

Octopus Ice Stick User Manual

Installation Manual, Planning Manual



Dok: AI-01

Three phase 400 V

- IS 48X
- IS 61X
- IS 81X
- IS 48XP
- IS 61XP
- IS 81XP

Copyright © 2009 Octopus Energi AB

This manual contains copyright protected information which is the property of Octopus Energi AB. No part of this document may be copied or forwarded electronically, or in any other way, without a prior written permission from Octopus Energi AB. The same rule applies to images in the manual and translation to other languages.

Edition 1

The right to make changes in this manual is reserved.

This document is produced by

Octopus Energi AB

Box 161

243 23 Höör

Sverige

More copies can be ordered from Octopus Energi AB. When ordering, always refer to the document number written on the first page of the manual as well as in the footer of each page.

Contents

Introduction	4
Safety Instructions	5
Introduction	7
User Manual	9
Included Parts	9
Temperature Setting	12
Care and Maintenance	14
Troubleshooting	15
Recycling and Dismantling	16
Technical Data	17
Installation Manual	19
Checklist	19
Unpacking and Inspection of Material	19
Lifting/Unloading	19
Assembling the Ice Stick	20
Connect the Ice Stick to the Heat Pump Module	21
Shape Pipes and Welds	25
Placement of the Heat Pump Module	25
Connecting to an Existing Heating System	26
System Configurations	27
Assembling and Connecting the Control Panel	30
Placement of the Air Temperature Sensor	30
Pressure Test	30
Vacuum Drive	30
Glycol	31
Propane	31
Operation Start-up	31
Temperature Setting	33
Parameter List	35
Installation Checklist	37
Wiring Diagrams (Three phase 400 V)	38
Measurements and Connections	41
Technical Data	43
Planning Manual	44
Electricity	44
Transport and Storage	44
Preparations	44
Additional Heating and Water Heating	47



Introduction

Congratulations! When you chose the Octopus heat pump, you chose a heat pump system which is a more energy-saving concept than traditional heat pumps for heating of, and hot water production for, buildings. The system examines a list of parameters to ensure that the operation always is machine-friendly and energy-efficient.

The system takes energy from the air in a way that is friendly to the environment. The system also ensures that there is minimum impact on the environment during installation. Octopus has developed the system according to the ideology that neither the house owner nor the environment should be disturbed.

How much heat a house needs, is dependent on many different factors. During a large part of the year, the house gets enough energy from the sun, people and household appliances. The house often needs more heat during autumn, winter and spring. How much more is necessary to keep the house warm, depends on the insulation of the house, the type of domestic heating system installed, the outdoor temperature, the general weather and losses through ventilation.

OctoEL, the control panel of the system, handles this for you by floating condensation, that is by only producing as much heat as the house needs to maintain an even indoor temperature.

Safety Instructions

Always follow the safety instructions in this manual as well as on signs and markings on and around the machine in order to prevent damage to person and machinery.

The heat pump may only be used in accordance with the instructions in this manual. All other use is forbidden. Incorrect use caused by not following the instructions in this manual may result in damage to property, and at worst in personal injury.

If problems arise with the Ice Stick heat pump, refer to the Troubleshooting chapter before you contact Octopus. If you need a service engineer, only contact authorized service engineers. All adjustments, other than room temperature and additional heating adjustments are strictly forbidden.

All maintenance work must only be carried out by Octopus Energi AB or authorized personnel.

This document should be kept for the lifetime of the heat pump.

Manual Symbols

The following symbols occur in the manual to help you when you read the directions.

WARNING!

Make sure that the current is disconnected before any maintenance work is started.

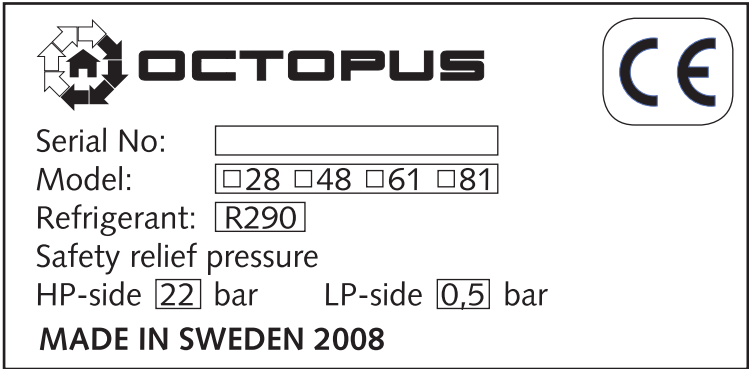
Safety directions. This symbol is used when a dangerous situation may arise.

NOTE!

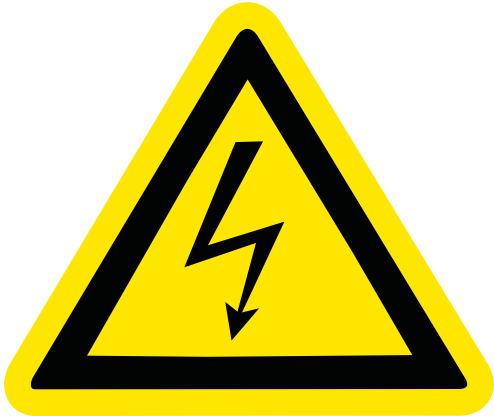
It is important that all radiators are completely open in order for the heat pump to work optimally.

Advice. This symbol is used when we want you to pay attention to something important.

Machine Signs



CE - Sign



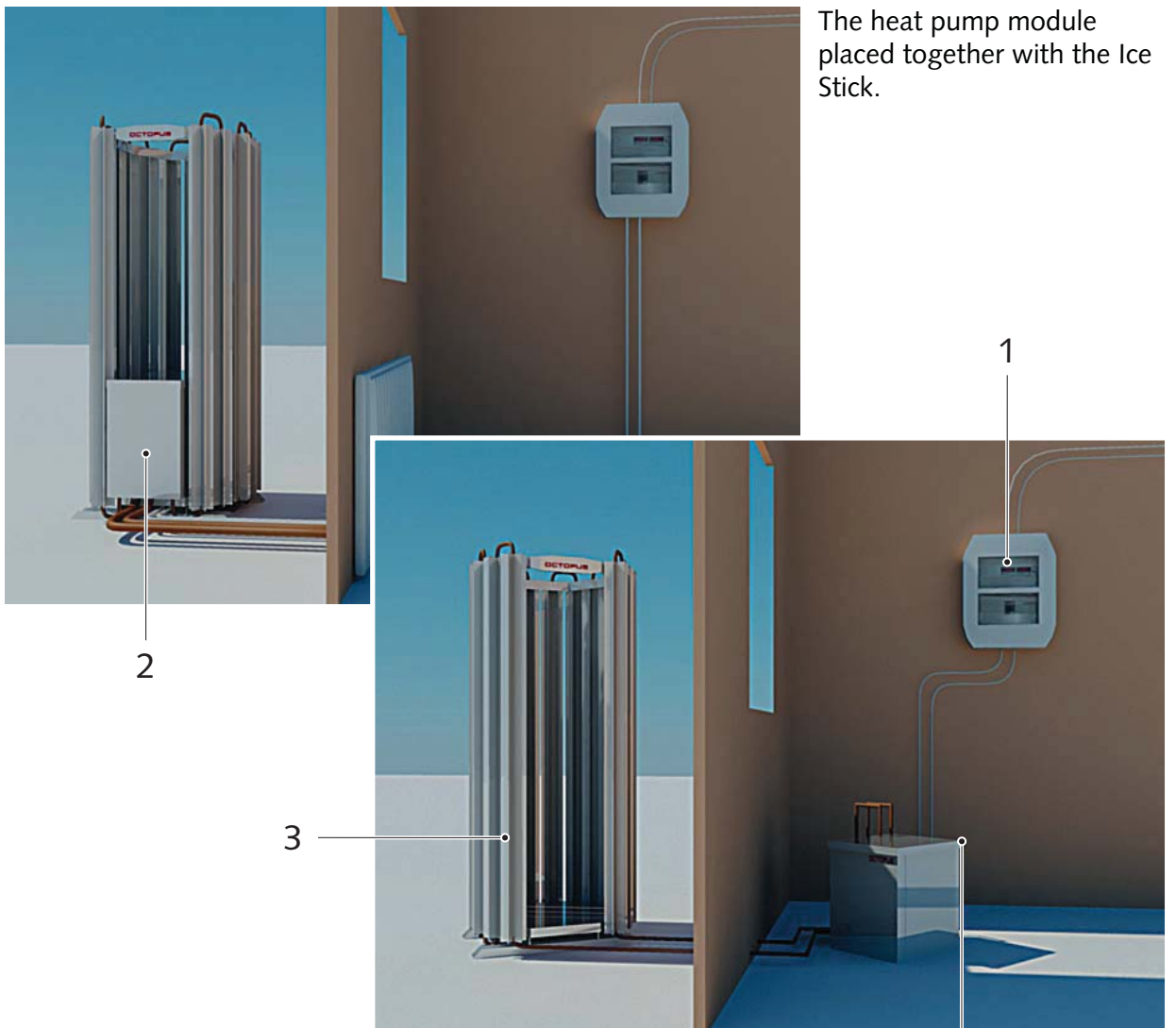
High Voltage Sign

Introduction

System Description

The system consists of a control panel (OctoEL) (1), a heat pump module (2) and the evaporator, Ice Stick (3). Depending on the configuration, the heat pump module can be placed together with the evaporator or inside the house.

The heat pump heats the water-borne system of the house by gathering free energy from the outside. The control panel manages the operation of the heat pump and the additional heating of the house using an indoor temperature sensor, ensuring that an even temperature is maintained irrespective of the weather.



The heat pump module placed together with the Ice Stick.

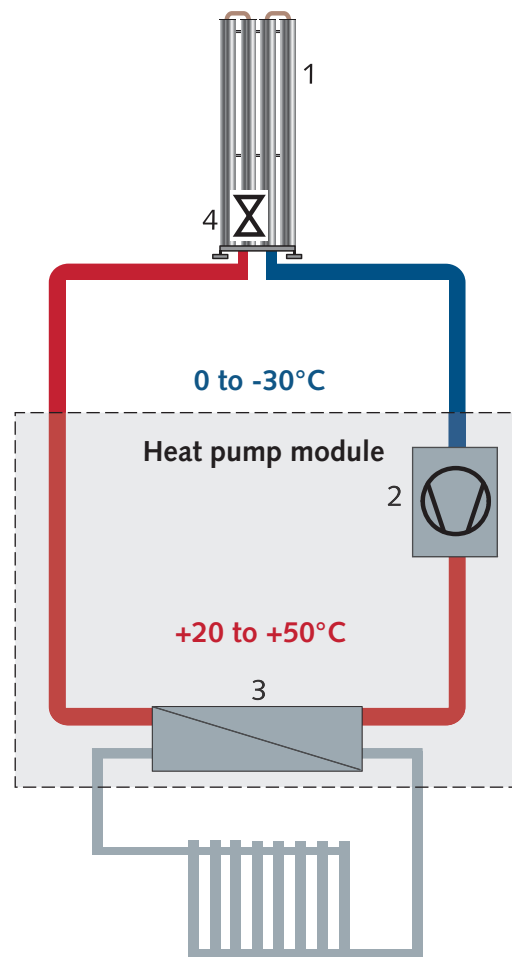
The heat pump module placed inside the house

- 1. Control panel (OctoEL)
- 2. Heat pump module
- 3. Evaporator/Ice Stick

Operation

Two copper pipes are connected to the evaporator. One pipe transfers fluid to the Ice Stick. The other pipe transfers energy filled gas to the heat pump module. Energy is transferred to the buildings water-bourne system by the heat pump module. The heated water is then pumped around the building.

- 1. The heat gathering part - low pressure**
This part of the heat pump is called the evaporator (Ice Stick). A refrigerant (propane) with a low temperature flows through the Ice Stick. The Ice Stick is heated by its surrounding environment, evaporating the refrigerant.
- 2. The preasure rising part - High pressure**
This part consists of a compressor. The heated and evaporated refrigerant is compressed by the compressor. The increase in pressure raises the temperature and condensation point (the point where gas returns to liquid form).
- 3. The heat emitting part - High pressure**
This part of the heat pump transfers the heat to the house and is called the condensor. The refrigerant passes through the condensor at a high temperature and condensation point. In the condensor, the refrigerant is cooled down by the heating system of the house (such as radiators or floor heating), leading to the condensation of the refrigerant (returning it to liquid form).
- 4. Pressure lowering part - Low pressure**
This part consists of a throttling device. The cooled refrigerant expands and both the temperature and the boiling point of the refrigerant is significantly lowered as a result of the lower pressure.



