

TERRA S/W

230 V

for brine - or groundwater plants

basic execution



TERRA
heat pump



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General information for operation of the heat pump.



General information for assembling the heat pump.



Very important information for assembling and operation of the heat pump. These informations are to be kept absolutely.



Place for the phone number of your service partner.

1. general information

With the acquisition of this plant you have decided yourself for a modern and economic heating system. Regular quality controls and improvements, as well as functional tests in the factory, guarantees a technically faultless device.

Read these documents attentively. You will contain important notes and for the sure and economical operation of the plant.

Tip for security:

Installation and maintenance can involve dangers by high Plant pressures, high temperatures and voltage-carrying Parts and being and must be done by experts.

Heat pumps may only be installed by competent experts and put into operation only by a company which is trained by IDM energy systems GmbH

For work on the heat pump all safety data in the corresponding documents, the sticker at the heat pump itself and all the other safety regulations have to be observed.

Transport:

By transport, never incline the thermal pump more than 15°.

The transportation packing should be removed just after the thermal pump is positioned at the place of installation.

Sound emission:

Terra heat pumps are very quiet in operation due to their construction.

Nevertheless it is important that the heating room should be positioned outside of sensitive to noise living quarter and should be provided with a well closing door closing.

Drying of subfloor or carcass:

The heat pump isn't setup for the increased need of heat for drying subfloor or carcass.

This must be done by equipment specially designed for this task.

Service and maintenance:

A regular maintenance as well as a check and Care of all important plant parts guarantees at last a safe and thrifty operation of the plant.

We recommend a contract for maintenance.

Cleaning:

If required, the Terra heat pump can be cleaned with a damp cloth. The use of cleansers is not recommended.

Correct EC guidelines

EC machine guideline (89/392/EEC)
EC low voltage guideline (73/23/EEC)
EC-EMV guideline (89/366/EEC)

Correct harmonized EN

EN378
EN60529
EN292/T1/T2
EN294
EN349
EN60335 1/2-40
EN55014
EN55104

Correct national norms/guidelines

ÖNORM M7755 2 (Austria)

Important safety reference:

The heat pump is filled with refrigerant. This Cryogen is non-poisonous and not combustible.

In case of damage however, refrigerant is could flow out of the plant, and could cause superseding of oxygen.

Due to open fire, toxic disintegration products can arise

By leaving refrigerant (smell) leave the installation site

immediately leaving and close the door.

Contact the customer service.

Works at and in the equipment are permitted only for authorized experts

Reference to disturbances and error messages see Page 20.

2. Heat pump for Brine or Groundwater operation

2.1 Description

Heat pump with gas inlet cooled scroll-cachet-compressor, with large dimensioned stainless steel heat exchangers as vaporizer, condenser and HGL-exchanger on a robust frame with heat and noise emission insulated casing.

A console with all operational and safety equipment is integrated in the body.

The device is prepared for the operation with a weather compensating flow temperature control (accessory).

The heat pump is accomplished in compact design and the vaporizer is already built inside the heat pump casing..

2.2 Range of operation

For a monovalent heating of one to two family homes with geothermal usage, whereby the house should be equipped with a low temperature heating (e.g. under floor heating, wall heating or low temperature radiators)

2.3 Delivery content

- Heat pump aggregate with gas inlet cooled scroll-cachet-compressor
- stainless steel heat exchanger as condenser
- stainless steel heat exchanger as vaporizer
- coolant collector and dryer
- Thermostatic expansion valve
- coolant observing window
- coolant heat exchanger
- High and low pressure manometer
- console with all operational and safety equipment
- Thermorelais to protect the compressor
- Internal motor protection
- Robust frame
- heat and noise emission insulated casing

2.4 Accessories

- Plastic brine-horizontal-collector Ø 25 x 2,3mm in loops of 100m each, incl. manifold, connection set and brine circulating pump
- Brine-bore-hole Ø 40mm incl. connection set and brine circulating pump
- Manifold for brine bore-hole collector
- 5 flexible connection pipes



As lower the maximal flow temperature is designed as higher is the heat pump efficiency

TERRA heat pumps operate with the safety coolant R 407 C, which circulates, if properly installed in a closed circuit and is practically no hazard for the environment.

5. Technical Data

in line with the EN 14511

TERRA

5 S/W 7 S/W 8 S/W 10 S/W 12 S/W 15 S/W

for brine application

Heating output at B 0°C/W 35°C in kW	4,99	6,28	7,67	9,12	11,28	14,14
Heating output at B 0°C/W 45°C in kW	4,83	6,12	7,43	8,84	10,83	13,49
Heating output at B 5°C/W 35°C in kW	5,86	7,25	8,93	10,51	13,35	16,17
Heating output at B 5°C/W 45°C in kW	5,63	6,93	8,56	10,17	12,73	15,44
Required electr. power at B 0°C/W 35°C in kW	1,24	1,57	1,91	2,24	2,77	3,34
Required electr. power at B 0°C/W 45°C in kW	1,58	2,00	2,40	2,83	3,44	4,12
Required electr. power at B 5°C/W 35°C in kW	1,28	1,59	1,89	2,24	2,79	3,37
Required electr. power at B 5°C/W 45°C in kW	1,64	2,01	2,42	2,86	3,53	4,21
COP at B 0°C/W 35°C	4,02	4,01	4,02	4,07	4,08	4,19
Electrical connection	230V/50 Hz					
Maximal current	11,4 A	14,8 A	17,3 A	23,1 A	23,5 A	30 A
Blocked runner current	47 A	61 A	76 A	100 A	114 A	150 A
Upstream fuse	16 A, D	16 A, D	20 A, D	32 A, D	32 A, D	32 A, D
Fuse for control current	10 A	10 A	10 A	10 A	10 A	10 A
Maximal flow temperature	55 °C	55 °C	55 °C	55 °C	55 °C	55 °C
Minimal heating water quantity	900 l/h	1.100 l/h	1.400 l/h	1.600 l/h	2.000 l/h	2.400 l/h
Minimal circulating brine quantity	1.050 kg/h	1.300 kg/h	1.600 kg/h	1.900 kg/h	2.350 kg/h	2.900kg/h
Pressure loss on heating circuit	9 kPa	12 kPa	12 kPa	16 kPa	14 kPa	21 kPa
Pressure loss on collector circuit	7 kPa	10 kPa	14 kPa	12 kPa	14 kPa	13 kPa
Dimensions (H x W x D in cm)	116/62/76	116/62/76	116/62/76	116/62/76	116/62/76	116/62/76
Weight	100 kg	105 kg	105 kg	115 kg	117 kg	124 kg
Heating flow and return	R	1" A.G.	1" A.G.	1" A.G.	1" A.G.	1" A.G.
HGL connections	R	---	---	---	---	---
Brine inlet and outlet	R	1" A.G.	1" A.G.	1" A.G.	1" A.G.	1" A.G.
Used coolant		R 407 C	R 407 C	R 407 C	R 407 C	R 407 C
Coolant quantity		1,8 kg	1,9 kg	2,0 kg	2,1 kg	2,6 kg
Compressor oil quantity		1,0 lt.	1,0 lt.	1,1 lt.	1,1 lt.	1,85 lt.
Amount of collector circuits		3	3	4	5	6
Total pipe length		300	300	400	500	600
Brine quantity (mixture)		105 lt.	105 lt.	140 lt.	175 lt.	210 lt.
Recommended resp. integrated buffer loading pump		UPS 25-60	UPS 25-60	UPS 25-60	UPS 25-60	UPS 25-60
Recommended pump power for brine collector up to 40m		UPS 25-60 32 x 2,0	UPS 25-60 32 x 2,0	UPS 25-60 40 x 2,3	Top S 25/7 40 x 2,3	Top S 25/7 40 x 2,3
Min. boiler room dimensions		6,0 m ³	6,2 m ³	6,5 m ³	6,8 m ³	8,4 m ³
Min venting opening dimensions (natural)		0,19 m ²	0,20 m ²	0,2 m ²	0,2 m ²	0,23 m ²
Min. air supply (mechanically)		74 m ³ /h	77 m ³ /h	80 m ³ /h	82 m ³ /h	95 m ³ /h

Note:

For large enough boiler rooms it is enough to have a natural venting with the above mentioned min. venting opening dimensions.

