors.

Centralised domestic hot water and swimming pool preparation

In a centralised configuration, the master controller also takes over the central domestic hot water and swimming pool preparation. In order to realise the central hot water and swimming pool preparation function, it is necessary to install the domestic hot water and swimming pool temperature sensor on the master controller.
The domestic hot water and swimming pool setpoint temperatures are set on the master controller, as are the performance levels.

Decentralised domestic hot water and swimming pool preparation

In a decentralised configuration, the domestic hot water and swimming pool preparation as well as the control of the circulation pumps are carried out via the heat pump manager of the respective heat pumps. The heat pumps are activated from the time of a domestic hot water or swimming pool requirement for a
Heating request blocked via the master controller. In order to realise the function of decentralised domestic hot water and swimming pool preparation, it is necessary to install the domestic hot water and swimming pool temperature sensor on the heat pump manager of the respective heat pump.

10.7.4 Electrical connection work Master controller

1. A shielded communication cable (e.g. Y(ST)Y..LG) must be established between the master controller and the heat pump managers. Details can be found in the enclosed electrical documentation.
2. The three-core electrical supply cable for the master controller (N1) is routed to the subsequent installation location of the master controller. The supply line (L/N/PE ~230 V, 50 Hz) for the master controller must be connected to continuous voltage and for this reason must be tapped before the utility company blocking contactor or connected to the household current, as otherwise important protective functions will be inoperative during the utility block.
3. The NO contact of the utility company blocking contactor (13/14) is connected to connector (1) (DI1) of function block 0 (grey). CAUTION! Extra low voltage!
4. The contactor (K20) for the immersion heater (E10) must be designed according to the heater output for monoenergetic systems (2nd heat generator) and provided by the customer. The control (230 V AC) is connected from the master controller via plug (7) (NO3) of function block 0 (grey).
5. The contactor (K21) for the flange heater (E9) in the domestic hot water cylinder must be designed according to the radiator output and provided by the customer. The control (230 V AC) is carried out from the master controller via plug (7) from the defined function block.
6. The contactors for points 3;4;5 are installed in the electrical distribution system. The mains cables for the radiators must be designed and fused in accordance with DIN VDE 0100.
7. The heat circulating pump (M13) is connected to plug (5) (230 V AC) and (8) (control signal) of function block 0 (grey).
8. The external sensor (R1) is connected to connector (3) (U1) of function block 0 (grey).

NOTE
When using three-phase pumps, a power contactor can be controlled with the 230 V output signal of the master controller. Sensor cables can be extended up to 50 m with 2 x 0.75 mm cables.

NOTE
Further information on wiring the heat pump manager can be found in the electrical documentation.

10.7.5 WPM Touch Master function blocks

The basic version of the WPM Touch master controller has an unchangeable pin assignment for the function "General/ 1. unmixed circle" to the "grey" function block.

Other functions can be individually assigned to three function blocks (yellow, green, red).

If these three function blocks are not sufficient, there is the option of using the **extension to add two more function blocks** (orange, blue). A maximum of five

function blocks are possible (yellow, green, red, orange, blue).

NOTE
The "Active cooling" function can only be selected for a reversible heat pump.

NOTE
The "Master" function only needs to be selected if a component in it is required.

Overview of functions

Pin assignment	Function
Master +A500	
R2.5	return sensor
R9.5	flow sensor

https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3206807685/Function blocks+WPM+Touch#%C3%9Coverview functions

Overview of pin assignment for fixed function block

	Steckernummer													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Funktionsblock 0	grau	grau	grau	grau	grau	grau	grau	grau	grau	grau	grau	grau	grau	grau
Funktion														
Allgemein / 1. ungemischter Kreis +A400	A1 K22	A2 K23	R1	R2.2	M13	H5	E10.2 K20	-	N27.1	N27.2	-	-	M16	M16 AO

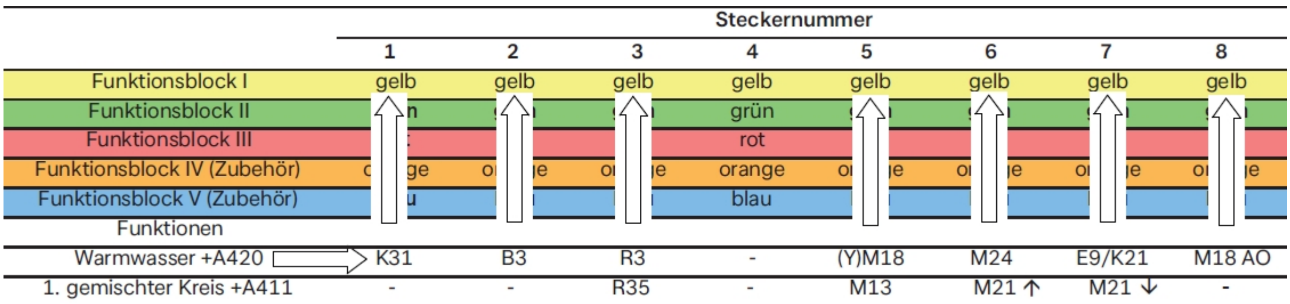
Overview of pin assignment for flexible function block

	Steckernummer							
	1	2	3	4	5	6	7	8
Funktionsblock I	gelb	gelb	gelb	gelb	gelb	gelb	gelb	gelb
Funktionsblock II	grün	grün	grün	grün	grün	grün	grün	grün
Funktionsblock III	rot	rot	rot	rot	rot	rot	rot	rot
Funktionsblock IV (Zubehör)	orange	orange	orange	orange	orange	orange	orange	orange
Funktionsblock V (Zubehör)	blau	blau	blau	blau	blau	blau	blau	blau
Funktionen								
Warmwasser +A420	K31	B3	R3	-	(Y)M18	M24	E9/K21	M18 AO
1. gemischter Kreis +A411	-	-	R35	-	M13	M21↑	M21↓	-
2. gemischter Kreis +A412	-	-	R5	-	M15	M22↑	M22↓	-
3. gemischter Kreis +A413	-	-	R21	-	M20	M29↑	M29↓	-
Bivalent +A441	-	-	-	-	E10.2/3	M26↑	M26↓	E10.2/3 AO
Regenerativ +A442	-	-	R13	-	M28	M27↑	M27↓	-
Schwimmbad +A430	-	B4	R20	-	M19	-	K36	M19 AO
Kühlen aktiv +A451	N5	K28	R24.2	R39	N9/M17	Y12↑	Y12↓	-
Kühlen passiv +A452	N5	K28	R11	R4	M12	Y5/Y6	M17	-
Solar +443	-	-	R22	R23	M23	-	-	M23 AO

Example: Selection of pin assignment with domestic hot water function selected on the yellow function block

First select the function to be used, in this case domestic hot water, and the function block to be assigned in colour, in this case yellow. Now select the component to be connected in the domestic hot water line of the table, for example domestic hot water sensor R3. The connector to be assigned to the yellow function block is then selected in the 1st line. In this case, the domestic hot water sensor R3 must be connected to the yellow connector with the number 3. This procedure must be selected for each component to be connected.

NOTE
When commissioning the system via the touch display, the function to be used is queried and set with the corresponding colour assignment.



	Steckernummer							
	1	2	3	4	5	6	7	8
Funktionsblock I	gelb	gelb	gelb	gelb	gelb	gelb	gelb	gelb
Funktionsblock II	[illegible]	[illegible]	[illegible]	grün	[illegible]	[illegible]	[illegible]	[illegible]
Funktionsblock III	[illegible]	[illegible]	[illegible]	rot	[illegible]	[illegible]	[illegible]	[illegible]
Funktionsblock IV (Zubehör)	[illegible]	[illegible]	[illegible]	orange	[illegible]	[illegible]	[illegible]	[illegible]
Funktionsblock V (Zubehör)	[illegible]	[illegible]	[illegible]	blau	[illegible]	[illegible]	[illegible]	[illegible]
Funktionen								
Warmwasser +A420	K31	B3	R3	-	(Y)M18	M24	E9/K21	M18 AO
1. gemischter Kreis +A411	-	-	R35	-	M13	M21 ↑	M21 ↓	-

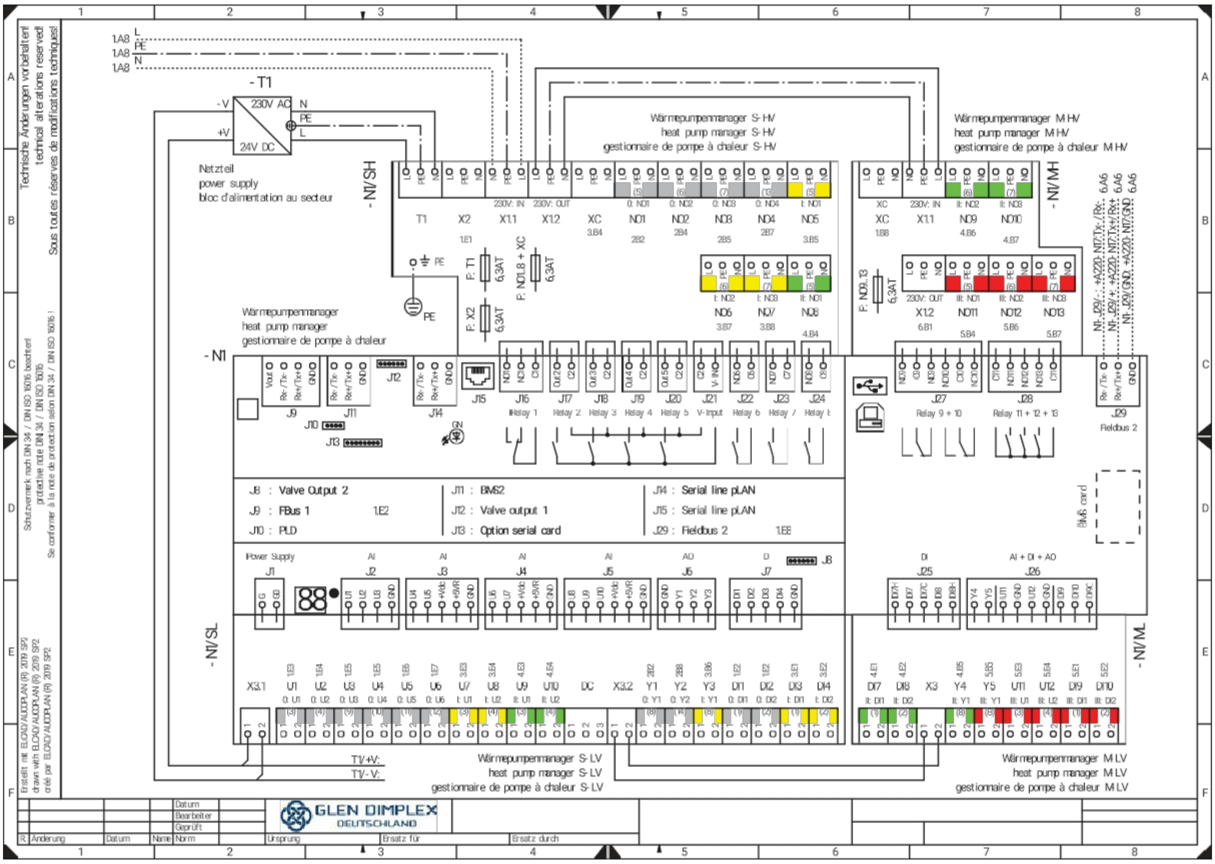
NOTE
The detailed electrical documentation can be found in the accessories pack of the respective heat pump

> **NOTE**
> Communication and control voltage cables must be laid between the wall-mounted master controller and the heat pump manager

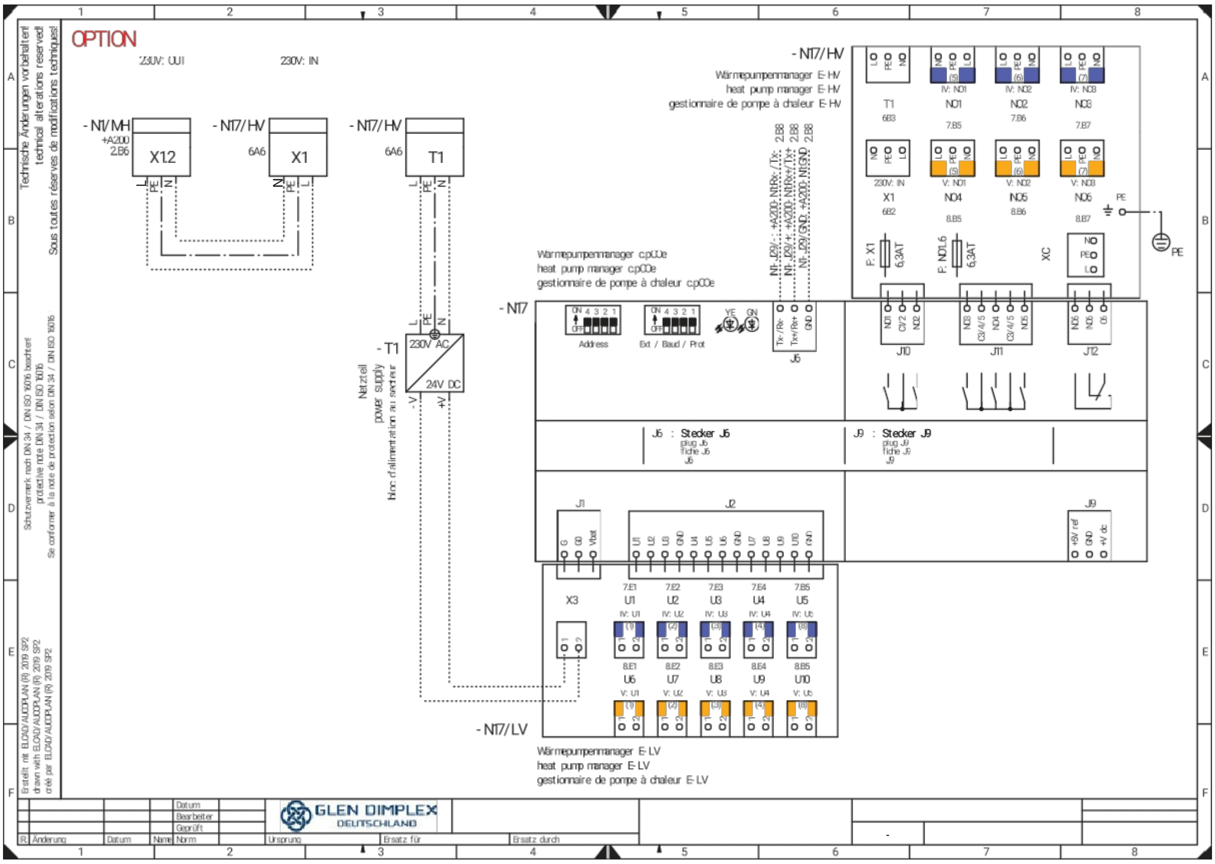
Hydraulic integration with buffer tank

The master controller can control the hydraulic integration of heat pump heating systems with both series and parallel buffer storage tanks. In the case of heat pump heating systems with parallel buffer storage tanks, complete discharging of the parallel buffer storage tank can be ensured by placing the common return sensor (R2.5) of the "Master" function and the demand sensor (R2.2) at the flow outlet of the parallel buffer storage tank. Please observe the approved hydraulic integrations.

Plug overview Basic function:



Plug function extension (WPM Touch +2)



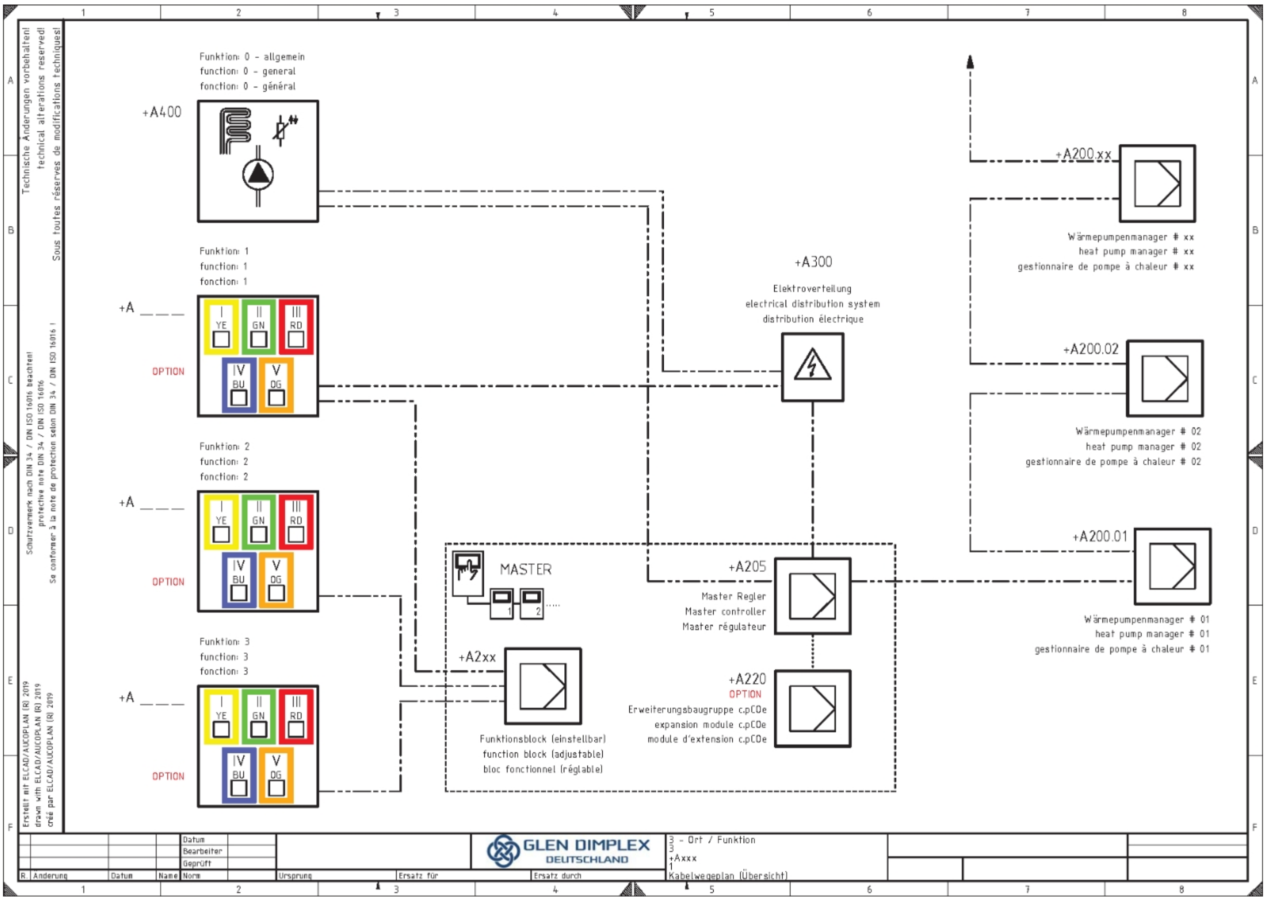
Associated cable assignments:

Function +A500 / Master controller

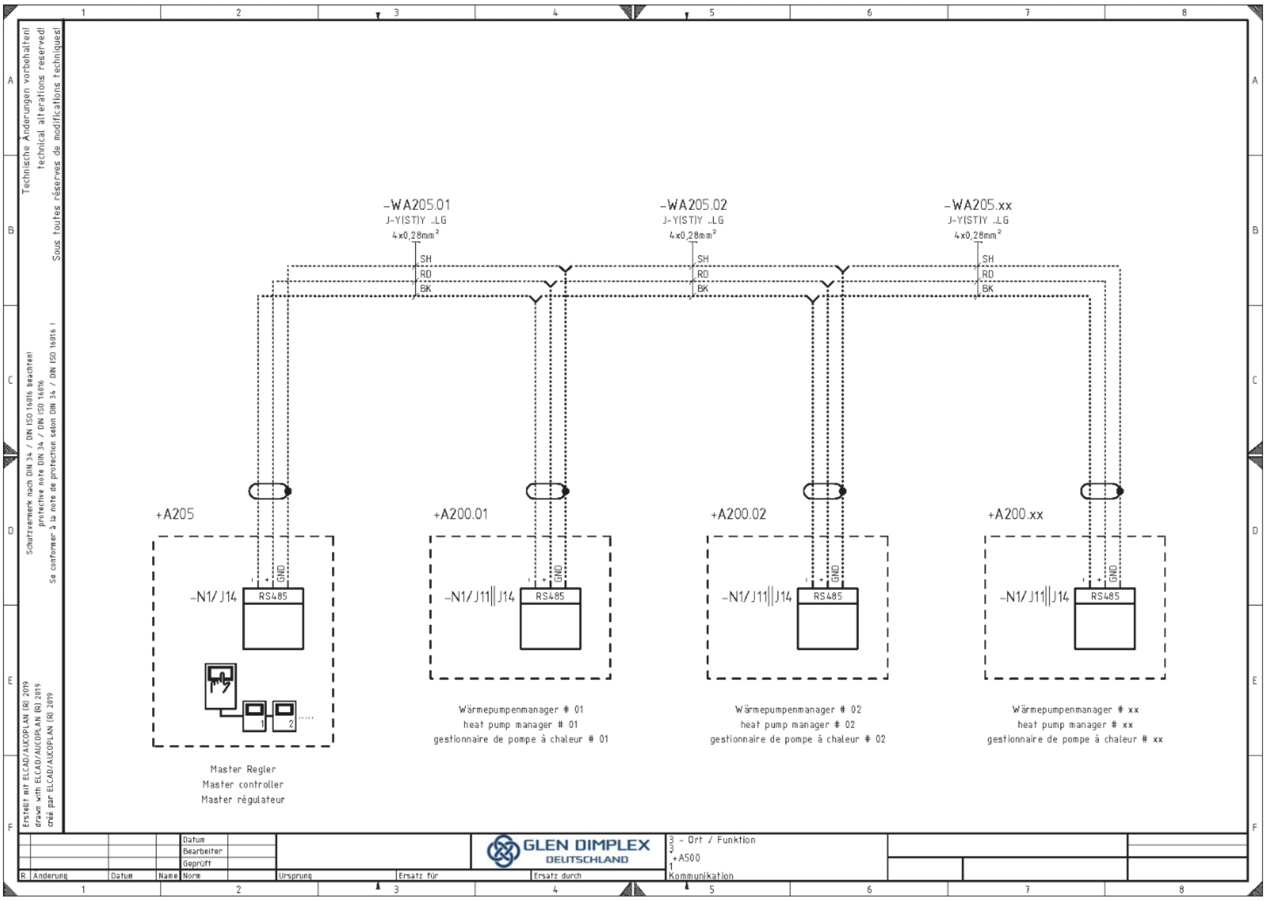
10.7.6 Cable assignment WPM Touch Master

- Function +A500 / Master controller

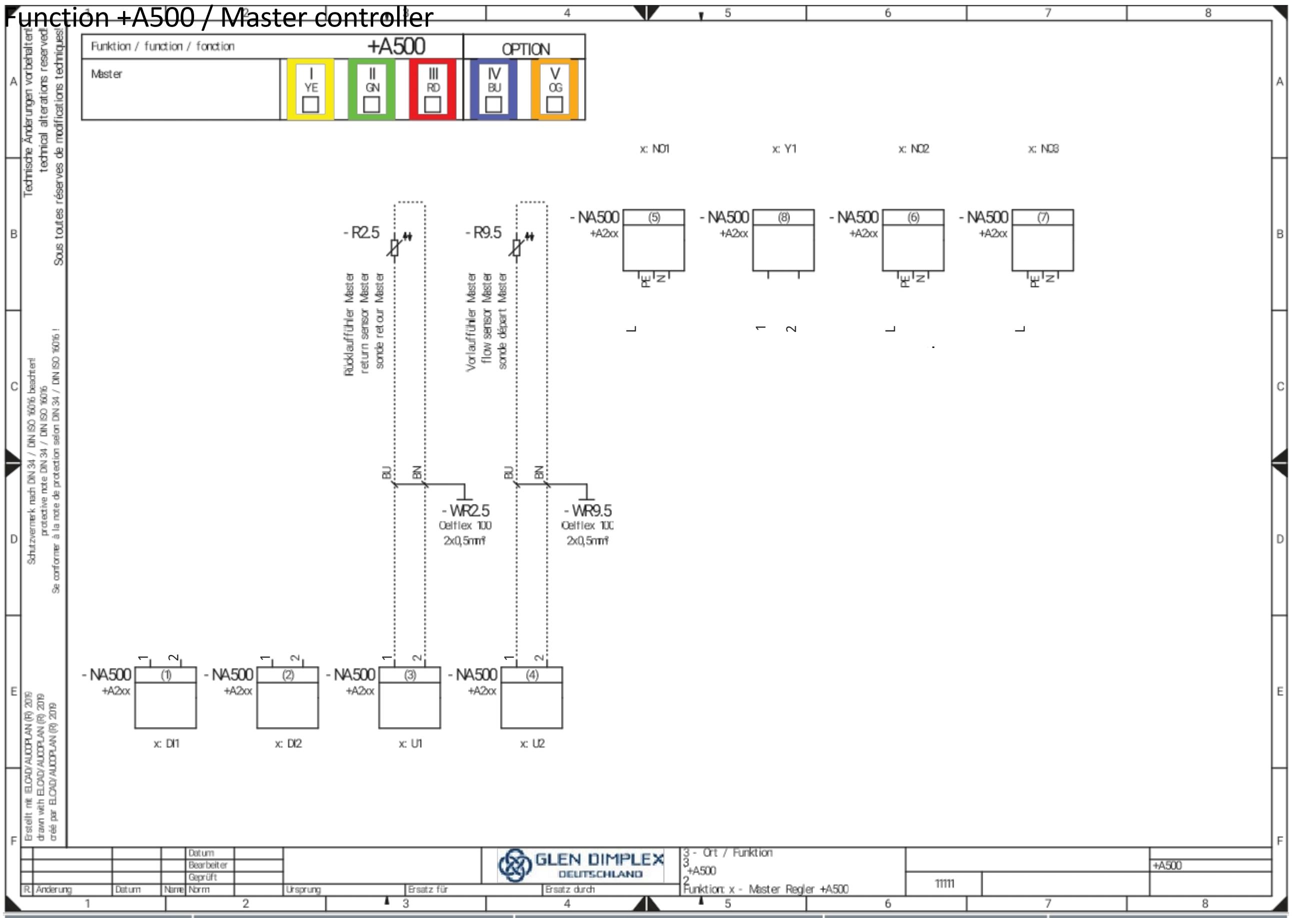
Cable routing plan



Communication plan



Function +A500 / Master controller



Cables	Designation	Cable type	Goal 1.	Goal 2
-WA205.xx	Cable communication	Data cable; shielded: J-Y(ST)Y ..LG 4 x 0.28mm²	+A200.02-N1/J14||J11 Heat pump manager	+A200.xx-N1/J14||J11 Heat pump manager
-WR2.5	Cable -R2.5	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA500 Function block 1. circuit	+A500-R2.5 Master return sensor
-WR9.5	Cable -R9.5	PVC control cable; coloured: Oelflex 100 2 x 0.5mm²	+A2xx-NA500 Function block 1. circuit	+A500-R9.5 Master flow sensor
-WA205.01	Cable communication	Data cable; shielded: J-Y(ST)Y ..LG 4 x 0.28mm²	+A200.01-N1/J14 Master controller	+A205-N1/J14||J11 Heat pump manager

Cables	Designation	Cable type	Goal 1.	Goal 2
-WA205.02	Cable communication	Data cable; shielded: J-Y(ST)Y ..LG 4 x 0.28mm²	+A200.0-N1/J14||J11 Heat pump manager	+A200.02-N1/J14||J11 Heat pump manager

11 System E E

11.1 Table of contents

The highly efficient **System E** air/water heat pump system is not only optimised for the rapid replacement of existing systems, but also for operation with radiators.

At the same time, it operates with the climate-friendly refrigerant R290 and is particularly quiet. System E is compatible with existing components of a heating system, such as fossil or renewable heat generators, domestic hot water cylinders and photovoltaic systems, and is therefore ideally suited to the challenges of a refurbishment project.

System E can be installed extremely quickly with ready-to-connect and practical system components and sets new standards in heating replacement with simplified commissioning and online support.

11.2 **Two variants form the basis for this:**

11.2.1 System E Pure

LA 1118CP

11.2.2 System E Comfort

LA 1118BWCP

Air-to-water heat pump for heating and cooling for a max. building heat load of up to 18 kW with **heat pump manager WPM Touch** for maximum flexibility in installation and design

Buffer and domestic hot water cylinders can be customised to suit local conditions.

Combination with other renewable heat generators or hybrid heating possible

Application recommendation: for high comfort requirements and more complex systems

Air-to-water heat pump for heating and cooling for a max. building heat load of up to 18 kW with Hydrotower incl. 100 litre buffer tank, 300 litre domestic hot water cylinder and integrated **WPM Touch controller**.

Plug'n'Play: Largely pre-configured system for simple, safe and quick installation

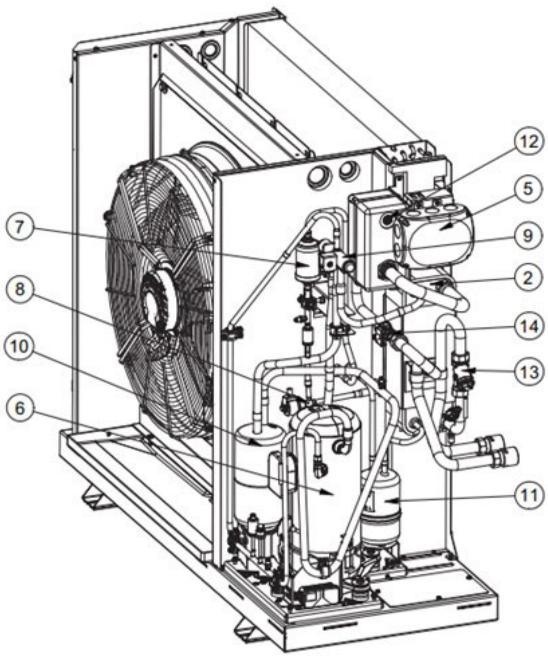
Can be combined quickly and easily with renewable or fossil fuelled heat generators

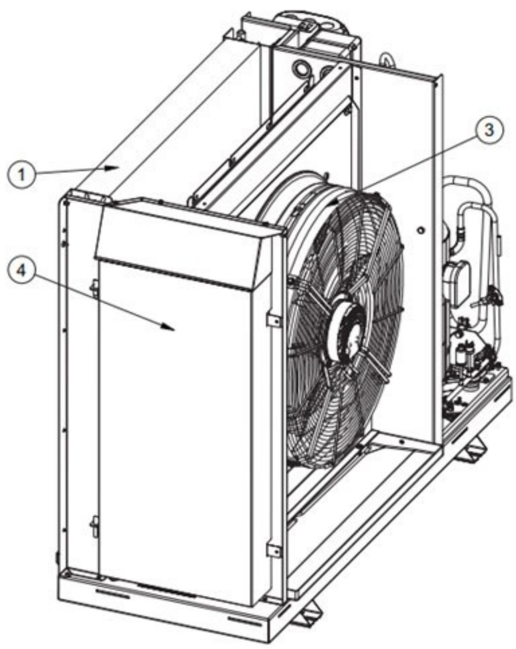
Application recommendation: For one/two-family houses, with radiators or underfloor heating or mixed installation of radiators and underfloor heating (1-2 heating circuits)

11.3 basic device

11.3.1 Heat pump Outdoor unit (monobloc)

LA 1118CP

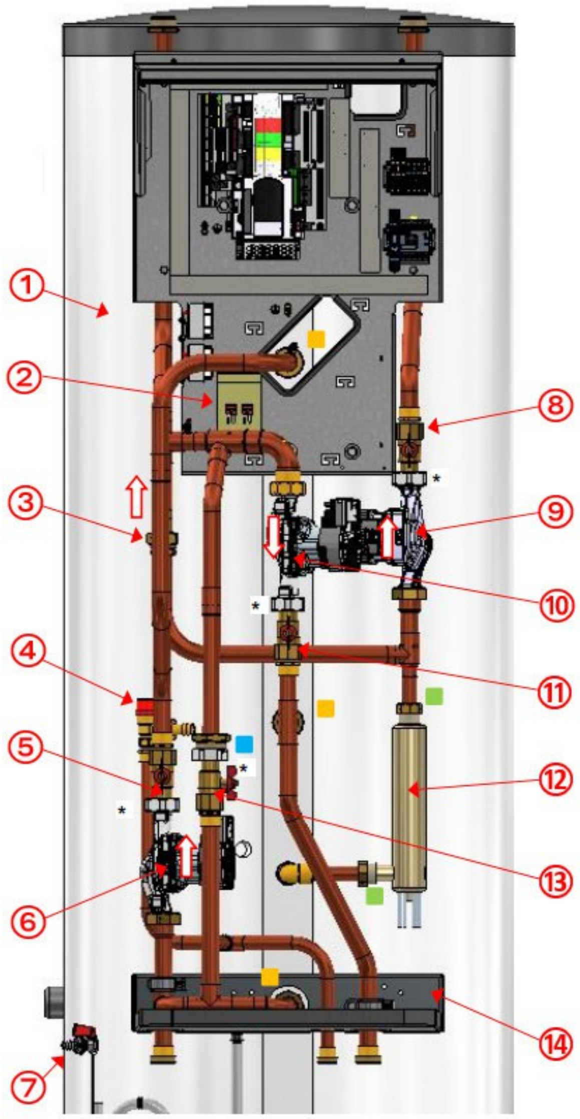




1. Evaporator air
2. condenser
3. fan
4. switch box
5. Connection box
6. compressor
7. Filter dryer
8. expansion valve
9. 4-way diverter valve Separator
10. Collector Purge
11. valve Dirt trap
12. Flow sensor
13.
14.

11.3.2 Hydraulic unit installed indoors (Hydrotower)

LA 1118BWCP (HWK 332HC)



① Combo tank

② Minigrip bag with link cables is supplied with switch box

③ RSV

④ Safety valve

⑤ Ball valve

⑥ Circulation pump (M18)

⑦ Filling and emptying tap

⑧ Ball valve

⑨ Circulation pump (M13)

⑩ Circulation pump (M16)

⑪ Ball valve

⑫ Electric heating

⑬ Ball valve

⑭ Storage mounting bracket

Hydraulic components

- Double differential pressureless manifold [DDV]
- Buffer tank 100 litres
- Unmixed heating circuit incl. circulation pump (self-regulating - 3/4 stages), shut-off valves and non-return device
- Primary circuit heat generator incl. circulation pump (PWM input signal), shut-offs
- 2nd heat generator electric tubular heating, heat output from 2, 4 to 6 kW, protected by safety temperature limiter
- 300 litre domestic hot water cylinder incl. domestic hot water circulating pump

Safety equipment:

- Safety valve, response pressure 3 bar

- Connection of an additional expansion vessel possible

11.4 Installation conditions System E

11.4.1 System E video tutorials

11.4.2 Safety area with 200 mm increased installation height

11.4.3 Safety area for floor-level installation

11.4.4 System E foundation plan

11.4.5 Installation Hydrotower HWK 332 HC (System E Comfort)

11.4.6 System E condensate drainage

11.4.7 System E connection on the heating side

11.4.8 Acoustic emissions System E

The general requirements for heat pumps installed outdoors apply:

General requirements for heat pumps installed outdoors

Danger
If the refrigerant propane leaks in the event of a fault, an ignitable atmosphere may form.

- Avoid ignition sources and fire loads in the safety area
- Keep the casing closed
- Installation in depressions, shafts or areas that do not allow free air flow or air exchange is not permitted.
- The minimum volume of the room in which the hydraulic safety group, quick air vent and buffer are installed must not be less than 12 m³.
- Set up the heat pump so that no refrigerant can enter the building in the event of a leak
- Empty conduits, openings etc. that lead into buildings, shafts etc. must be sealed airtight

The heat pump must always be installed on a suitable load-bearing foundation or on a permanently level, smooth and horizontal surface. The heat pump can be installed with an elevation of 200 mm or flush with the floor.

Furthermore, the heat pump should be installed close to walls. In the case of free-standing installation, it should be set up so that the air discharge direction of the fan is at right angles to the main wind direction in order to enable fault-free defrosting of the evaporator under high wind loads.

11.4.9 legal regulations and directives

The relevant regulations must be observed when connecting the heating system.

The System E heat pump is filled with flammable refrigerant R290 (propane) and is intended for outdoor installation only. Appropriate precautions must be taken during installation, assembly, operation and disposal.

Work on the heat pump may only be carried out by persons with the following knowledge. Use by untrained persons is not permitted.

Tätigkeit	eingewiesene Personen	sachkundige Fachkraft	autorisierter und sachkundiger Kundendienst
Transport, Lagerung		X	X
Aufstellung		X	X
Montage		X	X
Inbetriebnahmen			X
Bedienung	X	X	X
Reinigungsarbeiten		X	X
Pflege	X	X	x
Störung / Fehlersuche / Reparatur		X	X
Außerbetriebnahmen / Entsorgung			X

11.4.10 System E video tutorials

System E outdoor unit - set-up and installation

https://www.youtube.com/watch? v=bUMIga7q18I&list=PLvbfKjOwCCG01mUbeWgfYsxhs3i_SAo3y&index=2&pp=iAQB

System E indoor unit - set-up and installation

https://www.youtube.com/watch?v=ohnvBfrWYaE&list=PLvbfKjOwCCG01mUbeWgfYsxhs3i_SAo3y&index=2

11.4.11 Safety area with 200 mm increased installation height

If the appliance is raised 200 mm above the installation surface by means of a strip foundation or other suitable means**, a safety zone ① of 1 metre must be maintained around the appliance**. There must be no ignition sources such as sockets, light switches, lamps, electrical switches or other electrical devices in this area.
permanent sources of ignition as well as windows, doors, ventilation openings, light wells, openings to the sewerage system and the like. Furthermore, fire loads must be avoided there. Open drains to a lower area are permitted if there are no drains to the sewer system within a radius of one metre. Building openings within the safety area must be made airtight. The safety area must not extend onto neighbouring properties or public traffic areas. The appliance must be positioned in such a way that in the event of a leak, no refrigerant enters neighbouring buildings. If the appliance is to be installed on a full-surface foundation, it is recommended that this be recessed in the area of the condensate outlet so that connection work on the condensate drain can be carried out without any problems. No structural changes may be made in the safety area that would violate the safety area.

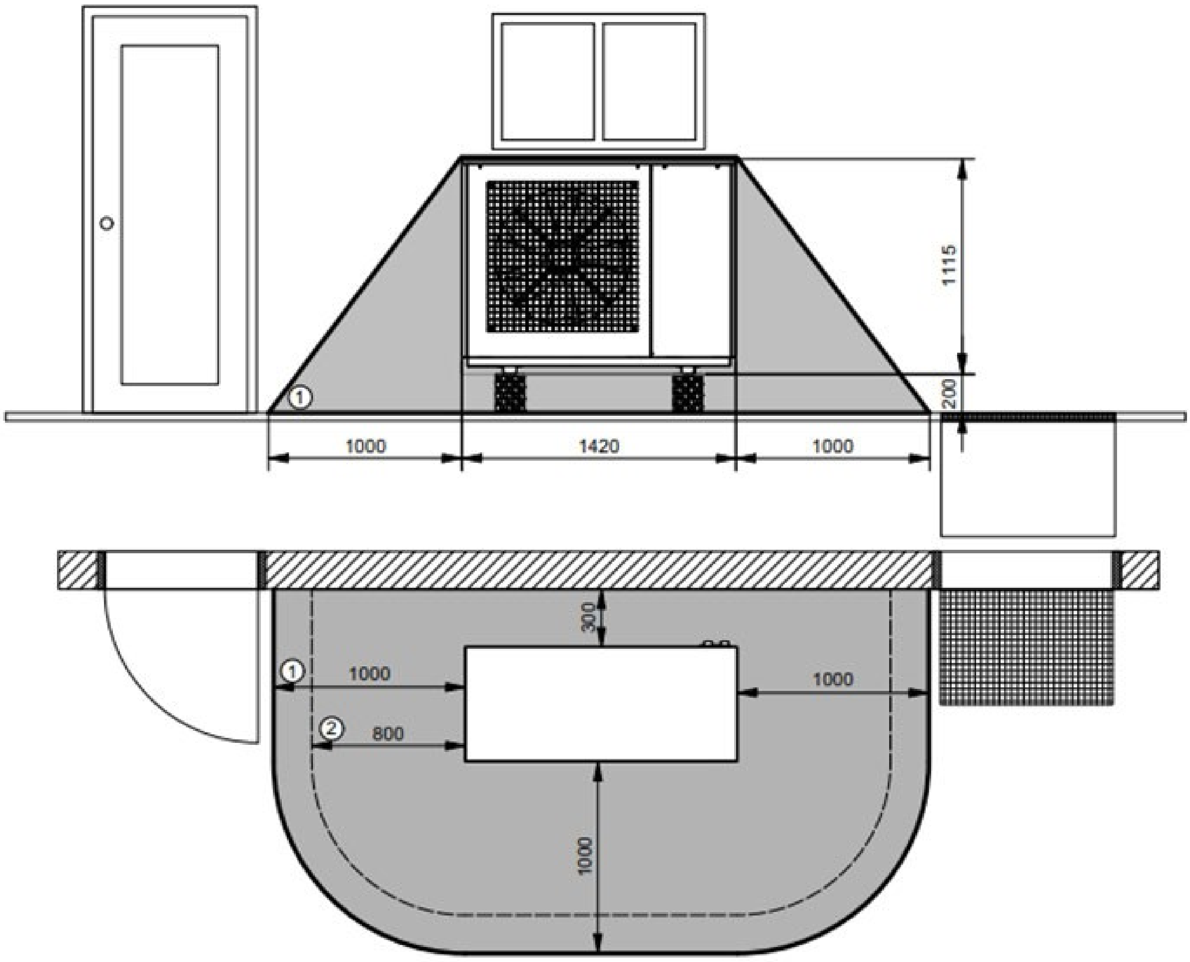
① Minimum lateral distance: 1.0 m

② Lateral service distance: 0.8 m

Additional specifications:

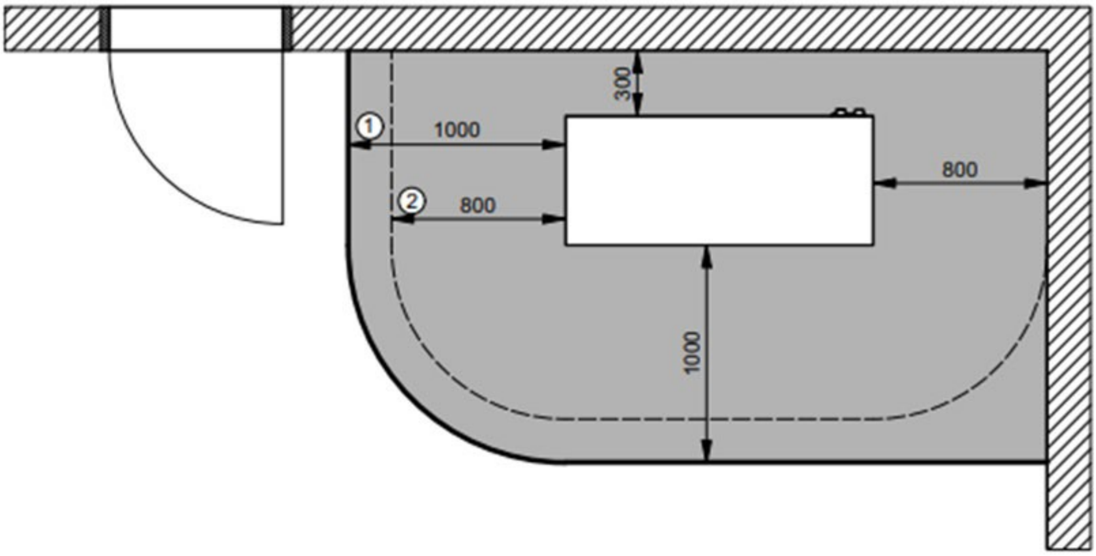
- Minimum distance on intake side: 0.3 m
- Installation in depressions not permitted

Safety area (elevated installation) of the heat pump

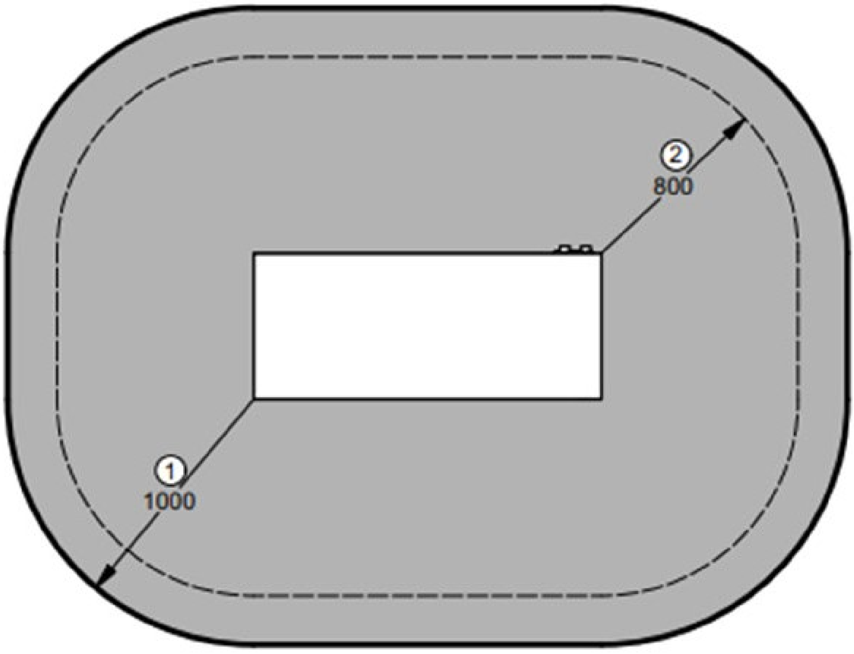


Safety area (raised installation) for installation in a corner

- Example of installation close to walls
- Maximum 2 walls permitted



Safety area (raised installation) for free field installation



11.4.12 Safety area for floor-level installation

If the appliance is installed flush with the floor, a **safety zone** ② **of 2 metres** must **be maintained around the appliance**. There must be no sources of ignition in this area, such as sockets, light switches, lamps, electrical appliances, etc.
switches or other permanent ignition sources as well as windows, doors, ventilation openings, light wells, openings to the sewerage system and the like. Furthermore, fire loads must be avoided there. Open drains to a lower surface are permitted if there are no drains to the sewer system within a radius of 2 metres.
Building openings within the safety area must be made airtight. The safety area must not

do not extend onto neighbouring properties or public traffic areas. The appliance must be positioned in such a way that in the event of a leak, no refrigerant enters neighbouring buildings. No structural changes may be made in the safety area that would violate the safety area.