User Manual

Included Parts

Evaporator/Ice Stick

The Ice Stick consists of a number of energy sticks. The amount of energy sticks are dependent on which heat pump you have. An energy stick consists of 2 meters of copper piping that are enclosed in aluminium profiles which gives an area equivalent to 64 meters of copper piping (22mm). For example, the IS48 consists of 12 energy sticks with a total area equivalent to 770 meters of copper piping. The propane inside the copper piping draws energy from the surrounding air water vapour. The Ice Stick has no moving parts and does not require defrosting.

Propane

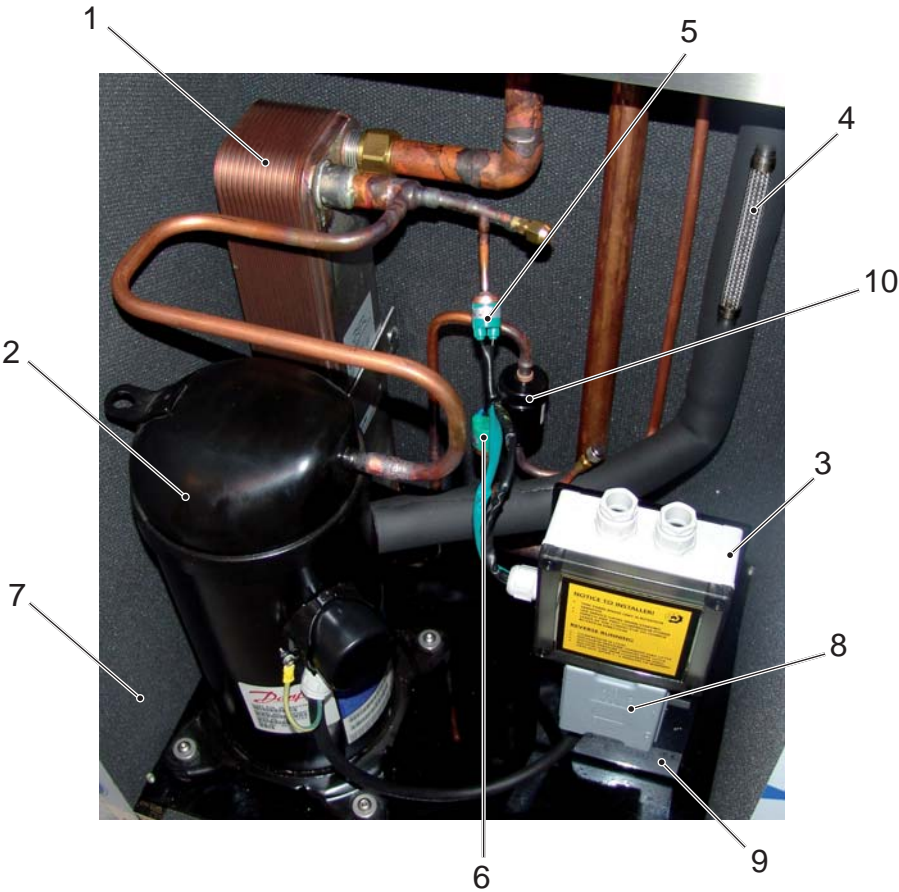
The heat pumps refrigerant circuit is filled with the refrigerant R290 (CH₃, CH₂, CH₃ Propane). R290 has no effect on the ozone and has a negligible direct greenhouse effect. Propane has no colour or scent. To be able to detect a leak an odorant has been added to the propane, resulting in the characteristic propane scent. Propane is not toxic but it is highly flammable.

When water vapour loses energy it returns to liquid (condensation), thereafter freezing to ice. Energy is released in every step. The creation of 1,4kg of ice saves 1 kWh. The liquid propane absorbs the energy within the copper piping of the energy stick and evaporates completely when it passes through all of the energy sticks.

Heat Pump Module

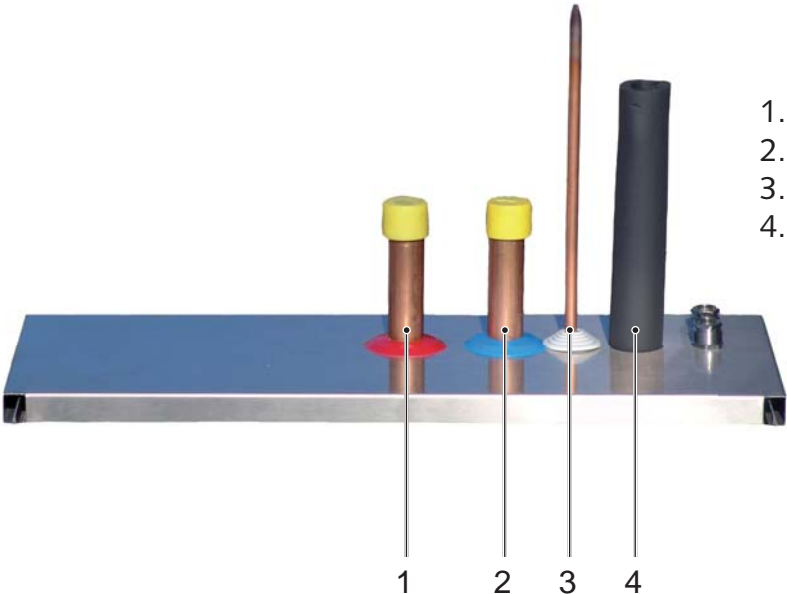
The heat pump module consists of the following:

1. A compressor. The compressor increases the pressure on the refrigerant and in doing so increases the temperature.
2. A heat exchanger (the condenser). Within the heat exchanger the hot gas transfers its energy to the water-borne system.
3. A junction box. The control panel is to be plugged into the switch box.
4. A vibration damper
5. A high pressure sensor
6. A low pressure sensor
7. Flameproof insulation
8. A safety switch
9. CE-sign
10. A drying filter



- 1. Heat exchanger
- 2. Compressor
- 3. Junction box
- 4. Vibration damper
- 5. High pressure sensor
- 6. Low pressure sensor
- 7. Flameproof insulation
- 8. Safety Switch
- 9. CE-Sign
- 10. Drying filter

On the top side of the XP model heat pump modules there are two pipes (inflow and out-flow) for the refrigerant and two pipes (inflow and outflow) for water.



- 1. Water, out (red)
- 2. Water, in (blue)
- 3. Refrigerant, out
- 4. Refrigerant, in

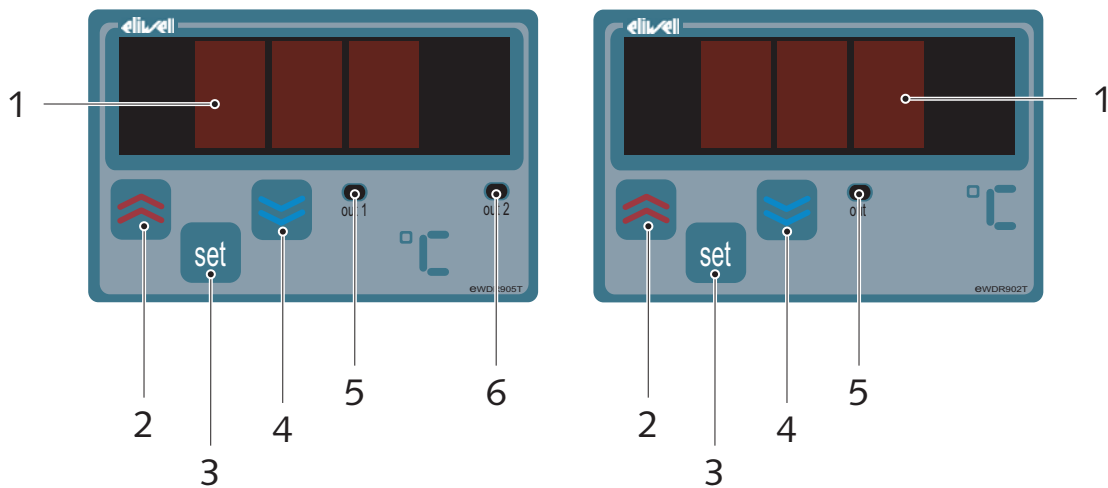
Control Panel (OctoEL)

The control panel controls the heating system for the entire house and has two digital thermostats.

The digital thermostat on the left, control panel 905, controls the temperature in the room where the air temperature sensor is placed. The air temperature sensor is to be placed in a suitable location in the house. Read more about the air temperature sensor below.

The digital thermostat on the right, control panel 902, controls the temperature of the hot water from the heat exchanger. This control panel also controls the pressure in the compressor (high or low pressure).

Control panel 905, air temperature regulation Control panel 902, heat pump protection



1. Display
2. Select up
3. Settings
4. Select down
5. out 1
6. out 2

1. Display
2. Select up
3. Settings
4. Select down
5. out

Air Temperature Sensor

The air temperature sensor measures the actual temperature of the room/house. The sensor provides data for the heat pump control panel to work with.

It is important that the air temperature sensor is placed in a room (or in a location) in the house where the highest average temperature is required. The air temperature sensor has to be placed where it is changed by the Octopus heating system of the room/house such as floor heating and radiators and not by local sources of heat such as lamps, stoves, and direct sunlight. The air temperature sensor should not be placed on external walls.

Temperature Setting

Temperature Regulation

The regulation of the temperature in the house is done with the left control panel, control panel 905. The factory default setting air temperature setpoint is 20°C.

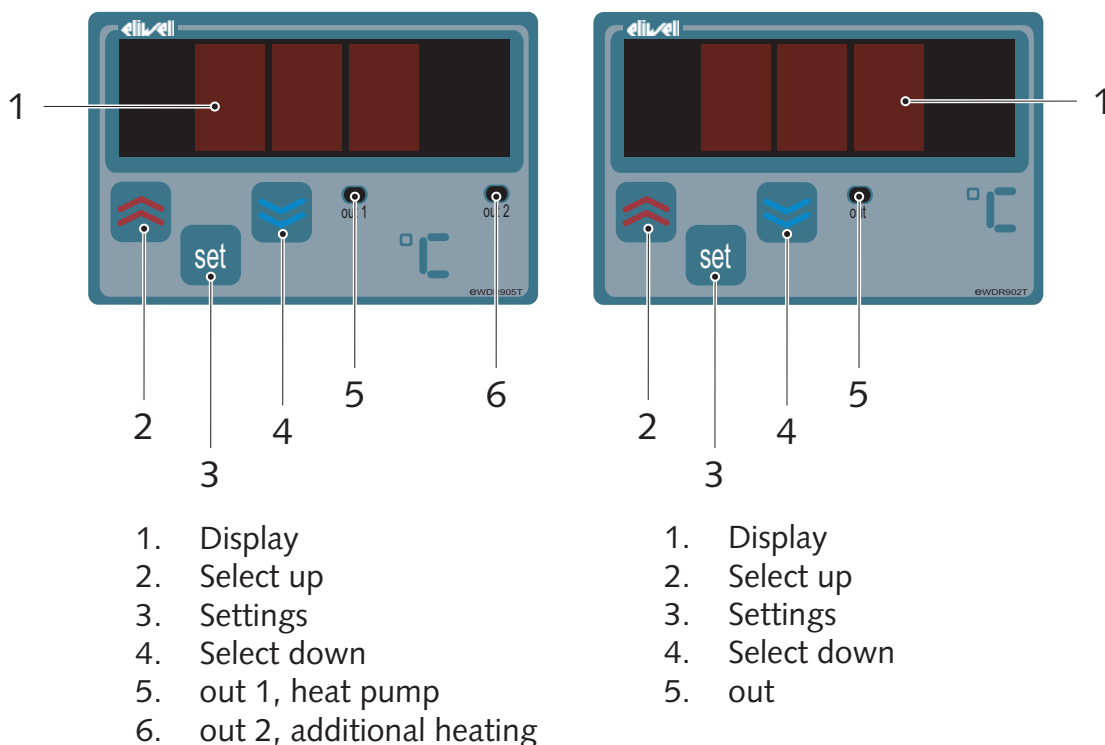
When the air temperature sensor measures a temperature that is 0.1°C below the control panel value the compressor is started with a delay of 500 seconds. If the measured temperature is 0.5°C below the control panel value the boost is started, this also occurs with a delay of 500 seconds. If floor heating is used the boost should be set to not start until the measured temperature is 1.0°C below the control panel value.

When there is no temperature difference between the air temperature sensor value and the control panel value the compressor and the additional heating is turned off. This is done with a delay of 500 seconds.