A mechanical venting of the boiler room is only required if the boiler room dimensions are not achieved.

TERRA
5 S/W 7 S/W 8 S/W 10 S/W 12 S/W 15 S/W
for groundwater application

Heating output at W10°C/W35°C in kW	6,62	8,26	10,08	12,00	15,07	18,53
Heating output at W10°C/W45°C in kW	6,43	8,06	9,84	11,52	14,50	17,90
Heating output at W15°C/W35°C in kW	7,68	9,60	11,71	13,92	17,38	20,56
Heating output at W15°C/W45°C in kW	7,20	8,93	10,94	12,86	16,03	19,58
Required electr. power at W10°C/W35°C in kW	1,32	1,65	1,94	2,34	2,94	3,65
Required electr. power at W10°C/W45°C in kW	1,71	1,09	2,51	2,99	3,69	4,44
Required electr. power at W15°C/W35°C in kW	1,35	1,66	2,01	2,39	2,96	3,62
Required electr. power at W15°C/W45°C in kW	1,70	2,09	2,52	2,97	3,68	4,40
COP at W 10°C/W 35°C	5,02	5,01	5,20	5,12	5,12	5,08
Electrical connection	230V/50 Hz					
Maximal Current	11,4 A	14,8 A	17,3 A	23,1 A	23,5 A	30 A
Blocked runner current	47 A	61 A	76 A	100 A	114 A	150 A
Upstream fuse	16 A, D	16 A, D	20 A, D	32 A, D	32 A, D	32 A, D
Sicherung Steuerstrom	10 A	10 A	10 A	10 A	10 A	10 A
Maximal flow temperature	55 °C	55 °C	55 °C	55 °C	55 °C	55 °C
Minimal heating water quantity	1200 l/h	1.500 l/h	1.850 l/h	2.200 l/h	2.750 l/h	3.400 l/h
Minimal groundwater quantity	1.200 l/h	1.500 kg/h	1.800 l/h	2.150 l/h	2.700 l/h	3.350 l/h
Pressure loss on heating circuit	11 kPa	18 kPa	17 kPa	22 kPa	21 kPa	29 kPa
Pressure loss on collector circuit	7 kPa	9 kPa	13 kPa	12 kPa	14 kPa	16 kPa
Dimensions (H x W x D in cm)	116/62/76					
Weight	100 kg	105 kg	105 kg	115 kg	117 kg	124 kg
Heating flow and return R	1" A.G.	1" A.G.	1" A.G.	1" A.G.	1" A.G.	1" A.G.
HGL-connections R	---	---	---	---	---	---
Brine inlet and outlet R	1" A.G.	1" A.G.	1" A.G.	1" A.G.	1" A.G.	1" A.G.
Used coolant	R 407 C	R 407 C	R 407 C	R 407 C	R 407 C	R 407 C
Coolant quantity	1,8 kg	1,9 kg	2,0 kg	2,1 kg	2,6 kg	2,9 kg
Compressor oil quantity	1,0 lt.	1,0 lt.	1,1 lt.	1,1 lt.	1,85 lt.	1,55 lt.
Recommended resp. integrated buffer loading pump	UPS 25-60	UPS 25-60	UPS 25-60	UPS 25-60	UPS 25-60	UPS 25-80
Min. boiler room dimensions	6,0 m ³	6,2 m ³	6,5 m ³	6,8 m ³	8,4 m ³	9,4 m ³
Min venting opening dimensions (natural)	0,19 m ²	0,20 m ²	0,2 m ²	0,2 m ²	0,23 m ²	0,24 m ²
Min. air supply (mechanically)	74 m ³ /h	77 m ³ /h	80 m ³ /h	82 m ³ /h	95 m ³ /h	107 m ³ /h

Note:

For large enough boiler rooms it is enough to have a natural venting with the above mentioned min. venting opening dimensions.

A mechanical venting of the boiler room is only required if the boiler room dimensions are not achieved.

2.6 Operational limits

TERRA-S resp. TERRA-W heat pumps must be only operated with the heat carrier medium brine or Groundwater. Other heat carrier media are not permitted.

Further it is not allowed to heat other fluids than heating water.

(Heating water quality see page 10)

Heat pumps have natural pressure resp. temperature operation limits. (See illustration)

It is not allowed to operate the TERRA heat pump outside these operational limits.

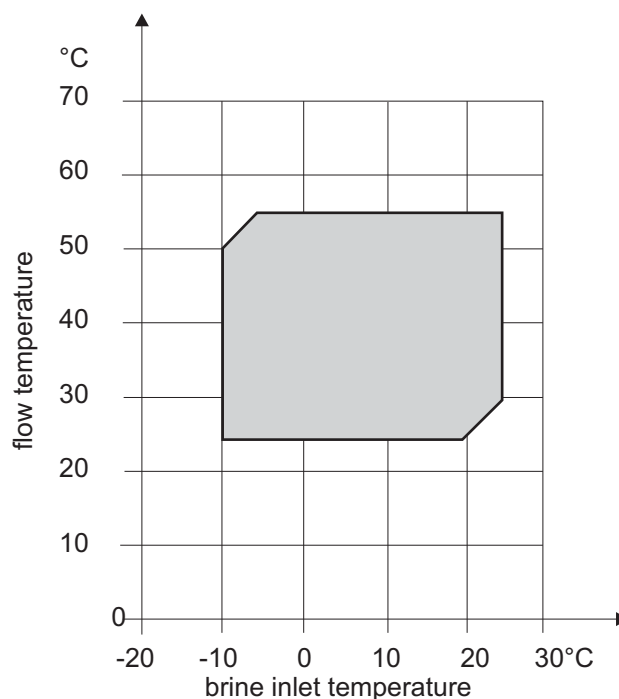
With groundwater heat pumps the groundwater has to have a certain water quality, see page 18. If one of those values is below or exceeds these limits it is not allowed to use the groundwater heat pump with this groundwater.

Note:

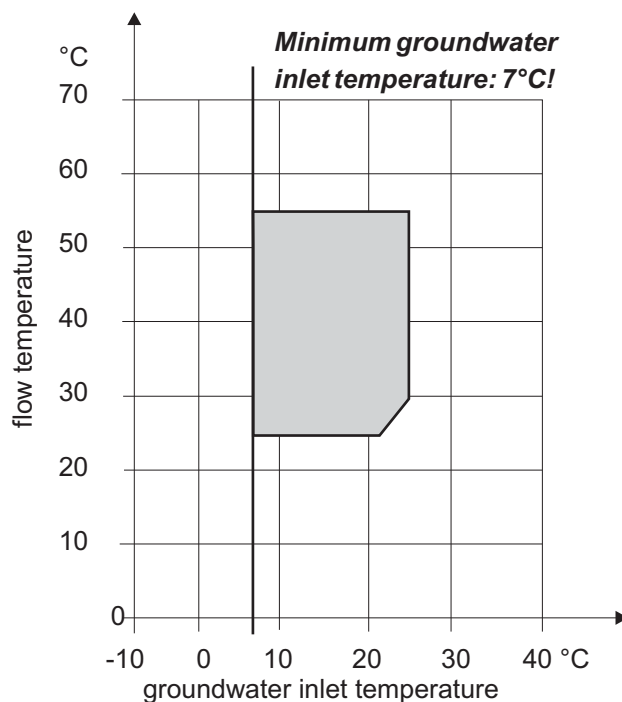
There are several safety applications integrated to protect the heat pump

- ▶ A combined high and low pressure manometer which can be reset by switching the machine off and back on.
- ▶ Max. flow temperature limit with will automatically reset.
- ▶ A Thermorelais which can be reset by switching the machine off and back on.
- ▶ Internal winding protection
- ▶ With groundwater heat pumps: minimum temperature limit for the groundwater return temperature and integrated water pressure switch.