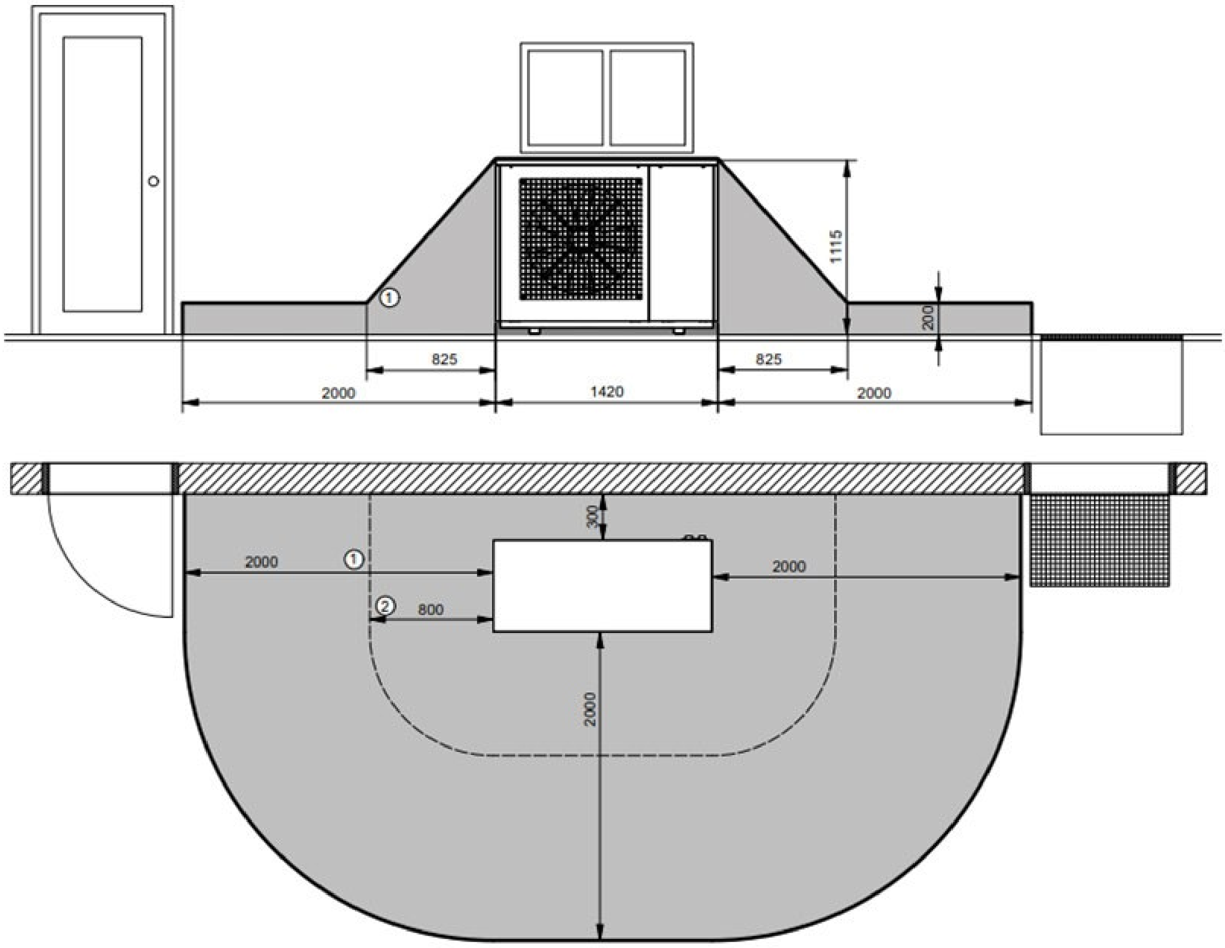
① Minimum lateral distance: 2.0 m

② Lateral service distance: 0.8 m

Additional specifications:

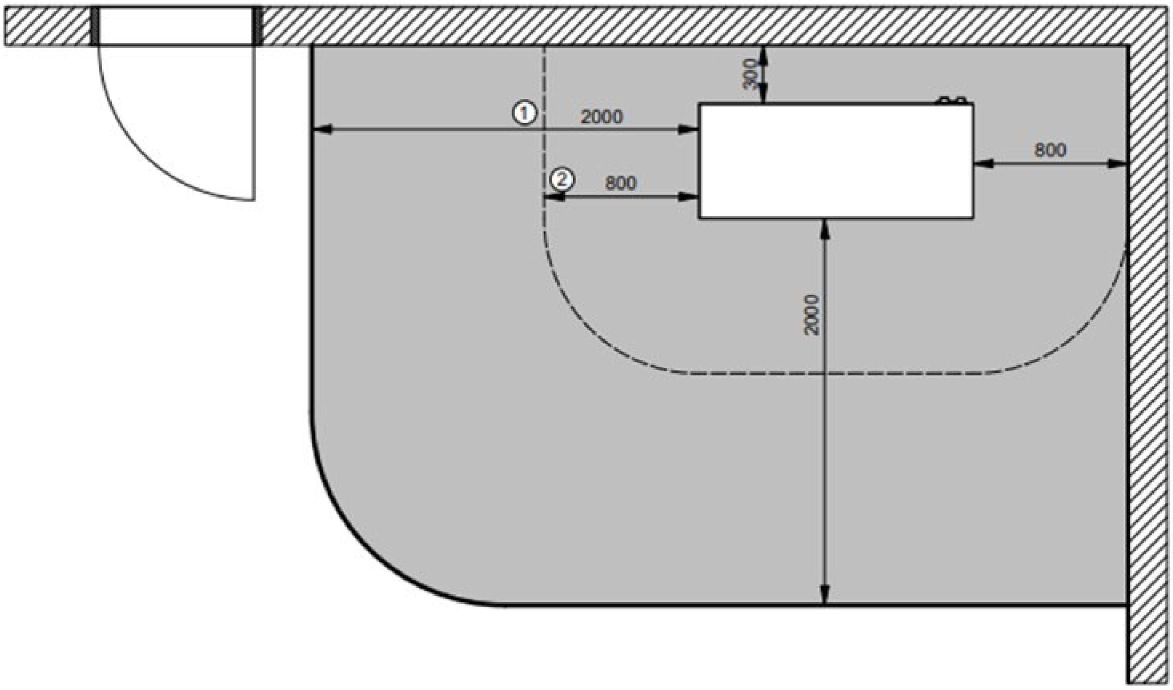
- Minimum distance on intake side: 0.3 m
- Installation in depressions not permitted

Safety area (floor-level installation) of the heat pump

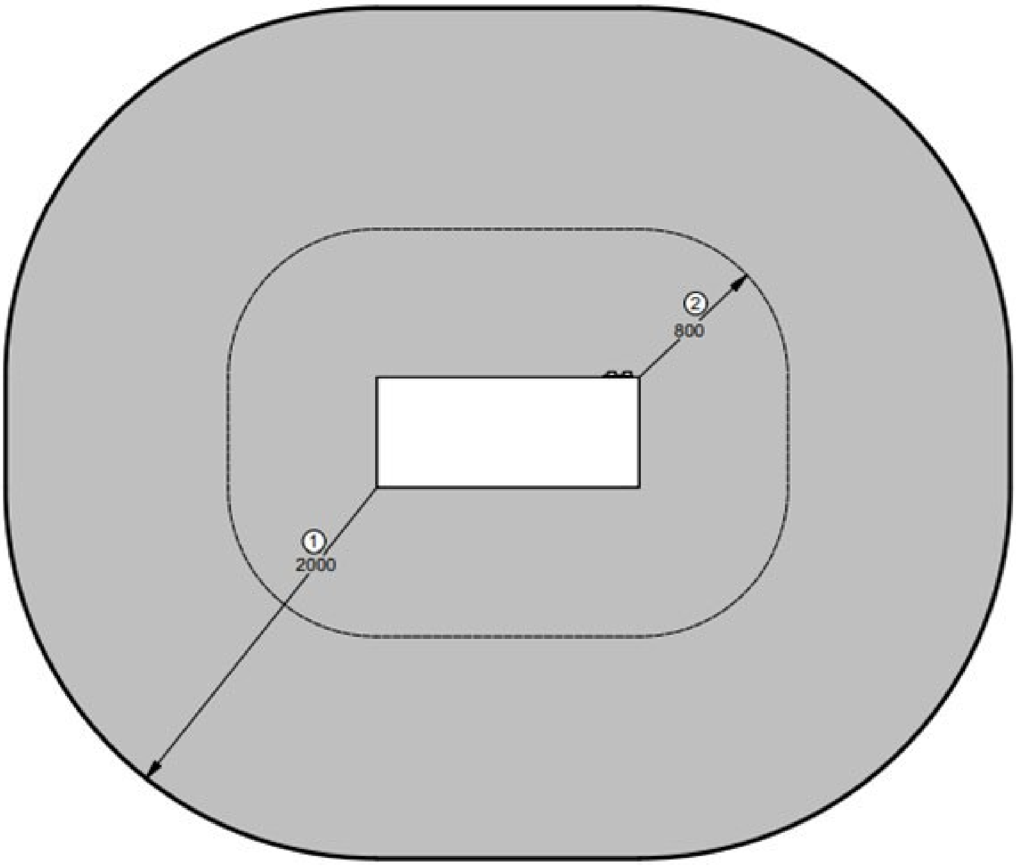


Safety area (floor-level installation) for installation in a corner

- Example of installation close to walls
- Maximum 2 walls permitted



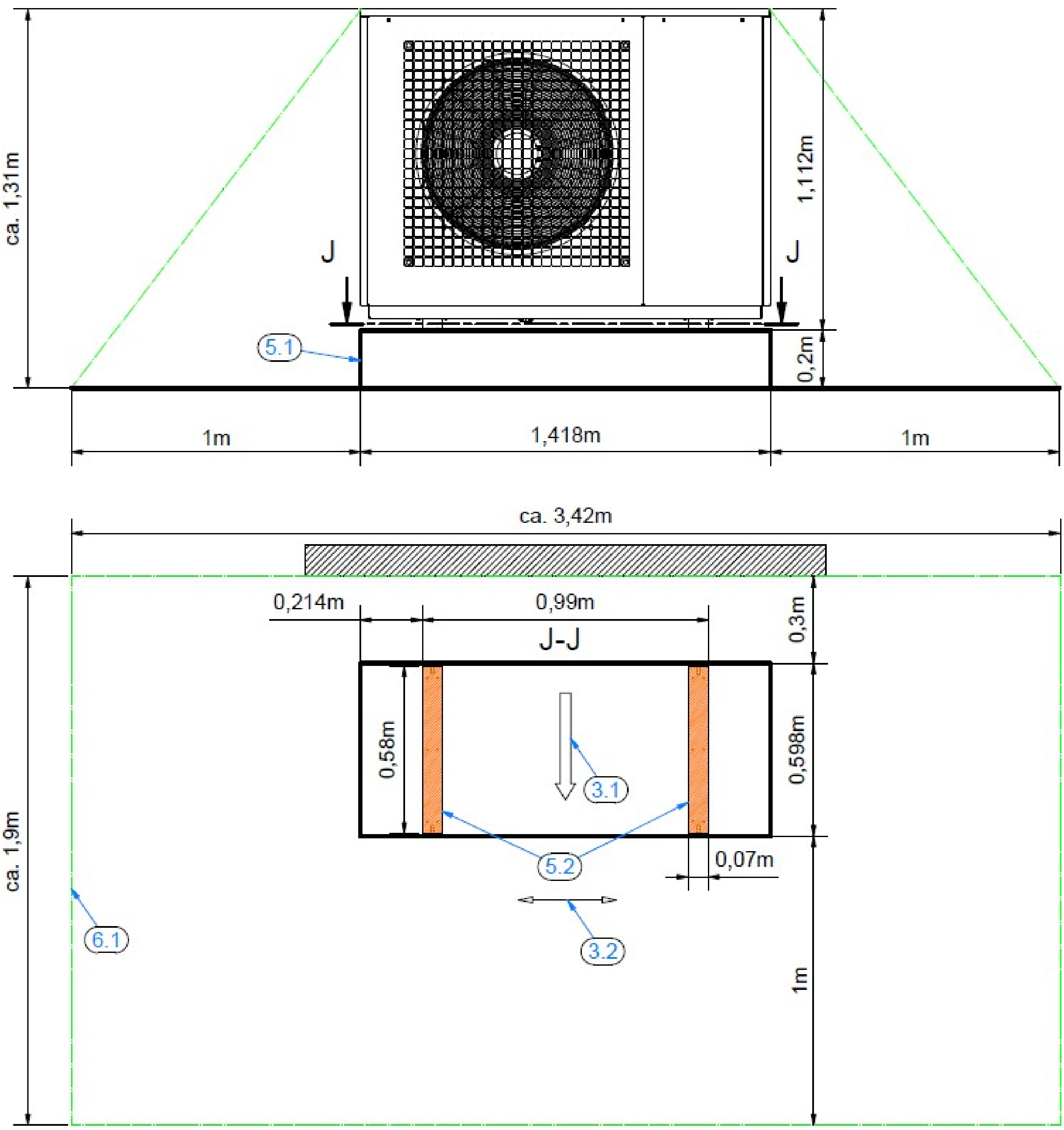
Safety area (floor-level installation) for free-standing installation



11.4.13 System E foundation plan

Foundation plan LA 1118CP

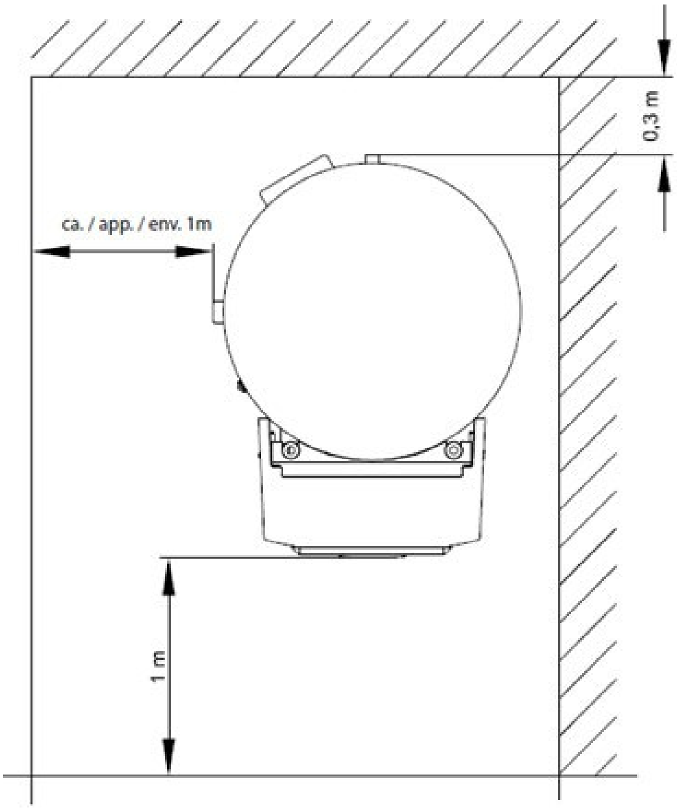
The heat pump must always be installed on a suitable load-bearing foundation or on a permanently level, smooth and horizontal surface. The heat pump can be installed with an **elevation of 200 mm** or **flush with the floor**.



https://www.youtube.com/watch? v=bUMIga7q18I&list=PLvbfKjOwCCG01mUbeWgfYsxhs3i_SAo3y&index=2&pp=iAQB

11.4.14 Installation Hydrotower HWK 332 HC (System E Comfort)

The appliance must be installed in a frost-free and dry room on a level, smooth and horizontal surface. The Hydro-Tower must be set up in such a way that maintenance work can be carried out from the operator side without any problems. This is guaranteed if a distance of 1 m is maintained at the front. The required height of the installation room must take into account the space required (approx. 30 cm see dimensional drawing) for changing the protective anode. The installation must be carried out in a frost-protected room and via short pipework.



Assembly and installation must be carried out by an authorised specialist company.

If the Hydro Tower is installed on an upper floor, the load-bearing capacity of the ceiling must be checked and vibration decoupling must be planned very carefully for acoustic reasons. Installation on a wooden ceiling should be rejected.

The following connections must be made to the Hydro-Tower:

- Flow/return heat pump
- Flow/return heating system
- Safety valve drain
- power supply
- Hot water pipe
- Circulation pipe
- Cold water pipe

Heating-side connection

The connections on the heating side of the Hydro-Tower are fitted with a 1 1/4" flat-sealing external thread. When connecting, a spanner must be used to hold the transitions.

Before the connections on the heating water side are made, the heating system must be flushed to remove any impurities, residues of sealing material or similar. An accumulation of residues in the condenser can lead to total failure of the heat pump.

It is possible to connect a second or third heating circuit (VTB manifold bar accessory). For this extension, the heat circulating pump (M13) in the HWK must be removed and replaced with a suitable fitting (centre distance 180 mm).

The following pre-wired heating circuit modules (heating or heating/cooling (C)) can be connected to the HWK 332HC:

- Unmixed heating circuits: MHU(C) 25 with pump
- Mixed heating circuits: MHM(C) 25 with pump
- MHMC 25Flex without pump with fitting 180 mm

The heating circuits are installed on site outside the Hydro-Tower.

https://www.youtube.com/watch?v=ohnvBfrWYaE&list=PLvbfKjOwCCG01mUbeWgfYsxhs3i_SAo3y&index=2

11.4.15 System E condensate drainage

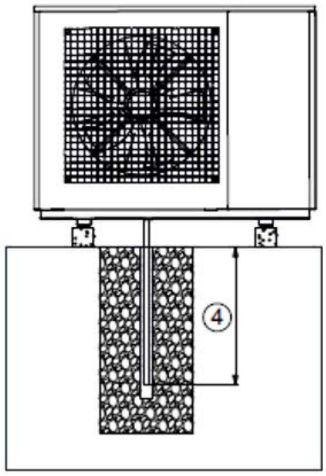
Frost-free condensate drainage must be ensured. To ensure proper drainage, the heat pump must be levelled.

> **NOTE**
> The frost limit ④ may vary depending on the climatic region. The regulations of the respective countries must be taken into account.

Variant 1.

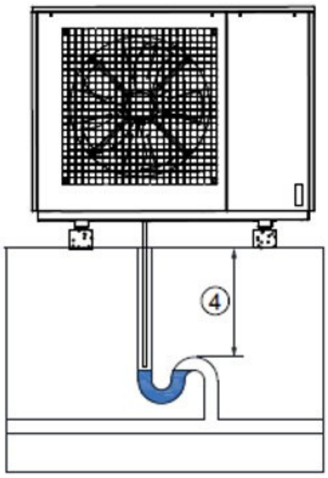
The condensate produced during operation must be drained vertically into a foundation with gravel fill. A daily infiltration capacity of at least 1.5 litres per kW heat output of the heat pump must be provided, whereby the diameter of the condensate water pipe should be at least 50 mm.

> **NOTE**
> The condensate pipe must be installed vertically to prevent icing in winter. If the condensate pipe is at risk of freezing, trace heating (special accessories) must be provided.



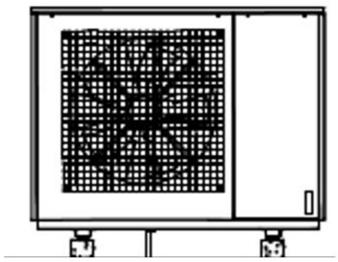
Variant 2

The condensate is discharged into a dirt, rain or drainage channel via a condensate pipe laid in the ground. The condensate pipe contains
A siphon is located below the frost line ④. The water level in the
The siphon prevents refrigerant from leaking into the
can get into the sewer. Lifting systems are not permitted! The siphon must be designed with a minimum sealing liquid height of 300 mm.



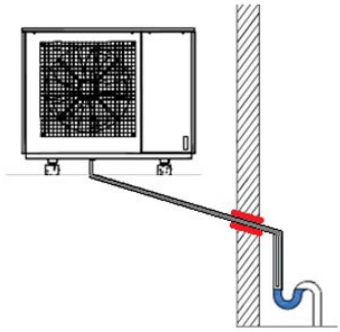
Variant 3

Free drainage is only recommended in climatic zones with short periods of frost. In colder climates, the condensate pipe in areas at risk of frost must be equipped with an appropriately dimensioned and controlled **electrical trace heating system** on the insulated condensate pipe.



Variant 4

The condensate pipe may be routed into the building. The wall duct must be made airtight here. The connection of the pipe in the building to the waste water pipe must be fitted with a siphon. The siphon must be protected from drying out. If this is not safely possible, a siphon must be provided that closes when the pipe runs dry. Lifting systems are not permitted.



Accessories (condensate drain heater):

Condensate drain heater KAH 1115 / KAH 2040

11.4.16 System E connection on the heating side

The general installation requirements for air-to-water heat pumps installed outdoors apply:

Heating-side connection

The general requirements for water quality in heating systems also apply:

Water quality in heating systems

Dimplex recommendation
Maximum heating/cooling water flow rate LA 1118CP: 1.8 m^3/h
→ PE district heating pipe 32 x 2.9

Accessory components for System E heat pumps (for connection on the heating side)

Installation box IBB 1118CP

Order code:
IBB 1118CP

Item no:
382120

description:
The installation box makes it easy to connect the LA 1118CP air-to-water heat pump from below. With the conversion kit, the factory-fitted side connection of the heat pump can simply be moved downwards. Pre-assembled connection box, incl. installation shaft, locking plate to protect against dirt and small animals. Feed-throughs for flow and return (G 1 1/4 inch). Two grommets for electric cables and installation material included in the scope of supply. Ideally suited for direct connection to rigid underground heating water connection cables

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Wall connection set SWA 1115

Order code:
SWA 1115

Item no:
382860

description:
Wall connection set for the externally installed System E air-to-water heat pump. Design wall panel can be individually extended from 295 - 460 mm to conceal the above-ground supply lines (electrical and hydraulic connections) and protect them from environmental influences.
Wall panel can be foamed out.
Delivery includes house entry sleeves with foam seals for flow, return and electric cable. Can be mounted on the inside and outside wall. Colour wall cover anthracite, house entry sleeves dark grey.

Floor console BKS 1115

Order code:
BKS 1115

Item no:
382450

description:
Floor bracket for raising and ventilating the System E air-to-water heat pump installed outside. The installation height of 200 mm makes it easy to connect the heat pump to the heating system.

Floor console BK SE

Order code:
BK SE

Item no:
382480

description:
Floor bracket for raising and ventilating the System E air-to-water heat pump installed outside. The installation height of 200 mm enables simple connection of the heat pump on the heating side. Delivery includes covering panels. Colour anthracite grey - smooth (RAL 7016).

https://www.youtube.com/watch?v=bUMIga7q18I&list=PLvbfKjOwCCG01mUbeWgfYsxhs3i_SAo3y&index=2https://www.youtube.com/watch?v=ohnvBfrWYaE&list=PLvbfKjOwCCG01mUbeWgfYsxhs3i_SAo3y&index=2

11.4.17 Acoustic emissions System E

The general information regarding noise emissions for air-to-water heat pumps installed outdoors applies:

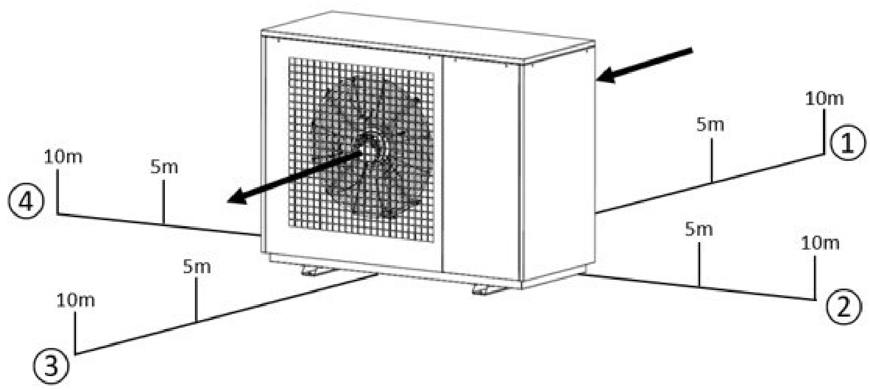
Noise emissions from heat pumps

System E has a vibration-decoupled compressor base plate. When installing heat pumps outdoors, special consideration must be given to sound propagation. It should be avoided that the sound emissions are reflected by walls.

Blowing directly at house walls etc. should also be avoided, as this can increase the sound pressure level. Structural obstacles can reduce sound propagation. If possible, the outlet side should be orientated towards the street.

Sound pressure level System E

LA 1118CP



Direction	③
1 m	41 dB(A)
5 m	27 dB(A)
10 m	21 dB(A)

11.5 Technical product information LA 1118CP

11.5.1 Device information

Type and order code	LA 1118CP
1. design	
heat source	air
Seasonal space heating energy efficiency ηs average climate 35 °C / 55 °C	196 % / 152 %
Energy efficiency class (35°C / 55°C)	A+++ / A+++
Controller	WPM

Type and order code		LA 1118CP
installation location		Exterior
Thermal energy metering		integrated
performance level		Inverter

2. operating limits

Heating water flow/return	°C	up to 65 / from 20
Air (heating)	°C	-22 to +35
Cooling water flow	°C	+12 to +20
Air (cooling)	°C	+15 to +45

3. flow/sound

Heating water flow / internal pressure differential Nominal flow according to EN 14511 (A7 / W35...30)	m^3/h / Pa	0,95 / 18000
Minimum heating water flow rate	m^3/h	0,95
Maximum heating / cooling water flow rate	m^3/h	1,8
Minimum cooling water flow rate	m^3/h	1,05
Sound power level according to EN 12102 for A7 / W55 outside normal operation / lowered operation	dB(A)	49 / 48
Sound pressure level at a distance of 10 m with A7 / W55 outside normal operation / lowered operation	dB(A)	21 / 20
Maximum sound power level in daytime operation with A7 / W55 outside	dB(A)	59
Air flow rate Normal operation / lowered operation	m^3/h	1700-5000 / 1600-4500

4. dimensions, weight and filling quantity

Device dimensions without connections	H x W x L mm	1107 x 1418 x 598
Device connections for heating	inch	G 1 1/4" EXTERNAL THREAD
Weight of the device excl. packaging	kg	213
Refrigerant / total charge weight	Type / kg	R290 / 1,3
GWP value / CO2 equivalent	- / t	3 / 0,004
Hermetically closed refrigeration circuit		Yes
Lubricant	Type	PZ46M

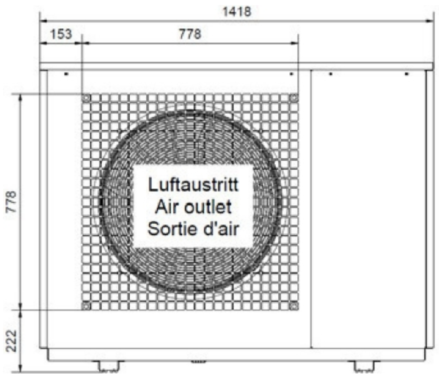
Type and order code		LA 1118CP
5. electrical connection		
Supply voltage / fusing / RCD type		3~/N/PE 400 V (50 Hz) / C13 / B
Control voltage / fusing via WPM		1~/N/PE 230V (50 Hz) / 6.3AT
Degree of protection according to EN 60 529		IP 24
Starting current limitation		Inverter
Rotary field monitoring		Yes
max. intake	kW	max. ~5.6
Power consumption crank case heater (regulated)	W	70
Fan power consumption	W	max. 280
6. safety regulations		
Complies with European safety regulations		see CE declaration of conformity
7 Other model features		
Defrost type		Cycle reversal
Frost protection Condensate tray / water in the appliance protected against freezing		Yes
Max. operating overpressure (heat sink)	bar	6,0
8. heat output / coefficient of performance (COP)		
Heat output / coefficient of performance (COP)		EN 14511
performance level		modulating
A-10 / W35	kW / ---	10,6 / 2,7
A-7 / W35	kW / ---	11,2 / 2,9
A2 / W35 opt.	kW / ---	4,9 / 4,6
A2 / W35 nominal	kW / ---	5,6 / 4,3
A7 / W35	kW / ---	5,4 / 5,6
A7 / W45	kW / ---	5,1 / 4,2
A7 / W55	kW / ---	4,0 / 3,2
A7 / W65	kW / ---	3,7 / 2,4

Type and order code		LA 1118CP
Cooling capacity / coefficient of performance (COP)		EN 14511
A35 / W18 opt.	kW / ---	4,6 / 4,0
A35 / W18 nominal	kW / ---	5,9 / 3,6
A35 / W18 max.	kW / ---	8,0 / 2,9

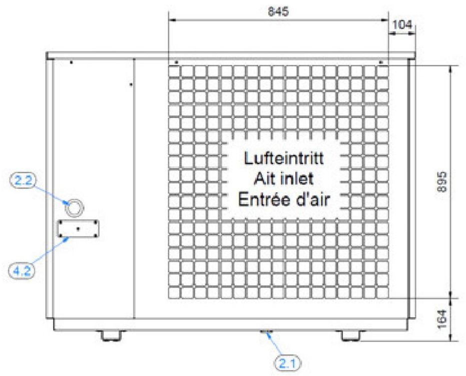
11.5.2 Dimensional drawing (option hydraulic connection from below)

(1.1) Flow G 1 1/4" external thread, flat sealing (1.2) Return G 1 1/4" external thread, flat sealing (2.1) Condensate line
(2.2) Electric wire feed-through
(3.1) Direction of air flow
(3.2) Main wind direction for free-standing installation
(4.1) Installation shaft for connection from below (optional accessory) (4.2) Cover for connection from below (optional accessory) (5.1) Foundation
(5.2) Support surface of floor consoles
(6.1) Safety and maintenance area for R290 see chapter Installation

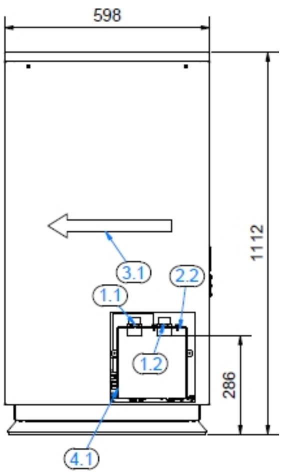
Front view



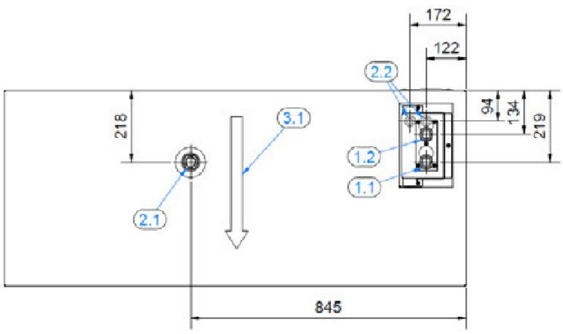
Rear view



Side view



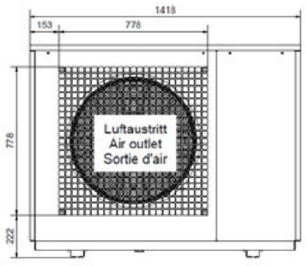
Top view



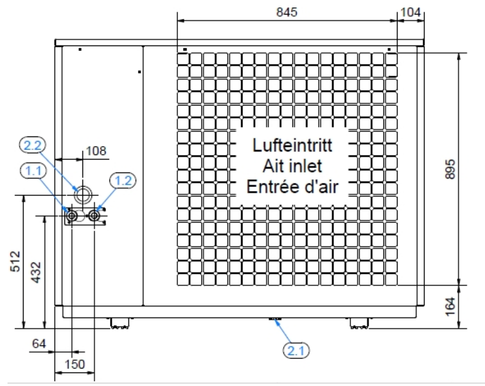
11.5.3 Dimensional drawing (option hydraulic connection from the rear)

(1.1) Flow G 1 1/4" external thread, flat sealing (1.2) Return G 1 1/4" external thread, flat sealing (2.1) Condensate line
(2.2) Electric wire feed-through
(3.1) Direction of air flow
(3.2) Main wind direction for free-standing installation
(4.1) Installation shaft for connection from below (optional accessory) (4.2) Cover for connection from below (optional accessory) (5.1) Foundation
(5.2) Support surface of floor consoles
(6.1) Safety and maintenance area for R290 see chapter Installation

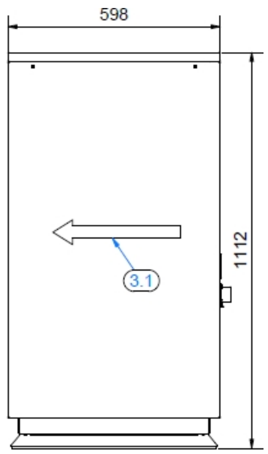
Front view



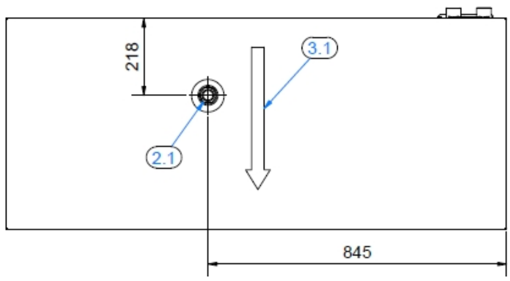
Rear view



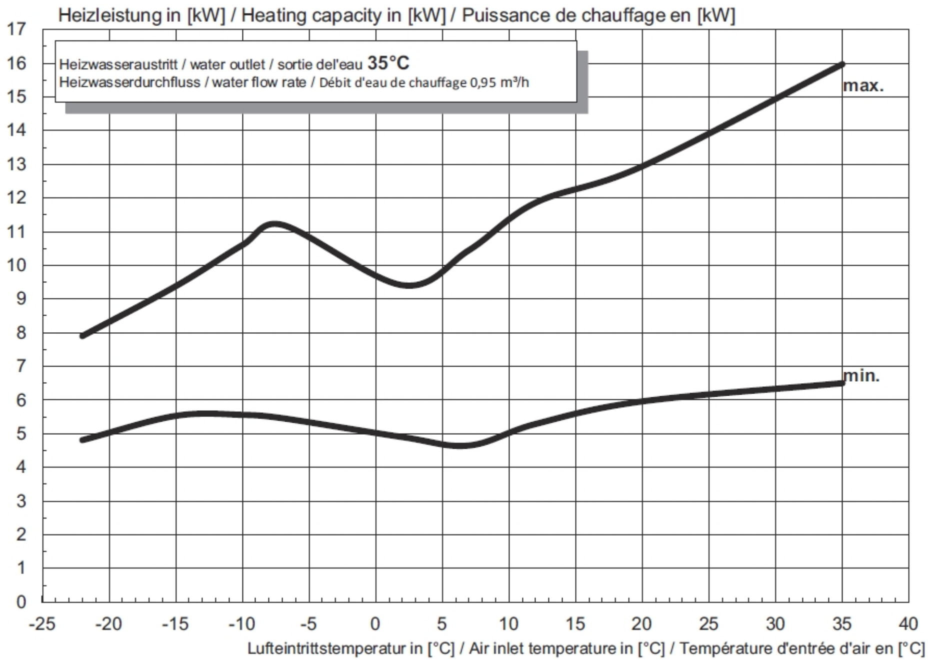
Side view

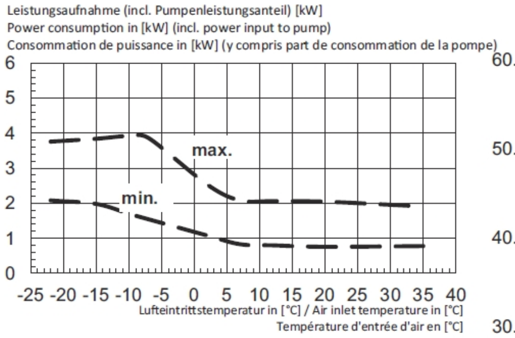


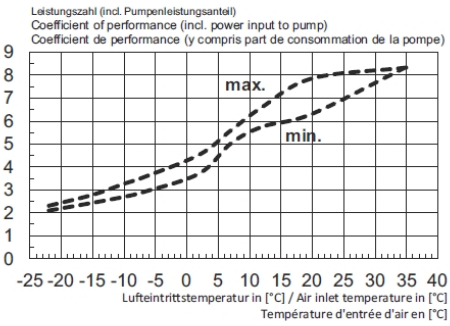
Top view

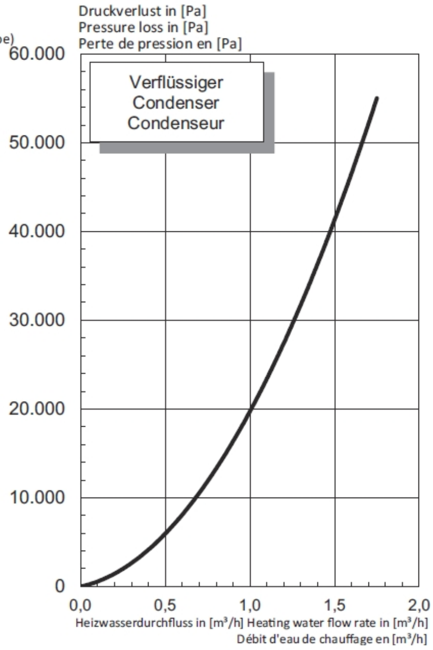


11.5.4 Heating characteristic curve (heating water outlet 35°C)

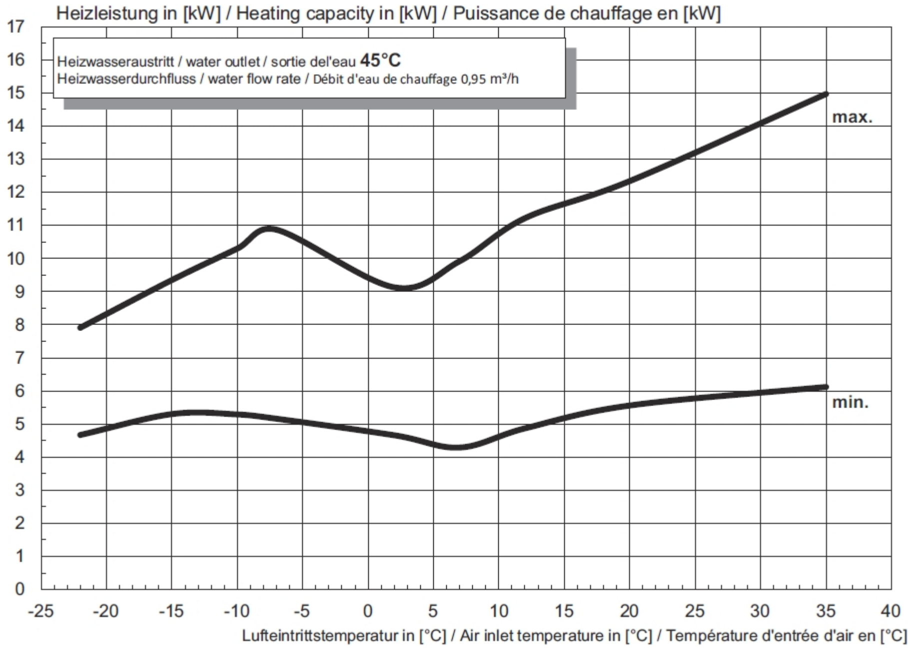

Heizleistung in [kW] / Heating capacity in [kW] / Puissance de chauffage en [kW]
Heizwasseraustritt / water outlet / sortie del'eau 35°C
Heizwasserdurchfluss / water flow rate / Débit d'eau de chauffage 0,95 m³/h
max.
min.
Lufteintrittstemperatur in [°C] / Air inlet temperature in [°C] / Température d'entrée d'air en [°C]

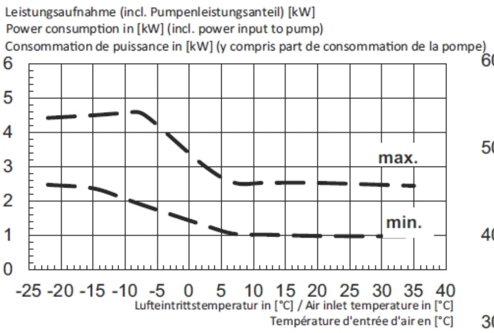

Leistungsaufnahme (incl. Pumpenleistungsanteil) [kW]
Power consumption in [kW] (incl. power input to pump)
Consommation de puissance in [kW] (y compris part de consommation de la pompe)
max.
min.
Lufteintrittstemperatur in [°C] / Air inlet temperature in [°C]
Température d'entrée d'air en [°C]

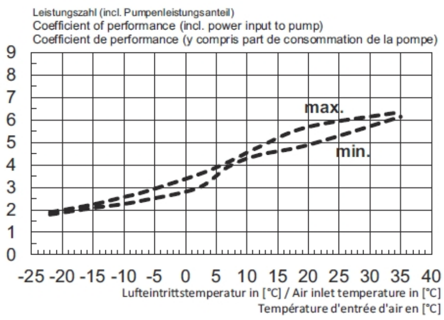

Leistungszahl (incl. Pumpenleistungsanteil)
Coefficient of performance (incl. power input to pump)
Coefficient de performance (y compris part de consommation de la pompe)
max.
min.
Lufteintrittstemperatur in [°C] / Air inlet temperature in [°C]
Température d'entrée d'air en [°C]

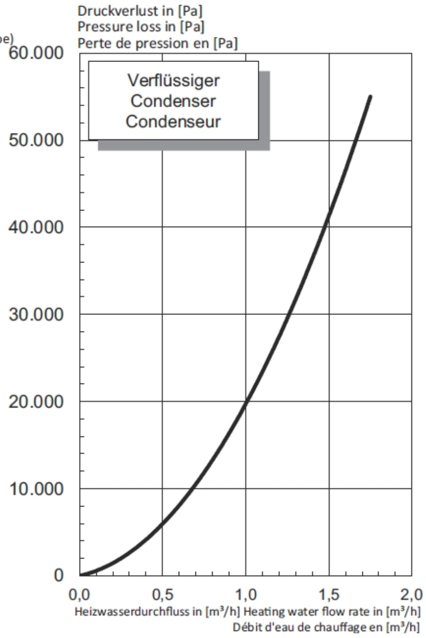

Druckverlust in [Pa]
Pressure loss in [Pa]
Perte de pression en [Pa]
Verflüssiger
Condenser
Condenseur
Heizwasserdurchfluss in [m³/h] Heating water flow rate in [m³/h]
Débit d'eau de chauffage en [m³/h]

11.5.5 Heating characteristic curve (heating water outlet 45°C)

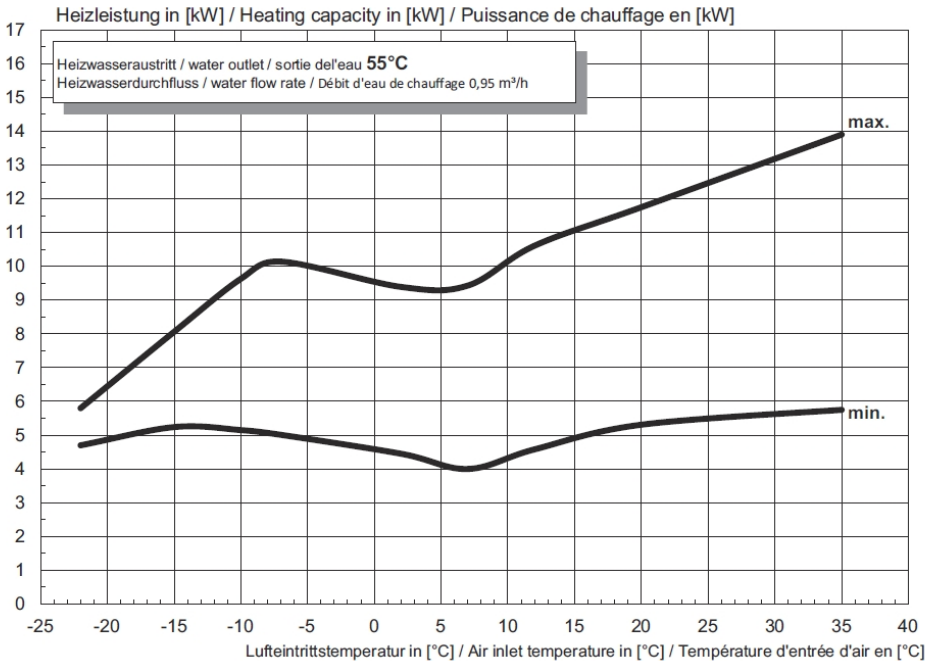


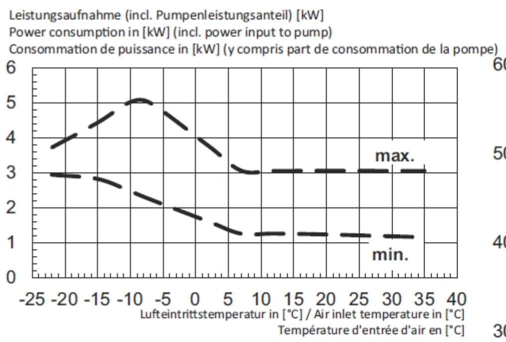


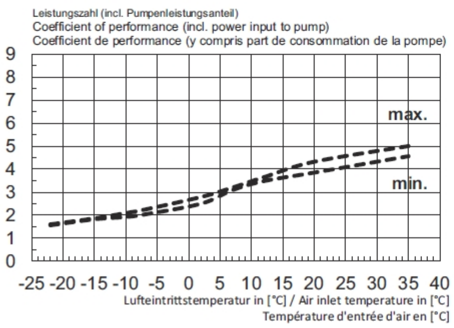


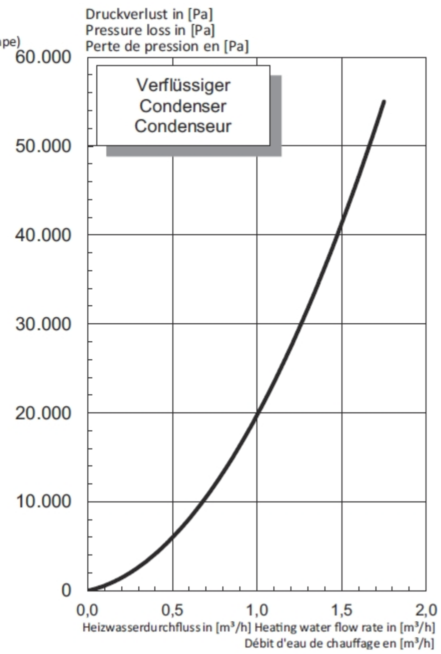


11.5.6 Heating characteristic curve (heating water outlet 55°C)

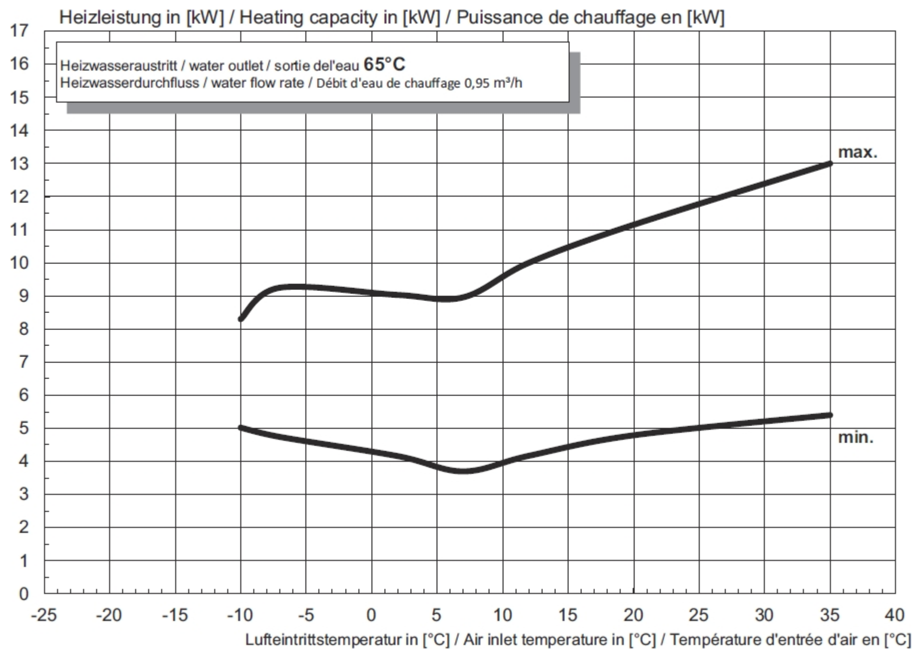


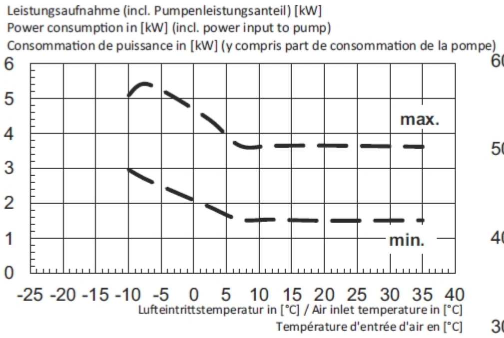


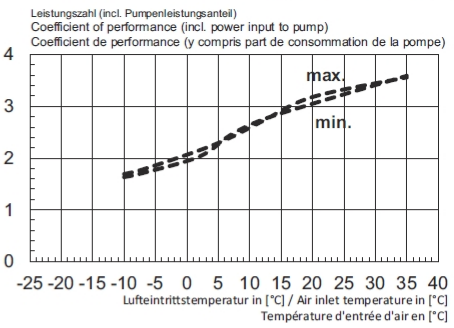


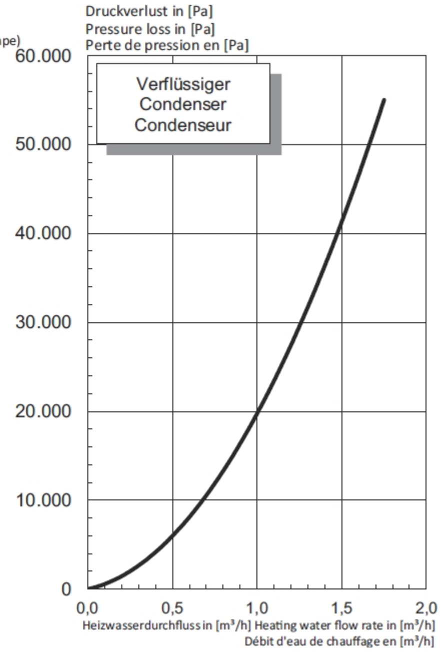


11.5.7 Heating characteristic curve (heating water outlet 65°C)

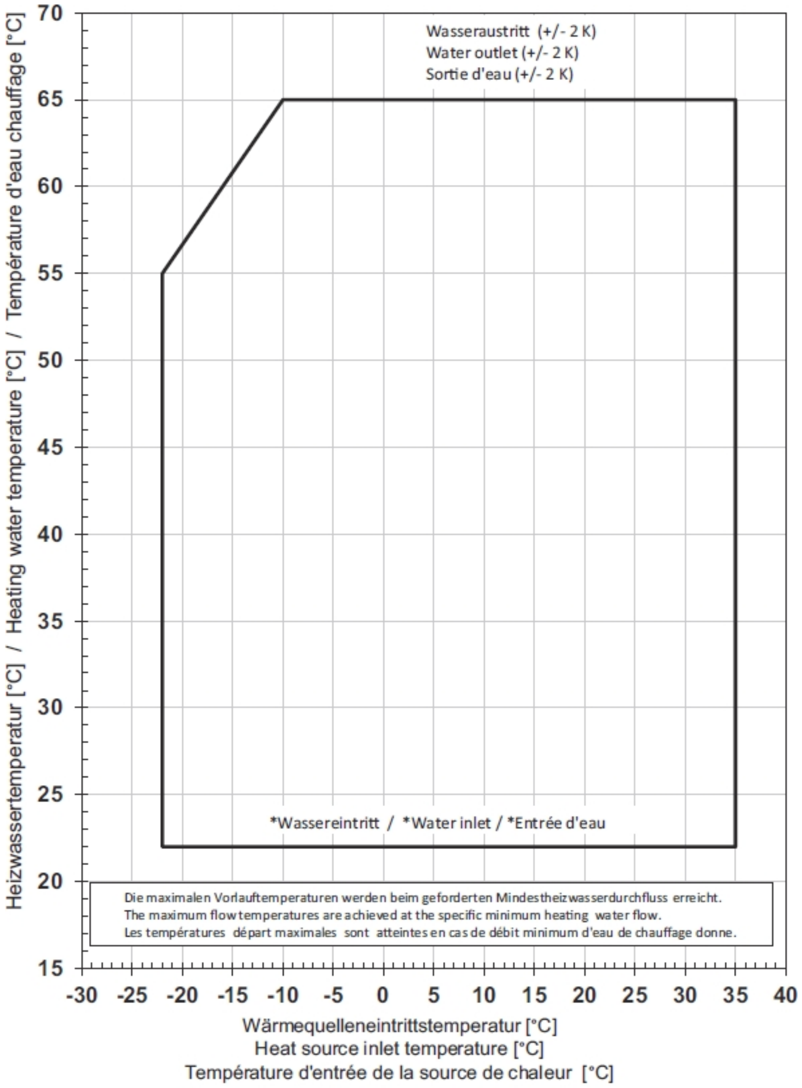

Heizleistung in [kW] / Heating capacity in [kW] / Puissance de chauffage en [kW]
Heizwasseraustritt / water outlet / sortie del'eau 65°C
Heizwasserdurchfluss / water flow rate / Débit d'eau de chauffage 0,95 m³/h
max.
min.
Lufteintrittstemperatur in [°C] / Air inlet temperature in [°C] / Température d'entrée d'air en [°C]


Leistungsaufnahme (incl. Pumpenleistungsanteil) [kW]
Power consumption in [kW] (incl. power input to pump)
Consommation de puissance in [kW] (y compris part de consommation de la pompe)
max.
min.
Lufteintrittstemperatur in [°C] / Air inlet temperature in [°C]
Température d'entrée d'air en [°C]


