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INSTALLATION MANUAL

AIR-TO-WATER HEAT PUMP

Please read this installation manual completely before installing the product.
Installation work must be performed in accordance with the national wiring standards by authorized personnel only.
Please retain this installation manual for future reference after reading it thoroughly.

Air-to-Water Heat Pump
THERMA V™

Original instruction

MFL69676201
Rev.01_050219

www.lg.com

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Important information

The manual describes the process of installation and maintenance of the device. The installation and maintenance can only be performed by qualified personnel. Read the manual carefully before the installation, this way you will be informed about the intended use, functionality and process of handling the device.

- The manual has to be handed over to the end user after installation.
- If this product is being handed over to a third person, ensure that you provide them with this manual too.

Definitions

- An informed person is a person who reads this manual.
- A qualified person has a certificate of expert qualifications.
- The authorized technician is trained and authorized by the manufacturer to perform maintenance and servicing of the device.
- The user uses the device according to its use.
- The installer is a person professionally trained for performing hardware and/or electric installation work and mounting of the device.

Incorrect use of the device can lead to damage to the device, property or injury to the user. To reduce risk, the manual points out important information with the use of symbols.

Symbols

These symbols indicate various risks for the user or the device.

WARNING	This symbol indicates the possibility of death or serious injury.
CAUTION	This symbol indicates the possibility of injury or damage to properties only.

	Be sure not to do.
	Be sure to follow the instruction.

NOTICE

A notice holding important information regarding requirements of the manufacturer and the device.

General

NOTICE

- Read Owner's manual and Installation manual before installation.
- Any altering or replacement of original components of the device voids the manufacturer's guarantee for safe and functional operation. The manufacturer is not responsible for the consequences and will not acknowledge claims for damages in these cases of undesignated and incorrect use of the device. The user is solely responsible for injuries and damages on the device itself or on other objects resulting from undesignated and incorrect use of the device.
- The installation of the device has to be performed in accordance with the manual; otherwise the manufacturer does not acknowledge the warranty.
- High pressure can cause to safety valve to leak water. Make sure the drainage pipe is open to atmospheric pressure.

WARNING

- Failure to comply with the manual and good practice while connecting the device to the power supply can lead to serious injury or death.
- Connecting the device to the power source can only be performed by a qualified personnel.

Safety warnings and instructions

WARNING

- It is prohibited to move, shift, clean or service the device while in operation.
- It is prohibited to play with the device. Children are not allowed to clean the device without supervision.
- The device can be operated independently only by informed persons who are familiar with the safe operation of the device and understand possible hazards of its operation. Children older than 8 and people with reduced physical and mental capacities and with lack of experience and knowledge can only operate the device under the supervision of an informed person.
- Before installation and any further adjustments to the device it is necessary to consider the manual for safe use and maintenance.
- The installation has to be performed in accordance with national regulations on electrical installations and with the instructions of the manufacturer. It has to be performed by a professionally trained person.
- It has to be made sure that the device does not endanger anybody. Access

to the device has to be denied to children and persons who are not informed about the operation of the device.

- The device must never be cleaned with cleaning agents containing sand, soda, acid or chlorides because these might damage the surface of the device.
- The device contains fluorinated greenhouse gas. Hence, installation, servicing and working with the coolant/device can only be performed by the authorised personnel. While performing works on the device it is necessary to prevent the leaking of the refrigerant into the atmosphere.
- It is necessary to consider all technical data and instructions in this manual including all warnings and notes during planning, design, installation and use of the device.
- Electrical installations have to be inspected in accordance with regulations on requirements for low voltage in buildings by a qualified personnel.
- Connecting the devices power cable must be performed by a qualified electrician. The device must be disabled during the procedure.
- In case the power cable of the device is damaged, it has to be replaced. The replacement can only be performed by the manufacturer and authorized maintenance worker.
- Before opening the device disconnect all electrical circuits and make sure the device is not under voltage.
- Do not use a defective or underrated circuit breaker. Use this appliance on a dedicated circuit.
- For electrical work, contact the dealer, seller, a qualified electrician, or an Authorized Service Center.
- Always ground the unit.
- Install the panel and the cover of control box securely.
- Always install a dedicated circuit and breaker.
- Use the correctly rated breaker or fuse.
- Do not modify or extend the power cable.
- Do not install, remove, or reinstall the unit by yourself (customer).
- For antifreeze, always contact the dealer or an authorized service center.
- For installation, always contact the dealer or an Authorized Service Center.
- Do not install the unit on a defective installation stand.
- Be sure the installation area does not deteriorate with age.
- Do not install the water pipe system as Open loop type.
- Use a vacuum pump or inert (nitrogen) gas when doing leakage test or purging air. Do not compress air or oxygen and do not use flammable gases.
- Make sure the connected condition of connector in product after maintenance.

- Do not touch leaked refrigerant directly.
- Take care to ensure that power cable could not be pulled out or damaged during operation.
- Do not place anything on the power cable.
- Do not plug or unplug the power supply plug during operation.
- Do not touch (operate) the unit with wet hands.
- Do not place a heater or other appliances near the power cable.
- Do not allow water to run into electric parts.
- Do not store or use flammable gas or combustibles near the unit.
- Do not use the unit in a tightly closed space for a long time.
- When flammable gas leaks, turn off the gas and open a window for ventilation before turning the unit on.
- If strange sounds, or small or smoke comes from unit, turn the breaker off or disconnect the power supply cable.
- Stop operation and close the window in storm or hurricane. If possible, remove the unit from the window before the hurricane arrives.
- Do not open the front cover of the unit while operation. (Do not touch the electrostatic filter, if the unit is so equipped.)
- Do not touch any electric part with wet hands. you should be power off before touching electric part.
- Do not touch refrigerant pipe and water pipe or any internal parts while the unit is operating or immediately after operation.
- If you touch the pipe or internal parts, you should be wear protection or wait time to return to normal temperature.
- Turn the main power on 6 hours ago before the product starting operation.
- Do not touch electric parts for 10 minutes after main power off.
- The inside heater of product may operate during stop mode. It is intended to protect the product.
- Be careful that some part of the control box are hot.
- When the unit is soaked (flooded or submerged), contact an Authorized Service Center.
- Be cautious that water could not be poured to the unit directly.
- Ventilate the unit from time to time when operating it together with a stove, etc.
- Turn the main power off when cleaning or maintaining the unit.
- Take care to ensure that nobody could step on or fall onto the unit.
- For installation, always contact the dealer or an Authorized Service Center.
- If the unit is not used for long time, we strongly recommend not to switch off the power supply to the unit.

⚠CAUTION

- Putting any kinds of items on or next to the device is prohibited.
- The device must not be placed in a room where it cannot be removed. Later walling or setting up of other obstacles next to the device is forbidden.
- For the correct operation of the device, the electrical distributor has to provide electricity of adequate quality (SIST EN 50160). In normal conditions this is within ± 10 % of the rated voltage. The data about the state of the electrical grid have to be acquired from the electrical distributor.
- Connecting the device to the electric grid has to be performed in accordance with the standards. The device has to be connected to the electric grid via the power supply cut-off which is installed into the electrical installation under the regulations in force. The power supply cut-off has to separate all contacts under the regulations of the overvoltage category III.
- Always check for gas (refrigerant) leakage after installation or repair of unit.
- Keep level even when installing the unit.
- Use two or more people to lift and transport the unit.
- Do not use the unit for special purposes, such as preserving foods, works of art, etc.
- Use a soft cloth to clean.
  Do not use harsh detergents, solvents, etc.
- Do not step on or put anything on the unit.
- Use a firm stool or ladder when cleaning or maintaining the unit.
- Do not turn on the breaker or power under condition that front panel cabinet, top cover, control box cover are removed or opened.
- The drainage hole of the safety valve must be directed downwards. Make sure it does not freeze A yearly inspection of the safety valve is necessary to ensure its proper operation; when performing it, remove lime deposits and make sure the safety valve is not blocked.
- In order to avoid a hazard due to inadvertent resetting of the thermal cut-out, this appliance must not be supplied through an external switching device, such as a timer, or connected to a circuit that is regularly switched on and off by the utility.

Obligations of the manufacturer

The manufacturer guarantees that the device is in accordance with current European directives and standards. The device is marked with the mark CE and it has all the necessary documentation.

We reserve the right to make changes to the manual without prior notice.

As manufacturer we do not take responsibility for the consequences arising from:

- Non-compliance with the manual for the device.
- Incorrect and/or inadequate maintenance of the device.
- Non-compliance with the manual for the installation of the device.

Obligations of the installer during installation

The installer is responsible for installing the device in accordance with the following requirements:

- To thoroughly study the instructions for use and installation accompanying the device before installation.
- To install the device in accordance with the instructions and national legislation, policies and standards in force.

Obligations of the user

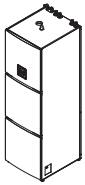
For ensuring unobstructed and effective operation of the device the user has to follow the following instructions:

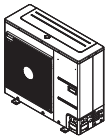
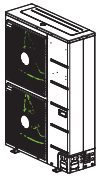
- To thoroughly study the instructions for use and installation accompanying the device before use.
- To have a qualified and authorized installer perform the installation of the device.
- Ensure regular yearly inspections and maintenance of the device by the authorized maintenance worker.
- Store this manual in an appropriate dry place close to the device.

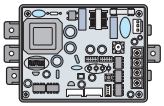
ENGLISH

Installation Part

Thank you for choosing LG Electronics Air-to-Water Heat Pump THERMA V.
Before starting installation, please ensure that all parts are found inside the product box.

INDOOR UNIT BOX		
Item	Image	Quantity
Indoor unit		1
Installation Manual		1
Owner's Manual		1

OUTDOOR UNIT BOX		
Item	Image	Quantity
Outdoor Unit (Product heating capacity : 9 kW)		1
Outdoor Unit (Product heating capacity : 12 kW, 14 kW, 16 kW)		1

Accessory Box		
Item	Image	Quantity
Modbus Converter (PP485B00K)		1

General Information

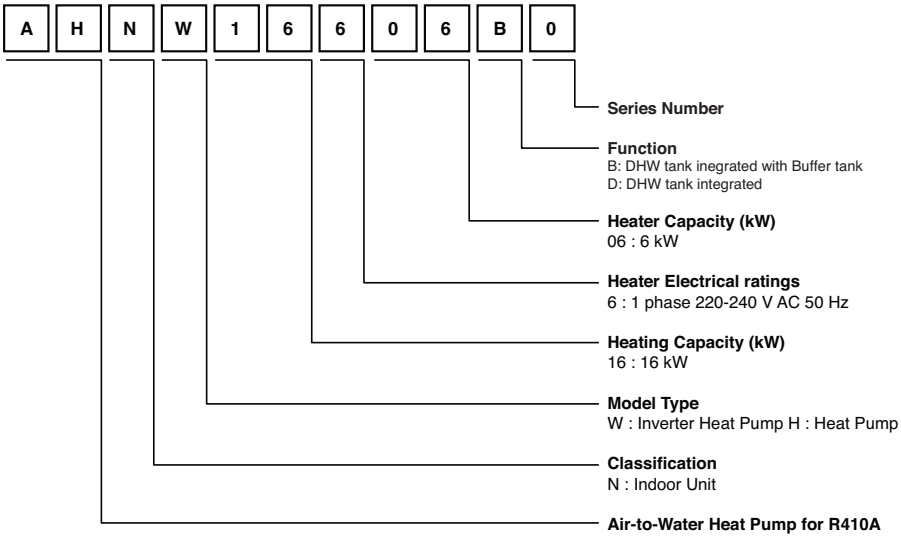
With advanced inverter technology, THERMAV. is suitable for applications like under floor heating, under floor cooling, and hot water generation. By Interfacing to various accessories user can customize the range of the application.

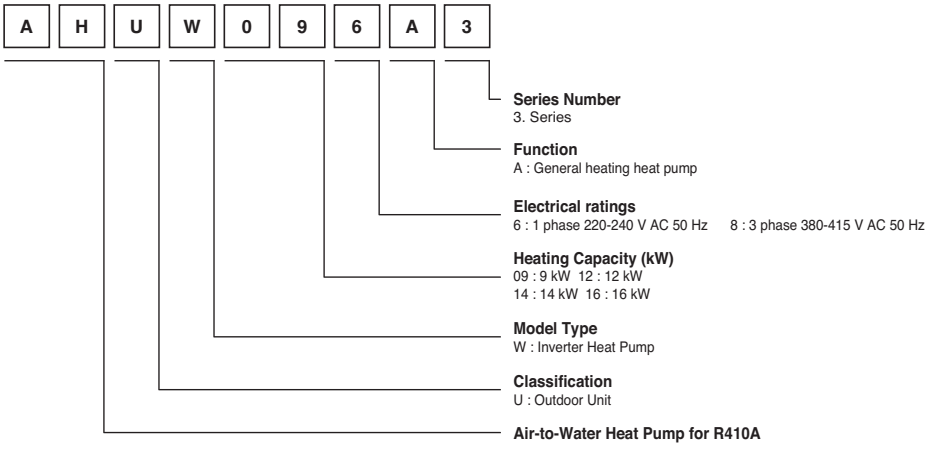
In this chapter, general information of THERMAV. is presented to identify the installation procedure. Before beginning installation, read this chapter carefully for useful hints on installation techniques.

Model Information

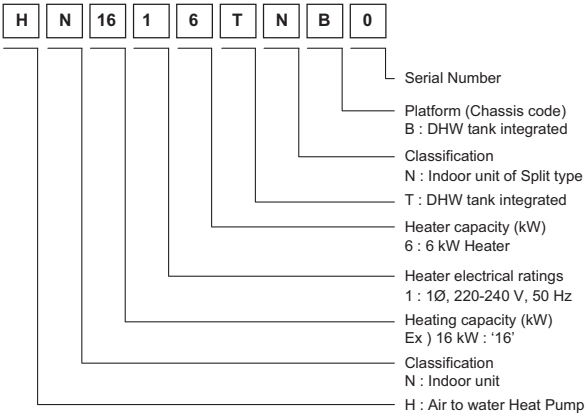
Model number nomenclature

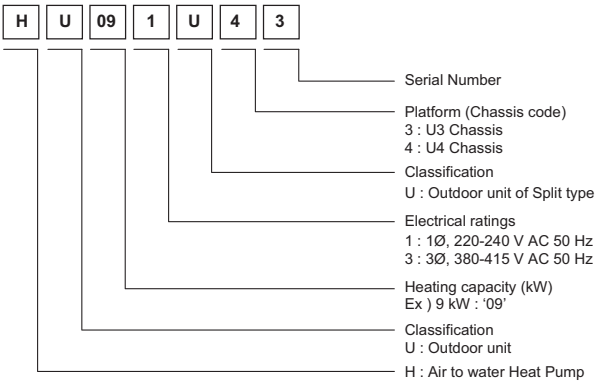
Factory Model Name





Buyer Model Name





Model name and related information

Model Name		Built-In Electric Heater(kW)	Capacity		Power Source
Outdoor Unit	Indoor Unit		Heating(kW)*1	Cooling(kW)*2	
AHUW146A2	AHNW16606B0	1Φ 4(2+2) 3Φ 6(2+2+2)	14.0	11.0	220-240 V ~ 50 Hz
AHUW096A3			9.0	9.0	
AHUW126A3			12.0	10.4	
AHUW146A3			14.0	11.0	
AHUW166A3			16.0	12.0	
AHUW128A3			12.0	10.4	380-415 V ~ 50 Hz
AHUW148A3			14.0	11.0	
AHUW168A3			16.0	12.0	

*1 : tested under Eurovent Heating condition
(water temperature 30 °C → 35 °C at outdoor ambient temperature 7 °C / 6 °C)

*2 : tested under Eurovent Cooling condition
(water temperature 23 °C → 18 °C at outdoor ambient temperature 35 °C / 24 °C)

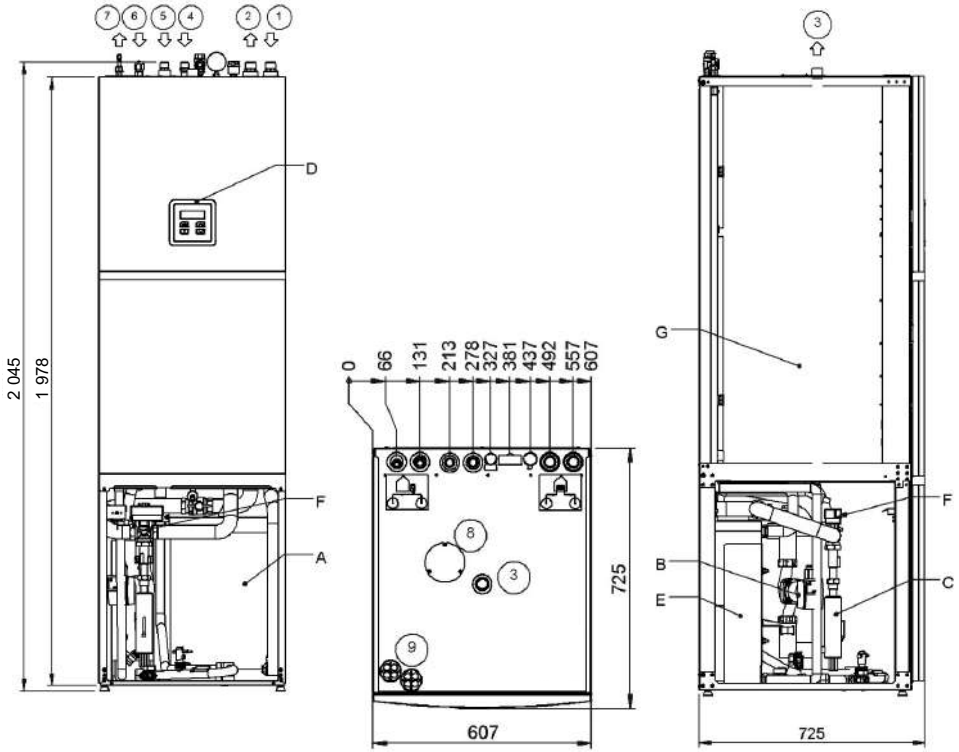
*3 : All appliances were tested at atmospheric pressure.

