

# TECHNICAL DOCUMENTATION INSTALLATION INSTRUCTIONS



## TERRA AL 50 Max

with NAVIGATOR 2.0 controller



Air-water-heat pumps for outdoor installation



## HEAT PUMPS FROM AUSTRIA

[www.idm-energie.at](http://www.idm-energie.at)

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**Important information on assembly and operation of the heat pump. These instructions must be observed!**

Subject to changes with regard to engineering and design!

# 1. General information



## 1.1. General information

By purchasing this system you have decided in favor of a modern and cost-effective heating system. Continuous quality controls and improvements as well as functional checks at our production facilities guarantee technically error-free equipment.

**Please read this documentation carefully. It contains important instructions for a correct installation, for the reliable and an economical operation of the system.**

## 1.2. Safety instructions

Installation and maintenance operations can be associated with dangers resulting from high system pressures, high temperatures and voltaged parts.

Heat pumps may only be installed by competent specialist and exclusively put into operation by a customer service specialist trained for that purpose by iDM-Energiesysteme GmbH.

If maintenance work is being done on the heat pump, disconnect the system and ensure that it is volt-free and provided with a safeguard to prevent unintentional restarting. Furthermore all safety instructions in the respective documentation or on instruction plates affixed to the heat pump itself resp. all other pertinent safety regulations shall be observed.

## 1.3. Transport and storage

In transporting the heat pump ensure that it is never tilted by more than 15°. Do not remove the transport packaging until the heat pump has reached its installation location. Heat pump components must not be stored outside. Heat pumps must not be stored in humid rooms or dusty environments. The transport fixtures as described in the following assembly instructions are used to transport the heat pump manually. The transport fixtures must not be used for transporting the components with a crane or similar hoisting equipment.

## 1.4. Sound emission

TERRA heat pumps are very quiet running due to the design. The heat pump is designed for outdoor installation only. Only the electricians, charge pump and other accessories are located in the boiler room. Nevertheless, it is important that the boiler room is located as far as possible outside the noise-sensitive living area and is equipped with a well-closing door!

## 1.5. Construction drying and floating screed heating

During construction drying or screed heating, the heat demand can exceed the heating capacity many times over due to the high moisture content of the structure. The heat pump system is not designed for this increased heat demand. In continuous operation of the heat pump, there is a risk of damaging icing of the outdoor unit due to the overload. For this reason, the increased heat demand must be covered by equipment to be provided by the customer.

## 1.6. Minimum heating temperature for air heat pumps

In order for air-source heat pumps to defrost properly, a minimum temperature of 20 °C on the heating side is required. This temperature must not be undershot during the heating season. If the temperature falls below this, it must be reheated to the minimum temperature of 20 °C using a bivalent heat generator. The air heat pump must not be switched off during the heating season

### 1.7. Service and maintenance

Regular maintenance as well as inspection and care of all important system parts guarantees safe and economical operation of the system in the long term. For this purpose, we recommend concluding a maintenance contract with the responsible customer service.

### 1.8. Cleaning

If necessary, the TERRA AL Max heat pump can be cleaned with a damp cloth. Cleaning agents containing solvents must not be used.

The disk packs of the air heat exchangers must be checked regularly and, if necessary, cleaned of impurities (e.g. leaves,...).

To prevent water damage, any dirt (e.g. leaves, ...) must be regularly removed from condensate trays and condensate drains. This ensures proper drainage of the condensate.

### 1.9. Ice-covering outdoor unit

Depending on the weather and outdoor humidity, it may happen that there will be formed an icy covering on the protective grids of the heat pump. This effect is common occurring in nature. This covering must be removed by the heat pump operator during this weather periods.



Since the temperatures in heating mode inside the outdoor unit are even under the surrounding temperature, it may come to a condensation on the cover of the outdoor unit.

### 1.10. Installation notes



- The TERRA AL Max heat pump is installed outside. The electrical system, the charge pump and accessories must be installed in a frost-proof room! (Room temperature must be between 5 °C and 25°C!)
- The installation of the internal parts in wet and humid rooms or in rooms subject to dust or explosion hazards is not permitted.
- In the case of danger, leave the installation site immediately.
- The control cabinet must not be installed in rooms with high EMC load!
- When installed near the coast, a minimum distance of 5 km from the coast must be maintained. If this safety distance is not observed, increased corrosion must be expected. These cases are excluded from the warranty.



All hydraulic pipings and all wall ducts must be thermally insulated and sounddecoupled. Water piping must be designed frost-proof.

### 1.11. Notes on the protection of the environment



Heat pumps are electronic devices of high-quality material which must not be disposed of in the same way as household waste. They must be disposed of in a professional and appropriate manner pursuant to the regulations of the local authorities. Disposal contrary to the regulations may lead damage the environment and health with the exception of sanctions imposed on law breakers.

### 1.12. Installation of additional components

The installation of additional components which have not been verified with the equipment may impair the function. No warranty or liability shall be assumed for any damage resulting therefrom.

### 1.13. Standards and guidelines



When installing the heat pump, observe all applicable national and international regulations on laying, installation, accident prevention and safety of piping systems and electrical components and devices as well as the instructions in these installation instructions.

That includes:

- the generally valid accident prevention and safety regulations
- the provisions regarding environmental protection
- the regulations of the professional associations
- the pertinent laws, standards, regulations and provisions, e.g. DIN, EN, DVGW, VDI and VDE.
- provisions of the local public utilities.

### 1.14. Description

TERRA AL Max heat pump is a compact air source heat pump for outdoor installation. It is operated from a remote wall cabinet installed inside the building. Heating, cooling and domestic hot water preparation can be performed as standard.

The TERRA AL Max heat pump operates with two compressors and two separate refrigeration circuits. This allows a capacity-dependent stage switching of the two compressors. While one refrigeration circuit operates in heating mode, the second refrigeration circuit can perform defrosting. In addition, the two separate refrigeration circuits ensure maximum operational reliability. A large number of SRS measures (sound reduction measures) ensure low sound levels.

The special compressors work with a refrigerant intermediate injection. This means that flow temperatures of 62 °C can be achieved even at very low outside temperatures (down to -20 °C). The sophisticated control program of the built-in NAVIGATOR® is tailored to efficient heat pump operation. The entire heat pump system is controlled according to demand and is equipped with a large number of monitoring, safety and alarm functions.

The heat pump is able to control one heating circuit without any accessories. When using heating circuit control modules up to 6 heating circles can be controlled.

In addition, the NAVIGATOR® offers a wide range of possible applications such as connection to [www.myidm.at](http://www.myidm.at) for remote maintenance and remote control via smartphones, the PC or PV integration.

The TERRA AL Max is filled with the safety refrigerant R410A at the factory. The NAVIGATOR® has an internal heat quantity measurement, no flow meters are required anymore.

The flow monitor supplied is installed in the heat pump return in a horizontal position.



The lower the maximum flow temperature, the higher the coefficient of performance of the heat pump!

### 1.15. Proper use

The heat pump may only be operated in a closed heating system installed by a specialist, in compliance with the installation and operating instructions. The stationary installation and the use of system-specific, approved components by the customer is a prerequisite for proper use. The heat pump may only be used for space heating, space cooling and for supplying a water heater. The heat pump may only be operated within the specified application limits. Commercial or industrial use for a purpose other than space heating, space cooling or for supplying a water heater is not permitted (such as for production processes, cold storage rooms or houses, food refrigeration, etc.). Misuse of the device or improper operation (e.g. opening the heat pump by system operator) is not permitted and leads to exclusion of liability.

### 1.16. Scope of delivery

- 2 pcs. suction gas cooled scroll capsule compressors
- 2 pcs. electronic expansion valves
- 2 pcs. speed controlled axial fans
- copper welded stainless steel plate exchanger as condenser
- switching valve for defrost and cooling operation
- 2 pcs. starting current limiter
- 2 pcs. crankcase heaters
- 2 pcs. condensate collecting trays
- 2 pcs. condensate drain hoses (1,5 m)
- 2 pcs. condensate drain heaters
- optimal heat and sound insulated housing
- sensor package (supplied loose)
- flow monitor (loose)
- check valve (loose)
- filter ball valve
- wall cabinet with Navigator 2.0 control and color 7" touch display

### 1.17. Accessories

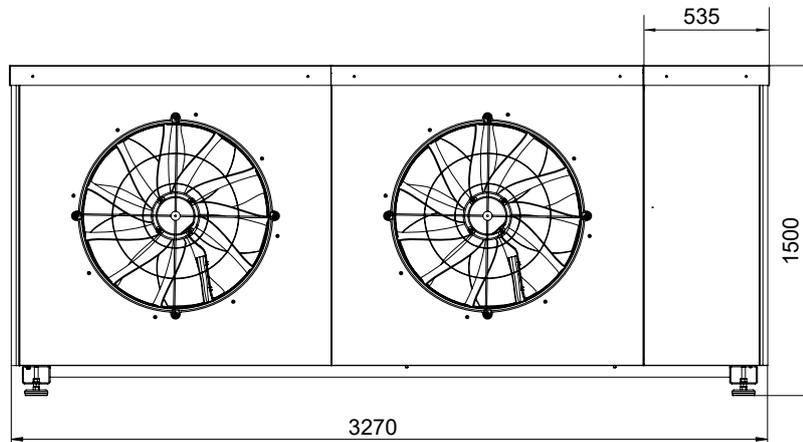
see iDM price list

## 2. Technical data

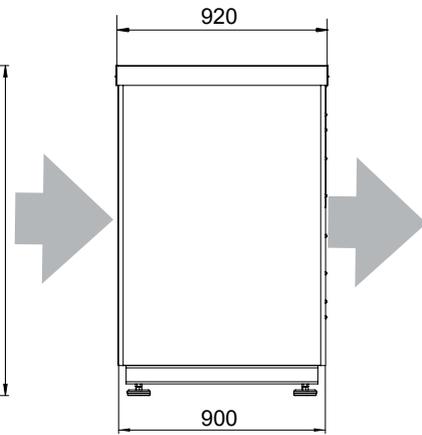


### 2.1. Dimensions TERRA AL 50 Max

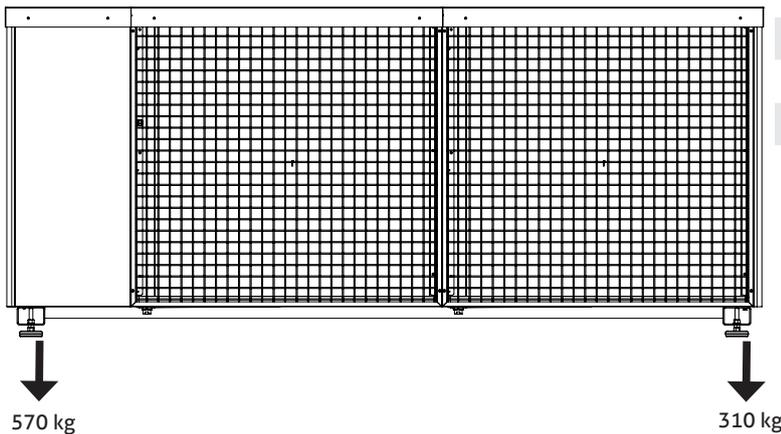
front view (air outlet)



side view



rear view (air inlet)



dimensions: HxWxD [mm] 1500x3270x920

total weight [kg] 880

refrigerant side [kg] 570

evaporator side [kg] 310

### 2.2. Dimensions electrical cabinet



dimensions: HxWxD [mm] 654x560x190

weight [kg] 30



## 2.3. Technical data

heat pump type		TERRA AL 50 Max	
energy efficiency class		 35 °C	 55 °C
performance data heating	unit		
heating capacity at A2°C/W35°C	kW	50,3	
heating capacity at A7°C/W35°C	kW	69,4	
heating capacity at A-7°C/W35°C	kW	45,5	
heating capacity at A2°C/W35°C (1 compressor)	kW	25,1	
heating capacity at A7°C/W35°C (1 compressor)	kW	34,6	
power consumption at A2°C/W35°C	kW	13,8	
power consumption at A7°C/W35°C	kW	15,6	
power consumption at A-7°C/W35°C	kW	14,7	
power consumption at A2°C/W35°C (1 compressor)	kW	6,9	
power consumption at A7°C/W35°C (1 compressor)	kW	7,8	
COP at A2°C/W35°C	-	3,64	
COP at A7°C/W35°C	-	4,45	
COP at A-7°C/W35°C	-	3,10	
COP at A2°C/W35°C (1 compressor)	-	3,64	
COP at A7°C/W35°C (1 compressor)	-	4,44	
<b>performace data cooling</b>			
cooling capacity at A35°C/W18°C	kW	70,5	
cooling capacity at A35°C/W7°C	kW	49,2	
cooling capacity at A35°C/W18°C (1 compressor)	kW	35,1	
power consumption at A35°C/W18°C	kW	21,3	
power consumption at A35°C/W7°C	kW	20,8	
power consumption at A35°C/W18°C (1 compressor)	kW	10,7	
EER at A35°C/W18°C	-	3,31	
EER at A35°C/W7°C	-	2,36	
EER at A35°C/W18°C (1 compressor)	-	3,29	

*Detailed data according the energy efficiency are shown in the appendix.*



## Technical data

heat pump type		TERRA AL 50 Max
<b>sound data according EN12102<sup>3</sup></b>	<b>unit</b>	
sound power level (full load)	dB(A)	73
sound power level (part load)	dB(A)	70
noise-reduced operation full load	dB(A)	71

The sound tool of the German heat pump association, which is available online, can be used to calculate the required sound pressure levels.

hydraulic and refrigerant data	unit	TERRA AL 50 Max
maximum flow temperature <sup>1</sup>	°C	62
nominal flow rate heating water (A7°C/W35°C, ΔT=5 K)	m <sup>3</sup> /h	12,90
flow rate heating water (A7°C/W55°C, ΔT=8 K)	m <sup>3</sup> /h	7,30
pressure loss heating side at nominal flow rate	kPa	24,4
flow- and return connections heating side	R	2" AG
built-in condensate drain, hose connection	mm	Ø 35
max. operating pressure heating side	bar	3
nominal air flow rate (A7°C/W35°C)	m <sup>3</sup> /h	2 x 11.000
refrigerant		R410A
number of compressors		2
number of refrigerant circles		2
quantity of refrigerant	kg	2 x 17,80
GWP <sup>2</sup>		1924
quantity of compressor oil (POE160SZ)	lt.	2 x 3,3

<sup>1</sup> The 62°C refers to the max. heat pump flow temperature. The resulting lower hot water temperature must be checked in relation to compliance with the drinking water.