Leistungszahl (incl. Pumpenleistungsanteil)
Coefficient of performance (incl. power input to pump)
Coefficient de performance (y compris part de consommation de la pompe)
max.
min.
Lufteintrittstemperatur in [°C] / Air inlet temperature in [°C]
Température d'entrée d'air en [°C]

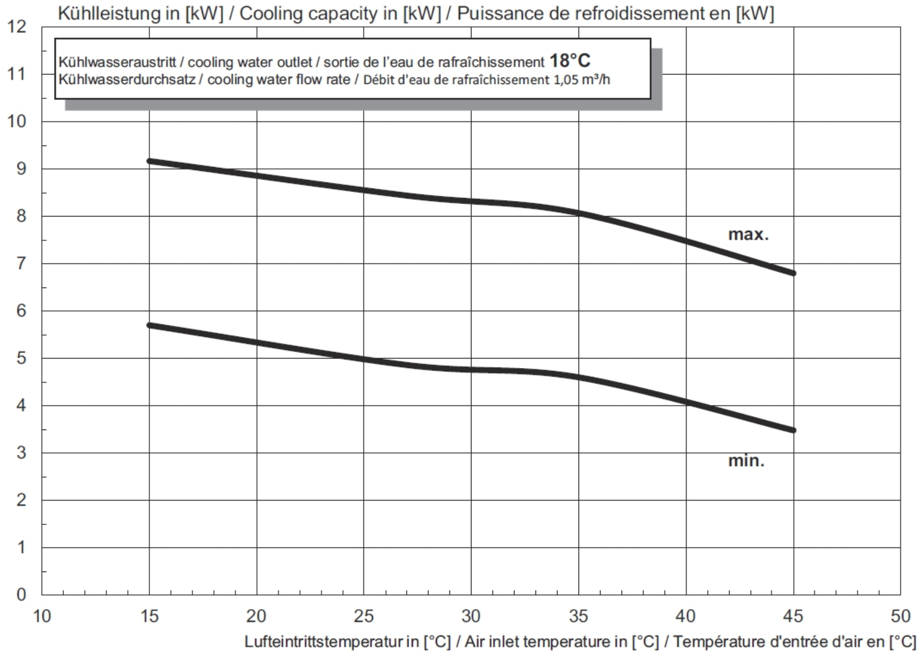

Druckverlust in [Pa]
Pressure loss in [Pa]
Perte de pression en [Pa]
Verflüssiger
Condenser
Condenseur
Heizwasserdurchfluss in [m³/h] Heating water flow rate in [m³/h]
Débit d'eau de chauffage en [m³/h]

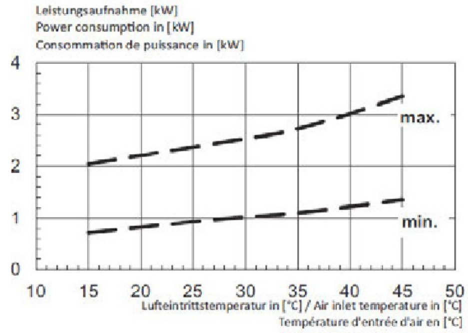
11.5.8 Heating operating limit diagram

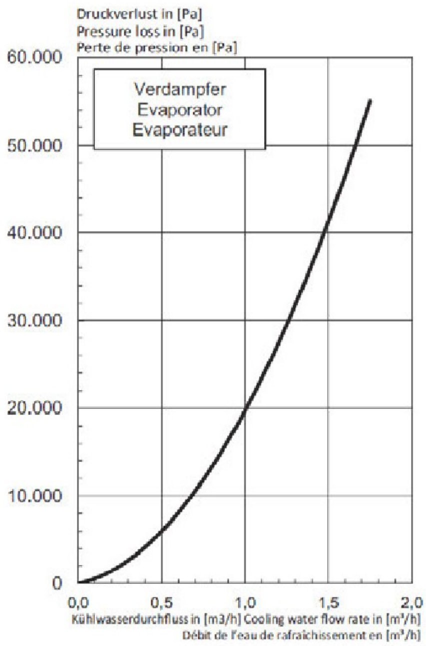


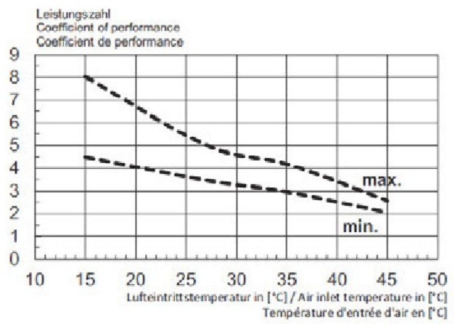
*Bei Luft/Wasser-Wärmepumpen stellt die minimale Heizwassertemperatur die Mindest-Rücklauftemperatur dar
*For air-to-water heat pumps the minimum heating water temperature is the minimum return temperature
*Sur les pompes à chaleur air / eau, la température minimale d'eau de chauffage correspond à la température retour minimale

11.5.9 Cooling Curve (cooling water outlet 18°C)

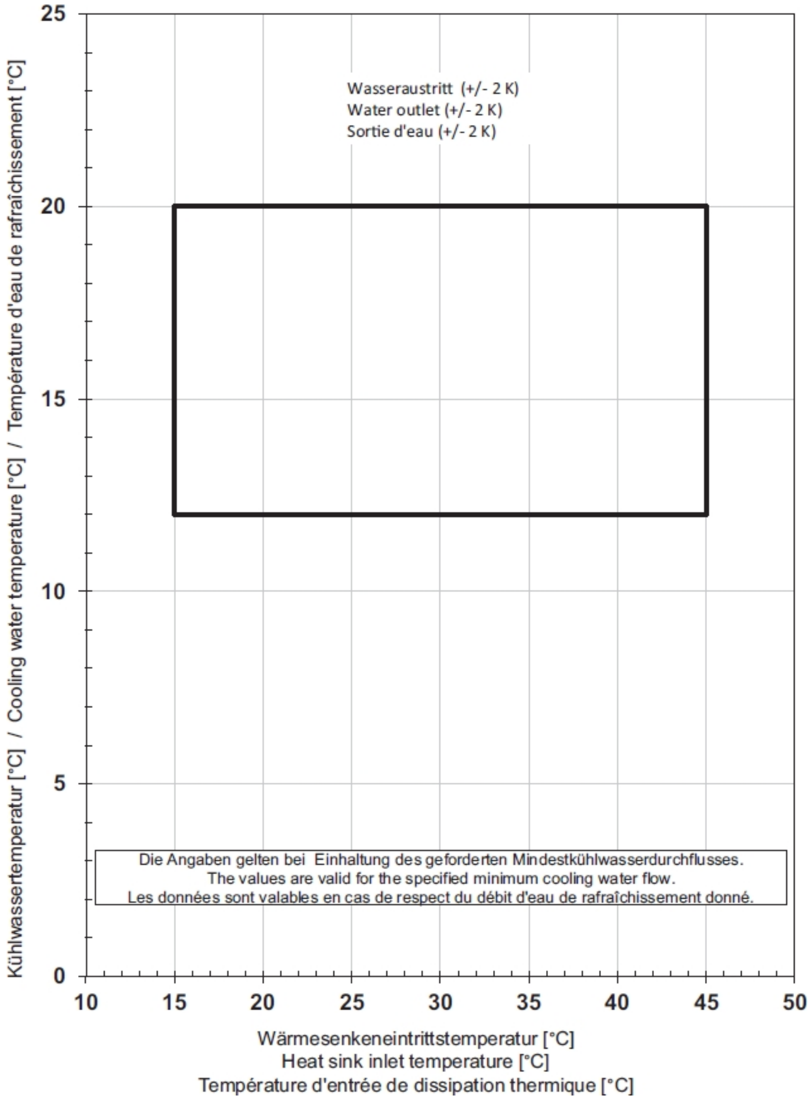








11.5.10 Cooling operating limit diagram



11.6 Technical product information LA 1118BWCP

System E Comfort (LA 1118BWCP) consists of the following components:

- LA 1118CP air-to-water heat pump (outdoor unit)
- Hydro-Tower HWK 332HC

Technical product information for the LA 1118CP heat pump (externally installed monoblock)

https://dimplex.atlassian.net/wiki/spaces/PRO/pages/edit-v2/3215392928

Technical product information HWK 332HC

Device information

Dimensioned drawing

Characteristic curves

11.6.1 Device information

Type and order code		HWK 332HC
1. design		
Execution		Hydro-Tower with WPM and double differential pressureless manifold [DDV]
Degree of protection according to EN 60529		IP 20
installation location		Inside
2. technical data		
Heat generator		external
buffer tank		
Nominal content	Litres	100
Permissible operating temperature	°C	85
Maximum operating overpressure	bar	3,0
Electric pipe heating	kW	2, 4 or 6[1]
Immersion heater (optional)	kW	to 3
domestic hot water cylinder		
Useful capacity	Litres	277
Heat exchanger surface	m^2	3,15
Permissible operating temperature	°C	95
Permissible operating pressure	bar	10,0
immersion heater	kW	1,5
Set pressure safety valve	bar	3,0
Sound power level	dB(A)	42
Sound pressure level at a distance of 1 m	dB(A)	35

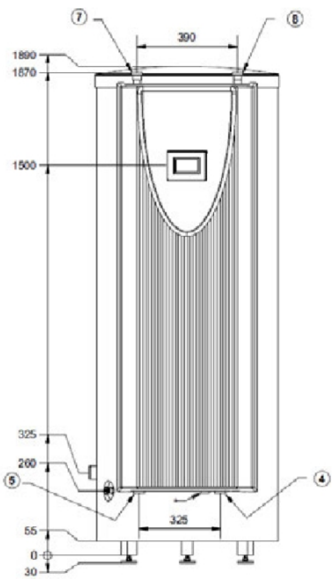
3. dimensions, connections and weight		
device dimensions[2]	H x W x L mm	1920 x 740 x 950
tilt dimension	mm	2000
Device connections		
for heat generators	inch	1 1/4" EXTERNAL THREAD/FL

unmixed heating circuit	inch	1 1/4" EXTERNAL THREAD/FL
for domestic hot water	inch	1" EXTERNAL THREAD
for circulation pipe	inch	3/4" FEMALE THREAD
for diaphragm expansion vessel	inch	1" EXTERNAL THREAD/FL
Anode diameter	mm	33
Anode length	mm	690
Anode connection thread	inch	1 1/4" FEMALE THREAD
Weight of the transport unit(s) incl. packaging	kg	215
4. electrical connection		
Control voltage Fusing		1~/N/PE 230 V (50 Hz) / C13 A
Supply voltage / fusing	(SPmax= 7.5 kW)	1~/N/PE 230 V (50 Hz) / B35 A 3~/N/PE 400 V (50 Hz) / B20 A
5. safety regulations		
Complies with European safety regulations		see CE declaration of conformity
6. other model features		
Water in the appliance protected against freezing[4]		Yes

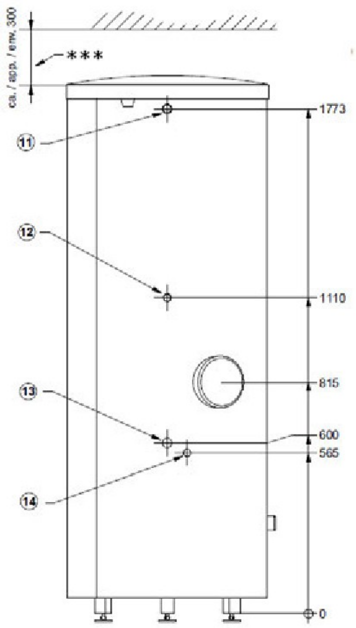
1. Delivery state 6 kW
2. Please note that more space is required for pipe connection, operation and maintenance
3. see CE declaration of conformity
4. the heat circulating pump and the heat pump controller must always be ready for operation

11.6.2 Dimensioned drawing

Front view

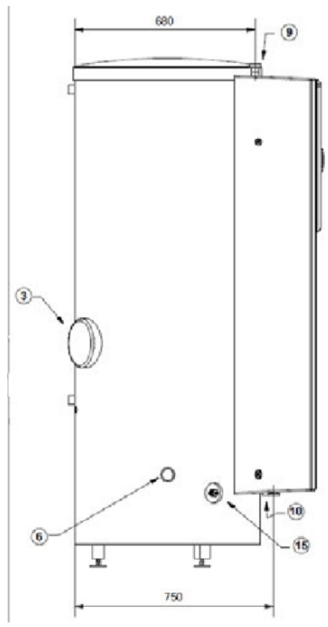


Rear view

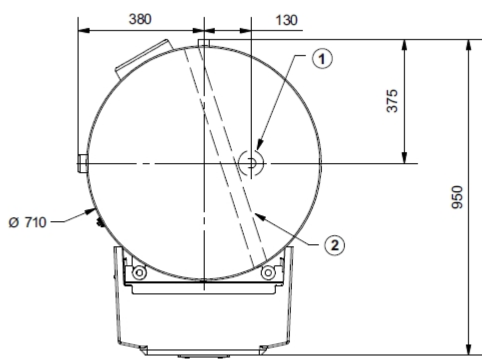


***Space required for anode replacement

Side view



Top view

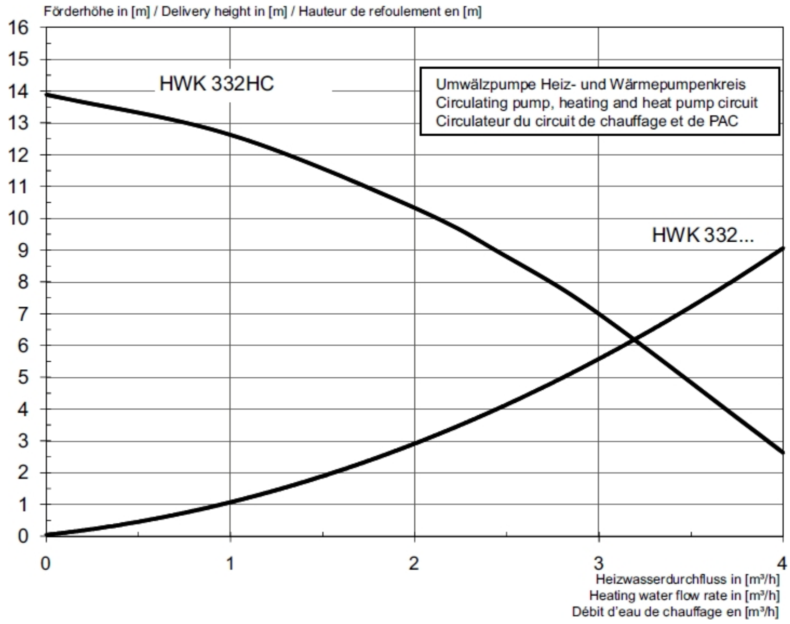


Legend

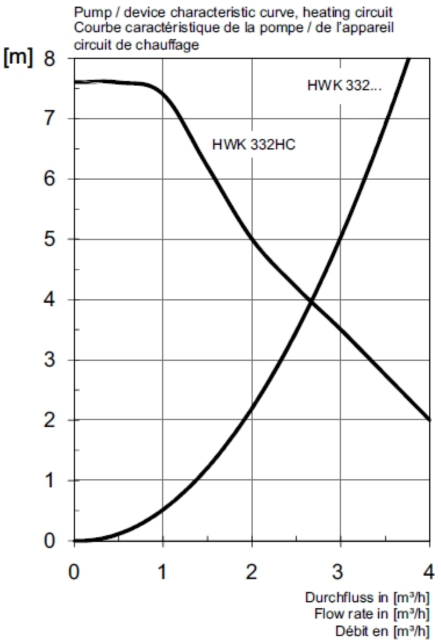
(1) Protective anode
(2) Cable duct under the top of the storage cover cap
(3) Electric heating element 1.5 kW
(4) Return to the heat pump G 1 1/4" external thread, flat-sealing
(5) Flow to heat pump G 1 1/4" external thread, flat-sealing
(6) G 1 1/2" (female thread) for optional immersion heater connection
(7) Heating water return G 1 1/4" external thread, flat-sealing
(8) Heating water flow G 1 1/4" external thread, flat-sealing
(9) Cable entry from the top
(10) Cable entry from below
(11) Domestic hot water outlet R 1" (external thread)
(12) Circulation pipe G 3/4" (female thread)
(13) Cold water inlet R1" (external thread)
(14) Empty conduit Ø22 (cable bushing)
(15) Fill and drain tap 1/2" (incl. hose nozzle)

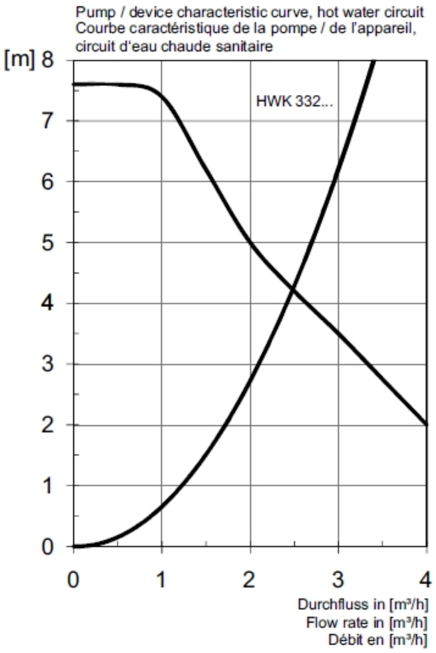
11.6.3 Characteristic curves

Pump/device characteristic curve (heating and heat pump circuit in operation)



Pump/device characteristic curve heating circuitPump/device characteristic curve hot water circuit


Pump / device characteristic curve, heating circuit
Courbe caractéristique de la pompe / de l'appareil
circuit de chauffage
[m]
HWK 332...
HWK 332HC
Durchfluss in [m³/h]
Flow rate in [m³/h]
Débit en [m³/h]


Pump / device characteristic curve, hot water circuit
Courbe caractéristique de la pompe / de l'appareil,
circuit d'eau chaude sanitaire
[m]
HWK 332...
Durchfluss in [m³/h]
Flow rate in [m³/h]
Débit en [m³/h]

12 System S

12.1 Table of contents

The **System S** air/water heat pump system in split design is a simple, stylish and sustainable solution for building air conditioning. System S is ideal for energy-efficient heating, cooling and hot water heating in new builds, refurbishments and replacements.

With its sustainable refrigerant and smart operation, the System S heat pump system offers a sustainable and innovative solution for detached and semi-detached houses.

The System S is a split air/water heat pump system with efficient inverter technology. It adapts intelligently to the building's actual heating, cooling and hot water requirements at all times. This makes it particularly efficient and powerful. Heating is possible down to an outside temperature of -25°C. The environmentally friendly refrigerant R32 also improves the CO_2 balance of the building and avoids annual leakage checks. Maximum flow temperatures of up to 65°C and the integrated cooling function combined with surface heating/cooling systems and / or fan convectors make it possible to utilise free environmental energy efficiently all year round.

12.2 Three possible combinations

12.2.1 System S Flex (LIA HXCF)

LIA 0608HXCF M

LIA 0911HXCF M

LIA 1316HXCF

LIA 1316HXCF M

12.2.2 System S Comfort (LIA BWCF)

LIA 0608BWCF M

LIA 0911BWCF M

LIA 1316BWCF

LIA 1316BWCF M

Variant with hydrobox

Ideal for new builds and renovations

The variant with wall-mounted hydrobox is particularly flexible to use. In combination with individually selected or existing hydraulic components and domestic hot water cylinders, this solution is predestined for properties in which the fossil or renewable heat generator is to be flexibly replaced or existing installations or components are to be integrated.

Variant with 300 litre domestic hot water cylinder + 100 litre buffer tank

Ideal for new builds and renovations

The Hydrauliktower, also as a ready-to-connect hydraulic unit, with a 300 litre domestic hot water cylinder and 100 litre buffer tank is available for quick and easy installation in demanding new builds or for renovation projects with larger hot water requirements (up to 6 people) and high comfort requirements. It is possible to connect an additional fossil or renewable heat generator.

12.2.3 System S Compact (LIA HWCF)

LIA 0608HWCF M

LIA 0911HWCF M

Variant with integrated domestic hot water cylinder (200 litres)

Ideal for new builds

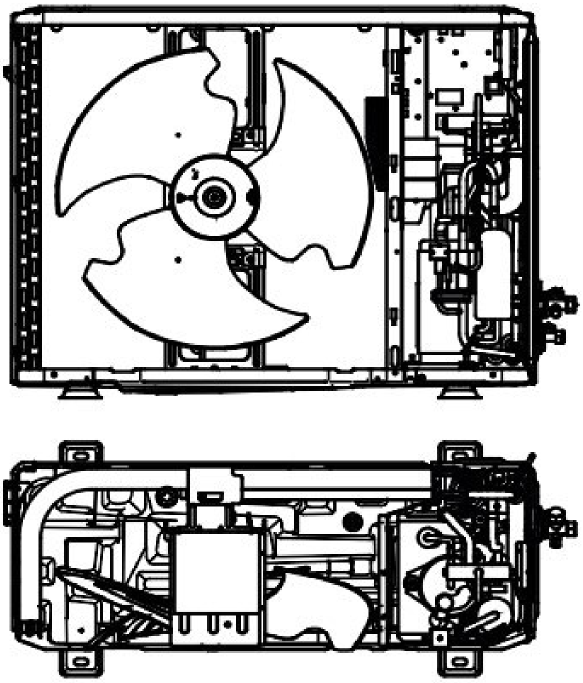
A particularly compact, ready-to-connect hydraulic unit with a footprint of 60 x 60 cm contains all the necessary hydraulic components and a domestic hot water cylinder (200 litres). This enables quick and easy installation in new builds and offers hot water convenience for up to 4 people. When using radiators or individual room control, the unit is supplemented by a buffer tank.

12.3 Basic device system S

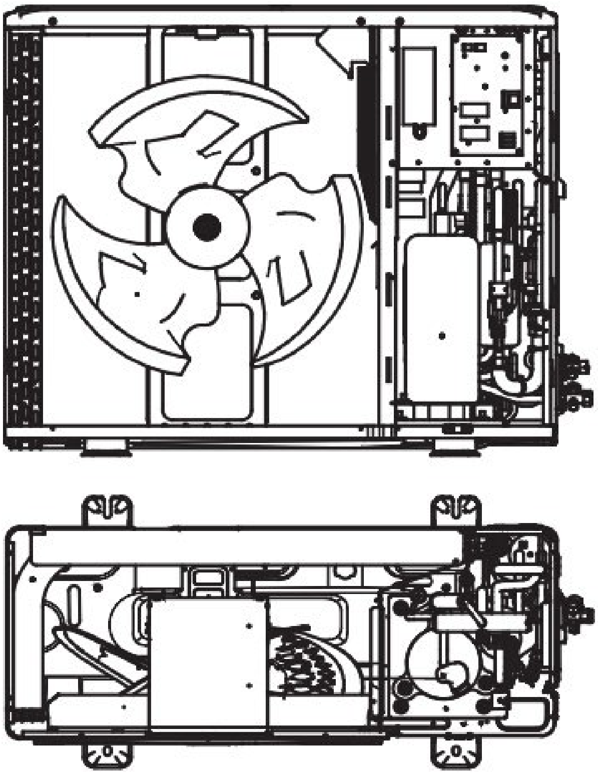
12.3.1 Heat pump outdoor unit

(same outdoor unit for all systems)

LIA



0608LIA 0911 / LIA 1316



NOTE

External sensor is provided by the outdoor unit as standard. Connection of an external sensor is possible

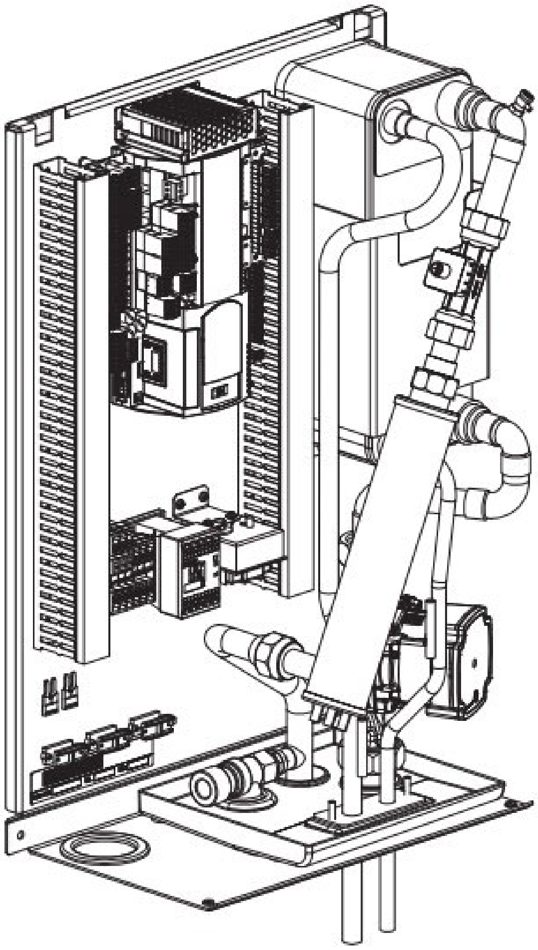
Installation of an external outdoor temperature sensor:

The outside temperature is measured via the heat source inlet sensor on the outside. A separate outdoor temperature sensor can be fitted as an option.

Further information on installing the outdoor temperature sensor:

https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3206742087/Temperaturf+hler+WPM+Touch#Mounting-the-outside-temperaturef%C3%9er

12.3.2 System S Flex (LIA HXCF)



Hydraulic components

- unmixed heating circuit incl. controlled circulation pump
- 2nd heat generator electric tubular heating, heat output from 2, 4 to 6 kW, protected by safety temperature limiter
- Flow sensor

Safety equipment:

- Safety valve, response pressure 2.5 bar

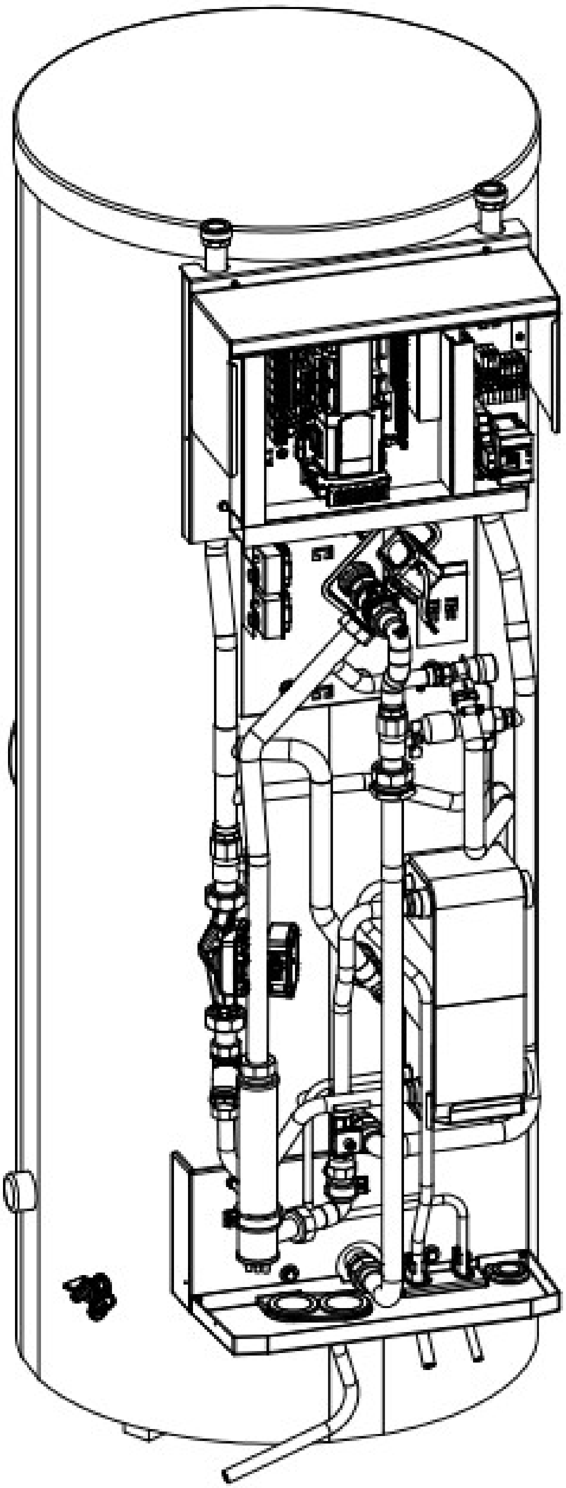
Refrigerating equipment

- Refrigerant / heating water heat exchanger
- Connections for split line

Electrical components

- Heat pump manager with connection boards
- Mains connection terminals and tubular heating contactor

12.3.3 System S Comfort (LIA BWCF)



Hydraulic components:

- unmixed heating circuit incl. controlled circulation pump
- 2nd heat generator electric tubular heating, heat output from 2, 4 to 6 kW, protected by safety temperature limiter
- Flow sensor
- 1.5 kW heating element
- 3-way reversing valve
- Storage tank (100l and 300l)
- Overflow valve

Safety equipment:

- Safety valve, response pressure 3 bar

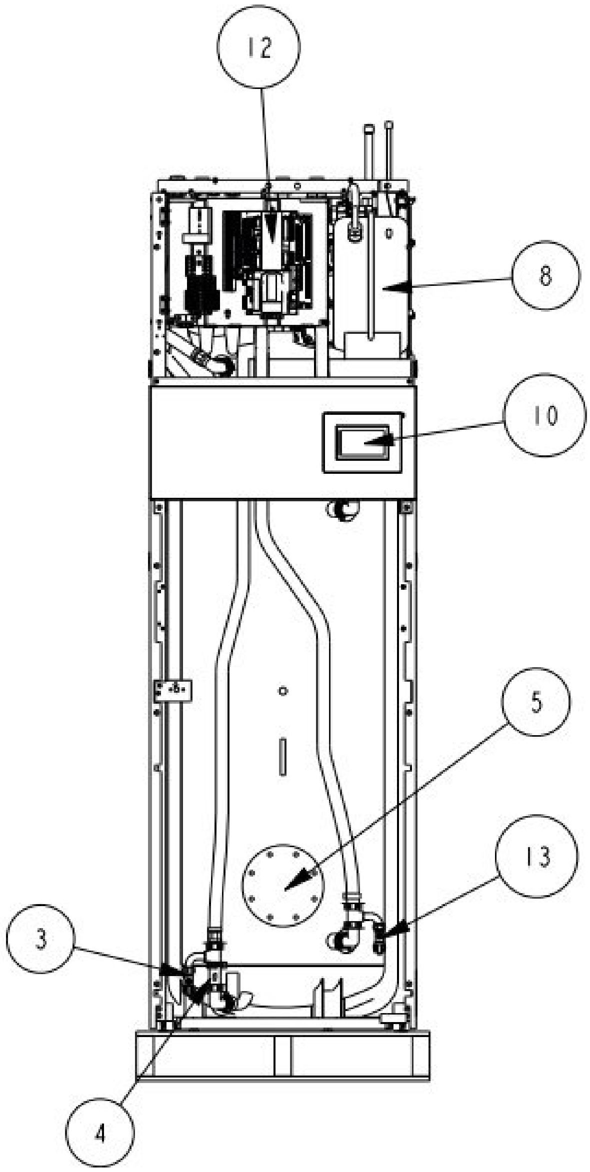
Refrigerating equipment:

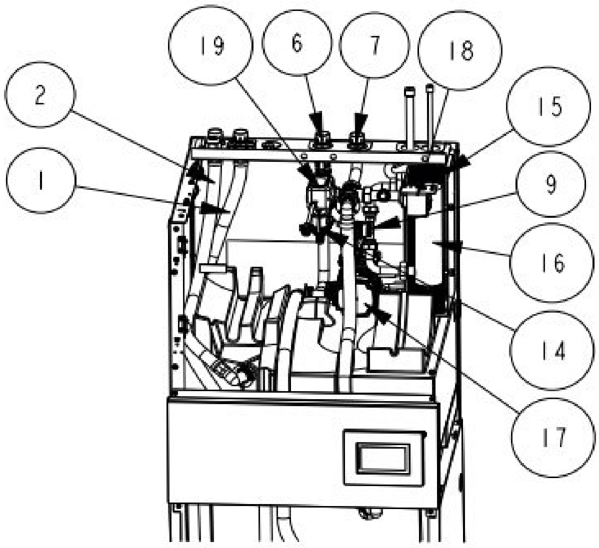
- Refrigerant / heating water heat exchanger
- Connections for split line

Electrical components:

- Heat pump manager with connection boards
- Mains connection terminals and tubular heating contactor

12.3.4 System S Compact (LIA HWCF)





① Cold water inlet
② Hot water outlet
③ Drain tap
④ Fitting piece
⑤ Cleaning flange
⑥ Return (entry)
⑦ Flow (exit)
⑧ 12 litre expansion tank
⑨ Flow meter
⑩ Touch display
⑪ Levelling feet
⑫ Switch box
⑬ Refill tap
⑭ Combined sludge and magnetite separator
⑮ Plate heat exchanger
⑯ Tubular heating 6kW
⑰ Circulation pump
⑱ Safety temperature limiter for pipe heating
⑲ Heating/hot water reversing valve

12.4 Installation conditions System S

12.4.1 Installation of System S outdoor unit

12.4.2 Foundation plan system S

12.4.3 Installation of System S indoor unit

12.4.4 Requirements Minimum installation area/minimum room volume

12.4.5 Installation in coastal areas System S

12.4.6 System S connection on the heating side

12.4.7 Refrigerant pipe connection system S

The refrigerating systems described in System S are filled with **R32**. The refrigerant R32 is a colourless, odourless and flammable gas.

Due to its higher density than air, R32 can accumulate in low-lying areas without sufficient ventilation. At low concentrations, symptoms such as dizziness, headache, nausea and incoordination may occur. At higher concentrations there is a risk of suffocation.

To ensure safe operation and, above all, to prevent personal injury in the event of a leak, certain criteria apply to the installation site that must be met in order to minimise potential hazards to people, property and the environment.

12.4.8 General installation conditions

Install the heat pump in rooms with sufficient air circulation. Do not block any

ventilation openings when installing the heat pump.

Do not store or use flammable or combustible materials near the heat pump. The installation site of the heat

pump must not be used as a workplace or workshop.

Do not expose the appliance to high temperatures, flames, sparks or sources of ignition (e.g. electric radiators).

The appliance must not be set up or operated near an open flame, gas-fuelled appliances, electric heaters or other comparable sources of ignition.

When installing the system, ensure that it is easily accessible for maintenance and repair purposes. The minimum

area of the installation room must be fulfilled depending on the filling quantity of the system

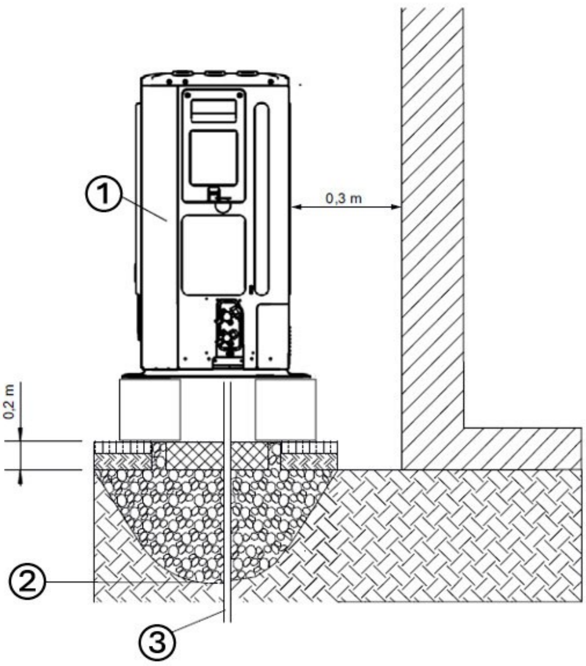
> **CAUTION**
> The minimum room area must also be observed when storing the heat pump.

12.4.9 Installation of System S outdoor unit

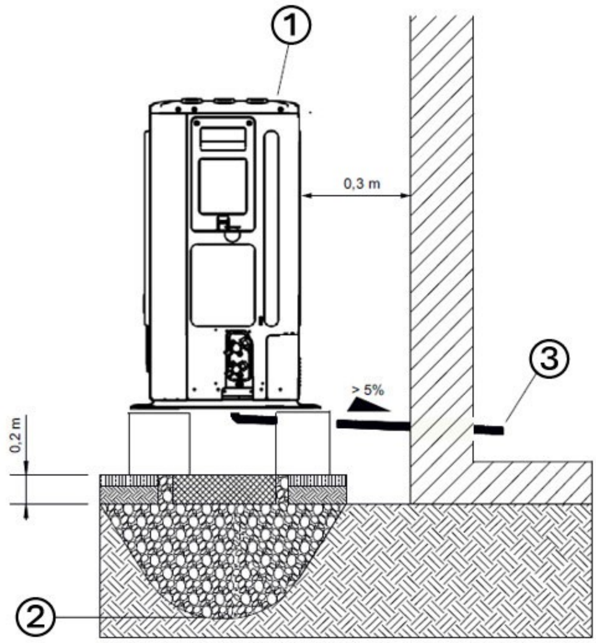
- It is recommended to install the outdoor unit close to the wall on a foundation separate from the building with a clearance of at least 0.3 m on the intake side
- If a canopy is fitted to protect against direct sunlight, rain or snow, the heat exchange of the appliance must not be impeded.
- For free-standing installation, the foundation on the intake side must be flush with the appliance. This prevents snow from building up between the foundation and the evaporator.
- The specified minimum distances must be observed.
- The installation location must be selected so that people are not disturbed by hot/cold air movements or noise emissions.
- The condensate tray offers various options for condensate drainage. In warmer regions, the condensate can drain freely from the appliance. In regions with longer periods of frost, a controlled condensate drain must be ensured.

When installing on a wall bracket, particular attention must be paid to sound decoupling from the building. If the wall bracket installation option is chosen, the following points must be observed:

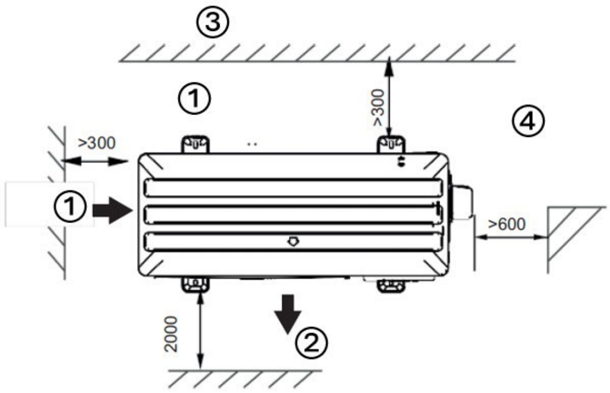
- Provide rubber buffer
- Note the weight of the outdoor unit
- Maximum height of wall bracket above floor 1 m
- Minimum distances must be observed



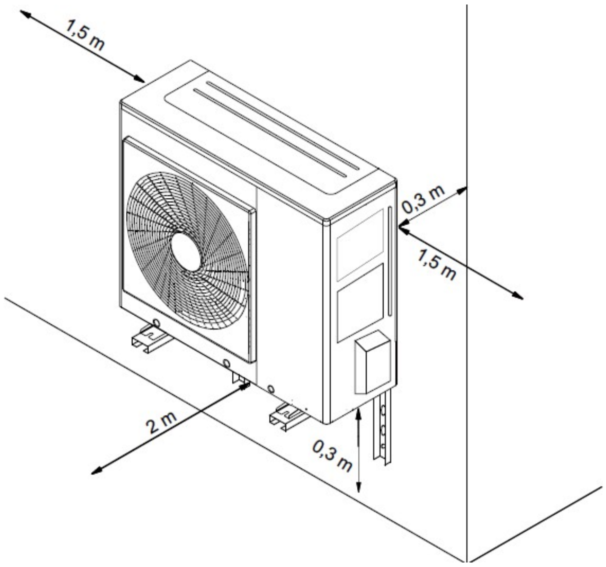
① Heat pump
② Frost line
③ Condensate drain



① Heat pump
② Frost line
③ Condensate drain



① Air inlet
② Air outlet
③ Wall or obstacle
④ Maintenance area



If several outdoor units are installed next to each other, the specified distances must be observed. Furthermore, care must be taken to ensure t h a t the air inlet and outlet do not interfere with each other due to the installation of several outdoor units.

NOTE
If the fan is installed close to walls, the physical effects on the building must be taken into account. There should be no windows or doors in the fan's discharge area.

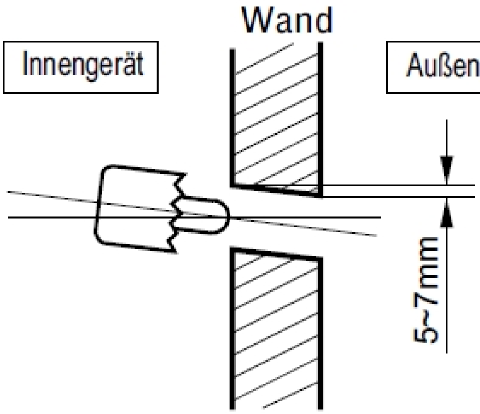
NOTE
Installation in troughs or courtyards is not permitted, as the cooled air collects on the ground and is sucked in again by the heat pump during prolonged operation.

CAUTION
Incorrect installation, maintenance or repair can increase the risk of cracks in the installed pipes and thus lead to material damage.

CAUTION
Improper installation of the unit may restrict the operation of the system.

Wall breakthroughs

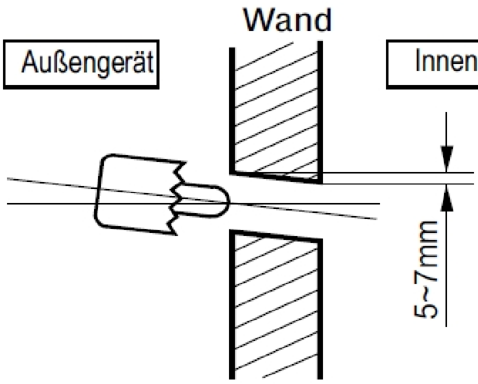
Split and electrical linesWall breakthrough Condensate drain



To lay the split and electric wires, please proceed as follows:

- Drill a 70 mm hole for the pipework using a core drill.
- The pipework opening should be slightly inclined towards the outdoor unit so that rain cannot penetrate the building.

During installation work, please ensure that connection points are easily accessible for maintenance and repair purposes.



To ensure the safe removal of condensate, the condensate drain must be laid in such a way that no frost build-up can occur. The frost limit may vary depending on the climatic region. The regulations of the respective countries must be observed.

When laying the condensate connection, ensure that the gradient is correct.

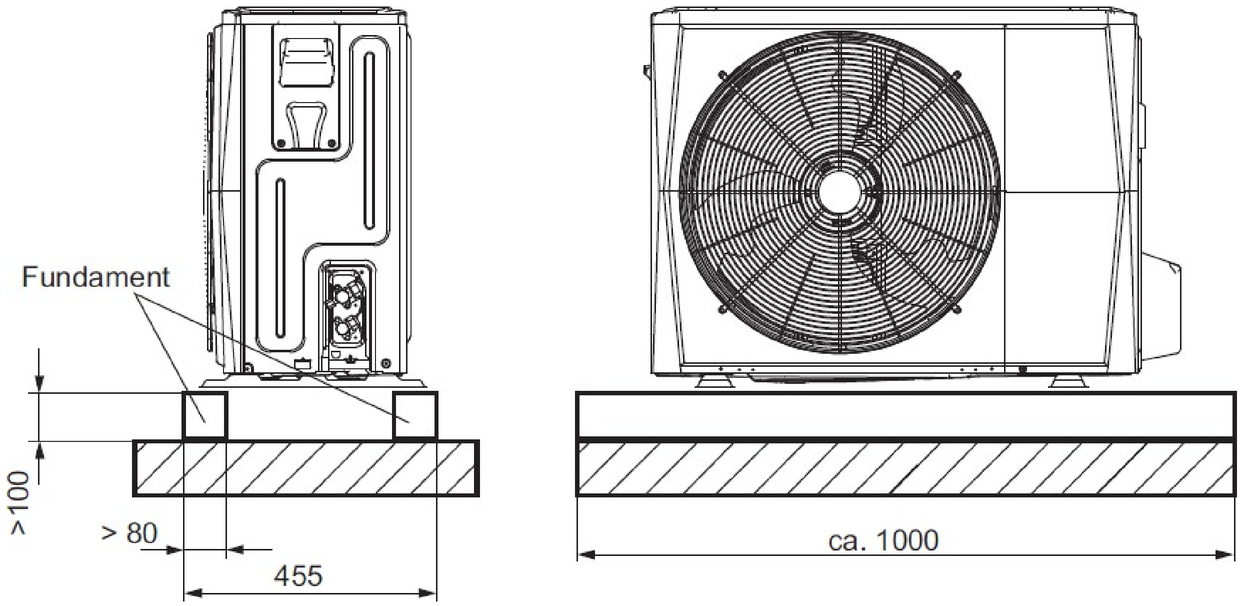
CAUTION
Care must be taken to ensure that the connections and cables are not subjected to any mechanical loads.

CAUTION
Connecting cables must not exhibit any mechanical damage.

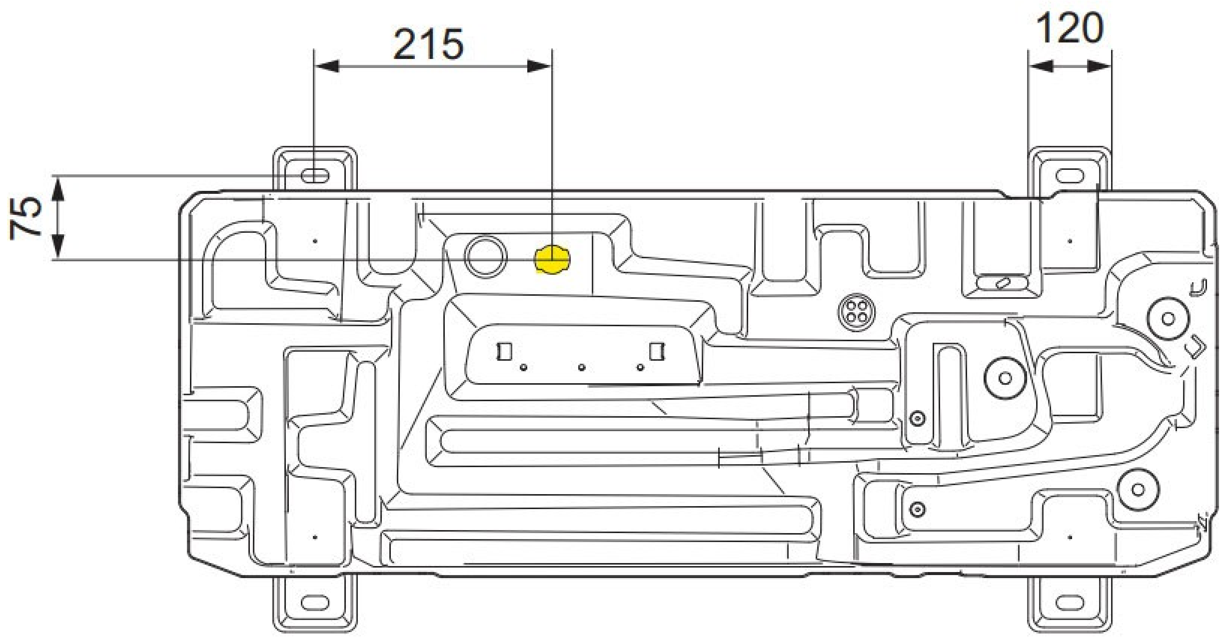
12.4.10 Foundation plan system S

It is recommended to install the outdoor unit close to the wall on a foundation separate from the building with a clearance of at least 0.3 m on the intake side
(see illustrations https://dimplex.atlassian.net/wiki/x/o4Hkvw)

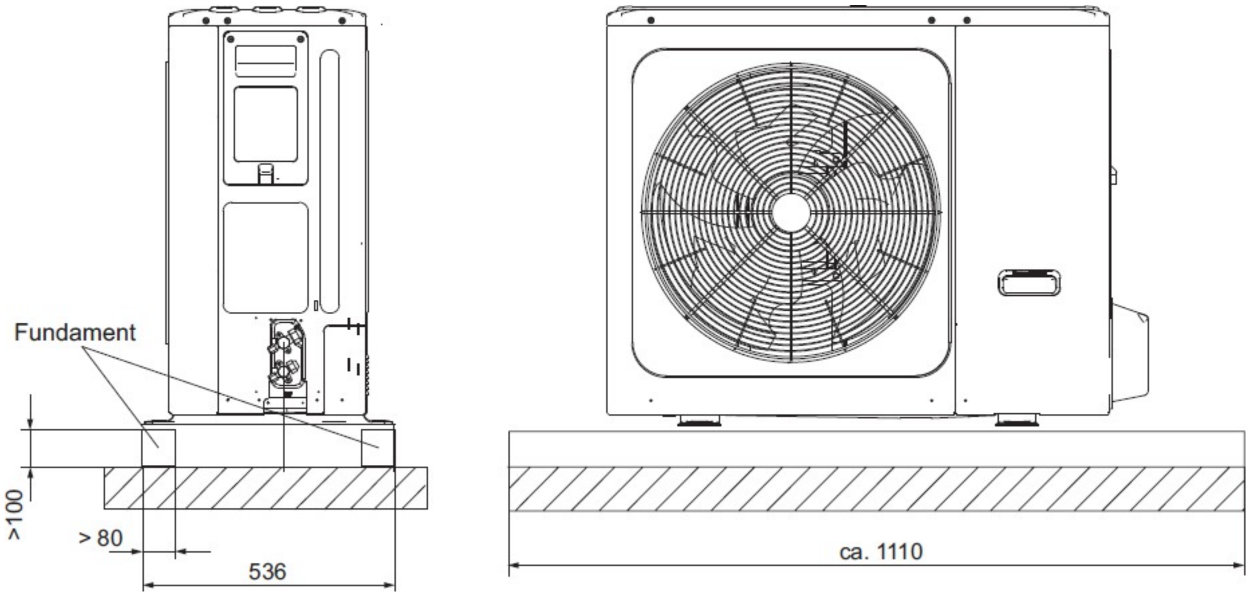
Foundation plan LIA 0608



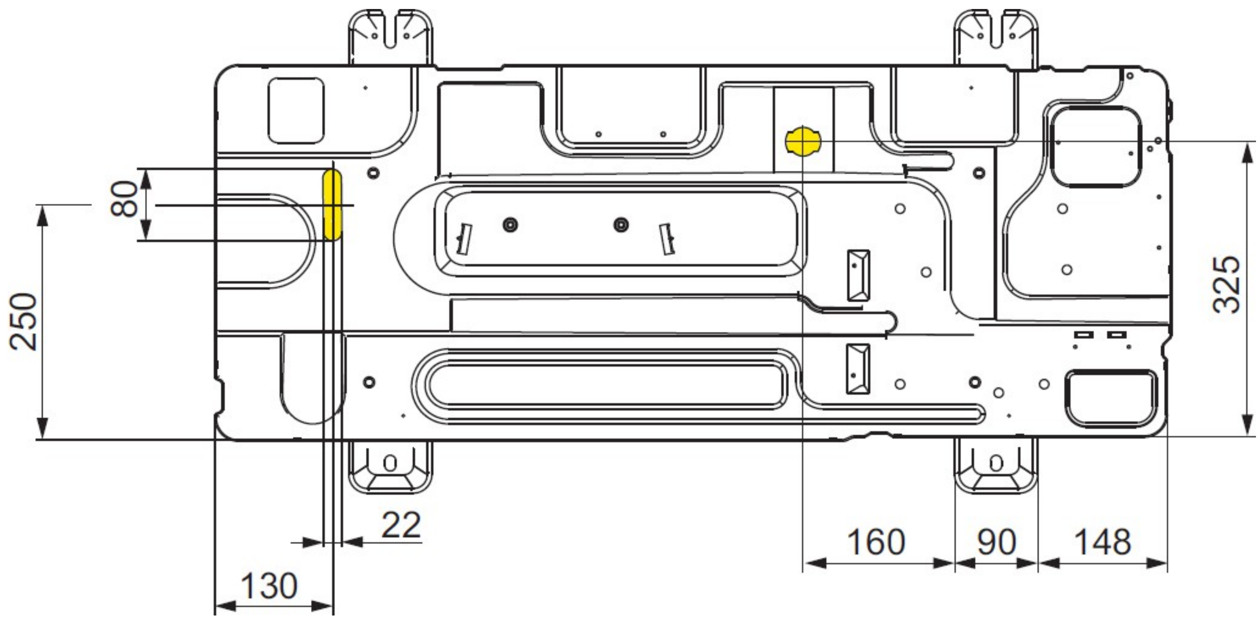
Condensate connection LIA 0608



Foundation plan LIA 0911/1316



Condensate connection LIA 0911/1316



12.4.11 Installation of System S indoor unit

General installation conditions for indoor unit

CAUTION
The installation room must fulfil the requirements for **minimum installation areas.**

CAUTION
The appliance must not be installed or operated in the vicinity of an open flame, gas-fuelled appliances, electric heaters or other comparable ignition sources.

