



TECHNICAL MANUAL

AIR TO WATER HEAT PUMP

INDOOR UNIT

HMA100V1 HMA100V2
HMA100VM1
HMS140VA1 HMS140VA2
HMS140V1 HMS140V2

OUTDOOR UNIT

FDCW71VNX-A
FDCW100VNX-A
FDCW140VNX-A

TANK UNIT

HT30
MT300
MT500

Service code

| Outdoor unit | History of service code | | | | Changes |
|--------------|-------------------------|---|---|---|--|
| FDCW71VNX-A | 1 | L | M | - | 1→L: Complied with LVD (changing fan guard) |
| FDCW100VNX-A | 1 | A | L | M | 1→A: Added drain pan heater A→L: Complied with LVD (changing fan guard) |
| FDCW140VNX-A | 1 | L | M | - | L→M: Connector discontinue countermeasure |

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When install the unit, be sure to check whether the selection of installation place, power supply specifications, usage limitation (piping length, height differences between indoor and outdoor units, power supply voltage and etc.) and installation spaces.

SAFETY PRECAUTIONS

- We recommend you to read this “SAFETY PRECAUTIONS” carefully before the installation work in order to gain full advantage of the functions of the unit and to avoid malfunction due to mishandling.
- The precautions described below are divided into [⚠WARNING] and [⚠CAUTION]. The matters with possibilities leading to serious consequences such as death or serious personal injury due to erroneous handling are listed in the [⚠WARNING] and the matters with possibilities leading to personal injury or damage of the unit due to erroneous handling including probability leading to serious consequences in some cases are listed in [⚠CAUTION]. These are very important precautions for safety. Be sure to observe all of them without fail.
- Be sure to confirm no anomaly on the equipment by commissioning after completed installation and explain the operating methods as well as the maintenance methods of this equipment to the user according to the owner's manual.
- Keep the installation manual together with owner's manual at a place where any user can read at any time. Moreover if necessary, ask to hand them to a new user

⚠WARNING

| | |
|---|---|
| <ul style="list-style-type: none"> ● Installation must be carried out by the qualified installer. If you install the system by yourself, it may cause serious trouble such as water leaks, electric shocks, fire and personal injury , as a result of a system malfunction. |  |
| <ul style="list-style-type: none"> ● Install the system in full accordance with the instruction manual. Incorrect installation may cause bursts, personal injury, water leaks, electric shocks and fire. |  |
| <ul style="list-style-type: none"> ● Use the original accessories and the specified components for installation. If parts other than those prescribed by us are used, It may cause water leaks, electric shocks, fire and personal injury. |  |
| <ul style="list-style-type: none"> ● When installing in small rooms, take prevention measures not to exceed the density limit of refrigerant in the event of leakage. Consult the expert about prevention measures. If the density of refrigerant exceeds the limit in the event of leakage, lack of oxygen can occur, which can cause serious accidents. |  |
| <ul style="list-style-type: none"> ● Ventilate the working area well in the event of refrigerant leakage during installation. If the refrigerant comes into contact with naked flames, poisonous gas is produced. |  |
| <ul style="list-style-type: none"> ● After completed installation, check that no refrigerant leaks from the system. If refrigerant leaks into the room and comes into contact with an oven or other hot surface, poisonous gas is produced. |  |
| <ul style="list-style-type: none"> ● Hang up the unit at the specified points with ropes which can support the weight in lifting for portage. And to avoid jolting out of alignment, be sure to hang up the unit at 4-point support. An improper manner of portage such as 3-point support can cause death or serious personal injury due to falling of the unit |  |
| <ul style="list-style-type: none"> ● Install the unit in a location with good support. Unsuitable installation locations can cause the unit to fall and cause material damage and personal injury. |  |
| <ul style="list-style-type: none"> ● Ensure the unit is stable when installed, so that it can withstand earthquakes and strong winds. Unsuitable installation locations can cause the unit to fall and cause material damage and personal injury. |  |
| <ul style="list-style-type: none"> ● Ensure that no air enters in the refrigerant circuit when the unit is installed and removed. If air enters in the refrigerant circuit, the pressure in the refrigerant circuit becomes too high, which can cause burst and personal injury. |  |
| <ul style="list-style-type: none"> ● The electrical installation must be carried out by the qualified electrician in accordance with “the norm for electrical work” and “national wiring regulation”, and the system must be connected to the dedicated circuit. Power supply with insufficient capacity and incorrect function done by improper work can cause electric shocks and fire. |  |
| <ul style="list-style-type: none"> ● Be sure to shut off the power before starting electrical work. Failure to shut off the power can cause electric shocks, unit failure or incorrect function of equipment. |  |
| <ul style="list-style-type: none"> ● Be sure to use the cables conformed to safety standard and cable ampacity for power distribution work. Unconformable cables can cause electric leak, anomalous heat production or fire. |  |
| <ul style="list-style-type: none"> ● Use the prescribed cables for electrical connection, tighten the cables securely in terminal block and relieve the cables correctly to prevent overloading the terminal blocks. Loose connections or cable mountings can cause anomalous heat production or fire. |  |
| <ul style="list-style-type: none"> ● Arrange the wiring in the control box so that it cannot be pushed up further into the box. Install the service panel correctly. Incorrect installation may result in overheating and fire. |  |
| <ul style="list-style-type: none"> ● Do not perform brazing work in the airtight room. It can cause lack of oxygen. |  |
| <ul style="list-style-type: none"> ● Use the prescribed pipes, flare nuts and tools for R410A. Using existing parts (for R22 or R407C) can cause the unit failure and serious accidents due to burst of the refrigerant circuit. |  |
| <ul style="list-style-type: none"> ● Tighten the flare nut by using double spanners and torque wrench according to prescribed method. Be sure not to tighten the flare nut too much. Loose flare connection or damage on the flare part by tightening with excess torque can cause burst or refrigerant leaks which may result in lack of oxygen. |  |

| | |
|--|---|
| <p>● Do not open the service valves for liquid line and gas line until completed refrigerant piping work, air tightness test and evacuation. If the compressor is operated in state of opening service valves before completed connection of refrigerant piping work, air can be sucked into refrigerant circuit, which can cause burst or personal injury due to anomalously high pressure in the refrigerant.</p> | ! |
| <p>● Do not put the drainage pipe directly into drainage channels where poisonous gases such as sulphide gas can occur. Poisonous gases will flow into the room through drainage pipe and seriously affect the user's health and safety</p> | ! |
| <p>● Only use prescribed optional parts. The installation must be carried out by the qualified installer. If you install the system by yourself, it can cause serious trouble such as water leaks, electric shocks, fire.</p> | ! |
| <p>● Do not run the unit with removed panels or protections. Touching rotating equipments, hot surfaces or high voltage parts can cause personal injury due to entrapment, burn or electric shocks.</p> | ⊘ |
| <p>● Be sure to fix up the service panels. Incorrect fixing can cause electric shocks or fire due to intrusion of dust or water.</p> | ⊘ |
| <p>● Do not perform any repairs or modifications by yourself. Consult the dealer if the unit requires repair. If you repair or modify the unit, it can cause water leaks, electric shocks or fire.</p> | ⊘ |
| <p>● Do not perform any change of protective device itself or its setup condition. The forced operation by short-circuiting protective device of pressure switch and temperature controller or the use of non specified component can cause fire or burst.</p> | ! |
| <p>● Be sure to switch off the power supply in the event of installation, inspection or servicing. If the power supply is not shut off, there is a risk of electric shocks, unit failure or personal injury due to the unexpected start of fan.</p> | ! |
| <p>● Consult the dealer or an expert regarding removal of the unit. Incorrect installation can cause water leaks, electric shocks or fire.</p> | ! |
| <p>● Stop the compressor before disconnecting refrigerant pipes in case of pump down operation. If disconnecting refrigerant pipes in state of opening service valves before compressor stopping, air can be sucked, which can cause burst or personal injury due to anomalously high pressure in the refrigerant circuit.</p> | ! |

⚠ CAUTION

| | |
|--|---|
| <p>● Carry out the electrical work for ground lead with care. Do not connect the ground lead to the gas line, water line, lightning conductor or telephone line's ground lead. Incorrect grounding can cause unit faults such as electric shocks due to short-circuiting.</p> | ⚡ |
| <p>● Use the circuit breaker with sufficient breaking capacity. If the breaker does not have sufficient breaking capacity, it can cause the unit malfunction and fire.</p> | ! |
| <p>● Earth leakage breaker must be installed. If the earth leakage breaker is not installed, it can cause electric shocks.</p> | ⊘ |
| <p>● Do not use any materials other than a fuse with the correct rating in the location where fuses are to be used. Connecting the circuit with copper wire or other metal thread can cause unit failure and fire.</p> | ⊘ |
| <p>● Do not install the unit near the location where leakage of combustible gases can occur. If leaked gases accumulate around the unit, it can cause fire.</p> | ⊘ |
| <p>● Do not install the unit where corrosive gas (such as sulfuric acid gas etc.) or combustible gas (such as thinner and petroleum gases) can accumulate or collect, or where volatile combustible substances are handled. Corrosive gas can cause corrosion of heat exchanger, breakage of plastic parts and etc. And combustible gas can cause fire.</p> | ⊘ |
| <p>● Secure a space for installation, inspection and maintenance specified in the manual. Insufficient space can result in accident such as personal injury due to falling from the installation place.</p> | ⊘ |
| <p>● When the outdoor unit is installed on a roof or a high place, provide permanent ladders and handrails along the access route and fences and handrails around the outdoor unit. If safety facilities are not provided, it can cause personal injury due to falling from the installation place.</p> | ⊘ |
| <p>● Do not use the indoor unit at the place where water splashes may occur such as in laundries. Since the indoor unit is not waterproof, it can cause electric shocks and fire.</p> | ⊘ |
| <p>● Do not install nor use the system close to the equipment that generates electromagnetic fields or high frequency harmonics. Equipment such as inverters, standby generators, medical high frequency equipments and telecommunication equipments can affect the system, and cause malfunctions and breakdowns. The system can also affect medical equipment and telecommunication equipment, and obstruct its function or cause jamming.</p> | ⊘ |
| <p>● Do not install the outdoor unit in a location where insects and small animals can inhabit. Insects and small animals can enter the electric parts and cause damage or fire. Instruct the user to keep the surroundings</p> | ⊘ |
| <p>● Do not use the base flame for outdoor unit which is corroded or damaged due to long periods of operation. Using an old and damage base flame can cause the unit falling down and cause personal injury.</p> | ⊘ |
| <p>● Do not install the unit in the locations listed below.</p> <ul style="list-style-type: none"> • Locations where carbon fiber, metal powder or any powder is floating. • Locations where any substances that can affect the unit such as sulphide gas, chloride gas, acid and alkaline can occur. • Vehicles and ships. • Locations where cosmetic or special sprays are often used. • Locations with direct exposure of oil mist and steam such as kitchen and machine plant. • Locations where any machines which generate high frequency harmonics are used. • Locations with salty atmospheres such as coastlines. | ⊘ |

- Locations with heavy snow. (If installed, be sure to provide base flame and snow hood mentioned in the manual)
 - Locations where the unit is exposed to chimney smoke.
 - Locations at high altitude. (more than 1000m high)
 - Locations with ammoniac atmospheres.
 - Locations where heat radiation from other heat source can affect the unit.
 - Locations without good air circulation.
 - Locations with any obstacles which can prevent inlet and outlet air of the unit.
 - Locations where short circuit of air can occur. (in case of multiple units installation)
 - Locations where strong air blows against the air outlet of outdoor unit.
- It can cause remarkable decrease in performance, corrosion and damage of components, malfunction and fire.

● **Do not install the outdoor unit in the locations listed below.**

- Locations where discharged hot air or operating sound of the outdoor unit can bother neighborhood.
 - Locations where outlet air of the outdoor unit blows directly to plants.
 - Locations where vibration can be amplified and transmitted due to insufficient strength of structure.
 - Locations where vibration and operation sound generated by the outdoor unit can affect seriously. (on the wall or at the place near bed room)
 - Locations where an equipment affected by high harmonics is placed. (TV set or radio receiver is placed within 5m)
 - Locations where drainage cannot run off safely.
- It can affect surrounding environment and cause a claim.



● **Do not install the remote control at the direct sunlight.**

It can cause malfunction or deformation of the remote control.



● **Do not use the unit for special purposes such as storing foods, cooling precision instruments and preservation of animals, plants or art.**

It can cause the damage of the items.



● **Take care when carrying the unit by hand.**

If the unit weights more than 20kg, it must be carried by two or more persons. Do not carry by the plastic straps, always use the carry handle when carrying the unit by hand. Use gloves to minimize the risk of cuts by the aluminum fins.



● **Dispose of any packing materials correctly.**

Any remaining packing materials can cause personal injury as it contains nails and wood. And to avoid danger of suffocation, be sure to keep the plastic wrapper away from children and to dispose after tear it up.



● **Pay attention not to damage the drain pan by weld spatter when welding work is done near the indoor unit.**

If weld spatter entered into the indoor unit during welding work, it can cause pin-hole in drain pan and result in water leakage. To prevent such damage, keep the indoor unit in its packing or cover it.



● **Be sure to insulate the refrigerant pipes so as not to condense the ambient air moisture on them.**

Insufficient insulation can cause condensation, which can lead to moisture damage on the ceiling, floor, furniture and any other valuables.



● **Be sure to perform air tightness test by pressurizing with nitrogen gas after completed refrigerant piping work.**

If the density of refrigerant exceeds the limit in the event of refrigerant leakage in the small room, lack of oxygen can occur, which can cause serious accidents.



● **Do not touch any buttons with wet hands.**

It can cause electric shocks.



● **Do not shut off the power supply immediately after stopping the operation.**

Wait at least 5 minutes, otherwise there is a risk of water leakage or breakdown.



● **Do not control the system with main power switch.**

It can cause fire or water leakage. In addition, the fan can start unexpectedly, which can cause personal injury.



● **Do not touch any refrigerant pipes with your hands when the system is in operation.**

During operation the refrigerant pipes become extremely hot or extremely cold depending the operating condition, and it can cause burn injury or frost injury.



Notabilia for units designed for R410A

- Only use R410A refrigerant. R410A is the refrigerant whose pressure is 1.6 times as high as that of conventional refrigerant.
- The size of charging port of service valve and check joint for R410A are altered from that for conventional refrigerant in order to prevent the system being charged with the incorrect refrigerant by mistake. And the protruding dimension of pipe for flare processing and flare nut size for R410A are also altered from that for conventional refrigerant in order to reinforce strength against the pressure for R410A. Accordingly the dedicated tools for R410A listed in the below mentioned table should be prepared for installation and servicing.
- Do not use charging cylinder. Using charging cylinder may alter the composition of refrigerant, which results in making the performance of the system worse.
- Refrigerant must be charged always in liquid state from the bottle.

| Dedicated tools for R410A | |
|---------------------------|--|
| a) | Gauge manifold |
| b) | Charge hose |
| c) | Electronic scale for refrigerant charge |
| d) | Torque wrench |
| e) | Flare tool |
| f) | Protrusion control gauge for copper pipe |
| g) | Vacuum pump adapter |
| h) | Gas leak detector |

Technical data

Technical specifications

Specifications

| Indoor model | | HMA100V1 HMA100V2 | HMA100VM1 | HMA100V1 HMA100V2 | HMA100VM1 | HMS140VA1 HMS140VA2 | HMS140V1 HMS140V2 | | |
|--|--------------------------------------|---|------------------------------------|---|-------------------|---|----------------------|------------------------|--|
| Outdoor model | | FDCW71VNX-A | | FDCW100VNX-A | | FDCW140VNX-A | | | |
| Power source | | 1 phase 230V 50Hz/ 3 phase 400V 50Hz | 3 phase 230V 50Hz | 1 phase 230V 50Hz/ 3 phase 400V 50Hz | 3 phase 230V 50Hz | 1 phase 230V 50Hz/ 3 phase 400V 50Hz | | | |
| Heating nominal capacity | condition 1 | kW | 8.0 (3.0 - 8.0) | | 9.0 (3.5 - 12.0) | | 16.5 (5.8 - 16.5) | | |
| | condition 2 | kW | 8.3 (2.0 - 8.3) | | 9.2 (3.5 - 10.5) | | 16.5 (4.2 - 17.2) | | |
| | condition 3 | kW | 5.9 | | 7.2 | | 12.0 | | |
| Heating power consumption | condition 1 | kW | 2.40 | | 2.50 | | 4.98 | | |
| | condition 2 | kW | 2.03 | | 2.07 | | 3.93 | | |
| | condition 3 | kW | 1.73 | | 1.97 | | 3.61 | | |
| COP | condition 1 | | 3.33 | | 3.60 | | 3.31 | | |
| | condition 2 | | 4.09 | | 4.28 | | 4.20 | | |
| | condition 3 | | 3.41 | | 3.65 | | 3.32 | | |
| Cooling nominal capacity | condition 1 | kW | 7.1 (2.0 - 7.1) | | 8.0 (3.0 - 9.0) | | 11.8 (3.1 - 11.8) | | |
| | condition 2 | kW | 10.7 (2.7 - 10.7) | | 11.0 (3.3 - 12.0) | | 16.5 (5.2 - 16.5) | | |
| Cooling power consumption | condition 1 | kW | 2.65 | | 2.85 | | 4.45 | | |
| | condition 2 | kW | 3.19 | | 3.04 | | 4.36 | | |
| EER | condition 1 | | 2.68 | | 2.81 | | 2.65 | | |
| | condition 2 | | 3.35 | | 3.62 | | 3.78 | | |
| Tapping capacity | 12liter/min | liter | 270 | | 270 | | — | | |
| | 16liter/min | liter | 200 | | 200 | | — | | |
| Operation range (Outdoor temperature) | heating | | -20 - 43 | | | | | | |
| | cooling | | 15 - 43 | | | | | | |
| Operation range (Water temperature) | heating | | 25 - 58 (65 with immersion heater) | | | | | | |
| | cooling | | 7 - 25 | | 7 - 25 | | 18-25 | | |
| System water flow | l/s | 0.19 - 0.38 | | 0.24 - 0.57 | | 0.40 - 0.79 | | | |
| Max current | A | 44/ 16 | 30 | 44/ 16 | 30 | 50/ 25 | | | |
| Recommended fuse rating | A | 50/ 16 | 32 | 50/ 16 | 32 | 63/ 25 | | | |
| Starting current | A | 5 | | | | | | | |
| Deviation, incoming supply | | -15 - +10% | | | | | | | |
| Max refrigerant pipe length | m | 30 | | | | | | | |
| Max height difference between IU and OU | m | 7 | | | | | | | |
| Indoor Unit | Height | mm | 1760 (+20 - 50mm, adjustable feet) | | | | 1004 | | |
| | Width | mm | 600 | | | | 513 | | |
| | Depth | mm | 650 | | | | 360 | | |
| | Weight (without water in the system) | kg | 140 | | | | 60 | | |
| | Color | | White | | | | | | |
| | IP Grade | | IP21 | | | | | | |
| | Immersion heater | | 9kW 4steps (2, 4, 6, 9) | | | | — | | |
| | Circ. Pump | Output | W | 9-63 (variable speed) | | | | 9-110 (variable speed) | |
| | | Max available external pressure | bar | 0.57 | | | | 0.61 | |
| | | Max flow | l/s | 0.54 | | | | 0.78 | |
| | | Flow at 20kPa pressure drop | l/s | 0.45 | | | | 0.67 | |
| | Emergency mode thermostat | °C | 35/45 | | | | | | |
| | Temperature limiter | °C | 98(-8) | | | | | | |
| | Safety valve | bar | 2.5 | | | | | | |
| | Volume total | liter | 270 ±5% | | | | | | |
| | Volume hot water coil | liter | 14 | | | | | | |
| | Material hot water coil | | Stainless steel | | | | | | |
| | Max pressure, tank | bar | 2.5 | | | | | | |
| | Max pressure, hot water coil | bar | 10.0 | | | | | | |
| | Water quality, domestic hot water | | ≤ EU directive no 98/83/EF | | | | | | |
| Volume expansion vessel | liter | — | | | | | | | |
| Ambient temperature, indoor module | °C | 5-35, RH95% | | | | | | | |
| Dimensions, climate system pipe | mm | 22 | | | | 28 | | | |
| Dimensions, hot water pipe | mm | 22 | | | | | | | |
| Water pipe connection | | Compression fittings | | | | | | | |
| External heat source connection | | ISO 228/1 G1 | | | | | | | |

Specifications

| Indoor model | | HMA100V1 HMA100V2 | HMA100VM1 | HMA100V1 HMA100V2 | HMA100VM1 | HMS140VA1 HMS140VA2 | HMS140V1 HMS140V2 |
|---|------------------------------------|--|--------------------------------|--|------------------------------|------------------------|----------------------|
| Outdoor model | | FDCW71VNX-A | | FDCW100VNX-A | | FDCW140VNX-A | |
| Outdoor Unit | Height | mm | 750 | 845 | 1300 | | |
| | Width | mm | 880 (+88 with valve cover) | 970 | 970 | | |
| | Depth | mm | 340 | 370 (+80 with foot rail) | 370 (+80 with foot rail) | | |
| | Weight | kg | 60 | 81 | 105 | | |
| | Color | | Stucco White | | | | |
| | Sound power level*1 | dB(A) | 64 | 64.5 | 71 | | |
| | Sound power level (silent mode) | dB(A) | 61 | 62 | 68 | | |
| | Sound pressure level*2 | dB(A) | 48 | 50 | 54 | | |
| | Sound pressure level (silent mode) | dB(A) | 45 | 47 | 51 | | |
| | Airflow | m3/min | 50 | 73 | 100 | | |
| | Type of compressor | | RMT5118MDE2 | RMT5126MDE2 | RMT5134MDE2 | | |
| | Refrigerant oil | liter | 0.68 M-MA68 | 0.9 M-MA68 | 0.9 M-MA68 | | |
| | Heat exchanger | | M fin & inner grooved tubing | straight fin & inner grooved tubing | M fin & inner grooved tubing | | |
| | Ref control | | EEV | | | | |
| | Defrost control | | Reversing cycle | | | | |
| | Fan | | Propeller fan x 1 | | | Propeller fan x 2 | |
| | Fan motor | W | 86 x 1 | 86 x 1 | 86 x 2 | | |
| | Shock & vibration absorber | | Rubber sleeve (for compressor) | | | | |
| | Electric heater (crank case) | W | 20 | | | | |
| | Electric heater (base) | W | 100 | 120 | 120 | | |
| Safety equipment | | Internal thermostat for fan motor Abnormal discharge temperature protection | | | | | |
| Power and signal line from indoor unit | | 5 core 2.5mm ² | 5 core 2.5mm ² | 3 core 6mm ² +3 core 1.5mm ² | | | |
| Refrigerant | | R410A | | | | | |
| Refrigerant volume (pipe length without additional charge) | kg (m) | 2.55 (15) | 2.9 (15) | 4.0 (15) | | | |
| Dimensions, refrigerant pipe | mm (inch) | Gas pipe: OD 15.88 (5/8"), Liquid pipe: OD 9.52 (3/8") | | | | | |
| Ref pipe connections | | Frare | | | | | |

Tank Unit (for HMS140VA and HMS140V only)

| Model | | HT30 | MT300 | MT500 |
|---------------------------------------|-------------|--------------------------------|----------------------------|-------------------|
| Power source | | 1phase 230V / 3phase 400V 50Hz | | |
| Volume | liter | 30 | 300 | 480 |
| Volume hot water coil | liter | — | 14 | 21 |
| Material hot water coil | | Stainless steel | | |
| Tapping capacity | 12liter/min | liter | 320 | 960 |
| | 16liter/min | liter | 230 | 560 |
| Stand-by heat loss*3 | W | — | 82 | 103 |
| Immersion heater | kW | 9kW 4steps | | |
| Height | mm | 360 | 1880 (+20 - 45mm) | 1695 (+20 - 55mm) |
| Width | mm | 590 | 600 | 760 |
| Depth | mm | 360 | 600 | 876 |
| Weight | kg | 24 | 110 | 130 |
| IP grade | | IP21 | | |
| Color | | White | | |
| Emergency mode thermostat | °C | 35/45 | | |
| Temperature limiter | °C | 98 (-8) | | |
| Safety valve | bar | 2.5 | | |
| Max pressure, Tank | bar | 2.5 | | |
| Max pressure, hot water coil | bar | — | 10.0 | |
| Water quality, domestic hot water | | — | ≤ EU directive no 98/83/EF | |
| Dimensions, climate system pipe | mm | 28 | | |
| Dimensions, hot water pipe | mm | 28 | | |
| Max water pipe length to indoor unit | m | 10 | | |
| Max wiring length to indoor unit | m | 10 | | |
| Water pipe connection, climate system | | ISO 228/1 G1B | | |
| Water pipe connection, hot water | | ISO 228/1 G1B | | |
| External heat source connection | | — | ISO 7/1 Rc1 | ISO 228/1 G1 |

Test conditions

| | | Water Temperature | Ambient Temperature |
|---------|-------------|--------------------|---------------------|
| Heating | condition 1 | 45°C out / 40°C in | 7°C DB / 6°C WB |
| | condition 2 | 35°C out / 30°C in | |
| | condition 3 | 35°C out / 30°C in | 2°C DB / 1°C WB |
| Cooling | condition 1 | 7°C out / 12°C in | 35°C DB |
| | condition 2 | 18°C out / 23°C in | |
| Tapping | | 40°C out / 15°C in | 7°C DB / 6°C WB |

*1: Test condition for sound power level

Temperature condition: Heating condition 2

*2: Test condition for sound pressure level

Temperature condition: Heating condition 2

MIC position: 1m away in front of outdoor unit at the height of 1m

*3: According to EN255-3

Installation requirements

| | HMA100V1 HMA100V2 HMA100VM1 | | HMS140VA1 HMS140VA2 | HMS140V1 HMS140V2 |
|---|-----------------------------------|----------------------|-------------------------|--------------------------|
| | FDCW71VNX-A | FDCW100VNX-A | FDCW140VNX-A | |
| Max pressure, climate system | 0.25 MPa (2.5 Bar) | | | |
| Max temperature, climate system | 65°C | | | |
| Max temperature in indoor unit | 65°C | | | |
| Max temperature from external heat source | 65°C | | | |
| Max supply temperature with compressor | 58°C | | | |
| Min supply temp. cooling | 7°C | | | 18°C |
| Max supply temp. cooling | 25°C | | | |
| Min volume, climate system without underfloor cooling application | 35 | 50 | 75 | |
| Min volume, climate system with underfloor cooling application | 70 | 100 | 150 | |
| Max flow, climate system | 0.38ℓ/s | 0.57ℓ/s | 0.79ℓ/s | |
| Min flow, climate system | 0.19ℓ/s | 0.22ℓ/s | 0.40ℓ/s | |
| Nominal system flow heating ($\Delta T=5K$) | 0.38ℓ/s (8kW,7/45°C) | 0.43ℓ/s (9kW,7/45°C) | 0.79ℓ/s (16.5kW,7/45°C) | |
| Nominal system flow cooling ($\Delta T=5K$) | 0.34ℓ/s (7.1kW,35/7°C) | 0.38ℓ/s (8kW,35/7°C) | 0.56ℓ/s (11.8kW,35/7°C) | 0.79ℓ/s (16.5kW,35/18°C) |

External circulation pump must be used when the pressure drop in the system is greater than the available external pressure. In such case, a bypass line with non-return valve must be installed.

Use an overflow valve if system flow cannot be guaranteed.

Number in the end of model name in indoor unit (e.g. HMA100V1 or HMA100V2) shows available languages in the software.

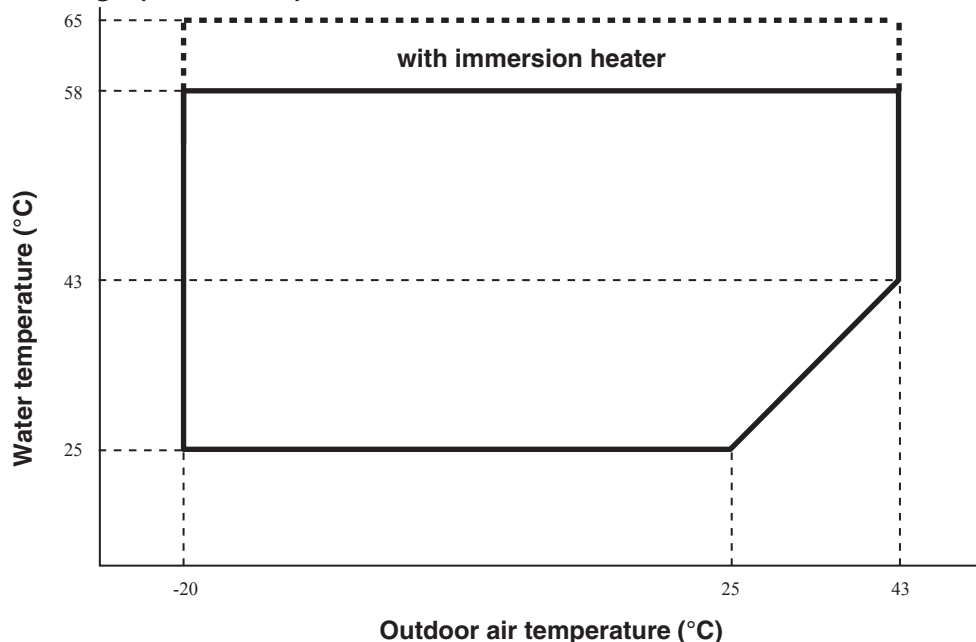
1: English, French, Italian*, German, Czech, Swedish, Danish, Norwegian, Finnish, Dutch

2: English, Latvian, Estonian, Lithuanian, Polish, Spanish*, Portuguese, Turkish, Hungarian, Slovenian

*According to the indoor unit software version, Italian and Spanish may be opposite.

Operating temperature range

Heating (All models)

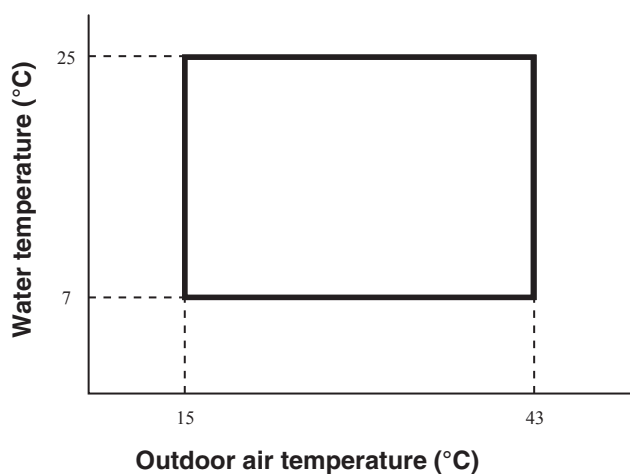


NOTE

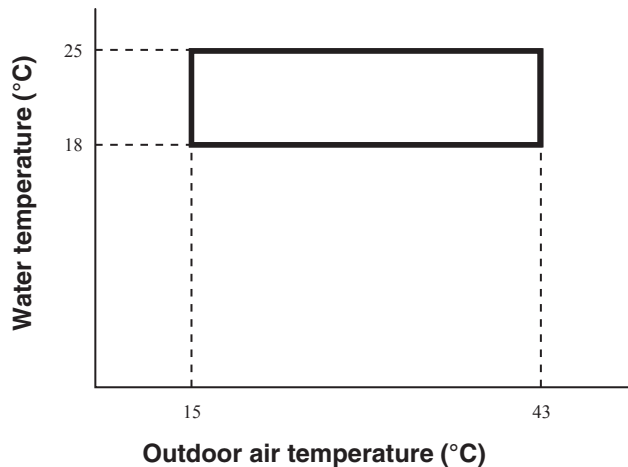
1. Avoid installing outdoor unit where wind blows stronger than 5m/s. In strong wind environment, operable temperature range is drastically narrowed if wind protection is not used.
2. In case outdoor unit is installed where outdoor air temperature drops below -10°C and wind blows directly into the outdoor unit, install wind protection on outdoor unit. If it is not observed, it will lead to abnormal stop. For details, see page 228.

Cooling

HMA100V, HMS140VA



HMS140V

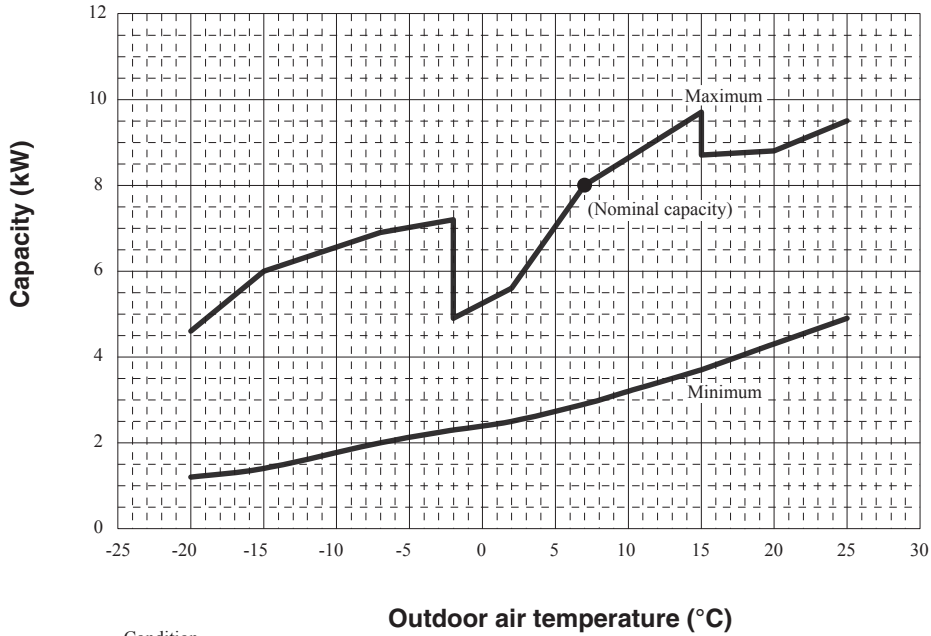


Capacity diagram

HMA100V-FDCW71VNX

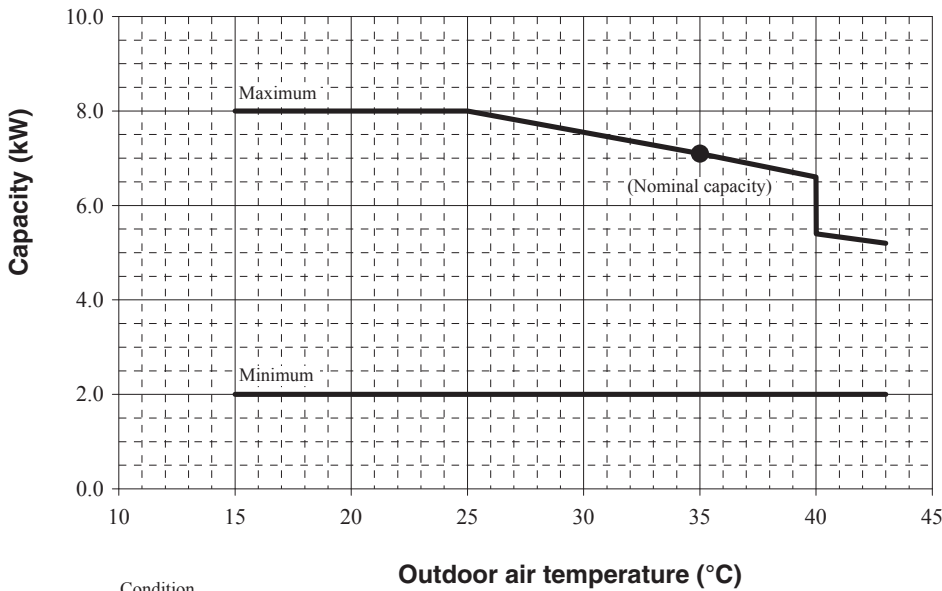
HMA100VM-FDCW71VNX

Heating



Condition
 Supply water temperature : 45°C
 Water flow rate : 1376 ℓ/h

Cooling

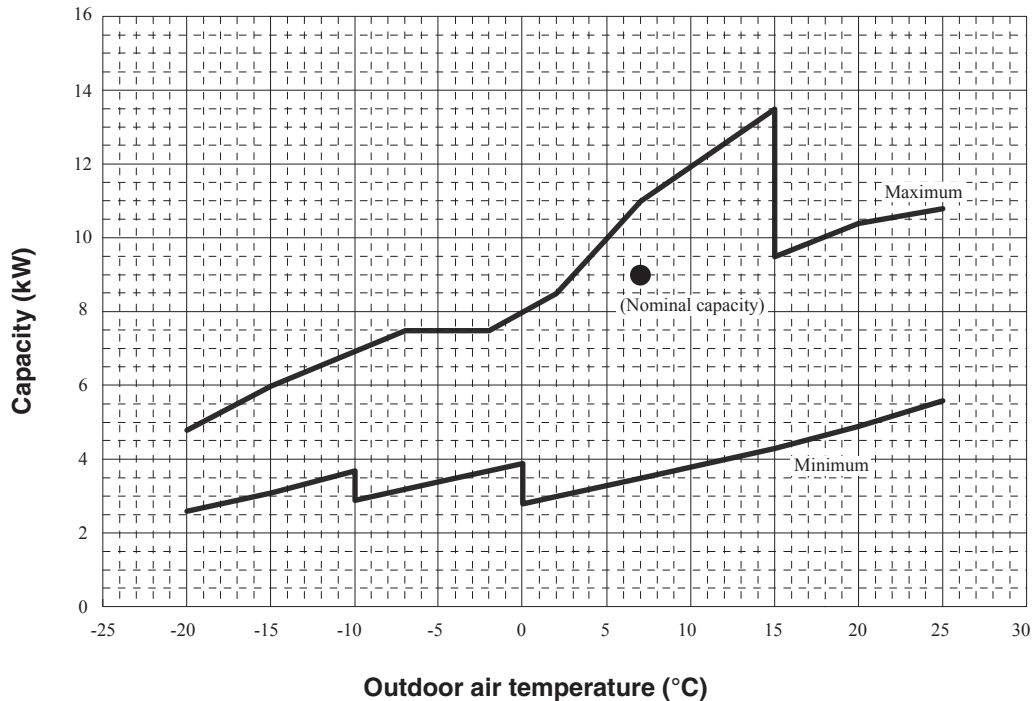


Condition
 Supply water temperature : 7°C
 Water flow rate : 1221 ℓ/h

HMA100V-FDCW100VNX

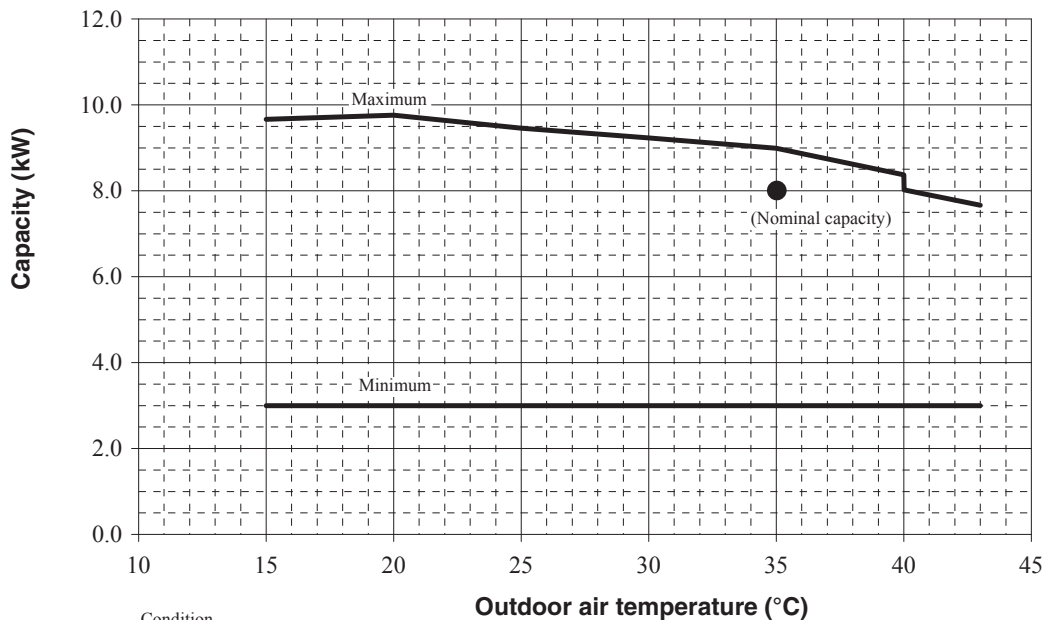
HMA100VM-FDCW100VNX

Heating



Condition
 Supply water temperature : 45°C
 Water flow rate : 1548 ℓ/h

Cooling

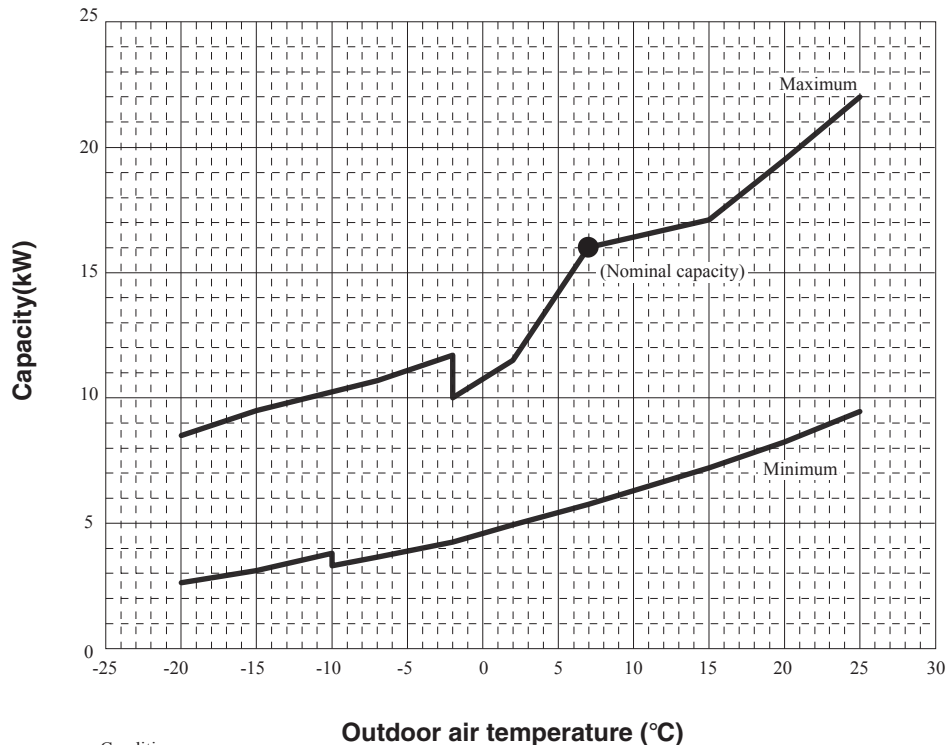


Condition
 Supply water temperature : 7°C
 Water flow rate : 1376 ℓ/h

HMS140VA-FDCW140VNX

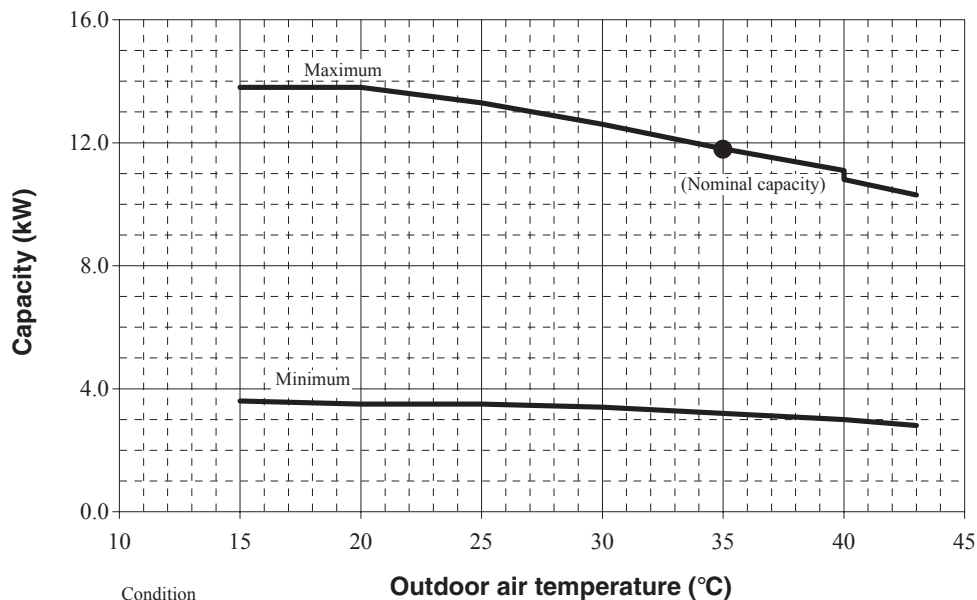
HMS140V-FDCW140VNX

Heating



Condition
 Supply water temperature : 45°C
 Water flow rate : 2838 ℓ/h

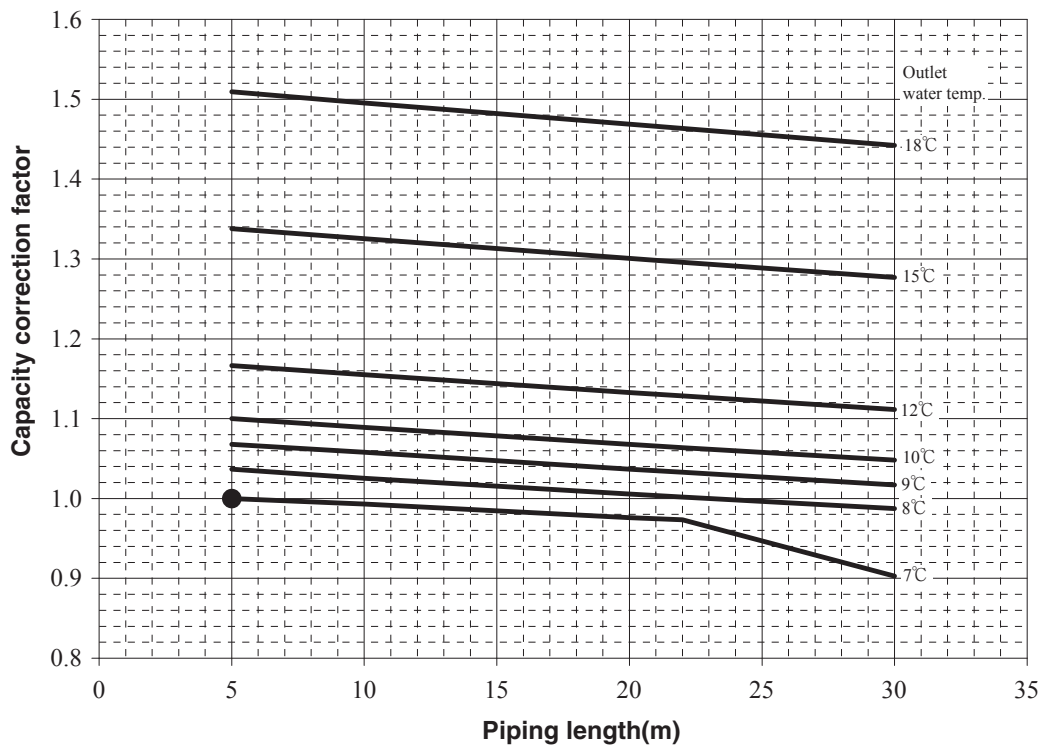
Cooling



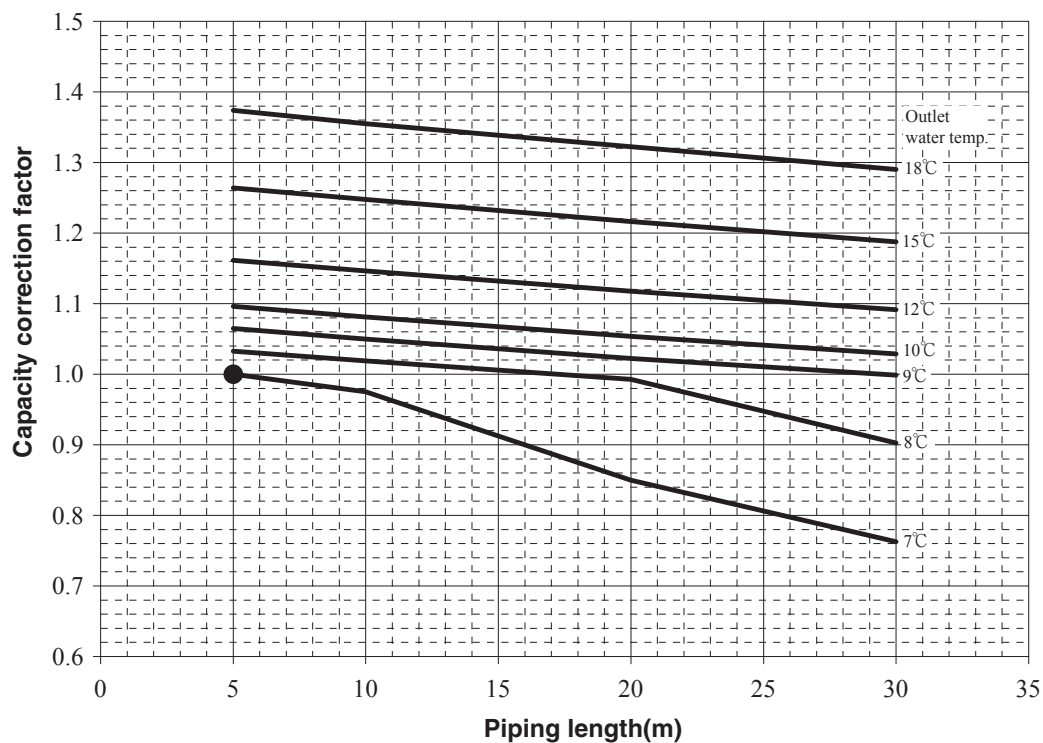
Condition
 Supply water temperature : 7°C
 Water flow rate : 2030 ℓ/h

Capacity correction factor according to piping length and outlet water temperature in cooling

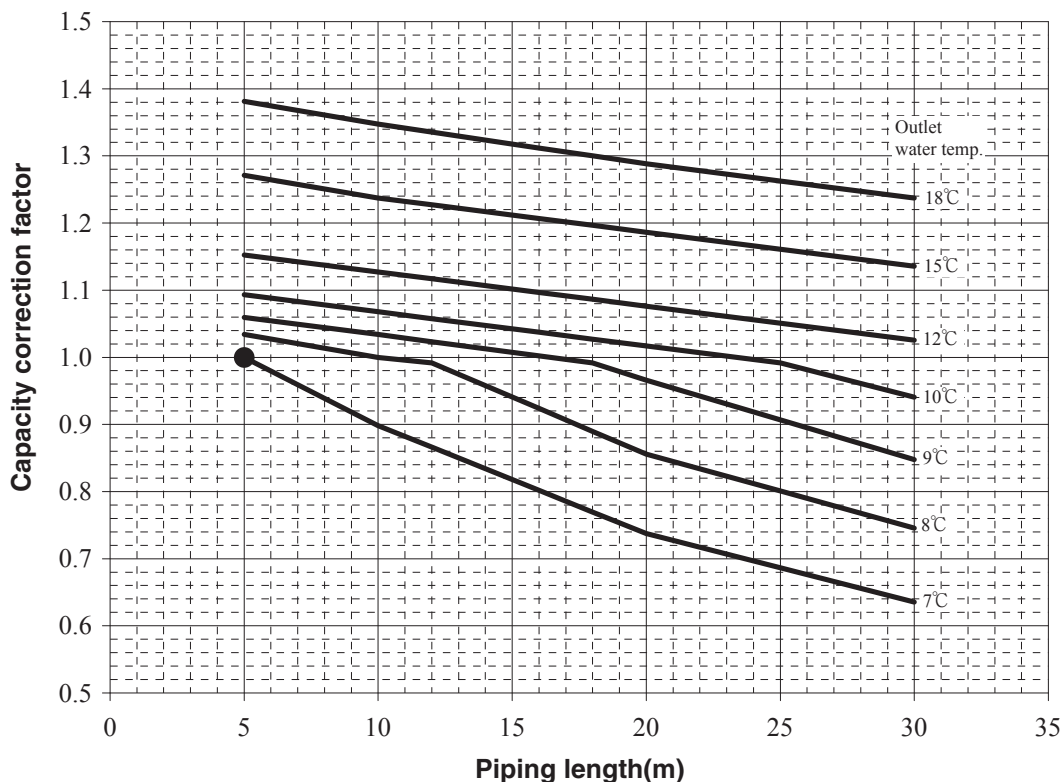
HMA100V-FDCW71VNX



HMA100V-FDCW100VNX



HMS140VA-FDCW140VNX



How to calculate estimated capacity according to ambient temp, water outlet temp and piping length

- (1) Read the cooling capacity at 7degC outlet and required ambient temperature.
- (2) Read the capacity correction factor at required water outlet temperature and piping length.
- (3) Multiply the values (1) and (2).

Example: HMS140VA, Ambient temperature 25degC, Water outlet 8degC, piping length 20m

- (1) Capacity at 25degC ambient and 7degC outlet: 13.2kW
- (2) Correction factor according to ambient temp and piping length: 0.85
- (3) Estimated capacity: $13.2 \times 0.85 = 11.2\text{kW}$

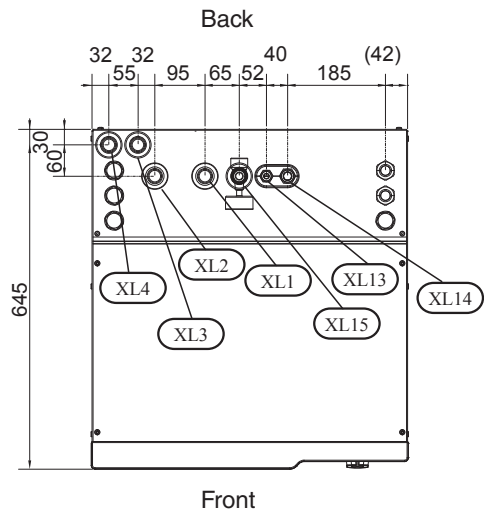
Note: The calculation result is only advisory and is not accurate.

Dimensions

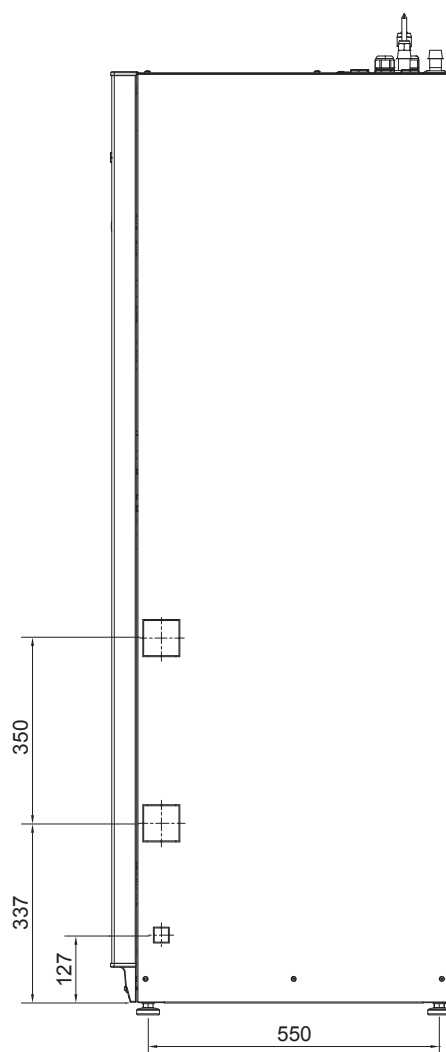
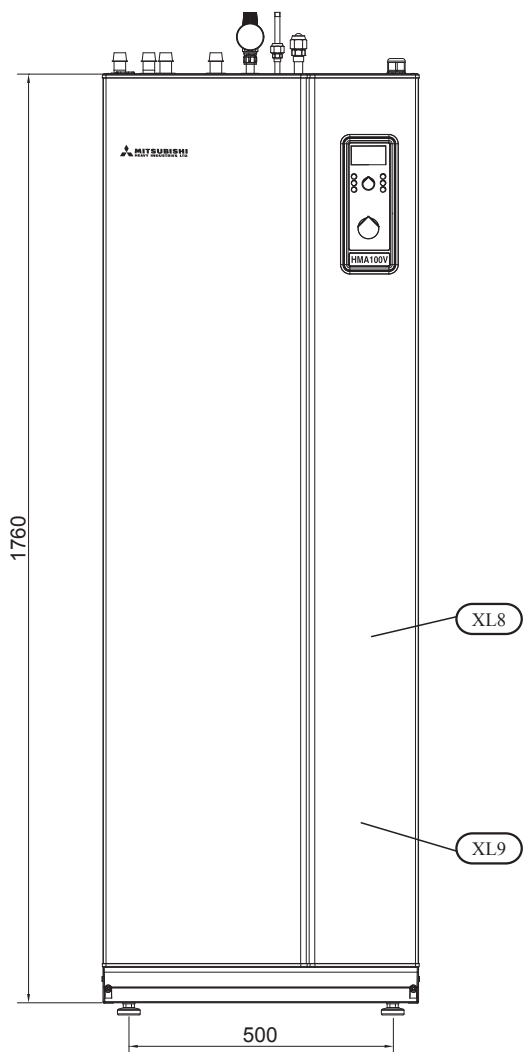
Indoor unit

HMA100V

HMA100VM

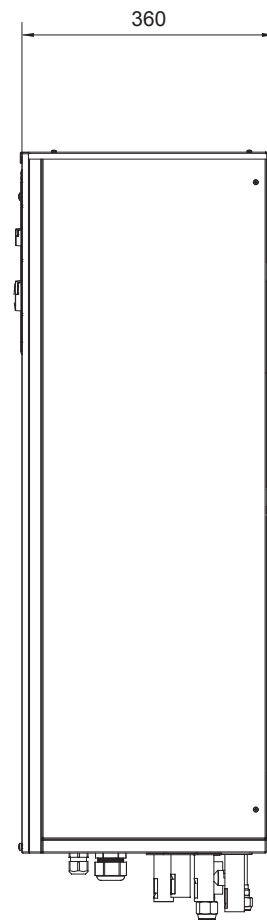
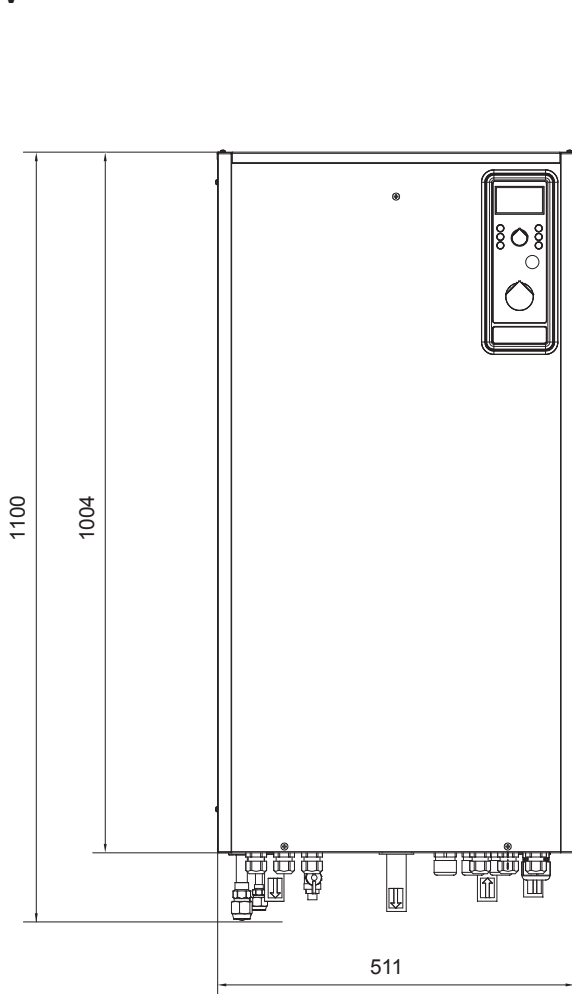


| Symbol | Contents | |
|--------|------------------------------------|--------|
| XL1 | Climate system supply | 22 mm |
| XL2 | Climate system return | 22 mm |
| XL3 | Cold water | 22 mm |
| XL4 | Hot water | 22 mm |
| XL8 | External heat source in | G1 |
| XL9 | External heat source out | G1 |
| XL13 | Liquid line refrigerant | 3 / 8" |
| XL14 | Gas line refrigerant | 5 / 8" |
| XL15 | Connection safety valve, manometer | |

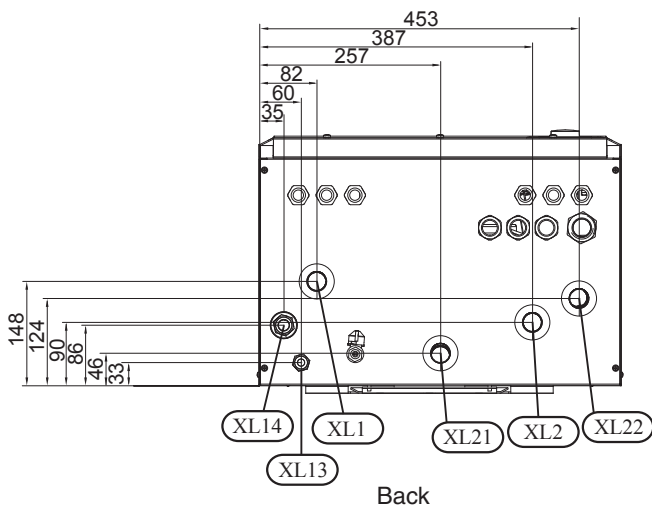


HMS140VA

HMS140V



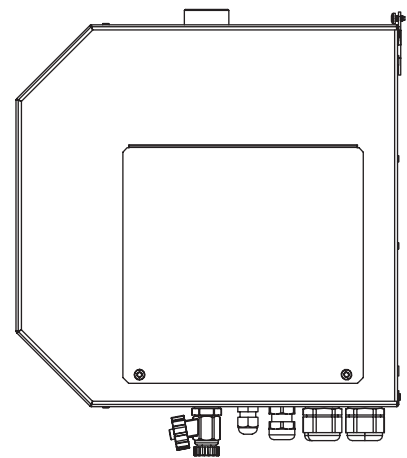
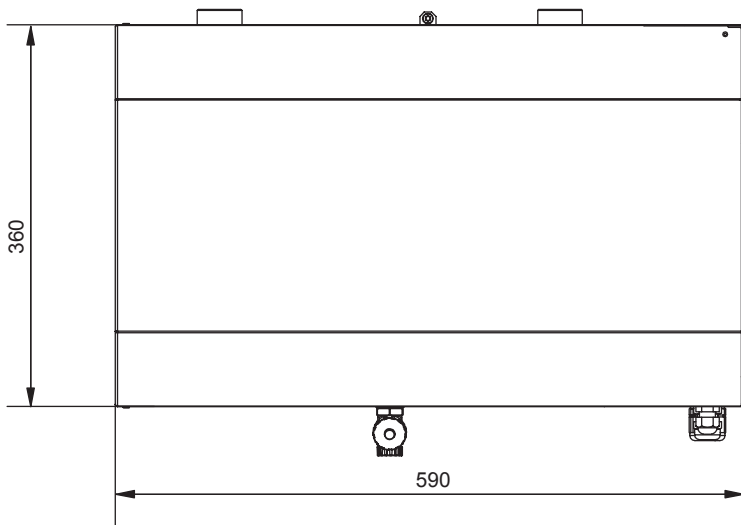
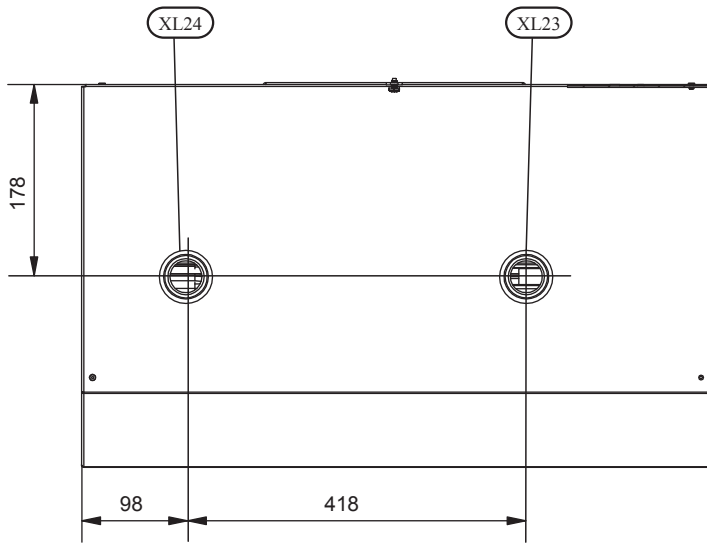
Front



Back

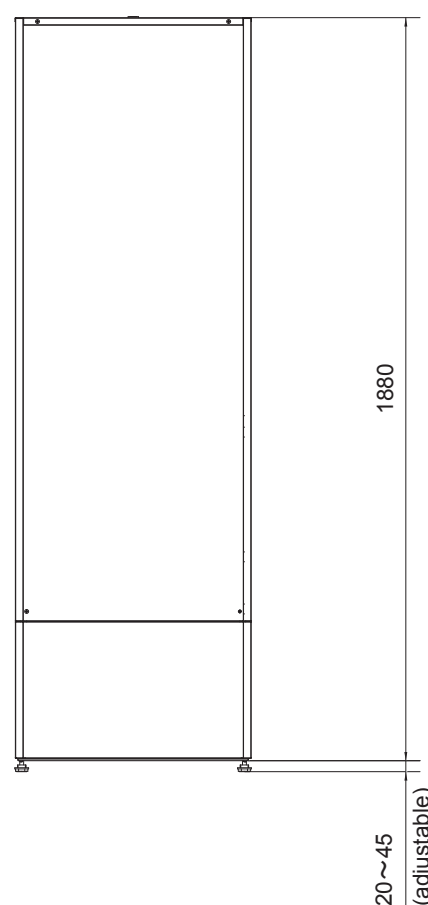
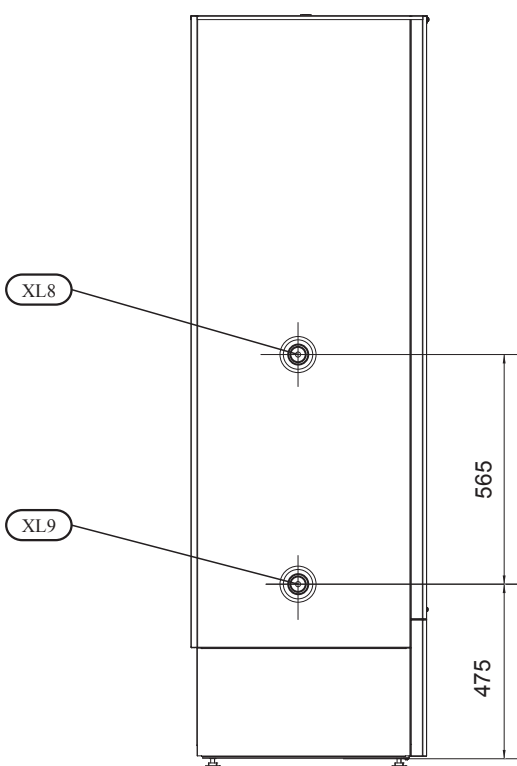
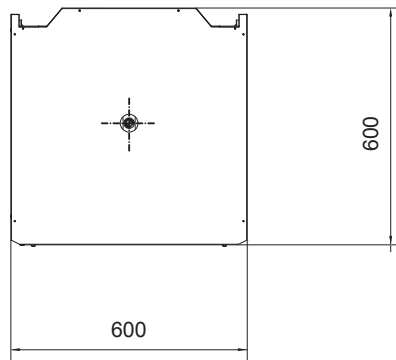
| Symbol | Contents | |
|----------|------------------------------|--------|
| XL1 (□→) | Climate system supply | 28 mm |
| XL2 (←□) | Climate system return | 28 mm |
| XL13 | Liquid line refrigerant | 3 / 8" |
| XL14 | Gas line refrigerant | 5 / 8" |
| XL21 (A) | Tank circuit supply (outlet) | 28 mm |
| XL22 (B) | Tank circuit return (inlet) | 28 mm |

HT30

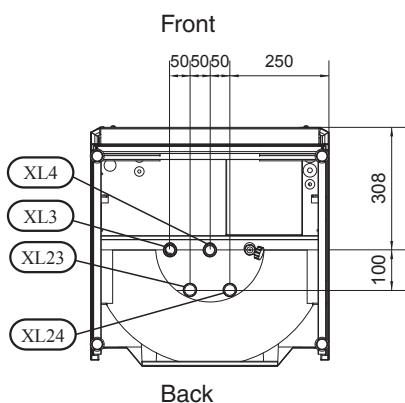


| Symbol | Contents | |
|----------|-----------------------------|----------|
| XL23 (B) | Circulation supply (outlet) | G1B (1") |
| XL24 (A) | Circulation return (inlet) | G1B (1") |

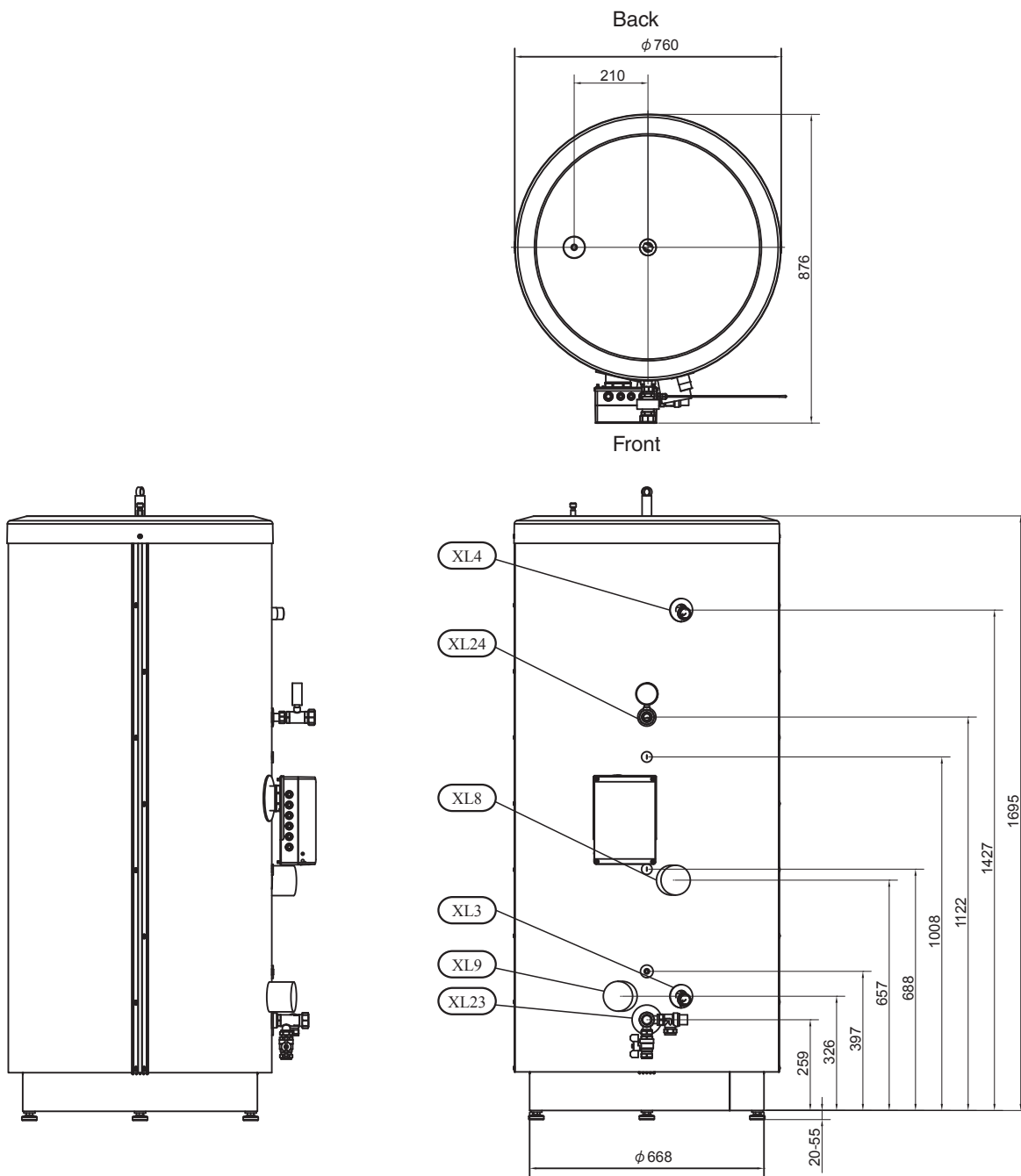
MT300





| Symbol | Contents | |
|----------|-----------------------------|----------|
| XL3 (→) | Cold water | G1B (1") |
| XL4 (→) | Hot water | G1B (1") |
| XL8 | External heat source in | Rc1 (1") |
| XL9 | External heat source out | Rc1 (1") |
| XL23 (B) | Circulation supply (outlet) | G1B (1") |
| XL24 (A) | Circulation return (inlet) | G1B (1") |



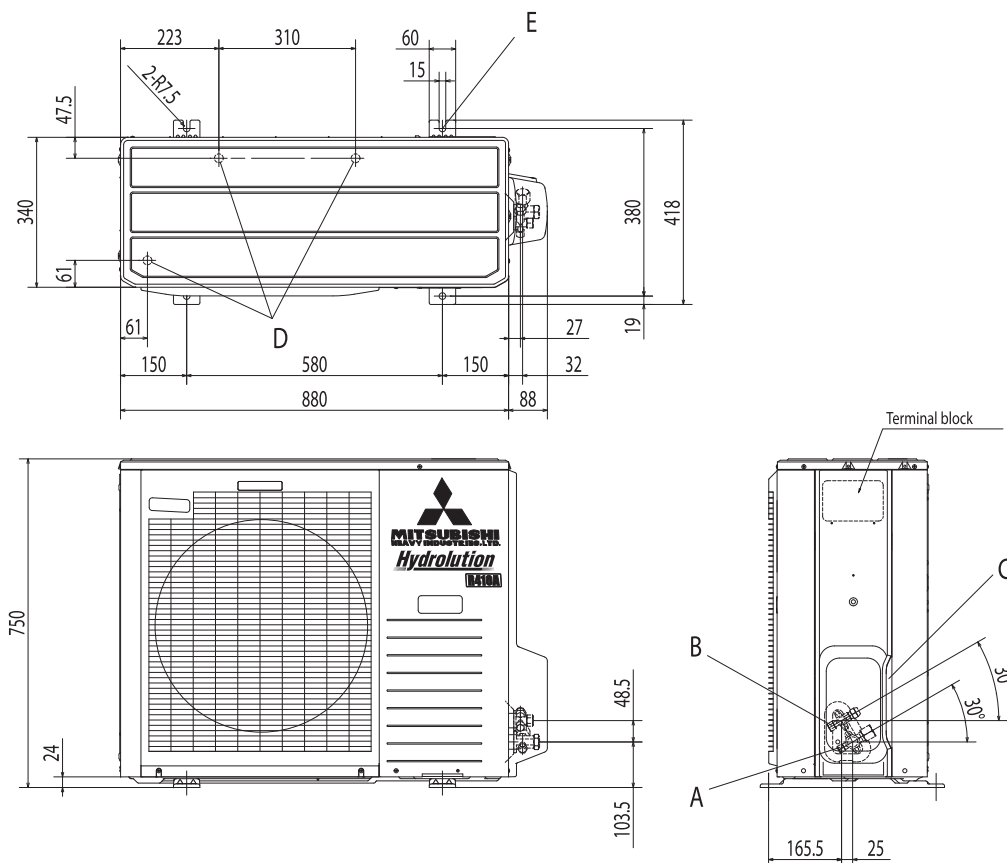
MT500



| Symbol | Contents | |
|---|-----------------------------|----------|
| XL3 () | Cold water | G1B (1") |
| XL4 () | Hot water | G1B (1") |
| XL8 | External heat source in | G1 (1") |
| XL9 | External heat source out | G1 (1") |
| XL23 (B) | Circulation supply (outlet) | 28 mm |
| XL24 (A) | Circulation return (inlet) | 28 mm |

Outdoor unit

FDCW71VNX-A

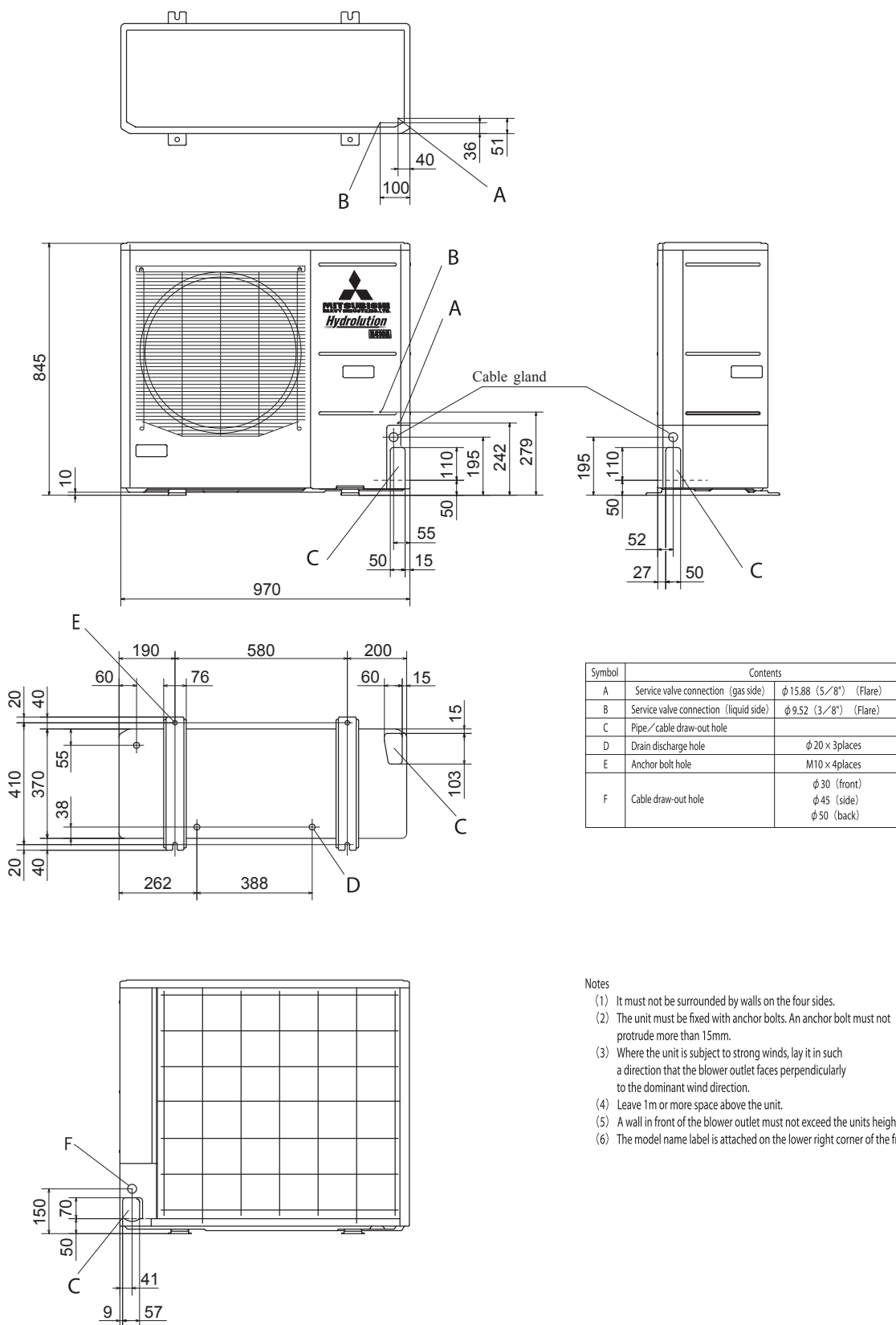


| Symbol | Contents | |
|--------|--|------------------------|
| A | Service valve connection (gas side) | φ 15.88 (5/8") (Flare) |
| B | Service valve connection (liquid side) | φ 9.52 (3/8") (Flare) |
| C | Pipe/cable draw-out hole | |
| D | Drain discharge hole | φ 20 × 3places |
| E | Anchor bolt hole | M10 × 4places |

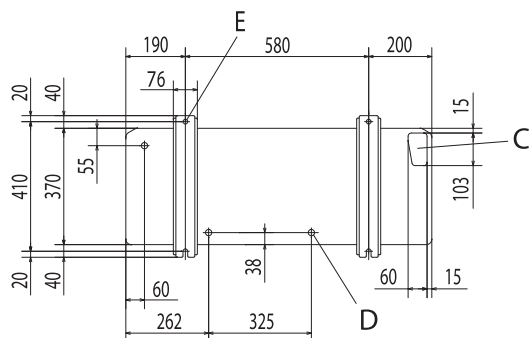
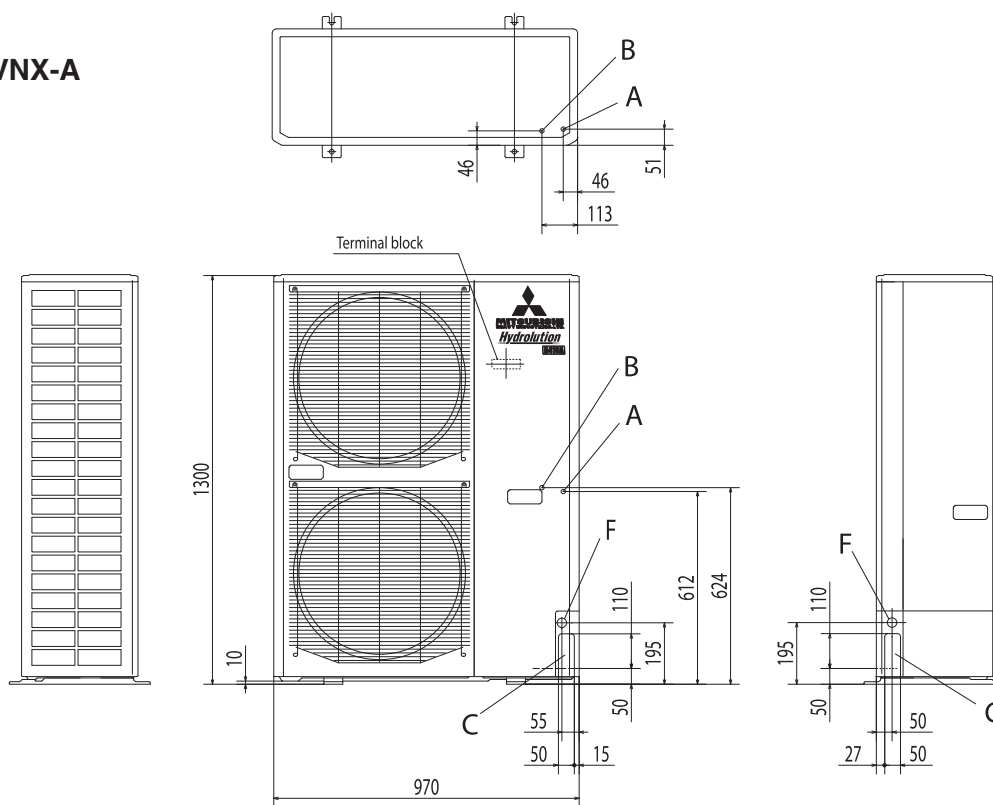
Notes

- (1) It must not be surrounded by walls on the four sides.
- (2) The unit must be fixed with anchor bolts. An anchor bolt must not protrude more than 15mm.
- (3) Where the unit is subject to strong winds, lay it in such a direction that the blower outlet faces perpendicularly to the dominant wind direction.
- (4) Leave 1m or more space above the unit.
- (5) A wall in front of the blower outlet must not exceed the units height.
- (6) The model name label is attached on the lower right corner of the front panel.

FDCW100VNX-A



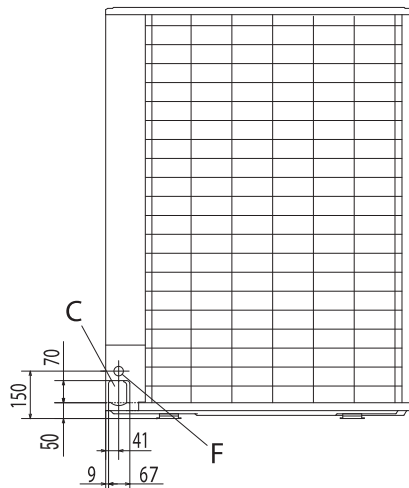
FDCW140VNX-A



| Symbol | Contents | |
|--------|--|--|
| A | Service valve connection (gas side) | φ 15.88 (5/8") (Flare) |
| B | Service valve connection (liquid side) | φ 9.52 (3/8") (Flare) |
| C | Pipe/cable draw-out hole | |
| D | Drain discharge hole | φ 20 × 3places |
| E | Anchor bolt hole | M10 × 4places |
| F | Cable draw-out hole | φ 30 (front) φ 45 (side) φ 50 (back) |

Notes

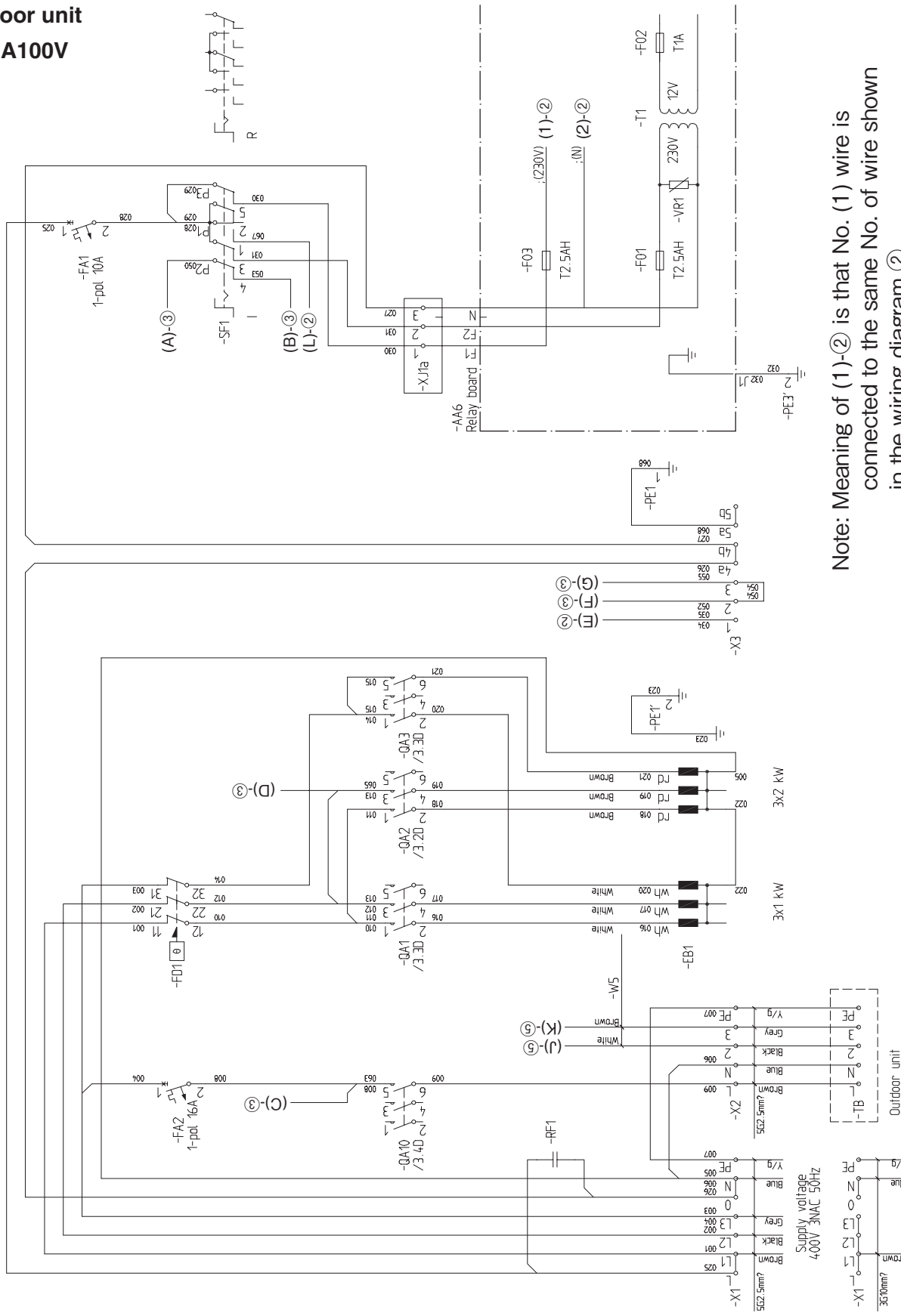
- (1) It must not be surrounded by walls on the four sides.
- (2) The unit must be fixed with anchor bolts. An anchor bolt must not protrude more than 15mm.
- (3) Where the unit is subject to strong winds, lay it in such a direction that the blower outlet faces perpendicularly to the dominant wind direction.
- (4) Leave 1m or more space above the unit.
- (5) A wall in front of the blower outlet must not exceed the units height.
- (6) The model name label is attached on the lower right corner of the front panel.



Electrical circuit diagram

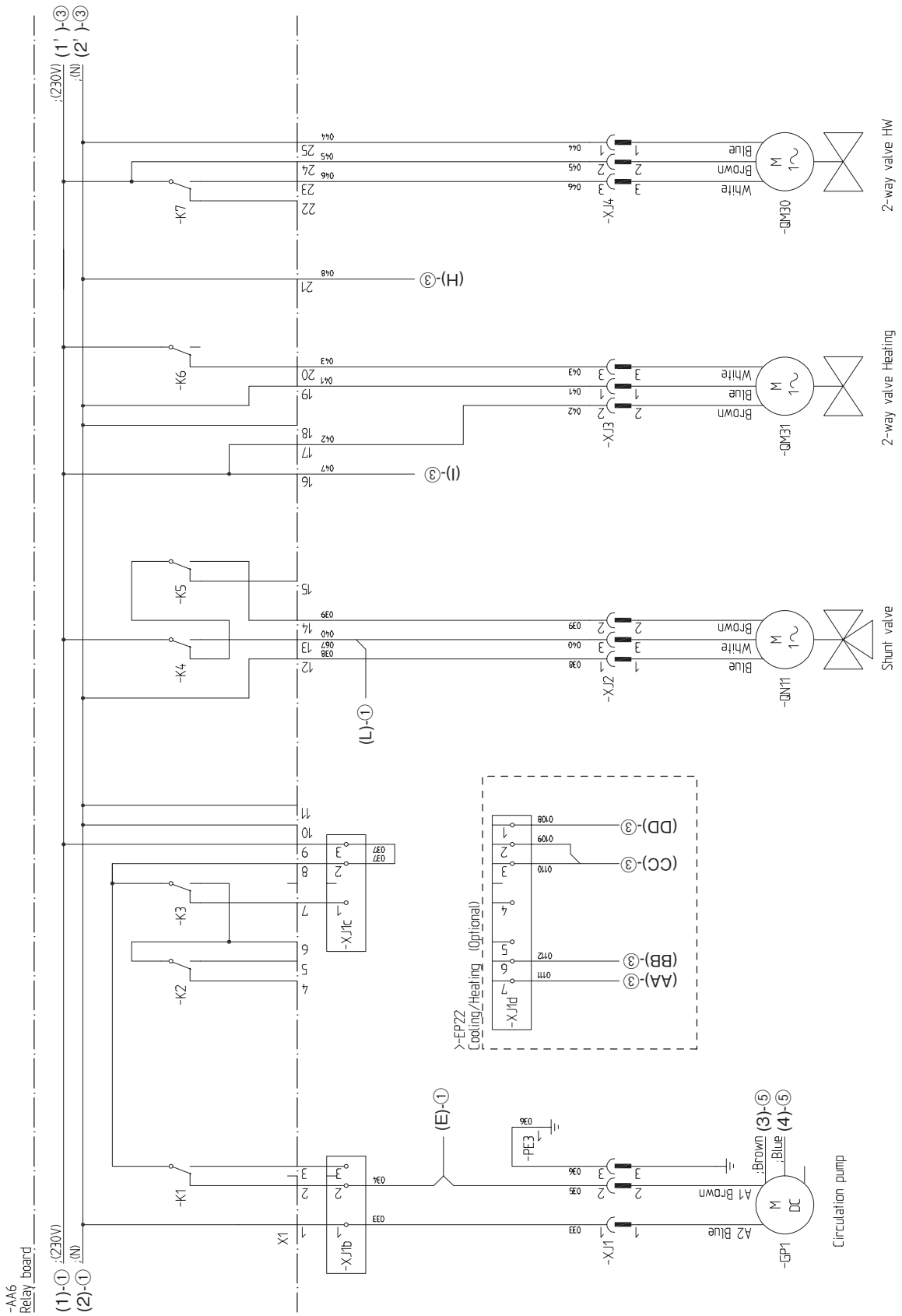
Indoor unit
HMA100V

HMA100V ①

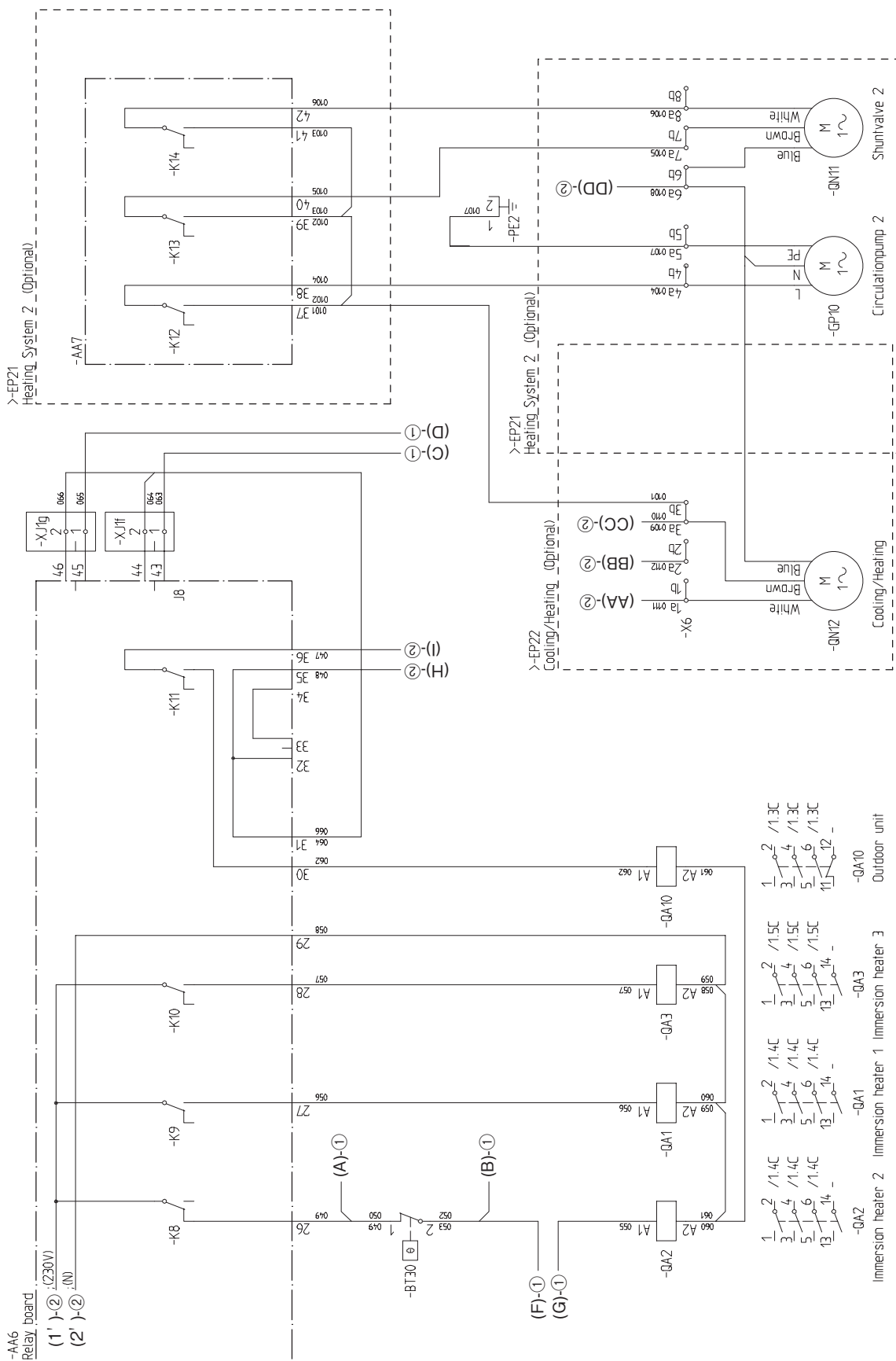


Note: Meaning of (1)-(2) is that No. (1) wire is connected to the same No. of wire shown in the wiring diagram (2).
(1) means the wiring No.
(2) means the wiring diagram No. such as HMA100V (2)

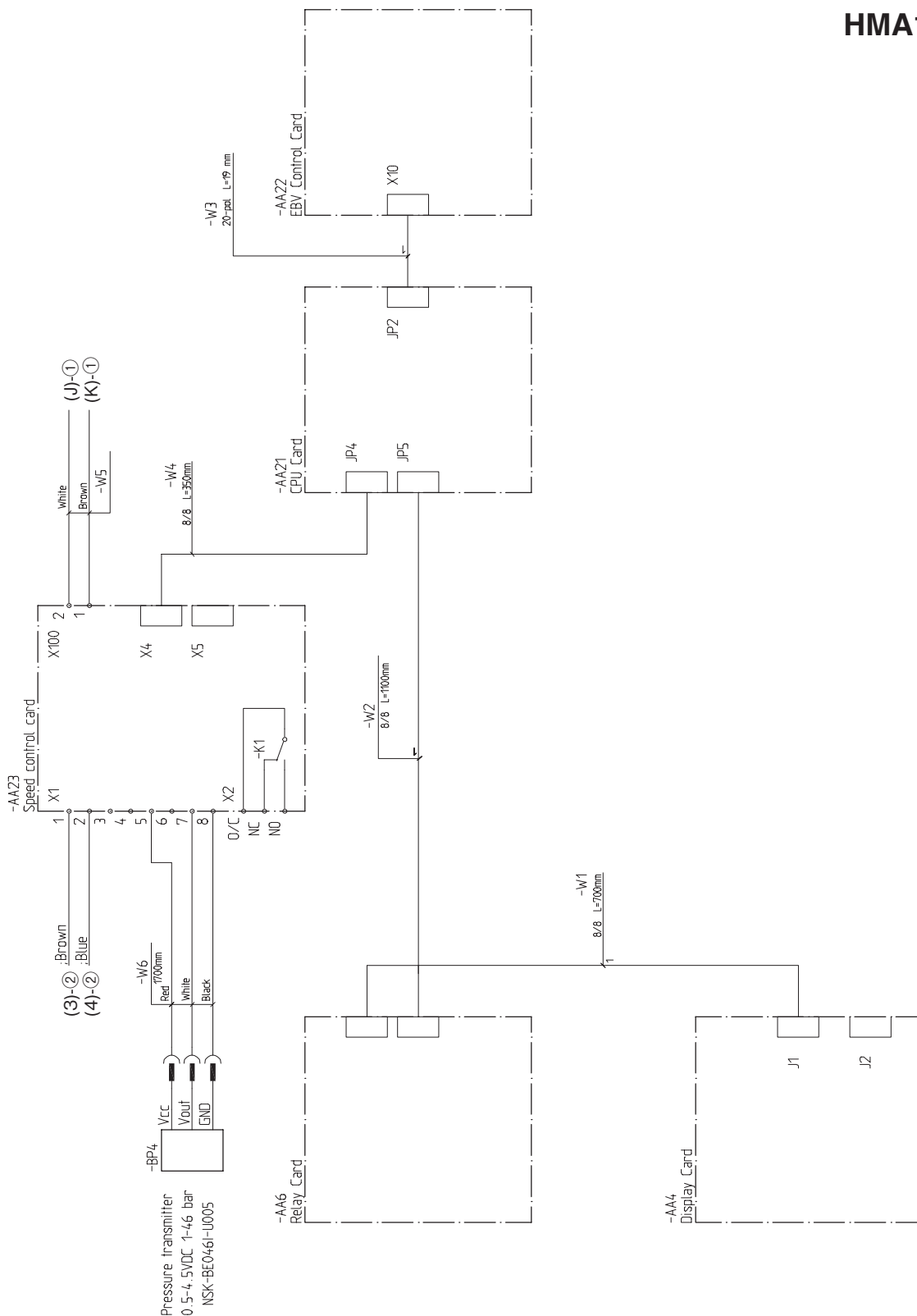
HMA100V ②



HMA100V ③

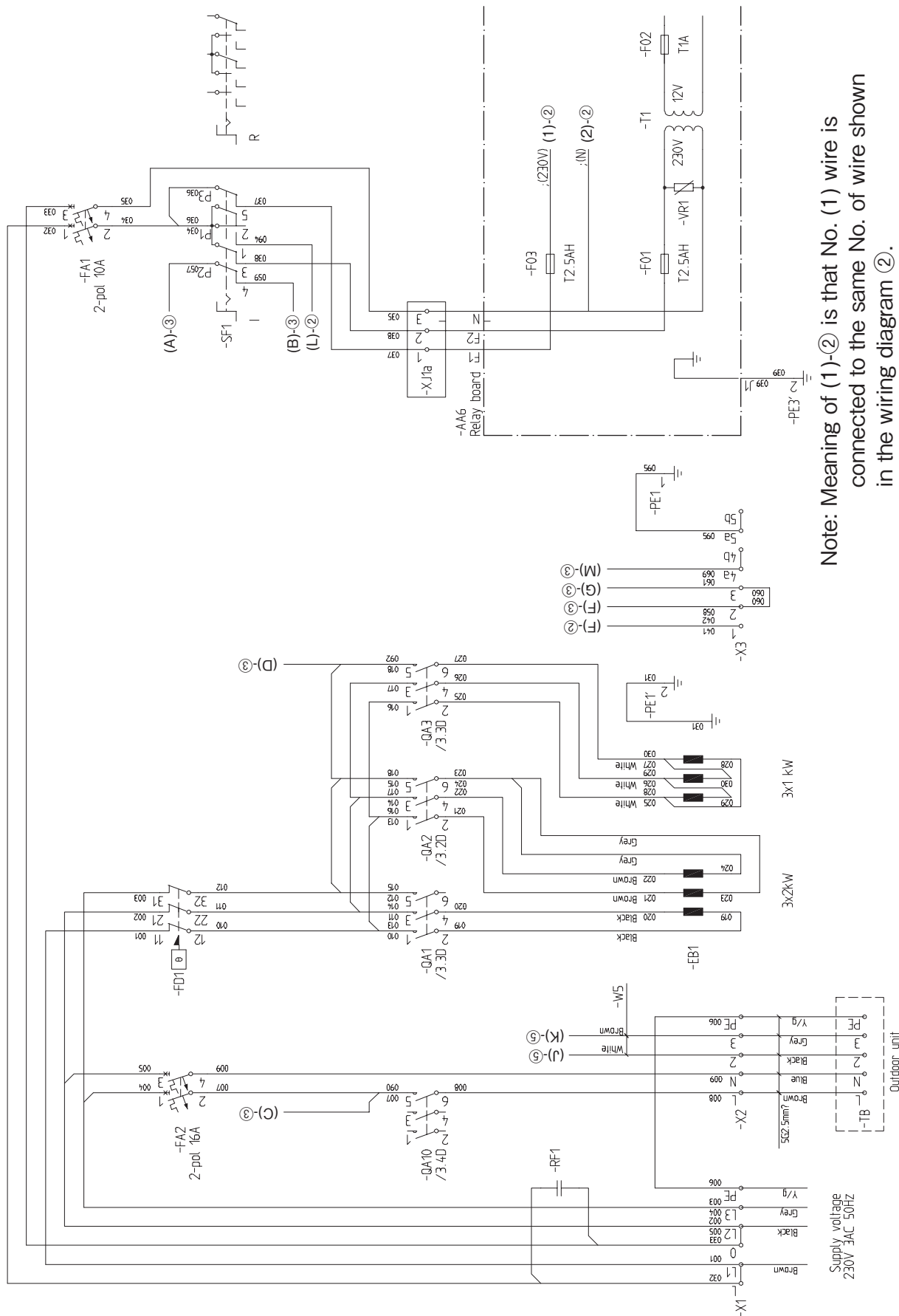


HMA100V ⑤



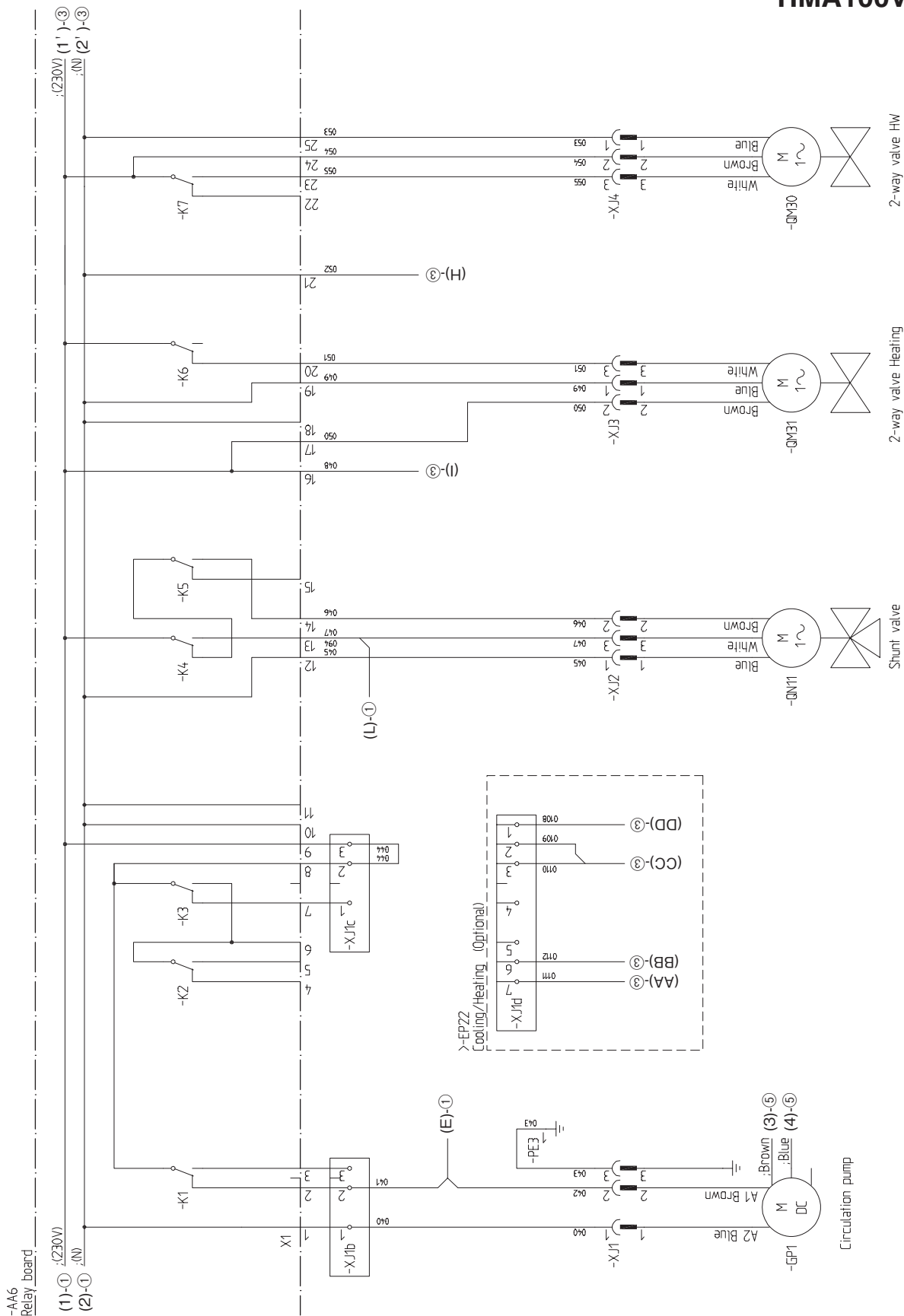
HMA100VM

HMA100VM ①

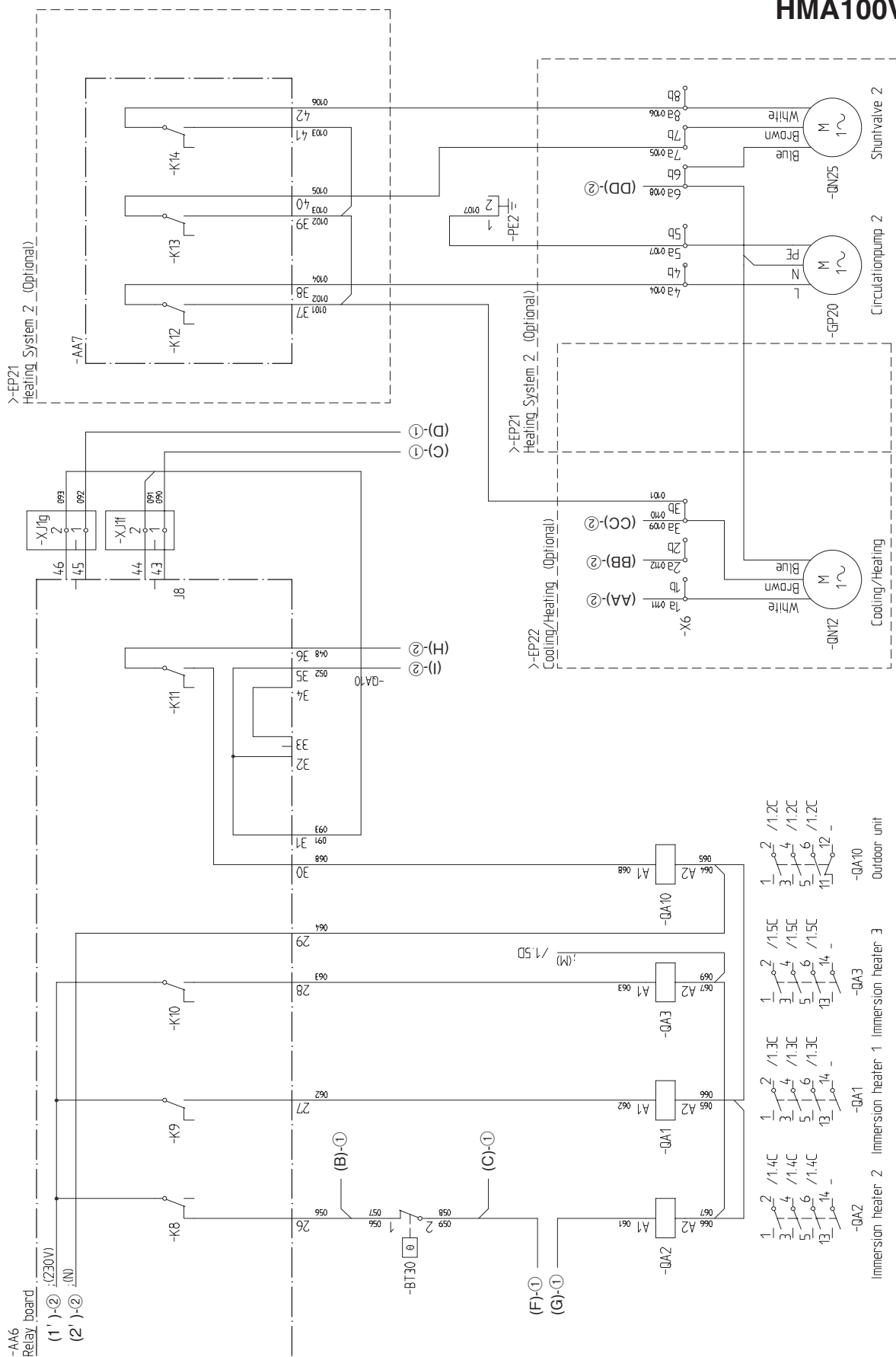


Note: Meaning of (1)-(2) is that No. (1) wire is connected to the same No. of wire shown in the wiring diagram (2).
 (1) means the wiring No.
 (2) means the wiring diagram No. such as HMA100VM (2)