<sup>2</sup> GWP value according to 5th IPCC Assessment Report

<sup>3</sup> uncertainty of measurement ± 1.5 dB(A)

electrical data	unit	TERRA AL 50 Max
electrical power supply compressor/fan	V/Hz	3~ 400/50
electrical power supply heating element (on site)	V/Hz	3~ 400/50
electrical power supply controller	V/Hz	1~ 230/50
initial current (one compressor)	A	54,40
operating current compressor	A	2 x 21,61
maximum operating current fan	A	2 x 1,45
maximum power consumption fan	kW	2 x 0,84
fuse power supply	A	C/K 63
fuse control supply	A	B/Z 13
fuse heating element up to 9 kW (on site)	A	B/Z 13
protection class outdoor unit	-	IP 44
protection class indoor unit	-	IP 20

## 2.4. Performance data

TERRA AL 50 Max - 2.0

TERRA AL 50 Max - 2-compressors												
AT[°C]	W35			W45			W55			W62		
	Q [kW]	P [kW]	COP									
20	93,00	16,80	5,54	87,80	19,90	4,41	82,60	23,00	3,59	78,40	24,20	3,24
15	85,10	16,50	5,16	80,80	19,30	4,19	76,40	22,20	3,44	72,40	23,50	3,08
12	80,20	16,20	4,95	76,80	19,20	4,00	73,40	22,20	3,31	69,10	23,50	2,94
10	76,00	16,00	4,75	73,50	19,10	3,85	71,00	22,20	3,20	66,50	23,40	2,84
7	69,40	15,60	4,45	67,60	18,60	3,63	65,80	21,70	3,03	62,20	23,10	2,69
2	50,30	13,80	3,64	49,00	16,50	2,97	47,70	19,20	2,48	44,00	21,30	2,07
0	49,23	13,99	3,52	48,11	16,72	2,88	46,99	19,47	2,41	43,42	21,46	2,02
-7	45,50	14,66	3,10	45,00	17,50	2,57	44,50	20,40	2,18	41,40	22,00	1,88
-15	38,60	14,60	2,64	38,20	17,80	2,15	37,70	20,80	1,81	38,20	23,10	1,65
-20	36,60	14,80	2,47	36,20	17,70	2,05	35,80	20,70	1,73	37,00	23,80	1,55

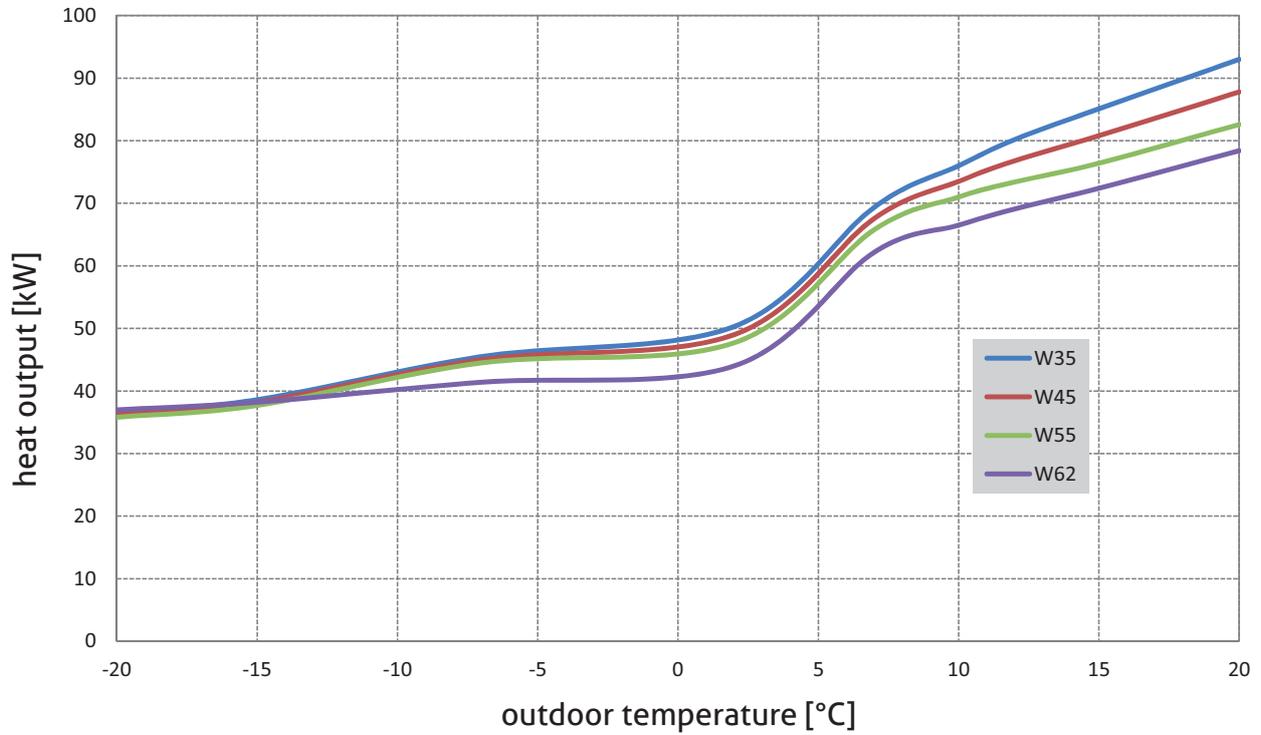
TERRA AL 50 Max - 1-compressor												
AT[°C]	W35			W45			W55			W62		
	Q [kW]	P [kW]	COP									
20	46,40	8,40	5,52	43,80	10,00	4,38	41,10	11,50	3,57	39,10	12,20	3,20
15	42,50	8,30	5,12	40,30	9,70	4,15	38,10	11,10	3,43	36,10	11,80	3,06
12	40,00	8,10	4,94	38,30	9,60	3,99	36,60	11,20	3,27	33,40	11,80	2,83
10	37,90	8,00	4,74	36,70	9,60	3,82	35,40	11,10	3,19	33,20	11,70	2,84
7	34,60	7,80	4,44	33,70	9,30	3,62	32,80	10,90	3,01	31,00	11,60	2,67
2	25,10	6,90	3,64	24,40	8,30	2,94	23,80	9,70	2,45	21,90	10,60	2,07
0	24,57	6,99	3,52	23,96	8,41	2,85	23,44	9,81	2,39	21,61	10,71	2,02
-7	22,70	7,30	3,11	22,40	8,80	2,55	22,20	10,20	2,18	20,60	11,10	1,86
-15	19,20	7,60	2,53	19,00	8,60	2,21	18,70	10,50	1,78	19,00	11,60	1,64
-20	18,20	7,40	2,46	18,00	8,90	2,02	17,80	10,40	1,71	18,40	12,00	1,53



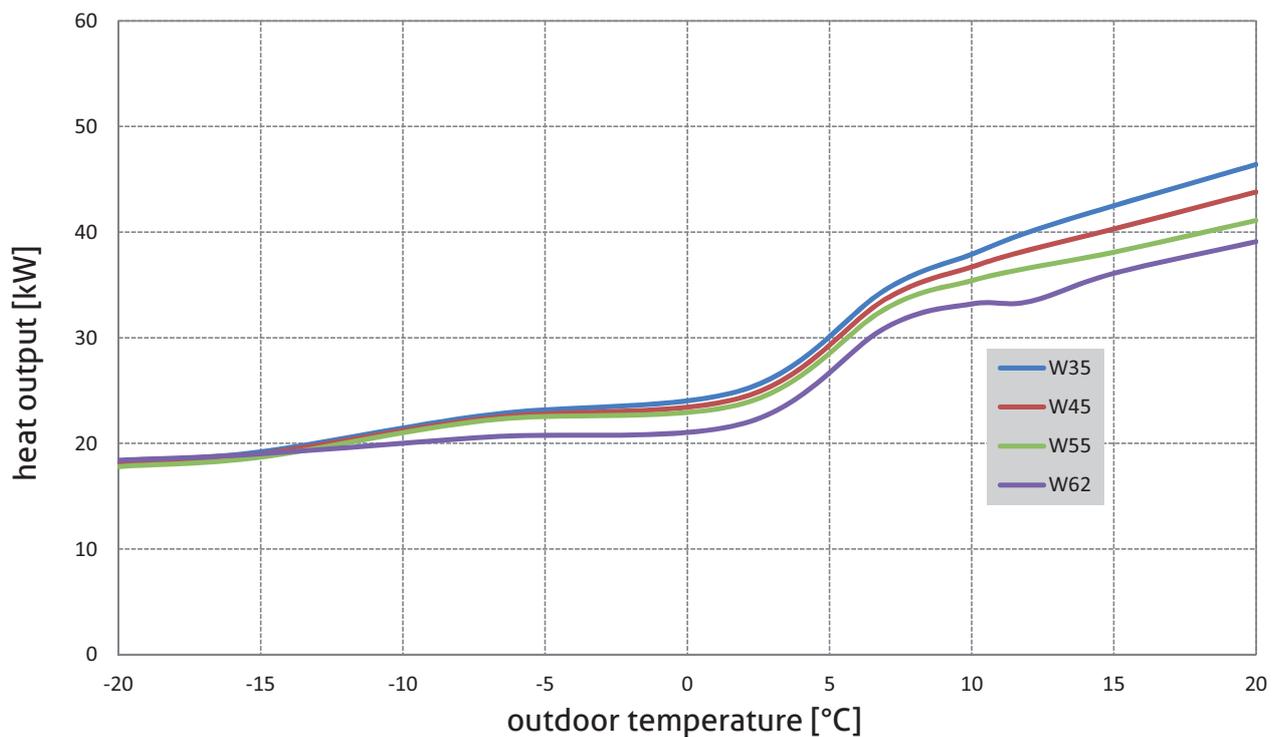
# 3. Dimensioning



## 3.1. Heat output at different flow temperatures and full power (2-stages)



## 3.2. Heat output at different flow temperatures and partial load (1-stage)



### 3.3. Limitation of use

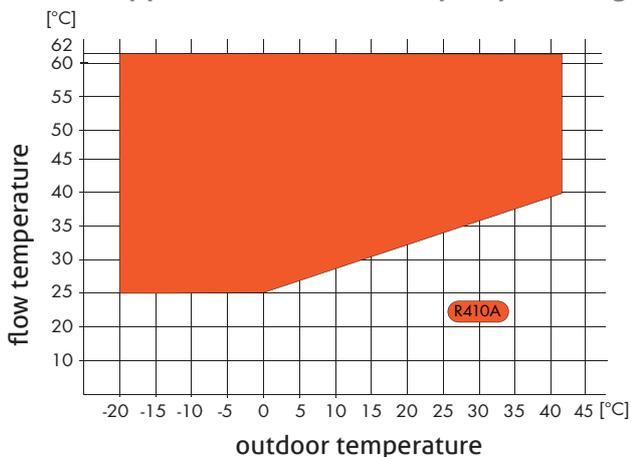
#### 3.3.1. General

The ambient temperature at the outdoor unit must not exceed 47°C. If the heat pump is in operation, the following operating limits apply.



The maximum possible operating temperature depends on the hydraulic design of the building and the configuration of the heat pump system. This is usually 5-8 K below the maximum heat pump flow temperature.

#### 3.3.2. Application limits heat pump heating

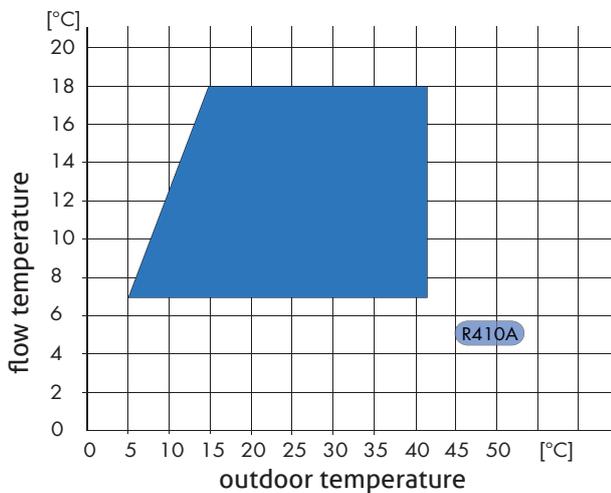


If the outdoor temperatures or the flow temperatures of the application range are exceeded or not reached, the compressor switches off. Heat pump operation outside these limits is not possible. If bivalence is available and configured in the Navigator control, it is switched to.