The heat pump has a default setpoint setting of 20°C. To change the air temperature setpoint carry out the following procedure:

1. Press **set** once. LED *out 1* should flash.
2. Use the blue or red arrow to set the desired temperature value.
3. Press **set** until LED *out 2* is flashing.
4. Use the blue or red arrow to set the temperature value to the same as in step 2.
5. Press **set** repeatedly to verify that the same value is shown in the display.

Control panel 905, air temperature regulation Control panel 902, heat pump protection



Heat Pump Protection

NOTE!

This value must only be changed by Octopus Energi AB or authorized personnel.

The digital thermostat to the right, control panel 902, shows the current water temperature after the heat pump. The factory setting is 55°C and must only be changed by Octopus Energi AB or authorized personnel.

The compressor is automatically shut off at the setpoint value (55°C) to protect the compressor and it is started again when the water temperature is 5°C below the setpoint value.

Additional Heating

Additional heating should be installed if it is not already installed.

During the coldest months of the year the heat pump might need additional heating to keep a constant temperature within the building. If the heat pump is forced to maintain an indoor temperature that is higher than its performance capacity and no additional heating is available it has to work continuously, thus not giving the heat pump the off times it needs. This can result in the evaporator freezing up to a point when its efficiency is lowered.

The different heat pump modules can be connected to all water-bourne systems such as district heating, electric element, oil-, gas-, or pellet boiler.

Radiators

NOTE!

All radiators must have open valves in the rooms that are to be heated.

Care and Maintenance

Controls

Check the Ice Stick for frost periodically to ensure that the heat pump is working as intended. If the heat pump should stop functioning, consult the troubleshooting section of this manual. If the problem persists, contact your installation technician for further instructions and assistance.

Defrosting of the Ice Stick

Defrosting of the Ice Stick is done automatically.

Change of Components

NOTE!

Change of components must only be performed by authorized personnel.

When a component is changed the new component must be equivalent to the original.

When changing the compressor the filter must be change as well.

Only solder in a well-ventilated area.

Troubleshooting

Description	Probable Cause	Solution
The house is not getting warm	The settings for the control panel are wrong	Check the settings for the control panel (see Control Panel, page 11)
	The additional heating is not working	Contact your installation technician
The right display is turned off	During extreme or long-running cold weather this can be normal	<ul style="list-style-type: none"> • Open all thermostats in the house, deareate the radiators/system • Check that the circulation pump is operating • Contact your installation technician
	May be caused by either too much or not enough refrigerant	
	May be caused by bad circulation within the house	
The Ice Stick is only partly frozen	If the weather is warm this can be normal, otherwise there is not enough refrigerant	Contact your install technician
The heat pump is loud and does not produce heat	The electrical phase is wrong	Turn off the heat pump with the motor protection (safety switch and contact your installation technician/electrician
The compressor does not start	The motor protection is tripped / the safety fuse is tripped	Reset the safety fuse followed by the motor protection. Contact your installation technician
The display is showing "EEE"	Faulty temperature sensor/bad connection	Contact your installation technician/electrician

Recycling and Dismantling

NOTE!

All current to the heat pump must be disconnected before dismantling can begin.

When the heat pump is to be dismantled and recycled, follow these instructions:

- Draining of the refrigerant must be performed by accredited personnel.
- The compressor shall be sent to an appropriate recycling centre.
- All other hardware shall be sorted and recycled.

Technical Data

Technical Data


Model Octopus™ IS	Unit	IS48X/XP	IS61X/XP	IS81X/XP
Aluminium profiles	pc	12	12	2 x 12
Electrical connection		400V, N3-Phase		
Fuse	A	10D	10D	16D
Compressor, type		Scroll		
Compressor, input	kW	3,0	3,7	5,0
Compressor, output capacity	m ³ /h	11,41	14,4	19,2
Max temperature	°C	55		
Refrigerant, Propane/R290	kg	~1	~1	~2
Pressure min/max	bar	0,5/22		
Temperature, boil/condense	°C	-33/+64		
Dimensions, evaporator (WxDxH)	mm	810x980x2220	810x980x2220	2 x 810x980x2220
Dimensions, heat pump module (WxDxH)	mm	590x500x730 (XP) 360x708x625 (X)		
Weight, evaporator	kg	97	97	2 x 97
Weight, heat pump module	kg	87	92	102
Control panel		OctoEL 10	OctoEL 10	OctoEL 16



DECLARATION OF CONFORMITY/MANUFACTURER'S DECLARATION
FÖRSÄKRAN OM ÖVERENSSTÄMMELSE/TILLVERKARDEKLARATION

Directive area <i>Direktivets område</i>	Directive no <i>Direktiv nr</i>
Safety of machinery <i>Maskindirektivet</i>	98/37/EG
Low voltage equipment <i>Lågspänningsdirektivet</i>	2006/95/EC
Electromagnetic compatibility <i>Elektromagnetisk kompatibilitet</i>	2004/108/EC
Pressure equipment <i>Tryckbärande anordning</i>	97/23/EC article 3.3

Manufacturer name, address, telephone and fax no: <i>Tillverkarens namn, adress, telefon och faxnummer:</i>
Octopus Energi AB Box 161, SE-243 23 Höör, Sweden Telephone: +46(0)413-51 05 00, Fax: +46(0)413-51 05 01

Brand name or trademark <i>Fabrikatnamn eller varumärke</i>	 OCTOPUS
---	--

Type of equipment <i>Typ av utrustning</i>	Heat pump 1-phase 220 V and 3-phase 380 V <i>Värmepump 1-fas 220 V och 3-fas 380 V</i>
--	--

Type designation etc. <i>Typbeteckning etc.</i>	
Name <i>Namn</i>	Size <i>Storlek</i>
IS	28, 48, 61, 81, 109

By signing this document, the undersigned declares as manufacturer that the equipment in question complies with the protection requirements of the above directive.

Genom att underteckna detta dokument försäkras undertecknad såsom tillverkare att angiven utrustning uppfyller skyddskraven i rubricerade direktiv.

Date / Datum

2009-06-29

Signature / Underskrift


Clarification / Namnförtydligande
Kurt Karlsson

Position / Befattning

Head of R&D / Utveckl.chef

Installation Manual

Checklist

Before starting the assembly, check that the actions listed below are attended to:

- Construction of Ice Stick concrete plinth
- Space requirements in regards to installation and services
- Dimensions of pipe and canal connections
- Holes in the wall for pipes and cables
- Supply of electricity

If any of these items are not attended to, please follow the instructions in the Planning Manual.

Before starting the assembly, check that the actions listed below are attended to:

- Same current on all electrical phases (not required when single phase)
- Capacity of the main fuse (it must be suitably rated)

Unpacking and Inspection of Material

Unpack the material and check to see that it has nothing missing or anything damaged due to transportation. Any damages due to transportation should be immediately reported to Octopus.

Lifting/Unloading

Consider the following when lifting/unloading the Ice Stick and the heat pump module:

- Be careful not to damage the material when lifting and unloading.
- A lifting device or a minimum of 4 people are recommended when unloading.
- The heat pump module must only be transported in the vertical position.

NOTE!

Secure tightly to ensure that the units are unable to turn over or slide out of the lifting device.

Assembling the Ice Stick

NOTE!

Octopus does not recommend installing the Ice Stick on a roof or a wall. Octopus claims no responsibility what so ever in the event of a roof or wall installation.

NOTE!

Make sure not to damage the pipes when lifting the Ice Stick from a lying to a standing position.

Consider the following before starting the assembly of the Ice Stick:

- The Ice Stick should be placed where it will best extract heat from rain, wind and sun.

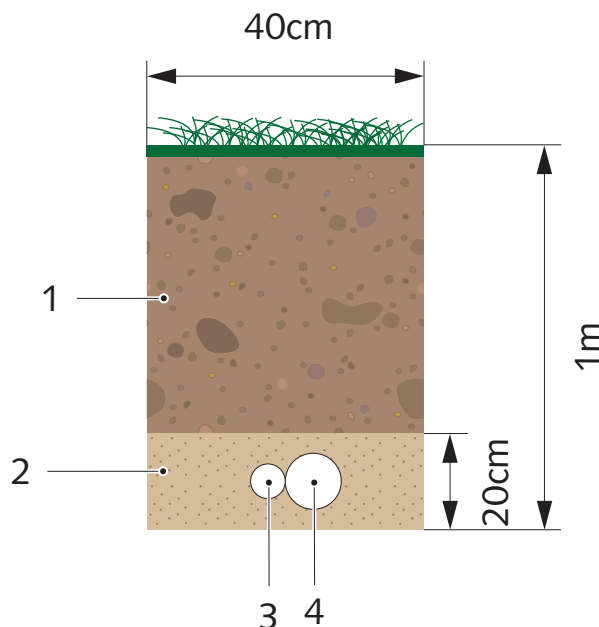
Perform the following when assembling the Ice Stick:

1. Drill four holes in the concrete plinth where the Ice Stick is to be placed.
2. Secure the Ice Stick in the concrete plinth with four 100mm M10 anchor bolts.

Connect the Ice Stick to the Heat Pump Module

Model IS48XP and IS61XP (compressor and heat exchanger within the house)

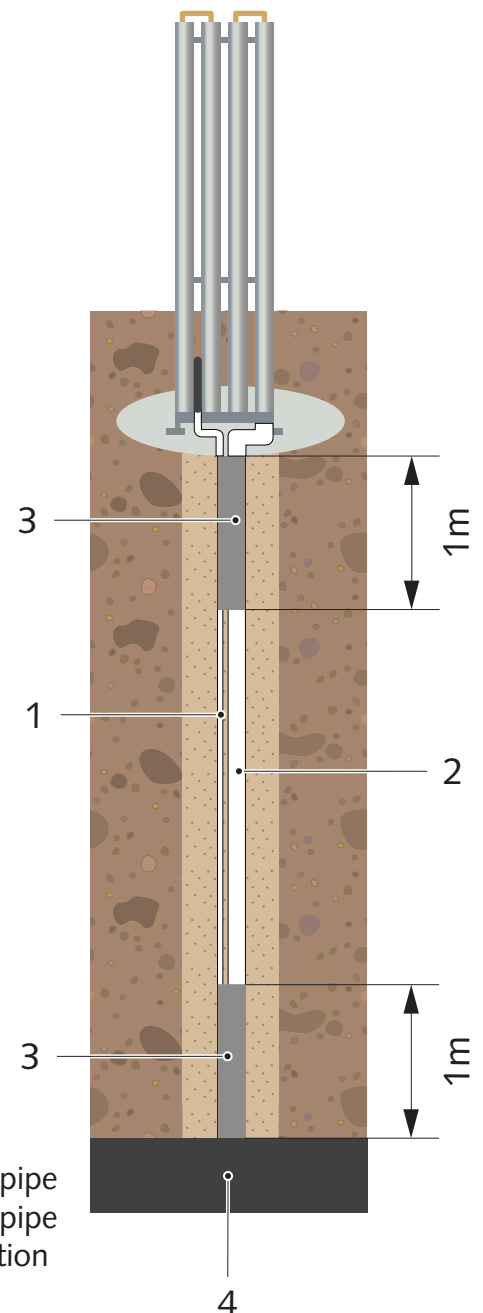
1. Fill the trench between the Ice Stick and the house with 100mm of sand.
2. Connect a 3/8" (0,85mm) copper pipe to the 1/4" pipe on the left-hand side.
3. Connect a 7/8" (1,15mm) copper pipe to the 22mm diameter pipe on the right-hand side.
4. Insulate the pipes at a length of one meter from the foundation the house wall with 13mm insulation. Place the pipes within the same insulation.
5. Lead the pipes into the house through a Ø110mm wavin pipe. The wavin pipe will protect against moisture.
6. Place the pipes close together on the sand bed and tie them together with cable ties.
7. Cover the pipes with 100mm of sand.
8. Fill the trench with soil.



1. Soil
2. Sand bed
3. 3/8" copper pipe
4. 7/8" copper pipe

NOTE!