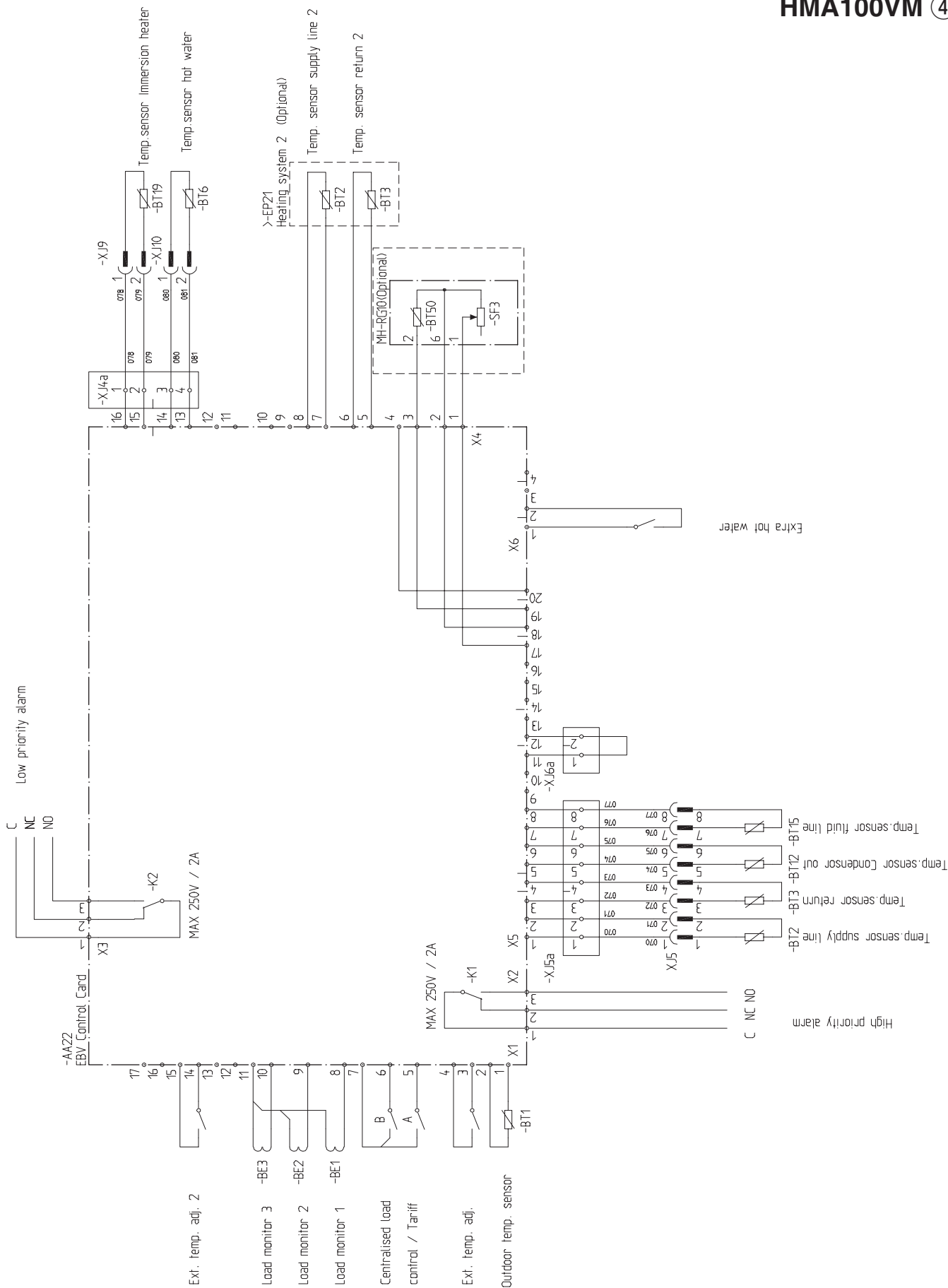
HMA100VM ②



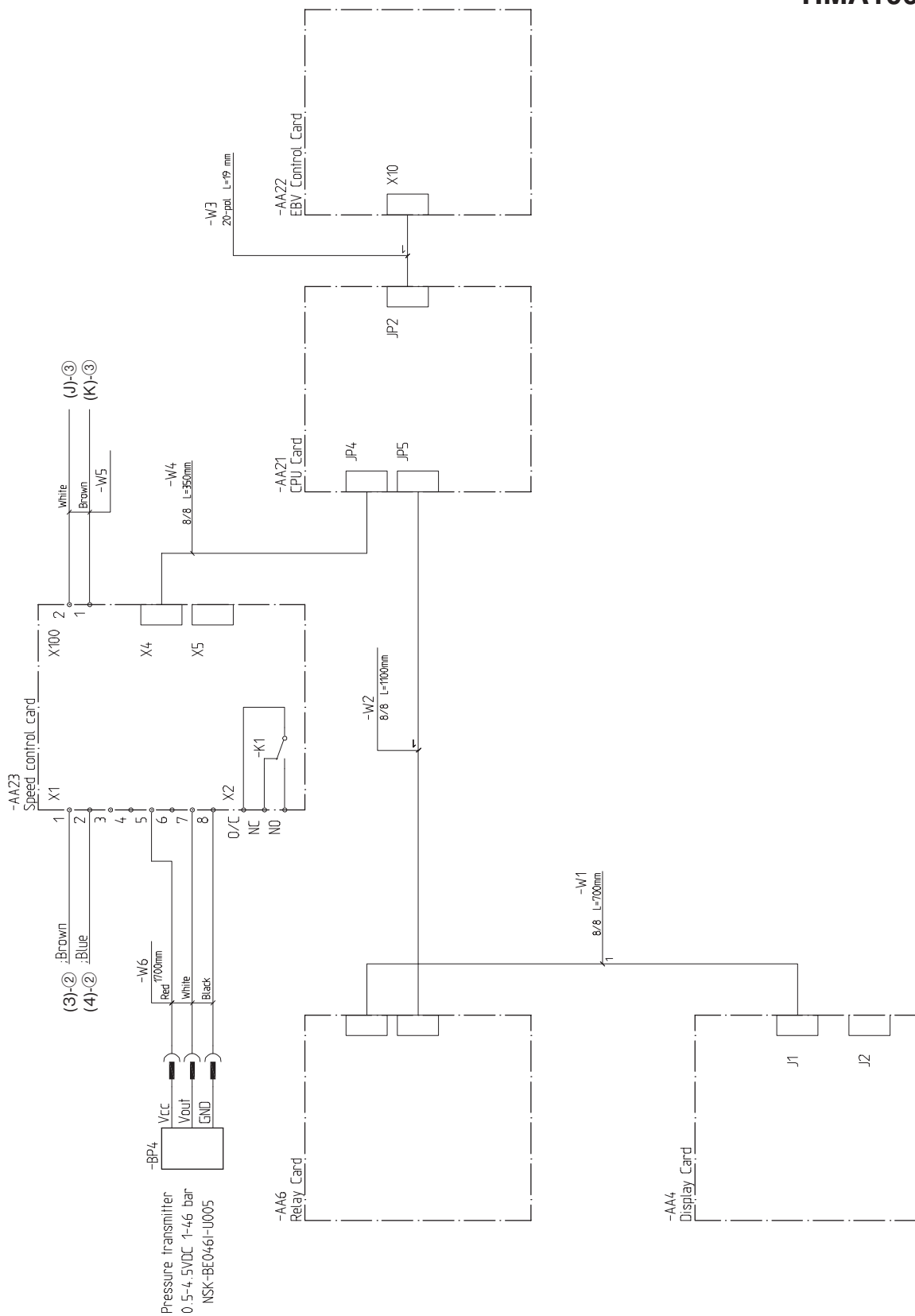
HMA100VM ③



HMA100VM ④

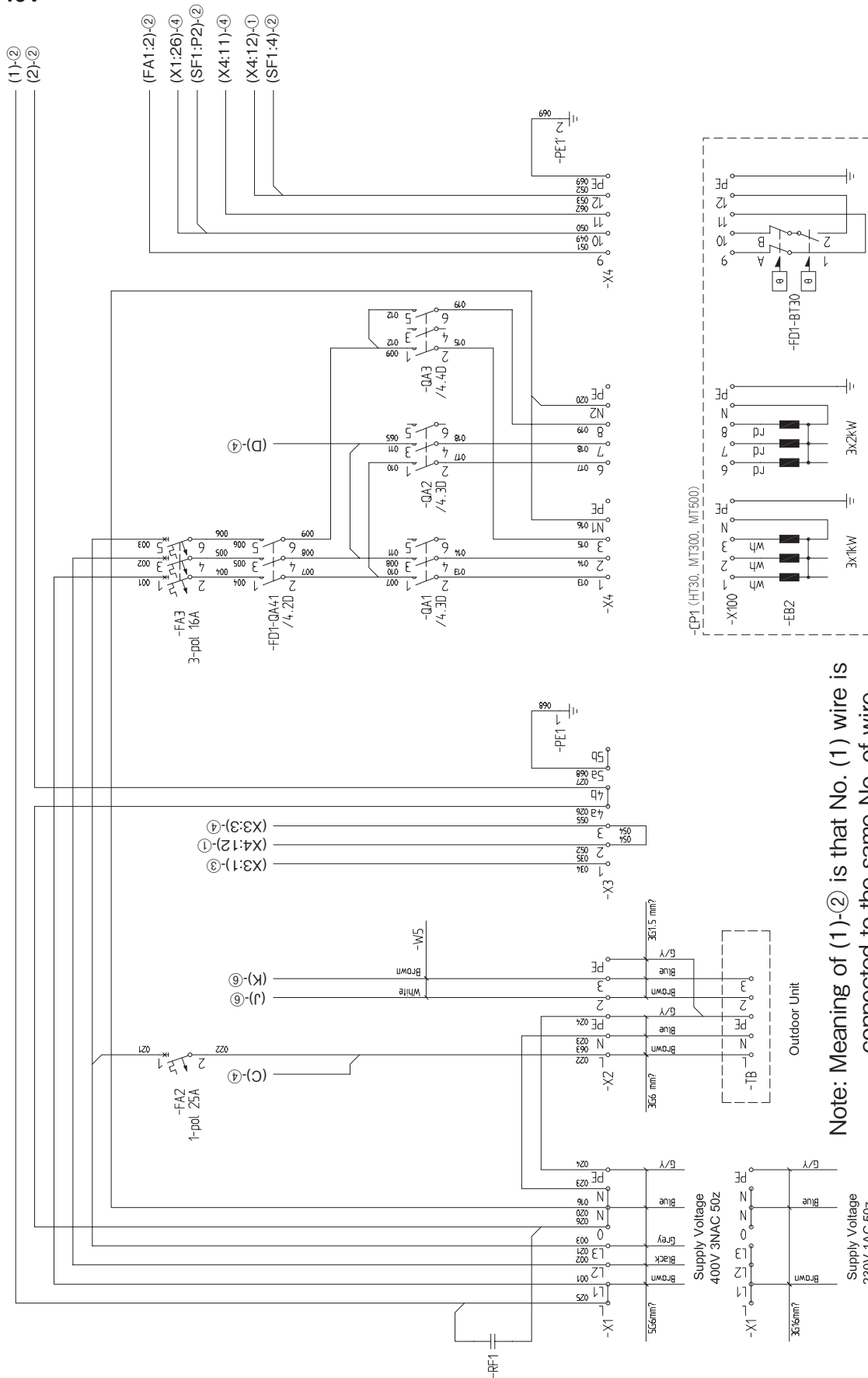


HMA100VM ⑤



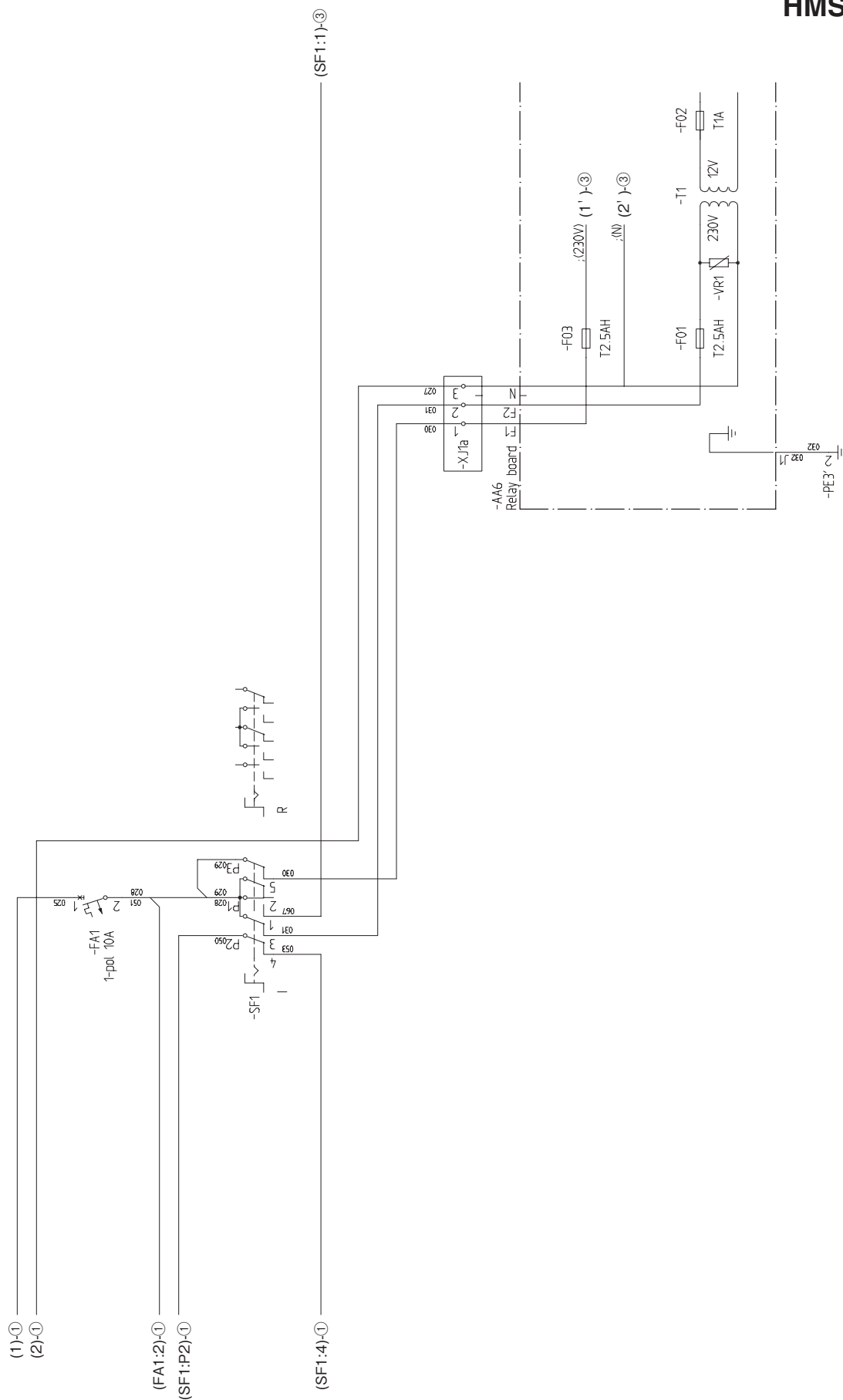
HMS140VA (HT30, MT300, MT500)
HMS140V

HMS140V ①



Note: Meaning of (1)-② is that No. (1) wire is connected to the same No. of wire shown in the wiring diagram ②.
 (1) means the wiring No.
 ② means the wiring diagram No. such as HMS140V ②

HMS140V ②



'13•HM-T-193

Technical data

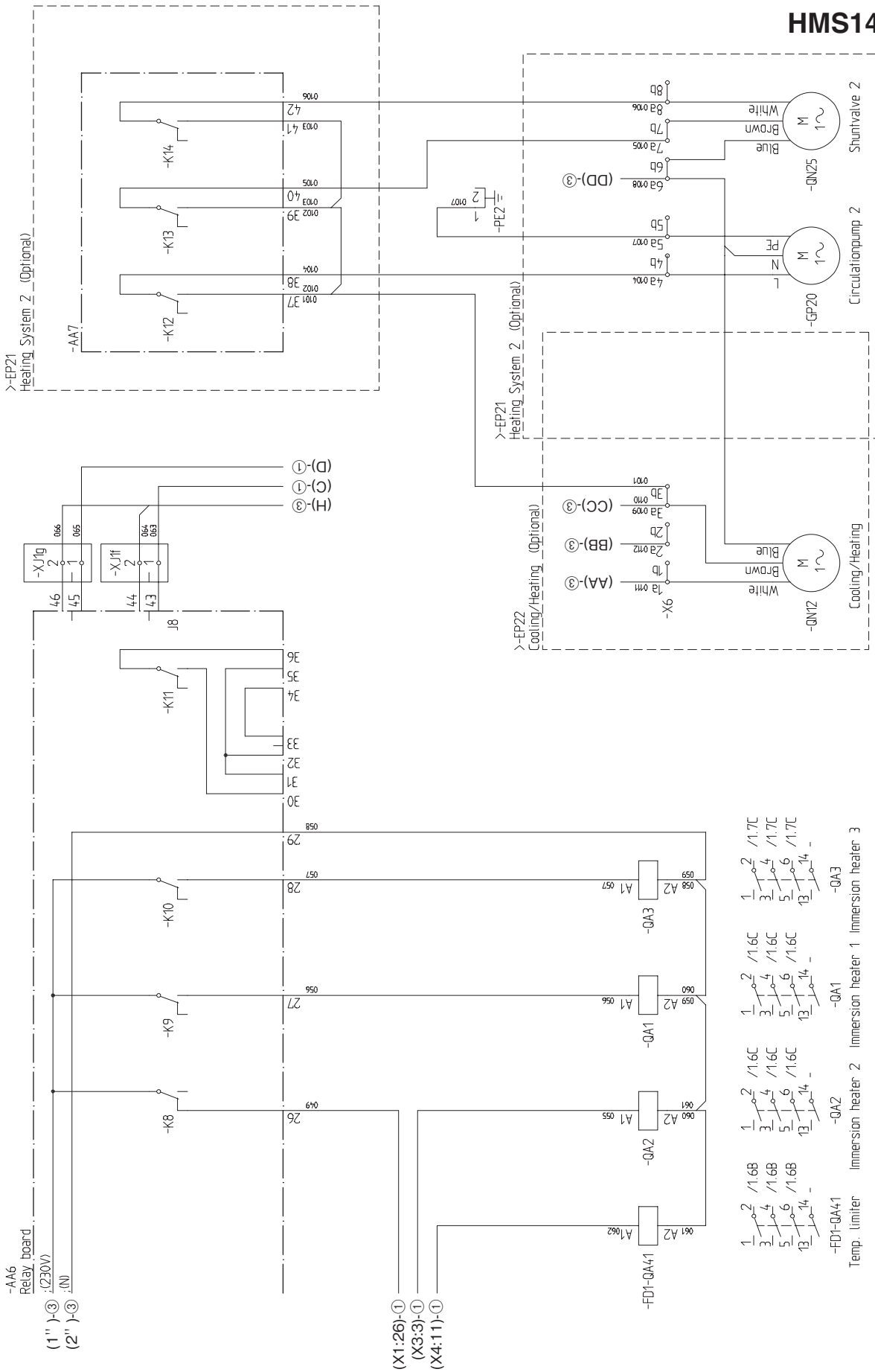
Electrical circuit diagram

HMS140V ③

The diagram illustrates the electrical control system for the HMS140V unit. It features a central relay board (AA6) with terminals 1 through 25. The power supply is provided via terminal block X1, with terminals (1')-(2) and (2')-(2) for 230V AC. The system includes a circulation pump (GP1) and three valves: a shunt valve (LND1), a 2-way valve for heating (LEM31), and a 2-way valve for hot water (LEM30). Each valve is controlled by a relay (K1-K7) and a terminal block (X2, X3, X4). A dashed box represents an optional 'Cooling/Heating' terminal block with terminals (AA)-(4), (BB)-(4), (CC)-(4), and (DD)-(4). The diagram also shows a fuse (F1) and a ground connection (PE3).

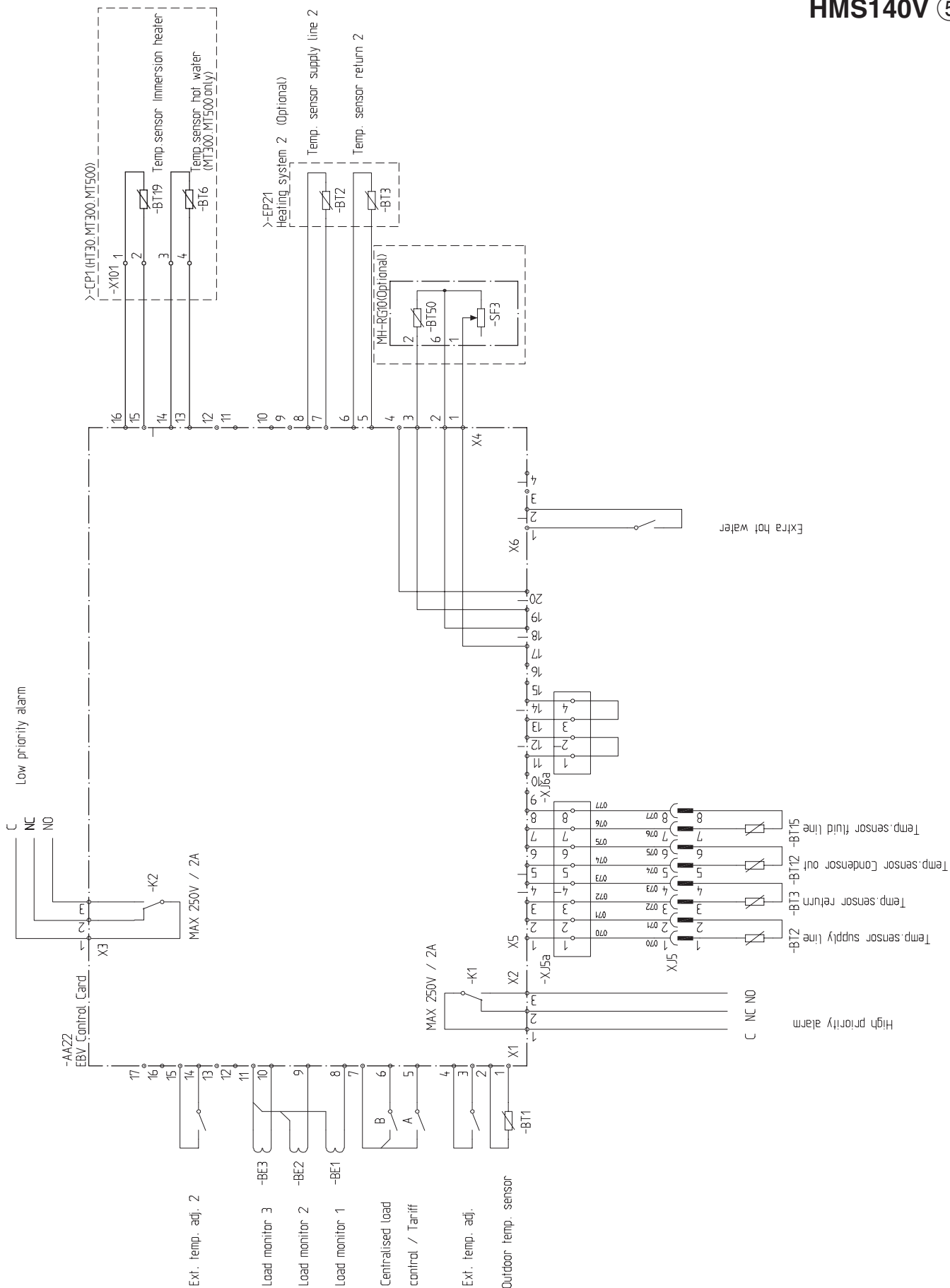
- 36 -

HMS140V ④

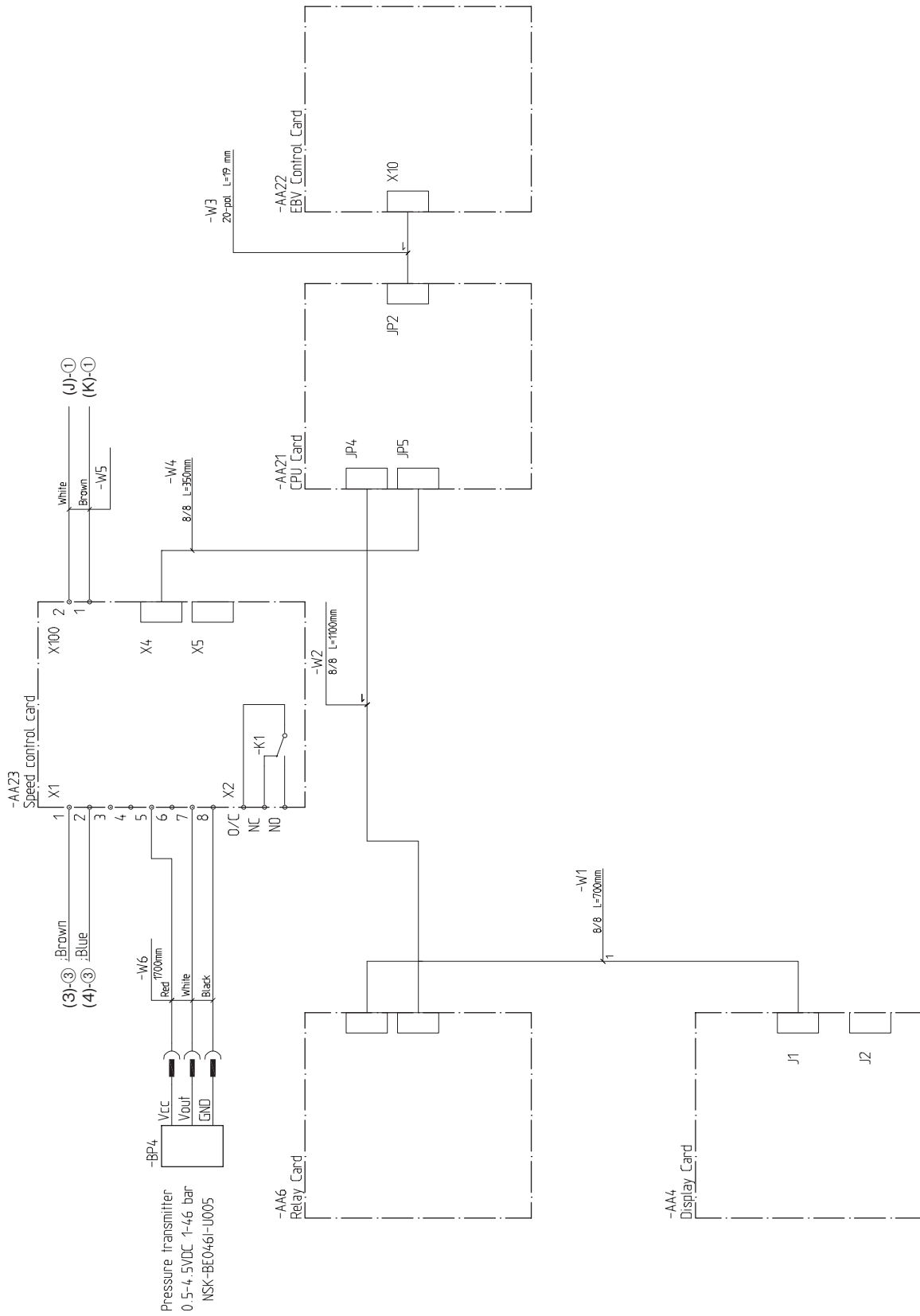


- 1 2 /1.6B
- 3 4 /1.6B
- 5 6 /1.6B
- 13 14 -
- FD1-QA41 Temp. limiter
- 1 2 /1.6C
- 3 4 /1.6C
- 5 6 /1.6C
- 13 14 -
- QA2 Immersion heater 2
- 1 2 /1.6C
- 3 4 /1.6C
- 5 6 /1.6C
- 13 14 -
- QA1 Immersion heater 1
- 1 2 /1.7C
- 3 4 /1.7C
- 5 6 /1.7C
- 13 14 -
- QA3 Immersion heater 3

HMS140V ⑤



HMS140V ⑥



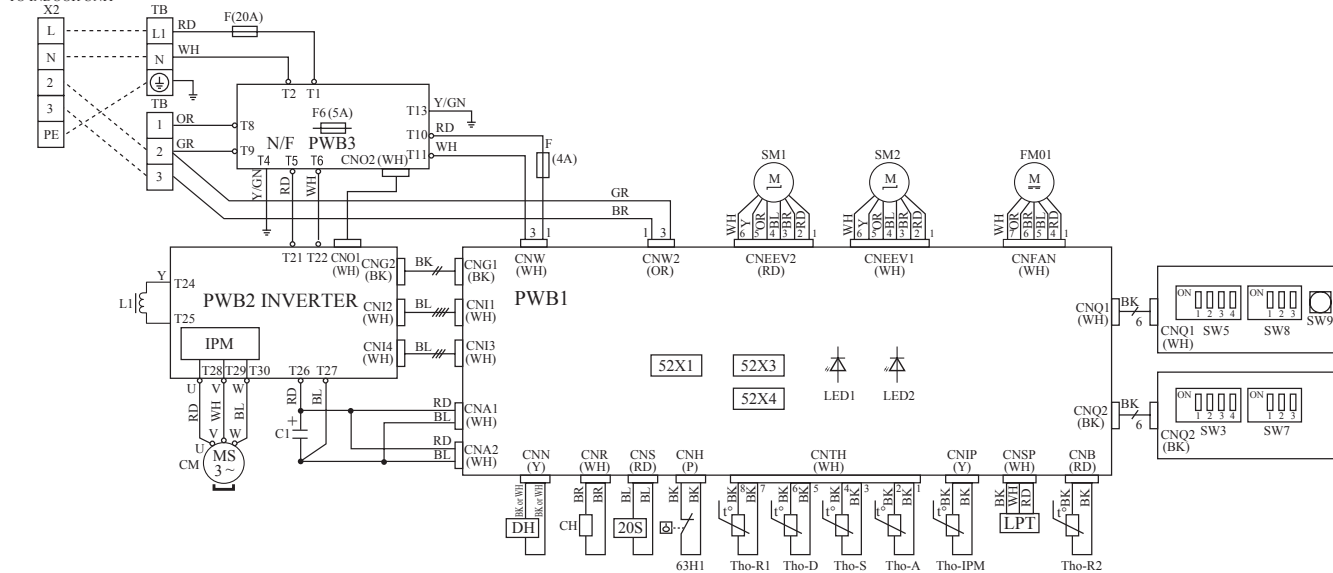
Outdoor unit

FDCW71VNX-A (Service code /1, /L only)

POWER SOURCE

230V 50Hz

TO INDOOR UNIT

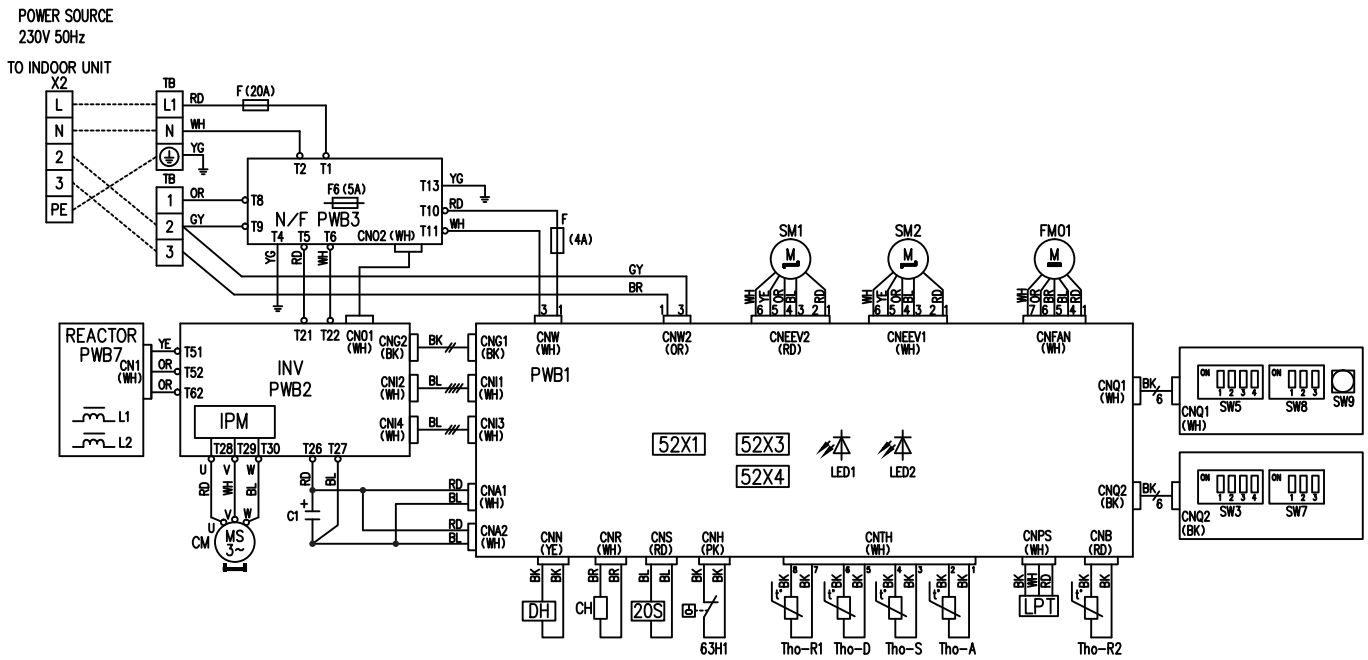


| Designation | Description |
|-------------|--------------------------------|
| 20S | Solenoid valve for 4 way valve |
| 52X1 | Auxiliary relay (for CH) |
| 52X3 | Auxiliary relay (for 20S) |
| 52X4 | Auxiliary relay (for DH) |
| 63H1 | High pressure switch |
| C1 | Capacitor |
| CH | Crankcase heater |
| CM | Compressor motor |
| CnA~Z | Connector |
| DH | Drain pan heater |
| F | Fuse |
| FM01 | Fan motor |
| IPM | Intelligent power module |
| L1 | Reactor |
| LED1 | Indication lamp (green) |
| LED2 | Indication lamp (red) |
| LPT | Low pressure sensor |
| SM1 | Expansion valve for cooling |
| SM2 | Expansion valve for heating |
| SW3,5,7,8 | Local setting switch |
| SW9 | Pump down switch |
| TB | Terminal block |

| Designation | Description |
|-------------|--|
| Tho-A | Temperature sensor, outdoor air |
| Tho-D | Temperature sensor, hot gas |
| Tho-IPM | Temperature sensor, IPM |
| Tho-R1 | Temperature sensor, heat exchanger out |
| Tho-R2 | Temperature sensor, heat exchanger in |
| Tho-S | Temperature sensor, suction gas |

Outdoor unit

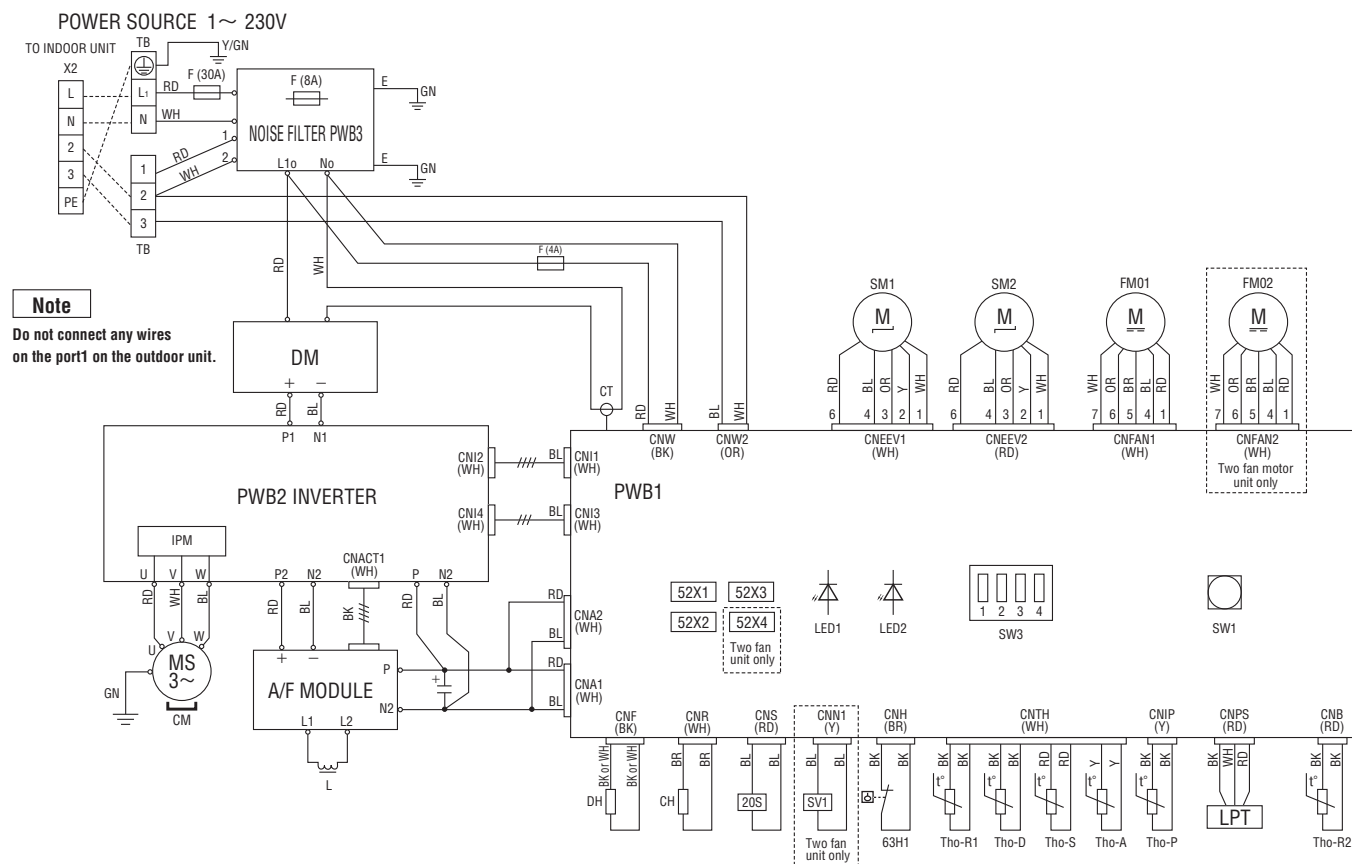
FDCW 71VNX-A (Service code /M~)



| Designation | Description |
|-------------|--------------------------------|
| 20S | Solenoid valve for 4 way valve |
| 52X1 | Auxiliary relay (for CH) |
| 52X3 | Auxiliary relay (for 20S) |
| 52X4 | Auxiliary relay (for DH) |
| 63H1 | High pressure switch |
| CH | Crankcase heater |
| CM | Compressor motor |
| CnA~Z | Connector |
| DH | Drain pan heater |
| F, F3, F6 | Fuse |
| FM01 | Fan motor |
| IPM | Intelligent power module |
| L1, L2 | Reactor |
| LED1 | Indication lamp (green) |
| LED2 | Indication lamp (red) |
| LPT | Low pressure sensor |
| SM1 | Expansion valve for cooling |
| SM2 | Expansion valve for heating |
| SW3,5,7,8 | Local setting switch |
| SW9 | Pump down switch |
| TB | Terminal block |

| Designation | Description |
|-------------|-----------------------------------|
| Tho-A | Thermistor (Outdoor air temp.) |
| Tho-D | Thermistor (Discharge pipe temp.) |
| Tho-R1 | Thermistor (Heat exchanger temp.) |
| Tho-R2 | Thermistor (Heat exchanger temp.) |
| Tho-S | Thermistor (Suction pipe temp.) |

FDCW 100VNX-A, 140VNX-A



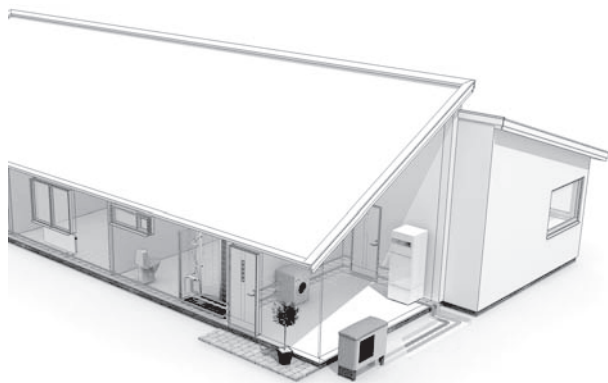
Note
Do not connect any wires on the port1 on the outdoor unit.

| Designation | Description |
|-------------|---------------------------------|
| 20S | Solenoid valve for 4-way valve |
| 52X1 | Auxiliary relay (for CH) |
| 52X2 | Auxiliary relay (for DH) |
| 52X3 | Auxiliary relay (for 20S) |
| 52X4 | Auxiliary relay (for SV1) |
| 63H1 | High pressure switch |
| CH | Crankcase heater |
| CM | Compressor motor |
| CT | Current sensor |
| DH | Drain pan heater |
| DM | Diode module |
| F | Fuse |
| FMo1 | Fan motor |
| IPM | Intelligent power module |
| L | Reactor |
| LED1 | Indication lamp (green) |
| LED2 | Indication lamp (red) |
| LPT | Low pressure sensor |
| SM1 | Expansion valve for cooling |
| SM2 | Expansion valve for heating |
| SV1 | Solenoid valve |
| SW1 | Pump down switch |
| SW3 | Local setting switch |
| TB | Terminal block |
| Tho-A | Temperature sensor, outdoor air |

| Designation | Description |
|-------------|--|
| Tho-D | Temperature sensor, hot gas |
| Tho-P | Temperature sensor, IPM |
| Tho-R1 | Temperature sensor, heat exchanger out |
| Tho-R2 | Temperature sensor, heat exchanger in |
| Tho-S | Temperature sensor, suction gas |

For Home Owners

Information about the installation



Product information

Hydrolution is a complete modern heat pump system that offers effective technical energy saving and reduced carbon dioxide emissions. Heat production is safe and economical with integrated hot water heater, immersion heater, circulation pump and climate system in the indoor unit.

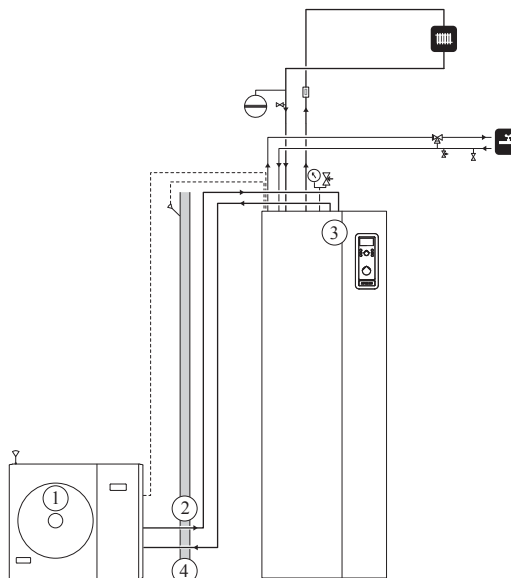
The heat is retrieved from the outdoor air through outdoor unit, where the refrigerant circulated in a closed piping system transfers the heat from the heat source (outdoor air) to indoor unit.

This eliminates the for holes and coils in the ground.

Features of Hydrolution

- Optimal annual heating factor thanks to the inverter controlled compressor.
- Outdoor unit with compact dimensions.
- Speed controlled system pump that supplies the heat pump with suitable system flow.
- Optimized operating costs. The speed of the compressor is adjusted according to the demand.
- Integrated coil water heater in indoor unit.
- Integrated clock for scheduling extra hot water and temperature lowering/increasing the supply water temperature.
- Prepared for control of two heating systems.
- Integrated active cooling function.
- Possible to connect external heat sources.

Principle of operation Hydrolution



Function

Hydrolution is a system that can produce heating, hot water and cooling.

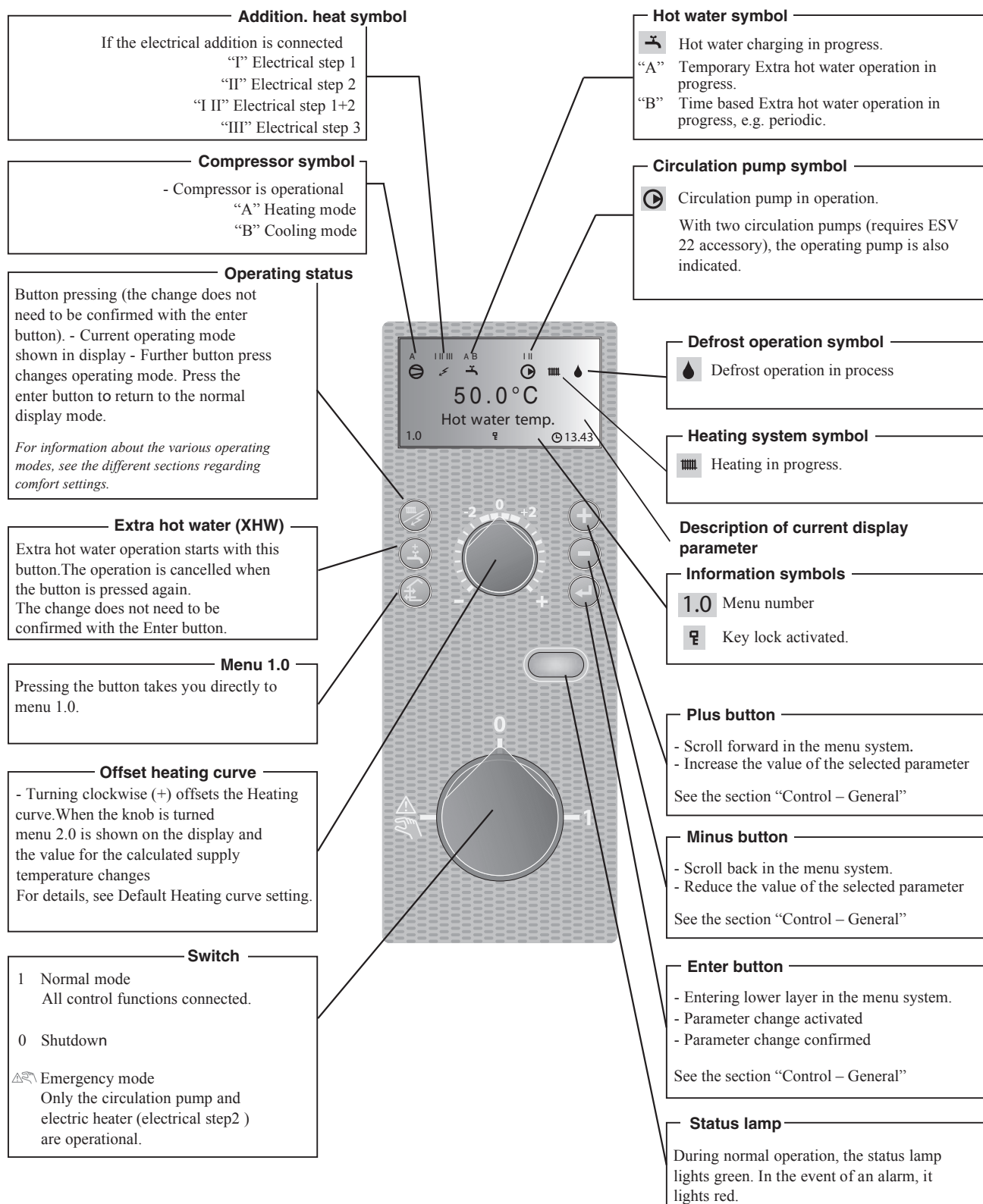
The principle during heating can be simplified as follows:

- ① The refrigerant in outdoor unit takes the heat from the outdoor air and is compressed to higher temperature by the compressor.
- ② The hot refrigerant (now in gas state) is routed into indoor unit.
- ③ The refrigerant releases the heat for further distribution in the system.
- ④ The refrigerant (now in liquid state) is routed back to outdoor unit and the process is repeated.

By reversing the entire process, and thereby the refrigerant in outdoor unit takes the heat from the water and release the heat to the outdoor air, the heat pump can cool instead if necessary.

Indoor unit determines when outdoor unit is to work and not to work, using the collated data from the temperature sensor. In the event of extra heat demands, indoor unit can connect additional heat source in the form of the internal immersion heater, or any connected external heat source.

Front panel, indoor unit



How to use front panel

All the most common settings are made from panel such as comfort etc. that you require the heat pump system to fulfil.

In order to make full use of it, certain basic settings must have been made (see page 47) and installation should be carried out according to the instructions.

Menu 1.0 (the temperature in the water heater) is normally shown on the display.



The plus and minus buttons and the enter button are used to scroll through the menu system as well as to change the set value in some menus.



Menu types (Menu 8.1.1)


Control is classified into different menu types depending on how “deep” into the controls you need to go.

- Normal [N]: The settings you as a customer often need.
- Extended [U]: Shows all detailed menus except the service menus.
- Service [S]: Shows all menus.




Changing of menu type is done from Menu 8.1.1

Quick movement

To quickly return to the main menu from a sub menu, press

the following button: 

Key lock

A key lock can be activated in the main menus by simultaneously pressing the  and the  buttons. The key symbol will then be shown on the display. 

The same procedure is used to deactivate the key lock.

Language setting (Menu 8.1.2)

Language used in the display can be chosen in Menu 8.1.2.

Comfort setting heating

General

The indoor temperature depends on several factors.

- Sunlight and heat emissions from people and household machines are normally sufficient to keep the house warm during the warmer parts of the year.
- When it gets colder outside, the heating system must be started. The colder it is outside, the warmer radiators and under floor heating systems must be.

Controlling heat production

Normally, the heat pump heats the water (heating medium) to the temperature required at a certain outdoor temperature. This occurs automatically on the basis of the collected temperature values from the outdoor sensor and sensors on the lines to the radiators (Supply water sensors). Extra accessories such as room sensors, can influence the temperature.

In order to operate the system properly, the correct settings must be made on the heat pump first, see the section “Default Heating curve setting”.

The outdoor sensor (mounted on an exterior wall of the house) senses variations in the outdoor temperature early on, sends the information to the heat pump control computer and heating operation is started. It does not have to be cold inside the house before the control system is activated. As soon as the temperature drops outside, the temperature of the water to the radiators (supply temp.) inside the house is increased automatically.

The heat pumps flow temperature (Menu 2.0) will hover around the theoretical required value, which is in brackets on the display.

Temperature of the heating system

The temperature of the heating system in relation to the outdoor temperature can be determined by you by selecting a heat curve and by using the “Offset heating curve” knob on the heat pump’s front panel.

Operating status



The “Operating mode” button is used to set the required operating mode.

The change does not need to be confirmed with the enter button.

The current operating mode is shown on the front panel display when the button is pressed and the mode changes when you continue to press the button.

The display returns to the normal display mode once the enter button is pressed.

The electric heater is only used for anti-freeze if it is deactivated in the menu system for all operating modes.

There are different operating modes to choose:

1. “Auto”

Indoor unit automatically selects the operating mode by taking the outdoor temperature into account. This means that the operating mode switches between “Heating” and “Hot water”.

The circulation pump is permitted to operate when there is a need.
 2. “AutoC”*

Indoor unit selects operating mode automatically (cooling can also be selected now) by the outdoor temperature. This means that the operating mode switches between “Heating”, “Cooling” and “Hot water”.

The circulation pump is permitted to operate when there is a need.
 3. Heating

Only heating and hot water mode.

The circulation pump is in operation the entire time. Electric heater is energized if necessary.
 4. Cooling*

Heat pump is used for cooling only if electric heater use is allowed. Otherwise, it is used for both cooling and hot water.

The circulation pump is in operation the entire time.
 5. Hot water

Only hot water is produced.

Only the compressor is operational.
 6. Add. Heat only

Heat pump is not operational. The function is activated/deactivated by pressing in the “operating mode button” for 7 seconds.
- * To use the cooling functions, the system must be designed to withstand low temperatures and cooling must be activated in Menu 9.3.3.

Changing the room temperature manually

If you want to temporarily or permanently increase or lower the indoor temperature, turn the “Offset heating curve” knob clockwise to increase or anticlockwise to lower. One line approximately represents 1 degree change in room temperature.

NOTE

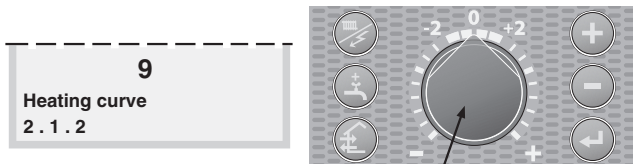
An increase in the room temperature may be inhibited by the radiator or underfloor heating thermostats, if so these must be set at 0.

Default Heating curve setting

The basic heating is set using Menu 2.1.2 and with the "Heating curve offset" knob.

If the room temperature does not reach the target, readjustment may be necessary.

If you do not know the correct settings, use the basic data from the automatic heating control system diagram on the right.



Menu 2.1.2 Heating curve

Offset heating curve

* Heating curve offset for system 2 can be made in Menu 3.1

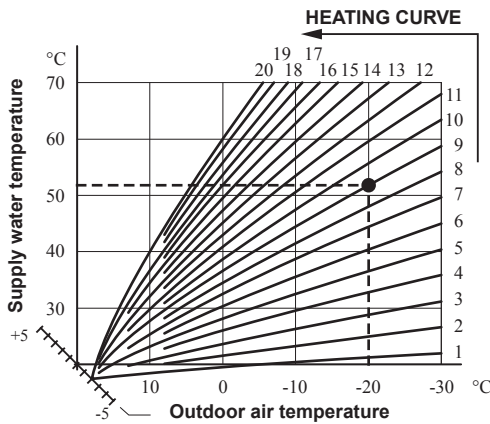
NOTE

Wait one day between settings so as to stabilise the temperatures.

Setting with diagrams

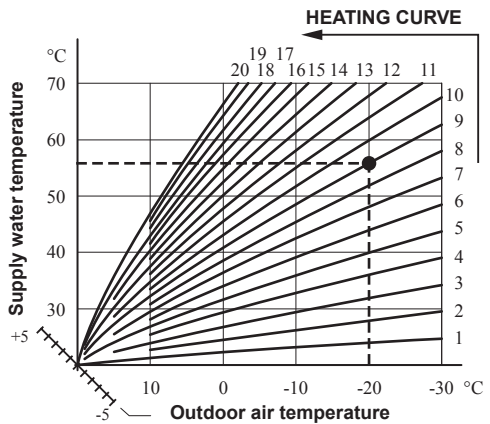
The diagram shows the relation between the outdoor air temperature in the area and the target supply water temperature of the heating system. This is set under Menu 2.1.2, "Heating curve". Limitations, which are not in the diagrams, can be set in the control system's permitted min and max temperatures. (See Menu 2.1.4 and 2.3 as well as 3.3 and 3.4)

Heating curve offset -2



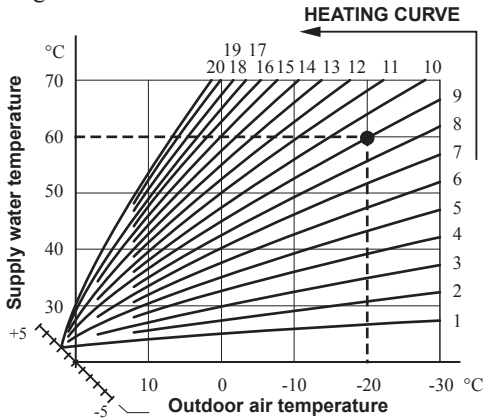
OFFSET HEAT CURVE

Heating curve offset 0



OFFSET HEAT CURVE

Heating curve offset +2



OFFSET HEAT CURVE

Readjusting the default settings

If the required room temperature is not obtained, readjustment may be necessary.

Cold weather conditions

- When the room temperature is too low, the “Heating curve” value is increased in Menu 2.1.2 by one increment.
- When the room temperature is too high, the “Heating curve” value is decreased in Menu 2.1.2 by one increment.

Warm weather conditions

- If the room temperature is low, increase the “Heating curve offset” setting by one step clockwise.
- If the room temperature is high, reduce the “Heating curve offset” setting by one step anti-clockwise.

Heating system 2

If the heating system has two different type of emitter like radiator and under floor heating, it is possible to set two different calculated supply temperature. System 1 for higher supply temperature can be set in Menu 2.1.0, and system 2 for lower supply temperature can be set in Menu 3.0.

Vacation set back

When you are away from home for a long time, it is possible to set the target supply water temperature for heating lower than usual to save energy consumption. Also, it is possible to cancel hot water operation during the period.

For details, see Menu 7.5.0 Vacation set back.

Silent mode

If you like to reduce noise from outdoor unit, it is possible to do by reducing the compressor speed and fan speed in outdoor unit.

For details, see menu 7.6.0 Silent mode.

Comfort setting with room sensor

If MH-RG10 is installed, operation mode is chosen not only by outdoor air temperature but also by room air temperature.

Upper limit of the outdoor air temperature to operate in Heating mode can be set in Menu 8.2.3 Stop temp Heating.

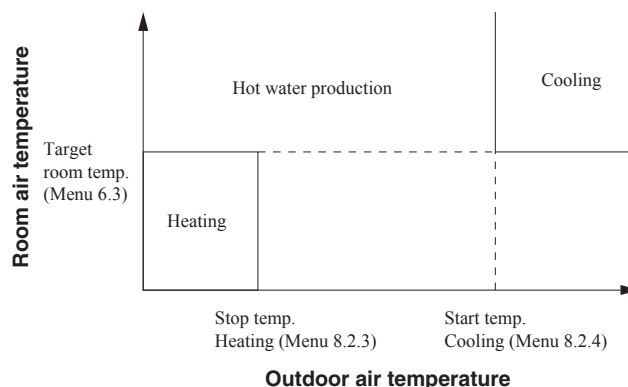
Lower limit of the outdoor air temperature to operate in Cooling mode can be set in Menu 8.2.4 Start temp Cooling.

Target room air temperature can be adjusted by turning the knob on MH-RG10, and it is displayed in Menu 6.3.

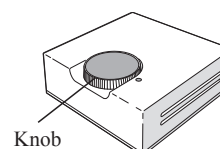
For details, see instruction manual for MH-RG10. The below figure shows an example of mode transition.

NOTE

Mode transition wouldn't happen even if MH-RG10 is installed in case Heating or Cooling mode is chosen. Choose Auto or AutoC in case room sensor is used.



Mode transition (in case AutoC is chosen)



MH-RG10

Comfort setting cooling

General

In the default setting, cooling operation is not allowed. In order to activate, change the setting on the Menu 9.3.3 Cooling system to “On”.

NOTE

The climate system must manage cooling operation. Setting must be made by installer when commissioning the system.

Settings must be made by the installer when commissioning the system.

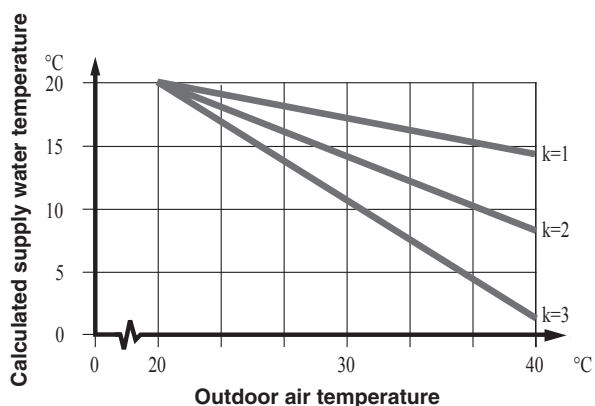
If a room sensor is connected, it starts and stops cooling based on both the room and the outdoor temperature. The lowest calculated supply water temperature is set in Menu 2.2.4.

Cooling operated from the outdoor sensor in operating mode AutoC

If the cooling system is set to “On” in Menu 9.3.3 and the outdoor air temperature is greater or equivalent to the set start temperature for cooling in Menu 8.2.4, cooling starts.

Cooling stops when the outdoor air temperature drops below the set value minus the set value in Menu 8.2.5.

The calculated supply water temperature is determined from the selected cooling curve in Menu 2.2.2 and the offset for cooling curve, Menu 2.2.1. Limitations, which are not in the diagram, are included in the control system’s permitted min temperature.



Comfort setting hot water

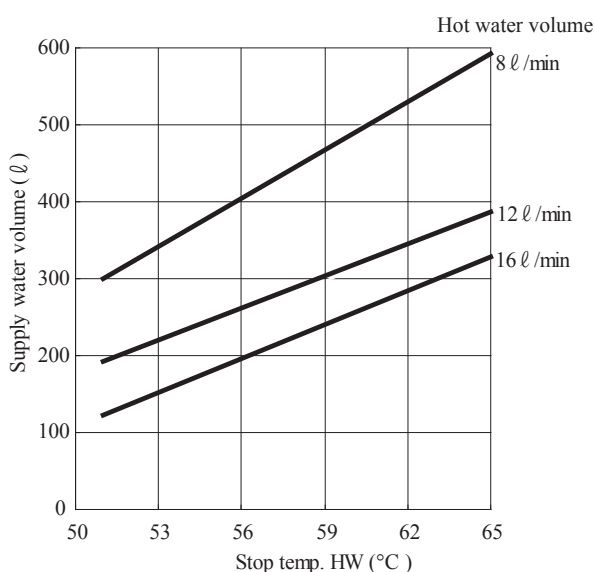
The integrated water heater is a coil model and is heated by circulating water, which is heated by the heat pump.

During “normal” consumption it is enough to run the heat pump to supply the different tapping points of the house with hot water. The temperature of the hot water in the water heater then varies between the set values.

Under section 1.0 [N] Hot water temp. on page 99 there is a complete description of menu settings for hot water temperatures.

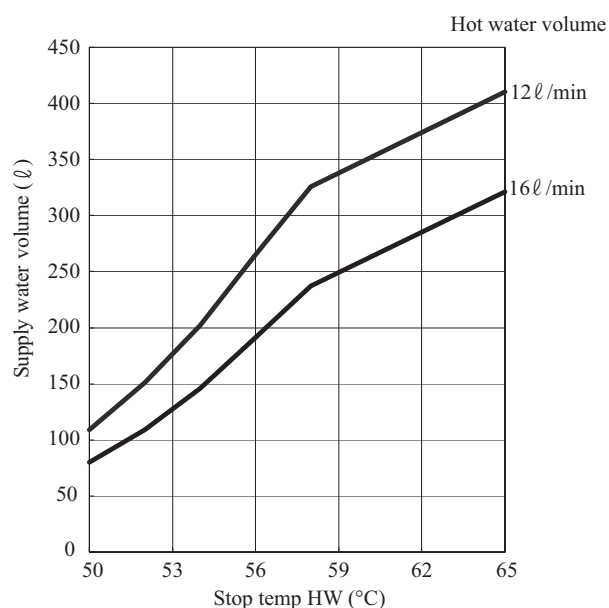
Available volume

<HMA100V, HMA100VM>

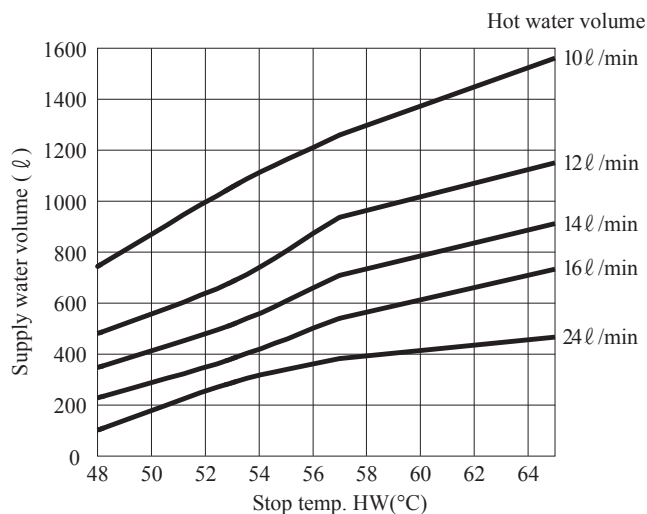


<HMS140VA, HMS140V>

MT300



MT500



*These graphs are based on the following conditions :
 Inlet water temperature : 15°C
 Outlet water temperature : 40°C
 Outdoor air temperature : 7°C

Hot water Supply is unlimited in case 8 l /min at the condition as the capacity is bigger than hot water supply.

Prioritizing



When the water temperature in the tank drops, heat pump operation shifts to hot water production. In case there is demand for both hot water and heating/cooling for long time, operation mode is periodically switched between hot water and heating/cooling. For details, see Menu 1.0 Hot water temp and Menu 8.5.0 Period settings.

Extra Hot Water

In all “Extra hot water” functions, the temperature of the hot water increases temporarily. The temperature is first increased to an adjustable level by the compressor (Menu 1.5) and then the electric heater is energized until the water temperature reaches the stop temperature (Menu 1.4).

Temporary “Extra hot water” is activated manually, whilst time based extra hot water is activated using the settings made in the control computer.

When:

- “A” appears above the  icon, temporary extra hot water is active.
- “B” appears above the  icon, time based extra hot water is active.

NOTE

“Extra hot water” usually means that the electric heater is activated regardless of Allow add heat setting (menu 8.2.1) and therefore increases the electrical consumption.

“Extra hot water” can be activated in three different ways:

1. Periodic time based extra hot water

Interval between extra hot water operation is selected in Menu 1.7. Menu 1.8 shows when the next extra hot water operation is due.

The increased temperature is maintained by the electric heater for one hour..

2. Schedule time based extra hot water

The start and stop times for the day of the week when the extra hot water operation is required are set in the sub menus to Menu 7.4.0.

The increased temperature is maintained by the electric heater for the selected period.

3. Temporary extra hot water

Extra hot water operation starts when Extra hot water button is pressed, and it is kept for 3 hours. The operation is cancelled when the button is pressed again during the period.

The increased temperature is maintained by the electric heater until the period of time has expired.

NOTE

Heat pump will not start until extra hot water period finishes. It may cause insufficient hot water supply if big demand comes.

Maintenance

Indoor unit and outdoor unit require minimal maintenance after commissioning.

Hydrolution contains many components and is why monitoring functions are integrated to help you.

If something abnormal occurs, a message appears about malfunctions in the form of different “alarm” texts in display.

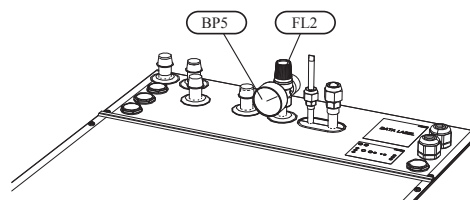
Checking the safety valves in indoor unit

Indoor unit or tank unit has been equipped with a safety valve for the water heater as well as a safety valve for the climate system by installer.

For HT30, a safety relief valve is supplied with tank unit and the valve is installed to water pipe by installer.

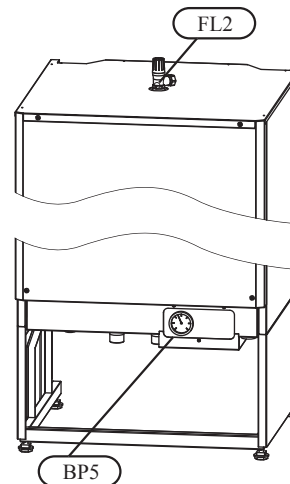
The climate system’s safety valve

<HMA100V, HMA100VM>

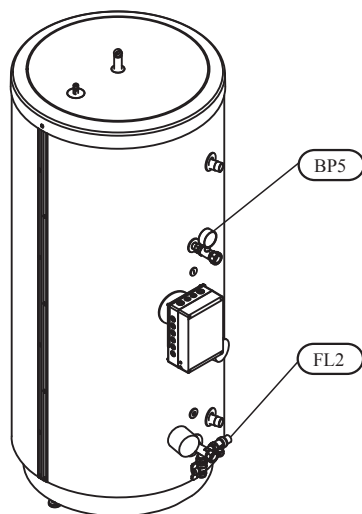


<HMS140VA, HMS140V>

MT300



MT500



The climate system’s safety valve (FL2) must be completely sealed. Checks must be carried out regularly as follows:

- Open the valve.
- Check that water flows through the valve. If this does not happen, replace the safety valve.
- Close the valve again.
- The heating system may need to be refilled after checking the safety valve, see the section “Filling the heating system”.

Hot water heater safety valve

The water heater’s safety valve sometimes releases a little water after hot water usage. This is because the cold water, which enters the heater to replace the hot water, expands when heated causing the pressure to rise and the safety valve to open.

Also check the water heater safety valve regularly. The appearance and location of the safety valve differs between different installations. Contact your installer for information.

Pressure gauge in indoor unit*

The working range of the heating system is normally 0.5 – 1.5 bar when the system is closed. Check this on the pressure gauge (BP5).

* HMS140V is not equipped with safety valve nor pressure gauge. They are on tank. For details, see page 222.

Emptying the hot water heater

The water heater is of the coil type and is drained using the siphon principle. This can be done either via the drain valve on the incoming cold water pipe or by inserting a hose into the cold water connection.

Emptying the vessel

Contact your installer if the vessel in indoor unit needs emptying.

Maintenance of outdoor unit

Outdoor unit is equipped with control and monitoring equipment, however some exterior maintenance is still necessary.

Make regular checks throughout the year that the inlet grille is not clogged by leaves, snow or anything else. During the cold months of the year, check to make sure that there isn’t a build up of ice or frost under outdoor unit. Strong wind combined with heavy snowfall can block the intake and exhaust air grilles. Make sure that there is no snow on the grilles.

Also check that the condensation water drain under outdoor unit is not blocked.

If necessary the outer casing can be cleaned using a damp cloth. Care must be exercised so that the heat pump is not scratched when cleaning. Avoid spraying water into the grilles or the sides so that water penetrates into outdoor unit. Prevent outdoor unit coming into contact with alkaline cleaning agents.

⚠ WARNING!

Rotating fan.

Saving tips

Your Hydrolution produces heat and hot water according to your needs. It also attempts to carry out all requirements with all available “aids” from the control settings made.

The indoor temperature is naturally affected by the energy consumption. Therefore, take care not to set a temperature higher than necessary.

Other known factors that affect the energy consumption are, for example, hot water consumption and the insulation level of the house, as well as the level of comfort you require.


Also remember:

- Open the thermostat valves completely (except in the rooms that are to be kept cooler for various reasons, e.g. bedrooms).

Thermostat valves in the radiators and floor loops can negatively affect the energy consumption. They slow the flow in the heating system, which the heat pump wants to compensate with increased temperatures. It then works harder and consumes more electrical energy.

Dealing with comfort disruption

Use the following list to find and remedy any heating or hot water problems.

| Symptom | Cause | Action |
|--|---|--|
| Low hot water temperature or a lack of hot water | Circuit or main MCB tripped. | Check and replace blown fuses. |
| | Heat pump and immersion heater do not heat. | Check and replace any blown circuit and main fuses. |
| | Possible earth circuit-breaker tripped. | Reset the earth circuit-breaker, if the earth circuit-breaker trips repeatedly, call an electrician. |
| | Switch (SF1) set to mode 0. | Set the switch to 1. |
| | Large hot water demand. | Wait a few hours and check if the hot water temperature rises. |
| | Too low start temperature setting on the control system. | Adjust the start temperature setting in menu 1.2. |
| Low room temperature. | Possible earth circuit-breaker tripped. | Reset the earth circuit-breaker, if the earth circuit-breaker trips repeatedly, call an electrician. |
| | Heat pump and immersion heater do not heat. | Check and replace any blown circuit and main fuses. |
| | Incorrect setting of “Heating curve, offset” and/or “Cooling curve, offset”. | Adjust the settings. Check Menu 2.1.1, 2.1.2 for heating system 1 3.1, 3.2 for heating system 2 2.1.1, 2.2.2 for cooling system |
| | Stop temp heating setting is too low. | Adjust the setting. Check Menu 8.2.3 |
| | Circuit or main MCB tripped. | Check and replace blown fuses. |
| | Heat pump in incorrect operating mode “Hot water” or “Cooling”. | Change operating mode to “Auto” or “AutoC” . |
| | The current limiter has restricted the current because many power consumers are being used in the property. | Switch off one/several of the power consumers. |
| High room temperature. | Incorrect setting of “Heating curve, offset” and/or “Cooling curve, offset”. | Adjust the settings. Check Menu 2.1.1, 2.1.2 for heating system 1 3.1, 3.2 for heating system 2 2.1.1, 2.2.2 for cooling system |
| | Heat pump in incorrect operating mode. | Change operating mode to “AutoC”. |
| | Start temp cooling setting is too high. | Adjust the setting. Check Menu 8.2.4. |
| | Heat load is too high. | Remove the excess heat load. |
| The compressor does not start. | Minimum time between compressor starts alternatively time after power switch on not being achieved. | Wait 30 minutes and check if the compressor starts. |
| | Alarm tripped. | See section “Alarms”. |
| | Alarm cannot be reset. | Activate operating mode “Add. heat only”. |
| Panel gone out. | | Check and replace any blown circuit and main fuses. |
| | | Check that the circuit breaker to the indoor unit is not off. |
| | | Set switch (SF1) to standby “  ”. |

The phenomena mentioned below are not malfunction.

| | |
|--|--|
| The air conditioning system sounds as if water is draining from it. | Sounds of rustling or gurgling may be heard when the operation is started, when the compressor is activated/deactivated during operation, or when the operation is stopped. These are the sounds of the refrigerant flowing through the system. |
| Sounds of rustling or gurgling may be heard from a stopped indoor unit. | These sounds can be heard when the air conditioning system is performing automatic control. |
| The air conditioning system cannot start operating again immediately after stopping. | Outdoor unit doesn't restart during the first 3 minutes after stopping operation. This is because a circuit for protecting the compressor is activated (the fan is operating during this period). |
| The outdoor unit discharges water or steam during heating operation. | Water or steam is discharge during defrosting operation which removes frost built up on the surface of the heat exchanger in the outdoor unit in heating mode. |
| The outdoor unit fan is not running even when the system is in operation. | The fan speed is automatically controlled according to the outdoor air temperature. It may be stopped in high outdoor air temperature in case of heating, and in low outdoor air temperature in case of cooling. Also, the fan is stopped during defrosting operation. REQUESTS The fan will suddenly begin to operate even if it is stopped. Do not insert finger and/or stick. |
| Hissing sounds are heard when the operation is stopped or during defrost operation. | These sounds are generated when the refrigerant valve inside the air conditioning system is activated. |

Operating mode “Add. heat only”



In the event of malfunctions that cause a low indoor temperature, you can normally activate “Add. heat only” in indoor unit, which means that heating only occurs with the immersion heater.

Activate the mode by holding in the operating mode button

 for 7 seconds.

Note that this is only a temporary solution, as heating with the immersion heater does not make any savings.

Emergency mode

Emergency mode is activated by setting the switch to “”. It is used when the control system and thereby operating mode “Add. heat only” do not function as they should. Emergency mode is activated by setting switch (SF1) to “”.

The following applies in emergency mode:

- The front panel is not lit and the control computer in indoor unit is not connected.
- Outdoor unit is off and only the circulation pump and immersion heater in indoor unit are active.
- An electrical step of 4 kW is connected. The immersion heater is controlled by a separate thermostat (BT30).
- The automatic heating control system is not operational, so manual shunt operation is required. Call installer.
- For valve position, see page 65.

Alarm indications

There are many monitoring functions integrated in Hydrolution. To alert you to any malfunctions, the control computer transmits alarm signals that can be read from the front panel display.

What happens in the event of an alarm?

- The background lighting in the display starts flashing and the status lamp lights red.
- Some alarms change operating mode to “Add. heat only.” and reduce the supply temperature to the minimum permitted temperature to notify you that something is wrong.

Different types of alarms

- Alarms with automatic reset (do not need to be acknowledged when the cause has disappeared).
- Existing alarms that require corrective action by you or the installer.
- A complete list of alarms is on page 154.

Recommended actions

1. Read off which alarm has occurred from the heat pump’s display.
2. As a customer you can rectify certain alarms. See the table below for relevant actions. If the alarm is not rectified, or is not included in the table, contact your installer.

| Alarm text on the display | Alarm description | Check/remedy before installers/service technicians are called |
|----------------------------------|--|--|
| LP-ALARM | Tripped low pressure sensor. | Check that the thermostats for the radiators/under-floor systems are not closed. |
| HP-ALARM | Tripped high pressure sensor. | Check that the thermostats for the radiators/under-floor systems are not closed. |
| OU power failure / OU Com. error | Outdoor unit not powered / Communication cut | Check that any circuit breakers to the outdoor unit are not off. |
| Display not lit | | Check and replace any blown circuit and main fuses. |
| | | Check that the circuit breakers to the indoor unit are not off. |
| | | Check that the switch (SF1) is in normal position (1). |

Resetting alarms

No harm in Resetting an alarm. If the cause of the alarm remains, the alarm recurs.

- When an alarm has been triggered, it can be reset by switching indoor unit off and on using the switch (SF1).
- When the alarm cannot be reset using the switch (SF1), the operating mode, “Add. heat only”, can be activated to resume a normal temperature level in the house. This is most easily carried out by holding the “Operating mode” button in for 7 seconds.

NOTE

Recurring alarms mean that there is a fault in the installation.

Contact your installer!

Installation

PSB012D955G

Outdoor unit installation

- This installation manual deals with outdoor units and general installation specifications only. For indoor units, refer to the respective installation manuals supplied with the units.
- Read this manual carefully before you set to installation work and carry it out according to the instructions contained in this manual.

Check before installation work

[Accessory]

| | | | |
|--------|---|---------|---|
| Edging |  | 1 piece | knock-out hole protection (100VNX, 140VNX only) |
|--------|---|---------|---|

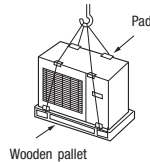
- Model name and power source
- Refrigerant piping length
- Piping, wiring and miscellaneous small parts
- Indoor unit installation manual

1. HAULAGE AND INSTALLATION (Take particular care in carrying in or moving the unit, and always perform such an operation with two or more persons.)

CAUTION When a unit is hoisted with slings for haulage, take into consideration the offset of its gravity center position. If not properly balanced, the unit can be thrown off-balance and fall.

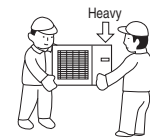
1) Delivery

- Deliver the unit as close as possible to the installation site before removing it from the packaging.
- When some compelling reason necessitates the unpacking of the unit before it is carried in, use nylon slings or protective wood pieces so as not to damage the unit by ropes lifting it.



2) Portage

- The right hand side of the unit as viewed from the front (diffuser side) is heavier. A person carrying the right hand side must take heed of this fact. A person carrying the left hand side must hold with his right hand the handle provided on the front panel of the unit and with his left hand the corner column section.



3) Selection of installation location for the outdoor unit

Be sure to select a suitable installation place in consideration of following conditions.

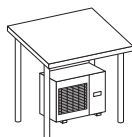
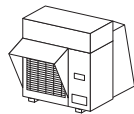
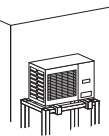
- A place where it is horizontal, stable and can endure the unit weight and will not allow vibration transmittance of the unit.
- A place where it can be free from possibility of bothering neighbors due to noise or exhaust air from the unit
- A place where the unit is not exposed to oil splashes.
- A place where it can be free from danger of flammable gas leakage.
- A place where drain water can be disposed without any trouble.
- A place where the unit will not be affected by heat radiation from other heat source.
- A place where snow will not accumulate.
- A place where the unit can be kept away 5m or more from TV set and/or radio receiver in order to avoid any radio or TV interference.
- A place where good air circulation can be secured, and enough service space can be secured for maintenance and service of the unit safely.
- A place where the unit will not be affected by electromagnetic waves and/or high-harmonic waves generated by other equipment.
- A place where chemical substances like sulfuric gas, chloric gas, acid and alkali (including ammonia), which can harm the unit, will not be generated and not remain.
- A place where strong wind will not blow against the outlet air blow of the unit.

Do not install the unit in places which exposed to sea breeze (e.g. coastal area) or calcium chloride (e.g. snow melting agent) exposed to ammonia substance (e.g. organic fertilizer).

4) Caution about selection of installation location

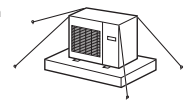
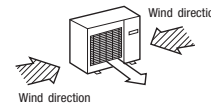
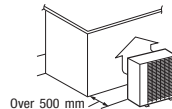
- (1) If the unit is installed in the area where the snow will accumulate, following measures are required.
The bottom plate of unit and intake, outlet may be blocked by snow.

1. Install the unit on the base so that the bottom is higher than snow cover surface.
2. Provide a snow hood to the outdoor unit on site.
Regarding outline of a snow hood, refer to our technical manual.
3. Install the unit under eaves or provide the roof on site.



- (2) If the unit can be affected by strong wind, following measures are required.
Strong wind can cause damage of fan (fan motor), or can cause performance degradation, or can trigger anomalous stop of the unit due to rising of high pressure or dropping of low pressure.

1. Install the outlet air blow side of the unit to face a wall of building, or provide a fence or a windbreak screen.
2. Install the outlet air blow side of the unit in a position perpendicular to the direction of wind.
3. The unit should be installed on the stable and level foundation. If the foundation is not level, tie down the unit with wires.



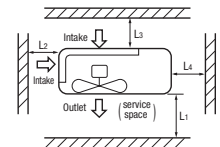
- Since drain water generated by defrost control may freeze, following measures are required.
- Don't execute drain piping work by using a drain elbow and drain grommets (optional parts). [Refer to Drain piping work.]
- Recommend setting Defrost Control (SW3-1) and Snow Guard Fan Control (SW3-2). [Refer to Setting SW3-1, SW3-2.]

4. Use wind guard in case outdoor unit is installed where ambient temperature drops below -10°C and natural wind blows into outdoor unit directly.
For detail see page 228.

5) Installation space

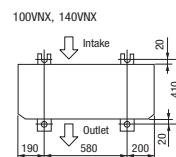
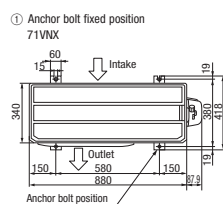
- Walls surrounding the unit in the four sides are not acceptable.
- There must be a 1-meter or larger space in the above.
- Where a danger of short-circuiting exists, install guide louvers.
- When more than one unit are installed, provide sufficient intake space consciously so that short-circuiting may not occur.
- Where piling snow can bury the outdoor unit, provide proper snow guards.
- A barrier wall placed in front of the exhaust diffuser must not be higher than the unit.
- Advisable to keep the right side service space (L4) more than 300 mm for easy maintenance.

| Size | 71VNX | | | 100VNX, 140VNX | | |
|------|-------|------|------|----------------|------|------|
| | I | II | III | I | II | III |
| L1 | Open | Open | 500 | Open | Open | 500 |
| L2 | 300 | 250 | Open | 300 | 5 | Open |
| L3 | 100 | 150 | 100 | 150 | 300 | 150 |
| L4 | 250 | 250 | 250 | 5 | 5 | 5 |

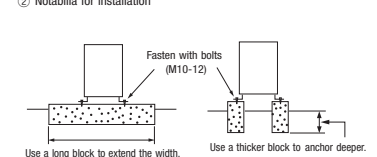


6) Installation

- In installing the unit, fix the unit's legs with bolts specified on the left.
- The protrusion of an anchor bolt on the front side must be kept within 15 mm.
- Securely install the unit so that it does not fall over during earthquakes or strong winds, etc.
- Refer to the left illustrations for information regarding concrete foundations.
- Install the unit in a level area. (With a gradient of 5 mm or less.)
Improper installation can result in a compressor failure, broken piping within the unit and abnormal noise generation.



② Notabilia for installation

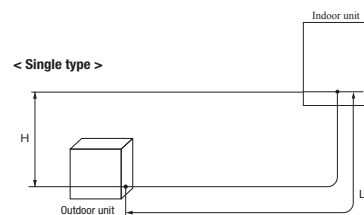


2. REFRIGERANT PIPING WORK

1) Restrictions on unit installation and use

- Check the following points in light of the indoor unit specifications and the installation site.
- Observe the following restrictions on unit installation and use. Improper installation can result in a compressor failure or performance degradation.

| Restrictions | Dimensional restrictions | | | Marks appearing in the drawing on the right |
|---|---|------------|--------|---|
| | 71VNX | 100VNX | 140VNX | |
| One-way pipe length of refrigerant piping | 30m or less | | | L |
| Elevation difference between indoor and outdoor units | When the outdoor unit is positioned higher, | 7m or less | | H |
| | When the outdoor unit is positioned lower, | 7m or less | | H |



2) Determination of pipe size

- Determine refrigerant pipe size pursuant to the following guidelines based on the indoor unit specifications.

| Outdoor unit connected | 71VNX, 100VNX, 140VNX | |
|-----------------------------|--|----------------|
| | Gas pipe | Liquid pipe |
| Refrigerant piping | φ15.88 Flare | φ9.52 Flare |
| Indoor unit connected | φ15.88 | φ9.52 |
| Connected indoor unit model | HMA100V, 100VM (71VNX, 100VNX), HMS140V (140VNX) | |

3) Refrigerant pipe wall thickness and material

- Select refrigerant pipes of the table shown on the right wall thickness and material as specified for each pipe size.

| | | |
|----------------------------------|-------------|-------------|
| Pipe diameter [mm] | 9.52 | 15.88 |
| Minimum pipe wall thickness [mm] | 0.8 | 1.0 |
| Pipe material* | O-type pipe | O-type pipe |

*Phosphorus deoxidized seamless copper pipe C1220T, JIS H3300

NOTE

- Select pipes having a wall thickness larger than the specified minimum pipe thickness.

4) On-site piping work

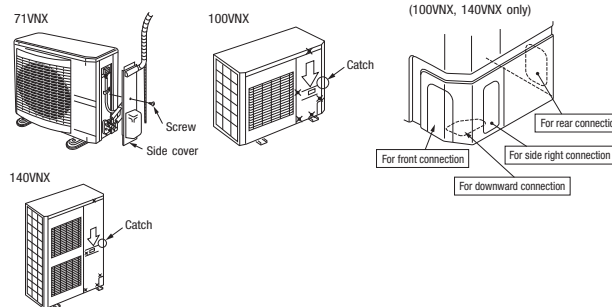
IMPORTANT

- Take care so that installed pipes may not touch components within a unit. If touching with an internal component, it will generate abnormal sounds and/or vibrations.

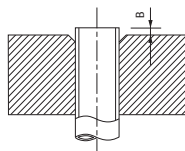
How to remove the service panel

First remove the screw (s) (x mark) of the service panel or the side cover and push it down into the direction of the arrow mark and then remove it by pulling it toward you.

- The pipe can be laid in any of the following directions: side right, front, rear and downward. (100VNX, 140VNX)
- Remove a knock-out plate provided on the pipe penetration to open a minimum necessary area and attach an edging material supplied as an accessory by cutting it to an appropriate length before laying a pipe. (100VNX, 140VNX)
- Carry out the on site piping work with the operation valve fully closed.
- Give sufficient protection to a pipe end (compressed and blazed, or with an adhesive tape) so that water or foreign matters may not enter the piping.
- Bend a pipe to a radius as large as practical.(R100~R150) Do not bend a pipe repeatedly to correct its form.
- Flare connection is used between the unit and refrigerant pipe. Flare a pipe after engaging a flare nut onto it. Flare dimensions for R410A are different from those for conventional R407C. Although we recommend the use of flaring tools designed specifically for R410A, conventional flaring tools can also be used by adjusting the measurement of protrusion B with a protrusion control gauge.



| Flared pipe end: A (mm) | |
|----------------------------|------|
| Copper pipe outer diameter | A |
| φ6.35 | 9.1 |
| φ9.52 | 13.2 |
| φ12.7 | 16.6 |
| φ15.88 | 19.7 |



| Copper pipe outer diameter | Copper pipe protrusion for flaring: B (mm) | |
|----------------------------|--|--------------------------|
| | In the case of a rigid (clutch) type | |
| | With an R410A tool | With a conventional tool |
| φ6.35 | 0~0.5 | 0.7~1.3 |
| φ9.52 | | |
| φ12.7 | | |
| φ15.88 | | |

- Tighten a flare joint securely with a double spanner.

CAUTION

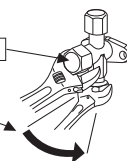
Do not apply force beyond proper fastening torque in tightening the flare nut.

Fix both liquid and gas service valves at the valve main bodies as illustrated on the right, and then fasten them, applying appropriate fastening torque.

| Operation valve size (mm) | Tightening torque (N·m) | Tightening angle (°) | Recommended length of a tool handle (mm) |
|---------------------------|-------------------------|----------------------|--|
| φ6.35 (1/4") | 14~18 | 45~60 | 150 |
| φ9.52 (3/8") | 34~42 | 30~45 | 200 |
| φ12.7 (1/2") | 49~61 | 30~45 | 250 |
| φ15.88 (5/8") | 68~82 | 15~20 | 300 |

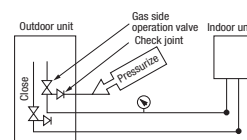
Do not hold the valve cap area with a spanner.

Use a torque wrench. If a torque wrench is not available, fasten the flare nut manually first and then tighten it further, using the left table as a guide.



5) Air tightness test

- Although outdoor and indoor units themselves have been tested for air tightness at the factory, check the connecting pipes after the installation work for air tightness from the operation valve's check joint equipped on the outdoor unit side. While conducting a test, keep the operation valve shut all the time.
 - Raise the pressure to 0.5 MPa, and then stop. Leave it for five minutes to see if the pressure drops.
 - Then raise the pressure to 1.5 MPa, and stop. Leave it for five more minutes to see if the pressure drops.
 - Then raise the pressure to the specified level (4.15 MPa), and record the ambient temperature and the pressure.
 - If no pressure drop is observed with an installation pressurized to the specified level and left for about one day, it is acceptable. When the ambient Temperature fall 1°C, the pressure also fall approximately 0.01 MPa. The pressure, if changed, should be compensated for.
 - If a pressure drop is observed in checking e) and a) - d), a leak exists somewhere. Find a leak by applying bubble test liquid to welded parts and flare joints and repair it. After repair, conduct an air-tightness test again.
- In conducting an air-tightness test, use nitrogen gas and pressurize the system with nitrogen gas from the gas side. Do not use a medium other than nitrogen gas under any circumstances.

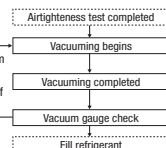


6) Evacuation

<Work flow>

When the system has remaining moisture inside or a leaky point, the vacuum gauge indicator will rise. Check the system for a leaky point and then draw air to create a vacuum again.

Run the vacuum pump for at least one hour after the vacuum gauge shows -101kPa or lower (-755mmHg or lower). Confirm that the vacuum gauge indicator does not rise even if the system is left for one hour or more.



Pay attention to the following points in addition to the above for the R410A and compatible machines.

- To prevent a different oil from entering, assign dedicated tools, etc. to each refrigerant type. Under no circumstances must a gauge manifold and a charge hose in particular be shared with other refrigerant types (R22, R407C, etc.).
- Use a counterflow prevention adapter to prevent vacuum pump oil from entering the refrigerant system.

7) Additional refrigerant charge

(1) Calculate a required refrigerant charge volume from the following table.

| | Additional charge volume (kg) per meter of refrigerant piping (liquid pipe φ6.35) | Refrigerant volume charged for shipment at the factory (kg) | Installation's pipe length (m) covered without additional refrigerant charge |
|--------|---|---|--|
| 71VNX | 0.06 | 2.55 | 15 |
| 100VNX | 0.06 | 2.9 | 15 |
| 140VNX | 0.06 | 4.0 | 15 |

● This unit contains factory charged refrigerant covering 15m of refrigerant piping and additional refrigerant charge on the installation site is not required for an installation with up to 15m refrigerant piping. When refrigerant piping exceeds 15m, additionally charge an amount calculated from the pipe length and the above table for the portion in excess of 15m.

Formula to calculate the volume of additional refrigerant required

$$\text{Additional charge volume (kg)} = \{ \text{Main pipe length (m)} - \text{Length covered without additional charge 15 (m)} \} \times 0.06 \text{ (kg/m)}$$

*When an additional charge volume calculation result is negative, it is not necessary to charge refrigerant additionally.

● To charge refrigerant again to the system, recover refrigerant from the system first and then charge the same volume as initial charge.

(2) Charging refrigerant

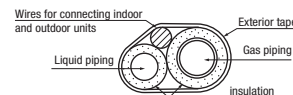
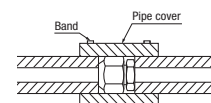
- Since R410A refrigerant must be charged in the liquid phase, you should charge it, keeping the container cylinder upside down or using a refrigerant cylinder equipped with a siphon tube.
- Charge refrigerant always from the liquid side service port with the operation valve shut. When you find it difficult to charge a required amount, fully open the outdoor unit valves on both liquid and gas sides and charge refrigerant from the gas (suction) side service port while running the unit in the cooling mode. In doing so, care must be taken so that refrigerant may be discharged from the cylinder in the liquid phase all the time. When the cylinder valve is throttled down or a dedicated conversion tool to change liquid-phase refrigerant into mist is used to protect the compressor, however, adjust charge conditions so that refrigerant will gasify upon entering the unit.
- In charging refrigerant, always charge a calculated volume by using a scale to measure the charge volume.
- When refrigerant is charged with the unit being run, complete a charge operation within 30 minutes. Running the unit with an insufficient quantity of refrigerant for a long time can cause a compressor failure.

NOTE ● Write down the additional and total refrigerant volume on the label in front.

8) Insulation on piping

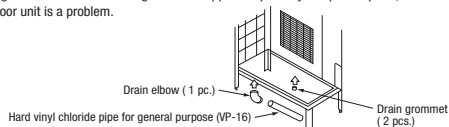
- (1) Dress refrigerant pipes (both gas and liquid pipes) for heat insulation and prevention of dew condensation.
- (2) Use a heat insulating material that can withstand 120°C or a higher temperature. Poor heat insulating capacity can cause heat insulation problems or cable deterioration.

- Improper heat insulation/anti-dew dressing can result in a water leak or dripping causing damage to household effects, etc.
- All gas pipes must be securely heat insulated in order to prevent damage from dripping water that comes from the condensation formed on them during a cooling operation or personal injury from burns because their surface can reach quite a high temperature due to discharged gas flowing inside during a heating operation.
- Wrap indoor units' flare joints with heat insulating parts (pipe cover) for heat insulation (both gas and liquid pipes).
- Give heat insulation to both gas and liquid side pipes. Bundle a heat insulating material and a pipe tightly together so that no gaps may be left between them and wrap them together with a connecting cable by a dressing tape.
- **Both gas and liquid pipes need to be dressed with 20 mm or thicker heat insulation materials above the ceiling where relative humidity exceeds 70%.**



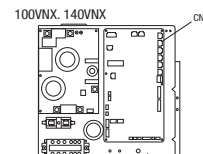
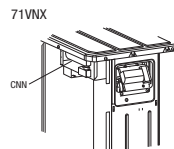
3. DRAIN PIPING WORK

- Execute drain piping by using a drain elbow and drain grommets supplied separately as optional parts, where water drained from the outdoor unit is a problem.



- There are 3 drain holes provided on the bottom plate of an outdoor unit to discharge condensed water.
- When condensed water needs to be led to a drain, etc., install the unit on a flat base (supplied separately as an optional part) or concrete blocks.
- Connect a drain elbow as shown in the illustration and close the other two drain holes with grommets.

- Do not use drain elbow and grommet made of plastic for drain piping when base heater for outdoor unit is used. Plastic grommet and elbow will be damaged and burnt in worst case.
- Prepare another drain tray made of metallic material for collecting drain when base heater is used.
- In case plastic grommet and drain elbow is used in warm climate area, disconnect the connector for heater on PCB shown in the drawing.



4. ELECTRICAL WIRING WORK

For details of electrical cabling, refer to the indoor unit installation manual.

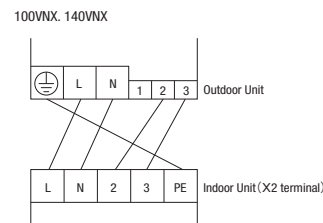
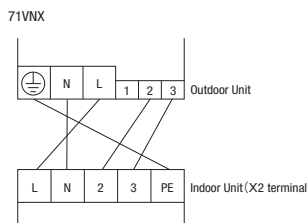
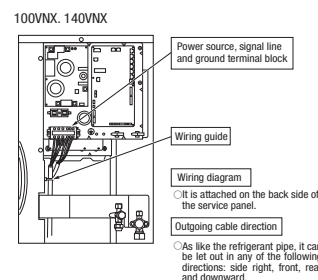
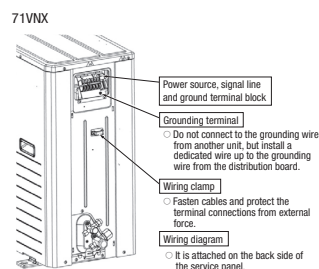
Electrical installation work must be performed by an electrical installation service provider qualified by a power provider of the country.

Electrical installation work must be executed according to the technical standards and other regulations applicable to electrical installations in the country.

- Ground the unit. Do not connect the grounding wire to a gas pipe, water pipe, lightning rod or telephone grounding wire. If improperly grounded, an electric shock or malfunction may result.
- A grounding wire must be connected before connecting the power cable. Provide a grounding wire longer than the power cable.
- Do not lay electronic control cables (remote control and signaling wires) and other cables together outside the unit. Laying them together can result in the malfunctioning or a failure of the unit due to electric noises.
- Fasten cables so that may not touch the piping, etc.
- When cables are connected, make sure that all electrical components within the electrical component box are free of loose connector coupling or terminal connection and then attach the cover securely. (Improper cover attachment can result in malfunctioning or a failure of the unit, if water penetrates into the box.)
- Connect a pair bearing a common terminal number with an indoor-outdoor connecting wire.
- In cabling, fasten cables securely so that no external force may work on terminal connections.
- Grounding terminals are provided in the control box.

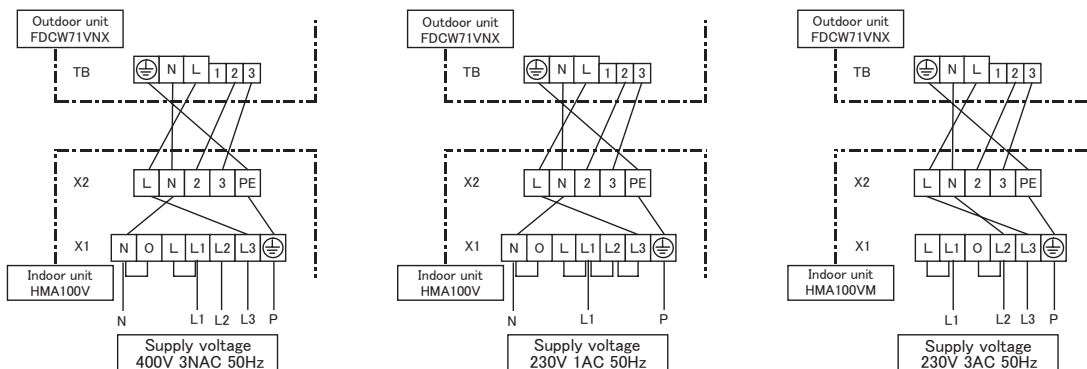
Power cable, indoor-outdoor connecting wires

- Always perform grounding system installation work with the power cord unplugged.

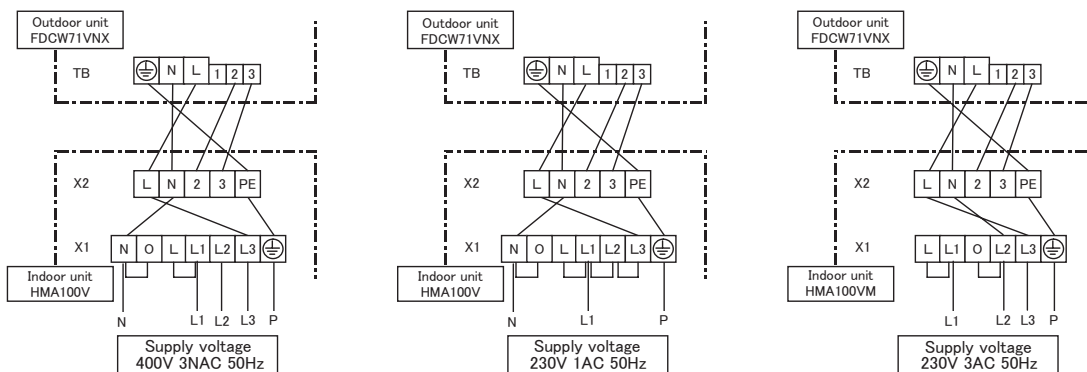


Connection between indoor unit and outdoor unit

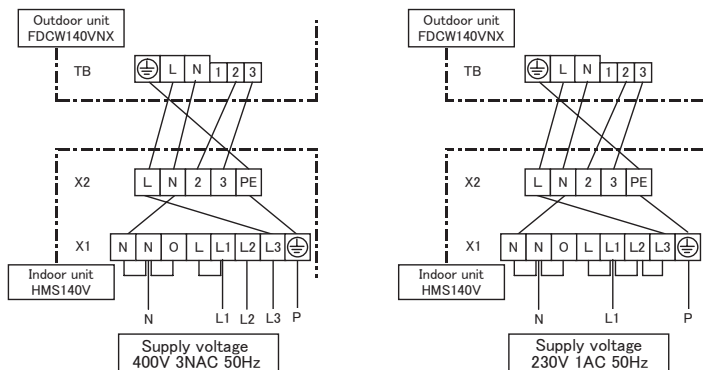
FDCW71VNX



FDCW100VNX



FDCW140VNX



5. COMMISSIONING For details of commissioning, refer to the Indoor unit installation manual

⚠ WARNING

- Before conduct a test run, make sure that the operation valves are open.
- Turn on power 6 hours prior to a test run to energize the crank case heater. Do not turn on the power when the ambient temperature is below -20°C to avoid breakdown of electronic component.
- In case of the first operation after turning on power, even if the unit does not operate for 30 minutes, it is not a breakdown.
- Always give a 3-minute or longer interval before you start the unit again whenever it is stopped.
- Removing the service panel will expose high-voltage live parts and high-temperature parts, which are quite dangerous. Take utmost care not to incur an electric shock or burns. Do not leave the unit with the service panel open.

A failure to observe these instructions can result in a compressor breakdown.

⚠ CAUTION

- When you operate switches (SW3) for on-site setting, be careful not to touch a live part.
- You cannot check discharge pressure from the liquid operation valve charge port.
- The 4-way valve (20S) is energized during a heating operation.
- When power supply is cut off to reset the unit, give 3 minutes or more before you turn on power again after power is cut off. If this procedure is not observed in turning on power again, "Communication error between outdoor and indoor unit" may occur.

Items to check before a test run

- When you leave the outdoor unit with power supplied to it, be sure to close the panel.

| Item No. used in the installation manual | Item | Check item | Check |
|--|----------------------|--|-------|
| 2 | Refrigerant plumbing | Were air-tightness test and vacuum extraction surely performed? | |
| | | Are heat insulation materials installed on both liquid and gas pipes? | |
| | | Are operation valves surely opened for both liquid and gas systems? | |
| 4 | Electric wiring | Is the unit free from cabling errors such as uncompleted connection, or reversed phase? | |
| | | Doesn't cabling cross-connect between units, where more than one unit are installed? | |
| | | Do indoor-outdoor connecting cables connect between the same terminal numbers? | |
| | | Is the unit grounded with a dedicated grounding wire not connected to another unit's grounding wire? | |
| | | Are cables free from loose screws at their connection points? | |
| | | Are cables held down with cable clamps so that no external force works onto terminal connections? | |

1) Test run method

Refer to the indoor unit installation manual.

2) Checking the state of the unit in operation

Use check joints provided on the piping before and after the four-way valve installed inside the outdoor unit for checking discharge pressure and suction pressure. As indicated in the table shown on the right, pressure detected at each point will vary depending on whether a cooling or heating operation has been selected.

| | Check joint of the pipe | Charge port of the gas operation valve |
|-------------------|------------------------------------|--|
| Cooling operation | Discharge pressure (High pressure) | Suction pressure (Low pressure) |
| Heating operation | Suction pressure (Low pressure) | Discharge pressure (High pressure) |

3) Setting SW3-1, SW3-2, on-site

(1) Defrost control switching (SW3-1)

- When this switch is turned ON, the unit will run in the defrost mode more frequently.
- Set this switch to ON, when installed in a region where outdoor temperature falls below zero during the season the unit is run for a heating operation.

(2) Snow guard fan control (SW3-2)

- When this switch is turned on, the outdoor unit fan will run for 10 seconds in every 10 minutes, when outdoor temperature falls to 3°C or lower and the compressor is not running.
- When the unit is used in a very snowy country, set this switch to ON.

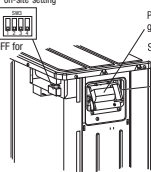
71VNX

Switches for on-site setting

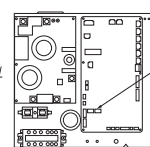
ON

↑

All set to OFF for shipment



100VNX, 140VNX



SWITCHES FOR ON-SITE SETTING SW3

ON

↑

All set to OFF for shipment

※ Do not operate SW3-3, SW5, SW7, SW8.

4) Failure diagnosis in a test run

| Indoor Unit Display | Error Code in Error Log | Printed circuit board LED (The cycles of 5 seconds) | | Failure event | Action |
|---------------------|-------------------------|---|-----------------------|---|--|
| | | Red LED | Green LED | | |
| OU phase error | E34 | Blinking once | Blinking continuously | Open phase | Check power cables for loose contact or disconnection |
| HP alarm | E40 | Blinking once | Blinking continuously | 63H1 actuation or operation with operation valves shut (occurs mainly during a heating operation) | 1. Check whether the operation valves are open. 2. If an error has been canceled when 3 minutes have elapsed since a compressor stop, you can restart the unit by effecting Check Reset from the remote control unit. |
| LP alarm | E49 | Blinking once | Blinking continuously | Low pressure error or operation with operation valves shut (occurs mainly during a cooling operation) | |

- If an error code other than those listed above is indicated, refer to the wiring diagram of the outdoor unit and the indoor unit Installation manual.

5) The state of the electronic expansion valve.

The following table illustrates the steady states of the electronic expansion valve.

| | When power is turned on | When the unit comes to a normal stop | | When the unit comes to an abnormal stop | |
|-------------------------------|-------------------------|--------------------------------------|----------------------------|---|----------------------------|
| | | During a cooling operation | During a heating operation | During a cooling operation | During a heating operation |
| Valve for a cooling operation | Complete shut position | Complete shut position | Full open position | Full open position | Full open position |
| Valve for a heating operation | Full open position | Full open position | Complete shut position | Full open position | Full open position |

6) Heed the following on the first operation after turning on the power supply.