#### 3.3.3. Maximum temperature in the distribution and storage system

The maximum heat pump flow temperature is the highest temperature that the heat pump can produce. Due to the spread between the flow and return of the heat pump, as well as the control-related switching hysteresis, it is not possible to reach this temperature in the heating circuit or in the storage system.

### 3.3.4. Application limits heat pump cooling



### 3.3.5. Minimum temperature in the distribution and storage system

The minimum heat pump flow temperature is the lowest temperature that the heat pump can produce. Due to the spread between the flow and return of the heat pump and the control-related switching hysteresis, it is not possible to reach this temperature in the cooling circuit or in the storage system.



The lowest possible operating temperature depends on the hydraulic design of the building and the configuration of the heat pump system. This is usually 5-8 K above the minimum heat pump flow temperature.



If the dew point limits are not observed in the design, this cannot be corrected by adjusting the control parameters. The distribution system thus does not allow proper cooling.

The dew point temperature can be reduced by using a room dehumidifier or a ventilation system. This can ensure a more stable cooling operation.

Depending on the room humidity, typical supply temperatures of surface cooling systems are 19 °C - 23 °C. The higher the flow temperature, the lower the cooling capacity. In order to achieve the required cooling capacity at high cooling flow temperatures, the required capacity can be compensated by "increasing the cooling area" or by laying the floor or ceiling cooling pipes closer together. The distribution system must be designed so that it can operate at temperatures above the dew point.



The floor structure and the floor covering must be suitable for cooling. Otherwise, damage cannot be ruled out.



If the outdoor temperatures or the flow temperatures of the application range are exceeded or not reached, the compressor switches off. Heat pump operation outside these limits is not possible.

### 3.3.6. Limitation of cooling operation by dew point temperature

If a heat pump system supplies a water-borne cooling distribution system (underfloor heating, ceiling cooling or similar), the dew point is a limiting factor for the operation of the cooling circuits. The dew point depends on the relative room humidity and the occurring surface temperature (flow temperature). If the supply temperature falls below the dew point, condensate forms and moisture damage or mold growth can occur. To avoid this, the supply temperature must be 1-2 K above the dew point. Operation below the dew point temperature is not possible, cooling is aborted.



# 4. Installation



## 4.1. Installation instruction

The TERRA AL 50 Max is only designed for exterior installation. Special actions has to be set for frost protections.

Despite the possibility of speed reduction, the heat pump should not be positioned adjacent to a living room or bedroom. The relevant installation guidelines conforming to EN 378, for example, must be observed.

## 4.2. Customer preparation

### Foundation:

The foundation should be level and stable. A base can be provided by the customer or a paving slab can be laid on a gravel base. The air source heat pump should be positioned slightly higher than the immediate site profile (minimum 200 mm).

If vibrations of the heat pump are transmitted via floors, ceilings, walls or other solids, this is referred to as structure-borne noise.

To avoid this noise inside buildings or structure-borne noise transmission, the heat pump has to be decoupled from the building. e.g. installation on a roof.

### Space requirements:

The heat pump must be positioned so that there is sufficient space for air intake and air outlet (see minimum distances for exterior installation). It should not be possible for the inlet and exhaust air openings to become blocked by snow, leaves, etc.

Installation in wall niches is to be avoided.



In order to avoid damage, caused by animals such as rodents or insects, all cable and pipe openings have to be closed.

### Inlet air:

The inlet air must be free of impurities such as sand and caustic materials such as ammonia, sulphur, chlorine, etc.

## 4.3. Condensation run-off

Air source heat pumps generate condensed water when in operation. Per defrosting cycle, i.e. within 2 minutes up to 15 lt. of condensate can accumulate. The condensation outlet should be conveyed into the waste water channel by using the appropriate pipe diameter for the machine.

The condensate must be able to run of also at temperatures below 0 °C. The easiest way to guarantee is by using the mounted heating cable, activated by the Navigator control.

## 4.4. Heating connections

The heating connections must be installed with the flexible hoses which are available as accessories. These hoses are factory insulated.

In general, all lines outdoors should be kept as short as possible. All pipes and wall openings must be professionally heat-insulated and frost-protected during installation.

## 4.5. Air outlet

The air outlet side must be the side that is not facing the building. To avoid an air short circuit, the air outlet side must be accessible and must not be narrowed or obstructed.

There is an increased risk of frost on the air outlet side and ice may form. Roof gutters, water-carrying pipes, water-containing containers, as well as occupied areas or walkways must not be located in the immediate vicinity of the air outlet side.

#### 4.6. Acoustic evaluation

##### Sound-power-level

The sound power is the sound energy per second emitted of a noise source. The sound power level is specific to the source of sound, independent of distance and direction and enables an easy comparison of different sound emitting devices. The sound power can only be determined via mathematical calculation according to international standards of the series ISO 3740 - based on sound pressure level measurements - as well as ISO 9614, which is based on the measurement of sound intensity. The sound power level of the heat pumps can be found in the technical specifications.

##### Sound-pressure-level

In contrast to the sound power level, the sound pressure level, which is caused by a noise source can be measured. The measured sound pressure is dependent on the distance from the noise source and the receiver location (geometrical divergence) as well as the local conditions. As the sound pressure level is a measure of the loudness of noise sensed by humans, the legislation defines limit values, that must not be exceeded.

##### Sound-propagation-outdoor

With increasing distance from a point noise source, the sound power is distributed on an increasing area due to spherical spreading. Therefore, the sound pressure level is continuously decreasing with increasing distance from the noise source to receiver location. Doubling the distance leads to a reduction of the sound pressure level of 6 dB(A). Besides the distance from the installation site of the heat pump the sound, the installation situation and local conditions also have significant impact on the resulting sound pressure level at the relevant place of immission. Major factors of influence are:

Sound attenuation by massive barriers e.g. buildings, walls or different terrain.

- reflection on acoustically hard ground e.g. glass facade and stone surfaces
- attenuation due to sound absorbing porous surfaces e.g. grass, trees
- reinforcement/reduction of by wind speed/direction

##### Noise-Immission

The noise caused by an source at a certain place is expressed as Immission, the corresponding sound pressure level is called Immission level. The immission level at the relevant place of immission can either be determined by measurements or calculation e.g. forecasting method according „TA Lärm“ (German Noise Prevention Code) especially, which is especially useful at the stage of planning. According to this method of calculation, the expected sound pressure level is calculated on the basis of the sound power level of the heat pump, the distance of the heat pump to the receiver location and the installation situation (directivity correction  $D_c$ ) of the relevant place of immission according the following formula:

$$L_{Aeq(sm)} = L_{WAeq} + D_c - 20 \cdot \log(s_m) - 11 \text{ dB}$$

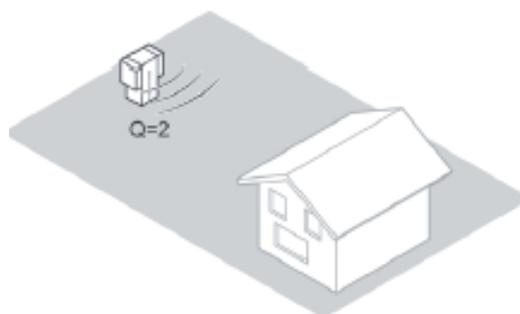
$L_{WAeq}$  = mean A-weighted sound pressure level [dB]

$D_c$  = directionality correction [-]

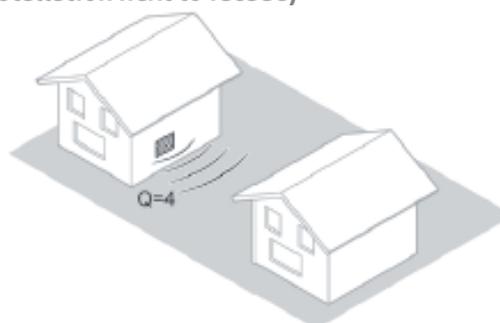
$S_m$  = distance from noise source to receiver location [m]

The following figures show the different installation situations of heat pumps and the corresponding directivity correction.

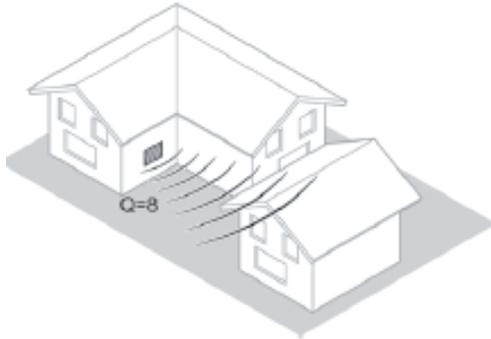
##### 1: Spherical spreading into 1/2 space (free standing installation)



##### 2: Spherical spreading into 1/4 space (installation next to facade)



**3: Spherical spreading into 1/8 space:**



**Relevant place of immission**

The relevant sound immissions are to be determined 0.5 m in front of the center of the open window (outside the building) of the room requiring protection most strongly affected by the noise. Rooms requiring protection according to DIN 4109:1989 are:

- living rooms and bedrooms
- children's rooms
- workrooms/offices
- classrooms and seminar rooms

**Rating level  $L_r$**

The rating level corresponds to an equivalent continuous sound pressure level associated with a specific period. The rating level is determined for both rating periods „day“ (6am-10pm) and „night“ (10pm-6am) separately. The operation time of the heat pump has particular impact on the resulting equivalent continuous sound pressure level. Reducing the operation time from 16 h per day to 4 h per day the rating level is reduced by 6 dB(A).

But the equivalent continuous sound pressure level alone is not sufficient in order to determine the disturbing effect of noise. In general noise is perceived very disruptive, if individual tones are clearly discernable or the noise is irregular (impulsiveness). These noise characteristics will be taken into account by applying a surcharge. Additionally, daytimes with increased sensitivity are taken into consideration. According the „TA Lärm“ the following corrections are applied:

information incorporation	0.3 or 6 dB
impulsiveness	0.3 or 6 dB
daytimes with increased sensitivity	6 dB

The rating level  $L_r$  shall be obtained by summing the calculated immission level and the applied corrections of the specific periods.

Finally, the determined rating level can be compared with legal limit values (e.g. „TA Lärm“).

Standard Immission Values (SIV) - relevant place of immission outside the building:

territory	SIV-day	SIV-night
industrial area	70 dB(A)	70 dB(A)
business park, commercial areas	65 dB(A)	50 dB(A)
village areas and mixed areas	60 dB(A)	45 dB(A)
settlement area	55 dB(A)	40 dB(A)
residential area	50 dB(A)	35 dB(A)
spa area, hospitals	45 dB(A)	35 dB(A)

In case of sound propagation inside buildings or structure-borne sound transmission the Standard Immission Values for the rating level of rooms needing particular protection are as following:

- SIV - day: 35 dB(A)
- SIV - night: 25 dB(A)

For the calculation of the rating level according „TA Lärm“ a calculation tool is provided at the homepage: <http://www.idm-energie.com>

**Tips for the installation of heat pumps**

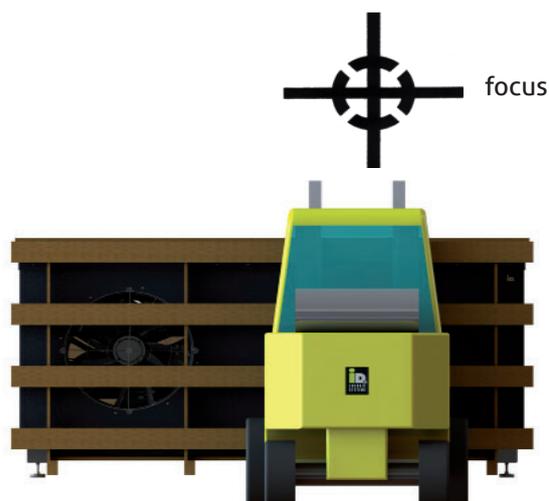
- Sound reflections areas should be kept as low as possible.
- The installation on acoustically hard ground and areas with depression in the terrain should be avoided.
- The distance from the heat pump and the relevant place of immission should be as big as possible.
- In case of outdoor installation the blow out of air in direction to the neighbour or relevant receiver location should be avoided .
- The airflow should not be blown directly against walls as sound reflections lead to increased sound pressure levels accordingly.

#### 4.7. Transport

When placing the heat-pump on site, the transportation crate must not be removed. The heat pump can be placed by forklift or crane to the concrete base. When the heat pump is located on its final site, the crate may be removed.



During transport pay attention to the focus! On the heatpump you find stickers marking the focus.



#### 4.8. Placing the heat-pump on site

When the heat pump is located on its final site, the crate can be removed. The standing feet are turned upwards, and the pallet is removed. Subsequently, the heat pump must be leveled.



The heat pump must be leveled by the 4 base feet (100 mm).

#### 4.9. Foundation construction

The ground must be a firm and level surface. It is possible to install concrete bases or other good bearing components. The load capacity must be guaranteed.