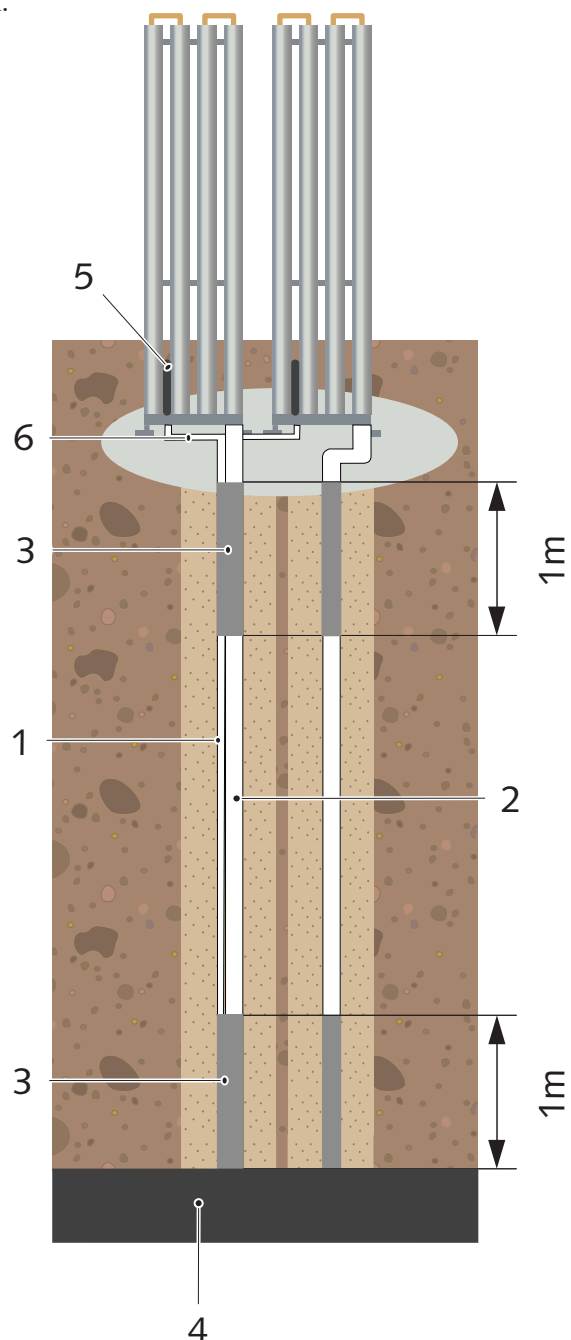
All soldering and shaping of pipes are to be performed according to the instructions in this manual, see page 25.



1. 3/8" copper pipe
2. 7/8" copper pipe
3. 13mm insulation
4. House wall

Model IS81XP

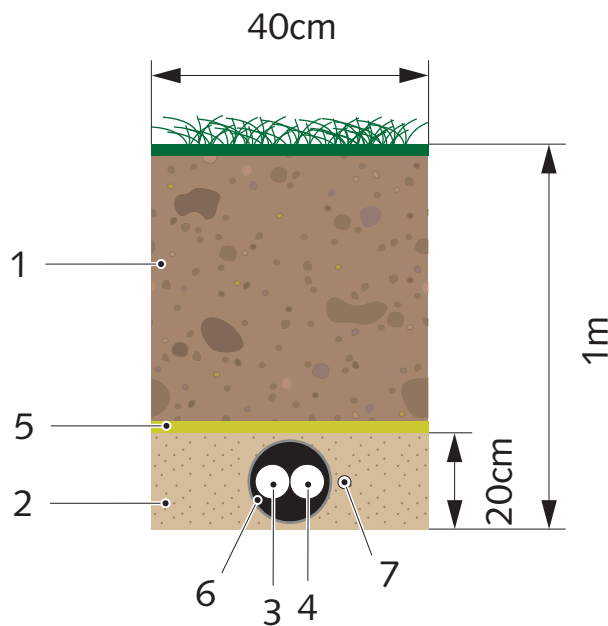
1. Fill the trench between the house and the Ice-Sticks with 100mm sand.
2. Connect the 3/8" * 0.85 mm copper pipe to the T-connection.
3. Connect the 7/8" * 1,15 mm copper pipe to the Ø22mm tube on the right side of the Ice-Sticks. 7/8" pipes have to have the same length.
4. Connect the both 34TUB with same length of 3/8" pipe to a T-connection.
5. Insulate the pipes at a length of one meter from the foundation the house wall with 13mm insulation.
6. Lead the pipes into the house through two Ø110mm wavin pipe. The wavin pipe will protect against moisture.
7. Place the 3/8" and one of the 7/8" pipe closely on the sand bed and tie them together with cable ties.
8. 7/8" pipes should be 1 m apart.
9. Cover the pipes with 100mm of sand.
10. Fill the trench with soil.



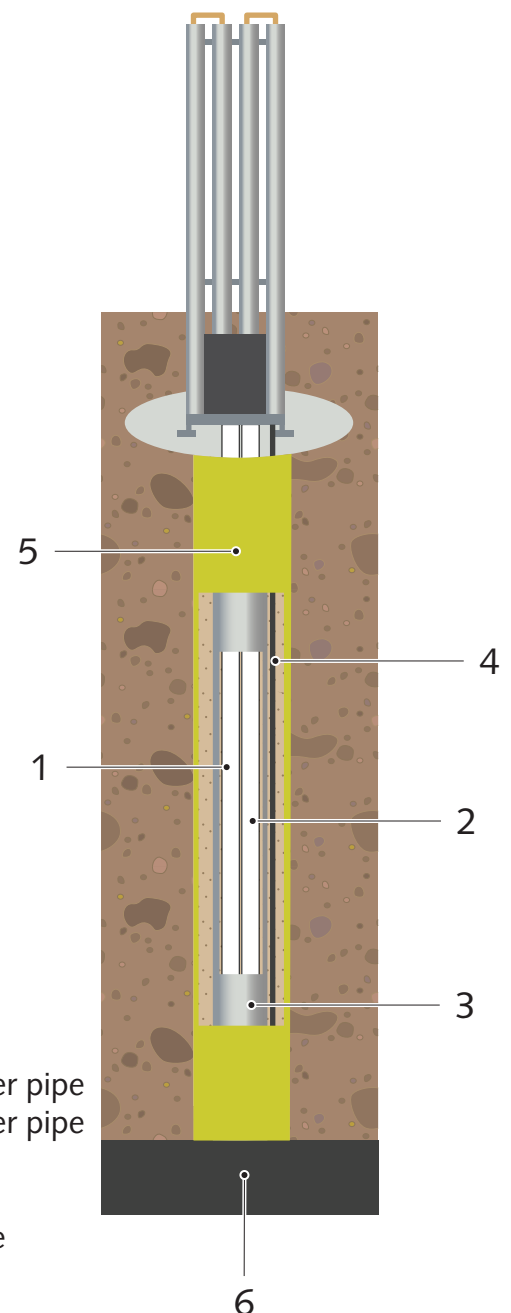
1. 3/8" copper pipe
2. 7/8" copper pipe
3. 13mm insulation
4. House wall
5. 34TUB
6. 3/8" copper pipe

Model IS48X and IS61X (compressor and heat exchanger at Ice Stick)

1. Fill the trench between the Ice Stick and the house with 100mm of sand.
2. Connect a Ø28mm insulated water pipe to the connection underneath the heat pump module marked with a blue colour. The blue connection is for incoming water.
3. Connect a Ø28mm insulated water pipe to the connection underneath the heat pump module marked with a red colour. The red connection is for outgoing water.
4. Connect the electric cables to the heat pump module.
5. Place the duo insulated pipe in a culvert.
6. Lead the culvert into the house.
7. Lead the electric cables into the house through a wavin pipe. The wavin pipe will protect against moisture.
8. Place the culvert on the sand bed.
9. Place the electric cables on the sand bed. Mark with plastic strips for electric cables.
10. Cover the culvert with 100mm of sand.
11. Place ground insulation sheets on top of the sand bed for extra insulation.
12. Fill the trench with soil.



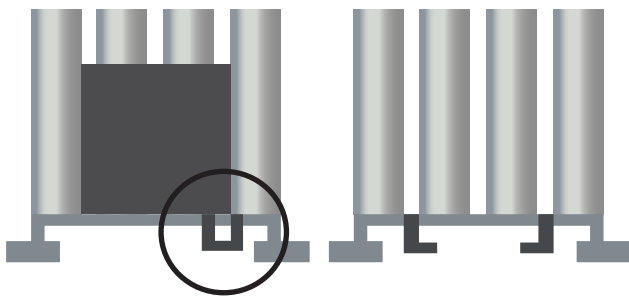
1. Soil
2. Sand bed
3. Ø28mm insulated water pipe
4. Ø28mm insulated water pipe
5. Ground insulation plate
6. Culvert
7. Electric cabel



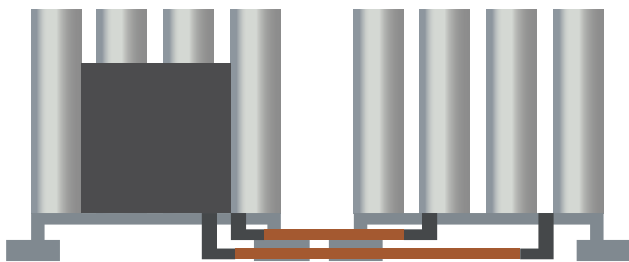
1. Ø28mm insulated water pipe
2. Ø28mm insulated water pipe
3. Culvert
4. Electric cabel
5. Ground insulation plate
6. House wall

Model IS81X (compressor and heat exchanger at Ice Stick)

1. Fill the trench between the Ice Stick and the house with 100mm of sand.
2. Open the pipe connection on the left Ice Stick.
3. Connect the two Ice Sticks with Ø22mm copper pipes.
4. Connect a Ø28mm insulated water pipe to the connection underneath the heat pump module marked with a blue colour. The blue connection is for incoming water.
5. Connect a Ø28mm insulated water pipe to the connection underneath the heat pump module marked with a red colour. The red connection is for outgoing water.
6. Connect the electric cables to the heat pump module.
7. Place the duo insulated pipe in a culvert.
8. Lead the culvert into the house.
9. Lead the electric cables into the house through a plastic tube. The tube will act as protection against moisture.
10. Place the culvert on the sand bed.
11. Place the electric cables on the sand bed. Mark with plastic strips for electric cables.
12. Cover the culvert with 100mm of sand.
13. Place ground insulation sheets on top of the sand bed for extra insulation.
14. Fill the trench with soil.

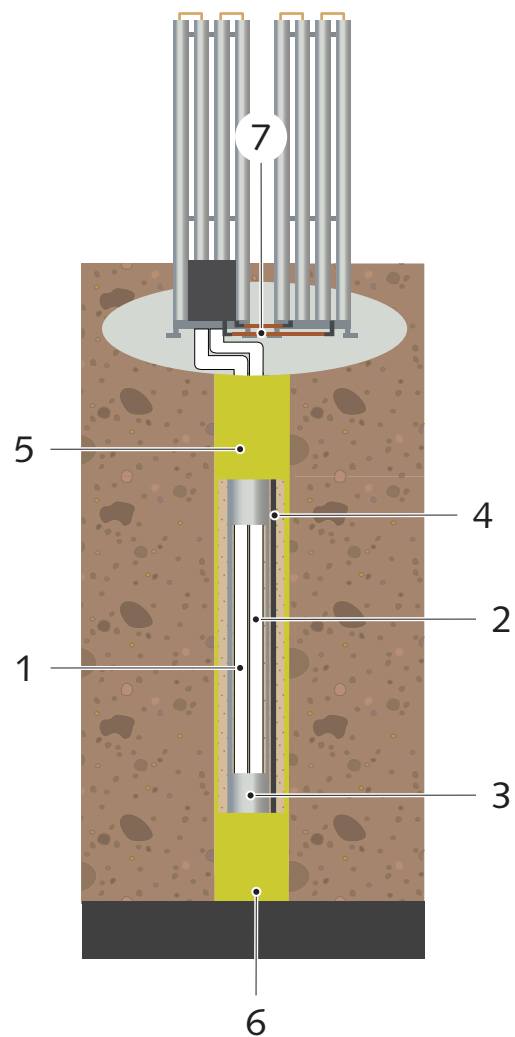


Open the pipe connection on the left Ice Stick.



Connect the two Ice Sticks with Ø22mm copper pipes.

1. Ø28mm insulated water pipes
2. Ø28mm insulated water pipes
3. Culvert
4. Electrical cable
5. Ground insulation sheet
6. House Wall
7. Ø22mm copper pipe



Shape Pipes and Welds

All laying and shaping of pipes to be carried out by accredited personnel according to industry standards.

When joining two copper pipes, a 5% silver solder is to be used.

When joining a copper pipe to corrosion free metal, a 55% silver solder is to be used.

Placement of the Heat Pump Module

NOTE!

Only valid for models
IS 48XP, IS 61XP and
IS 81XP

- The heat pump module must stand upright, that is with a 0% slope of the floor.
- The heat pump module should always be accessible for service. The working space in front of the heat pump module must be at least 1,2 meter, see page 41-42 for measurements.
- No heavy objects is to be placed on top of the heat pump module.
- Do not jump/step/stand on the heat pump module.
- The floor in the room where the heat pump module is placed should be dry. Make sure that there are no possibilities for water to enter the heat pump module, for example from the ceiling.
- No objects are to be hung on the piping of the heat pump module.