This outdoor unit may start in the standby mode (waiting for a compressor startup), which can continue up to 30 minutes, to prevent the oil level in the compressor from lowering on the first operation after turning on the circuit breaker. If that is the case, do not suspect a unit failure.

Indoor unit installation

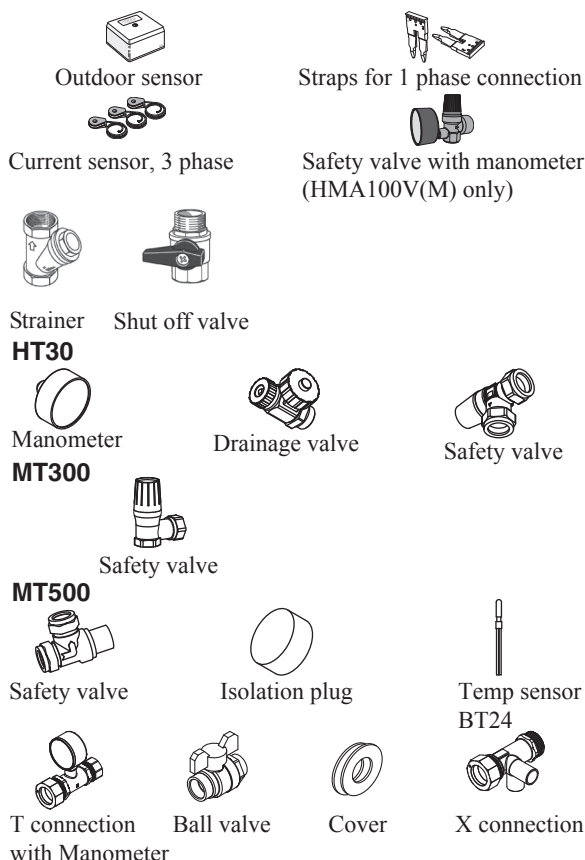
General information

Transport and storage

Indoor unit can be transported vertically and must be stored vertically and in dry conditions. HMS140VA and HMS140V can be transported and stored vertically or horizontally.

Supplied components

HMA100V, HMA100VM, HMS140VA, HMS140V



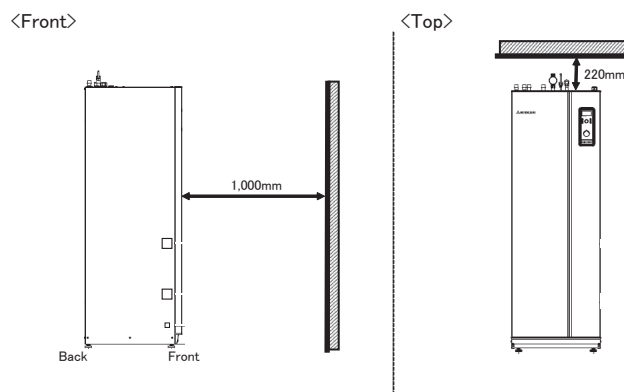
The enclosed kit is located behind the front service cover in indoor unit.

Assembly

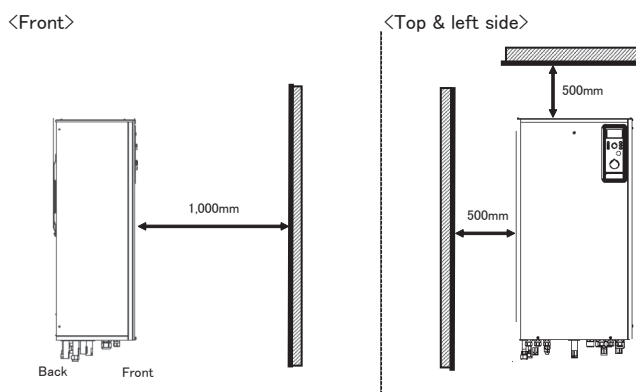
- It is recommended that indoor unit is installed in a room with existing floor drainage, most suitably in a utility room or boiler room.
- The surface must be firm, preferably a concrete floor or foundation. For wall mount unit, the surface must be firm, flat and vertical, preferably a concrete wall.
- Install indoor unit with its back to an outside wall, ideally in a room where noise does not matter. If this is not possible, avoid placing it against a wall behind a bedroom or other room where noise may be a problem.
- Floor standing indoor unit can be aligned using the adjustable feet.
- Route pipes so they are not fixed to an internal wall that backs on to a bedroom or living room.

- For HMA100V and HMA100VM, be sure that sufficient service space is provided as shown in following page.
- For HMS140VA and HMS140V, be sure to connect a tank on HW port even if HW application is not used.
- For HMS140VA and HMS140V, install tank unit and its pipings to indoor unit indoors in order to avoid icing.
- For HT30, MT300 and MT500, be sure that sufficient service space is provided as shown in the following page.

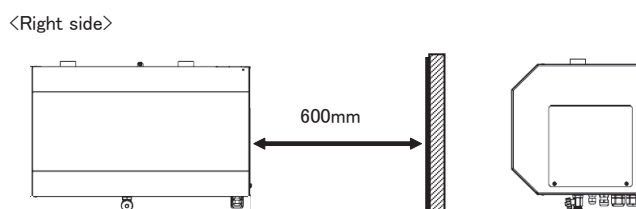
HMA100V, HMA100VM



HMS140V, HMS140VA

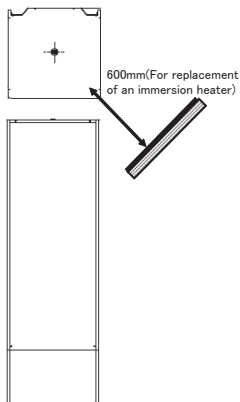


HT30

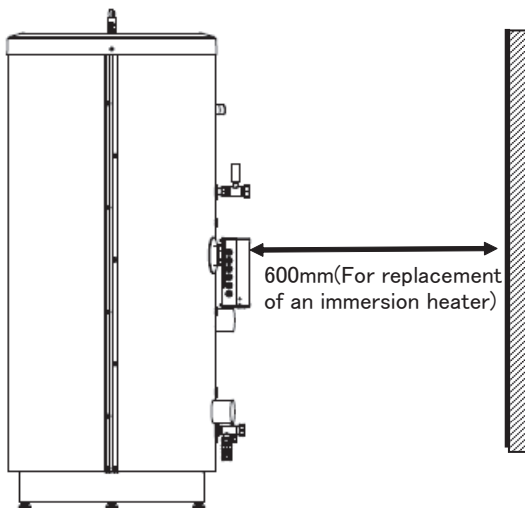


MT300

<Front>



MT500



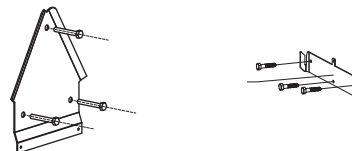
Hanging indoor unit/tank on a wall HMS140V

1. Ensure the final product position keeps the required clearance for installation and servicing.
2. Place the bracket attached onto the wall so that the hydrobox is not tilted and fix it with 3 deck screws on the wall.

Choose appropriate size and material of screw according to the material of the wall so that the indoor unit would not fall down.

HMS140

HT30



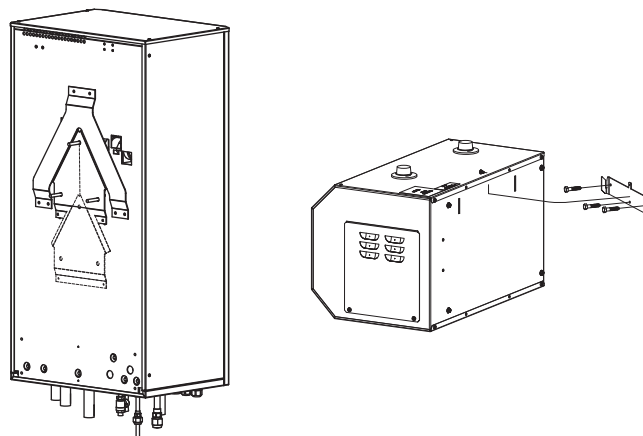
NOTE

Indoor unit and tank weigh 60kg and 24kg respectively excluding water inside.

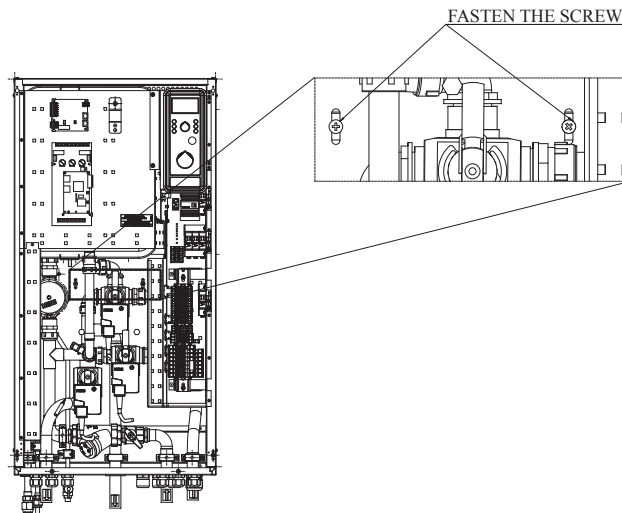
3. Hang indoor unit / tank on bracket.

HMS140

HT30



4. fix indoor unit on bracket with screws attached (indoor unit only).



Dimensioning expansion vessel

Internal volume in HMA100V and HMA100VM for calculating expansion vessel is 270ℓ. The expansion vessel's volume must be at least 5% of the total volume.

HMS140VA and HMS140V have 18 ℓ of expansion vessel, which can cover the total system water volume mentioned in the below table.

| Safety relief valve position | 5 m higher than expansion vessel | 0 m | 5 m lower than expansion vessel |
|------------------------------|----------------------------------|-----|---------------------------------|
| system water volume (ℓ) | 390 | 330 | 240 |

If the system volume exceeds the limit, extra expansion vessel is necessary. Install it in the same level and same pre-pressure as the original one.

Initial pressure and max height difference

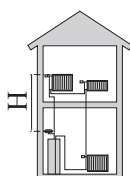
Recommended maximum height difference between expansion vessel and the highest point in the system is 5m.

The initial pressure of the pressure expansion vessel must be dimensioned according to the maximum height (H) between the vessel and the highest positioned radiator, see figure. An initial pressure of 0.5 bar (5 mvp) means a maximum permitted height difference of 5 m.

If the standard initial pressure in the pressure vessel is not high enough it can be increased by filling via the valve in the expansion vessel. The expansion vessel's standard initial pressure must be entered in the check list on User's manual.

Any change in the initial pressure affects the ability of the expansion vessel to handle the expansion of the water.

Consult local distributor in case the height difference exceeds 5m.



Emptying the vessel

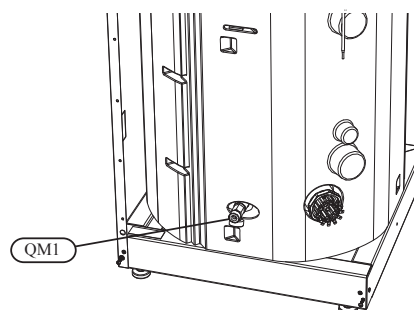
The vessel in indoor unit is emptied by opening the valve (QM1) and safety valve (FL2).

NOTE

When the vessel in indoor unit is emptied via the valve (QM1), some water will remain in the coil and in the heat exchanger.

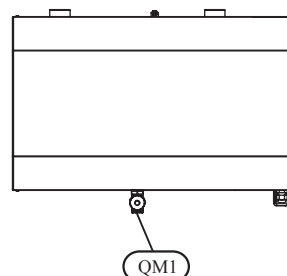
This means that there is a risk of the heat exchanger, pipes and valves freezing at low temperatures as well as a hygienic risk for the coil in the hot water section.

<HMA100V, HMA100VM>

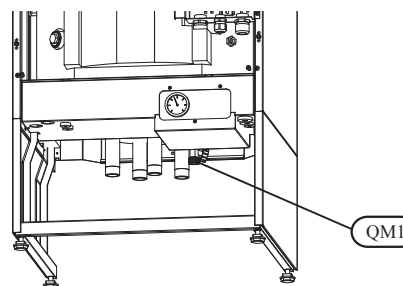


<HMS140VA, HMS140V>

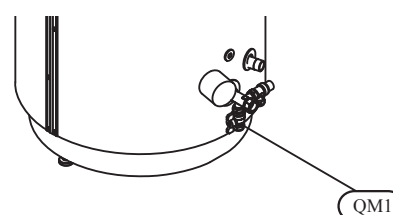
HT30




MT300



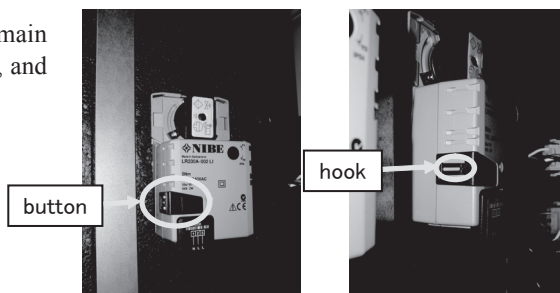
MT500



Manual shunting

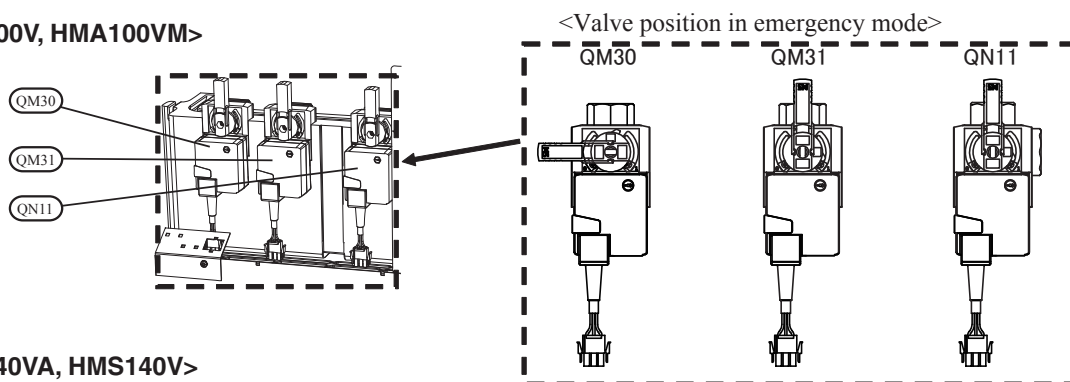
When indoor unit is set to emergency mode  on the main switch SF1, the heating control system is not in operation, and is why manual shunt operation is required.

1. To change a position of valve, depress a button and lock it by pressing a hook shown in the photo.
2. Turn the mixing valve to the desired position by hand.
3. When recovered, press the button to unhook so that the valve is controlled by the system.

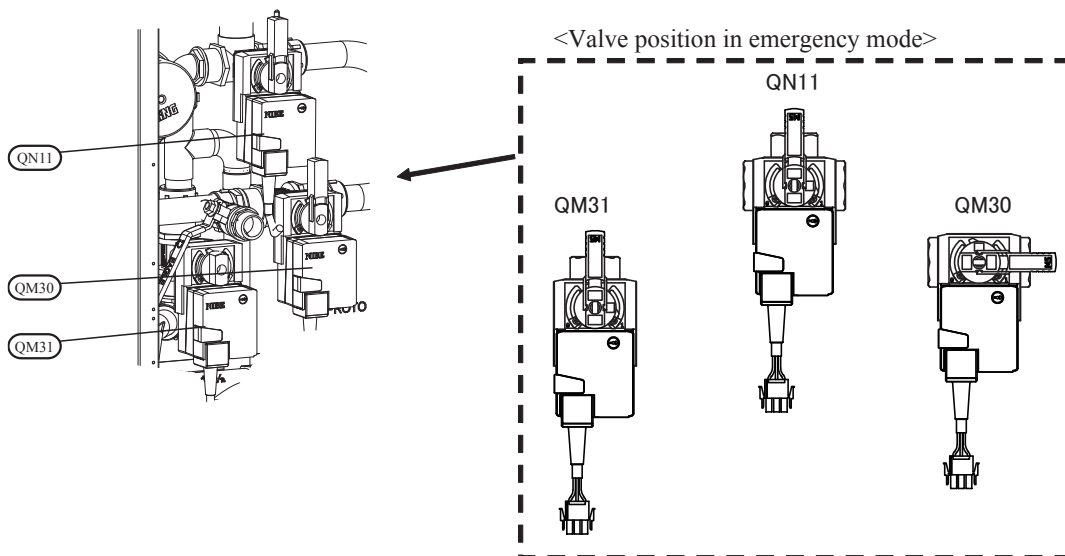


In emergency mode, the valve positions should be set as follows.

<HMA100V, HMA100VM>



<HMS140VA, HMS140V>



Recommended installation order

- 1 For wall mount type hang indoor unit on appropriate position and connect indoor unit and tank unit.
2. Connect indoor unit to the climate system, cold and hot water lines as well as any external heat sources. See page 68. Also see docking descriptions on page 72 and further on.
3. Install the refrigerant pipes according to the description on the Installation manual for outdoor unit.
4. Connect the current limiter, any centralised load control and external contacts as well as the cable between indoor unit and outdoor unit. Cable between indoor unit and tank should be connected for the system tank is separated. See page 76.
5. Connect incoming electricity to indoor unit. See page 76.
6. Follow the commissioning instructions on page 82.

Pipe installation

General

Pipe installation must be carried out in accordance with current norms and directives. Indoor unit can operate with a return temperature of up to 65 °C and an outgoing temperature from the unit of 65 °C.

Indoor unit is not equipped with shut off valves; these must be installed outside the heat pump to facilitate any future servicing.

Indoor unit can be connected to the radiator system, floor heating system and/or fan convectors.

Install the supplied safety valve and manometer.

Overflow valve

NOTE

A free flow is required for all docking options, which means that an overflow valve must be installed.

The circulation pump may become damaged.

System requirements

The minimum water volume in the climate system is subject to the values in the table below.

In case the system has shuttle valve QN12 (see page 73), the piping before the valve must have the minimum required volume. Water volume on HT30, MT300 or MT500 cannot be counted on this calculation.

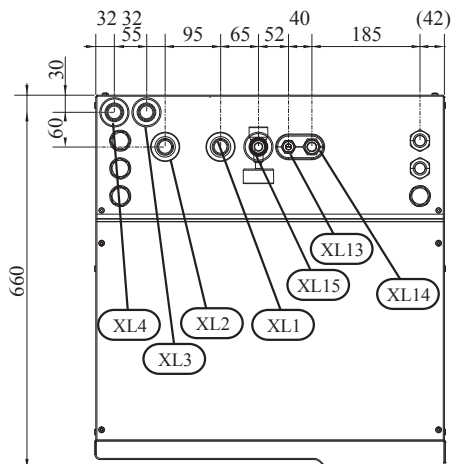
If it is not fulfilled, volume vessel must be installed.

For more options, see the docking description on page 72.
(liter)

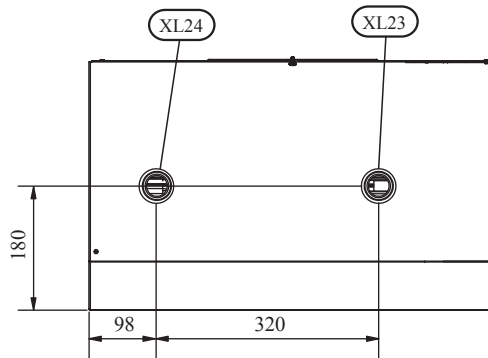
| | With underfloor cooling application | Without underfloor cooling application |
|---------------------------------|-------------------------------------|--|
| HMA100V, HMA100VM FDCW71VNX | 70 | 35 |
| HMA100V, HMA100VM FDCW100VNX | 100 | 50 |
| HMS140VA, HMS140V FDCW140VNX | 150 | 75 |

Dimensions and pipe connections

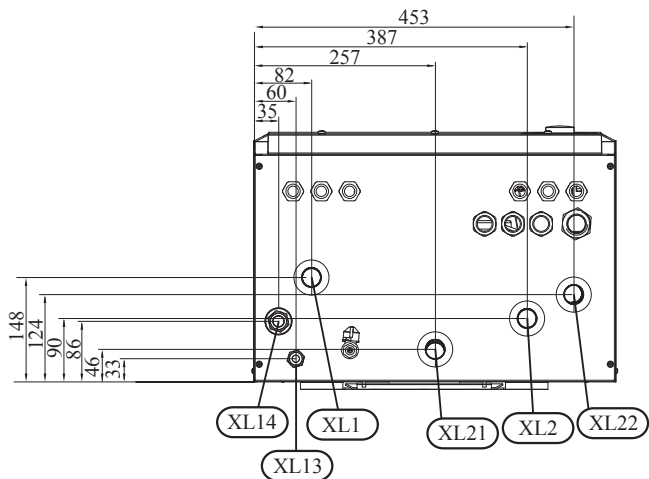
<HMA100V, HMA100VM>



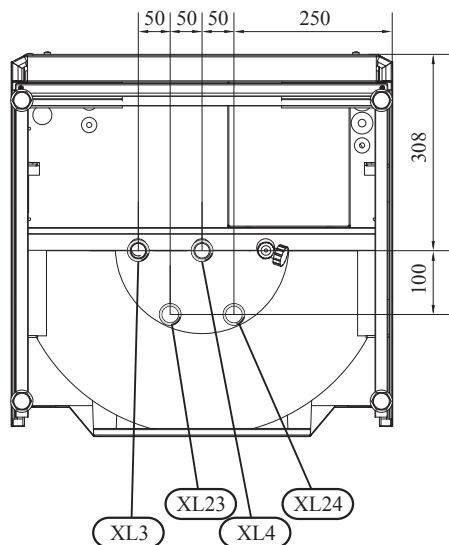
<HT30>



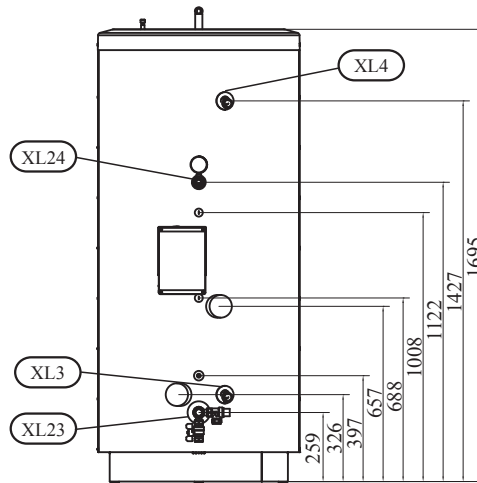
<HMS140VA, HMS140V>



<MT300>



<MT500>

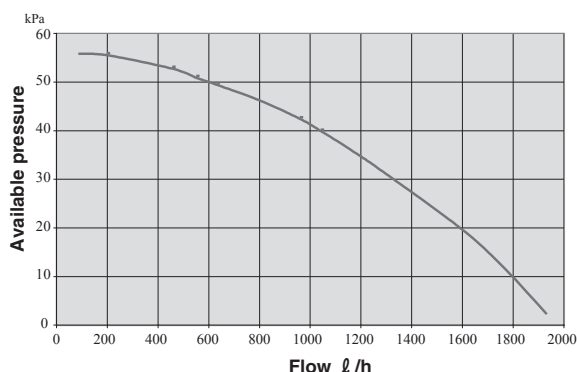


| | HMA100 | HMS140 |
|---|--------|--------|
| XL1 Climate system supply (→) | 22 mm | 28 mm |
| XL2 Climate system return (←) | 22 mm | 28 mm |
| XL3 Cold water | 22 mm | — |
| XL4 Hot water | 22 mm | — |
| XL13 Liquid line refrigerant | 3 / 8" | 3 / 8" |
| XL14 Gas line refrigerant | 5 / 8" | 5 / 8" |
| XL15 Connection safety valve, manometer | | |
| XL21 Tank circuit supply (A) | — | 28 mm |
| XL22 Tank circuit return (B) | — | 28 mm |

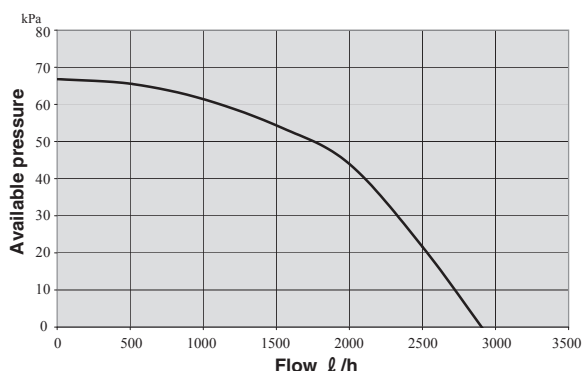
| | HT30 | MT300 | MT500 |
|-----------------------------|------|-------|-------|
| XL3 Cold water (→) | — | G1B | G1B |
| XL4 Hot water (←) | — | G1B | G1B |
| XL23 Circulation supply (B) | G1B | G1B | 28 mm |
| XL24 Circulation return (A) | G1B | G1B | 28 mm |

Pump capacity diagram

<HMA100V, HMA100VM>



<HMS140VA, HMS140V>



Connection of extra circulation pump

When connecting extra circulation pumps, requirements for pressure, maximum flow etc must be met. See page 72 for location.



NOTE

Non-return valve must be installed near indoor unit in case extra circulation pump is used.

The circulation pump may become damaged.

Connecting the climate system

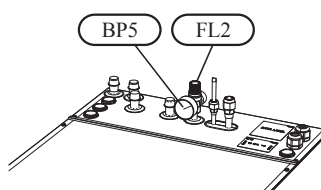
Pipe connections for the climate system are made at the top (HMA100) or on the bottom (HMS140)

For HMS140, Connect  marked pipe to supply line and  marked pipe to return line from climate system.

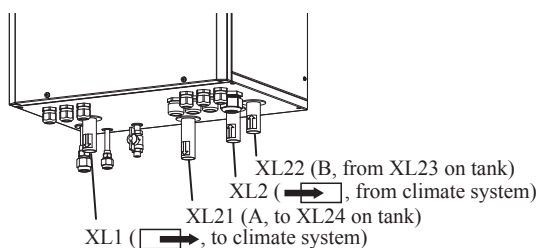
- All required safety devices and shut-off valves (installed as close to the indoor unit as possible) must be fitted.
- Install the bleed valves where necessary, highest point of the water system in usual case.
- The safety valve (FL2) must be installed as illustrated. The entire length of the overflow water pipe from the safety valves must be inclined to prevent water pockets and must also be frost proof.

- The end of overflow pipe from the safety valves must be left open to the atmosphere. The water may drip from the pipe.
- HT30 doesn't have a port for FL2. Safety valve should be installed on site.
- HMS140VA and HMS140V need to connect a buffer vessel on the hot water tank even if hot water supply is not necessary.
See connecting the hot water heater for details.

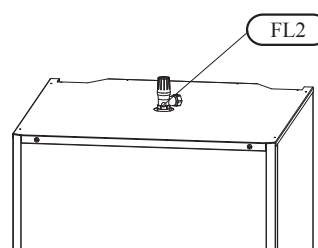
<HMA100V, HMA100VM>



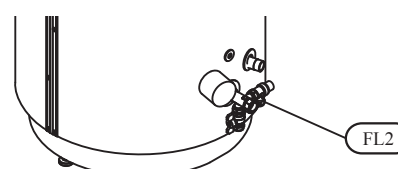
<HMS140VA, HMS140V>



<MT300>



<MT500>



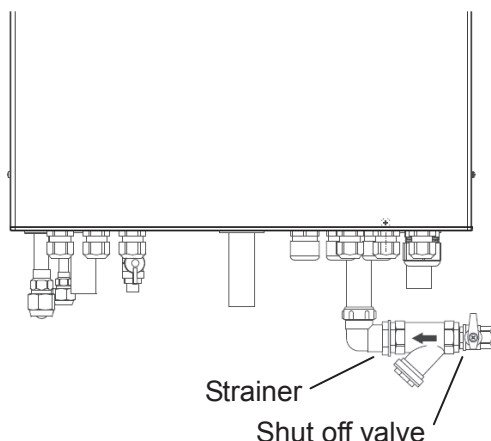
- When connecting to a system with thermostats on all radiators, an overflow valve must be fitted, or some of the thermostats must be removed to ensure sufficient flow.
- See section Dockings on page 72 for outline diagram.

Connecting the climate system

- Strainer and shut off valve are supplied together with the indoor unit. Install them horizontally on XL2 as shown in the following drawing.

Strainer should be put as close as possible to XL2 in order to prevent contamination from entering the indoor unit.

Make sure to insulate them if they are installed indoors and it is used for cooling application.



Connecting the hot water heater / buffer Vessel

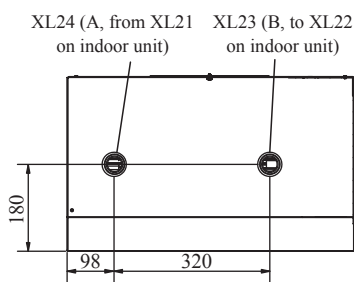
Connecting hot water tank to HMS140VA and HMS140V

For HMS140VA and HMS140V, it is necessary to connect hot water tank or buffer vessel even if hot water supply is not necessary.

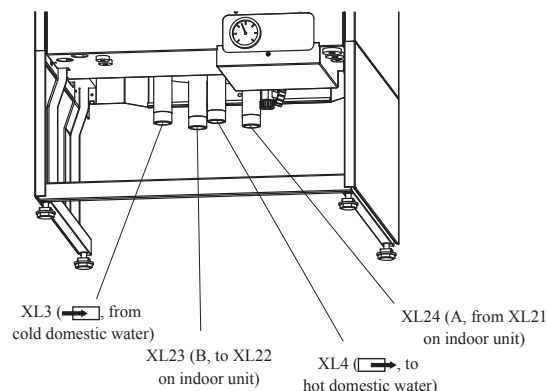
Connect A and B to their corresponding connections on the indoor unit.

- Tank and its pipings to indoor unit must be installed indoors where the temperature wouldn't drop below 15 °C in order to prevent pipings from icing.
- Maximum piping length between HMS140V and tank is 10 m.
- Tank unit should be placed on firm, preferably a concrete floor or foundation.
- Tank unit can be aligned using the adjustable feet.
- Ensure that there is 1000 mm free space in front and 300 mm above the product for future service.

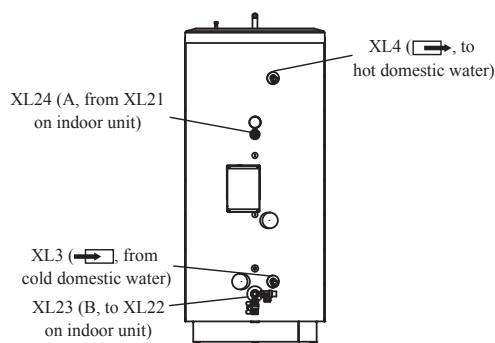
<HT30>



<MT300>



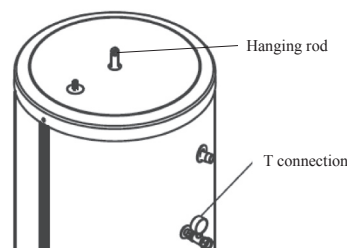
<MT500>



- For MT500, install joints and relevant components as illustrated before connecting pipes.
- Remove hanging rod on top after installation and plug the hole with isolation plug attached.

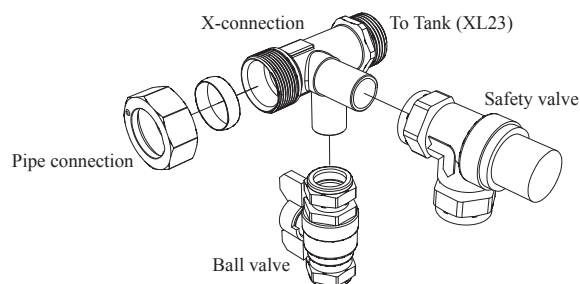
<T connection with Mamometer>

Fasten it on XL24 so that the Mamometer comes on top.





<X connection>

- Fasten it on XL23 so that the pipe for Ball valve is downwards.
- Fasten Ball valve on the bottom pipe.
- Fasten Safety valve on the side pipe so that drain outlet is downwards.



Connecting hot water coil to water main

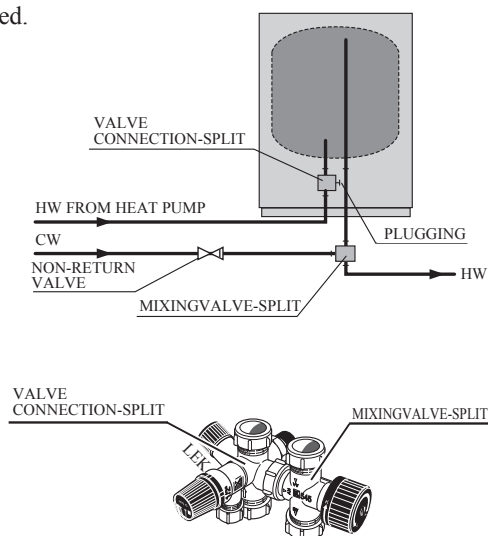
The water heater in the indoor unit must be supplied with necessary set of valves.

Connect  marked pipe to HW supply and  marked pipe to cold water main.

- Install a mixing valve if the temperature exceeds 60 °C.
- Thermostatic mixing valve is necessary for hot water supply at a stable temperature even if the temperature does not exceed 60 °C
- The safety valve must have a maximum 10.0 bar opening pressure and be installed on the incoming domestic water line according to outline diagram. The entire length of the overflow water pipe from the safety valves must be inclined to prevent water pockets and must also be frost proof.
- The end of overflow pipe from the safety valves must be left open to the atmosphere. The water may drip from the pipe.
- See section Dockings on page 72 for outline diagram.

Extra electric hot water heater

The heat pump should be supplemented with an electric water heater, if a hot tub or other significant consumer of hot water is installed.



Connection of external heat source

Connect an external heat source such as gas or oil boiler to (XL8) (in) and (XL9) (out) on tank. To use these connections, the corresponding “Punchout” parts in the outer panel must be removed. Also cut off the insulation above the connections.

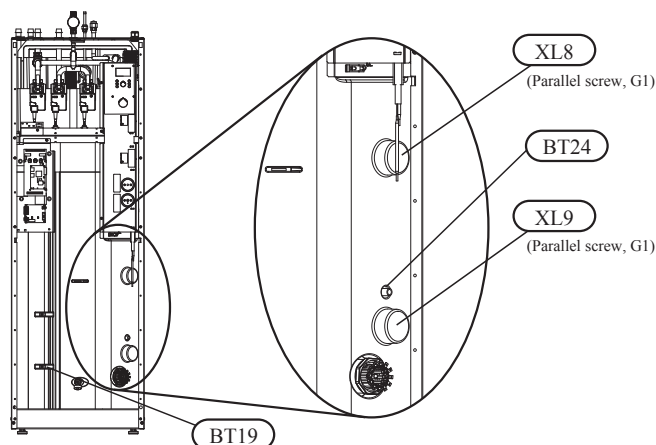
For external heat source controlled by indoor unit, temperature sensor BT19 should be replaced to the position BT24 in order to control the external heat source appropriately. For MT500, disconnect the sensor on BT19, connect the attached sensor as supplied parts on the same terminal and put it on BT24. It is recommended to apply thermal silicone paste on the sensor element for better measurement.

For external heat source controlled independently, temperature sensor of it should be placed on BT24 to control it appropriately.

BT19 is placed behind insulation.

For details, see page 125.

<HMA100V, HMA100VM>



<HMS140V>

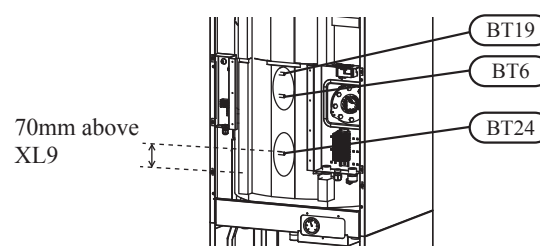
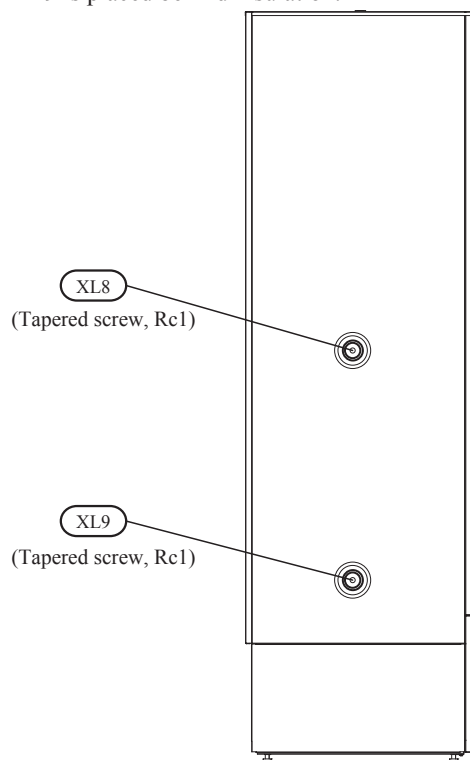
HMS140VA and HMS140V don't have a port to connect external heat source but MT300 and MT500 have it.

<HMS140V>

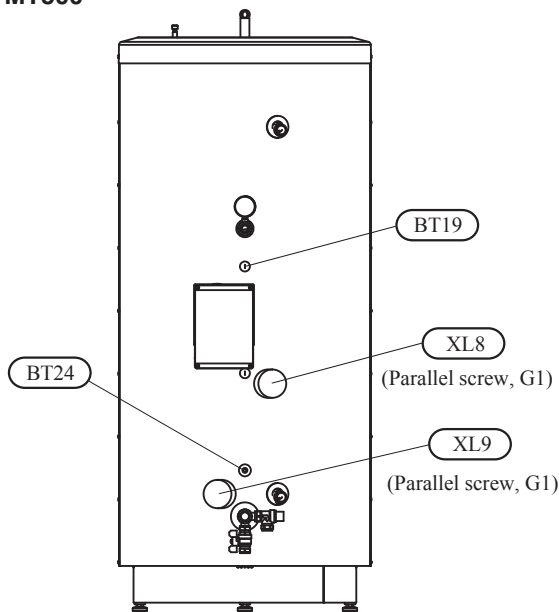
HMS140V doesn't have a port to connect external heat source but MT300 and MT500 have it.

MT300

BT19 is placed behind insulation.

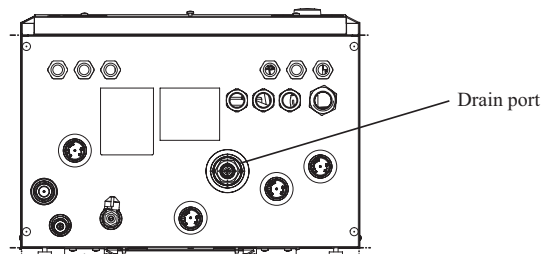


MT500



Indoor unit has a drain port on the bottom. Connect a drain hose to drain condensed water when cooling application is used.

<HMS140VA, HMS140V>



Connecting refrigerant pipes

See Installation manual for outdoor unit.

Piping insulation

Install insulation on all piping in order to avoid condensation during cooling operation.

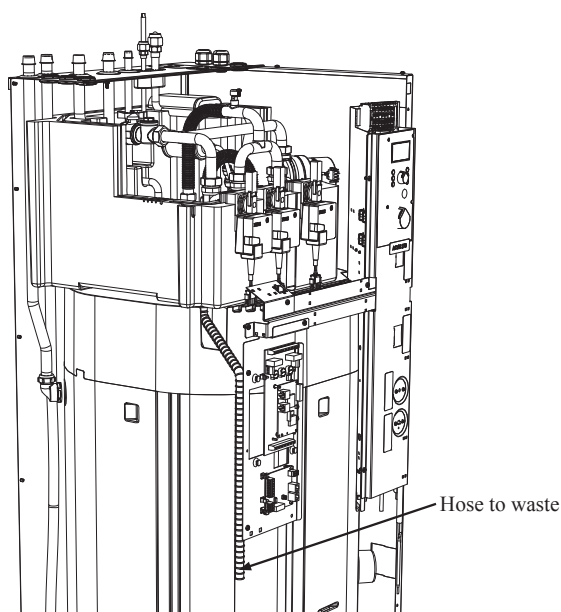
It is also strongly recommended to insulate piping for heating only application in order to avoid getting burned or reducing the heating capacity.

The thickness of the insulation should be 20mm where the relative humidity exceeds 70%.

Drain connection

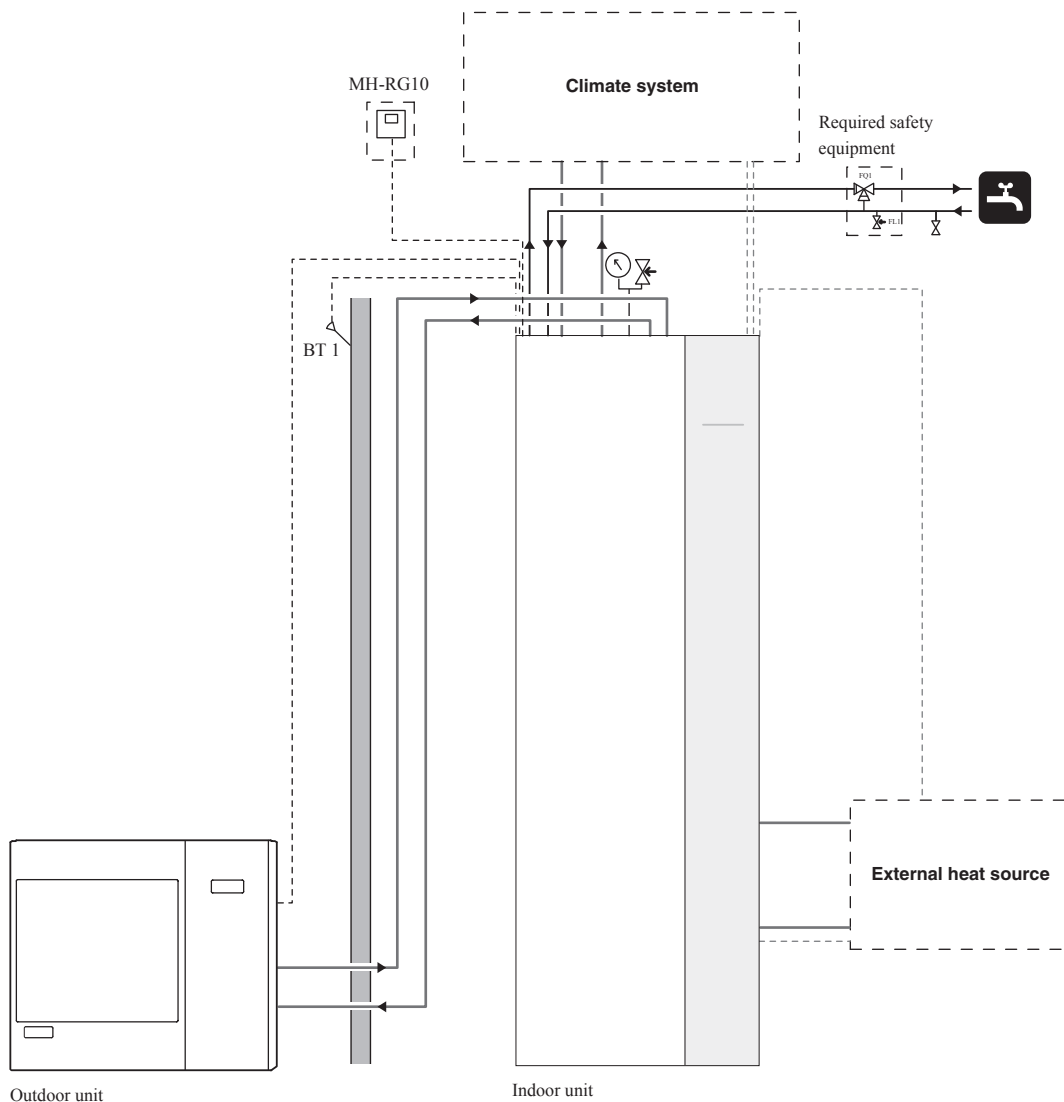
Indoor unit has a drain connection. A hose routes any waste water past the product's electronics to minimise the risk of damage. If necessary, a hose extension can be connected.

<HMA100V, HMA100VM>



Dockings

Hydrolution with climate system and any external heat source



Outdoor unit

Indoor unit

NOTE

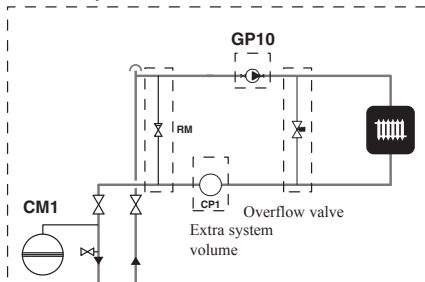
These are the outline diagrams. Actual installations must be planned according to applicable standards.

Symbol key

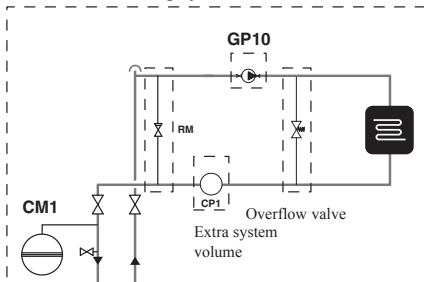
| Symbol | Description |
|--------|-----------------------|
| | Venting valve |
| | Shut-off valve |
| | Non-return valve |
| | Control valve |
| | Safety valve |
| | Temperature sensor |
| | Expansion vessel |
| | Pressure gauge |
| | Circulation pump |
| | Shunt / shuttle valve |
| | Fan |

Climate system

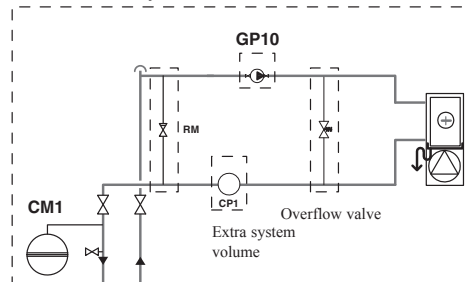
Radiator system



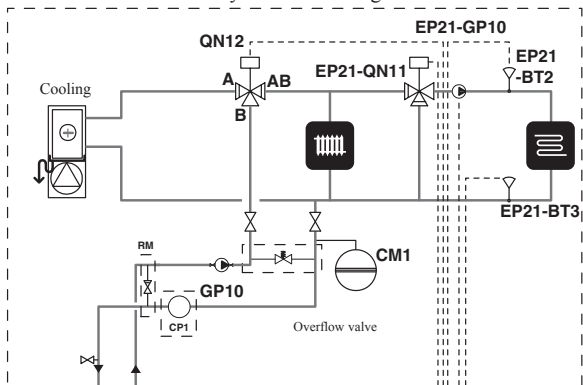
Under floor heating systems



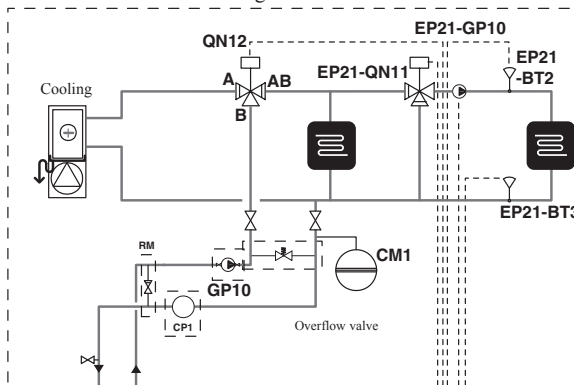
Fan convector system



Radiator and under floor heating for heating as well as fan convector system for cooling

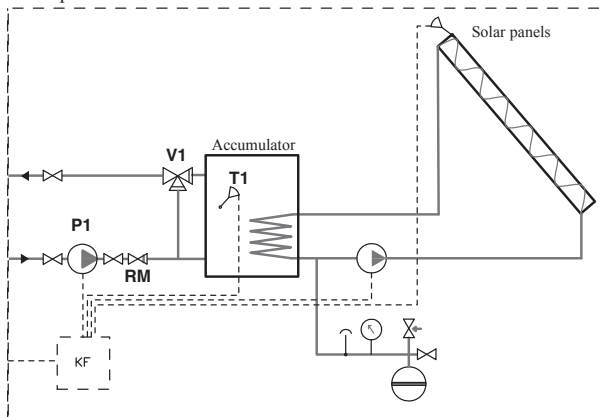


Double under floor heating system for heating and fan convector for cooling

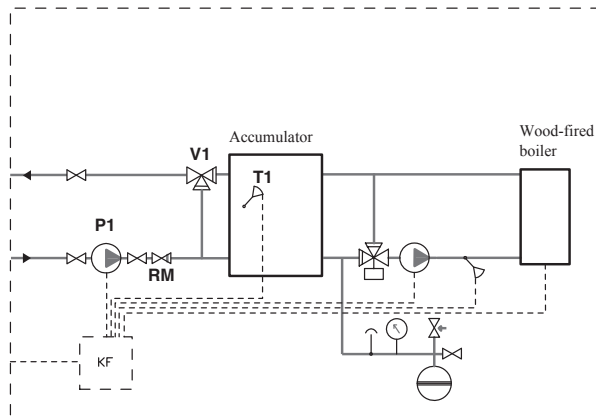


External heat source

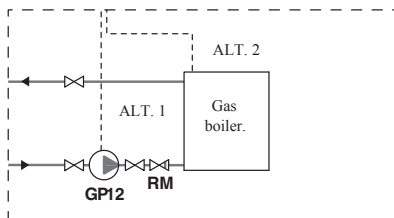
Solar panels



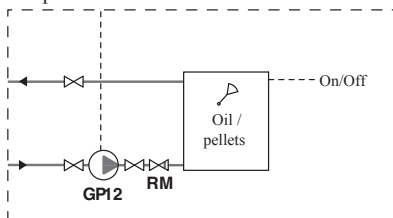
Wood-fired boiler with accumulator



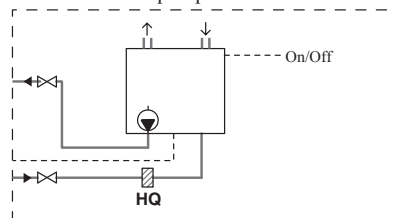
External heat source



Oil/pellet boiler



Exhaust air heat pump



Explanation

| | | | | | |
|-----------|---------------------------------------|-----------|---------------------------|------|-------------------------------------|
| BT1 | Temperature sensor, outdoor | EP21-QN11 | Shunt valve | QN12 | Shuttle valve for Cooling / Heating |
| CM1 | Expansion vessel | GP10 | External Circulation pump | RM | Non-return valve |
| CP1 | Buffer vessel | GP12 | Circulation pump | T1 | Temperature sensor |
| EP21-BT2 | Temperature sensor, supply line 2 | HQ | Strainer | V1 | Shunt valve |
| EP21-BT3 | Temperature sensor, return 2 | KF | External control | | |
| EP21-GP10 | Circulation pump for heating system 2 | P1 | Circulation pump | | |

Electrical installation

General

Indoor unit must be installed via an isolator switch in accordance with the local codes and regulations.

Other electrical equipment, except the outdoor sensors, current transformers and outdoor unit are ready connected at the factory.

- Disconnect the indoor unit and outdoor unit before insulation testing the house wiring.
- For recommended fuse ratings, refer to the following table.

| Indoor | Outdoor | 230V 1AC | 230V 3AC | 400V 3NAC |
|---------------------|------------|----------|----------|-----------|
| HMA100V | FDCW71VNX | 50A | — | 16A |
| | FDCW100VNX | 50A | — | 16A |
| HMA100VM | FDCW71VNX | — | 32A | — |
| | FDCW100VNX | — | 32A | — |
| HMS140VA HMS140V | FDCW140VNX | 63A | — | 25A |

- If the building is equipped with an earth-fault breaker, Hydrolution should be equipped with a separate one.
- Connection must not be carried out without the permission of the electricity supplier and under the supervision of a qualified electrician.
- For interconnection cable between indoor unit and outdoor unit, the size shown on the table below is recommended.

| Indoor | Outdoor | Cable size |
|---------------------|-------------------------|--|
| HMA100V | FDCW71VNX FDCW100VNX | 5×2.5 mm ² |
| | FDCW71VNX FDCW100VNX | 5×2.5 mm ² |
| HMS140VA HMS140V | FDCW140VNX | 3×6 mm ² (power cable*1) 3×1.5 mm ² (communication cable) |

*1 Maximum current on power cable is 25A.

Choose suitable size in accordance with regulations.

| Indoor | Tank | Cable size |
|---------------------|-------|--|
| HMS140VA HMS140V | HT30 | 5×6 mm ² ×2 (power cable*2) |
| | MT300 | 5×1.5 mm ² (signal cable) |
| | MT500 | 4×1.5 mm ² (signal cable) |

*2 Maximum current on power cable is 26A for 230V 1AC, 9A for 400V 3NAC.

Choose suitable size in accordance with regulations.

- Outdoor unit is equipped with a single phase compressor. This means that phase L3 is loaded with up to 15A for FDCW71VNX and FDCW100VNX, 25A for FDCW140VNX during compressor operation.

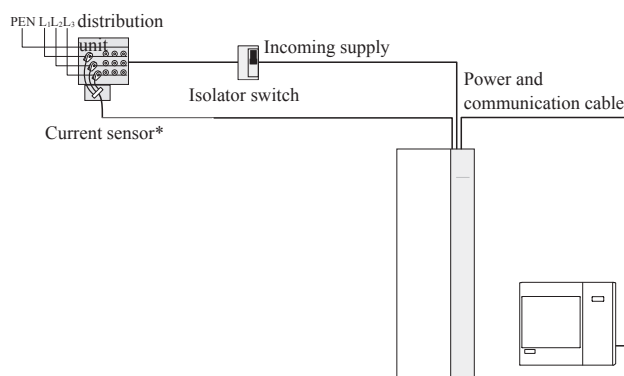
NOTE

Electrical installation and service must be carried out under the supervision of a qualified electrician. Electrical installation and wiring must be carried out in accordance with the stipulations in force.

NOTE

The switch (SF1) must not be switched to "1" or "⚠️" until the system has been filled with water. The circulation pump and immersion heater may become damaged.

Principle diagram, electrical installation

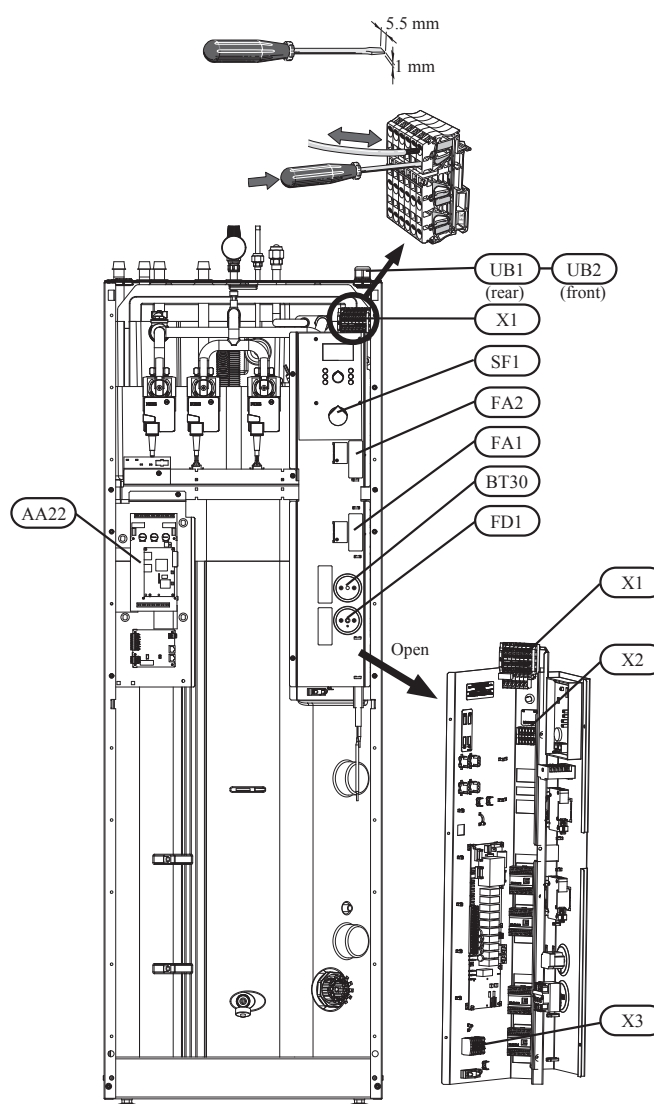


* Only in a 3-phase installation.

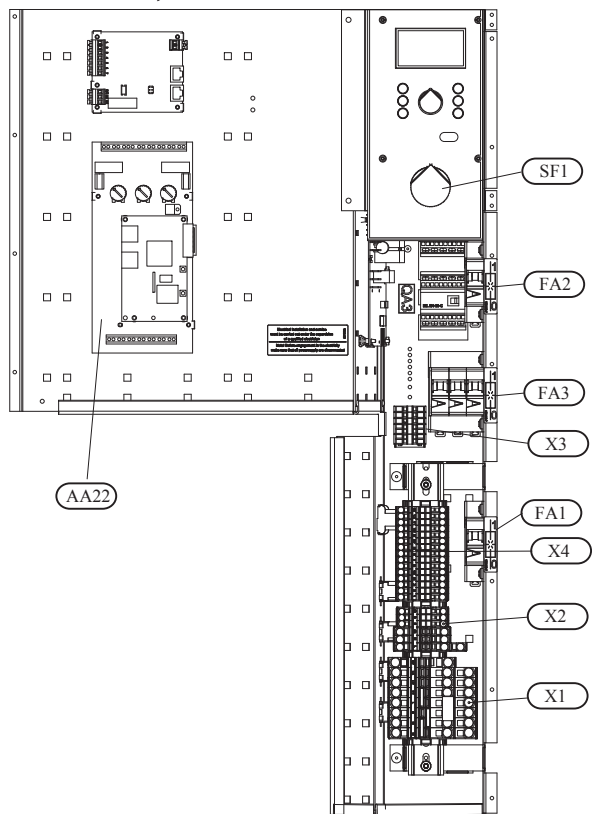
For details, see Connecting the current limiter.

Electrical components

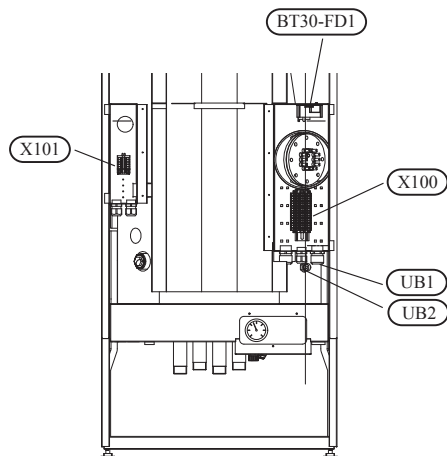
<HMA100V, HMA100VM>



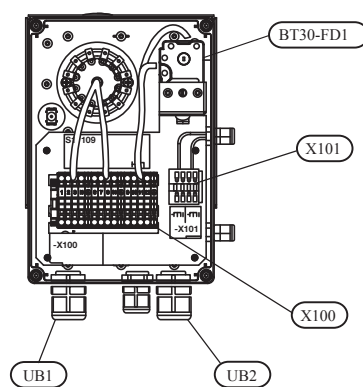
<HMS140VA, HMS140V>



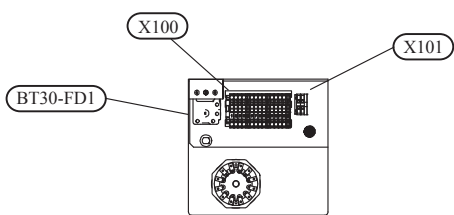
<MT300>



<MT500>



<HT30>



Explanation

| Symbol | Type | Scale length of conductor (mm) | |
|--------|---|--------------------------------|---------------------------|
| | | HMA100 | HMS140 |
| AA22 | PCB | | |
| UB1 | Cable gland | | |
| UB2 | Cable gland | | |
| X1 | Terminal block, incoming mains supply | 14 | 19 |
| X2 | Terminal block, outgoing supply and communication to outdoor unit | 9 | 15 (supply) 13 (comm.) |
| X3 | Terminal block, external heat source | 9 | 9 |
| X4 | Terminal block, outgoing supply to tank | — | 13 |
| X100 | Terminal block, incoming supply from indoor unit | — | 13 |
| X101 | Terminal block, sensor from indoor unit | — | 9 |
| SF1 | Switch | | |
| FA1 | Miniature circuit breaker, control system | | |
| FA2 | Miniature circuit breaker, outdoor unit | | |
| FA3 | Miniature circuit breaker, tank | | |
| BT30 | Thermostat, standby mode | | |
| FD1 | Temperature limiter | | |

Connecting the supply

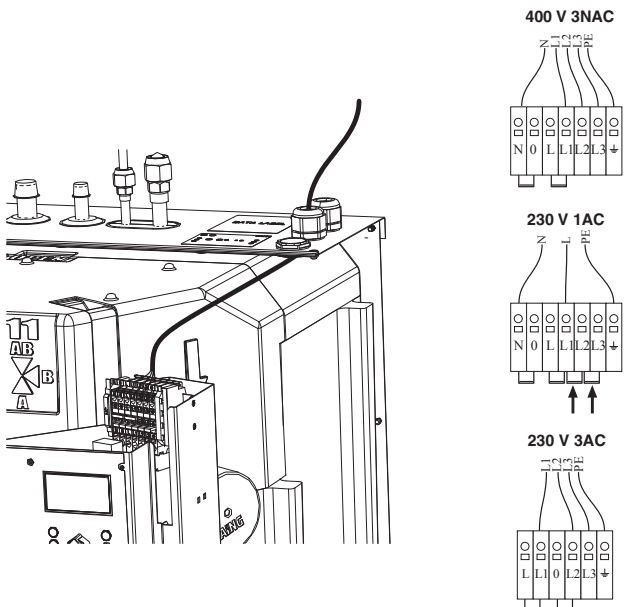
Incoming supply is connected on terminal block (X1) via cable gland (UB1). The cable must be dimensioned according to the applicable norms.

Indoor unit can be connected with either 400 V 3NAC or 230 V 1AC.

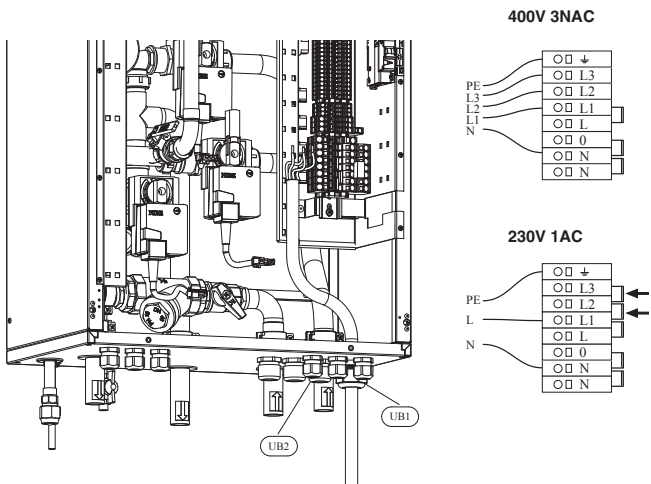
400 V 3NAC/230V 3AC: Connect incoming supply according to the markings on terminal (X1).

230 V 1AC: Install the supplied straps between terminals L1 and L2 as well as between L2 and L3 on incoming terminal block (X1). Connect incoming supply according to the terminal markings.

<HMA100V, HMA100VM>



<HMS140VA, HMS140V>



Miniature circuit-breaker (FA1, FA2, FA3)

The automatic heating control system, circulation pumps and their wiring in indoor unit, are internally fuse protected with a miniature circuit breaker (FA1).

Outdoor unit and equipment are internally fuse protected in indoor unit, with a miniature circuit breaker (FA2).

Tank unit and equipment are internally fuse protected in indoor unit with a miniature circuit breaker (FA3).

Temperature limiter (FD1)

The temperature limiter (FD1) cuts the current supply to the electrical heater if the temperature rises up between 90 and 100°C and can be manually reset.

Resetting

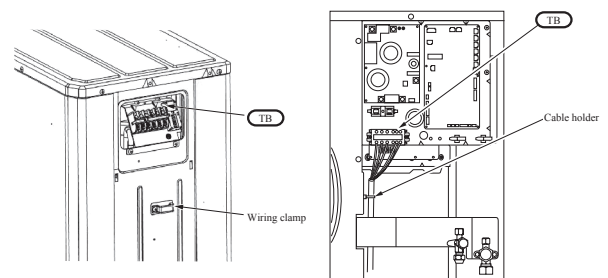
The temperature limiter (FD1) is accessible behind the front cover. The temperature limiter is reset by firmly pressing in its button.

NOTE

Reset the temperature limiter, it may have tripped during transport.

Connection between indoor unit and outdoor unit

The cable between the units must be connected between terminal block for incoming supply (TB) in outdoor unit and terminal block (X2) in indoor unit via cable gland (UB2).



FDCW71VNX-A

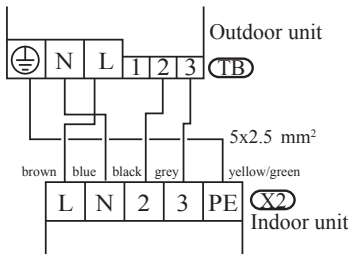
FDCW100, 140VNX-A

Note!

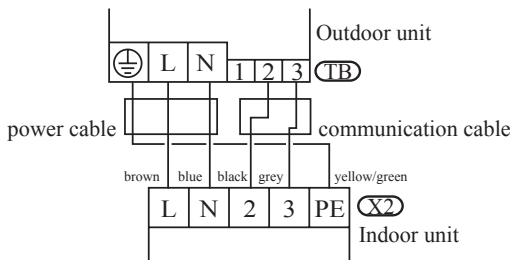
- Outdoor unit must be earthed before the wiring between the units is connected.
- The wiring must be attached so that the terminal block is not put under stress.
- Scale length of conductor is 8 mm.

Connect phase (brown), neutral (blue), communication (black and grey) as well as earth (yellow/green) as illustrated:

<FDCW71VNX>



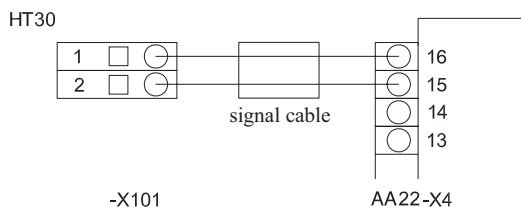
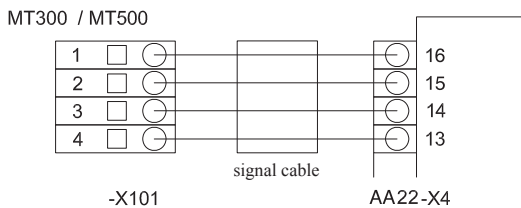
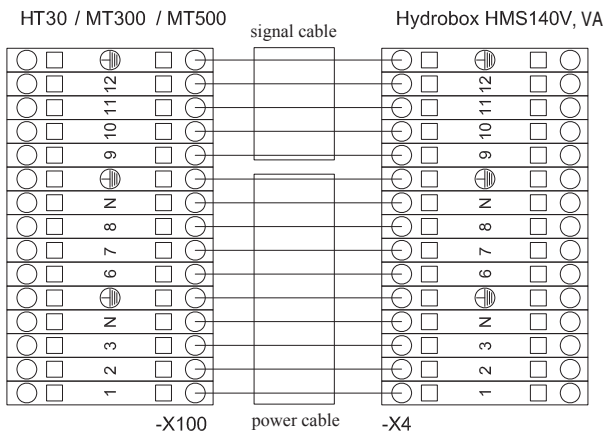
<FDCW100VNX, 140VNX>



Connection between indoor unit and tank (HMS140VA and HMS140V only)

Cable between indoor unit and tank must be connected between the terminal block (X4) in indoor unit and the terminal block (X100) in tank, the terminal on PCB (AA22-X4) in indoor unit and the terminal block (X101) in tank respectively.

Connect the terminals as shown in the following figure.



Main circuit breaker size setting (R24 on AA22) (Applicable only in case of 3 phase power supply)

The size of the property's main circuit breaker is set using the knob (R24) on the circuit limiter PCB, (AA22). The setting can be read in Menu 8.3.4.

| Main fuse rating | Knob position |
|------------------|----------------------|
| 16 | 16 |
| 20 | 20 |
| 25 | 25 (factory setting) |
| 35 | 35 |
| 50 | 50 |
| 63 | 63 |

Setting max power, electric heater (R25 on AA22)

Setting of the different maximum immersion heater outputs is made using the knob (R25) on the PCB (AA22). Set value displayed in Menu 8.3.2. The following table only applies when Menu 9.2.8 Add. heat type is set to "Internal power" (factory setting).

| Rotary S/W position (R25) | Electrical heater output(kW) | Max electric power step (Menu 8.3.2) | Max load(A) | | | | |
|---------------------------|------------------------------|--------------------------------------|-------------|----------|---------|---------|---------|
| | | | 3 phase | | | 1 phase | |
| | | | HMA100V | HMA100VM | HMS140V | HMA100V | HMS140V |
| A | 4.0 | 2 | 15 | 29 | 25 | 35 | 44 |
| B | 6.0 | 3 | 15 | 30 | 25 | 44 | 54 |
| C(Factory setting) | 9.0 | 4 | 15 | 30 | 25 | 44 | 54 |

When the outdoor unit is in operation, maximum heater output is limited to 6.0 kW.

Setting max boiler temperature (R26 on AA22)

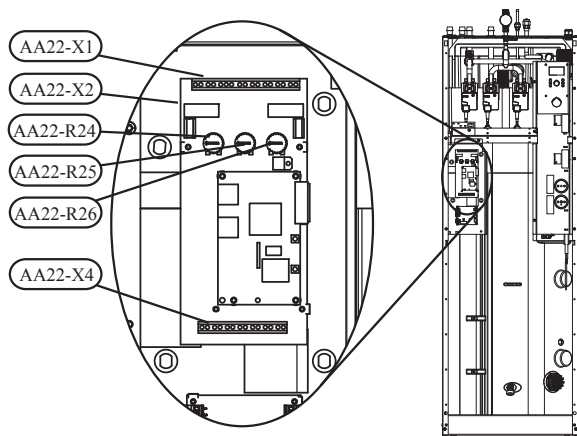
The setting of the different maximum boiler temperatures is made on the knob (R26) on the PCB (AA22). Set value displayed in Menu 9.3.1.

| Boiler temperature | Knob position |
|--------------------|---------------------|
| 55 | A |
| 60 | B |
| 65 | C (factory setting) |
| 65 | D |
| 65 | E |
| 65 | F |

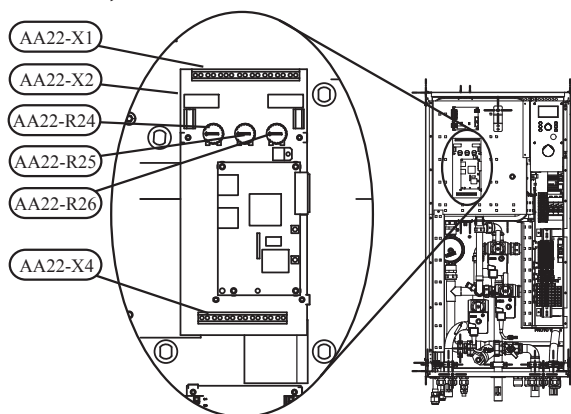
PCB, terminal and wiring diagram

The following connections are made on the PCB (AA22).
See wiring diagram for complete wiring diagram of the PCB.

<HMA100V, HMA100VM>



<HMS140VA, HMS140V>



Connecting the outdoor air sensor

Install the outdoor air temperature sensor in the shade on a wall facing north or north-west, so it is unaffected by the morning sun. Connect the sensor to terminal block X1:1 and X1:2 on the PCB (AA22) via cable gland UB2. Use a 2 core cable of at least 0.5 mm².

If the outdoor air temperature sensor cable runs close to power cables, shielded cable must be used.

If a conduit is used it must be sealed to prevent condensation in the sensor capsule.

Connecting the current limiter

When many electrical appliances are connected in the property at the same time as the electric heater is operating, there is a risk of the property's main fuse tripping. Hydrolution is equipped with an integrated current limiter that controls the electrical steps and the compressor. If necessary, the electrical steps are disengaged and/or the compressor frequency is reduced.

A current sensor should be installed on each incoming phase conductor in to the distribution box to measure the current. The distribution box is an appropriate installation point.

Connect the current sensor to a multi-core cable in an enclosure next to the distribution box. Use unscreened multicore cable of at least 0.50 mm², from the enclosure to indoor unit.

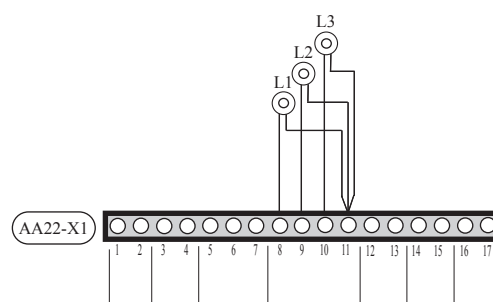
In indoor unit connect the cable to the PCB (AA22) on terminal X1:8–11.

L1 connects on X1:8 and X1:11.

L2 connects on X1:9 and X1:11.

L3 connects on X1:10 and X1:11.

X1:11 is the common terminal block for the three current sensors.



Connection of centralised demand control/tariff

In case centralised demand control or tariff control is used this can be connected to the terminal block (X1) on the PCB (AA22).

Tariff A prohibits energizing immersion heater. It is valid when X1:5 and X1:7 is closed.

Tariff B prohibits heat pump operation. It is valid when X1:6 and X1:7 is closed.

Tariff A and B can be used in combination.

Connecting external contacts

MH-RG 10, sensor for changing the room temperature

An external sensor (MH-RG10) can be connected to indoor unit to change the flow temperature and the target room temperature. Connect the sensor to the terminal block from X4:1 to X4:3 on the PCB (AA22) according to wiring diagram.

Activated in Menu 9.3.6.

The target supply water temperature is adjusted according to the gap between actual room temperature and set room temperature. The set room temperature is set using the knob on MH-RG 10 and is shown in Menu 6.3.

In addition, the heating system to which the control is valid can be chosen in Menu 6.2.

Contact for changing the room temperature

An external contact such as a room thermostat or a timer can be connected to indoor unit to change the flow temperature and consequently the room temperature. The contact must be potential free and non-locking.

When the contact is closed, the heating curve offset is changed by the number of steps shown here. The value is adjustable between -10 and +10. It is possible to set the offset value on system 1 and 2 independently.

Terminals to be connected

Heating system 1: X1:3 and X1:4 on the PCB (AA22)

Heating system 2: X1:14 and X1:15 on the PCB (AA22)

Menu to change the offset value

Heating system 1: Menu 2.4 “External adjustment”

Heating system 2: Menu 3.5 “External adjust. 2”


Contact for activation of “Extra hot water”

An external contact can be connected to indoor unit for activation of the “Temporary extra hot water” function. The contact must be potential free and non-locking and connected to terminal block X6:1 and X6:2 on PCB (AA22).

When the contact makes for at least one second, the “Temporary Extra hot water” function is activated. The function is cancelled automatically after 3 hours.

Alarm outputs

External indication of common alarms is possible through the relay function on the PCB (AA22), terminal block X2:1–2.

When switch (SF1) is in the “0” or “” position the relay is in the alarm position.

Docking specific connection

Hydrolution is prepared to control an external circulation pump (GP10 and EP21–GP10), external mixing valve (EP21–QN11), shuttle valve for cooling (QN12), as well as external heat source e.g. oil, gas or pellets.

External circulation pump (GP10, accessory)

Connect external circulation pump (GP10) to terminal block X3:1 (230 V), X3:4 (N) and X3:5 (PE). Max output is 50W

The circulation pump (GP10 and EP21–GP10) is active when the circulation pump (GP1) in indoor unit is active.

NOTE

Be sure to install non-return valve near indoor unit when an external circulation pump is installed.

The circulation pump may become damaged.

External mixing valve (EP21–QN11, accessory)

Connection and function are described in the Installation instructions for accessory ESV 22/28.

22 is for HMA100 and 28 is for HMS140

Shuttle valve, cooling (QN12, accessory)

Connection and function are described in the Installation instructions for accessory VCC 22/28.

22 is for HMA100 and 28 is for HMS140

External heat source control

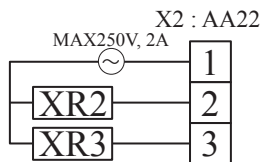
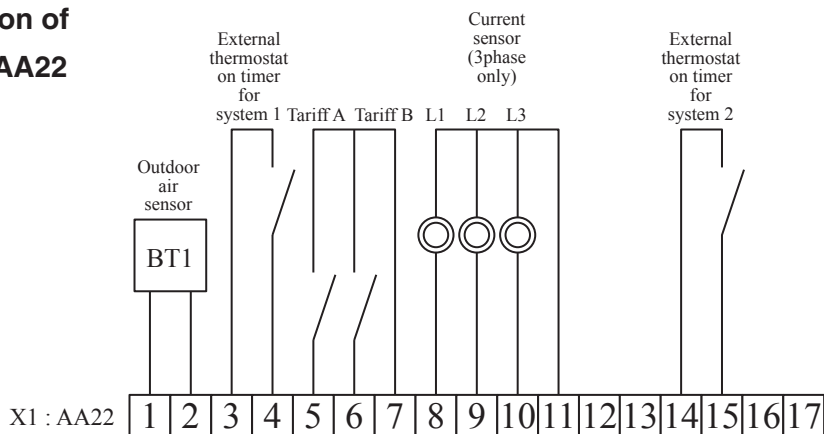
Hydrolution can control an external heat source.

ON/OFF control of the external heat source can be done by following settings.

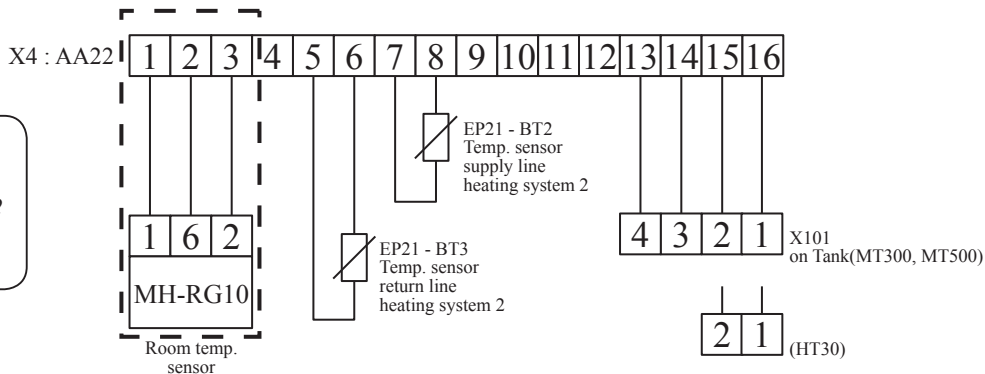
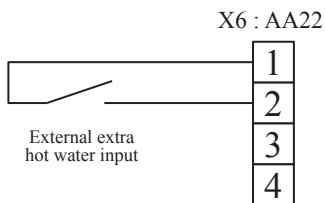
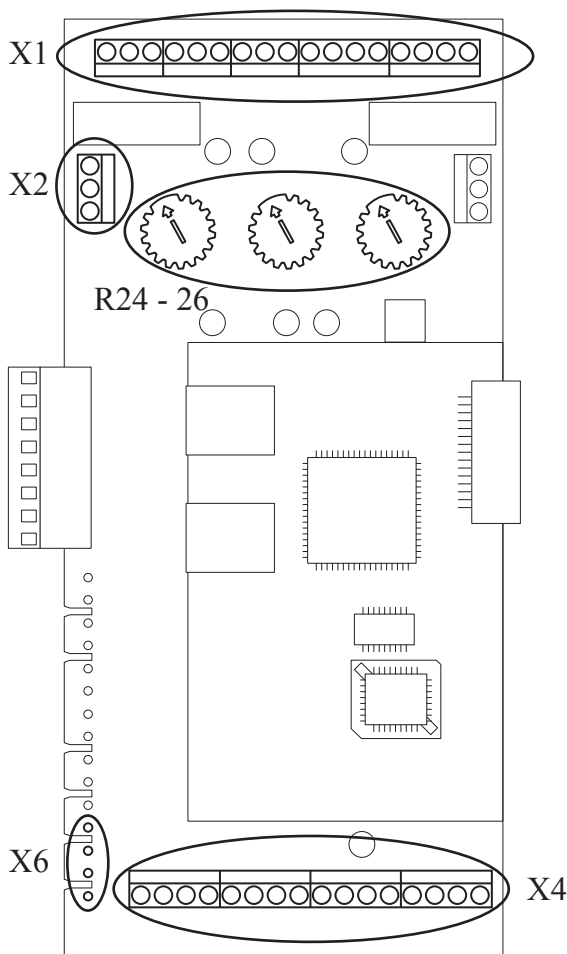
1. Remove the strap on terminal block X3:2 and X3:3.
2. Connect the signal input line to terminal block X3:2 (230 V) and X3:4 (N) (max 0.2 A).
3. Set “Ext. 1 step” in Menu 9.2.8.

Summary of the function of the terminals on PCB AA22

*
Optional other than outdoor air sensor (BT1) and current sensor (L1, L2 and L3)



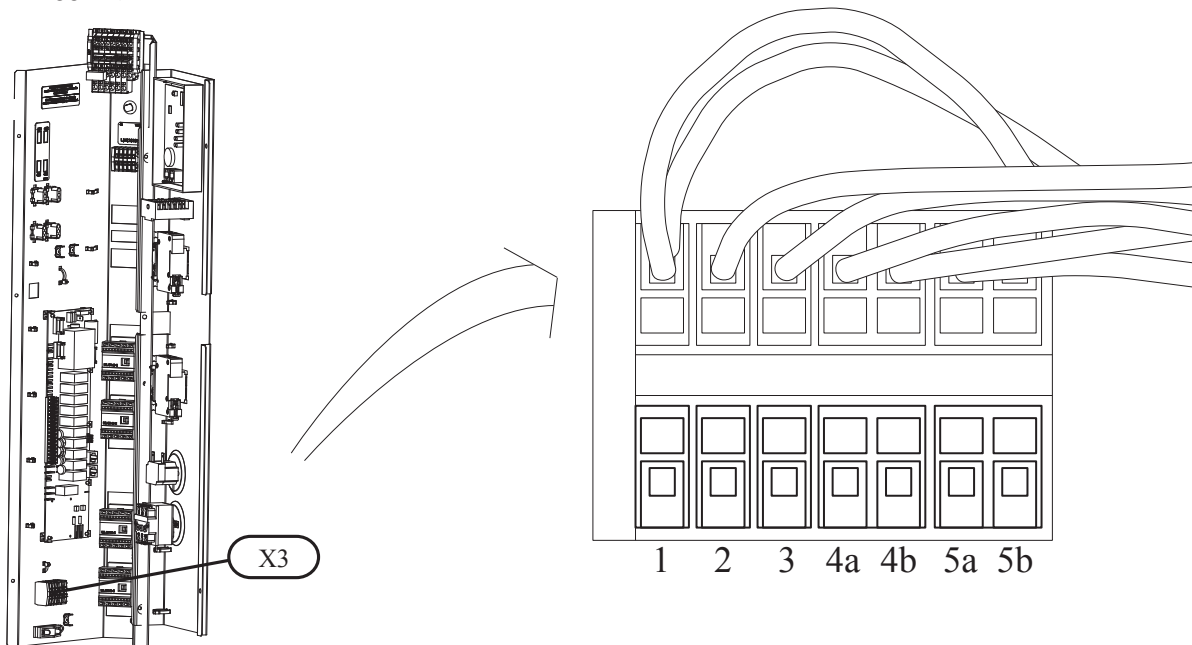
XR2: Alarm output (no voltage contactor)
XR3: Operation output (no voltage contactor)



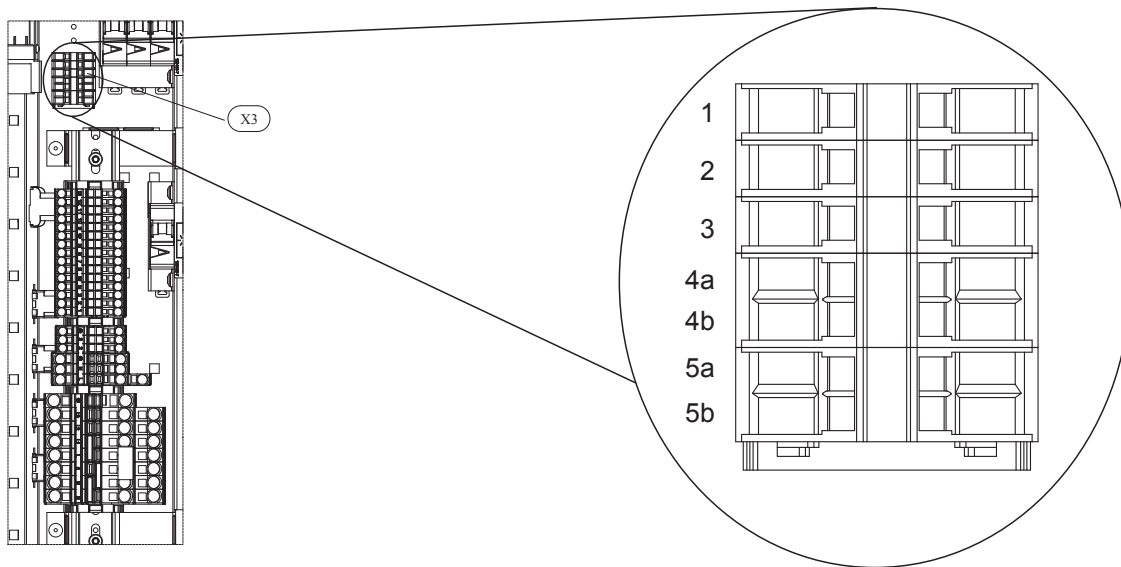
NOTE
Be sure that MH-RG10 is connected to Terminal X4 on AA22 correctly as it is shown.

How to connect external circulation pump and heat source on X3

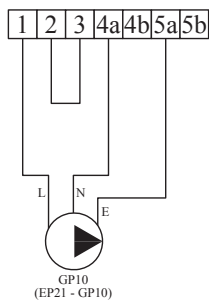
<HMA100V, HMA100VM>



<HMS140VA, HMS140V>



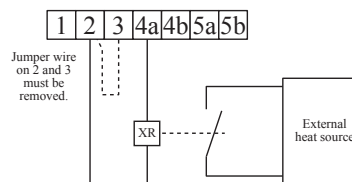
How to connect external circulation pump



NOTE

Max output is up to 50W.

How to connect external heat source



NOTE

Max current is 0.2A

Start-up and inspection

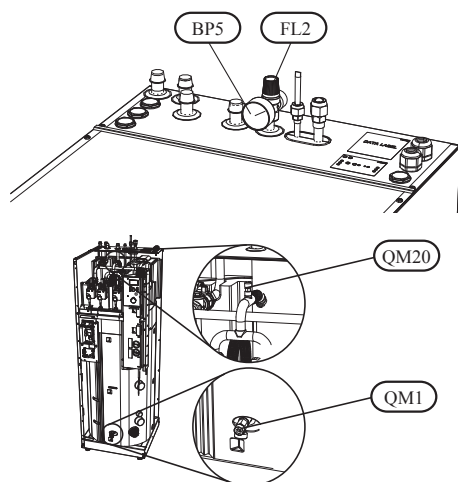
Preparations

Connect outdoor and indoor unit (refrigerant pipe and wiring) and connect indoor unit to the climate system.

Filling the climate system

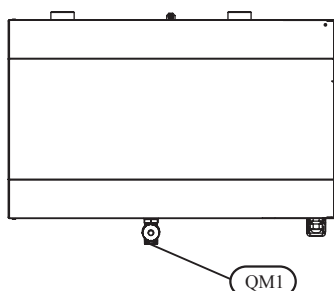
1. Ensure that the pressure gauge (BP5) is visible.
2. Ensure the valve to expansion vessel is closed (HMS140VA and HMS140V only).
3. Connect a hose to the filling valve (QM1) and open the valve to fill the system.
4. For MT500, open the venting valve (QM20) to fill the tank with water. Close QM20 when water comes out from it.
5. After a while the pressure gauge (BP5) will show rising pressure.
6. When the pressure has reached about 2.5 bar a mix of air and water starts to emerge from the safety valve (FL2). Close the filling valve (QM1).
7. Open the valve to expansion vessel in indoor unit when air vent is completed (HMS140VA and HMS140V only).

<HMA100V, HMA100VM>

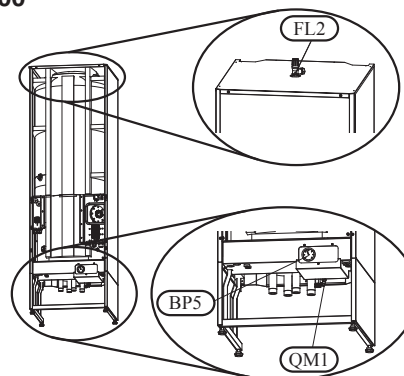


<HMS140VA, HMS140V>

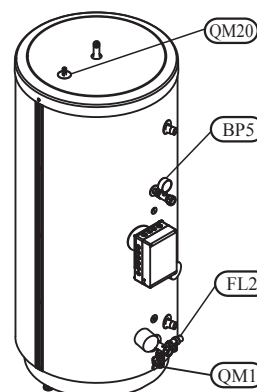
HT30



MT300



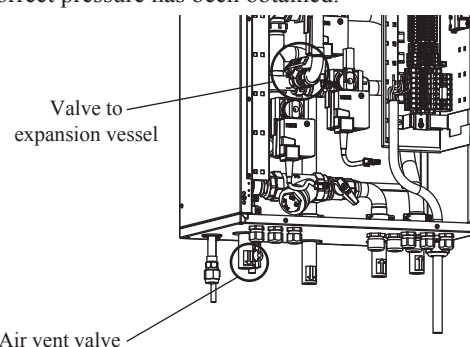
MT500



Venting the climate system

1. Vent indoor unit and tank through the safety valve or venting valve (FL2 or QM20) and the rest of the heating system through the relevant venting valves.
2. Vent indoor unit through venting valve on indoor unit to bleed rest of air completely. (HMS140VA and HMS140V only)
3. Open the valve to expansion vessel when air vent is completed. (HMS140VA and HMS140V only)

Keep topping up and venting until all air has been removed and the correct pressure has been obtained.



NOTE

*Be sure to bleed air in the climate system completely.
The circulation pump may become damaged.*

Filling the hot water coil

The hot water coil is filled by opening a hot water tap.

Commissioning

Outdoor unit

1. Check that the miniature circuit-breaker (FA2) in indoor unit is on.

Indoor unit

1. Check that the temperature limiter (FD1) has not tripped.
2. Switch on the main circuit breaker and check that the miniature circuit breaker (FA1, FA3) in indoor unit is on.
3. Set switch (SF1) to “1” (the switch should be switched on for 6 hours before the compressor can be started).

When switch (SF1) is set to “0” - wait at least 1 minute before setting it back to “1”.

4. Select operating mode “Add. heat only” by holding in the operating mode button for 7 seconds.
5. Set the date and time in Menu 7.1 and 7.2.
6. Set the language in Menu 8.1.2.
7. Select “Service” in Menu 8.1.1.
8. Set Menu 9.3.14 to “No HW” when HT30 is connected.
9. Select additional heat source type in Menu 9.2.8.
10. Set the fuse size on knob (R24). Check the value in Menu 8.3.1.
11. Set the max immersion heater output on knob (R25). Check the value in Menu 8.3.2.
12. Select the desired heating curve in Menu 2.1.2 and set the parallel offset using the knob.
13. Check that the hot water temperature in Menu 1.0 exceeds 25 °C.
14. When the above steps have been completed, select operating mode “Auto”.

The heat pump starts 30 minutes after the outdoor unit is powered if there is a heat demand.

Setting system flow heating

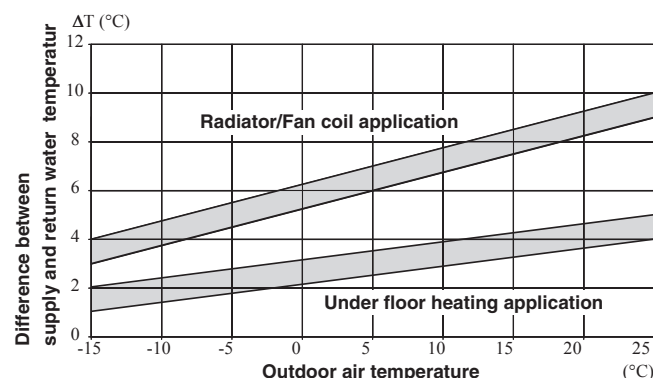
1. Ensure that the heat pump produces heating for the climate system.
2. Select “On” in Menu 9.6.2.
3. Select the value in Menu 9.6.1. according to the table below.

| FDCW71 | FDCW100 | FDCW140 |
|--------|---------|---------|
| 55 | 40 | 57 |

NOTE

If it is not shown, set the Menu 8.1.1 to “Service”.

4. Check the supply and return line temperatures in Menu 2.5. Adjust the circulation pump speed in Menu 2.1.5 so that the difference between these temperatures is according to the diagram below.
5. Select “Off” in Menu 9.6.2.



Setting system flow cooling

The factory setting 100% in Menu 2.2.5 is recommended.

Comfort setting heating

See page 46 for setting the Heating curve.

Comfort setting cooling

Cooling function is deactivated in the default setting. See page 49 how to activate it.

For HMS140VA with fan coil application, it is also necessary to change Cooling curve (menu 2.2.2) and Minimum supply cooling (menu 2.2.4) settings as follows to obtain enough capacity.

Cooling curve (2.2.2): 3


Minimum supply cooling (2.2.4): 10

For HMS140V, do not set the Minimum supply cooling lower than 18°C.

Commissioning Hydrolution without outdoor unit connected

1. Check that the temperature limiter (FD1) has not tripped.
2. Switch on the main circuit breaker and check that the miniature circuit breaker (FA1) in indoor unit is on.
3. Set switch (SF1) to “1”.
4. Select operating mode “Add. heat only” by holding in the operating mode button for 7 seconds.
5. Set the date and time in Menu 7.1 and 7.2.
6. Select “Service” in Menu 8.1.1.
7. Select addition type in Menu 9.2.8.
8. Set the fuse size on knob (R24). Check the value in Menu 8.3.1.
9. Set the max immersion heater output on knob (R25). Check the value in Menu 8.3.2.
10. Select the desired heating curve in Menu 2.1.2 and set the parallel offset using the knob.

NOTE

Do not turn the switch (SF1) to 1 or  until the system has been filled with water.

The circulation pump and immersion heater may become damaged.

Checking external heat source controlled by the signal from indoor unit

1. Check if the signal wire is connected as instructed.
2. Select “Ext. 1 step” in Menu 9.2.8.
3. Select operating mode “Add. heat only” by holding in the operating mode button for 7 seconds.
4. Ensure that the max temperature from the external heat source does not exceed 65 °C.
5. Select operating mode “Auto” by pressing the operating mode button.

Checking external heat source controlled independently

1. Adjust the start temperature of the external heat source so that it starts earlier than the internal electric heater.
2. Adjust the stop temperature of the external heat source so that the temperature in indoor unit does not exceed 65 °C.

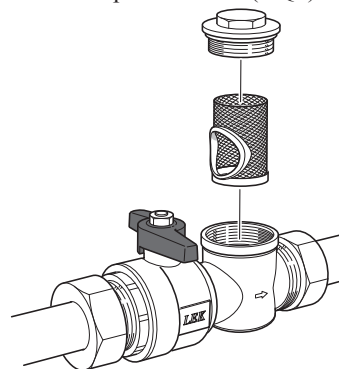
Inspection of the installation

Current regulations require the heating installation to be inspected before it is commissioned. The inspection must be carried out by a suitably qualified person and should be documented. Use the check list on the following page. The above applies to closed heating systems.

Do not replace any part of the split-system without carrying out new checks.

Cleaning the particle filter

Clean the particle filter (HQ1) after installation.



Secondary adjustment

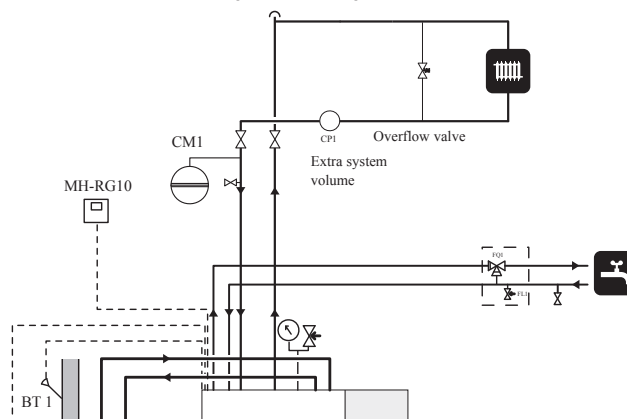
Air is initially released from the hot water and venting may be necessary. If gurgling sounds can be heard from Indoor unit or from the climate system, the entire system will require additional venting.

NOTE

Use bleed valve (QM20), any external bleed valves as well as safety valve (FL2). The latter must be operated carefully as it opens quickly. When the system is stable (correct pressure and all air eliminated) the automatic heating control system can be set as required.

Basic Menu settings to be checked

1. Single heating application with a room sensor (MH-RG10)



Fill in the altered set value on the blank cell of “Set value”.

As for the set value which is already written in the cell, check if the setting is properly changed.

1. Initial settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|----------|----------|---------------|-----------|--------------------------|-----------------------------------|
| Language | 8.1.2 | English | _____ | <input type="checkbox"/> | Language setting used for display |
| Date | 7.1 | - | _____ | <input type="checkbox"/> | |
| Time | 7.2 | - | _____ | <input type="checkbox"/> | |

2. Heating settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|----------------------|--------------|---------------|-----------|--------------------------|---|
| Heating curve | 2.1.2 | 9 | _____ | <input type="checkbox"/> | |
| Offset heating | Knob (2.1.1) | 0 | _____ | <input type="checkbox"/> | Offset value can be set by the knob in the control panel. Value can be checked in Menu 2.1.1 |
| Min supply heating | 2.1.4 | 25°C | ____°C | <input type="checkbox"/> | Adjust the min/max supply temperature according to the required feeding temperature of the emitter in the system. |
| Max supply heating | 2.3 | 55°C | ____°C | <input type="checkbox"/> | |
| Circ-pump speed heat | 2.1.5 | 100% | ____% | <input type="checkbox"/> | Adjust the circulation pump speed setting according to “Setting system flow heating”. |
| Allow add.heat | 8.2.1 | Heat | _____ | <input type="checkbox"/> | Setting whether the electric heater is used for heating. |
| Period time | 8.5.1 | 60min | ____min | <input type="checkbox"/> | These settings decide the operation period of hot water and heating when both demand comes up at the same time. |
| Max time for HW | 8.5.2 | 40min | ____min | <input type="checkbox"/> | Period time defines a cycle time of hot water and heating operation, and Max time for HW defines the maximum hot water operation time of the period time. |
| Stop temp heating | 8.2.3 | 17°C | ____°C | <input type="checkbox"/> | Heating operation is prohibited when the outdoor air temperature exceeds the setting value. |

3. Room sensor settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|------------------|----------|---------------|-----------|--------------------------|--|
| Room sensor type | 9.3.6 | Off | RG10 | <input type="checkbox"/> | In case this menu is not shown on the display, set the menu 8.1.1 to “S”. |
| Heating system | 6.2 | Off | System1 | <input type="checkbox"/> | This setting defines the system where the adjustment by the room sensor should be valid. |

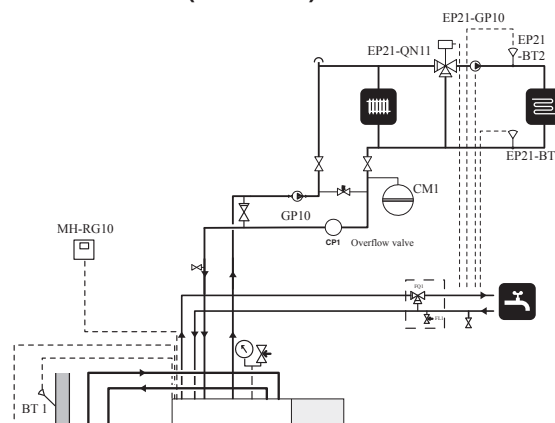
4. Hot water settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|--------------------------|------------|---------------|-----------|--------------------------|---|
| Start temperature HW | 1.2 | 47°C | ____°C | <input type="checkbox"/> | These settings should be adjusted based on the hot water load in the property. |
| Stop temperature HW | 1.3 | 53°C | ____°C | <input type="checkbox"/> | |
| Extra hot water function | see Item 5 | | | <input type="checkbox"/> | Setting is necessary when user use this function for larger hot water demand or for disinfection. |
| Block HW/Heating | 9.3.14 | HW+Heating | _____ | <input type="checkbox"/> | Set it to No HW when HT30 is used for HMS140 |

5. Extra hot water settings (in case it is required)

| Function | Menu No. | Default value | Set value | Check | Remarks |
|--|---------------|---------------|-----------|--------------------------|---|
| Stop temperature XHW | 1.4 | 65°C | ____°C | <input type="checkbox"/> | |
| Heat pump stop XHW | 1.5 | 60°C | ____°C | <input type="checkbox"/> | Operable temperature range of the outdoor unit can be set. |
| Max heat p. time XHW | 1.6 | 30min | ____min | <input type="checkbox"/> | Total operable time of heat pump during XHW operation can be set. |
| XHW Monday - Sunday (Weekly timer based extra hot water setting) | 7.4.1 - 7.4.7 | 00:00-00:00 | _____ | <input type="checkbox"/> | The setting is invalid when start time and stop time is set at the same time (e.g. 22:00 - 22:00) |
| Interval XHW (Periodic extra hot water setting) | 1.7 | 0days | ____days | <input type="checkbox"/> | Interval of the extra hot water operation is set. |

2. Dual heating application with a room sensor (MH-RG10)



1. Initial settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|----------|----------|---------------|-----------|--------------------------|-----------------------------------|
| Language | 8.1.2 | English | — | <input type="checkbox"/> | Language setting used for display |
| Date | 7.1 | - | — | <input type="checkbox"/> | |
| Time | 7.2 | - | — | <input type="checkbox"/> | |

2. Heating settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|----------------------|-----------------|---------------|-----------|--------------------------|---|
| Heating curve | 2.1.2 | 9 | — | <input type="checkbox"/> | Target water temperature for radiator |
| Offset heating | Knob (2.1.1) | 0 | — | <input type="checkbox"/> | Offset value can be set by the knob in the control panel. Value can be checked in Menu 2.1.1 |
| Min supply heating | 2.1.4 | 25°C | —°C | <input type="checkbox"/> | Adjust the min/max supply temperature according to the required feeding temperature of the emitter in the system. |
| Max supply heating | 2.3 | 55°C | —°C | <input type="checkbox"/> | |
| Circ-pump speed heat | 2.1.5 | 100% | —% | <input type="checkbox"/> | Adjust the circulation pump speed setting according to "Setting system flow heating". |
| Allow add.heat | 8.2.1 | Heat | — | <input type="checkbox"/> | Setting whether the electric heater is used for heating. |
| Period time | 8.5.1 | 60min | —min | <input type="checkbox"/> | These settings decide the operation period of hot water and heating when both demand comes up at the same time. |
| Max time for HW | 8.5.2 | 40min | —min | <input type="checkbox"/> | Period time defines a cycle time of hot water and heating operation, and Max time for HW defines the maximum hot water operation time of the period time. |
| Stop temp heating | 8.2.3 | 17°C | —°C | <input type="checkbox"/> | Heating operation is prohibited when the outdoor air temperature exceeds the setting value. |
| Heating curve 2 | 3.2 | 6 | — | <input type="checkbox"/> | Target water temperature for under floor heating. |
| Offset heating 2 | 3.1 | -1 | — | <input type="checkbox"/> | Offset value for heating system 2. |
| Min supply temp 2 | 3.3 | 15 | — | <input type="checkbox"/> | Min/max supply temperature setting for emitter downstream. |
| Max supply temp 2 | 3.4 | 45 | — | <input type="checkbox"/> | |
| Heating system 2 | 9.3.4 | off | Heating | <input type="checkbox"/> | Heating system 2 becomes active when it is set. |

3. Room sensor settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|------------------|----------|---------------|-----------|--------------------------|--|
| Room sensor type | 9.3.6 | Off | RG10 | <input type="checkbox"/> | In case this menu is not shown on the display, set the menu 8.1.1 to "S". |
| Heating system | 6.2 | Off | System1+2 | <input type="checkbox"/> | This setting defines the system where the adjustment by the room sensor should be valid. |

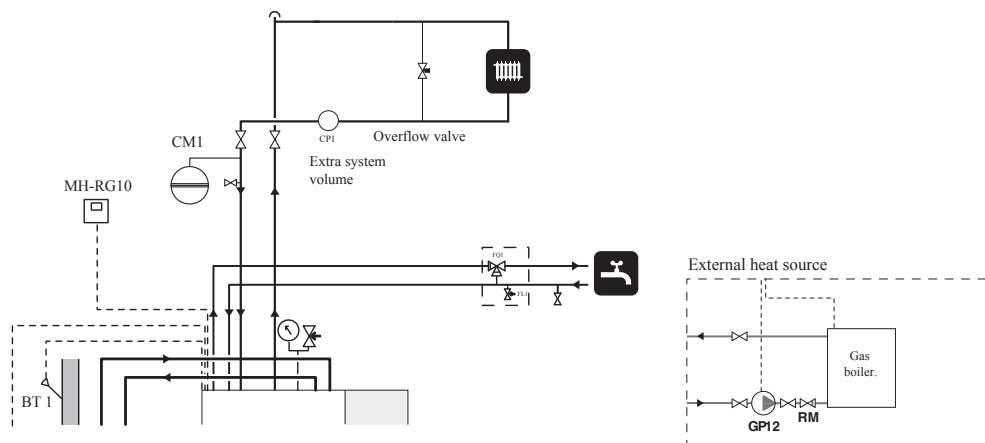
4. Hot water settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|--------------------------|----------|---------------|-----------|--------------------------|---|
| Start temperature HW | 1.2 | 47°C | —°C | <input type="checkbox"/> | These settings should be adjusted based on the hot water load in the property. |
| Stop temperature HW | 1.3 | 53°C | —°C | <input type="checkbox"/> | |
| Extra hot water function | | see Item 5 | — | <input type="checkbox"/> | Setting is necessary when user use this function for larger hot water demand or for disinfection. |
| Block HW/Heating | 9.3.14 | HW+Heating | — | <input type="checkbox"/> | Set it to No HW when HT30 is used for HMS140 |

5. Extra hot water settings (in case it is required)

| Function | Menu No. | Default value | Set value | Check | Remarks |
|---|------------------|---------------|-----------|--------------------------|---|
| Stop temperature XHW | 1.4 | 65°C | —°C | <input type="checkbox"/> | |
| Heat pump stop XHW | 1.5 | 60°C | —°C | <input type="checkbox"/> | Operable temperature range of the outdoor unit can be set. |
| Max heat p. time XHW | 1.6 | 30min | —min | <input type="checkbox"/> | Total operable time of heat pump during XHW operation can be set. |
| XHW Monday - Sunday (Weekly timer based extra hot water setting) | 7.4.1 - 7.4.7 | 00:00-00:00 | — | <input type="checkbox"/> | The setting is invalid when start time and stop time is set at the same time (e.g. 22:00 - 22:00) |
| Interval XHW (Periodic extra hot water setting) | 1.7 | 0days | —days | <input type="checkbox"/> | Interval of the extra hot water operation is set. |

3. Single heating application with external heat source



Fill in the altered set value on the blank cell of “Set value”.

As for the set value which is already written in the cell, check if the setting is properly changed.