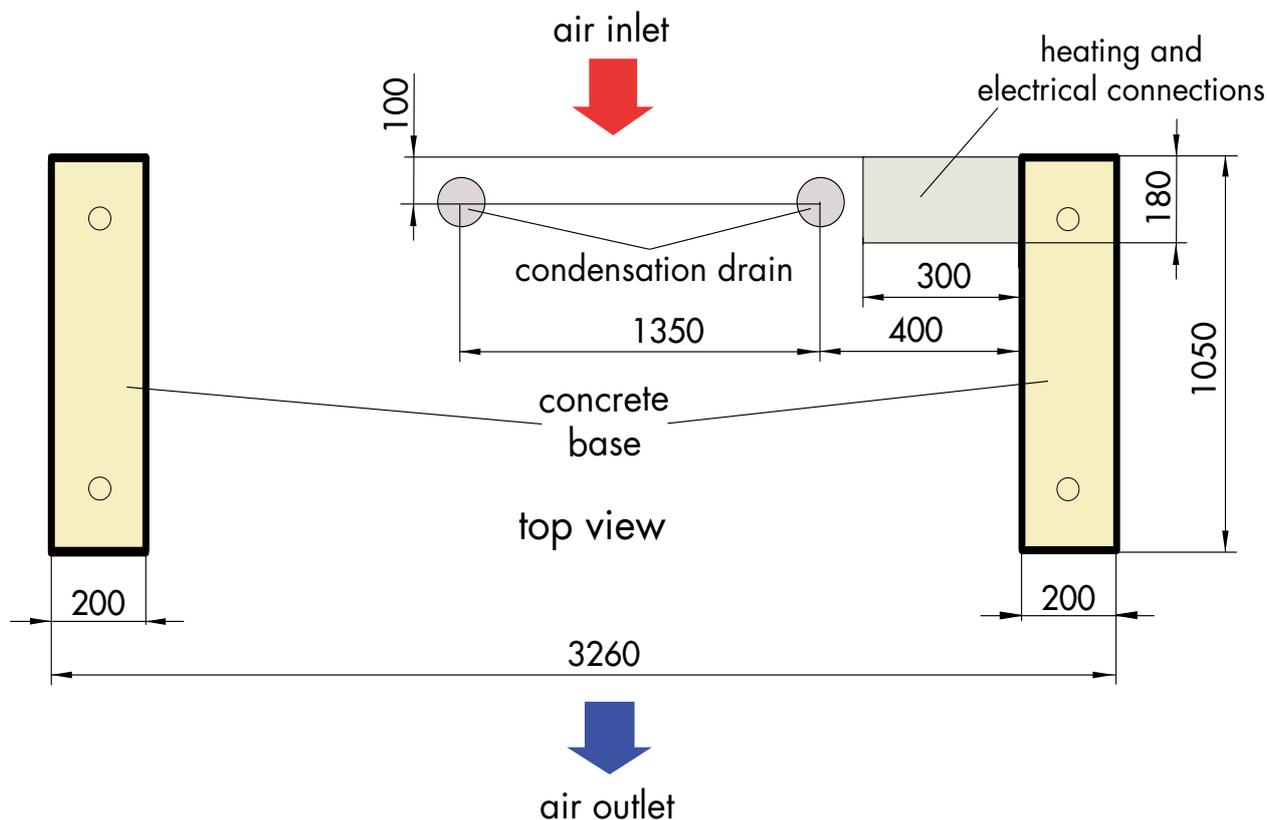
The air source heat pump have to be positioned at least 20 cm higher the the surrounding area.

If the base is lower than the expected snow level, the suction must be kept free of snow snowfall.



The maximum length of the hydraulic interconnections between Hygienik or heating buffer and heat pump must not exceed 35 m. Please note when planing the position of the concrete base.

The charging pump must be dimensioned accordingly.

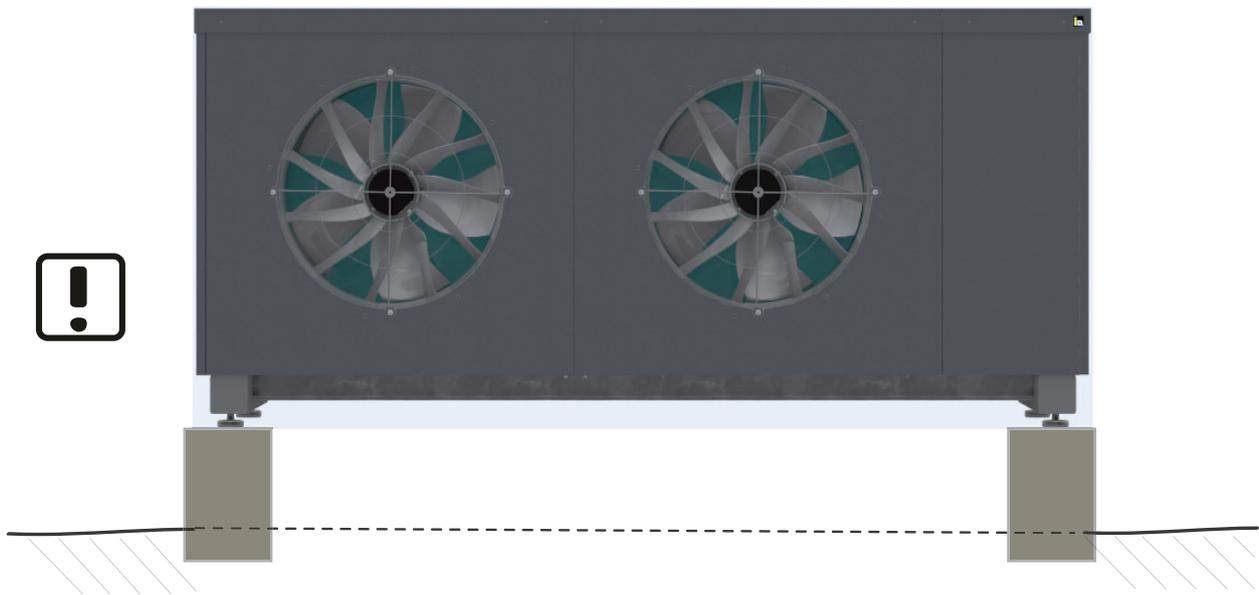


The hydraulic connections and the two condensate drain lines are located on the rear side (air intake or evaporator side). Take into account when planning the base!

### Possible ground plan of the concrete base

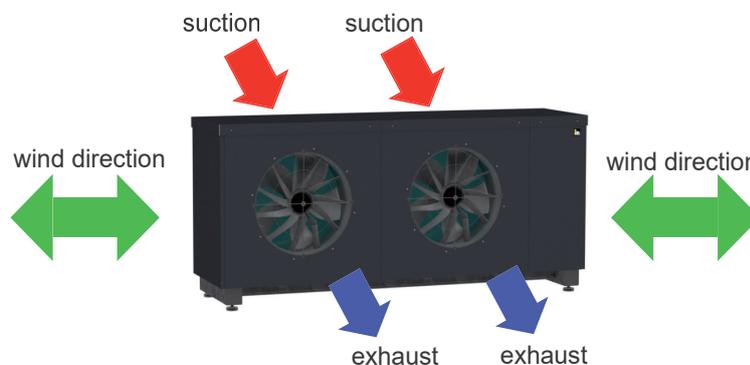


The ground must be a firm and level surface. It is possible to install concrete bases or other good bearing components. The load capacity must be guaranteed.



#### 4.10. Wind direction

When installing in windy areas (eg on the roof), the orientation of the machine must be selected in such a way that the expected wind direction is turned by 90 degrees to the suction/exhaust direction of the heatpump.



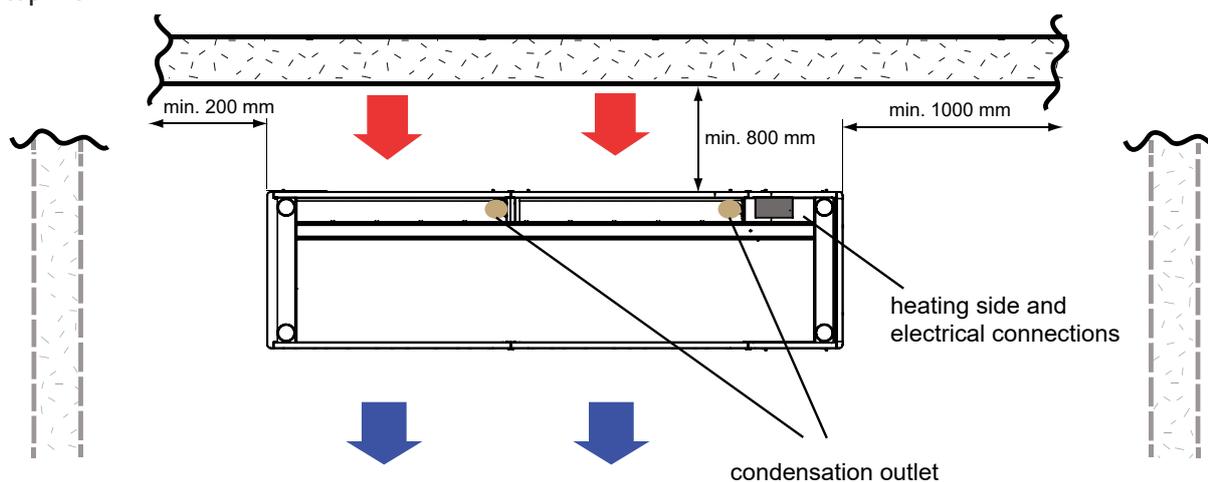
#### 4.11. Decoupling from the building

If vibrations of the heat pump are transmitted via walls, ceilings, floors or other solid bodies, this is referred to as structure-borne sound. To avoid this structure-borne noise, the heat pump, the base or the connecting lines must be decoupled from the building, e.g. when installed on a flat roof. If necessary, vibration dampers to be designed by the customer must be used.

#### 4.12. Space requirements

The installation in a brickwork niche should generally be avoided. The outlet side must always be freely accessible. In addition, the left side or the right side must be kept free or open. The following minimum distances must be additionally strictly adhered to.

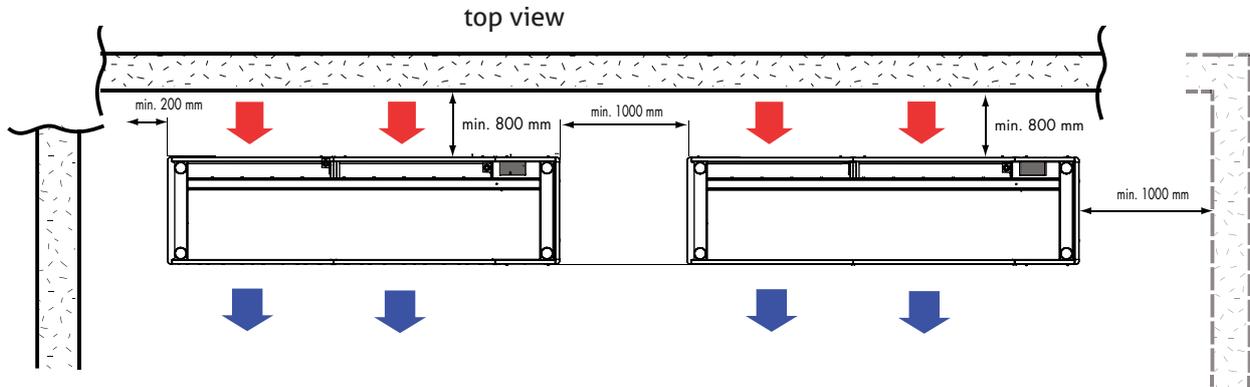
top view



Enclosing the outdoor unit on several sides, e.g. corner installations with roofing, should generally be avoided. If such an installation is nevertheless implemented, a proper air supply and exhaust must be ensured in any case. Core drillings through walls are usually not sufficient.