Parts and Dimensions

Indoor unit

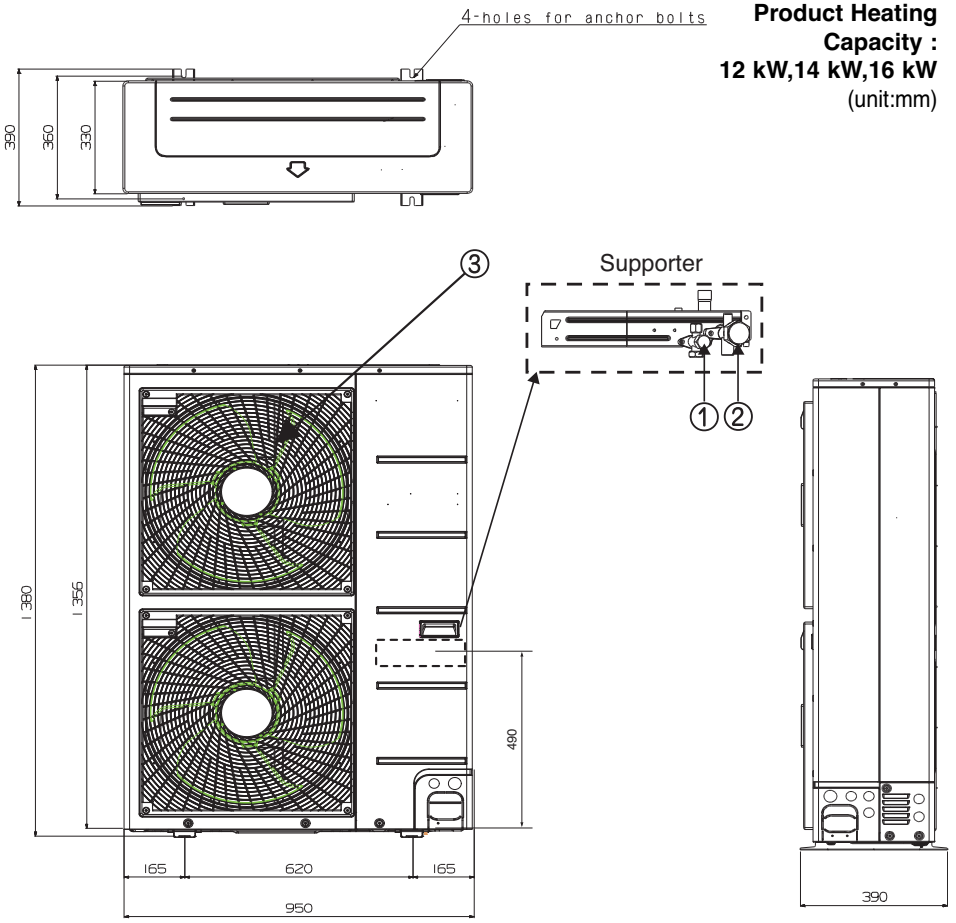
1	Heating/Cooling Inlet	A	Buffer tank
2	Heating/Cooling Outlet	B	Circulating pump
3	Warm sanitary water	C	Electric flow heater
4	DHW - circulation	D	TT3000 Controller
5	Cold sanitary water - supply	E	Condenser
6	Gas pipe 5/8“– refrigerant	F	3 Way Valve
7	Liquid pipe 3/8“– refrigerant	G	DHW tank
8	Mg. Anode		

(unit:mm)



Outdoor unit(External)

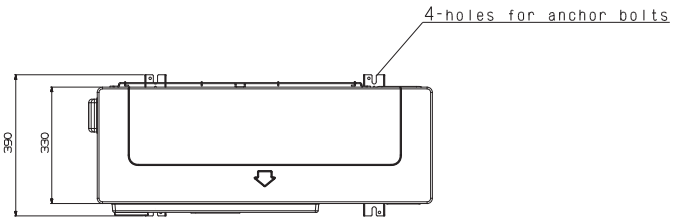
Product Heating Capacity : 12 kW,14 kW,16 kW
(unit:mm)

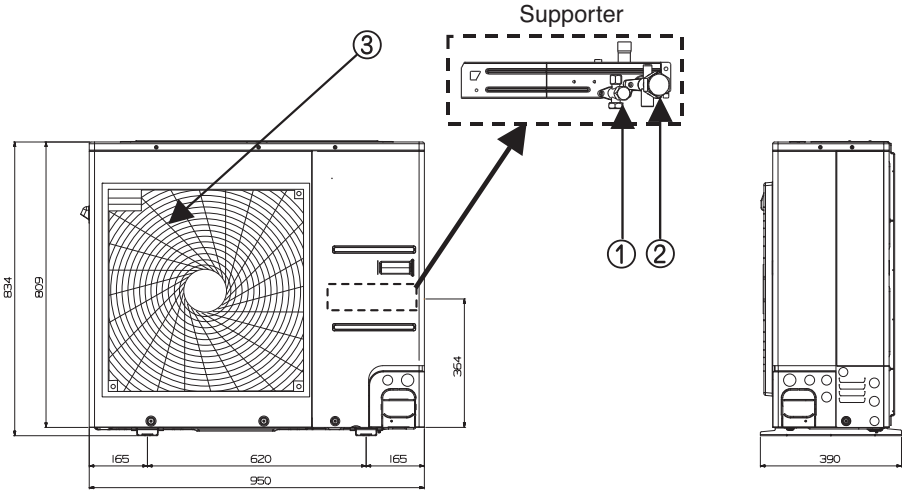


Description

No	Name
1	Liquid-side Service Valve
2	Gas-side Service Valve
3	Air discharge Grill

Product Heating
Capacity : 9 kW
(unit:mm)





Description

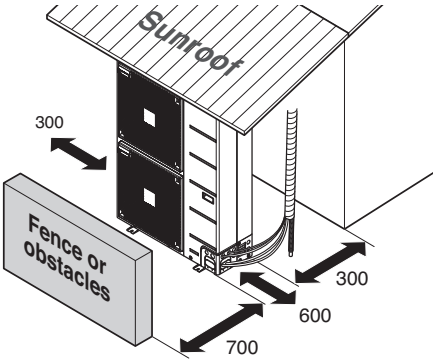
No	Name
1	Liquid-side Service Valve
2	Gas-side Service Valve
3	Air discharge Grill

Installation of Outdoor Unit

The outdoor unit of THERMAV is installed outside to exchange heat with ambient air. Therefore, it is important to properly secure the outdoor unit against harsh environmental conditions and mechanical injuries. This chapter provides instructions to install the outdoor unit, make a route to connect with the indoor, and precautionary measures to follow if installed around seaside.

Conditions where Outdoor Unit is Installed

- If a sunroof is built over the unit to prevent direct sunlight or rain exposure, make sure that heat radiation from the heat exchanger is not restricted.
- Ensure that the spaces indicated by arrows around front, back and side of the unit.
- Do not place animals and plants in the path of the warm air.
- Consider weight of the outdoor unit into account and select a place where noise and vibration are minimum.
- Select a place such that the warm air and noise from the outdoor unit do not disturb neighbors.



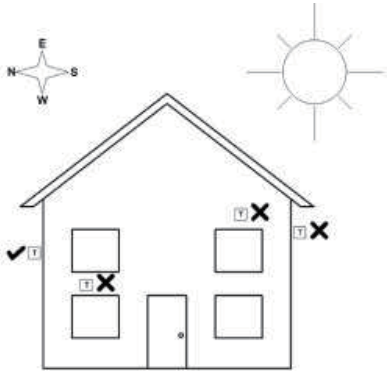
Minimum service space (unit:mm)

Set up and connection of the external sensor

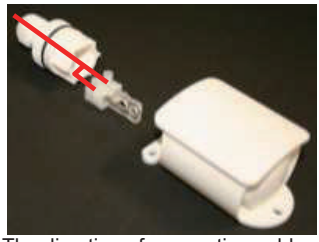
For controlling heating according to the external temperature, it is necessary to install the external temperature sensor.

CAUTION

The sensor must be set up in a shady spot.
The sensor must not be set up above a window or door. It must be located away from heat sources.
For measuring external temperature, the sensor type PT 1000 is used.



Temperature sensor for external temperature.



The direction of connecting cables.

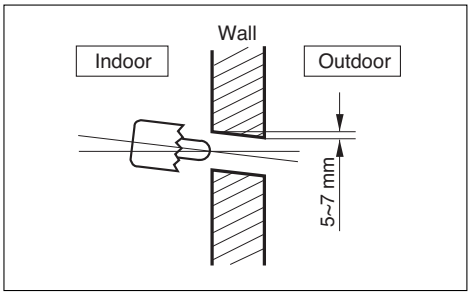
T Temperature sensor for external temperature.

CAUTION

The external sensor must be connected and should be watertight to prevent water penetration.

Drill a Hole in the Wall

- For drilling a hole into the wall to connect a pipe to connect pipe between the indoor unit and the outdoor unit, please follow the below instructions.
  - Drill the piping hole with a Ø 70 mm hole core drill.
  - Piping hole should be slightly tilted to the outdoor side to prevent raindrops from entering indoors.



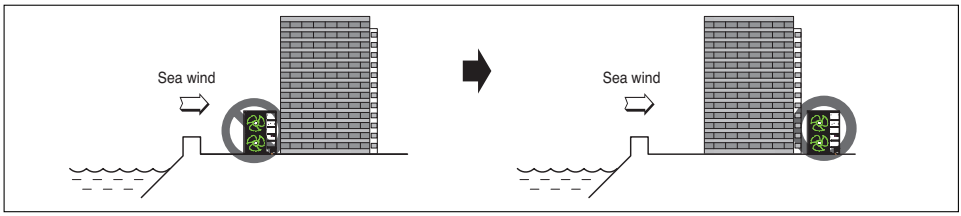
Installation at Seaside

⚠CAUTION

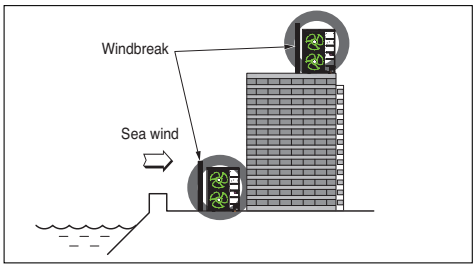
1. Air conditioners should not be installed in areas where corrosive gases, such as acid or alkaline gas, are produced.
2. Do not install the product where it could be exposed to sea breezes directly. It can result in corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient performance.
3. If outdoor unit is installed close to the seaside, it should avoid direct exposure to the sea breezes. Otherwise it needs additional anticorrosion treatment on the heat exchanger.

Selecting the location(Outdoor Unit)

1) If the outdoor unit is to be installed close to the seaside, direct exposure to the sea breezes should be avoided. Install the outdoor unit on the opposite side of the direction of the sea breeze.



2) In case, to install the outdoor unit on the seaside, put up a windbreak not to be exposed to the sea wind.



- It should be strong enough like concrete to prevent the sea wind from the sea.
- The height and width should be more than 150 % of the outdoor unit.
- It should be kept more than 700 mm of space between outdoor unit and the windbreak for easy. air flow.

3) Select a well-drained place.

Periodic (more than once/a year) clean the impurities settled on the heat exchanger by using water.

Seasonal wind and cautions in winter

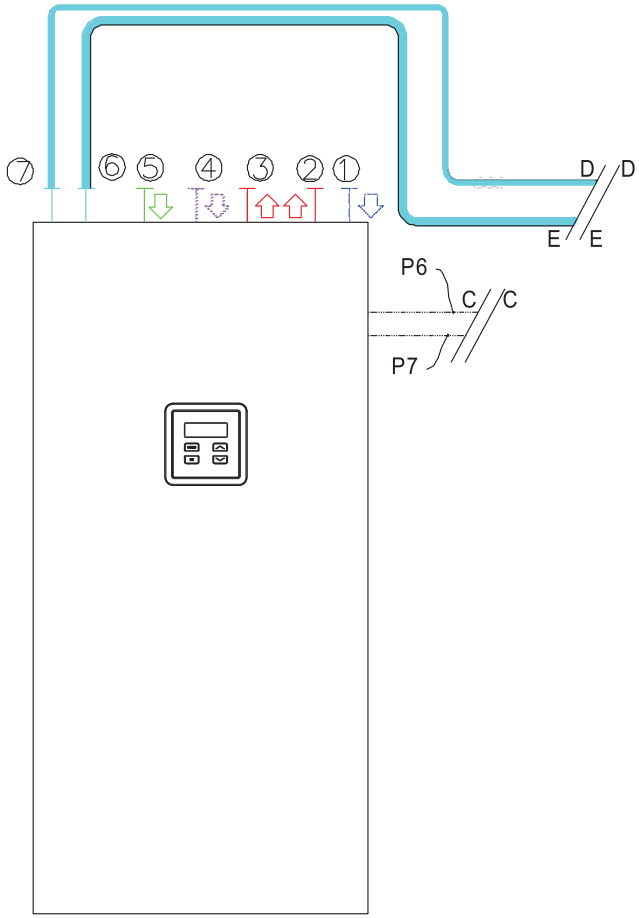
- Sufficient measures are required in a frozen area or chilly climates to facilitate efficient operation of the product.
- Take preemptive measures in case there is a seasonal wind or snow in winter.
- Install a suction and discharge duct not to let in snow or rain.
- Install the outdoor unit such that it does not come in contact with snow directly. If snow piles up and freezes on the air suction hole, the system may malfunction. If it is installed in a snowy area, attach the hood to the system.
- Install the outdoor unit at the installation console higher by 500 mm than the average snowfall (annual average snowfall) if it is installed at the area with heavy snowfall.
- Where snow is accumulated on the upper part of the Outdoor Unit by more than 100 mm, always remove the snow for efficient operation.

1. The height of H frame must be more than 2 times the snowfall and its width shall not exceed the width of the product. (If width of the frame is wider than that of the product, snow may accumulate)
2. Don't install the suction hole and discharge hole of the Outdoor Unit facing the seasonal wind.

Installation of Indoor Unit

General

The device is installed according to capacity



1	Heating/Cooling Inlet	3	DHW – outlet
2	Heating/Cooling Outlet	4	DHW – circulation
C	Electrical and communication connection	5	DHW – inlet
E	Connection to outdoor unit	6	Gas pipe 5/8“– refrigerant
D	Connection to outdoor unit	7	Liquid pipe 3/8“– refrigerant
P6	Power supply cable	P7	Communication cable - connection between outdoor and indoor unit

Location of the device

NOTICE

- It is obligatory to consider the minimal clearance from obstacles for ensuring unobstructed access for maintenance and service.
- The location of the device has to be accessible by manual transport devices to ensure undisturbed delivery of replacement parts and equipment for maintenance and servicing. The operator is charged costs connected with hiring special equipment for installing the device, servicing and maintenance separately, these costs are not subjected to warranty.
- When you install a device into the building, ensure that you build in a water drain in case of spillage.

Minimal clearance from the device

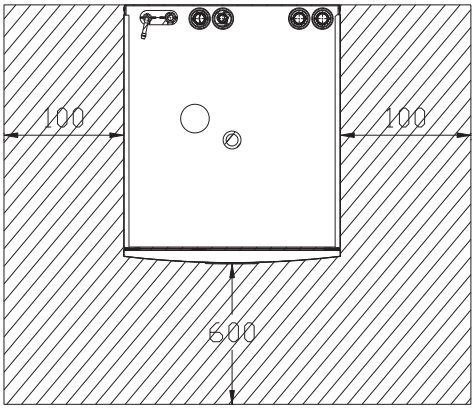
CAUTION

The device must not be installed under pipelines because there is a possibility of condensate forming. Ingress of water condensate can cause disturbances in the operation.