1. Initial settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|----------|----------|---------------|-----------|--------------------------|-----------------------------------|
| Language | 8.1.2 | English | — | <input type="checkbox"/> | Language setting used for display |
| Date | 7.1 | - | — | <input type="checkbox"/> | |
| Time | 7.2 | - | — | <input type="checkbox"/> | |

2. Heating settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|----------------------|-----------------|---------------|-------------|--------------------------|---|
| Heating curve | 2.1.2 | 9 | — | <input type="checkbox"/> | |
| Offset heating | Knob (2.1.1) | 0 | — | <input type="checkbox"/> | Offset value can be set by the knob in the control panel. Value can be checked in Menu 2.1.1 |
| Min supply heating | 2.1.4 | 25°C | —°C | <input type="checkbox"/> | Adjust the min/max supply temperature according to the required feeding temperature of the emitter in the system. |
| Max supply heating | 2.3 | 55°C | —°C | <input type="checkbox"/> | |
| Circ-pump speed heat | 2.1.5 | 100% | —% | <input type="checkbox"/> | Adjust the circulation pump speed setting according to “Setting system flow heating”. |
| Allow add.heat | 8.2.1 | Heat | — | <input type="checkbox"/> | Setting whether the electric heater is used for heating. |
| Period time | 8.5.1 | 60min | — min | <input type="checkbox"/> | These settings decide the operation period of hot water and heating when both demand comes up at the same time. |
| Max time for HW | 8.5.2 | 40min | — min | <input type="checkbox"/> | Period time defines a cycle time of hot water and heating operation, and Max time for HW defines the maximum hot water operation time of the period time. |
| Stop temp heating | 8.2.3 | 17°C | —°C | <input type="checkbox"/> | Heating operation is prohibited when the outdoor air temperature exceeds the setting value. |
| Add heat type | 9.2.8 | Internal el. | Ext. 1 step | <input type="checkbox"/> | Make sure the wiring for external heat source. |

3. Room sensor settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|------------------|----------|---------------|-----------|--------------------------|--|
| Room sensor type | 9.3.6 | Off | RG10 | <input type="checkbox"/> | In case this menu is not shown on the display, set the menu 8.1.1 to “S”. |
| Heating system | 6.2 | Off | System1 | <input type="checkbox"/> | This setting defines the system where the adjustment by the room sensor should be valid. |

4. Hot water settings

| Function | Menu No. | Default value | Set value | Check | Remarks |
|--------------------------|----------|---------------|-----------|--------------------------|---|
| Start temperature HW | 1.2 | 47°C | —°C | <input type="checkbox"/> | These settings should be adjusted based on the hot water load in the property. |
| Stop temperature HW | 1.3 | 53°C | —°C | <input type="checkbox"/> | |
| Extra hot water function | | see Item 5 | | <input type="checkbox"/> | Setting is necessary when user use this function for larger hot water demand or for disinfection. |
| Block HW/Heating | 9.3.14 | HW+Heating | — | <input type="checkbox"/> | Set it to No HW when HT30 is used for HMS140 |

5. Extra hot water settings (in case it is required)

| Function | Menu No. | Default value | Set value | Check | Remarks |
|---|------------------|---------------|-----------|--------------------------|---|
| Stop temperature XHW | 1.4 | 65°C | —°C | <input type="checkbox"/> | |
| Heat pump stop XHW | 1.5 | 60°C | —°C | <input type="checkbox"/> | Operable temperature range of the outdoor unit can be set. |
| Max heat p. time XHW | 1.6 | 30min | — min | <input type="checkbox"/> | Total operable time of heat pump during XHW operation can be set. |
| XHW Monday - Sunday (Weekly timer based extra hot water setting) | 7.4.1 - 7.4.7 | 00:00-00:00 | — | <input type="checkbox"/> | The setting is invalid when start time and stop time is set at the same time (e.g. 22:00 - 22:00) |
| Interval XHW (Periodic extra hot water setting) | 1.7 | 0days | — days | <input type="checkbox"/> | Interval of the extra hot water operation is set. |

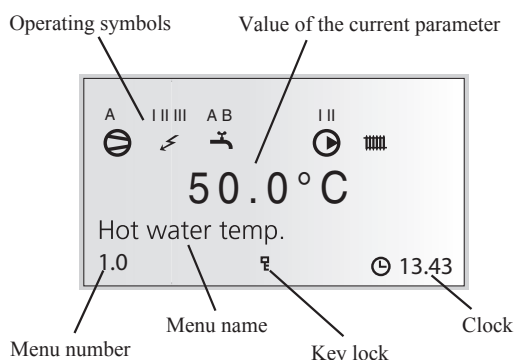
Checklist: Checks before commissioning

| Hot water | Notes | Checked |
|--------------------------------------|---|--------------------------|
| Non-return valve | Is it installed in right direction ? | <input type="checkbox"/> |
| Safety valve | Is it installed in cold water line ? | <input type="checkbox"/> |
| Mixer valve | Is it installed in right direction ? | <input type="checkbox"/> |
| | | <input type="checkbox"/> |
| Heating | Notes | Checked |
| System volume | Tank _____ ℓ + System _____ ℓ = Total _____ ℓ | <input type="checkbox"/> |
| Safety valve | Is FL2 installed ? | <input type="checkbox"/> |
| Expansion vessel | Total system volume × 5% or more _____ ℓ | <input type="checkbox"/> |
| Internal heater | Permitted/prohibited (Menu 8.2.1) | <input type="checkbox"/> |
| External heat Source | Yes → Type _____ Setting (Menu 9.2.8) _____ No | <input type="checkbox"/> |
| Heating system 2 | Yes No | <input type="checkbox"/> |
| Cooling | Notes | Checked |
| Pipe system, condensation insulation | | <input type="checkbox"/> |
| Reversing valve (QN12) | Is it installed in right direction ? | <input type="checkbox"/> |
| | | <input type="checkbox"/> |
| Refrigerant system | Notes | Checked |
| Pipe length (within 12m) | _____ m | <input type="checkbox"/> |
| Height difference (within 7m) | _____ m | <input type="checkbox"/> |
| Test pressurization | 4.15 MPa | <input type="checkbox"/> |
| Leak tracing | | <input type="checkbox"/> |
| End pressure Evacuation | -0.1 MPa or lower for one hour | <input type="checkbox"/> |
| | | <input type="checkbox"/> |
| Electrical installation | Notes | Checked |
| Property's main fuse | 3/1 phase _____ A | <input type="checkbox"/> |
| Group fuse | 3/1 phase _____ A | <input type="checkbox"/> |
| Current limiter/current sensor | Is it installed properly if the power supply is 3 phase ? | <input type="checkbox"/> |
| | | <input type="checkbox"/> |
| Accessories | Notes | Checked |
| External circulation pump | Yes/No | <input type="checkbox"/> |
| Buffer vessel | Yes/No Volume _____ ℓ | <input type="checkbox"/> |
| Relief valve | Yes/No | <input type="checkbox"/> |
| Room sensor | Yes/No Type _____ Setting (Menu 9.3.5, 9.3.6, 6.2) | <input type="checkbox"/> |
| | | <input type="checkbox"/> |

Control

Control

Display



Menu types

Control is classified into different menu types depending on how “deep” into the controls you need to go.

- Normal [N]: The settings you as a customer often need.
- Extended [U]: Shows all detailed menus except the service menus.
- Service [S]: Shows all menus.

Menu management



The Plus button is used to move forward to the next menu on the current menu level and to increase the value of the parameter in menus where this is possible.



The Minus button is used to move back to the previous menu on the current menu level and to decrease the value of the parameter in menus where this is possible.



The Enter button is used to select submenus of the current menu, to permit parameters to be changed and to confirm any changes to parameters. When the menu number ends with a zero this indicates that there is a submenu.

Changing parameters

In order to change a parameter (value):

1. Access the required menu.
2. Press button, the numerical value starts to flash.
3. Increase or decrease using or buttons.
4. Confirm by pressing button.
5. Menu 1.0 is automatically displayed again 30 minutes after the last button is pressed.

Example

Changing the heating curve, Menu 2.1.

1. The starting point is Menu 1.0.
2. Press button to move to Menu 2.0.
3. Press button to move to Menu 2.1.
4. Press button to change the value.
5. Change the value by pressing or buttons.
6. Confirm the selected value by pressing button.
7. Press button to access Menu 1.0.

Menu tree

1.0 [N] Hot water temp.

| | |
|---------------------------------|--------------------------------|
| 1.1 [N] Max HW/Peroid time | |
| 1.2 [N] Start temperature HW | |
| 1.3 [N] Stop temperature HW | |
| 1.4 [U] Stop temperature XHW | |
| 1.5 [U] Heat pump stop XHW | |
| 1.6 [U] Max heat p. time XHW | |
| 1.7 [U] Interval XHW | |
| 1.8 [U] Next XHW action | |
| 1.9 [U] HW run time | |
| 1.10.0 [S] HW charge act/set | 1.10.1 [S] HW charge set temp |
| | 1.10.2 [S] Circ-pump speed HW |
| | 1.10.3 [S] Circ-pump manual |
| | 1.10.4 [S] HW reg min |
| | 1.10.5 [S] HW reg P |
| | 1.10.6 [S] HW reg Q |
| | 1.10.7 [S] HW reg sample time |
| | 1.10.8 [S] HW reg xp |
| | 1.10.9 [S] HW reg value for xP |
| | 1.10.10 [S] Return |
| 1.11.0 [S] CompFreq HW settings | 1.11.1 [S] CompFreq HW set |
| | 1.11.2 [S] CompFreq manual |
| | 1.11.3 [S] CompFreq at +20 |
| | 1.11.4 [S] CompFreq at -5 |
| | 1.11.5 [S] Return |
| 1.12 [N] Return | |

2.0 [N] Supply temp.

| | | |
|-----------------------------|--------------------------------|----------------------------------|
| 2.1.0 [N] Heating settings | 2.1.1 [N] Offset heating/Total | |
| | 2.1.2 [N] Heating curve | |
| | 2.1.3.0 [U] Own heating curve | 2.1.3.1 [U] Supply temp.at +20 |
| | | 2.1.3.2 [U] Supply temp.at -20 |
| | | 2.1.3.3 [U] Buckling temperature |
| | | 2.1.3.4 [U] Supply t. at buckl. |
| | | 2.1.3.5 [U] Return |
| | 2.1.4 [U] Min supply heating | |
| | 2.1.5 [U] Circ-pump speed heat | |
| | 2.1.6 [N] Return | |
| 2.2.0 [N] Cooling settings | 2.2.1 [N] Offset cooling/Total | |
| | 2.2.2 [N] Cooling curve | |
| | 2.2.3.0 [U] Own cooling curve | 2.2.3.1 [U] Supply temp.at +20 |
| | | 2.2.3.2 [U] Supply temp.at +40 |
| | | 2.2.3.3 [U] Return |
| | 2.2.4 [U] Min supply cooling | |
| | 2.2.5 [U] Circ-pump speed cool | |
| | 2.2.6 [N] Return | |
| 2.3 [U] Max supply temp. | | |
| 2.4 [U] External adjustment | | |
| 2.5 [U] Supply/Return temp. | | |
| 2.6 [U] Degree minutes | | |
| 2.7 [N] Return | | |

3.0 [N] Supply temp. 2

| |
|--------------------------------|
| 3.1 [N] Offset heating/Tot 2 |
| 3.2 [N] Heating curve 2 |
| 3.3 [U] Min supply temp. 2 |
| 3.4 [U] Max supply temp. 2 |
| 3.5 [U] External adjust. 2 |
| 3.6.0 [U] Own heating curve 2 |
| 3.6.1 [U] Supply temp.at +20 |
| 3.6.2 [U] Supply temp.at -20 |
| 3.6.3 [U] Buckling temperature |
| 3.6.4 [U] Supply t. at buckl |
| 3.6.5 [U] Return |
| 3.7 [U] Supply/Return temp 2 |
| 3.8 [N] Return |

5.0 [N] Heat pump

| |
|---------------------------------|
| 5.1 [N] Number of starts |
| 5.2 [N] Run time compressor |
| 5.3 [U] Time to start |
| 5.4 [U] Outdoor temp. Tho-A |
| 5.5 [U] Heat Ex Tho-R1 |
| 5.6 [U] Heat Ex Tho-R2 |
| 5.7 [U] Suction temp. Tho-S |
| 5.8 [U] Hot gas Tho-D |
| 5.9 [U] Liquid line temp. |
| 5.10 [U] Condensor out / max |
| 5.11 [U] HP |
| 5.12 [U] LP LPT |
| 5.13 [U] Fan speed |
| 5.14.0 [U] CompFreq act/set |
| 5.14.1 [U] OU current CT |
| 5.14.2 [U] Inverter temp Tho-IP |
| 5.14.3 [U] Return |
| 5.15.0 [S] OU communication |
| 5.15.1 [S] Com. error rate |
| 5.15.2 [S] Com. errors |
| 5.15.3 [S] Reset com. errors |
| 5.15.4 [S] Return |
| 5.16 [N] Return |

4.0 [N] Outdoor temp.

| |
|-----------------------------|
| 4.1 [N] Outdoor avg. temp. |
| 4.2 [U] Outdoor filter time |
| 4.3 [U] Outdoor avg. 1min. |
| 4.4 [N] Return |

6.0 [N] Room temperature*

| |
|------------------------------|
| 6.1 [U] Room compensation |
| 6.2 [U] Heating system |
| 6.3 [N] Room temp. setpoint |
| 6.4 [U] Room temp avg. 1min |
| 6.5 [U] Room integrator time |
| 6.6 [N] Return |

*Requires accessory and activation in Menu 9.3.6.

| 7.0 [N] Clock | |
|-----------------------------|--------------------------------|
| 7.1 [N] Date | |
| 7.2 [N] Time | |
| 7.3.0 [U] Temp set back | 7.3.1 [U] Set back time |
| | 7.3.2 [U] Set back temp +/- |
| | 7.3.3 [U] Heating system |
| | 7.3.4 [U] Return |
| 7.4.0 [U] Extra hot water | 7.4.1 [U] XHW Monday |
| | 7.4.2 [U] XHW Tuesday |
| | 7.4.3 [U] XHW Wednesday |
| | 7.4.4 [U] XHW Thursday |
| | 7.4.5 [U] XHW Friday |
| | 7.4.6 [U] XHW Saturday |
| | 7.4.7 [U] XHW Sunday |
| | 7.4.8 [U] Return |
| 7.5.0 [U] Vacation set back | 7.5.1 [U] Vacation begins |
| | 7.5.2 [U] Vacation ends |
| | 7.5.3 [U] Heating system |
| | 7.5.4 [U] Offset heating curve |
| | 7.5.5 [U] HW off |
| | 7.5.6 [U] Return |
| 7.6.0 [N] Silent mode | 7.6.1 [N] Silent mode time |
| | 7.6.2 [N] Return |
| 7.7 [N] Return | |

| 8.0 [N] Other adjustments | |
|-----------------------------|--------------------------------|
| 8.1.0 [N] Display settings | 8.1.1 [N] Menu type |
| | 8.1.2 [N] Language |
| | 8.1.3 [N] Display contrast |
| | 8.1.4 [N] Light intensity |
| | 8.1.5 [N] Return |
| 8.2.0 [N] Op. mode settings | 8.2.1 [N] Allow add. heat |
| | 8.2.2 [N] Add. heat only |
| | 8.2.3 [U] Stop temp. heating |
| | 8.2.4 [U] Start temp. cooling |
| | 8.2.5 [U] Hysteresis |
| | 8.2.6 [N] Return |
| 8.3.0 [U] Current limiter | 8.3.1 [U] Fuse size |
| | 8.3.2 [U] Max. electric power |
| | 8.3.3 [U] Current phase 1 |
| | 8.3.4 [U] Current phase 2 |
| | 8.3.5 [U] Current phase 3 |
| | 8.3.6 [U] Transform. ratio EBV |
| | 8.3.7 [U] Return |
| 8.5.0 [U] Period settings | 8.5.1 [U] Period time |
| | 8.5.2 [U] Max time for HW |
| | 8.5.3 [U] Return |
| 8.6 [N] Return | |

9.0 [S] Service menus

| | | |
|------------------------------|---------------------------------|----------------------------|
| 9.1.0 [S] Heat pump settings | 9.1.1 [S] DM start heating | |
| | 9.1.2 [S] DM start cooling | |
| | 9.1.3 [S] Stop Temp. heat low | |
| | 9.1.4 [S] Stop Temp. heat high | |
| | 9.1.5 [S] Stop Temp. cool low | |
| | 9.1.6 [S] Stop Temp. cool high | |
| | 9.1.7 [S] Time bet. starts | |
| | 9.1.8 [S] Min CompFreq act/set | |
| | 9.1.9 [S] Max CompFreq act/set | |
| | 9.1.10 [S] OU cur. heat act/max | |
| | 9.1.11 [S] OU cur. cool act/max | |
| | 9.1.12 [S] Tank defrost Temp. | |
| | 9.1.13 [S] Return | |
| 9.2.0 [S] Add. heat settings | 9.2.1 [S] DM start add. heat | |
| | 9.2.2 [S] Time factor | |
| | 9.2.3 [S] Docking type | |
| | 9.2.4 [S] Reg. amplification | |
| | 9.2.5 [S] Reg. integrator time | |
| | 9.2.6 [S] Shunt amplification | |
| | 9.2.7 [S] Shunt amplification2 | |
| | 9.2.8 [S] Add. heat type | |
| | 9.2.9 [S] Return | |
| 9.3.0 [S] Operating settings | 9.3.1 [S] Max. boiler temp. | |
| | 9.3.2 [S] Logger | |
| | 9.3.3 [S] Cooling system | |
| | 9.3.4 [S] Heating system 2 | |
| | 9.3.5 [S] Room unit | |
| | 9.3.6 [S] Room sensor type | |
| | 9.3.7.0 [S] Forced control | 9.3.7.1 [S] Forced control |
| | | 9.3.7.2 [S] K1 |
| | | 9.3.7.3 [S] K2 |
| | | 9.3.7.4 [S] K3 |
| | | 9.3.7.5 [S] K4 |
| | | 9.3.7.6 [S] K5 |
| | | 9.3.7.7 [S] K6 |
| | | 9.3.7.8 [S] K7 |
| | | 9.3.7.9 [S] K8 |
| | | 9.3.7.10 [S] K9 |
| | | 9.3.7.11 [S] K10 |
| | | 9.3.7.12 [S] K11 |
| | | 9.3.7.13 [S] K12 |
| | | 9.3.7.14 [S] K13 |
| | | 9.3.7.15 [S] K14 |
| | | 9.3.7.16 [S] Alarm 1 |
| | | 9.3.7.17 [S] Alarm 2 |
| | | 9.3.7.18 [S] Return |
| | 9.3.8 [S] Factory setting | |
| | 9.3.9 [S] Operating state | |

9.0 [S] Service menus

| | | |
|------------------------------|-----------------------------------|-----------------------------|
| | 9.3.10.0 [S] Floor drying setting | 9.3.10.1 [S] Floor drying |
| | | 9.3.10.2 [S] Period time 1 |
| | | 9.3.10.3 [S] Temp. period 1 |
| | | 9.3.10.4 [S] Period time 2 |
| | | 9.3.10.5 [S] Temp. period 2 |
| | | 9.3.10.6 [S] Return |
| | 9.3.11 [S] Supply pump exer. | |
| | 9.3.12 [S] Supply diff HP | |
| | 9.3.13 [S] Diff HP add. heat | |
| | 9.3.14 [S] Block HW/Heating | |
| | 9.3.15 [S] Heat drop at alarm | |
| | 9.3.16 [S] Type of HW sensor | |
| | 9.3.17 [S] Freeze protection HX | |
| | 9.3.18 [S] Return | |
| 9.4 [S] Quick start | | |
| 9.5.0 [S] System info | 9.5.1 [S] Heat pump type | |
| | 9.5.2 [S] Cpu usage percent | |
| | 9.5.3 [S] Com rate/1000 | |
| | 9.5.4 [S] Unit w. com. problem | |
| | 9.5.5 [S] Run time add. heat | |
| | 9.5.6 [S] Run time hot water | |
| | 9.5.7 [S] Program version | |
| | 9.5.8 [S] 106-card version | |
| | 9.5.9 [S] Display version | |
| | 9.5.10 [S] Relay card version | |
| | 9.5.11 [S] Lowest supply temp. | |
| | 9.5.12 [S] Percent runtime | |
| | 9.5.13 [S] Period | |
| | 9.5.14 [S] Run status | |
| | 9.5.15 [S] Run status last | |
| | 9.5.16 [S] Run status time | |
| | 9.5.17 [S] Return | |
| 9.6.0 [S] Heat reg. settings | 9.6.1 [S] CompFreq | |
| | 9.6.2 [S] Manual CompFreq | |
| | 9.6.3 [S] Max deltaF | |
| | 9.6.4 [S] CompFreq regP | |
| | 9.6.5 [S] Time min freq start | |
| | 9.6.6 [S] Time min freq heat | |
| | 9.6.7 [S] Max diff flow-cFlow | |
| | 9.6.8 [S] CompFreq GMz | |
| | 9.6.9 [S] Return | |
| 9.7 [S] Reset alarm | | |
| 9.8.0 [S] Alarm log | 9.8.1.0 [S] Log 1 | 9.8.x.1 [S] Time |
| | | 9.8.x.2 [S] Alarm type |
| | | 9.8.x.3 [S] Run status |
| | | 9.8.x.4 [S] Run status last |
| | | 9.8.x.5 [S] Run status time |

9.0 [S] Service menus

| | |
|----------------|-----------------------------------|
| | 9.8.x.6 [S] Run time compressor |
| | 9.8.x.7 [S] Outdoor avg. 1min. |
| | 9.8.x.8 [S] Outdoor temp Tho-A |
| | 9.8.x.9 [S] Supply/Return temp |
| | 9.8.x.10 [S] Condensor out |
| | 9.8.x.11 [S] Hot water temp. |
| | 9.8.x.12 [S] CompFreq act/set |
| | 9.8.x.13 [S] Heat Ex Tho-R1 |
| | 9.8.x.14 [S] Heat Ex Tho-R2 |
| | 9.8.x.15 [S] Suction temp. Tho-S |
| | 9.8.x.16 [S] Hot gas Tho-D |
| | 9.8.x.17 [S] Liquid line temp. |
| | 9.8.x.18 [S] HP |
| | 9.8.x.19 [S] LP LPT |
| | 9.8.x.20 [S] OU current CT |
| | 9.8.x.21 [S] Inverter temp Tho-IP |
| | 9.8.x.22 [S] Circ-pump speed |
| | 9.8.x.23 [S] Relay status 1-8 |
| | 9.8.x.24 [S] Relay status 9-14 |
| | 9.8.x.25 [S] Program status 1-8 |
| | 9.8.x.26 [S] Program status 9-16 |
| | 9.8.x.27 [S] Return |
| | 9.8.2.0 [S] Log 2 |
| | 9.8.3.0 [S] Log 3 |
| | 9.8.4.0 [S] Log 4 |
| | 9.8.5 [S] Clear alarm log |
| | 9.8.6 [S] Return |
| 9.9 [S] Return | |

Main menus

Menu 1.0 [N] Hot water temp.

The current hot water temperature in the vessel is shown here. Figure on left shows the one in the middle and right one in brackets shows the one on the bottom.

Menu 2.0 [N] Supply temp.

The current supply temperature for the heating system is shown here with the calculated supply temperature in brackets.

Menu 3.0 [N] Supply temp. 2

The current supply temperature for heating system 2 is shown here with the calculated supply temperature in brackets.

Menu 4.0 [N] Outdoor temp.

The current outdoor air temperature is displayed here.

Menu 5.0 [N] Heat pump

The outdoor operation data are shown in the sub-menus to this menu.

The following text appears in the display

| Text | Means |
|--------------|---|
| Off | Shown when there is no compressor demand and none of the following apply. |
| On | Shown during normal operation with the compressor. |
| Initiates | Shown while the compressor is running. |
| Com. problem | Shown in the event of temporary communication problems. |
| Defrosting | Shown during defrost. |
| Oil return | Shown when the compressor is rotated to be lubricated. |
| Protection | Shown when the compressor is in some form of protection or during a start delay of 30 minutes. |
| Shutdown | Shown in the event of an alarm, tariff B or Operating mode Addition only. |
| Stopped | Shown when the outdoor temperature is outside the compressor's working range (too high or too low temperature). |

Menu 6.0 [N] Room temperature

The room temperature is shown here and the set room temperature in brackets. The factor for the room sensor and heating system to control are set in the sub-menus to this menu.

Menu 7.0 [N] Clock

The date and time are set in the submenus of this menu. Different temperature reductions and increases at selected times are also set from this menu.

Menu 8.0 [N] Other adjustments

The menu type, language, operating mode settings and load monitor reading are set in the sub-menus to this menu.

Menu 9.0 [S] Service menus

This menu and its sub-menus are only shown on the display screen when access has been selected in Menu 8.1.1.

Values can be read and various settings can be made from these sub-menus.

NOTE! These settings should only be made by persons with the necessary expertise.

- [N] Normal, covers the normal user's needs.
- [U] Extended, shows all menus except the service menus.
- [S] Service, shows all menus, returns to normal 30 minutes after the last button was pressed.

1.0 [N] Hot water temp.

Menu 1.1 [N] Max HW/Period time

The time of the hot water period and the time for the whole period are shown here. Whole period is shown in brackets. Shown for both hot water charging and heating when necessary:

Time for Heating (Max.) when heating is in progress.

Time for Hot water (Max.) if hot water charging is in progress.

Menu 1.2 [N] Start temperature HW

The temperature when the heat pump starts hot water charging is set here.

Setting range: 25 – 55 °C

Default value: 47 °C

Menu 1.3 [N] Stop temperature HW

The temperature when the heat pump stops hot water charging is set here.

Setting range: 30 – 60 °C

Default value: 53 °C

Menu 1.4 [U] Stop temperature XHW

The desired temperature during extra hot water is set here.

Setting range: 40 – 65 °C

Default value: 65 °C

Menu 1.5 [U] Heat pump stop XHW

The desired stop temperature during extra hot water for the heat pump is set here.

Setting range: 40 – 60 °C

Default value: 60 °C

Menu 1.6 [U] Max heat p. time XHW

Here you select the maximum amount of time the heat pump can charge hot water for during extra hot water.

Setting range: 0 – 60 min

Default value: 50 min

Menu 1.7 [U] Interval XHW

Periodic time based extra hot water is selected here.

Extra hot water is shut off at the value “Off”. Extra hot water is started when the value is confirmed.

Setting range: 0 – 90 days

Default value: Off

Menu 1.8 [U] Next XHW action

Time to the next periodic Extra hot water operation is level shown here.

Menu 1.9 [U] HW run time

Shows how long hot water charging with the compressor has been in progress (accumulated).

Menu 1.10.0 [S] HW charge act/set

Shows the actual and target values for the hot water charging temperature.

Hot water charging settings are made in the sub-menus for this menu.

Menu 1.10.1 [S] HW charge set temp

Actual target supply temperature during hot water operation can be set.

Target supply temperature is set at 1.3 Stop temperature HW plus the set value in this menu.

Setting range: 0 – 10 °C

Default value: 2.0 °C

Menu 1.10.2 [S] Circ-pump speed HW

The speed of the heating medium pump during hot water charging is shown here.

Menu 1.10.3 [S] Circ-pump manual

Select “On” to manually control the HW pump.

Setting range: Off, On

Default value: Off

Menu 1.10.4 [S] HW reg min

Here you select the control signal that the heating medium pump is to start at.

Setting range: 1 – 50

Default value: 1

Menu 1.10.5 [S] HW reg P

P part for the HW pump regulator is selected here.

Setting range: 0 – 127

| | HMA100 | HMS140 |
|---------------|--------|--------|
| Default value | 14 | 10 |

Menu 1.10.6 [S] HW reg Q

Q part for the HW pump regulator is selected here.

Setting range: 0 – 127

Default value: 110

Menu 1.10.7 [S] HW reg sample time

The sample time for hot water charging is set here.

Setting range: 1 – 30

Default value: 5

Menu 1.10.8 [S] HW reg xP

Here you select the extra amplification that the HW pump regulator is to use below the breaking point.

Setting range: 1.0 – 10.0

Default value: 2.5

Menu 1.10.9 [S] HW reg value for xP

Here you select the breaking point when the flow is no longer linear to the control signal in the heating medium pump.

Setting range: 1 – 100

Default value: 40

Menu 1.10.10 [S] Return

Return to Menu 1.10.0.

Menu 1.11.0 [S] CompFreq HW settings

The compressor frequency during hot water charging is shown here.

Settings can be made regarding the compressor frequency during hot water charging in the submenus to this menu.

Menu 1.11.1 [S] CompFreq HW set

Here you select the compressor frequency for hot water charging during manual control.

This setting is valid only when “On” is selected in Menu 1.11.2.

| | FDCW71 | FDCW100 | FDCW140 |
|--------------------|----------|---------|----------|
| Setting range (Hz) | 20 – 118 | 25 – 85 | 20 – 120 |
| Default value (Hz) | – | – | – |

Menu 1.11.2 [S] CompFreq manual

Select “On” to control the compressor frequency for hot water charging manually.

Setting range: Off, On

Default value: Off

Menu 1.11.3 [S] CompFreq at +20

The compressor frequency for hot water charging at an outdoor air temperature of 20 °C is selected here.

| | FDCW71 | FDCW100 | FDCW140 |
|--------------------|----------|---------|----------|
| Setting range (Hz) | 20 – 118 | 25 – 85 | 20 – 120 |
| Default value (Hz) | 60 | 40 | 60 |

Menu 1.11.4 [S] CompFreq at -5

The compressor frequency for hot water charging at an outdoor air temperature of -5 °C is selected here.

| | FDCW71 | FDCW100 | FDCW140 |
|--------------------|----------|---------|----------|
| Setting range (Hz) | 20 – 118 | 25 – 85 | 20 – 120 |
| Default value (Hz) | 100 | 80 | 100 |

Menu 1.11.5 [S] Return

Return to Menu 1.11.0.

Menu 1.12 [N] Return

Return to Menu 1.0.

2.0 [N] Supply temp.

Menu 2.1.0 [N] Heating settings

Heating settings are made in the sub-menus for this menu.

Menu 2.1.1 [N] Offset heating/Total

The selected heating curve offset is shown here.

The total offset of the heat curve is also shown here. It include schedule, outer compensation and any room control.

Note! The value is changed using the “Heating curve offset” knob.

Setting range: -10 – 10

Menu 2.1.2 [N] Heating curve

The selected heating curve is shown here. At value 0, the function “Own heat curve” is activated, see Menu 2.1.3.0.

Setting range: 0 – 20

Default value: 9

Menu 2.1.3.0 [U] Own heating curve

Here you can select your own curve definition. This is an individual linear curve with one break point. You select a break point and the associated temperatures.

Note! The “Heating curve” in Menu 2.1.2 must be set to 0 to activate this function.

Menu 2.1.3.1 [U] Supply temp.at +20

The supply temperature at an outdoor air temperature of +20 °C is selected here.

Setting range: 0 – 80* °C

Default value: 20 °C

* Limited by Menu 2.3 Max supply temp.

Menu 2.1.3.2 [U] Supply temp.at -20

The supply temperature at an outdoor air temperature of -20 °C is selected here.

Setting range: 0 – 80* °C

Default value: 35 °C

* Limited by Menu 2.3 Max supply temp.

Menu 2.1.3.3 [U] Buckling temperature

Here you select at what outside air temperature the break point shall occur.

Setting range: -15 – 15 °C

Default value: 0 °C

Menu 2.1.3.4 [U] Supply t. at buckl.

You set the calculated supply temperature for the break point here.

Setting range: 0 – 80* °C

Default value: 30 °C

* Limited by Menu 2.3 Max supply temp.

Menu 2.1.3.5 [U] Return

Return to Menu 2.1.3.0.

Menu 2.1.4 [U] Min supply heating

The set minimum level for the supply temperature to the heating system is shown here.

The calculated flow temperature never drops below the set level irrespective of the outdoor temperature, heating curve or its offset heating curve.

Setting range: 20 – 65 °C

Default value: 25 °C

Menu 2.1.5 [U] Circ-pump speed heat

The speed of the circulation pump during space heating is selected here.

Setting range: 1 – 100

Default value: 100

Menu 2.1.6 [N] Return

Return to Menu 2.1.0.

Menu 2.2.0 [N] Cooling settings

Cooling settings are made in the sub-menus for this menu.

Menu 2.2.1 [N] Offset cooling/Total

The selected cooling curve offset is changed here.

The total offset of the cooling curve is also shown here. It includes schedule, outer compensation and any room control.

Setting range: -10 – 10

Default value: -1

Menu 2.2.2 [N] Cooling curve

The selected cooling curve is shown here. At value 0, the function "Own cooling curve" is activated, see Menu 2.2.3.0.

Setting range: 0 – 3

Default value: 1

Menu 2.2.3.0 [U] Own cooling curve

Here you can select your own curve definition.

Note! The cooling curve in Menu 2.2.2 must be set to 0 to activate this function.

Menu 2.2.3.1 [U] Supply temp.at +20

The supply temperature at an outdoor air temperature of +20 °C is selected here.

Setting range: 0 – 80* °C

Default value: 20 °C

* Limited by Menu 2.2.4 Min. supply cooling.

Menu 2.2.3.2 [U] Supply temp.at +40

The supply temperature at an outdoor air temperature of +40 °C is selected here.

Setting range: 0 – 80* °C

Default value: 10 °C

* Limited by Menu 2.2.4 Min. supply cooling.

Menu 2.2.3.3 [U] Return

Return to Menu 2.2.3.0.

Menu 2.2.4 [N] Min supply cooling

The set minimum level for the supply temperature to the cooling system is shown here.

The calculated flow temperature never drops below the set level irrespective of the outdoor temperature, cooling curve or its offset.

| | HMA100 | HMSI40VA | HMS140V |
|--------------------|--------|------------------|----------------------|
| Setting range (°C) | 7 – 25 | 7 – 25 | 7 – 25* ² |
| Default value (°C) | 10 | 18* ¹ | 18 |

*1 It is necessary to adjust the value for fan coil application.

See page 83, Comfort setting cooling.

*2 Do not set the value lower than 18 °C. It may cause water leak and damage your property or the product itself.

Menu 2.2.5 [N] Circ-pump speed cool

The speed of the circulation pump during cooling is selected here.

Setting range: 1 – 100

Default value: 100

Menu 2.2.6 [N] Return

Return to Menu 2.2.0.

Menu 2.3 [U] Max supply temp.

The set maximum level for the supply temperature to the heating system is shown here.

The calculated flow temperature never exceeds the set level irrespective of the outdoor temperature, heating curve or offset heating curve.

Setting range: 25 – 65 °C

Default value: 55 °C

Menu 2.4 [U] External adjustment

Connecting an external contact, for example, a room thermostat (accessory) or a timer allows you to temporarily or periodically raise or lower the room temperature. When the external contact is closed, the heating curve offset or cooling curve offset is changed by the number of steps shown here.

If room control is active there is a degree change to the set room temperature.

Setting range: -10 – 10

Default value: 0

Menu 2.5 [U] Supply/Return temp.

The current supply and return line temperatures are shown here. Return temperature is shown in brackets.

Menu 2.6 [U] Degree minutes

Current value for number of degree-minutes. In addition, this value can be changed to accelerate the start of heating production or cooling.

Setting range: -32000 – 32000

Default value: 0

Menu 2.7 [N] Return

Return to Menu 2.0.

3.0 [N] Supply temp. 2

Menu 3.1 [N] Offset heating/Tot 2

The heating curve offset 2 is selected here.

The total offset of heat curve 2 is also shown here. It includes schedule, outer compensation and any room control.

Setting range: -10 – 10

Default value: -1

Menu 3.2 [N] Heating curve 2

The selected heating curve is shown here. At value 0, the function “Own heat curve 2” is activated, see Menu 3.6.0.

Setting range: 0 – 20

Default value: 6

Menu 3.3 [U] Min supply temp. 2

The set minimum level for the supply temperature for heating system 2 is shown here.

The calculated flow temperature never drops below the set level irrespective of the outdoor temperature, heating curve or its offset.

Setting range: 10 – 65 °C

Default value: 15 °C

Menu 3.4 [U] Max supply temp. 2

The set maximum level for the supply temperature for heating system 2 is shown here.

The calculated flow temperature never exceeds the set level irrespective of the outdoor temperature, heating curve or its offset.

Setting range: 10 – 65 °C

Default value: 45 °C

Menu 3.5 [U] External adjust. 2

Connecting an external contact, for example, a room thermostat (accessory) or a timer allows you to temporarily or periodically raise or lower the room temperature. When the external contact is closed, the heating curve offset or the cooling curve offset is changed by the number of steps shown here.

If room control is active there is a degree change to the set room temperature.

Setting range: -10 – 10

Default value: 0

Menu 3.6.0 [U] Own heating curve 2

Here you can select your own curve definition. This is an individual linear curve with one break point. You select a break point and the associated temperatures.

Note! The “Heating curve” in Menu 3.2 must be set to 0 to activate this function.

Menu 3.6.1 [U] Supply temp.at +20

The supply temperature at an outdoor air temperature of +20 °C is selected here.

Setting range: 0 – 80* °C

Default value: 20 °C

* Limited by Menu 3.4 Max supply temp. 2.

Menu 3.6.2 [U] Supply temp.at -20

The supply temperature at an outdoor air temperature of -20 °C is selected here.

Setting range: 0 – 80* °C

Default value: 35 °C

* Limited by Menu 3.4 Max supply temp. 2.

Menu 3.6.3 [U] Buckling temperature

Here you select at what outside air temperature the break point shall occur.

Setting range: -15 – 15 °C

Default value: 0 °C

Menu 3.6.4 [U] Supply t. at buckl

You set the calculated supply temperature for the break point here.

Setting range: 0 – 80* °C

Default value: 30 °C

* Limited by Menu 3.4 Max supply temp. 2.

Menu 3.6.5 [U] Return

Return to Menu 3.6.0.

Menu 3.7 [U] Supply/Return temp 2

The present supply and return temperatures for heating system 2 are shown here. Return temperature is shown in brackets.

Menu 3.8 [N] Return

Return to Menu 3.0.

4.0 [N] Outdoor temp.

Menu 4.1 [N] Outdoor avg. temp.

This menu shows the average outdoor temperature according to the set value in Menu 4.2 (factory setting: 24h).

Menu 4.2 [U] Outdoor filter time

Here you select during how long the average temperature in Menu 4.1 is calculated.

Setting range: 1 min, 10 min, 1h, 2h, 4h, 6h, 12h, 24h

Default value: 24h

Menu 4.3 [U] Outdoor avg. 1min.

Shows the average outdoor temperature over the last minute.

Menu 4.4 [N] Return

Return to Menu 4.0.

5.0 [N] Heat pump

Menu 5.1 [N] Number of starts

The accumulated number of starts with the compressor in outdoor unit is shown here.

Menu 5.2 [N] Run time compressor

The accumulated time that the compressor has been used in outdoor unit is shown here.

Menu 5.3 [U] Time to start

Time until the compressor start in outdoor unit is shown in this menu.

Menu 5.4 [U] Outdoor temp. Tho-A

This menu shows the outdoor air temperature that the heat pump measures.

Menu 5.5 [U] Heat Ex Tho-R1

This menu shows the evaporator temperature in the heat pump at sensor Tho-R1.

Menu 5.6 [U] Heat Ex Tho-R2

This menu shows the evaporator temperature in the heat pump at sensor Tho-R2.

Menu 5.7 [U] Suction temp. Tho-S

This menu shows the suction gas temperature in the heat pump.

Menu 5.8 [U] Hot gas Tho-D

This menu shows the hotgas temperature in the heat pump.

Menu 5.9 [U] Liquid line temp.

This menu shows the liquid line temperature in the heat pump.

Menu 5.10 [U] Condensor out / max

Shows the current and max. allowed temperature after the condenser.

Menu 5.11 [U] HP

The current high pressure and corresponding temperature during heating are shown here. During cooling, the actual low pressure and corresponding temperature are shown.

Menu 5.12 [U] LP LPT

The current low pressure is shown here.

Menu 5.13 [U] Fan speed

The fan speed is shown here.

Menu 5.14.0 [U] CompFreq act/set

The actual and set point value for the compressor frequency are shown here.

Menu 5.14.1 [U] OU current CT

The present phase current to outdoor unit is shown here.

Menu 5.14.2 [U] Inverter temp Tho-IP

The current inverter temperature is shown here.

Menu 5.14.3 [U] Return

Return to Menu 5.14.0.

Menu 5.15.0 [S] OU communication

Readings regarding any communication errors can be made in the sub-menus to this menu.

Menu 5.15.1 [S] Com. error rate

Shows the percentage of incorrect communications with outdoor unit since start-up.

Menu 5.15.2 [S] Com. errors

Shows the total number of incorrect communications with outdoor unit since start-up.

Menu 5.15.3 [S] Reset com. errors

Select “Yes” here to reset the counters in menu 5.15.1 and 5.15.2. The settings returns to “No” once the action has been carried out.

Setting range: Yes, No

Menu 5.15.4 [S] Return

Return to Menu 5.15.0.

Menu 5.16 [N] Return

Return to Menu 5.0.

6.0 [N] Room temperature*

*Requires accessory and activation in Menu 9.3.6.

Menu 6.1 [U] Room compensation

A factor is selected here that determines how much the calculated supply temperature is affected by the difference between the room temperature and the set room temperature. A higher value gives a greater change.

Setting range: 0 – 10.0

Default value: 2.0

Menu 6.2 [U] Heating system

You select here whether the room sensor is Valid for heating system 1 (menu 2.0) and/or heating system 2 (menu 3.0).

Setting range: Off, System 1, System 2, System 1+2

Default value: Off

Menu 6.3 [N] Room temp. setpoint

The desired room temperature is shown here.

Setting range: 10 – 30 °C

Menu 6.4 [U] Room temp avg. 1min

Shows the average room temperature over the last minute.

Menu 6.5 [U] Room integrator time

Select the integration time for room control here.

Setting range: 0 – 120

Default value: Off

Menu 6.6 [N] Return

Return to Menu 6.0.

7.0 [N] Clock

Menu 7.1 [N] Date

The current date is set here.

Menu 7.2 [N] Time

Here the current time is set.

Menu 7.3.0 [U] Temp set back

Settings, e.g. for night reduction can be selected in the submenus to this menu.

Menu 7.3.1 [U] Set back time

The time for the set back operation, e.g. night reduction is chosen here.

Menu 7.3.2 [U] Set back temp +/-

Changes of the heat curve during set back operation period, e.g. the night reduction is set here.

Setting range: -10 – 10

Default value: 0

Menu 7.3.3 [U] Heating system

The heating system to apply the set back operation is selected here. If heating system 2 is present the menu can be set to “Off”, “System 1”, “System 2” or “System 1+2”. In other cases only “Off” and “System 1” can be selected.

Setting range: Off, System 1, System 2, System 1+2

Default value: Off

Menu 7.3.4 [U] Return

Return to Menu 7.3.0.

Menu 7.4.0 [U] Extra hot water

Settings are made in the sub-menus of this menu when extra hot water is required on a specific day.

Menu 7.4.1 – 7.4.7 [U] XHW Monday – XHW Sunday

Here you select the period for respective days when extra hot water should be activated. Hours and minutes for both start and stop are shown. Equal values mean that extra hot water is not activated. Time can be set past midnight.

Setting range: 00:00 – 23:45

Default value: 00:00 – 00:00

Menu 7.4.8 [U] Return

Return to Menu 7.4.0.

Menu 7.5.0 [U] Vacation set back

Holiday settings are made in the sub-menus to this menu.

When the holiday function is active, the calculated supply line temperature is reduced according to the setting and hot water charging can be switched off.

When the holiday function is deactivated, the heat pump operates hot water for an hour, before periodic extra hot water is activated (even if periodic extra hot water is activated in Menu 1.7).

Note! The holiday setting does not deactivate cooling.

Menu 7.5.1 [U] Vacation begins

The start date for holiday changing is set here. The date is changed by pressing the enter button. The holiday change starts applying at 00:00 on the selected date.

Same date in Menu 7.5.1 and 7.5.2 deactivates the holiday function.

Menu 7.5.2 [U] Vacation ends

The end date for holiday changing is set here. The date is changed by pressing the enter button. The holiday change stops applying at 23:59 on the selected date.

Same date in Menu 7.5.1 and 7.5.2 deactivates the holiday function.

Menu 7.5.3 [U] Heating system

The heating system to apply the Vacation set back is selected here. If heating system 2 is present the menu can be set to “Off”, “System 1”, “System 2” or “System 1+2”. In other cases only “Off” and “System 1” can be selected.

Setting range: Off, System 1, System 2, System 1+2

Default value: Off

Menu 7.5.4 [U] Offset heating curve

How much the heating curve is to be offset during the holiday period is set here.

If the relevant heating system has a room sensor, the change is given in degrees.

Setting range: -10 – 10

Default value: -5

Menu 7.5.5 [U] HW off

You can choose if hot water operation is cancelled during the holiday period

Setting range: No, Yes

Default value: Yes

Menu 7.5.6 [U] Return

Return to Menu 7.5.0.

Menu 7.6.0 [N] Silent mode

Setting is made in the sub-menu of this menu if Silent mode is activated on a certain period.

When the silent mode is activated, maximum compressor speed and fan speed in outdoor unit is reduced in order to make the noise smaller.

Take note that the capacity is reduced by around 30% during silent mode.

It is valid in heating mode only.

Menu 7.6.1 [N] Silent mode time

Here you select the period when the silent mode should be activated. Hours and minutes for both start and stop are shown. Equal values mean that the silent mode is not activated. Time can be set past midnight.

Setting range: 00:00-23:45

Menu 7.6.2 [N] Return

Return to Menu 7.6.0

Menu 7.7 [N] Return

Return to Menu 7.0.

8.0 [N] Other adjustments**Menu 8.1.0 [N] Display settings**

Settings concerning language and menu type are set in the sub-menus to this menu.

Menu 8.1.1 [N] Menu type

The menu type is chosen here.

[N] Normal, covers the normal user's needs.

[U] Extended, shows all menus except the service menus.

[S] Service, shows all menus, returns to normal menu level 30 minutes after the last button was pressed.

NOTE

Incorrect settings in the service menus can damage the property and/or heat pump.

Setting range: N, U, S

Default value: N

Menu 8.1.2 [N] Language

Language settings are made here.

Menu 8.1.3 [U] Display contrast

The display's contrast is set here.

Setting range: 0 – 31

Default value: 0

Menu 8.1.4 [U] Light intensity

The light intensity in idle mode is set here. Idle mode starts 30 minutes after the last button was pushed.

Setting range: 0=off, 1=low, 2=average.

Default value: 2

Menu 8.1.5 [N] Return

Return to Menu 8.1.0.

Menu 8.2.0 [N] Op. mode settings

Settings regarding auto mode can be made in the sub-menus to this menu.

Menu 8.2.1 [N] Allow add. heat

At which operating mode the electric heater is to be permitted to produce hot water and heat when needed is selected here.

Setting range: Off, Heating, Heating + Cooling, Cooling

Default values: Heating

Menu 8.2.2 [N] Add. heat mode

Selected if electric heater only is to be used to produce hot water and heat.

Setting range: Off, On

Default value: Off

Menu 8.2.3 [U] Stop temp. heating

The average outdoor air temperature at which the heat pump (in auto mode) is to stop heat production.

When the average outdoor air temperature falls below Stop temp. heating – Hysteresis (Menu 8.2.5) heating starts again.

Setting range: 1 – 43 °C

Default value: 17 °C

Menu 8.2.4 [U] Start temp. cooling

The average outdoor air temperature at which the heat pump (in autoC mode) is to start cooling.

When the average outdoor temperature exceed it, cooling starts.

When the average outdoor air temperature falls below Start temp. cooling – Hysteresis (Menu 8.2.5) cooling stops.

Setting range: 10 – 43* °C

Default value: 25 °C

* Operable temperature range is 15 – 43 °C.

Menu 8.2.5 [U] Hysteresis

See Menu 8.2.3 and Menu 8.2.4. Also affects control with room sensor.

Setting range: 0.5 – 5.0

Default value: 1.0

Menu 8.2.6 [N] Return

Return to Menu 8.2.0.

Menu 8.3.0 [U] Current limiter

Settings and readings regarding the load monitor are set in the sub-menus to this menu.

Menu 8.3.1 [U] Fuse size

The setting selected on the PCB (AA22) switch (R24) is shown here.

Menu 8.3.2 [U] Max. electric power

The setting selected on the PCB (AA22) switch (R25) is shown here.

Menu 8.3.3 [U] Current phase 1

Measured current from phase 1 shown here. If the value falls below 2.8 A “low” is displayed.

Menu 8.3.4 [U] Current phase 2

Measured current from phase 2 shown here. If the value falls below 2.8 A “low” is displayed.

Menu 8.3.5 [U] Current phase 3

Measured current from phase 3 shown here. If the value falls below 2.8 A “low” is displayed.

Menu 8.3.6 [U] Transform. ratio EBV

The transfer value must be defined depending on the current transformers used for the PCB.

Setting range: 100 – 1250

Default value: 300

Menu 8.3.7 [U] Return

Return to Menu 8.3.0.

Menu 8.5.0 [U] Period settings

Time periods for heating and hot water production are set in the sub-menus for this menu.

Menu 8.5.1 [U] Period time

You can set the length of cycle time for water production and heating/cooling in case there is demand for both.

Setting range: 5 – 60 min

Default value: 60 min

Menu 8.5.2 [U] Max time for HW

Here you select operation period for hot water of the period time. (8.5.1)

Setting range: 0 – 60 min

Default value: 40 min

Menu 8.5.3 [U] Return

Return to Menu 8.5.0.

Menu 8.6 [N] Return

Return to Menu 8.0.

9.0 [S] Service menus

Menu 9.1.0 [S] Heat pump settings

Settings for outdoor unit are made in the sub-menus to this menu.

Menu 9.1.1 [S] DM start heating

Degree minute setting for start of heat pump, heating.

Setting range: -120 – 0

Default value: -60

Menu 9.1.2 [S] DM start cooling

Degree minute setting for start of heat pump, cooling.

Setting range: 0 – 120

Default value: 60

Menu 9.1.3 [S] Stop Temp. heat low

Lowest limit of the heat pump's working range during heating. It stops below this outdoor air temperature.

The heat pump is permitted to start again when the outdoor air temperature increases by two degrees above the set value.

Setting range: -25 – 43 °C

Default value: -25 °C

Menu 9.1.4 [S] Stop Temp. heat high

Highest limit of the heat pump's working range during heating. It stops above this outdoor air temperature.

The heat pump is permitted to start again when the outdoor air temperature decreases by two degrees below the set value.

Setting range: -25 – 43 °C

Default value: 43 °C

Menu 9.1.5 [S] Stop temp. cool low

Lowest limit of the heat pump's working range during cooling. It stops below this outdoor air temperature.

The heat pump is permitted to start again when the outdoor air temperature increases by two degrees above the set value.

Setting range: 10 – 43 °C

Default value: 10 °C

Menu 9.1.6 [S] Stop temp. cool high

Highest limit of the heat pump's working range during cooling. It stops above this outdoor air temperature.

The heat pump is permitted to start again when the outdoor air temperature decreases by two degrees below the set value.

Setting range: 10 – 43 °C

Default value: 43 °C

Menu 9.1.7 [S] Time bet. starts

Minimum time interval in minutes between compressor starts in the heat pump.

Setting range: 0 – 60 min

Default value: 0 min

Menu 9.1.8 [S] Min CompFreq act/set

Select the min compressor frequency here. Both actual and set values are shown.

| | FDCW71 | FDCW100 | FDCW140 |
|--------------------|---------|---------|---------|
| Setting range (Hz) | 20 – 86 | 20 – 80 | 20 – 77 |
| Default value (Hz) | 20 | 20 | 20 |

Menu 9.1.9 [S] Max CompFreq act/set

Select here the max limit for the compressor. Both actual and set values are shown.

| | FDCW71 | FDCW100 | FDCW140 |
|--------------------|----------|---------|----------|
| Setting range (Hz) | 20 – 118 | 25 – 85 | 20 – 120 |
| Default value (Hz) | 118 | 85 | 120 |

Menu 9.1.10 [S] OU Cur. heat act/max

The phase current to outdoor unit is shown and the highest permitted current in heating mode can be set here.

| | FDCW71 | FDCW100 | FDCW140 |
|-------------------|--------|---------|---------|
| Setting range (A) | 7 – 16 | 7 – 17 | 7 – 25 |
| Default value (A) | 15 | 15 | 24 |

Menu 9.1.11 [S] OU Cur. cool act/max

The phase current to outdoor unit is shown and the highest permitted current in cooling mode can be set here.

| | FDCW71 | FDCW100 | FDCW140 |
|-------------------|--------|---------|---------|
| Setting range (A) | 7 – 15 | 7 – 17 | 7 – 23 |
| Default value (A) | 14 | 15 | 22 |

Menu 9.1.12 [S] Tank defrost Temp.

If the system is colder than the set value during defrosting, connecting to HW. If HW is colder, the electric heater starts.

Setting range: 20 – 30 °C

Default value: 20 °C

Menu 9.1.13 [S] Return

Return to Menu 9.1.0.

Menu 9.2.0 [S] Add. heat settings

Settings regarding additional heat, shunt in indoor unit and any extra shunt can be made in the sub-menus to this menu.

Menu 9.2.1 [S] DM start add. heat

The degree minute deficit to activate additional heat supply is set here.

Setting range: -1000 – -30

Default value: -400

Menu 9.2.2 [S] Time factor

The time factor of the immersion heater since first start up is shown here. The value is saved and is not reset even when the system is switched off using the main power switch.

Menu 9.2.3 [S] Docking type

No function.

Menu 9.2.4 [S] Reg. amplification

P section for additional heat control.

Setting range: 0 – 10.0

Default value: 1.5

Menu 9.2.5 [S] Reg. integrator time

I section for additional heat control.

Setting range: 5 – 60

Default value: 10

Menu 9.2.6 [S] Shunt amplification

Applies to shunt 1 (QN11). E.g. 2 degrees difference and 2 in amplification gives 4 sec/min controlling the shunt.

Setting range: 0.1 – 5.0

Default value: 1.0

Menu 9.2.7 [S] Shunt amplification2

Applies to any heating system 2 (accessory required). E.g. 2 degrees difference and 2 in amplification gives 4 sec/min controlling the shunt. This function compensates for the speed variation found on different shunt motors that may be installed.

Setting range: 0.1 – 5.0

Default value: 1.0

Menu 9.2.8 [S] Add. heat type

Select the type of additional heat source to be used.

Setting range: Internal power, Ext. 1 step, Ext. Lin 3, Ext. Bin 3, Internal power 2

Default value: Internal power (other models)
Internal power 2 (HMA100VM)

Menu 9.2.9 [S] Return

Return to Menu 9.2.0.

Menu 9.3.0 [S] Operating settings

Settings regarding accessories, additional heat operation, floor drying and a return to the factory settings can be made in the sub-menus to this menu.

Menu 9.3.1 [S] Max. boiler temp.

The setting selected on the PCB (AA22) knob (R26) is shown here.

Menu 9.3.2 [S] Logger

Select “On” here if logger is installed.

Setting range: Off, On

Default value: Off

Menu 9.3.3 [S] Cooling system

Select “On” if cooling system is installed (accessory required).

Setting range: Off, On

Default value: Off

Menu 9.3.4 [S] Heating system 2

Usage of heating system 2 is defined in this menu. If “Off” is selected in Menu 9.3.3 only “Off” or “Heat” can be selected (accessory required).

Setting range: Off, Heating, Heating + Cooling, Cooling

Default value: Off

Menu 9.3.5 [S] Room unit

No function

Default value: Off

Menu 9.3.6 [S] Room sensor type

Room sensor type is selected here. Menu 6.0 can be accessed if other than “Off” is chosen.

Setting range: Off, RG10

Default value: Off

Menu 9.3.7.0 [S] Forced control

Settings regarding forced control of the relays in the heat pump are made from the sub-menus in this menu.

Menu 9.3.7.1 [S] Forced control

When “On” is selected in this menu, the user temporarily takes control of the relays in the heat pump. The setting automatically returns to “Off”, 30 minutes after the last button was pushed or after a restart.

Setting range: Off, On

Default value: Off

Menu 9.3.7.2 – 9.3.7.15 [S] K1 – K14

Here you can select manual control of the relays.

Setting range: Off, On, Auto

Default value: Auto

Menu 9.3.7.16 [S] Alarm 1

Here you can select manual test of alarm relay 1.

Setting range: Off, On, Auto

Default value: Auto

Menu 9.3.7.17 [S] Alarm 2

Here you can select manual test of alarm relay 2.

Setting range: Off, On, Auto

Default value: Auto

Menu 9.3.7.18 [S] Return

Return to Menu 9.3.7.0.

Menu 9.3.8 [S] Factory setting

Here you can select to restore factory settings in indoor unit.

When returning to the factory settings the language switches to English.

Setting range: Yes, No

Default value: No

Menu 9.3.9 [S] Operating state

Describes the operating status of Hydrolution.

Shutdown: Additional heater and heat pump are shutdown due to an alarm.

Alternating: The heat pump produces heat and switches, when necessary, between hot water and heating.

Combined Mode: Due to a great heating demand, the electric heater is used for hot water and the heat pump produces heat. The electric heater assists, when necessary, with heat production.

Cooling: The heat pump produces cooling and switches between hot water and cooling system, when necessary.

Super cooling: Only cooling. This is carried out by the heat pump. Hot water produced by electric heater.

Hot water: Only hot water is produced. This is carried out by the heat pump.

Add heat only: The heat pump is off and both hot water and heat is produced by the electric heater.

Menu 9.3.10.0 [S] Floor drying setting

Settings for the floor drying program are made in the submenus to this menu.

Menu 9.3.10.1 [S] Floor drying

“On” or “Off” is selected for the floor drying program from this sub-menu. After time period 1 a switch is made to time period 2 followed by a return to the normal settings.

Setting range: Off, On

Default value: Off

Menu 9.3.10.2 [S] Period time 1

Selection of the number of days in period 1.

Setting range: 1 – 5 days

Default value: 3 days

Menu 9.3.10.3 [S] Temp. period 1

Selection of the flow temperature in period 1.

Setting range: 15 – 50 °C

Default value: 25 °C

Menu 9.3.10.4 [S] Period time 2

Selection of the number of days in period 2.

Setting range: 1 – 5 days

Default value: 1 days

Menu 9.3.10.5 [S] Temp. period 2

Selection of the flow temperature in period 2.

Setting range: 15 – 50 °C

Default value: 40 °C

Menu 9.3.10.6 [S] Return

Return to Menu 9.3.10.0.

Menu 9.3.11 [S] Supply pump exer.

Pump operation can be deactivated here. Pump is in operation for 2 minutes 12 hours after last operation.

Setting range: Off, On

Default value: On

Menu 9.3.12 [S] Supply diff HP

When the current supply water temperature deviates from the set value compared to that calculated, the heat pump is forced to stop/start irrespective of the degree-minute value.

Heating mode: If the current supply water temperature exceeds the calculated supply water by set value, the degree minute number is set to 1. The compressor stops when there is only a heating requirement.

If the current supply water temperature drops below the calculated temperature by set value, the degree minute number is overwritten to smaller value set in Menu 9.1.1 by 1. This means that the compressor will start.

Cooling mode: If the current supply water temperature drops below the calculated supply by set value, the degree minute number is set to -1. The compressor stops when there is only a cooling requirement.

Setting range: 3 – 25 °C

Default value: 10 °C

Menu 9.3.13 [S] Diff HP add. heat

If electric heater is permitted to use (Menu 8.2.1) and the current supply water temperature falls below the calculated temperature by the set value plus the value from Menu 9.3.12, the degree minute value is overwritten to bigger value set in Menu 9.2.1 by 1. When the compressor has reached full speed, the degree minute value is set to the value in Menu 9.2.1 and electric heater is permitted. This means that the electric heater can cut in immediately.

Setting range: 1 – 8 °C

Default value: 3 °C

Menu 9.3.14 [S] Block HW/Heating

If heating or hot water are not required, they can be deselected here.

Operating mode Hot water or Add. heat only will be selectable if heating is deselected.

Setting range: No HW, No heating, HW+Heating

Default value: HW+Heating

Menu 9.3.15 [S] Heat drop at alarm

Here you select whether heat production is to be reduced in the event of an alarm.

Setting range: Yes, No

Default value: Yes

Menu 9.3.16 [S] Type of HW sensor

Here you can select whether to use hot water sensors that manage higher temperatures (above 90 °C) or not.

Standard: Standard setting

High temp: Calculation for HW jacket sensor (BT6), Addition sensor (BT19) as well as supply sensor (BT2) are replaced to suit a sensor that manages higher temperatures (up to 110 °C). Used if new sensor is installed in connection with installation of solar heating.

Setting range: Standard, High temp

Default value: Standard

Menu 9.3.17 [S] Freeze protection HX

Select here whether water heat exchanger anti freeze is to be active or not.

Setting range: On, Off

Default value: On

Menu 9.3.18 [S] Return

Return to Menu 9.3.0.

Menu 9.4 [S] Quick start

If “Yes” is selected, the compressor starts in the heat pump within 4 minutes if there is a demand. However, there is always a 30 minute compressor start delay if the power supply has been switched off.

Setting range: No, Yes

Default value: No

Menu 9.5.0 [S] System info

The sub menus to this menu contain information that is used when troubleshooting.

Only for service personnel.

Menu 9.5.1 [S] Heat pump type

The type of connected heat pump is shown here.

Menu 9.5.2 [S] Cpu usage percent

The CPU load is shown here.

Menu 9.5.3 [S] Com rate/1000

The number of communication retransmissions is shown here.

Menu 9.5.4 [S] Unit w. com. problem

Any communication problems that a unit may have are shown here as well as the relevant unit.

Menu 9.5.5 [S] Run time add. heat

The accumulated running time for the electric heater since the first start is shown.

Menu 9.5.6 [S] Run time hot water

The accumulated operating time in hours for hot water production with compressor since the first start-up is shown here.

Menu 9.5.7 [S] Program version

The current program software version in indoor unit is shown here.

Menu 9.5.8 [S] 106-card version

The communication PCB version number is shown here (AA23).

Menu 9.5.9 [S] Display version

The display version number is shown here.

Menu 9.5.10 [S] Relay card version

The relay PCB version number is shown here.

Menu 9.5.11 [S] Lowest supply temp.

The minimum supply water temperature since start-up is shown here.

Menu 9.5.12 [S] Percent runtime

The compressor’s running time percentage.

Menu 9.5.13 [S] Period

Period counter for switching between hot water and heating/cooling.

Menu 9.5.14 [S] Run status

Shows the current operating status of outdoor unit

The display can show: Off, Hot water, Heating, Cooling, Defrost, Oil return or XHW.

Menu 9.5.15 [S] Run status last

Shows the previous operating status for outdoor unit

The display can show: Off, Hot water, Heating, Cooling, Defrost, Oil return or XHW.

Menu 9.5.16 [S] Run status time

The time since the last operating status change.

Menu 9.5.17 [S] Return

Return to Menu 9.5.0.

Menu 9.6.0 [S] Heat reg. settings

Settings regarding the heating regulator can be made in the sub-menus to this menu.

Menu 9.6.1 [S] CompFreq

The current target frequency of the compressor is shown here.

Setting the target frequency during manual control of the compressor is activated in Menu 9.6.2.

| | | | |
|-------------------|----------|---------|----------|
| | FDCW71 | FDCW100 | FDCW140 |
| Setting range(Hz) | 20 – 118 | 20 – 85 | 20 – 120 |

Menu 9.6.2 [S] Manual CompFreq

Select “On” to control the compressor frequency manually in Menu 9.6.1.

Setting range: Off, On

Default value: Off

Menu 9.6.3 [S] Max deltaF

The parameter for the heat regulator’s max change of the target compressor frequency is selected here.

Setting range: 1 – 10 Hz

Default value: 3 Hz

Menu 9.6.4 [S] CompFreq regP

Select P part for heat regulator.

Setting range: 1 – 60 Hz

Default value: 5

Menu 9.6.5 [S] Time min freq start

Select here the time that the compressor is to run at min speed, after start connecting to the climate system.

Setting range: 10 – 120 min

Default value: 70 min

Menu 9.6.6 [S] Time min freq heat

Select here the time that the compressor is to run at fixed frequency after shifting to heating. The compressor then runs at min frequency or at the frequency it had before hot water charging.

Setting range: 3 – 60 min

Default value: 3 min

Menu 9.6.7 [S] Max diff flow-cFlow

You can set the maximum overshoot of the supply temperature from the target. Max. deviation of supply temperature is controlled by this setting regardless of degree minutes value.

Setting range: 2.0 – 10.0 °C

Default value: 4.0 °C

Menu 9.6.8 [S] CompFreq GMz

Here you select a value for the dynamic in the degree minute regulator.

Setting range: 95 – 127

Default value: 126

Menu 9.6.9 [S] Return

Return to Menu 9.6.0.

Menu 9.7 [S] Reset alarm

Select “Yes” here to reset/acknowledge alarms in indoor unit. The settings returns to “No” once the action has been carried out.

Setting range: Yes, No

Menu 9.8.0 [S] Alarm log

The alarm logs with the last 4 alarms are shown in the sub-menus of this menu.

Menu 9.8.1.0 – 9.8.4.0 [S] Log 1 – Log 4

The alarm logs are shown in the sub-menus of this menu. Log 1 is the last alarm, log 2 the next to last, etc.

Menu 9.8.x.1 [S] Time

Menu 9.8.x.2 [S] Alarm type

Error code is displayed. For details see page 152.

| Alarm number | Cause |
|--------------|------------------------------------|
| 3 | TB alarm |
| 4 | OU power failure |
| 5 | Low condenser out |
| 6 | High condenser out |
| 7 | Anti freeze HX |
| 8 | High HW temp. |
| 9 | High AH temp. |
| 10 | High supply temp. system 1 |
| 11 | High supply temp. system 2 |
| 12 | High return temp. system 1 |
| 13 | High return temp. system 2 |
| 14 | Aborted defrost |
| 16 | Aborted defrost |
| 30 | Sensor fault UG |
| 31 | S. fault HP |
| 32 | Sensor fault condenser out |
| 33 | S. fault Liquid line |
| 34 | S. fault HW |
| 35 | S. fault Add. Heat |
| 36 | Sensor fault supply temp. system 1 |
| 37 | Sensor fault supply temp. system 2 |
| 38 | Sensor fault return temp. system 1 |
| 39 | Sensor fault return temp. system 2 |
| E5 | OU Com. error |
| E35 | High HX temp |
| E36 | High hotgas |
| E37 | Sensor fault OU |
| E38 | Sensor fault OU |
| E39 | Sensor fault OU |
| E40 | HP alarm |
| E41 | Inverter error |
| E42 | Inverter error |
| E45 | Inverter error |
| E47 | Inverter error |
| E48 | Fan alarm |
| E49 | LP alarm |
| E51 | Inverter error |
| E53 | Sensor fault OU |
| E54 | LP alarm |
| E57 | Low refrigerant |
| E59 | Inverter error |

Menu 9.8.x.3 [S] Run status

Menu 9.8.x.4 [S] Run status last

Menu 9.8.x.5 [S] Run status time

Menu 9.8.x.6 [S] Run time compressor

Menu 9.8.x.7 [S] Outdoor avg. 1min.

Menu 9.8.x.8 [S] Outdoor temp Tho-A

Menu 9.8.x.9 [S] Supply/Return temp

Menu 9.8.x.10 [S] Condensor out

Menu 9.8.x.11 [S] Hot water temp.

Menu 9.8.x.12 [S] CompFreq act/set

Menu 9.8.x.13 [S] Heat Ex Tho-R1

Menu 9.8.x.14 [S] Heat Ex Tho-R2

Menu 9.8.x.15 [S] Suction temp. Tho-S

Menu 9.8.x.16 [S] Hot gas Tho-D

Menu 9.8.x.17 [S] Liquid line temp.

Menu 9.8.x.18 [S] HP

Menu 9.8.x.19 [S] LP LPT

Menu 9.8.x.20 [S] OU current CT

Menu 9.8.x.21 [S] Inverter temp Tho-IP

Menu 9.8.x.22 [S] Circ-pump speed

Menu 9.8.x.23 [S] Relay status 1-8

Menu 9.8.x.24 [S] Relay status 9-14

Menu 9.8.x.25 [S] Program status 1-8

Menu 9.8.x.26 [S] Program status 9-16

Menu 9.8.x.27 [S] Return

Return to Menu 9.8.x.0.

Menu 9.8.5 [S] Clear alarm log

Select “Yes” to erase the entire alarm log. The settings returns to “No” once the action has been carried out.

Setting range: Yes, No

Menu 9.8.6 [S] Return

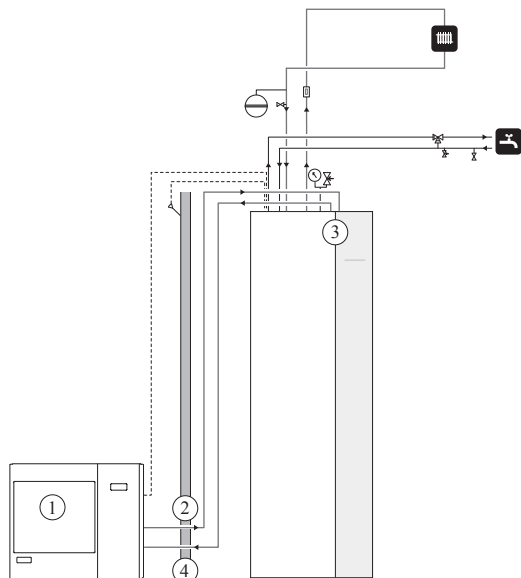
Return to Menu 9.8.0.

Menu 9.9 [S] Return

Return to Menu 9.0.

System description

Principle of operation Hydrolution



Function

Hydrolution is a system that can produce heating, hot water and cooling.

The principle during heating can be simplified as follows:

- ① The refrigerant in outdoor unit retrieves heat from the outdoor air then compresses it, which increases the temperature further.
- ② The hot refrigerant (now in gas state) is routed into indoor unit.
- ③ The refrigerant releases the heat for further distribution in the system.
- ④ The refrigerant (now in liquid state) is routed back to outdoor unit and the process is repeated.

By reversing the process, thereby allowing the refrigerant in outdoor unit to retrieve the heat from the water and release it into the outdoor air, the heat pump can cool instead, if necessary.

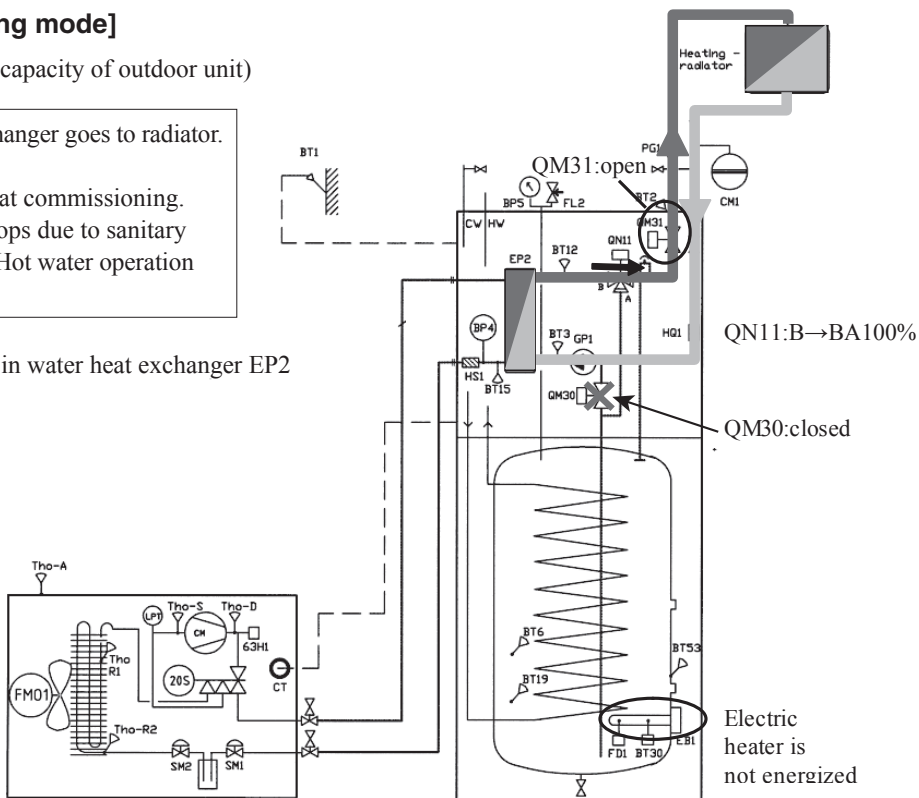
Indoor unit determines when outdoor unit is to work and not to work, using the collated data from the temperature sensor. In the event of extra heat demands, indoor unit can connect additional heat in the form of the internal immersion heater, or any connected external addition.

Heating operation mode [Alternating mode]

(When the heat load can be covered by the capacity of outdoor unit)

100% of hot water from water heat exchanger goes to radiator.
 Hot water in the tank is not used.
 Water pump runs at constant speed set at commissioning.
 When the water temperature in tank drops due to sanitary water use, the operation is switched to Hot water operation mode.

Counterflow in water heat exchanger EP2

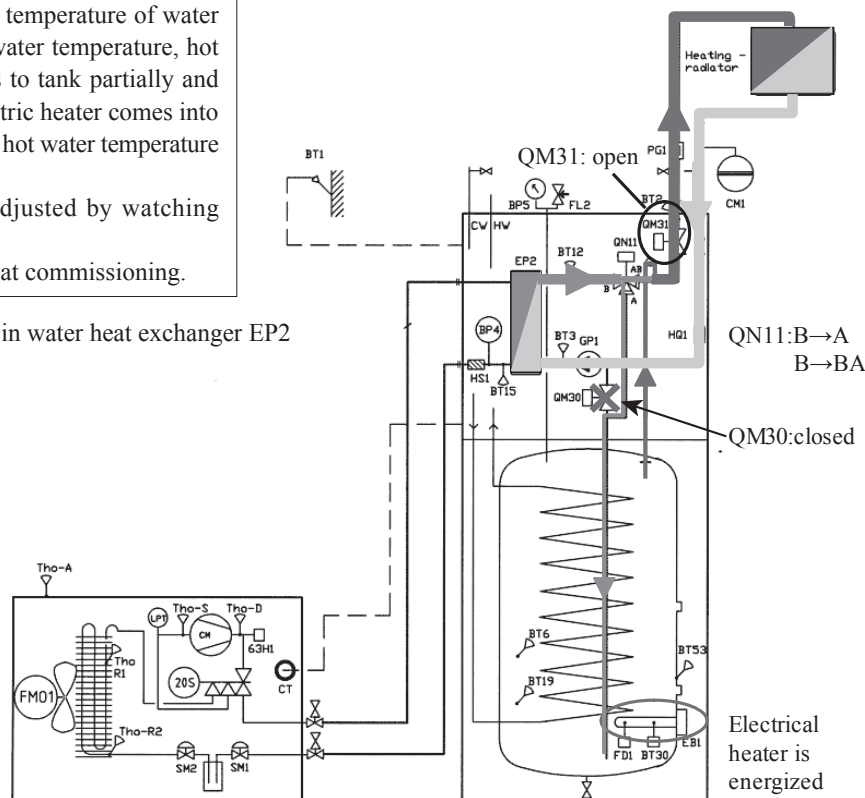


Heating operation mode [Combined mode]

(When the heat load cannot be covered by the capacity of outdoor unit)

If the heat load is big and outlet water temperature of water heat exchanger does not reach target water temperature, hot water from water heat exchanger goes to tank partially and hot water in the tank warmed with electric heater comes into the radiator circuit in order to adjust the hot water temperature to reach target water temperature.
 Opening degree of 3-way valve is adjusted by watching temperature with BT2.
 Water pump runs at constant speed set at commissioning.

Counterflow in water heat exchanger EP2

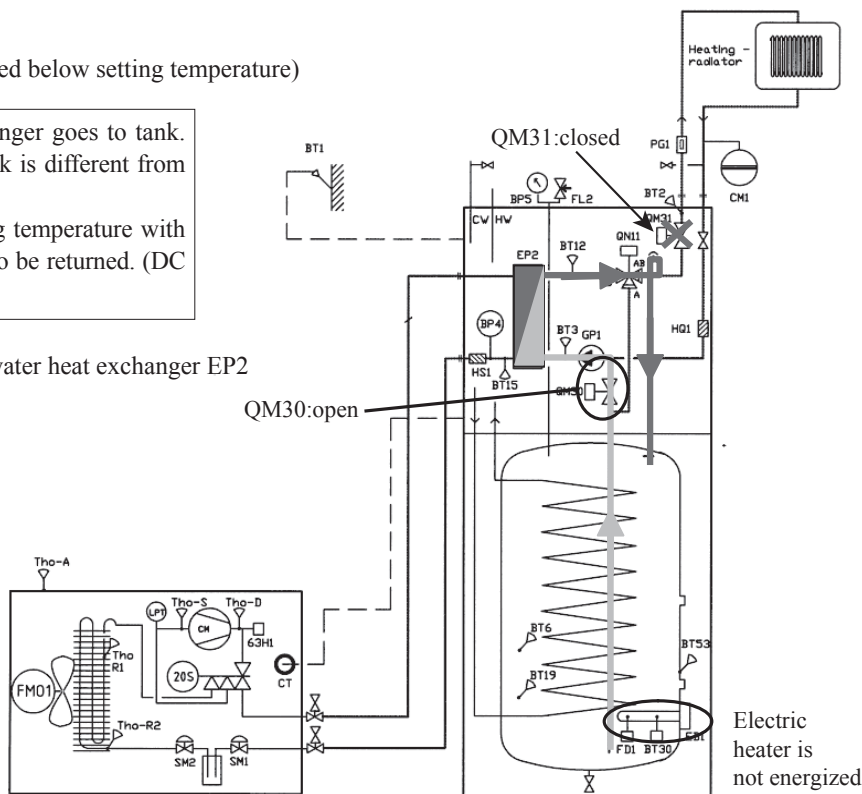


Hot water operation mode

(When the water temperature in tank is decreased below setting temperature)

100% of hot water from water heat exchanger goes to tank.
 (Take note that water flow going in/out tank is different from combined mode).
 Water pump controls its speed by watching temperature with BT12 in order to adjust hot water volume to be returned. (DC motor pump can control variable speed)

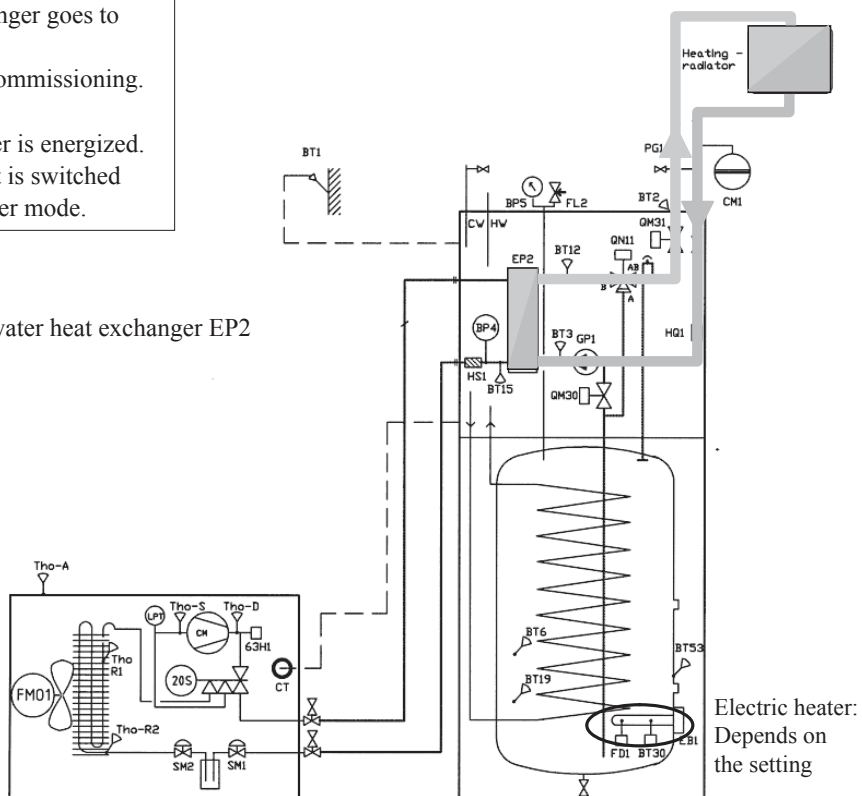
Counterflow in water heat exchanger EP2



Cooling operation mode

100% of cold water from water heat exchanger goes to radiator/fan coil etc.
 Water pump runs at constant speed set at commissioning.
 When the hot water demand occurs,
 Electric heater is permitted: Electric heater is energized.
 Electric heater is prohibited: Outdoor unit is switched to Hot water mode.

Parallel flow in water heat exchanger EP2



General

Explanation

External

| | |
|---------|-----------------------------------|
| QN11 | Mixing valve |
| QN12 | Shuttle valve for heating/cooling |
| RM | Non-return valve |
| CM1 | Expansion vessel |
| EP21 | Heating system 2 |
| GP10 | Circulation pump, external 1 |
| KF | External control |
| PG1 | Flow indicator |
| MH-RG10 | Room sensor MH-RG 10 (accessory) |
| CP1 | Buffer vessel (accessory) |
| FL1 | Safety valve |
| FQ1 | Mixer valve, HW |

Indoor unit

| | |
|------|--|
| BT1 | Temperature sensor, outdoor air (external) |
| BT2 | Temperature sensor, supply |
| BT3 | Temperature sensor, heat exch. in (Twin) |
| BT6 | Temperature sensor, tank water |
| BT12 | Temperature sensor, heat exch. out (Twout) |
| BT15 | Temperature sensor, liquid pipe (Thi-L) |
| BT19 | Temperature sensor, immersion heater |
| BT24 | Temperature sensor, external heat source |
| BT30 | Thermostat, standby mode |
| FD1 | Temperature limiter |
| BP4 | High pressure sensor |
| QN11 | Mixing valve |
| QM30 | Reversing valve, hot water |
| QM31 | Reversing valve, climate system |
| HS1 | Filter dryer (refrigerant) |
| EB1 | Immersion heater |
| EP2 | Heat exchanger |
| GP1 | Circulation pump, climate system |
| HQ1 | Particle (water) |
| FL2 | Safety valve, tank |
| BP5 | Pressure gauge |
| CW | Sanitary cold water inlet |
| HW | Sanitary hot water outlet |

Outdoor unit

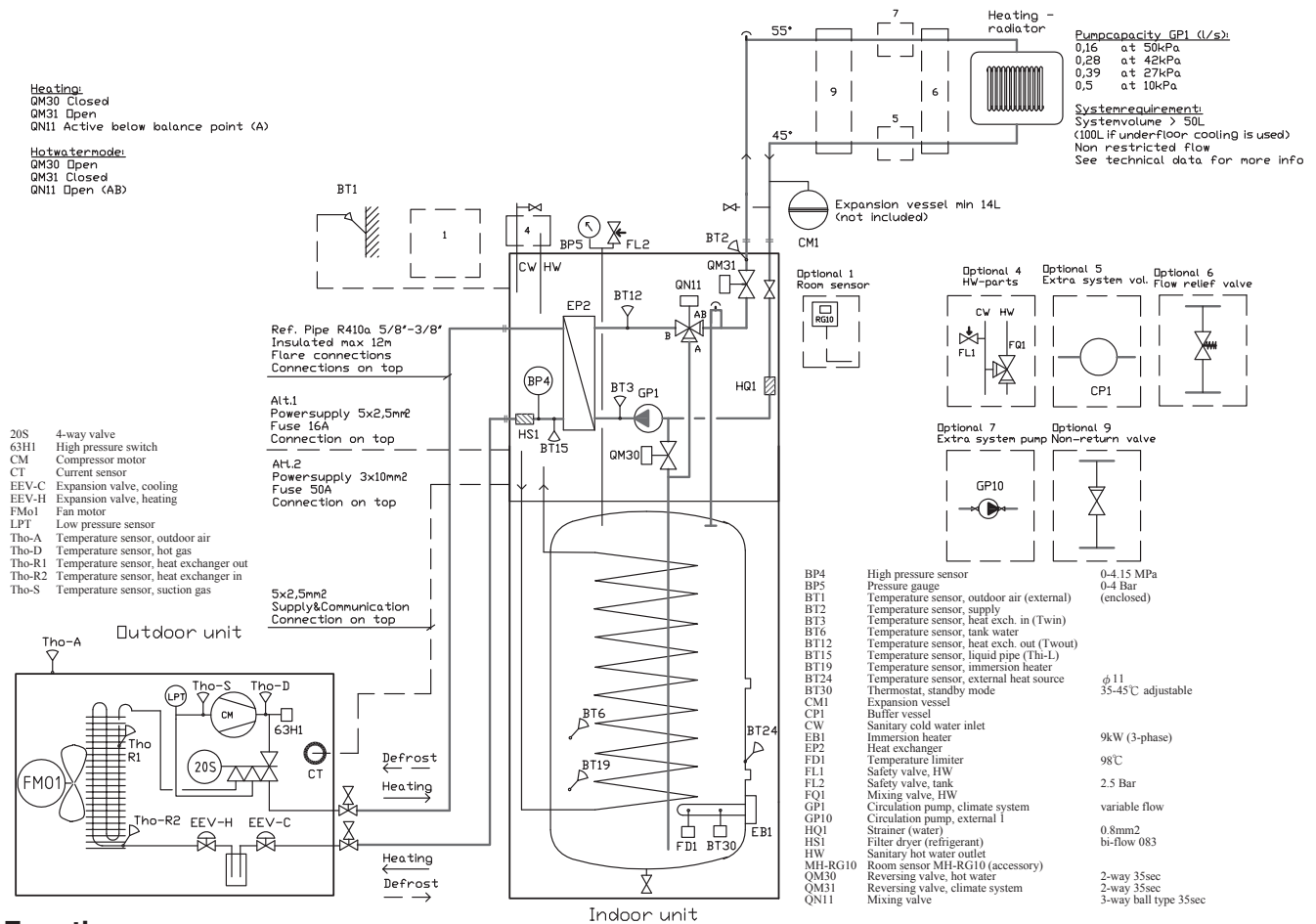
| | |
|--------|--|
| Tho-A | Temperature sensor, outdoor air |
| Tho-D | Temperature sensor, hot gas |
| Tho-R1 | Temperature sensor, heat exchanger out |
| Tho-R2 | Temperature sensor, heat exchanger, in |
| Tho-S | Temperature sensor, suction gas |
| LPT | Low pressure sensor |
| 63H1 | High pressure switch |
| CT | Current sensor |
| EEV-C | Expansion valve, cooling |
| EEV-H | Expansion valve, heating |
| FMo1 | Fan motor |
| 20S | 4-way valve |
| CM | Compressor motor |
| SV | Valve, solenoid |

Optional parts

| | |
|--|--|
| Optional 1 : Room sensor | To control the system operation by room temperature. See page 48 |
| Optional 4 : HW parts | To manage outlet water temperature. See page 69 |
| Optional 5 : Extra system volume | To ensure minimum required water volume in heating system. See page 66 |
| Optional 6 : Flow relief valve | To ensure water flow in case thermostats are installed on radiators. See page 66 |
| Optional 7 : Extra system pump | To ensure water flow in case pressure drop of heating system is big. See page 68 |
| Optional 8 : Extra system volume only with floor heating / cooling | To ensure minimum required water volume especially for under-floor system. See page 66 |
| Optional 9 : Non-return valve | To ensure water flow in the extra system pump during HW operation. See page 68 |

Radiators - only heating

HMA100V - FDCW100VNX (71VNX)



Function

The heat pump prioritises hot water charging. The compressor output is adjusted according to the outdoor temperature. The circulation pump varies the flow to maintain a high charge temperature.

When the water heater is full, the valves QM30 and QM31 switch to the heating system. The heat pump is then controlled by a calculated set point value on the flow line. The compressor varies the output according to the demand. The circulation pump runs at a fixed set speed.

If the compressor does not manage the entire heat demand, the electric heater is activated if it is allowed by setting and the heat shunted out on the flow line.

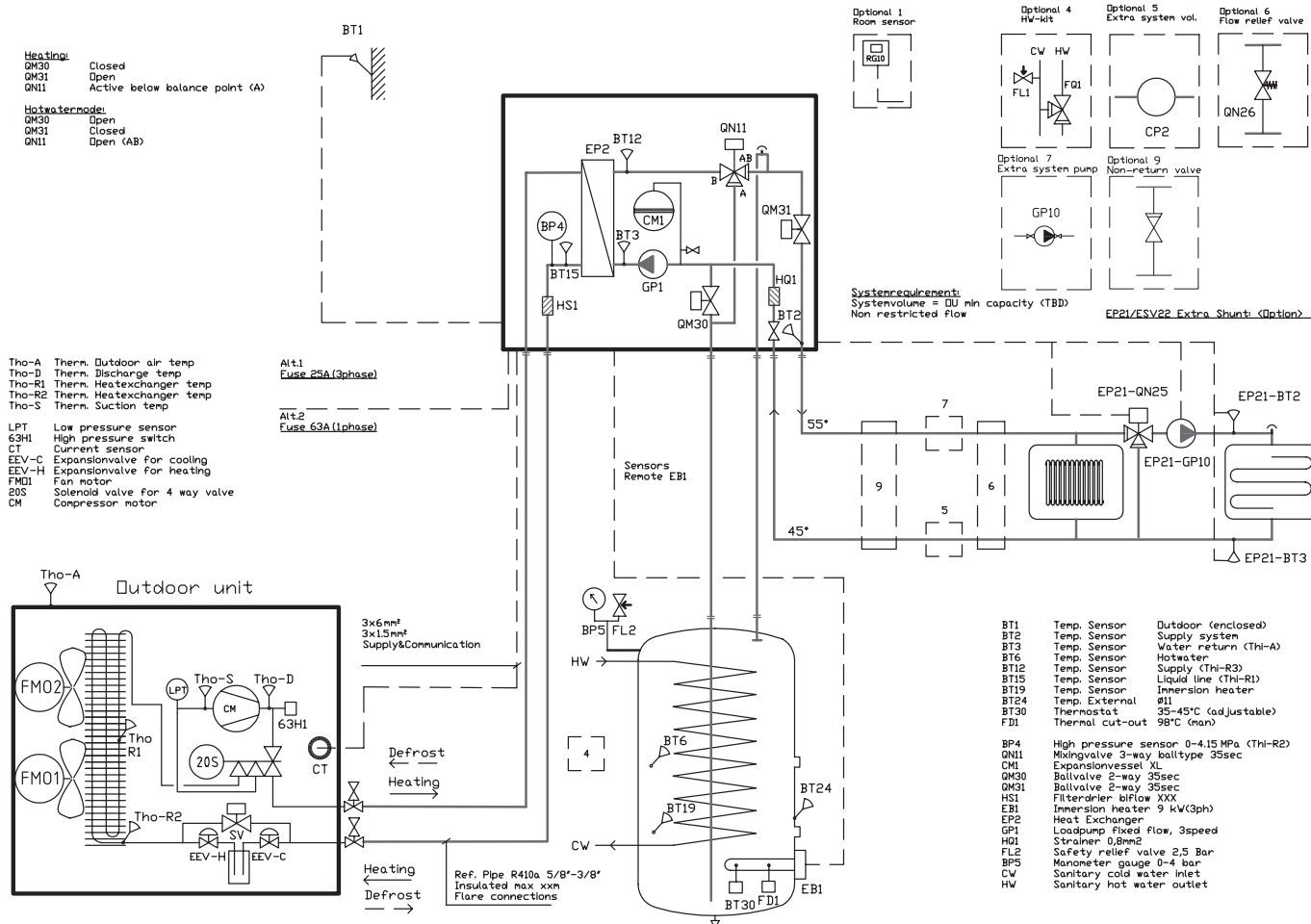
Installation requirements

See page 9.

| Heating mode | |
|--------------|---------------------------------|
| QM30 | Closed |
| QM31 | Open |
| QN11 | Active during balance point (A) |

| Hot water mode | |
|----------------|-----------|
| QM30 | Open |
| QM31 | Closed |
| QN11 | Open (AB) |

HMS140V (MT300)-FDCW140VNX



Function

The heat pump prioritises hot water charging. The compressor output is adjusted according to the outdoor temperature. The circulation pump varies the flow to maintain a high charge temperature.

When the water heater is full, the valves QM30 and QM31 switch to the heating system. The heat pump is then controlled by a calculated set point value on the flow line. The compressor varies the output according to the demand. The circulation pump runs at a fixed set speed.

If the compressor does not manage the entire heat demand, the electric heater is activated if it is allowed by setting and the heat shunted out on the flow line.

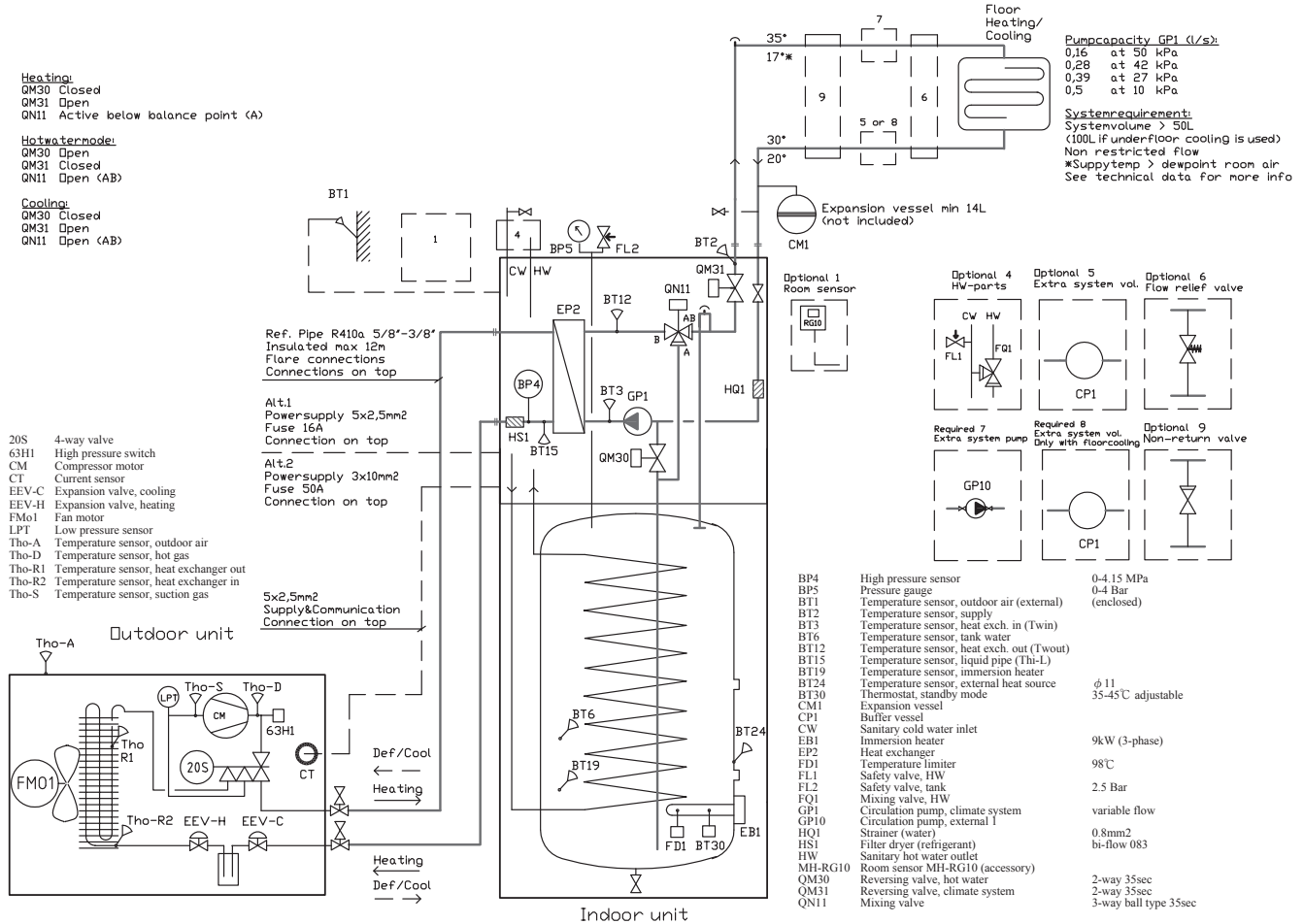
| Heating mode | |
|--------------|---------------------------------|
| QM30 | Closed |
| QM31 | Open |
| QN11 | Active during balance point (A) |

| Hot water mode | |
|----------------|-----------|
| QM30 | Open |
| QM31 | Closed |
| QN11 | Open (AB) |

Installation requirements

See page 9.

Underfloor heating and cooling



Function

The heat pump prioritises hot water charging. The compressor output is adjusted according to the outdoor temperature. The circulation pump varies the flow to maintain a high charge temperature.

When the water heater is full, the valves QM30 and QM31 switch to the heating system. The heat pump is then controlled by a calculated set point value on the flow line. The compressor varies the output according to the demand. The circulation pump runs at a fixed set speed.

If the compressor does not manage the entire heat demand, the electric heater is activated if it is allowed by setting and the heat shunted out on the flow line.

In the event of a cooling demand, the heat pump is controlled by a calculated set point value on the flow line. The compressor varies the output according to the demand. The charge pump runs at a fixed set speed.

| Heating mode | |
|--------------|---------------------------------|
| QM30 | Closed |
| QM31 | Open |
| QN11 | Active during balance point (A) |

| Hot water mode | |
|----------------|-----------|
| QM30 | Open |
| QM31 | Closed |
| QN11 | Open (AB) |

| Cooling mode | |
|--------------|-----------|
| QM30 | Closed |
| QM31 | Open |
| QN11 | Open (AB) |

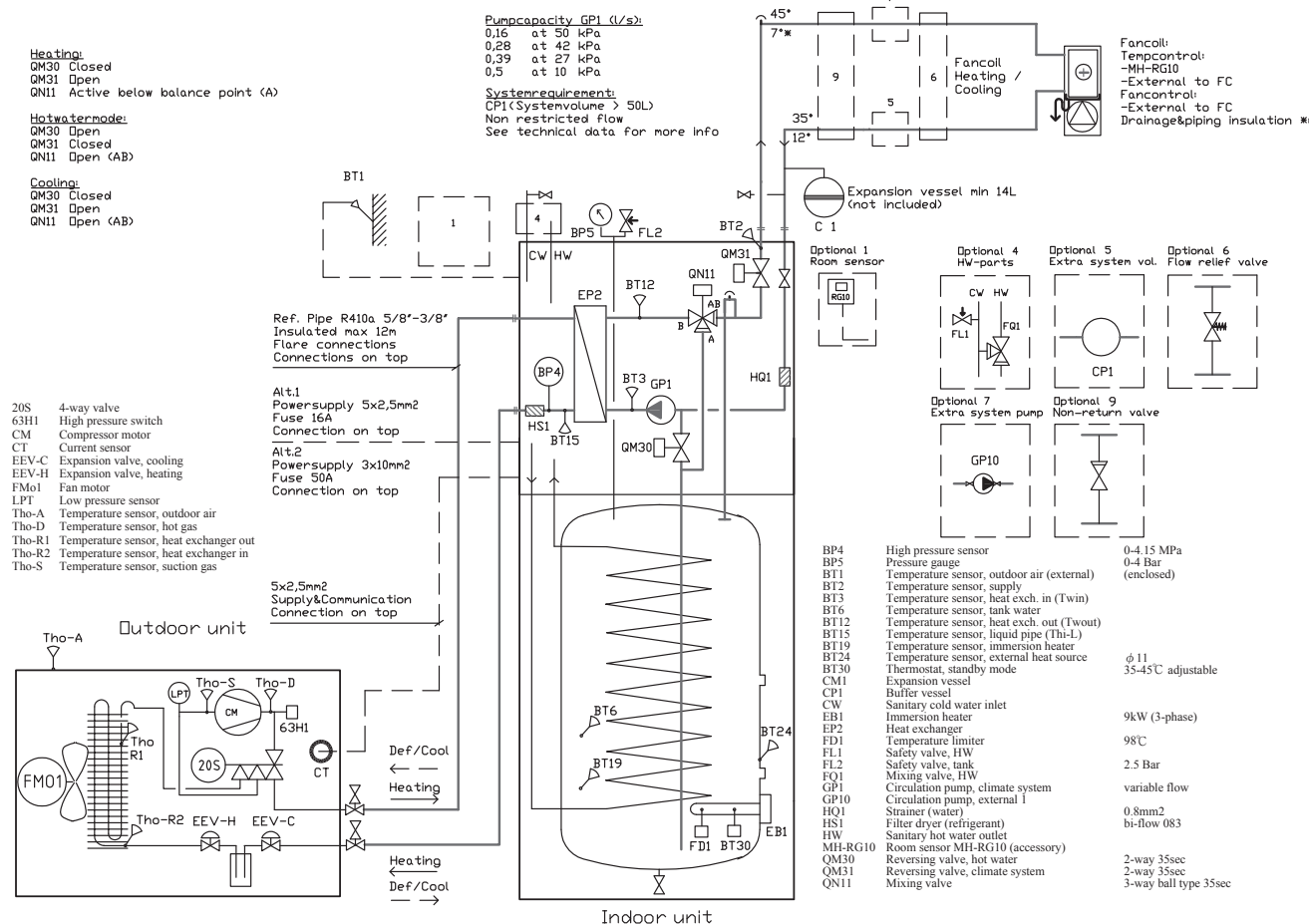
Installation requirements

See page 9.

NOTE

Low supply temperature setting may cause condensation on the floor.

Fan convectors - heating and cooling



Function

The heat pump prioritises hot water charging. The compressor output is adjusted according to the outdoor temperature. The circulation pump varies the flow to maintain a high charge temperature.

When the water heater is full, the valves QM30 and QM31 switch to the heating system. The heat pump is then controlled by a calculated set point value on the flow line. The compressor varies the output according to the demand. The circulation pump runs at a fixed set speed.

If the compressor does not manage the entire heat demand, the electric heater is activated if it is allowed by setting and the heat shunted out on the flow line.

In the event of a cooling demand, the heat pump is controlled by a calculated set point value on the flow line. The compressor varies the output according to the demand. The charge pump runs at a fixed set speed.

| Heating mode | |
|--------------|---------------------------------|
| QM30 | Closed |
| QM31 | Open |
| QN11 | Active during balance point (A) |

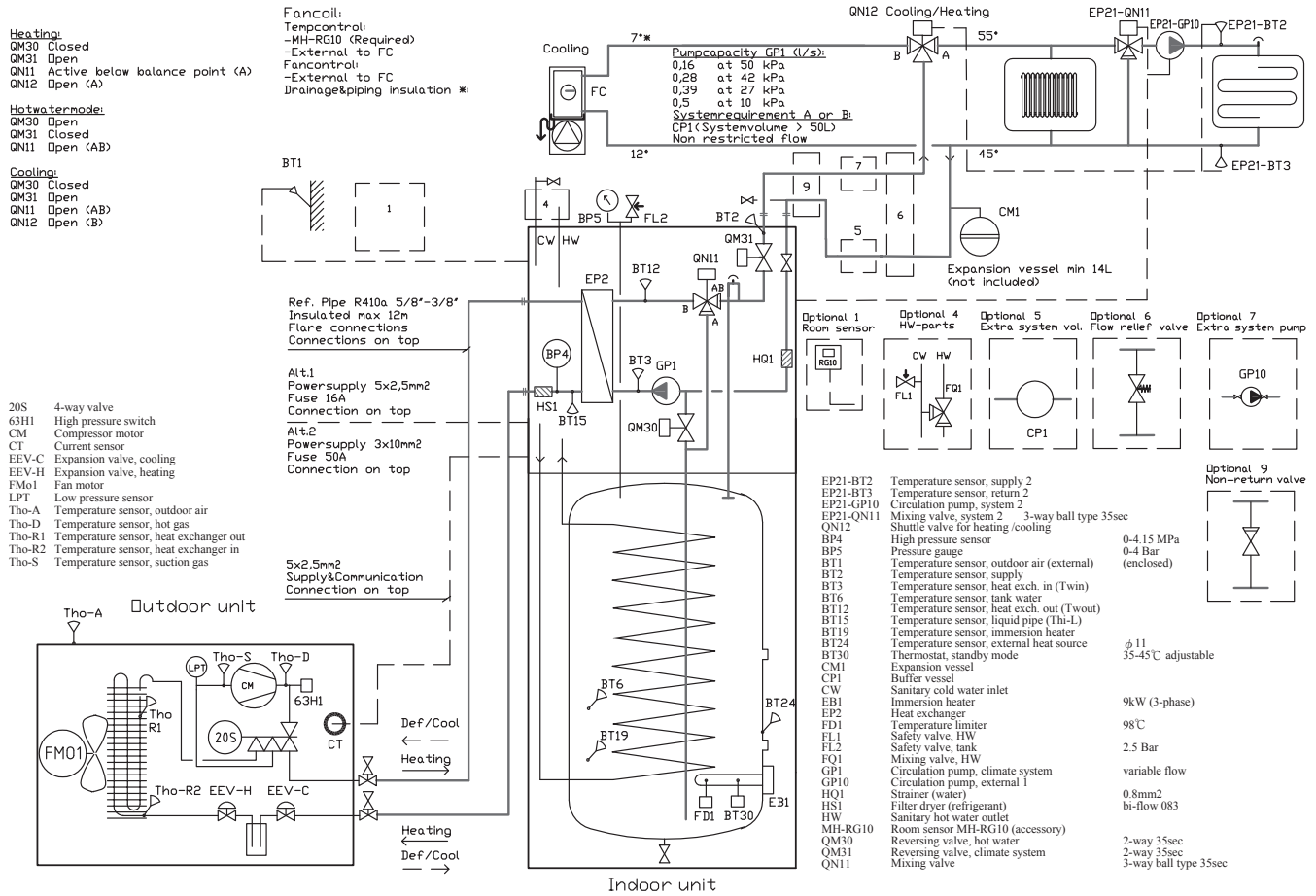
| Hot water mode | |
|----------------|-----------|
| QM30 | Open |
| QM31 | Closed |
| QN11 | Open (AB) |

| Cooling mode | |
|--------------|-----------|
| QM30 | Closed |
| QM31 | Open |
| QN11 | Open (AB) |

Installation requirements

See page 9.

Dual system - heating and cooling



Function

The heat pump prioritises hot water charging. The compressor output is adjusted according to the outdoor temperature. The circulation pump varies the flow to maintain a high charge temperature.

When the water heater is full, the valves QM30 and QM31 switch to the heating system. The heat pump is then controlled by a calculated set point value on the flow line. The compressor varies the output according to the demand. The circulation pump runs at a fixed set speed.

Extra shunt (EP21-QN11) lowers the temperature on system 2 according to settings in indoor unit.

If the compressor does not manage the entire heat demand, the electric heater is activated if it is allowed by setting and the heat shunted out on the flow line.

During cooling the valve QN12 switches to the cooling system. The heat pump is then controlled by a calculated set point value on the flow line. The compressor varies the output according to the demand. The circulation pump runs at a fixed set speed.

Heating mode

| | |
|------|---------------------------------|
| QM30 | Closed |
| QM31 | Open |
| QN11 | Active during balance point (A) |
| QN12 | Open (A) |

Hot water mode

| | |
|------|-----------|
| QM30 | Open |
| QM31 | Closed |
| QN11 | Open (AB) |

Cooling mode

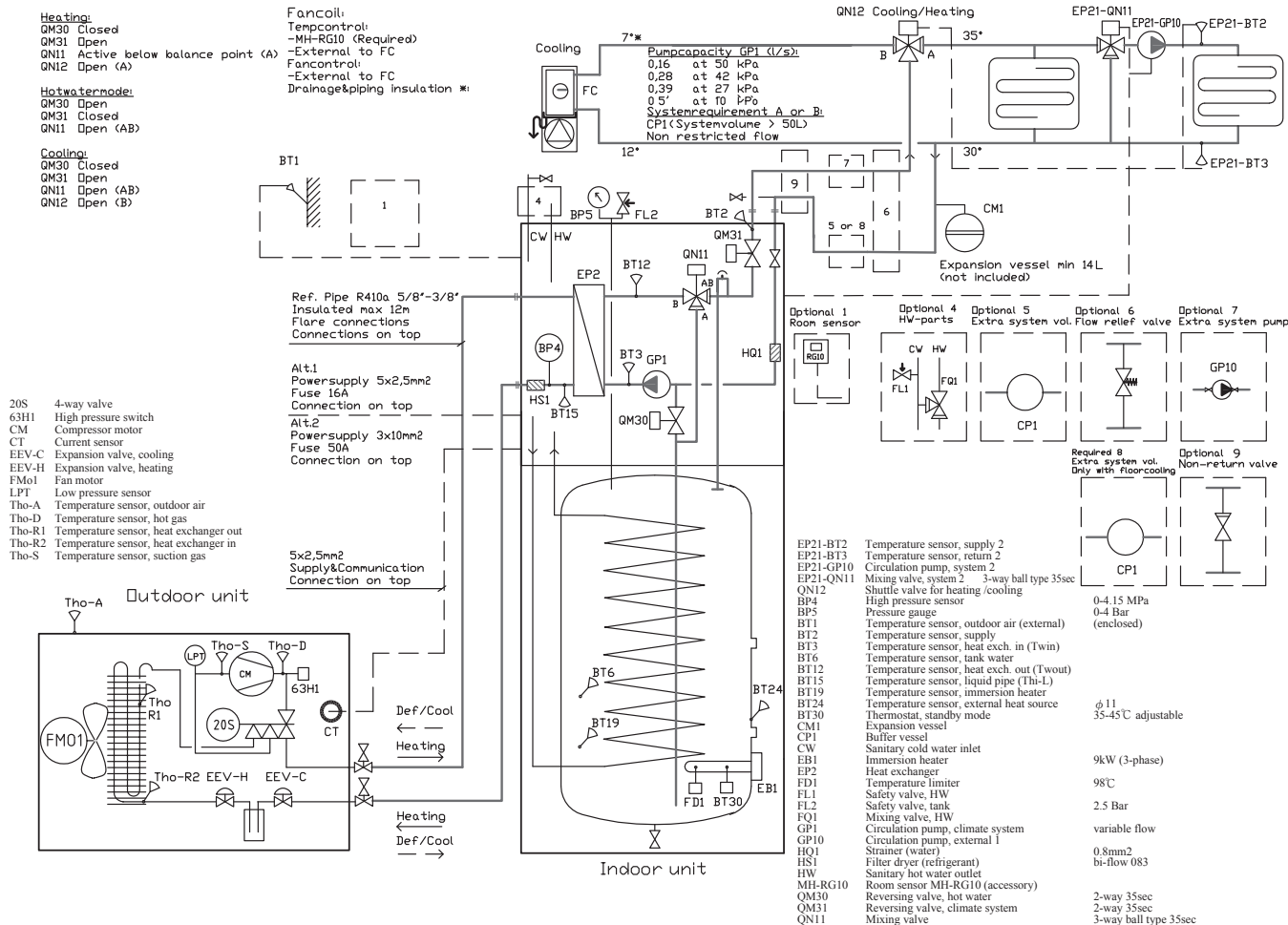
| | |
|------|-----------|
| QM30 | Closed |
| QM31 | Open |
| QN11 | Open (AB) |
| QN12 | Open (B) |

Installation requirements

See page 9.