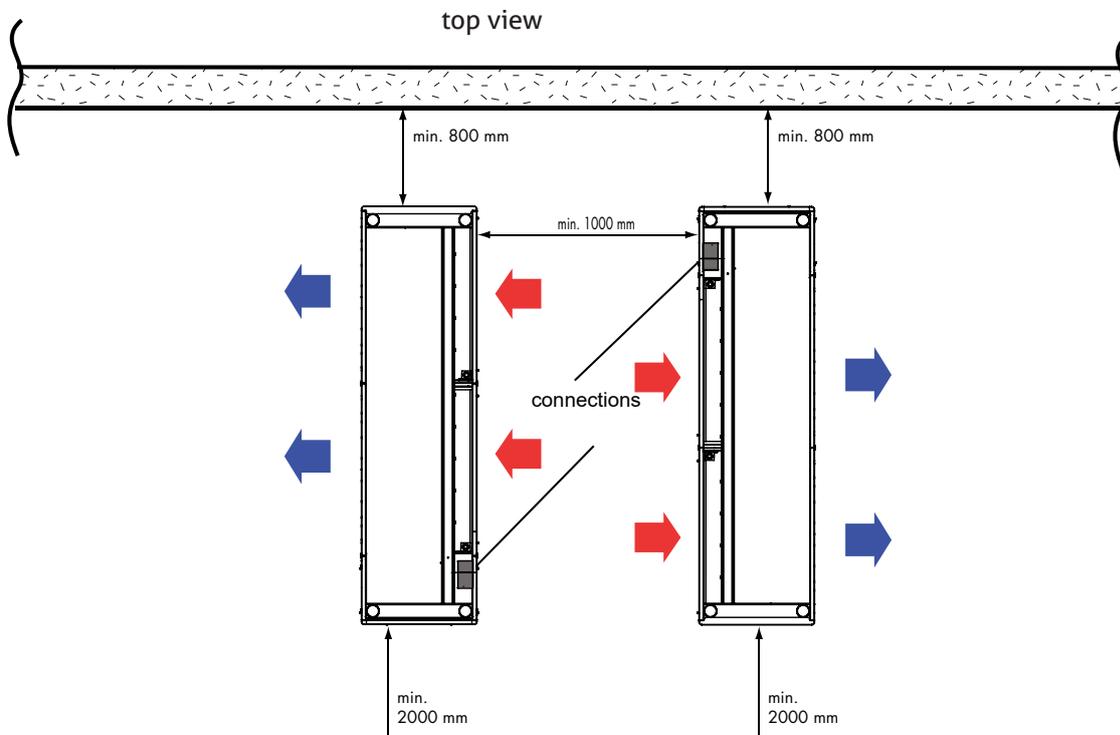
### 4.13. Space requirements cascade

#### Example 1



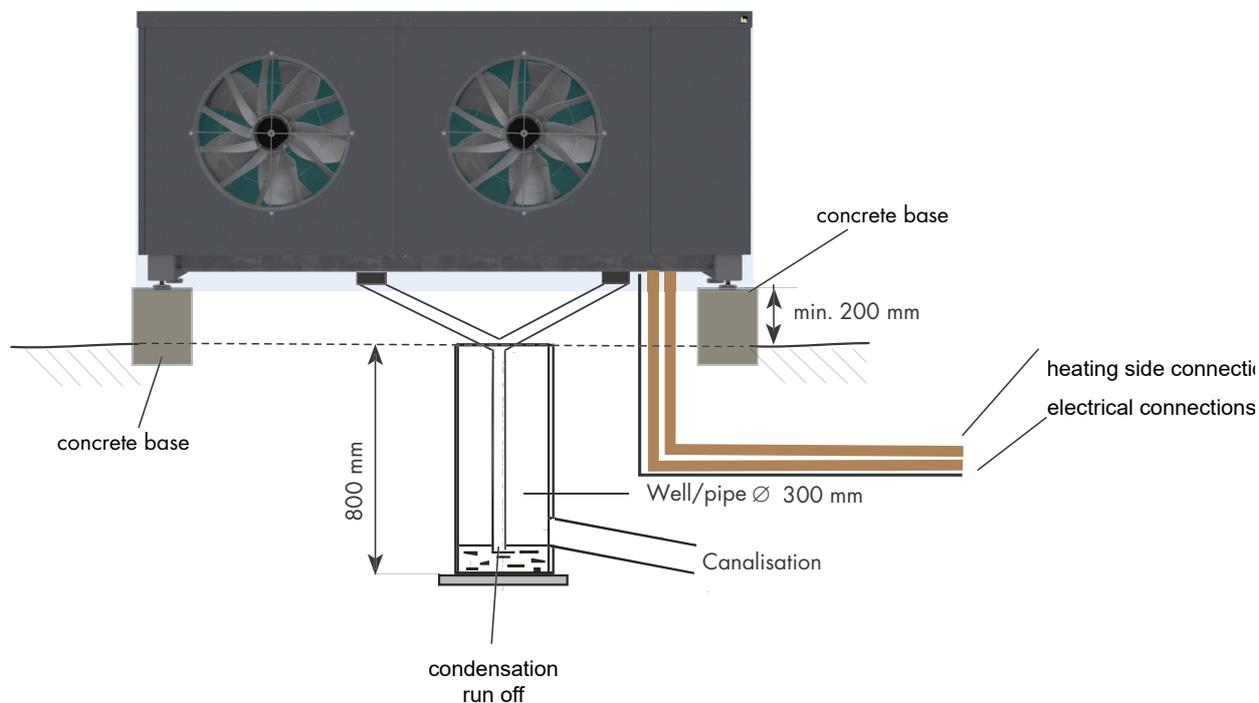
Up to five TERRA AL Max heat pumps can be connected side by side in cascade. The minimum distances must be observed due to maintenance work and possible air short circuits.

#### Example 2



With variant 2, two TERRA AL Max heat pumps can be connected in cascade. The minimum distances must be observed due to maintenance work and possible air short circuits. One of the two outlet sides must be free in any case!

#### 4.14. Condensate run off



Special actions have to be set for the appearing condensate. As a result of a defrosting cycle up to 15 lt. condensate within 2 minutes can occur on every evaporator unit. It must be ensured, that the condensate is discharged. The condensate outlet must be secured by the pre-mounted heating cable. The heating cable extends approx. 1 m into the drain hose



To avoid overheating or a defect of the condensation run-off heating, following points must be observed. The heating cable must not be laid in loops, and only as a single cable. The heating cable must not touch itself (grinding - minimum distance 50 mm). Smallest bending radius 25 mm.

## 5. Heating connections



### 5.1. Requirements heating connections

The pertinent laws, regulations and standards for boiler house pipework and also for heat pump systems must be observed.

- Before the heatpump in the heating return a magnetic dirt trap must be installed.
- The to the heatpump included flow switch must be installed in the return of the heat pump in a horizontal position.
- The safety and expansion devices for closed heating systems pursuant to EN 12828 must be provided.
- If an electric heating element is used in the heating buffer, an additional safety device must be installed on the buffer.
- The line dimensioning must comply with the required flow volumes.
- The connection hoses for heat pump inlet, return flow and warm water inlet must be installed. The connection hoses can be shortened to the desired length, however, not shorter than 60 cm. Furthermore the connection hoses must not be bent!
- At the highest points of the connection lines venting options must be provided, and at the lowest points outlet options.
- In order to avoid energy losses the connection lines must be insulated with suitable material.

#### Oxygen diffusion

In the case of non diffusion-resistant underfloor heating with plastic pipes or open heating systems, corrosion may occur in the steel parts if steel pipes, steel radiators or storage heating systems are used. Corrosion products can deposit in the condenser and lead to a capacity loss of the heat pump or high-pressure disturbances. Therefore avoid open heating systems or steel pipe installations in conjunction with non- diffusion-resistant plastic pipes in underfloor heating.

 Incorrect flow volumes due to incorrect pipework, false fixtures or improper pump operation can cause damage!

#### Heating water quality

Very clear guidelines on heating water quality apply to the filling of heating systems. The European standard EN 12828, ÖNORM H 5195 and, above all, VDI Guideline No. 2035 must be observed and are considered to be the state of the art.

For example, the hardness of the filling water must be taken into account. Because 1 °dH means that 17 mg of lime per liter can be excreted. In the case of a heating system with a water capacity of 1,500 liters (buffer tank), this means 510 grams of lime at 20 °dH. Since the lime settles most easily at the hottest and narrowest points in the system, gas boilers, heat exchangers for solar systems, etc. are most affected. Also the plate exchanger for hot water heating (especially in wood boiler and solar systems) and the hot gas heat exchanger in the TERRA-HGL heat pump may also calcify if the heating water is very hard. Therefore, the heating water must be treated in accordance with the standards (softening / desalination).

The pH value of the heating water must be checked, it must be between 8.2 and 9.5.

The hydraulic connection lines between the outdoor unit and the indoor unit are part of the closed heating system. Any difference in height between the outdoor unit and the indoor unit is therefore irrelevant for the design of the charge pump.

#### Flexible connection hoses

The approximately 30 cm long flexible connection hoses are pre-insulated and available as accessories and are mounted on the heat pump flow or return.



The inspection and the preparation of the heating water, belongs to the responsibility of the competent heating engineer.

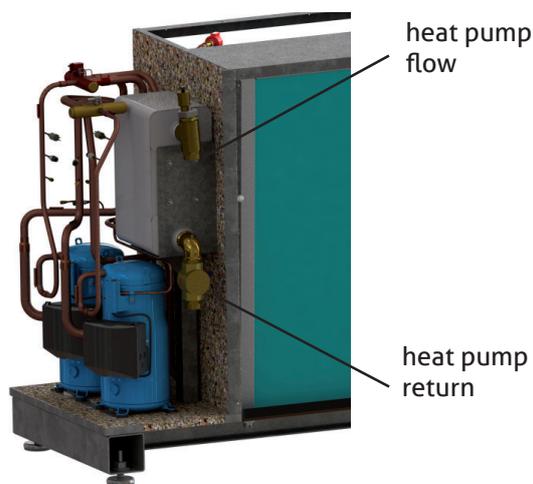


The hydraulic executions must be expertly insulated (heat loss and noise reduction)

## 5.2. Frost protection

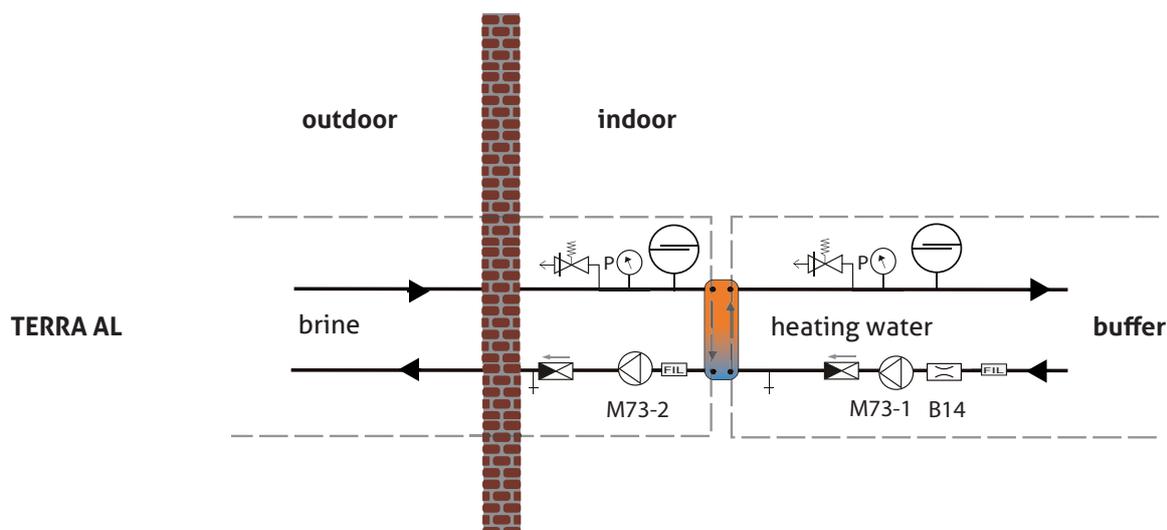
The hydraulic pipelines must be isolated expertly, and they must be installed underneath the frost line.

For bivalent-alternative operating mode, or if longer waiting periods could occur, in addition there is a frost protection function for the outdoor unit. Falls the outdoor temperature below the antifreeze outside temperature and the flow temperature of the heat pump below the minimum temperature, the charge pump starts, until the pipelines are again on temperature.



If the heat pump should be still equipped with an additional intermediate brine circuit, it must be ensured that the charging pump (M73-1) and the additional onsite pump (M73-2) may use the same driven signal. (safety-heat exchanger, brine-pump and accessories have to be provided on site)

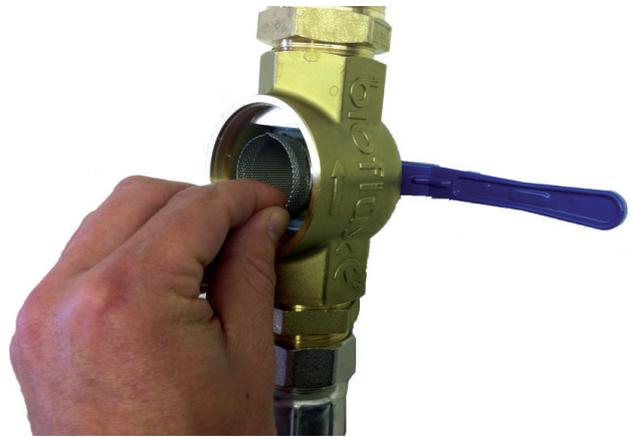
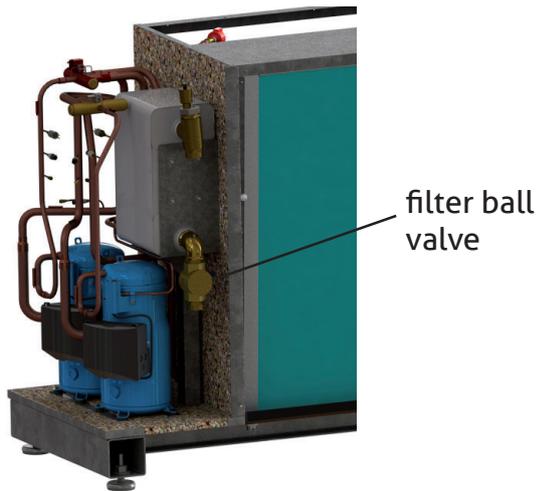
The charge pump and the on site pump can be connected in parallel and driven via the signal of the charge pump. The flow switch B14 must be installed on the heating water side in a horizontal position.



Basic scheme, only necessary if an additional safety brine circuit is provided.

### 5.3. Cleaning filter ball valve

A filter ball valve is installed in the return of the heat pump in front of the condenser. This is to filter out coarse contaminants which are located in the heating water. This filter must be cleaned before commissioning and at every maintenance.