Connecting to an Existing Heating System

NOTE!

Octopus recommends installing preheating when tap hot water is to be heated (see page 27-29 for more information).

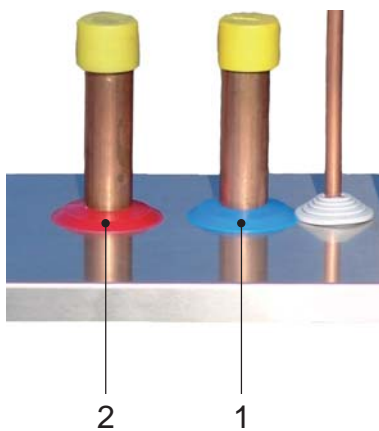
NOTE!

The Ice Stick shall not be connected to an accumulation tank.

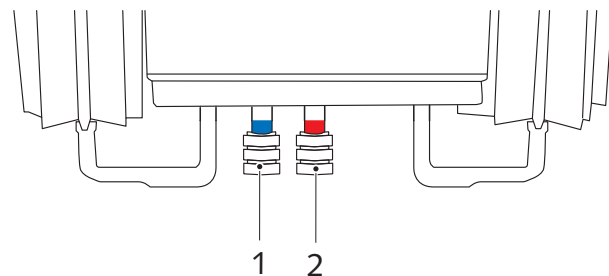
Octopus recommends using flexible connection hoses for vibration dampening when connecting the heat pump module to an existing heating system.

The following applies when connecting water pipes to the heat pump module, regardless of model:

- The connection for incoming water is marked with blue.
- The connection for outgoing water is marked with red.



XP - model

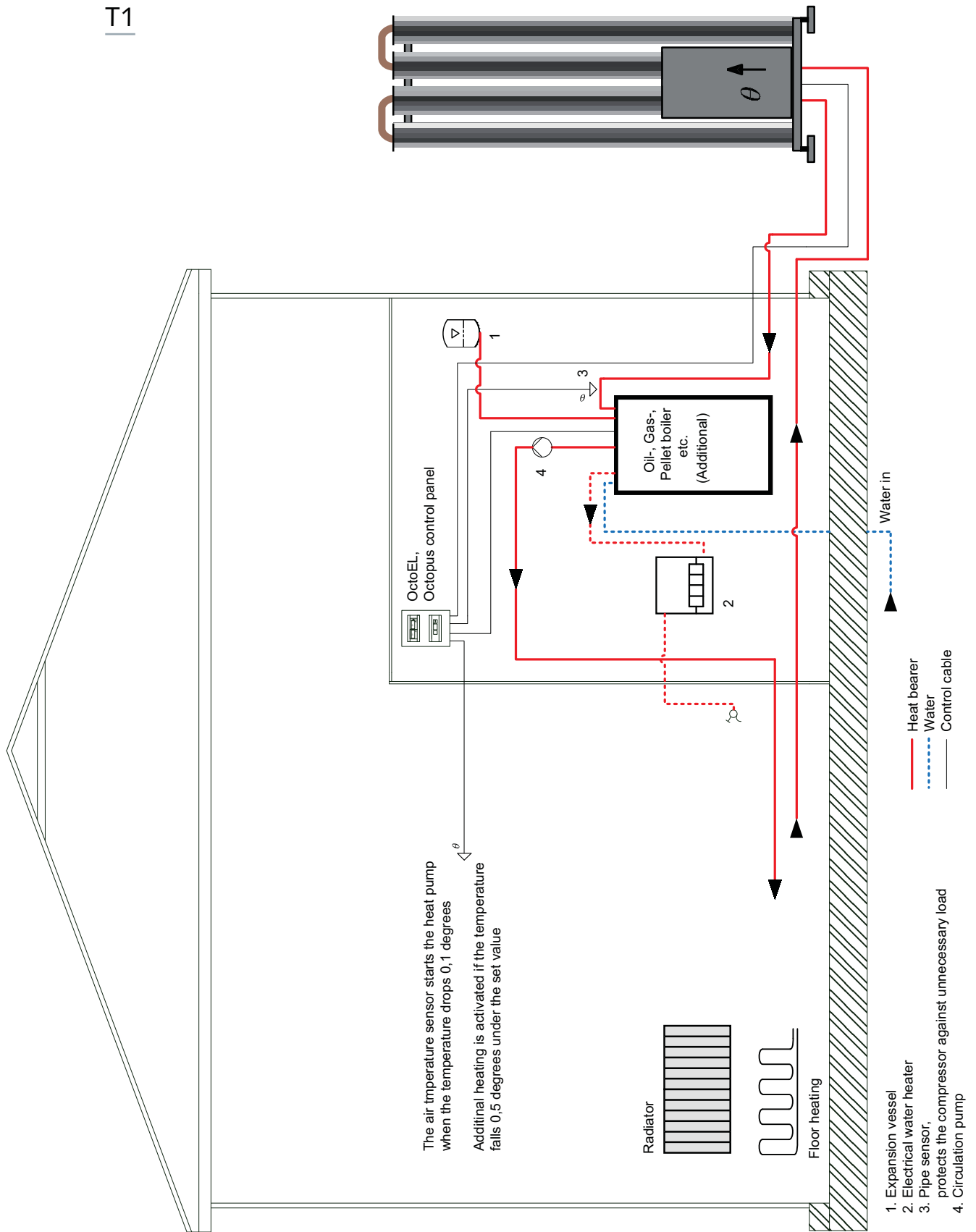


X - model

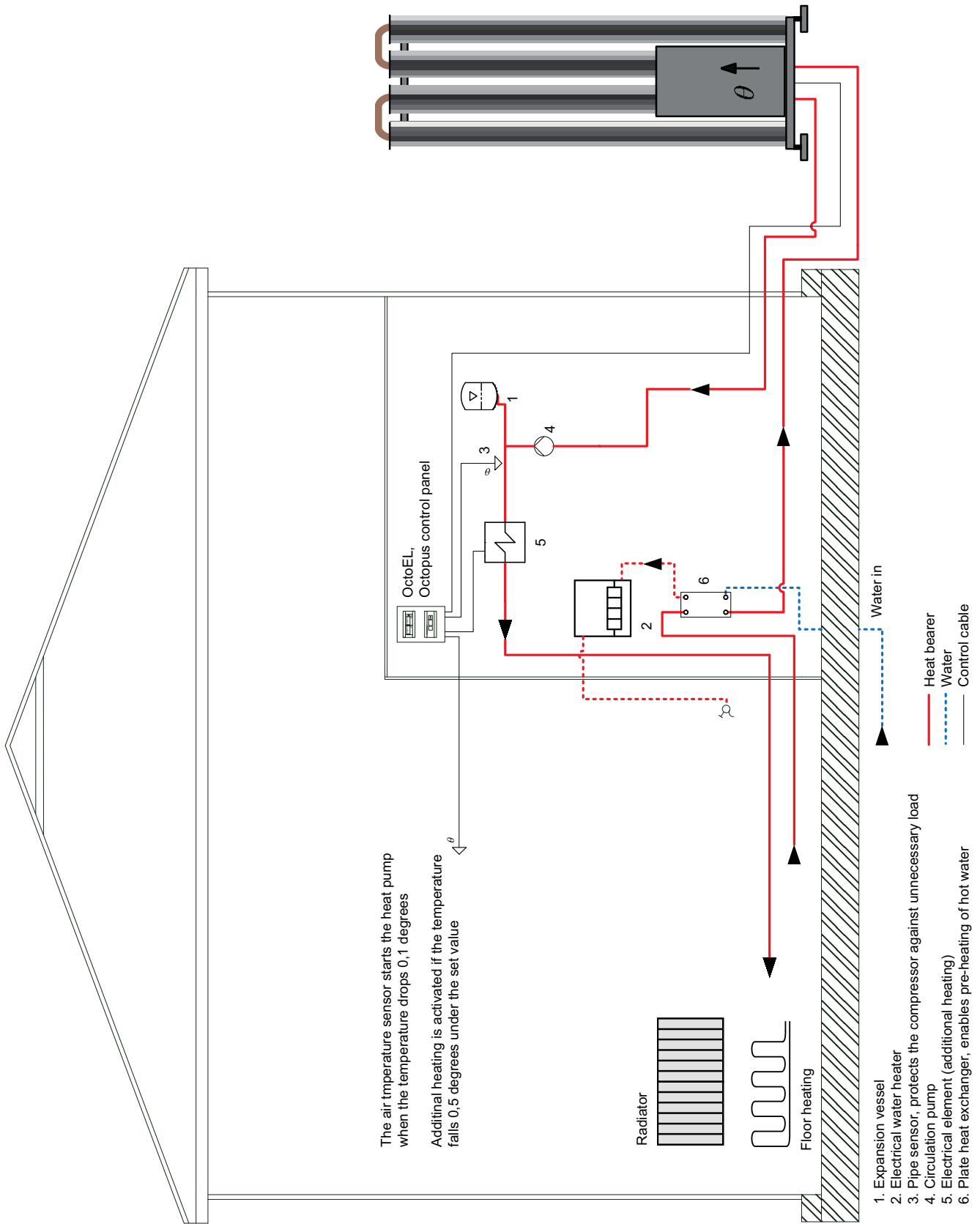
1. Connection for incoming water to the heat pump module
2. Connection for outgoing water

System Configurations

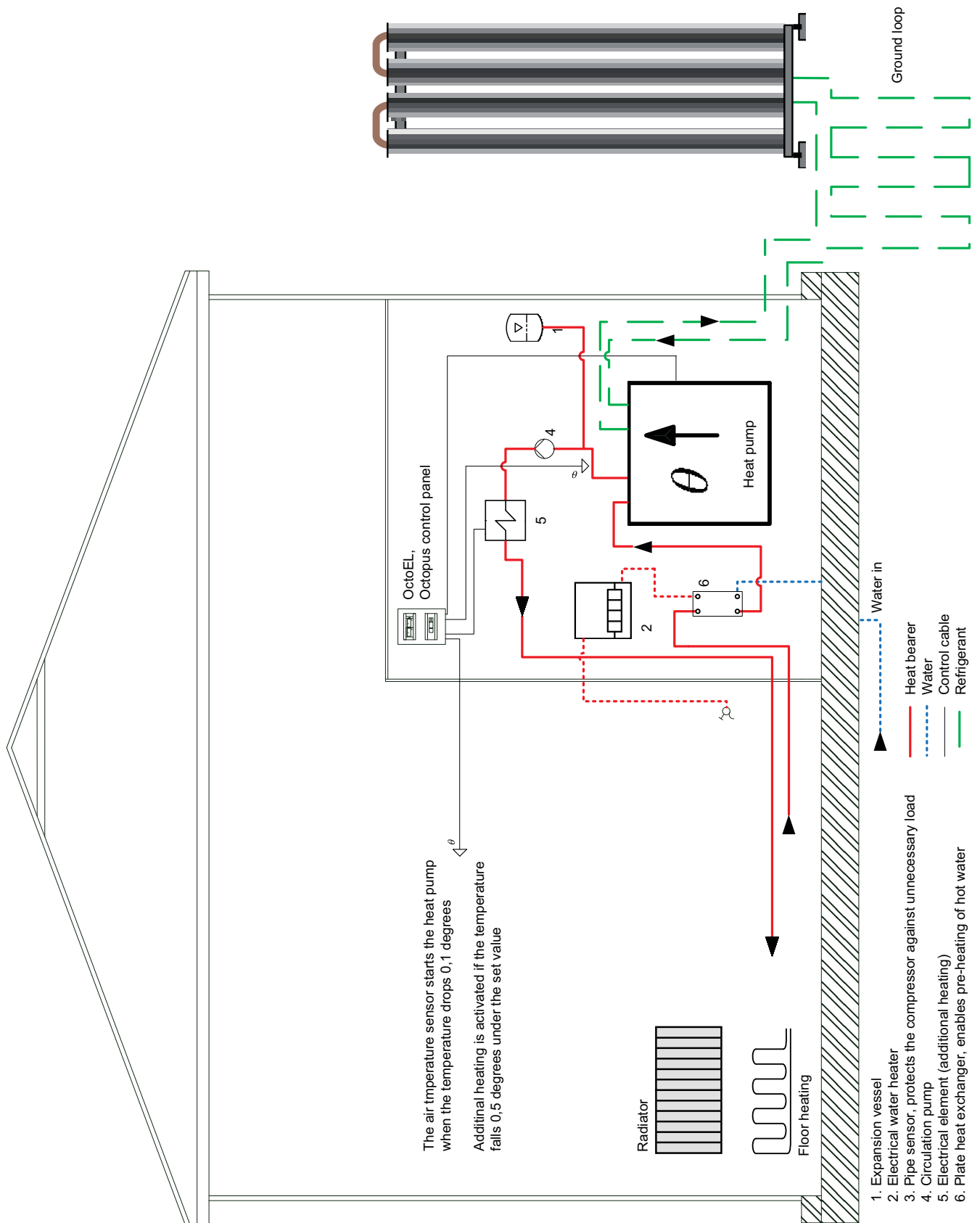
T1



T2



T3



Assembling and Connecting the Control Panel

NOTE!