CAUTION
The appliance must not be installed in a room that is also used as a workplace or workshop (risk of ignition due to flying sparks).

CAUTION
When setting up the appliance, ensure that no ventilation openings are blocked.

NOTE
Assembly and installation must be carried out by an authorised specialist company.

NOTE
The heat pump is not intended for use above 2000 metres above sea level.

System S Flex (LIA HXCF)

The appliance must always be installed indoors on a flat and smooth wall.

Maintenance work can easily be carried out from the operator side (a larger minimum distance to the side is not required, a mounting clearance of 5 cm must be maintained). This is guaranteed if a distance of approx. 1 m is maintained at the front.

The indoor unit should be installed at a height of approx. 1.20 metres.

The installation must be carried out in a frost-protected room and via short pipe runs.

System S Comfort (LIA BWCF)

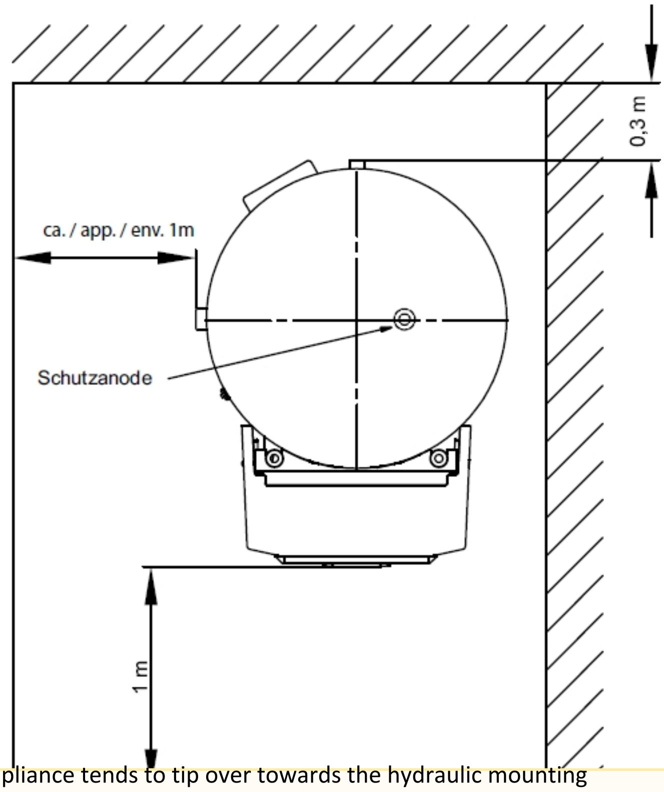
The appliance must always be installed indoors on a flat, smooth and level surface.

The indoor unit must be set up so that maintenance work can be carried out from the operator side without any problems. This is guaranteed if a distance of 1 m is maintained at the front. The required height of the installation room must take into account the space required (approx. 30 cm, see dimensional drawing) for changing the protective anode.

The installation must be carried out in a frost-protected room and via short pipe runs.

If the indoor unit is installed on an upper floor, the load-bearing capacity of the ceiling must be checked and vibration decoupling must be carefully planned for acoustic reasons. Installation on a wooden ceiling is not recommended.

The appliance should not be installed in rooms with high humidity (e.g. shower rooms, washrooms, etc.).



CAUTION
When unfilled
(domestic hot water cylinder without water), the appliance tends to tip over towards the hydraulic mounting assembly. Do not lean against the back of the appliance!

System S Compact (LIA HWCF)

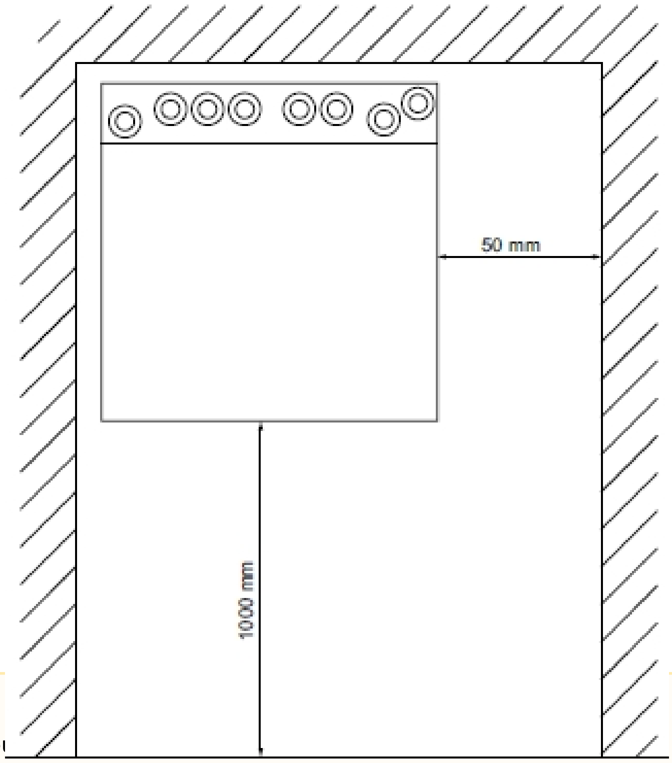
The appliance must always be installed indoors on a flat, smooth and level surface.

The indoor unit must be set up so that maintenance work can be carried out from the operator side without any problems. This is guaranteed if a distance of 1 m is maintained at the front. The required height of the installation room must take into account the space required (approx. 30 cm, see dimensional drawing) for changing the protective anode.

The installation must be carried out in a frost-protected room and via short pipe runs.

If the indoor unit is installed on an upper floor, the load-bearing capacity of the ceiling must be checked and vibration decoupling must be carefully planned for acoustic reasons. Installation on a wooden ceiling is not recommended.

The appliance should not be installed in rooms with high humidity (e.g. shower rooms, washrooms, etc.).



> **CAUTION**
> When unfilled (domestic hot water cylinder withou
> hydraulic mounting assembly. Do not lean against the back of the appliance!

12.4.12 Requirements Minimum installation area/minimum room volume

Requirements for the minimum installation area:

Heat pumps operated with the refrigerant R32 are devices that fulfil the requirements of
of EN 378-1_4:2016 must be installed. With regard to the standard, it must be ensured that the installation room is of sufficient size so that the limit values for toxicity and flammability are not exceeded indoors.

When considering the minimum installation area of the room, the filling quantity of the system is decisive. Please note that extending the connection lines of the appliance may result in a change in the filling quantity of the system. You should therefore check whether the installation room is suitable, even if a higher refrigerant fill quantity is taken into account.
An installation room is any room that contains components containing refrigerant (indoor unit, outdoor unit, refrigerant lines) or into which refrigerant can be released.
Several rooms with suitable openings (which are not closed) can be
The rooms that have a common ventilation supply, return or exhaust air system that does not contain the evaporator or condenser are to be treated as a single room.

During installation work, care should always be taken to ensure that the refrigerant lines are kept to a necessary minimum.

To check the required installation conditions, proceed as follows:
Determination of the refrigerant fill quantity:
Please note that a different refrigerant fill quantity may be necessary due to the extension of the connection pipework.

Check the tables for the respective heat pump to see whether the installation conditions are sufficient for operating the heat pump.

Limit values toxicity and flammability:

If the refrigerant fill quantity is below 1.842 kg, the toxicity limit value is decisive for the installation conditions.

The filling quantity is toxicity limit value x room volume.

The toxicity limit **v a l u e** corresponds to the ATEL/ODL values or the practical limit value, **whichever is higher**.

R32 ATEL/ODL:	0,30
R32 Practical limit: Concentration limit	0,061
(toxicity):	R32 = 1 x (0. 3) = 0. 3kg per $1m^3$ volume

> **NOTE**
> The installer must ensure a room volume of 1 m^3 per 0.3 kg of R32 refrigerant.

> **NOTE**
> If the refrigerant fill quantity of the system exceeds 1.842 kg, the flammability limit value is decisive for the installation conditions. It should be noted that, in contrast to the limit value for toxicity, this is the room area.

System S limit values

LIA 0608 (1.5 kg R32)	Minimum room volume 5 m^3
LIA 0911 (1.65 kg R32)	Minimum room volume 5.50 m^3
LIA 1316 (1.84 kg R32)	Minimum room volume 6.1 m^3.

Minimum room volume

Calculated according to EN378-1_4:2016 and EN60335-2-40, the following room sizes result (see table) for the respective pipe length and the resulting filling quantity. Due to the flammability and toxicity of the refrigerant, the following minimum room sizes must be observed.

LIA 0608								
Pipe length [m]	≤15	16	17	18	19	20	21	22
Filling quantity [kg]	1,5	1,52	1,54	1,56	1,58	1,60	1,62	1,64
Minimum room volume Toxicity [m^3]	5,00	5,07	5,13	5,20	5,27	5,33	5,40	5,47
Minimum room volume flammability [m^3]	3,26	3,30	3,34	3,39	3,43	3,47	3,52	3,56

LIA 0608								
Min. room area Brenn. HXCF [m²]								
Min. room area Brenn. BWCF [m²]								
Min. room area Brenn. HWCF [m²]								
Pipe length [m]	23	24	25	26	27	28	29	30
Filling quantity [kg]	1,66	1,68	1,70	1,72	1,74	1,76	1,78	1,80
Minimum room volume Toxicity [m³]	5,53	5,60	5,67	5,73	5,80	5,87	5,93	6,00
Minimum room volume flammability [m³]	3,60	3,65	3,69	3,74	3,78	3,82	3,87	3,91
Min. room area Brenn. HXCF [m²]								
Min. room area Brenn. BWCF [m²]								
Min. room area Brenn. HWCF [m²]								

LIA 0911								
Pipe length [m]	≤15	16	17	18	19	20	21	22
Filling quantity [kg]	1,65	1,688	1,726	1,764	1,802	1,84	1,878	1,916
Minimum room volume Toxicity [m³]	5,50	5,63	5,75	5,88	6,01	6,13	6,26	6,39
Minimum room volume flammability [m³]	3,58	3,67	3,75	3,83	3,91	4,00		
Min. room area Brenn. HXCF [m²]							7,50	7,81
Min. room area Brenn. BWCF [m²]							30,02	31,24
Min. room area Brenn. HWCF [m²]							5,63	5,74
Pipe length [m]	23	24	25	26	27	28	29	30
Filling quantity [kg]	1,954	1,992	2,03	2,068	2,106	2,144	2,182	2,22
Minimum room volume Toxicity [m³]	6,51	6,64	6,77	6,89	7,02	7,15	7,27	7,40
Minimum room volume flammability [m³]								
Min. room area Brenn. HXCF [m²]	8,12	8,44	8,77	9,10	9,44	9,78	10,13	10,49
Min. room area Brenn. BWCF [m²]	32,50	33,77	35,07	36,40	37,75	39,12	40,52	41,94
Min. room area Brenn. HWCF [m²]	5,85	5,97	6,08	6,23	4,46	6,70	6,94	7,18

LIA 1316								
Pipe length [m]	≤15	16	17	18	19	20	21	22
Filling quantity [kg]	1,84	1,878	1,916	1,954	1,992	2,03	2,068	2,106
Minimum room volume Toxicity [m³]	6,13	6,26	6,39	6,51	6,64	6,77	6,89	7,02
Minimum room volume flammability [m³]	4,00							
Min. room area Brenn. HXCF [m²]		7,50	7,81	8,12	8,44	8,77	9,10	9,44
Min. room area Brenn. BWCF [m²]		30,02	31,24	32,50	33,77	35,07	36,40	37,75
Pipe length [m]	23	24	25	26	27	28	29	30
Filling quantity [kg]	2,144	2,182	2,22	2,258	2,296	2,334	2,372	2,41
Minimum room volume Toxicity [m³]	7,15	7,27	7,40	7,53	7,65	7,78	7,91	8,03
Minimum room volume flammability [m³]								
Min. room area Brenn. HXCF [m²]	9,78	10,13	10,49	10,85	11,22	11,59	11,97	12,36
Min. room area Brenn. BWCF [m²]	39,12	40,52	41,94	43,39	44,87	46,36	47,89	49,43

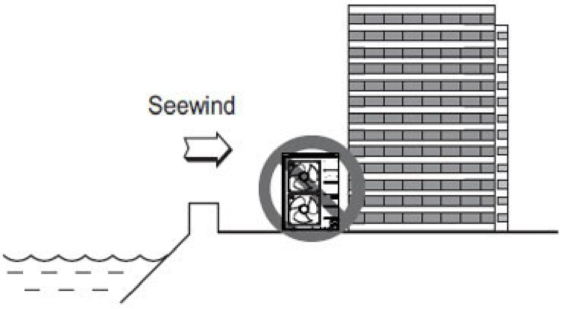
12.4.13 Installation in coastal areas System S

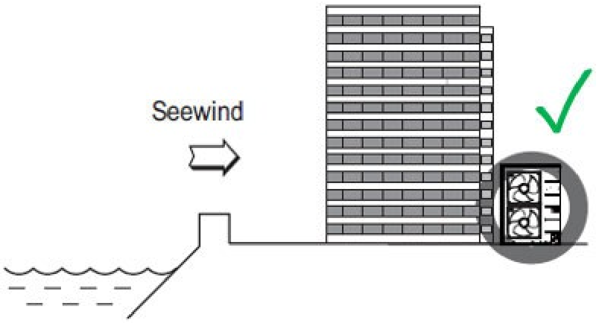
If installed near the sea, the high salt concentration can lead to increased corrosion. The maintenance intervals may need to be adapted to local conditions. Responsibility for the installation of the heat pump lies with the specialist company installing the system.
Local conditions such as building regulations, static loading of the structure, wind loads, etc. must be taken into account.

NOTE
If the outdoor unit is installed in a coastal area, a direct sea breeze must be avoided.

Case 1:

If the outdoor unit is installed in a coastal area, a direct sea breeze should be avoided. Install the outdoor unit against the direction of the sea breeze.

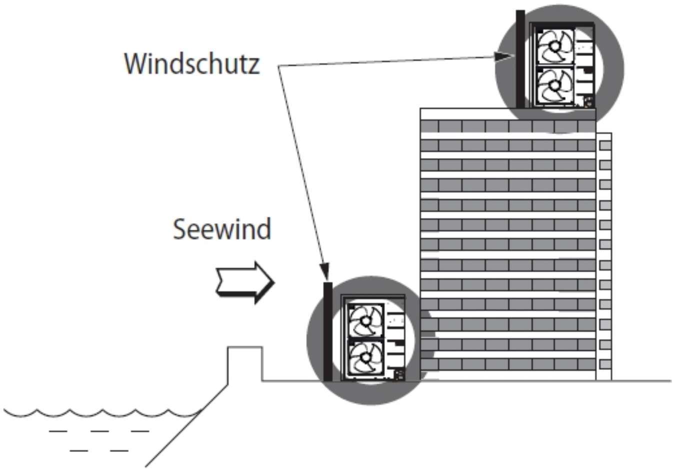




Case 2:

If the outdoor unit is installed in the direction of the sea wind, install a windbreak to intercept the sea wind:

- The windbreak should be sturdy enough to absorb the sea wind, for example made of concrete
- The height and width of the draft shield should be at least 150% of the outdoor unit
- A distance of at least 700 mm from the outdoor unit should be maintained to ensure sufficient air flow



NOTE
Dust and salt contamination on the heat exchanger and fan should be cleaned regularly (at least once a year) with running water.

NOTE
The use of heat pumps is safe from a distance of 12 km from the sea with a maximum salt content of 3.5 %

If the heat pump is installed on the rear side of a building facing away from the sea, the required minimum distance is halved. For bodies of water with a low salt content, the following calculation formula be applied:

Minimum distance =	12 km x salinity in %	

	3,5 %	

The minimum distance would therefore be 5.14 km for an installation on the Baltic Sea with a salinity of 1.5%, for example, which is reduced to 2.5 km if the heat pump is located at the rear of the building facing away from the sea.

Salt content

The actual salt content depends on the installation location and must be determined on site:

Average salinity of the North Sea:	3,5 %
Average salinity of the Baltic Sea:	1,8 % - 0,3 % (Decrease in salinity from west to east)

12.4.14 System S connection on the heating side

Before the connections on the heating water side of the heat pump are made, the heating system must be flushed to remove any impurities, residues of sealing material or similar.

> **CAUTION**
> An accumulation of residues in the condenser can lead to total failure of the heat pump.

Once the heating system has been installed, it must be filled, purged and depressurised. The following must be observed when filling the system:

- Untreated filling and supplementary water must be of drinking water quality (colourless, clear, without deposits)
- The filling and supplementary water must be pre-filtered (pore size max. 5 µm).

Stone formation in hot water heating systems cannot be avoided, but is negligible in systems with flow temperatures below 60 °C. At high flow temperatures and especially in bivalent systems in the high output range (combination heat pump + boiler), flow temperatures of 60 °C and more can be reached. The filling and supplementary water should therefore fulfil the following guide values in accordance with VDI 2035 - Sheet 1.

See: **Water quality in heating systems**

Water quality in heating systems

System S Flex (LIA HXCF)

Internal unit connection:	**1" flat-sealing external thread** (When connecting, a spanner must be used to hold the transitions) There is a hose nozzle on the safety valve for connecting a plastic hose on site. This should be fed into a siphon or drain.

System S Comfort (LIA BWCF)

Internal unit connection: **1 1/4" flat sealing external thread**

(When connecting, a spanner must be used to hold the transitions)

There is a hose nozzle on the safety valve for connecting a plastic hose on site. This should be fed into a siphon or drain.

A corresponding venting device must be provided on site in the heating circuit.

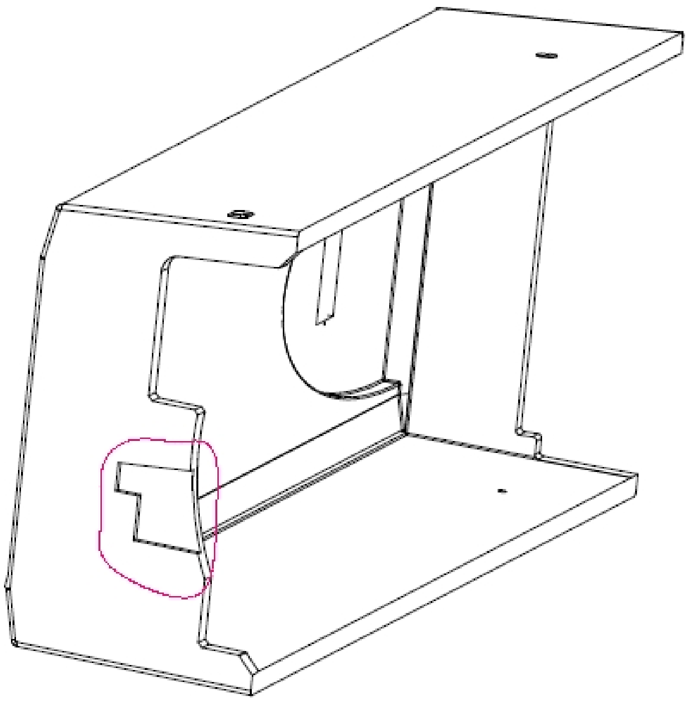
It is recommended to provide a shut-off device in the return before integrating the indoor unit.

Domestic hot water connection: **1" external thread Pipe connection**

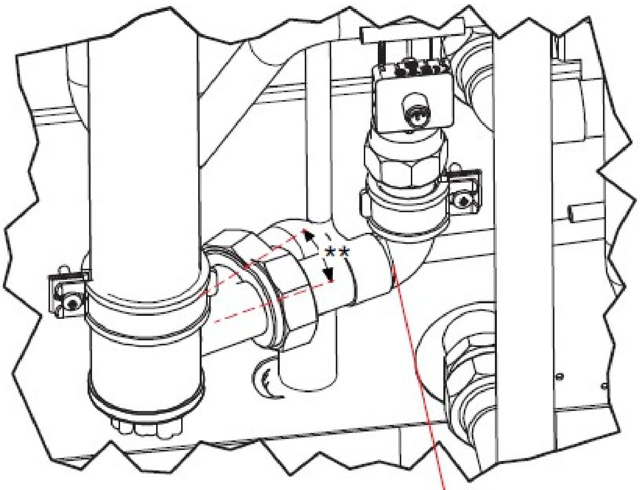
Furthermore, the domestic hot water cylinder is equipped with a 3/4" internal thread connection for the circulation line.

CAUTION
Pipe runs should be as short as possible and oversizing should be avoided. All pipework should be laid in accordance with legal requirements in order to avoid heat loss from the system and condensation.

Connection of second (external) heat generator: To integrate a second (external) heat generator into the heating water circuit, it is necessary to cut out the thinned area on the underside of the appliance cover.



Furthermore, the copper pipe bridge (in the direction of flow) upstream of the electric heater must be removed. If the electric heater is to remain in the heating water circuit, the radiator must be turned by approx. 18° - 20° towards the cylinder. This is necessary for an unobstructed connection (with pipe bend 28 and coupling nut).



If the electric heating is to be removed from the heating circuit 1, the flat-sealing connection of the heating pipes is made directly to the 1 1/4" threaded connections. In this case, the connected flow pipe must be suitably fixed (vibration-free and tight) in the area of the former radiator attachment.

System S Compact (LIA HWCF)

Internal unit connection: **3/4" flat sealing external thread**

(When connecting, a spanner must be used to hold the transitions)

A flexible hose is attached to the rear of the indoor unit to drain any water from the heating coil PRV
(Pressure Relief Valve) or the cold water inlet ERV (Expansion Relief Valve). The flexible hose must be connected to a suitable
drainage point in accordance with the requirements of the building regulations. This hose must be fed into a siphon or drain with the extension required on site.

Domestic hot water connection: **3/4" copper pipe connection**

> **CAUTION**
> Pipe runs should be as short as possible and oversizing should be avoided. All pipework should be laid in accordance with legal requirements in order to avoid heat loss from the system and condensation.

12.4.15 Refrigerant pipe connection system S

CAUTION
Work with the refrigerant R32 may only be carried out by experienced and adequately trained personnel.

CAUTION
Incorrect installation, maintenance or repair of this appliance may increase the risk of property damage or injury.

When installing the refrigerant pipes, certain requirements must be met with regard to pipe length and elevation.

During installation work, no foreign substances may enter the refrigerant lines and no oxygen may enter the refrigerant circuit. The connection lines must be evacuated. The installation of pipework should be kept to a minimum.

The connections and cables must not be subjected to any mechanical stress during installation work.
The refrigerant lines must be protected from damage in order to prevent leaks and the associated associated leakage of refrigerant. All connection points between the outdoor and indoor units must be easily accessible for maintenance and repair purposes.

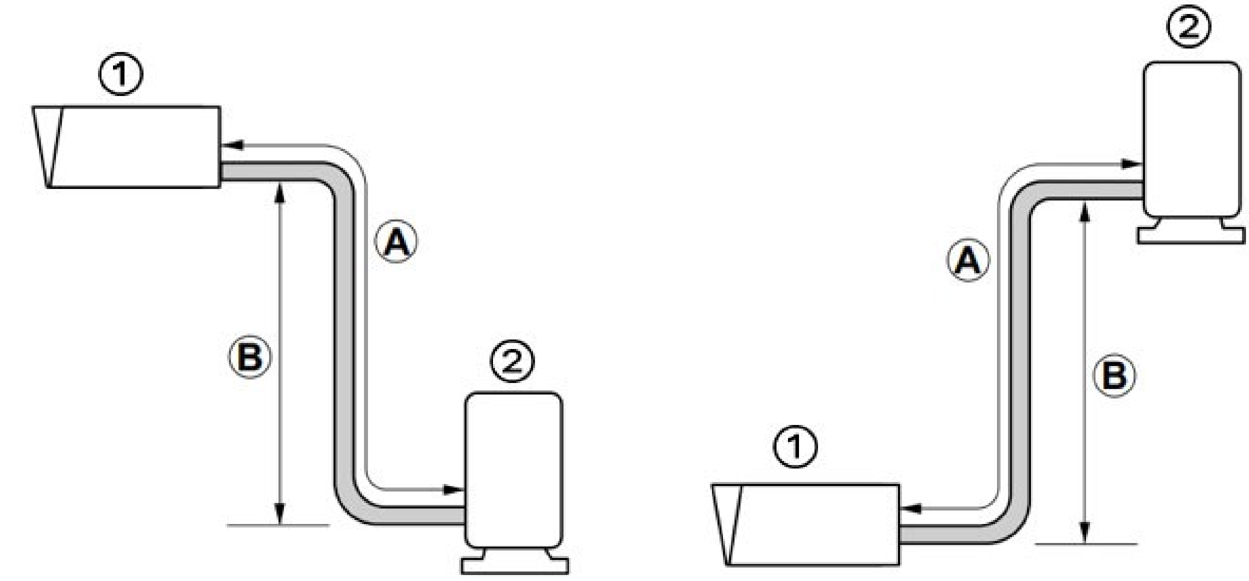
After completion of the pipe system, all pipes must be checked for leaks using suitable means. A Leakage tightness test must be carried out with dry nitrogen. During the Leakage tightness test, never apply more pressure to the system than is declared in the instructions and on the type plate.

CAUTION
Only equipment and tools intended for the product, pressure and temperatures may be used for work on the appliance.

Requirements for pipe length and elevation

The standard pipe length is 15 metres. Up to a length of 15 m, no additional refrigerant charge is required. If the pipe length is more than 15 m, the system must be charged with additional refrigerant.

NOTE
The requirements for the minimum installation area must be observed when filling with additional refrigerant.



① Indoor unit ② Outdoor unit

NOTE
If the indoor unit is installed higher than the outdoor unit, the installation of oil breakaway and oil lifting bends in the hot gas line must be checked separately by a refrigeration engineer if the height difference is greater than 4 metres.

CAUTION
If the filling quantity changes, document this in an easily recognisable place (e.g. filling quantity on the rating plate). Do not add more than the prescribed amount of refrigerant to the system.

Pipe length and elevation System S

Model	Pipe size in mm (inch)		Length A (m)			Elevation B (m)		additio nal. Colder* (g/m)
	Gas	Liquid c.	Normal	Min.	Max	Normal	Max.	
0609	15,9 (5/8")	6,35 (1/4")	15	3	30	0	15	20
0911	15,9 (5/8")	9,52 (3/8")	15	3	30	0	15	38
1316	15,9 (5/8")	9,52 (3/8")	15	3	30	0	15	38

Additional refrigerant	Model	Total length of the liquid line	
		≤ 15 m	**15 m**

Total additional refrigerant	**0609**	0 g	(A-15) x 20 g
Total additional refrigerant	**0911**	0 g	(A-15) x 38 g
Total additional refrigerant	**1316**	0 g	(A-15) x 38 g

***Example**: When installing the 14 kW model at a distance of 30 m, 570 g of refrigerant must be added according to the following calculation: (30-15) x 38 g = 570 g

13 System C

13.1 Table of contents

The new compact and networked **System C** heat pump solution with refrigerant R290 is suitable for solutions in all areas where high performance is required. In addition to retail applications, apartment buildings, commercial properties, building networks and neighbourhoods can also be served with System C in a future-proof and highly efficient manner - in new and existing buildings.

The system series offers heating, cooling and hot water preparation solutions for standardised and individual requirements. The heat pumps are equipped with the natural and future-proof refrigerant R290.

The range is complemented by sophisticated service offerings, intelligent control, variable cascadability and the associated planning services as well as customised hydraulics.
Dimplex also offers a sophisticated range of services, intelligent control and the option of automated system reports.

13.2 System C includes the following heat pumps:

13.2.1 LA 33TPR

13.2.2 LA 60P-TUR

13.3 System optimisation through networking

System C is reversible and can be cascaded up to 14 times from 33 kW to 500 kW. Higher outputs are also possible in individual cases. The system is intelligently controlled via the Dimplex master controller.

controlled. The heating/cooling and hot water preparation functions can be separated and combined with all other Dimplex heat pumps across all heat sources in the system.

13.4 Standardised system solutions

System C can be used reliably and highly efficiently as a standardised application, e.g. in new and existing buildings for heating and cooling.

The plug-and-play solution offers a high degree of planning security: the required hydraulics can be planned and provided in advance if required, e.g. for connection to an existing building or building network.

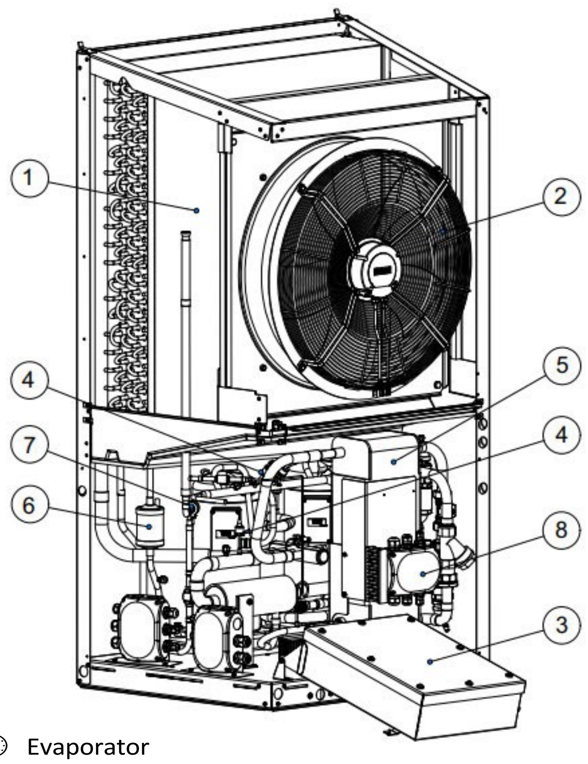
Solar or fossil-fuelled heat generators can be easily integrated into the system. This makes System C easy to plan and install - a high degree of prefabrication and intelligent system integration enable efficient scalability.

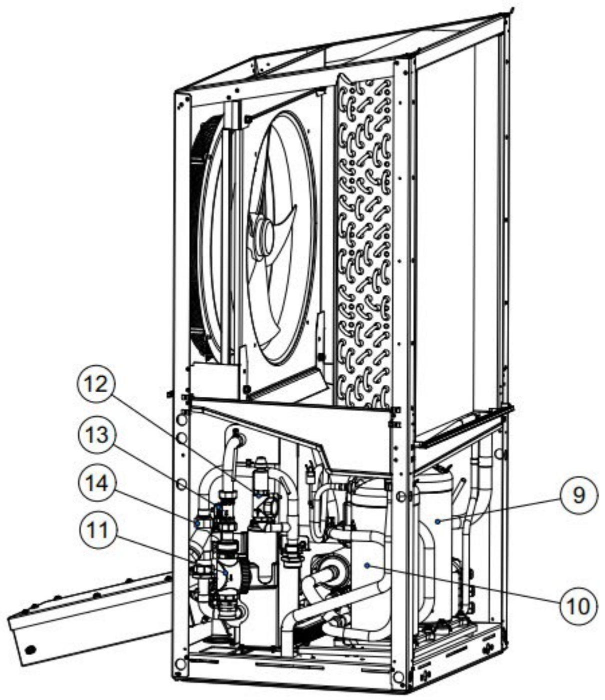
13.5 Customised system solutions

Projects with higher output requirements demand more customisation. In this case, Dimplex also plans customised systems with the right hydraulic components and the perfectly designed associated system, including a control concept, such as variable concepts for integrating waste heat. The customised design of the system saves time and money during installation.
In addition, planning reliability is higher, as is quality thanks to industrial production and testing.

13.6 Basic device system C

13.6.1 LA 33TPR





① Evaporator

⑧ Connection box

② Fan

③ **Switch box***

④ Pressure switch

⑤ Condenser

⑥ Filter dryer

⑦ Expansion valve

⑨ Compressor 1.

⑩ Compressor 2

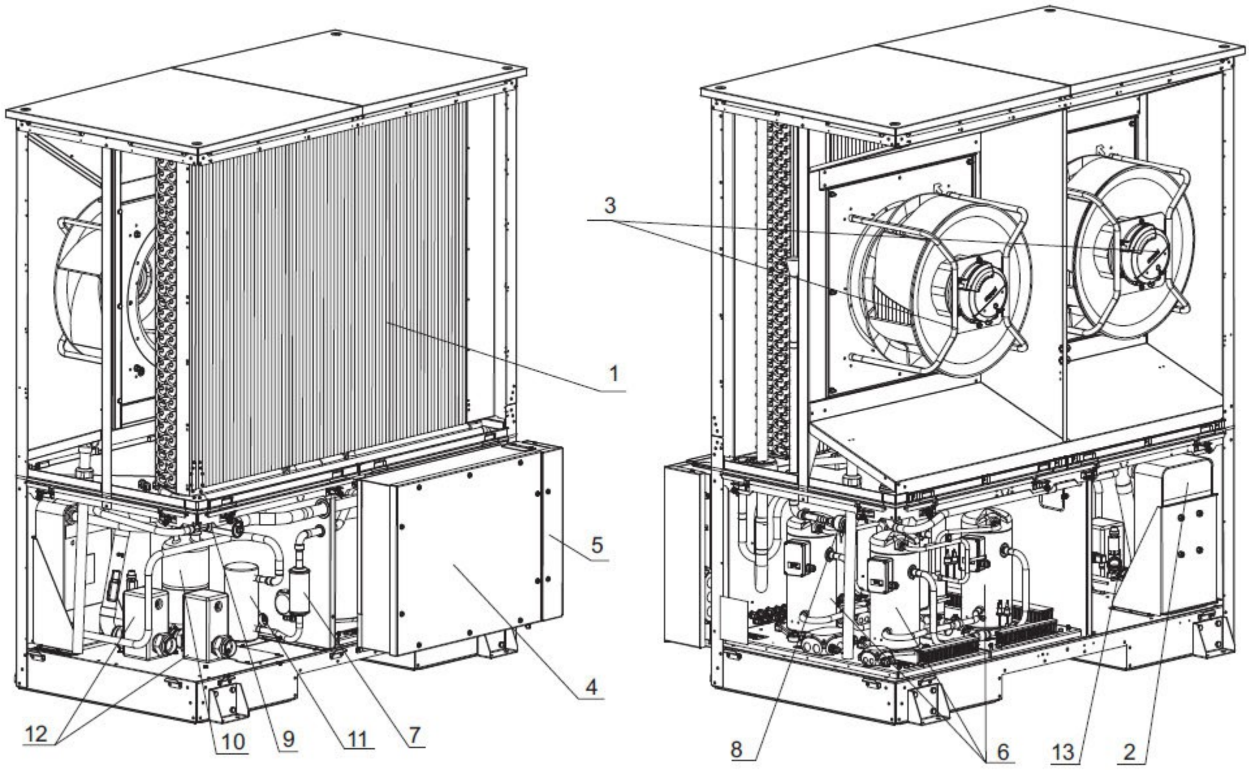
⑪ Air separator

⑫ Safety valve

⑬ Flow sensor

⑭ Dirt traps

13.6.2 LA 60P-TUR



① Evaporator air

② Condenser

③ Fan

④ **Switch box***

⑤ Connection box

⑥ Compressor

⑦ Filter dryer

⑧ Expansion valve

⑨ 4-way diverter valve

⑩ Internal heat exchanger

⑪ Collector

⑫ Purge valve

⑬ Safety valve

13.6.3 *switch box

CAUTION
The switch box is designed to be vapour-proof in accordance with DIN EN 60079-15. NC contact is only permitted by an authorised and competent after-sales service for maintenance or service work. Before commissioning or after completion of the work, a vapour safety test must be carried out in accordance with the repair instructions.

13.7 Installation conditions System C

13.7.1 Additional requirements for externally installed heat pumps with flammable refrigerants System C

13.7.2 Foundation plan system C

13.7.3 Condensate line for heat pumps with flammable refrigerant System C

13.7.4 System C connection on the heating side

The general requirements for heat pumps installed outdoors apply:

General requirements for heat pumps installed outdoors

These specifications must be complied with as a matter of priority and are binding for the installation and operation of the system. The specialised company installing the system is responsible for this.

The heat pump, in particular its refrigeration circuit, must be protected against damage during installation and other construction work.

Caution
Flammable refrigerant R290 (propane): Safety zone must be observed.

Caution
There must be no ignition sources in the safety area

Caution
The heat pump is designed exclusively for outdoor installation. Installation in depressions, shafts or areas that do not allow free air flow or air exchange is not permitted.

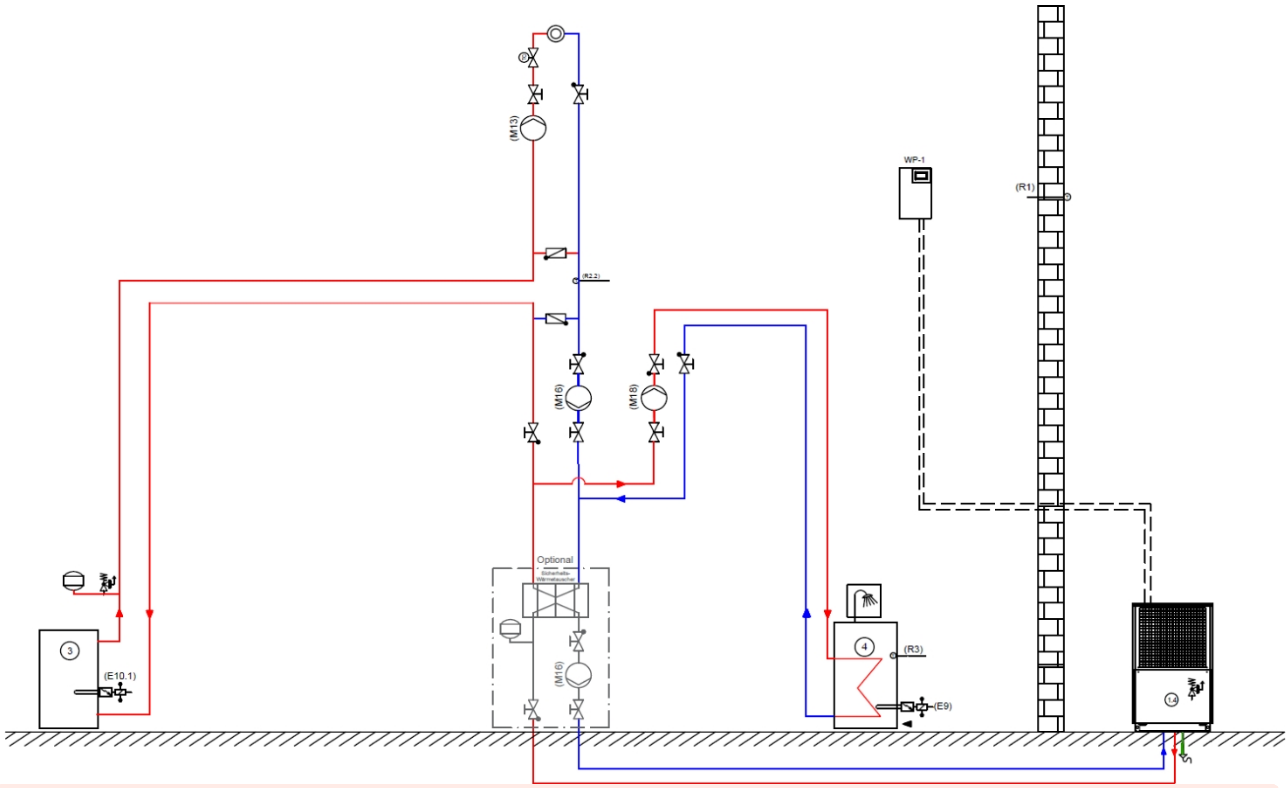
The appliance represents a permanently technically dense system. In rare cases, however, the plate heat exchanger may leak due to freezing. The risk is in particular
increases if the dirt traps are tampered with, the requirements for filling the hydraulic circuit are not met or minimum flow rates are not observed.

Caution
Propane may leak into the hydraulic circuit. For this reason, the blow-off line of a safety valve inside buildings must lead to the outside.

There should be no sinks, shafts, drains into the sewage system or permanent ignition sources in the vicinity of the discharge opening.

Alternatively, other measures can also be implemented to minimise the risk. For example, an indirect system with an additional **plate heat exchanger for hydraulic separation** of the primary and secondary circuits or a gas separation system with monitoring by propane gas warning sensors. These measures must be coordinated on site in accordance with national or regional regulations, guidelines and standards.

Hydraulic integration plate heat exchanger:



Caution
The safety precautions at the installation site must be taken by the customer in accordance with the nationally and regionally applicable regulations, guidelines and standards. Implementation of the safety precautions should be carried out in co-operation with the local authorities and/or independent technical inspection bodies.

NOTE
Responsibility for the installation of the heat pump lies with the specialist company installing the system.

NOTE
After commissioning of the heat pump by an authorised and competent after-sales service, the responsibility for the proper operation of this heat pump lies with the operator.

NOTE
Before commissioning, the operator must carry out a hazard analysis for the system.

13.7.5 Additional requirements for externally installed heat pumps with flammable refrigerants System C

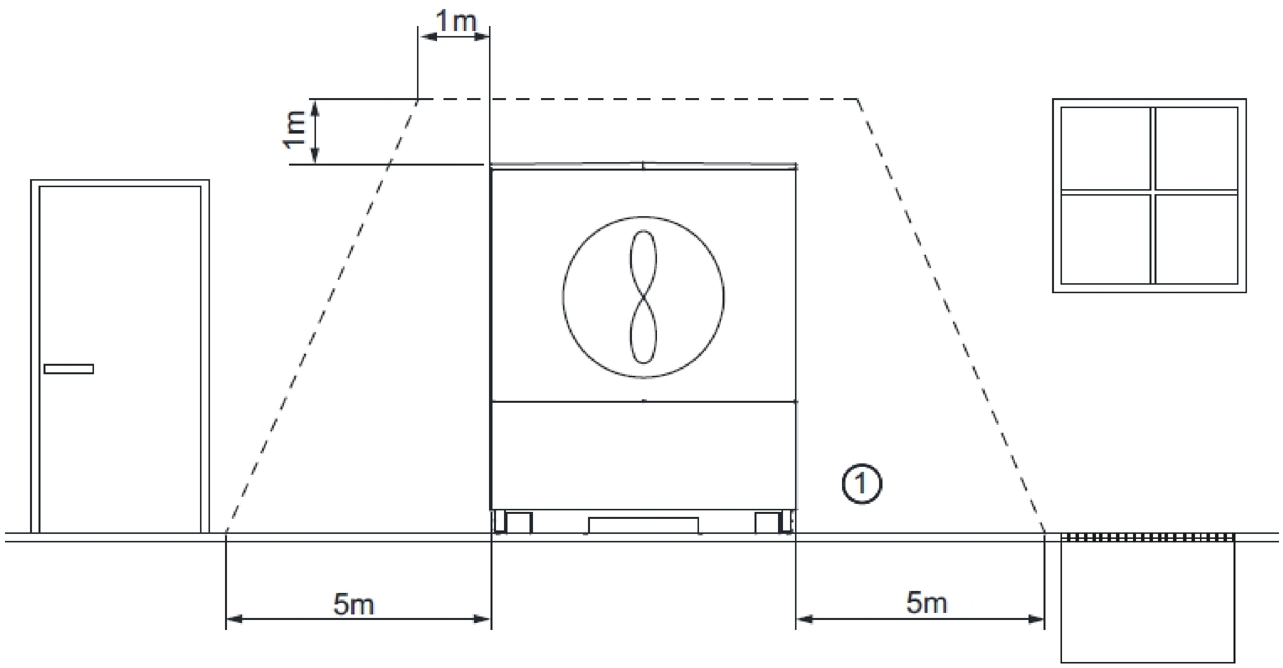
Caution
The heat pump must be installed in such a way that, in the event of a leak, no propane enters the building or endangers people in any other way.

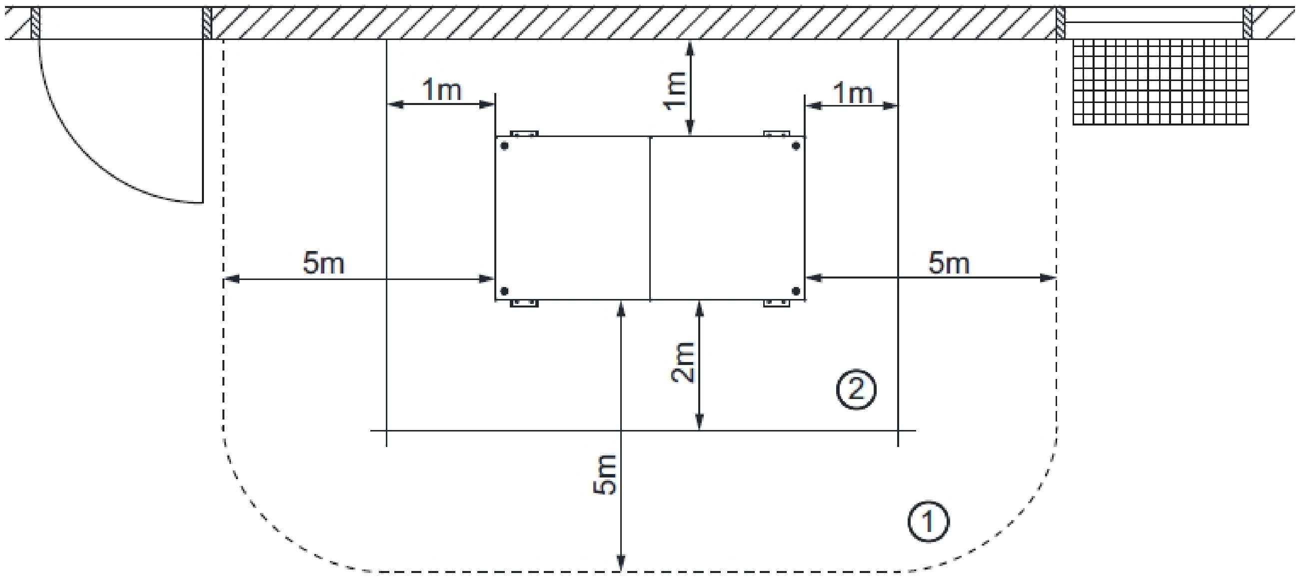
Floor-level installation

A safety zone ① of 5 metres must be maintained around the appliance. There must be no

ignition sources, windows, doors or ventilation openings in this area,
light wells, openings to the sewerage system and the like. Open drains (e.g. gutter for
roof installation of the heat pump) to a lower surface are permitted if there are no drains into the sewer system within a radius of 5 metres.