Underfloor heating and fan convectors- heating and cooling

Underfloor heating and fan convectors- heating and cooling



Function

The heat pump prioritises hot water charging. The compressor output is adjusted according to the outdoor temperature. The circulation pump varies the flow to maintain a high charge temperature.

When the water heater is full, the valves QM30 and QM31 switch to the heating system. The heat pump is then controlled by a calculated set point value on the flow line. The compressor varies the output according to the demand. The circulation pump runs at a fixed set speed.

Extra shunt (EP21-QN11) lowers the temperature on system 2 according to settings in indoor unit.

If the compressor does not manage the entire heat demand, the electric heater is activated if it is allowed by setting and the heat shunted out on the flow line.

During cooling the valve QN12 switches to the cooling system. The heat pump is then controlled by a calculated set point value on the flow line. The compressor varies the output according to the demand. The circulation pump runs at a fixed set speed.

| Heating mode | |
|--------------|---------------------------------|
| QM30 | Closed |
| QM31 | Open |
| QN11 | Active during balance point (A) |
| QN12 | Open (A) |

| Hot water mode | |
|----------------|-----------|
| QM30 | Open |
| QM31 | Closed |
| QN11 | Open (AB) |

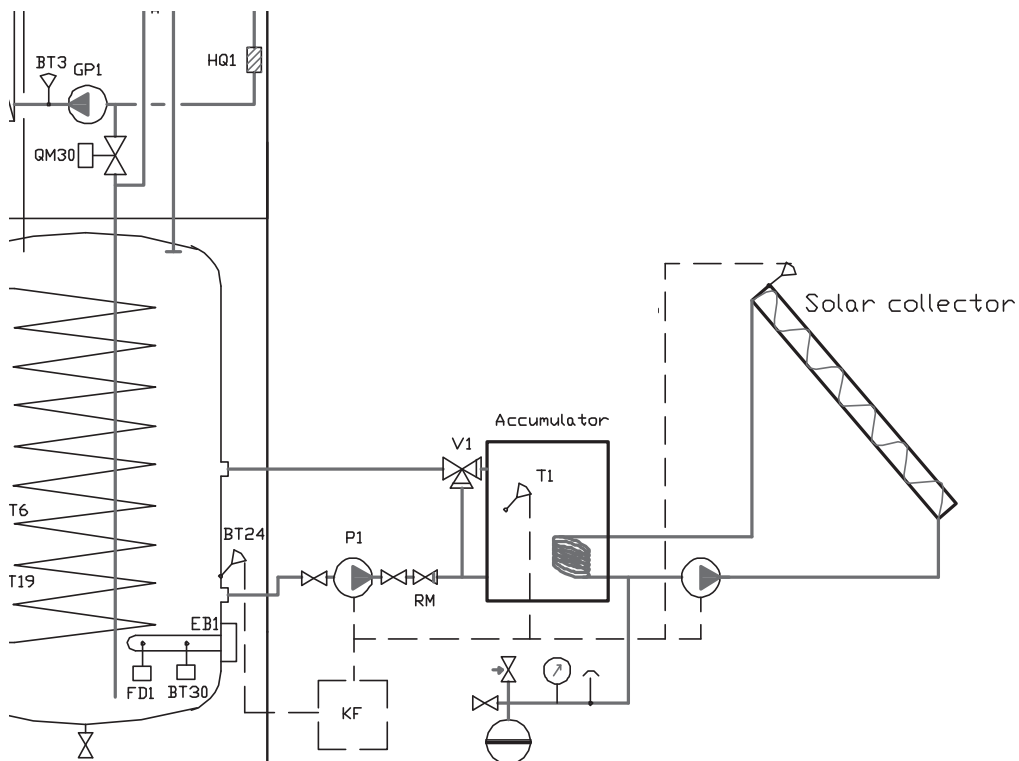
| Cooling mode | |
|--------------|-----------|
| QM30 | Closed |
| QM31 | Open |
| QN11 | Open (AB) |
| QN12 | Open (B) |

Installation requirements

See page 9.

External heat source

Sun



Function

By connecting a solar heat collector via intermediate heat exchanger to indoor unit or tank, the solar heat can produce hot water and heating for the house.

If the solar panel does not produce necessary heat, the outdoor unit and the immersion heater generate heat.

The solar panel must have an external automatic control device (KF).

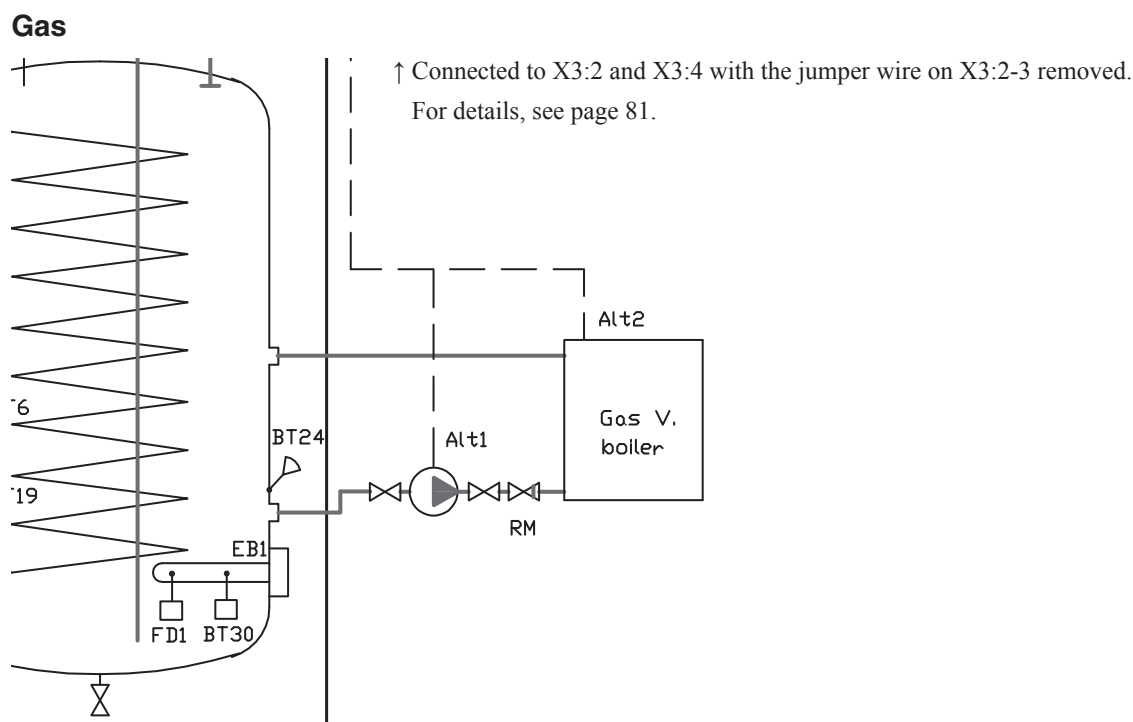
Additional temperature sensor should be placed on BT24 and KF should control the solar panel as follows,

P1 should stop when BT24 senses 65 °C at maximum.

P1 shouldn't start until T1 reaches 55 °C at minimum.

V1 must control the supply temperature at 65°C or lower.

Accumulators and primary system design are dimensioned by the boiler supplier. Ensure that there is sufficient volume to prevent overheating.



Function

Hydrolution engages additional heat source when the compressor output is not sufficient for the house demand.

When the additional heat source is connected, valves QM 30 and QM31 shift to the heating system. Valve QN11 shuts in the event of a heat demand on the flow line. Hot water can be produced with the additional heat source.

Max temp should be 65°C out from the gas fired boiler.

Control signal for additional heat source taken from terminal block X3.

Jumper wire between X3:2-3 must be removed.

The control signal input is connected to terminal block X3:2 (230V), X3:4 (N).

Temperature sensor BT19 should be replaced to the position BT24 in order to control gas boiler appropriately.

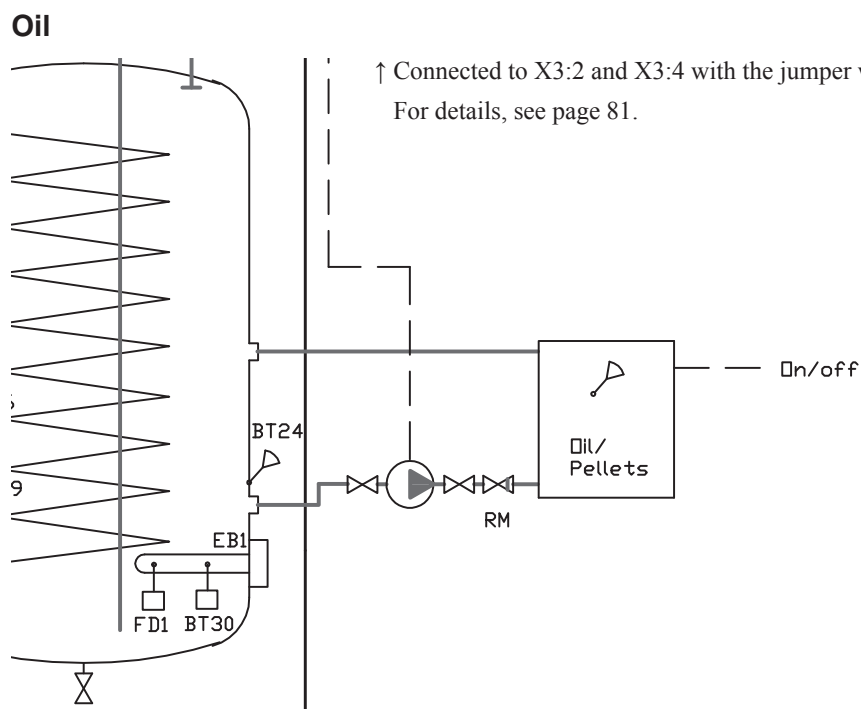
Menu 9.2.8 set to External Line 1.

Alt 1: The gas boiler runs continuously. Indoor unit controls the circulation pump.

Alt 2: Condensing gas boiler with internal circulation pump. Indoor unit provides the gas boiler with start and stop signals.

NOTE

Maximum current on the terminal block X3 is 0.4A



Function

Hydrolution engages additional heat source when the compressor output is not sufficient for the house demand.

When the additional heat source is connected, valves QM 30 and QM31 shift to the heating system. Valve QN11 shuts in the event of a heat demand on the flow line. Hot water can be produced with the additional heat source.

Max temp should be 65°C out from the oil/pellet boiler.

Control signal for additional heat source taken from terminal block X3.

Jumper wire between X3:2-3 must be removed.

The control signal input is connected to terminal block X3:2 (230V), X3:4 (N).

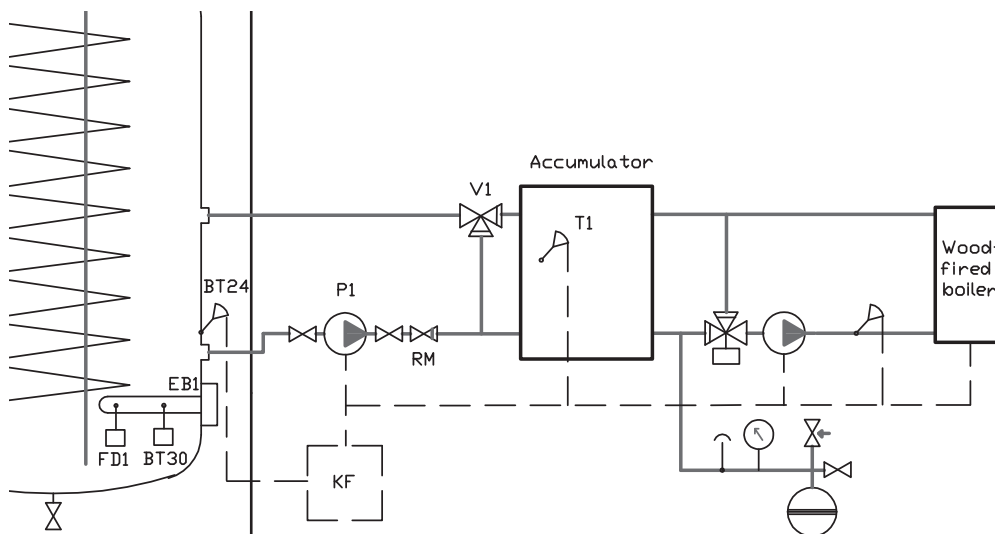
Temperature sensor BT19 should be replaced to the position BT24 in order to control gas boiler appropriately.

Menu 9.2.8 set to External Line 1.

The oil fired boiler is started and stopped by external control. Indoor unit controls the circulation pump.

NOTE

Maximum current on the terminal block X3 is 0.4A

Wood**Function**

By connecting a wood-fired boiler via accumulator tank to indoor unit or tank, hot water and heat to the house can be produced by it.

If there is no heat in the accumulator tank, heat and hot water are produced by the heat pump or by internal electric heater according to the selected operating mode.

The wood installation must have an external automatic control device (KF).

Additional temperature sensor should be placed on BT24 and KF should control the wood fired boiler as follows,

P1 should stop when BT24 senses 65 °C at maximum.

P1 shouldn't start until T1 reaches 55 °C at minimum.

V1 must control the supply temperature at 65°C or lower.

Accumulators and primary system design are dimensioned by the boiler supplier. Ensure that there is sufficient volume to prevent overheating.

Service

Operation control function by the indoor unit control

Operation mode

General

The modes mentioned below can be chosen from the control panel. Hot water operation always has the first priority over heating/cooling.

| Mode | Function |
|--------------------------------|--|
| (1) Auto | <ul style="list-style-type: none"> The mode is automatically switched over between (3) Heating mode and (5) Hot water operation mode. Automatic switching rule is mentioned below. |
| (2) AutoC | <ul style="list-style-type: none"> The mode is automatically changed among (3) Heating mode, (4) Cooling mode and (5) Hot water mode. Automatic switching rule is mentioned below. |
| (3) Heating | <ul style="list-style-type: none"> Hot water is supplied for heating. Circulation pump is always running for heating regardless of the outdoor unit operation. Hot water operation will be made when the tank water temperature lowers. (Alternating mode, see page 116 for details) When the outdoor unit can not cover the heat load, electric heater use is allowed and water in the tank is supplied for heating to fulfill the required heat load. (Combined mode, see page 116 for details.) |
| (4) Cooling (Super Cooling) | <ul style="list-style-type: none"> Cold water is supplied for cooling. Circulation pump is always running for cooling regardless of the outdoor unit operation. Hot water operation will be made when the tank water temperature lowers; by the outdoor unit if the electric heater is not allowed (Cooling) by the electric heater if it is allowed (Super Cooling) |
| (5) Hot water | <ul style="list-style-type: none"> Always hot water operation . Water is not supplied to the climate system. Circulation pump stops when the outdoor unit stops. Electric heater use is not allowed. |
| (6) Extra hot water | <ul style="list-style-type: none"> Hot water operation for higher temperature or for big demand. Electric heater is used if the target temperature is higher than the operable range of the heat pump. |
| (7) Add. Heat only | <ul style="list-style-type: none"> Outdoor unit is not allowed to operate. Only electric heater is exclusively used for Heating and Hot water operation. Circulation pump is always running. |

Note 1 : The measured value of outdoor air temperature (BT1) which is used for control, is averaged in accordance with the prescribed formula.
See Menu 4.2 for setting.

Note 2 : Heating/Cooling demand is calculated as numeric DM (Degree Minutes) from the supply water temperature (BT2) and its target temperature in accordance with the prescribed formula. See Menu 2.6, 9.1.1, 9.1.2 and 9.2.1 for setting.

Note 3 : Electric heater can be replaced with external heat source of the docking feature. See Menu 8.2.1, 8.2.2 and 9.2.8 for setting.

Note 4 : Two sets of climate system can be controlled with different heating curve. See Menu 3.1-3.7 for setting.

Operation control function by the indoor unit control

Actuator operation according to the operation mode

| State | Function | Run status | Outdoor unit side | | | Indoor unit side | | | | | |
|--------------------------|---|------------|-------------------|------------------|-----------------|---------------------|----------------------|------------------|-----------------|-----------------|--------------------------|
| | | | Compressor CM | Outdoor fan FMO1 | 4-way valve 20S | Electric heater EB1 | Circulation pump GPI | Shunt valve QN11 | Ball valve QM30 | Ball valve QM31 | Cooling shift valve QN12 |
| Heating Alternating mode | Switching between heating and hot water | Heating | ON/OFF | ON/OFF | ON | OFF | ON | Closed (B⇒AB) | Closed | Open | Closed (⇒A) |
| | | Hot water | | | | | | | | Open | |
| Heating Combined mode | Outdoor unit produces heating and electric heater supports lack of capacity | Heating | ON | ON | ON | ON | Active (B⇒A) | Closed | Closed | Open | Closed (⇒A) |
| | | | | | | | | | | | |
| Cooling | Switching between cooling and hot water | Cooling | ON/OFF | ON/OFF | OFF | OFF | ON | Closed (B⇒AB) | Closed | Open | Open (⇒B) |
| | | Hot water | | | ON | | | | | Open | |
| Super Cooling | Outdoor unit produces cooling and electric heater produces hot water | Cooling | ON/OFF | ON/OFF | OFF | - | ON | Closed (B⇒AB) | Closed | Open | Open (⇒B) |
| | | Hot water | | | - | | | | | | |
| Hot water | Producing hot water | Hot water | ON | ON | ON | OFF | ON | Closed (B⇒AB) | Open | Closed | Closed (⇒A) |
| | | Stopping | | | ON | | | | | | |
| Add. Heat only | Producing heating and hot water with electric heater | Heating | OFF | OFF | ON/OFF | ON | Active (B⇒A) | Closed | Closed | Open | Closed (⇒A) |
| | | Hot water | | | | | | | | | |
| Defrost | Defrosting outdoor unit heat exchanger | Defrost | ON | OFF | OFF | ON | Closed (B⇒AB) | Closed | Closed | Open | Closed (⇒A) |
| | | Defrost 2 | | | | | | | | Open | |
| Shutdown | Only in the event of serious alarms | Stop | OFF | OFF | ON/OFF | OFF | Closed (B⇒AB) | Closed | Closed | Open | Closed (⇒A) |

Note:

Defrost 2: When BT3 < Tank defrost temp.

Operation control function by the indoor unit control

Mode transition in Auto/AutoC mode

Change-over of Heating/Cooling/Hot water operation is controlled by detection with outdoor air temperature sensor (BT1) of the indoor unit. Threshold value depends on setting on Menu 8.2.3 – 8.2.5.

Menu 8.2.3 Stop temp. heating:

If outdoor air temperature is below setting value on Menu 8.2.3-8.2.5, heating mode is chosen.

If outdoor air temperature is above setting value on Menu 8.2.3, it switches to hot water mode.

Default of setting value is 17°C.

Menu 8.2.4 Start temp. cooling (in case of AutoC mode):

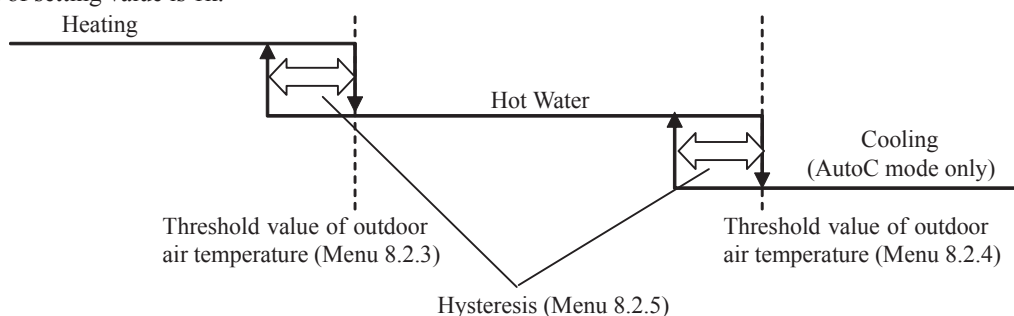
If outdoor air temperature is above setting value on Menu 8.2.4, cooling mode is chosen.

If outdoor air temperature is below setting value on Menu 8.2.4-8.2.5, it switches to hot water mode.

Default of setting value is 25°C.

Menu 8.2.5 Hysteresis:

Default of setting value is 1k.



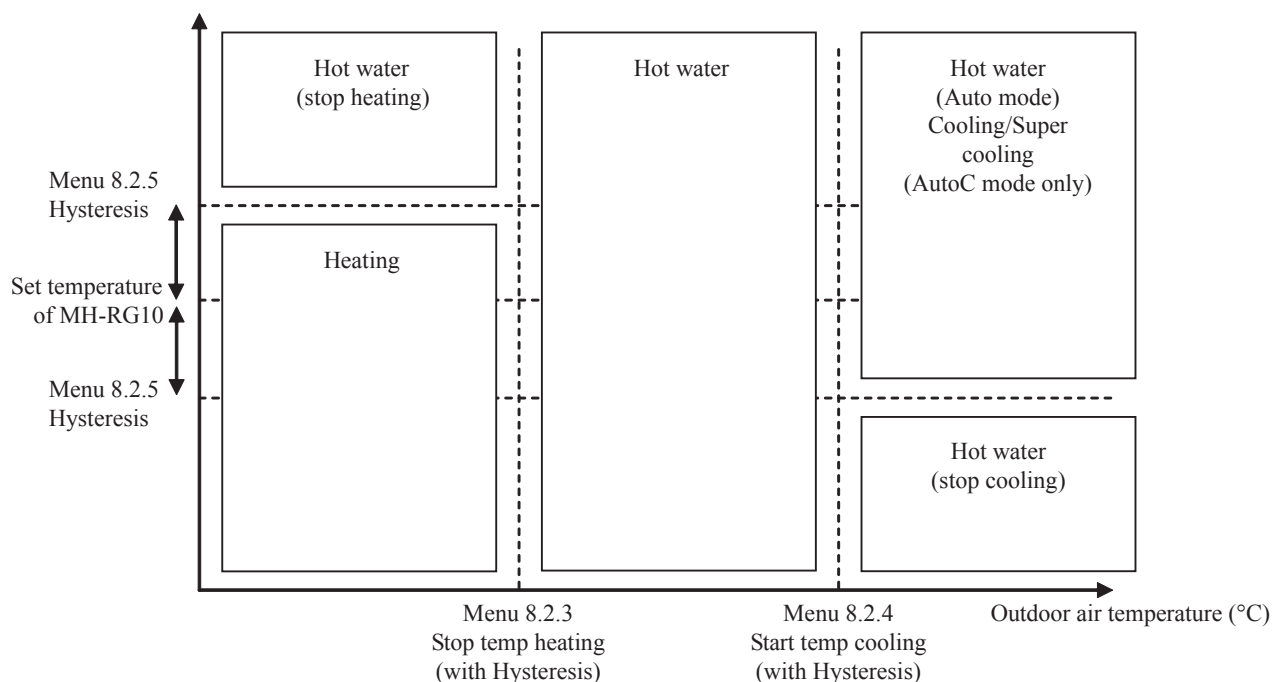
Mode transition by outdoor air temperature

Mode transition in Auto/AutoC mode with room sensor (MH-RG10) used

When MH-RG10 is installed in the system, mode is decided not only by outdoor air temperature but also by in combination with the gap between actual room temperature (BT50) and set room temperature.

The set value of start temp cooling can be smaller than that of stop temp heating. In this case, heating and cooling operation will be change-over directly at the threshold value for cooling on Menu 8.2.4-8.2.5.

Indoor air temperature (°C)



Mode transition when MH-RG10 is used

The required indoor temperature can be set using the knob on MH-RG10. The set temperature can be seen in Menu 6.3.

Exceptional case of mode transition

In order to prevent water pipes on the system from freezing, there is some exception of mode transition when the outdoor air temperature (BT1) drops below 0°C.

1) In (4) Cooling or (5) Hot water mode;

Operation changed to (3) Alternating mode of Heating with the lowest allowable temperature of supply water as the target.

If the supply water temperature does not reach the target, electric heater is forcibly activated regardless of the setting so that the supply water temperature is kept at the lowest allowable temperature.

2) In (1) Auto or (2) AutoC mode and the condition to choose (5) Hot water mode is fulfilled; (3) Heating mode is chosen instead, and the circulation pump operates at all time.

When the outdoor air temperature (BT1) exceeds 1°C, the exceptional operation is deactivated.

During combined mode of heating, it is also deactivated regardless of the outdoor air temperature (BT1) if the target temperature of supply water exceeds its lowest allowable temperature plus 1°C.

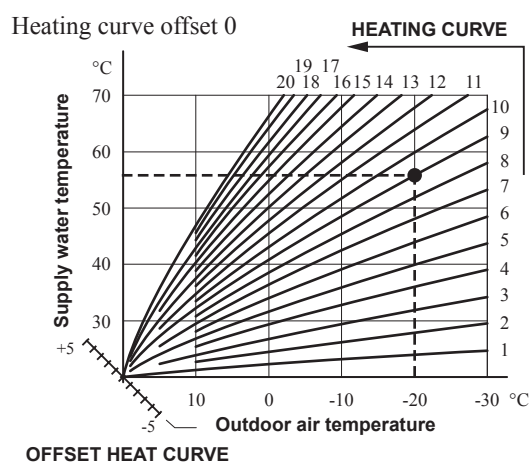
Operation control function by the indoor unit control

Supply water temperature control in heating

Target supply water temperature can be seen in Menu 2.0 (for heating system 1) and 3.0 (for heating system 2).
 For dual system, the target temperature for downstream heating system must be lower than that for upstream heating system.

Heating curve

Heating curve is the basic principle to decide the target supply water temperature for heating.
 The lower the outdoor air temperature (BT1) becomes, the higher the target supply water temperature becomes, and the characteristics can be adjusted in Menu 2.1.2 (for heating system1) or in Menu 3.2 (for heating system 2).
 The figure below shows the case that heating curve 9 is chosen. In this case, the target supply water temperature is 55°C at -20°C outdoor air temperature condition.

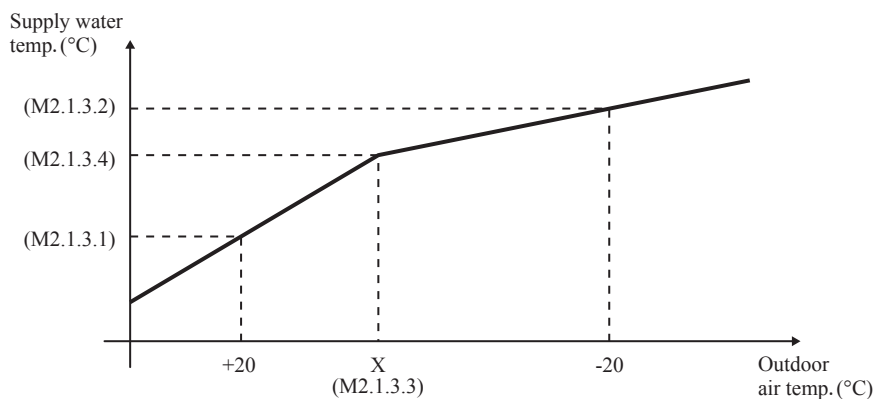


Own heating curve

If there is not suitable heating curve programmed in a system, it is possible to create own heating curve.

To create own heating curve,

- (1) Set Menu 2.1.2 to 0
- (2) Set Menu 2.1.3.1 to desired supply water temperature at 20 degrees for outdoor air temperature.
- (3) Set Menu 2.1.3.2 to desired supply water temperature at -20 degrees for outdoor air temperature.
- (4) Set Menu 2.1.3.3 to desired outdoor air temperature which means break point.
- (5) Set Menu 2.1.3.4 to desired supply water temperature at break point set in menu 2.1.3.3



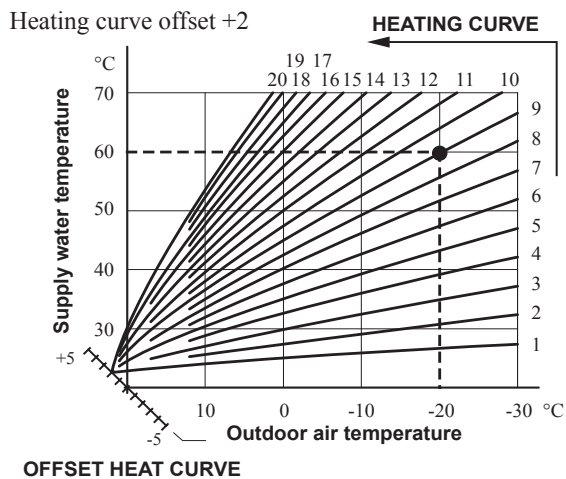
Operation control function by the indoor unit control

Heating curve offset

It is possible to offset the heating curve chosen in the menu above in order to obtain higher target supply water temperature.

The offset for heating system 1 can be set using the knob on the controller. The set value can be seen in Menu 2.1.1.

The figure below shows the case that heating curve 9 is chosen with heating curve offset +2. In this case, the target supply water temperature is 60°C at -20°C outdoor air temperature condition.



The offset for heating system 2 can be set in Menu 3.1.

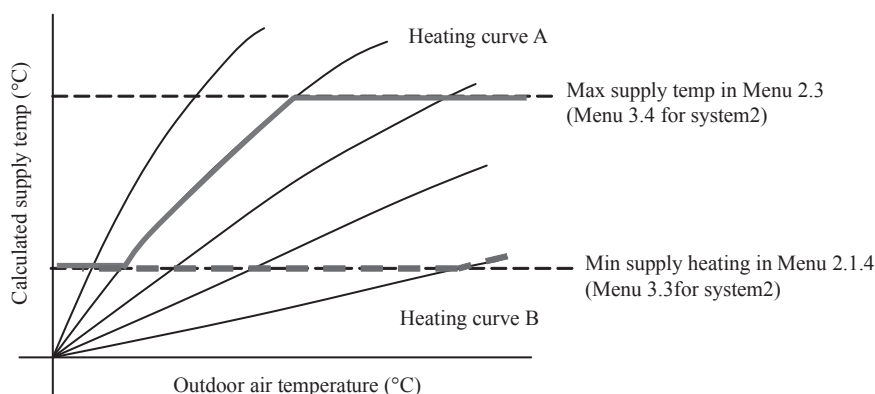
Operation control function by the indoor unit control

Upper / Lower limit of the supply water temperature

Regardless of the heating curve setting and the outdoor air temperature, target water temperature cannot exceed the min/max supply water temperature set in Menu 2.1.4 and 2.3 for heating system 1 or in Menu 3.3 and 3.4 for heating system 2.

Upper and lower limit is set after various offset correction.

For example, when the upper and lower limit is set as below mentioned figure, and if heating curve A and B is selected, target supply water temperature is shown in full line and dotted line respectively.



Water temperature control when deviated from the target

When the DM value is significantly small, supply water temperature must be controlled higher than target temperature to reduce the deficit of DM value. However, too big overshoot of the supply temperature will affect comfort.

In order to control the supply water temperature to avoid fluctuation of room temperature, overshoot limit is set in Menu 9.6.7 (Max diff flow-cFlow). Once the supply water temperature reaches the threshold of Menu 9.6.7, thereafter the compressor speed is controlled so that the supply water temperature is kept below the overshoot limit.

For details, see the timing chart on page 142.

Operation control function by the indoor unit control

Heating thermo-ON / OFF control

The control by DM value is the basic principle to operate/stop the outdoor unit operation.

DM (Degree-Minutes) value

DM value is integrated value of the gap between the target and actual supply water temperature.

Compressor required speed and electric heater ON/OFF are controlled by the DM value.

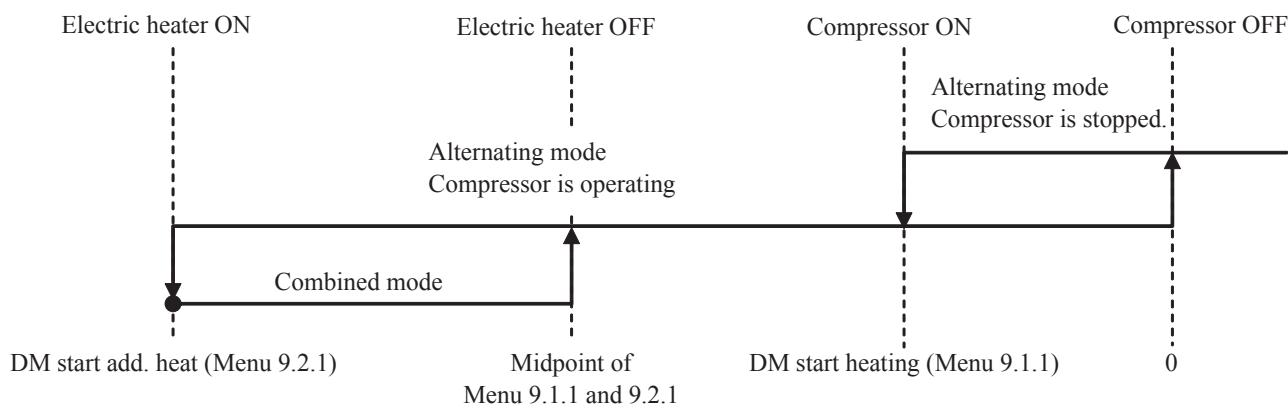
DM value is limited from +100 to DM start add. heat (Menu 9.2.1) and does not exceed the limit.

Operation state transition according to DM value

According to the DM value, operating state is changed.

Default of DM start heating value (Menu 9.1.1) is -60.

Default of DM start add. heat value (Menu 9.2.1) is -400.



Alternating mode

It implements heating operation only with the outdoor unit. The outdoor unit starts when the DM value becomes DM start heating set at Menu 9.1.1 or lower.

If hot water demand increases and tank water temperature (BT6) lowers below the set value in Menu 1.3, operation state will switch to hot water operation. For details, see Hot water operation control.

Combined mode

The system goes into Combined mode only when the electric heater is allowed to use in Menu 8.2.1.

Hot water in tank is used for heating to cover the excess heat load.

Electric heater in the tank is energized, and the target tank water temperature is set at +2°C of heating curve or target tank water temperature for hot water (set on Menu 1.5), whichever is higher.

Opening degree of mixing valve QN11 is adjusted so that the supply water temperature to the climate system will be -1°C of heating curve.

Note : Electric heater can be replaced with external heat source of the docking feature. See Menu 8.2.1, 8.2.2 and 9.2.8 for setting.

Exceptional processing of DM value

In case the actual supply water temperature BT2 deviates from the target temperature drastically, DM value is sometimes forcibly overwritten to make the water temperature close to the target quickly.

Forced outdoor unit operation

In case the actual supply water temperature is lower than the target temperature and the gap is bigger than the value set in Menu 9.3.12 (Supply temp diff) when the outdoor unit is not operating, the DM value is overwritten to smaller value than in Menu 9.1.1 by 1, which results in starting the outdoor unit operation immediately.

For details, see timing chart on page 142.

Forced combined mode operation

In case the actual supply water temperature is lower than the target temperature and the gap is bigger than the value set in Menu 9.3.12 plus 9.3.13 (Diff HP add. heat) during Alternating mode operation, the DM value is overwritten to bigger value than in Menu 9.2.1 by 1, which result in going into combined mode operation earlier.

For details, see timing chart on page 142.

Forced outdoor unit stop

In case the actual supply water temperature is higher than the target temperature and the gap is bigger than the value set in Menu 9.3.12 when the outdoor unit is operating, the DM value is overwritten to 1, which results in stopping the outdoor unit operation immediately if there is no hot water demand.

Exceptional compressor speed control**Forced minimum compressor speed operation**

When the compressor starts, the request frequency is set at minimum for certain period. The period can be set in Menu 9.6.5.

This control is cancelled when (1) the set time has elapsed, or (2) DM value gets significantly low.

Supply water temperature control in cooling

Principle such as cooling curve, cooling curve offset and upper/lower limit is the same as heating operation.

Target supply water temperature can be checked in Menu 2.0.

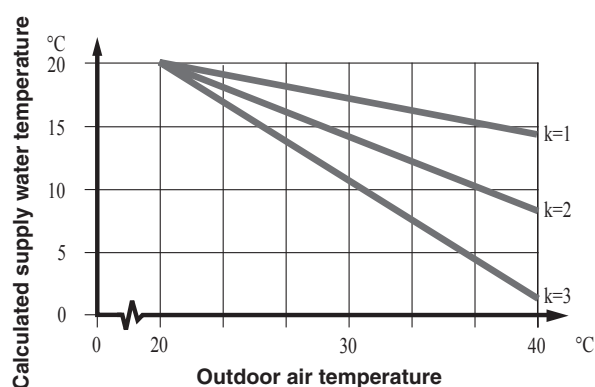
Cooling curve can be chosen in Menu 2.2.2

Cooling curve

Cooling curve is the basic principle to decide the target supply water temperature for cooling.

The higher the outdoor air temperature (BT1) becomes, the lower the target supply water temperature becomes, and the characteristics can be adjusted in Menu 2.2.2.

The figure below shows the characteristics of cooling curve. When cooling curve 1 is chosen, target supply water temperature is around 16°C at 35°C outdoor air temperature condition.



Upper/Lower limit of the supply water temperature

Regardless of the cooling curve setting and the outdoor air temperature, target supply water temperature can not exceed the min/max supply water temperature set in Menu 2.2.4 and 2.3.

Upper and lower limit is set after various offset correction.

Water temperature control when deviated from the target

When the DM value is significantly big, supply water temperature must be controlled lower than target temperature to reduce the surplus of DM value. However, too big overshoot of the supply temperature will affect comfort.

In order to control the supply water temperature to avoid fluctuation of room temperature, overshoot limit is set in Menu 9.6.7 (Max diff flow-cFlow). Once the supply water temperature reaches the threshold of Menu 9.6.7, thereafter the compressor speed is controlled so that the supply water temperature is kept above the overshoot limit.

Cooling thermo-ON / OFF control

Principle of the control such as DM value is the same as heating operation.

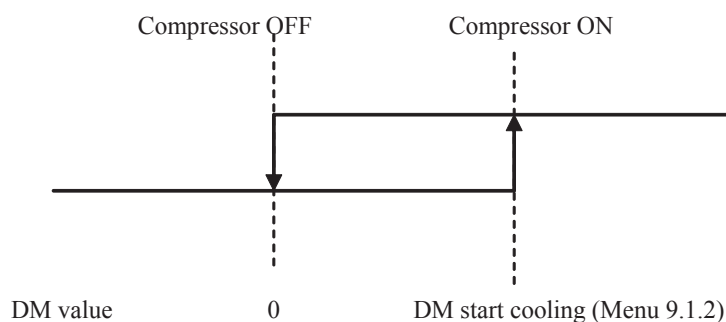
DM (Degree-Minutes) value

DM value is limited from -100 to +400 and does not exceed the limit.

Operation state transition according to DM value

According to the DM value, operating state is changed.

Default of DM start cooling value (Menu 9.1.2) is +60.



Exceptional processing of DM value

Forced outdoor unit operation

In cooling mode, there is no exceptional DM value processing to operate the outdoor unit according to the gap between target and actual supply water temperature.

Forced outdoor unit stop

In case the actual supply water temperature is lower than the target temperature and the gap is bigger than the value set in Menu 9.3.12 when the outdoor unit is operating, the DM value is overwritten to -1, which results in stopping the outdoor unit operation immediately.

Exceptional compressor speed control

Forced minimum compressor speed operation

When the compressor starts, the request frequency is set at minimum for certain period. The period can be set in Menu 9.6.5.

The control is cancelled when (1) the set time has elapsed, or (2) DM value gets significantly high.

Hot water operation control

Hot water operation is prioritized over heating and cooling.

ON/OFF control

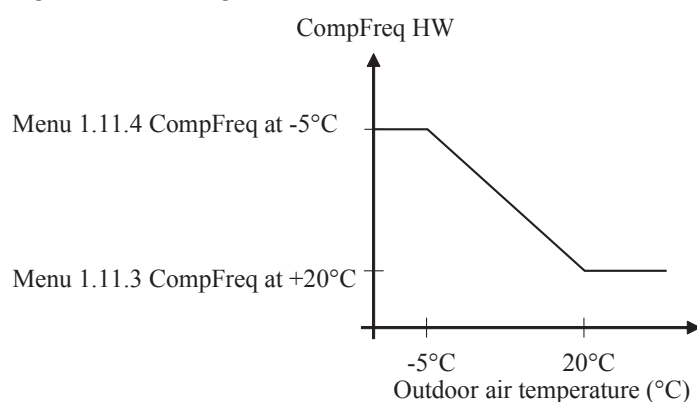
Regardless of the DM value, hot water operation when tank water temperature (BT6) lowers below Start temp HW in Menu 1.2. It finishes when the tank water temperature reaches Stop temp HW in Menu 1.3.

In case there are demands for both hot water and heating/cooling, there is a case that the operation finishes although the tank temperature doesn't reach the threshold. For details, see Hot water operation during alternating mode

Pump speed is controlled so that higher temperature water can be returned to the tank.

Compressor speed control

During the hot water operation, compressor speed is controlled according to the map linked with the outdoor air temperature. The map can be changed with the setting in Menu 1.11.3 and 1.11.4



Hot water operation during alternating mode

When there are demands for both hot water and heating, the operation is switched between heating state and hot water state in order to cover both demands.

Operation time ratio between heating state and hot water state can be set in Menu 8.5.1 (Period time) and 8.5.2 (Max time for HW).

Menu 8.5.2 shows the operation duration for hot water and the rest of the time Menu 8.5.1-8.5.2 is for heating.

As long as both heating and hot water demands remain, in other words the conditions to finish both operations are not fulfilled, both operations appear in turn according to the duration of which is set in the menu.

If either condition to finish heating or hot water operation is fulfilled, another operation will be done thereafter unless both demands come up again.

Hot water operation during cooling mode

There are two different ways to produce hot water during cooling and it can be chosen by the setting of electric heater use in Menu 8.2.1 (Allow add. heat).

If the electric heater is allowed to use (Cool or Heat+Cool in setting), hot water production is done by electric heater.

If it is not allowed (Off or Heat in setting), hot water production is done by the outdoor unit.

Defrost operation

When frost accumulates on the surface of the outdoor heat exchanger, defrost operation starts to remove it.

For detailed operation condition, see outdoor unit control.

During defrost operation, indoor unit operates as follows in order to extract heat from the heating system;

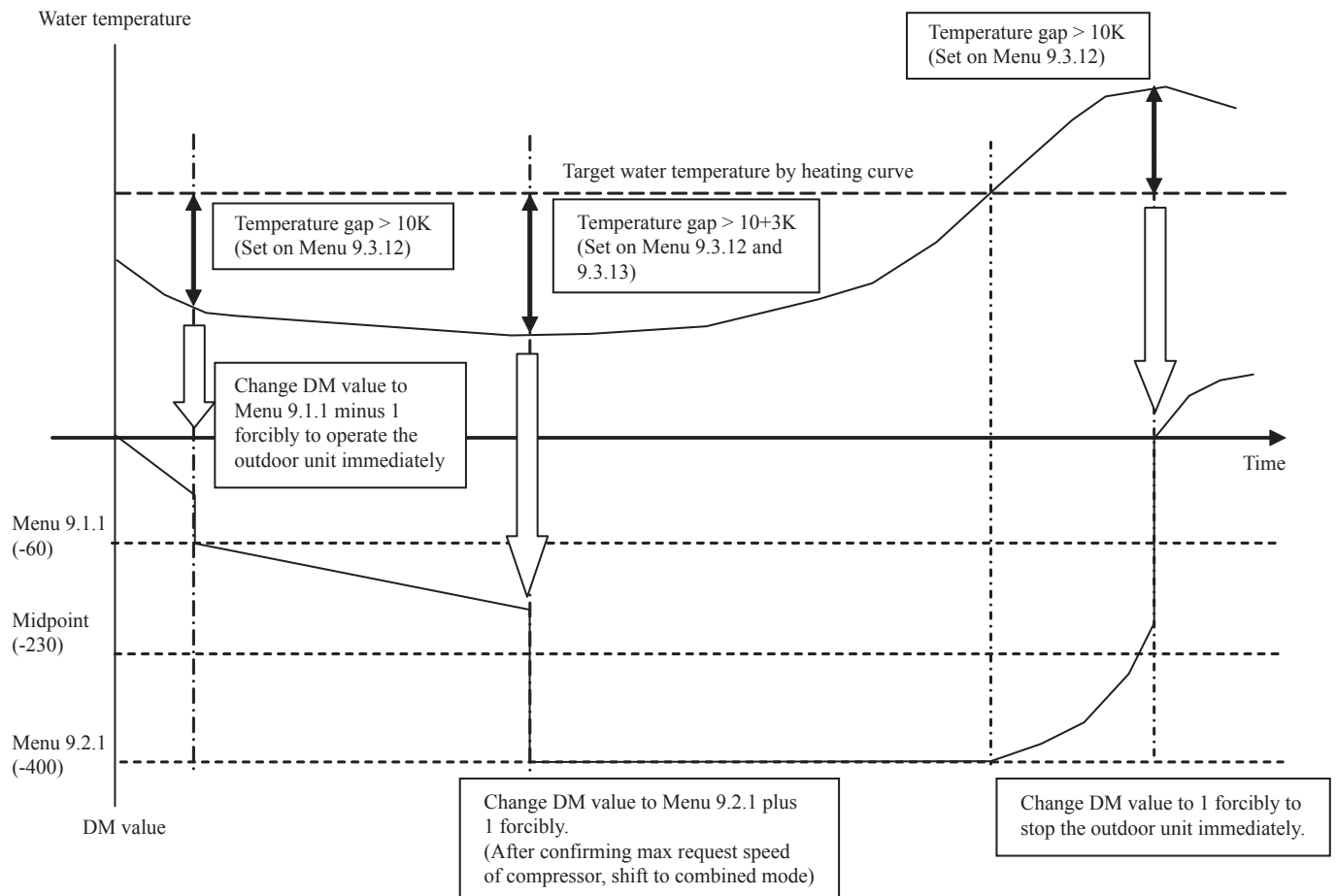
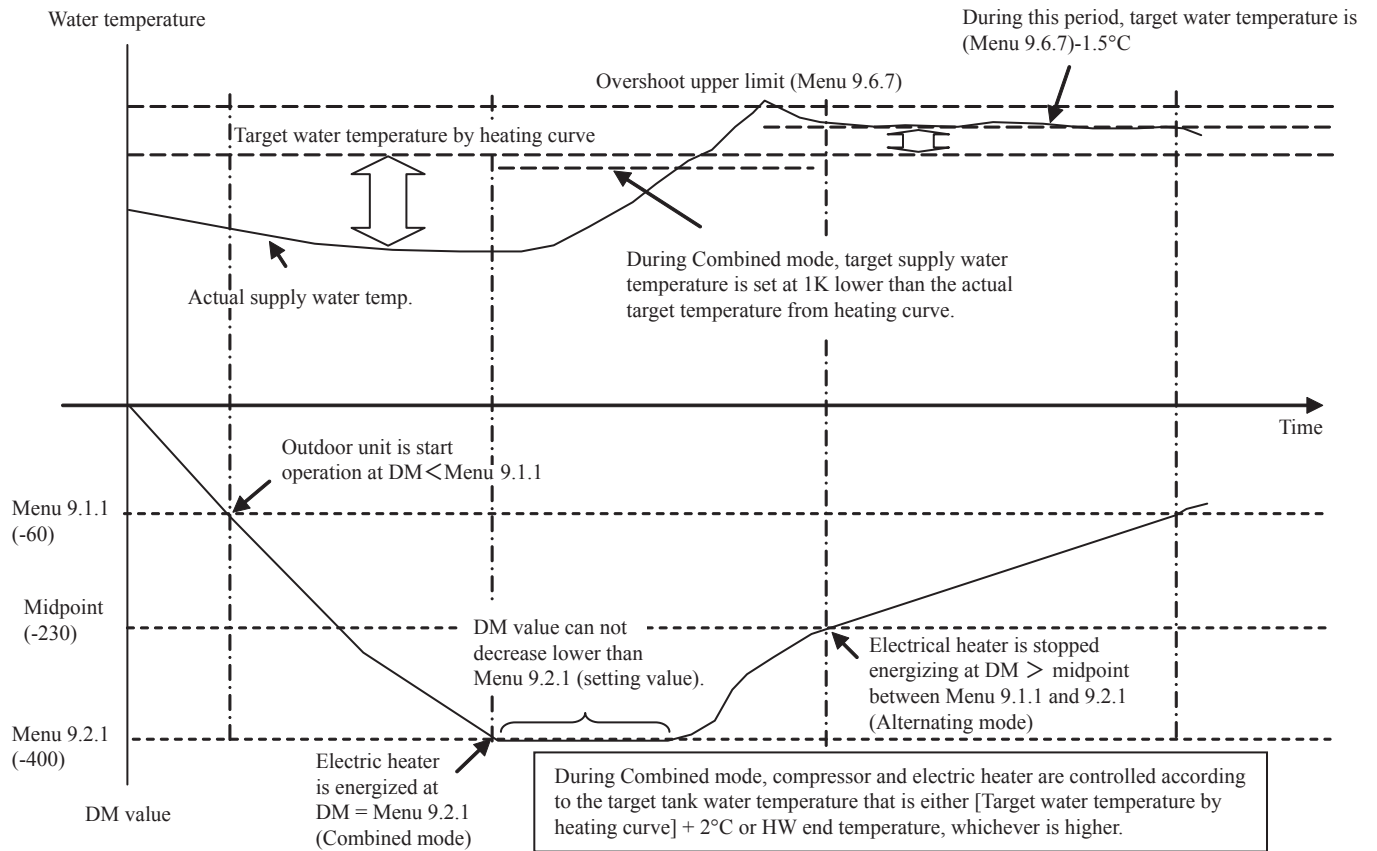
- Shunt valve QN11 and ball valve QM 30 and 31 are towards heating system.
- Circulation pump GP1 keeps operating

In case the return water temperature (BT3) does not reach the threshold value defined in Menu 9.1.12, the ball valves QM30 and 31 switch towards hot water to extract heat from the tank.

Still the return water temperature is lower than the threshold, electric heater starts energized.

Operation control function by the indoor unit control

Timing chart of DM value and supply water temperature



Protection control

Current protection

1) Maximum current limit control for the outdoor unit (by indoor unit control)

When the operation current of the outdoor unit comes close to the limit, request compressor speed is retained in order to keep the current.

If the current exceeds the threshold set in Menu 9.1.10, request compressor speed is reduced.

2) Maximum current limit control for electric heater or other heat source

This function is available for 3phase connection only.

If the current on L1 or L2 exceeds the limit, heater output is reduced once every 5 seconds until the current drops to the normal level.

If the current on L3 exceeds the limit, compressor speed is reduced by 6rps every 30 seconds until the current drops to the normal level.

Freeze protection of water heat exchanger

This function can be activated on Menu 9.3.17

(1) In cooling mode

Compressor speed is kept when the low pressure (BP4) reaches 0.75 MPa, and stopped when it reaches 0.65 MPa for 20 seconds. Operation is automatically restarted when it reaches 0.83 MPa and the supply water temperature becomes 14°C or higher, but it will permanently stop if the protection is activated for 3 times within an hour.

(2) In defrosting mode

Compressor stops when the low pressure (BP4) reaches threshold value depending on water temperature.

After stopping, the system automatically restarts with heating mode but the period to prohibit defrost is reduced to 15 minutes.

When the above action is repeated for 10 times, the system stops and error code is displayed.

Low condenser out

Compressor stops when the supply temperature (BT12) becomes below 5°C and it automatically restarts when the supply temperature (BT12) becomes above 14°C.

Operation control function by the outdoor unit control

Determination of compressor speed (frequency)

- 1) Maximum and minimum frequency under normal operating conditions

(rps)

| Model | FDCW71VNX | | FDCW100VNX | | FDCW140VNX | |
|-------------------|-----------|---------|------------|---------|------------|---------|
| Operation mode | Cooling | Heating | Cooling | Heating | Cooling | Heating |
| Maximum frequency | 86 | 118 | 80 | 85 | 77 | 120 |
| Mimumum frequency | 20 | 20 | 20 | 25 | 20 | 20 |

- 2) Maximum required frequency under high outdoor air temperature condition

Maximum required frequency is limited according to the outdoor air temperature (Tho-A)

(rps)

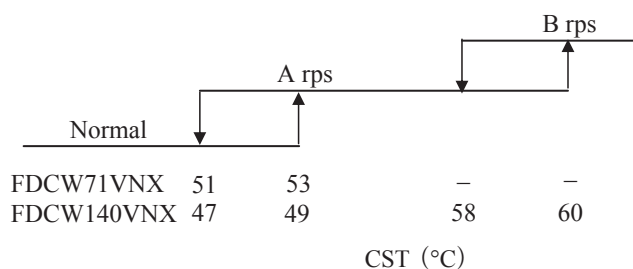
| Model | FDCW71VNX | FDCW100VNX | FDCW140VNX |
|--------------|-------------------------------|------------|------------|
| Cooling mode | $40 < Tho-A \leq 46^{\circ}C$ | 67 | 75 |
| | $46^{\circ}C < Tho-A$ | 60 | 70 |
| Heating mode | $-2 < Tho-A \leq 18^{\circ}C$ | 81 | 85 |
| | $18^{\circ}C < Tho-A$ | 74 | 60 |

- 3) Maximum frequency under high condensing saturated temperature (CST) in heating mode.

Maximum frequency is limited according to the condensing saturated temperature.

(rps)

| Model | FDCW71VNX | FDCW100VNX | FDCW140VNX |
|--------------|-----------|------------|------------|
| Heating mode | A rps | 100 | 100 |
| | B rps | — | 95 |



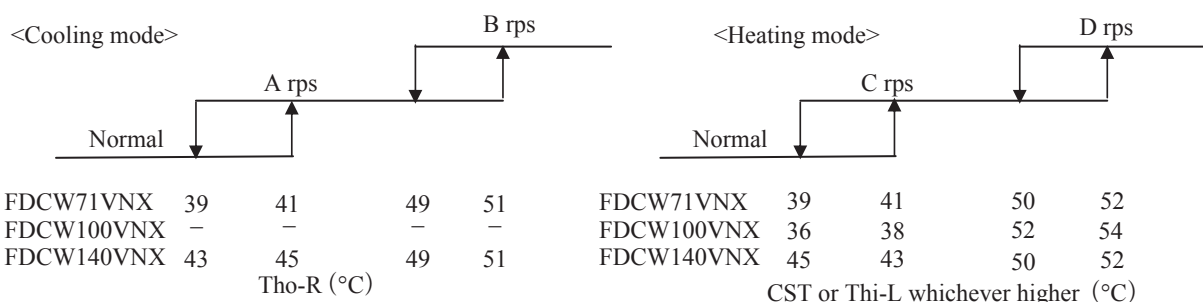
- 4) Minimum required frequency under high condensing saturated temperature condition.

According to the outdoor heat exchanger temperature (Tho-R), minimum required frequency in cooling mode is changed as per A or B in below table.

And according to the condensing saturated temperature (CST) detected by indoor unit pressure sensor (BP4) or liquid pipe temperature (Thi-L) detected by indoor unit temperature sensor (BT15), whichever is higher, minimum required frequency in heating mode is changed as per C or D in below table.

(rps)

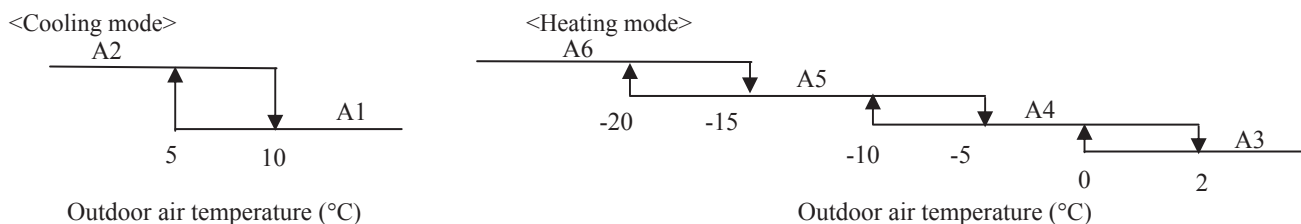
| Model | FDCW71VNX | FDCW100VNX | FDCW140VNX |
|--------------|-----------|------------|------------|
| Cooling mode | A rps | 30 | 30 |
| | B rps | 40 | 40 |
| Heating mode | C rps | 30 | 25 |
| | D rps | 40 | 35 |



Operation control function by the outdoor unit control

- 5) Minimum required frequency adjustment under outdoor air temperature (Tho-A) condition
According to the outdoor air temperature, minimum required frequency is offset by as per below table.

| Model | | FDCW71VNX | FDCW100VNX | FDCW140VNX |
|--------------|----|-----------|------------|------------|
| Cooling mode | A1 | 0 | | |
| | A2 | +15 | | |
| Heating mode | A3 | 0 | 0 | 0 |
| | A4 | 0 | +10 | +5 |
| | A5 | +10 | +20 | +15 |
| | A6 | +20 | +30 | +25 |



- 6) When any of the controls from 1) - 5) above may duplicate, whichever the smallest value among duplicated controls is taken as the maximum required frequency, and whichever the biggest value is taken as the minimum required frequency.

Compressor start control

- Compressor starts upon receipt of the thermostat ON signal from the indoor unit
- However, at initial start-up after turning the power circuit breaker on, the compressor may enter the standby state for maximum 30 minutes in order to prevent from dry-up of oil in the compressor.

Compressor soft start control

- Compressor protection start I
[Control condition] Normally, the compressor operation frequency is raised in following start pattern.
[Control contents]
 - It starts the compressor at 55 rps as target frequency.
 - Compressor speed acceleration finishes when the pressure difference becomes bigger than 0.34MPa in heating or when the low pressure reaches 0.8MPa in cooling.
 - At 30 seconds after starting compressor, the target frequency changes to **A** rps and compressor is kept operation at **A** rps as fixed frequency for **B** minutes.

| Model | Operation Mode | A rps | B min |
|------------|----------------|-------|-------|
| FDCW71VNX | Cooling | 20 | 4 |
| | Heating | 40 | 4 |
| FDCW100VNX | Cooling | 20 | 4 |
| | Heating | 55 | 2 |
| FDCW140VNX | Cooling | 20 | 4 |
| | Heating | 40 | 4 |

- Compressor protection start II
[Control condition] The initial start-up of compressor after turning the power supply ON
[Control contents] According to the operation mode and the outdoor air temperature (Tho-A), the outdoor unit starts the compressor with the following control.
 - It starts the compressor at 55 rps as target frequency.
 - Compressor acceleration finishes, when pressure difference becomes bigger than 0.34MPa in heating or the low pressure becomes 0.8MPa in cooling.
 - At 30 seconds after starting compressor, the target frequency changes to **A** rps and the compressor is kept operation at **A** rps as fixed frequency for **B** minutes.

Operation control function by the outdoor unit control

| Model | Operation Mode | A rps | B min |
|------------|----------------|-------|-------|
| FDCW71VNX | Cooling | 20 | 10 |
| FDCW100VNX | Cooling | 30 | 10 |
| FDCW140VNX | Cooling | 20 | 10 |

3) Compressor protection start III

[Control condition] In case all of the following conditions are fulfilled

- a) Restarting the compressor in heating mode after 2 hours or longer stop of compressor.
- b) The outdoor air temperature at restart is lower than 0°C.

[Control contents]

- a) It starts the compressor at 55rps as target frequency.
- b) Compressor acceleration finishes, when pressure difference becomes bigger than 0.34MPa
- c) At 30 seconds after starting compressor, the target frequency changes to **A** rps and the compressor is kept operation at **A** rps as fixed frequency for **B** minutes

| Model | Operation Mode | A rps | B min |
|------------|----------------|-------|-------|
| FDCW71VNX | Heating | 40 | 15 |
| FDCW100VNX | Heating | 40 | 15 |
| FDCW140VNX | Heating | 40 | 15 |

Outdoor fan control

1) Outdoor fan speed

a) Upper limit

According to the relation between the heat exchanger temperature and outdoor air temperature, maximum fan speed is limited as follows.

i) Cooling

FDCW71VNX

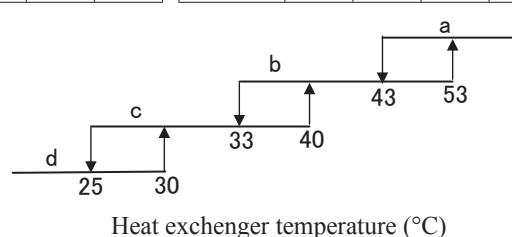
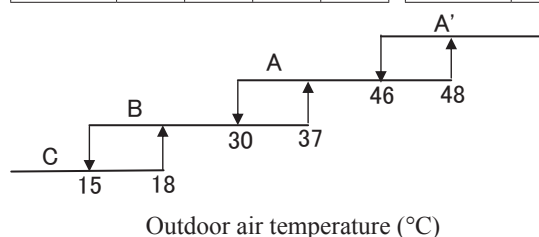
| | | (rpm) | | | |
|---------------|-----|-------|-----|-----|--|
| Tho-A \ Tho-R | A' | A | B | C | |
| a | 850 | 850 | 850 | 710 | |
| b | 850 | 850 | 710 | 600 | |
| c | 710 | 710 | 600 | 400 | |
| d | 600 | 600 | 400 | 200 | |

FDCW100VNX

| | | (rpm) | | | |
|---------------|-----|-------|-----|-----|--|
| Tho-A \ Tho-R | A' | A | B | C | |
| a | 820 | 820 | 820 | 740 | |
| b | 820 | 820 | 740 | 600 | |
| c | 740 | 740 | 600 | 350 | |
| d | 600 | 600 | 350 | 200 | |

FDCW140VNX

| | | (rpm) | | | |
|---------------|-----|-------|-----|-----|--|
| Tho-A \ Tho-R | A' | A | B | C | |
| a | 745 | 745 | 745 | 640 | |
| b | 745 | 745 | 640 | 560 | |
| c | 640 | 640 | 560 | 370 | |
| d | 560 | 560 | 370 | 200 | |



ii) Heating

FDCW71VNX

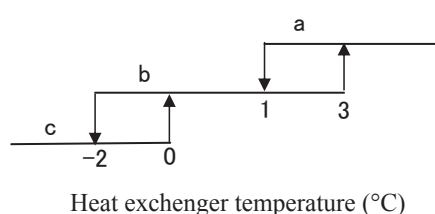
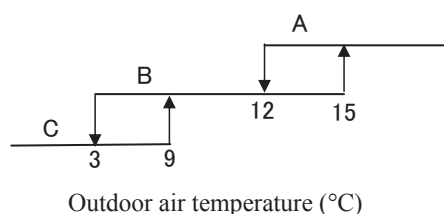
| | | (rpm) | | |
|---------------|-----|-------|-----|--|
| Tho-A \ Tho-R | A' | A | B | |
| a | 850 | 850 | 850 | |
| b | 850 | 850 | 710 | |
| c | 710 | 710 | 600 | |

FDCW100VNX

| | | (rpm) | | |
|---------------|-----|-------|-----|--|
| Tho-A \ Tho-R | A' | A | B | |
| a | 600 | 600 | 740 | |
| b | 600 | 740 | 820 | |
| c | 740 | 820 | 870 | |

FDCW140VNX

| | | (rpm) | | |
|---------------|-----|-------|-----|--|
| Tho-A \ Tho-R | A' | A | B | |
| a | 850 | 850 | 850 | |
| b | 850 | 850 | 710 | |
| c | 710 | 710 | 600 | |



Operation control function by the outdoor unit control

b) Lower limit

| Model | Operation Mode | Min.rpm |
|------------|----------------|---------|
| FDCW71VNX | Cooling | 130 |
| | Heating | 390 |
| FDCW100VNX | Cooling | 130 |
| | Heating | 390 |
| FDCW140VNX | Cooling | 130 |
| | Heating | 370 |

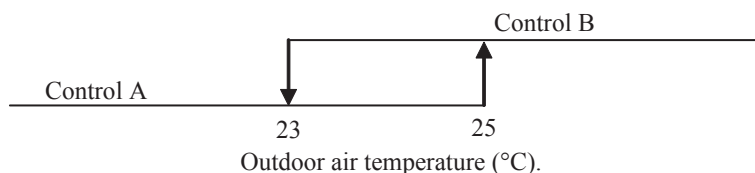
2) Fan speed control during cooling operation

Fan speed is controlled every 15 seconds according to the outdoor heat exchanger temperature (Tho-R1,-R2), whichever the higher.

| Tho-R | Fan speed |
|----------------------------------|---------------------|
| Less than 30°C | Reduced by 10 rpm |
| 30°C or higher but 45°C or lower | Retained |
| Higher than 45°C | Increased by 10 rpm |

3) Fan speed control during heating operation

According to the outdoor air temperature (Tho-A), fan speed control is switched between A and B.



[Control A]

Fan speed is controlled every 15 seconds according to the difference between the outdoor air temperature (Tho-A) and the outdoor heat exchanger temperature (Tho-R1,-R2), whichever the higher.

| (Tho-A)-(Tho-R) | Fan speed |
|---------------------------------|---------------------|
| Less than 3degC | Reduced by 10 rpm |
| 3degC or more but 6degC or less | Retained |
| More than 6degC | Increased by 10 rpm |

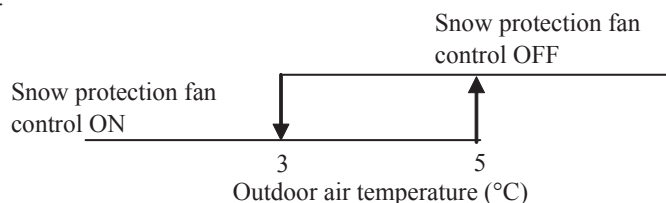
[Control B]

Fan speed is controlled every 15 seconds according to the low pressure (LPT).

| LPT | Fan speed |
|-----------------------------------|---------------------|
| More than 1.1MPa | Reduced by 10 rpm |
| 1.0MPa or more but 1.1MPa or less | Retained |
| Less than 1.0MPa | Increased by 10 rpm |

4) Snow protection fan control

If the dip switch (SW3-2) on the outdoor control PCB is turned ON, the outdoor fan is operated for 30 seconds at 740rpm once in every 10 minutes according to outdoor air temperature (Tho-A) shown in below figure in the stop mode or anomalous stop mode.



Silent mode

When outdoor unit receives silent mode signal from indoor unit, silent mode operation starts.

[Control contents]

a) Fan speed upper limits are restricted according to the following table.

| Model | Operation Mode | Max speed (rpm) |
|------------|----------------|-----------------|
| FDCW71VNX | Heating | 600 |
| FDCW100VNX | Heating | 600 |
| FDCW140VNX | Heating | 560 |

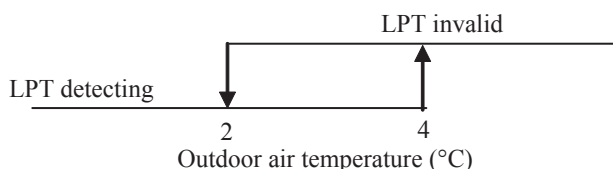
* Compressor speed limits are also restricted by indoor unit control command.

Defrosting

- 1) Defrosting start conditions
If all of the following defrosting condition A or condition B are met, the defrosting operation starts.

For model 140, SV1 is open when 4 way valve switches, and closed when low pressure keeps 0.55MPa or higher for 5 seconds or longer.

- a) Defrosting conditions A
 - i) Cumulative compressor operation time after the end of defrosting has elapsed 37 [45] minutes (15 minutes in case the previous defrost operation is forcibly finished by indoor unit protection control) and the cumulative compressor operation time after the start of heating operation has elapsed 30 minutes
 - ii) After 5 minutes from the compressor ON.
 - iii) After 5 minutes from the start of outdoor fan.
 - iv) After satisfying all above conditions, if the outdoor heat exchanger temperature (Tho-R1, Tho-R2, whichever the lower) and the outdoor air temperature (Tho-A) become lower than the defrosting start temperature as shown in Fig 4-1 for 15 seconds continuously. Or suction gas saturated temperature (SST), which is detected by the low pressure sensor (LPT), and the outdoor air temperature (Tho-A) stay for 3 minutes within the temperature range lower than the defrosting operation start temperature as shown Fig 4-2. However it is not effective during 10 minutes after the start of compressor and if the outdoor air temperature is within the range of LPT invalid as shown in below figure.



Note: Figure in [] is for model 71.

- b) Defrosting conditions B
 - i) If the previous defrosting was ended compulsorily due to the time out of defrosting operation period and cumulative compressor operation time after the end of defrosting has elapsed 30 minutes and operation mode is kept heating.
 - ii) After 5 minutes from the compressor ON.
 - iii) After 5 minutes from the start of outdoor fan.

- 2) Defrosting end conditions

When any of following conditions is satisfied, the defrosting operation is ended.

- a) When it has elapsed 8 minutes and 20 seconds after the start of defrosting. (After 10 minutes and 20 seconds for model 71)
- b) When the outdoor heat exchanger temperatures (Tho-R1, Tho-R2), whichever the lower, becomes 12°C or higher continuously for 10 seconds.

- 3) Switching of defrosting control with SW3-1

- a) If the dip switch SW3-1 on the outdoor control PCB is turned ON, it makes earlier to enter the defrosting operation. Use this function, if installing the unit in snowing region.

- b) Control contents

- i) It allows entering defrosting operation under the defrosting condition A when the cumulative heating operation time has elapsed 30 minutes. It is 37 [45] minutes at SW3-1 OFF (factory default)
- ii) It allows entering defrosting operation under the defrosting condition B when the cumulative heating operation time has elapsed 20 minutes. It is 30 minutes at SW3-1 OFF (factory default)
- iii) It allows entering defrosting operation when the outdoor heat exchanger temperature (Tho-R) and the suction pressure saturated temperature (SST) are higher than normal.

Note (1) Figure in [] is for model 71.

Model 71-140

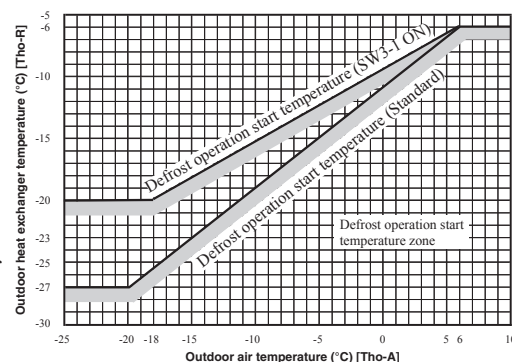


Fig 4-1

Model 71-140

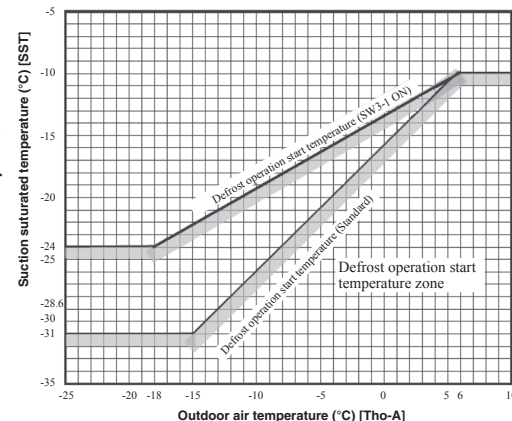


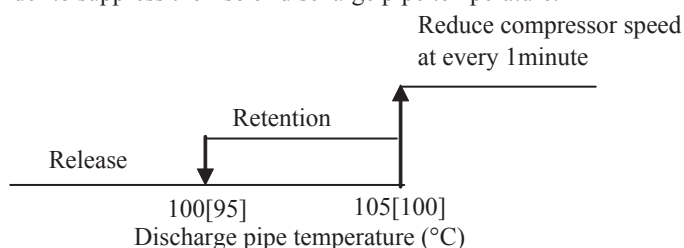
Fig 4-2

Protective control/ anomalous stop control by compressor speed (frequency)

1) Compressor discharge pipe temperature protection

a) Protective control

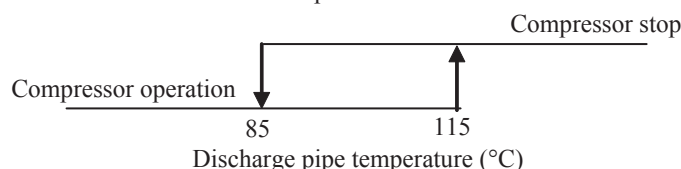
If the discharge pipe temperature (detected with Tho-D) exceed the setting value, the compressor speed (frequency) is controlled in order to suppress the rise of discharge pipe temperature.



Note (1) Figures in [] are for model 140.

b) Anomalous stop control

- i) If the discharge pipe temperature (detected with Tho-D) exceed the setting value, the compressor stops.
- ii) When the discharge pipe temperature anomaly is detected 2 times within 60 minutes or 60 minutes continuously including the time of compressor stopping, discharge pipe temperature error is displayed and E36 is recorded in Error Log and it enters the anomalous stop mode.



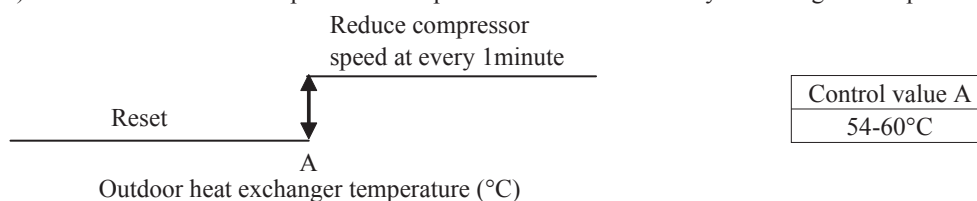
c) Reset of anomalous stop mode

When the discharge pipe temperature drops to the reset value of 85°C or lower for 45 minutes continuously, it becomes possible to restart from control.

2) Cooling high pressure protection

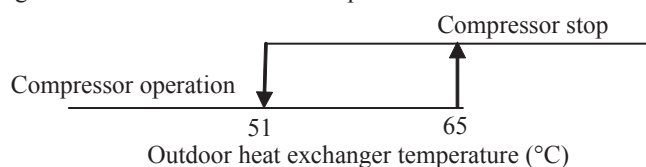
a) Protective control

- i) When the outdoor air temperature (Tho-A) is 40°C or higher and the outdoor heat exchanger temperature (Tho-R) exceeds setting value, the compressor speed (frequency) is controlled in order to suppress the rise of high pressure.
- ii) The control value A is updated to an optimum value automatically according to the operating conditions



b) Anomalous stop control

- i) If the outdoor heat exchanger temperature (Tho-R) exceeds the setting value, the compressor stops.
- ii) When the outdoor heat exchanger temperature anomaly is detected 5 times within 60 minutes, or 60 minutes continuously including the time of compressor stopping, cooling overload error is displayed and E35 is recorded in the Error Log and it enters the anomalous stop mode.



c) Reset of anomalous stop mode

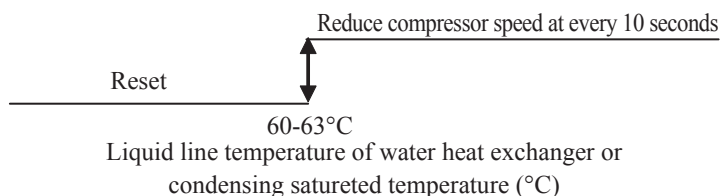
When the outdoor heat exchanger temperature drops to the reset value of 51°C or lower, it becomes possible to restart from the control.

Operation control function by the outdoor unit control

3) Heating high pressure protection

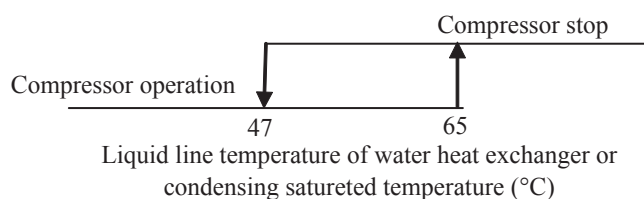
a) Protective control

- i) If the liquid line temperature of water heat exchanger (BT15=Thi-L) or the condensing saturated temperature (CST), whichever the higher, exceeds the setting value, the compressor speed (frequency) is controlled to suppress the rise of high pressure.
- ii) Control value A is updated to an optimum value automatically according to the operating conditions.



b) Anomalous stop control

If the liquid line temperature of water heat exchanger (BT15=Thi-L) or the condensing saturated temperature (CST), whichever the higher, exceeds the setting value for 2 seconds, compressor stops. The compressor automatically restarts when the temperature gets 47°C or lower.



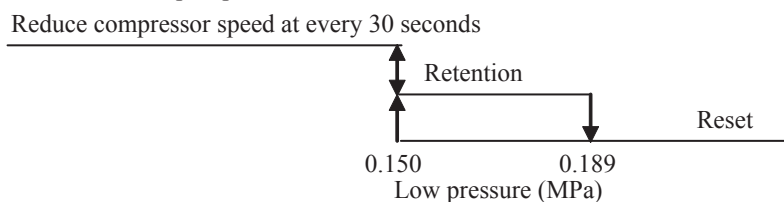
4) Anomaly detection control by the high pressure switch (63H1)

- i) If the high pressure rises and activates the high pressure switch (opens at 4.15MPa/close at 3.15MPa), the compressor stops.
- ii) Under any of following conditions, HP alarm is displayed and E40 is recorded in the Error Log, and it enters the anomalous stop mode.
 - ① When high pressure exceeds the setting value and the compressor is stopped by 63H1 5 times. within 60 minutes.
 - ② When 63H1 has been in the open state for 60 minutes continuously including the time of compressor stopping.

5) Low pressure control

a) Protective control

If the value detected by the low pressure sensor (LTP) exceeds the setting value, the compressor speed (frequency) is controlled to restrain the drop of pressure.



b) Anomalous stop control

- i) When a value detected by the low pressure sensor (LPT) satisfies any of the following conditions, compressor stops.
 - ① When the low pressure drops to 0.079MPa or lower for 15 seconds continuously.
- ii) Under any of the following conditions, LP alarm is displayed and E49 is recorded in Error Log, and it enters the anomalous stop mode.
 - ① When the low pressure drops and the compressor stops under any of above conditions 3 times within 60 minutes.
 - ② When the low pressure sensor detects 0.079MPa for 5 minutes continuously including the time of compressor stopping
 - ③ However, when the control condition ① is established during the control of the compressor protection start III, LP alarm is displayed and E49 is recorded in Error Log at the first stop of compressor and it enters the anomalous stop mode.

Operation control function by the outdoor unit control

6) Overcurrent protection

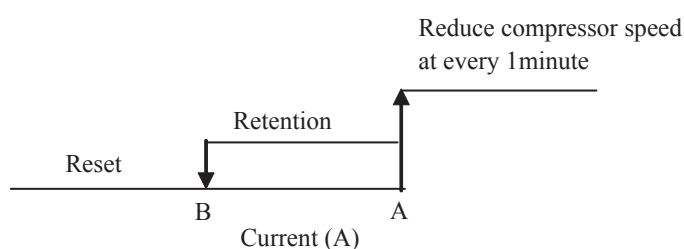
a) Current safe control I

When the inverter primary current (CT current) reaches following value, the compressor speed is reduced until it gets to the cancellation value.

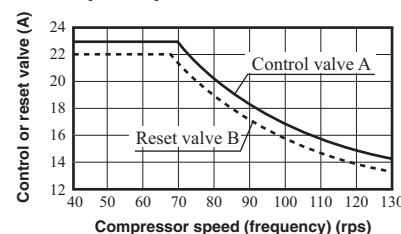
| Model | Operation Mode | Current (A) |
|------------|----------------|-------------|
| FDCW71VNX | Cooling | 15 |
| | Heating | 16 |
| FDCW100VNX | Cooling | 17 |
| | Heating | 17 |
| FDCW140VNX | Cooling | 23 |
| | Heating | 25 |

b) Current safe control II

Detecting the outdoor inverter output (secondary side) current, if the current values exceed setting values, the compressor speed (frequency) is controlled in order to protect the inverter.



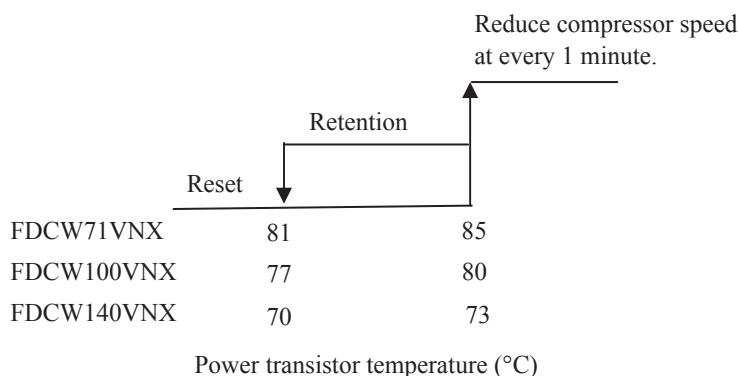
(Fig. C) The control value "A" and the reset value vary depending on the compressor speed.



| Model | Cooling | | Heating | |
|------------|-----------------|---------------|-----------------|---------------|
| | Control value A | Reset value B | Control value A | Reset value B |
| FDCW71VNX | 13 | 12 | 13 | 12 |
| FDCW100VNX | Fig -C | Fig -C | Fig -C | Fig -C |
| FDCW140VNX | | | | |

7) Power transistor temperature control (except FDCW71VNX-A /M)

This control monitors the power transistor temperature (TIP) from the start operation of compressor, and when the following condition is established, compressor speed (frequency) is controlled.



8) Anomalous power transistor current

- a) If the current value of power transistor exceeds the setting value, the compressor stops in order to prevent from overcurrent of inverter.
- b) When the current value of power transistor exceeds the specified value and compressor stops 4 times within 30 minutes, Inverter error is displayed and E42 is recorded in the Error Log. And it enters the anomalous stop mode.

9) Anomalous inverter PCB

If the power transistor detects any anomaly for 15 minutes including the time of compressor stopping, Inverter error is displayed and E51 is recorded in the Error Log, and it enters the anomalous stop mode.

Operation control function by the outdoor unit control

- 10) Anti-freeze control by the compressor frequency control
It depends on the command from indoor unit
- 11) Refrigerant amount shortage protection
Under the control of compressor protection start III during cooling operation, the following control is performed by detecting the liquid line temperature of indoor unit (BT15=Thi-L) and inlet water temperature (BT3=Twin).
[Control condition] When the state that the temperature of indoor unit water heat exchanger (Thi-R=Thi-L) does not become lower than the inlet water temperature (BT3=Twin) by 4°C or more for 1 minute continuously.
[Control contents] It judges that the flowing of refrigerant into the indoor unit is insufficient so that the compressor is stopped and insufficient refrigerant amount error is displayed and E57 is recorded in the Error Log.
- 12) Broken wire detection on temperature thermistor and low pressure sensor
- a) Outdoor heat exchanger temperature thermistor, outdoor air temperature thermistor and low pressure sensor.
If the following is detected for 5 seconds continuously within 2 minutes to 2 minutes 20 seconds after the compressor ON, the compressor stops. After a delay of 3 minutes, the compressor restarts but if the same anomaly is detected repeatedly 3 times within 40 minutes, the compressor stops with the anomalous stop mode.
- Outdoor heat exchanger temperature thermistor (Tho-R1, R2): -50°C or lower
 - Outdoor air temperature thermistor (Tho-A): -30°C or lower
 - Low pressure sensor (LPT): 0Volt or lower, or 3.49Volt or higher
- Note : During defrosting operation and for 3 minutes after the end of defrosting operation, this control is not performed.
- b) Discharge pipe temperature thermistor, suction pipe temperature thermistor
If the following is detected for 5 seconds continuously within 10 minutes to 10 minutes 20 seconds after the compressor ON, the compressor stops. After a delay of 3 minutes, the compressor restarts but if the same anomaly is detected repeatedly 3 times within 40 minutes, the compressor stops with the anomalous stop mode.
- Discharge pipe temperature thermistor (Tho-D): -10°C or lower
 - Suction pipe temperature thermistor (Tho-S): -50°C or lower
- Note : During defrosting operation and for 3 minutes after the end of defrosting operation, this control is not performed.
- 13) Fan motor error
- a) If the outdoor fan speed is detected 100rpm or lower for 30 seconds continuously under the outdoor fan control mode (with the operation command of fan speed 390rpm or higher), the compressor stops.
- b) When the outdoor fan speed drops to 100rpm or lower 5 times within 60 minutes and the compressor stops, Fan alarm is displayed and E48 is recorded in the Error Log and it enters the anomalous stop mode.
- 14) Anomalous stop by the compressor start/stop
- a) When it fails to shift to the rotor position detection operation of compressor DC motor during 5 seconds after establishing the compressor start condition, the compressor stops temporarily and restarts 3 minutes later.
- b) If it fails to shift to the rotor position detection operation again at second time, it judged the anomalous compressor start and the compressor stops. Compressor startup failure is displayed and E59 is recorded in the Error Log and it enters the anomalous stop mode.

Pump-down control

It is possible to recover the refrigerant on the piping into the outdoor unit by this function.

Pump-down operation starts when the following conditions are fulfilled.

- a) Within ten minutes since the operation mode is changed to Add heat. only mode.
- b) SW1 [SW9] on the outdoor unit PCB is pressed for 2 seconds.

[Note]

Pump-down operation doesn't start even though SW1 [SW9] is pressed for 2 seconds, if more than 10 minutes has elapsed since the mode is changed to Add heat. only.

In that case, change the mode other than Add heat. only and set again.

Note (1) Figure in [] is for model 71.

1) Control contents

- a) Close the operation valve at the liquid side, (the operation valve at gas side should be left open.)
- b) The compressor is started with the target speed (frequency) at **A rps** in cooling mode.

| Model | A rps |
|------------|-------|
| FDCW71VNX | 62 |
| FDCW100VNX | 55 |
| FDCW140VNX | 45 |

- c) Red and green lamps (LED) flash continuously on the outdoor control PCB.
- d) Each of protection and error detection controls, excluding the low pressure control, is effective.
- e) Outdoor fan is controlled as usual.
- f) Electronic expansion valve is fully opened.

2) Control ending conditions

Stop control is initiated depending on any of following conditions

- a) Low pressure of 0.087MPa or lower is detected for 5 seconds continuously.
 - i) Red LED: stays lighting, Green LED: keeps flashing
 - ii) It is possible to restart when the low pressure is 0.087MPa or higher.
 - iii) Electronic expansion valve (cooling/heating) is kept fully open.
- b) Stop by the error detection control
 - i) Red LED: keeps flashing, Green LED: keeps flashing
 - ii) Restarting is prohibited. To return to normal operation, reset the power supply.
 - iii) Electronic expansion valve (cooling/heating) is kept fully open.
- c) When cumulative operation time of compressor under the pump-down control is elapsed 5 minutes.
 - i) Red LED: stays OFF, Green LED: keeps flashing
 - ii) It is possible to pump-down again.
 - iii) Electronic expansion valve (cooling/heating) is kept fully open.

Note : After the stop of compressor, close the operation valve at the gas side.

Alarm list

Alarm with automatic reset

| Alarm No. | Alarm text on the display | Triggers alarm | Resets alarm |
|-----------|---------------------------|--|---|
| 70 | Low condenser out | When condenser supply (BT12) is less than 5°C. | When condenser supply is greater than 14°C. |
| 71 | High KF | When condenser supply is greater than 60°C and there are more than 120 seconds since shifting to the heating system. | When condenser supply is lower than 51°C. |
| 72 | Anti freeze HX | When the low pressure is less than 0.65 MPa in cooling mode. | When the low pressure is greater than 0.83 MPa or condenser out is greater than 14 degrees. |
| 73 | Freeze prot | When the outdoor temperature drops below 0°C and the operating mode does not permit heating. | When the outdoor temperature rises above 1°C. |
| 75 | Current limit | Too high current output from the house. | When the current output decreases. |
| 77 | Aborted defrost | When the low pressure is less than threshold value according to water temperature. | Defrost operation is forcibly finished and heating operation restarts automatically. |
| 78 | Min flow protection | When the temperature difference between BT12 and BT3 is bigger than predetermined value during defrost operation. | Defrost operation is forcibly finished and heating operation restarts automatically. |

Temperature limiter alarm

The following alarm blocks both outdoor unit and electric heater.

| Alarm No. | Alarm text on the display | Description | May be due to |
|-----------|---------------------------|---|--|
| 3 | TB alarm | Temperature limiter in indoor unit has tripped. | <ul style="list-style-type: none"> - The temperature limiter has tripped during transportation - High temperature in indoor unit - Blown circuit fuse - Tripped miniature circuit breaker <p>Also see the troubleshooting guide on page 159.</p> |

Indoor unit alarm

The following alarms stop the operation of indoor unit. Electric heater is activated at min permitted supply temperature.

| Alarm No. | Alarm text on the display | Description | May be due to |
|-----------|---------------------------|---|--|
| 4 | OU power failure | No voltage to the outdoor unit from indoor unit. | <ul style="list-style-type: none"> - Blown circuit fuse - Tripped miniature circuit breaker <p>Also see the troubleshooting guide on page 160.</p> |
| 5 | Low condenser out | Too low temperature out from the condenser. Occurs if alarm 70 occurs 3 times within an hour. | <ul style="list-style-type: none"> - Low temperature during cooling - Low flow during cooling <p>Also see the troubleshooting guide on page 161.</p> |
| 6 | High KF | Too high temperature out from the condenser. Occurs if alarm 71 occurs 3 times within an hour. | <ul style="list-style-type: none"> - Low flow in heating operation - Too high set temperatures <p>Also see the troubleshooting guide on page 162.</p> |
| 7 | Anti freeze HX | Anti-freeze of heat exchanger. Occurs if alarm 72 occurs 3 times within an hour. | <ul style="list-style-type: none"> - Low flow during defrost <p>Also see the troubleshooting guide on page 163.</p> |
| 14 | Aborted defrost | Occurs if alarm 70 or 77 occurs 10 times continuously during defrost operation. | <ul style="list-style-type: none"> - Refrigerant leakage - Improper installation place of outdoor unit - Insufficient water flow <p>Also see the troubleshooting guide on page 166.</p> |

| Alarm No. | Alarm text on the display | Description | May be due to |
|-----------|---------------------------|---|---|
| 16 | Aborted defrost | Occurs if alarm 78 occurs 10 times continuously during defrost operation. | - Insufficient water flow Also see the troubleshooting guide on page 166. |
| 31 | S. fault HP | Sensor fault, high pressure (BP4). | - Open-circuit or short-circuit on sensor input - Sensor does not work Also see the troubleshooting guide on page 167. |
| 32 | Sensor fault KF | Sensor fault, condensor out (BT12). | - Open-circuit or short-circuit on sensor input - Sensor does not work (see “Temperature sensor” section) Also see the troubleshooting guide on page 168. |
| 33 | S. fault Liquid line | Sensor fault, liquid line (BT15). | - Open-circuit or short-circuit on sensor input - Sensor does not work (see “Temperature sensor” section) Also see the troubleshooting guide on page 168. |

Outdoor unit alarm

| Alarm No. | Alarm text on the display | Description | May be due to |
|-----------|---------------------------|---|--|
| E5 | OU Com. error | Communication between the outdoor unit and indoor unit is not made. | - Isolator switch for outdoor unit off - Electrical noise from the other equipment. |
| E35 | High HX temp | Temperature deviation on the hot gas sensor (Tho-R1/R2) five times within 60 minutes or under 60 minutes. | - Sensor does not work (see “Temperature sensor” section) - Insufficient air circulation or blocked heat exchanger - Defective control PCB in outdoor unit - Too much refrigerant Also see the troubleshooting guide on page 169. |
| E36 | Permanent Hotgas | Temperature deviation on the hot gas sensor (Tho-D) two times within 60 minutes or under 60 minutes. | - Sensor does not work (see “Temperature sensor” section) - Blocked filter - Insufficient air circulation or blocked heat exchanger - If the fault persists during cooling, there may be an insufficient amount of refrigerant. - Defective control PCB in outdoor unit Also see the troubleshooting guide on page 170. |
| E37 | S. fault Tho-R | Sensor fault, heat exchanger in outdoor unit (Tho-R). | - Open-circuit or short-circuit on sensor input - Sensor does not work (see “Temperature sensor” section) - Defective control PCB in outdoor unit Also see the troubleshooting guide on page 171. |
| E38 | S. fault Tho-A | Sensor fault, outdoor air sensor in outdoor unit (Tho-A). | - Open-circuit or short-circuit on sensor input - Sensor does not work (see “Temperature sensor” section) - Defective control PCB in outdoor unit Also see the troubleshooting guide on page 172. |

| Alarm No. | Alarm text on the display | Description | May be due to |
|-----------|---------------------------|--|--|
| E39 | S. fault Tho-D | Sensor fault, hot gas in outdoor unit (Tho-D). | <ul style="list-style-type: none"> - Open-circuit or short-circuit on sensor input - Sensor does not work (see “Temperature sensor” section) - Defective control PCB in outdoor unit <p>Also see the troubleshooting guide on page 173.</p> |
| E40 | HP alarm | The high pressure switch (63H1) is activated 5 times within 60 minutes or under 60 minutes continuously. | <ul style="list-style-type: none"> - Insufficient air circulation or blocked heat exchanger - Open circuit or short circuit on input for high pressure sensor (63H1) - Defective high pressure sensor - Expansion valve not correctly connected - Service valve closed - Defective control PCB in outdoor unit - Low or no flow during heating operation - Defective circulation pump <p>Also see the troubleshooting guide on page 174.</p> |
| E42 | Inverter error | Voltage from the inverter outside the parameters four times within 30 minutes. | <ul style="list-style-type: none"> - Incoming power supply interference - Service valve closed - Insufficient amount of refrigerant - Compressor fault - Defective inverter PCB in outdoor unit <p>Also see the troubleshooting guide on page 175.</p> |
| E45 | Inverter error | Communication between PCB for inverter and control PCB broken. | <ul style="list-style-type: none"> - Open-circuit in connection between PCBs - Defective fan motor - Defective inverter PCB in outdoor unit - Defective control PCB in outdoor unit <p>Also see the troubleshooting guide on page 176.</p> |
| E47 | Inverter error | Inverter A/F module over current | <ul style="list-style-type: none"> - Instantaneous power failure <p>Also see the troubleshooting guide on page 177.</p> |
| E47 | Inverter error | Inverter A/F module anomaly (FDCW71VNX-A /M~) | <ul style="list-style-type: none"> - Instantaneous power failure <p>Also see the troubleshooting guide on page 177-1.</p> |
| E48 | Fan alarm | Deviations in the fan speed in outdoor unit. | <ul style="list-style-type: none"> - The fan must not rotate freely - Defective control PCB in outdoor unit - Defective fan motor - Control PCB in outdoor unit dirty - Fuse (F2) blown <p>Also see the troubleshooting guide on page 178.</p> |
| E49 | LP alarm | Too low value on the low pressure sensor 3times within 60 minutes. | <ul style="list-style-type: none"> - Open circuit or short circuit on input for low pressure sensor - Defective low pressure sensor - Defective control PCB in outdoor unit - Open circuit or short circuit on input for suction gas sensor (Tho-S) - Defective suction gas sensor (Tho-S) <p>Also see the troubleshooting guide on page 179.</p> |

| Alarm No. | Alarm text on the display | Description | May be due to |
|-----------|---------------------------|--|---|
| E51 (E41) | Inverter error | Continuous deviation on power transistor for 15 minutes. | <ul style="list-style-type: none"> - Defective fan motor - Defective inverter PCB in outdoor unit - Defective control PCB in outdoor unit Also see the troubleshooting guide on page 181. |
| E53 | S. fault Tho-S | Sensor fault, suction gas in outdoor unit (Tho-S). | <ul style="list-style-type: none"> - Open-circuit or short-circuit on sensor input - Sensor does not work (see “Temperature sensor” section) - Defective control PCB in outdoor unit Also see the troubleshooting guide on page 182. |
| E54 | S. fault LPT | Sensor fault, low pressure sensor in outdoor unit. | <ul style="list-style-type: none"> - Open-circuit or short-circuit on sensor input - Sensor does not work (see “Temperature sensor” section) - Defective control PCB in outdoor unit - Fault in the refrigerant circuit Also see the troubleshooting guide on page 183. |
| E57 | Low refrigerant | Insufficient refrigerant is detected at initial startup in cooling mode. | <ul style="list-style-type: none"> - Service valve closed - Loose connection of sensor (BT15 or BT3) - Defective sensor (BT15 or BT3) - Insufficient amount of refrigerant Also see the trouble shooting guide on page 184. |
| E59 | Inverter error | Compressor fails to startup for 14 times (7 patterns × 2 times) | <ul style="list-style-type: none"> - Defective outdoor fan motor - Defective inverter PCB in outdoor unit - Compressor fault - Incoming power supply interference Also see the trouble shooting guide on page 185. |

Hot water alarm

The following alarms block hot water production via outdoor unit. The additional heat source is blocked completely.

| Alarm No. | Alarm text on the display | Description | May be due to |
|-----------|---------------------------|---|---|
| 8 | High HW temp. | Too high temperature (>90°C) on hot water sensor (BT6). | - Contactor to internal electric heater defective - Incorrect external heat source setting Also see the troubleshooting guide on page 164 |
| 9 | High AH temp. | Too high temperature (>90°C) on immersion heater sensor (BT19). | - Contactor to internal electric heater defective - Incorrect external heat source setting Also see the troubleshooting guide on page 164. |
| 34 | S. fault HW | Sensor fault, hot water (BT6). | - Open-circuit or short-circuit on sensor input - Sensor does not work (see "Temperature sensor" section) Also see the troubleshooting guide on page 168. |
| 35 | S. fault AH | Sensor fault, immersion heater (BT19). | - Open-circuit or short-circuit on sensor input - Sensor does not work (see "Temperature sensor" section) Also see the troubleshooting guide on page 168. |

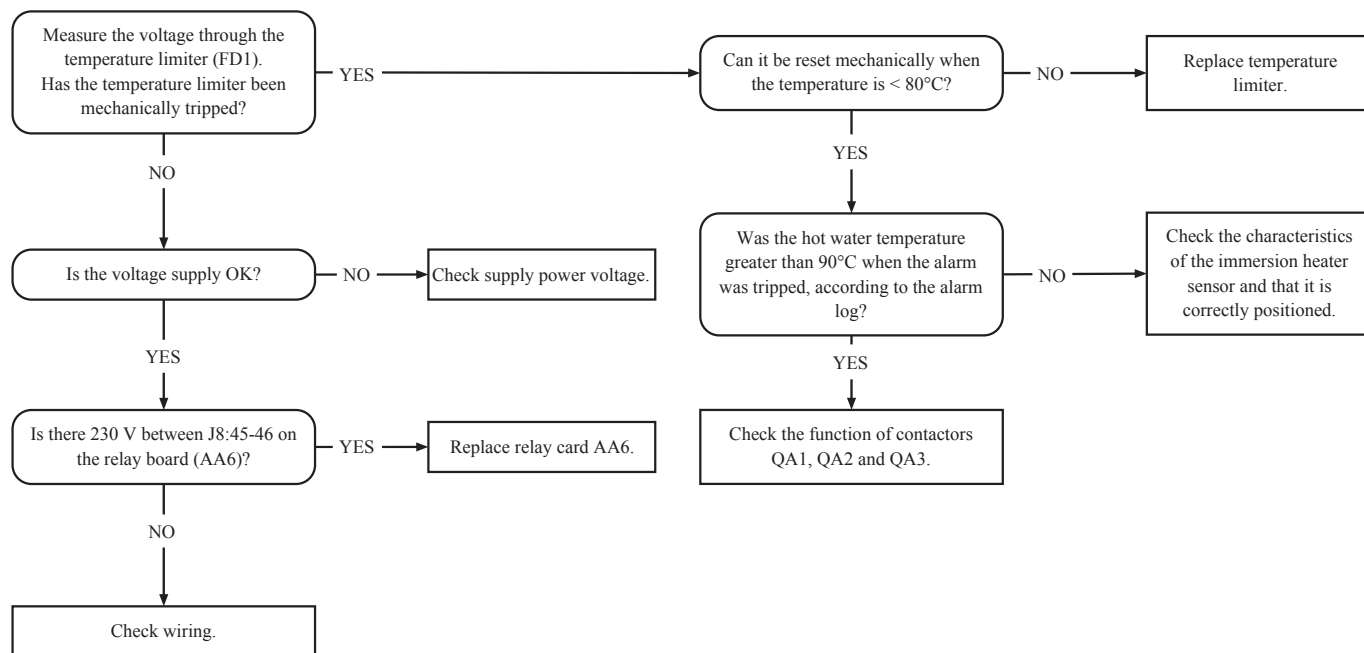
Supply alarm

The following alarms switch off heating/cooling. Only hot water production is permitted.

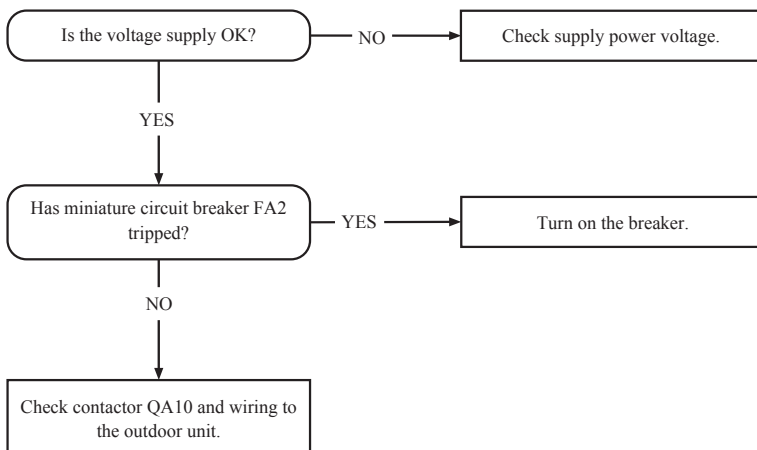
| Alarm No. | Alarm text on the display | Description | May be due to |
|-----------|---------------------------|---|---|
| 10 | High VBF1 | Too high temperature (>90°C) on flow line sensor, system 1 (BT2). | - Sensor does not work (see "Temperature sensor" section) Also see the troubleshooting guide on page 165. |
| 11 | High VBF2 | Too high temperature (>90°C) on flow line sensor, system 2. | - Sensor does not work (see "Temperature sensor" section) Also see the troubleshooting guide on page 165. |
| 30 | Sensor fault UG | Sensor fault, outdoor temperature (BT1). | - Open-circuit or short-circuit on sensor input - Sensor does not work (see "Temperature sensor" section) Also see the troubleshooting guide on page 168. |
| 36 | Sensor fault VBF1 | Sensor fault, supply, system1 (BT2). | - Open-circuit or short-circuit on sensor input - Sensor does not work (see "Temperature sensor" section) Also see the troubleshooting guide on page 168. |
| 37 | Sensor fault VBF2 | Sensor fault, supply, system 2. | - Open-circuit or short-circuit on sensor input - Sensor does not work (see "Temperature sensor" section) Also see the troubleshooting guide on page 168. |

Troubleshooting guide

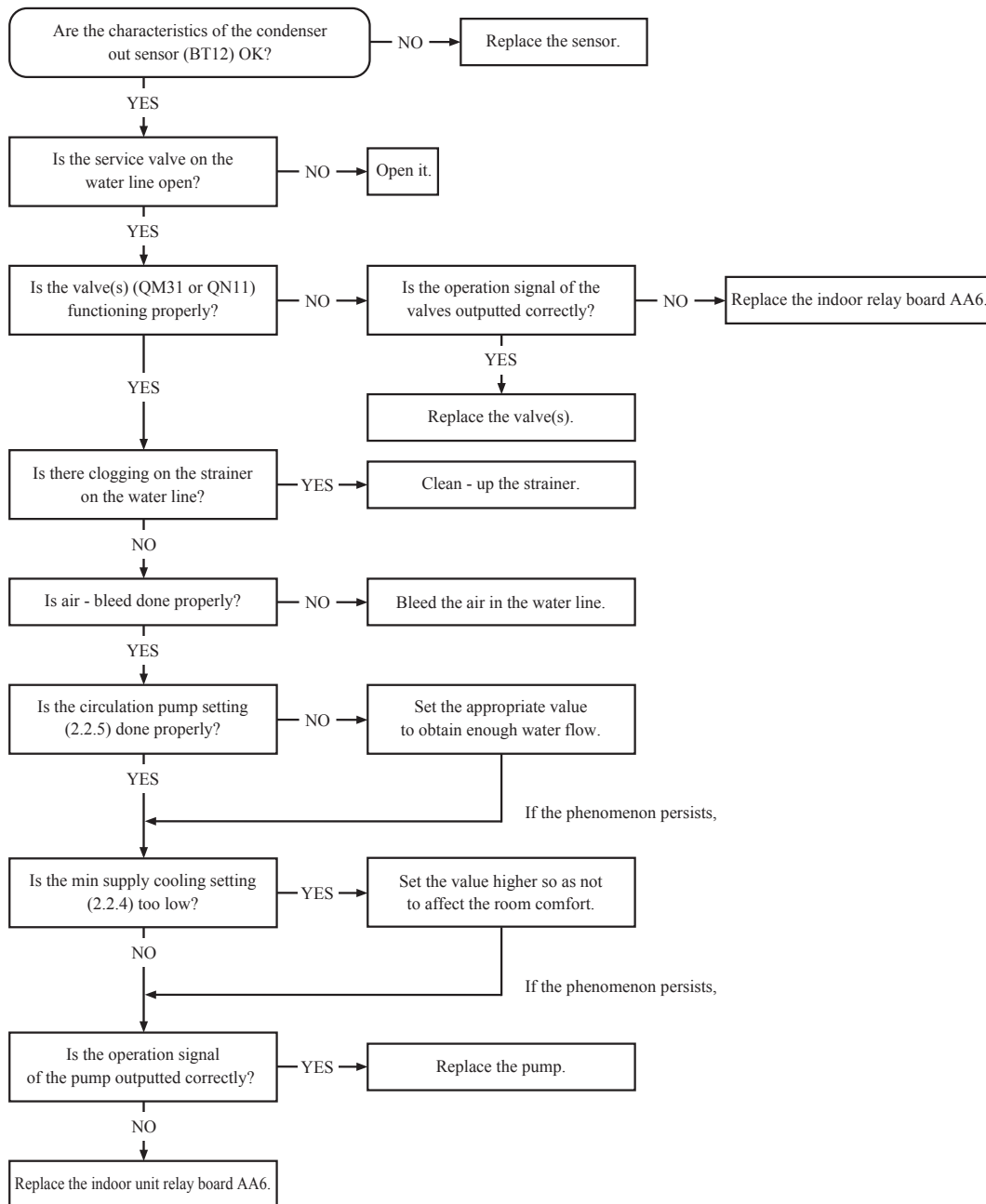
3 - Thermal cutout



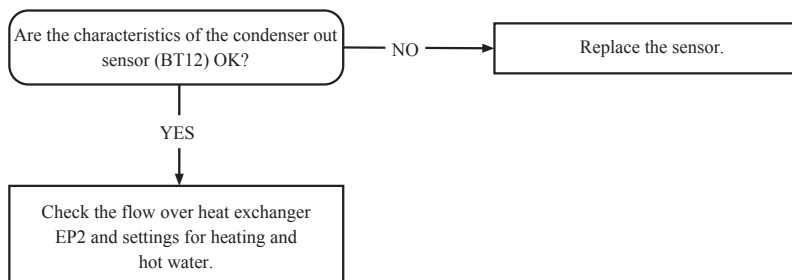
4 - OU power failure



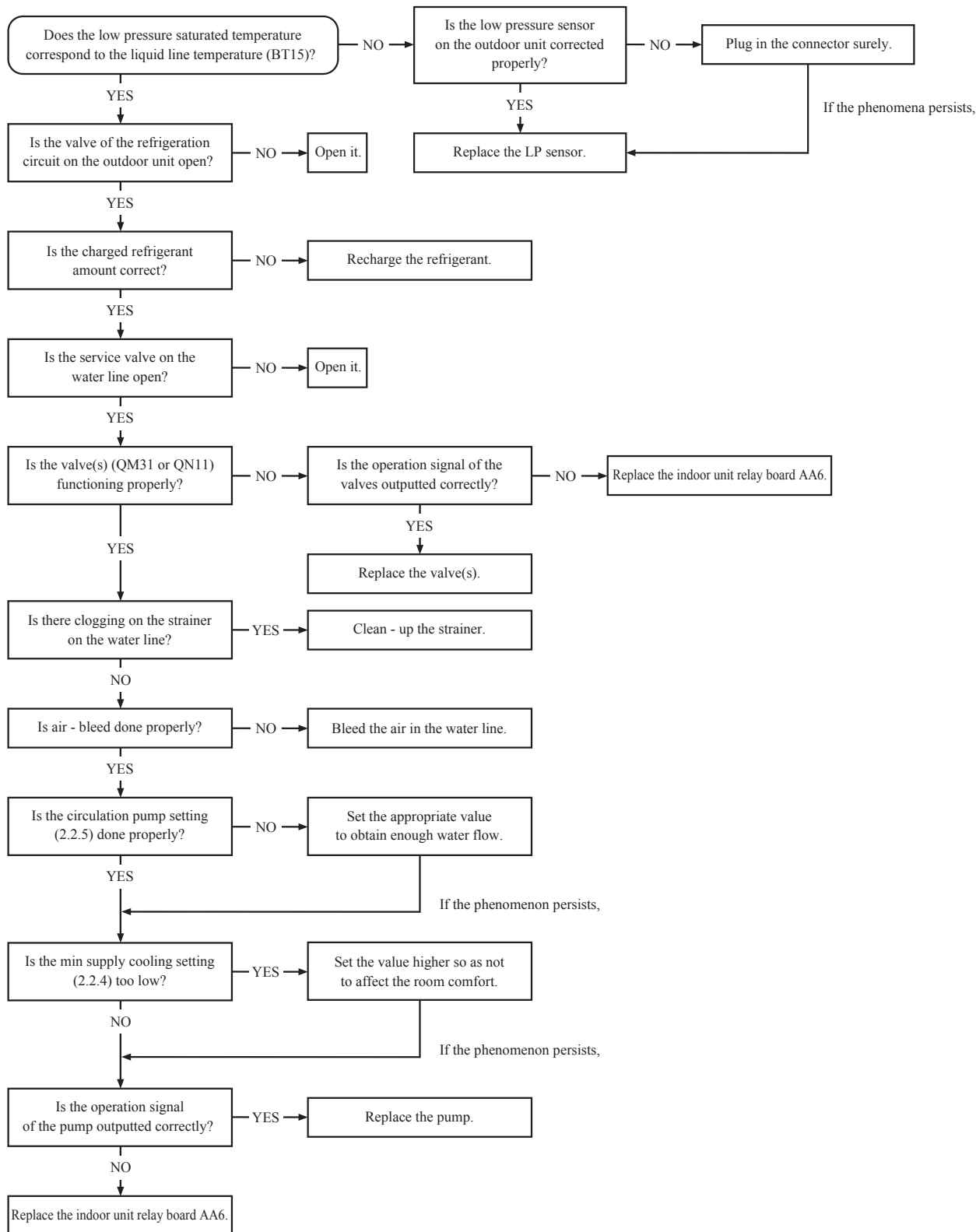
5 - Low condenser out



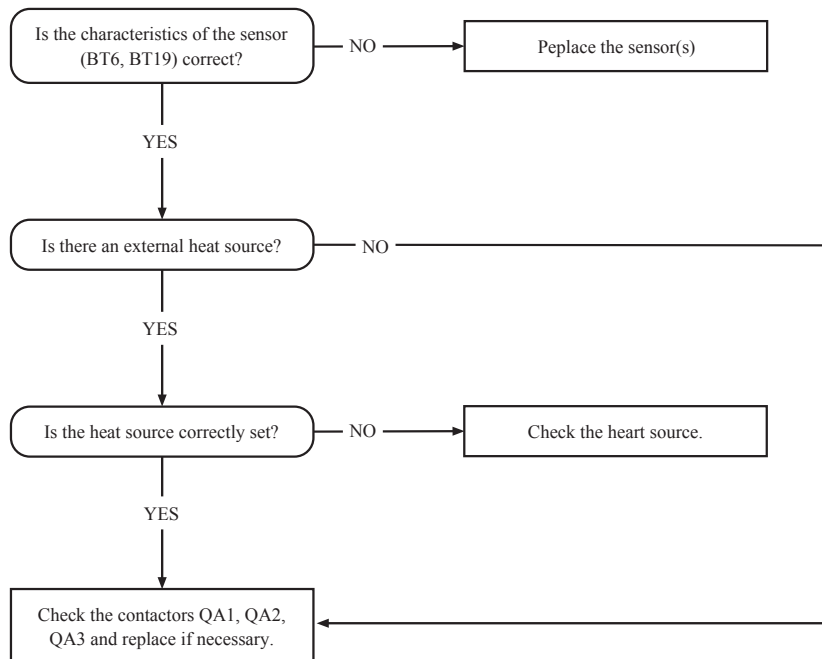
6 - High condenser out



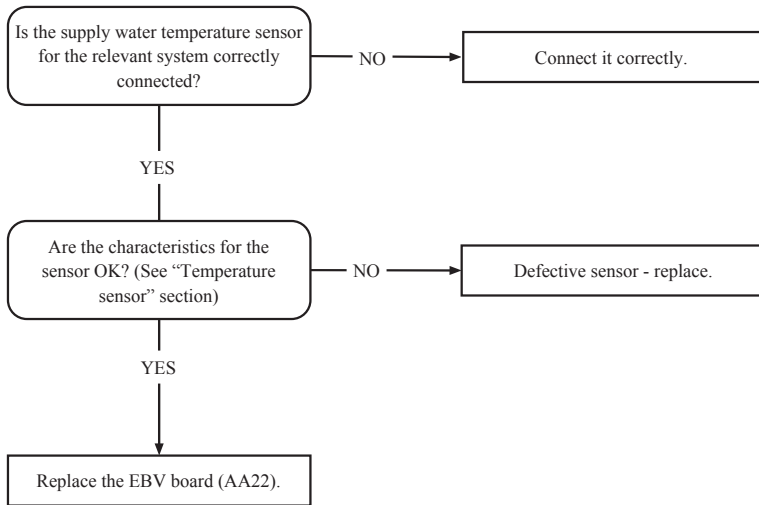
7 - Anti freeze HX



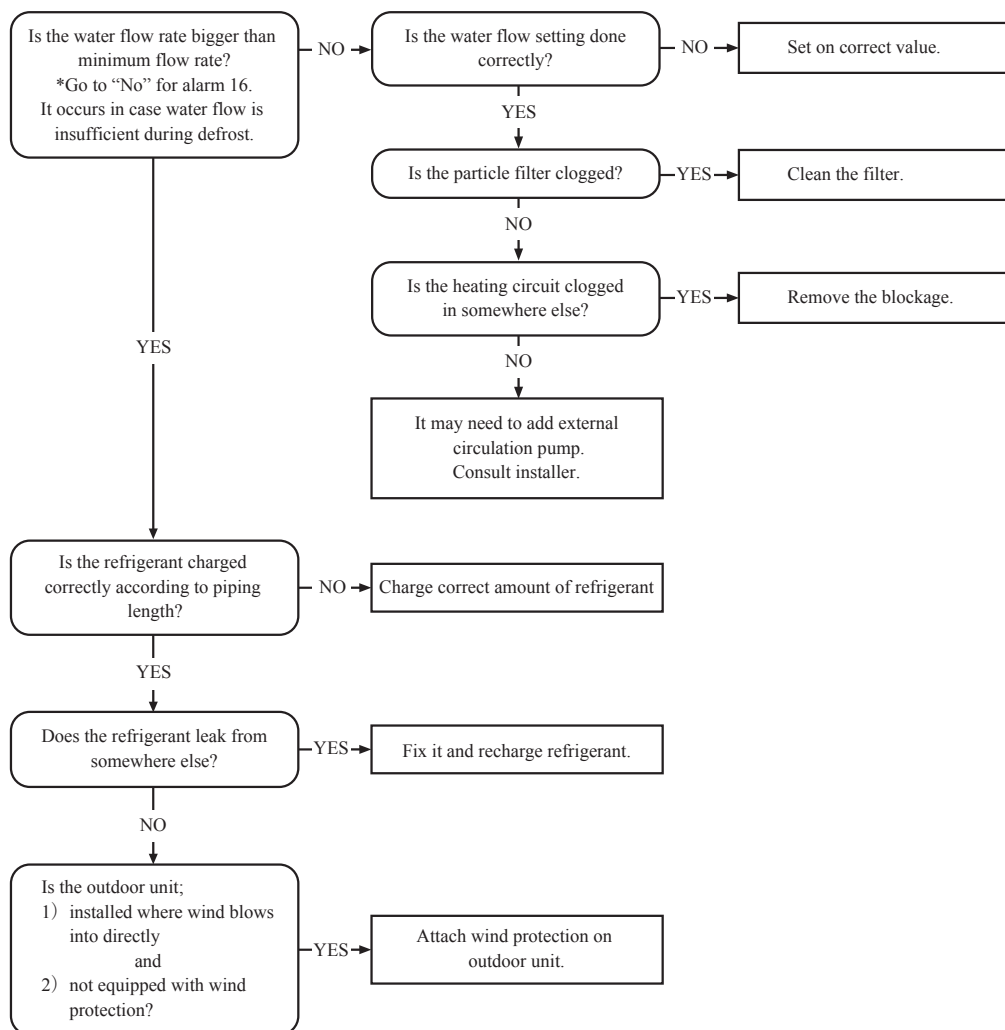
8 - High HW temp., 9 High AH temp.