The heat pump module shall always be connected to a permanent electrical installation.

- The control panel should be installed near the heat pump module if the heat pump module is placed indoors.
- All electrical work is to be done by authorized personnel according to the wiring diagrams (see pages 38-40).

Placement of the Air Temperature Sensor

It is important that the air temperature sensor in the house is placed in the room (or location) where the highest average temperature is required. It is also important that the air temperature sensor is placed in the room where it is affected by the Octopus heating system of the room/house, such as floor heating and radiators, and not by any local heat source such as lamps, stoves or direct sunlight. The air temperature sensor should not be placed on external walls.

Pressure Test

A pressure test is performed to check that all parts of the refrigerant will mechanically keep for the normal running pressure in the facility. This is done with nitrogen gas.

Perform the pressure test according to industry standard.

Vacuum Drive

The two things that is desired to accomplish by performing a vacuum drive are:

1. Acquire a system that is completely free of any other gas than the refrigerant.
2. Acquire a system that is completely without moisture.

Perform a vacuum drive according to industry standard.

Glycol

NOTE!

Only valid for models IS 48X, IS 61X and IS 81X

Glycol can be added to protect the condensor from frostburst.

Propane

NOTE!

Refill of propane (R290) is only to be performed by accredited personnel.

NOTE!

Refill of propane (R290) is done at operation start-up.

Operation Start-up

NOTE!

To be able to quickly start the compressor, the setting for "od" on the control panel displays must be changed (see Delay Setting on page 34). In operation mode this is set to 500 seconds but can be set to 0 seconds during operation start-up or service.

Models IS48XP, IS61XP, IS81XP and IS81X

- After a pressure test and a vacuum drive are performed on the heat pump, refrigerant can be added.
- Connect a manometer to the valves of the low- and high pressure pipes.
- Add refrigerant until the right-hand side display of the control panel is lit. This occurs at 1,5 bar.
- The compressor can now be started, letting it draw additional refrigerant from the low pressure pipe.
- When the Ice Sticks are halfway frozen additional refrigerant should be added a little at a time. Wait a few minutes to see how far the frost has spread.
- When the Ice Sticks are frozen all around it must be checked that the condensation does not exceed the flow temperature by more than 5 degrees.
- If the condensation is exceptionally high this might be because there is too much refrigerant in the system or it might be due to bad circulation.

Bad circulation is usually caused by:

- The circulation pump
- Air in the system
- Closed valves
- The water flow has been wrongly connected through the heat pump

Models IS48X and IS61X

The models IS48X and IS61X are filled with refrigerant when delivered.

- Connect a manometer to the valves of the low- and high pressure pipes.
- When the Ice Sticks are frozen all over it must be checked that the condensation does not exceed the flow temperature by more than 5 degrees.
- If the condensation is exceptionally high this might be because there is too much refrigerant in the system or it might be due to bad circulation.

Bad circulation is usually caused by:

- The circulation pump
- Air in the system
- Closed valves
- The water flow has been wrongly connected through the heat pump

Compressor Startup (only three phase unit)

The compressor is a three-phase unit that is sensitive to the rotation direction and can be damaged if it is operation with a faulty rotation direction during longer periods of time. To change the rotation direction, switch two incoming phases. Check the compressor drive at operation start-up.

During normal operation:

1. The peak pressure increases rapidly
2. The suction pressure decreases rapidly
3. The hot gas pipe is warm within 5-10 seconds after start-up

During faulty rotation direction:

1. The compressor is loud
2. The peak pressure does not change
3. The suction pressure does not change

Refilling and Deaerating

After operation start-up of the heat pump the following is to be checked:

1. The water pressure
2. That there is no air in the radiator circuit or in the circulation pump

Temperature Setting

Temperature Regulation

The regulation of the temperature in the house is carried out by the left control panel, control panel 905. The factory default setting air temperature setpoint is 20°C.

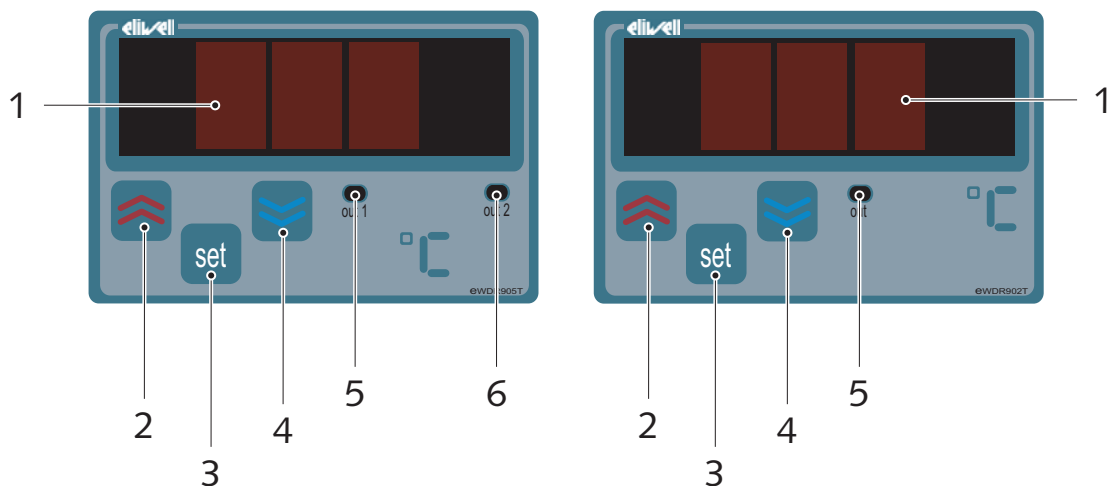
When the air temperature sensor measures a temperature that is 0.1°C below the control panel value the compressor is started with a delay of 500 seconds. If the measured temperature is 0.5°C below the control panel value the boost is started, this also occurs with a delay of 500 seconds. If floor heating is used the boost should be set to not start until the measured temperature is 1.0°C below the control panel value.

When there is no temperature difference between the air temperature sensor value and the control panel value the compressor and the additional heating is turned off. This is done with a delay of 500 seconds.

The heat pump has a default setpoint setting of 20°C. To change the air temperature setpoint carry out the following procedure:

1. Press **set** once. LED *out 1* should flash.
2. Use the blue or red arrow to set the desired temperature value.
3. Press **set** until LED *out 2* is flashing.
4. Use the blue or red arrow to set the temperature value to the same as in step 2.
5. Press **set** repeatedly to verify that the same value is shown in the display.

Control panel 905, air temperature regulation Control panel 902, heat pump protection



1. Display
2. Select up
3. Settings
4. Select down
5. out 1, heat pump
6. out 2, additional heating

1. Display
2. Select up
3. Settings
4. Select down
5. out

Heat Pump Protection

The digital thermostat to the right, control panel 902, shows the current water temperature after the heat pump. The default setpoint value is 55°C.

To change the setting value, perform the following:

1. Press **set** until LED *out* is flashing.
2. Use the blue or red arrow button to set the desired value.

The compressor is automatically shut off at the setpoint value (out) to protect the compressor and it is started again when the water temperature is 5°C below the set value.

Delay Setting

The factory setting for delay time is 500 seconds. During operation start-up or service this value can be set to 0 seconds. After operation start-up or service the value must be reset.

To change these values, perform the following in both control panels:

1. Press and hold **set** until 'd1' is displayed.
2. Use the blue or red arrow button until 'od' is displayed.
3. Press and hold **set** and use the blue or red arrow button to set the desired value.

Note that the delay time is to be reset to 500 seconds.

Parameter List

Parameter List EWDR 905 C PTC 220V (left digital thermostat)

Parameter	Description	Range	Unit	Factory Setting
d1	Differential		°C	-0,1
d2	Differential		°C	-0,5
db	Neutral state zone	1	°C	
LS1	Lowest set value for user	min	°C	-5
LS2	Lowest set value for user	min	°C	-5
HS1	Highest set value for user	max	°C	50
HS2	Highest set value for user	max	°C	50
od	Relay time delay	0-500	sek	500
Lci	Lowest current value (4mA) relative to shown value			
Hci	Highest current value (20mA) relative to shown value			
CAL	Calibration of operation sensor	0	°C	
OCO	Connections of relay sockets	in		in
HC1	Relayfunction H=activated when lowered C=activated when elevated	H / C		H
HC2	Relayfunction H=activated when lowered C=activated when elevated	H / C		H
dp	Selection of decimal point on=with, oF=without	on / oF		on
tAp	Factory setting			

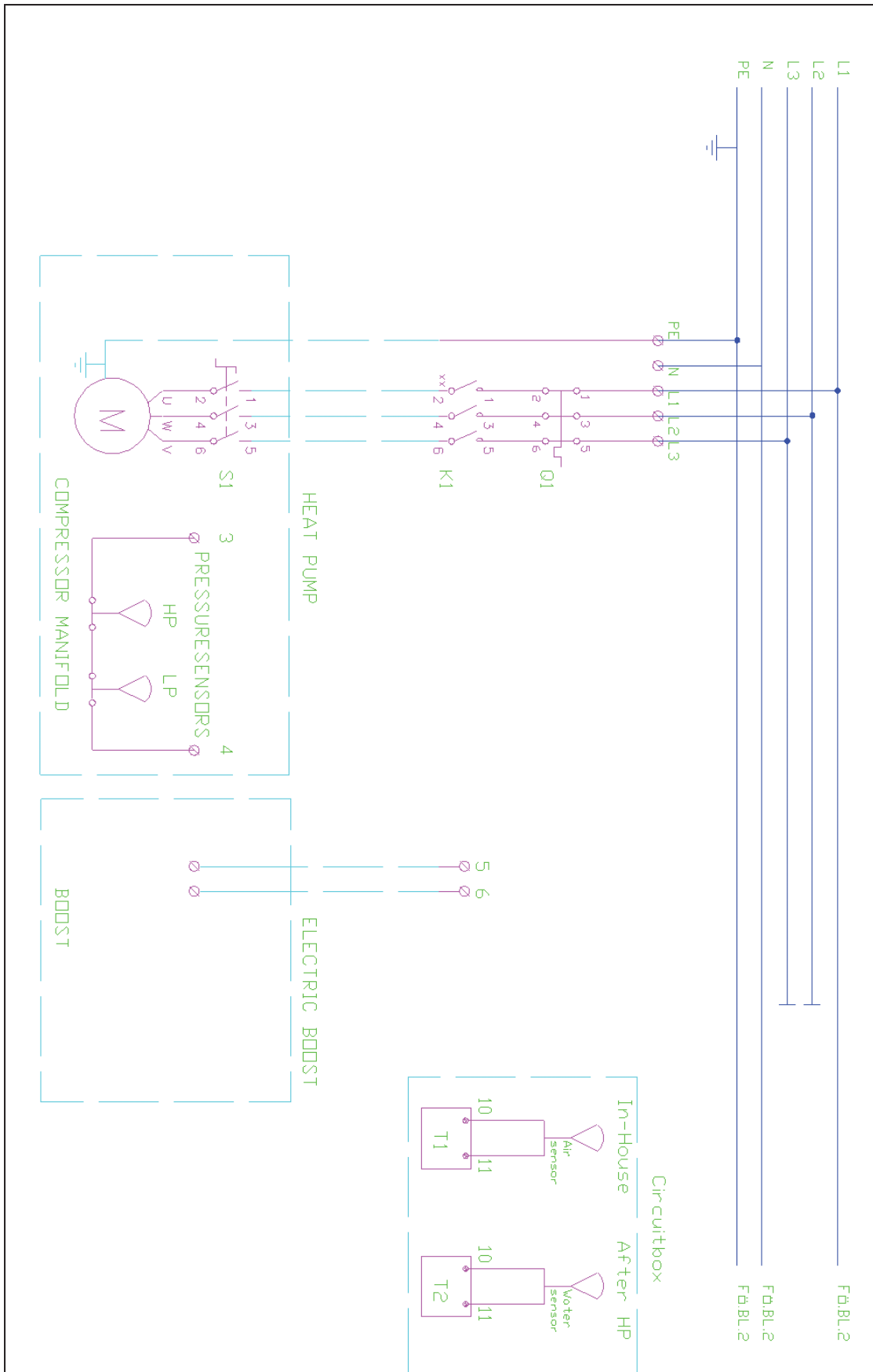
Parameter List EWDR 902 T PTC 220V (right digital thermostat)