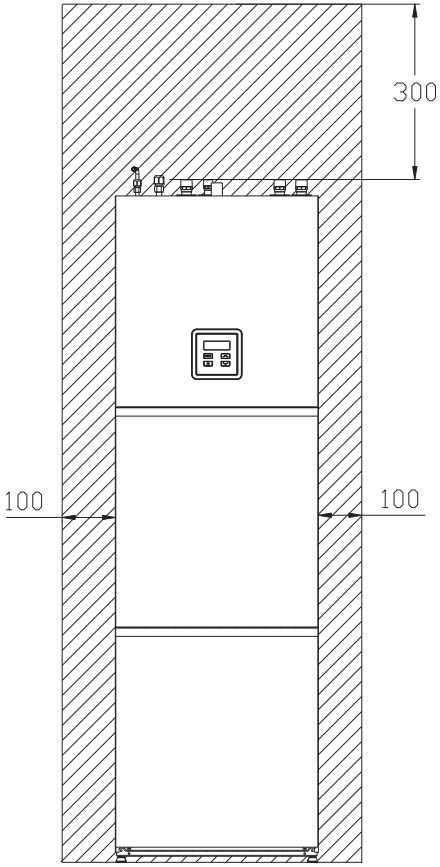
NOTICE

The installation location of the indoor unit must be dry and in the temperature range between +10 C and 40 °C.

Minimal clearances of the external device from walls facilitates seamless operation, maintenance and servicing.



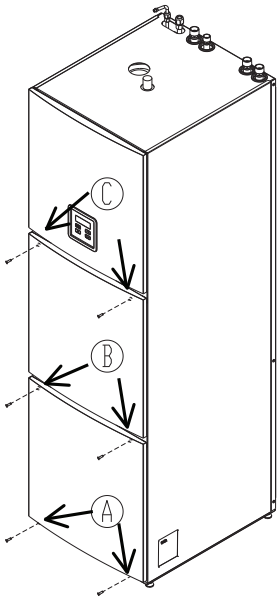
(unit:mm)



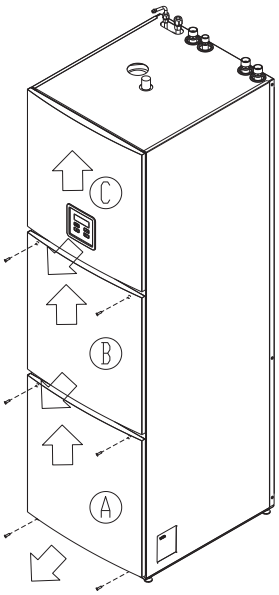
The unit should be installed upwards in a straight manner.

Front panel removal

Front panel removal



Firstly unscrew 2 screws of the panel (A).



Open the panel (A) towards yourself and pull upward. After this repeat the procedure for each panel.(B,C)

Connection with the outdoor unit

The connection between the indoor and outdoor unit is performed via refrigerant pipes and communication line.

⚠CAUTION

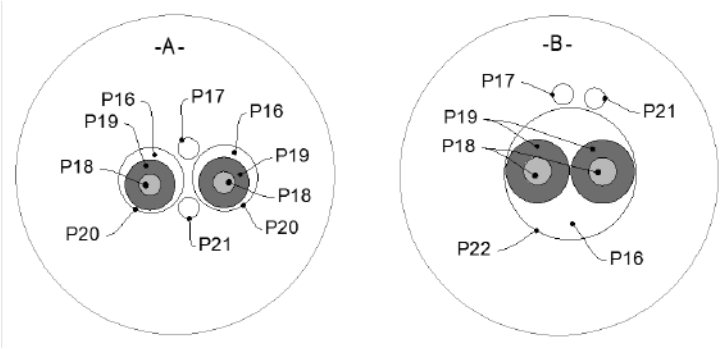
The pipeline and electrical cables have to be protected against heat and waterproof insulation in a protective pipe. This prevents the pipe connections soaking in cases of heavy groundwater or rainfall and with it intensive draining of heat into its surroundings.

Gas and liquid connection

The pipe connection between the external and internal devices can be made by positioning the pipes in two ways:

• A inside two separate ribbed protective pipes,

• B in one joint ribbed protective pipe.



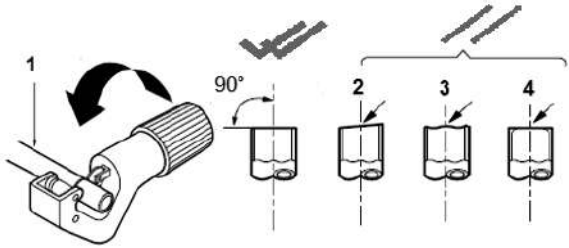
A		B	
P16	Fill with waterproof polyurethane foam	P20	Ribbed protective pipe min. ϕ 75
P17	Protective pipe for external sensors or communication cables	P21	The ribbed protective pipe for the power cable depends on the dimension of the supply cable
P18	Copper pipe Cu – refrigerant grade quality	P22	Ribbed protective pipe min. ϕ 150
P19	Insulation min. 13 mm.		

Preparation of the refrigerant pipe

Prepare the pipe by following the below steps. Note that damaged joints of the pipe result in leakage. Thus, create joints in accordance with the below regulations.

STEP 1: Cutting the pipe

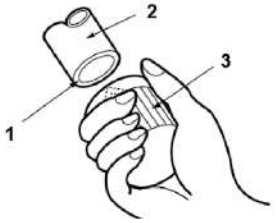
- Use a pipe cutter which does not produce chips to cut the pipe.
- Determine the distance between the outdoor and indoor unit.
- Cut the pipes longer in order to ensure connecting the internal and external device normally.



1 Copper pipe **2** Inclined **3** Uneven **4** Rough

STEP 2: Removal of chips

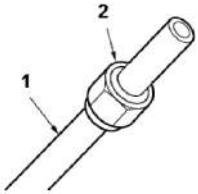
- Remove all chips from the part where the pipe was cut.
- Hold the pipe downward during cleaning so that the chips do not fall into the pipe.



1 Copper pipe **2** Copper pipe held downward **3** Beveler

STEP 3: Inserting the screw nut

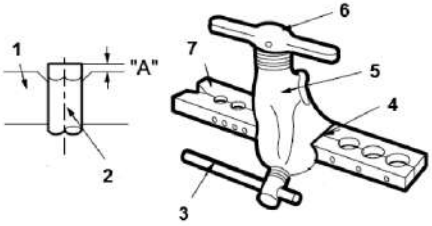
• Remove the screw nut from the exterior unit.
• Insert the screw nut into the pipe which has been cleaned.



1 Copper pipe **2** Screw nut

STEP 4: Edging

• The edging has to be performed with tools for edging as shown:



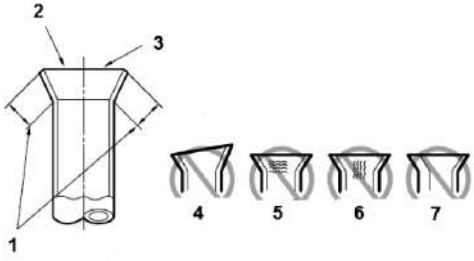
1 Holder **2** Copper pipe **3** Fitting **4** Cone **5** Bracket **6** Handle **7** Holder

• Mount the copper pipe firmly into the tool for edging. Consider the dimensions listed in the table below.

External diameter		"A"
[mm]	[inch]	[mm]
9.52	3/8	1.5 ~ 1.7
15.88	5/8	1.6 ~ 1.8

STEP 5: Testing

- Compare the edging of the pipe with the picture below.
- In the case of damaged edging, cut off the damaged part and repeat the edging procedure.



1 Circular edging of the pipe of the same length.
2 Circularly smooth edge
3 Interior edge and surface without scratches
4 Inclined edge
5 Uneven surface
6 Cracked / rough
7 Unequal thickness

Connecting the refrigerant pipe on the indoor unit

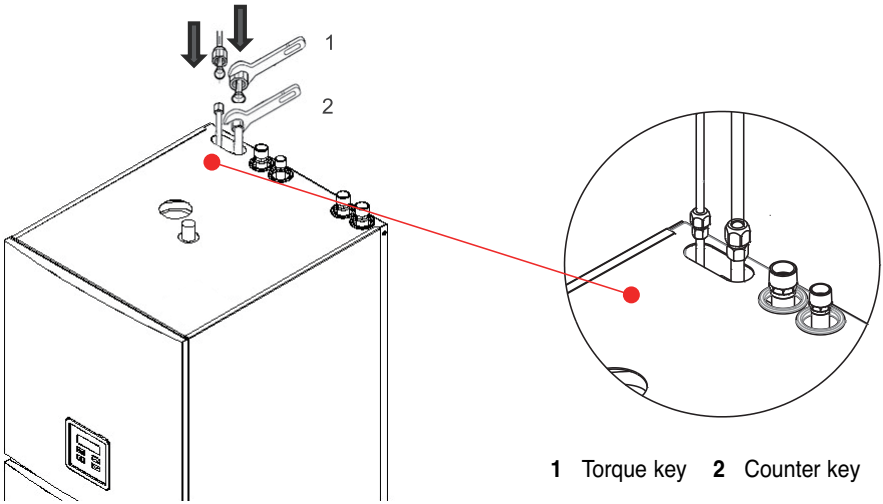
STEP 1: Determine the direction of the pipe connection

- The refrigerant pipe connections are located at the top of the unit. Please refer to the device drawing for additional information.

STEP 2: Mounting

- Align with the middle of the pipe and then tighten the screw nut by hand.
- Tighten the screw nut with a torque wrench until it clicks. Prescribed torques for tightening:

External diameter		Torque
[mm]	[inch]	[Nm]
9.52	3/8	34 – 42
15.88	5/8	65 – 81



1 Torque key **2** Counter key

Hydraulic connection

⚠ WARNING

The dimensioning of circulation pumps, valves, safety elements and pipes has to be performed by the design engineer according to the heating/cooling capacity of the device.

Before connecting the device, it is necessary to rinse the pipe system thoroughly and remove impurities (solid particles, oils, greases ...).

Use suitable detergents if necessary.

⚠ CAUTION

The closing valve with exhaust has to be installed lower than the pipe connections on the device.

DHW system

The hydraulic connection has to be installed in accordance with the national and local regulations for connecting buffer tanks for DHW to enable the water flow in full force. To prevent water leakage, install a drain through the floor below the level of the device. The following picture shows the correct hydraulic connection of the device.

⚠ CAUTION

In the event of a longer absence from home and no use of hot water, close the valve on the cold water supply.

⚠ CAUTION

Because different materials are used for pipe installation, all connections on the device (cold and hot water, circulation, heat conductor) have to be galvanically isolated; otherwise corrosion of connections can occur on the inner side of the buffer tank for DHW. We recommend placing galvanic isolators made of red brass the length of at least twice the diameter of the pipe on the connections.

The DHW tank is intended for storing drinking water, this is why the water has to be in accordance with the national regulations on drinking water in force; otherwise, damage to the device and a termination of the warranty can arise.

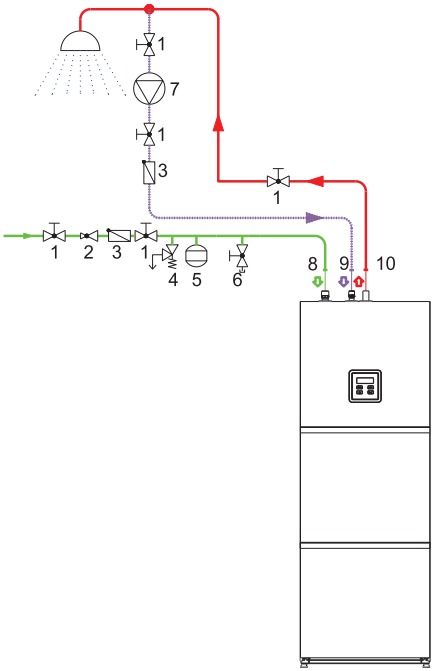
The cold DHW connection of the device must be fitted with a safety valve with the rated pressure of 0.6 MPa (6 bar).

For proper operation of expansion vessel, a suitable setting of the vessels operating pressure must be made. The pressure is set in regards to the pressure in the DHW system. The setting needs to be checked every 12 months.

❗ NOTICE

The cold DHW connection must be fitted with an expansion vessel suitable for drinking water. The selection and installation must be in accordance with the standard DIN 4807 T5.

1 Ball valve
2 Pressure reducing valve
3 Check valve
4 Safety valve
5 Expansion vessel
6 Charging pipe
7 Circulation pump
8 Cold sanitary water
9 Cold circulation water
10 Warm sanitary water



Adjusting the safety valve [MPa (bar)]	0.6 (6.0)		
System pressure [MPa (bar)]	0.3 (3.0)	0.35 (3.5)	0.4 (4.0)
Volume of the DHW [L]	200		
Expansion vessel[L]	5	8	12

Setting the pressure for the expansion vessel for DHW

Expansion vessel for DHW is factory filled to a precharge pressure p0 with dry nitrogen. The pressure must be set depending on the settings of the pressure reducing valve on the DHW supply to the building.

The pressure in the expansion vessel must be set according to the following formula:

$$P_0\ [MPa] = P_{rv}\ [MPa] - 0.02\ [MPa],$$
$$(P_0\ [bar] = P_{rv}\ [bar] - 0.2\ [bar])$$

P_0 – pressure in the expansion vessel

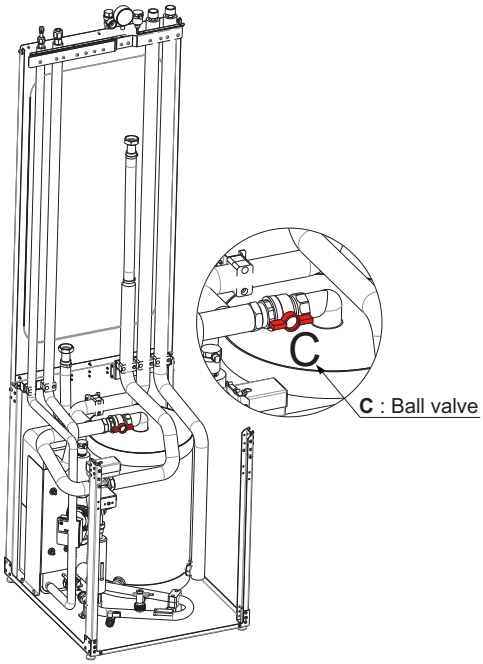
P_{rv} – setting of the pressure reducing valve

Heating system

For unobstructed and safe operation, it is important to have a heat accumulator with a minimal volume of 40 l (integrated in the IDU). The accumulator is needed for hydraulic balancing, ensuring unobstructed flow and defrosting. A larger accumulator ensures a more balanced temperature of heating and more comfort.

NOTICE

When installing an additional larger heat accumulator, it is necessary to close the ball valve in the indoor unit. The location of the closing valve is indicated on the picture below.



The heating system piping diagram

An example of the basic hydraulic scheme of the heating system is as shown below: For other circuits, see The Hydraulic Circuit Diagram Catalogue.