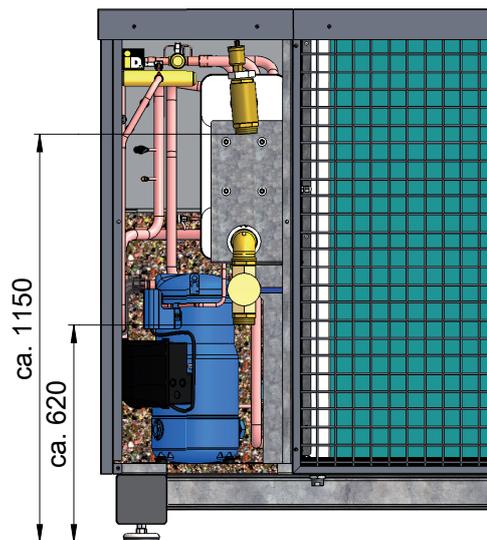


### 5.4. Level of hydraulic connections

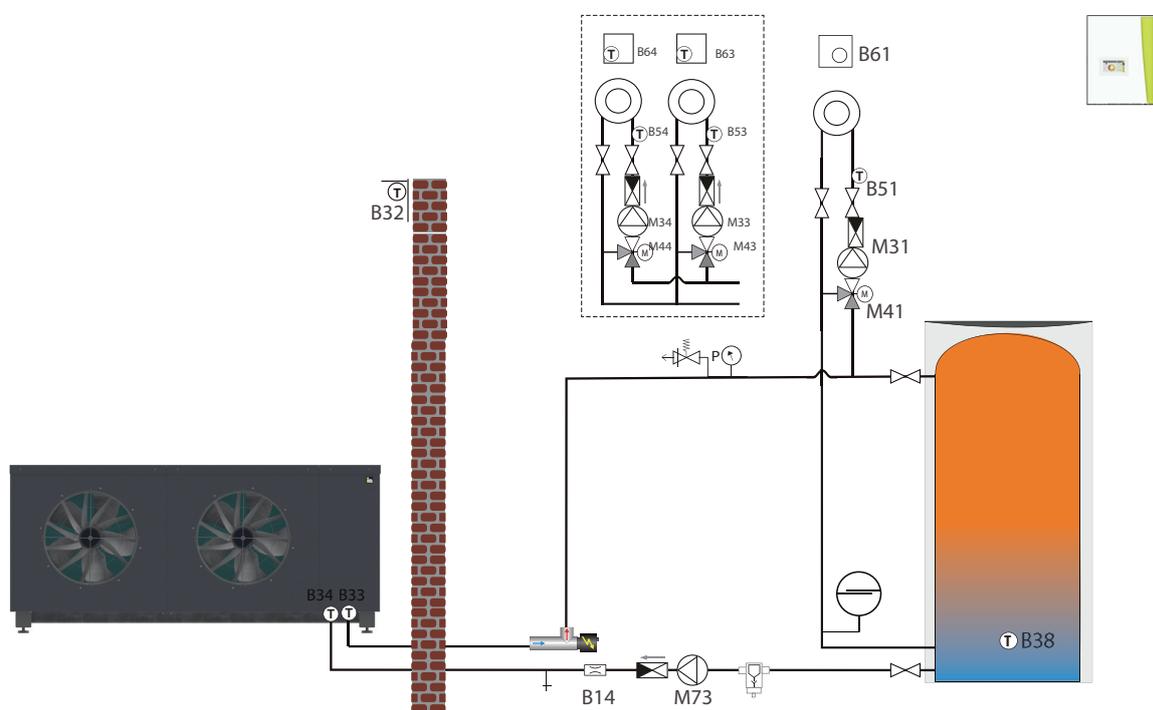
The heat pump flow is connected at a height of around 1.150 mm and the heat pump return at a height of around 620 mm. Details without flexible connection hoses.

- flush the system for 30 minutes (only at commissioning necessary)
- switch off the heat pump/charging pump
- close the wing handle on the ball valve
- open the screw connection at the bottom
- remove and clean the filter - replace the filter
- close the ball valve on the bottom
- open the wing handle on the ball valve
- start the heat pump

This filter must be cleaned before commissioning and at every maintenance.

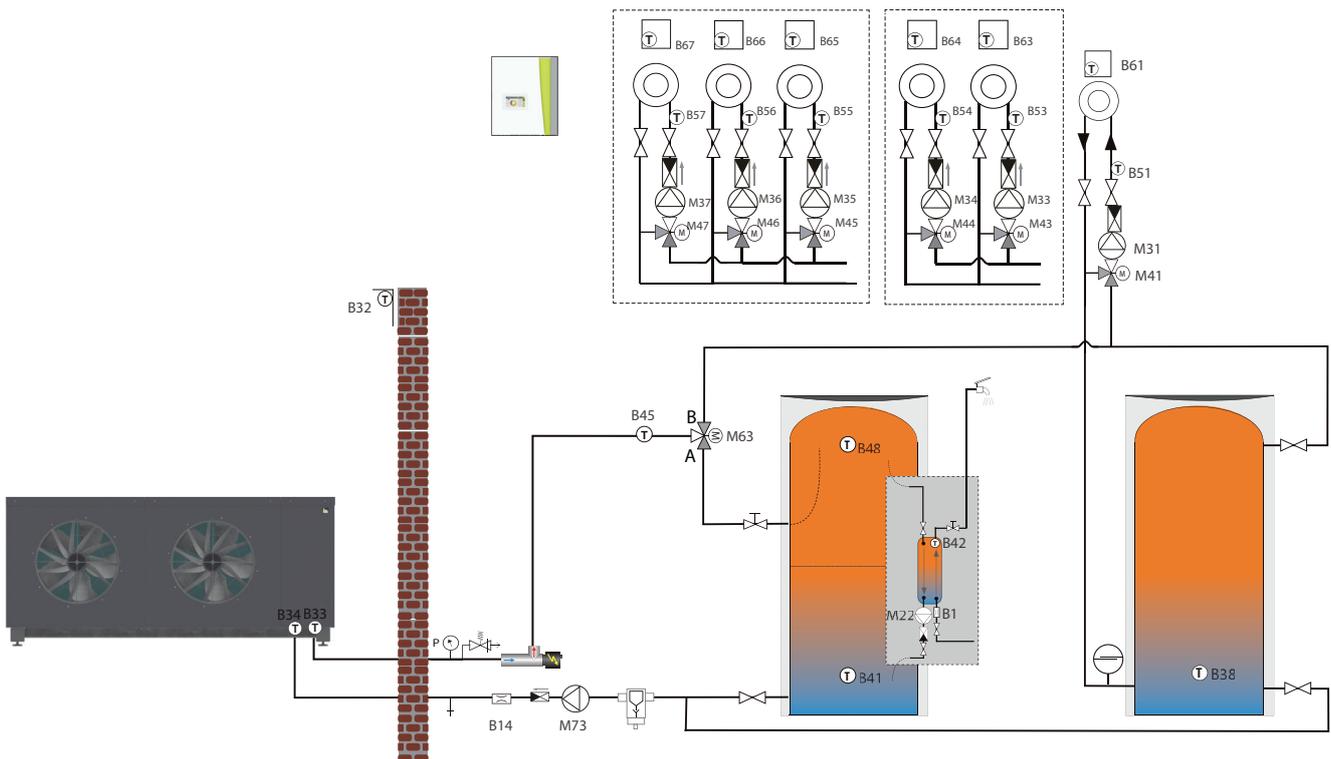


## 5.5. System schemes

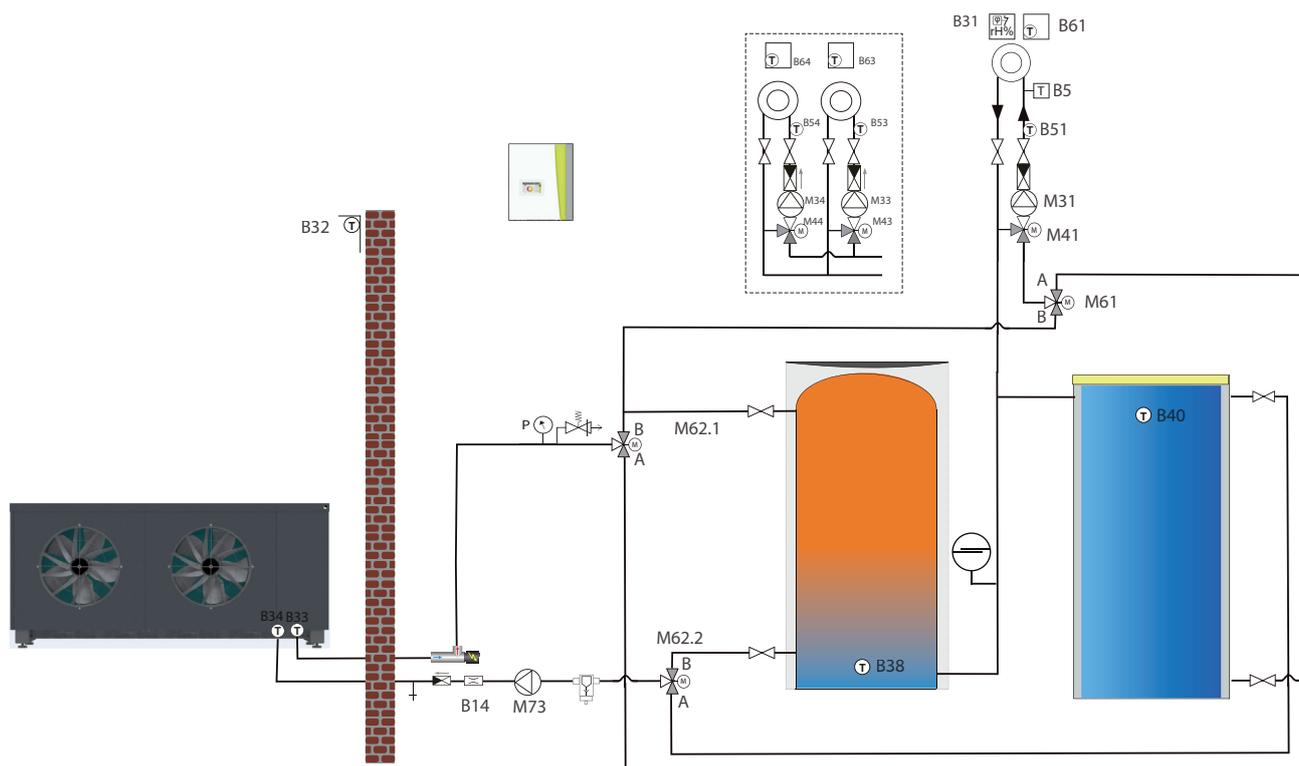
**TERRA AL Max + TERMO + 1 heating circuit (L5.1-1-5-0-0)**


This diagram is only a non-binding suggestion for the integration of an iDM heat pump into the heating system. This scheme is for illustration purposes only and does not replace professional planning by the executing companies. iDM Energiesysteme cannot accept any liability for the function of the overall system. The general instructions for iDM system diagrams must be observed.

**TERRA AL Max + Hygienik for hot water only + TERMO + 1 HC (L5.1-1-2+6-0-0)**



 This diagram is only a non-binding suggestion for the integration of an iDM heat pump into the heating system. This scheme is for illustration purposes only and does not replace professional planning by the executing companies. iDM Energiesysteme cannot accept any liability for the function of the overall system. The general instructions for iDM system diagrams must be observed.

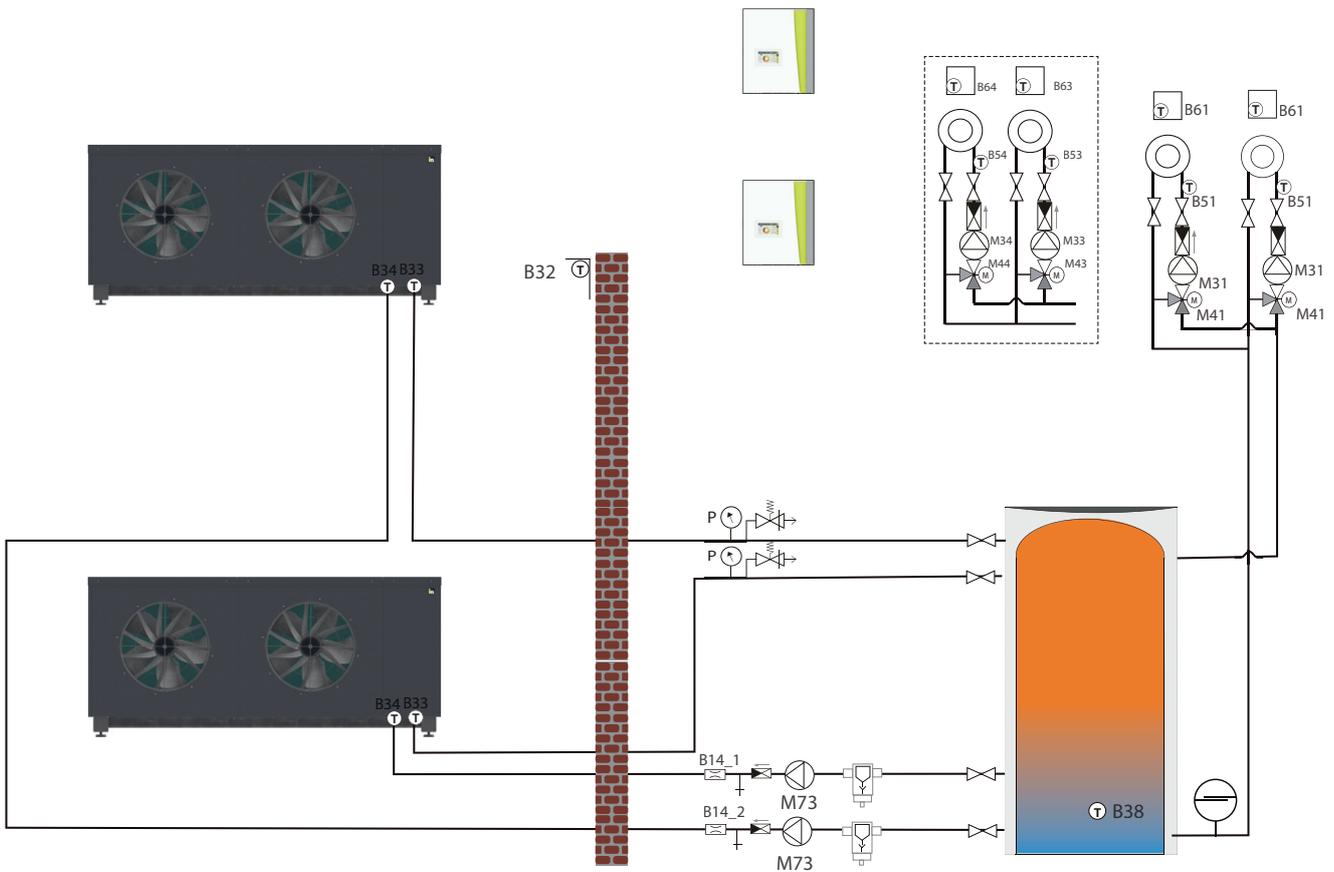
**TERRA AL Max + TERMO + cooling buffer + 1 HC (L5.1-1-5+7-2-0)**

**Attention!**

- Place the dew point monitor in a suitable place.
- Simultaneous heating and cooling of the heating circuits is not possible.