Range of application for brine heat pumps

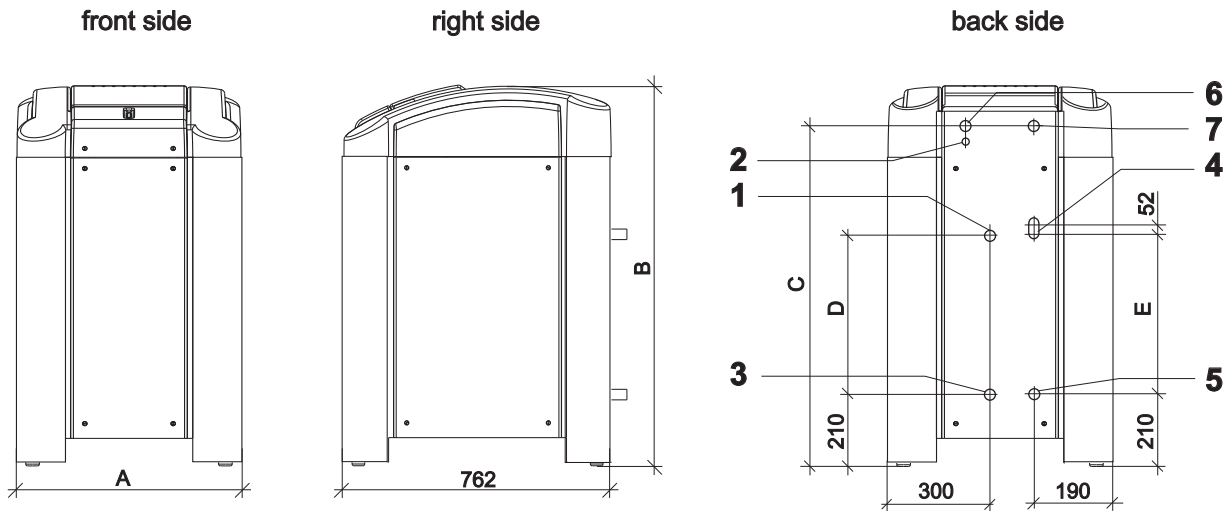


Range of application for groundwater heat



Also during the winter the groundwater inlet temperature must not drop below 7°C!

2.7 Technical dimensions



TERRA	5S/W	7S/W	8S/W	10S/W	12S/W
A	622	622	622	622	622
B	1160	1160	1160	1160	1160
C	1025	1025	1025	1025	1025
D	465	465	465	465	465
E	465	465	465	465	465

Legend:

- 1 flow connection (use enclosed connection pipe)
- 2 Opening for electrical connection with grind voltage
- 3 return connection (use enclosed connection pipe)
- 4 Brine resp. groundwater inlets (use enclosed connection pipe)
- 5 Brine resp. groundwater outlets (use enclosed connection pipe)
- 6 Opening \varnothing 50mm for output (heat pump, groundwater pump)
- 7 Opening \varnothing 50mm for low voltage cable input (sensor and data cables)

Dimensions for connections:

- For brine heat pumps: see page 3
- For groundwater heat pumps: see page 4



On the backside of the heat pump is a sticker with the connecting description located

2.8 Installation

The TERRA heat pump must be installed in a frost protected room by a certified Installation company. The room temperature should be in between 5°C and 35°C.

The installation in wet rooms or rooms that are at high risk of dust or explosives is prohibited

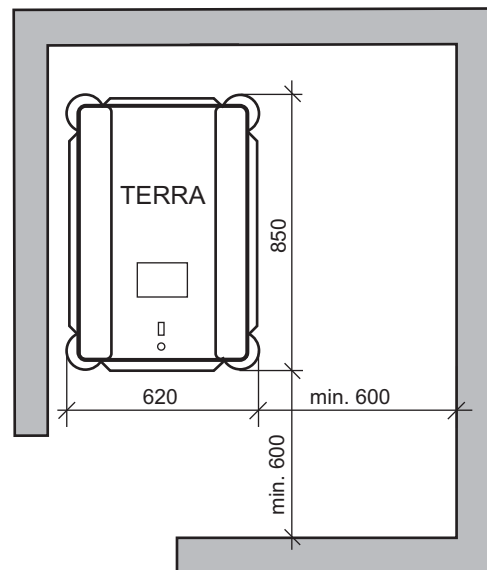
The TERRA heat pump should be installed on a leveled, straight and capable ground (e.g. concrete) to avoid noise conduction. If floor screed is used, the screed and floor insulation have to be omit to ensure a silent operation.

A minimum distance of 60cm is required in front of and next to the heat pump. (See illustration on by)

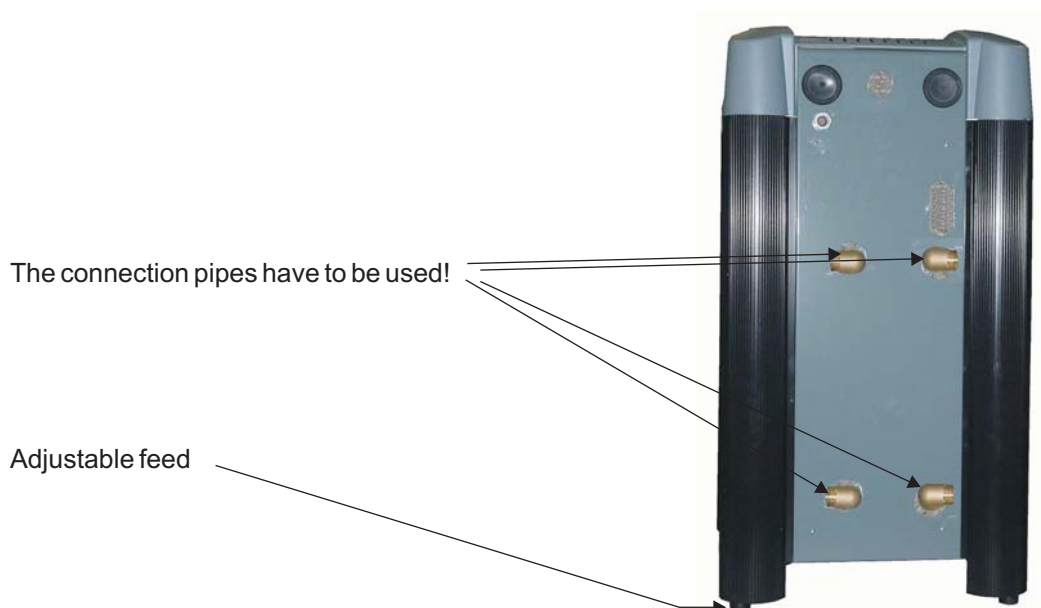
The appropriated laws, regulations and Norms have to be taken into notice, specially the EN 378 Part 1..

To avoid noise conduction via the piping, the enclosed flexible connection pipes for the flow and return, as well as for the brine in- and outlet resp. the groundwater in- and outlet have to be used. The connection pipes must not be kinked!

For a leveled installation of the TERRA heat pump there are adjustable feet provided.