10 - High Supply temp. 1, 11 High Supply temp. 2



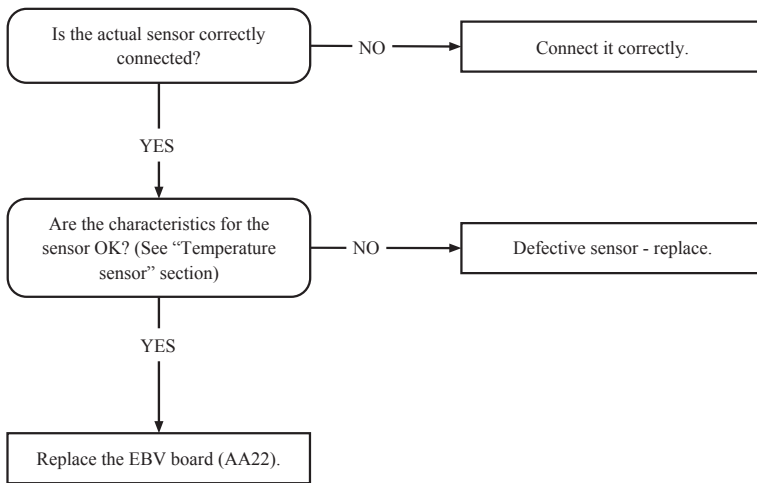
14, 16 - Aborted defrost



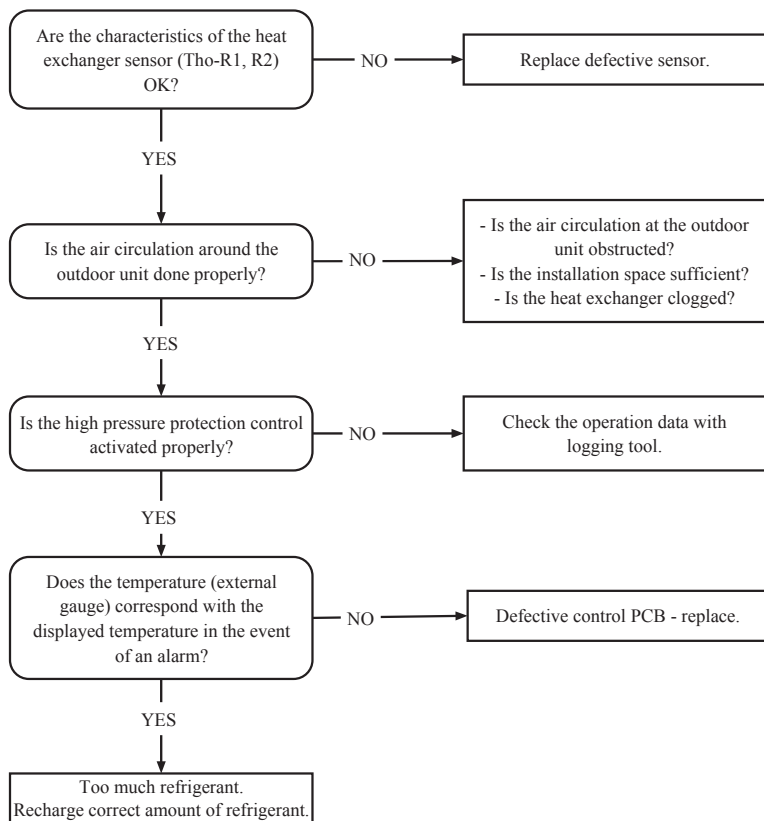
31 - S. fault HP



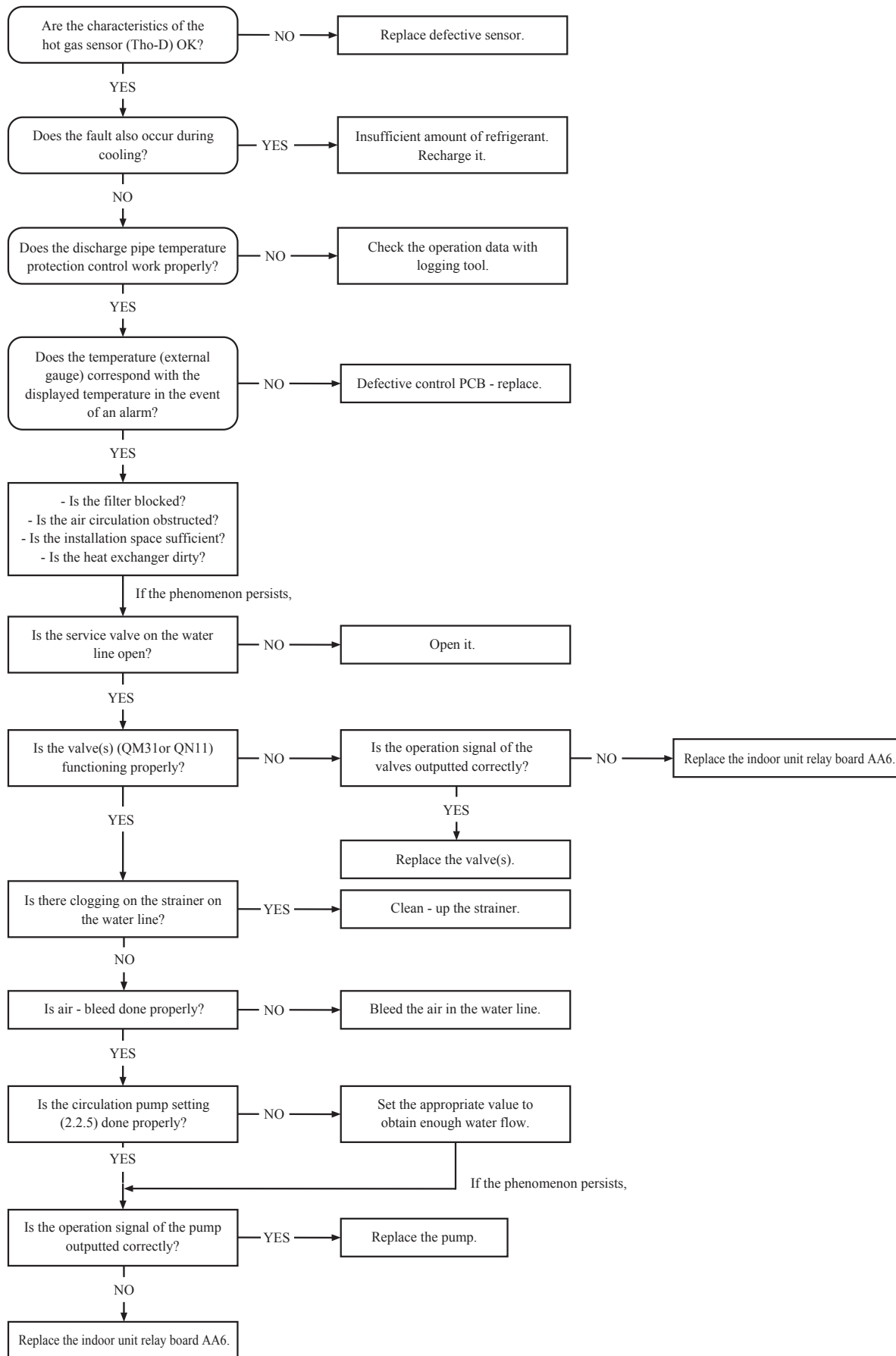
**30 - S. fault Outdoor, 32 - S. fault Cond out, 33 - S. fault Liquid line, 34 - S. fault HW,
35 - S. fault AH, 36 - S. fault supply 1, 37 - S. fault supply 2**



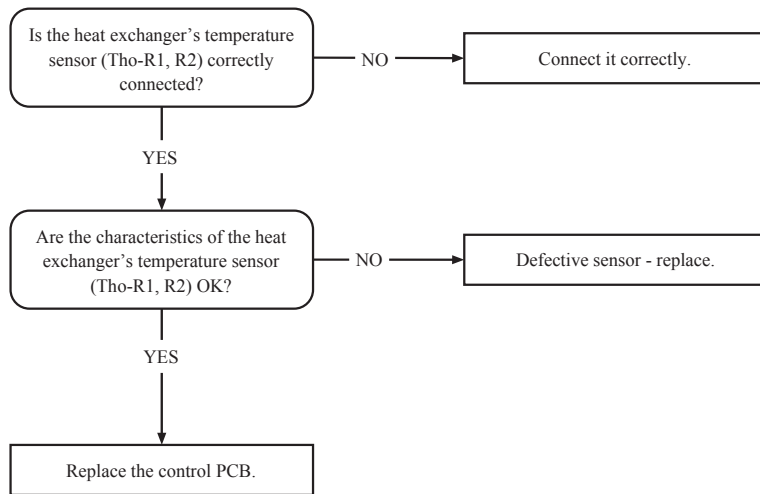
E35 - High HX temp



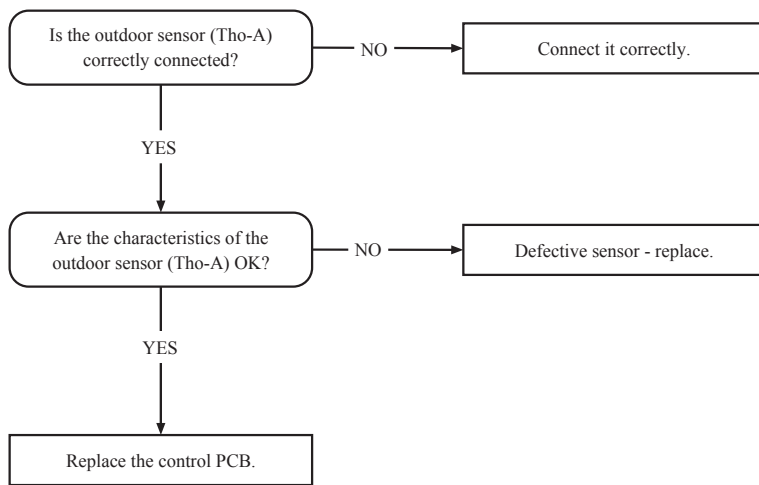
E36 - Permanent Hotgas



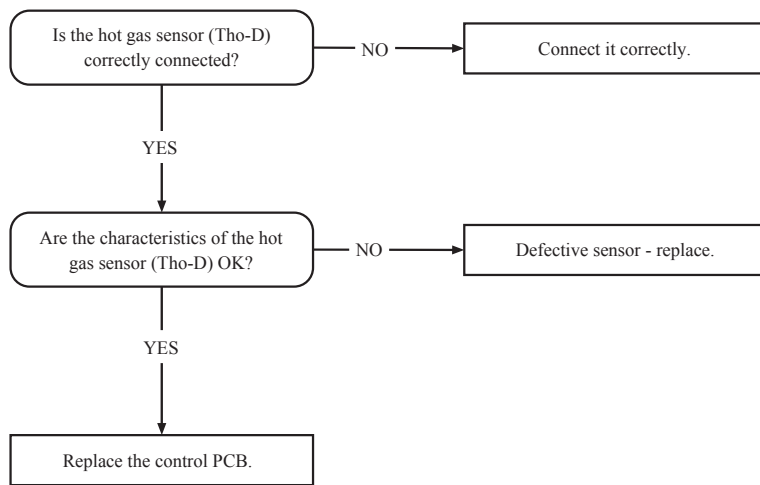
E37 - S. fault Tho-R



E38 - S. fault Tho-A

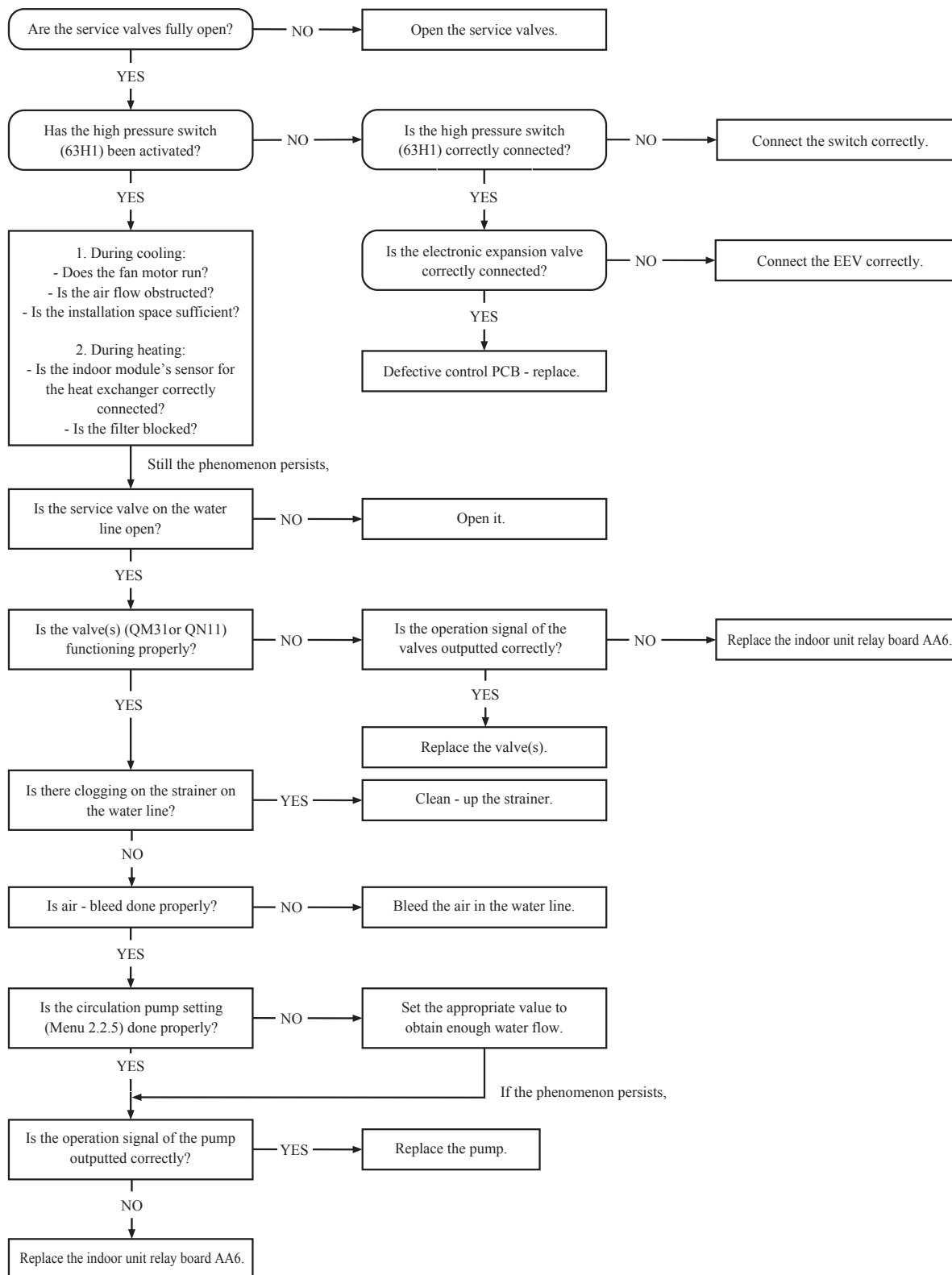


E39 - S. fault Tho-D

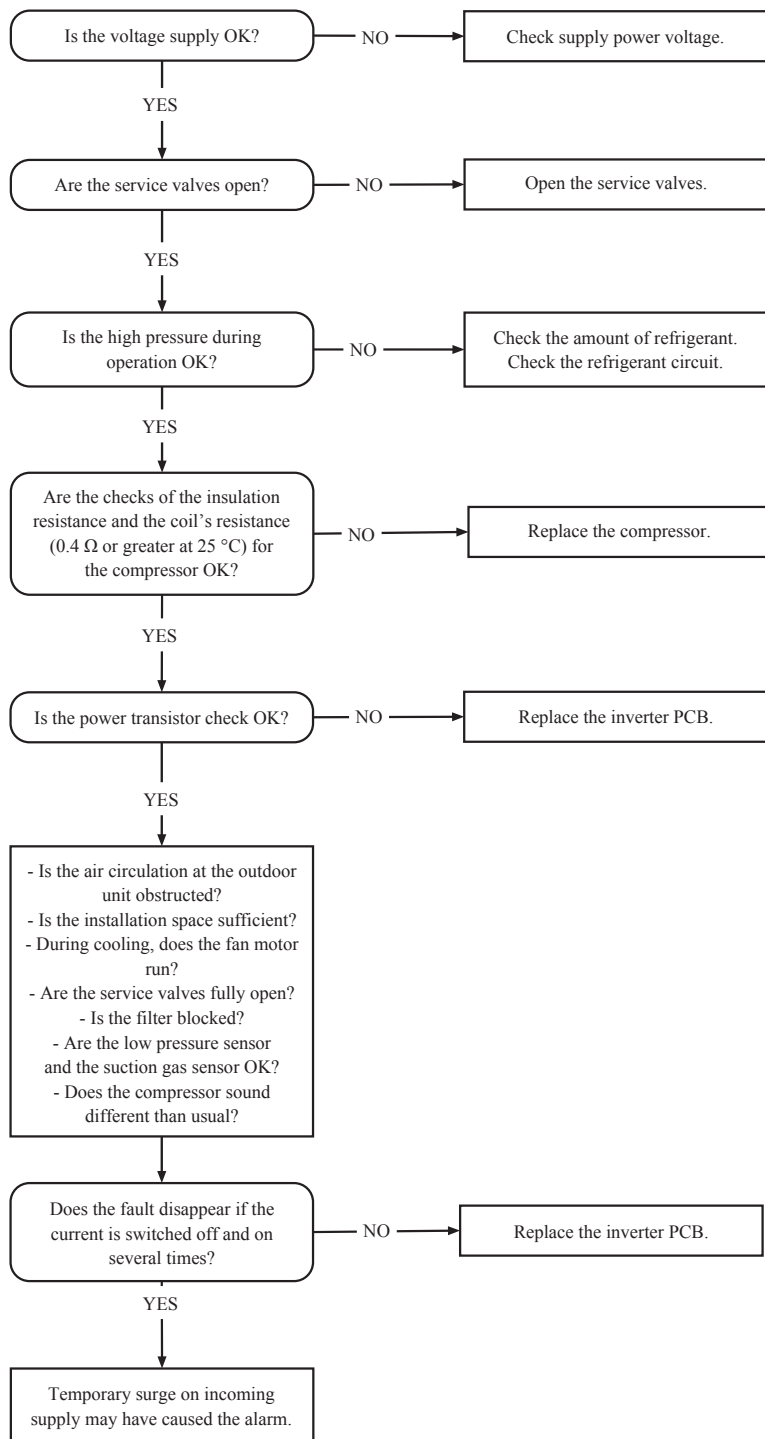


E40 - HP alarm

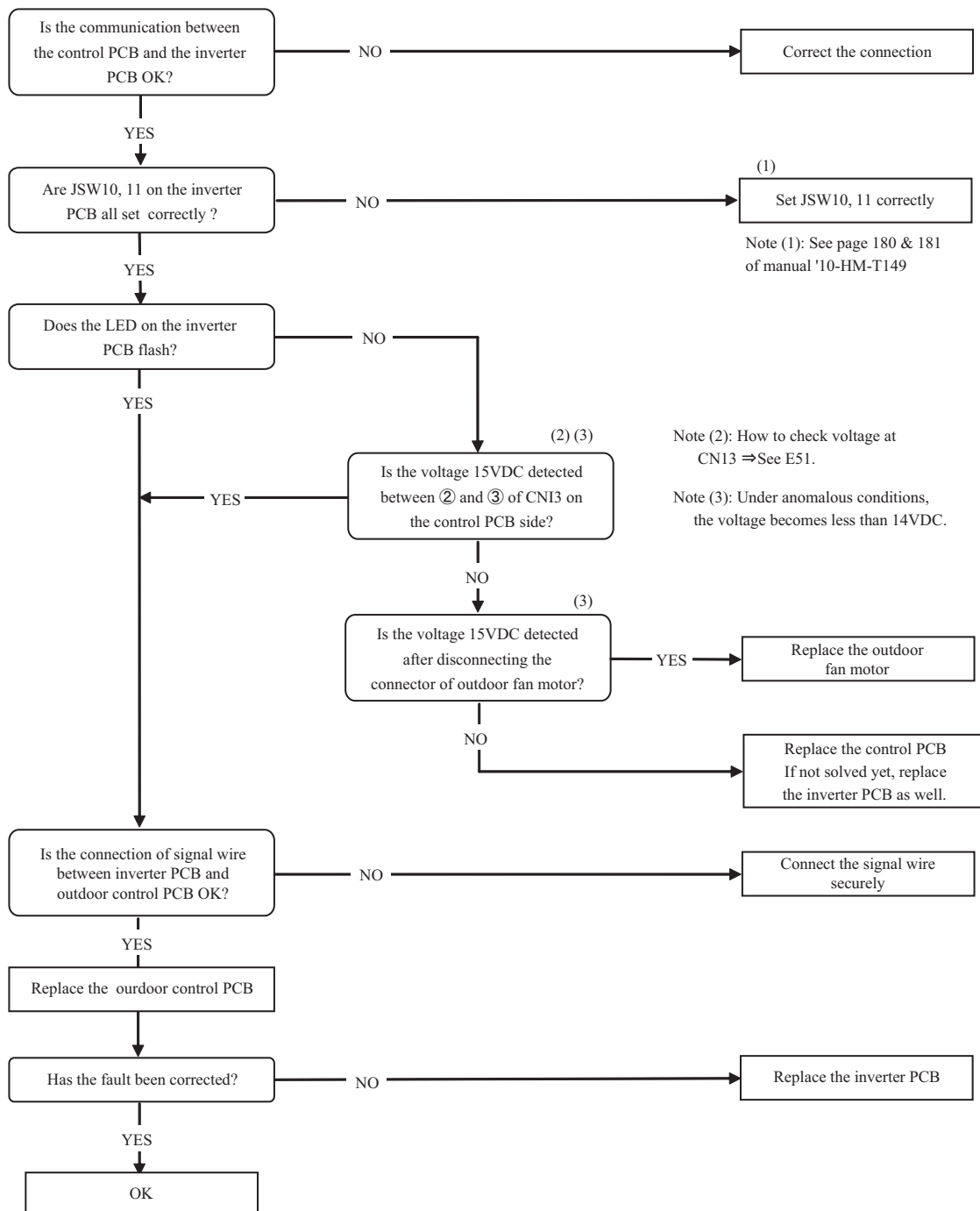
If the voltage supply to the outdoor unit is switched off and on too quickly, E40 may be displayed. This is normal.



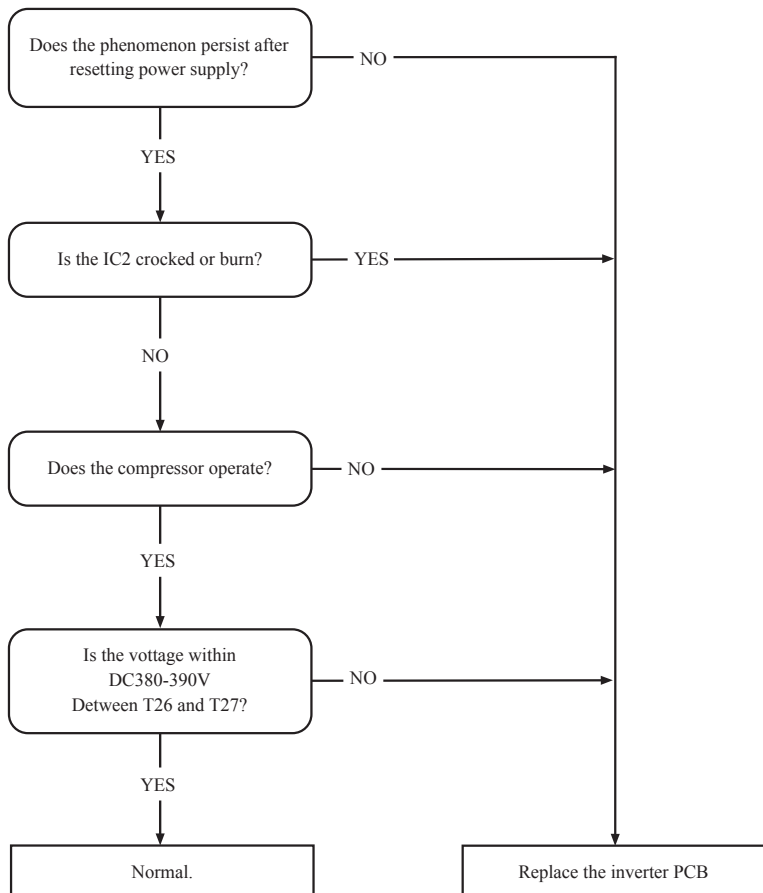
E42 - Current cut



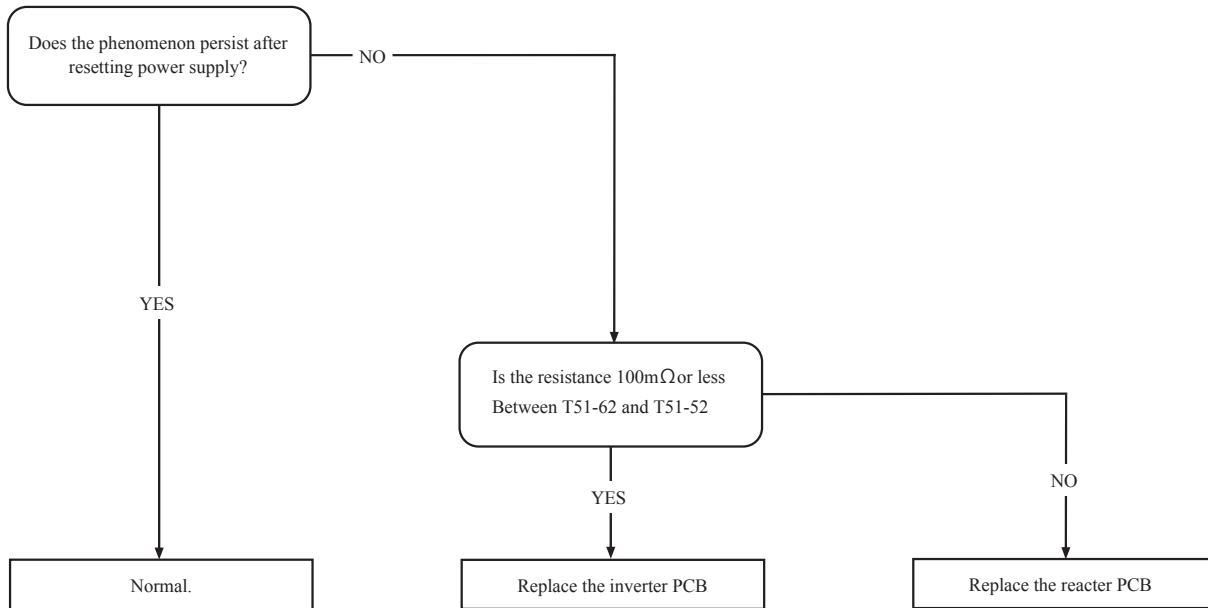
E45 - Inverter communication error



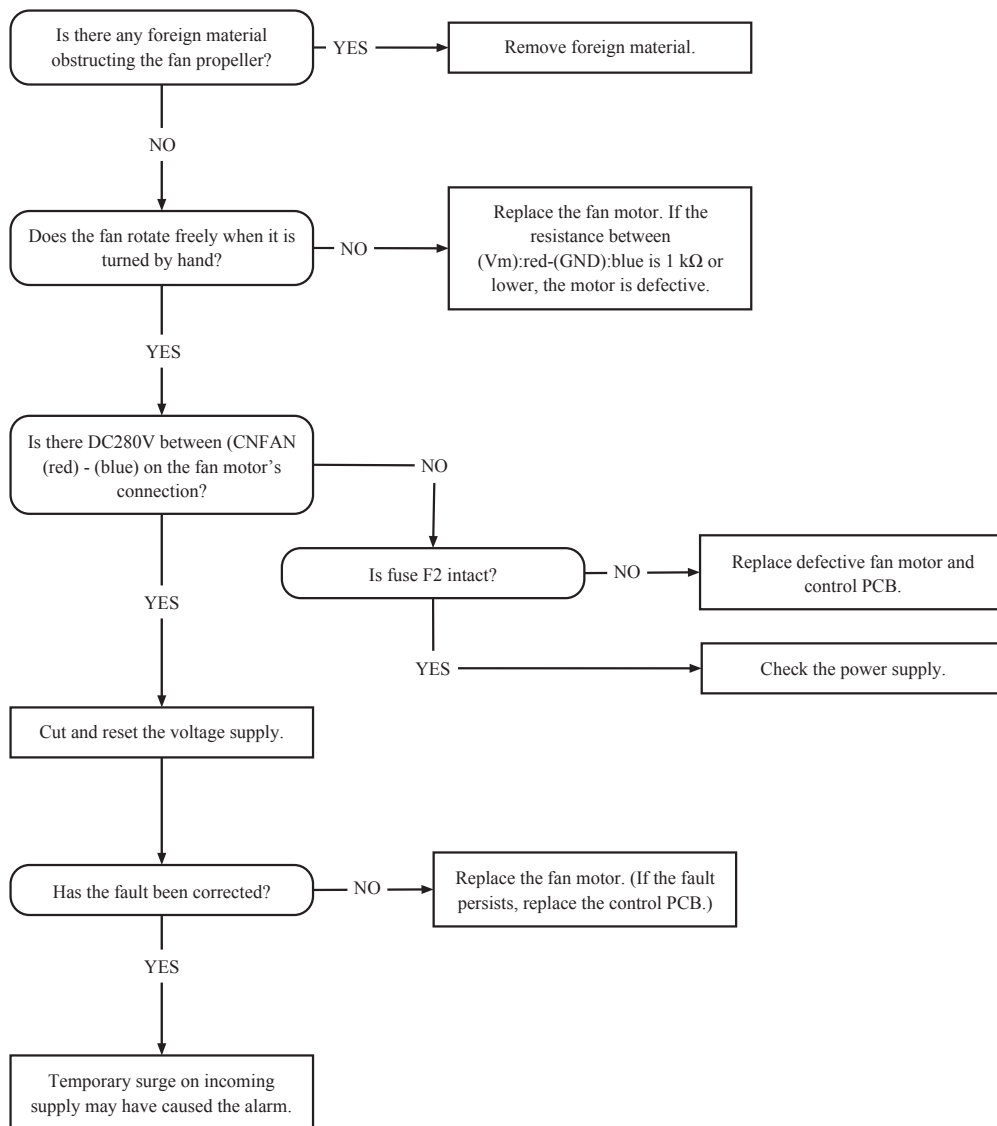
E47 - Inverter A/F module over current



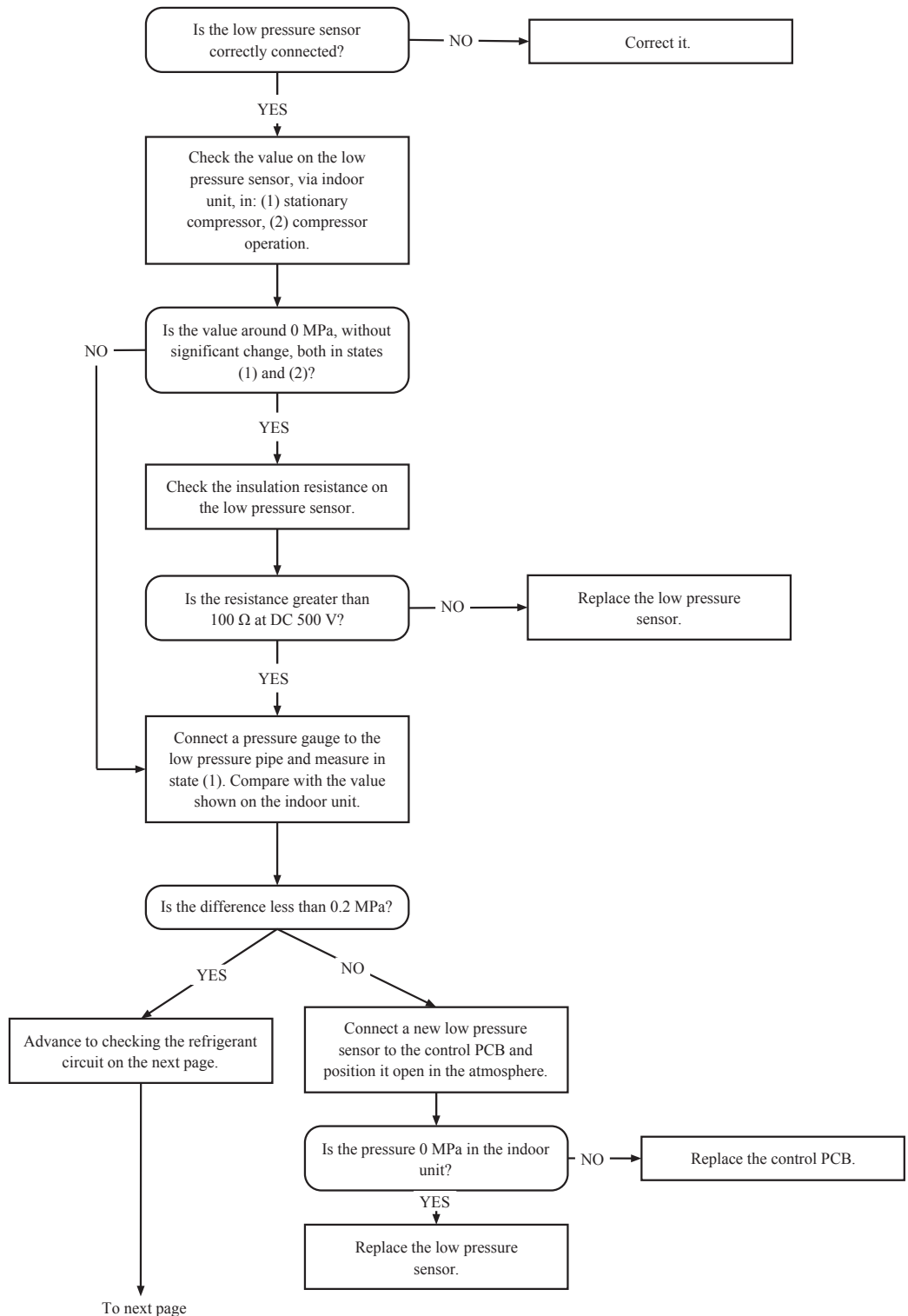
E47 - Inverter A/F module anomaly (FDCW71VNX-A /M~)

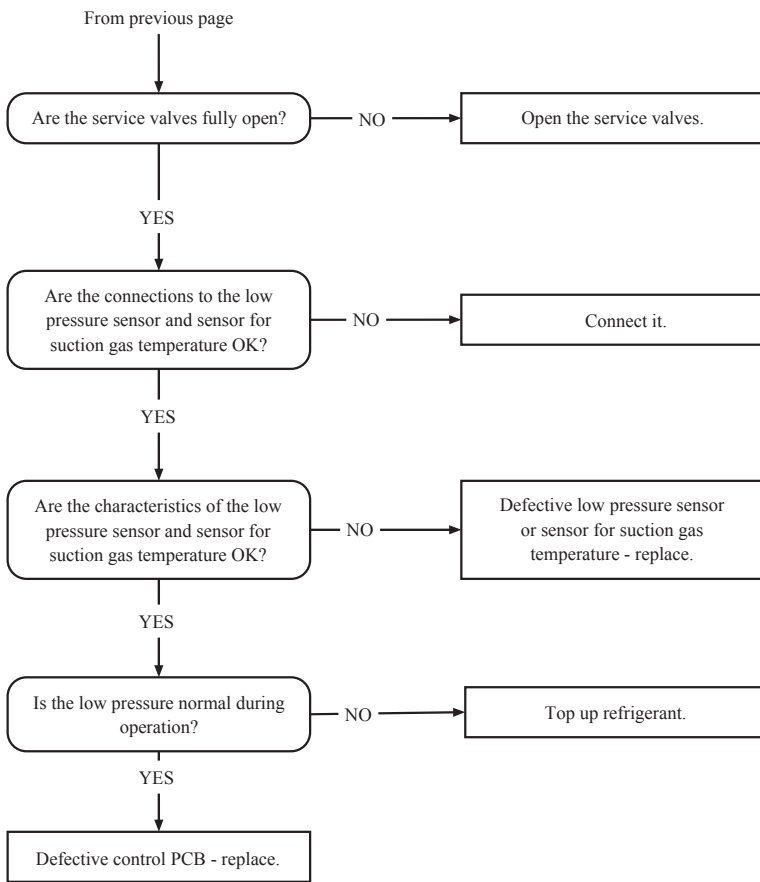


E48 - Fan alarm

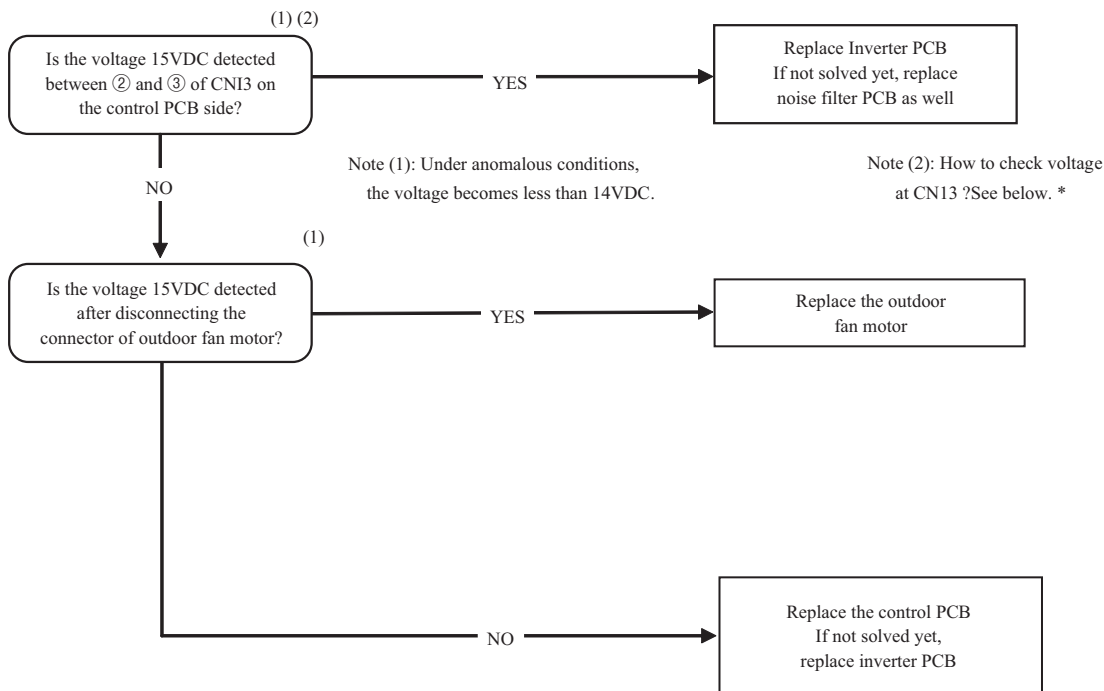


E49 - LP alarm



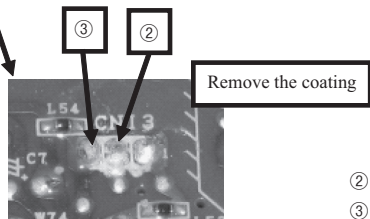
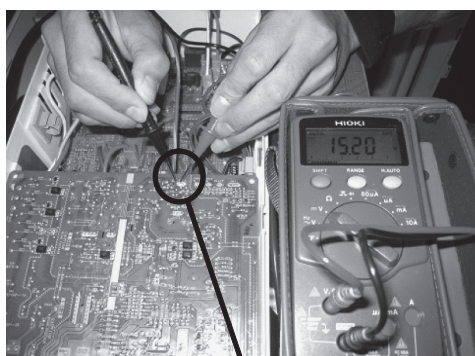


E51(E41) - Inverter and fan motor error



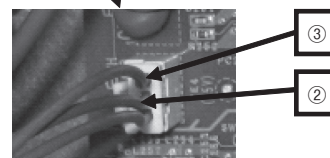
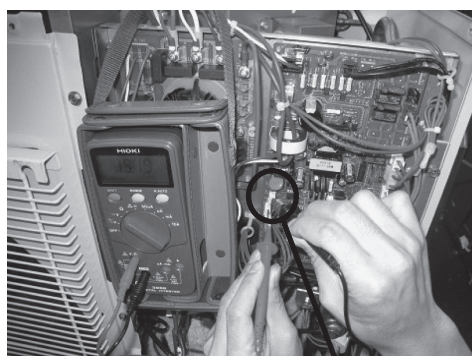
* How to check the voltage between ② and ③ of CN13

For FDCW71VNX

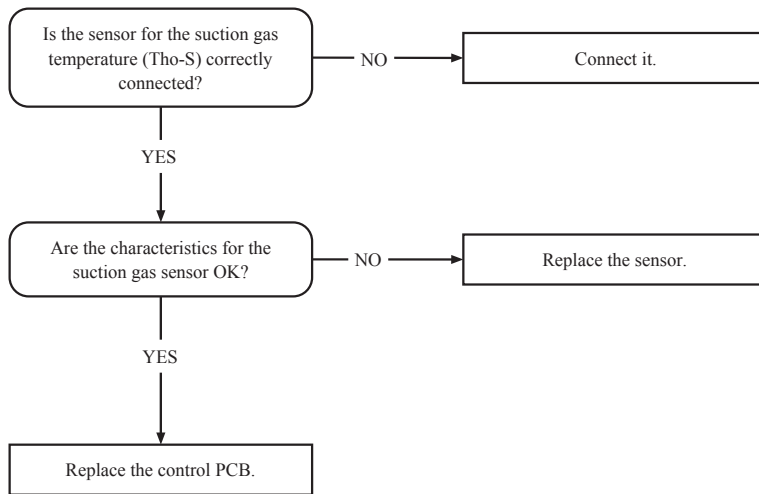


②: 15V (+)
 ③: GND (-)

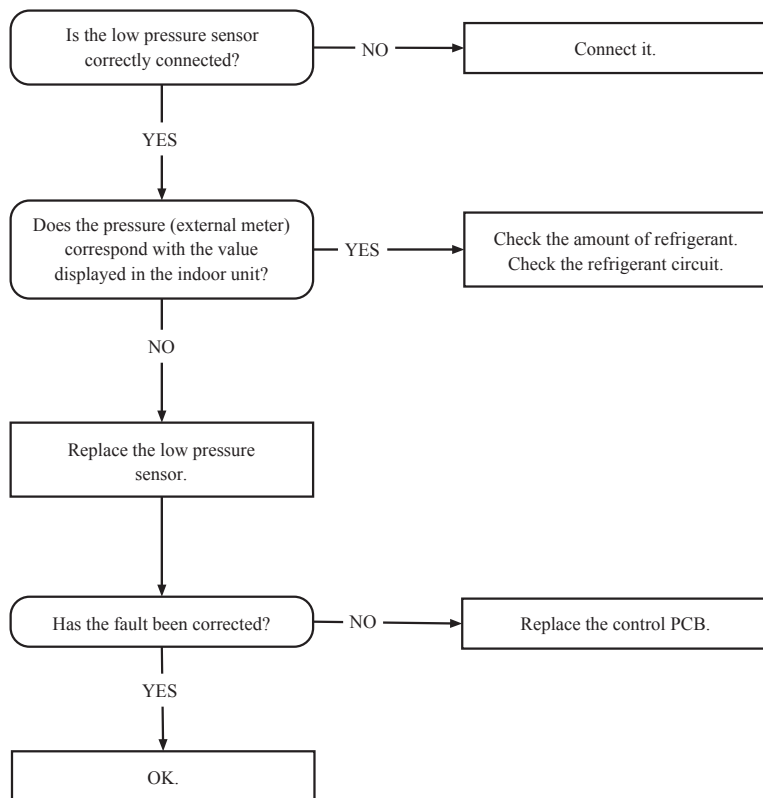
For FDCW100VNX and FDCW140VNX



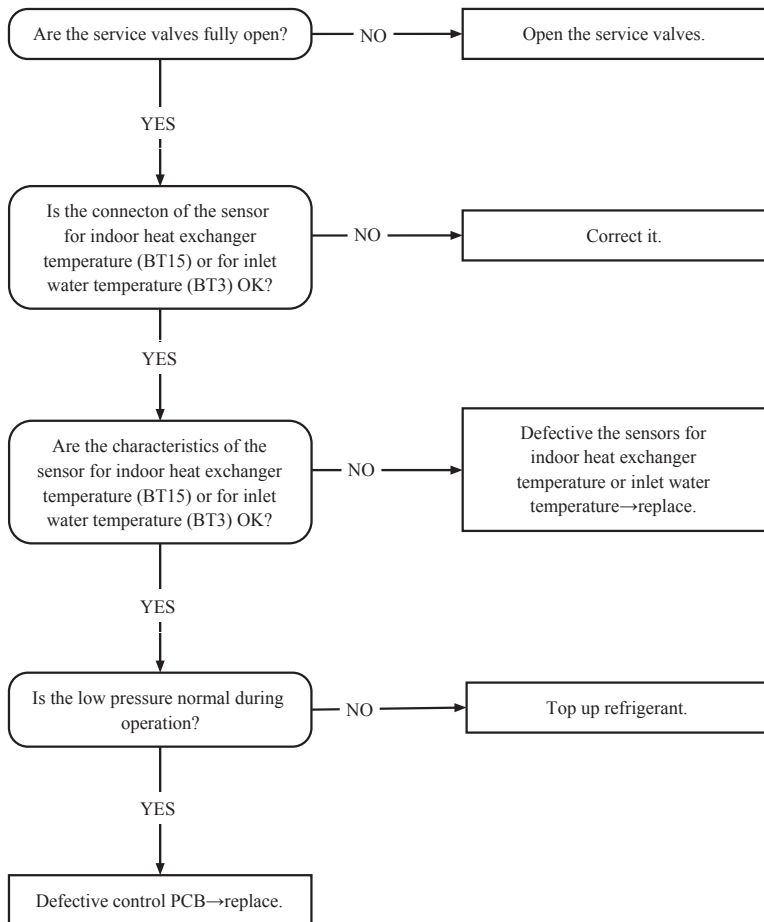
E53 - S. fault Tho-S



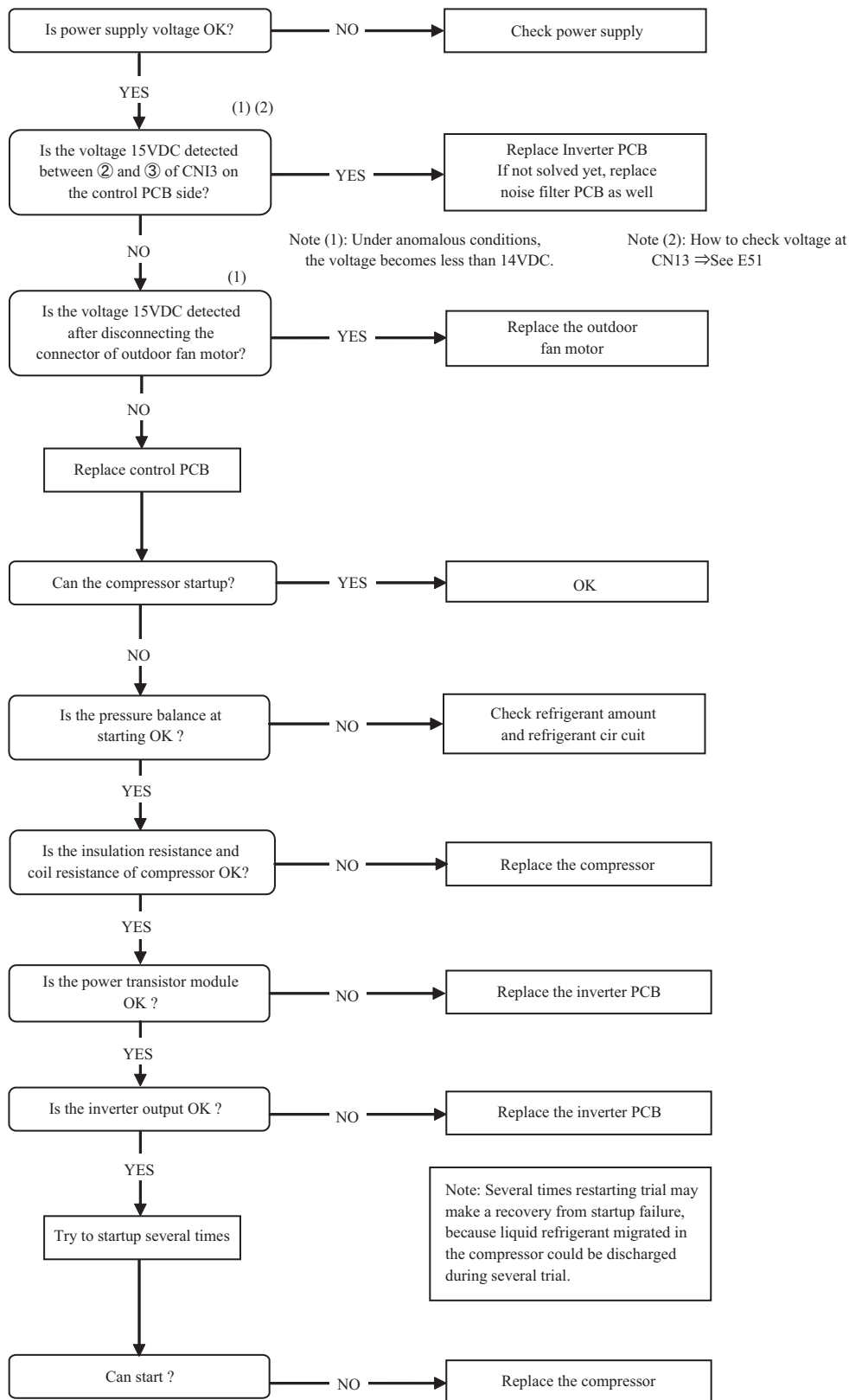
E54 - S. fault LPT



E57 - Low refrigerant



E59 - Inverter error



Function check, components

Indoor unit Relay test - forced control

Control conditions

Forced control of the relays can be carried out in Menu 9.3.7.0. Menu 9.3.7.1 must be selected to “On” in order for the function to be activated. Respective relay controlled by selecting 0, 1 or dash (-) for each relay in Menu 9.3.7.2 to 9.3.7.15.

0 is not powered -inactive, **1** is voltage out -active, and **(-)** means “Auto”, i.e. the control system selects whether the output is active or inactive.

⚠ WARNING!

Forced control must only be used by users familiar with the system. When forced control is activated, the alarm functions are disabled.

Testing shunts

Relay 2 and 3 are connected in series and used to control Three-way valve Cooling/heating.

Relays K4 and K5 are used to open and close mixing valve QN11. Therefore, relays K4 and K5 must not be set to mode 1 at the same time.

To open the mixing valve, select relay K4 to position 1 and relay K5 to position 0.

To close the mixing valve, select relay K5 to position 1 and relay K4 to position 0.

The mixing valve is locked when K4 and K5 are in position 0.

Relays K13 and K14 are used to open and close mixing valve 2. Therefore, relays K13 and K14 must not be set to mode 1 at the same time.

To open the mixing valve, select relay K13 to position 1 and relay K14 to position 0.

To close the mixing valve, select relay K14 to position 1 and relay K13 to position 0.

The mixing valve is locked when K13 and K14 are in position 0.

Relay functions

| Relay | Component | Name | Status | Function | Connection |
|---------------|-----------------------------------|-----------|------------|----------|--------------|
| K1 | Circulation pump, climate system | -GP1 | 0 | Off | |
| | | | 1 | On | X1:2 |
| K2, K3 | Shuttle valve for Cooling/heating | -QN12 | K2-0, K3-0 | Off | |
| | | | K2-0, K3-1 | On | X1:4 |
| K4 | Mixing valve | -QN11 | 1 | Open | X1:13 |
| K5 | Mixing valve | -QN11 | 1 | Close | X1:14 |
| K6 | Reversing valve, climate system | -QM31 | 0 | Closed | |
| | | | 1 | Open | X1:20 |
| K7 | Reversing valve, hot water | -QM30 | 0 | Closed | |
| | | | 1 | Open | X1:23 |
| K8 | Contactor electrical step 2 | -QA2 | 0 | Off | |
| | | | 1 | On | X1:26 |
| K9 | Contactor electrical step 1 | -QA1 | 0 | Off | |
| | | | 1 | On | X1:27 |
| K10 | Contactor electrical step 3 | -QA3 | 0 | Off | |
| | | | 1 | On | X1:28 |
| K11 | Operating contactor Outdoor unit | -QA10 | 0 | Off | |
| | | | 1 | On | X1:30 |
| K12 | Circulation pump | -GP10 | 0 | Off | |
| | | | 1 | On | X1:38 |
| K13 | Mixing Valve, system 2 | EP21-QN11 | 1 | Open | X1:40 |
| K14 | Mixing Valve, system 2 | EP21-QN11 | 1 | Close | X1:42 |
| Alarm relay 1 | High priority alarm relay | -AA22-K1 | 0 | inactive | -AA22 X2:1-2 |
| | | | 1 | active | -AA22 X2:1-3 |
| Alarm relay 2 | Low priority alarm relay | -AA22-K2 | 0 | inactive | -AA22 X3:1-2 |
| | | | 1 | active | -AA22 X3:1-3 |

Tips

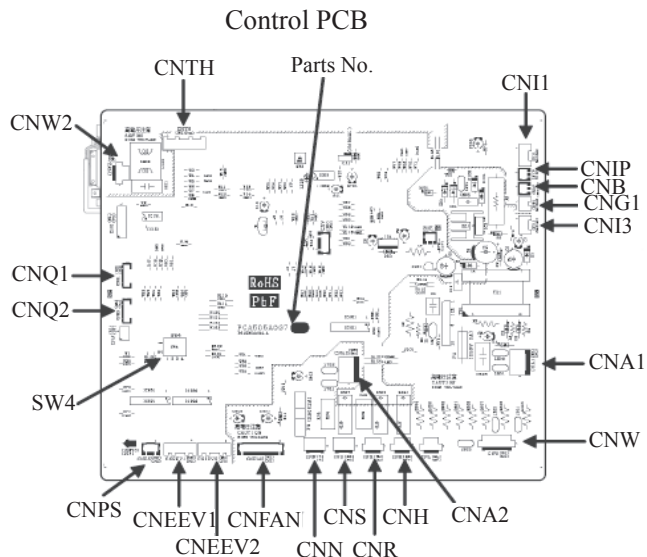
- Always close forced control in Menu 9.3.7.1 after using it.

Dip switch setting

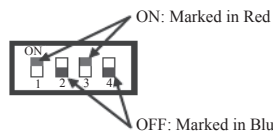
FDCW71VNX (Service code /1, /L only)

(1) Control PCB

| Switches | Factory setting | Remarks |
|----------|-----------------|-------------------|
| SW3-1* | OFF | * See below table |
| SW3-2* | OFF | * See below table |
| SW3-3 | OFF | Keep OFF |
| SW3-4 | ON | Keep ON |
| SW4-1 | ON | Keep ON |
| SW4-2 | ON | Keep ON |
| SW4-3 | OFF | Keep OFF |
| SW4-4 | OFF | Keep OFF |
| SW5-1 | OFF | Keep OFF |
| SW5-2 | OFF | Keep OFF |
| SW5-3 | OFF | Keep OFF |
| SW5-4 | OFF | Keep OFF |
| SW7-1 | OFF | Keep OFF |
| SW7-2 | OFF | Keep OFF |
| SW7-3 | OFF | Keep OFF |
| SW8-1 | OFF | Keep OFF |
| SW8-2 | OFF | Keep OFF |
| SW8-3 | OFF | Keep OFF |
| SW9 | OFF | Tactile switch |



Note: Meaning of marking on the DIP switch

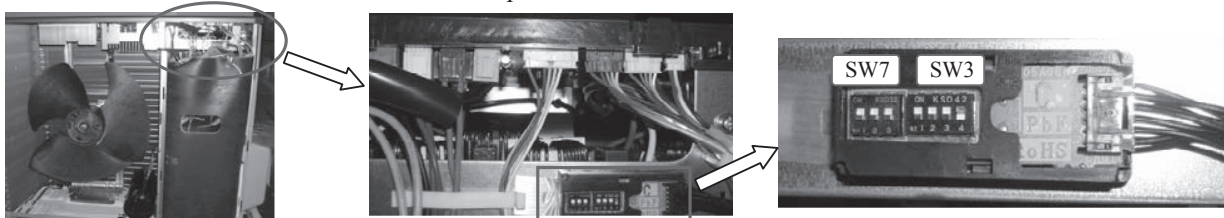


When replacing PCB, set up the DIP switch according to the previous setting with the meaning of marking in mind or with reference to this factory setting list.

* Function of DIP switch

| Switch | Function | Setting | |
|--------|-------------------------|---------|-----------------|
| | | OFF | ON |
| SW3-1 | Defrost setting | Normal | Cold region |
| SW3-2 | Snow protection control | Normal | Snow protection |

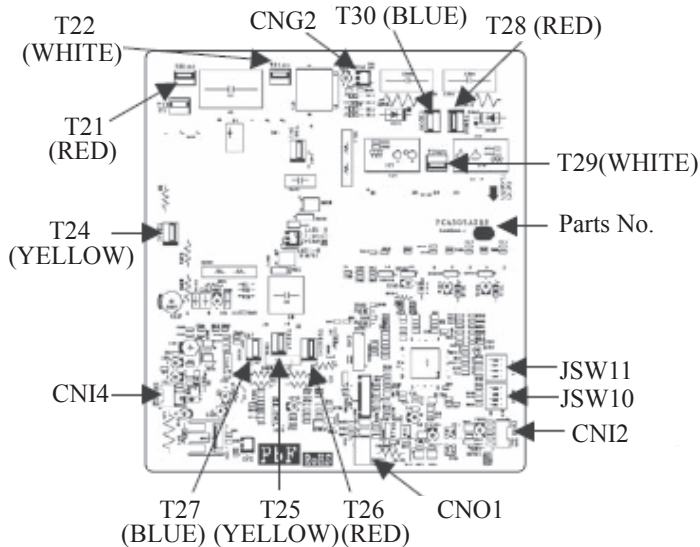
Note: DIP switch SW3 is located as shown in the photo.



(1) Inverter PCB

| Switches | Factory setting | Remarks |
|----------|-----------------|-------------------------|
| JSW10-1 | OFF | Keep OFF |
| JSW10-2 | OFF | Keep OFF |
| JSW10-3 | OFF | Keep OFF |
| JSW10-4 | OFF | Keep OFF |
| JSW11-1 | ON | Keep as factory setting |
| JSW11-2 | ON | Keep as factory setting |
| JSW11-3 | ON | Keep as factory setting |
| JSW11-4 | ON | Keep as factory setting |

Inverter PCB

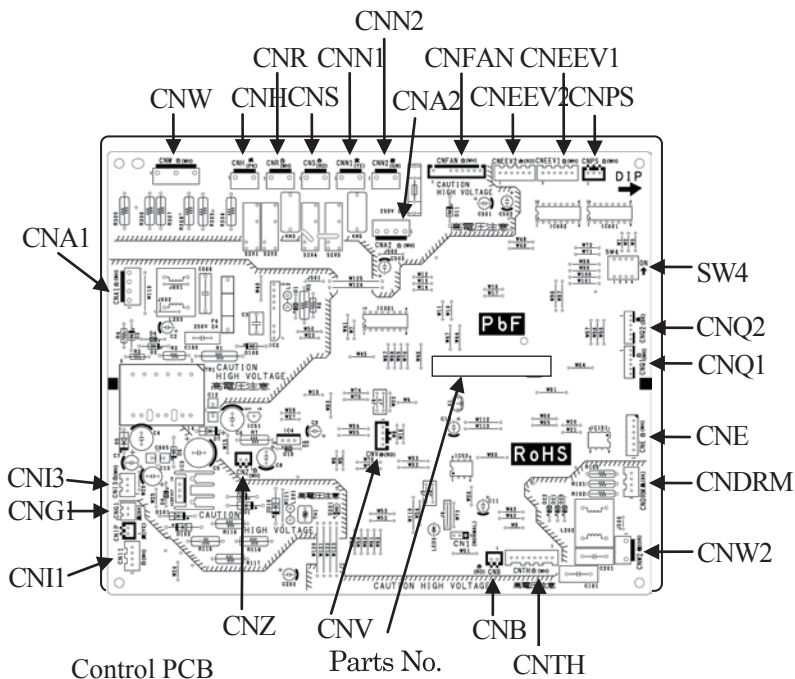


Dip switch setting

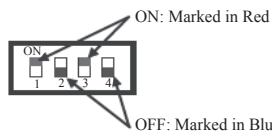
FDCW71VNX (Service code /M~)

(1) Control PCB

| Switches | Factory setting | Remarks |
|----------|-----------------|-------------------|
| SW3-1* | OFF | * See below table |
| SW3-2* | OFF | * See below table |
| SW3-3 | OFF | Keep OFF |
| SW3-4 | ON | Keep ON |
| SW4-1 | ON | Keep ON |
| SW4-2 | ON | Keep ON |
| SW4-3 | OFF | Keep OFF |
| SW4-4 | OFF | Keep OFF |
| SW5-1 | OFF | Keep OFF |
| SW5-2 | OFF | Keep OFF |
| SW5-3 | OFF | Keep OFF |
| SW5-4 | OFF | Keep OFF |
| SW7-1 | OFF | Keep OFF |
| SW7-2 | OFF | Keep OFF |
| SW7-3 | OFF | Keep OFF |
| SW8-1 | OFF | Keep OFF |
| SW8-2 | OFF | Keep OFF |
| SW8-3 | OFF | Keep OFF |
| SW9 | OFF | Tactile switch |



Note: Meaning of marking on the DIP switch

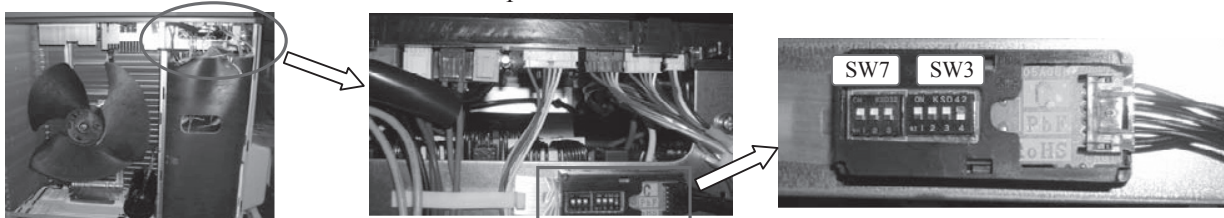


When replacing PCB, set up the DIP switch according to the previous setting with the meaning of marking in mind or with reference to this factory setting list.

* Function of DIP switch

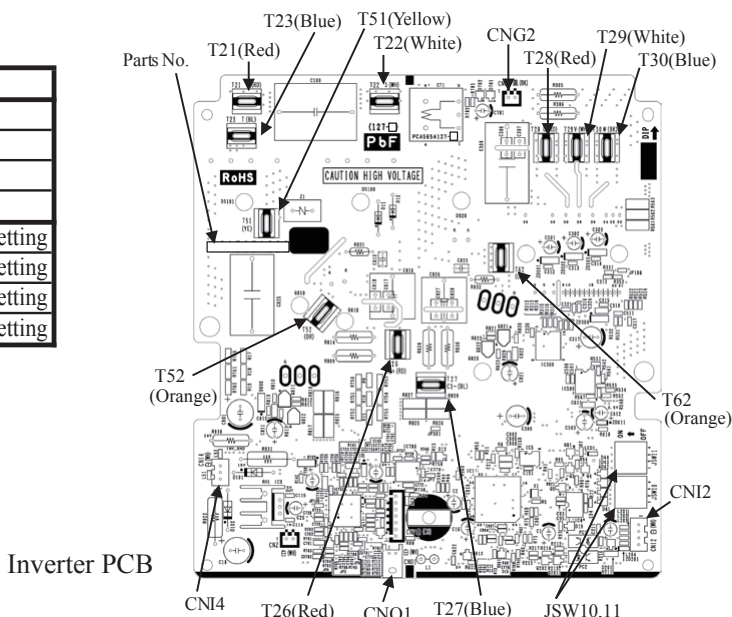
| Switch | Function | Setting | |
|--------|-------------------------|---------|-----------------|
| | | OFF | ON |
| SW3-1 | Defrost setting | Normal | Cold region |
| SW3-2 | Snow protection control | Normal | Snow protection |

Note: DIP switch SW3 is located as shown in the photo.



(1) Inverter PCB

| Switches | Factory setting | Remarks |
|----------|-----------------|-------------------------|
| JSW10-1 | OFF | Keep OFF |
| JSW10-2 | OFF | Keep OFF |
| JSW10-3 | OFF | Keep OFF |
| JSW10-4 | OFF | Keep OFF |
| JSW11-1 | ON | Keep as factory setting |
| JSW11-2 | ON | Keep as factory setting |
| JSW11-3 | ON | Keep as factory setting |
| JSW11-4 | ON | Keep as factory setting |



DIP switches, FDCW100VNX, FDCW140VNX

FDCW100VNX, 140VNX

(1) Control PCB

| Switches | Factory setting | | Remarks |
|----------|-----------------|--------|-------------------------|
| | 100VNX | 140VNX | |
| JSW1-1 | OFF | OFF | Keep as factory setting |
| JSW1-2 | OFF | ON | Keep as factory setting |
| JSW1-3 | OFF | OFF | Keep as factory setting |
| JSW1-4 | OFF | OFF | Keep as factory setting |
| SW4-1 | ON | ON | Keep as factory setting |
| SW4-2 | ON | ON | Keep as factory setting |
| SW4-3 | OFF | | Keep OFF |
| SW4-4 | ON | | Keep ON |
| SW3-1* | OFF | | Keep OFF |
| SW3-2* | OFF | | Keep OFF |
| SW3-3 | OFF | | Keep OFF |
| SW3-4 | OFF | | Keep OFF |
| SW5-1 | OFF | | Keep OFF |
| SW5-2 | ON | | Keep OFF |
| SW5-3 | OFF | | Keep OFF |
| SW5-4 | OFF | | Keep OFF |
| J5** | With/ON | | Keep With/ON |
| J6** | With/ON | | Keep With/ON |
| J7** | With/ON | | Keep With/ON |
| SW1 | OFF | | Tactile switch |
| SW2-1 | ON | | Keep ON |
| SW2-2 | ON | | Keep ON |
| SW2-3 | ON | | Keep ON |

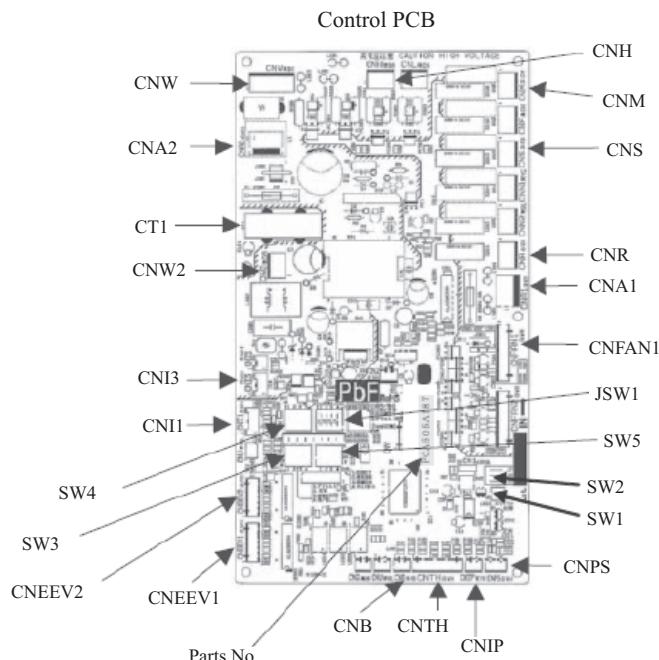
* Function of DIP switch

| Switch | Function | Setting | |
|--------|-------------------------|---------|-----------------|
| | | OFF | ON |
| SW3-1 | Defrost setting | Normal | Cold region |
| SW3-2 | Snow protection control | Normal | Snow protection |

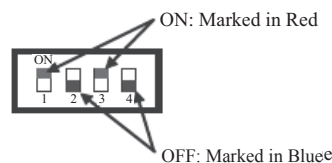
** Control PCB on the unit: Jumper,
Control PCB of the spare part: Dip switch

(2) Inverter PCB

| Switches | Factory setting | | Remarks |
|----------|-----------------|--------|-------------------------|
| | 100VNX | 140VNX | |
| JSW10-1 | OFF | | Keep OFF |
| JSW10-2 | OFF | | Keep OFF |
| JSW10-3 | OFF | | Keep OFF |
| JSW10-4 | OFF | | Keep OFF |
| JSW11-1 | ON | OFF | Keep as factory setting |
| JSW11-2 | OFF | OFF | Keep as factory setting |
| JSW11-3 | OFF | ON | Keep as factory setting |
| JSW11-4 | ON | ON | Keep as factory setting |

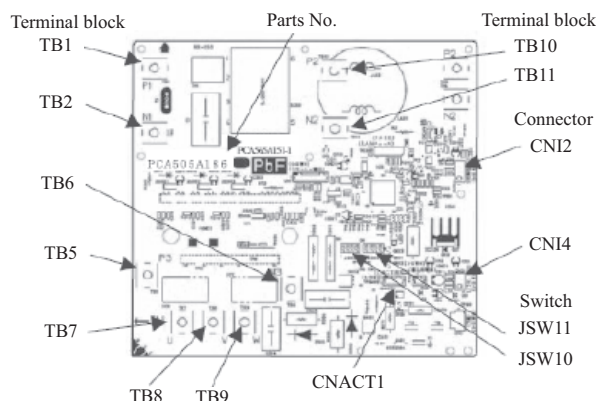


Note: Meaning of marking on the DIP switch



When replacing PCB, set up the DIP switch according to the previous setting with the meaning of marking in mind or with reference to this factory setting list.

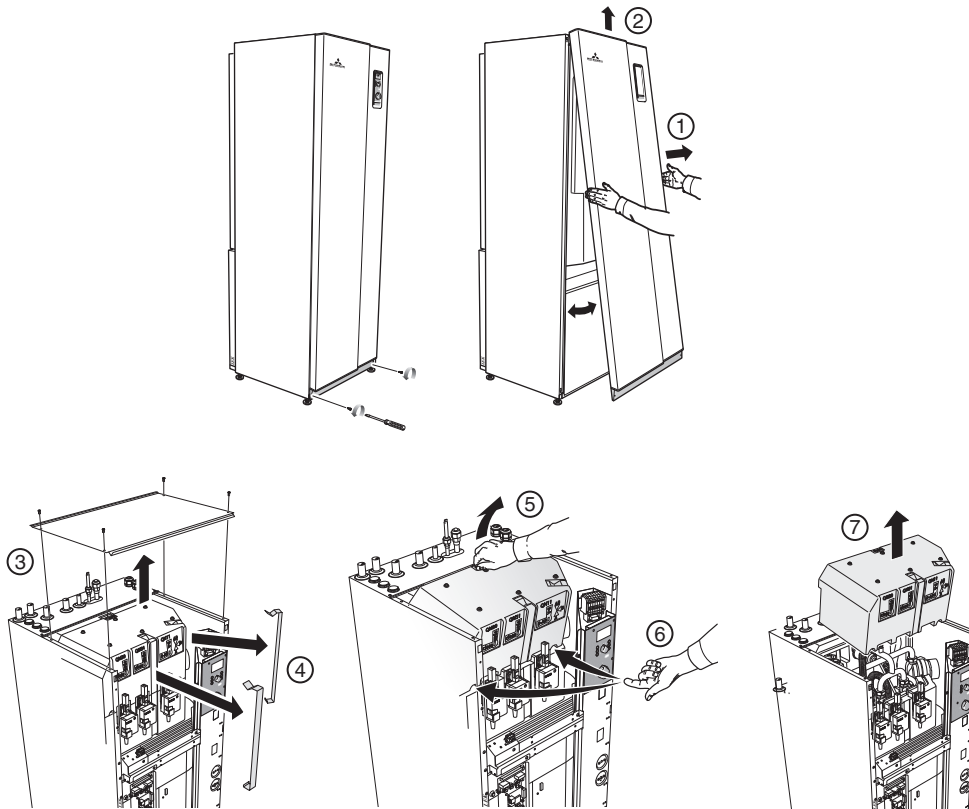
Inverter PCB



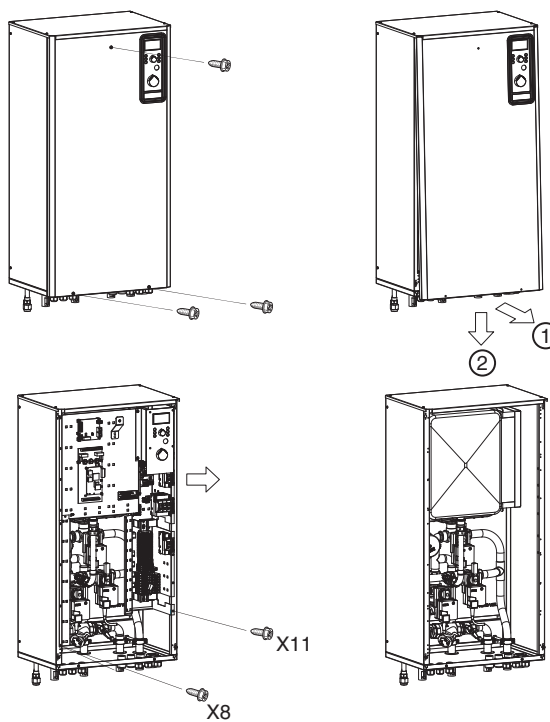
Component replacement

Indoor unit

HMA100V, HMA100VM



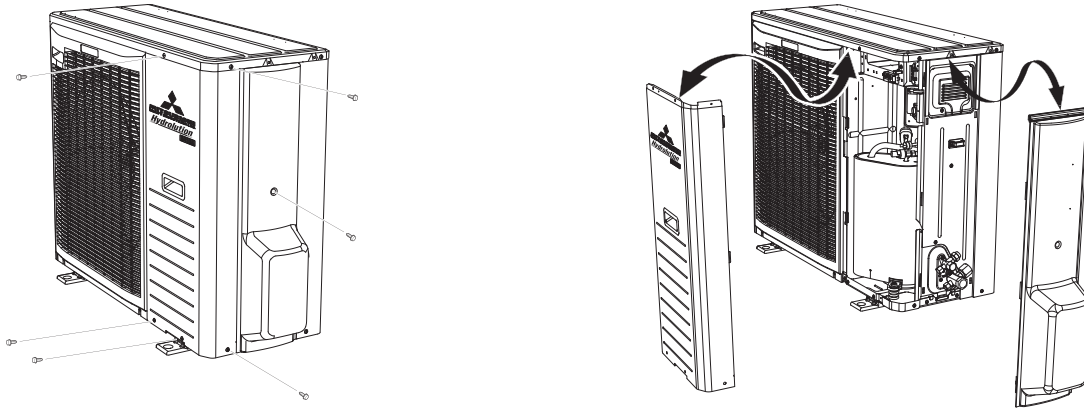
HMS140VA, HMS140V



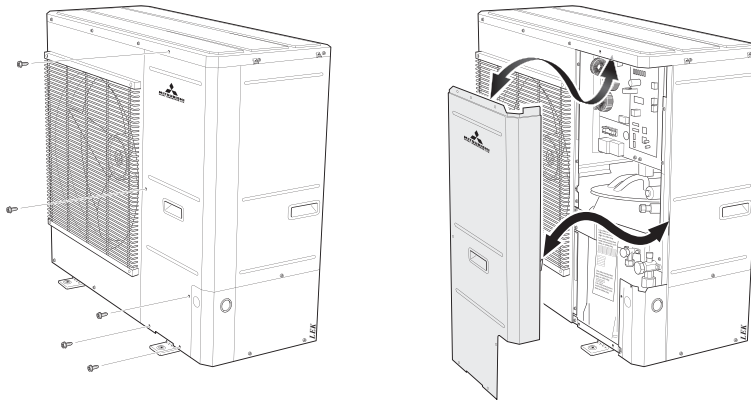
Component replacement

Outdoor unit

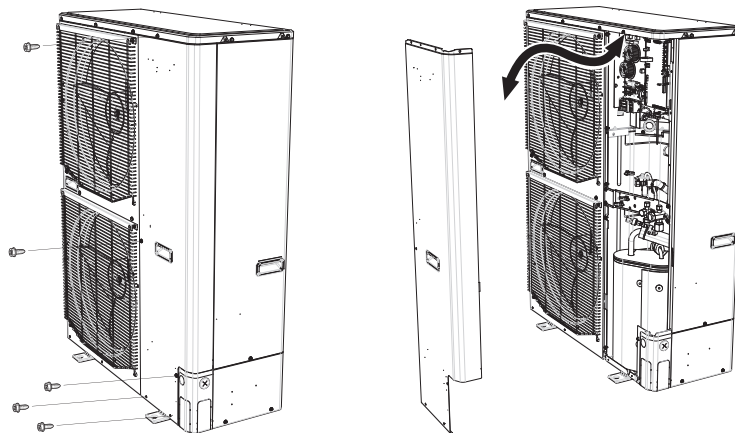
FDCW71VNX



FDCW100VNX



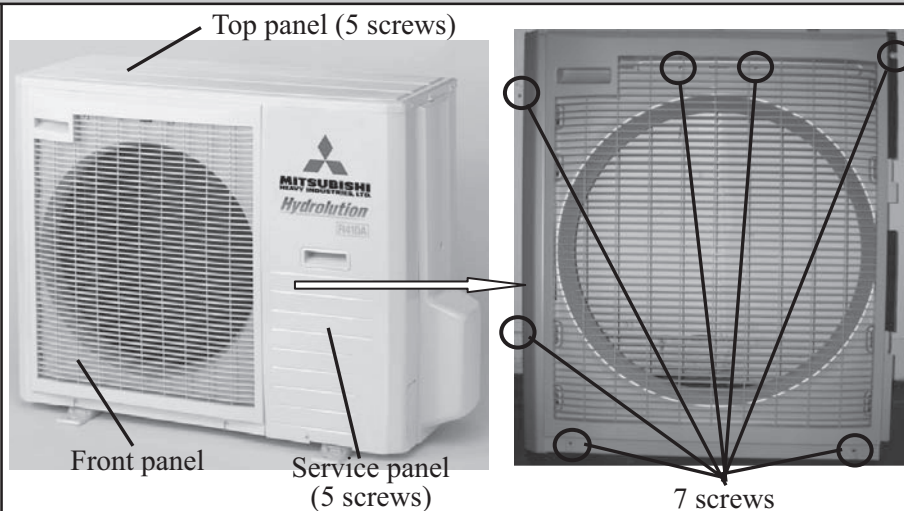
FDCW140VNX



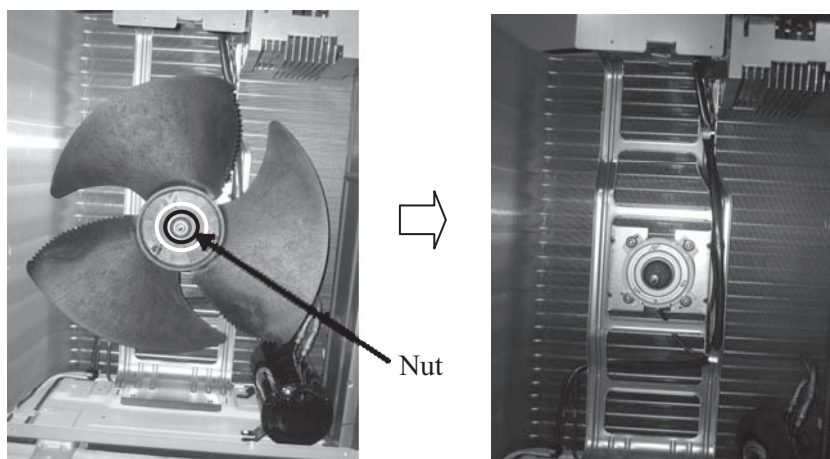
FDCW71VNX

Fan and fan motor (FMo1)

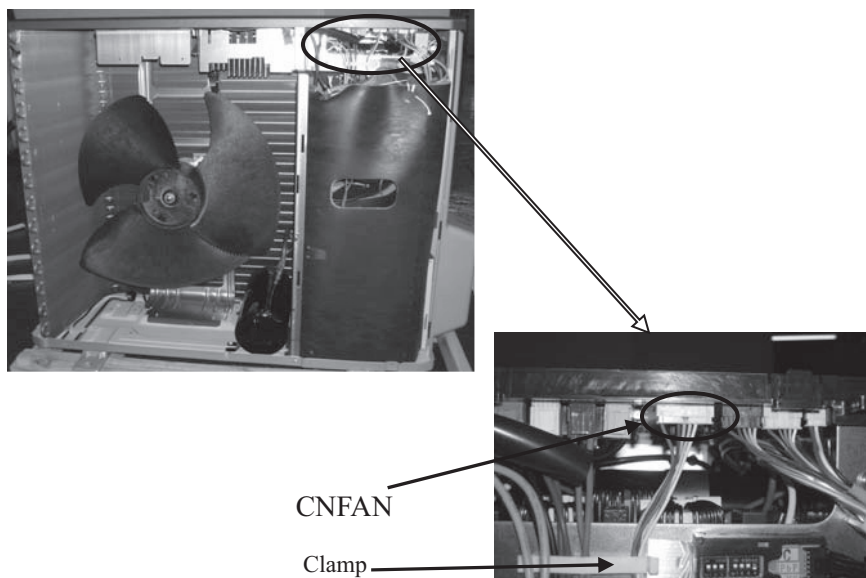
1. Loosen the screws and remove the top panel and service panel first.
2. Loosen 5 screws and remove the front panel including fan grille.



3. Loosen the nut and remove the fan propeller



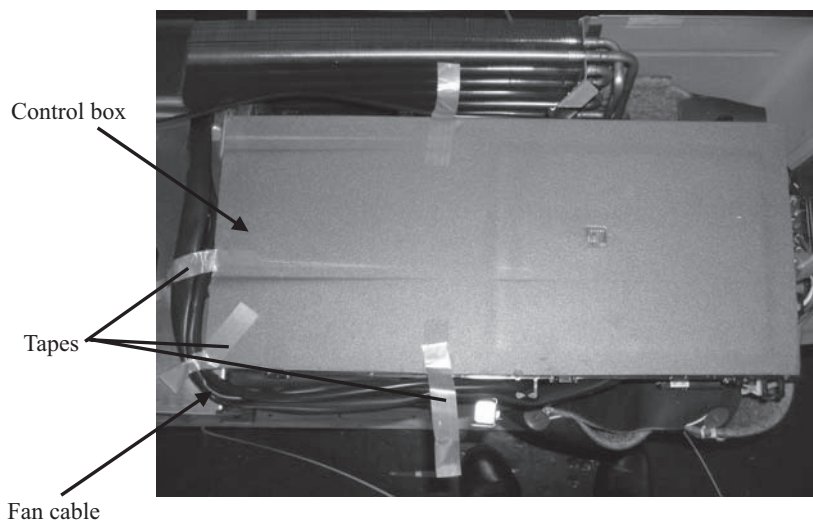
4. Disconnect the connector of CNFAN
5. Detach the clamp



FDCW71VNX

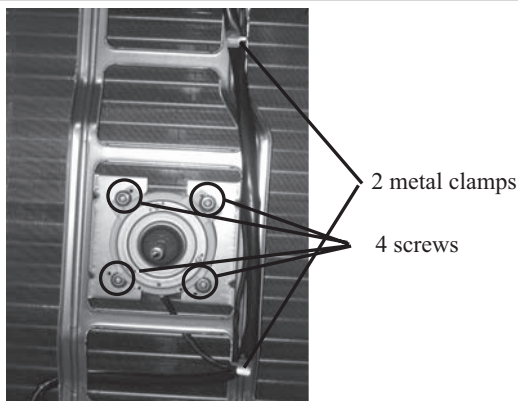
Fan and fan motor (FMo1)

6. Remove tapes and fan cable



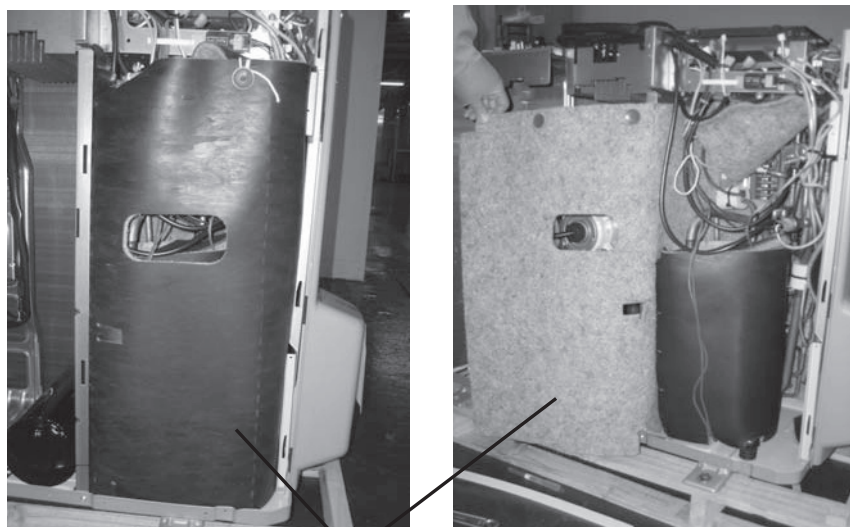
7. Release 2 metal clamps

8. Loosen 4 screws and remove fan motor



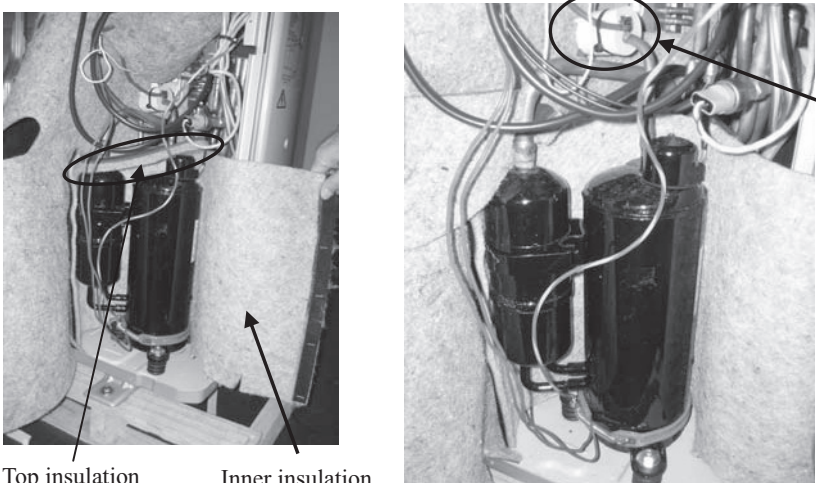
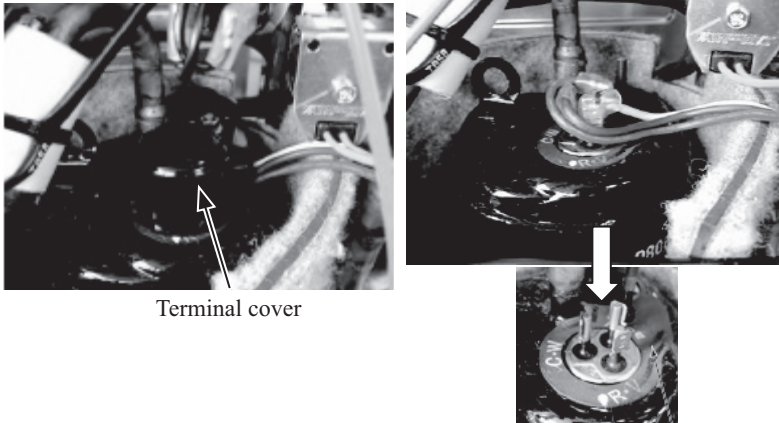

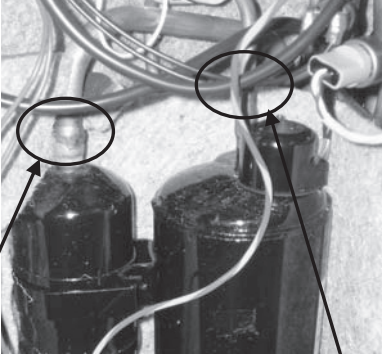
Compressor (CM)

1. Untie the strings and remove the outer insulation



Outer Insulation

FDCW71VNX

| Compressor (CM) | |
|---|--|
| <p>2. Remove the top and inner insulations.</p> <p>3 Cut off the strap and pull out the sensor (Tho-D)</p> |  <p>Top insulation Inner insulation</p> <p>Tho-D</p> |
| <p>4. Remove the terminal cover</p> <p>5. Disconnect the fasten terminal connectors from compressor. U: Red cable V: White cable W: Blue cable</p> |  <p>Terminal cover</p> |
| <p>6. Remove the crankcase heater</p> <p>7. Unscrew and disconnect the grounding cable</p> <p>8. Loosen 3 nuts of compressor fixing bolts</p> |  <p>Screw for grounding cable</p> <p>Crankcase heater</p> <p>3 nuts of compressor fixing bolts</p> |
| <p>9. Disconnect the pipes for suction and discharge gas</p> <p>10. Remove the compressor</p> |  <p>Suction gas pipe</p> <p>Discharge gas pipe</p> |

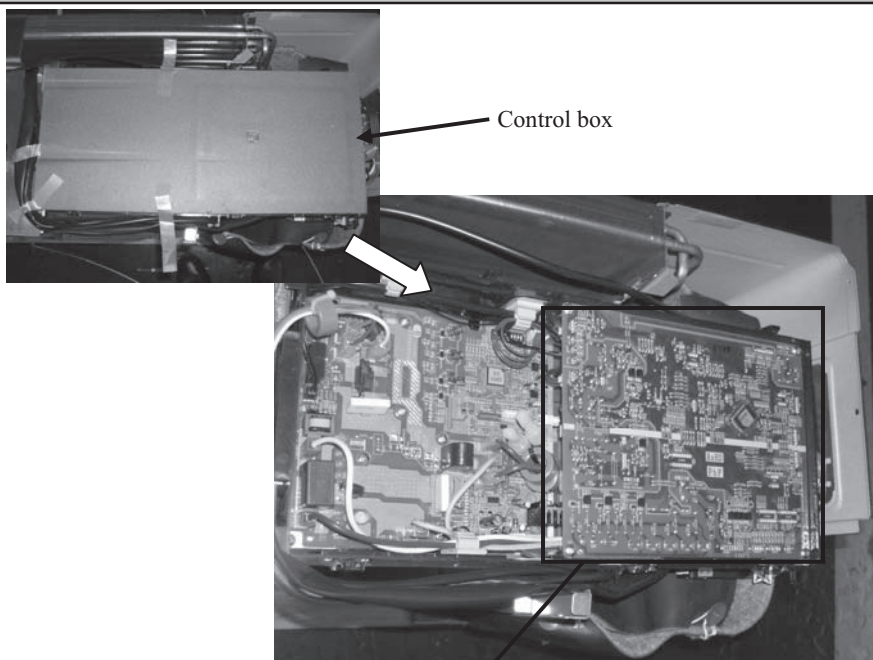
FDCW71VNX (Service code /1, /L only)

Control PCB (PWB1)

1. Open the top panel

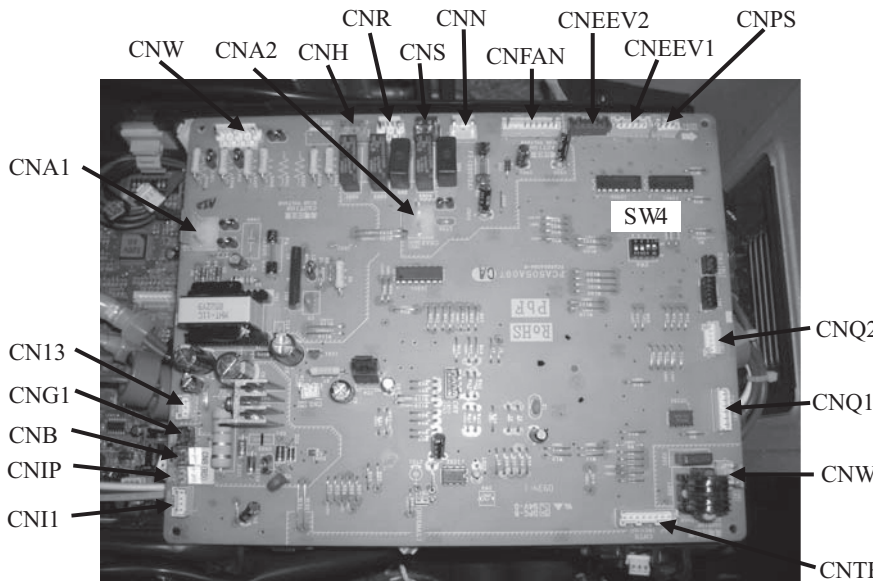
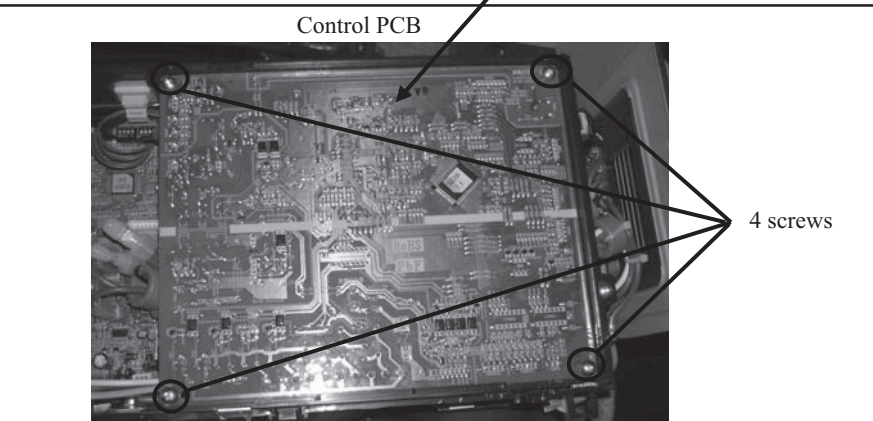
2. Open the control box cover.

Note: Be sure to do this work after elapsing 3 minutes from power OFF.



3. Loosen 4 screws

4. Disconnect all connectors and remove the control PCB



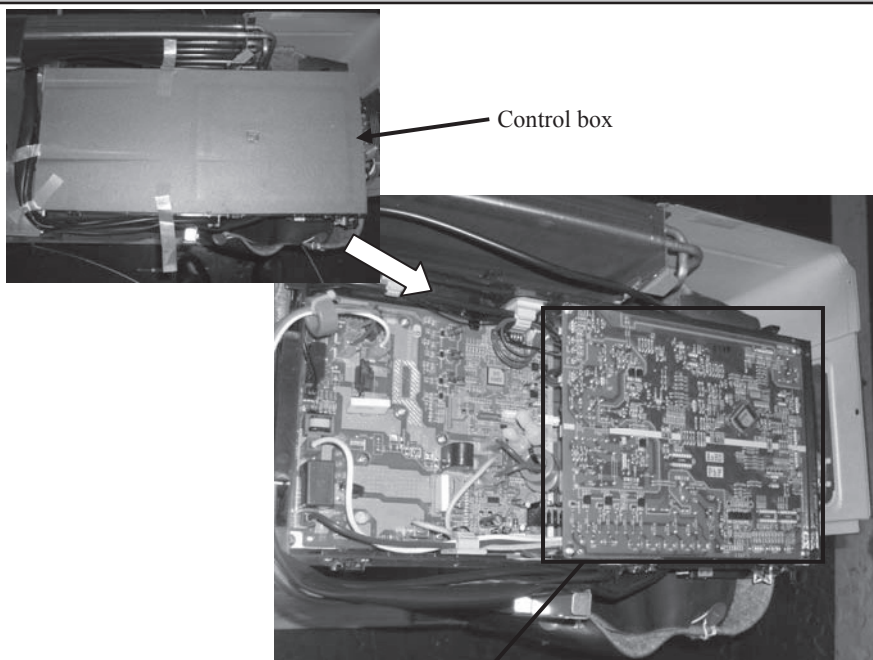
FDCW71VNX (Service code /M~)

Control PCB (PWB1)

1. Open the top panel

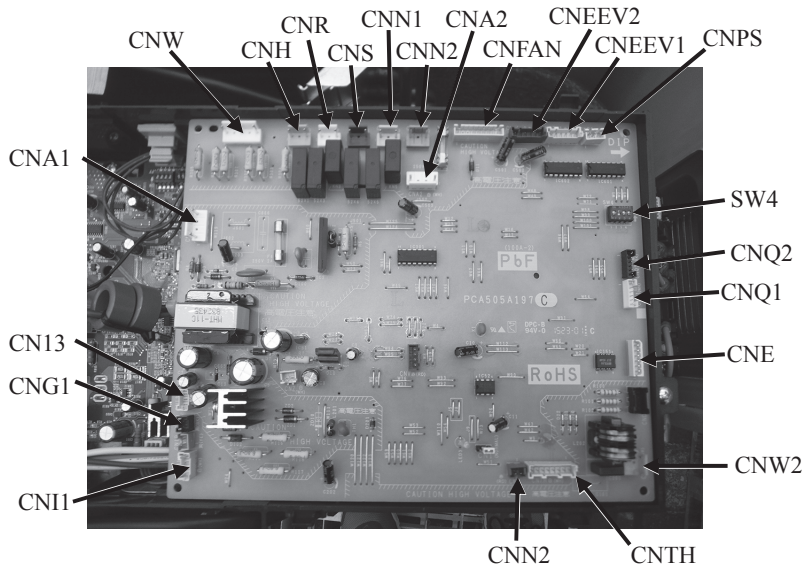
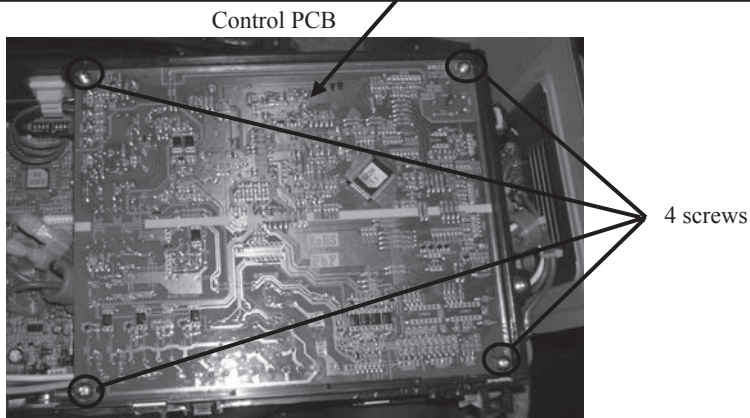
2. Open the control box cover.

Note: Be sure to do this work after elapsing 3 minutes from power OFF.



3. Loosen 4 screws

4. Disconnect all connectors and remove the control PCB

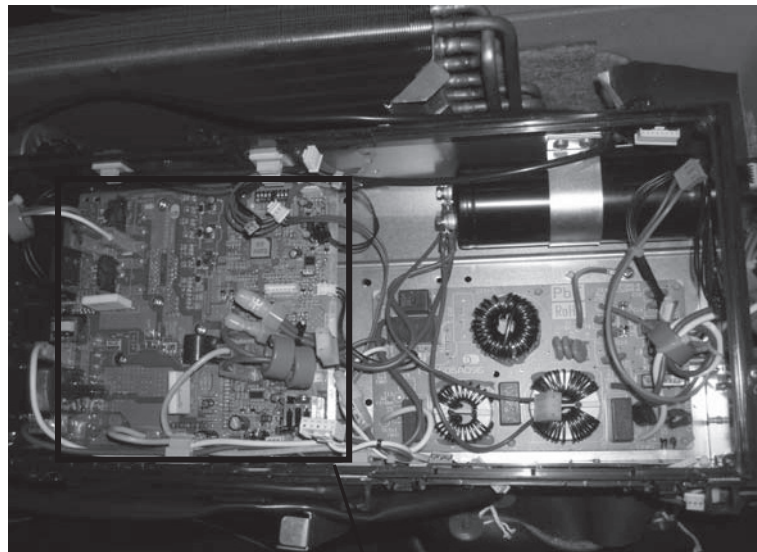


FDCW71VNX (Service code /1, /L only)

Inverter PCB (PWB2)

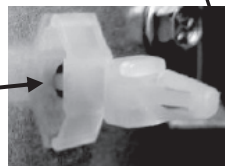
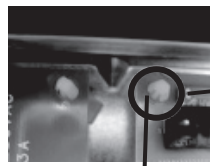
1. Remove control PCB first

Note: Be sure to do this work after elapsing 3 minutes from power OFF.