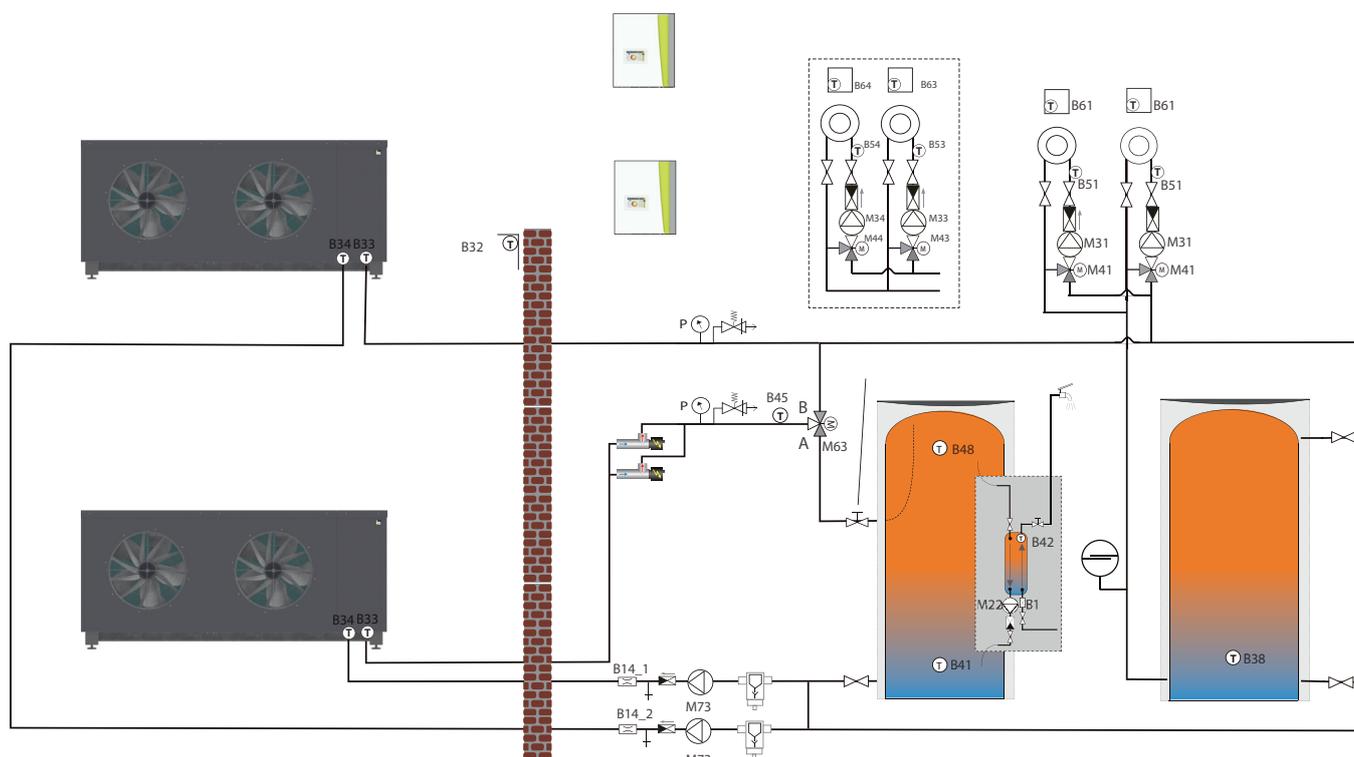


This diagram is only a non-binding suggestion for the integration of an iDM heat pump into the heating system. This scheme is for illustration purposes only and does not replace professional planning by the executing companies. iDM Energiesysteme cannot accept any liability for the function of the overall system. The general instructions for iDM system diagrams must be observed.

**TERRA AL Max cascade + TERMO + 2 HC (L5.1+5.1-0-5-0-0)**



 This diagram is only a non-binding suggestion for the integration of an iDM heat pump into the heating system. This scheme is for illustration purposes only and does not replace professional planning by the executing companies. iDM Energiesysteme cannot accept any liability for the function of the overall system. The general instructions for iDM system diagrams must be observed.

**TERRA AL Max Cascade + Hygienik 2.0 + heating buffer + 2 HC (L5.1+5.1-1-2+5-0-0)**


This diagram is only a non-binding suggestion for the integration of an iDM heat pump into the heating system. This scheme is for illustration purposes only and does not replace professional planning by the executing companies. iDM Energiesysteme cannot accept any liability for the function of the overall system. The general instructions for iDM system diagrams must be observed.

## 6. Electrical connection



### 6.1. Power supply

When working on the heat pump, the system must be completely disconnected and tensionless. The heat pump must be prevented from being switched on again.

The electrical connection must be made by a licensed electrical company. The electrical connection must be registered by the responsible power supply company.

The executing electrical company is responsible for the standard-compliant connection of the electrical installation and the applied protective measure.

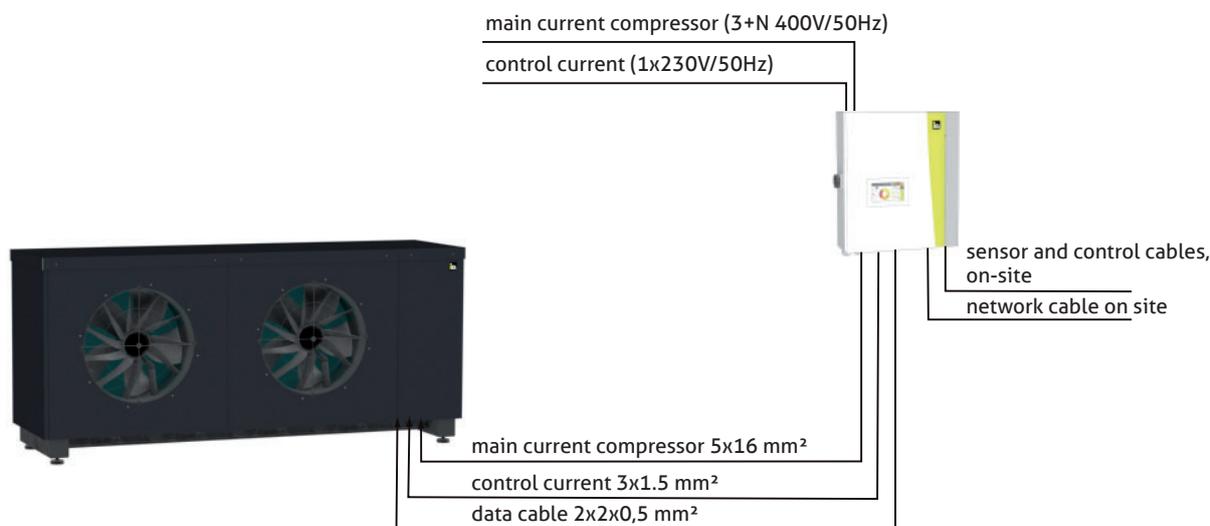
The mains voltage at the connection terminals of the heat pump must be 400 V or 230 V  $\pm 10\%$ . The dimensions of the connection lines must be checked by the installation company carrying out the work.

When using a residual current circuit breaker, an all-current sensitive RCD with tripping characteristic type B  $I_{\Delta N} \geq 30\text{mA}$  must be selected for the main current connection of the heat pump.

The specified RCD type refers to the heat pump, without taking into account externally connected components (observe installation instructions, data sheets).

The electrical connection and feeder lines must be copper lines.

Electrical details can be found in the circuit diagram.



If a heating element is used as a bivalence, the main power supply of the heating element is not laid over the indoor unit, but is prepared by the customer on site.



A network socket is already provided on the bottom surface of the cabinet. For plug and play usage of myIDM (heat-pump control via internet). The network cable have to be plugged in there.

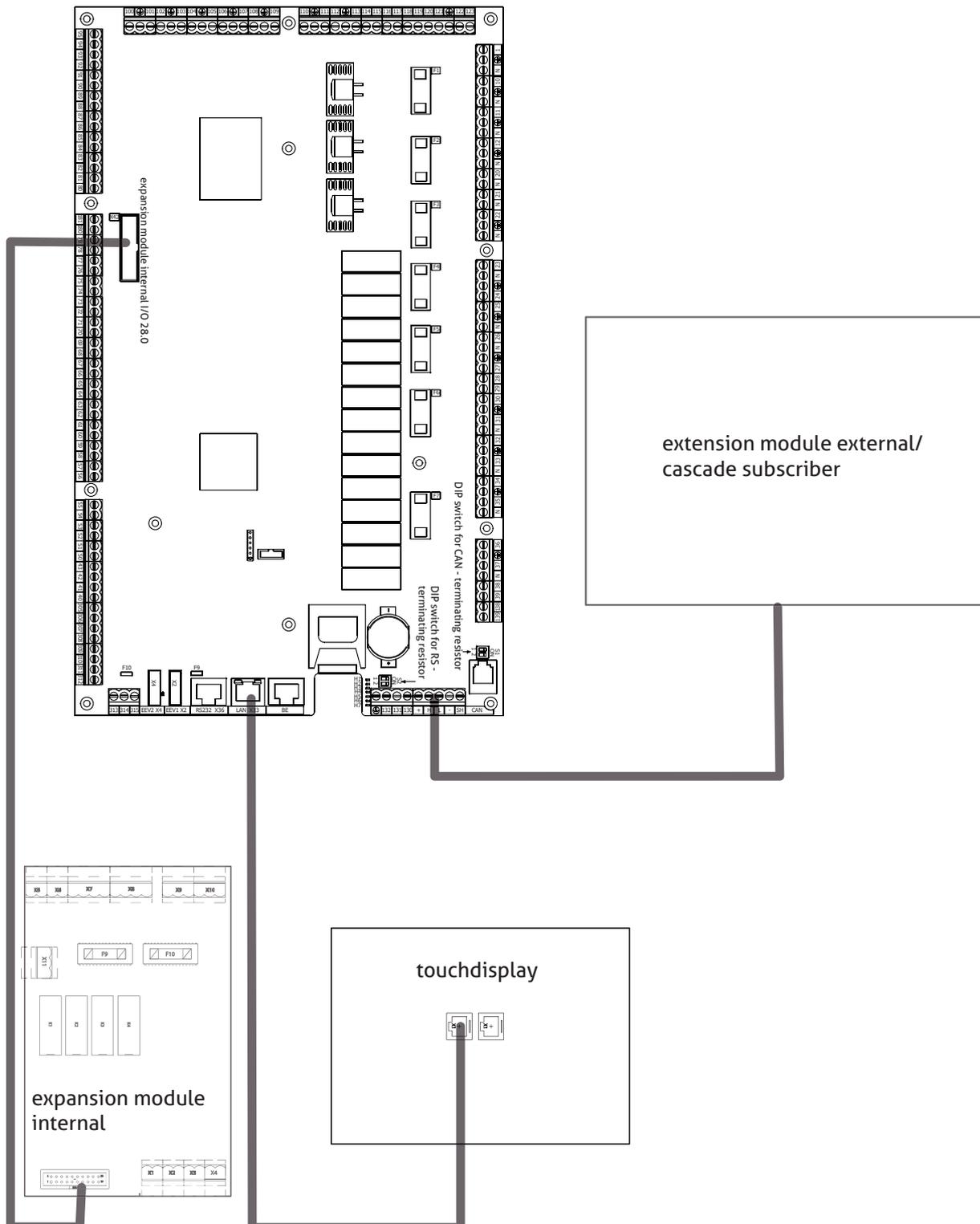


For data transmission, a shielded cable must be used. All electrical details can be derived from the appropriate circuit diagram.