**The minimum distances have to be provided!
The minimum size of the boiler room has to be provided!**



2.8 Hydraulic schematics

System scheme 1:

TERRA heat pump with IDM-Hygienik

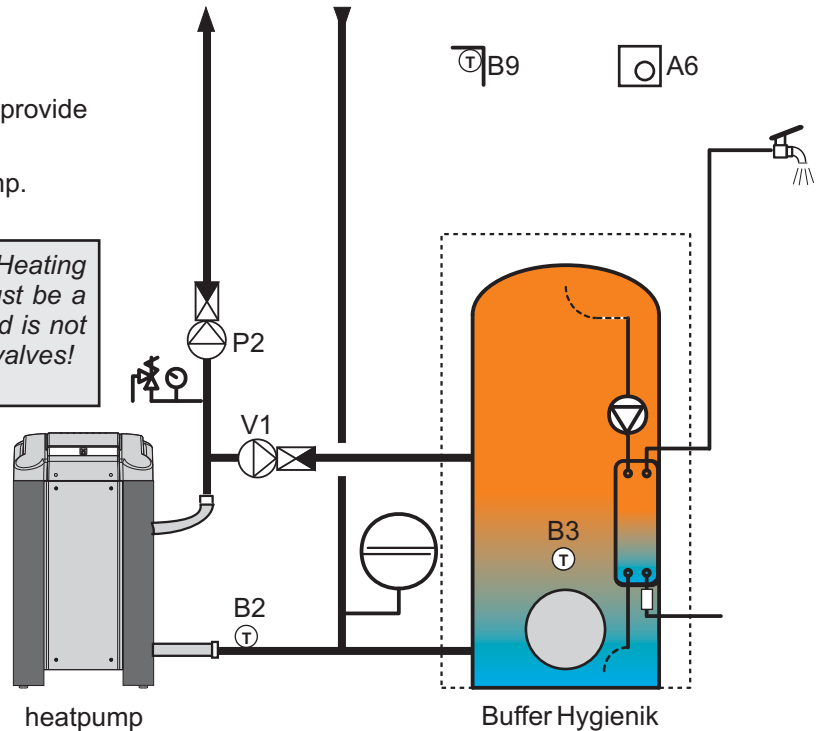
In this scheme the Hygienik is only used to provide domestic hot water.

The heating is fed straight from the heat pump.



It is only possible to use 1 Heating circuit. The heating circuit must be a pumped circuit (no mixer!) and is not possible to use zoning control valves!

The sensor B2 has to be placed inside a sensor pocket at the return.



System scheme 2:

TERRA heat pump with IDM-Hygienik with dividing membrane

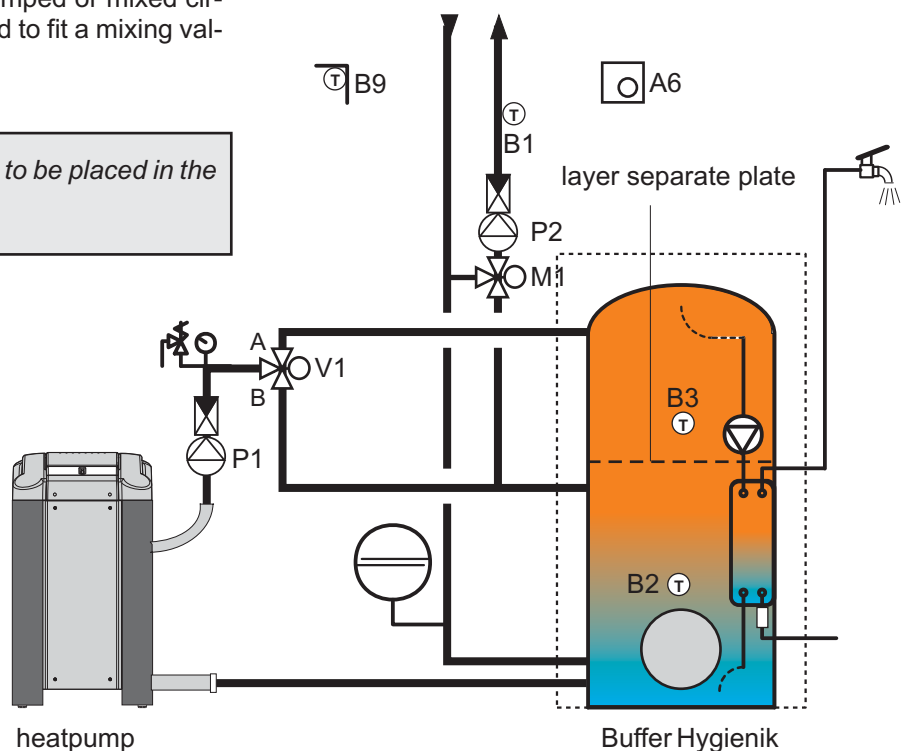
The upper part of the buffer is loaded under priority by a priority valve.

The lower part of the buffer is the heating buffer.

The heating circuit can be a pumped or mixed circuit, whereby it is recommended to fit a mixing valve.



The sensor B2 has to be placed in the lower buffer part.



System scheme 3:

TERRA heat pump with IDM-Hygienik and extra heating buffer

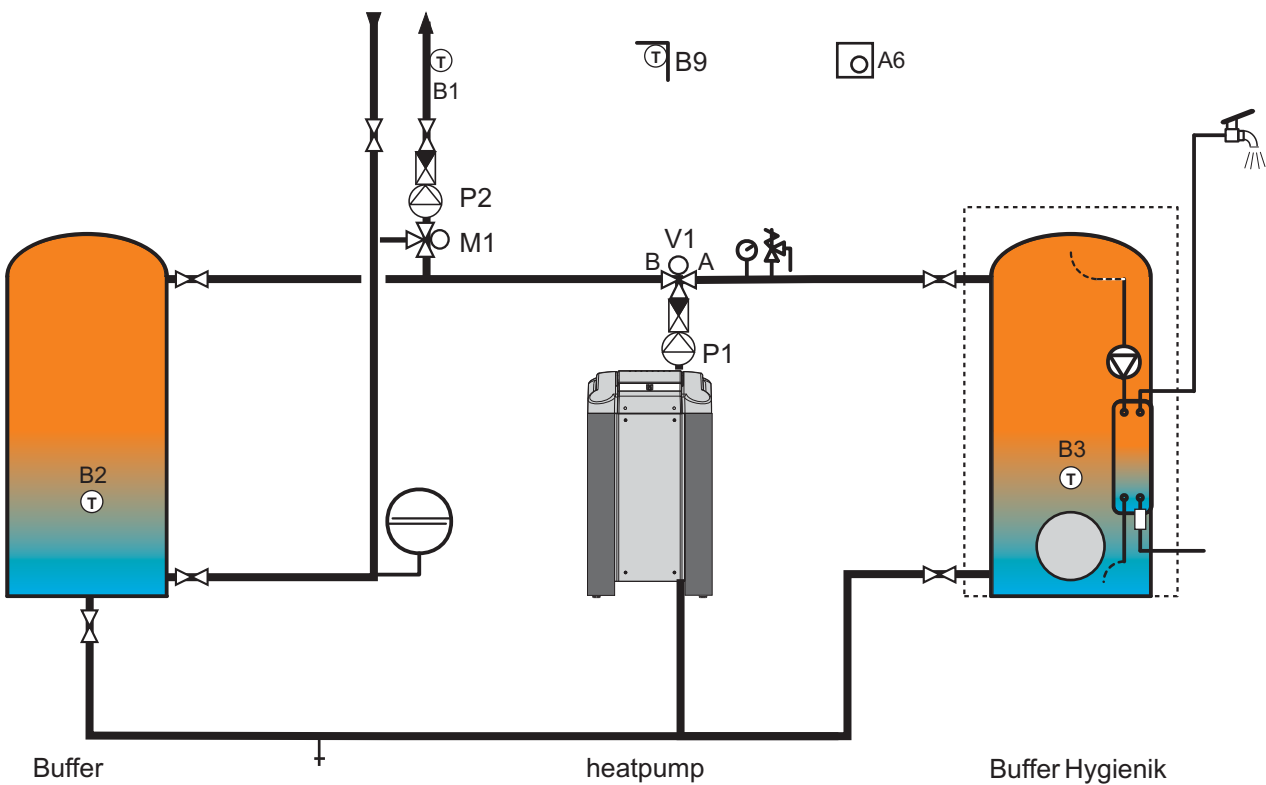
The Hygienik is only used to provide domestic hot water and is loaded under priority by the priority valve.