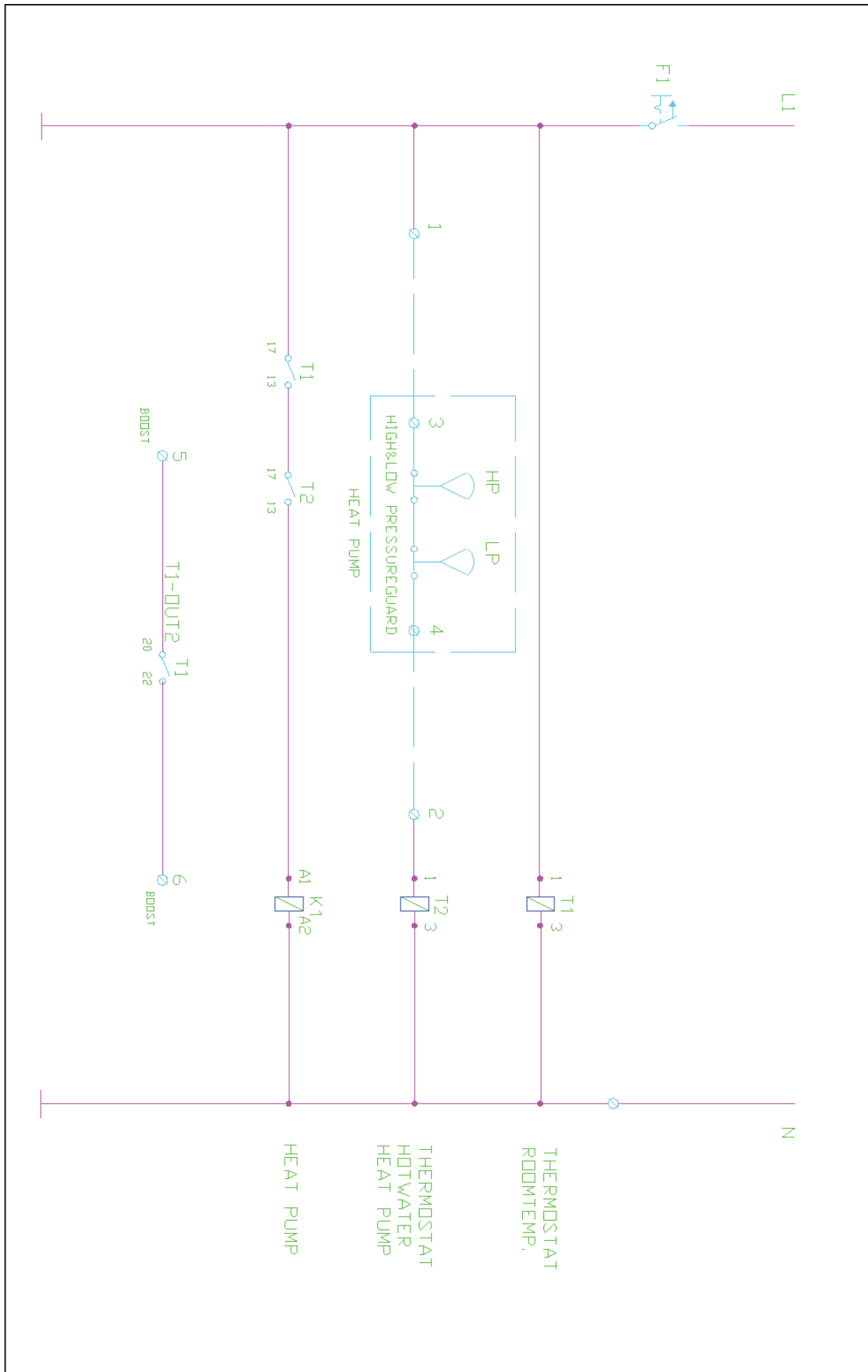
Parameter	Description	Range	Unit	Factory Setting
d1	Differential		°C	-5
LS1	Lowest set value for user	min	°C	-5
HS1	Highest set value for user	max	°C	55
od	Relay time delay	0-500	sek	500
Lci	Lowest current value (4mA) relative to shown value			
Hci	Highest current value (20mA) relative to shown value			
HC1	Relayfunction H=activated when lowered C=activated when elevated	H / C		H
dp	Selection of decimal point on=with, oF=without	on / oF		on
tAp	Factory setting			

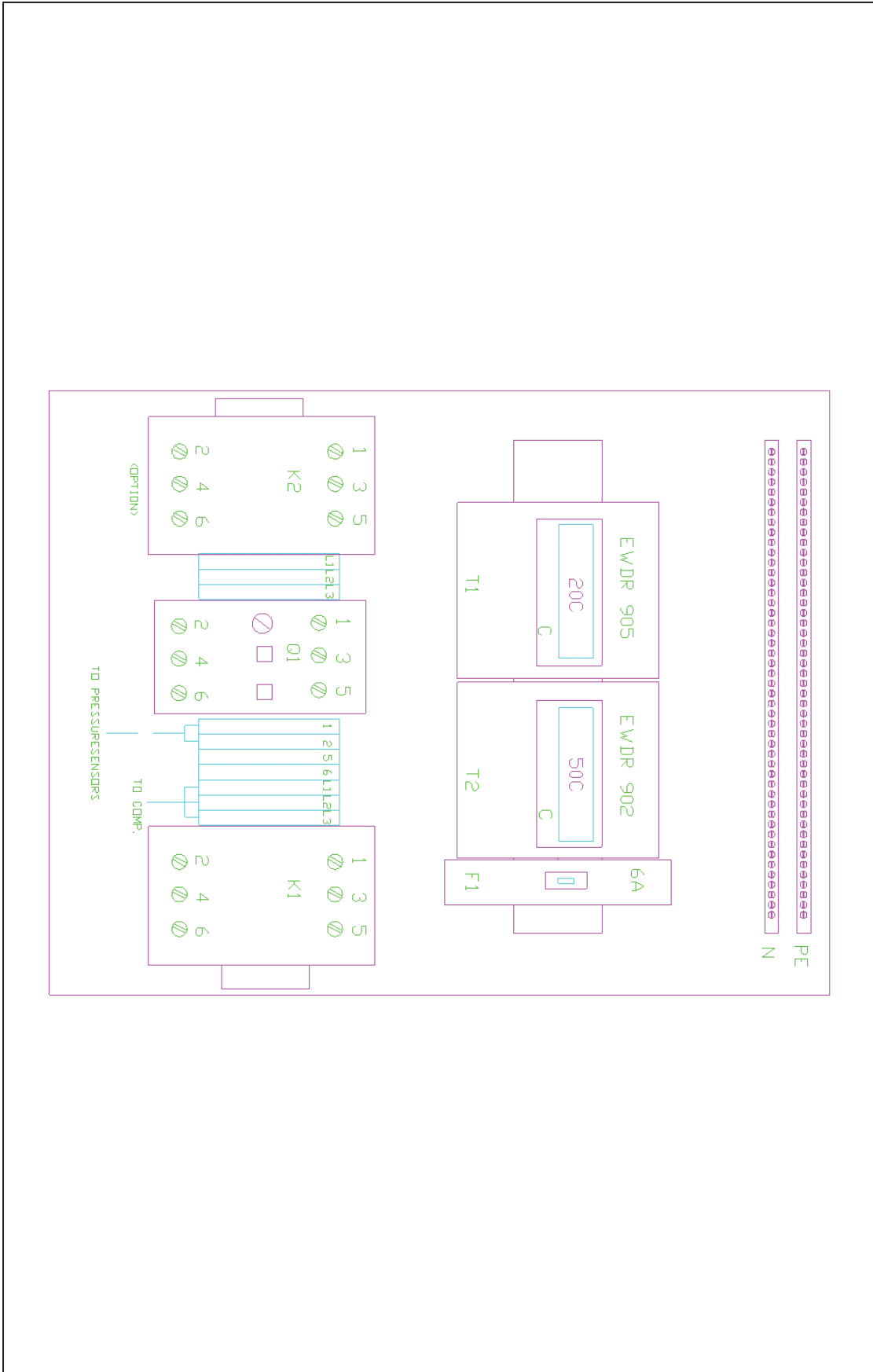
Installation Checklist

Serial Number
Installation Date
Installation Technicians
Pressure Test <input type="checkbox"/> Passed <input type="checkbox"/> Failed
Vacuum Drive <input type="checkbox"/> Passed <input type="checkbox"/> Failed
Additional Heating <input type="checkbox"/> Electric Element <input type="checkbox"/> Oil Boiler <input type="checkbox"/> Gas Boiler <input type="checkbox"/> Pellet Boiler <input type="checkbox"/> District Heating <input type="checkbox"/> _____
Heating System <input type="checkbox"/> Radiators <input type="checkbox"/> Air Heating Aggregate <input type="checkbox"/> Supply Air Aggregate <input type="checkbox"/> Floor Heating <input type="checkbox"/> _____

Wiring Diagrams (Three phase 400 V)

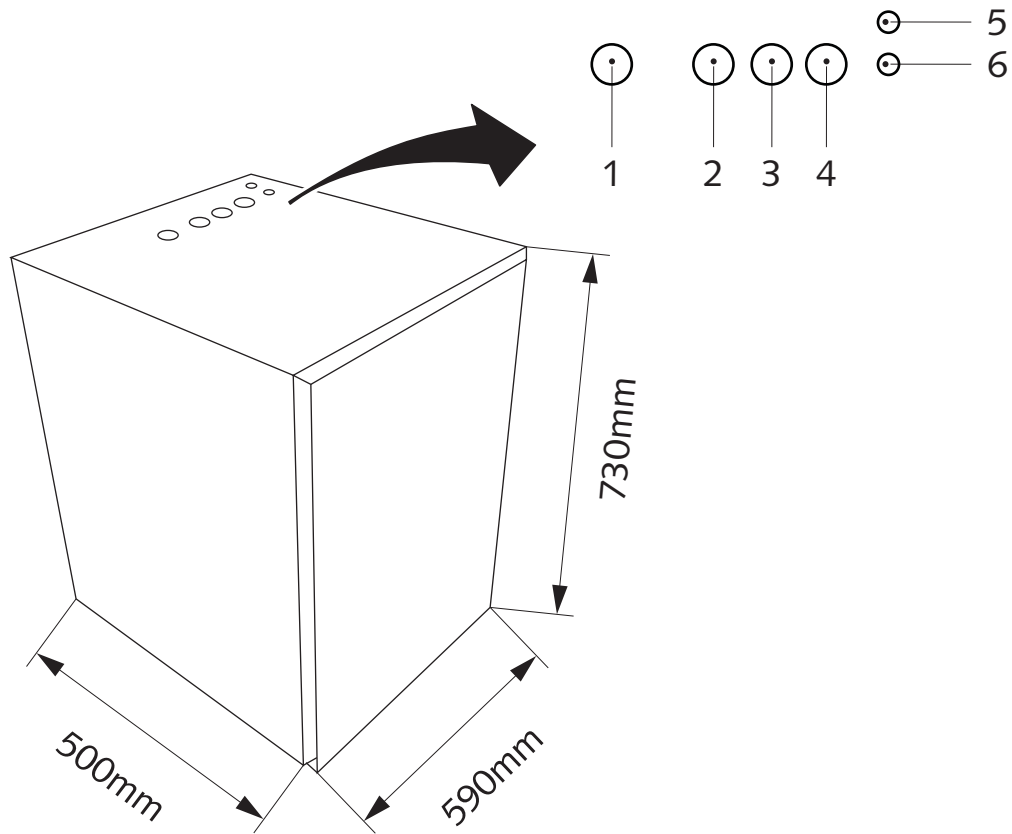






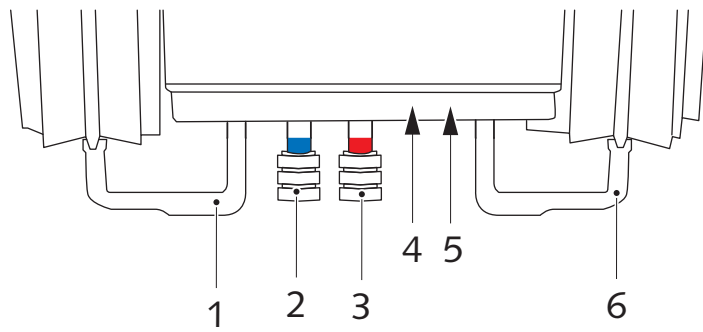
Measurements and Connections

XP-models

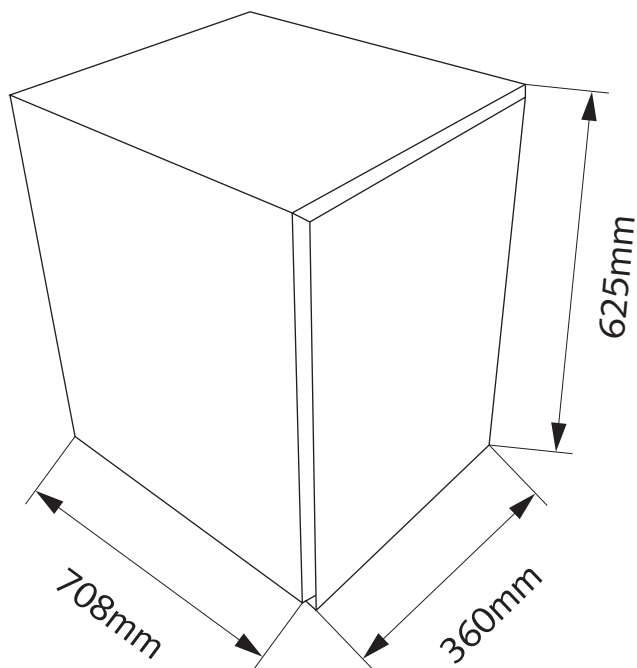


1. Ø connection for outgoing water
2. Ø connection for incoming water
3. Ø connection for outgoing refrigerant
4. Ø connection for incoming refrigerant
5. Ø electrical connection
6. Ø electrical connection