Scheme of the heating system in hydro modules with an integrated boiler

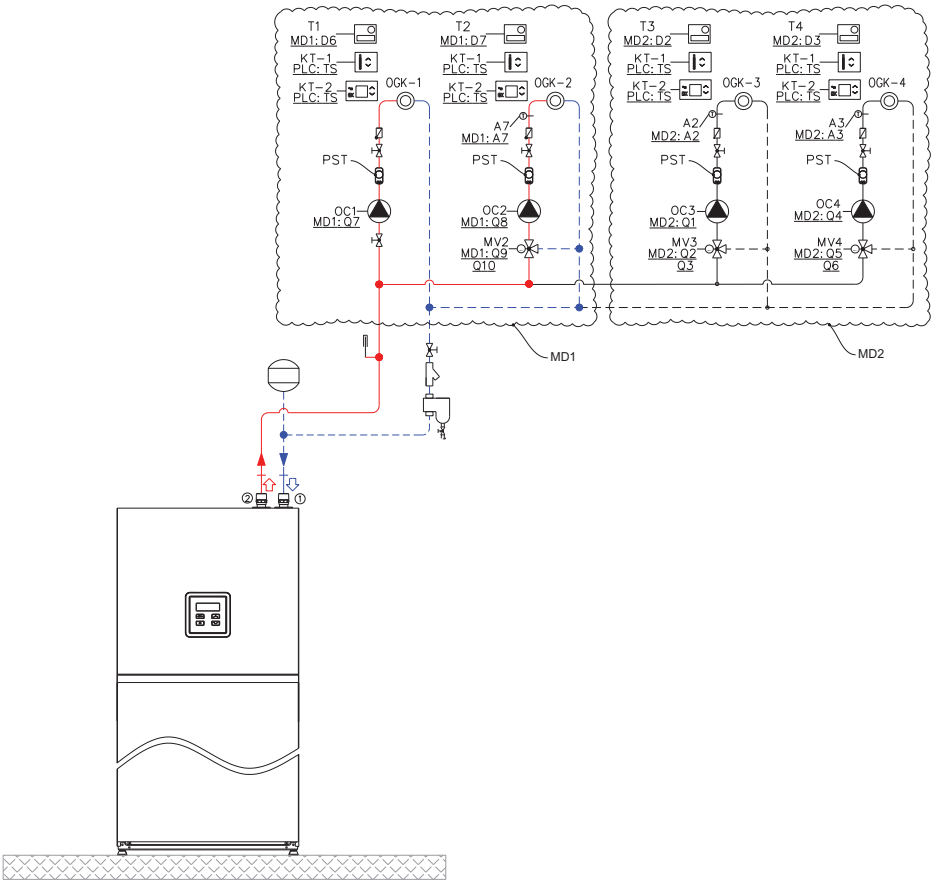
The elements on the scheme are marked in the following manner:

Legend of reading:

OC1 ⟶ Mark of the element

MD1:Q7 ⟶ Mark of the connecting clip on the input/output module - MD

⟶ Mark of the input/output module



ELEMENTS	CONNECTING TERMINALS	MARK	CHARACTERISTICS
		1	Return for heating
		2	Supply pipe for heating
PLC			Processing unit
PST			Pipe safety thermostat
Spatial			Connector on PLC
	Q1-Q12		Digital outputs of regulation ~ 230 V (input/output module MD1 and MD2)
	A1-A8		Analogue input (input/output module MD1 and MD2)
	D1-D9		Digital input (input/output module MD1 and MD2)
MD1			Basic input/output module 1
T1			Thermostat of heating cycle 1
T2			Thermostat of heating cycle 2
OC1			Circulation pump of heating cycle 1
OC2			Circulation pump of heating cycle 2
MV2			Mixing valve of heating cycle 2
OGK-1			Heating cycle 1
OGK-2			Heating cycle 2
MD2			Expansion input/output module 2
T3			Thermostat of heating cycle 3
T4			Thermostat of heating cycle 4
OC3			Circulation pump of heating cycle 3
OC4			Circulation pump of heating cycle 4
MV3			Mixing valve of heating cycle 3
MV4			Mixing valve of heating cycle 4
OGK-3			Heating cycle 3
OGK-4			Heating cycle 4

MARK	CHARACTERISTICS	MARK	CHARACTERISTICS
	Closing valve		Manometer
	Circulation pump		Temperature sensor
	Closing valve with exhaust		Thermometer
	Drain valve with plug		Consumer of heat / coolness
	Water filter		Automatic vent
	Expansion vessel		3-way switching valve with EM drive
	Safety valve		3-way mixing valve with EM drive
	Non-return valve	——	Supply pipe
	Magnetic separator of impurities	- - - -	Return line
	Pipe safety thermostat		

⚠CAUTION

The supply line of each heating cycle must be fitted with a pipe safety thermostat that is connected sequentially with the circulation pump to safeguard against the inflow of high temperature.

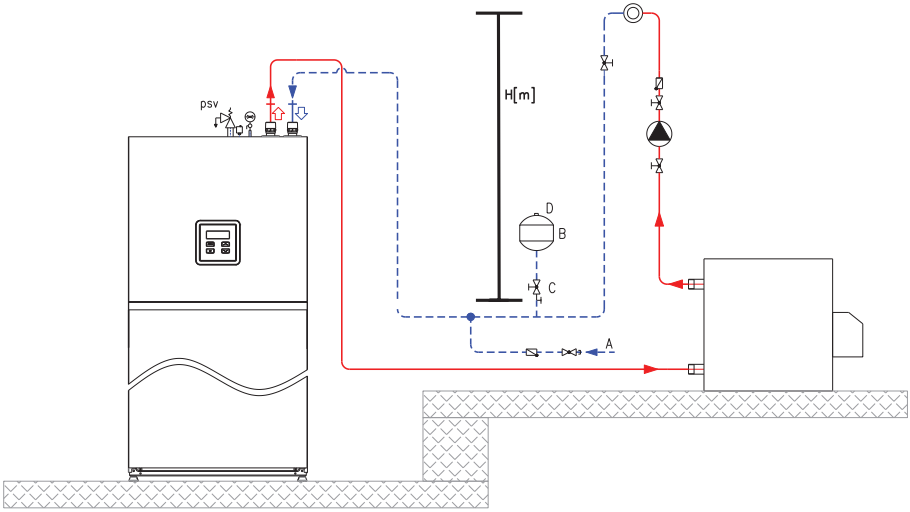
Charging of the heating system

⚠WARNING

Ensure that the venting of the system is strong to avoid malfunctions while operating.

⚠CAUTION

An expansion vessel of suitable dimensions must be fitted to the heating system. The expansion vessel must be regulated in accordance with standard EN 12828.
For normal operation of the expansion vessel, the vessel's working pressure should be appropriately adjusted. The settings have to be checked once in every 12 months.
Consider the maximal operational pressure of the expansion vessel and filling the heating system.



A - Filling the system.
B - Expansion vessel.
C - Ball valve with exhaust.
D - Air filling valve.
H - Height of the heating system (from expansion vessel to the highest heating body in the building).
P_{SV} - Pressure of the safety valve.

❗NOTICE

If the pressure in the expansion system is p0, it results in malfunctioning of the heating system.
The dimensioning of the expansion vessel must comply with the standard EN 12828 regulations.

Setting the pressure for the expansion vessel P_0

- Before filling the system with water, check and set the pressure P_0. The expansion vessel is factory set to the pressure specified on its data label. For correct operation of the system, set the pressure P_0 according to the equation below. The filling must not exceed the maximum operational pressure specified on the data label of the expansion vessel.
- Calculate the P_0 pressure value with the help of the equation:

$$P\_0\ [MPa] = P\_rv\ [MPa] - 0.02\ [MPa],$$
$$(P\_0\ [bar] = P\_rv\ [bar] - 0.2\ [bar])$$

P_0 – pressure in the expansion vessel

P_{rv} – setting of the pressure reducing valve

⚠ CAUTION

If the calculation shows a pressure lower than 0.1 MPa (1 bar), set the pressure of the expansion vessel to 0.1 MPa (1 bar).
P_0 [0.1 MPa (1 bar)] – pressure in the expansion vessel,
$P_{0\,min}$ [0.1 MPa (1 bar)] – minimum allowed pressure of the heating system,
$P_{0\,max}$ [0.1 MPa (1 bar)] – maximum allowed pressure of the heating system,
H [m] – Height of the heating system.

- Set the amount of pressure in the expansion vessel by releasing or adding dry nitrogen.
- Record the new value of the pressure P_0 on the data label.
- Open the closing valve of the expansion vessel carefully, open the vents and close the drain.

Filling the heating system

- Use the filling valve to fill the system with water of suitable quality (with anti-corrosion additives, etc.) to the pressure P_F.

$$P_F\ [MPa] = P_0\ [MPa] + 0.03\ [MPa]$$
$$(P_F\ [bar] = P_0\ [bar] + 0.3\ [bar])$$

Filling the system to the final pressure

- The final pressure of the system is determined by heating the system to the maximum heating temperature (thermal degassing).
- Turn off the circulation pumps, open the vents and vent the system.
- Fill the system up to the final pressure which is 0.05 MPa (0.5 bar) lower than the venting pressure of the safety valve.

$$P_E\ [MPa] \le P_{sv}\ [MPa] - 0.05\ [MPa]$$
$$(P_E\ [bar] \le P_{sv}\ [bar] - 0.5\ [bar])$$

P_E – the final pressure of the system,

P_{SV} – the pressure of the safety valve.

Preparing the heating system

Prepare the system according to one of the recommended hydraulic piping diagrams which is specified by the manufacturer of the device. This is the only way to ensure reliable and effective operation of the device. After connecting the device to the heating system, it is necessary to examine all circulating pumps and electric motor valves for correct functioning.

The device must be connected to the heating system via rubber compensator or flexible pipes. The latter must not be under tension in final position, this would worsen the devices noise and vibration protection. In extreme cases this can also lead of damage of the device.

Quality of heating water

The quality of the water used in the heating system is very important. The water from the water supply is mostly suitable for use in the heating system. In new systems, the impurities are a consequence of welding, soldering, dirty pipes (oil, grease), etc. In case the impurities start accumulating in the device this can worsen the flow and heat transfer, In extreme cases, the water freezes inside the pipes consequently destroying the system.

⚠ WARNING

- To protect the device from intake and accumulation of dirt in the heat exchanger, you must install the strainer on the return line, inlet into the device.
- A galvanic disconnection between individual elements of the heating system (i.e. boiler, container ...) is obligatory.
  In the case of using grey steel pipes in the heating system, it is necessary to degrease them (the interior of the pipe) before connecting them to the heat pump.

⚠ CAUTION

The water in the heating system has to be in accordance with the requirements of standard VDI 2035 and must not contain microorganisms. The heating system has to be filled with soft water, which has been treated with anti-corrosion and antibacterial agents for preventing corrosion. Before filling, the heating system has to be cleaned of all impurities.
The heating system has to be thoroughly vented. You must prevent air, including diffusion air entering the device.

- If the product is installed at existing hydraulic water loop, it is important to clean hydraulic pipes to remove sludge and scale.
- Installing sludge strainer in the water loop is very important to prevent performance degrade.
- Chemical treatment to prevent rust should be performed by the installer.
- It is strongly recommended to install an additional filter on the heating water circuit. Especially to remove metallic particles from the heating piping, it is advisable to use a magnetic or cyclone filter, which can remove small particles. Small particles may damage the unit and CANNOT be removed by the standard filter of the heat pump system.

NOTICE

To prevent damage to the components of the hydraulic system, we recommend the additional installation of Micro-bubble venting system.

The micro bubbles in the system forms larger bubbles which eventually can cause corrosion of the system, result in system component malfunction and operation disturbance.

The table below represents the maximal allowed content of individual substances in the heating water and the influence of these on the heat exchanger. Do not use the heating water that contains any substance in concentrations ;resulting in corrosion of the heating system (influence "-"). Do not use heating water that contains two or more substances in concentrations ;resulting in corrosion in the heating system (influence "0").

TYPE OF PRESENT SUBSTANCE	UNIT	CONCENTRATION	INFLUENCE TO THE HEAT CONDUCTOR
'Organic sediment	mg / L		0
Ammonia NH_3	mg / L	< 2	+
		1 to 20	0
		> 20	-
Chloride	mg / L	< 300	+
		> 300	0
Allowed water hardness	°dH	5 – 10	
Electrical conductivity	µS / cm	< 10	0
		10 to 500	+
		> 500	-
Iron (Fe) removed	mg / L	< 0.2	+
		> 0.2	0
Free carbonic acid	mg / L	< 5	+
		5 to 20	0
		> 20	-
Manganese (Mn) removed	mg / L	< 0.1	+
		> 0.1	0
Nitrates (NO_3) removed	mg / L	< 100	+
		> 100	0
pH value	mg / L	< 7.5	0
		7.5 to 9	+
		> 9	0
Oxygen	mg / L	< 2	+
		> 2	0
Hydrogen sulphide (H_2S)	mg / L	< 0.05	+
		> 0.05	-
HCO3- / SO_4^{2}-	mg / L	> 1	+
		< 1	0
Hydrogen carbonate	mg / L	< 70	0
		70 to 300	+
		> 300	0
Aluminium (Al) removed	mg / L	< 0.2	+
		> 0.2	0
Sulphates	mg / L	< 70	+
		70 to 300	0
		> 300	-
Sulphite (SO_3)	mg / L	< 1	+
Chlorine (gas) (Cl_2)	mg / L	< 1	+
		1 to 5	0
		> 5	-

Table: Influence of various aggressive substances in the heating water based up on the stability of stainless copper welded plate transmitters. (+ = no influence, 0 = danger of corrosion, - = corrosion - use not permitted).

CAUTION

The heating system has to be filled with water with the hardness scale between 5 °dH and 10 °dH. Malfunctions of the device caused by water hardness is not covered by the warranty.

Electrical connection

Connect the indoor unit to the mains according to the instructions described in this chapter.

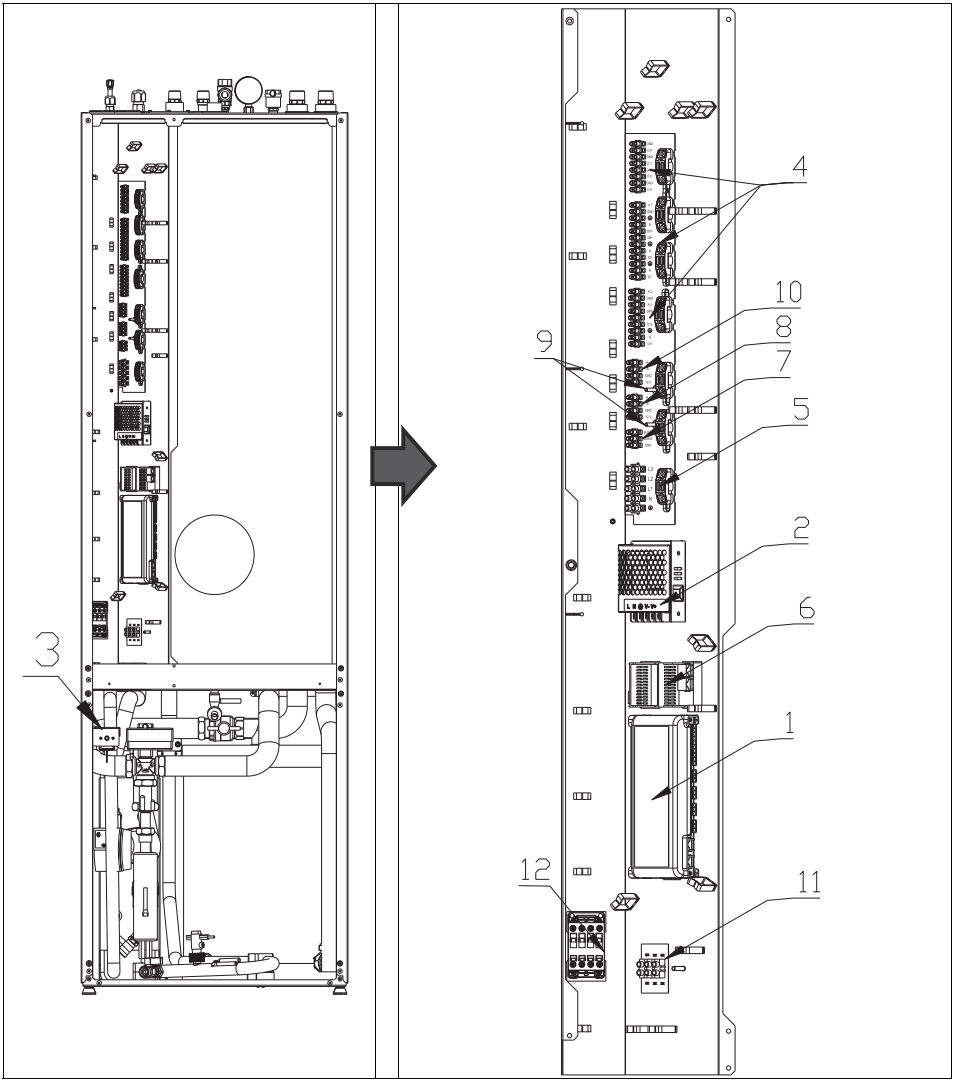
⚠ WARNING

- The final electrical connection can only be performed by the person authorized by the manufacturer to ensure correct and efficient operation of the device.
  IT IS STRICTLY PROHIBITED FOR UNAUTHORIZED PERSONS TO TAMPER WITH THE ELECTRICAL CONNECTION OF THE DEVICE.
- The device must be connected to the mains, which has a built-in RCD residual-current device, switch type A.
- Pay attention to the characteristics of the inputs and outputs. Incorrect connection can lead to damage of the device.