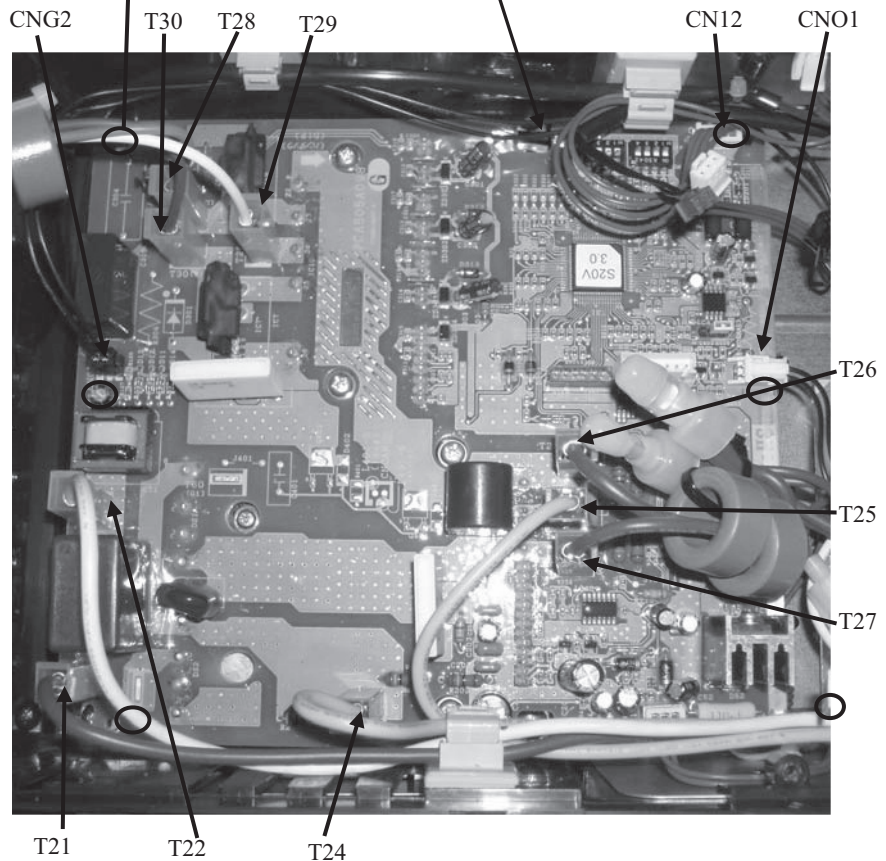


2. Disconnect the connectors

3. Pinch the head of locking support and remove inverter PCB



Inverter PCB

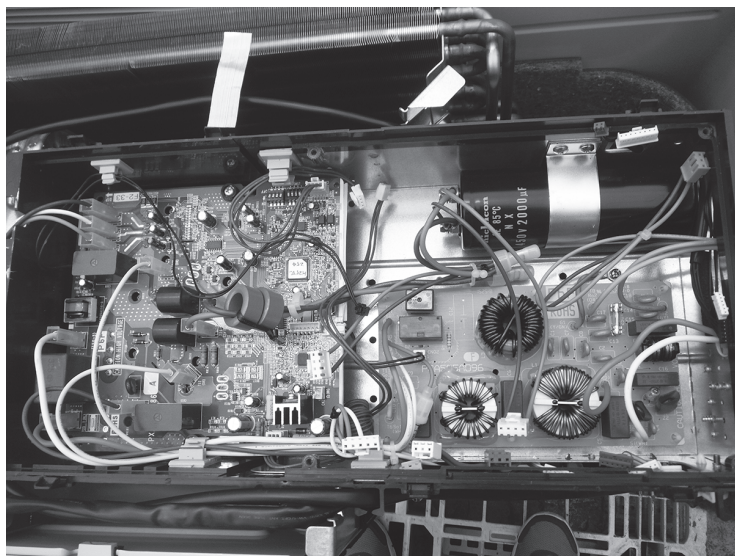


FDCW71VNX (Service code /M~)

Inverter PCB (PWB2)

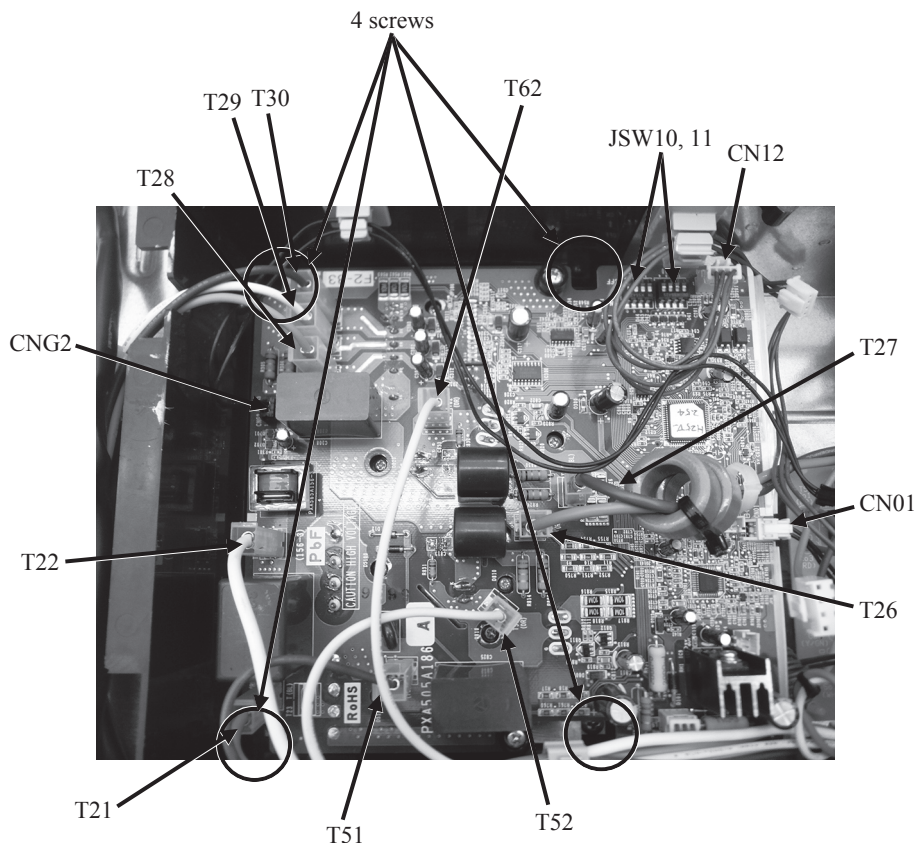
1. Remove control PCB first

Note: Be sure to do this work after elapsing 3 minutes from power OFF.



2. Disconnect the connectors

3. Loosen 4 screws and remove inverter PCB.

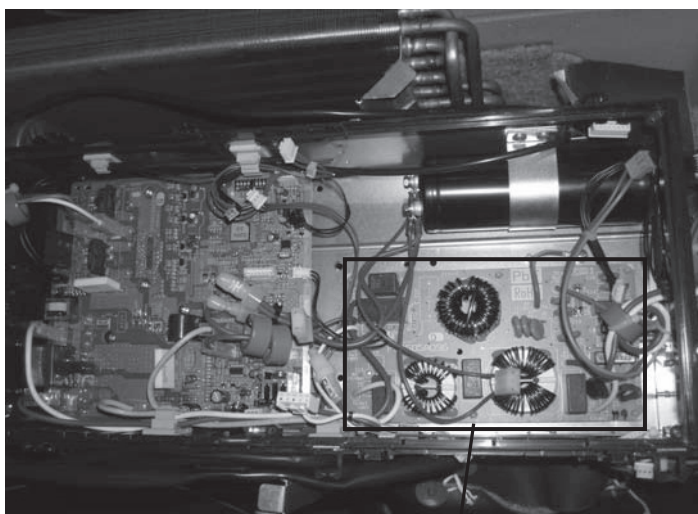


FDCW71VNX

Noise filter PCB (PWB3)

1. Remove control PCB first

Note: Be sure to do this work after elapsing 3 minutes from power OFF.



3. Cut straps

4. Disconnect the connectors CNA2 and CNO2 on the noise filter PCB

5. Unscrew and remove the grounding cable (T4)

6. Disconnect the connectors and terminals as follows

1) On the inverter PCB

T21 for T5

T22 for T6

2) On the control PCB

CNW for T10 and T11

3) On the terminal block

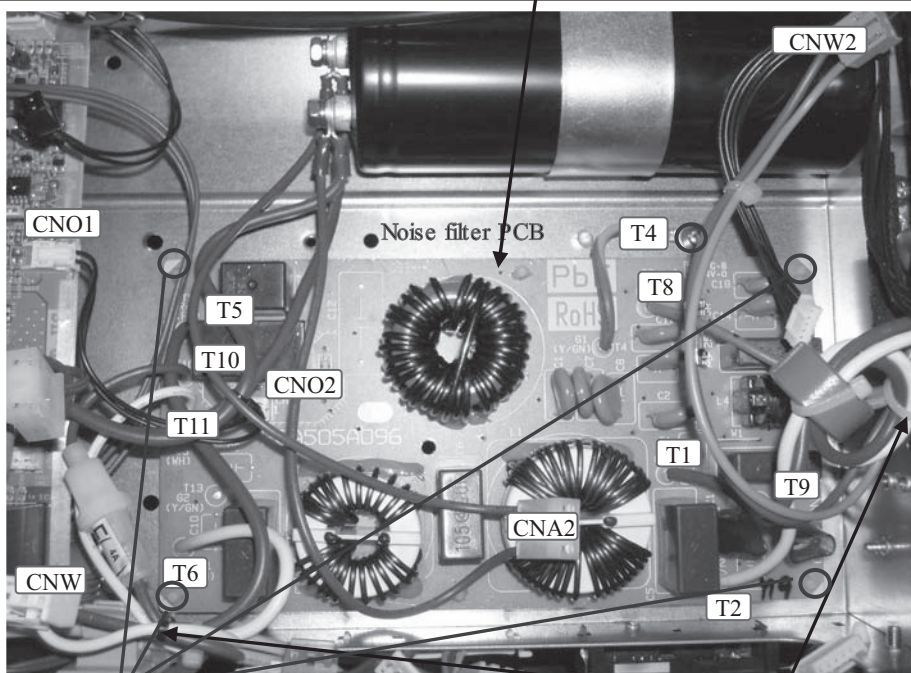
L1 for T1

N for T2

1 for T8

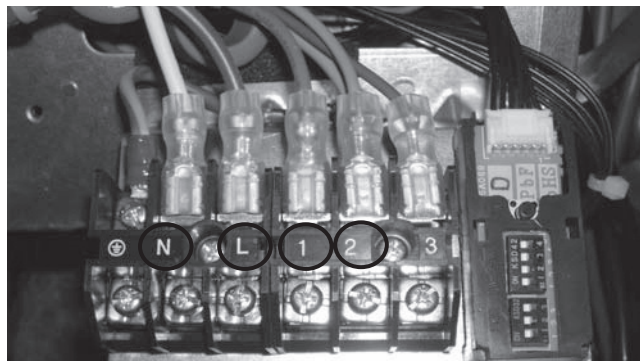
2 for T9

7. Pinch the head of locking support and remove the noise filter PCB.



4 locking supports

Straps

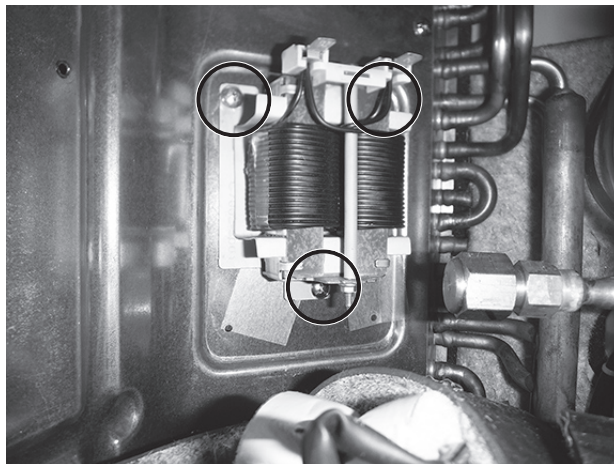


FDCW71VNX (Service code /1, /L only)

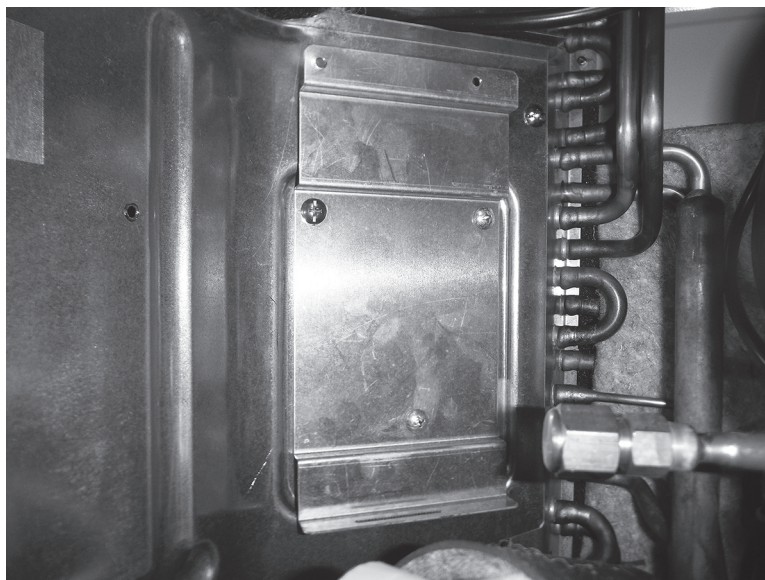
Reactor PCB (PWB7)

- 1. Disconnect the connectors
- 2. Loosen 3 screws and remove reactor

Note: Replace at the same time as the Inverter PCB.



- 3. Secure to bracket with three screws.
(Use the screws removed in Step2)



FDCW71VNX (Service code /1, /L only)

Reactor PCB (PWB7)

4. Insert the bottom of the reactor PCB into the bracket mounted in step 3, and secure it with two screws. (refer to Fig A)

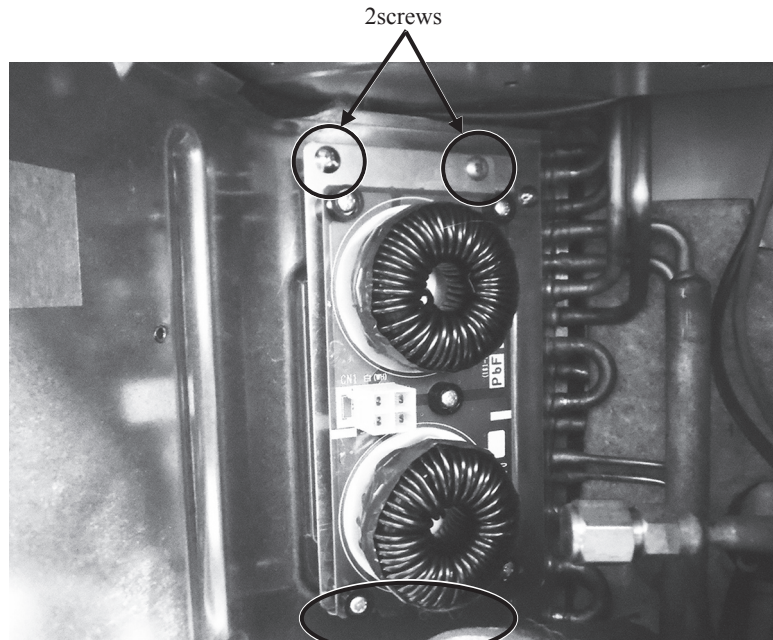
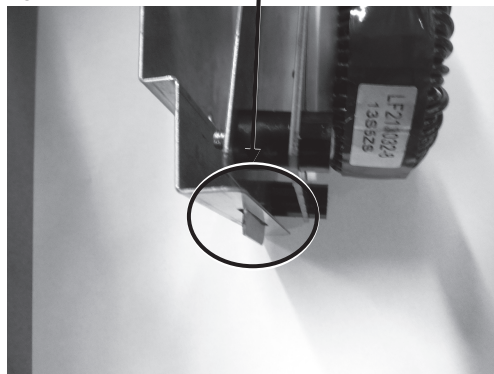
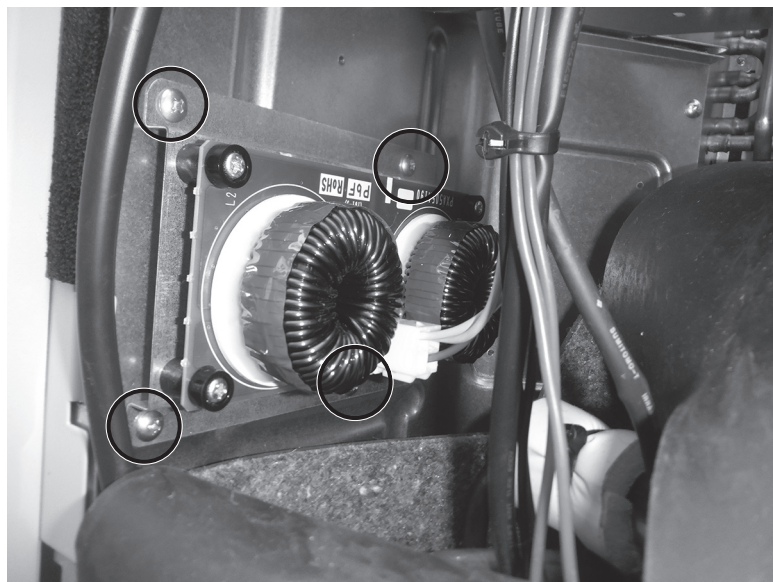


Fig A



FDCW71VNX (Service code /M~)**Reactor PCB (PWB7)**

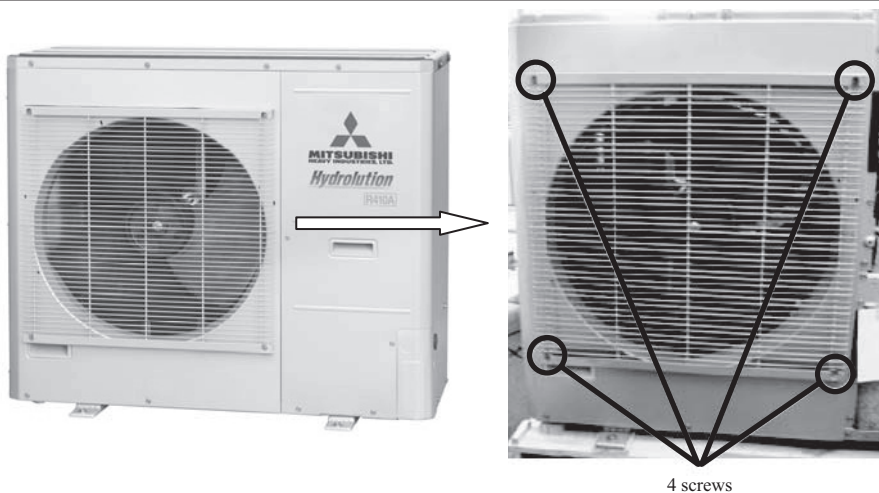
1. Disconnect the connector
2. Loosen 4 screws and remove reactor PCB with bracket.



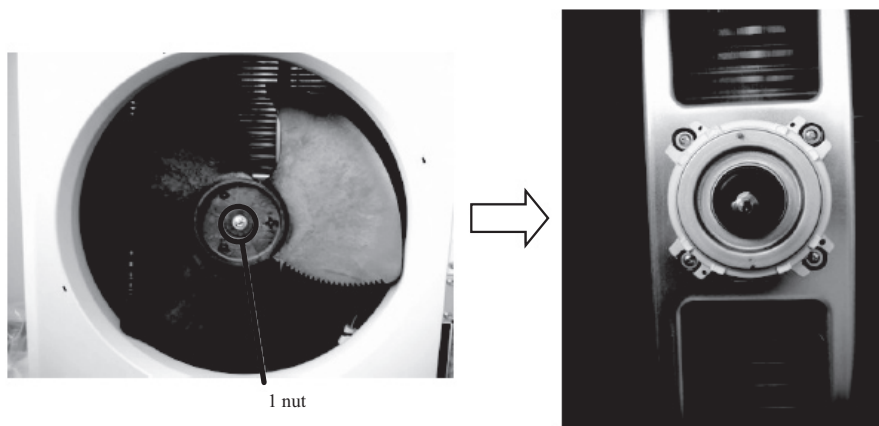
FDCW100VNX

Fan and fan motor (FMo1)

1. Loosen 4 screws and remove the fan grille

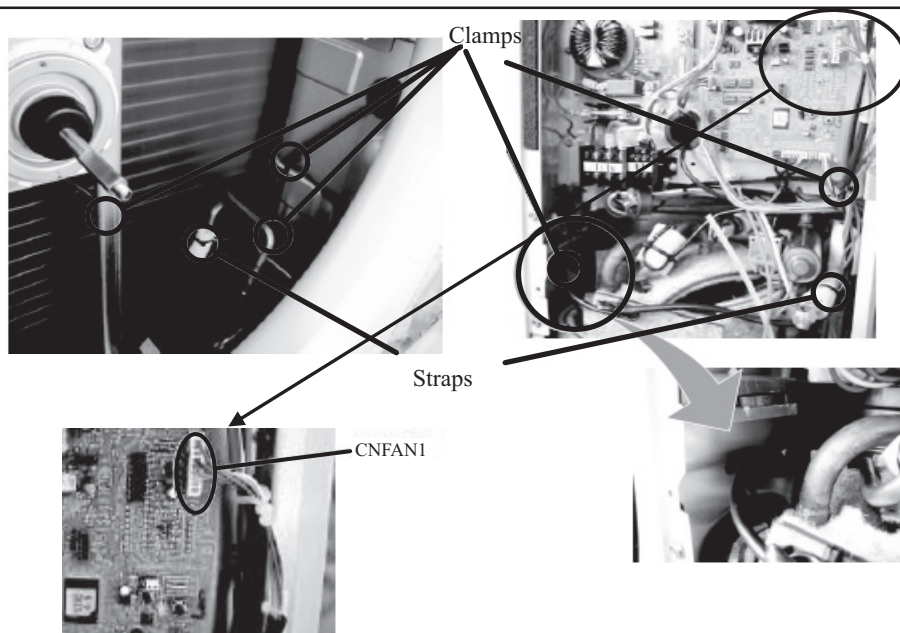


2. Loosen the nut and remove the fan propeller



3. Detach the clamps and cut off the straps

4. Disconnect the connector of CNFANI

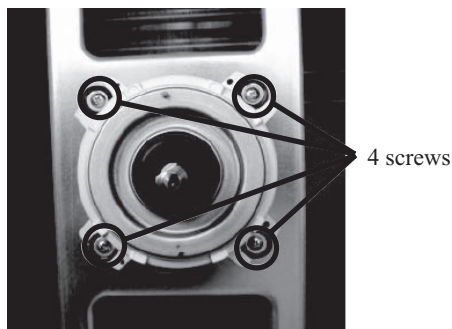


FDCW100VNX

Fan and fan motor (FMo1)

5. Loose 4 screws

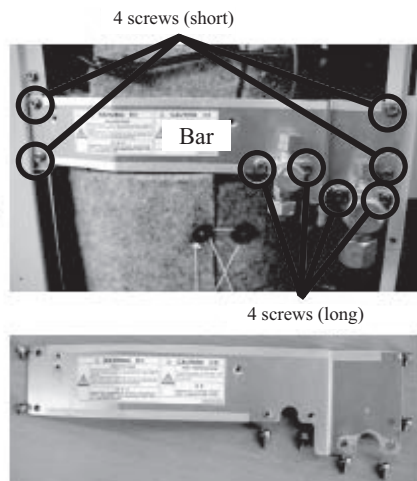
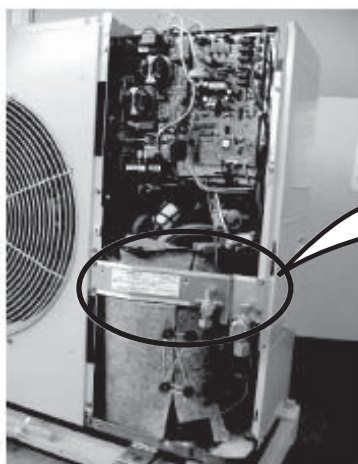
6. Remove the fan motor



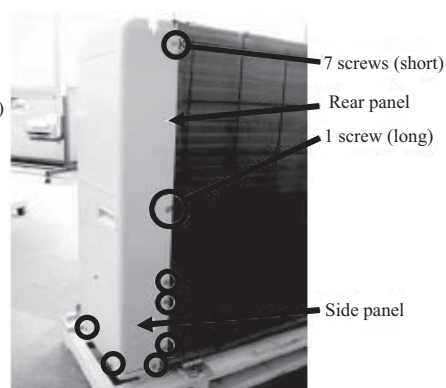
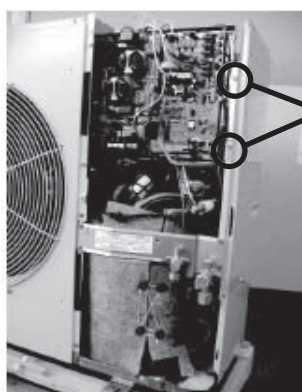
Compressor (CM)

1. Loosen screws and remove the service panel and top panel.

2. Loosen 4 short screws and 4 long screws and then remove the bar for easy access to the compressor.



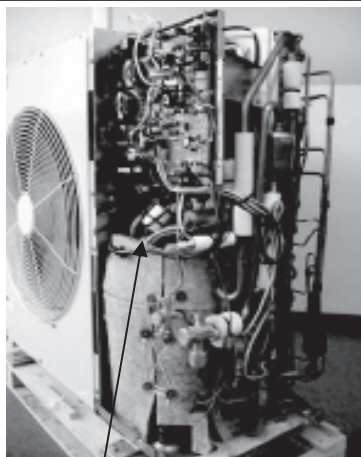
3. Loosen screws and remove the side panel



FDCW100VNX

Compressor (CM)

- 4. Remove the top insulation
- 5. Remove the terminal cover
- 6. Disconnect the fasten terminal connectors from compressor.
 U: Red cable
 V: White cable
 W: Blue cable



Top Insulation

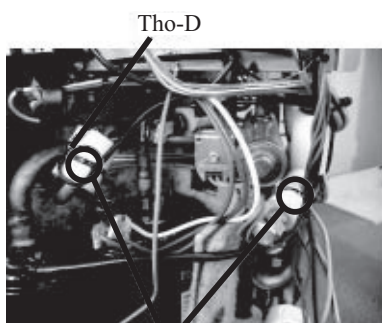


Terminal cover



Fasten terminal

- 7. Cut off the strap and pull out the sensor (Tho-D)

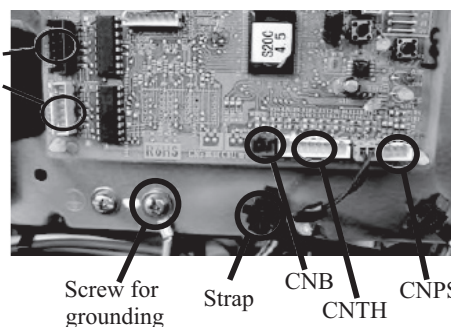
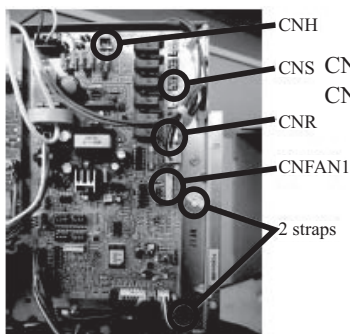


2 straps

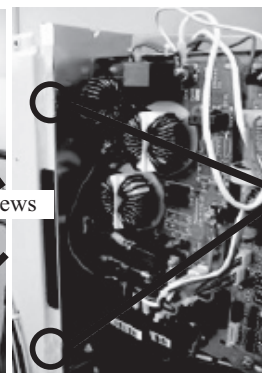
- 8. Remove the control unit for easy replacement work of compressor according to following procedure.

- 1) Disconnect all connectors shown in the photo
- 2) Cut off the straps
- 3) Unscrew and disconnect the grounding cable
- 4) Loosen the screws shown in the photo.
- 5) Remove the control unit.

Note: Be sure to do above work after elapsing 3 minutes from power OFF.



Screws



Screws



FDCW100VNX

Compressor (CM)

9. Untie the strings and remove the insulations

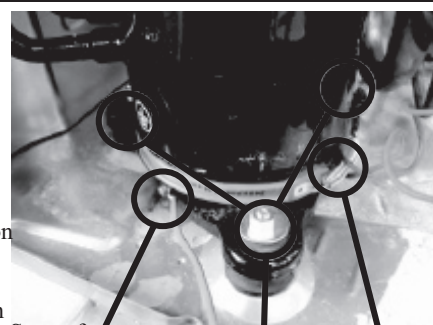
10. Unscrew and disconnect the grounding cable

11. Loosen 3 nuts of compressor fixing bolts



Upper insulation

Lower insulation



Screw for grounding

3 nuts of compressor fixing bolts

Crankcase heater

12. Disconnect the pipes for suction and discharge gas

13. Remove the compressor



Suction gas pipe

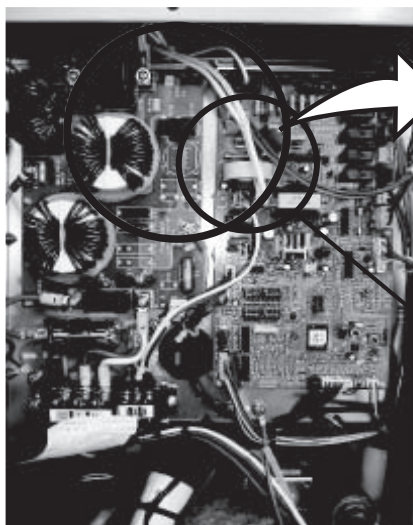
Discharge gas pipe

Control PCB (PWB1)

1. Unscrew and disconnect the cable

2. Cut the straps and take the cable out from CT hole as shown in the photo.

Note: Be sure to do this work after elapsing 3 minutes from power OFF.



1 screw

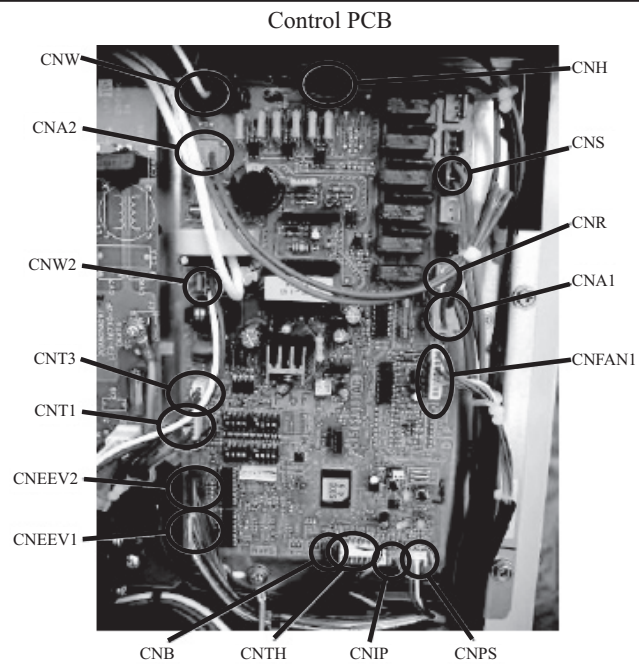
2 straps



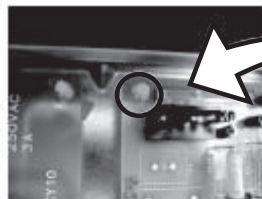
FDCW100VNX

Control PCB (PWB1)

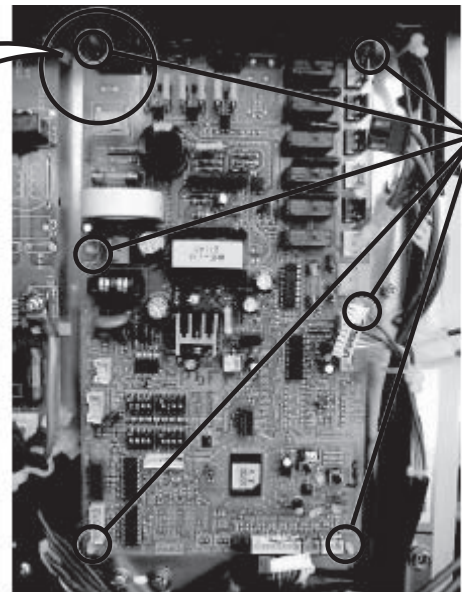
3. Disconnect all connectors



4. Pinch the head of locking supports and remove the control PCB.



Locking support



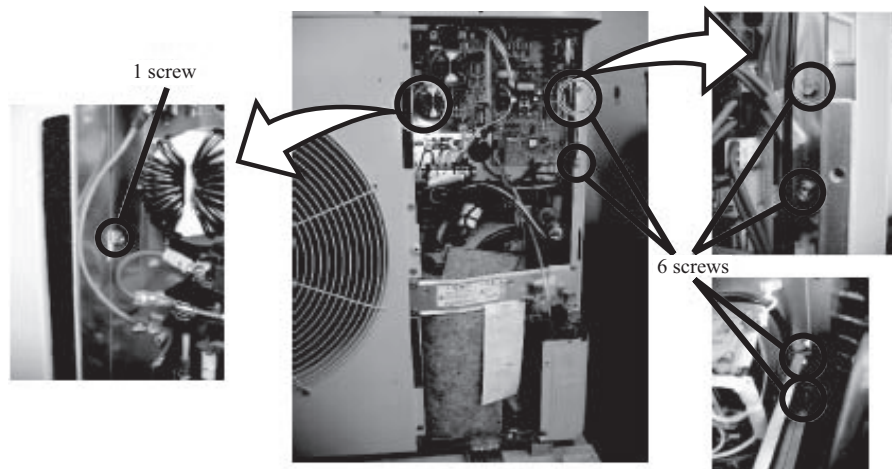
6 locking supports.

FDCW100VNX

Inverter PCB (PWB2)

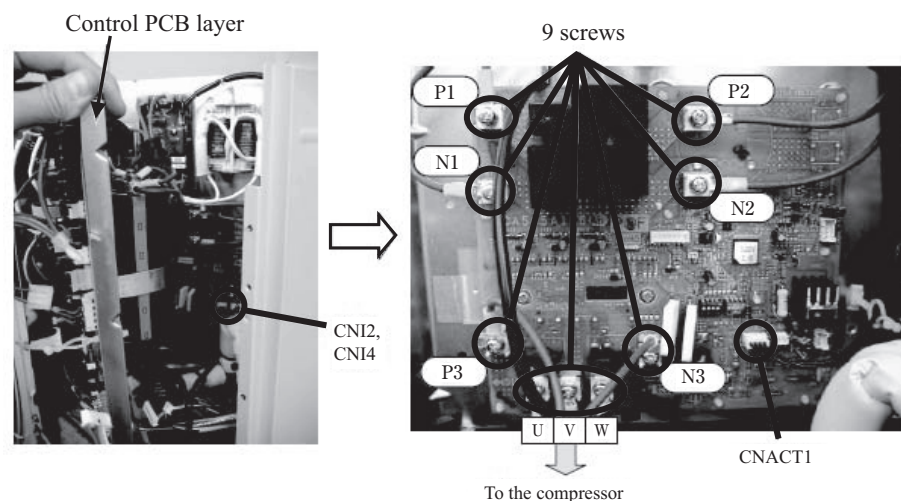
1. Loosen 7 screws and remove the control PCB layer.

Note: Be sure to do this work after elapsing 3 minutes from power OFF.

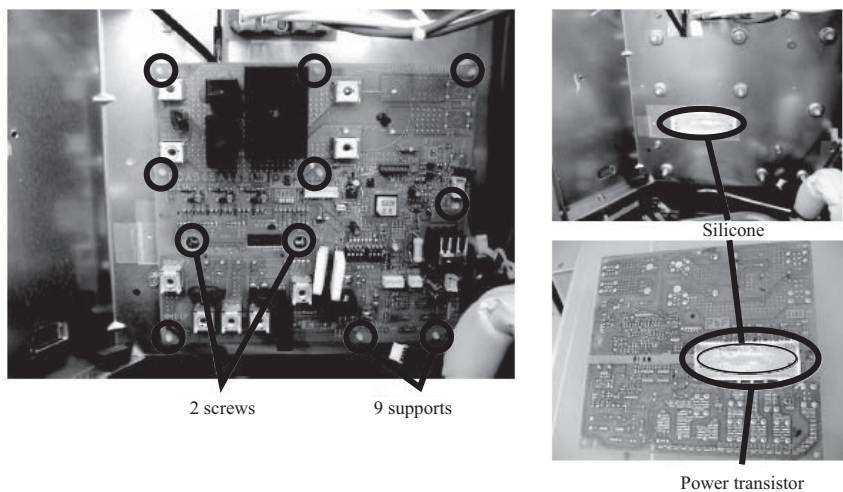


2. Disconnect the connectors of CNI2, CNI4 and CNACT1

3. Loosen 9 screws and disconnect the cables



4. Loosen 2 screws and pinch the heads of 9 locking supports and then remove inverter PCB

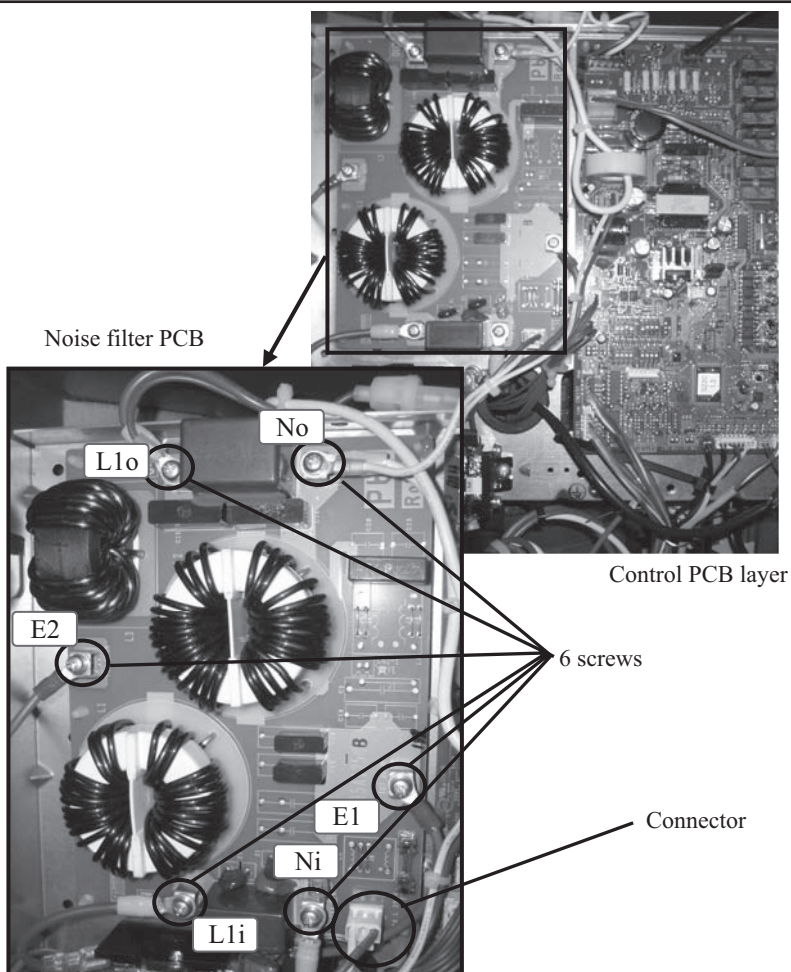


FDCW100VNX

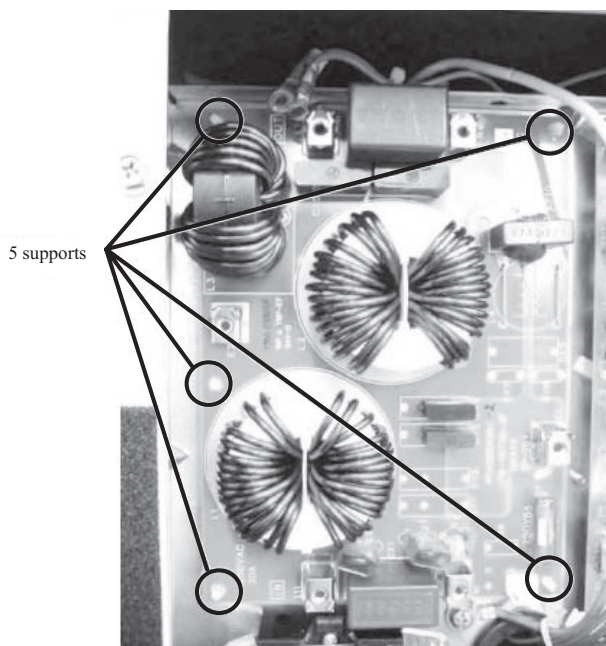
Noise filter PCB (PWB3)

1. Loosen 6 screws and disconnect the cables
2. Disconnect the connector

Note: Be sure to do this work after elapsing 3 minutes from power OFF.



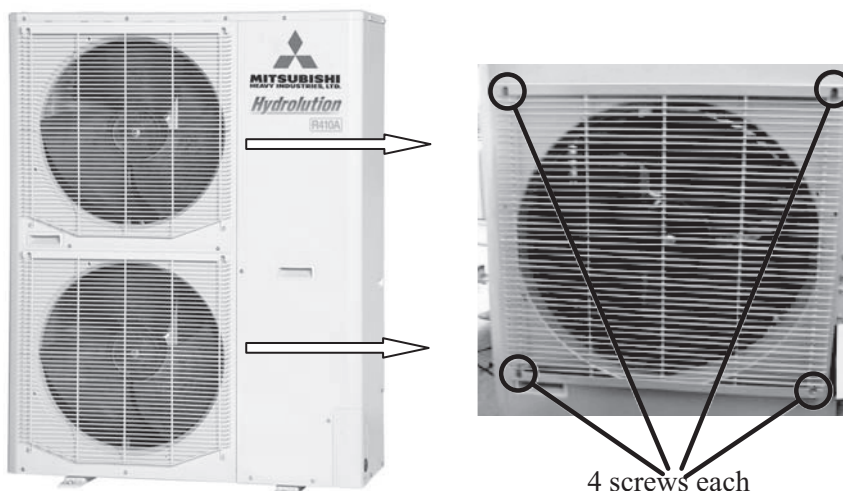
3. Pinch the head of locking support and remove the noise filter PCB



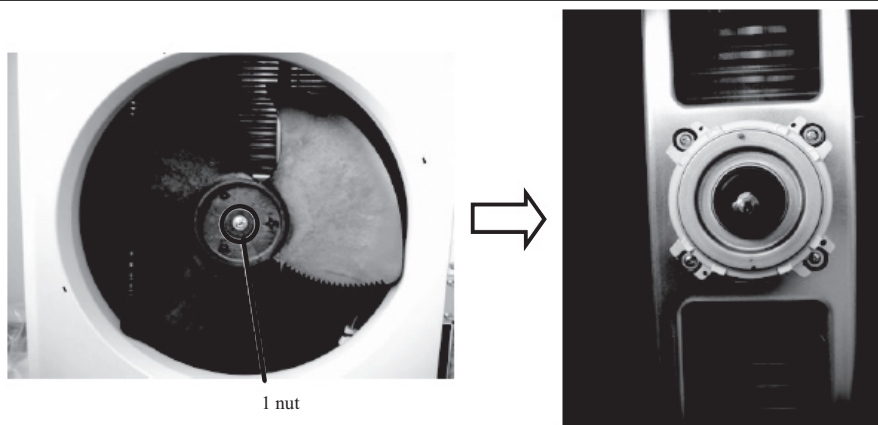
FDCW140VNX

Fan and fan motor (FMo1 & FMo2)

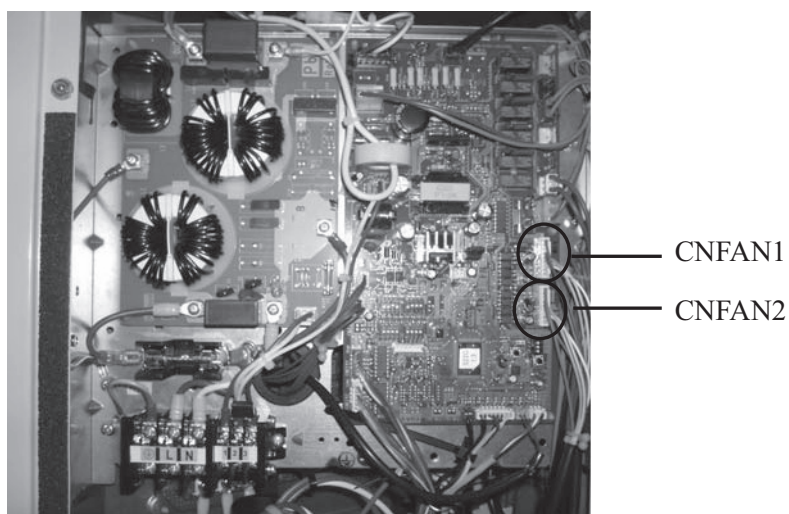
1. Loosen the screws and remove the fan grille for upper fan (FMo1) and/or lower fan (FMo2).



2. Loosen the nut and remove the fan propeller for upper fan (FMo1) and/or lower fan (FMo2)



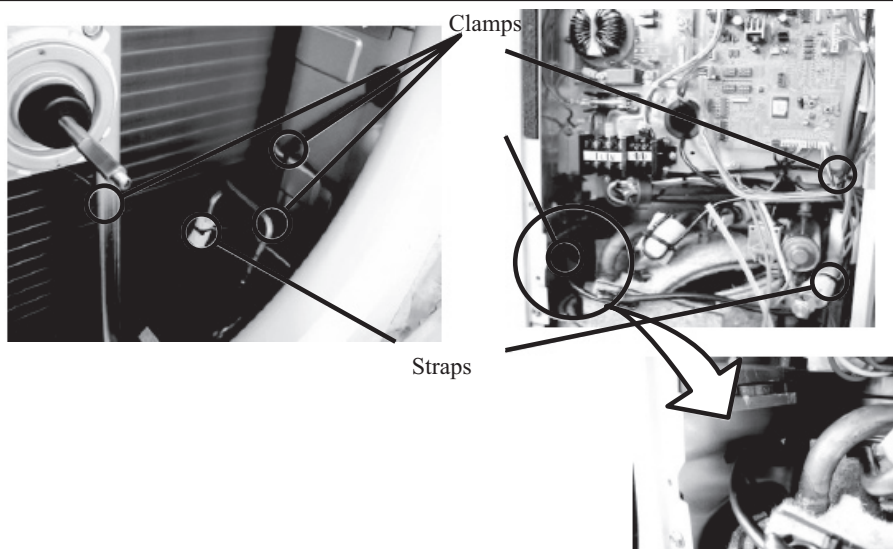
3. Disconnect the connector of CNFAN1 (for FMo1) and/or CNFAN2 (for FMo2)



FDCW140VNX

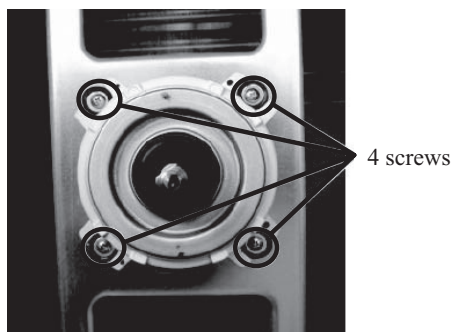
Fan and fan motor (FMo1 & FMo2)

4. Detach the clamps and cut off the straps



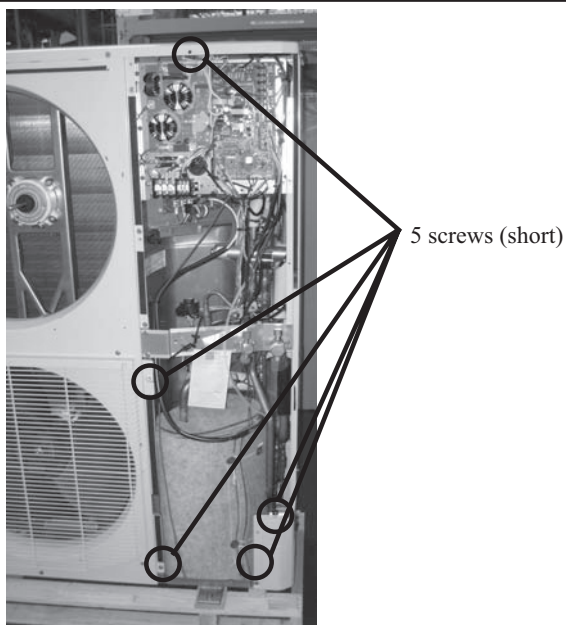
5. Loosen 4 screws

6. Remove the fan motor (FMo1 and/or FMo2)

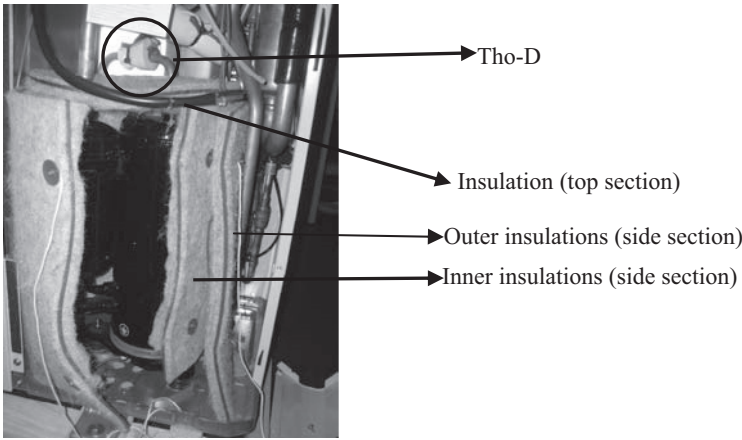
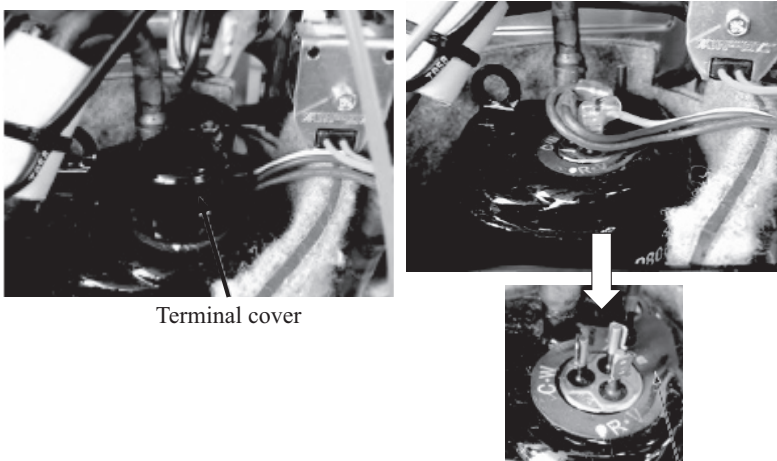
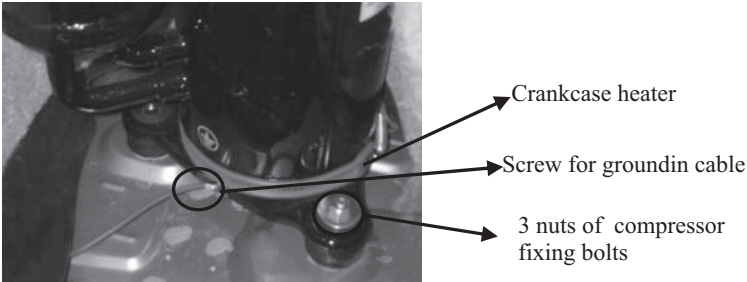
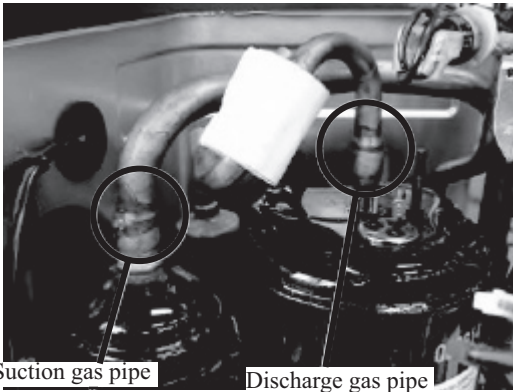


Compressor (CM)

1. Loosen 5 screws and remove the service panel



FDCW140VNX

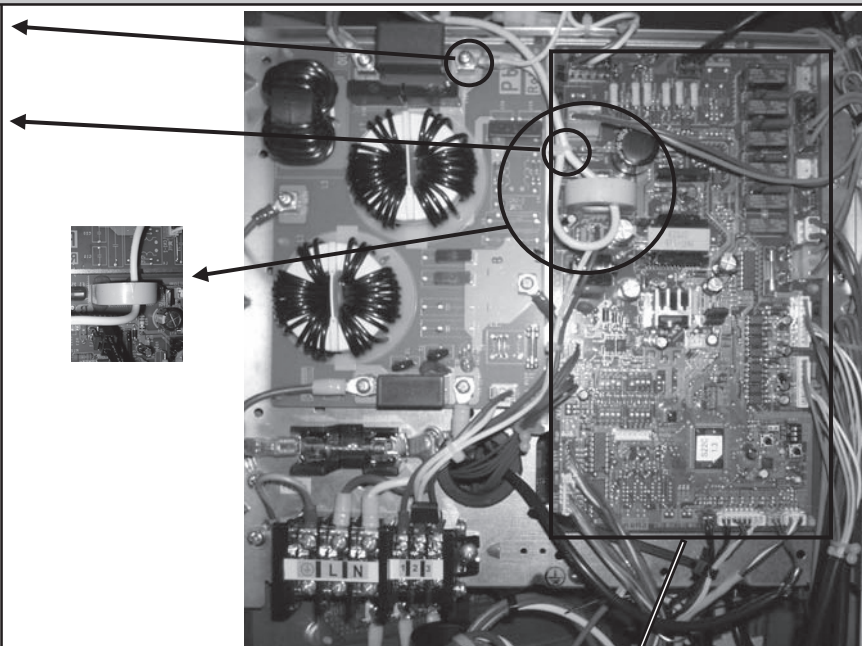
| Compressor (CM) | |
|--|--|
| <p>2. Untie the strings and remove the top and side insulations</p> <p>3 Cut off the strap and pull out the sensor (Tho-D)</p> |  |
| <p>4. Remove the terminal cover</p> <p>5. Disconnect the fasten connectors from compressor. U: Red cable V: White cable W: Blue cable</p> |  <p style="text-align: center;">Terminal cover</p> |
| <p>6. Remove the crankcase heater</p> <p>7. Unscrew and disconnect the grounding cable</p> <p>8. Loosen 3 nuts of compressor fixing bolts</p> |  |
| <p>9. Disconnect the pipes for suction and discharge gas</p> <p>10. Remove the compressor</p> |  <p style="text-align: center;">Suction gas pipe Discharge gas pipe</p> |

FDCW140VNX

Control PCB (PWB1)

- 1. Unscrew and disconnect the cable
- 2. Cut the strap and take the cable out from CT hole as shown in the photo

Note: Be sure to do this work after elapsing 3 minutes from power OFF.

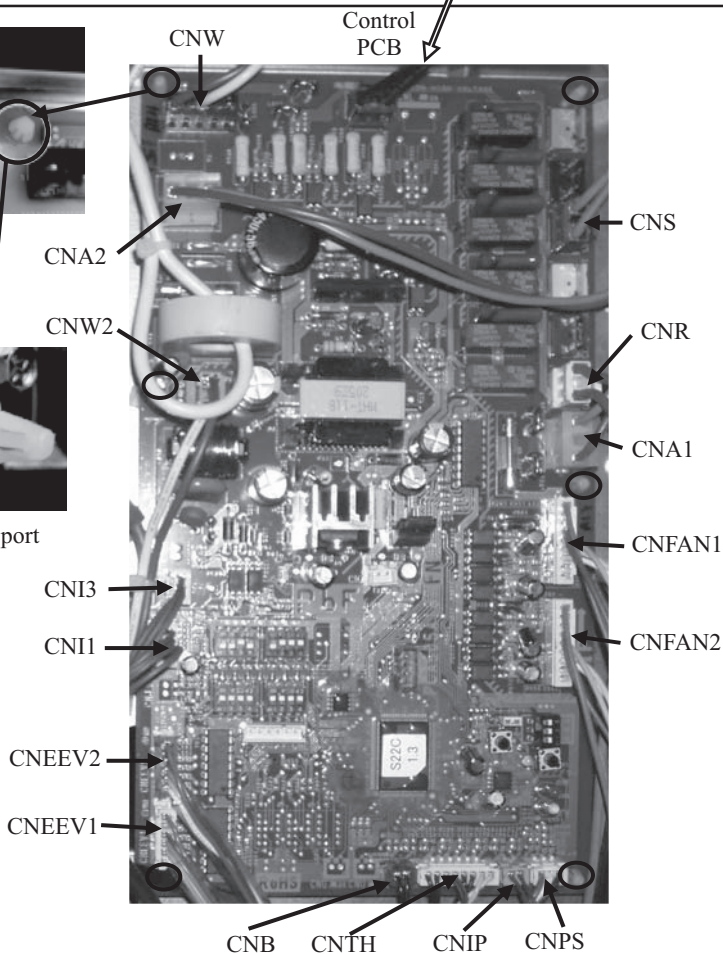


Control PCB layer

- 3. Disconnect all connectors
- 4. Pinch the head of locking support and remove the control PCB.



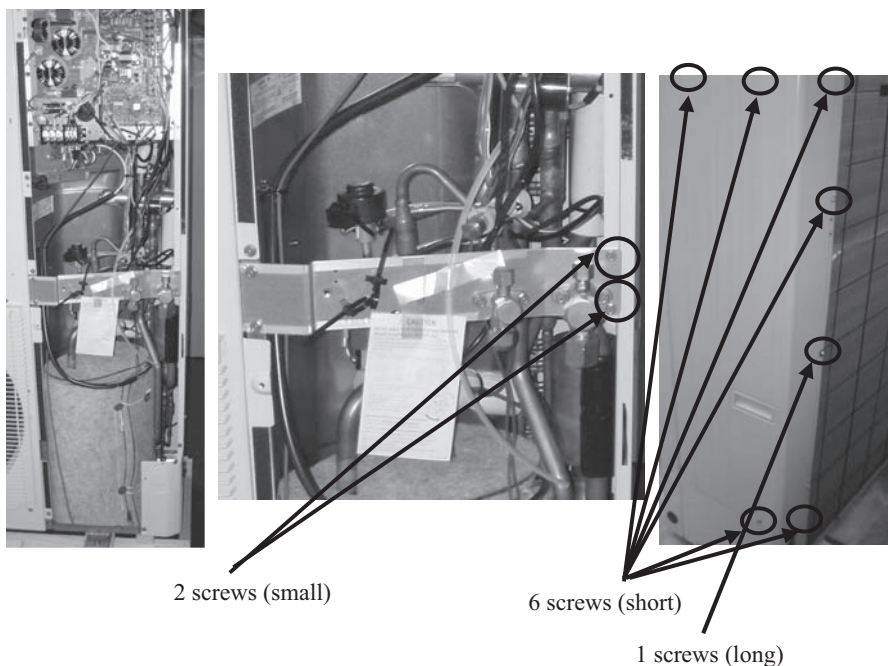
Locking support



FDCW140VNX

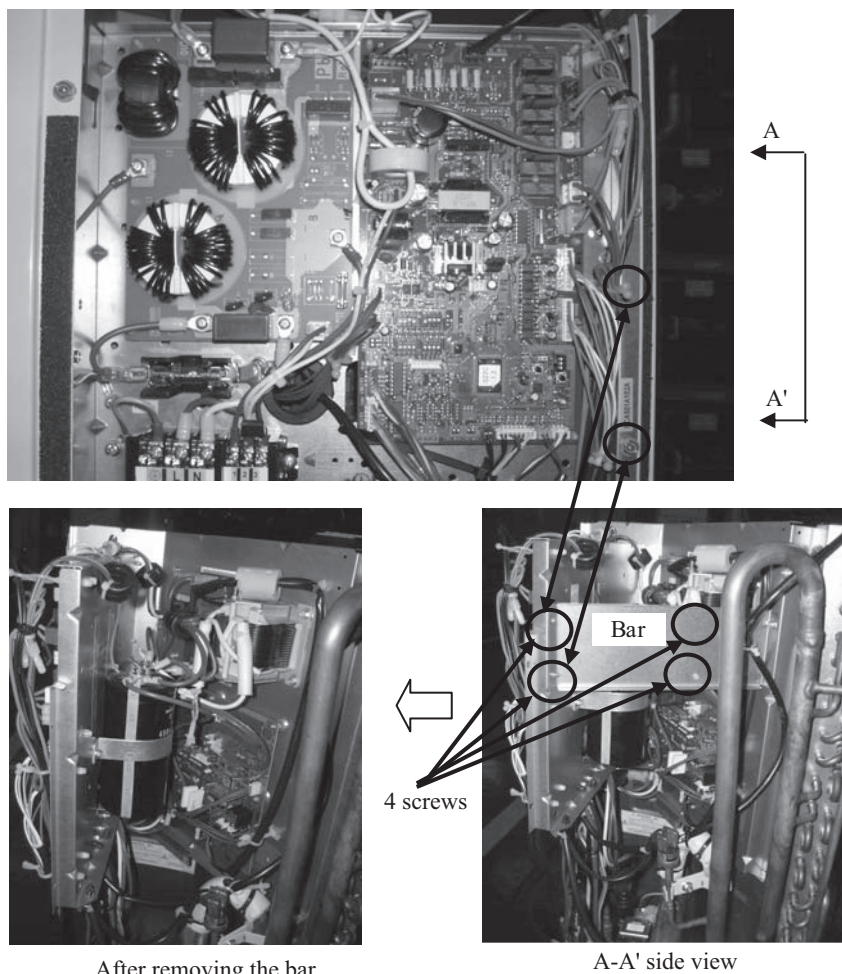
Inverter PCB (PWB2)

- 1. Loosen 2 screws on the bar
- 2. Loosen 7 screws and remove side pannel



- 3. Loosen 4 screws and remove the bar for easy access to the inverter PCB layer

Note: Be sure to do this work after elapsing 3 minutes from power OFF.



FDCW140VNX

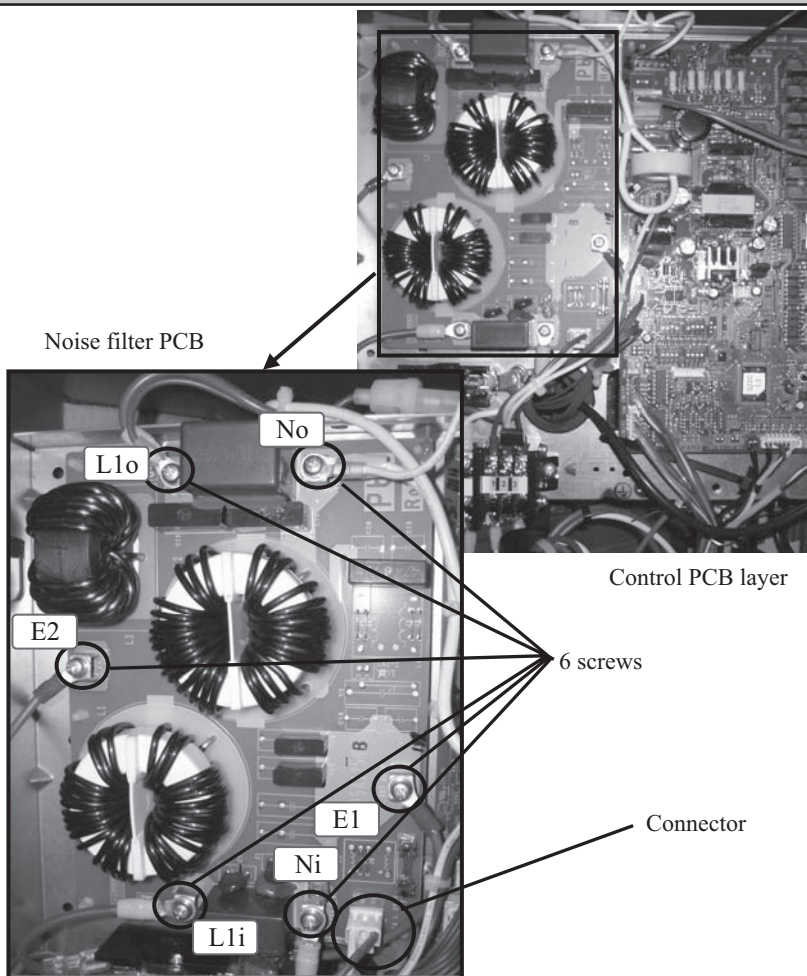
| Inverter PCB (PWB2) | |
|---|---|
| <p>4. Loosen a screw on the capacitor and disconnect the red and blue cables which are connected to the control PCB</p> <p>5. Disconnect the fasten terminals of red and white cables which are connected to the control PCB.</p> | |
| <p>6. Remove the control PCB layer by lifting it up.</p> | |
| <p>7. Disconnect the connectors of CNI2, CNI4 and CNACT1</p> <p>8. Loosen 9 screws and disconnect the cables</p> | <p style="text-align: center;">Control PCB layer</p> <p style="text-align: center;">9 screws</p> <p style="text-align: center;">CNI2, CNI4</p> <p style="text-align: center;">CNACT1</p> <p style="text-align: center;">To the compressor</p> |
| <p>9. Loosen 2 screws and pinch the heads of 9 locking supports and then remove the inverter PCB.</p> | <p style="text-align: center;">2 screws</p> <p style="text-align: center;">9 supports</p> <p style="text-align: center;">Silicone</p> <p style="text-align: center;">Power transistor</p> |

FDCW140VNX

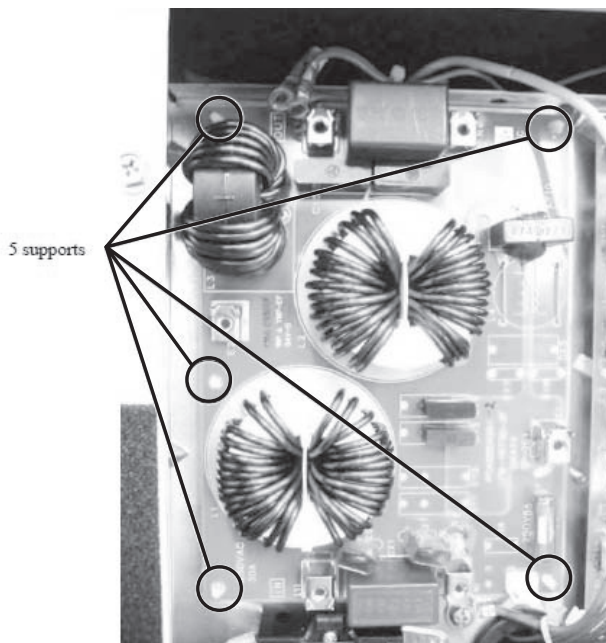
Noise filter PCB (PWB3)

1. Loosen 6 screws and disconnect the cables
2. Disconnect the connector

Note: Be sure to do this work after elapsing 3 minutes from power OFF.



3. Pinch the head of locking support and remove the noise filter PCB



Components

Indoor unit

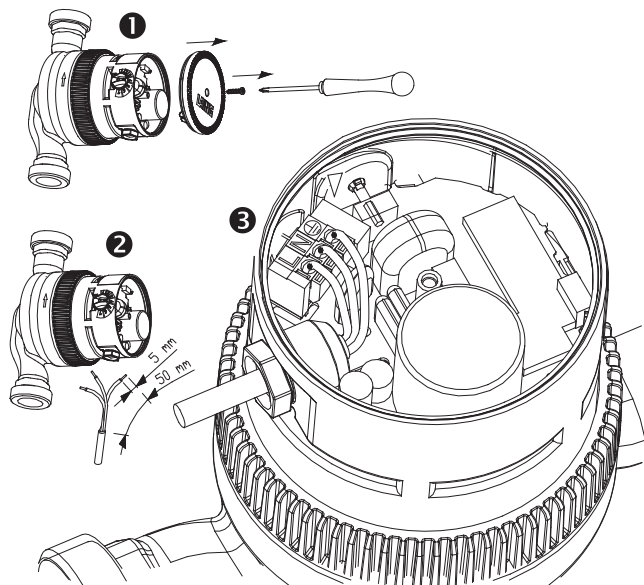
Circulation pump (GP10)

General

NOTE

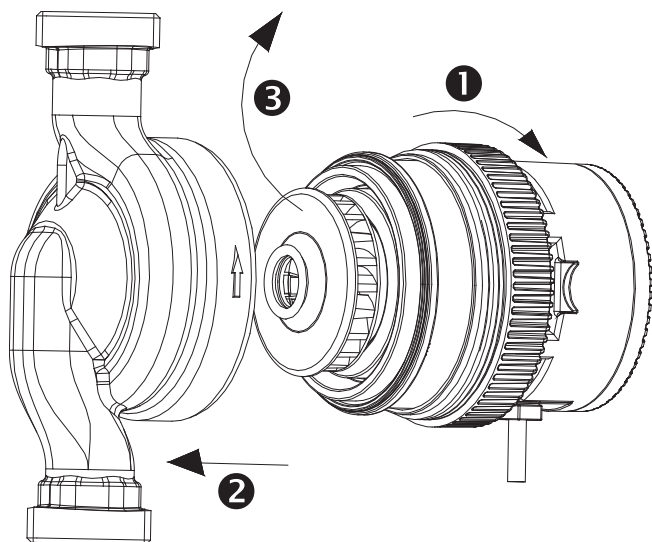
The pump must not be operated dry, as this damages the bearings extremely quickly.

Electrical connections



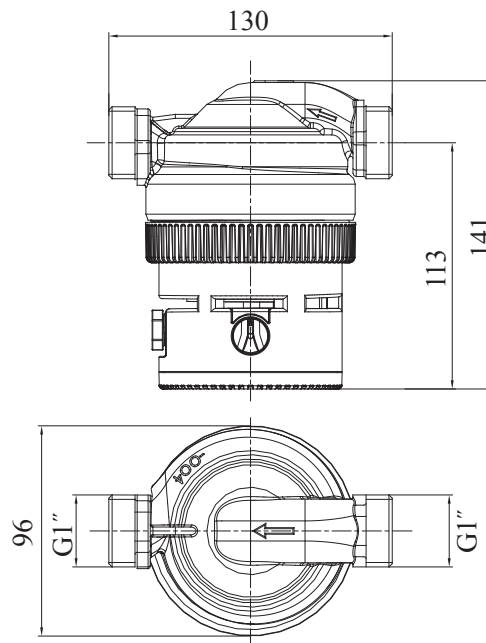
When the electrical connection is correct, the indicator lamp illuminates green continuously.

Disassembly



Dimensions

<All models>



Troubleshooting

| Indicator lamp | Cause | Action |
|----------------------|--|---|
| Off | The pump is not connected or is incorrectly connected. | - Check the connection. - Power failure. Check power supply and fuses. |
| 1 × short + 1 × long | Low voltage. | - Check supply voltage. |
| 3 × short + 1 × long | Temperature too high. | - The pump restarts automatically.* - Check max. system temperature. |
| 5 × short + 1 × long | Pump blocked. | - Open and clean the pump. |

* The pump reduces the voltage automatically (the speed) at 105 °C, to stop completely at 125 °C. When the pump has cooled to 115 °C again, it restarts automatically.

Other faults:

| Problem | Cause | Action |
|------------------|--------------------|----------------------------|
| Noise from pump. | Air in the system. | - Vent the system. |
| | Dirt in the pump. | - Open and clean the pump. |
| | Worn bearings. | - Replace the pump. |

Technical specifications

Circulation pump

<HMA100V, HMA100VM>

| | |
|---------------------|-------------------|
| Max pressure height | 6 m |
| Max volume flow | 3000 ℓ/h |
| Min/max temperature | -10 °C* to +95 °C |
| Max system pressure | 6 bar |
| Connection | G1" Accessories |
| Length | 130 mm |
| Voltage | 200-240 V |
| Frequency | 50/60 Hz |
| Output | 9–80 W |

* Not frozen or condensed

<HMS140VA, HMS140V>

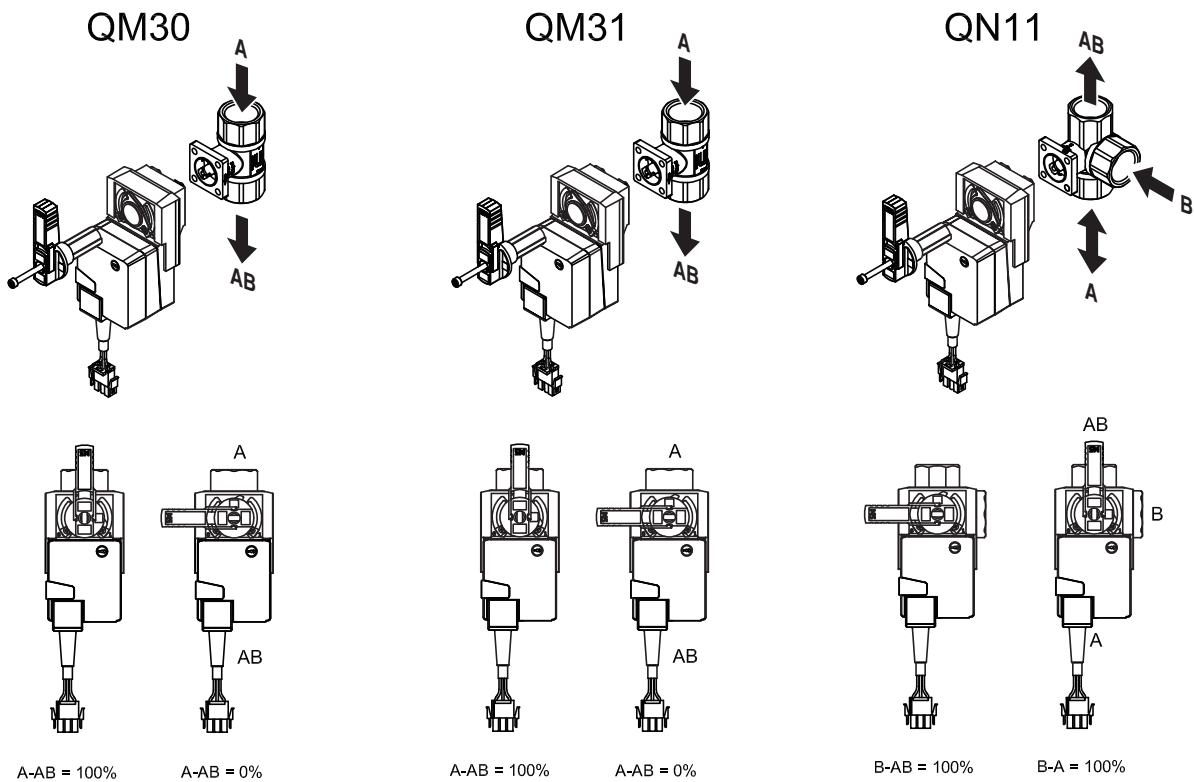
| | |
|---------------------|-------------------|
| Max pressure height | 7 m |
| Max volume flow | 3500 ℓ/h |
| Min/max temperature | -10 °C* to +60 °C |
| Max system pressure | 6 bar |
| Connection | G1" Accessories |
| Length | 130 mm |
| Voltage | 200-240 V |
| Frequency | 50/60 Hz |
| Output | 9–110 W |

* Not frozen or condensed

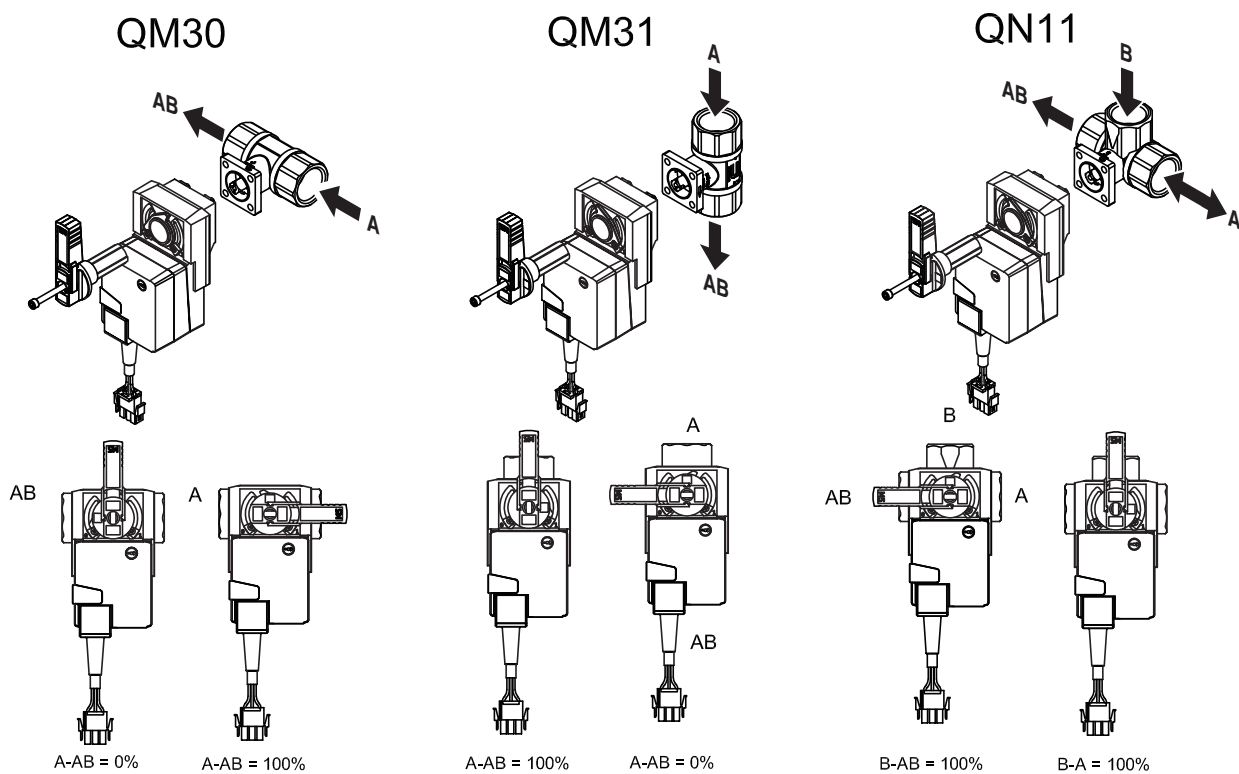
→ Pump capacity diagram
Refer to page 68

Shuttle valves

<HMA100V, HMA100VM>



<HMS140VA, HMS140V>

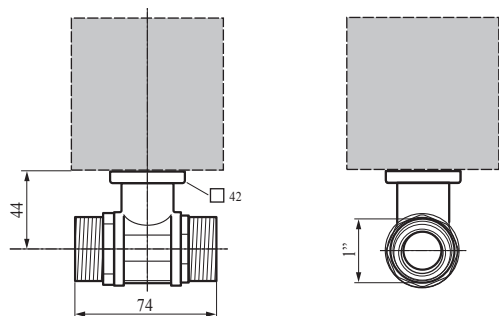


Technical data 2 way valve

V415B

| | |
|------------|---------|
| Connection | G1" ext |
| Length | 74 mm |
| KVS value | 8.6 |

Dimension 2 way valve

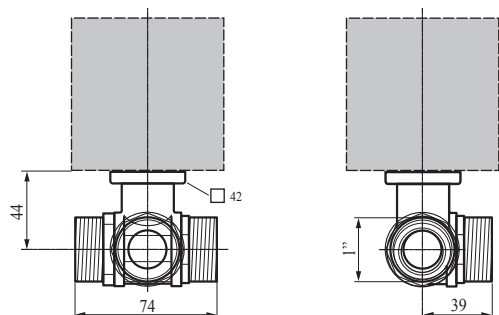


Technical data 3 way valve

V515B

| | |
|------------|---------|
| Connection | G1" ext |
| Length | 74 mm |
| KVS value | 4.5 |

Dimension 3 way valve

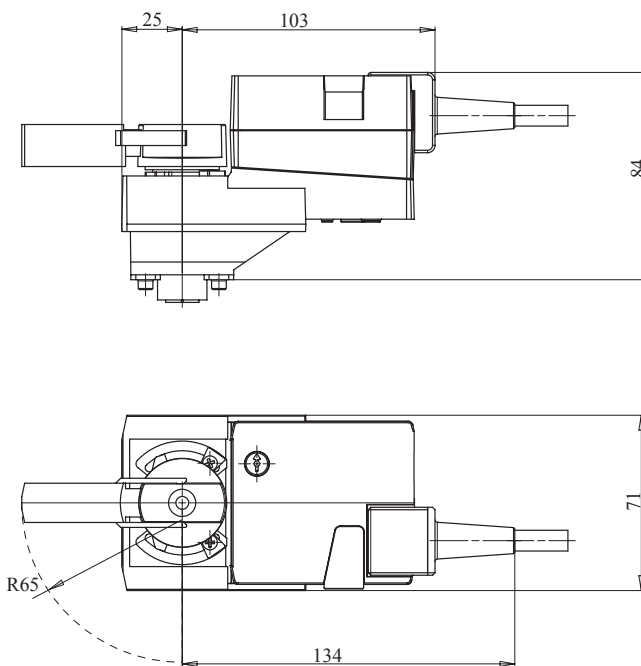


Technical specifications actuator

LR230A-002 LI

| | |
|------------------------|--------------------------|
| Voltage | AC 100-240 V |
| Frequency | 50/60 Hz |
| Output | 1.5 W |
| Electrical connections | 3 × 0.75 mm ² |
| Run time | 35 s / 90 ° |

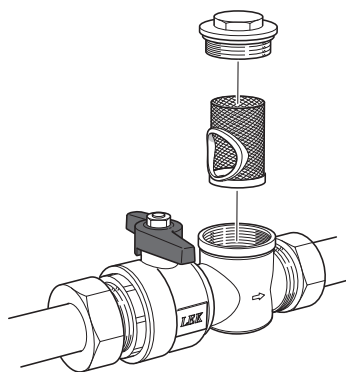
Dimension actuator



Particle filter (HQ1)

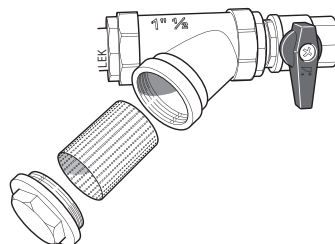
<HMA100V, HMA100VM>

| | |
|------------|---------------------|
| Mesh size | 0.6 mm ² |
| Connection | G1" ext |
| Length | 118 mm |
| KVS value | 8.6 |



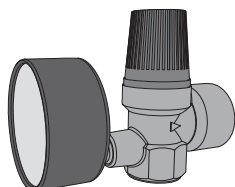
<HMS140VA, HMA140V>

| | |
|------------|----------------------|
| Mesh size | 0.25 mm ² |
| Connection | Rp1 1/2" int |
| Length | 102 mm |
| KVS value | 23 |



Safety valve (FL2)

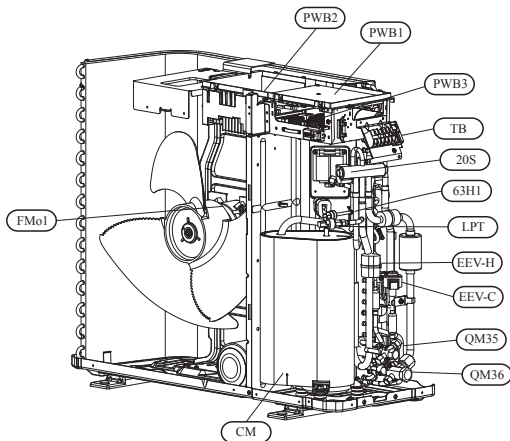
| | |
|-------------------|-----------|
| Connection inlet | G1/2" int |
| Connection outlet | G3/4" int |
| Opening pressure | 2.5 bar |



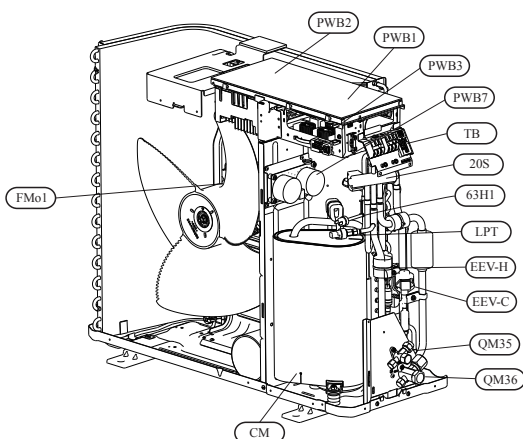
Outdoor unit

Component image

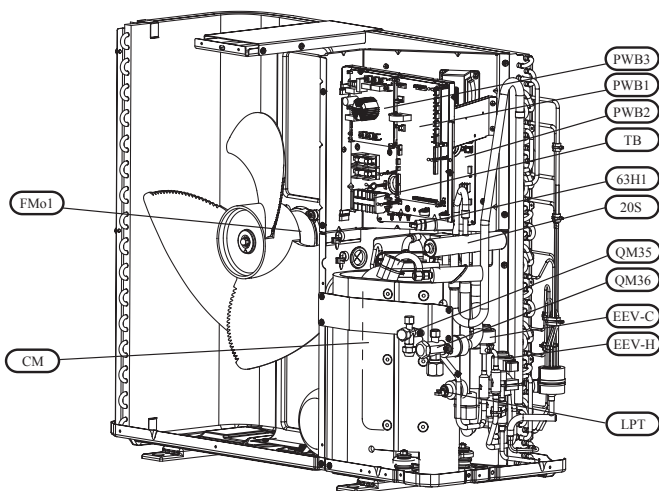
FDCW71VNX (Service code /1, /L)



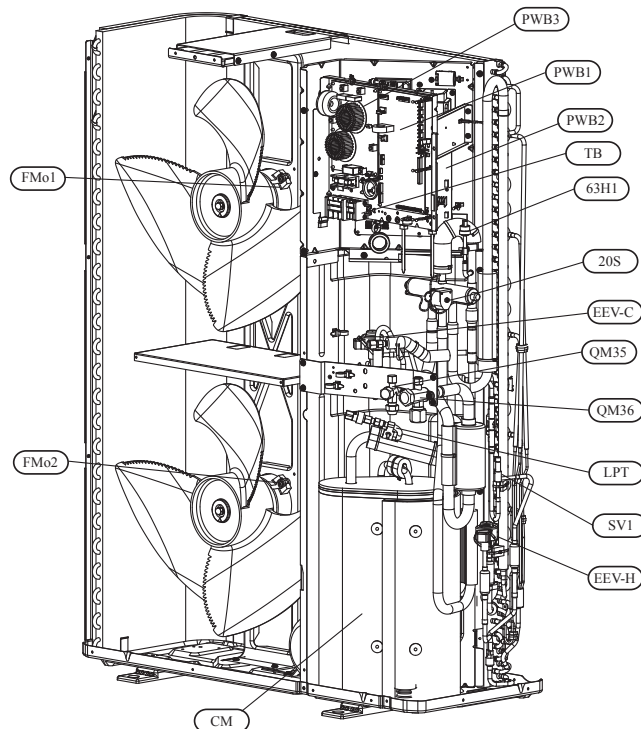
FDCW71VNX (Service code /M~)



FDCW100VNX



FDCW140VNX

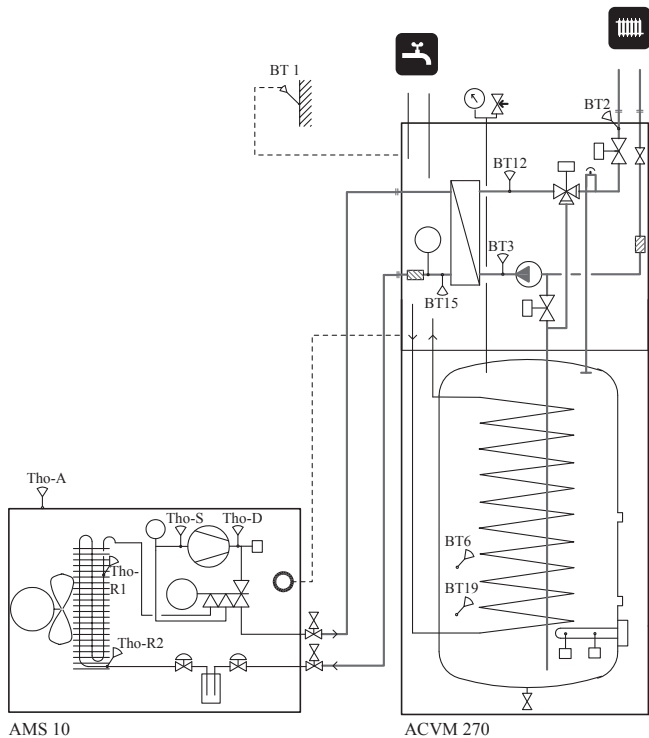


List of components

- 20S Solenoid for 4-way valve
- 63H1 High pressure switch
- CM Compressor motor
- EEV-C Expansion valve, cooling
- EEV-H Expansion valve, heating
- FMo1 Fan motor
- FMo2 Fan motor
- LPT Low pressure sensor
- PWB1 Control PCB
- PWB2 Inverter PCB
- PWB3 Noise filter PCB
- PWB7 Reactor PCB
- QM35 Service valve, liquid side
- QM36 Service valve, gas side
- SV1 Valve, solenoid
- TB Terminal block

Temperature sensor

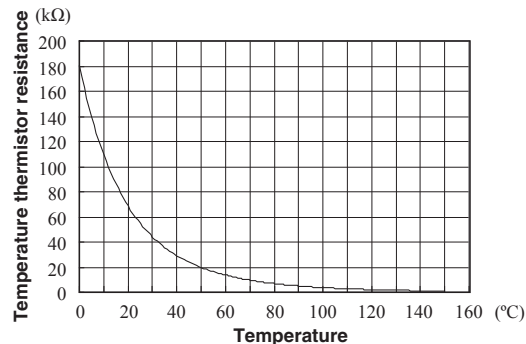
Sensor placement



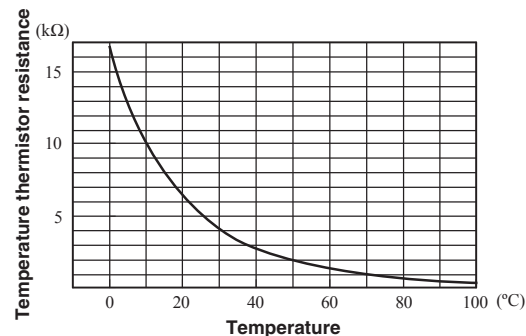
- BT1 Temperature sensor, outdoor air (external)
- BT2 Temperature sensor, supply
- BT3 Temperature sensor, heat exch. in (Twin)
- BT6 Temperature sensor, tank water
- BT12 Temperature sensor, heat exch. out (Twout)
- BT15 Temperature sensor, liquid pipe (Thi-L)
- BT19 Temperature sensor, immersion heater
- Tho-A Temperature sensor, outdoor air
- Tho-D Temperature sensor, hot gas
- Tho-R1 Temperature sensor, heat exchanger out
- Tho-R2 Temperature sensor, heat exchanger in
- Tho-S Temperature sensor, suction gas

Data for sensor in outdoor unit

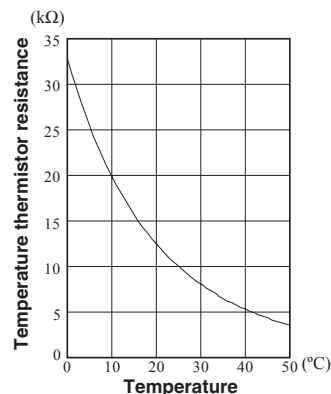
Tho-D



Tho-S, Tho-R1, Tho-R2



Tho-A

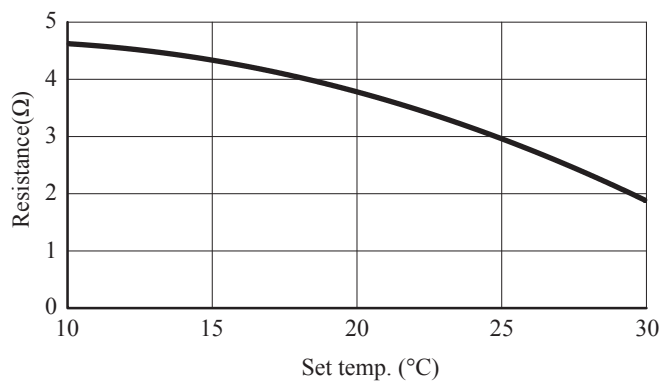


Data for sensor in indoor unit and tank unit

| Temperature (°C) | Resistance (kΩ) | Voltage (V) |
|------------------|-----------------|-------------|
| -40 | 102 | 4.78 |
| -35 | 73.5 | 4.70 |
| -30 | 53.4 | 4.60 |
| -25 | 39.3 | 4.47 |
| -20 | 29.2 | 4.31 |
| -15 | 21.9 | 4.12 |
| -10 | 16.6 | 3.90 |
| -5 | 12.7 | 3.65 |
| 0 | 9.81 | 3.38 |
| 5 | 7.62 | 3.09 |
| 10 | 5.97 | 2.80 |
| 15 | 4.71 | 2.50 |
| 20 | 3.75 | 2.22 |
| 25 | 3.00 | 1.95 |
| 30 | 2.42 | 1.70 |
| 35 | 1.96 | 1.47 |
| 40 | 1.60 | 1.27 |
| 45 | 1.31 | 1.09 |
| 50 | 1.08 | 0.94 |
| 60 | 0.746 | 0.70 |
| 70 | 0.525 | 0.51 |

Characteristic of RG10

| Setting | Set temp. (°C) | Resistance(Ω) |
|---------|----------------|---------------|
| 1 | 15 | 4.34 |
| 2 | 18 | 4.08 |
| 3 | 20 | 3.84 |
| 4 | 21 | 3.58 |
| 5 | 23 | 3.36 |
| 6 | 24 | 3.11 |
| 7 | 26 | 2.74 |
| 8 | 28 | 2.25 |
| 9 | 30 | 1.80 |

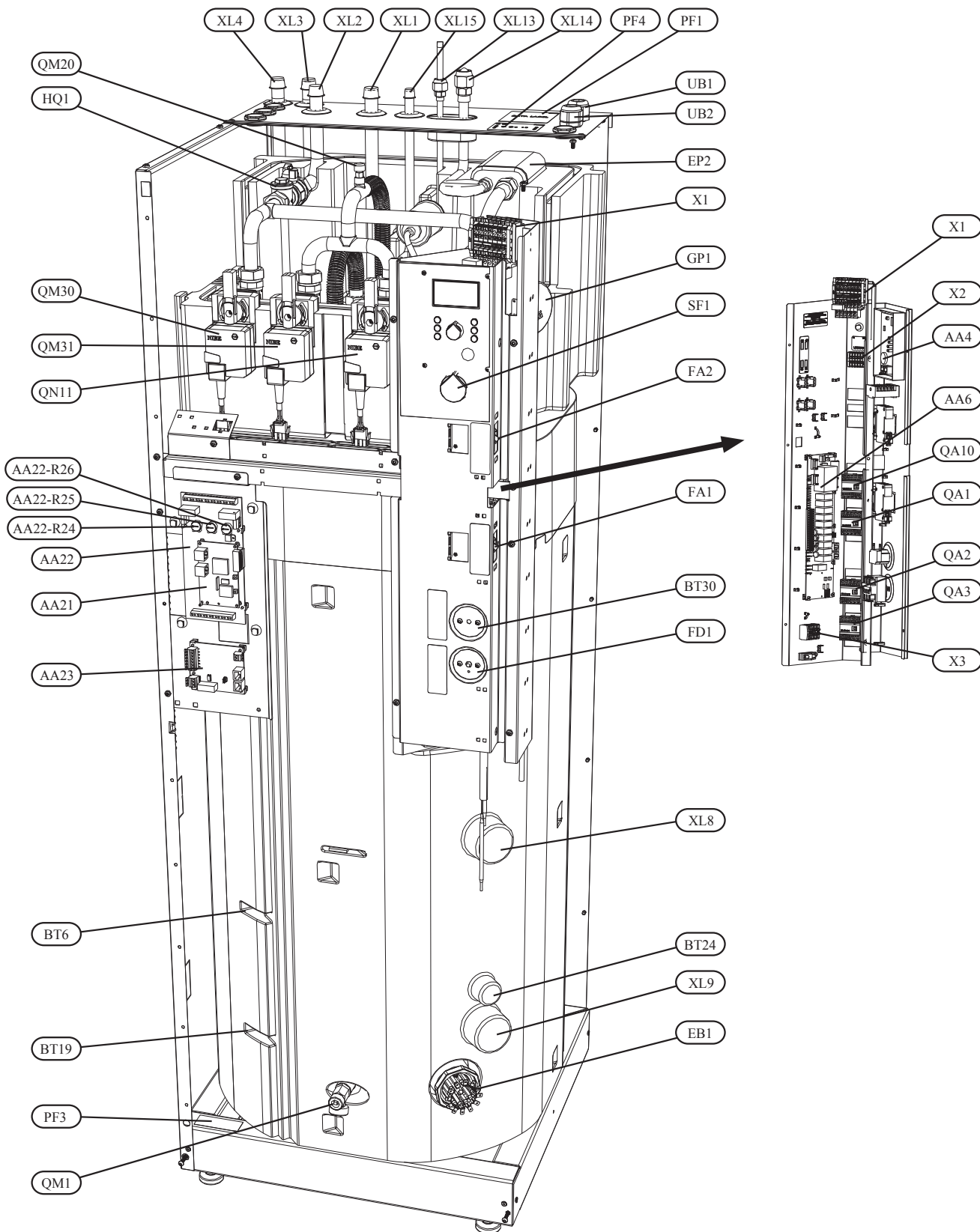


Component positions

Indoor unit

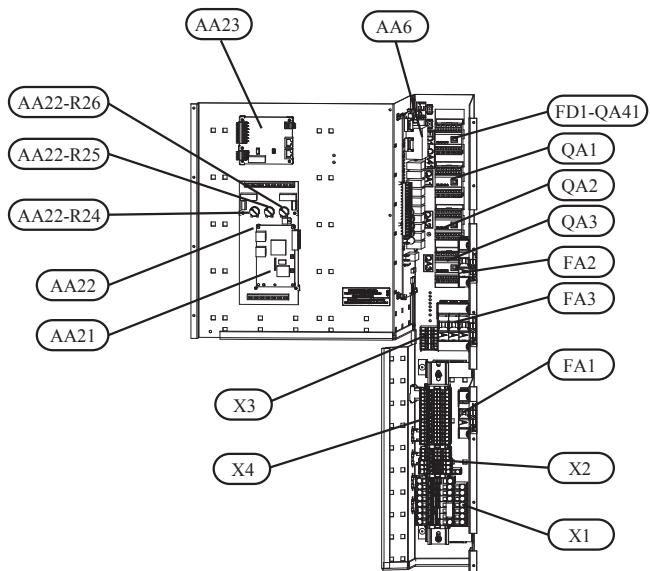
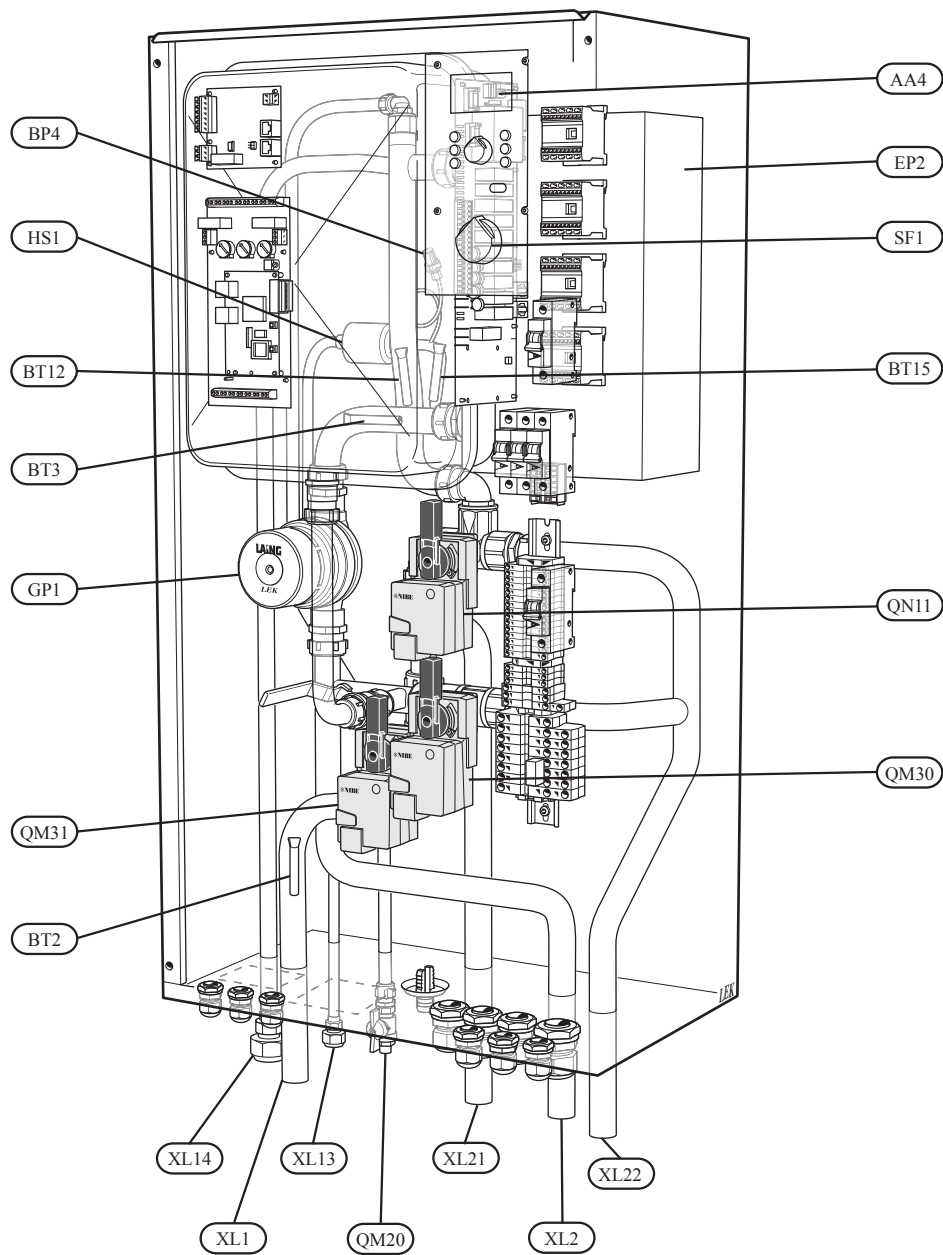
Component image

HMA100V, HMA100VM

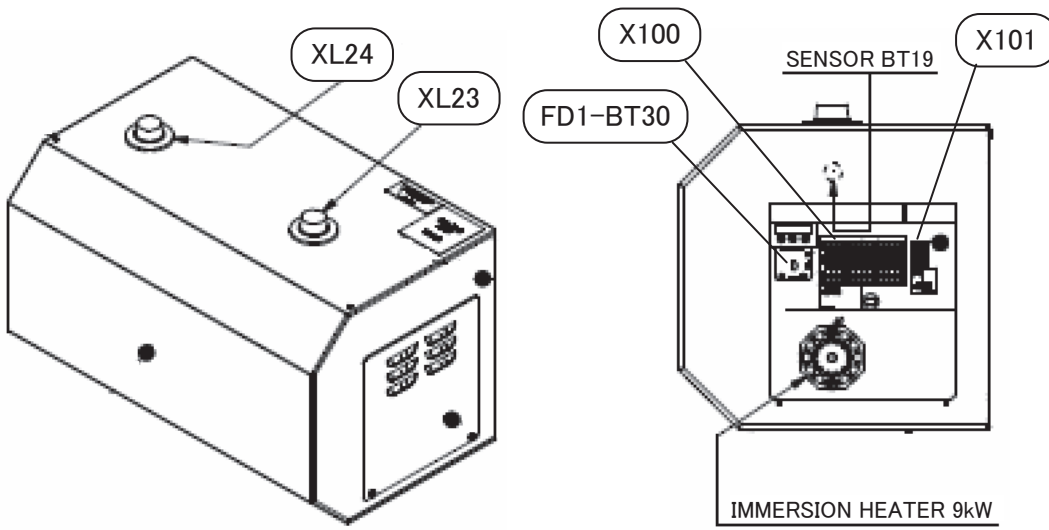


Component positions

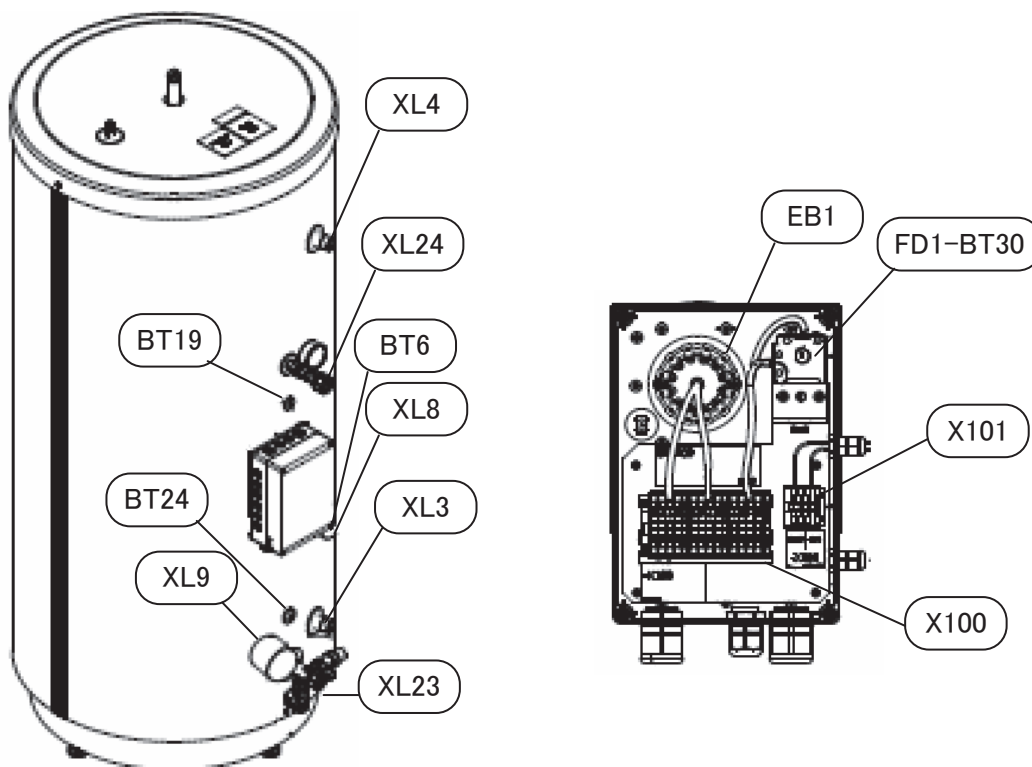
HMS140VA, HMS140V



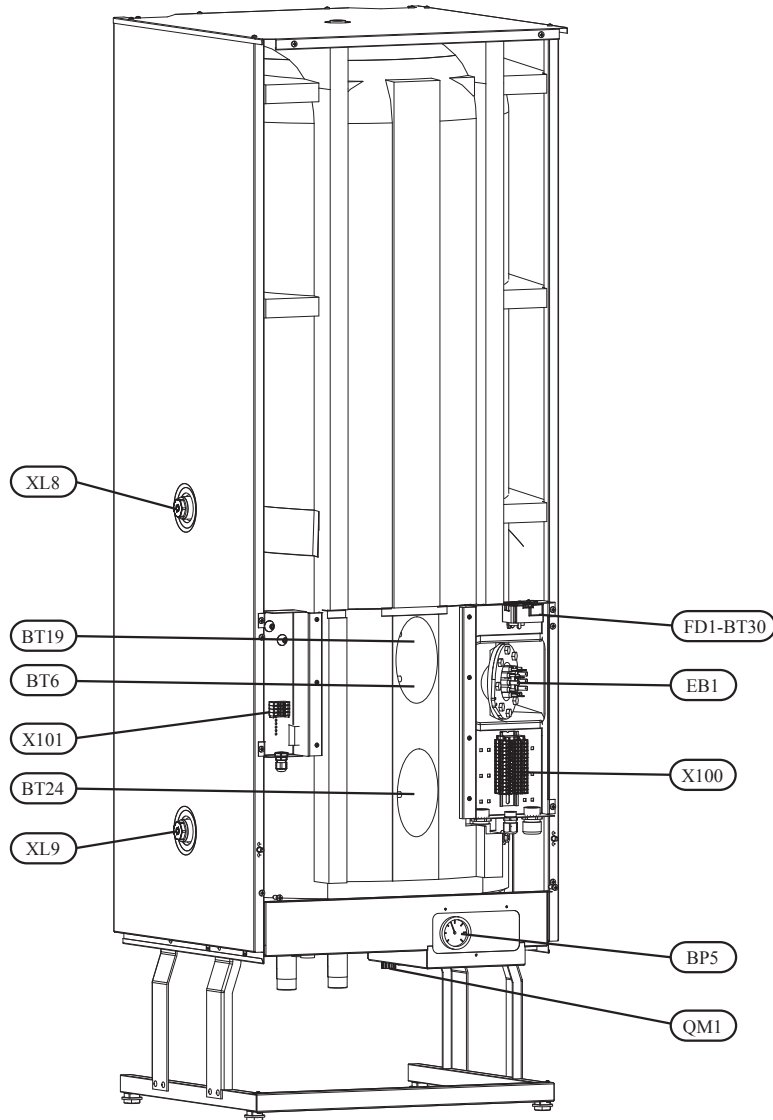
HT30



MT500



MT300



List of components**Pipe connections**

| | |
|------|------------------------------------|
| XL1 | Climate system supply |
| XL2 | Climate system return |
| XL3 | Cold water |
| XL4 | Hot water |
| XL8 | Docking in |
| XL9 | Docking out |
| XL13 | Liquid line refrigerant |
| XL14 | Gas line refrigerant |
| XL15 | Connection safety valve, manometer |
| XL21 | Tank circuit supply |
| XL22 | Tank circuit return |
| XL23 | Circulation supply |
| XL24 | Circulation return |

Valves etc.

| | | |
|------|--|-----------------------|
| EP2 | Heat exchanger | |
| GP1 | Circulation pump, climate system | variable flow |
| HQ1 | Strainer (water) | 0.8mm ² |
| QM1 | Valve, draining/filling climate system | |
| QM20 | Venting valve | |
| QM30 | Reversing valve, hot water | 2-way 35sec |
| QM31 | Reversing valve, climate system | 2-way 35sec |
| QN11 | Mixing valve | 3-way ball type 35sec |

Electrical components

| | |
|------|--|
| X1 | Terminal block, incoming electric power |
| X2 | Terminal block, outgoing electricity and communication |
| X3 | Terminal block, external addition |
| X4 | Terminal block, outgoing supply to tank |
| X100 | Terminal block, incoming supply from indoor unit |
| X101 | Terminal block, sensor from indoor unit |
| SF1 | Switch |
| FA1 | Miniature circuit breaker, control system |
| FA2 | Miniature circuit breaker, outdoor unit |
| FA3 | Miniature circuit breaker, tank |
| EB1 | Immersion heater |
| AA4 | Display unit |
| AA6 | Relay card |
| AA21 | CPU card |
| AA22 | EBV card |
| | R24 Setting, fuse size |
| | R25 Setting, max power, electrical addition |
| | R26 Setting, max boiler temperature |
| AA23 | Communication board |
| QA1 | Contactactor |
| QA2 | Contactactor |
| QA3 | Contactactor |
| QA10 | Contactactor |

Sensor, thermostats

| | |
|------|--|
| BT6 | Temperature sensor, tank water |
| BT19 | Temperature sensor, immersion heater |
| BT24 | Temperature sensor, external heat source |
| BT30 | Thermostat, standby mode |
| FD1 | Temperature limiter |

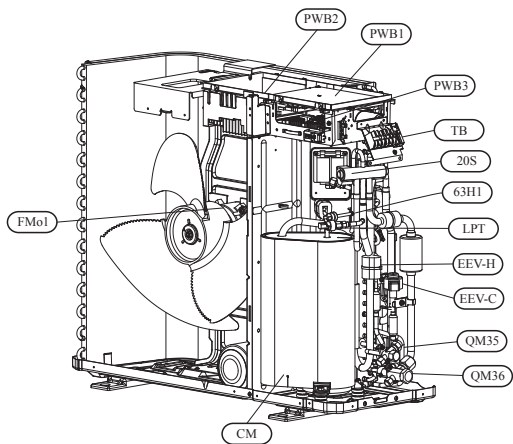
Miscellaneous

| | |
|-----|------------------------|
| UB1 | Cable gland |
| UB2 | Cable gland |
| PF1 | Rating plate |
| PF3 | Serial number plate |
| PF4 | Sign, pipe connections |

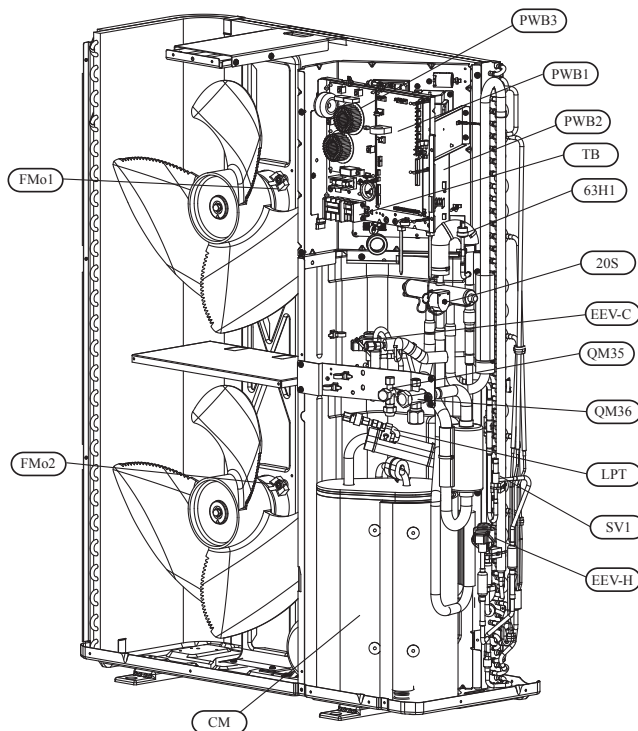
Outdoor unit

Component image

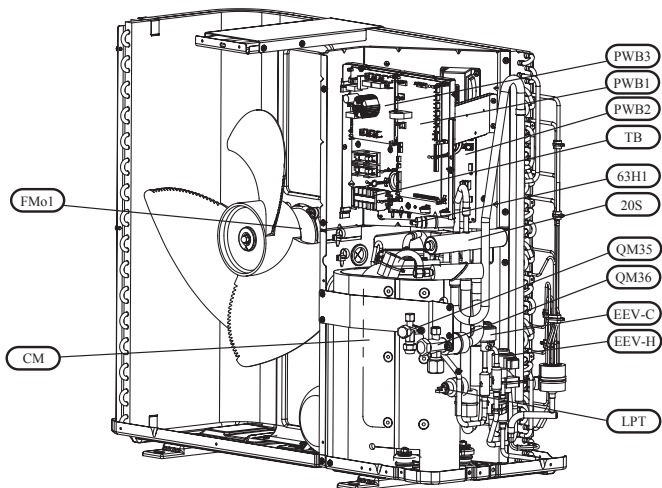
FDCW71VNX



FDCW140VNX



FDCW100VNX

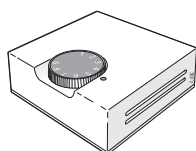


List of components

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- PWB1 Control PCB
- PWB2 Inverter PCB
- PWB3 Noise filter PCB
- QM35 Service valve, liquid side
- QM36 Service valve, gas side
- SV1 Valve, solenoid
- TB Terminal block

Accessories

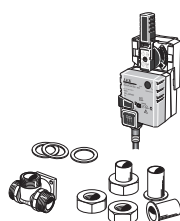
Accessories



MH-RG 10

Room sensor.