The heating is supplied by an extra buffer.

The heating circuit can be a pumped or mixed circuit, whereby it is recommended to fit a mixing valve.



The sensor B2 has to be placed inside the buffer.



2.10 Connection on the heating side

The appropriated laws, regulations and Norms for heating installations are also valid for installations that include heat pumps.

It is obligatory to fit a filter into the heating return before the heat pump.

- The circulating pump power has to match the installation (see technical data on page 3 and 4)
- The safety and expansion installations for closed heating systems relevant to EN 12828 have to be provided.
- The connection pipes should be as short as possible. The pipe dimensions have to match the required water flow. (See technical data on page 3 and 4)
- The enclosed flexible connection pipes for the heating flow and return as well as for the brine and groundwater circuit have to be used. The connection pipes can be shortened to a desired length though not shorter than 60cm! Further the connection pipes must not be kinked!
- At the highest point of the pipes has to be an air vent as well as a drain on the lowest point.
- To avoid heat losses, the connection pipes have to be insulated with an appropriate material.

Oxygen diffusion

If not diffusion proof plastic pipes for the under floor heating or a vented heating system is used, it can happen that, if steel pipes, steel radiators or steel buffer are installed, corrosion occurs onto these steel parts.

Corrosion particles can settle down into the liquidizer and can cause power losses of the heat pump or high pressure faults.

Therefore it should be avoided to use vented heating systems or steel pipe installations in connection with non diffusion proof under floor heating pipes.

Heating water quality

Depending on the Heating water quality stone formation (solids mainly from calcium carbon) especially onto the heat exchanger surface can occur. With a high Calcium hydrocarbon content it is a higher risk of stone formation.

Therefore at Installations with a water hardness of more than 14°dH resp. with a Calcium hydrocarbon concentration of more than 2,5 mol/m³ the heating water has to be treated. (Softened/desalted)

The Calcium hydrocarbon concentration $c(\text{Ca}(\text{HCO}_3)_2)$ of you heating water can be got from your local water supplier.

The ph-value also needs to be checked and has to be in between 8 and 9,5.



Wrong water flows by reason of wrong pipe dimensions, wrong fittings or incorrect pump operation can cause fatal disfunction.

2.11 Electrical scheme

The electrical connection has to be reported with your local electricity supply.

The required size of the upstream fuse for the main electric circuit can be seen within the technical data on page 3 and 4. It is important to use a sluggish fuse (characteristic D). The relevant wire diameter has to be calculated by an electrician.

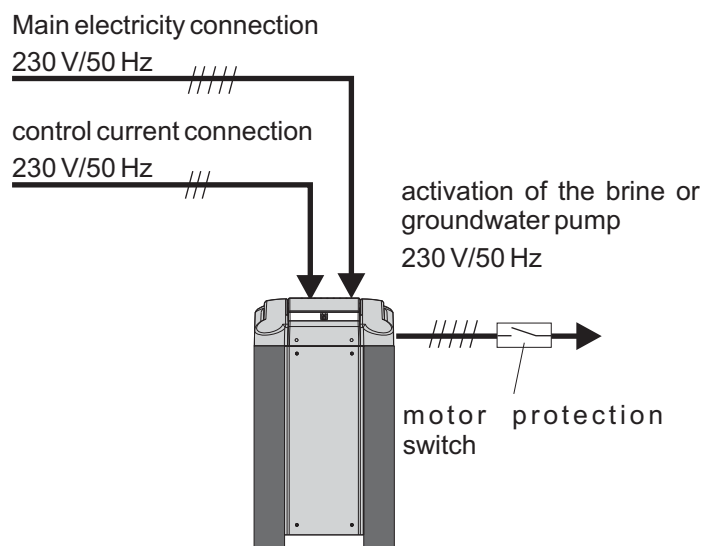
A **Thermorelais** to protect the compressor is already integrated.

A **suitable motor protection** for the brine or groundwater pump **needs to be installed** and adjusted.

The heat pump is usually operated with a weather compensating flow temperature control.

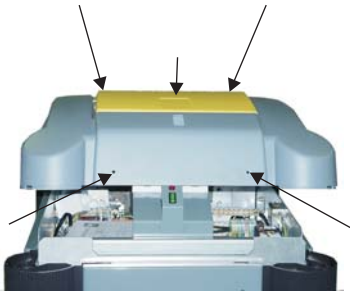
The connections to control the heat pump with a **room sensor** are prepared inside the console. (Look up the electrical connections on page 12)

The **grid voltage** has to be inside certain tolerance margins to insure a trouble free operation of the heat pump (it can be asked at your local electricity supplier)



2.12 Electrical connection

Before connecting the heat pump, the plastic cover has to be removed. Now the connectors are accessible. The connectors for the main and grid electricity are separated. (See illustration resp. next page)



Release the bolts from the plastic cover and underneath the yellow lid to remove the cover.

Grid connection: 230V/50Hz
Main electricity connection: 230V/50Hz

The cables have to have the relevant strength, see point 2.5 on the technical data on page 3 and 4. The required connections of devices from the micro processor chip output have to be made out of flexible cable with 1,5mm².

One comment to the problematic of Electro magnetically compatibility: From year to year more effort and Know-How is required from manufactures and end user of modern electronics because of Electro magnetically compatibility.

The amount of electrical applications is steadily rising and with them the potential for faults. Together with power lines, transmitting devices and other telecommunication installations a invisible electro smog is created.

These disturbances affect all systems, both, biological (us humans) and electronic systems. They cause undesired faulty currents in many ways.

We can just guess the consequences onto biological systems, but you can measure the consequences on-to electrical systems, and in heavy cases you can even see them.

These disturbances can have various results:

- Short term measuring faults
- Long term measuring faults
- Short term disruption of data connection
- Long term disruption of data connection
- Loss of data
- Damage of the facility

All electrical applications like protection coils, motors, transmitters, high voltage power lines, etc. can cause such disruptions, whereby the disturbance can occur in many different linked ways. (Galvanic, inductive, capacitive or radiation)

From our side everything undertaken is to protect the multi talent control against those disturbances. (Hardware design, electro magnetic emission proof console, grid filter, etc.)

The electrician is further responsible to avoid eventual ways of disturbance during his installation.



The electricity supply has to be disconnected before removal of the plastic cover!

The pumps have to be commissioned before the heat pump is put into operation!