⚠ CAUTION

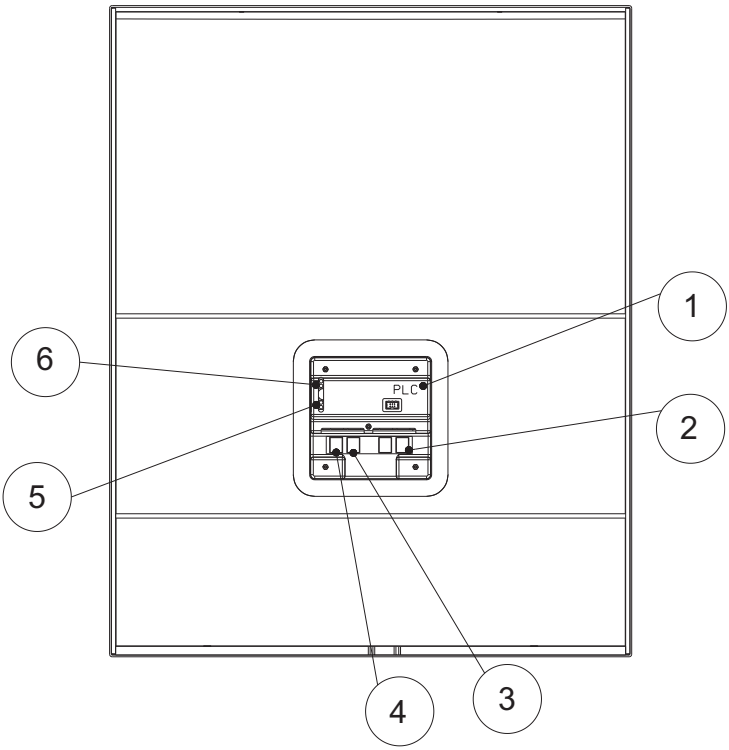
- Connecting the device to the electrical network has to be performed in accordance with the standards for connecting devices to the electrical network. The device has to be connected to the electrical network via the power supply which is provided for electrical installation under the regulations in force.
- The device must be connected to the mains using a cable with appropriate diameter (refer to paragraph 7 for more detailed information). The electrician defines the cable diameter according to the installation method, distance of the device from the main electrical cabinet and the power of the device.
- The total electrical power of the devices which are directly connected to the controller must not exceed 500 W. Else, separate power to the external devices is required connect only the control elements to the controller.
- Do not intertwine the communication cable (in accordance with the best engineering practices and regulations) with power cables.

Description of electrical connection board



1	Input/output module MD1	7	Communication with outdoor unit (PI485)
2	Power supply ~ 230 V / 12 V	8	Connecting clips spatial corrector KT-1(2)
3	RESET button (Thermal protection of the electrical heater).	9	Place of grounding the plated (braided) communication cable
4	Connecting clips of external devices	10	Communication with outdoor unit and internal expansion unit TT3003.
5	Connecting clips of the power line	11	Connecting clips neutral conductor
6	WEB module (Option)	12	Electrical contactor

Display - process module



1	Process module PLC	4	WM - connection with the WEB module (factory made).
2	TE2 - connection with the input/output module (factory made).	5	RQ2 - connection for resetting the alarm (factory made).
3	TEX - communication with the ODI - Gateway module PI485.	6	RQ1 - connection of the signal for reporting an alarm (optional).

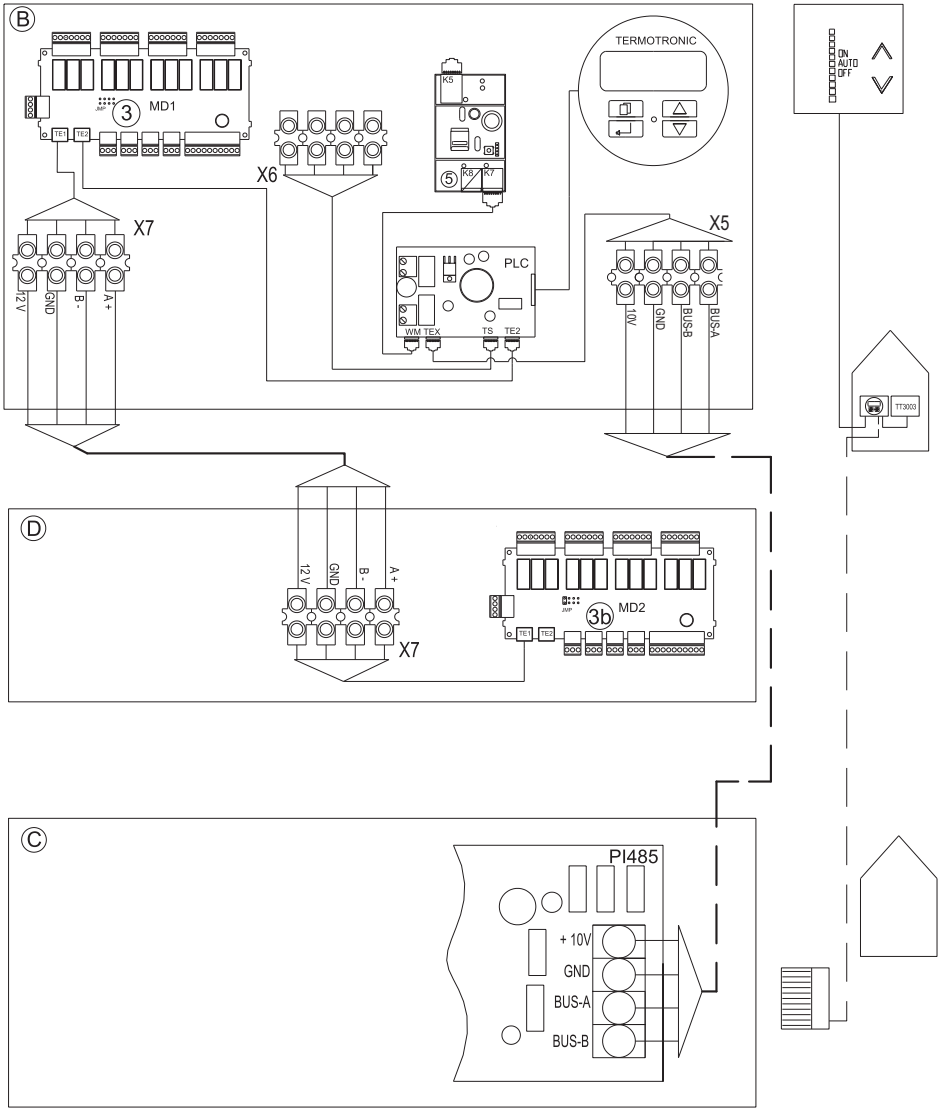
Schematic display of the control system - TT3000

⚠CAUTION

Connect the internal control unit TT3000 to external device with a plated cable; such that the plating of the cable is grounded on the envisioned spot (–functional earthing).

Proper functioning requires a connection between the terminal clip X5 on the internal unit and connecting clips Bus_A [+] / Bus_B [-] / GND / 10 V on the Gateway PI485 module (Modbus Converter) on the external device.

ELEMENTS MARK	CONNECTING TERMINALS	CHARACTERISTICS
B		**Indoor unit TT3000**
3		**Basic input/output module MD1**
	TE1	Communication with I/O module MD2
	TE2	Communication with the control electronics of the PLC screen module
JMP		Set-up of bridges (without)
X7		**Connecting terminal for communication with expansion module MD2**
	A +, B-	Communication
	GND, 12 V	Power supply
X6		**Connecting terminal for the spatial correctors(optional)**
	A +, B-	Communication
	GND, 12 V	Power supply
X5		**Connecting terminal for communication with external module Gateway PI485 in Outdoor unit**
	BUS-A, BUS-B	Communication
	GND, 10 V	Power supply
5		**Web module**
	TW MODBUS	Communication with PLC
	TX MODUBUS	Not in use
	Ethernet	Internet (Ethernet) connection
PLC		**Process module**
	WM	Communication with Web module
	TEX	Communication with outdoor unit – PI485 Gateway
	TS	Communication with the spatial corrector
	TE2	Communication with the basic V/I module MD1
D		**Expansion wall unit TT3003**
3b		**Expansion input/output module MD2**
	TE1	Communication with the basic V/I module MD1
	TE2	Not in use
JMP		Set-up of bridges (in first position)
X7		**Connecting terminal for communication with I/O module MD1**
	A +, B-	Communication
	GND, 12 V	Power supply
C		**Gateway PI485 in the outdoor unit**
PI485		**External module Gateway PI485**
	BUS–A , BUS–B	Communication with the control electronics of the Process module PLC
	GND	Power supply
	+ 10 V	Power supply


B
3
MD1
TE1
TE2
X6
K5
K6
K7
5
TERMOTRONIC
ON
AUTO
OFF
X7
12 V
GND
B -
A +
PLC
WM TEX
TS
TE2
X5
10V
GND
BUS-B
BUS-A
TT3003
D
12 V
GND
B -
A +
X7
3b
MD2
TE1
TE2
C
PI485
+ 10V
GND
BUS-A
BUS-B

Connecting the internal control unit – TT3000

⚠DANGER

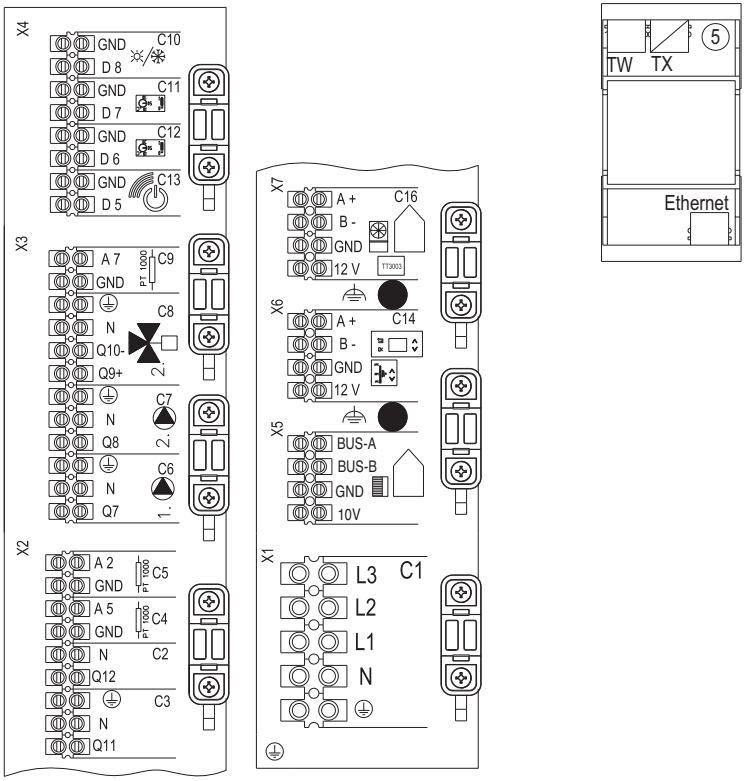
Connecting the device to the power source can only be performed by a qualified installer in a voltage-free state!

As part of connecting the internal control unit to the connecting clips X1…X7, connect the following cables:

- **Power cable,**
- **Communication cable for the external device,**
- **Outdoor temperature sensor**

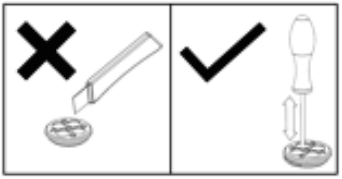
Legend of cable connections to the connecting clips:

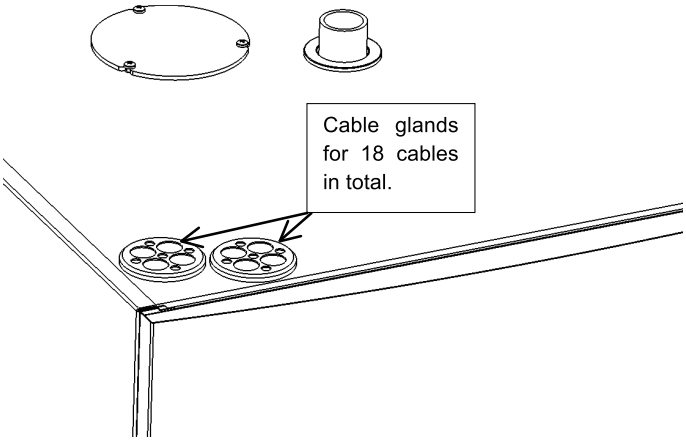
MARK	CONNECTING TERMINALS	DIMENSIONS OF CABLE	DESCRIPTION
X1	L1, L2, L3, N, ⏚		**Power cable**
X2	A5, GND	2 x 0.75 mm²	**Temperature sensor of outdoor temperature**
	Q12, N	2 x 0.75 mm²	Additional external source
	N, Q11, ⏚	3 x 0.75 mm²	Cooling valve
X3	Q7, N, ⏚	3 x 0.75 mm²	Circulation pump of heating cycle 1 (optional)
	Q8, N, ⏚	3 x 0.75 mm²	Circulation pump of heating cycle 2 (optional)
	N, Q9+, Q10-	3 x 0.75 mm²	Mixing valve of heating cycle 2 (optional)
	A7, GND	2 x 0.75 mm²	Temperature sensor of mixing-heating cycle 2 (optional)
X4	D8, GND	2 x 0.75 mm²	Switch for heating/cooling (optional)
	D7, GND	2 x 0.75 mm²	Thermostat of mixing cycle 2 (optional)
	D6, GND	2 x 0.75 mm²	Thermostat of mixing cycle 1 (optional)
	D5, GND	2 x 0.75 mm²	Remote on/off (optional)
X5	BUS–A, BUS – B, GND, 10 V	Cable H05VV-F 4 x 0,75 mm²	**Communication of the external control unit in the WPLV device**
X7	A+, B-, 12 V, GND	4 x 0.75 mm²	**Communication with the expansion unit TT3003**
5			**Web module**
	TW MODBUS	UTP	Communication with PLC
	TX MODBUS	/	Not in use
	Ethernet	UTP	Internet connection


X4
GND
C10
D 8
GND
C11
D 7
GND
C12
D 6
GND
C13
D 5
X3
A 7
GND
PT 1000
C9
N
C8
Q10-
Q9+
2.
N
C7
Q8
2.
N
C6
Q7
1.
X2
A 2
GND
PT 1000
C5
A 5
GND
PT 1000
C4
N
C2
Q12
C3
N
Q11
X7
A +
C16
B -
GND
12 V
TT3003
X6
A +
C14
B -
GND
12 V
X5
BUS-A
BUS-B
GND
10V
X1
L3
C1
L2
L1
N
TW
TX
5
Ethernet

⚠CAUTION

Make sure that all the cables are fed through the cable glands at the top of the unit. In that way you will ensure the tightness of the device.





In order to ensure water tightness of the cable routing follow the below instructions:

1. Make a small hole in the thin rubber membrane for each cable.
2. Push the cable through making sure the membrane isn't damaged and that the membrane tightly wraps the cable.
3. Pull the cable back for approximately 5 mm to make a positive seal.

⚠CAUTION

Make sure only one cable is fed through each cable gland hole to ensure a proper water tightness seal.

Connection of power cable

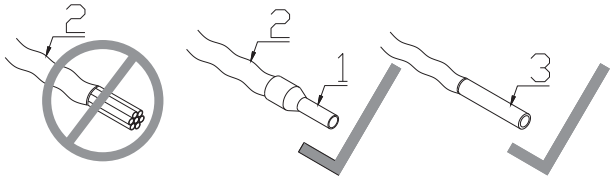
⚠WARNING

Connecting the device to the power source can only be performed by a qualified installer in a voltage-free state!

⚠CAUTION

- The supply and communication cables have to be routed into the device and electrical cabinet through separate envisioned ducts and overflows which are installed before the cable clamp. This is to ensure that the cable is reliable and the electrical cabinet is protected from water penetration.
- Incorrect dimensioning of the power cable or defective terminal fuses of the device could lead to an overload of the safety elements on the power grid of the building which could lead to short-circuits. Follow the requirements listed in this manual.
- Multi strand flexible cables must be connected to the indoor unit terminal blocks with crimped end sleeves.

Solid core wires do not use crimped end sleeves.

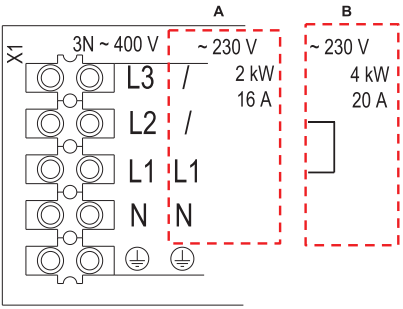


1 End sleeve **2** Multi strand flexible cable **3** Solid core wire

- The device comes with an electrical heater 3 x 2 kW. The power supply is connected according to your specifications.

a) ~ 230 V / 50 Hz on the connecting clips L1, N and PE,

Connecting terminals of the supply cable



~ 230 V / 50 Hz

For connecting the **2 kW** heater, connect the connecting terminals in section A to **L1, N** and **PE** (⏚). Input fuse: **16 A**.