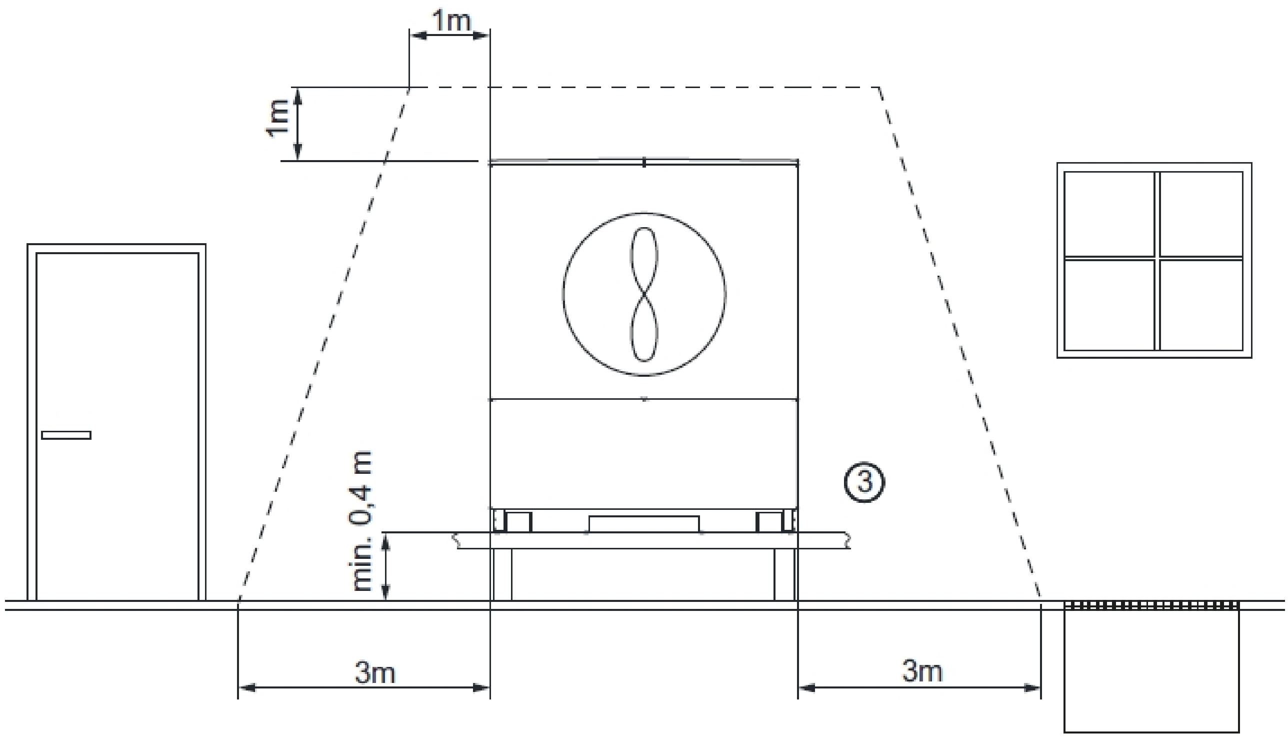
Building openings within the safety area must be made airtight. The safety area must not extend onto neighbouring properties or public traffic areas. The appliance must be positioned in such a way that, in the event of a leak, no refrigerant enters neighbouring buildings or endangers people in any other way.

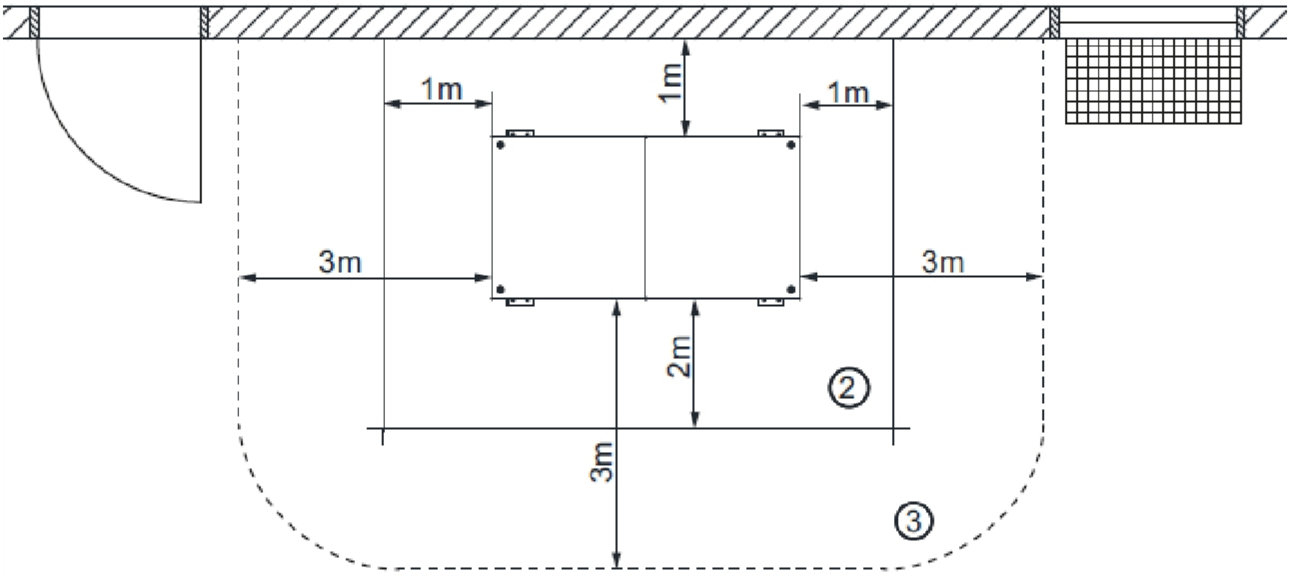




Upright installation (plinth mounting)

If the heat pump is installed on a base (elevation) with a base height of at least 40 cm, the safety area ③ around the heat pump can be reduced to 3 metres. The base must be designed in such a way that an air flow can flow under the base from all directions.





The heat pump is not a source of ignition. If several heat pumps are installed, the safety zone ① or ③ must be formed around the entire group of heat pumps. The maintenance distances ② between the individual heat pumps must be observed.

If other devices are installed within the safety area ① or ③, their components within the safety area must not be a source of ignition.

If it is not possible to implement the installation conditions described at the top, alternative measures can be used. The operator must coordinate these alternative measures with the local authorities and/or independent test centres (e.g. the use of propane gas detectors that de-energise the ignition sources in the safety area in the event of a leak).

NOTE
The safety area of the heat pump may only be entered by authorised and trained personnel.

A sign must be displayed at the entrance to the safety area, noting the dangers, the behaviour and the fact that this area may only be entered by instructed personnel.

Caution
The intake and air outlet area must not be restricted or blocked.

NOTE
Country-specific building regulations must be observed!

Caution
Installation in troughs or courtyards is not permitted, as the cooled air collects on the ground and is sucked in again by the heat pump during prolonged operation

Caution
The heat pump, in particular its refrigeration circuit, must be protected against damage during installation and other construction work.

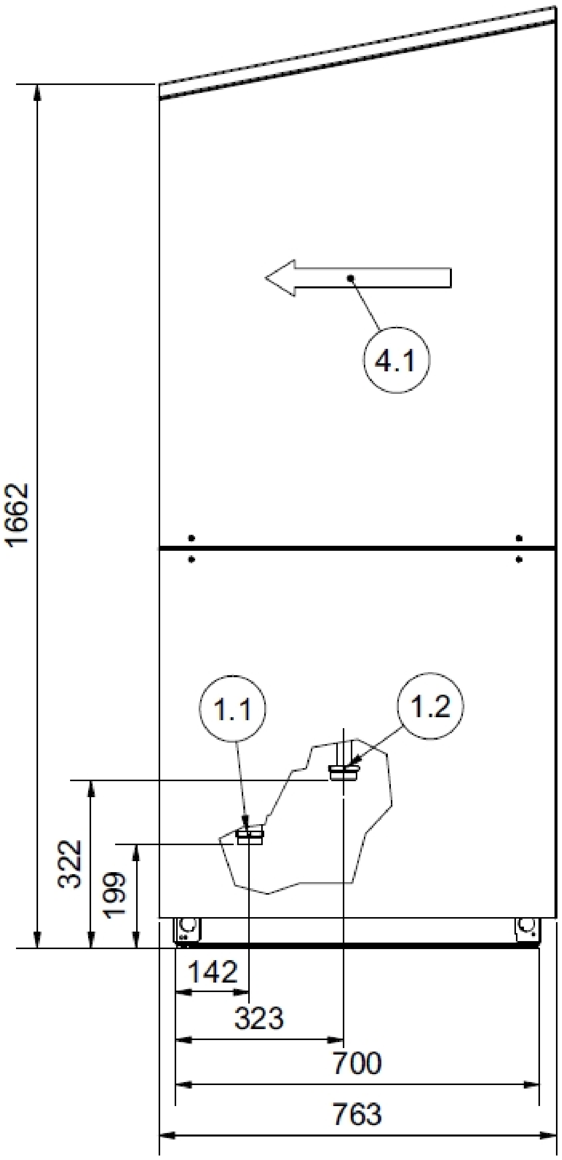
> **NOTE**
> If the fan is installed close to walls, the physical effects on the building must be taken into account. There should be no windows or doors in the fan's discharge area.

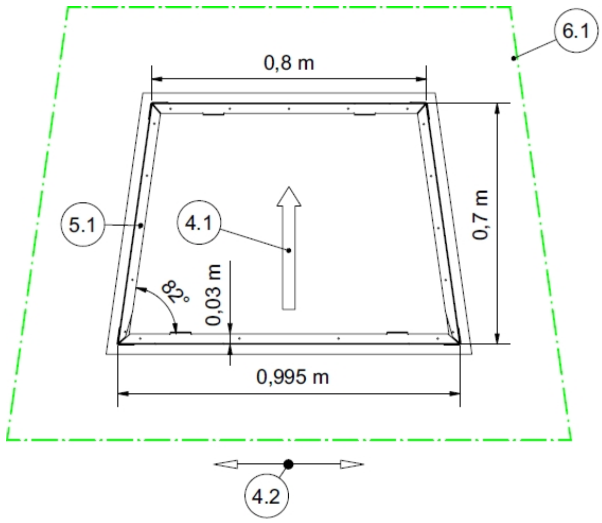
> **NOTE**
> Installation close to walls can lead to increased dirt accumulation due to the air flow in the intake and air outlet area. The colder outside air should be blown out in such a way that it does not increase heat loss in neighbouring heated rooms.

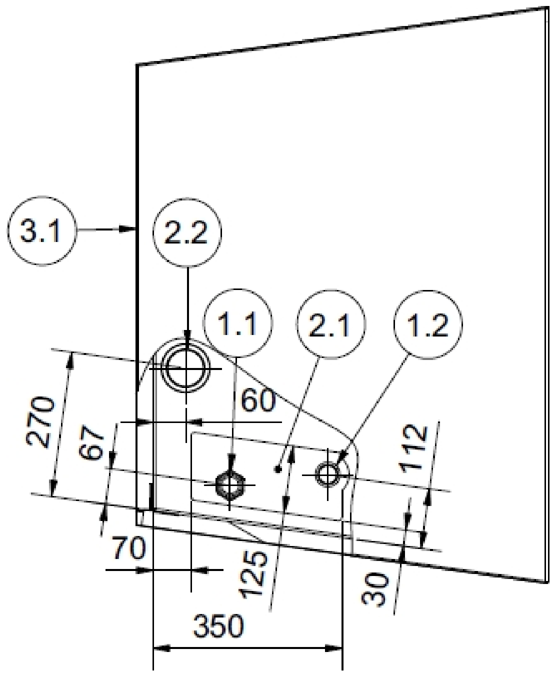
13.7.6 Foundation plan system C

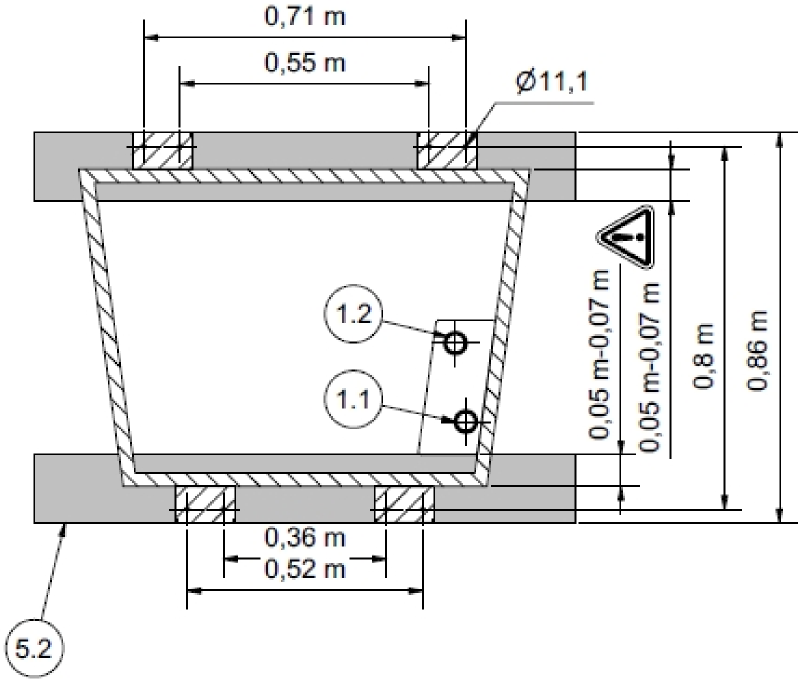
The heat pumps are generally designed for installation at ground level. In the event of deviating conditions (e.g.: installation on a platform, flat roof, ...) or increased risk of tipping (e.g. exposed location, high wind load, ...), additional tilt protection must be provided on site. When installing on a foundation with direct contact to the building, vibration decoupling must be provided to prevent solid-borne noise from being transmitted into the building. It must be checked whether lightning protection is required and, if necessary, this must be provided. During installation, the conditions at the installation site, such as local building regulations, static load on the building, wind loads, lightning protection, etc. must be taken into account.

LA 33TPR


4.1
1.1
1.2
1662
322
199
142
323
700
763


6.1
0,8 m
5.1
4.1
0,7 m
82°
0,03 m
0,995 m
4.2


3.1
2.2
1.1
2.1
1.2
270
67
60
112
70
125
30
350



2.1 Condensate pipe feed-through

2.2 Electric wire feed-through

3.1 operator side

4.1 direction of air flow

4.2 Main wind direction with free installation

4.3 Sound insulation bonnet (optional accessory)

4.4 Mounting bracket (optional accessory)

5.1 Floor frame support surface (all-round)

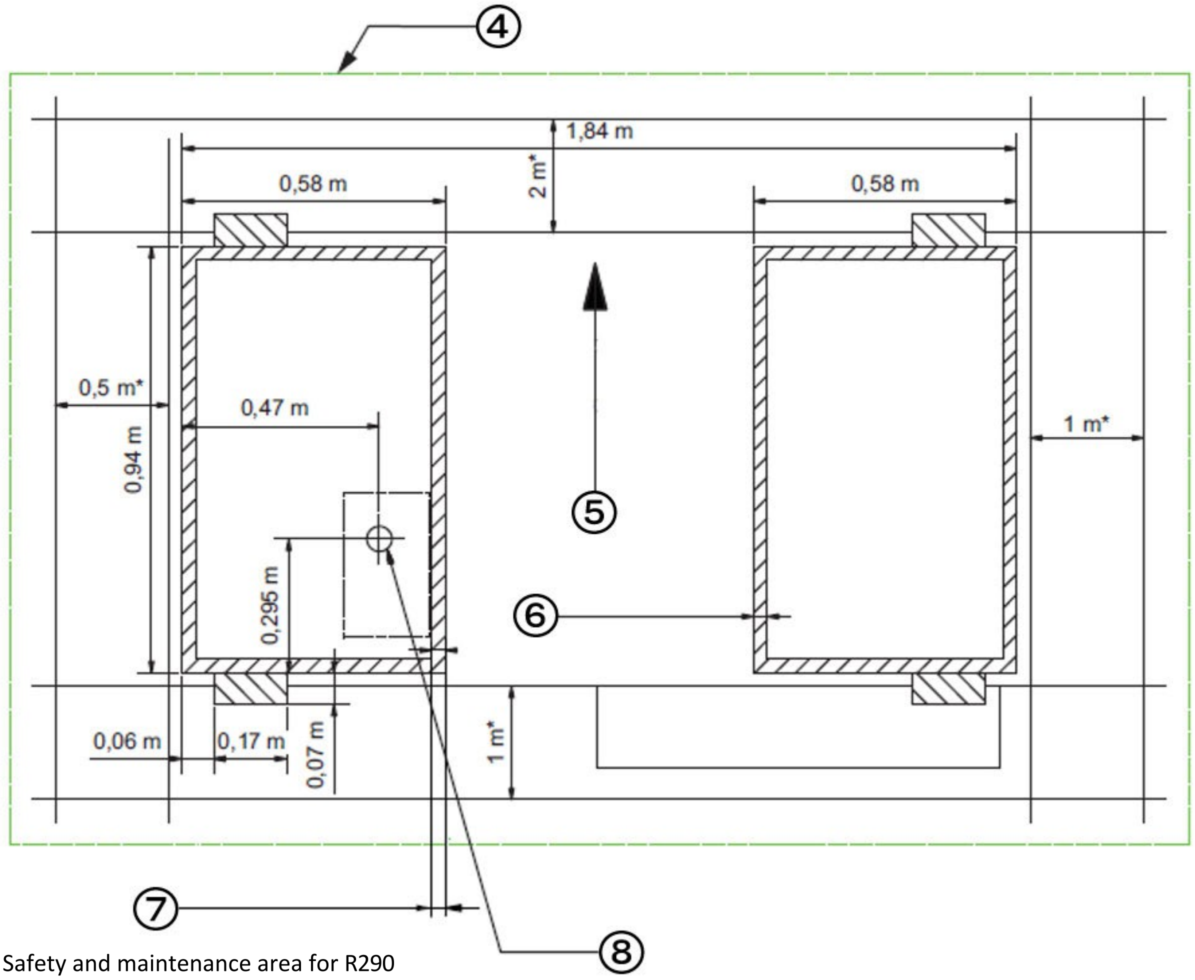
5.2 Podium line-up

6.1 Safety and maintenance area for R290

1.1 Flow G 1 1/2" external thread, flat sealing

1.2 Return G 1 1/2" external thread, flat sealing

LA 60P-TUR



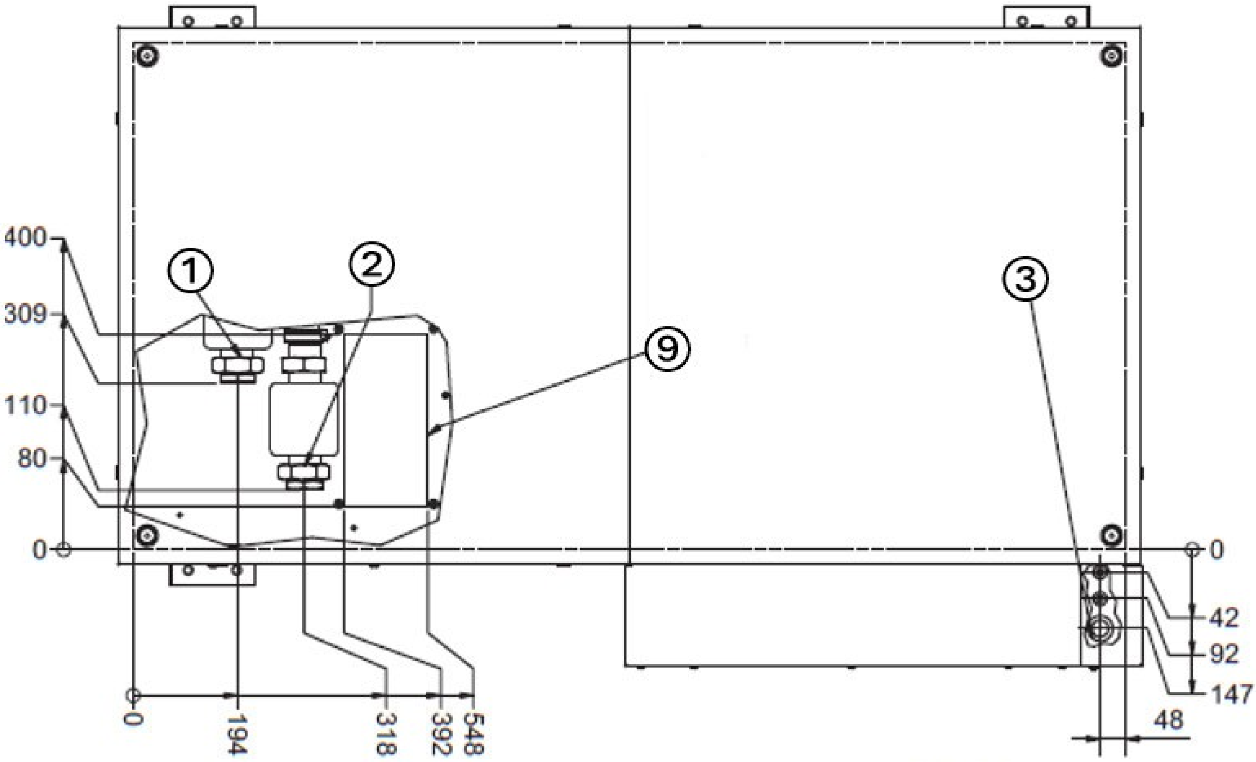
④ Safety and maintenance area for R290

⑤ Direction of air flow

⑥ circumferential 0.03m

⑦ circumferential 0.03m

⑧ Condensate drain breakthrough



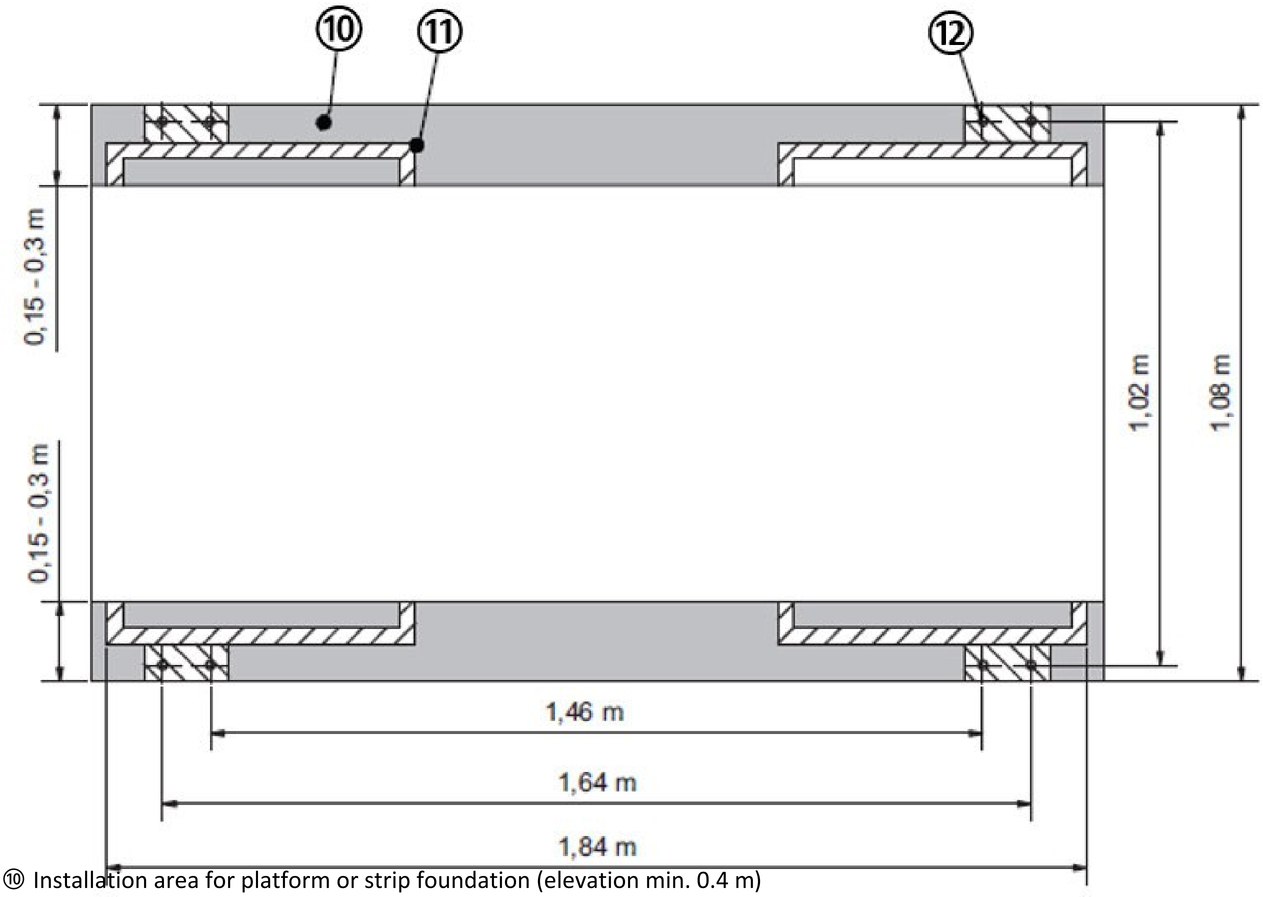
① Cooling inlet / heating outlet RP 2"

② Cooling outlet / Heating inlet RP 2"

③ Electric wire

⑨ Lead-through area for heating water and condensate pipework

Installation variant on a load-bearing substructure



⑩ Installation area for platform or strip foundation (elevation min. 0.4 m)

⑪ Required contact area

⑫ Fastening points ⌀17.5 mm

13.7.7 Condensate line for heat pumps with flammable refrigerant System C

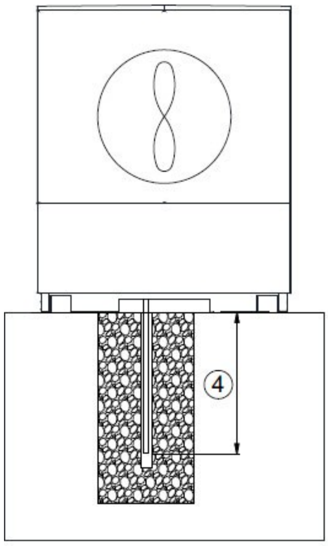
Frost-free condensate drainage must be ensured. To ensure proper drainage, the heat pump must be levelled.

> **NOTE**
> The frost limit ④ can vary depending on the climatic region. The regulations of the respective countries must be taken into account.

Variant 1.

The condensate produced during operation must be drained vertically into a foundation with gravel fill. A daily infiltration capacity of at least 1.5 litres per kW heat output of the heat pump must be provided, whereby the diameter of the condensate water pipe should be at least 50 mm.

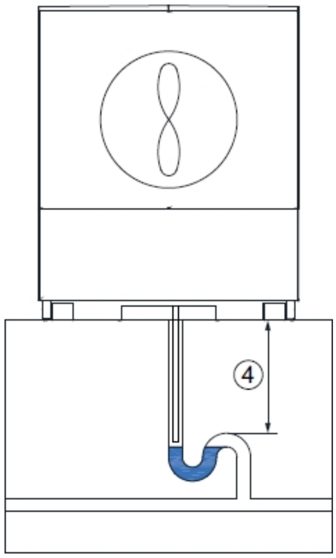
NOTE
The condensate pipe must be installed vertically to prevent icing in winter.



Variant 2

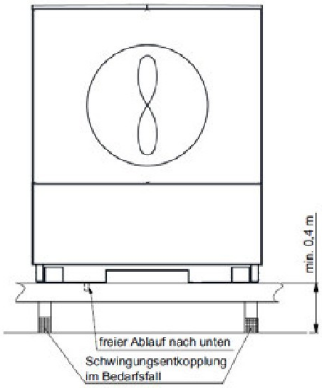
The condensate is discharged into a dirt, rain or drainage channel via a condensate pipe laid in the ground. In the

A siphon is located below the frost line ④ in the condensate pipe. The water level in the siphon prevents refrigerant from escaping during a possible leakage into the sewer. **Lifting systems are not permitted!** The siphon must be designed with a minimum sealing liquid height of 300 mm. The tightness and correct functioning of the condensate drain must be checked and ensured as part of maintenance work.



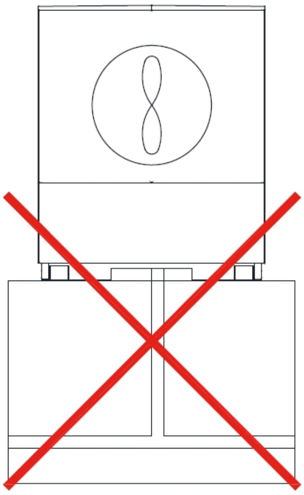
Variant 3

Free drainage is only recommended in climatic zones with short periods of frost. In colder climates, the condensate pipe must be in areas at risk of frost with an appropriately dimensioned and controlled electrical trace heating system on the insulated condensate pipe.



NOTE
The trace heating must be approved for use in an explosion-protected area (device category 3G).
The condensate produced must be channelled into a frost-free or heated drain.

Caution
The direct discharge of condensate into a dirt, rain or drainage channel is not permitted!



13.7.8 System C connection on the heating side

The general installation requirements for air-to-water heat pumps installed outdoors apply:

Heating-side connection

The general requirements for water quality in heating systems also apply:

Water quality in heating systems

Minimum heating water flow rate

The minimum heating water flow rate of the heat pump must be ensured in every operating status of the heating system. This can be achieved, for example, by installing a double differential pressureless manifold [DDV].

Fusing the heating water flow rate

Connection of district heating pipe LA 33TPR

Dimplex recommendation
Maximum heating/cooling water flow rate LA 33TPR: _ m³/h
→ PE district heating pipe

Connection for district heating pipe LA 60P-TUR

Dimplex recommendation
Maximum heating/cooling water flow rate LA 33TPR: _ m³/h
→ PE district heating pipe

13.8 Technical product information LA 33TPR

13.8.1 Device information

Type and order code		LA 33TPR
1. design		
heat source		air
Execution		Universal Reversible
Controller		WPM
Thermal energy metering		integrated
installation location		Exterior
Performance levels		2
2. operating limits		
Heating water flow / return [1]	°C	up to 64 ±2K / from 22
Cooling water flow / return	°C	[2] +10 to +20 / up to max. 28 °C

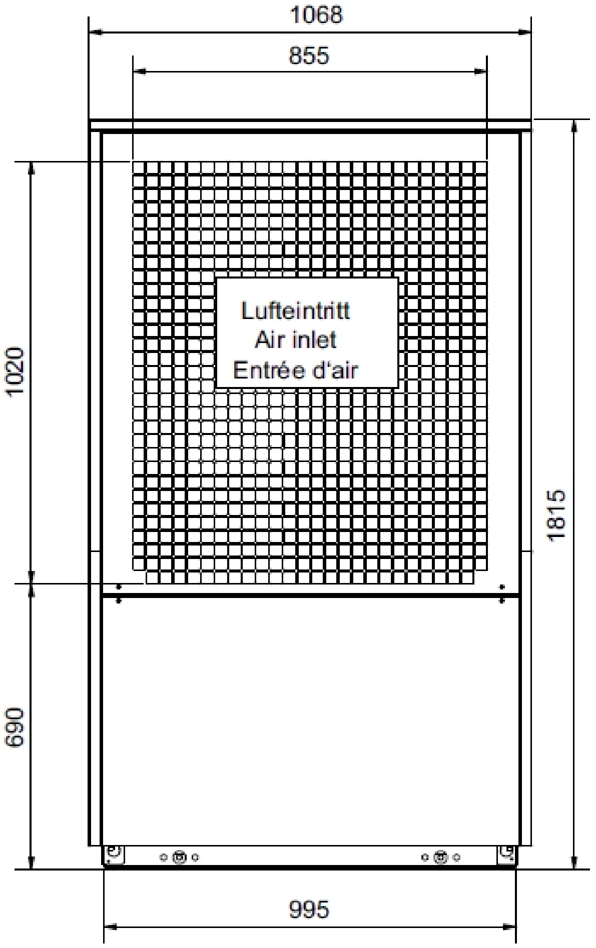
Type and order code		LA 33TPR
Air (heating)	°C	-22 to +40
Air (cooling)	°C	+10 to +45
3. flow/sound		
Heating water flow / internal pressure differential (A7 / W35/30)	m³/h / Pa	2,8 / 15900
Heating water flow / internal pressure differential (A7 / W45/40)	m³/h / Pa	2,7 / 15100
Minimum heating water flow rate (A7 / W55/47)	m³/h / Pa	1,7 / 5800
Cooling water flow rate / internal pressure differential (A35 / W18/23)	m³/h / Pa	4,4 / 39100
Minimum cooling water flow rate [3]	m³/h / Pa	3,7 / 27800
Sound power level according to EN 12102 Normal operation / lowered operation [4]	dB(A)	63 / 60
Sound pressure level at a distance of 10 m (outlet side) [5] Normal operation / lowered operation [4]	dB(A	37 / 33
Air flow rate (EC fan control range)	m³/h	0 - 7000
4. dimensions, weight and filling quantities		
Device dimensions without connections [6]	H x W x L mm	1855 x 1065 x 775
Weight of the transport unit(s) incl. packaging	kg	333
Device connections for heating	inch	G 1 1/2" EXTERNAL THREAD
Refrigerant / total charge weight	Type / kg	R290 / 2,5
Lubricant / total filling quantity	Type / litre	Hatcol 4467 / 4.78
Volume of heating (cooling) water in the appliance	Litres	5,4
Hermetically closed refrigeration circuit		Yes
5. electrical connection		
Supply voltage / fusing / RCD type		3 L/PE 400 V (50 Hz) / C25A / B
Control voltage / fusing via WPM		1~/N/PE 230 V (50 Hz) / 6.3 AT
Degree of protection according to EN 60 529		IP 24
Starting current limitation		soft starter

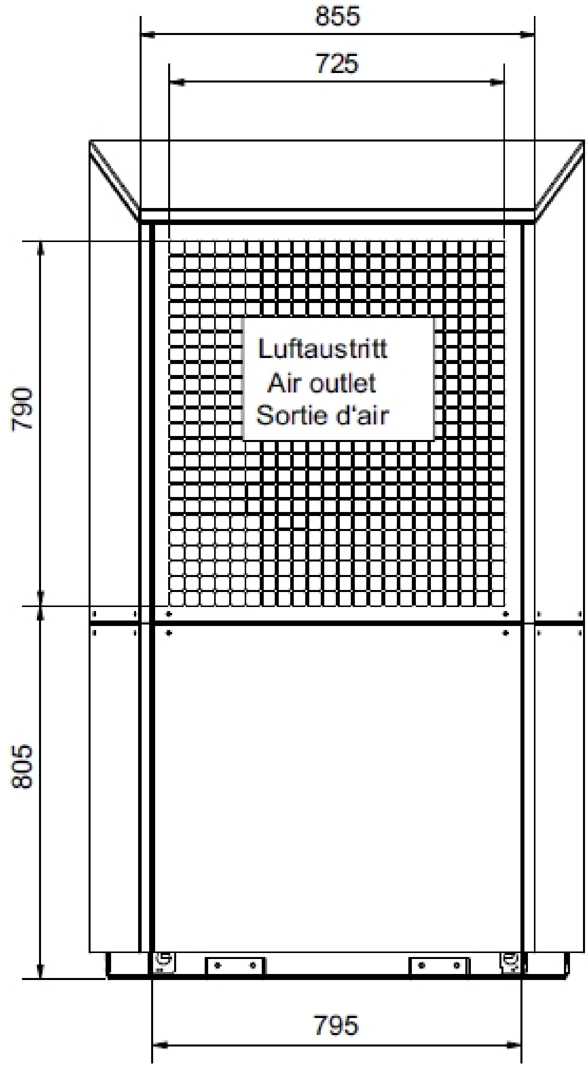
Type and order code		LA 33TPR	
Rotary field monitoring		Yes	
starting current	A	29	
Nominal power consumption A7/W35 / max. intake [7]	kW	3,2 / 11,7	
Nominal current A7/W35 / cos φ	A / ---	6,4 / 0,72	
Compressor protection power consumption (per compressor)	W	54	
Fan power consumption	W	up to 390	
6. safety regulations			
Complies with European safety regulations[8]		see CE declaration of conformity	
7 Other model features			
Type of defrosting (as required)		Cycle reversal	
Frost protection Condensate tray / water in the appliance protected against freezing [9]		Heated / yes	
Max. operating overpressure (heat source / heat sink)	bar	1,8	
8. power / coefficient of performance (COP)			
SCOP (seasonal coefficient of performance (COP)) medium climate 35 °C / 55 °C		4,32 / 3,54	
ηs average climate 35 °C / 55 °C		170 / 139	
Heat output / coefficient of performance (COP) [7]		EN 14511	
	performance level	1	2
A-7 / W35	kW / ---	11,0 / 3,4	19,9 / 3,1
A2 / W35	kW / ---	13,3 / 4,0	22,2 / 3,7
A7 / W35-30	kW / ---	16,2 / 4,9	
A10 / W35	kW / ---	17,3 / 5,2	
A7 / W45-40	kW / ---	15,8 / 4,0	
A7 / W55-47	kW / ---	15,4 / 3,4	
Cooling capacity / coefficient of performance (COP) [7]			
	performance level	1	2
A35 / W23-18	kW / ---	12,1 / 2,6	25,3 / 2,4

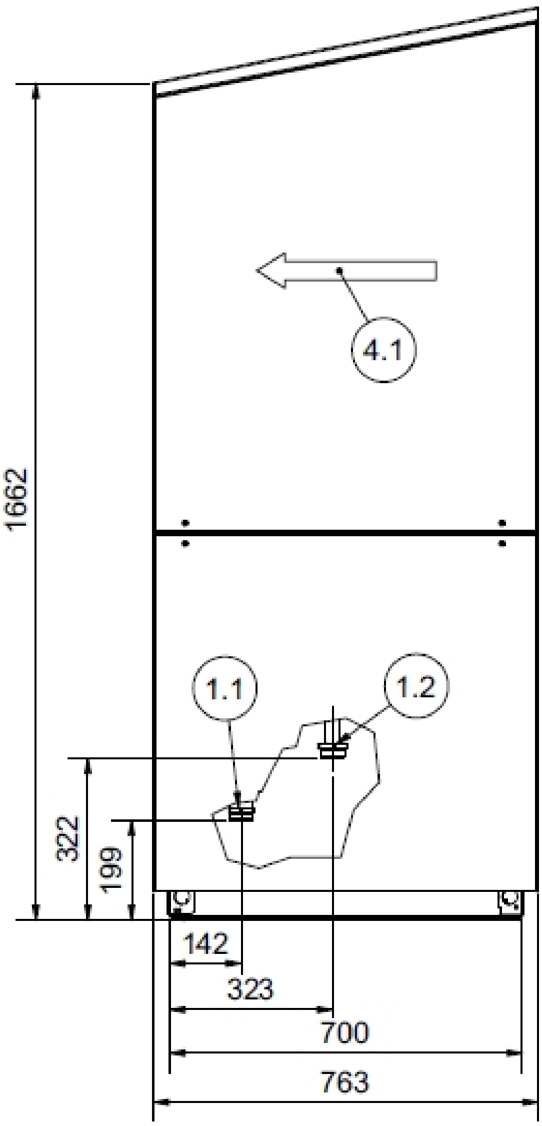
Type and order code		LA 33TPR	
A27 / W18	kW / ---	12,7 / 3,0	27,1 / 2,9
A35 / W17-12	kW / ---		21,5 / 2,2
A35 / W10	kW / ---	10,2 / 2,3	
A27 / W12	kW / ---		23,1 / 2,6
A27 / W10	kW / ---	10,8 / 2,7	

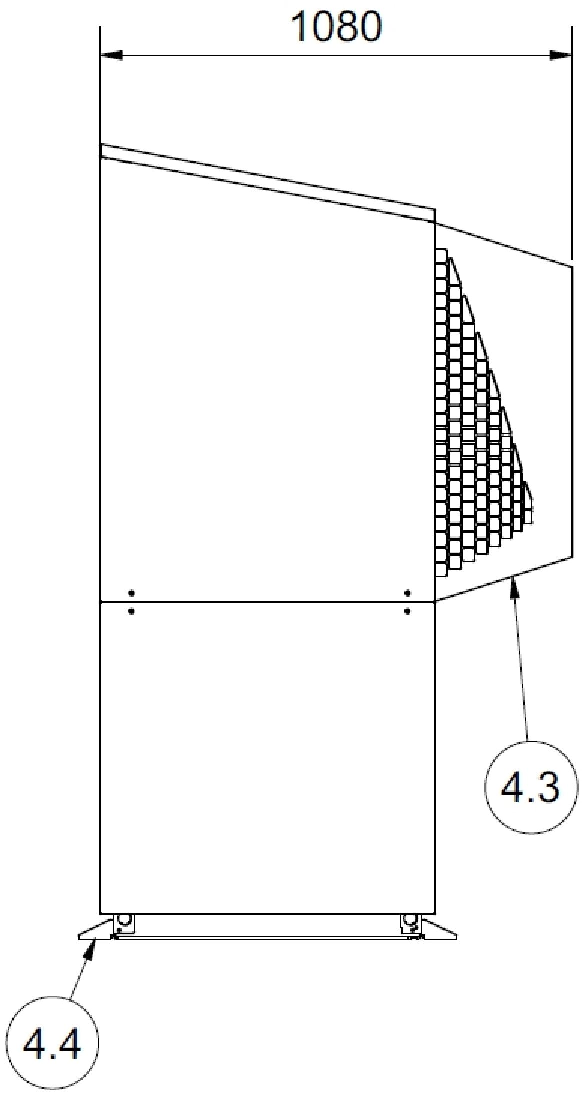
1. At air temperatures from -22 °C to -1 °C, flow temperature rising from 45 °C to 64 °C
2. The minimum achievable flow temperature depends on the current volume flow, the set return set temperature and the current performance level.
3. Results in a cooling water temperature spread of 5K ±1K in 2-compressor operation with A35/W12 and A35/W8.
4. In setback mode, the heat output and COP are reduced by approx. 5 %
5. The specified sound pressure level corresponds to the operating noise of the heat pump in heating operation at 55 °C flow temperature.
   The specified sound pressure level represents the free-field level. Depending on the installation location, the measured value can deviate by up to 16 dB(A).
6. Please note that more space is required for pipe connection, operation and maintenance
7. This information characterises the size and performance of the system. The bivalence point and control must be taken into account for economic and energy considerations.
   These specifications are only achieved with clean heat exchangers. Notes on care,
   Commissioning and operation are described in the corresponding sections
   can be found in the installation and operating instructions. For example, A 7 / W35 means: heat source temperature 7 °C and heating water flow temperature 35 °C.
8. see CE declaration of conformity
9. The heat circulating pump and the heat pump manager must always be ready for operation.

13.8.2 Dimensioned drawing









1.1 Flow G 1 1/2" external thread, flat sealing

1.2 Return G 1 1/2" external thread, flat sealing

2.1 Condensate pipe feed-through

2.2 Electric wire feed-through

3.1 operator side

4.1 direction of air flow

4.2 Main wind direction with free installation

4.3 Sound insulation bonnet (optional accessory)

4.4 Mounting bracket (optional accessory)

5.1 Floor frame support surface (all-round)

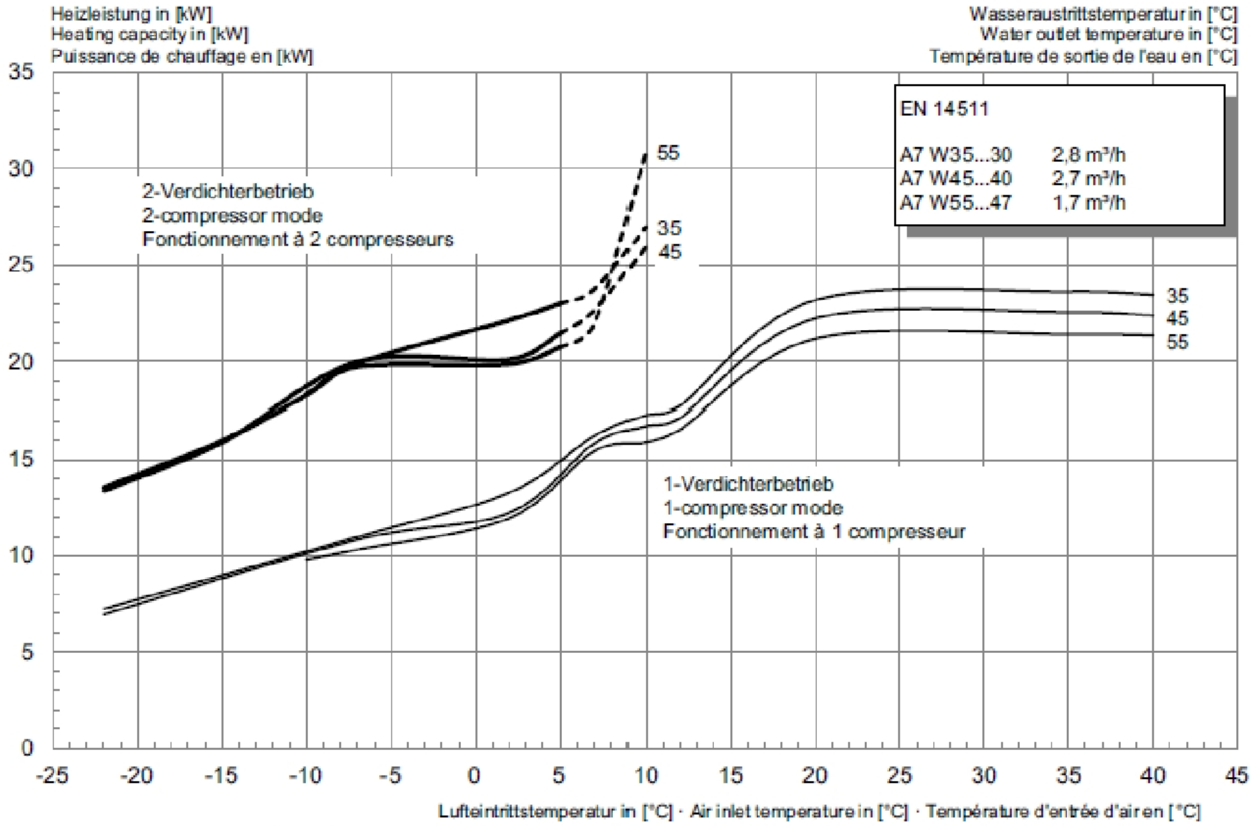
5.2 Podium line-up

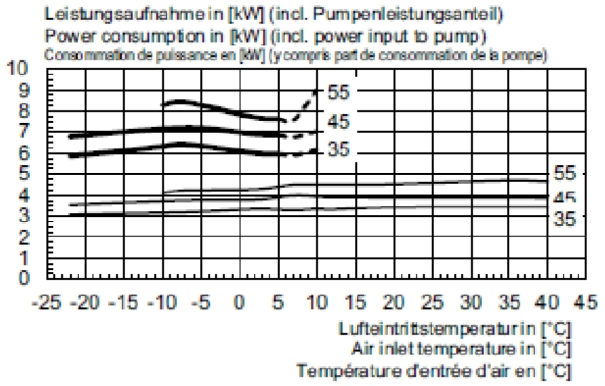
6.1 Safety and maintenance area for R290

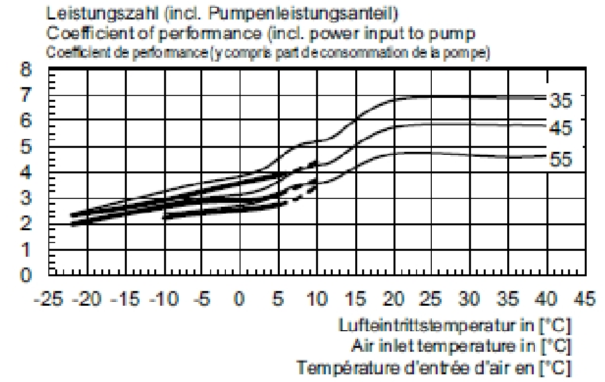
Further information on the foundation:

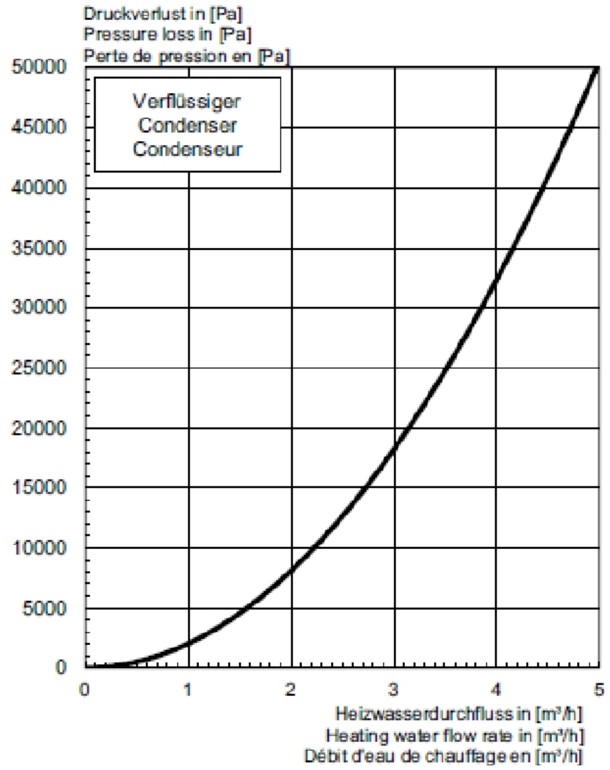
https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3248816129/Fundamentplanung+System+C#LA-33TPR