### 6.2. Connection diagram for the electric components

The central controller unit is located below the front panel (below the operating unit). All connections

on the central unit are disconnectable. Additional modules such as the internal extension module for two further heating circuits, as well as the extension module for three heating circuits and the operating unit are connected as shown in the diagram below.



 If a heating element is used as a bivalent system, the supply line must be laid by the customer. The supply of the heating element is not carried out via the electrical cabinet.

In principle, all electrotechnical systems can represent possible sources of interference, e.g. contactors, electric motors, transmitters, line voltage or high voltage lines, etc. whereby the influence of the equipment can take place on the various coupling paths (galvanic, inductive, capacitive, by radiation).

### 6.3. EMC compatibility

Some remarks regarding problems with EMC: Electromagnetic compatibility requires all manufactures and operators of modern electrical engineering and electronics to invest higher amounts of money and more know-how from year to year.

As the number of electronic devices in use is continuously rising, the number of potential disturbance sources also rises. Together with the lines of the energy supply companies, of transmission equipment and other communication facilities "Electromagnetic pollution" that is invisible for us is created.

These disturbances have an effect on all systems, not only on biological (on creatures), but also on electrotechnical systems. They lead to undesired error flows which can have diverse effects.

The effects on biological systems are extremely difficult to fathom, the effects on electrotechnical systems are, however, measurable, and in the most unfavorable case also visible.

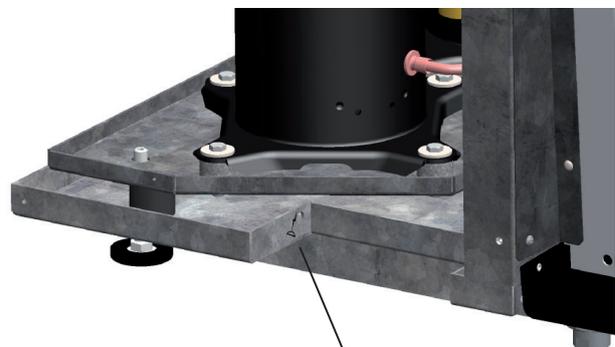
The disturbances can have various effects:

- short-term measurement errors
- long-term measurement errors
- short-term interruption of data connections
- long-term interruption of data connections
- data loss

We have undertaken everything possible to make the navigator regulation as fail-safe as possible (hardware design, EMC--proof control panel, network filter etc). It now lies within the field of responsibility of the electrician in setting up the electronic installation to avoid possible coupling paths.

### 6.4. Lightning protection and potential compensation

An 11 mm bore is found on the base plate of the refrigeration part at the opening for the hydraulic feedthrough. If required, lightning protection or equipotential bonding can be connected here.



lightning protection and potential compensation

### 6.5. Assigning the inputs on the central unit

The assignment of inputs on the central unit is shown in the electric circuit diagram relating to the system.

### 6.6. Configuration of sensors

Sensor lines are furnished as standard with a line cross-section of 0.75 mm<sup>2</sup>.

The sensor positions are shown in the respective installation layout. A perfect function can only be guaranteed by a correct position and optimal thermal transition (heat-conductive paste).

If necessary, the sensors can be extended by using suitable cabling. Ensure a clean corrosion-free connection.



Together with each heat pump a standard sensor set is supplied. This is included and stored in the control cabinet of the heat pump.

### 6.7. Sensor configuration

The following sensors are included in the delivery contents. Depending on the system design following sensors have to be installed.

- space heating storage tank sensor (B38)
- cooling buffer sensor (B40)
- domestic hot water heating sensor bottom (B41)
- domestic hot water heating sensor top (B48)
- loading sensor (B45)
- flow sensor heating circuit A (B51)
- fresh water station

The sensors have to be set as shown on the piping schemes.



The sensor lines must be laid separately from the feed lines. (see EMC problems)

### 6.8. Flow temperature sensor

The flow temperature sensor for the heating circuits used are in any case essential. They are mounted to the appropriate flow lines and connected according to the connection diagram.

The flow sensors for the heating circuits C-G are connected to the respective heat circuit extension module. (see assembly instructions extension module)

The loading sensor (B45) is necessary when the heat pump is switched the priority valve (M63).

### 6.9. Configuration of outputs

The detailed configuration of outputs on the central unit is derived from the electric circuit diagram relating to the system.

### 6.10. Connecting the mixers

The ESBE mixers are connected three-pole according to the circuit diagram.

mixer open = brown  
mixer closed = black

### 6.11. Grounding the system

If the protective conductor is connected properly that means that the control panel and the housing of the heat pump are grounded properly.

In the case of maintenance operations, ensure that the potential equalization is restored properly once the maintenance has been finished.

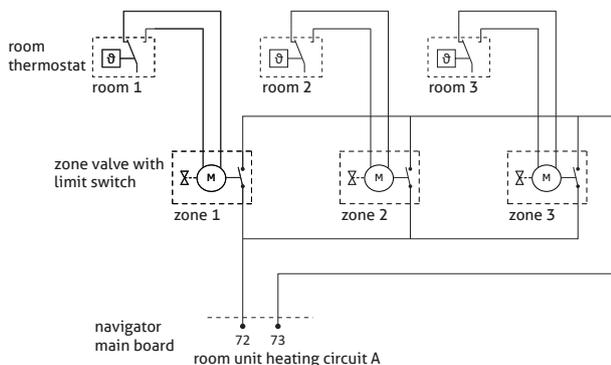
### 6.12. Maximum delimitation in underfloor heating

In underfloor heating circuits an additional application thermostat has to be mounted and the appropriate heating circuit feed has to be switched in series above that.

### 6.13. Sum signal zone valves

In setting the sum signal zone valve a requirement is generated if one of the zone valves is open. The difference to the room thermostat function is that irrespective of heating or cooling operation a requirement in the closed contact of a zone valve is generated.

If zone valves are used, a sum signal of all zone valves can be generated to be able to switch the heating and cooling circuit ON resp. OFF with the thermostat function.



### 6.14. Connecting external specifications 0-10 V

To connect the reference value input 0-10 V, the input of the air humidity sensor is used. Via this 0-10 V signal the regulation of the target temperature is specified.

Information on the electric details are found in the circuit diagram attached.

### 6.15. Opening and closing the electrical cabinet

To open the electrical cabinet, there is a recess with a diameter of approx. 8mm on the underside of the door. The locking mechanism is located about two centimetres above the edge of the unit. Pressing the locking bolt releases the lock. To lock the door again, use a screwdriver or a pointed object into the recess at the same time, the door can be closed completely.



## 7.1. Notes for commissioning

Before commissioning the heat pump, check the heating side for leaks, flush thoroughly, filled and carefully vented.

### Commissioning requirements

- The heating and a possibly existing buffer have to be filled and ventilated.
- In the heat pump return, a filter ball valve is installed in front of the condenser. After the system has been flushed for at least 30 minutes, the filter must be cleaned.
- At the start-up the complete heating buffer has to be heated up to min 20°C. This can be performed e.g. with the electric heating rod.
- The electrical installation must be completed and fused properly.
- The heat pump may only be switched on if it is properly filled on the coolant side as well as on the heating side and if the electrical connections are in place.
- At the start-up the maximum temperature limit has to be set. The switch-off point at 62°C must be checked and , if applicable, the shut-down tmperature then adapted.
- The heat pump is furnished with a delay time of 10 minutes, so that the compressor only starts after this start-up delay.
- If the heat pump is to be drained on the heating side in a frost-proof mode, the connection hose has to be loosened at the heat pump return (plate eat exchanger).

## 7.2. Switching the heat pump on for the very first time

After pressing the main switch on the heat pump, the commissioning assistant is started after selecting the desired language.

## 7.3. Operation

The TERRAAL Max heat pump is controlled via the automatically switched on and off by the fully automatic on and off. For operation and commissioning see the separate operating and commissioning in-

struction. An annual inspection and maintenance of the system by the customer service is recommended, especially with a view to safeguarding warranty claims.

## 7.4. Errors

The TERRA heat pump is furnished with a multitude of safety switching device so that in the event of disturbances no damage will take place to the equipment.

If contrary to expectations the heat pump fails to function, please check the error message shown on the display on the navigator regulation. See the operating instructions of the navigator regulation!



Heat pumps can only operate within their operating limits. This concerns the heat source temperature and the heating water temperature. Before the heat pump is put into operation for the first time, the heating water temperatures could be outside these operating limits. In order to be able to carry out commissioning, the heating water must be preheated to at least 20°C with an electric heater or a mobile heater if necessary.



In accordance with Regulation (EU) No. 517/2014 of 01/01/2015 on certain fluorinated greenhouse gases and in accordance with Regulation (EU) No. 1516/2007, the operator of a heat pump system is obligated to carry out regular leak tests by a certified professional. The interval may vary depending upon the CO<sup>2</sup> equivalent capacity. The inspection intervals are indicated in the Check- and banking book.



If an error occurs several times in sequence, please contact your iDM customer service! Customer service phone No: \_\_\_\_\_

## Product data sheet

### Product data sheet

*In addition to the supplementing Directive (EU) Nr: 811/2013*

*in line with Commission Delegated Regulation 2010/30 EU - Energy labelling*

Manufacturer: IDM-Energiesysteme, Seblas 16-18, 9971 Matrei in Osttirol

Heat pump type		TERRA AL 60 Max	
Heat transfer media		Air-Water	
Parameter	Climate zone	35 °C	55 °C
Grade for space heating energy efficiency [-]	Cold	A	A
	Average	A+	A+
	Warm	A++	A++
Space heating energy efficiency $\eta_s$ [%]	Cold	118	94
	Average	136	112
	Warm	165	133
SCOP	Cold	3,02	2,43
	Average	3,47	2,87
	Warm	4,20	3,39
Rated heat output $P_{rated}$ [kW]	Cold	47	47
	Average	55	54
	Warm	54	51
Annual energy consumption $Q_{HE}$ [kWh]	Cold	38.411	47.882
	Average	32.619	39.036
	Warm	17.209	20.027
Sound power level $L_{WA}$ [dB(A)]	Indoor	n.a.	n.a.
	Outdoor	80	80





## EU-Declaration of Conformity

### IDM-Energiesysteme GmbH

Seblas 16-18, A-9971 Matrei in Osttirol  
 Phone: 0043 4875/6172-0, Fax: 0043 4875/6172-85  
 E-Mail: [team@idm-energie.at](mailto:team@idm-energie.at), Homepage: [www.idm-energie.at](http://www.idm-energie.at)  
 UID-Nr.: ATU 433 604 0



## CE Declaration of Conformity (Original copy)

IDM-Energiesysteme GmbH, Seblas 16-18, A-9971 Matrei East Tyrol, confirms, that device(s) referred to below in the version put into circulation by us satisfies/satisfy the requirements of the EU Directives, EU Safety Standards and product-specific EU Standards.

The basic components of IDM heat-pumps are condenser, evaporator, pipelines, liquid receiver, valves, surge drum and compressors. General technical Data you can find on the nameplate. A change to the device(s) not authorized by us will render this declaration invalid.

#### EU Directives

Low Voltage Directive  
(2014/35/EU)

EMC Directive  
(2014/30/EU)

Ecodesign Directive  
(2009/125/EU)

Pressure Equipment Directive  
(2014/68/EU)

EU-ROHS-Directive  
(2011/65/EU)

#### EU Regulation

Regulation on fluorinated greenhouse gases  
(EU regulation 517/2014)

Regulation (EU) No. 813/2013  
on the execution of the RL 2009/125/EU

Fluid group: 2  
 Kategorie: II  
 valuation procedure: Modul A2

#### Notified body:

TÜV Austria Services GmbH  
 Deutschstraße 10  
 A-1230 Wien  
 Identification number: 0408

#### Amongst others, the following harmonized standards have been considered analogously

EN 378-1/2/3/4: 2012  
 EN 14511-1/2/3/4: 2015  
 EN 12102: 2013  
 EN 9614-2: 1996  
 EN 60335-1 + appendix ZE: 2012  
 EN 60335-2-40: 2014  
 EN 62233: 2008  
 EN 55014-1/2: 2006/1997  
 EN 61000-3-2/3: 2014/2013 (for AL 17 Twin)  
 EN 61000-3-11/12: 2000/2011  
 EN 14825: 2013

#### Details EU-PED (2014/68/EU)

#### Concerning following products:

**Air to water heat pump**  
 TERRA AL 17 Twin  
 TERRA AL 24 Twin  
 TERRA AL 32 Twin  
 TERRA AL 60 Max

incl. model P  
 incl. model P  
 incl. model P

#### Documentation officer:

IDM-Energiesysteme GmbH  
 A-9971 Matrei i.O., Seblas 16-18

Details on the type, year, serial number and other technical data you can find on the name plate.

  
 Hans-Jörg Hoheisel,  
 CEO

  
 Andreas Bachler,  
 Technical director

Matrei i.O, July 25, 2019

**Always there for you:**

**© iDM ENERGIESYSTEME GMBH**  
Seblas 16-18 | A-9971 Mauterhorn in Osttirol  
[www.idm-energie.at](http://www.idm-energie.at) | [team@idm-energie.at](mailto:team@idm-energie.at)

**iDM service technology:**

COMMISSIONING - SERVICING - ON-SITE SERVICE

Our service technicians are happy to help on-site.

Contact details for your regional customer service centre can be found on our website.

**iDM academy:**

PRACTICAL KNOWLEDGE FOR SALES AND TECHNOLOGY

The comprehensive range of seminars for specialists at the iDM power family is available to you any time on our website.

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