For connecting the **4 kW** heater, connect the connecting terminals in section B to **L1, N** and **PE** (⏚). It is also necessary to connect the bridge from **L1** to L2

Input fuse: **20 A.**

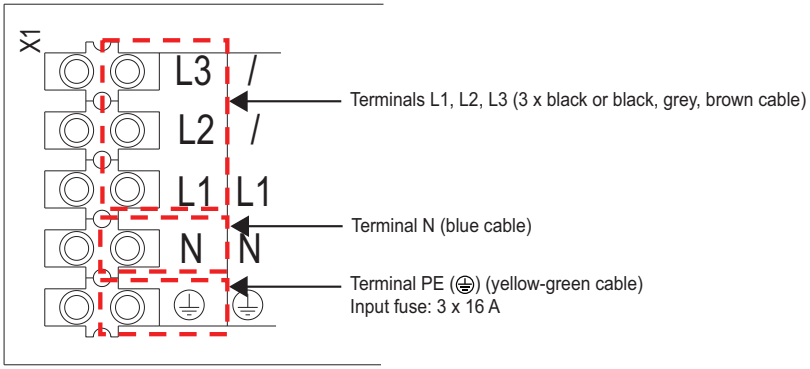
Clip PE (⏚) (yellow-green cable), clip N (blue cable), clips L1 (black or grey or brown cable).

⚠DANGER

In case of 1~230 V; 50 Hz connection it is not allowed to connect a secondary bridge between L2 to L3 or L1 to L3 in order to have 3x2 kW electrical heating capacity. Failure to comply may cause internal overheating and fire hazard.

b) 3N ~ 400 V / 50 Hz on the connecting clips L1, L2, L3, N and PE (⏚).

Connecting clips of the supply cable



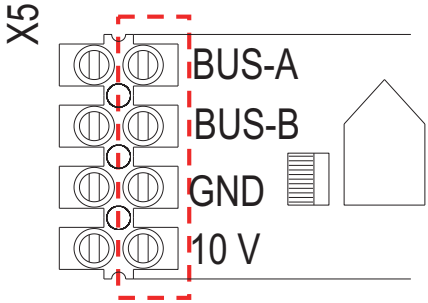
Connecting the communication cable

The communication cable is intended for the communication between the indoor and outdoor. For the dimensions of the communication cable, see technical data.

⚠CAUTION

It is important to correctly connect the cable to terminal block X5.

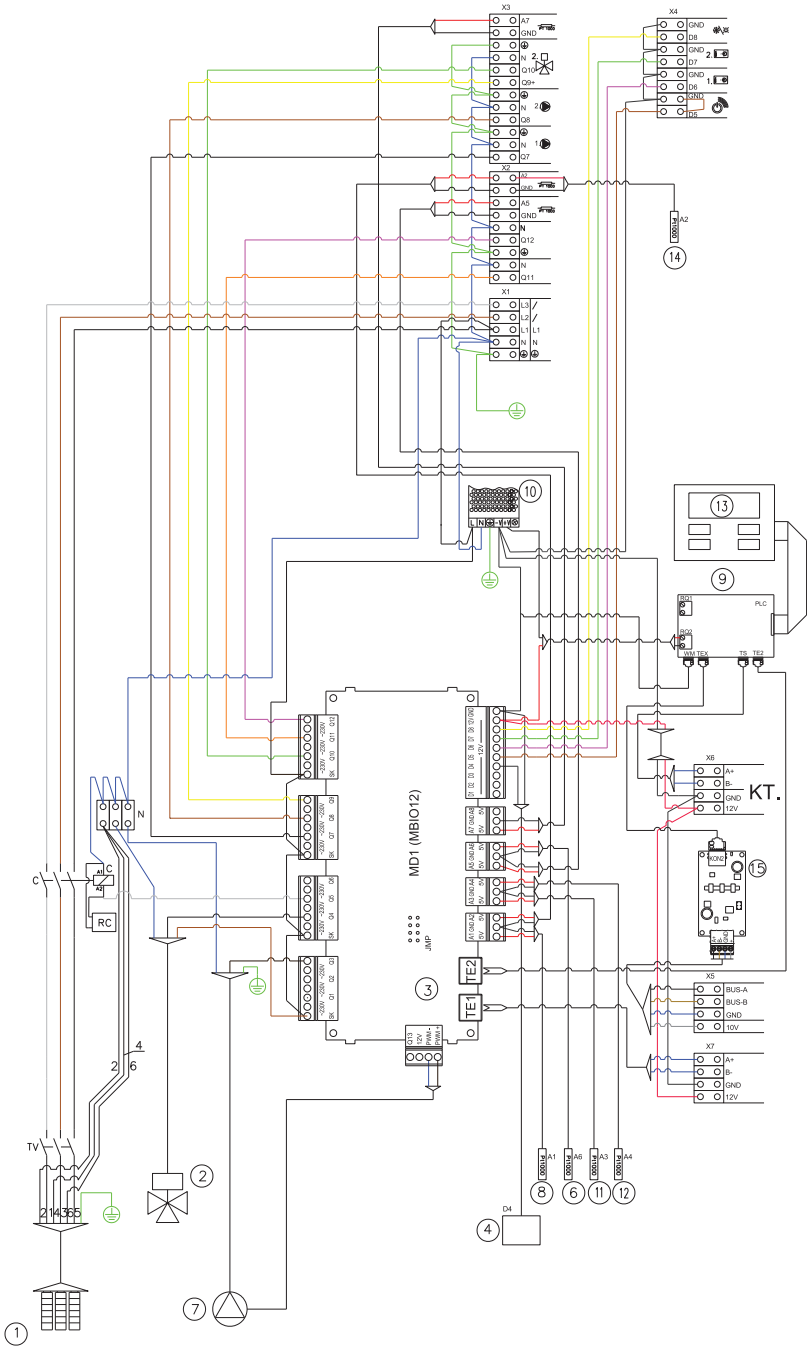
The communication cable connects the external device to the terminal terminals **X5** on the indoor unit. It is necessary to connect the terminals **BUS–A, BUS–B** and **GND** and **10 V**.



⚠DANGER

The communication connection is considered as a low-voltage connection. The type of the communication cable must be H05VV-F 4 x 0.75 mm² (IEC 60227-53) or similar.

Electrical scheme

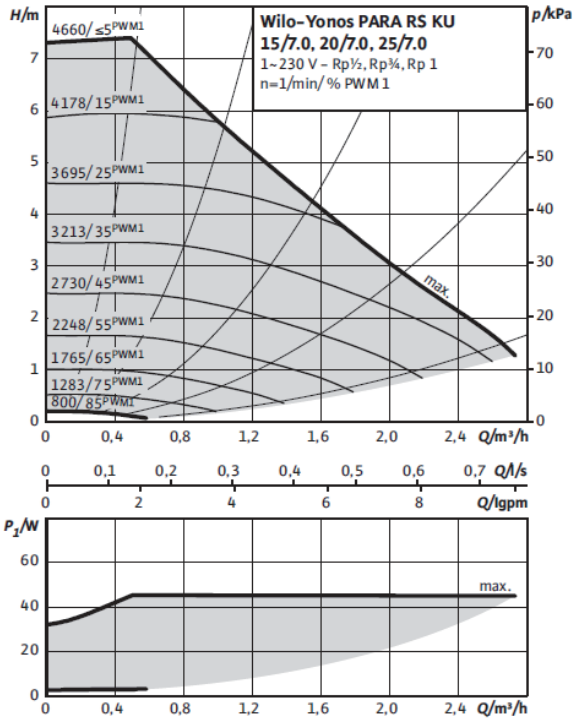


ELEMENT	TERMINAL BLOCK	DESCRIPTION
X1	L1, L2, L3, N, PE	Power cable
X2	A5, GND	Temperature sensor for external temperature
	Q11, N	Cooling valve
	Q12, N, PE	Additional external source
X3	Q7, N, PE	Circulation pump of heating cycle 1 (optional)
	Q8, N, PE	Circulation pump of heating cycle 2 (optional)
	N, Q9+, Q10-	Mixing valve of heating cycle 2 (optional)
	A7, GND	Temperature sensor of mixing-heating cycle 2 (optional)
X4	D8, GND	Switch heating/cooling and/or PV signal (optional)
	D7, GND	Thermostat of heating cycle 2 (optional)
	D6, GND	Thermostat of heating cycle 1 (optional)
	D5, GND	Remote on/off (optional)
X5	BUS–A, BUS – B, GND, 10 V	Communication with the ODU
X6	A+, B-, 12 V, GND	Communication spatial corrector (optional)
X7	A+, B-, 12 V, GND	Communication with expansion unit TT3003
1		Flow electrical heater
2		Tree way valve for switching between heating and DHW
3		**Basic input/output module MD1**
4	D4	Flow switch
5		**Web module (OPTIONAL)**
	TW Modbus	Communication with PLC
	TX Modbus	Not in use
	Ethernet	Internet connection
6	A6	Temperature sensor of the supply pipe
7	Q3	Main circulation pump
8	A1	Temperature sensor of the return line
9		**Process module - PLC**
	WM	Communication with the Web module
	TEX	MODBUS communication with the ODU
	TS	Communication with the spatial corrector
	TE2	Communication with the basic module MD1
	RQ1	ALARM dry contact
	RQ2	RESET dry contact
10		**Power supply ~ 230 V / 12 V**
	L	Phase 230 V 50 Hz
	N	Neutral 230 V 50 Hz
		Protective earth
	V-	GND
	V+	12 V dc
11	A3	Temperature sensor refrigerant pipe – condenser inlet.
12	A4	Temperature sensor refrigerant pipe – condenser outlet.
13		Membrane Keyboard
14	A2	Temperature sensor of sanitary water
C		Electrical contactor of the electrical heater
TV		Thermal protection of the electrical heater
RC		RC Filter.

Pump capacity

AHNW16606B0
Pump model : Yonos PARA RS 25/7.0 PWM1 Ku

External control via PWM 1



⚠WARNING

Selecting a water flowrate outside the curves can cause damage to or malfunction of the unit.

Piping and Wiring for Outdoor Unit

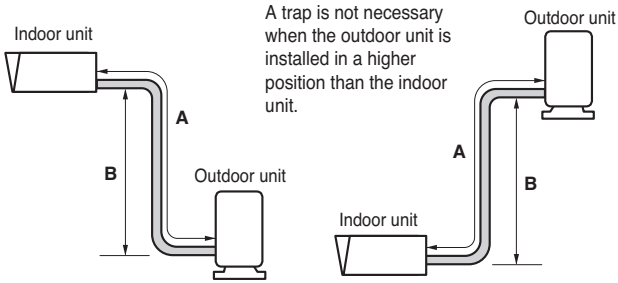
Procedures about refrigerant piping and electric wiring of the outdoor unit are described in this chapter. Most of procedures are similar to those of LG Air Conditioner.

Refrigerant Piping

Before starting refrigerant piping, constraints in pipe length and elevation should be examined. After meeting all constraints, some preparations are required to proceed. Initially, connect the pipe to both the indoor and outdoor units.

Constraints in Pipe Length and Elevation

Pipe Size (mm : inch) (Diameter : Ø)		Length A (m)		Elevation B (m)		*Additional Refrigerant (g/m)
Gas	Liquid	Standard	Max.	Standard	Max.	
15.88(5/8")	9.52(3/8")	7.5	50	0	30	40



⚠ CAUTION

1. Standard pipe length is 7.5 m If the pipe length is longer than 7.5 m, additional charge of the refrigerant is required according to the table.
   • Example : If 16 kW model is installed at a distance of 50 m, 1 700 g of refrigerant should be added according to following formula : (50-7.5) x 40 g = 1 700 g
2. Rated capacity of the product is based on standard length and maximum allowable length is based on the product reliability in the operation.
3. Improper refrigerant charge may result in malfunctioning.

Note:

Fill in the f-gas Label attached on outdoor about the quantity of the fluorinated greenhouse gases (This note about f-gas label may not apply depending on your product type or market.)

① Manufacturing site (See Model Name label)

② Installation site (If possible being placed adjacent to the service points for the addition or removal of refrigerant)

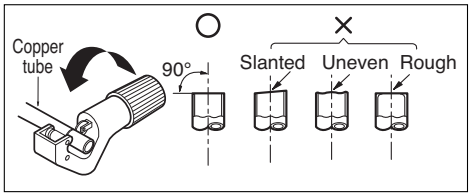
③ The total Charge (① + ②)

Preparation for Piping

Preparation for piping is shown in the below 5 steps. As main cause of refrigerant leakage is due to defects in flaring work, please carry out the appropriate flaring work as shown below:

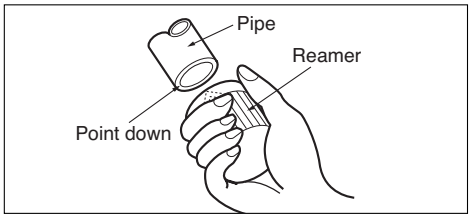
Step 1. Cut the pipes and the cable.

- Use the accessory piping kit or the pipes purchased locally.
- Measure the distance between the indoor unit and the outdoor unit.
- Cut the pipes a little longer than the measured distance.



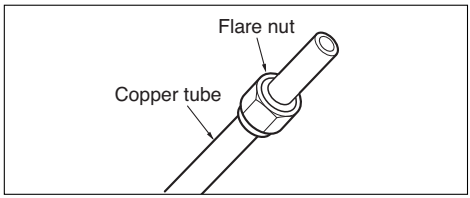
Step 2. Burrs removal.

- Remove all burrs completely from cross sectional cut of the pipe.
- Put the rear end of the pipe in the downward direction to prevent drop of burrs from entering the pipe.



Step 3. Insert flare nut.

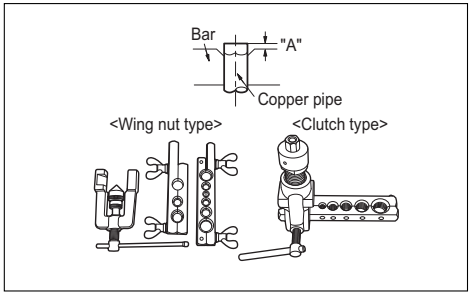
- Take out flare nuts attached to the indoor unit and the outdoor unit.
- Insert flare nuts into the burr-removed pipe.
- If flaring work is finished, it is impossible to insert nuts into the pipe.



Step 4. Flaring work.

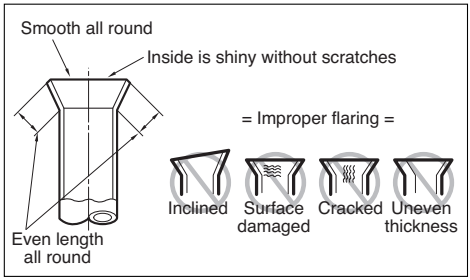
- Carry out flaring work using dedicated flaring tool for R-410A refrigerant as shown below.
- Firmly hold the copper tube in a bar(or die) as per the dimensions in the table above.

Pipe diameter Inch (mm)	A inch (mm)	
	Wing nut type	Clutch type
Ø 1/4 (Ø 6.35)	0.04~0.05 (1.1~1.3)	0~0.02 (0~0.5)
Ø 3/8 (Ø 9.52)	0.06~0.07 (1.5~1.7)	
Ø 1/2 (Ø 12.7)	0.06~0.07 (1.6~1.8)	
Ø 5/8 (Ø 15.88)	0.06~0.07 (1.6~1.8)	
Ø 3/4 (Ø 19.05)	0.07~0.08 (1.9~2.1)	



Step 5. Check

- Correspond the flared work to the right figure.
- If the flare seems improper, remove the flared section and redo the entire flaring work.

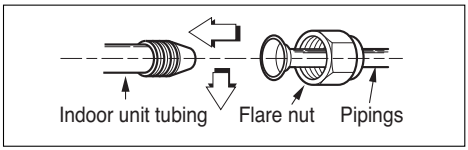


Connecting Pipe to Indoor Unit

Connecting pipe to the indoor unit is shown in the below two steps. Read the following directions carefully.

Step 1. Pre-tightening.

• Align the center of the pipes and sufficiently tighten the flare nut by hand.

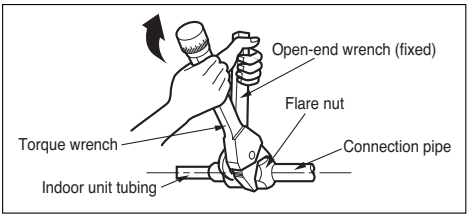


Step 2. Tightening.

• Tighten the flare nut with a wrench.

• Tighten the torque as per the values in the table:

Outside diameter		Torque
mm	inch	kgf·m
6.35	1/4	1.8 ~ 2.5
9.52	3/8	3.4 ~ 4.2
12.7	1/2	5.5 ~ 6.6
15.88	5/8	6.6 ~ 8.2
19.05	3/4	9.9 ~ 12.1



Connecting Pipe to Outdoor Unit

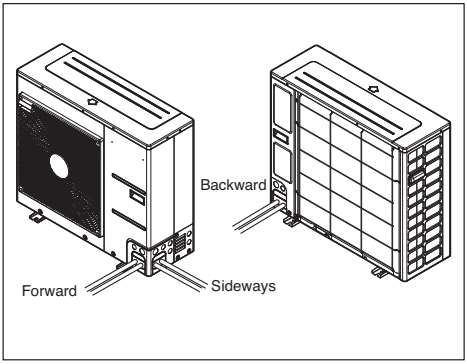
Connecting pipe to the outdoor unit is shown in the below five steps including PCB setting.