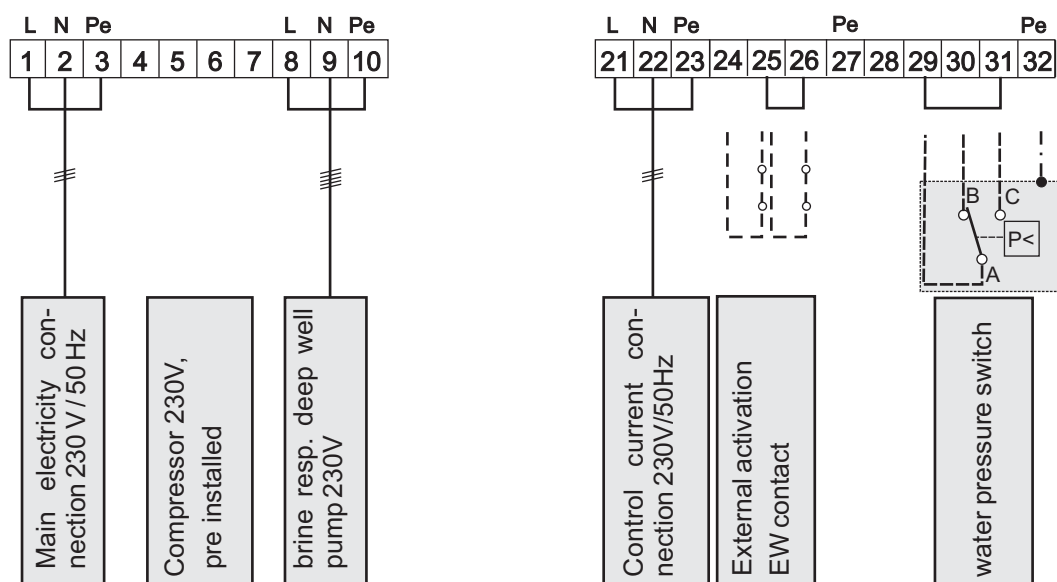
All connections have to be tightened before the heat pump is put into operation!

The whole heating system has to be filled before the heat pump is connected to the grid and put into operation, otherwise the circulating pumps could run dry.

Electrical connection for all brine and groundwater heat pumps of the type TERRA

Subsequent the necessary connections that are performed as inline connections are shown. The gray connections have to be connected on site, whereby the rest is pre connected already.

The wire diameter for the main electricity and for the brine resp. the deep well pump wire has to be dimensioned corresponding to the technical data. (See page 3 and 4 for brine resp. groundwater systems)



Connector description:

Connectern 1 to 3:

Main electricity connection 230V 50Hz

Connector 4 to 7::

Compressor 230V, pre connected

Connector 8 to 10:

Connection brine resp. deep well pump

Connector 21 to 23:

Control current connection 230V/50Hz

Connector 24 and 25:

External activation (if no control is integrated): a potential free contact has to be connected between connector 24 and 25

Connector 25 and 27:

EW barrier: a potential free contact has to be connected between connector 25 and 26 (remove the pre installed bridge)

Connector 28:

Not in use

Connector 29 to 32:

Water pressure switch, at groundwater systems to be installed on site, whereby the pre installed bridge has to be removed; at brine systems the contact 29 and 31 has to be bridged.

3. Heat source systems

3.1 General Information

The given required area for geothermal heat pumps is related to average ground conditions (Soil, clay). The required collector size and therefore the area has to be increased for poor grounds (gravel). Contact your IDM-partner for further consultation.

A pump trial run for 48 hours at the end of February and a water analysis is recommended for the use of groundwater.

Following criteria decides which the suitable Heat source system is:

- ▶ Is enough ground or surface water available?
- ▶ Is the ground or surface water temperature also during the winter above 8°C?
- ▶ Is the ground or surface water quality sufficient enough?
- ▶ Is enough space for a horizontal collector available?
- ▶ Is a bore hole as a result of the available space required?

The different heat source systems are described on the following pages.



In various countries the use of geothermal heat has to be permitted by the water right authority. A corresponding request has to be made in time.

4. Brine-Horizontal Collector

4.1 Description

In this system there are plastic pipes $\text{Ø}25 \times 2,3\text{mm}$ with a length of 100m each placed into the ground to transfer the heat out of the ground. Depending on the heat pump size there are more circuits necessary. The brine mixture circulates inside these pipes. The heat exchange between the brine and the coolant happens inside the vaporizer set with a stainless steel plate heat exchanger.

Following fittings are necessary for the installation: Brass manifold with gate valves, safety blow off, manometer, pressure vessel, thermometer and a brine circulating pump.

The enclosed flexible connection pipes have to be fitted to avoid noise conduction. The connection pipes between manifold and heat pump have to be made on site, whereby galvanized pipes can't be used.

The brine mixing ratio has to be chosen up to -15°C (= 30% anti freeze). If too much anti freeze is added, the specific heat capacity of the brine decreases.

4.2 Range of Application

Suitable for all heat pumps of type TERRAS

4.3 Delivery Content

► Plastic pipes $\text{Ø} 25 \times 2,3\text{mm}$ in loops of 100m each, the amount of loops depends on the heat pump output.

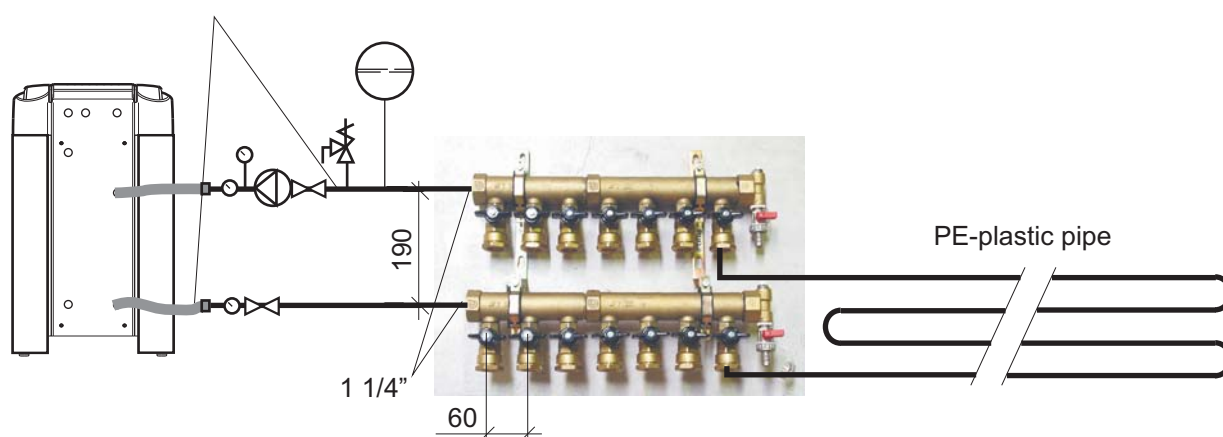
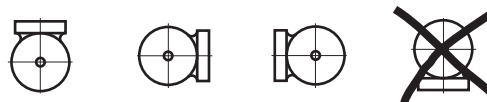
- Connection set including
- Manifold with gate valves for each circuit
 - Safety blow off
 - Manometer
 - 2 thermometers
 - Pressure vessel
 - Brine circulation pump

Note: The used anti-freeze has to be permitted by IDM-Energiesysteme GmbH.

- The brine circuit pipes have to be insulated with a suitable and diffusion proof insulation against condensing water.
- Brine circulation pump and pressure vessel have to be installed onto the flow.
- The brine pressure vessel has to be connected above the pipes.

Attention: The pump electrical connection box can't show down! The pump motor can't be insulated!

Connecting on Site: It is not allowed to use any galvanized pipes! The enclosed flexible connection pipes have to be used!



4.4 Technical Data

Pipe distance: about 80cm

Pipe depth: 110 120cm

Type	S 5	S 7	S 8	S 10	S 12
Amount of circuits	3	3	4	5	6
Total length of pipe, in meter	300	300	400	500	600
Required area in m ²	240	240	320	400	480
Dimensions brine circuit. DN	25	25	25	25	25
Length of manifold	180	180	240	300	360
Brine mixture in liter*	105	105	140	175	210

* Brine mixture (30% anti freeze content), without the amount inside the connection pipes.

For the recommended brine circulation pump see technical data on page 3.

The given required area for geothermal heat pumps is relates to average ground conditions (Soil, clay). The required collector size and therefore the area has to be increased for poor grounds (gravel). The circuits have to be bedded in fine sand (0,3 0,5mm).