13.8.3 Heating characteristic curve

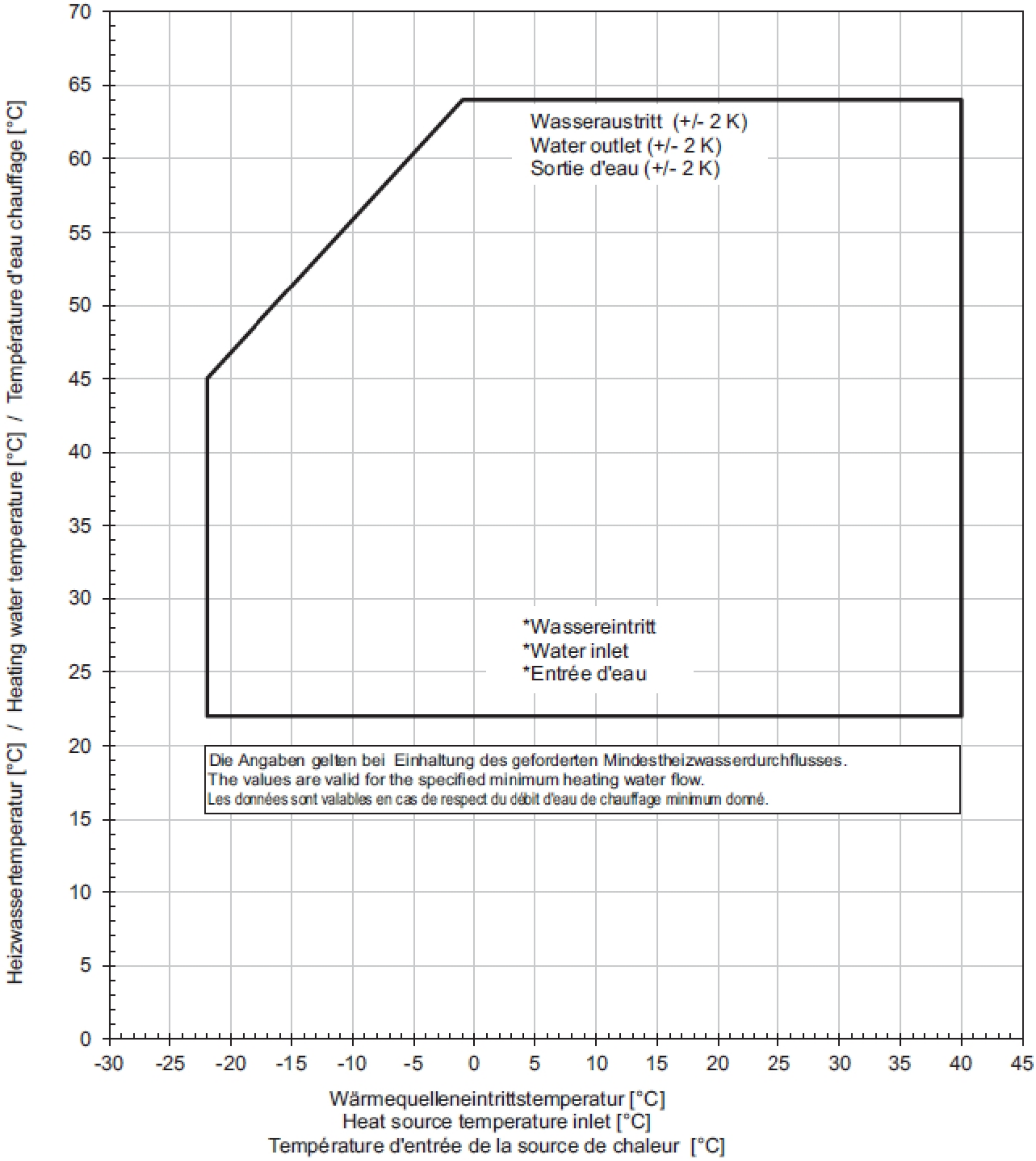




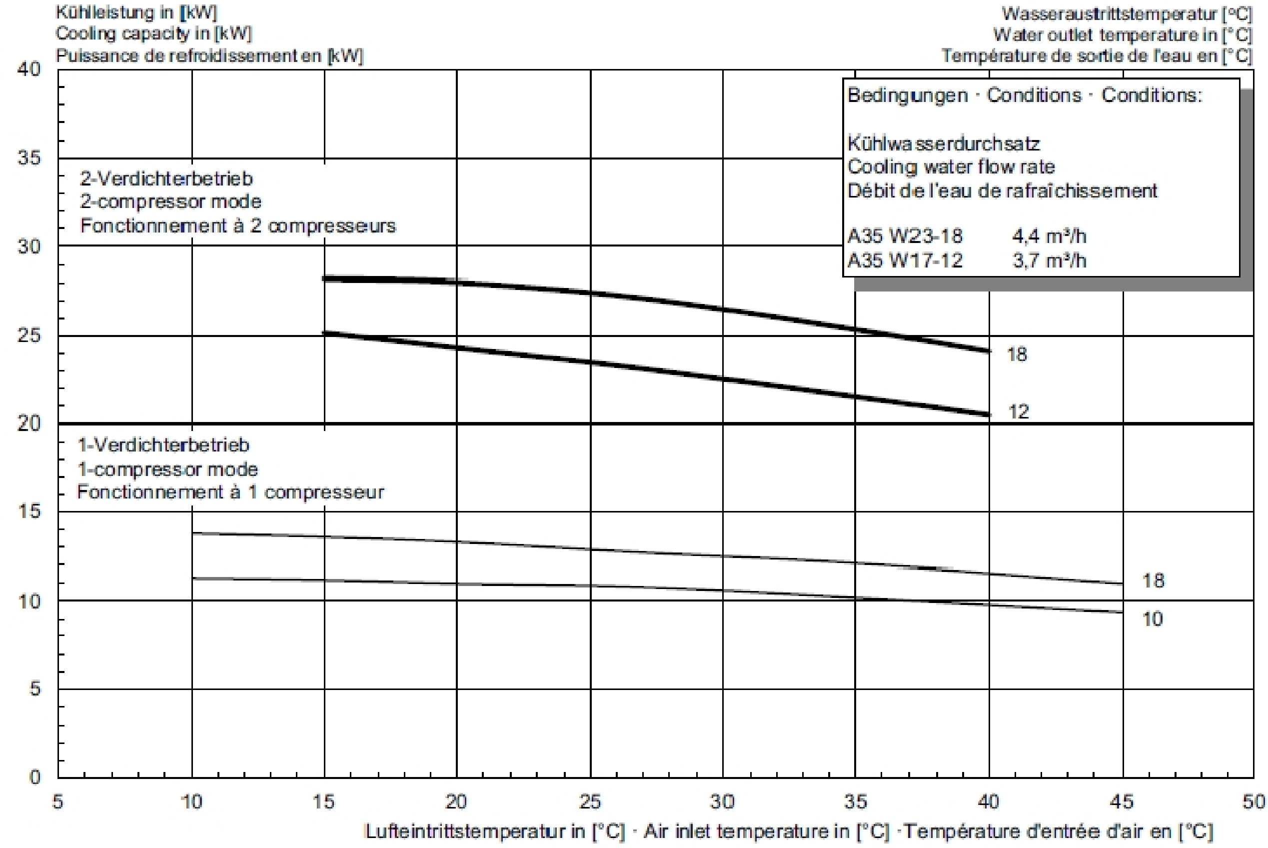


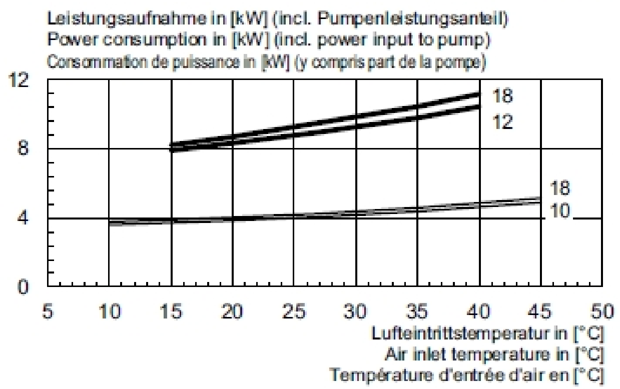


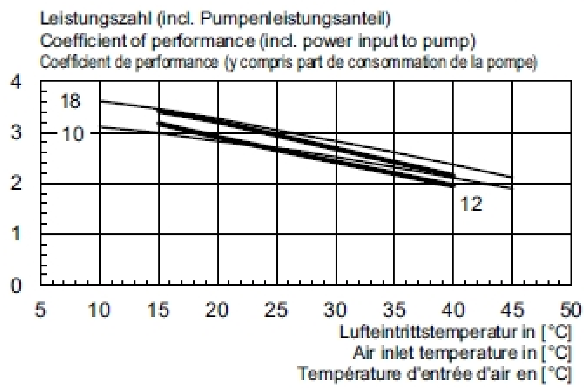
13.8.4 Heating operating limit diagram

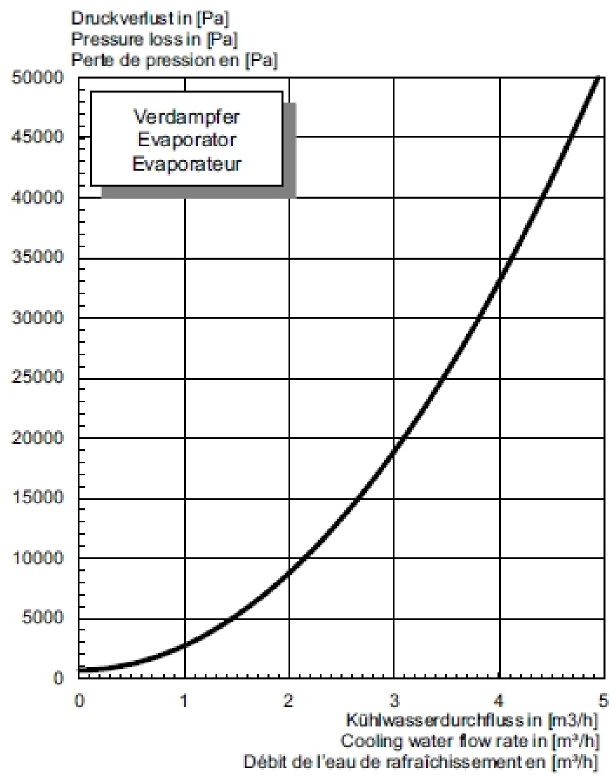


13.8.5 Cooling Curve

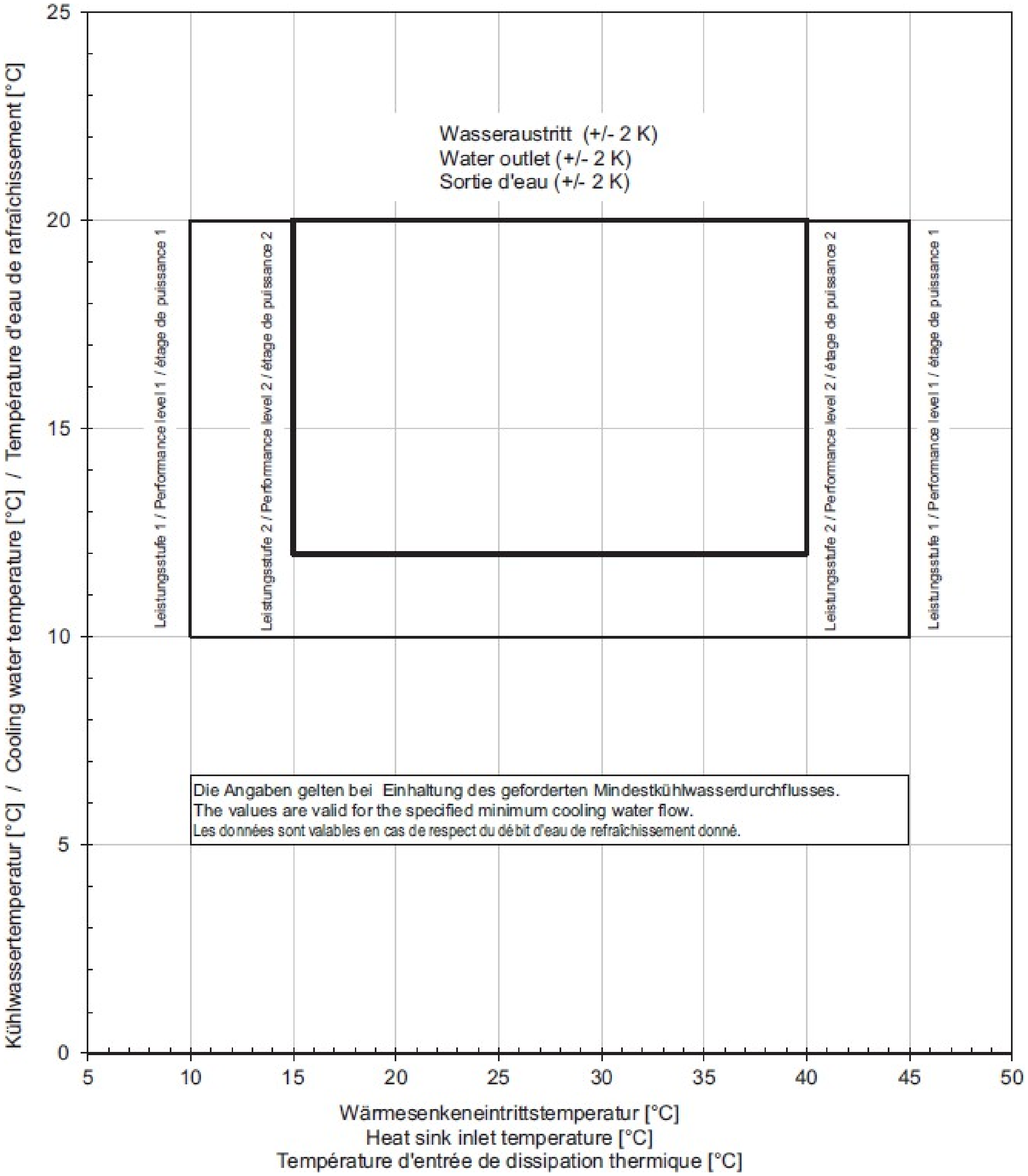








13.8.6 Cooling operating limit diagram



13.9 Technical product information LA 60P- TUR

13.9.1 Device information

Type and order code		LA 60P-TUR
1. design		
heat source		air
Execution		Universal Reversible
Controller		WPM
Thermal energy metering		integrated
installation location		Exterior
Performance levels		2
2. operating limits		
Heating water flow / return [1]	°C	up to 64 ±2K / from 22
Cooling water flow / return	°C	[2] +7 to +20 / min. 10°C to max. 28 °C
Air (heating)	°C	-22 to +40
Air (cooling)	°C	+10 to +45
3. flow/sound		
Heating water flow / internal pressure differential (A7 / W35/30)	m³/h / Pa	5,8 / 8400
Heating water flow / internal pressure differential (A7 / W45/40)	m³/h / Pa	5,6 / 7800
Minimum heating water flow rate (A7 / W55/47)	m³/h / Pa	3,4 / 4100

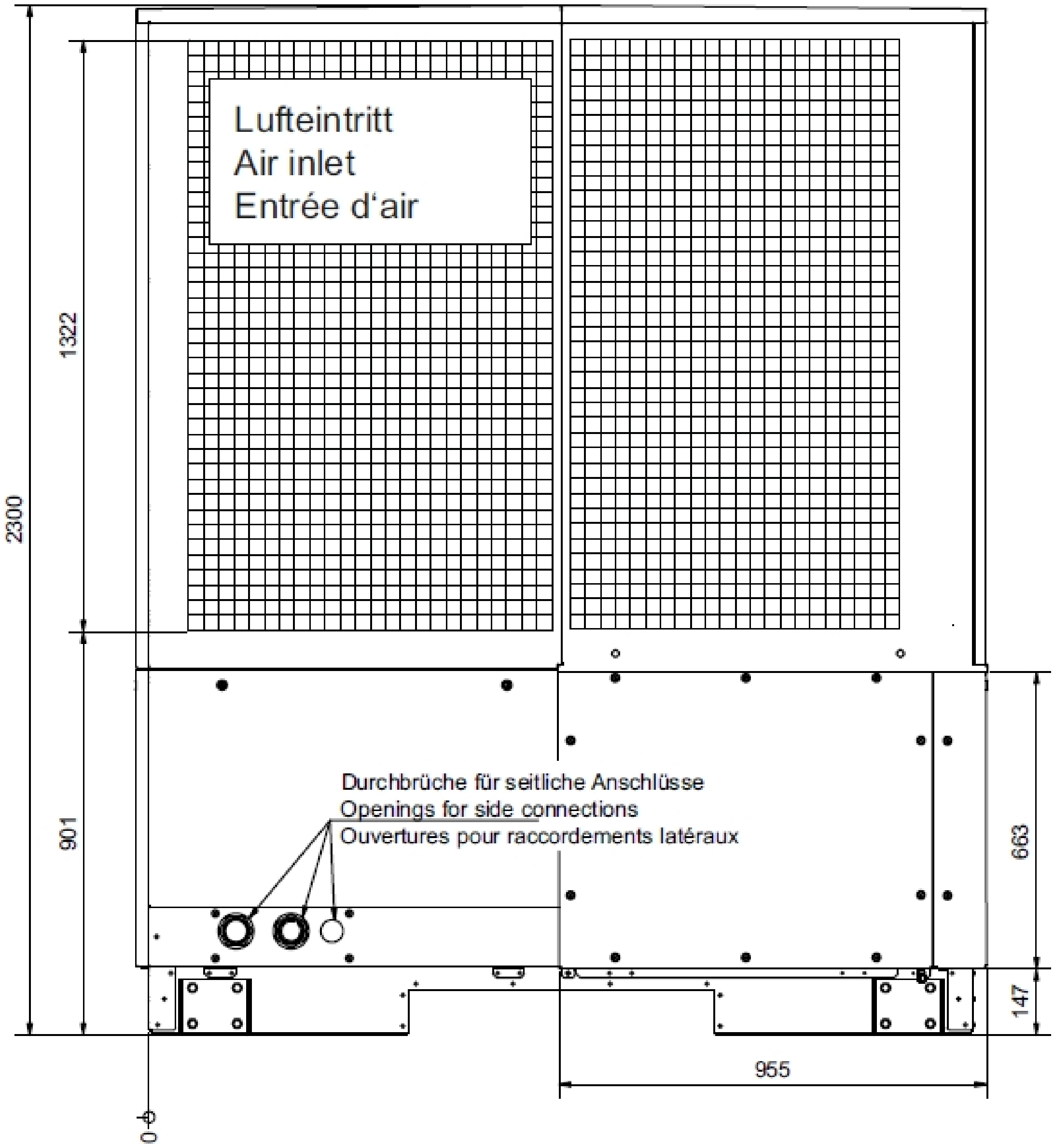
Type and order code		LA 60P-TUR
Cooling water flow rate / internal pressure differential (A35 / W18/23)	m³/h / Pa	11,2 / 31600
Minimum cooling water flow rate [3]	m³/h / Pa	8,5 / 18500
Sound power level according to EN 12102 Normal operation / lowered operation [4]	dB(A)	74 / 67
Sound pressure level at a distance of 10 m (outlet side) [5] Normal operation / lowered operation [4]	dB(A	46 / 39
Air flow rate (EC fan control range)	m³/h	0 - 25000
4. dimensions, weight and filling quantities		
Device dimensions without connections [6]	H x W x L mm	2300 x 1900 x 1190
Weight of the transport unit(s) incl. packaging	kg	910
Device connections for heating	inch	Rp 2"
Refrigerant / total charge weight	Type / kg	R290 / 7,6
Lubricant / total filling quantity	Type / litre	Hatcol 4467 / 9.1
Volume of heating (cooling) water in the appliance	Litres	9,3
5. electrical connection		
Supply voltage / fusing / RCD type		3~/PE 400 V (50 Hz) / C50A / B
Control voltage / fusing via WPM		1~/N/PE 230 V (50 Hz) / 6.3 AT
Degree of protection according to EN 60 529		IP 24
Starting current limitation		soft starter
Rotary field monitoring		Yes
starting current	A	78
Nominal power consumption A7/W35 / max. intake [7]	kW	6,8 / 22,4
Nominal current A7/W35 / cos φ	A / ---	12,9 / 0,76
Compressor protection power consumption (per compressor)	W	54
Fan power consumption	W	up to 3.9

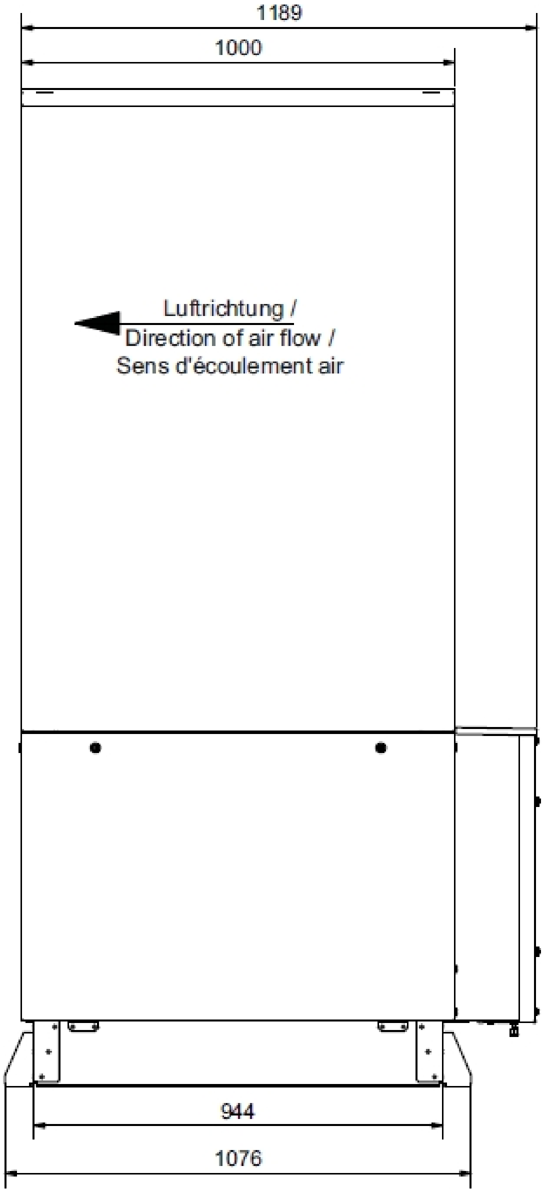
Type and order code		LA 60P-TUR	
6. safety regulations			
Complies with European safety regulations[8]		see CE declaration of conformity	
7 Other model features			
Type of defrosting (as required)		Cycle reversal	
Frost protection Condensate tray / water in the appliance protected against freezing [9]		Heated / yes	
Max. operating overpressure (heat source / heat sink)	bar	1,8	
Hydraulic 4-way reversing valve (external)[10]		Accessories	
8. power / coefficient of performance (COP)			
SCOP (seasonal coefficient of performance (COP)) medium climate 35 °C / 55 °C		4,35 / 3,54	
ŋs average climate 35 °C / 55 °C		171 / 139	
Heat output / coefficient of performance (COP) [7]		EN 14511	
performance level		1	2
A-15 / W35	kW / ---	18,6 / 2,8	34,6 / 2,7
A-7 / W35	kW / ---	22,9 / 3,4	42,1 / 3,1
A2 / W35	kW / ---	25,7 / 3,9	44,6 / 3,6
A7 / W35-30	kW / ---	33,3 / 4,9	
A10 / W35	kW / ---	36,9 / 5,3	
A7 / W45-40	kW / ---	32,3 / 4,0	
A7 / W55-47	kW / ---	31,8 / 3,4	
Cooling capacity / coefficient of performance (COP) [7]			
performance level		1	2
A35 / W23-18	kW / ---	31,6 / 3,5	64,5 / 3,0
A27 / W18	kW / ---	32,7 / 3,9	67,1 / 3,6
A35 / W12-7	kW / ---	22,8 / 2,6	49,6 / 2,6
A27 / W7	kW / ---	24,0 / 3,0	51,7 / 3,0

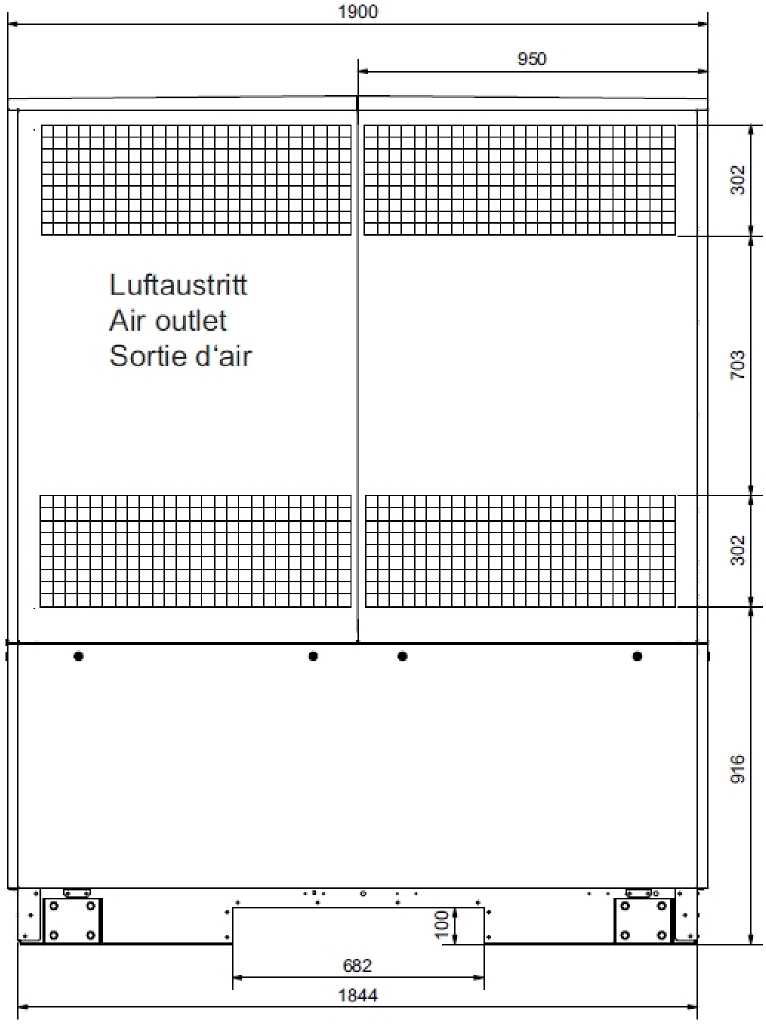
1. At air temperatures from -22 °C to -1 °C, flow temperature rising from 45 °C to 64 °C
2. The minimum achievable flow temperature depends on the current volume flow, the set return set temperature and the current performance level.
3. Results in a cooling water temperature spread of 5K ±1K in 2-compressor operation with A35/W7.

4. In setback mode, the heat output and COP are reduced by approx. 5 %
5. The specified sound pressure level corresponds to the operating noise of the heat pump in heating operation at 55 °C flow temperature.
   The specified sound pressure level represents the free-field level. Depending on the installation location, the measured value can deviate by up to 16 dB(A).
6. Please note that more space is required for pipe connection, operation and maintenance
7. This information characterises the size and performance of the system. The bivalence point and control must be taken into account for economic and energy considerations.
   These specifications are only achieved with clean heat exchangers. Notes on care,
   Commissioning and operation are described in the corresponding sections
   can be found in the installation and operating instructions. For example, A 7 / W35 means: heat source temperature 7 °C and heating water flow temperature 35 °C.
8. see CE declaration of conformity
9. The heat circulating pump and the heat pump manager must always be ready for operation.
10. The specified values apply when using the hydraulic 4-way reversing valve (observe the accessories instructions).

13.9.2 Dimensioned drawing



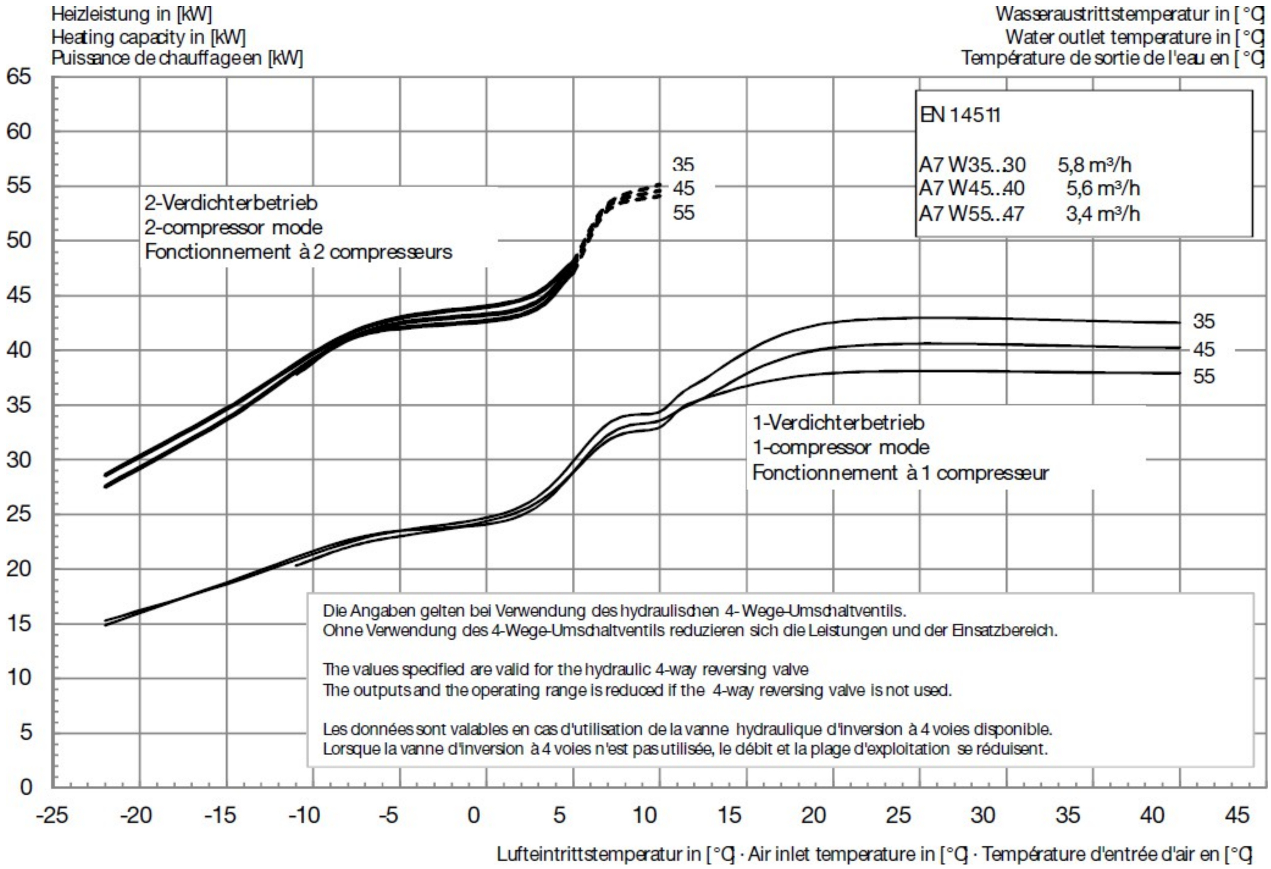

1189
1000
Luftrichtung /
Direction of air flow /
Sens d'écoulement air
944
1076

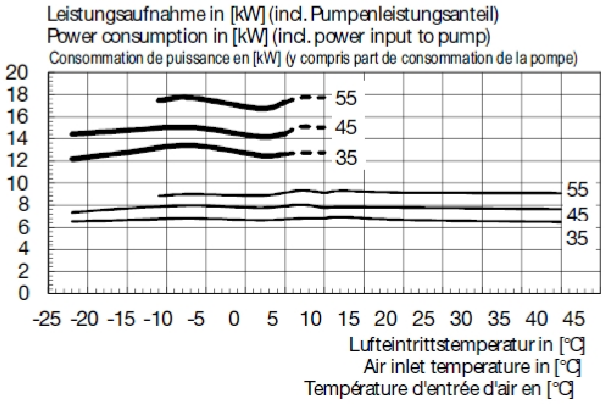


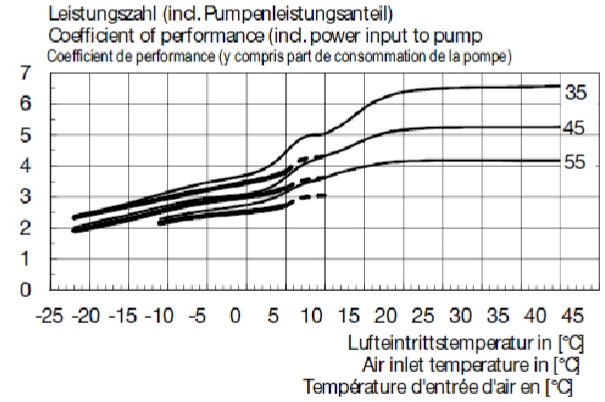
Further information on the foundation:

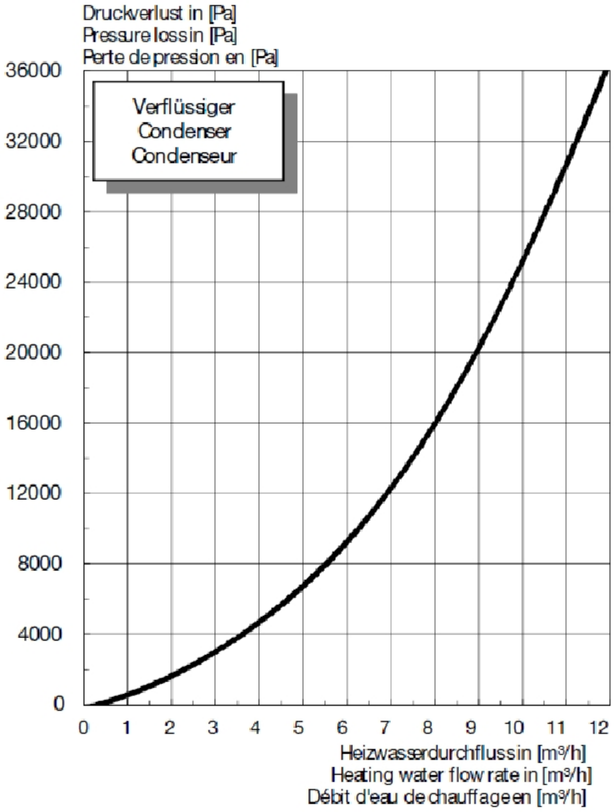
https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3248816129/Fundamentplanung+System+C#LA-60P-TUR

13.9.3 Heating characteristic curve

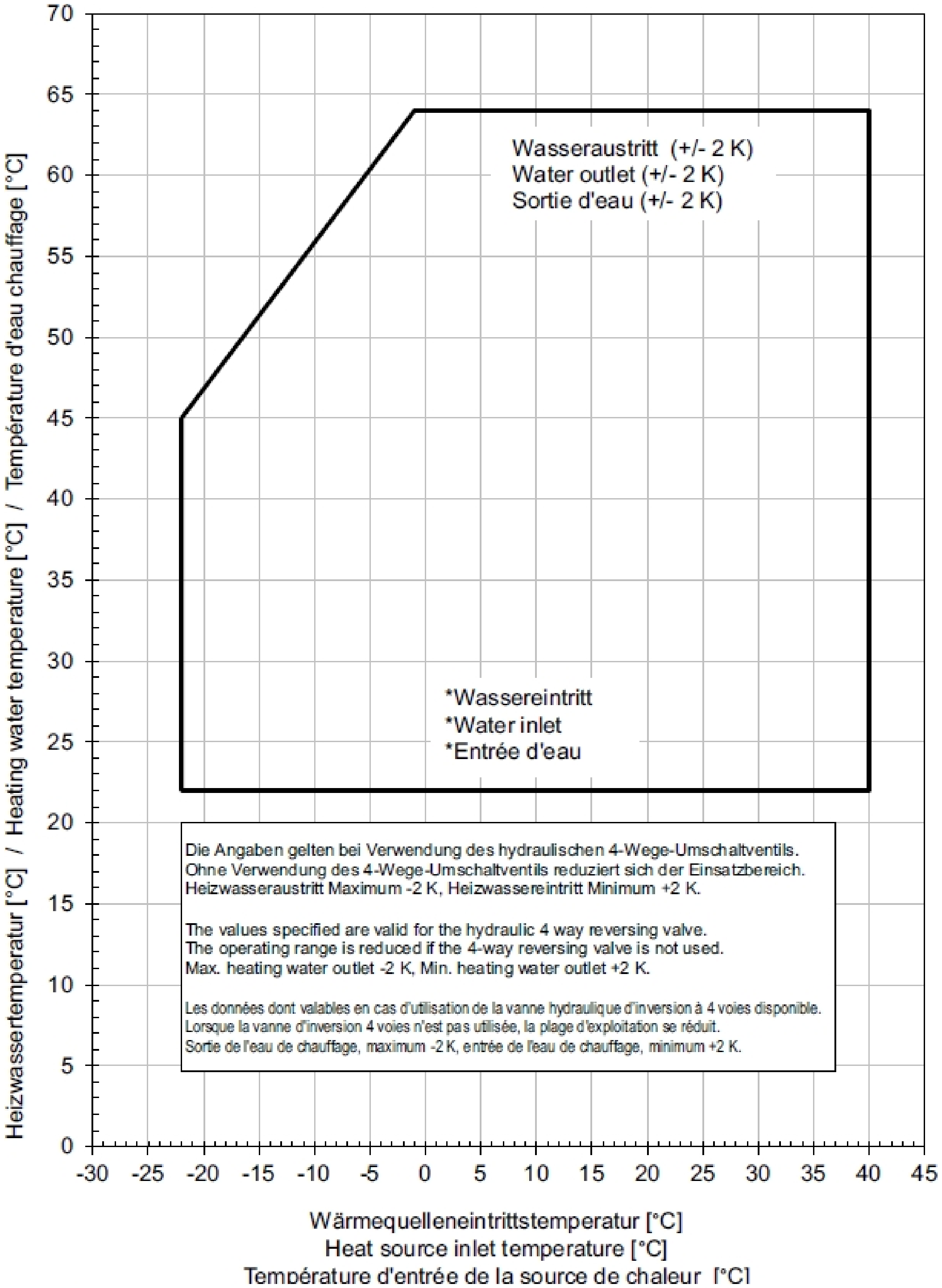



Leistungsaufnahme in [kW] (incl. Pumpenleistungsanteil)
Power consumption in [kW] (incl. power input to pump)
Consommation de puissance en [kW] (y compris part de consommation de la pompe)
20
18
16
14
12
10
8
6
4
2
0
55
45
35
55
45
35
-25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]


Leistungszahl (incl. Pumpenleistungsanteil)
Coefficient of performance (incl. power input to pump)
Coefficient de performance (y compris part de consommation de la pompe)
7
6
5
4
3
2
1
0
35
45
55
-25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]

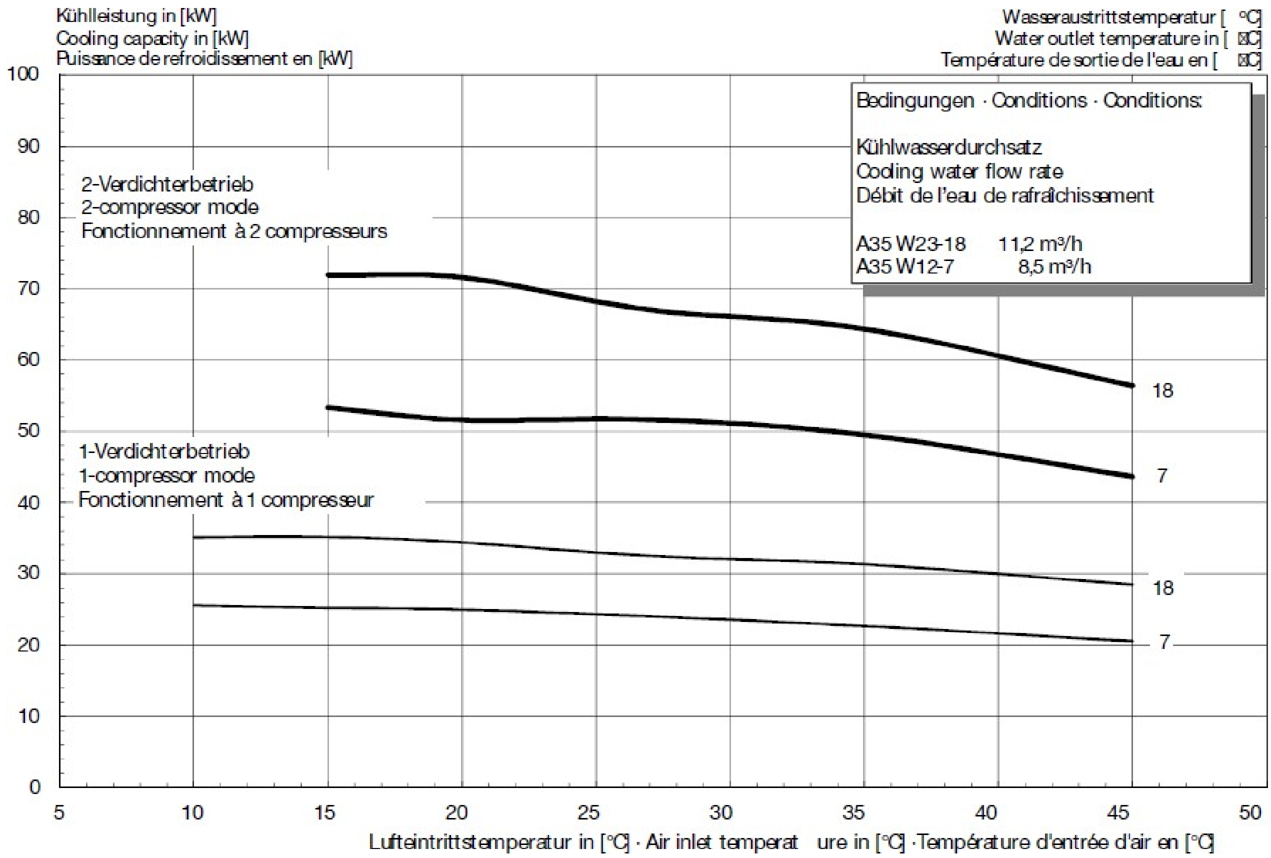

Druckverlust in [Pa]
Pressure loss in [Pa]
Perte de pression en [Pa]
Verflüssiger
Condenser
Condenseur
36000
32000
28000
24000
20000
16000
12000
8000
4000
0
0 1 2 3 4 5 6 7 8 9 10 11 12
Heizwasserdurchfluss in [m³/h]
Heating water flow rate in [m³/h]
Débit d'eau de chauffage en [m³/h]

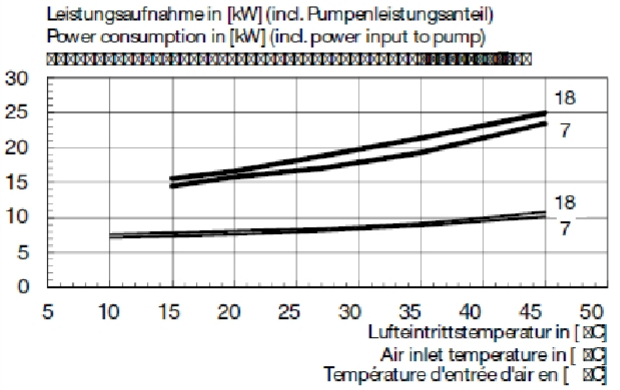
13.9.4 Heating operating limit diagram

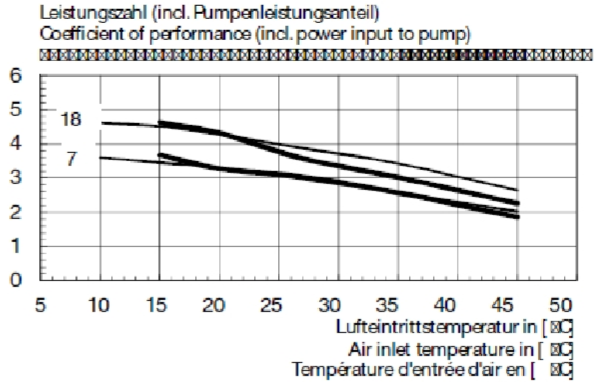


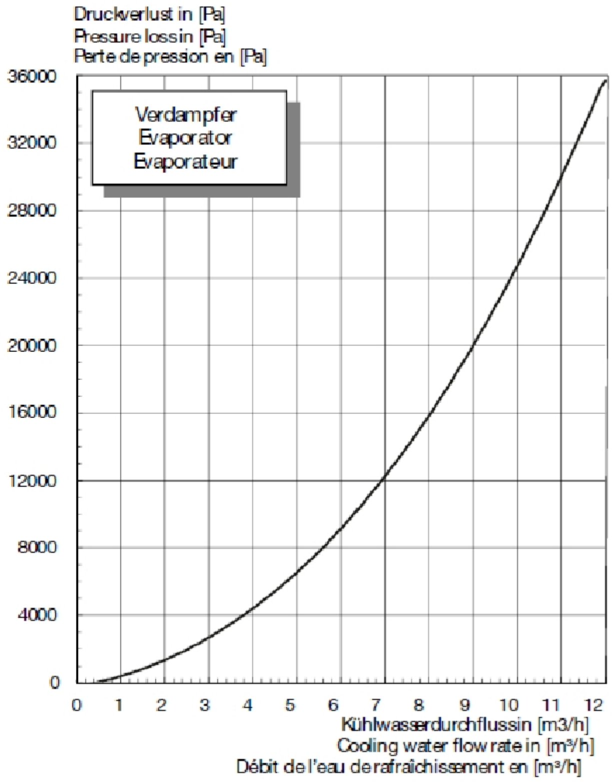
*Bei Luft/Wasser-Wärmepumpen stellt die minimale Heizwassertemperatur die Mindest-Rücklauftemperatur dar
*For air-to-water heat pumps the minimum heating water temperature is the minimum return temperature
*Sur les pompes à chaleur air / eau, la température minimale d'eau de chauffage correspond à la température retour minimale

13.9.5 Cooling Curve

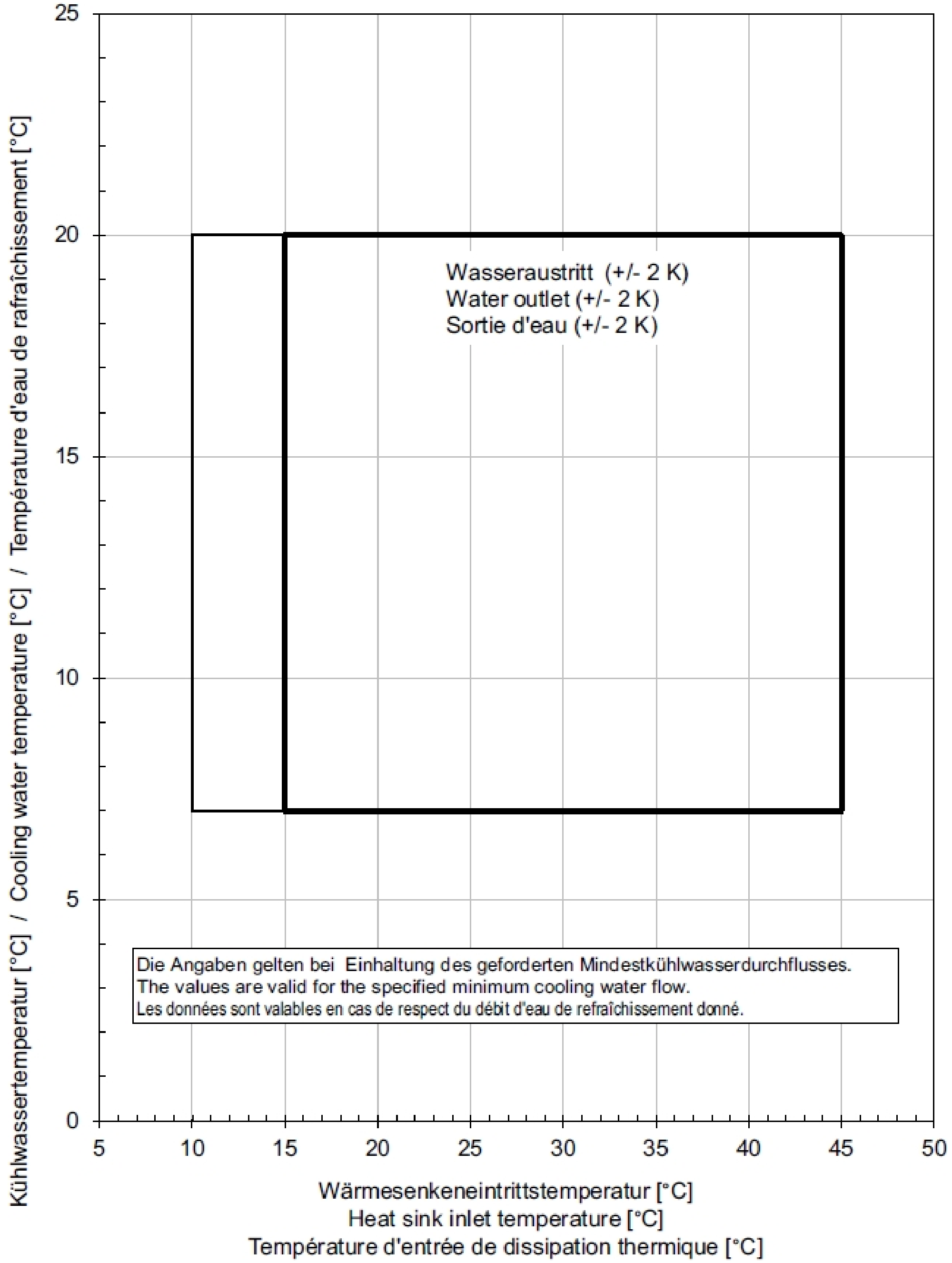



Leistungsaufnahme in [kW] (incl. Pumpenleistungsanteil)
Power consumption in [kW] (incl. power input to pump)
30
25
20
15
10
5
0
18
7
18
7
5 10 15 20 25 30 35 40 45 50
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]


Leistungszahl (incl. Pumpenleistungsanteil)
Coefficient of performance (incl. power input to pump)
6
5
4
3
2
1
0
18
7
5 10 15 20 25 30 35 40 45 50
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]


Druckverlust in [Pa]
Pressure loss in [Pa]
Perte de pression en [Pa]
Verdampfer
Evaporator
Evaporateur
36000
32000
28000
24000
20000
16000
12000
8000
4000
0
0 1 2 3 4 5 6 7 8 9 10 11 12
Kühlwasserdurchfluss in [m3/h]
Cooling water flow rate in [m³/h]
Débit de l'eau de rafraîchissement en [m³/h]

13.9.6 Cooling operating limit diagram



14 LI 1422C/1826C

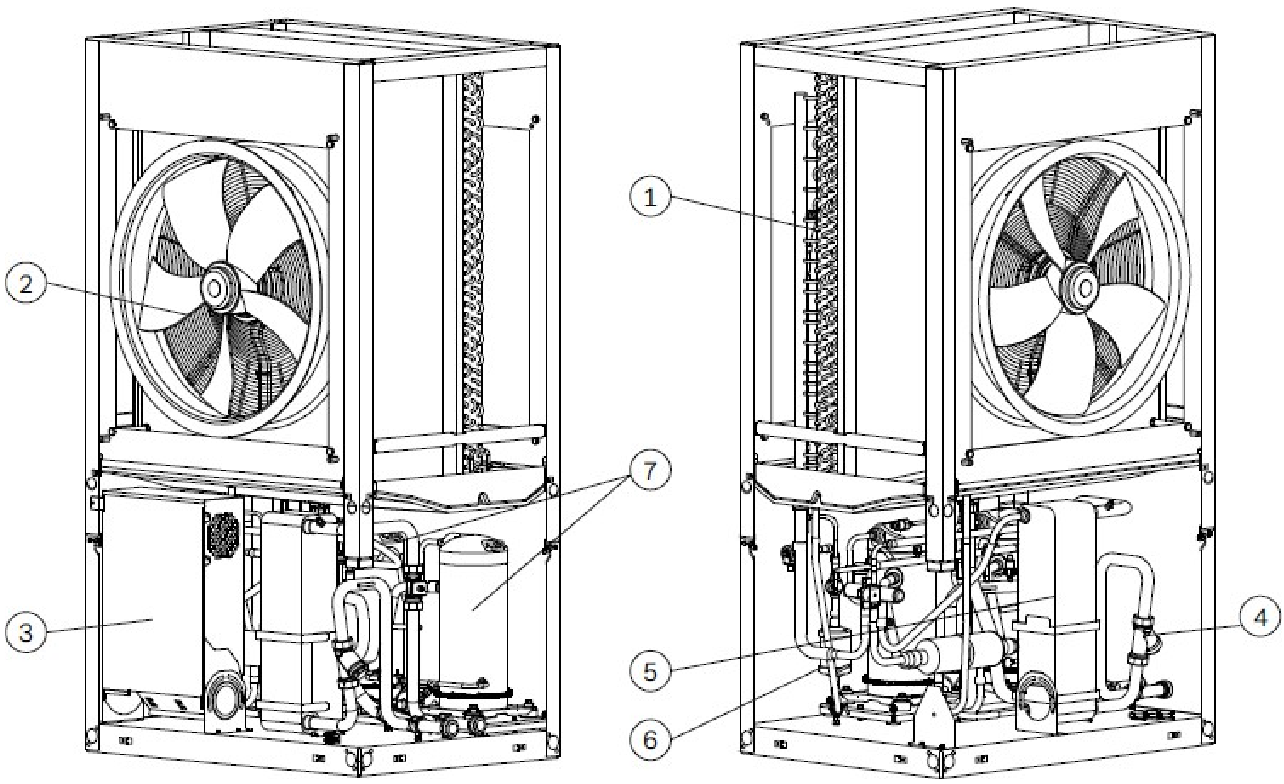
14.1 Table of contents

The **LI 1422C/1826C** is an air-to-water heat pump for **indoor installation** for heating and cooling. The installation of the heat pump can be adapted to the structural conditions in a variety of ways through the use of air ducts. This makes it ideal for replacing appliances, for use in new builds and also as an alternative to an oil or gas heating system.