X-models



1. Connection for outgoing refrigerant
2. Ø connection for incoming water
3. Ø connection for outgoing water
4. Ø electrical connection
5. Ø electrical connection
6. Connection for incoming refrigerant



Technical Data

Technical Data

Model Octopus™ IS	Unit	IS48X/XP	IS61X/XP	IS81X/XP
Aluminium profiles	pc	12	12	2 x 12
Electrical connection		400V, N3-Phase		
Fuse	A	10D	10D	16D
Compressor, type		Scroll		
Compressor, input	kW	3,0	3,7	5,0
Compressor, output capacity	m ³ /h	11,41	14,4	19,2
Max temperature	°C	55		
Refrigerant, Propane/R290	kg	~1	~1	~2
Pressure min/max	bar	0,5/22		
Temperature, boil/condense	°C	-33/+64		
Dimensions, evaporator (WxDxH)	mm	810x980x2220	810x980x2220	2 x 810x980x2220
Dimensions, heat pump module (WxDxH)	mm	590x500x730 (XP) 360x708x625 (X)		
Weight, evaporator	kg	97	97	2 x 97
Weight, heat pump module	kg	87	92	102
Control panel		OctoEL 10	OctoEL 10	OctoEL 16

Planning Manual

Electricity

The heat pump module shall always be connected to a permanent electrical installation. We define a permanent electrical installation to be a connection to a power distribution grid.

The size of the incoming cable and fuse size of the local utility should be large enough for the proposed installation.

Transport and Storage

The heat pump is delivered on europallets. If there is a delay before assembly and connection, consider the following:

- The heat pump should be placed in a dry location indoors.

Consider the following during the transport of the Ice Stick and the heat pump module:

- Be careful not to damage the material when lifting and unloading.
- A lifting device or a minimum of 4 people are recommended when unloading.
- The heat pump module must only be transported in the upright position.

Preparations

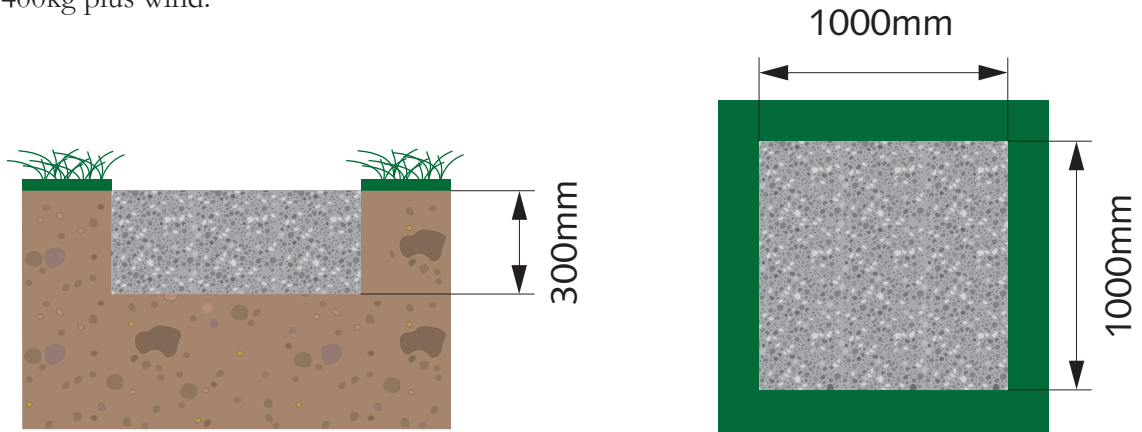
Placement of the Ice Stick

We recommend that the location for the placement of the Ice Stick is as windy and sunny as possible, preferably at the southern end of the building. The distance from the building to the Ice Stick should be at least one meter from the outer wall. If the building is L-shaped, avoid placing the Ice Stick within the inner angle of the building.

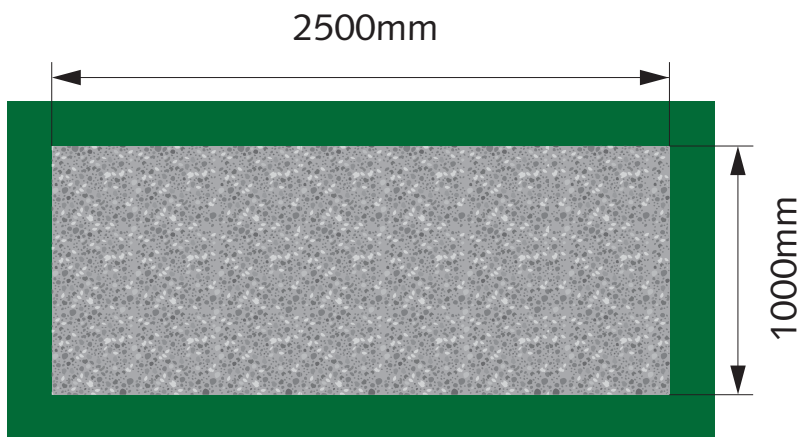
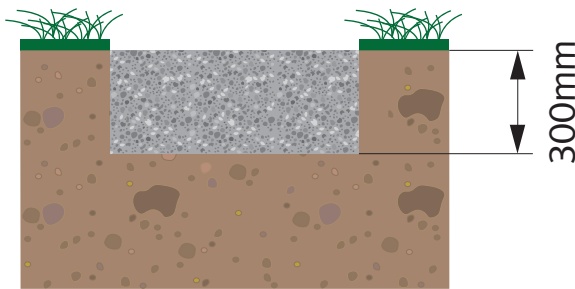
The Concrete Plinth and Assembly of the Ice Stick

The Ice Stick should be assembled onto a concrete plinth measuring 1000*1000*300mm (see image). If there are two Ice Sticks, they should be assembled onto a concrete plinth measuring 2500*1000*300mm (see image).

The concrete plinth can either be cast in concrete or constructed by firmly secured cement blocks. Another type of construction can be used provided it can handle a load of up to 400kg plus wind.



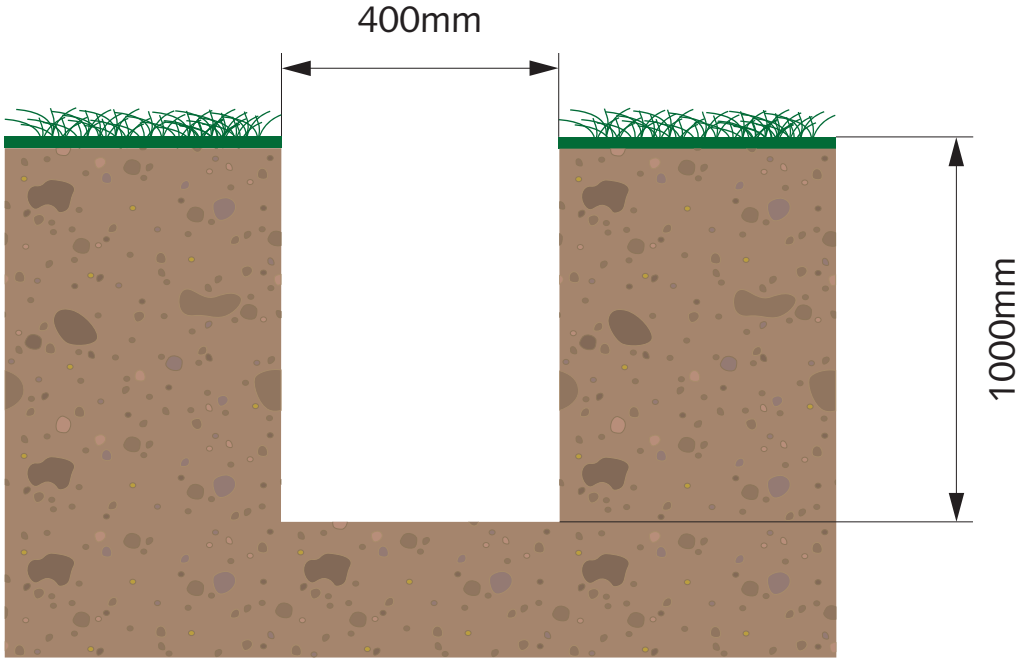
Concrete plinth for model IS48X/XP and IS61X/XP



Concrete plinth for model IS81X/XP

Digging the Trench

A trench is dug between the concrete plinth and the house wall. The dimension of the trench can be 400*1000mm (see image). The dimension of the trench can vary due to the soil. When installing an XP model, note that there is a risk of freezing around the trench.



Penetration of Walls/Floors

NOTE!
Shall only be performed by accredited personnel.

NOTE!
Consider the risk of freezing within the walls.

Placement of the Heat Pump Module

NOTE!
Only valid for models IS 48XP, IS 61XP and IS 81XP

- The heat pump module must stand upright.
- The heat pump module should always be accessible for service.
- No heavy objects is to be placed on top of the heat pump module.
- It is forbidden to jump/step/stand on the heat pump module.
- No objects are to be hung on the piping of the heat pump module.
- The working space in front of the heat pump module should be at least 1,2 meter.
The measurements (WxDxH) of the heat pump module are 590mm x 500mm x 730mm.

Placement of the Control Panel

The installation of the control panel is to be carried out by authorised technician. The location of the control panel should be agreed with the client and engineer prior to the installation.

- The control panel should be installed near the heat pump module if the heat pump module is placed indoors.
- The control panel should be installed in a room free of moisture and dust.

Placement of the Air Temperature Sensor

The installation of the air temperature sensor is to be carried out by authorised technician. The location of the air temperature sensor should be agreed with the client and engineer prior to the installation.

It is important that the air temperature sensor in the house is placed in the room (or location) where the highest average temperature is required. It is also important that the air temperature sensor is placed in the room where it is affected by the heating system of the room/house, such as floor heating and radiators, and not by any local heat source such as lamps, stoves or direct sunlight. The air temperature sensor should not be placed on external walls.

Additional Heating and Water Heating

Additional heating should be installed if not already installed.

The heat pump might need som assistance from additional heating during the coldest months to maintain a steady temperature. If the heat pump is pressured to keep a indoor temperature higher that its performance and if there are no additional heating, the Ice Stick will have to work continuously and by doing so, not allowing it to have the breaks it need. This can result in the Ice Stick freezing up to much thus lowering its effect.

The different heat pump modules can be connected to all the water-borne systems (that acts as additional heating) such as district heating, electric element, oil- , gas-, or pellet boiler.

Domestic Hot-water for Households

NOTE!

Constant circulation is needed if pre-heating should work.
To achieve constant circulation all radiators need to have open valves.

Octopus recommends installing pre-heating when heating domestic hot-water.

Within the Octopus solution, pre-heating of domestic hot-water is included. A single-jacket and insulated water heater is installed in the house but with an integral difference compared to regular water heaters. The water entering the heater and its mixing valve have already been heated by the water-borne system of the house. This is best done with a plate heat exchanger. With this solution the heat pump stands for the largest contribution during the winter. During the summer, almost half of the energy is drawn from the house, acting as a large solar collector.

The benefits of pre-heating are drastically lowered domestic hot-water costs for a small investment together with disburdening the heat pump from the high load required when producing domestic hot-water.