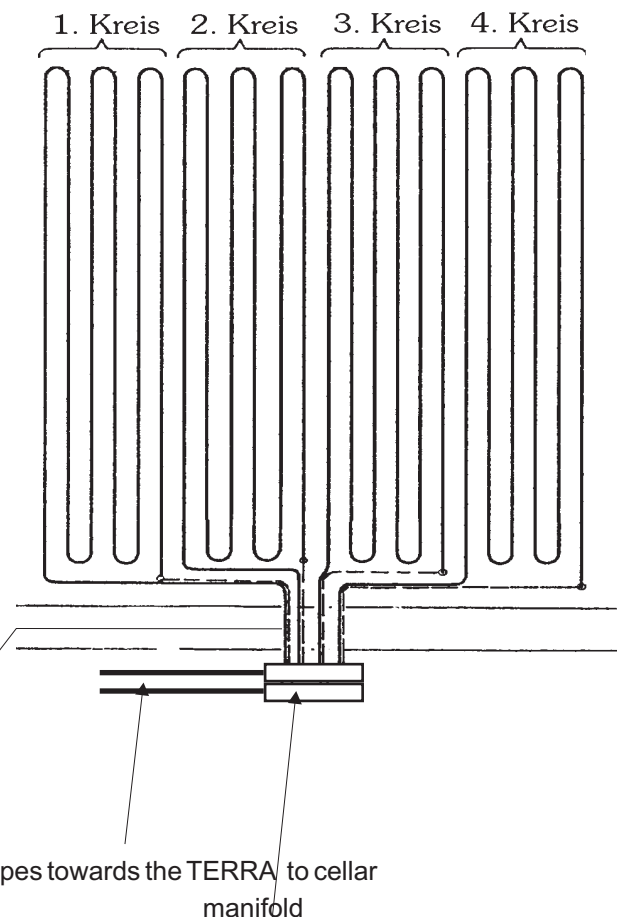
Contact your IDM-partner for further consultation.

4.5 Installation schematic

An example for a TERRA 8 S-HGL heat pump with 4 circuits and a manifold connection inside the cellar.

- ▶ For a length of 2m, where the pipes are brought together, they have to be insulated.
- ▶ The connection pipes have to be insulated with suitable insulation, galvanized pipes can't be used.
- ▶ A minimum distance of 1m has to be provided to any water supply and drainage pipes as well as to walls
- ▶ Openings inside the wall have to be insulated and made water proof.
- ▶ A warning tape has to be bedded 0,5m above the pipes.
- ▶ An installation plan and photos have to be made.

The manifold connection can also be outside the house inside a manhole.



5. Brine bore-hole system

5.1 Description

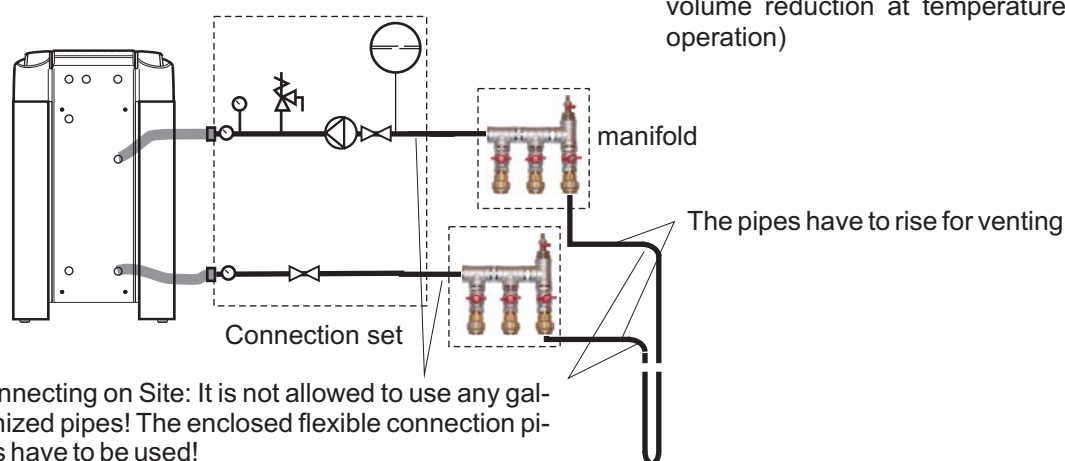
In this system the collector is made out of plastic pipes with a special pipe head. This vaporizing system requires smallest space of all ground vaporizers. The bore-hole diameter is 125mm, the depth and collector length depend on the heat pump output. The brine mixture circulates inside the pipes. The heat exchange between the brine and the coolant happens inside the vaporizer set with a stainless steel plate heat exchanger.

For the brine circuit connection is required: A brass manifold with gate valves, safety blow off, manometer, pressure vessel, thermometer and brine circulation pump.

The enclosed flexible connection pipes have to be used to avoid any noise conduction. The connection between manifold and heat pump has to be built on site, whereby it is not allowed to use any galvanized pipes!

5.2 Range of Application

Suitable for all heat pumps of type TERRA S.



Connecting on Site: It is not allowed to use any galvanized pipes! The enclosed flexible connection pipes have to be used!

5.3 Delivery content

- ▶ Collector plastic pipes, the size depends on the heat pump output
- ▶ Connection set including
 - Safety blow off
 - Manometer
 - 2 thermometers
 - Pressure vessel
 - Brine circulation pump
- ▶ Manifold has to ordered separately

Note:

- The used anti-freeze has to be permitted by IDM-Energiesysteme GmbH.
- The brine circuit pipes have to be insulated with a suitable and diffusion proof insulation against condensing water.
- Brine circulation pump and pressure vessel have to be installed onto the flow.
- The brine pressure vessel has to be connected above the pipes.
- The circuits have to be filled with the anti freeze mixture from the pressure vessel on (because of volume reduction at temperature drops during operation)

5.4 Technical data

Type	TS 5	TS 7	TS 8	TS 10	TS 12
Amount of bore-holes	1	1	2	2	2
Total depth collector* m	80	100	130	150	190
Collector-Ø mm 40	40	40	40	40	40
Connection pipe -Ø	DN 40	DN 40	DN 40	DN 40	DN 40
circulation pump**	25-60	26-60	25-60	25-80	25-80
Length of manifold L	60	60	60	120	120
Brine mixture***	160	200	250	290	360

* The given collector depth is an average value and is depending on the condition of the ground.

** For the bore-hole collector: Type of pump: xx-xx = Grundfos UPS, xx/xx = Wilo Top S

*** Brine mixture (= 30% Proportion of anti-freeze), without contents of the collecting line

6. Ground and Surface water systems

6.1 Description

In this system ground or surface water is used as a heat source. In the case of groundwater usage the water is pumped out of a tap well, cooled down inside the vaporizer and via the return well brought back in to the ground. It has to be ensured that the return well is in flow direction of the groundwater downstream of the tap well.

The heat exchange between the water and the coolant happens inside the vaporizer with a stainless steel plate heat exchanger.

To protect the vaporizer there is an automated minimum temperature limit control and a water pressure switch integrated and connected. A pressure reducing valve is necessary for the operation of the water pressure switch. (To be fitted on site, see illustration)

The enclosed flexible pipes have to be used to avoid noise conduction. The groundwater pipes have to be built on site.

Note:

- To avoid a blocking of the vaporizer, settle basins have to be provided in case of high amounts of particles inside the well water. (Sand, muck)
- Flow and return pipes have to be frost protected, with a slope towards the well.
- The pipes inside the house have to be insulated against condensing water.
- A duct with electrical wires for the deep well pump has to be placed from the tap well towards the heat pump.
- The well cover has to be light and airtight to avoid formation of algae and a silting of the well.
- The well pump should be a deep well pump.
- The well should be flushed for at least 48 hours after constructing to avoid a contamination of the system.