14.1.1 **LI 1422C**

14.1.2 **LI 1826C**

14.2 Basic device LI 1422C/1826C



① Evaporator

② Fan

③ **Switch box***

④ Dirt traps

⑤ Condenser

⑥ Filter dryer

⑦ Compressor

14.2.1 *switch box

The switch box inside the appliance can be folded out after removing the lower front cover and loosening the fixing screw.

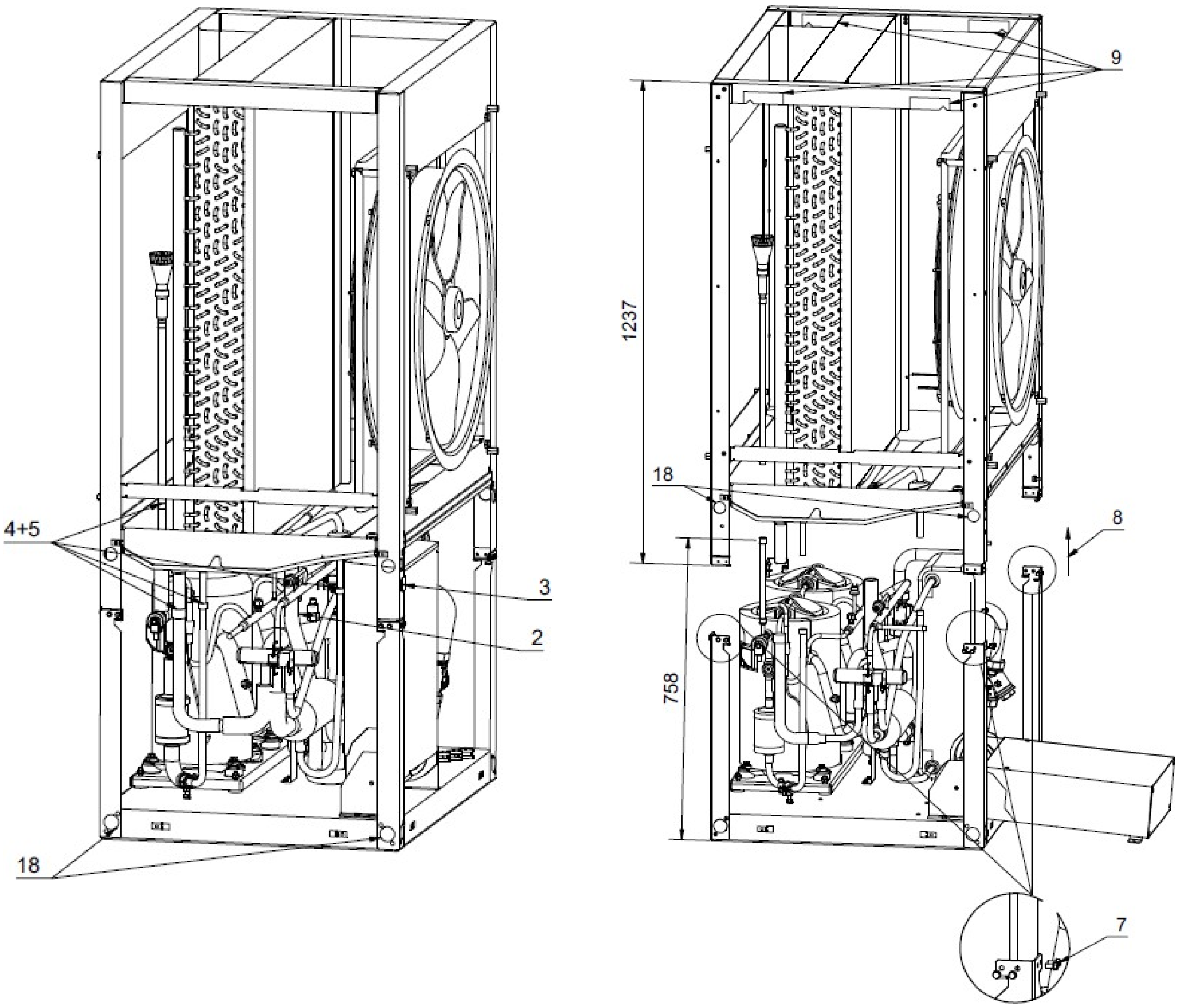
The switch box contains the mains connection terminals, the power contactors, soft start units and the extended controller unit (refrigeration circuit controller). The refrigeration circuit controller monitors and controls all heat pump signals and communicates with the heat pump manager.

Communication and control or mains cables, which should be routed separately, are fed into the switch box through the cable entry area in the side panel.

Device division for easier transport

14.3 Device division for easier transport

It is possible to separate the LI 1422C/1826C into two parts for easier transport in existing homes or buildings:



To do this, proceed as follows after removing the covering panels:

1. Extract refrigerant
2. Remove condensate hose
3. Detach the switch box from the frame
4. Remove the pipe insulation over the solder joints
5. Separate 4x solder joints chip-free.
6. Disconnect the fan cable in the switch box
7. Loosen 4x screws at each corner
8. Lift down the upper part of the heat pump
9. Areas for raising on the frame

12. Re-solder the separation points (with inert gas flushing)
13. Evacuate the refrigeration circuit
14. Fill with refrigerant Carry out a
15. Leakage tightness test
16. Reattach pipe insulation Reconnect fan
17. Holes for attaching a transport aid (e.g. carrying straps, etc.)
18.

10. Transporting the heat pump to the installation location
11. Joining parts together
19. Remove transport locks on both sides of the floor before commissioning

> **NOTE**
> Do not raise the condensate tray. This cannot absorb any forces.

> **NOTE**
> The condensate hose must be removed before the upper part is switched off.

14.3.1 Weights according to device division

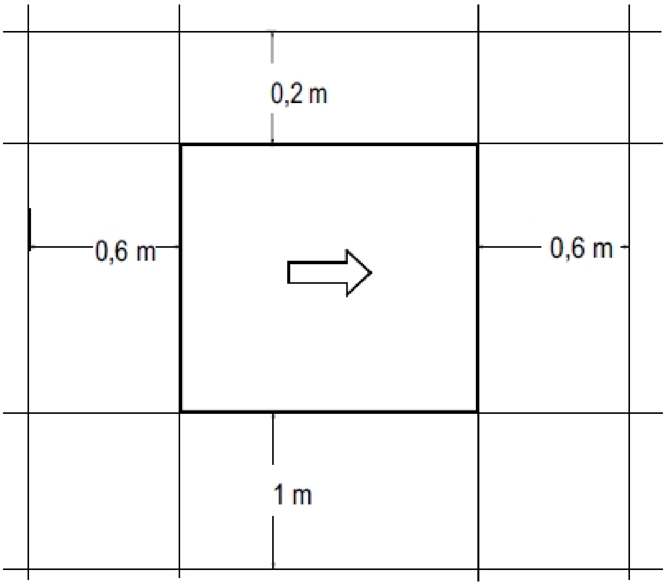
LI 1422C	
Upper part	100 kg
Lower part	135 kg
Facade	41 kg
LI 1826C	
Upper part	115 kg
Lower part	135 kg
Facade	41 kg

14.4 Installation conditions LI 1422C/1826C

14.4.1 Requirements for the installation room LI 1422C/1826C

The general requirements for the installation room for air-to-water heat pumps installed indoors apply:

Requirements for the installation room
The heat pump must be installed in such a way that maintenance work can be carried out without any problems. This is guaranteed if the distances to solid walls shown in the illustration are maintained.



NOTE
The heat pump is not intended for use above 2000 metres above sea level.

The appliance should never be installed in rooms with high humidity. Condensation can form on the heat pump and the air circuit if the humidity is above 50 % and the outside temperature is below 0 °C.

Frost or temperatures higher than 35 °C must not occur in the installation room at any time of the year.

If the heat pump is installed on an upper floor, the load-bearing capacity of the ceiling must be checked and vibration decoupling must be planned very carefully for acoustic reasons. Installation on a wooden ceiling should be rejected.

Condensate drainage

The condensate that accumulates during operation must be drained away frost-free. To ensure proper drainage, the heat pump must be levelled.

The condensate water pipe must have a diameter of at least 50 mm and must be routed into the sewer with frost protection. Do not discharge condensate directly into septic tanks and pits.

The aggressive vapours and a condensate line that is not installed frost-free can destroy the evaporator.

14.4.2 Air-side connection LI 1422C/1826C

Caution
The intake and air outlet area must not be restricted or blocked.

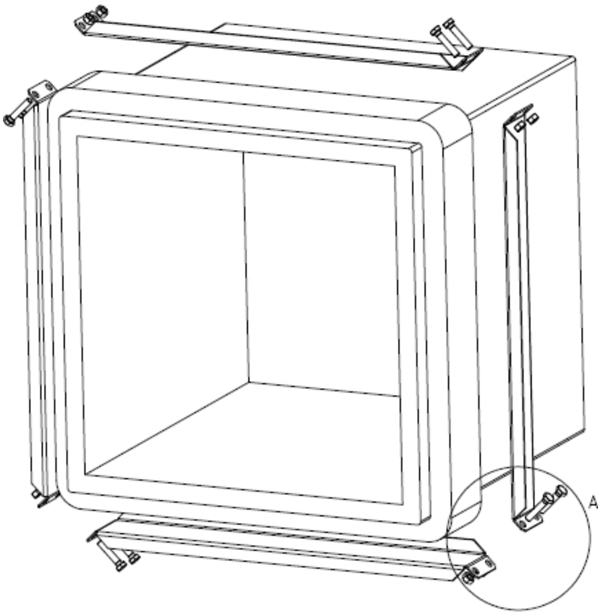
Caution
The heat pump may only be operated with attached air ducts.

The air ducts made of lightweight glass fibre concrete offered as accessories are moisture-resistant and open to diffusion.

The following components are available:

- https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3311435781/Luftkan+le+and+accessories#air-duct-straight-(LKL)
- https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3311435781/Air+ducts+and+accessories#Air+duct-90%C2%B0-Bend-(LKB)
- https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3311435781/Air+duct+and+accessories#connection+kit-f%C3%BCr-air+duct%C3%A4le-(VSLK)
- https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3311435781/Air+ducts+and+accessories#Closing-frame-set-air-duct-(ARLK)
- https://dimplex.atlassian.net/wiki/spaces/PRO/pages/3311435781/Air+channels+and+accessories#Sealing+collars-f%C3%BCr--suction+and+discharge--(DMK)

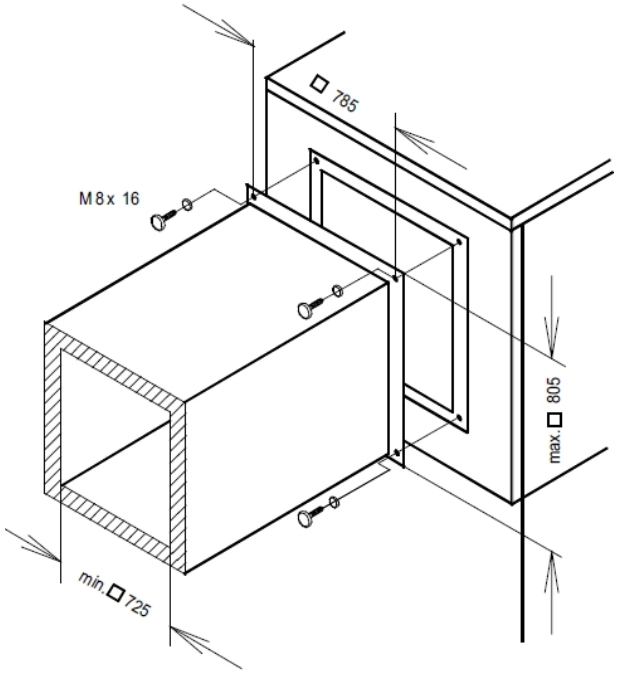
The sealing collar is used to seal the air ducts on the heat pump. The air ducts themselves are not screwed directly to the heat pump. When ready for operation, only the rubber seal touches the heat pump. This ensures easy assembly and disassembly of the heat pump on the one hand and good structure-borne sound decoupling on the other.



Connection of on-site air duct

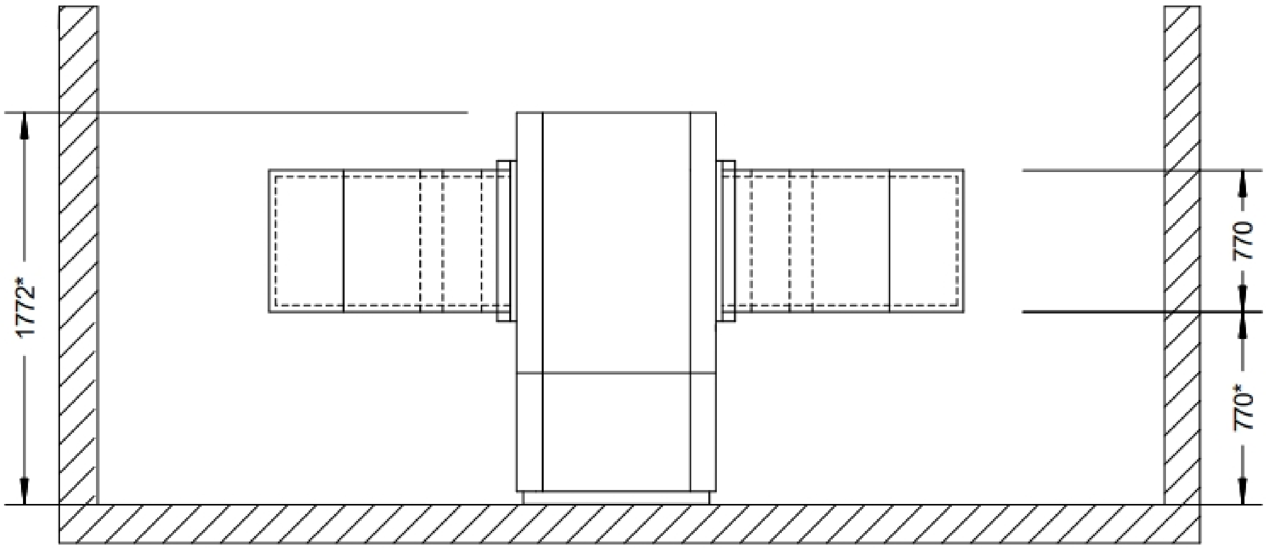
If an air duct other than the one available as an accessory is used, the external and internal dimensions specified in the sketch must be observed. In addition, suitable vibration decoupling and duct insulation must be ensured.

When using flange-mounted air ducts, one connecting stub each on the intake and exhaust side of the evaporator is fastened to the threaded holes provided using 4 M8x16 hexagon head screws. Make sure that both air duct stubs only come into contact with the insulation and not with the outer sheet metal.

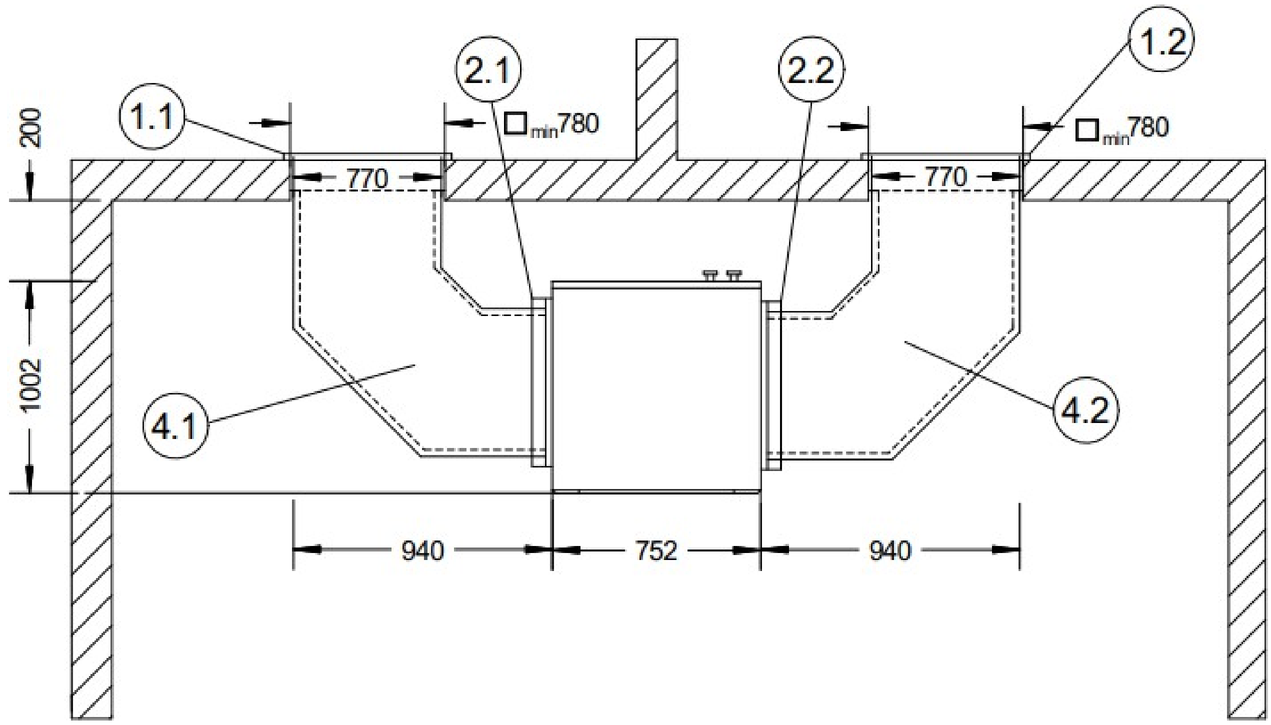


Installation variants for air ducts

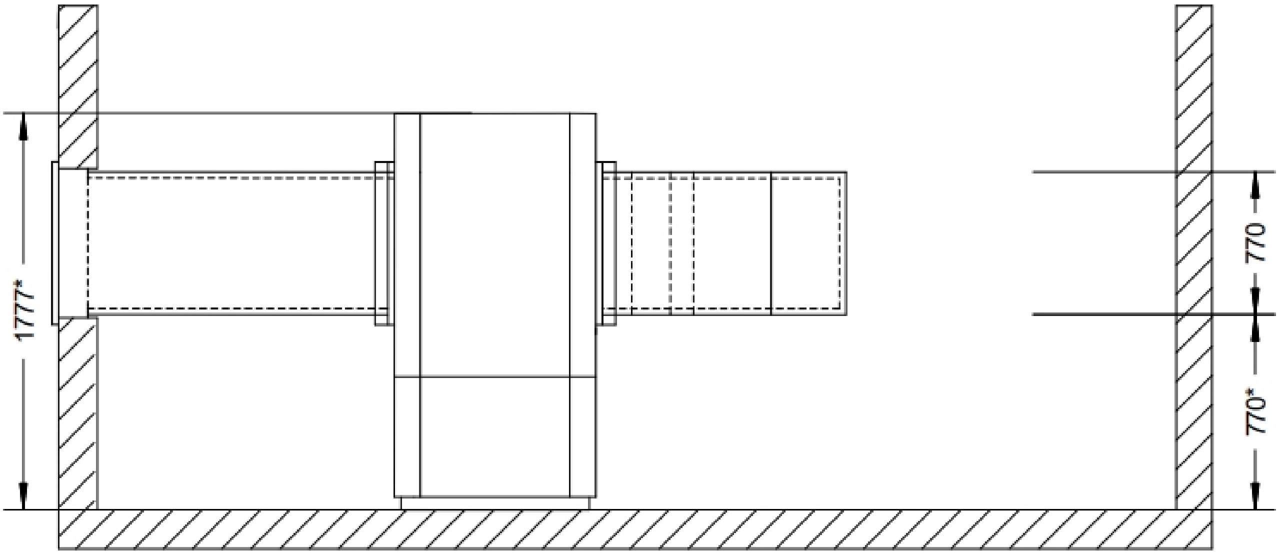
Wall installation



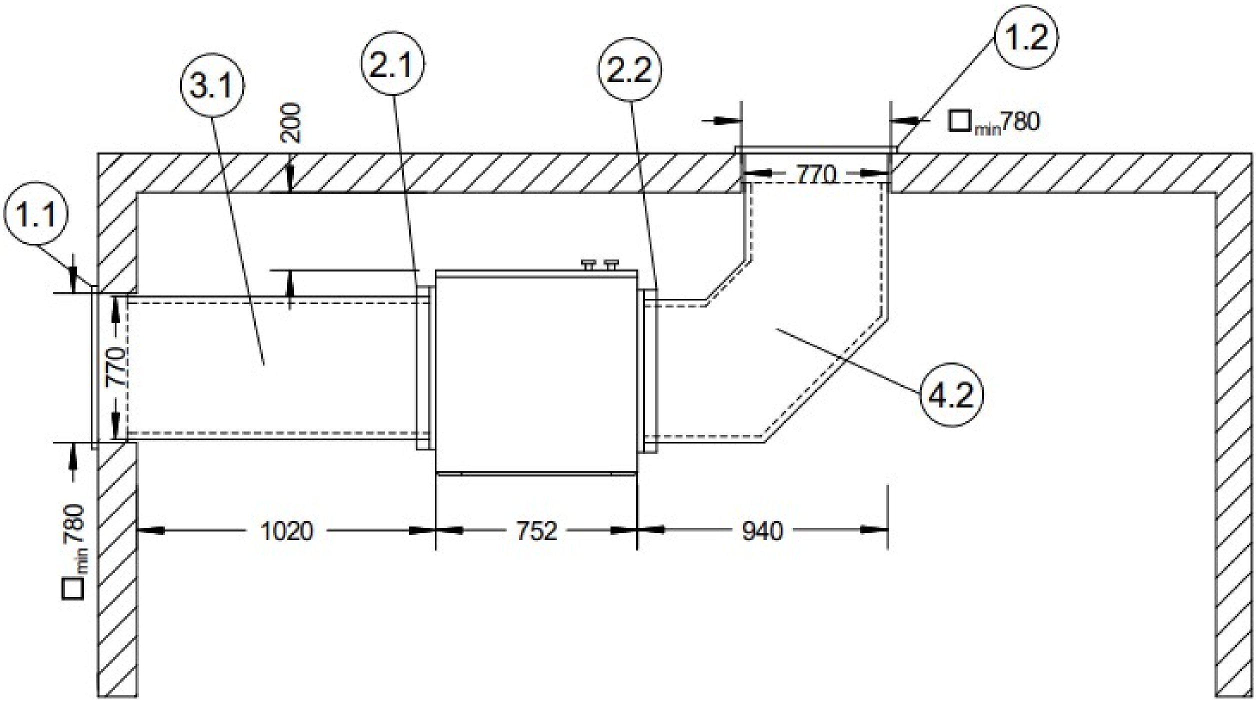
*SYL250 +5mm



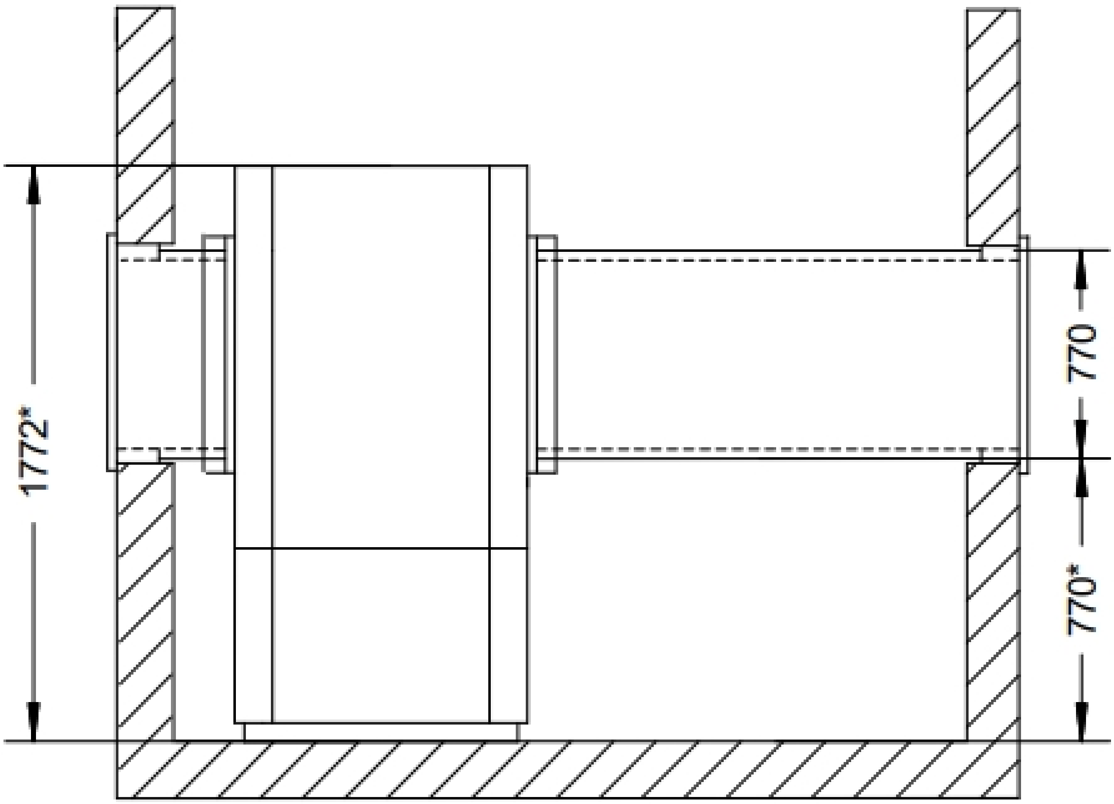
installation in a corner



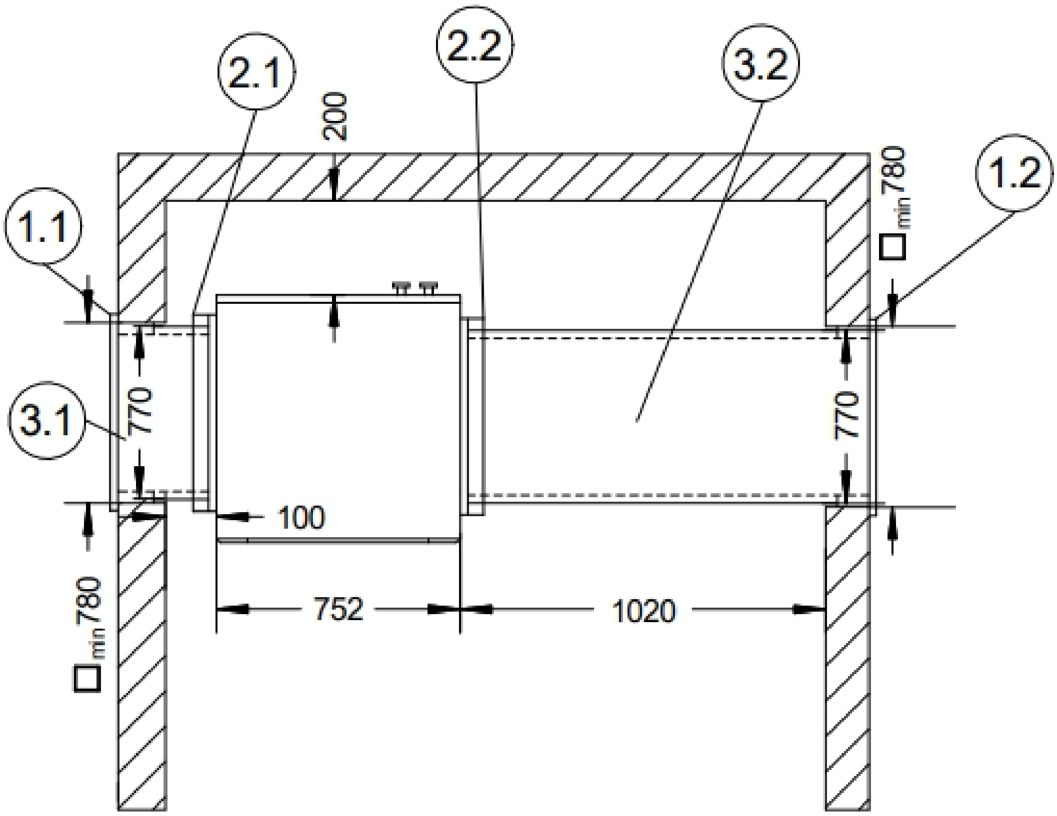
*SYL250 +5mm



Straight installation



*SYL250 +5mm



Legend

Pos.	Designation	Type
1	**rain guard**	
1.1	Intake rain guard	RSG 800
1.2	Rain guard air outlet	RSG 800
2	**sealing collar**	
2.1	Sealing collar intake	DMK 800
2.2	Sealing collar air outlet	DMK 800
3	**Straight air duct**	
3.1	Air duct straight intake	LKL 800A
3.2	Straight air duct air outlet	LKL 800A
4	**Air duct bend**	
4.1	Air duct Arch intake	LKB 800
4.2	Air duct Arch air outlet	LKB 800

14.4.3 Heating-side connection LI 1422C/1826C

The connections on the heating side of the heat pump are fitted with **1 1/4" external threads.** When connecting to the heat pump, a spanner must be used to hold the transitions.

The general requirements for water quality in heating systems also apply:

Water quality in heating systems

Minimum heating water flow rate

The minimum heating water flow rate of the heat pump must be ensured in every operating status of the heating system. This can be achieved, for example, by installing a double differential pressureless manifold [DDV].

Fusing the heating water flow rate

14.5 Technical product information LI 1422C

14.5.1 Device information

Type and order code		LI 1422C
1. design		
heat source		air
Seasonal coefficient of performance (COP) medium climate 35 °C / 55 °C		179 % / 135 %
Controller		WPM Touch
Installation location of heat generator		inside
Installation location Heat source		inside
Thermal energy metering		integrated
Performance levels		2
2. operating limits		
Heating water flow / return [1]	°C	up to 60 ± 2K / from 22

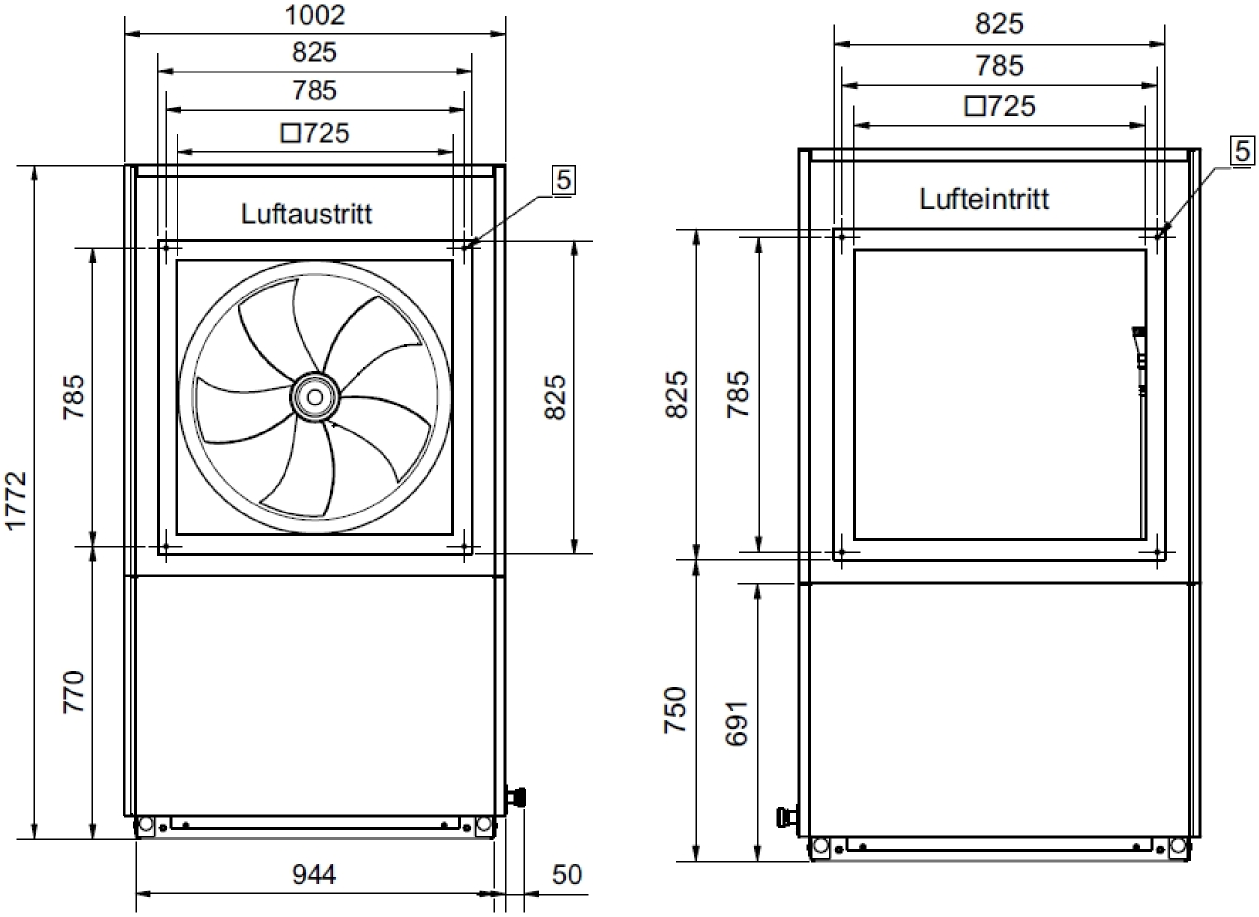
Type and order code		LI 1422C
Air (heating) [1]	°C	-22 to +35
Cooling water flow	°C	+7 to +20
Air (cooling)	°C	+15 to +45
3. flow²/sound		
Heating water flow / internal pressure differential (A7 / W35 ... 30)	m³/h / Pa	1,95 / 12900
Heating water flow / internal pressure differential (A7 / W45 ... 40)	m³/h / Pa	1,85 / 11500
Heating water flow / internal pressure differential (A7 / W55 ... 47)	m³/h / Pa	1,10 / 4800
Minimum heating water flow rate (A7 / W55/47)	m³/h / Pa	1,10 / 4800
Cooling water flow rate / internal pressure differential (A35 / W18 .. 23)	m³/h / Pa	3,3 / 37000
Minimum cooling water flow rate	m³/h / Pa	1,95 / 12900
Sound power level according to EN 12102 for A7/W55 inside/outside[3] [4] Normal operation	dB(A)	54 / 56
Sound power level according to EN 12102 for A7/W55 inside/outside[3] [4] lowered operation[5]	dB(A	53 / 54
Sound pressure level at 1 m distance inside[3] [4] [6] [6]	dB(A	45
Air flow rate with external static pressure differential	m³/h / Pa m³/h / Pa	5500 / 0 4000 / 25
4. dimensions, weight and filling quantities		
Device dimensions[7]	H x W x D mm	1770 x 750 x 1000
Device connections for heating	inch	G 1 1/4"
Weight of the transport unit(s) incl. packaging	kg	307
Heat pump weight	kg	281
Refrigerant / total charge weight	Type / kg	R410A / 5.4
GWP value / CO2 equivalent	--- / t	2088 / 11
Hermetically closed refrigeration circuit		ha
Lubricant / total filling quantity	Type / litre	Polyolester (POE) / 2.48

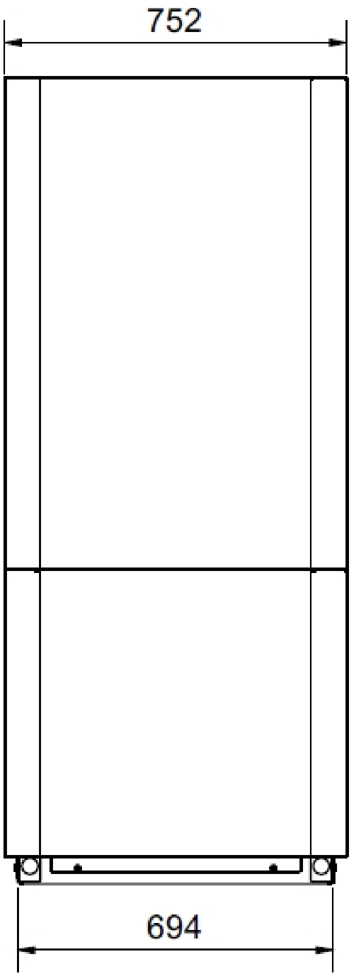
Type and order code		LI 1422C	
Volume of heating water in the interior	Litres	3,8	
5. electrical connection			
Supply voltage / fusing / RCD type		3~/PE 400V (50Hz) / C16A / B	
Control voltage / fusing / RCD type		1~/N/PE 230V (50Hz) / C13A / A	
Degree of protection according to EN 60 529		IP 21	
Starting current limitation		soft starter	
starting current	A	19	
Nominal power consumption A2 / W35 / max. intake²	kW	4,7 / 8,0	
Nominal current A2 / W35 / cos φ	A / ---	8,5 / 0,8	
Fan power consumption	W	up to 500	
6. safety regulations			
Complies with European safety regulations[8]		see CE declaration of conformity	
7 Other model features			
Type of defrosting (as required)		Cycle reversal	
Frost protection Condensate tray / water in the appliance protected against freezing [9]		Yes	
Max. operating overpressure (heat source / heat sink)	bar	3,0	
8. power / coefficient of performance (COP)			
Heat output / coefficient of performance² [5]		EN 14511	
	performance level	1	2
A-7 / W35	kW / ---	7,5 / 3,3	13,9 / 3,1
A2 / W35	kW / ---	9,4 / 4,1	15,9 / 3,7
A7 / W35-30	kW / ---	11,7 / 5,0	(20,9 / 4,7)
Cooling capacity / coefficient of performance² [3]			
	performance level	1	2
A27 / W18	kW / ---	10,4 / 4,0	21,0 / 3,6
A27 / W7	kW / ---	6,8 / 2,7	16,0 / 2,8

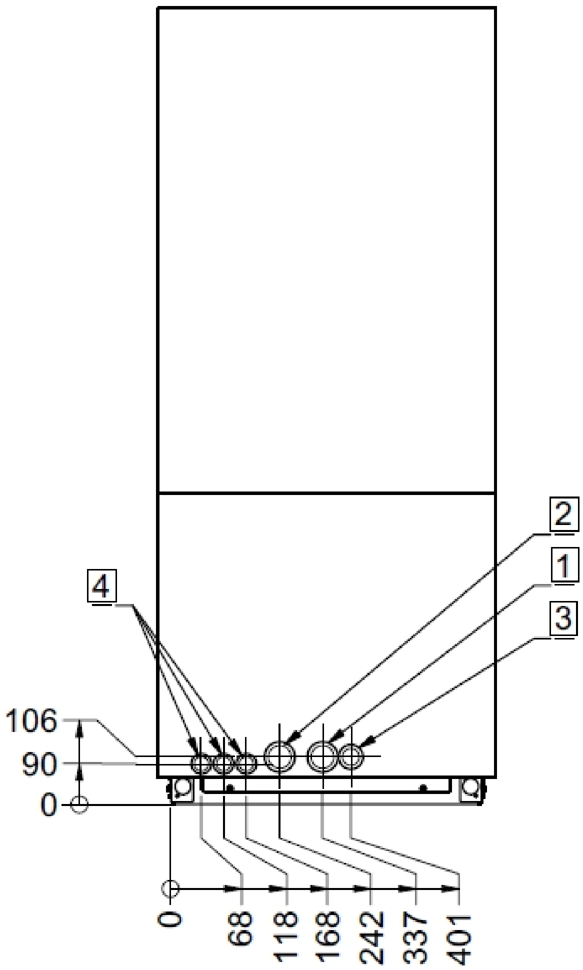
Type and order code		LI 1422C	
A35 / W18	kW / ---	10,3 / 4,0	19,3 / 2,9
A35 / 7	kW / ---	6,5 / 2,3	14,8 / 2,3

1. At air temperatures from -22°C to -5°C, flow temperature rising from 45°C to 60°C.
2. These specifications characterise the size and performance of the system in accordance with EN 14511. The bivalence point and control must be taken into account for economic and energy considerations. These specifications are only achieved with clean heat exchangers. Notes on maintenance, commissioning and operation can be found in the relevant sections of the installation and operating instructions. For example, A2/W35 means: heat source temperature 2 °C and heating water flow temperature 35 °C.
3. Tonality according to DIN 45681 Table 1 is ≤ 2 dB inside / ≤ 1 dB outside.
4. Sound measurement was carried out with two 90° bends and weather protection grille at the intake and air outlet.
5. In setback mode, the heat output and COP are reduced by approx. 5%
6. The specified sound pressure level represents the free-field level. Depending on the installation location, the measured value can deviate by up to 16 dB(A).
7. Please note that more space is required for pipe connection, operation and maintenance.
8. see CE declaration of conformity
9. The heat circulating pump and the heat pump manager must always be ready for operation.
10. Special operation, normal operation above 5 °C outside temperature 1 Compressor operation

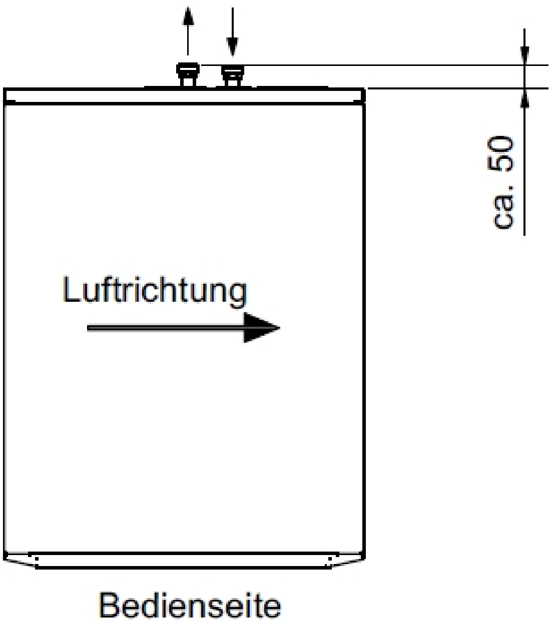
14.5.2 Dimensioned drawing



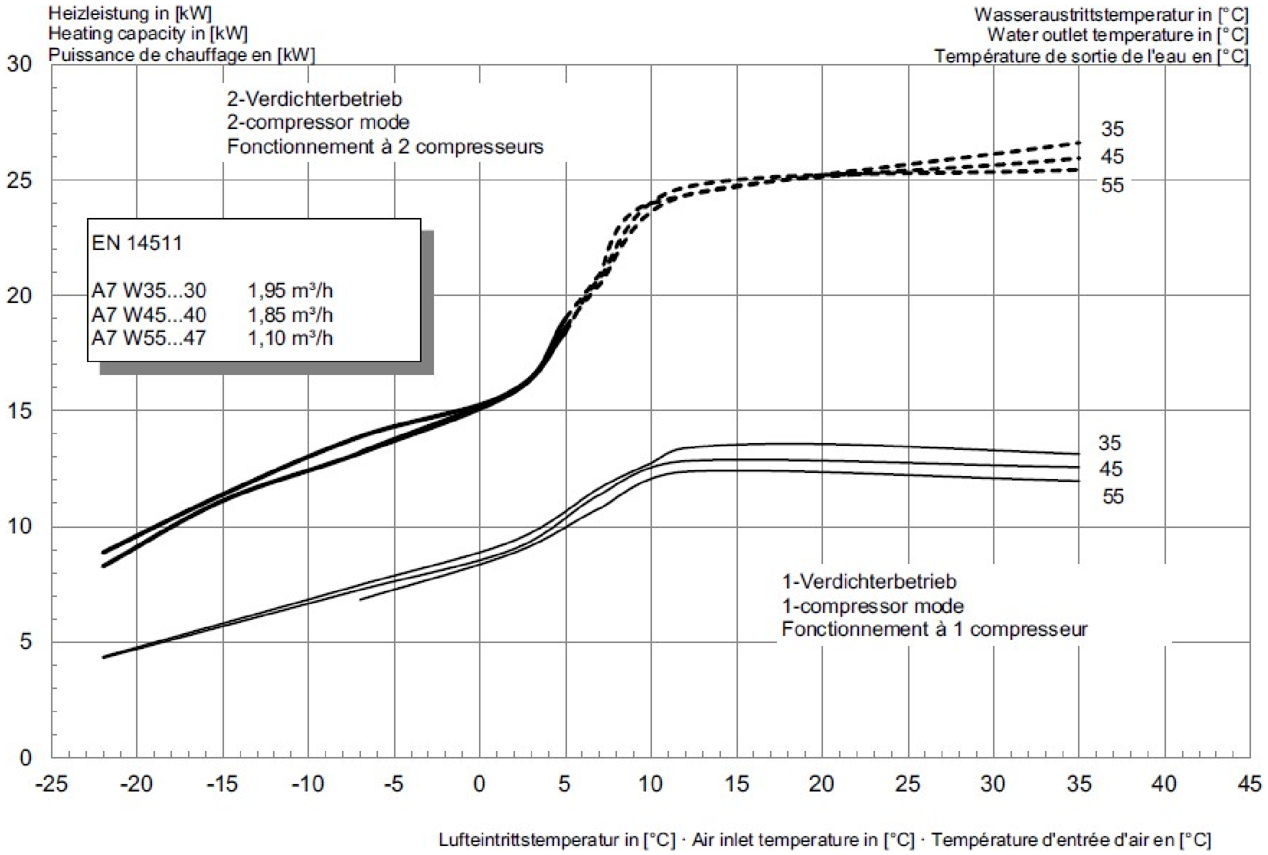


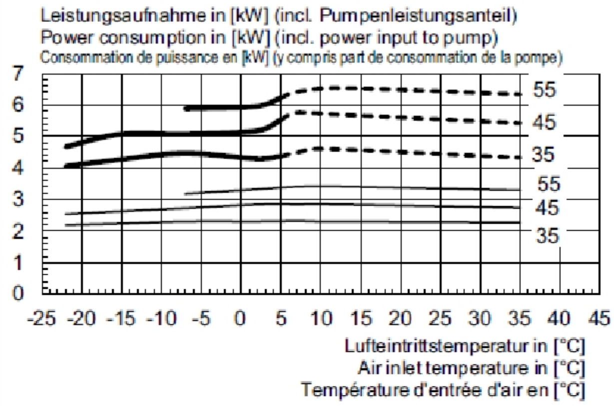


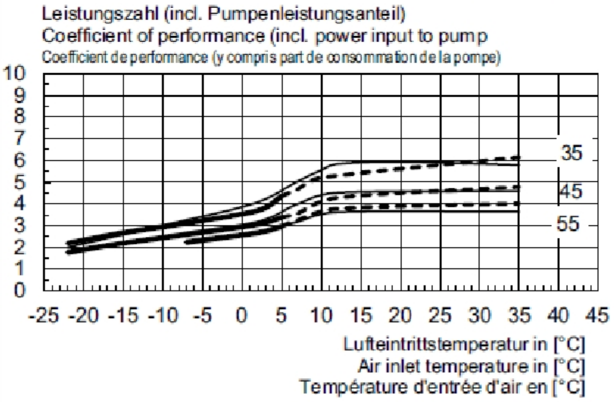
1. Flow output from the HP 1 1/4" external thread
2. Return input to the HP 1 1/4" external thread
3. condensate drain
4. Electric wires
5. 4x female thread M8x15