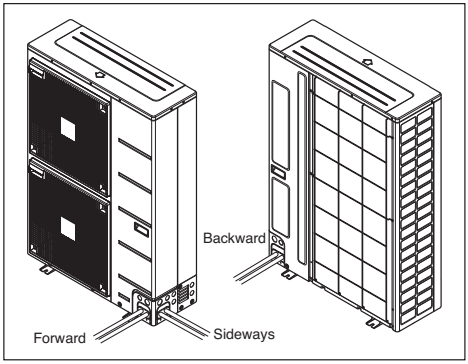
Step 1. Determine direction of pipes.

• The pipes can be interconnected in four directions

• The directions are indicated in the below figure.

• The pipes cannot be connected in the downward direction.

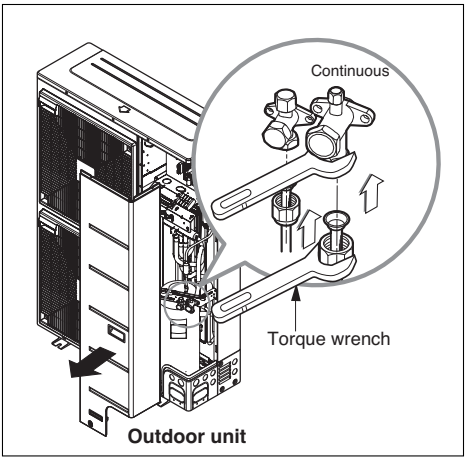




Step 2. Tightening

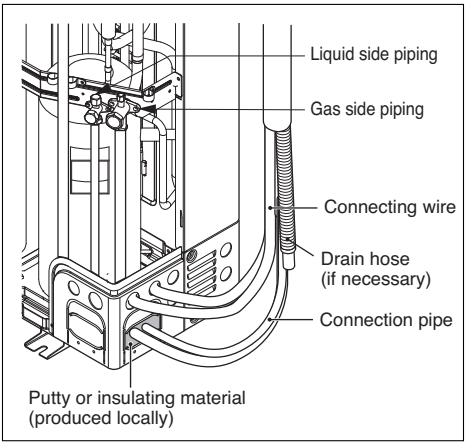
- Align the center of the pipes and sufficiently tighten the flare nut by hand.
- Tighten the flare nut with a wrench until the wrench clicks
- Tighten the torque as per values in the table:

Outside diameter		Torque
mm	inch	kgf·m
6.35	1/4	1.8 ~ 2.5
9.52	3/8	3.4 ~ 4.2
12.7	1/2	5.5 ~ 6.6
15.88	5/8	6.6 ~ 8.2
19.05	3/4	9.9 ~ 12.1



Step 3. Preventing entering of foreign objects

- Plug the pipe through-holes with putty or insulation material (procured locally) to fill up all gaps as shown in the figure on the right.
- If insects or small animals enter the outdoor unit, it may cause a short circuit.
- Finally, fill in the vacuum in between the pipes by wrapping the conducting portion of the indoor unit with insulation material and securing it with two kinds of vinyl tape. Note that providing thermal insulation is very important.



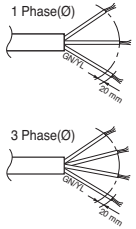
Electrical Wiring

Two kind of cables should be connected to the outdoor unit : One is 'Power cable', the other one is 'Connecting cable'. Power cable is a cable which is used to supply external electricity to the outdoor unit. This cable is generally connected between the external power source (such as main electric power distribution panel of user's house) and the outdoor unit. Conversely, connection cable is used to connect between the outdoor unit and the indoor unit to supply electric power to the indoor unit and to establish the communication between the outdoor unit and the indoor unit.

Procedure for wiring to the outdoor unit is performed in four steps. Before starting the wiring, check if the wire specification is suitable and read the following directions and cautions VERY carefully.

⚠CAUTION

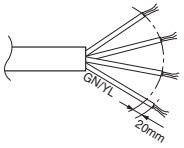
The power cord connected to the outdoor unit should be complied withIEC 60245 or HD 22.4 S4 (This equipment shall be provided with a cord set complying with the national regulation.



NORMAL CROSS-SECTIONAL AREA

Model	Phase (Ø)	Area (mm²)
AHNW16606B0	1	4
AHUW146A2		6
AHUW096A3		
AHUW126A3		
AHUW146A3		
AHUW166A3		
AHNW16606B0	3	2.5
AHUW128A3		
AHUW148A3		
AHUW168A3		

The connecting cable connected to the outdoor unit should be complied with IEC 60245 or HD 22.4 S4 (This equipment shall be provided with a cord set complying with the national regulation.)

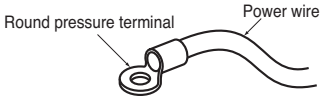


When the connection line between the indoor unit and outdooor unit is over 40 m, connect the telecommunication line and power line separately.

If the supply cord is damaged, it must be replaced by a special cord or assembly availible from the manufacturer of its service agent.

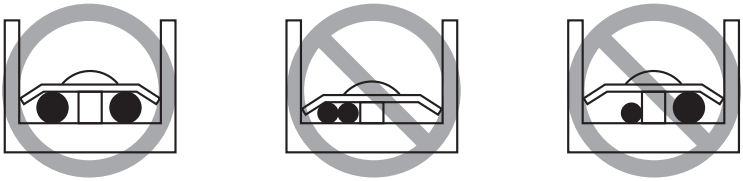
Precautions when laying power wiring

Use round pressure terminals for connections to the power terminal block.



In absence of the pressure terminals, follow the instructions below.

- Do not connect wiring of different thicknesses to the power terminal block. (Slack in the power wiring may cause abnormal heat.)
- When connecting wiring which is the same thickness, do as shown in the correct figure as below:



⚠WARNING

Make sure that the screws of the terminal are not loosely fitted.

Point for attention regarding quality of the public electric power supply

This equipment complies with respectively:

- EN/IEC 61000-3-12 (1) provided that the short-circuit power Ssc is greater than or equal to the minimum Ssc value at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to consult the network operator if necessary, that the equipment is connected only to a supply with Ssc value greater than or equal to the minimum Ssc value.

Model	Minimum Ssc Value
AHUW146A2	3 142
AHUW096A3	
AHUW126A3	
AHUW146A3	
AHUW166A3	

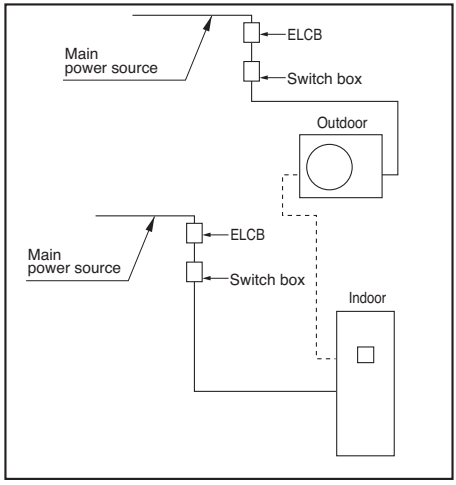
Model	Minimum Ssc Value
AHUW128A3	2 348
AHUW148A3	
AHUW168A3	

- European/International Technical Standard setting the limits for voltage changes, voltage fluctuations and flicker in public low-voltage supply systems for equipment with rated current ≤ 75 A.
- European/International Technical Standard setting the limits for harmonic currents produced by equipment connected to public low-voltage systems with input current ≤16 A of > 75 A per phase.

Circuit Breaker Specification

Perform the electrical wiring work according to the electrical wiring specifications:

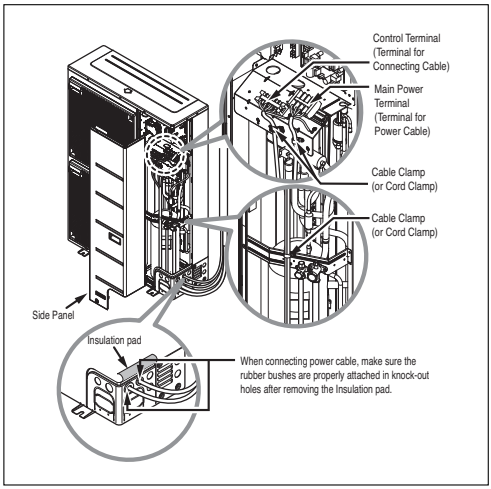
- All wiring must comply with the local requirements.
- Select a power source that is capable of supplying the current required by the air conditioner.
- Use a recognized ELCB(Electric Leakage Circuit Breaker) between the power source and the unit. A device to properly disconnect all the supply lines must be fitted.
- Model of circuit breaker should be recommended by authorized personnel only.



Model	Phase(Ø)	ELCB
AHNW16606B0	1	20 A
AHUW146A2		40 A
AHUW096A3		30 A
AHUW126A3		40 A
AHUW146A3		
AHUW166A3		
AHNW16606B0	3	16 A
AHUW128A3		20 A
AHUW148A3		
AHUW168A3		

Wiring Procedure for Power Cable and Connecting Cable

Step 1. : Disassemble the side panel from the outdoor unit by loosing screws.
Step 2. : Connect the Power Cable to the Main Power Terminal and Connecting cable to Control Terminal, respectively.
See the below figure for detailed information. When connecting earth cable, the diameter of cable should be bigger than 1.6 mm^2 to secure it safety. The place where the earth cable is connected to the terminal block is indicated by the earth symbol ⏚ .
Step 3. : Use cable clamps (or cord clamps) to prevent unintended move of Power cable and Connecting the cable.
Step 4. : Reassemble the side panel to the outdoor unit by tightening the screws firmly.



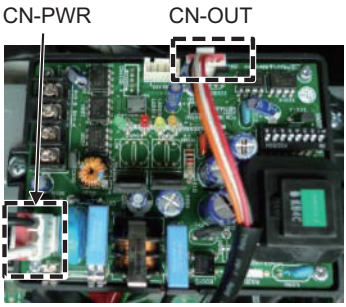
⚠CAUTION

After checking and confirming following conditions, start the wiring work.

1. Secure dedicated power source for the Air-to-Water heat pump. See the wiring diagram provided with the control box of the indoor unit.
2. Provide a circuit breaker switch between power source and the outdoor unit.
3. Rarely, the screws used to fasten internal wires become loose due to the vibration faced while transportation of the product. Check these screws and ensure that if they are all fastened tightly. If not tightened, the wire can be short-circuited.
4. Check the specification of power source such as phase, voltage, frequency, etc.
5. Confirm that the electrical capacity is sufficient.
6. Ensure that the starting voltage is maintained at more than 90 percent of the rated voltage marked on the name plate.
7. Confirm that the cable thickness is as specified in the power sources specification. (Particularly note the relation between cable length and thickness.)
8. Provide an ELB(electric leakage breaker) when the installation place is wet or moist.
9. The following issues are caused by abnormal voltage supply such as sudden voltage increasing or voltage drop-down.
   - Chattering of a magnetic switch (frequent on and off operation)
   - Physical damage of parts where magnetic switch is contacted
   - Break of fuse
   - Malfunction of overload protection parts or related control algorithms.
   - Failure of compressor start up
10. Ground wire to ground outdoor unit to prevent electrical shock.

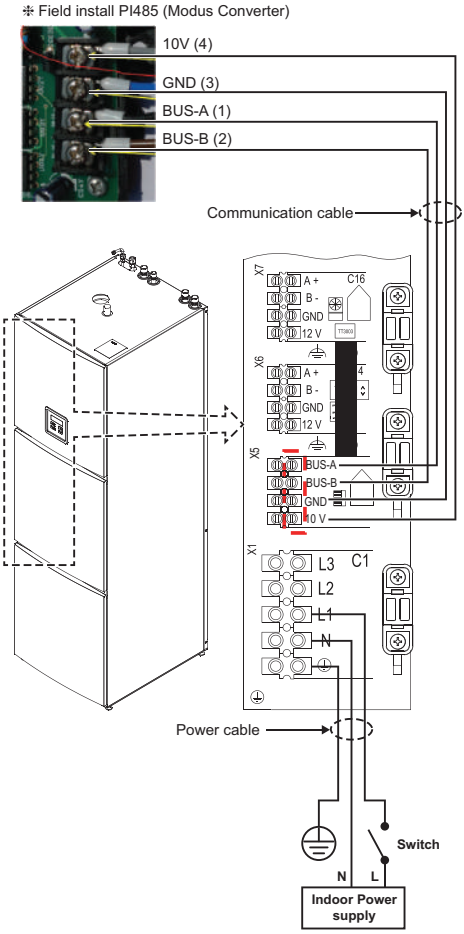
Connecting the communication cable to the Outdoor Unit

The communication cable is intended for communication between the external Gateway PI485(Modbus Converter) and the internal input/output module.
Gateway PI485(Modbus Converter) is an accessory.
After you assemble the an Gateway PI485 (Modbus Converter) on the C/box(Outdoor Unit),
Connect Cables. (① CN-OUT, ② CN-PWR)



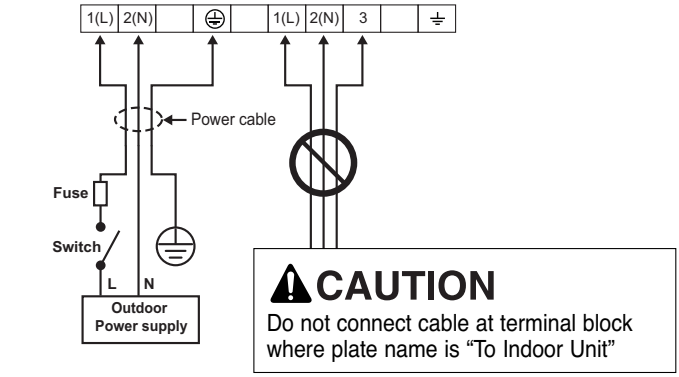
< Diagram for Connecting Power cable & Communication cable >

After routing the plated cable between Indoor unit and Outdoor unit , connect four cables you connect to the connection clips Bus_A [+] / Bus_B [-] / GND / 10 V on the Gateway PI485(Modbus Converter) module.
Gateway PI485(Modbus Converter) is located on the Outdoor Unit as shown in the picture below.

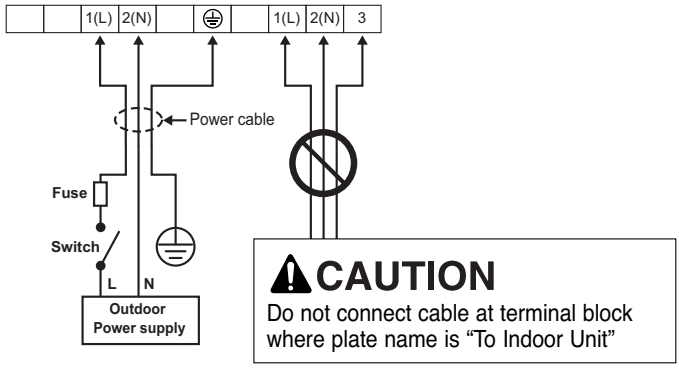


< Diagram for Connecting Power cable & Communication cable >

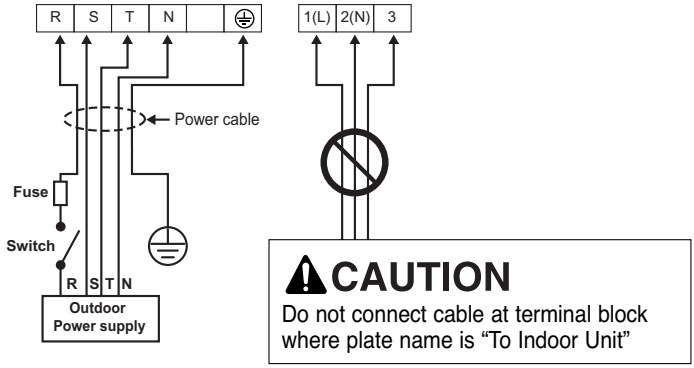
Model : AHUW096A3



Model : AHUW146A2, AHUW126A3, AHUW146A3, AHUW166A3



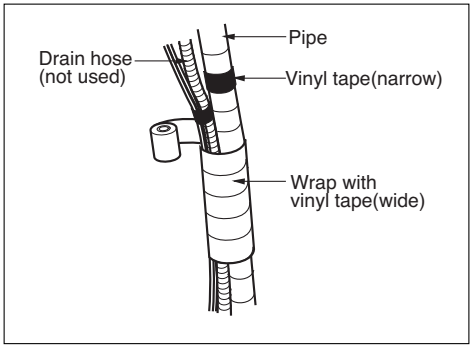
Model : AHUW128A3, AHUW148A3, AHUW168A3



Finalizing

After pipes are connected and electric cables are wired, pipe forming and commissioning tests are yet to be performed. Especially, careful attention is required while performing the test for any leakages. As leakage of the refrigerant results in degrading the performance directly. Note that it is almost impossible to detect a leakage point leaked point after all installation procedures are completed.