6.2 Range of Application

Water inlet temperature: min. +7°C!

Min. water flow: see chart on page 3

Groundwater quality:

Following values have to be reached:

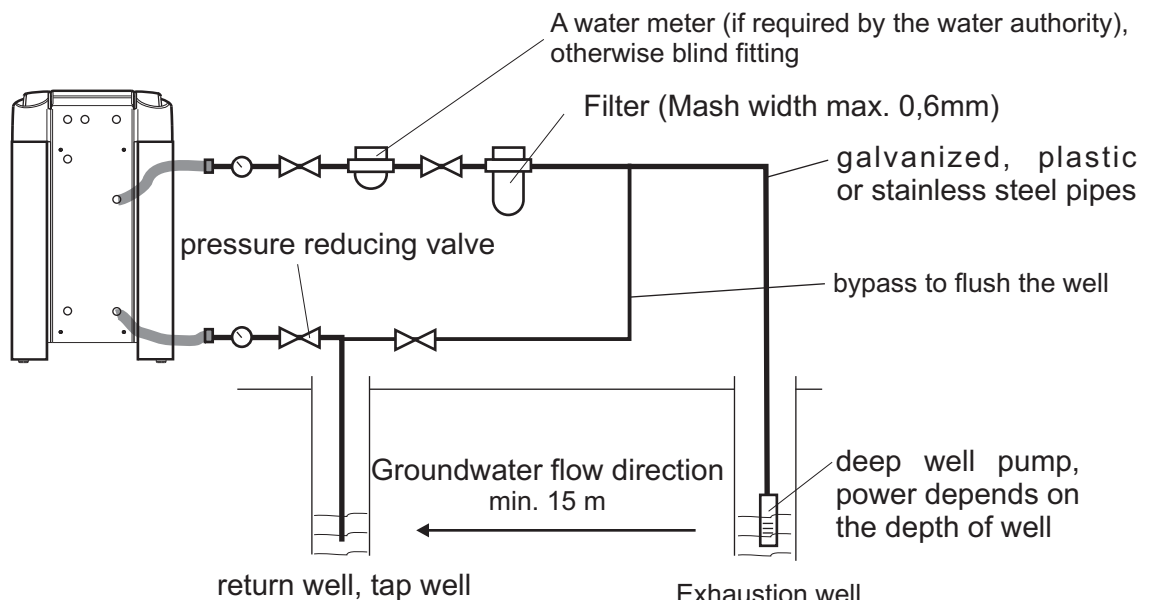
Ph-value:	6,5 - 9
Chloride:	< 100 mg/kg
Sulfate:	< 50 mg/kg
Nitrate:	< 100 mg/kg
Manganese:	< 1 mg/kg*
Free Carbonic acid:	< 20 mg/kg
Ammoniac:	< 2 mg/kg
Iron:	< 2 mg/kg*
Free Chloride:	< 0,5 mg/kg
Electric Conduction:	> 50µS/cm und < 600µS/cm
Oxygen	< 2mg/kg*

***If those limits are exceeded, the vaporizer and pipes can get mocked up as well as the return well can get silted.**

A pump trial run for 48 hours at the end of February and a water analysis is recommended to check the possibility for groundwater as a heat source.

6.3 Accessories

- ▶ To be installed on site:
 - Deep well pump with suitable pipe
 - Motor protection switch for the deep well pump
 - Water filter
 - Water meter with gate valve
 - Pressure reducing valve
 - Maybe Thermometer



7. Advices for the Installation

The heating and brine resp. groundwater circuits have to be pressure tested, neatly flushed, filled and carefully vented before the TERRA heat pump is put into operation.

Requirements for system start up:

- ▶ The heating system as well as the buffer tank has to be filled and vented.
- ▶ In case of a brine heat pump the brine circuit has to be filled with anti freeze (-15°C), flushed and vented.
- ▶ The electrical installation has to be finished.
- ▶ It is only allowed to start the heat pump if the circuits on the cooling and the heating side are properly filled and the electrical connections are checked.
- ▶ Before starting up, the flow temperature limit has to be checked and set. The shut off limit of 55°C has to be checked and if needed the shut off temperature has to be changed.
- ▶ The heat pump has a start up delay, so that the compressor will just start after this time.
- ▶ To drain the heat pump on the heating side frost protected the heat pump return connection has to be opened.
- ▶ The groundwater return temperature limit has to be set before start up so that the heat pump shuts down at a water return temperature of 3°C.

Flush switch for the brine resp. groundwater pump

Note:

At the heat pump console there is a particular switch to flush and vent the brine or groundwater circuits. (See illustration)

As soon as the electrical connections (main and control current) are installed, the brine resp. groundwater pump can put into operation by switching the switch onto "Spülen" ("Flush"). The main switch at the front of the console does not have to be switched on.







After the proper commission the switch has obligatory be set onto "Automatik".






8. Settings max.flow temperature thermostat









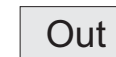














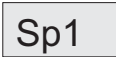



















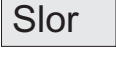
















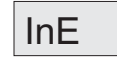




1. (*) calibrate feeler with hand measuring instrument

2. description keys:

			push short : next, more 2 sec : menu exit
entrance menu change: on, off			push short : back, less 2 sec : menu exit

3. entrance in the programming level:

Act. Temp. >  2sec. > **OPER** >  **ConF.** >  >  bis **381** >  >

 	 	 	 	 	
					
  1		  On.FA		  Ptc	
					
  49		  Cool		  1	
					
  10		  6.0		  °C	
					
  52		  InF		  OFF	
					
		  InF		  (*)	
					
		  InF		  1.000	
					
				  Our	
					
				  100	

9. Operation

The TERRA heat pump is switched on and off fully automated by the Multi talent control.

For a proper operation of the controls the manual has to be looked up.

An annual service and maintenance of the installation by a customer service is recommended in concern of warranty claims.

Display:

operating and fault lights flow temperature thermostat fuse brine flush switch



Humming alarm light

main switch

heating control
(accessory)

10. Faults / Fault removal

The heat pump is equipped with a variety of safety applications to protect the machine for possible faults.

If the heat pump is contrary to expectation not running, so the following things have to be checked:

9.1 Is the green indicator light inside the main switch shining?

If not:

- Is the heat pump activated by the control? Look up the referring control manual.
- Is the fuse inside the heat pump console intact? (For the position of the fuse look up the Description of the heat pump)
- Is the fuse of the primary control intact, e.g. the EVA-system?

See referring system description..

9.2 Is the humming fault light shining (see illustration on page 20)?

Open the yellow lid and check the individual fault lights, for this see 9.3 (right) and illustration on page 12.

9.3 Is one of the 5 red fault lights shining?

- 1 High pressure fault
- 2 or Low pressure fault:

If one of those lights is shining switch off the main switch and after a few seconds back on. The heat pump is ready for operation again. But still the function of the heating circuit pumps should be checked.

- 3 Motor protection: If this light is shining the compressor was overloaded. Switch off the main switch and after a few seconds back on. The heat pump is ready for operation again. But still the main electricity connection should be checked.
- 4 Over temperature: If this light is shining, the heat pump has a too high temperature, has to cool down and will switch back on automatically.
- 5 Groundwater too cold: If this light is shining, the groundwater return temperature out of the heat pump is too low.
The groundwater circuit has to be checked.



Note: If the fault light “Over temperature” or “Groundwater too cold” is shining, but no temperature is displayed at the referring thermostat, the main electricity supply is cut off. It can be a blocking time of the electricity supply or a fault.



In case of a series of High pressure, low pressure or Thermorelais faults, please contact your customer service!

Customer service phone number: _____