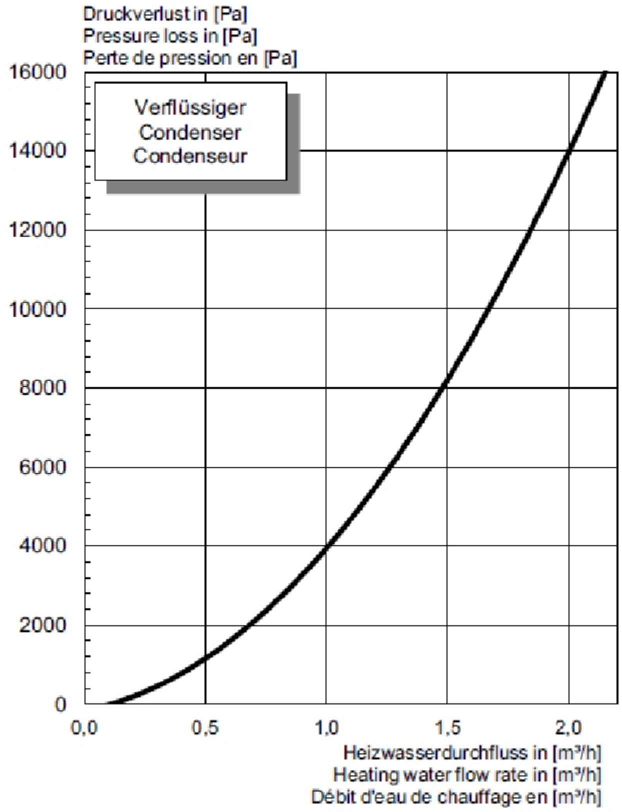


14.5.3 Heating characteristic curve

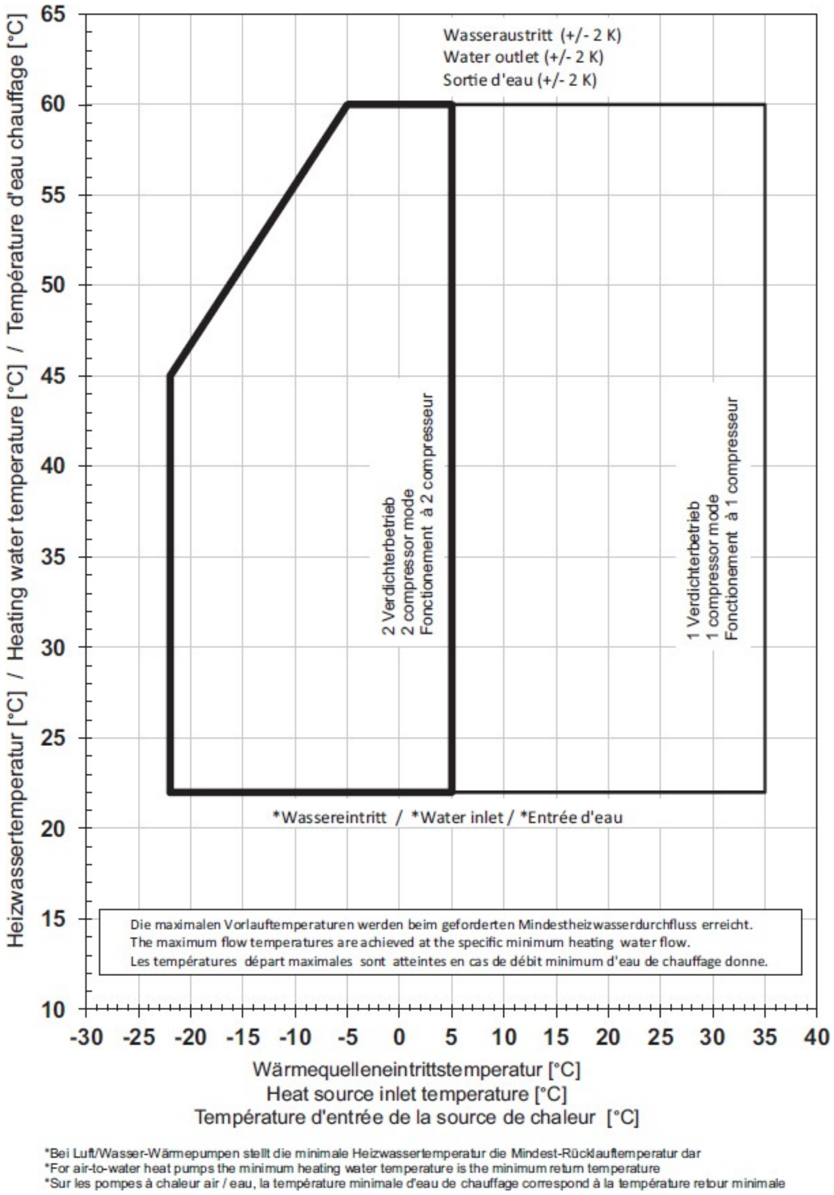



Leistungsaufnahme in [kW] (incl. Pumpenleistungsanteil)
Power consumption in [kW] (incl. power input to pump)
Consommation de puissance en [kW] (y compris part de consommation de la pompe)
7 6 5 4 3 2 1 0
55
45
35
55
45
35
-25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]

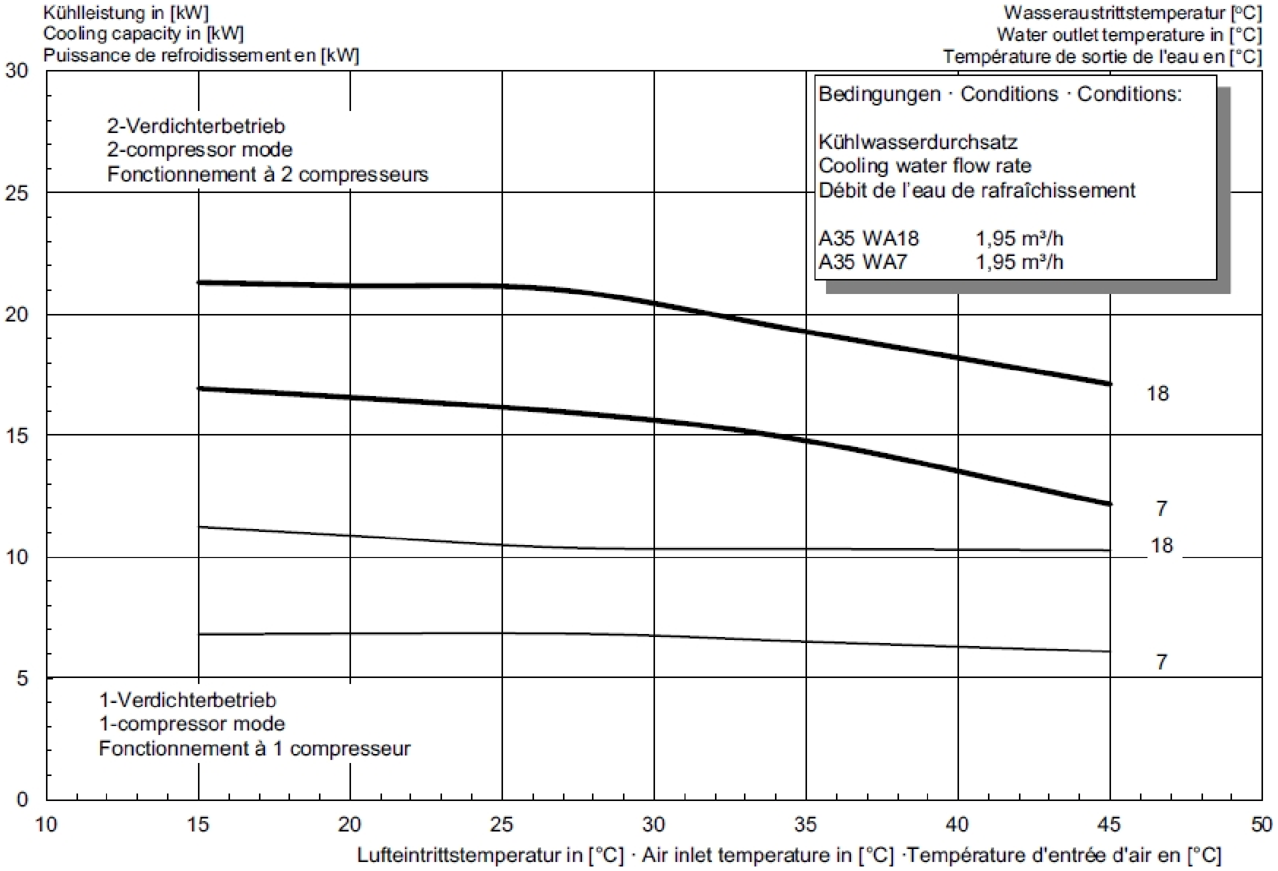

Leistungszahl (incl. Pumpenleistungsanteil)
Coefficient of performance (incl. power input to pump
Coefficient de performance (y compris part de consommation de la pompe)
10 9 8 7 6 5 4 3 2 1 0
35
45
55
-25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]

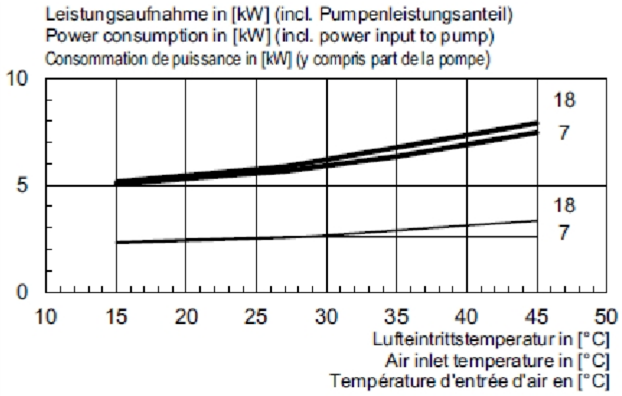

Druckverlust in [Pa]
Pressure loss in [Pa]
Perte de pression en [Pa]
Verflüssiger
Condenser
Condenseur
16000 14000 12000 10000 8000 6000 4000 2000 0
0,0 0,5 1,0 1,5 2,0
Heizwasserdurchfluss in [m³/h]
Heating water flow rate in [m³/h]
Débit d'eau de chauffage en [m³/h]

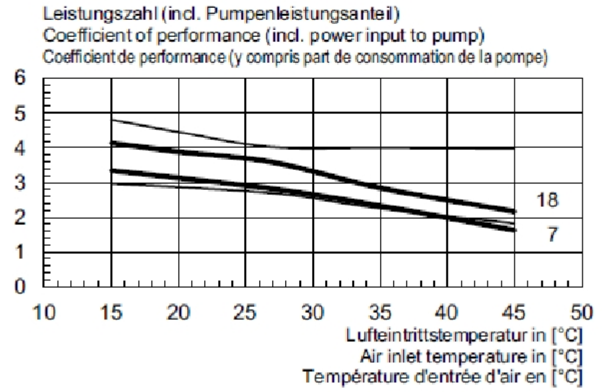
14.5.4 Heating operating limit diagram

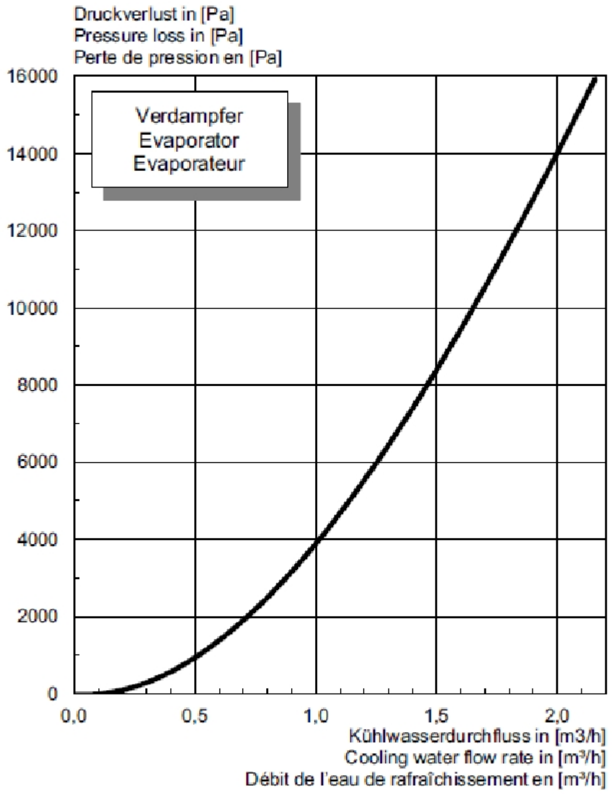


14.5.5 Cooling Curve

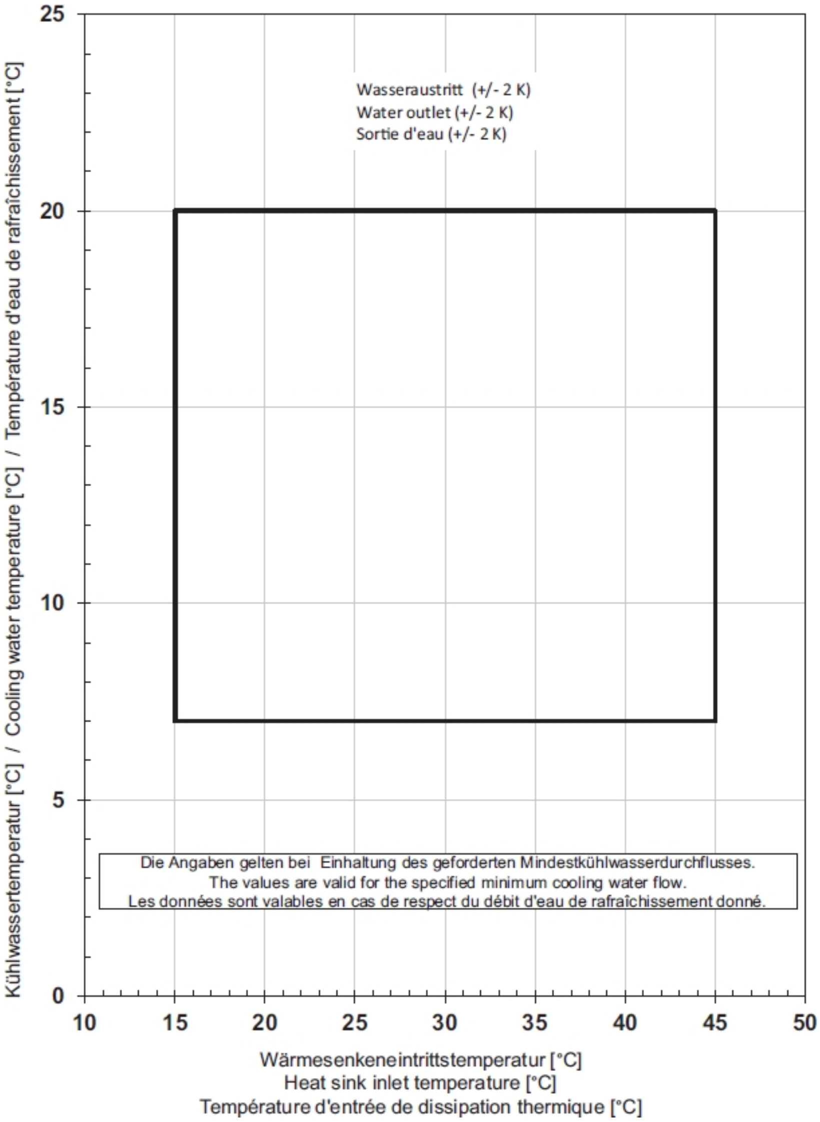



Leistungsaufnahme in [kW] (incl. Pumpenleistungsanteil)
Power consumption in [kW] (incl. power input to pump)
Consommation de puissance in [kW] (y compris part de la pompe)
10
5
0
18
7
18
7
10 15 20 25 30 35 40 45 50
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]


Leistungszahl (incl. Pumpenleistungsanteil)
Coefficient of performance (incl. power input to pump)
Coefficient de performance (y compris part de consommation de la pompe)
6
5
4
3
2
1
0
18
7
10 15 20 25 30 35 40 45 50
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]


Druckverlust in [Pa]
Pressure loss in [Pa]
Perte de pression en [Pa]
16000
14000
12000
10000
8000
6000
4000
2000
0
Verdampfer
Evaporator
Evaporateur
0,0 0,5 1,0 1,5 2,0
Kühlwasserdurchfluss in [m3/h]
Cooling water flow rate in [m³/h]
Débit de l'eau de rafraîchissement en [m³/h]

14.5.6 Cooling operating limit diagram



14.6 Technical product information LI 1826C

Device information

Dimensional drawing

Heating characteristic

curve

Operating limit diagram Heating Cooling

Curve Operating limit diagram Cooling

14.6.1 Device information

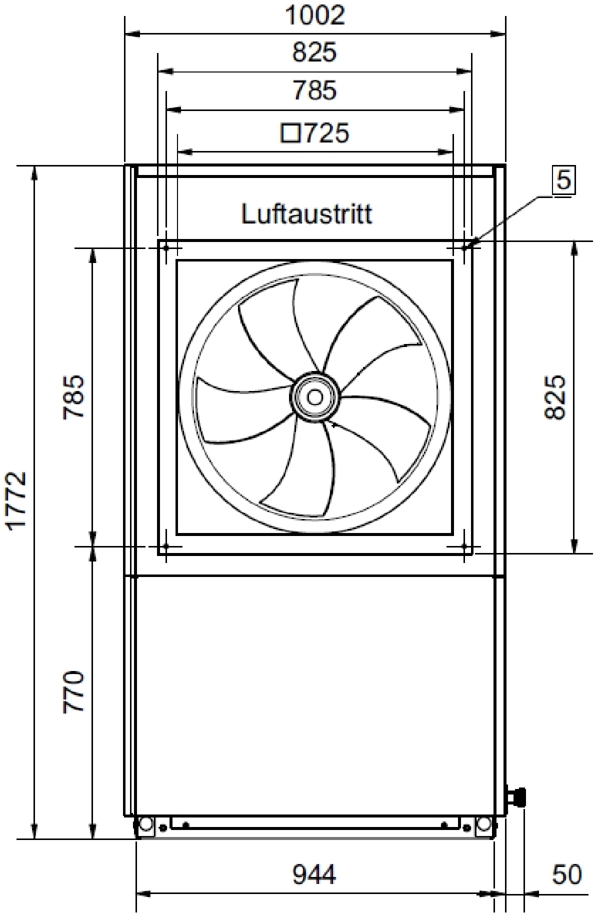
Type and order code		LI 1826C
1. design		
heat source		air
Seasonal coefficient of performance (COP) medium climate 35 °C / 55 °C		175 % / 135 %
Controller		WPM Touch
Installation location of heat generator		inside
Installation location Heat source		inside
Thermal energy metering		integrated
Performance levels		2
2. operating limits		
Heating water flow / return [1]	°C	up to 60 ± 2K / from 22
Air (heating) [1]	°C	-22 to +35
Cooling water flow	°C	+9 to +20
Air (cooling)	°C	+15 to +45
3. flow[2]/sound		
Heating water flow / internal pressure differential (A7 / W35 ... 30)	m^3/h / Pa	2,5 / 12500
Heating water flow / internal pressure differential (A7 / W45 ... 40)	m^3/h / Pa	2,4 / 11200
Heating water flow / internal pressure differential (A7 / W55 ... 47)	m^3/h / Pa	1,45 / 2300
Minimum heating water flow rate (A7 / W55/47)	m^3/h / Pa	1,45 / ---
Cooling water flow rate / internal pressure differential (A35 / W18 .. 23)	m^3/h / Pa	3,0 / 19300
Minimum cooling water flow rate	m^3/h / Pa	2,5 / 12500
Sound power level according to EN 12102 for A7/W55 inside/outside[3] [4] Normal operation	dB(A)	57 / 60
Sound power level according to EN 12102 for A7/W55 inside/outside[3] [4] lowered operation[5]	dB(A	55 / 58

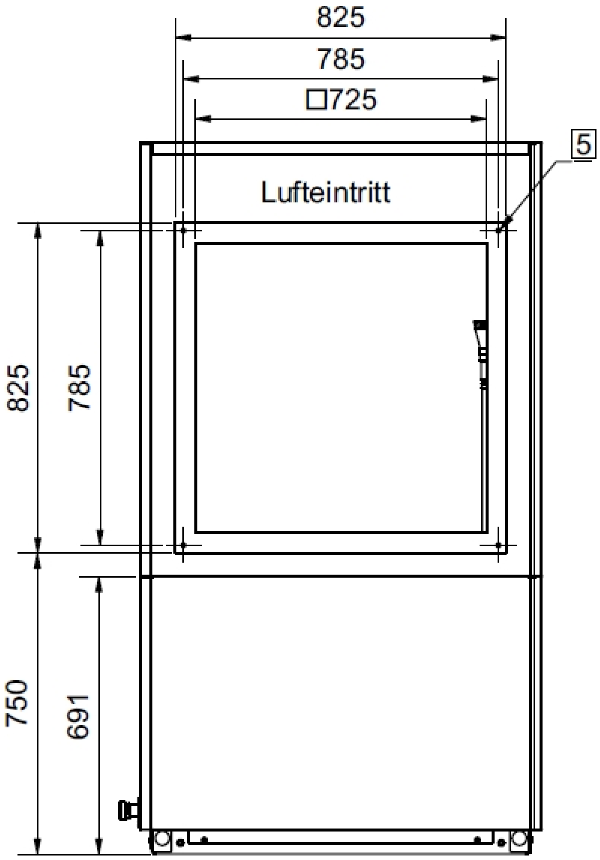
Type and order code		LI 1826C
Sound pressure level at 1 m distance inside[3 4 6 6]	dB(A	49
Air flow rate with external static pressure differential	m³/h / Pa m³/h / Pa	8300 / 0 7300 / 25
4. dimensions, weight and filling quantities		
Device dimensions[7]	H x W x D mm	1770 x 750 x 1000
Device connections for heating	inch	G 1 1/4"
Weight of the transport unit(s) incl. packaging	kg	326
Heat pump weight	kg	299
Refrigerant / total charge weight	Type / kg	R410A / 6.6
GWP value / CO2 equivalent	--- / t	2088 / 14
Hermetically closed refrigeration circuit		Yes
Lubricant / total filling quantity	Type / litre	Polyolester (POE) / 2.48
Volume of heating water in the interior	Litres	4,0
5. electrical connection		
Supply voltage / fusing / RCD type		3~/PE 400V (50Hz) / C20A / B
Control voltage / fusing / RCD type		1~/N/PE 230V (50Hz) / C13A / A
Degree of protection according to EN 60 529		IP 21
Starting current limitation		soft starter
starting current	A	26
Nominal power consumption A2 / W35 / max. intake[2]	kW	5,1 / 9,9
Nominal current A2 / W35 / cos φ	A / ---	9,2 / 0,8
Fan power consumption	W	up to 500
6. safety regulations		
Complies with European safety regulations[8]		see CE declaration of conformity
7 Other model features		
Type of defrosting (as required)		Cycle reversal

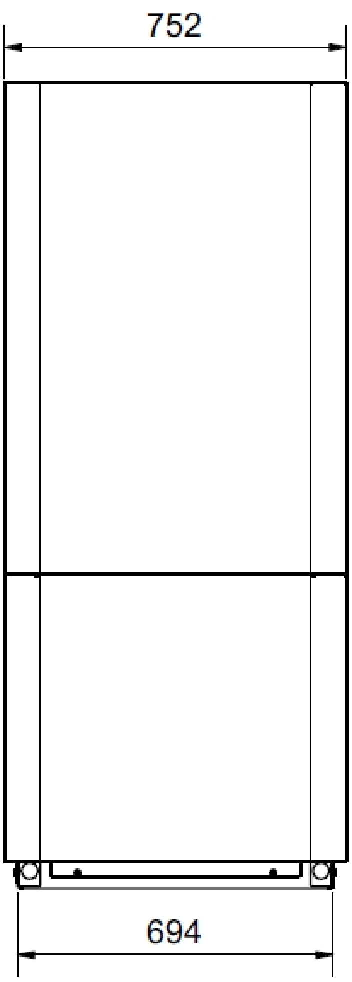
Type and order code		LI 1826C	
Frost protection Condensate tray / water in the appliance protected against freezing [9]		Yes	
Max. operating overpressure (heat source / heat sink)	bar	3,0	
8. power / coefficient of performance (COP)			
Heat output / coefficient of performance[2] [5]		EN 14511	
	performance level	1	2
A-7 / W35	kW / ---	9,8 / 3,4	18,3 / 3,2
A2 / W35	kW / ---	11,3 / 3,9	18,6 / 3,7
A7 / W35-30	kW / ---	14,2 / 4,8	(21,3 / 4,2)
Cooling capacity / coefficient of performance[2] [3]			
	performance level	1	2
A27 / W18	kW / ---	10,9 / 3,3	19,2 / 2,6,6
A27 / W7	kW / ---	7,9 / 2,5	16,5 / 2,3
A35 / W18	kW / ---	9,5 / 2,5	17,7 / 2,1
A35 / 7	kW / ---	7,0 / 1,9	14,9 / 1,9

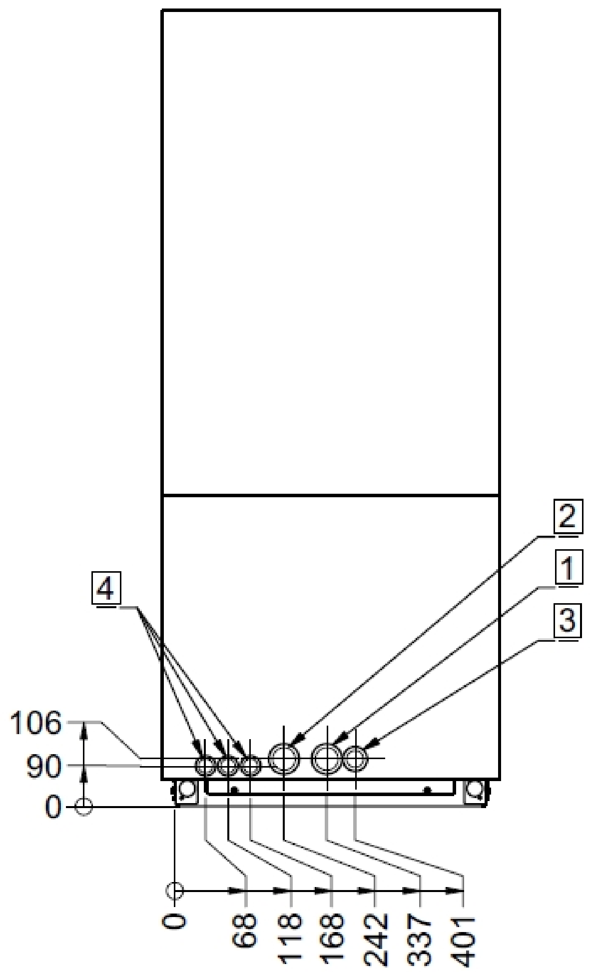
1. At air temperatures from -22°C to -5°C, flow temperature rising from 45°C to 60°C.
2. These specifications characterise the size and performance of the system in accordance with EN 14511. The bivalence point and control must be taken into account for economic and energy considerations. These specifications are only achieved with clean heat exchangers. Notes on maintenance, commissioning and operation can be found in the relevant sections of the installation and operating instructions. For example, A2/W35 means: heat source temperature 2 °C and heating water flow temperature 35 °C.
3. Tonality according to DIN 45681 Table 1 is ≤ 2 dB inside / ≤ 1 dB outside.
4. Sound measurement was carried out with two 90° bends and weather protection grille at the intake and air outlet.
5. In setback mode, the heat output and COP are reduced by approx. 5%
6. The specified sound pressure level represents the free-field level. Depending on the installation location, the measured value can deviate by up to 16 dB(A).
7. Please note that more space is required for pipe connection, operation and maintenance.
8. see CE declaration of conformity
9. The heat circulating pump and the heat pump manager must always be ready for operation.
10. Special operation, normal operation above 5 °C outside temperature 1 Compressor operation

14.6.2 Dimensioned drawing

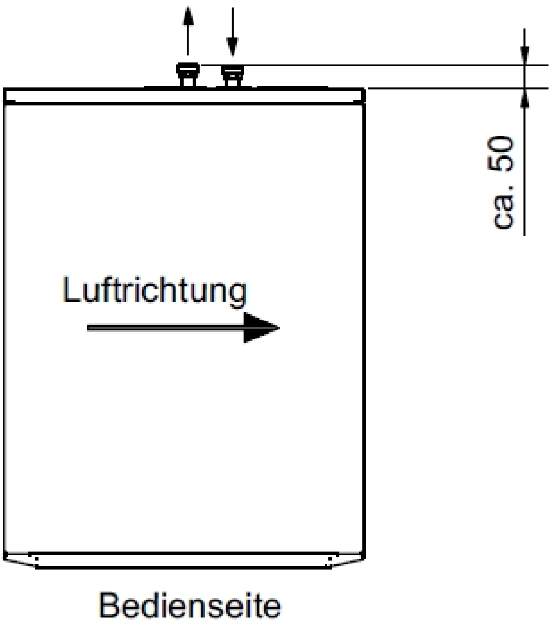




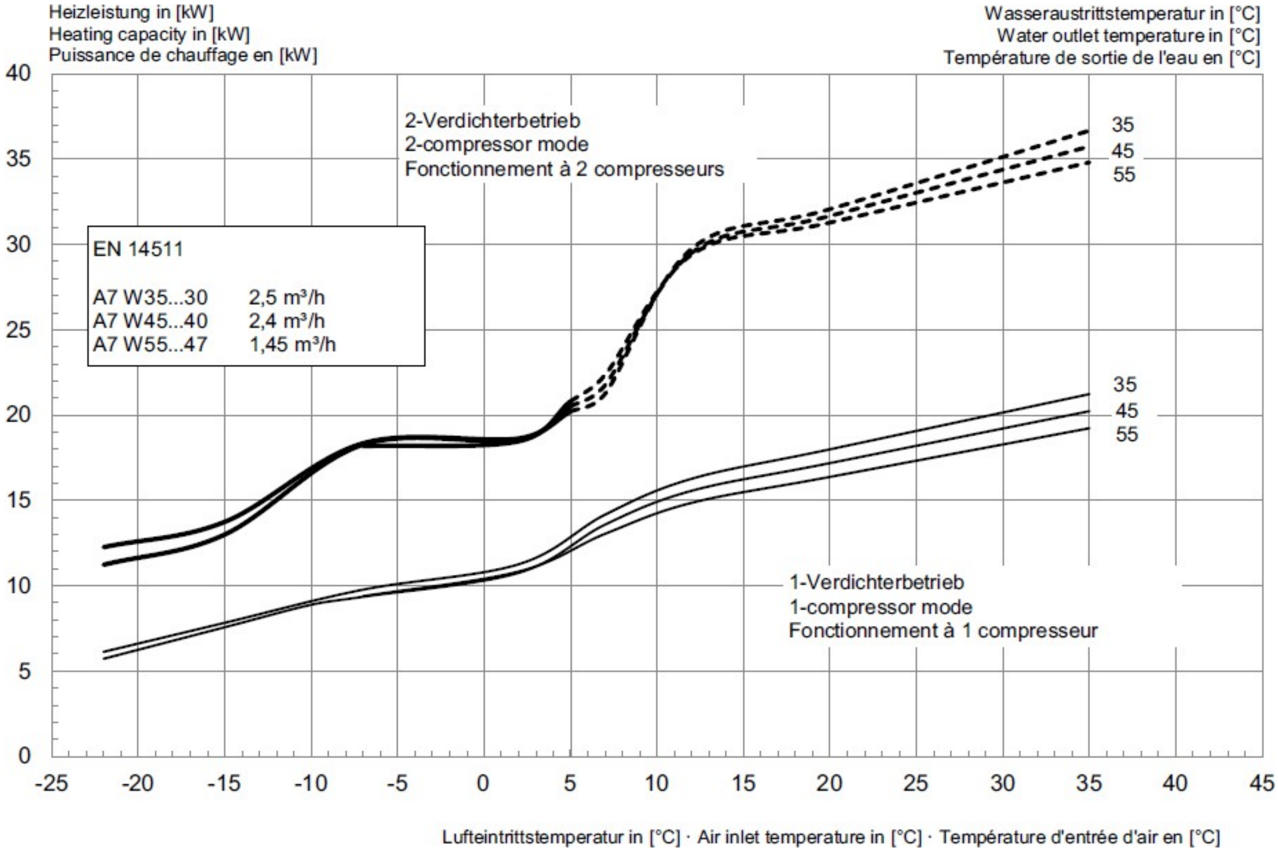


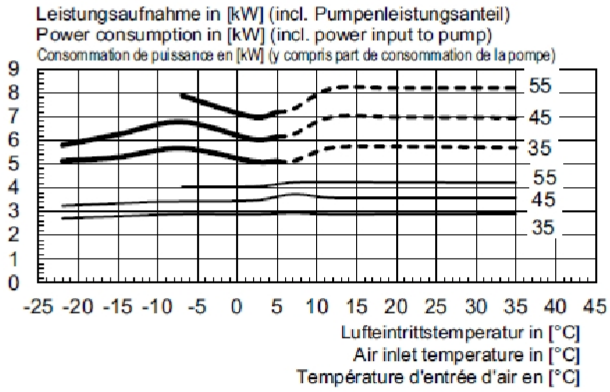


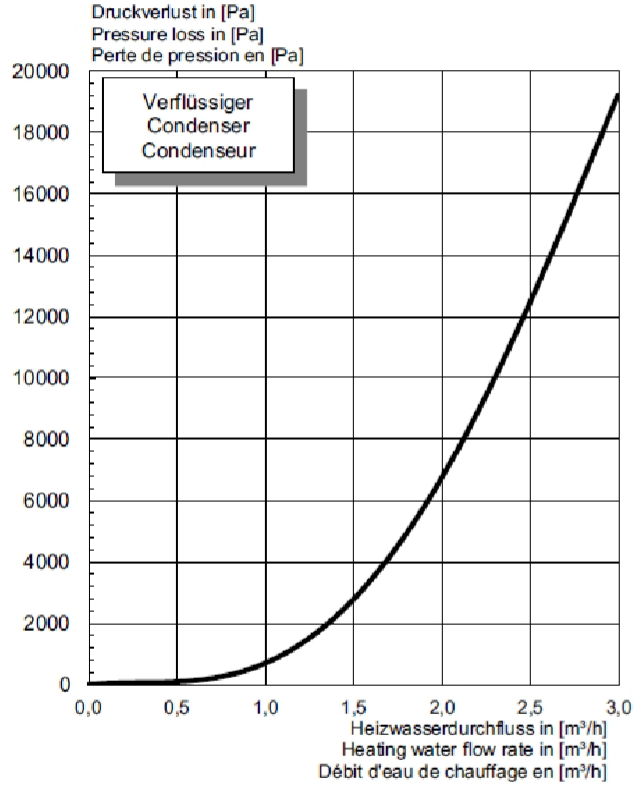
1. Flow output from the HP 1 1/4" external thread
2. Return input to the HP 1 1/4" external thread
3. condensate drain
4. Electric wires
5. 4x female thread M8x15

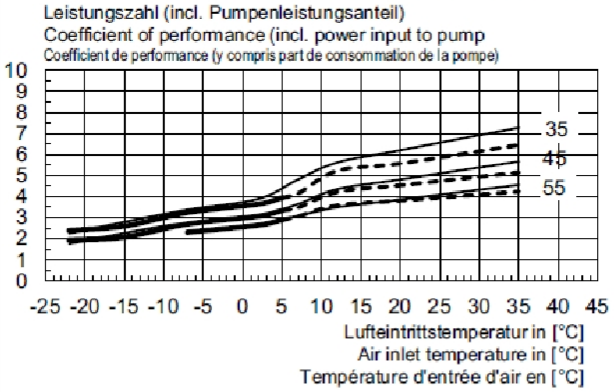


14.6.3 Heating characteristic curve

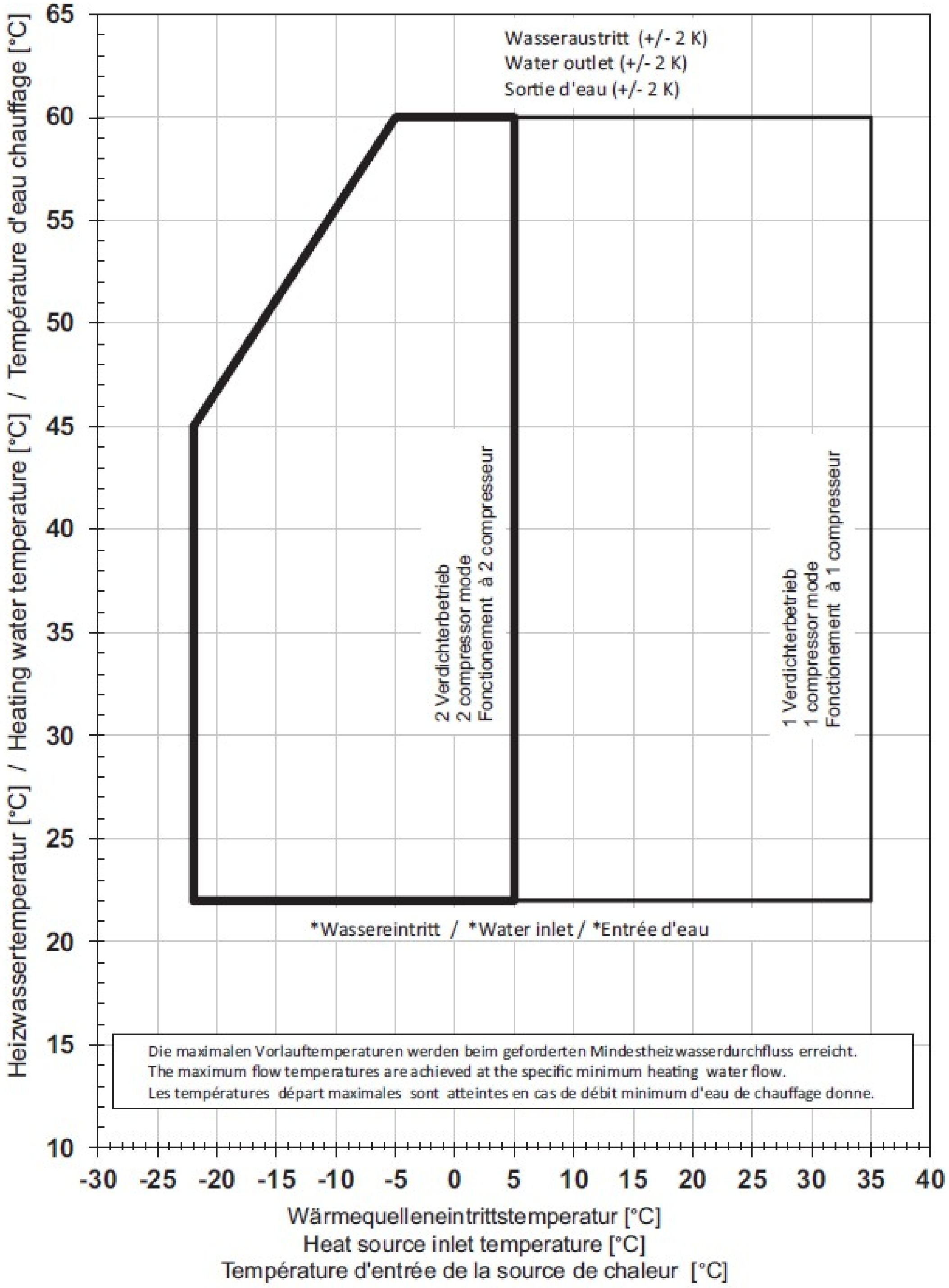



Leistungsaufnahme in [kW] (incl. Pumpenleistungsanteil)
Power consumption in [kW] (incl. power input to pump)
Consommation de puissance en [kW] (y compris part de consommation de la pompe)
55
45
35
55
45
35
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]


Druckverlust in [Pa]
Pressure loss in [Pa]
Perte de pression en [Pa]
Verflüssiger
Condenser
Condenseur
Heizwasserdurchfluss in [m³/h]
Heating water flow rate in [m³/h]
Débit d'eau de chauffage en [m³/h]

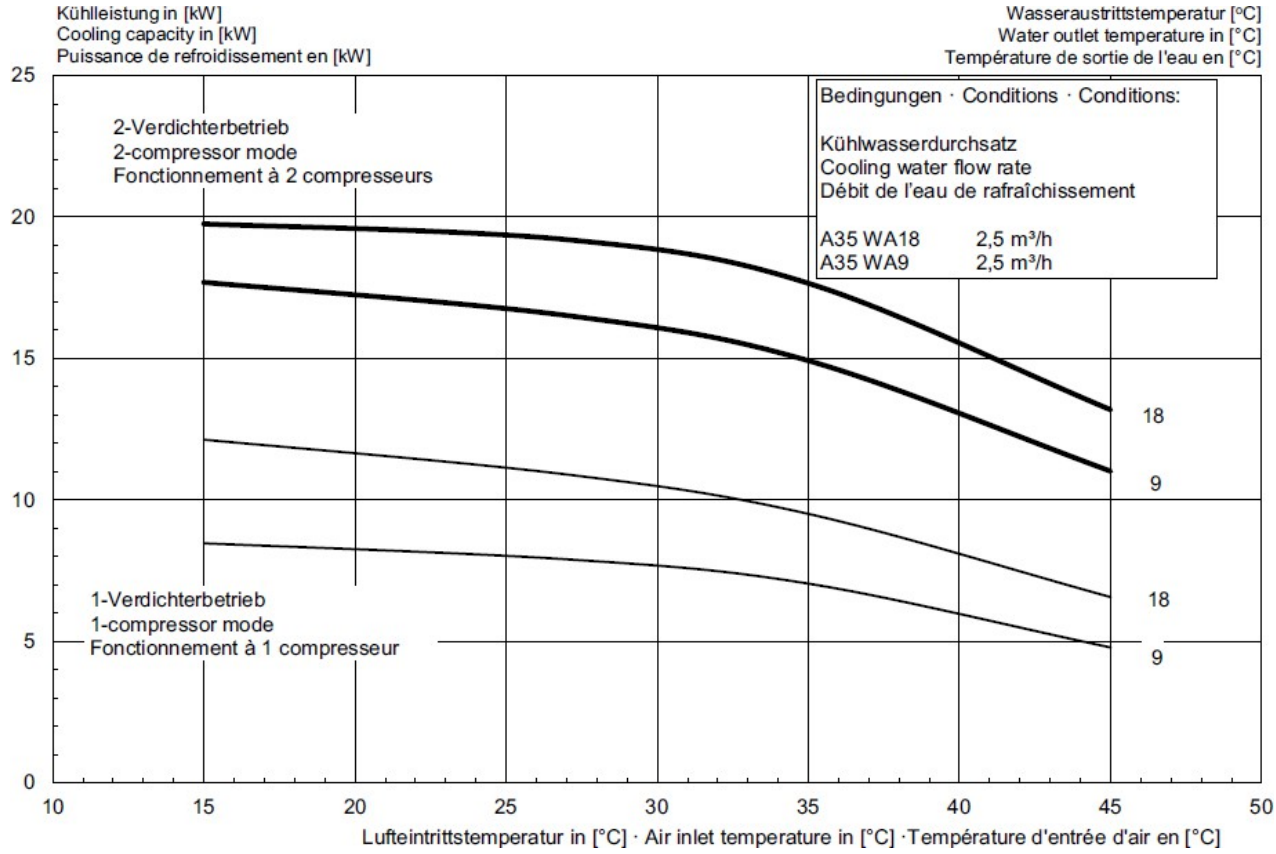

Leistungszahl (incl. Pumpenleistungsanteil)
Coefficient of performance (incl. power input to pump
Coefficient de performance (y compris part de consommation de la pompe)
35
45
55
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]

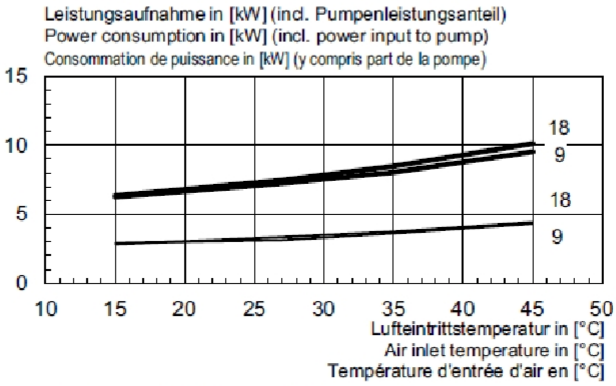
14.6.4 Heating operating limit diagram

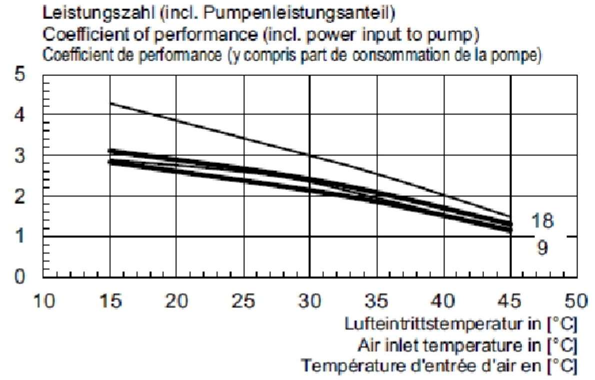


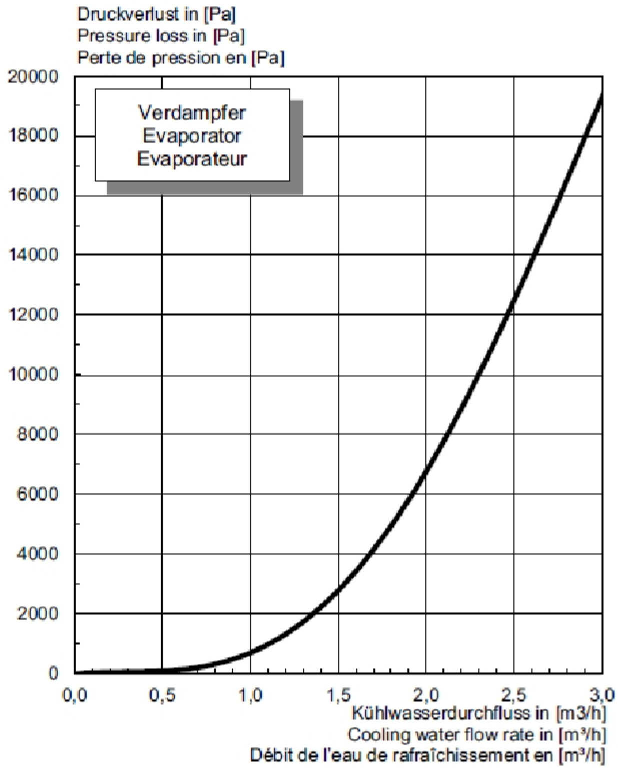
*Bei Luft/Wasser-Wärmepumpen stellt die minimale Heizwassertemperatur die Mindest-Rücklauftemperatur dar
*For air-to-water heat pumps the minimum heating water temperature is the minimum return temperature
*Sur les pompes à chaleur air / eau, la température minimale d'eau de chauffage correspond à la température retour minimale

14.6.5 Cooling Curve

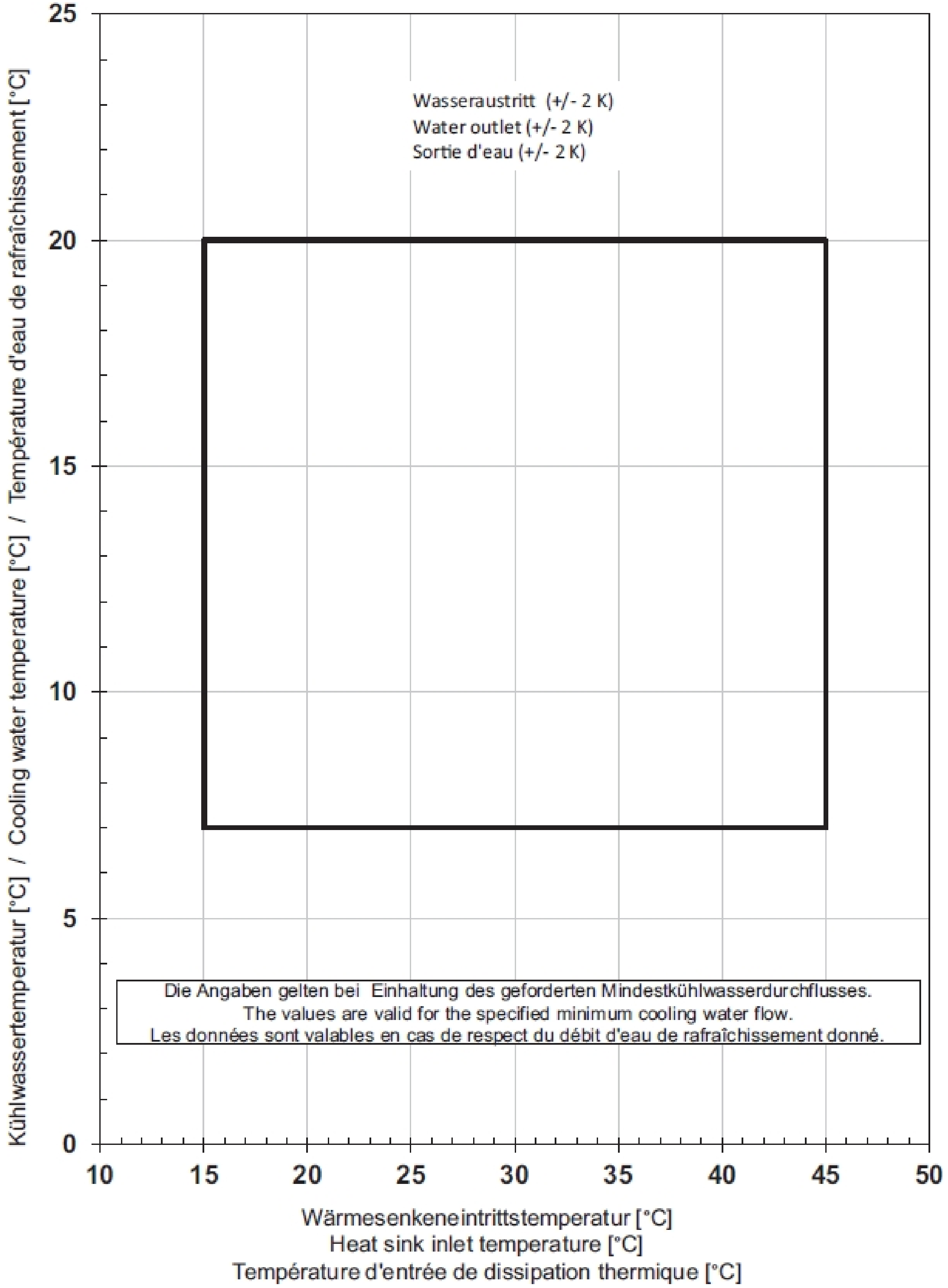



Leistungsaufnahme in [kW] (incl. Pumpenleistungsanteil)
Power consumption in [kW] (incl. power input to pump)
Consommation de puissance in [kW] (y compris part de la pompe)
15
10
5
0
10 15 20 25 30 35 40 45 50
18
9
18
9
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]


Leistungszahl (incl. Pumpenleistungsanteil)
Coefficient of performance (incl. power input to pump)
Coefficient de performance (y compris part de consommation de la pompe)
5
4
3
2
1
0
10 15 20 25 30 35 40 45 50
18
9
Lufteintrittstemperatur in [°C]
Air inlet temperature in [°C]
Température d'entrée d'air en [°C]


Druckverlust in [Pa]
Pressure loss in [Pa]
Perte de pression en [Pa]
Verdampfer
Evaporator
Evaporateur
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0,0 0,5 1,0 1,5 2,0 2,5 3,0
Kühlwasserdurchfluss in [m3/h]
Cooling water flow rate in [m³/h]
Débit de l'eau de rafraîchissement en [m³/h]

14.6.6 Cooling operating limit diagram



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D-95326 Kulmbach

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