Pipe Forming

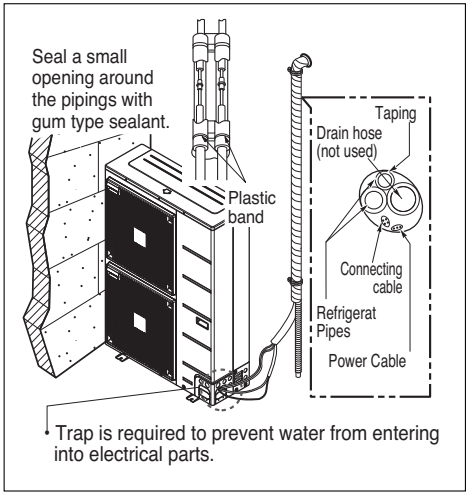


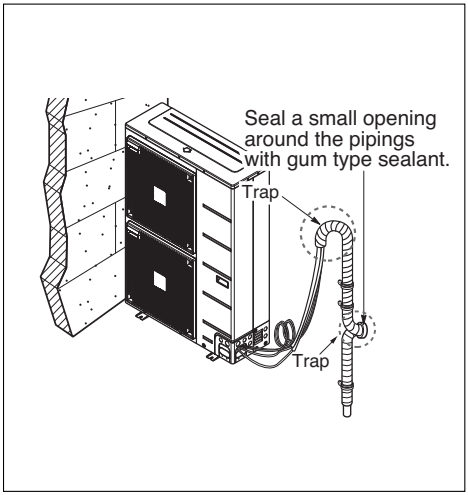
Cover the vacuum created by pipes by wrapping the connecting cable and refrigerant pipe (between the indoor unit and outdoor unit) with thermal insulation material and securing it with two kinds of vinyl tape.

1. Tape the refrigerant pipe, power cable and connecting cable from below to the top.
2. Secure the taped pipe is along with the exterior wall. Invent a trap to prevent water entering the room and electrical part.
3. Secure the taped pipe along the exterior wall using saddle or its equivalent.

Taping Procedure

1. Tape the pipes, connecting cable and power cable from below to above. If the direction of the tape is from top to below, rain drops might enter the pipes or cables.
2. Secure the taped pipe along the exterior wall using saddle or it's equivalent.
3. Create a trap is required to prevent water from entering into the electrical parts.





Leakage test and Evacuation

Air and moisture remaining in the refrigerant system have undesirable effects as indicated below.

1. Pressure in the system rises.
2. Operating current rises.
3. Cooling(or heating) efficiency drops.
4. Moisture in the refrigerant circuit may freeze and block capillary tubing.
5. Water may lead to corrosion of parts in the refrigeration system.

Therefore, the indoor/outdoor unit and connecting tube must be checked for leak tight, and vacuumed to remove incondensible gas and moisture in the system.

Preparation

- Check that each tube(both liquid and gas side tubes) between the indoor and outdoor units have been properly connected and all wiring for the test run has been completed. Remove the service valve caps from both the gas and the liquid side on the outdoor unit. Check that both the liquid and the gas side service valves on the outdoor unit are kept closed at this stage.

Leakage test

- Connect the manifold valve(with pressure gauges) and dry nitrogen gas cylinder to this service port with charge hoses.

⚠ CAUTION

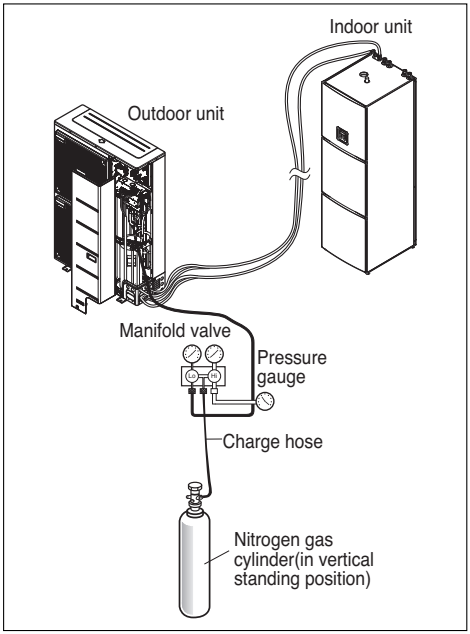
Ensure that you use a manifold valve for leakage test.
If it is not available, use a stop valve for this purpose. The "Hi" knob of the manifold valve must always be kept close.

- Pressurize the system to no more than 3.0 MPa with dry nitrogen gas and close the cylinder valve when the gauge reading reached 3.0 MPa Next, test for leaks with liquid soap.

⚠ CAUTION

To avoid nitrogen entering the refrigerant system in a liquid state, the top of the cylinder must be higher than its bottom when you pressurize the system. Usually, the cylinder is used in a vertical standing position.

1. Perform a leakage test of all joints of the tubing(both indoor and outdoor) and both gas and liquid side service valves. Bubbles indicate a leak. Be sure to wipe off the soap with a clean cloth.
2. After the system is found to be free of leaks, relieve the nitrogen pressure by loosening the charge hose connector at the nitrogen cylinder. When the system pressure is reduced to normal, disconnect the hose from the cylinder.

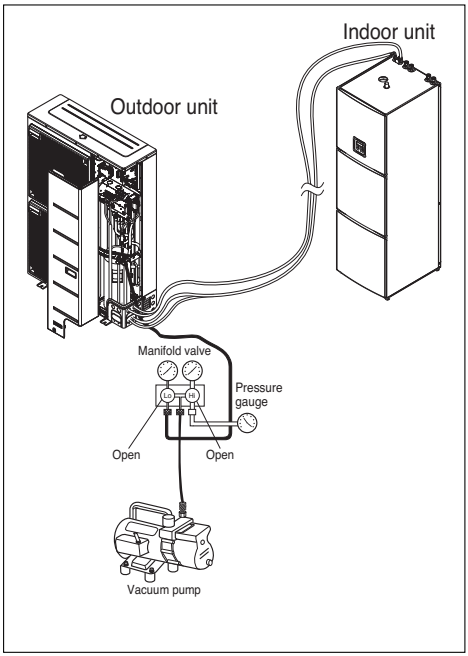


Evacuation

1. Connect the charge hose end described in the preceding steps to the vacuum pump to evacuate the tubing and indoor unit.
   Confirm that the "Lo and Hi" knob of the manifold valve is open. Then, run the vacuum pump.
   The operation time for evacuation varies with tubing length and capacity of the pump. The following table shows the time required for evacuation.

Required time for evacuation when 30 gal/h vacuum pump is used	
If tubing length is less than 10 m(33 ft)	If tubing length is longer than 10 m(33 ft)
30 min. or more	60 min. or more
0.5 torr or less	

2. When the desired vacuum is reached, close the "Lo and Hi" knob of the manifold valve and stop the vacuum pump.



Finishing the job

1. With a service valve wrench, turn the valve stem of liquid side valve counter-clockwise to fully open the valve.
2. Turn the valve stem of gas side valve counter-clockwise to fully open the valve.
3. Loosen the charge hose connected to the gas side service port slightly to release the pressure, then remove the hose.
4. Replace the flare nut and its bonnet on the gas side service port and fasten the flare nut securely with an adjustable wrench. This process is very important to prevent leakage from the system.
5. Replace the valve caps at both gas and liquid side service valves and fasten it tightly.
   This completes air purging with a vacuum pump.
   The air conditioner is now ready to test run.

System Set-Up

To communicate with IDU & ODU, Installer has to set up dip switch.

If not configured correctly, Improper operation can be expected.

DIP Switch Setting

⚠CAUTION

Turn off electric power supply before configuring the DIP switch

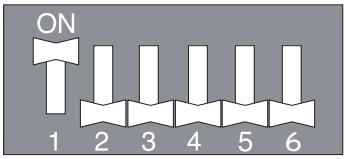
- Whenever adjusting DIP switch, turn off electric power supply to avoid electric shock.
- It is not possible to change the DIP switch settings while its is operating.
  You must turn off power before configuring the DIP switch. After setting, turn on power.

<General Information>

ON is selected

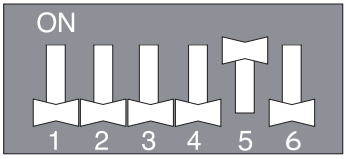
OFF is selected

<Dip Switch Setting value>



ON is selected in No.1

Model : AHUW096A3, AHUW126A3
AHUW146A3, AHUW166A3
AHUW128A3, AHUW148A3
AHUW168A3



ON is selected in No.5

Model : AHUW146A2

Check Points, Maintenance and Troubleshooting

Before starting operation, pre-check points are described in this chapter. Some comments about maintenance and how to do troubleshooting are presented.

Check List before Starting Operation

⚠CAUTION

Turn off the power before changing wiring or handling product

No	Category	Item	Check Point
1	Electricity	Field wiring	• All switches having contacts for different poles should be wired tightly according to regional or national legislation. • Only qualified person can connect or route the wiring. • Wiring and local-supplied electric parts should be complied with European and regional regulations. • Wiring should be following the wiring diagram supplied with the product.
2		Earth wiring	• Earth should be connected. Do not earth to gas or city water pipe, metallic section of a building, surge absorber, etc.
3		Power supply	• Use dedicated power line.
4		Terminal block wiring	• Connections on the terminal block (inside the control box of the indoor unit) should be tightened.
5	Water	Charged water pressure	• After water charging, the pressure gage (in front of the indoor unit) should indicate 2.0~2.5 bar. Do not exceed 3.0 bar.
6		Air purge	• During water charging, air should be taken out through the hole of the air purge. • If water does not splash out when the tip (at the top of the hole) is pressed, then air purging is not completed yet. If well purged, the water will splash out like fountain. • Be careful when testing air purge. Splashed water may make your dress wet.
7		Shut-off valve	• Two shut-off valves (located at the end of water inlet pipe and water outlet pipe of the indoor unit) should be open.
8		By-pass valve	• By-pass valve should be installed and adjusted to secure enough water flow rate. If the rate of water flow is low, flow switch error can be occurred.
9	Product Installation	Parts inspection	• There should apparently be no damaged parts inside the indoor unit.
10		Refrigerant leakage	• Refrigerant leakage degrades the performance. If leakage is found, contact qualified LG air conditioning installation person.
11		Drainage treatment	• While cooling, condensed dew can drop down to the bottom of the indoor unit. In this case, prepare a drain to drain out (for example, vessel to contain condensed dew) to avoid water drops.

Care and Maintenance

The electrical and hardware installation of the device must be visually inspected once in a year. If any malfunctions have been detected, contact the authorised personnel.

⚠CAUTION

The servicing and maintenance of the device can only be performed by a person authorized by the manufacturer. In case of a malfunction, first contact the installer who installed the device.

Cleaning the water filter

❗NOTICE

Cleaning of water filters of the device is advised to be performed at least once yearly.

⚠CAUTION

A blocked water filter and magnetic filter can lead to disturbances in operation of the device or incorrect functioning of the device. In this case, the screen displays a warning of flow malfunction (”Caution, flow!”).

Monitoring the pressure in the heating system

❗NOTICE

- Periodically, once yearly, check the water pressure in the heating system.
- In case the pressure falls (i.e. Leakage of the system) and as a result there is not enough water flow the screen displays a warning of flow malfunction (”Caution, flow!”).

Cleaning of the heat exchangers

Cleaning of the heating system (water section)

Residue of grease and sealants in pipes can pollute the condenser of the device up to a point where cleaning is necessary. In this case the authorized person should clean the pipes with a solution (up to 5 % of phosphorous acid) that should be heated to room temperature. The condenser has to be completely disconnected from the heating system and rinsed with diluted phosphorous acid in the opposite direction of normal flow.

After cleaning, the condenser has to be rinsed thoroughly with an agent neutralizing the acid detergent so as to prevent the contamination of the heating system.

⚠WARNING

Acid detergents should be used carefully, instructions of the manufacturer and environmental regulations must be followed. The cleaning can only be performed by a qualified person.

If you are doubtful about using the detergents arise, consult with the manufacturer of the detergent.

Disturbances in the operation

In case of a malfunction during the operation of the device the screen of the internal unit displays “Caution, malfunction”.

Search for the malfunctioning message in the manual. For error correction, call the installer who performed the installation of the device.

Reset of the thermal protection of the electrical heater

The thermal protection of the electrical heater additionally protects the device in the following cases:

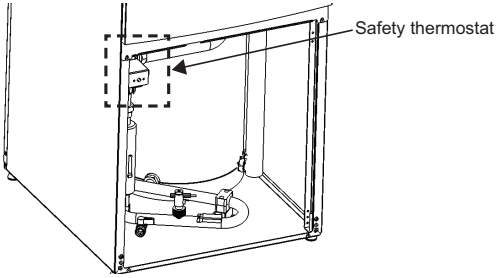
• The electrical flow heater can be permanently short-circuited.

• At commissioning, air is in the system; this causes heating without heat extraction.

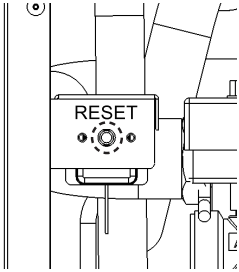
The easiest way to determine whether the thermal protection of the electrical heater is turned off is to turn on the operation of the auxiliary source on the control unit. Determine the feeling by hand the difference between the supply line and the return line. The electrical heater works if the supply line is warmer. Activation of the auxiliary source is explained in the manual.

In case the electrical heater does not work because of one of the aforementioned reasons, the safety thermostat has to be reset after the problem is resolved.

Firstly you have to remove the front bottom panel.



Reset the safety thermostat by pressing the red button until you hear a “CLICK”.



NOTICE

Resetting the device can only be performed by installers, authorized contractors for commission or authorized maintenance worker in a voltage-free state.

CAUTION

Turn off the power before proceeding with maintenance.

Test Run

After professional installation, the authorized contractor has to commission of the device.

⚠CAUTION

The commissioning can only be performed by a person authorized by the manufacturer! If the commission is performed by an unauthorized person, the warranty period is not applicable.

Management of the device must be performed in accordance with current instructions for use.

Check before Test run

1	Check to see whether there is any refrigerant leakage, and check whether the power or transmission cable is connected properly.
2	Confirm that 500 V megger shows 2.0 MΩ or more between power supply terminal block and ground. Do not operate in the case of 2.0 MΩ or less. **NOTE**: Never carry out mega ohm check over terminal control board. Otherwise the control board may break. Immediately after mounting the unit or after leaving it turned off for an extended length of time, the resistance of the insulation between the power supply terminal board and the ground may decrease to approx. 2.0 MΩ as a result of refrigerant accumulation in the internal compressor. If the insulation resistance is less than 2.0 MΩ, turn on the main power supply.

⚠CAUTION

During test operation in winter, it concentrates mainly on the heating operation.
Before cooling test operation, to consider freezing of the plate heat exchanger, performing the cooling test operation after raising the water temperature up to 30°C in the heating mode.

Limiting concentration

Limiting concentration is the limit of Freon gas concentration where immediate measures can be taken without harming the human body when refrigerant leaks in the air. The limiting concentration shall be described in the unit of kg/m³ (Freon gas weight per unit air volume) for facilitating calculation

Limiting concentration: 0.44 kg/m³(R410A)

■ **Calculate refrigerant concentration**

$$\text{Refrigerant concentration} = \frac{\text{Total amount of replenished refrigerant in refrigerant facility (kg)}}{\text{Capacity of smallest room where indoor unit is installed (m}^3\text{)}}$$

Airborne Noise Emission

The sound pressure of this product is below the 70 dB.
• The noise level can vary depending on the site.

The figures quoted are emission level and are not necessarily safe working levels. Whilst there is a correlation between the emission and exposure levels, this cannot be used reliably to determine whether or not further precautions are required. Factor that influence the actual level of exposure of the workforce include the characteristics of the work room and the other sources of noise, i.e. the number of equipment and other adjacent processes and the length of time for which an operator exposed to the noise. Also, the permissible exposure level can vary from country to country. This information, however, will enable the user of the equipment to make a better evaluation of the hazard and risk.

Search the Manual Using Your Mobile

1. After running a QR Code reader app in your Smartphone, red the QR Code below.

※ When installed, enter the model name and send it to the customer.

Sales Model Name (Indoor) :_____

Sales Model Name (Outdoor) :_____

2. Select the desired region.
3. Press the " 🔍 " on the top right and enter the model name.
4. Press "Support".
5. Press "Manual & Documents".
6. Select the manual that you want to see.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