Part No. MCD291A001



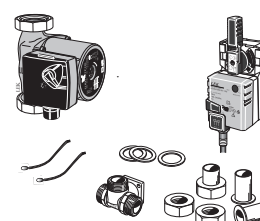
VCC22 / VCC28

Reversing valve, cooling

22 is for HMA100 and 28 is for HMS140

Part No. MCD291A002(22)

MCD291A005(28)



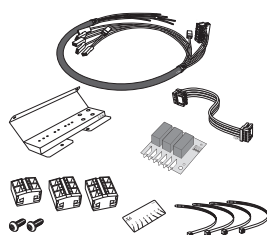
ESV 22 / ESV28

Extra mixing valve group.

22 is for HMA100 and 28 is for HMS140

Part No. MCD291A003(22)

MCD291A006(28)



ACK22 / ACK28

Cable kit for ESV22/28 or VCC22/28

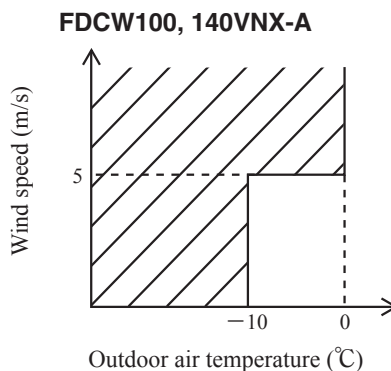
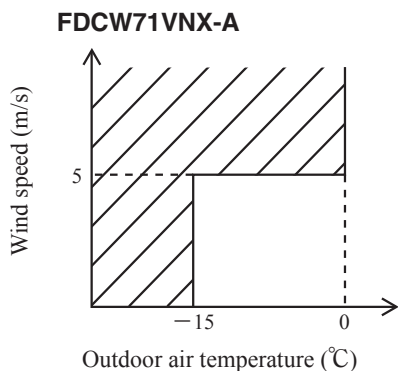
Part No. MCD291A004(22)

MCD291A007(28)

Wind protection (prepared on site)

At the site where the following conditions meet, wind protection for outdoor unit is required to avoid capacity drop or abnormal stop for protection.

- Natural wind directly blows into outdoor unit.
- Relation between wind speed and outdoor air temperature is in the hatched area at the coldest day.



According to the wind direction, install appropriate wind guard.

Front wind guard for wind from front.

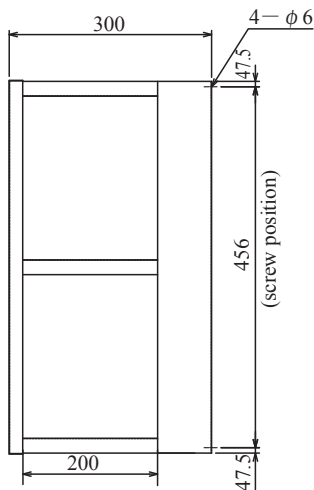
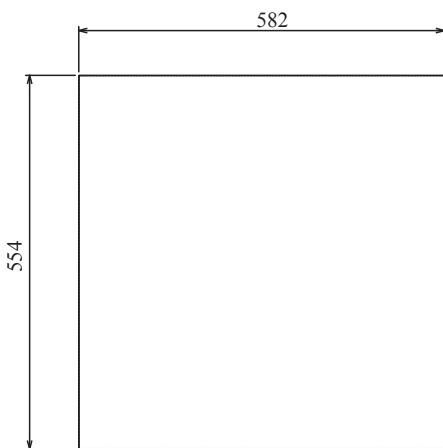
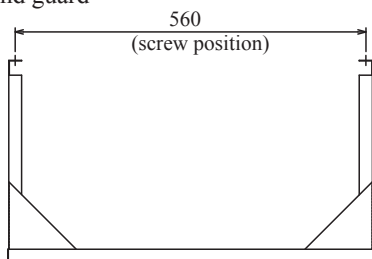
Side wind guard for wind from left side.

Rear wind guard for wind from rear.

Fasten the components with screws used in the outdoor unit where applicable.

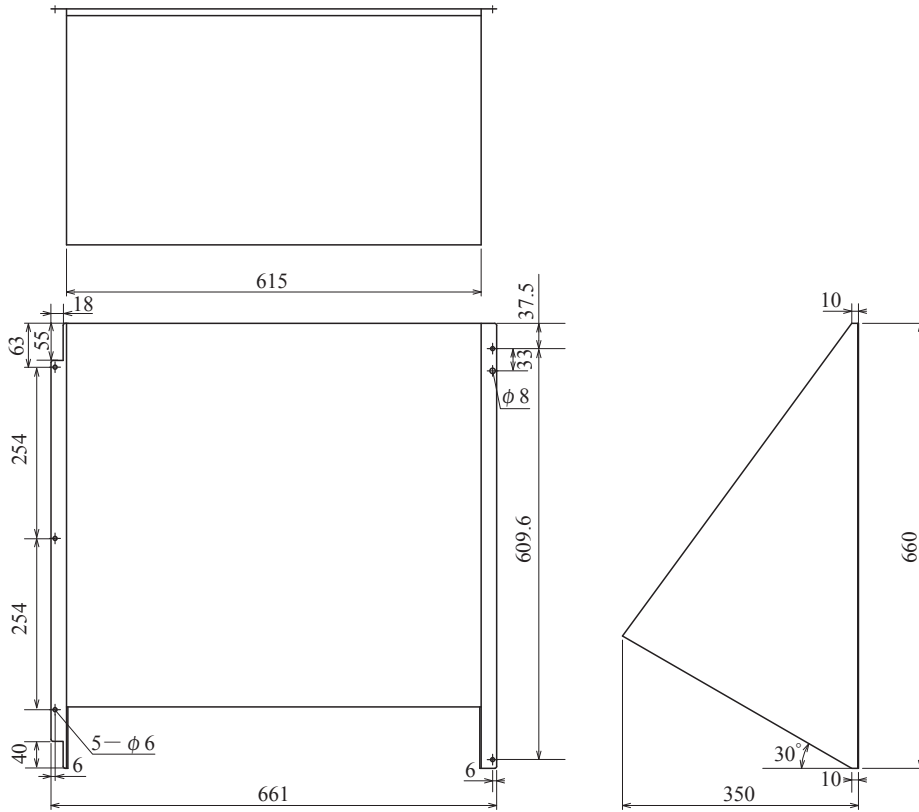
<For FDCW71VNX-A>

Front wind guard

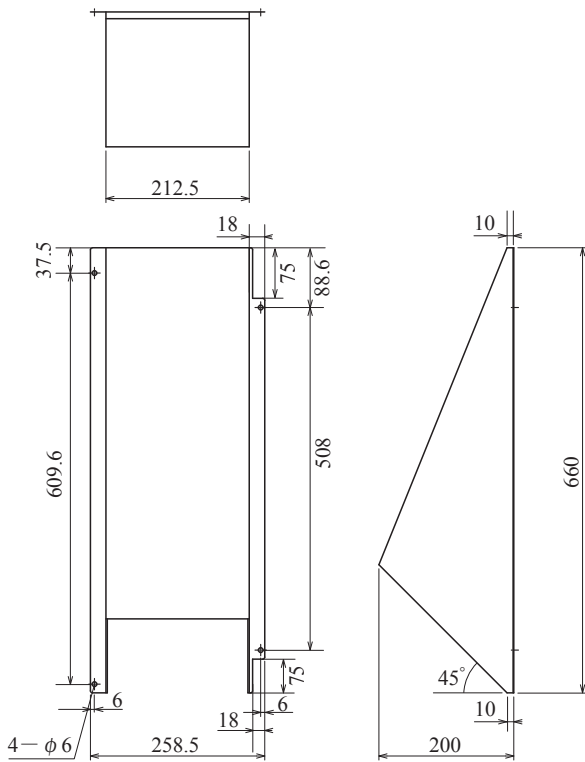


Use M4×10 self-drilling screw to attach it where screw hole is not available.

Rear wind guard

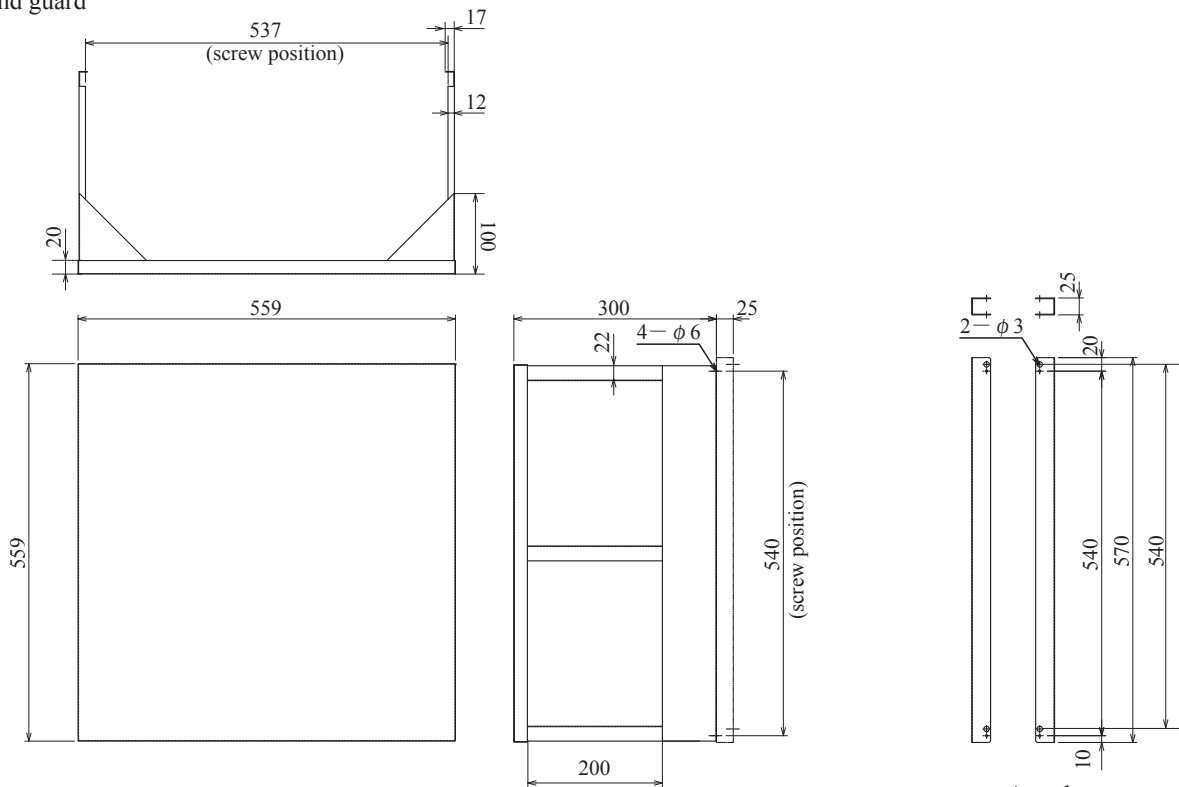


Side wind guard

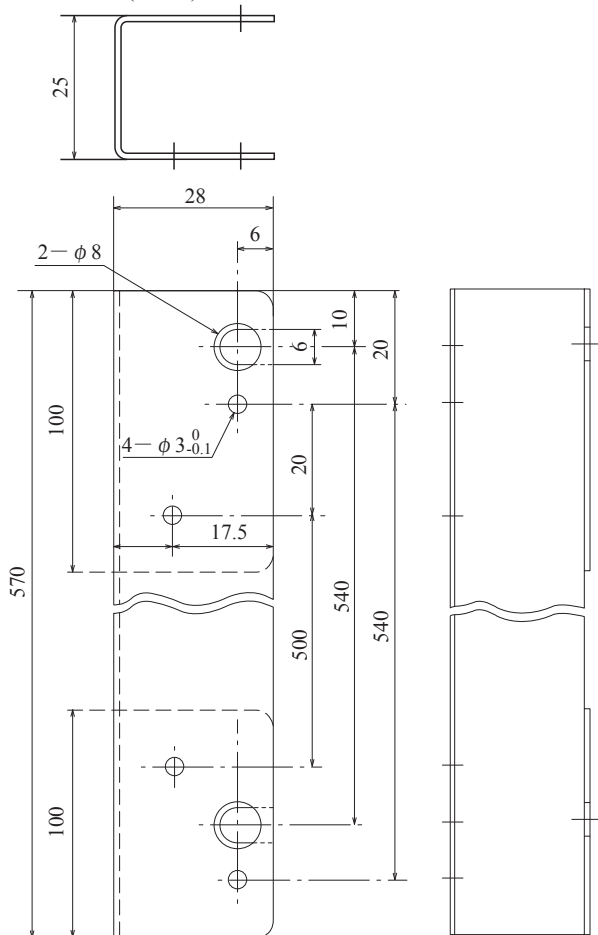


<For FDCW100VNX-A>

Front wind guard



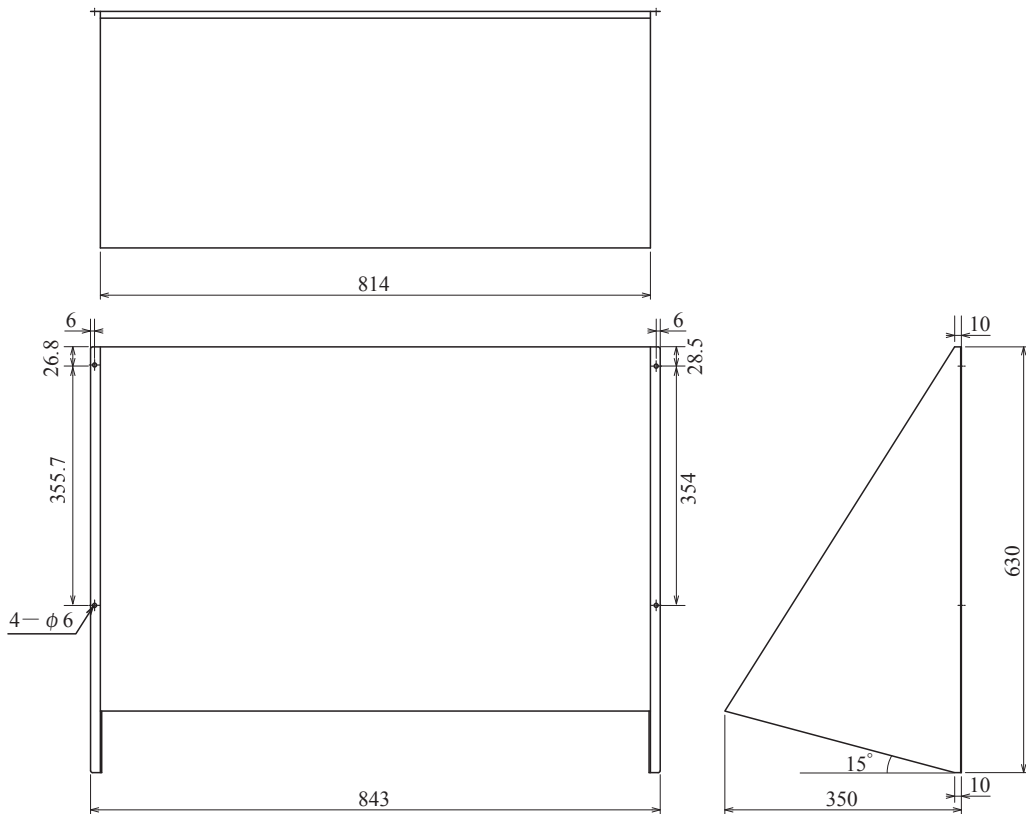
Attachment (detail)



Attachment

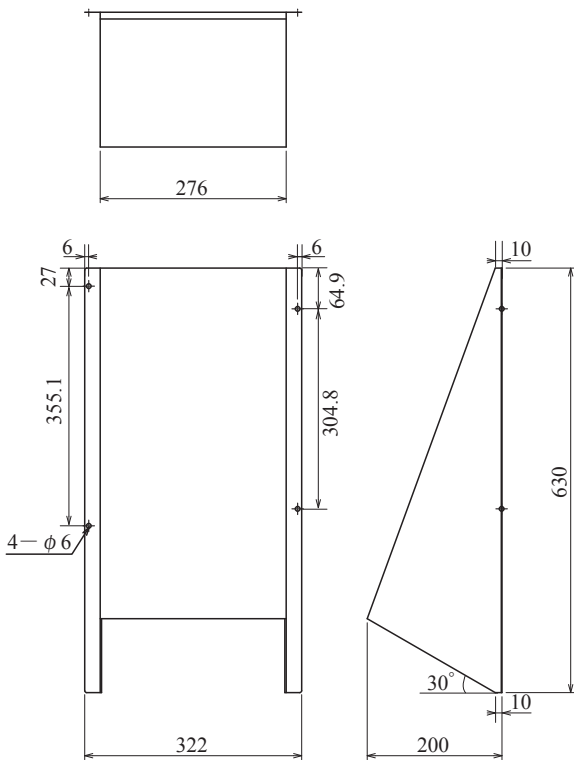
Prepare a pair of symmetrical attachment.

Rear wind guard



Use M5×13 self-drilling screw to attach it where screw hole is not available.

Side wind guard



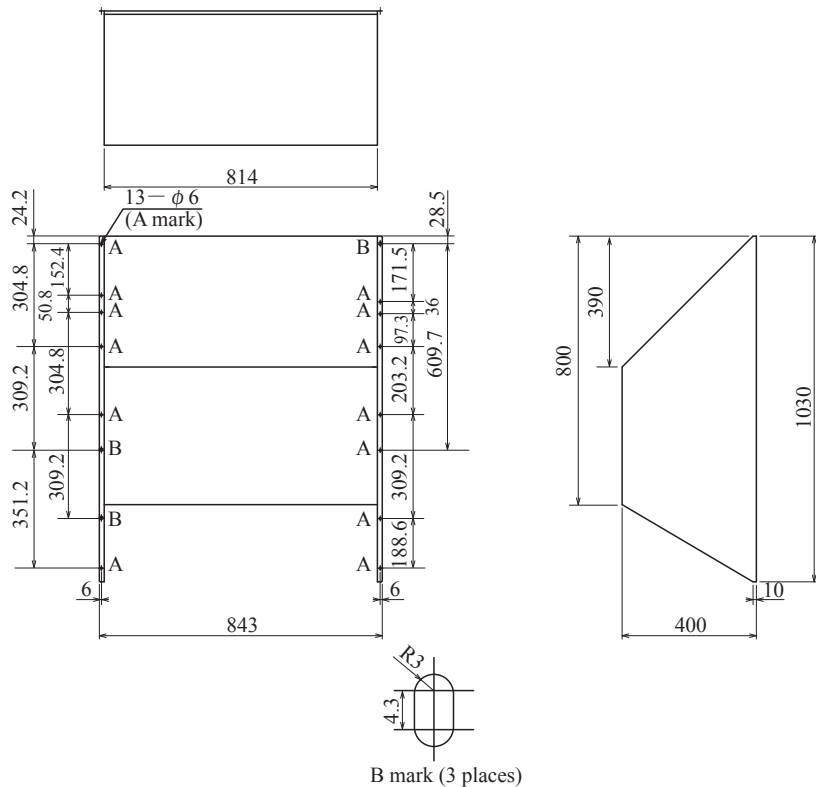
Use M5×13 self-drilling screw to attach it where screw hole is not available.

<For FDCW140VNX-A>

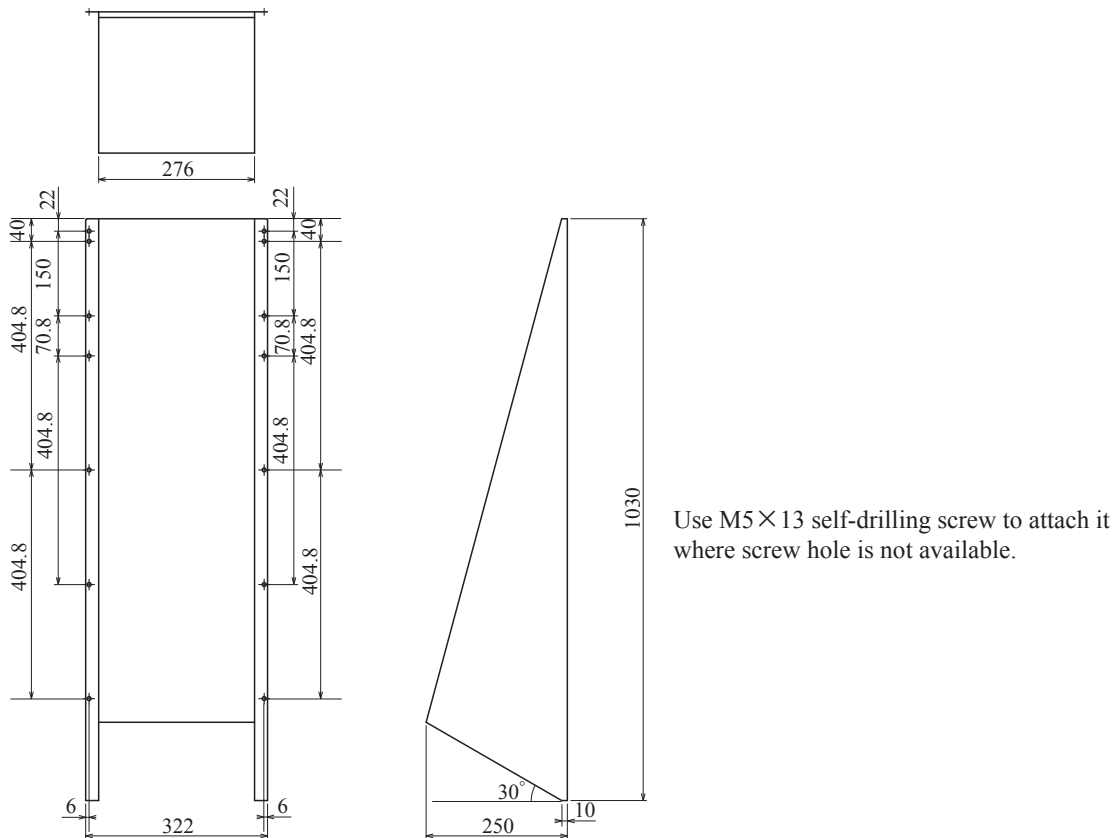
Front wind guard

Appearance is as same as FDCW100VNX-A but two pieces are required.

Rear wind guard



Side wind guard



Installation manual

VCC22

General

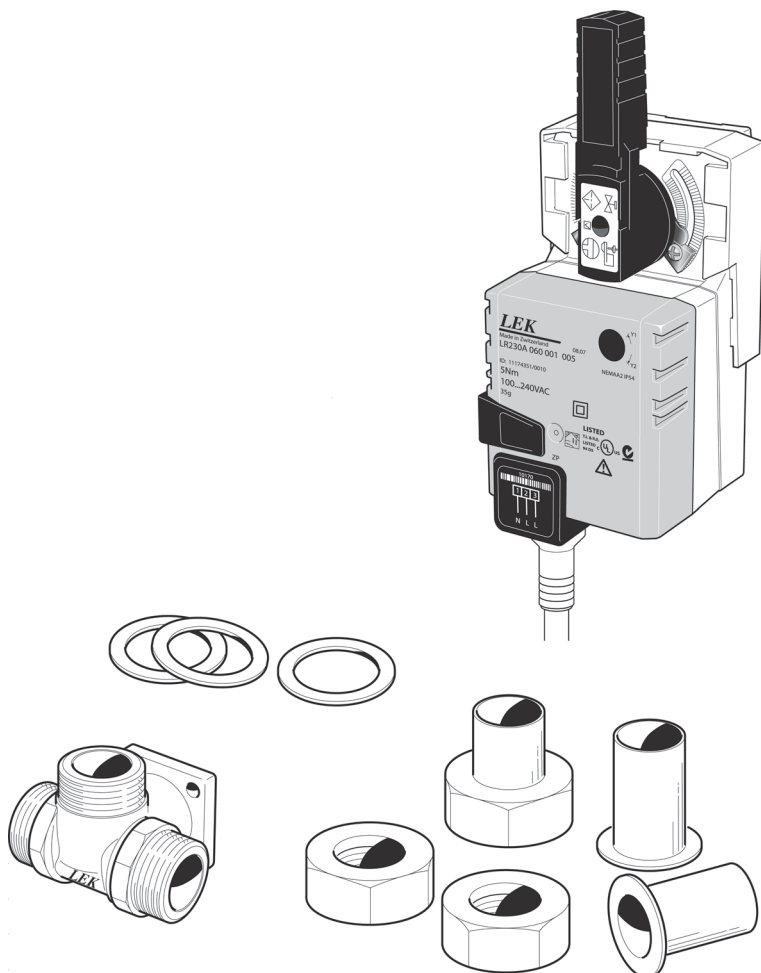
This accessory is used when HMA100V is installed in houses with cooling and heating systems, for example, in cases where the house has a radiator system and fan con-ectors.

NOTE

This accessory also requires accessory ACK 22.

Contents

- 3 x Copper pipe, collared
- 3 x Flat gasket
- 3 x Swivel nut 1"
- 1 x 3-way valve
- 1 x Control motor, EP22-QN12



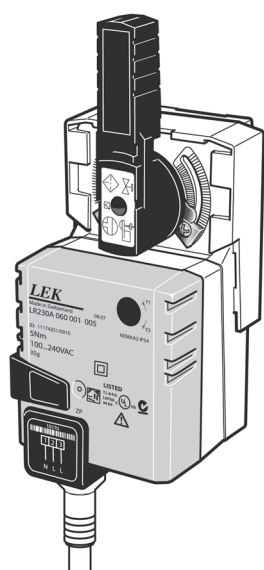
Pipe connections

Install as follows:

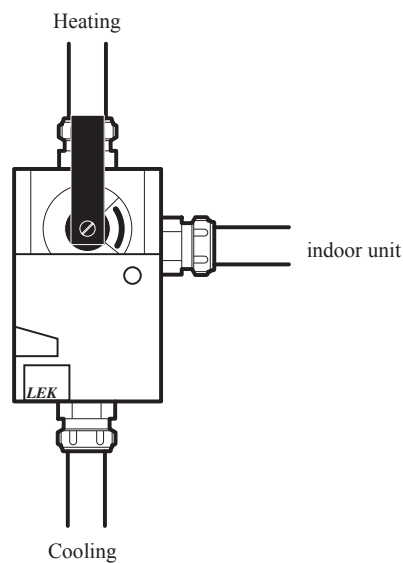
- First drain the boiler water reservoir/heating system if filled with water.
- The shunt valve (EP22-QN12) is located on the flow line after indoor unit, before the first radiator in the heating system 1, see image.

NOTE

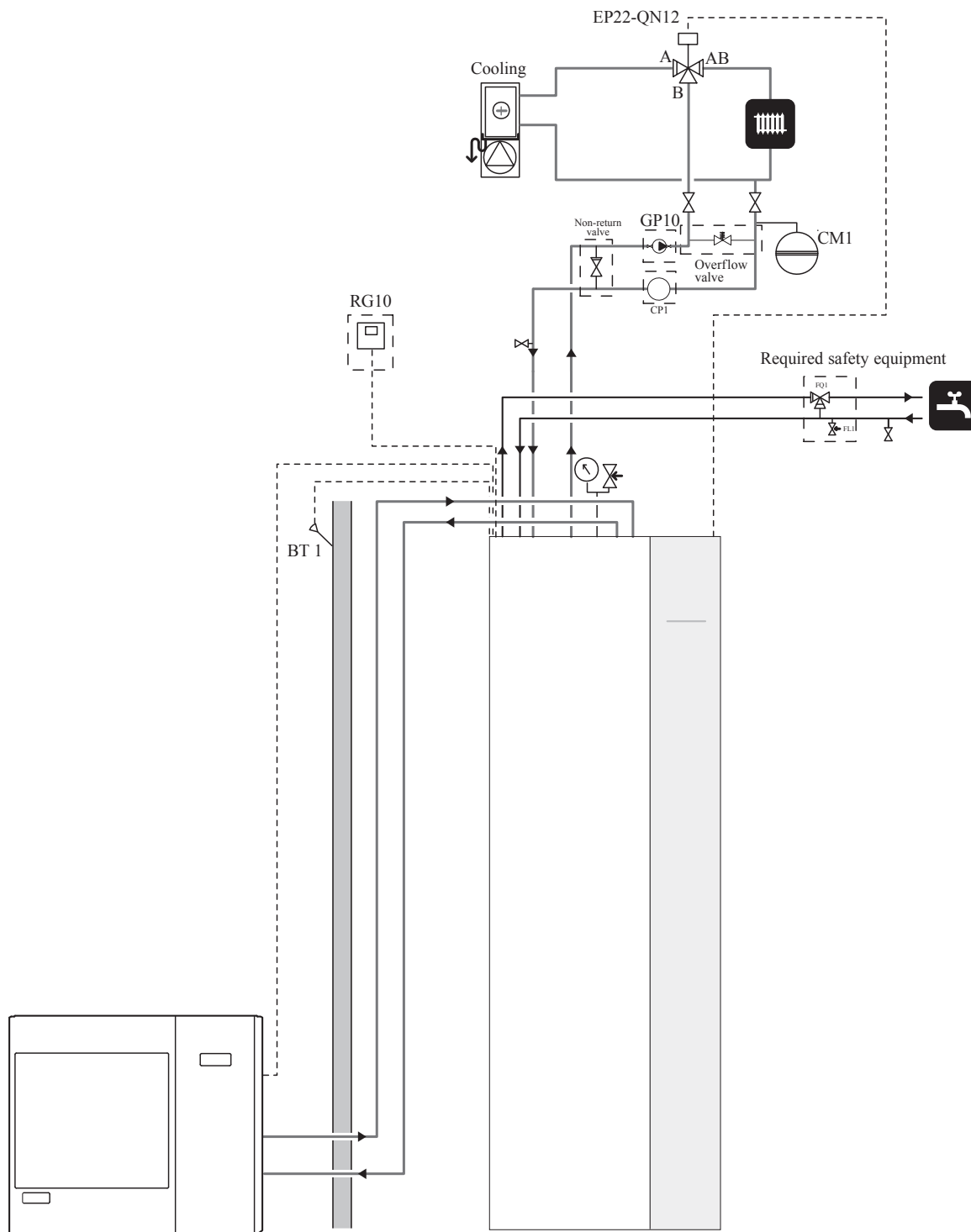
Incorrect installation can affect the function.



By-pass valve, (EP22-QN12)
 Connections, ϕ 22 mm



Outline diagram with VCC 22 - reversing valve, cooling



Explanation

| | | | |
|------|-----------------------------|-----------|------------------|
| BT1 | Temperature sensor, outdoor | GP10 | Circulation pump |
| CP1 | Buffer vessel | EP22-QN12 | Shuttle valve |
| CM1 | Expansion vessel | | |
| EP22 | Cooling/heating | | |

Electrical connection

NOTE

All electrical connections must be carried out by an authorised electrician.

Electrical installation and wiring must be carried out in accordance with the stipulations in force.

Indoor unit must not be powered when installing VCC 22.

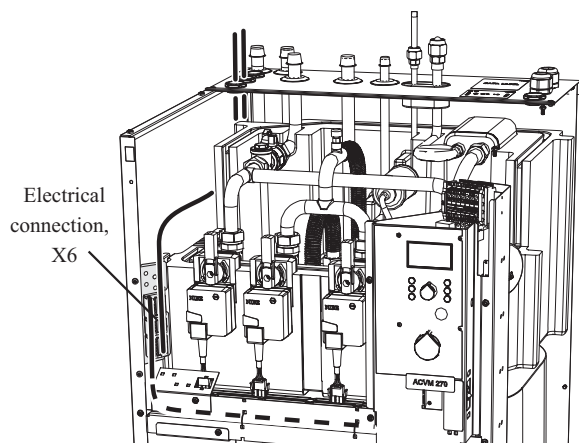
Program settings

- Select “Service” in menu 8.1.1 to gain access to menus 9.0 and the sub-menus.
- Select “On” in menu 9.3.3, “Cooling system”.
- Settings are made for cooling start and stop in menu 8.2.4 and 8.2.5.
- In the sub menus for menu 2.2.0 other cooling settings are made, e.g. cooling curve selection.

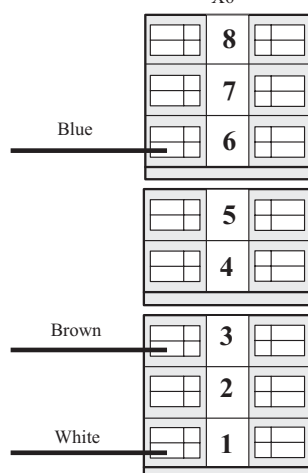
See page 89 for details.

The electrical circuit diagram is at the end of these installation instructions.

From VCC 22



Electrical connection, X6



1. The accessory ACK 22 is installed according to the supplied installation instructions.
2. Connect valve actuator EP22-QN12 as follows:
 - Brown cable (230 V signal) to - spring terminal X6:3a
 - White cable (230 V signal) to spring terminal X6:1a
 - Blue cable (zero) to spring terminal X6:6a

VCC28

General

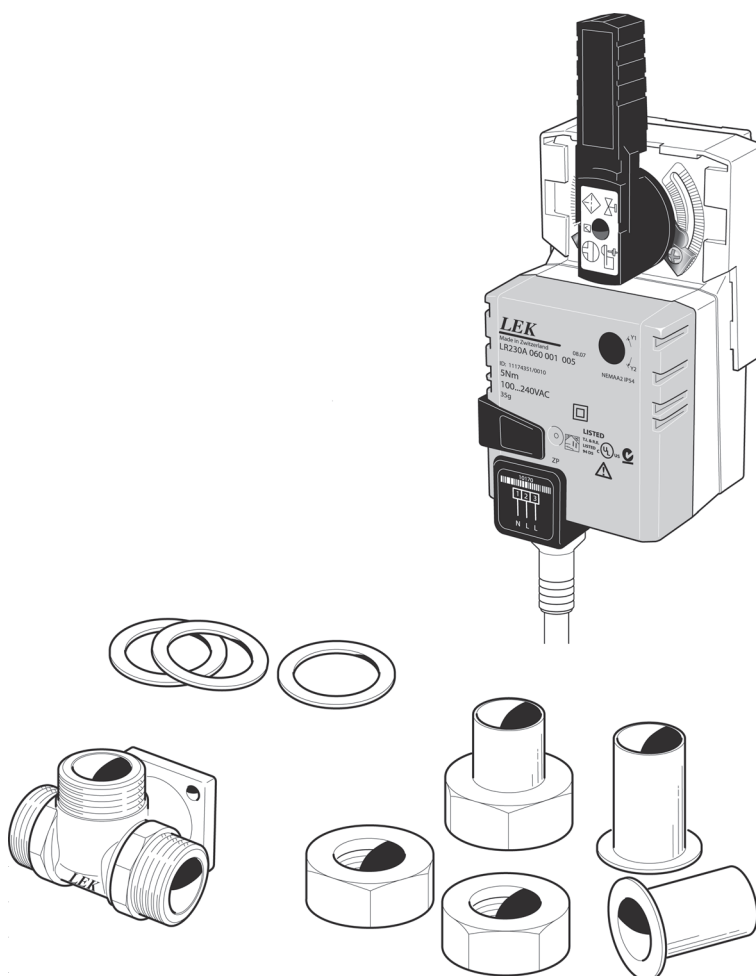
This accessory is used when the indoor module is installed in houses with cooling and heating systems, for example, in cases where the house has a radiator system and fan convectors.

NOTE

This accessory also requires accessory ACK 28.

Contents

- 3 x Copper pipe, collared
- 3 x Flat gasket
- 3 x Swivel nut 1 1/4"
- 1 x 3-way valve
- 1 x Control motor, EP22-QN12



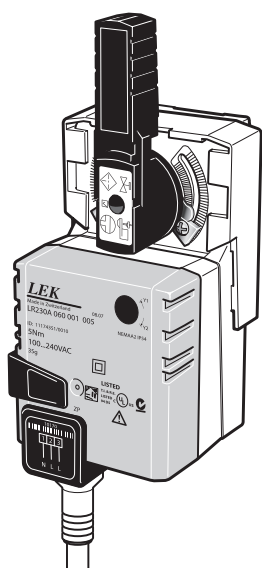
Pipe connections

Install as follows:

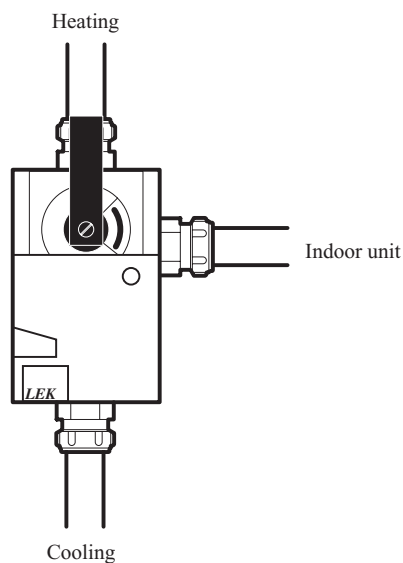
- First drain the boiler water reservoir/heating system if filled with water.
- The shunt valve (EP22-QN12) is located on the flow line after the indoor unit, before the first radiator in the heating system 1, see image.

NOTE

Incorrect installation can affect the function.

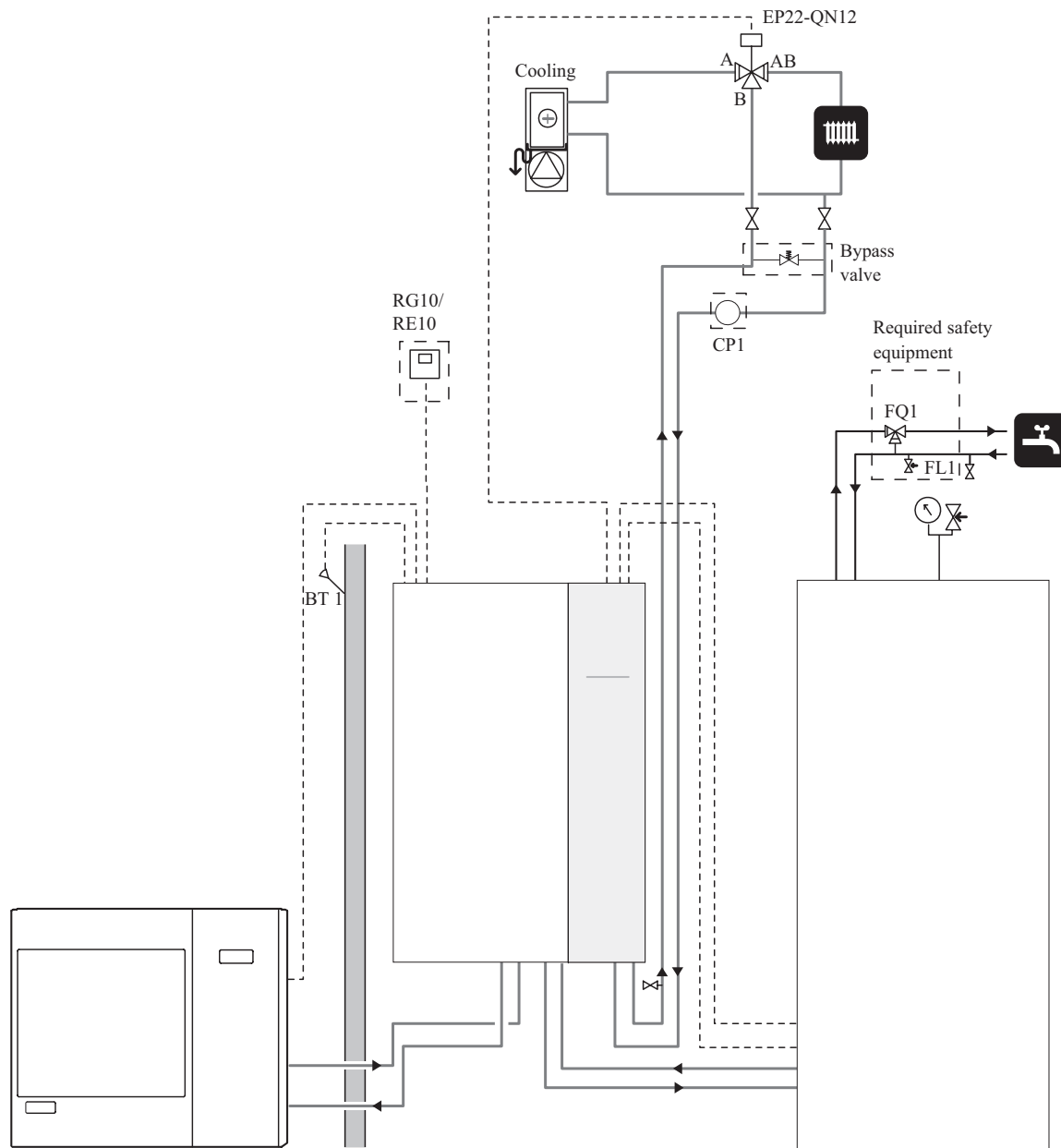


By-pass valve, (EP22-QN12)
 Connections, ϕ 28 mm



KVS value 8.5

Outline diagram indoor unit with VCC 28 - reversing valve, cooling



Explanation

| | | | |
|-----|-----------------------------|-----------|-----------------|
| BT1 | Temperature sensor, outdoor | EP22 | Cooling/heating |
| CP1 | Buffer vessel | EP22-QN12 | Shuttle valve |

Electrical connection

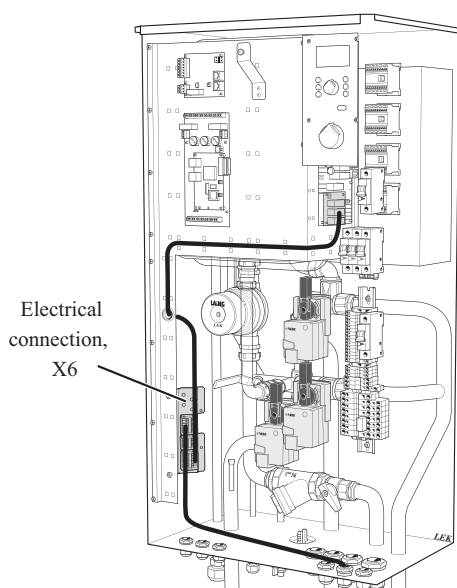
NOTE

All electrical connections must be carried out by an authorised electrician.

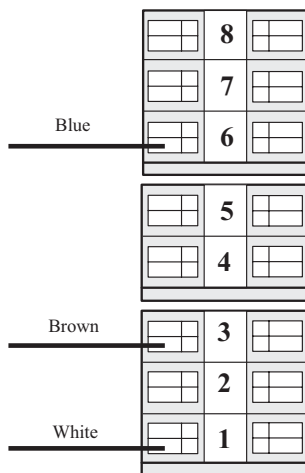
Electrical installation and wiring must be carried out in accordance with the stipulations in force.

The indoor module must not be powered when installing VCC 28.

The electrical circuit diagram is at the end of these installation instructions.



Electrical connection, X6



1. The accessory ACK 28 is installed according to the supplied installation instructions.
2. Connect valve actuator EP22-QN12 as follows:
 - Brown cable (230 V signal) to - spring terminal X6:3a

- White cable (230 V signal) to spring terminal X6:1a
- Blue cable (zero) to spring terminal X6:6a

Program settings

- Select “Service” in menu 8.1.1 to gain access to menus 9.0 and the sub-menus.
- Select “On” in menu 9.3.3, “Cooling system”.
- Settings are made for cooling start and stop in menu 8.2.4 and 8.2.5.
- In the sub menus for menu 2.2.0 other cooling settings are made, e.g. cooling curve selection.

See page 89 for details.

ESV 22

General

This accessory is used when HMA 100V or HMS 140V is installed in houses with two different heating systems that require different flow line temperatures, for example, in cases where the house has both a radiator system and an under floor heating system. In the following text heating system 1 covers the system that requires the greater temperature and that is connected to the normal supply line respectively return line connection. Heating system 2 covers the heating system that works at the lower temperature.

The water flow in the two heating systems should not exceed the value for the maximum system flow.

NOTE

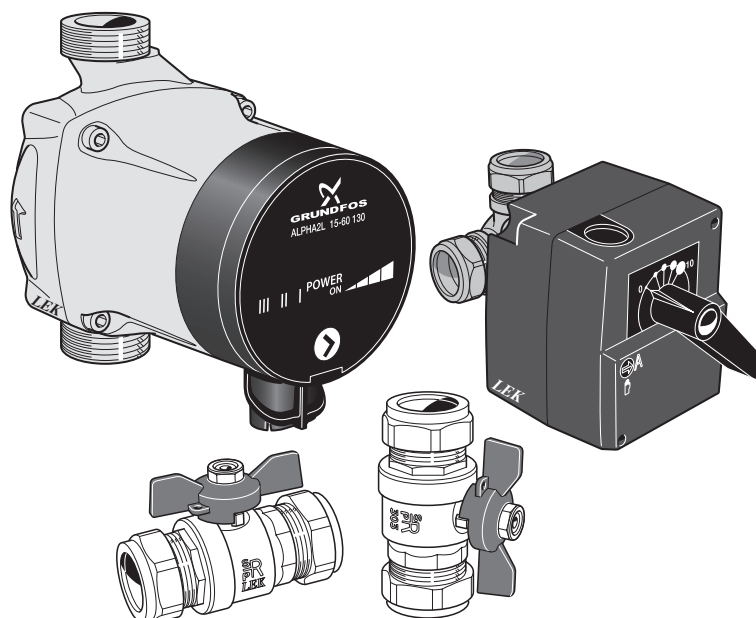
This accessory requires accessory ACK 22 for installation in the HMA 100V series.

NOTE

This accessory requires accessory ACK 28 for installation in the HMS 140V series.

Contents

- 1 x 3 wire circulation pump
- 4 x Cable ties
- 2 x Heating pipe paste
- 1 x Insulation tape
- 2 x Flat gasket
- 4 x Round sleeve
- 1 x Circulation pump, EP21-GP20
- 2 x Ball valve M Swivel nut
- 1 x 3-way valve
- 2 x Aluminium tape (pieces)
- 2 x Temperature sensor, EP21-BT2 (flow sensor), EP21-BT3 (return sensor)
- 1 x Control motor, EP21-QN25
- 1 x Alpha switch



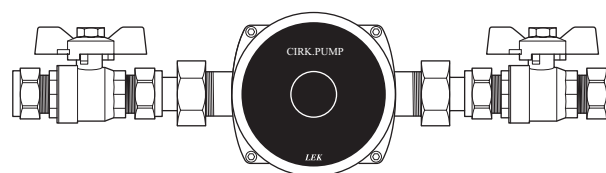
Pipe connections

Install as follows:

- First drain the boiler water reservoir/heating system if filled with water.
- The extra heating medium pump (EP21-GP20) is placed in a suitable location between the shunt valve (EP21-QN25) and heating system 2 in the direction of flow.
- The shunt valve (EP21-QN25) is located on the supply line after indoor unit, between the inlet of heating system 1 and 2. Connect the shunt valve (EP21-QN25) ports 1, 2 and 3 to corresponding pipes, see image on page 243 and 244.
- The flow sensor (EP21-BT2) is installed on the pipe after the heat medium pump (EP21-GP20).
- The return line sensor (EP21-BT3) is installed on the pipe from heating system 2.
- When installing the sensor, heat conducting paste must be used and the pipe must be insulated to obtain the correct temperature measurement.

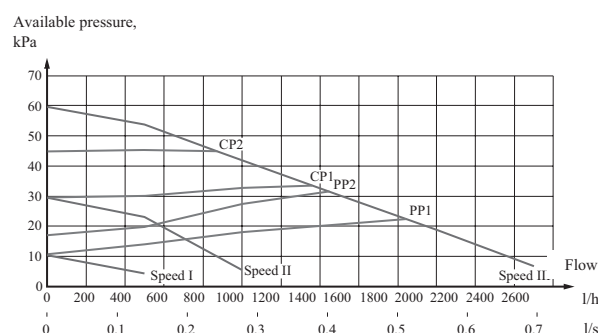
NOTE

Incorrect installation can affect the function.

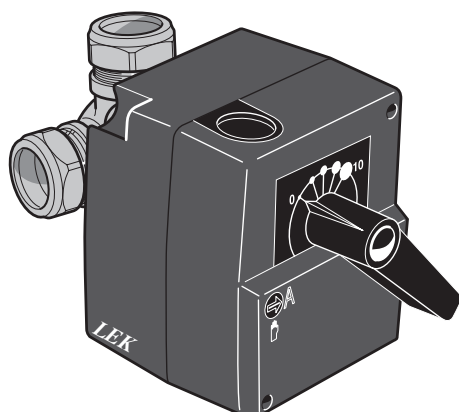


Heating medium pump, (EP21-GP20)
Connections, Ø 22 mm

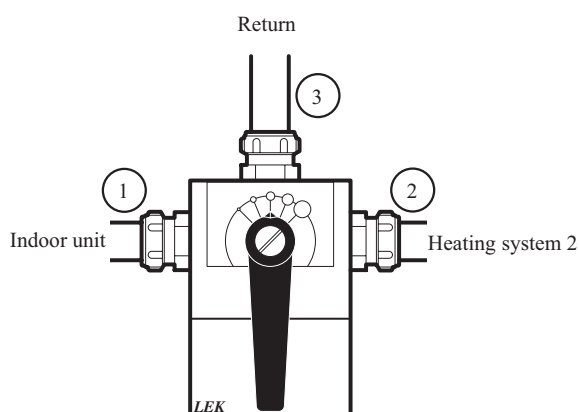
Pump and pressure drop diagrams



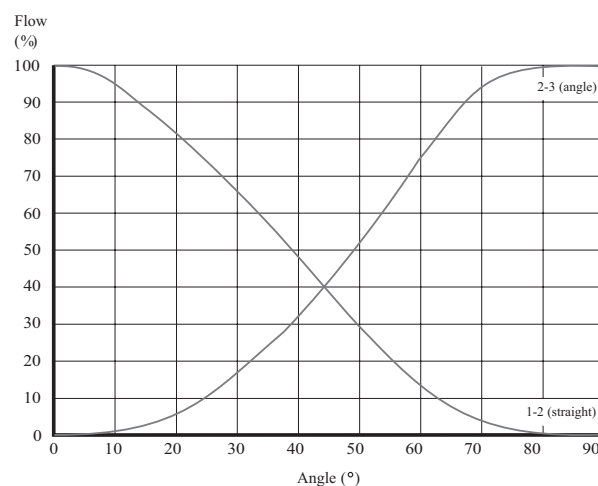
Choose between seven settings on the pump. You can choose between three different constant speeds (I, II or III) or two different curves, one proportional pressure (PP) and one constant pressure (CP), where 1 is lowest and 2 highest.



By-pass valve, (EP21-QN25)
Connections, Ø 22 mm



Shunt valve characteristics

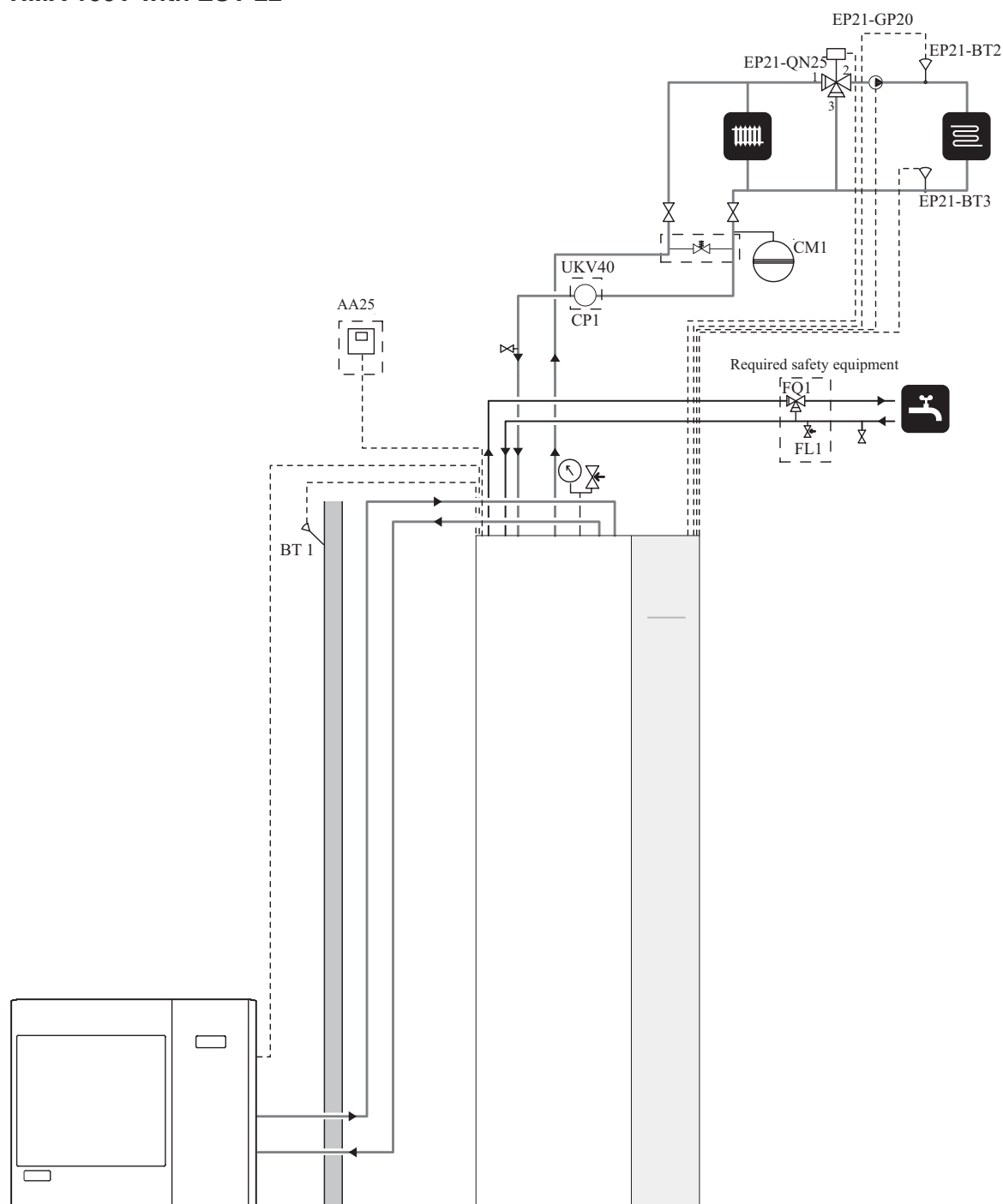


KVS value 6.3

Recommended for floor heating areas up to 200 m².

Outline diagram indoor unit with ESV 22 - extra shunt

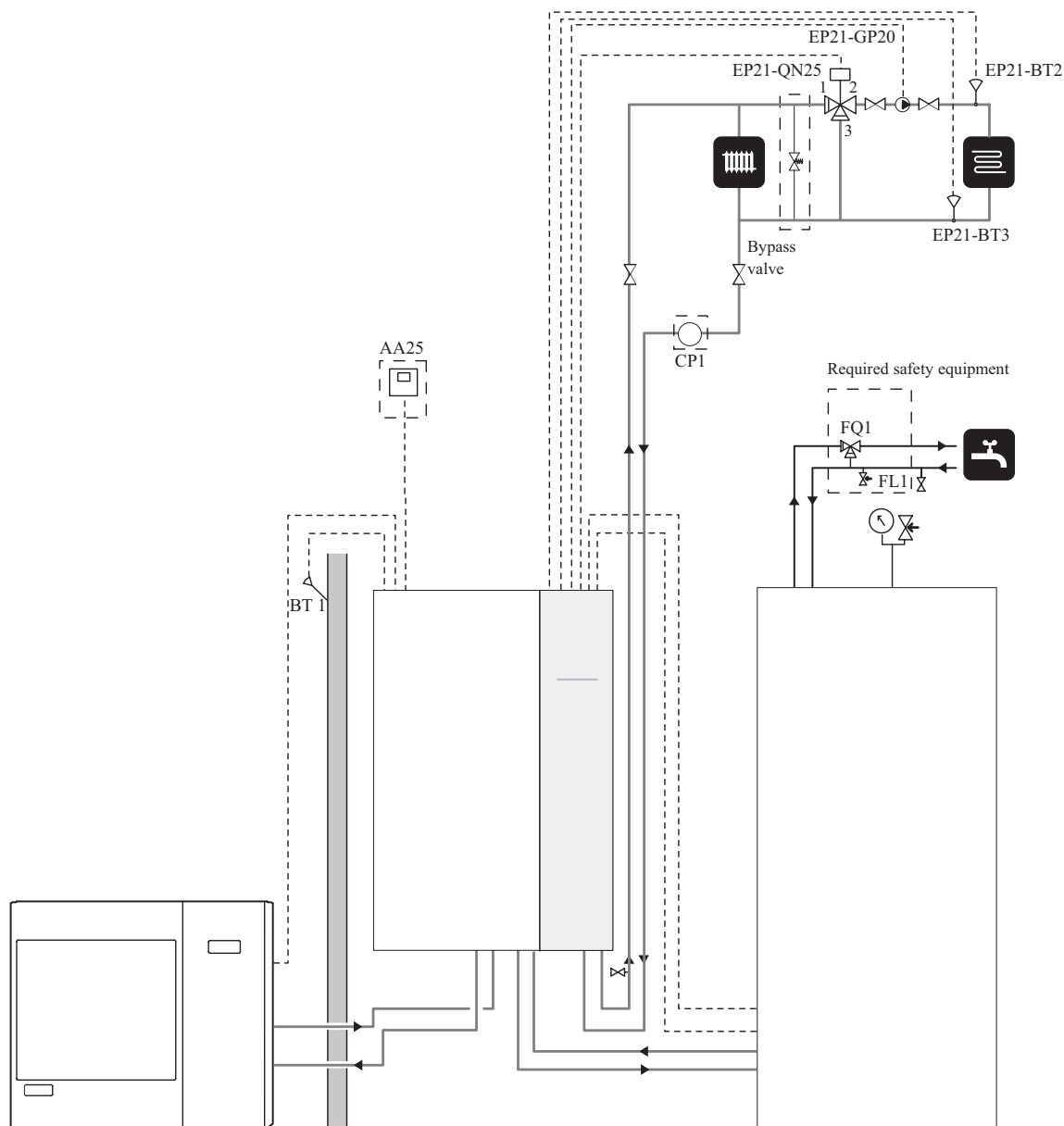
HMA 100V with ESV 22



Explanation

| | | | |
|----------|-----------------------------------|-----------|------------------------|
| BT1 | Temperature sensor, outdoor | CP1 | Buffer vessel |
| EP21-BT2 | Temperature sensor, supply line 2 | EP21-GP20 | Extra circulation pump |
| EP21-BT3 | Temperature sensor, return 2 | EP21-QN25 | Shunt valve |
| CM1 | Expansion vessel | | |

HMS 140V with ESV 22



Explanation

| | | | |
|----------|-----------------------------------|-----------|-------------------------|
| AA25 | Equipment box (MH-RG10) | CP1 | Buffer vessel |
| BT1 | Temperature sensor, outdoor | EP21-GP20 | Extra circulation pump |
| EP21-BT2 | Temperature sensor, supply line 2 | EP21-QN25 | Shunt valve |
| EP21-BT3 | Temperature sensor, return 2 | FL1 | Safety valve, hot water |
| CM1 | Expansion vessel | FQ1 | Mixer valve, hot water |

Electrical connection

NOTE

All electrical connections must be carried out by an authorised electrician.

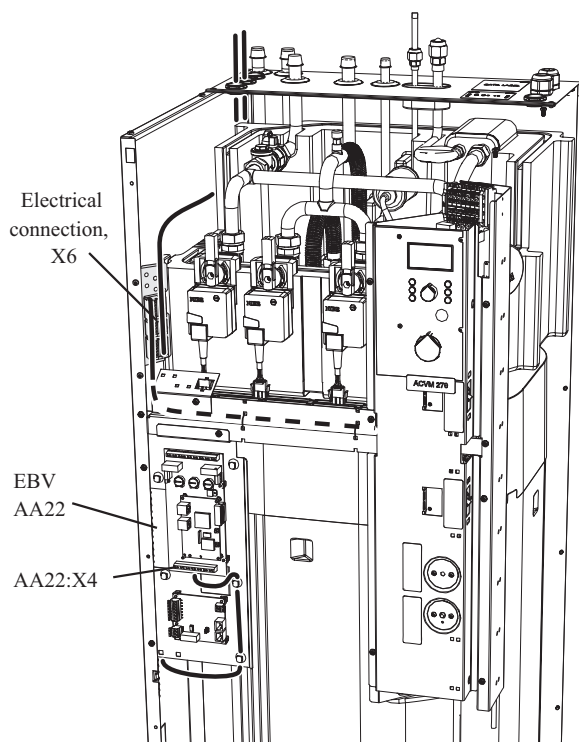
Electrical installation and wiring must be carried out in accordance with the stipulations in force.

The indoor unit must not be powered when installing ESV 22.

Electrical connection HMA 100V

The electrical circuit diagram is at the end of these installation instructions.

From ESV 22



- The sensor used as flow sensor (EP21-BT2) is connected to terminal AA22:X4:7 and AA22:X4:8 in the load monitor card's lower terminal block.

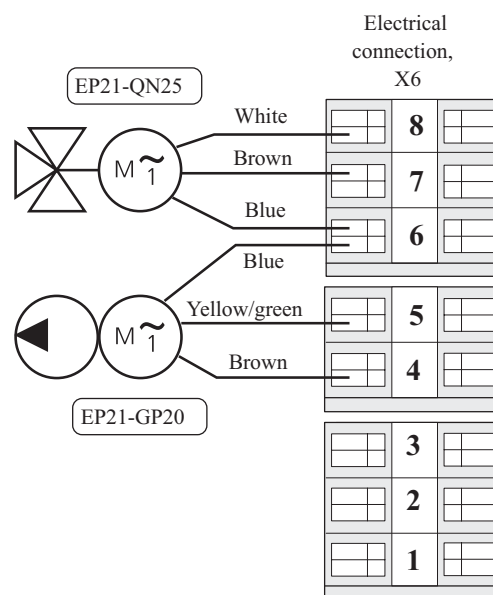
- The return line sensor (EP21-BT3) is connected to terminal AA22:X4:5 and AA22:X4:6 on the same card.

Connect valve actuator (EP21-QN25) as follows:

- White cable (230 V signal) to spring terminal X6:8a
- Brown cable (230 V signal) to spring terminal X6:7b
- Blue cable (zero) to spring terminal X6:6b

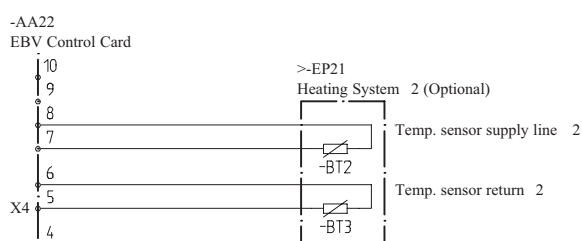
Connect the 3 wire circulation pump in the connection box on the circulation pump (EP21-GP20). Yellow/green cable to earth, blue to zero and brown to phase. Connect the circulation pump (EP21-GP20) to the terminal block X6 as follows:

- Blue cable (zero) to spring terminal -X6:6a
- Yellow/green cable (earth cable) to spring terminal -X6:5a
- Brown cable (phase) to spring terminal -X6:4a



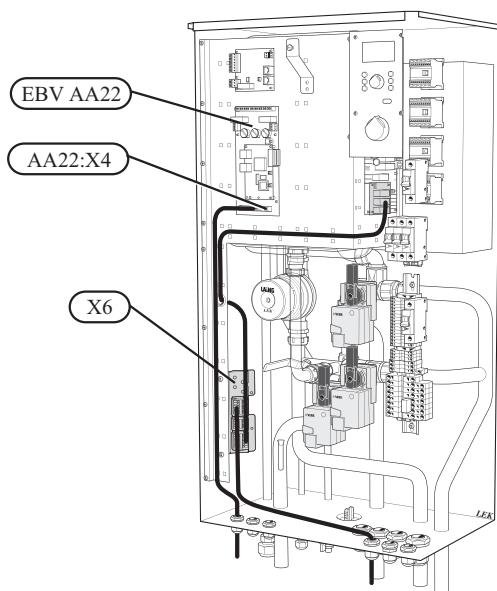
1. The accessory ACK 22 is installed according to the supplied installation instructions.
2. The sensors are connected by twin cables (for example EKXX or LiYY) as follows for the load monitor card (EBV-AA22) see image below:

Use the enclosed round pin sleeves for splicing between the 2-cables and sensors BT2 and BT3.



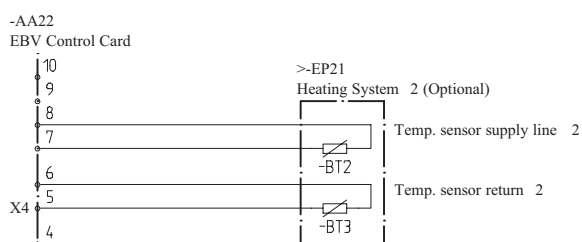
Electrical connection HMS 140V

The electrical circuit diagram is at the end of these installation instructions.



1. The accessory ACK 28 is installed according to the supplied installation instructions.
2. The sensors are connected by twin cables (for example EKXX or LiYY) as follows for the load monitor card (EBV-AA22) see image below:

Use the enclosed round pin sleeves for splicing between the 2-cables and sensors BT2 and BT3.



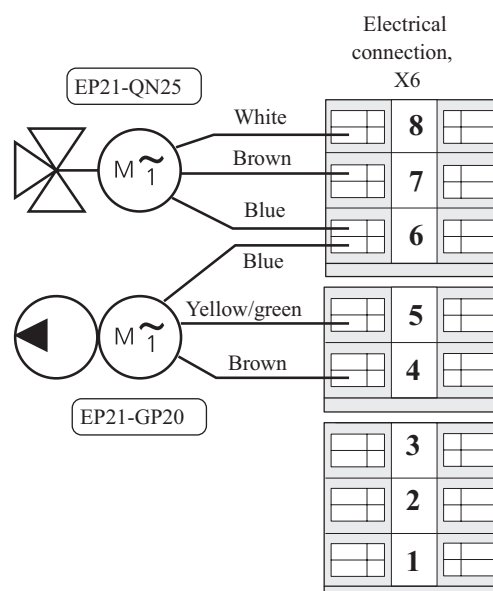
- The sensor used as flow sensor (EP21-BT2) is connected to terminal AA22:X4:7 and AA22:X4:8 in the load monitor card's lower terminal block.
- The return line sensor (EP21-BT3) is connected to terminal AA22:X4:5 and AA22:X4:6 on the same card.

Connect valve actuator (EP21-QN25) as follows:

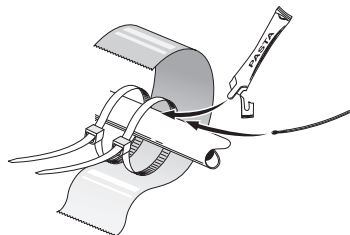
- White cable (230 V signal) to spring terminal X6:8a
- Brown cable (230 V signal) to spring terminal X6:7b
- Blue cable (zero) to spring terminal X6:6b

Connect the 3 wire circulation pump in the connection box on the circulation pump (EP21-GP20). Yellow/green cable to earth, blue to zero and brown to phase. Connect the circulation pump (EP21-GP20) to the terminal block X6 as follows:

- Blue cable (zero) to spring terminal -X6:6a
- Yellow/green cable (earth cable) to spring terminal -X6:5a
- Brown cable (phase) to spring terminal -X6:4a



Temperature sensor installation



Install the temperature sensor with cable ties with the heat conducting paste and aluminium tape.

Then insulate with supplied insulation tape.

NOTE

Sensor and communication cables must not be placed near power cables.

Program settings

- Select “Service” in menu 8.1.1 to gain access to menus 9.0 and the sub-menus.
- Then select “Heating”, “Heating + Cooling” or “Cooling” in menu 9.3.4, “Heating system 2”. Menu 3.0 and its sub-menus become accessible.
- In the sub-menus the curve co-efficient 2, offset heat curve 2 and min- and max levels for the flow line temperature 2 are set in the same way as heat system 1 under menu 2.0.

See page 89 for details.

ESV 28

General

This accessory is used when HMS 140V is installed in houses with two different heating systems that require different flow line temperatures, for example, in cases where the house has both a radiator system and an under floor heating system. In the following text heating system 1 covers the system that requires the greater temperature and that is connected to the normal supply line respectively return line connection. Heating system 2 covers the heating system that works at the lower temperature.

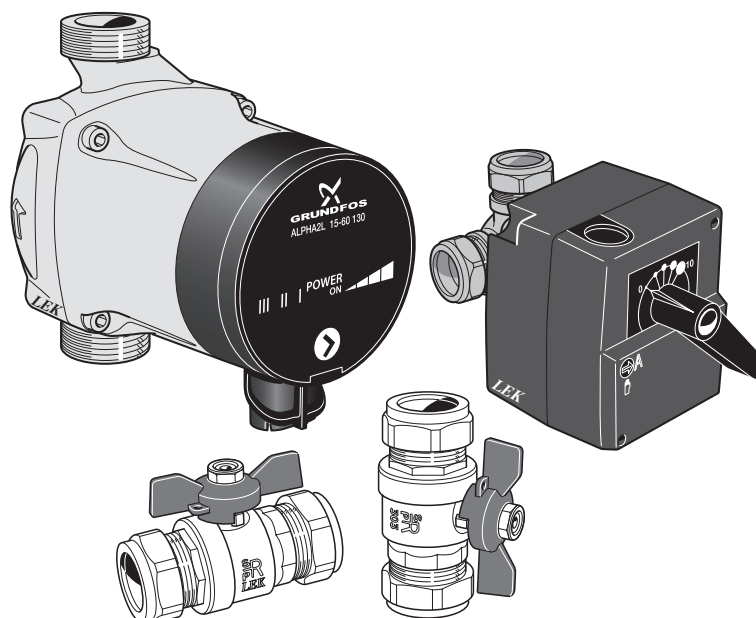
The water flow in the two heating systems should not exceed 2850 l/h (0.79 l/s).

NOTE

This accessory requires accessory ACK 28 for installation in the HMS 140V series.

Contents

- 2 x Copper pipe, collared
- 1 x 3 wire circulation pump
- 4 x Cable ties
- 2 x Heating pipe paste
- 1 x Insulation tape
- 2 x Flat gasket
- 4 x Round sleeve
- 2 x Swivel nut 1"
- 1 x Circulation pump, EP21-GP20
- 2 x Ball valve
- 1 x 3-way valve
- 2 x Aluminium tape (pieces)
- 2 x Temperature sensor, EP21-BT2 (flow sensor), EP21-BT3 (return sensor)
- 1 x Control motor, EP21-QN25
- 1 x Alpha switch



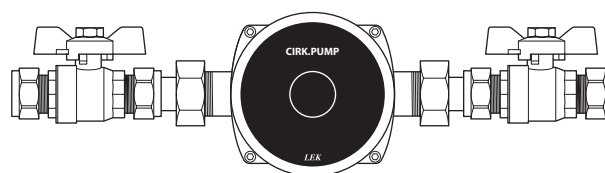
Pipe connections

Install as follows:

- First drain the boiler water reservoir/heating system if filled with water.
- The extra heating medium pump(EP21-GP20) is placed in a suitable location between the shunt valve (EP21- QN25) and heating system 2 in the direction of flow.
- The shunt valve (EP21-QN25) is located on the supply line after indoor unit, between the inlet of heating system 1 and 2. Connect the shunt valve (EP21-QN25) ports 1, 2 and 3 to corresponding pipes, see image on page 250.
- The flow sensor (EP21-BT2) is installed on the pipe after the heat medium pump (EP21-GP20).
- The return line sensor (EP21-BT3) is installed on the pipe from heating system 2.
- When installing the sensor, heat conducting paste must be used and the pipe must be insulated to obtain the correct temperature measurement.

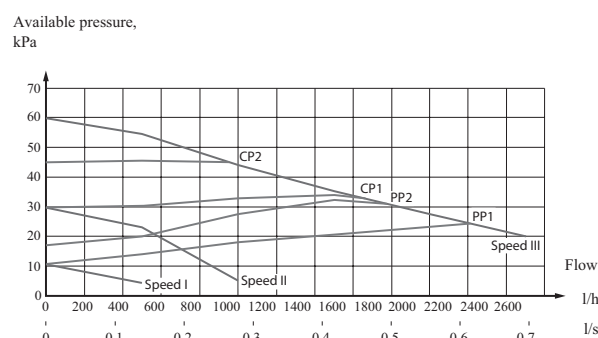
NOTE

Incorrect installation can affect the function.

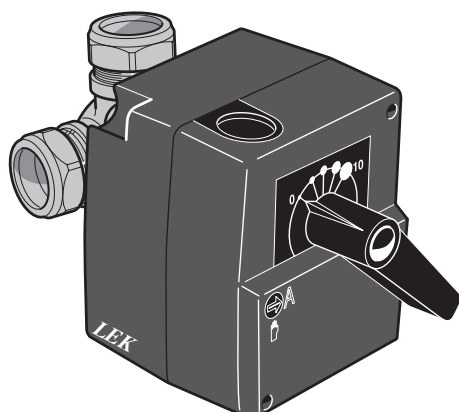


Heating medium pump, (EP21-GP20)
Connections, Ø 22 mm

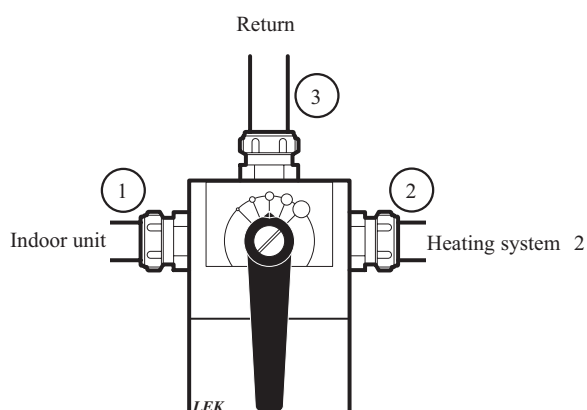
Pump and pressure drop diagrams



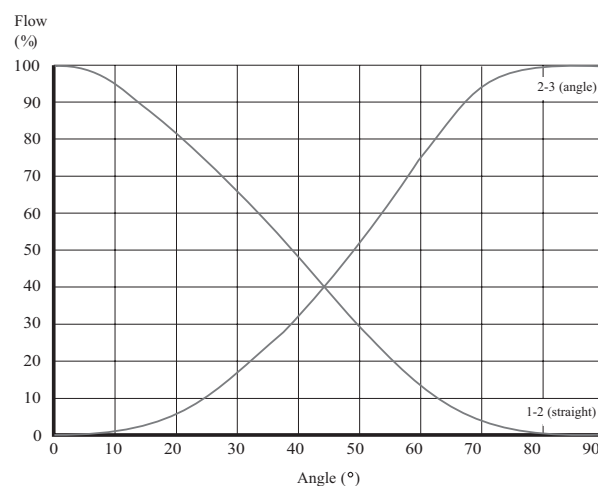
Choose between seven settings on the pump. You can choose between three different constant speeds (I, II or III) or two different curves, one proportional pressure (PP) and one constant pressure (CP), where 1 is lowest and 2 highest.



By-pass valve, (EP21-QN25)
Connections, Ø 28 mm



Shunt valve characteristics

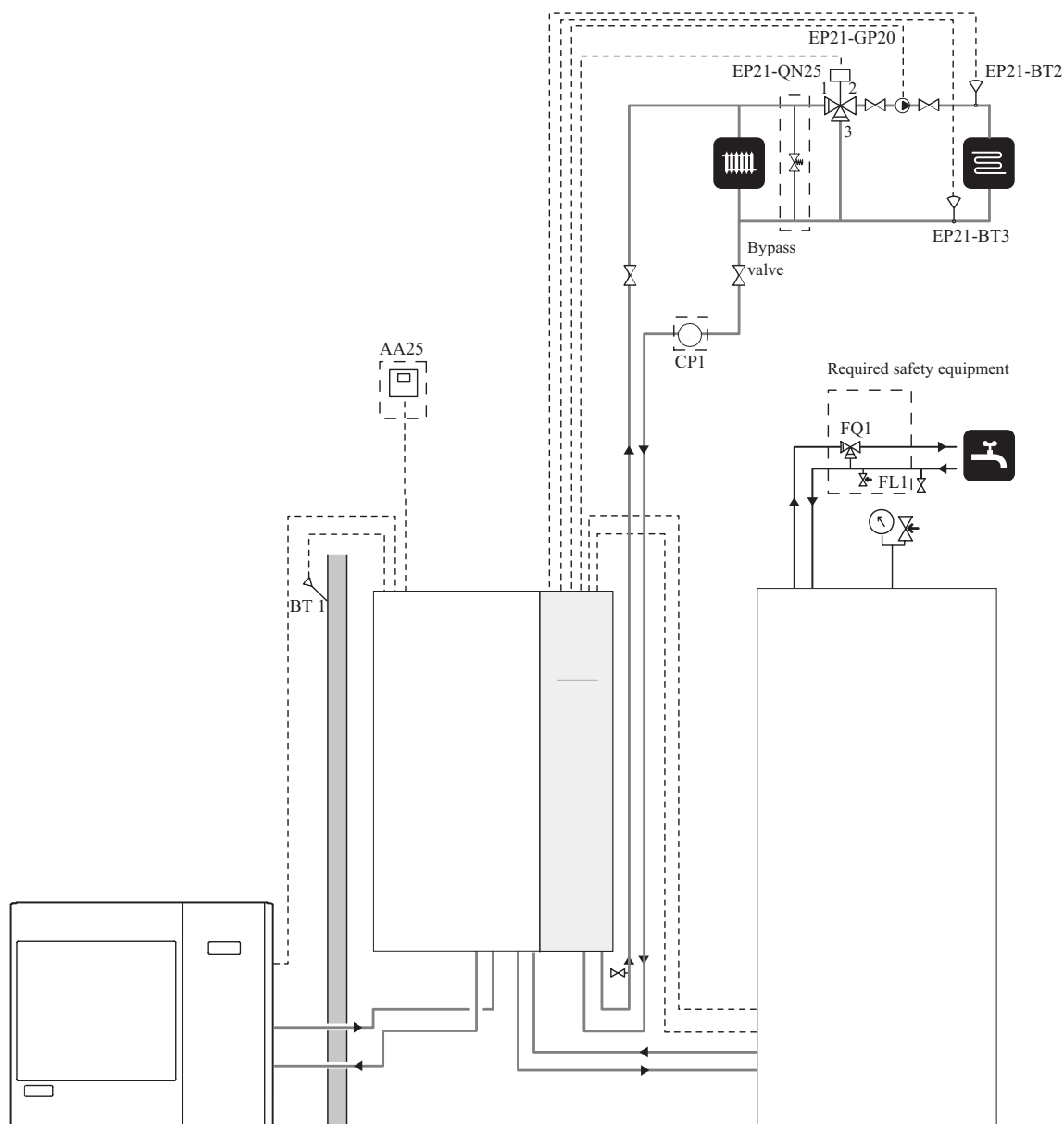


KVS value 12

Recommended for floor heating areas over 200 m².

Outline diagram indoor unit with ESV 28 - extra shunt

HMS 140V with ESV 28



Explanation

| | | | |
|----------|-----------------------------------|-----------|-------------------------|
| AA25 | Equipment box (MH-RG10) | CP1 | Buffer vessel |
| BT1 | Temperature sensor, outdoor | EP21-GP20 | Extra circulation pump |
| EP21-BT2 | Temperature sensor, supply line 2 | EP21-QN25 | Shunt valve |
| EP21-BT3 | Temperature sensor, return 2 | FL1 | Safety valve, hot water |
| | | FQ1 | Mixer valve, hot water |

Electrical connection HMS 140V

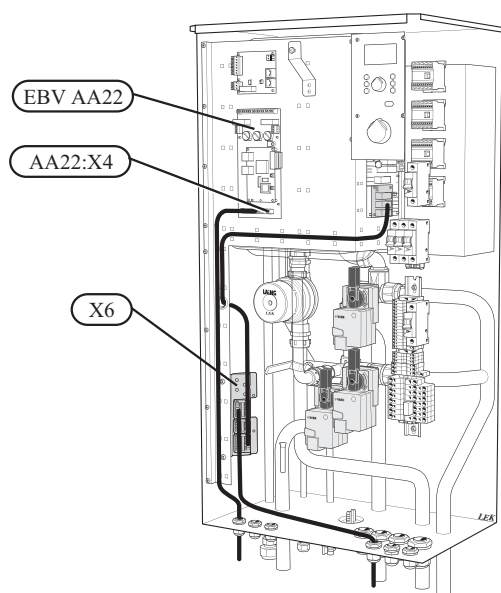
NOTE

All electrical connections must be carried out by an authorised electrician.

Electrical installation and wiring must be carried out in accordance with the stipulations in force.

The indoor unit must not be powered when installing ESV 28.

The electrical circuit diagram is at the end of these installation instructions.

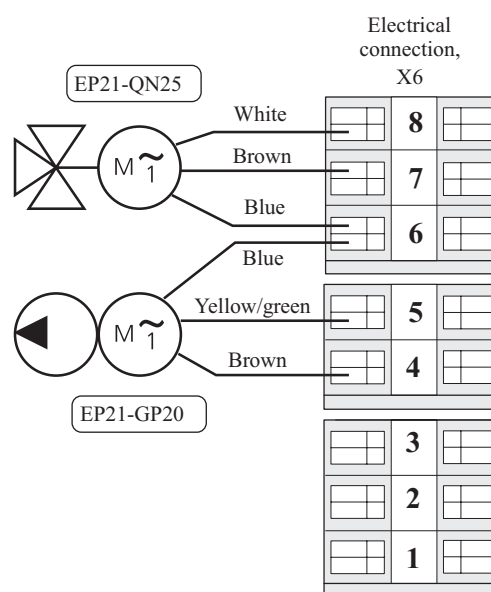


Connect valve actuator (EP21-QN25) as follows:

- White cable (230 V signal) to spring terminal X6:8a
- Brown cable (230 V signal) to spring terminal X6:7b
- Blue cable (zero) to spring terminal X6:6b

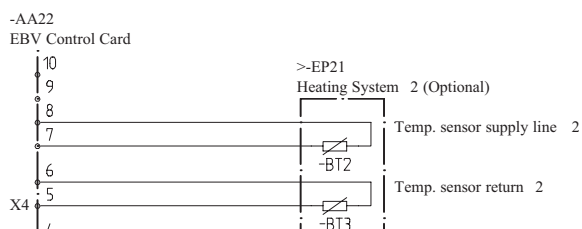
Connect the 3 wire circulation pump in the connection box on the circulation pump (EP21-GP20). Yellow/green cable to earth, blue to zero and brown to phase. Connect the circulation pump (EP21-GP20) to the terminal block X6 as follows:

- Blue cable (zero) to spring terminal –X6:6a
- Yellow/green cable (earth cable) to spring terminal –X6:5a
- Brown cable (phase) to spring terminal –X6:4a



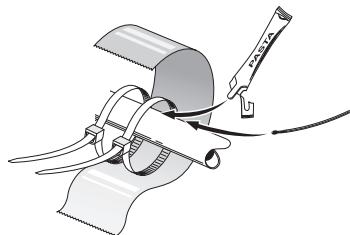
1. The accessory ACK 28 is installed according to the supplied installation instructions.
2. The sensors are connected by twin cables (for example EKXX or LiYY) as follows for the load monitor card (EBV-AA22) see image below:

Use the enclosed round pin sleeves for splicing between the 2-cables and sensors BT2 and BT3.



- The sensor used as flow sensor (EP21-BT2) is connected to terminal AA22:X4:7 and AA22:X4:8 in the load monitor card's lower terminal block.
- The return line sensor (EP21-BT3) is connected to terminal AA22:X4:5 and AA22:X4:6 on the same card.

Temperature sensor installation



Install the temperature sensor with cable ties with the heat conducting paste and aluminium tape.

Then insulate with supplied insulation tape.

NOTE

Sensor and communication cables must not be placed near power cables.

Program settings

- Select “Service” in menu 8.1.1 to gain access to menus 9.0 and the sub-menus.
- Then select “Heating”, “Heating + Cooling” or “Cooling” in menu 9.3.4, “Heating system 2”. Menu 3.0 and its sub-menus become accessible.
- In the sub-menus the curve co-efficient 2, offset heat curve 2 and min- and max levels for the flow line temperature 2 are set in the same way as heat system 1 under menu 2.0.

See page 89 for details.

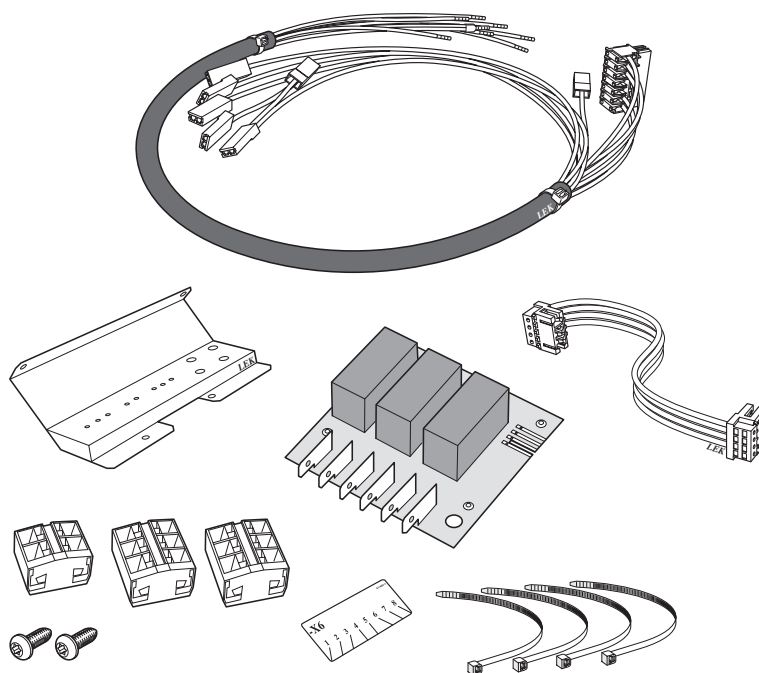
ACK 22

General

This accessory is used to connect accessories ESV 22 and VCC 22 to the indoor unit HMA100V.

Contents

- 1 x Cable set
- 2 x Torx head screw, M5 self-tapping
- 5 x Cable ties
- 1 x Relay card with wiring (AA7)
- 1 x Label
- 1 x Terminal block 2x1-pole (X6)
- 1 x Terminal block 2x1-pole PE (X6)
- 2 x Terminal block 2x3-pole (X6)
- 1 x End plate for terminal block (X6)
- 4 x Strain relief (mounting, cable tie)
- 1 x Installation plate



Electrical connection

NOTE

All electrical connections must be carried out by an authorised electrician.

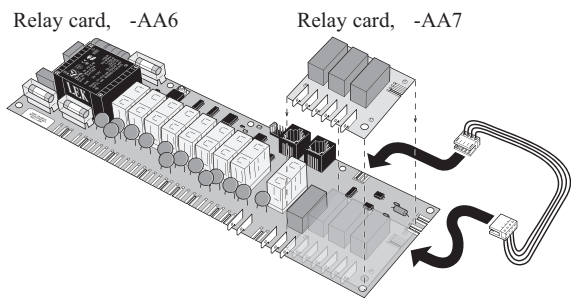
Electrical installation and wiring must be carried out in accordance with the stipulations in force.

Indoor unit must not be powered when installing ACK 22.

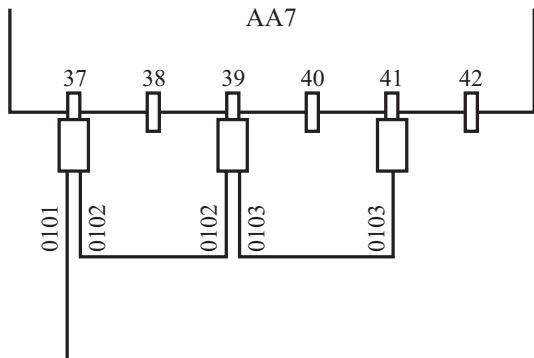
The electrical circuit diagram is at the end of these installation instructions.

Following cables for ACK 22 are used in this kit: 0101 to 0112.

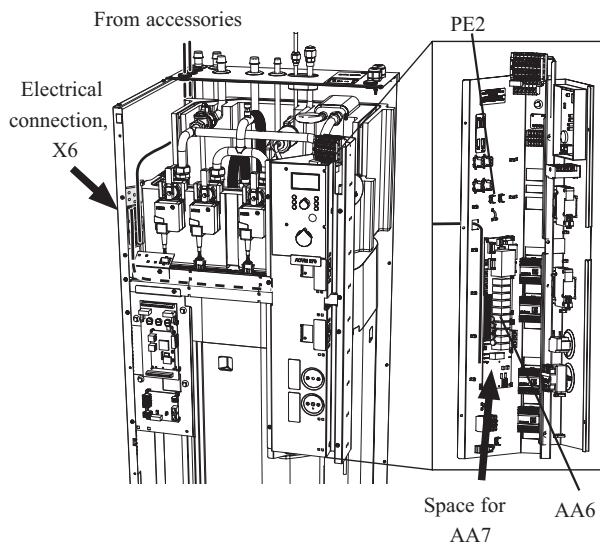
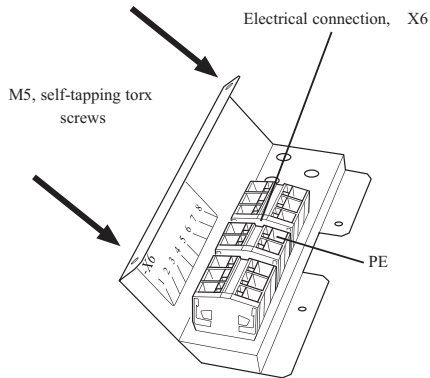
1. The supplied relay card (AA7) is installed on the existing relay card (AA6) using the plastic turrets, see image below.
2. Connect the edge connector wiring between the supplied relay card (AA7) and relay card (AA6) as illustrated below.



3. The corresponding wiring with flat pin sleeves and zero numbers 0101 to 0103 are installed as follows:
 - Brown cables with zero number 0101 and 0102 to flat pin AA7:37.
 - Brown cables with zero number 0102 and 0103 to flat pin AA7:39.
 - Brown (single) cable with zero number 0103 to flat pin AA7:41.

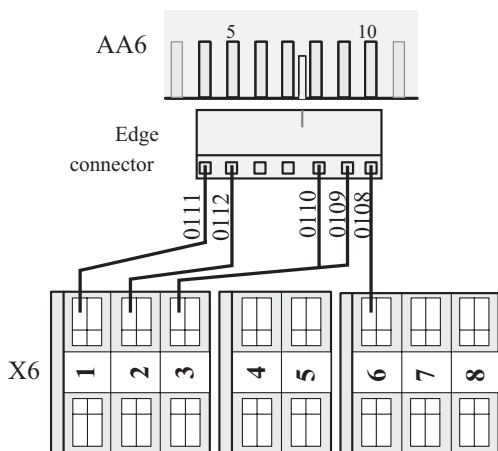
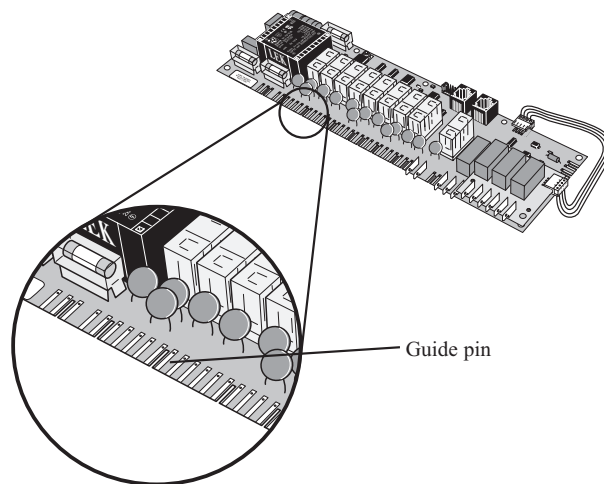


4. Mount the terminal blocks, label and strain relief on the mounting plate. Screw the plate into place with two accompanying M5 self-tapping torx screws, see image below.



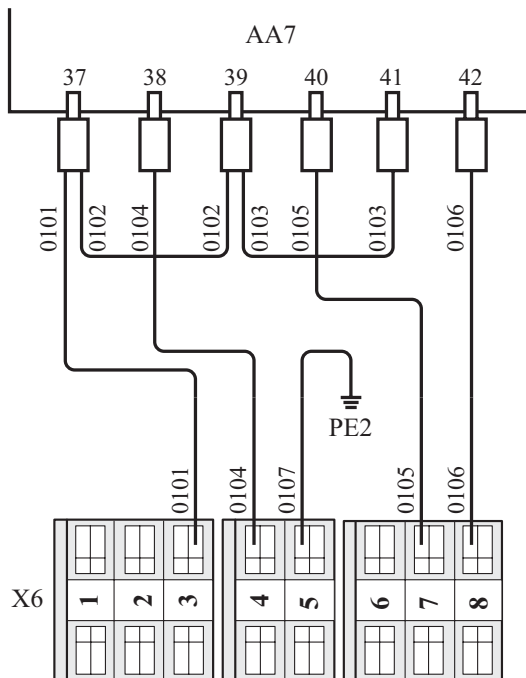
5. Press the 7-pole edge connector with zero number 0108 to 0112 on the relay card AA6 according to the image below (NOTE! Be careful to match up the guide pin in the edge connector with its hole in the card edge). Then connect the loose wire ends as follows:

- Blue cable with zero number 0108 to spring terminal X6:6a.
- Brown cables with zero number 0109 and 0110 to spring terminal X6:3a.
- Black cable with zero number 0111 to spring terminal X6:1a.
- Grey cable with zero number 0112 to spring terminal X6:2a.



6. Connect the other individual wires as follows:

- Brown cable with zero number 0101 to spring terminal X6:3b.
- Yellow/green cable with zero number 0107 to spare connection on ground flat pin –PE2 (see image on page 254) and in spring terminal X6:5a.
- Brown cable with zero number 0104 to flat pin AA7:38 and in spring terminal X6:4a.
- Brown cable with zero number 0105 to flat pin –AA7:40 and in spring terminal –X6:5a.
- Black cable with zero number 0106 to flat pin –AA7:42 and in spring terminal –X6:8a.



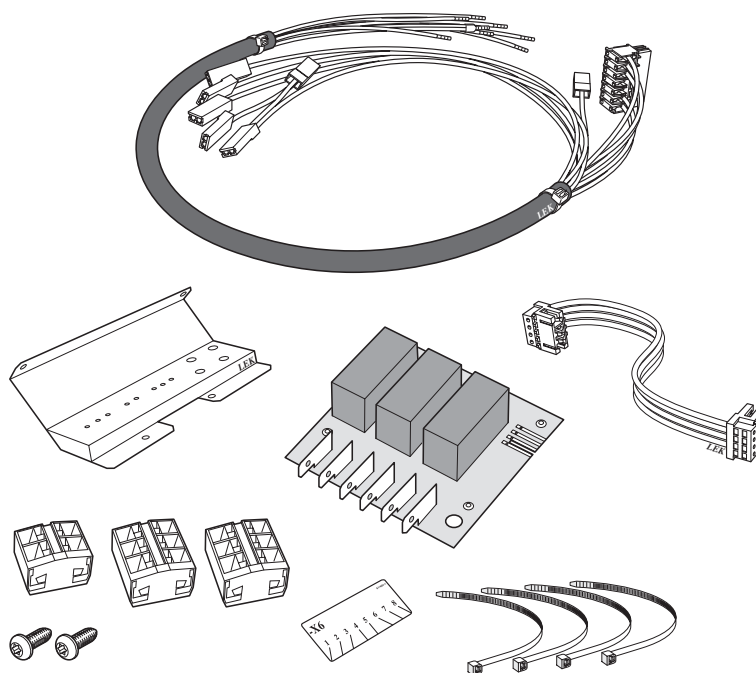
ACK 28

General

This accessory is used to connect accessories ESV 28 and VCC 28 to the indoor unit.

Contents

- 1 x Cable set
- 2 x Torx head screw, M5 self-tapping
- 10 x Cable ties
- 1 x Relay card with wiring (AA7)
- 1 x Label
- 1 x Terminal block 2x1-pole (X6)
- 1 x Terminal block 2x1-pole PE (X6)
- 2 x Terminal block 2x3-pole (X6)
- 1 x End plate for terminal block (X6)
- 4 x Strain relief (mounting, cable tie)
- 1 x Installation plate



Electrical connection

NOTE

All electrical connections must be carried out by an authorised electrician.

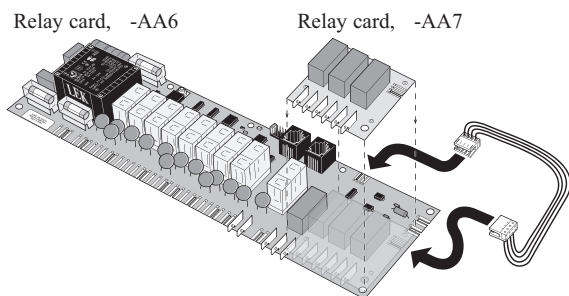
Electrical installation and wiring must be carried out in accordance with the stipulations in force.

The indoor unit must not be powered when installing ACK 28.

The electrical circuit diagram is at the end of these installation instructions.

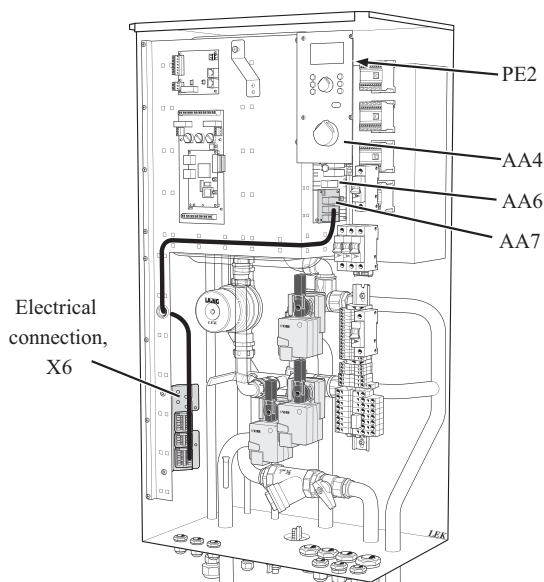
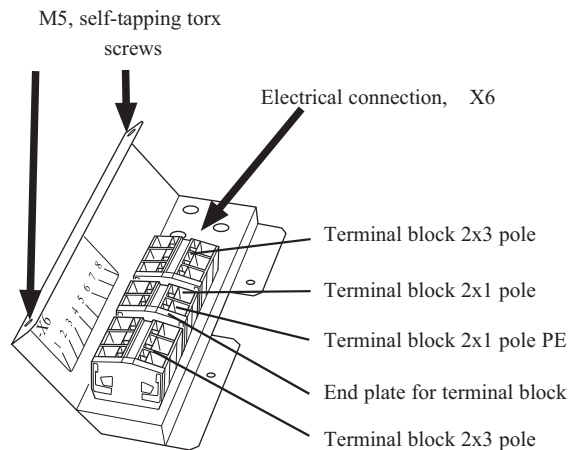
Following cables for ACK 28 are used in this kit: 0101 to 0112.

1. Remove the display unit (AA4).
2. The supplied relay card (AA7) is installed on the existing relay card (AA6) using the plastic turrets, see image below.
3. Connect the edge connector wiring between the supplied relay card (AA7) and relay card (AA6) as illustrated below.



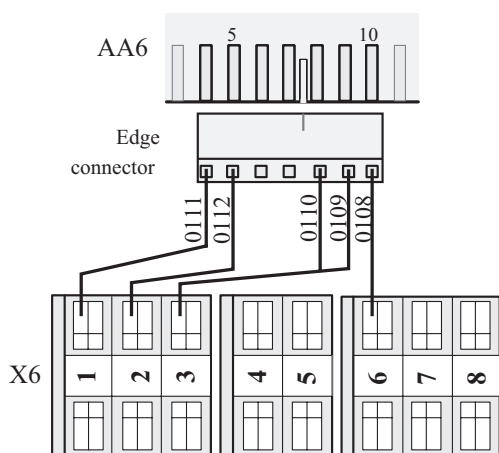
4. The corresponding wiring with flat pin sleeves and zero numbers 0101 to 0103 are installed as follows:
 - Brown cables with zero number 0101 and 0102 to flat pin AA7:37.
 - Brown cables with zero number 0102 and 0103 to flat pin AA7:39.
 - Brown (single) cable with zero number 0103 to flat pin AA7:41.

5. Mount the terminal blocks, label and strain relief on the mounting plate. Screw the plate into place with two accompanying M5 self-tapping torx screws, see image below.



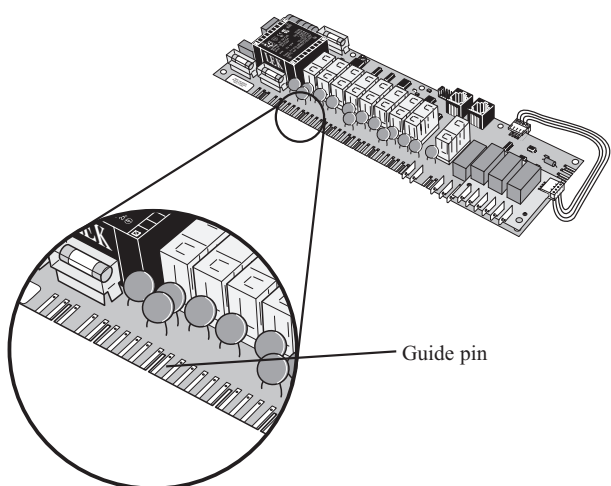
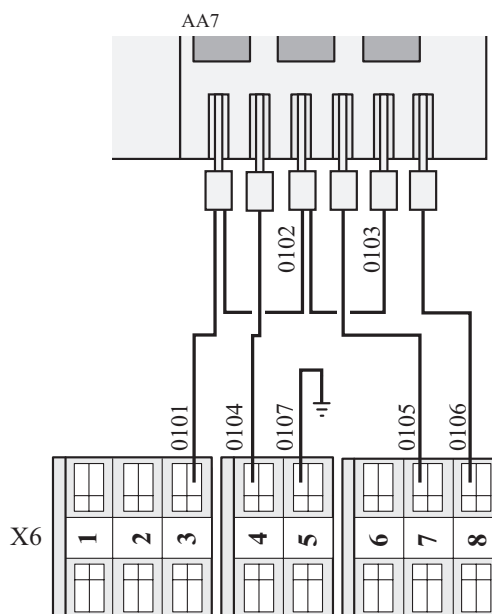
6. Press the 7-pole edge connector with zero number 0108 to 0112 on the relay card AA6 according to the image below (NOTE! Be careful to match up the guide pin in the edge connector with its hole in the card edge). Then connect the loose wire ends as follows:

- Blue cable with zero number 0108 to spring terminal X6:6a.
- Brown cables with zero number 0109 and 0110 to spring terminal X6:3a.
- Black cable with zero number 0111 to spring terminal X6:1a.
- Grey cable with zero number 0112 to spring terminal X6:2a.



7. Connect the other individual wires as follows:

- Brown cable with zero number 0101 to spring terminal X6:3b.
- Yellow/green cable with zero number 0107 to spare connection on ground flat pin –PE2 (see image on page 257) and in spring terminal X6:5a.
- Brown cable with zero number 0104 to flat pin AA7:38 and in spring terminal X6:4a.
- Brown cable with zero number 0105 to flat pin –AA7:40 and in spring terminal –X6:7a.
- Black cable with zero number 0106 to flat pin –AA7:42 and in spring terminal –X6:8a.



MH-RG10

General

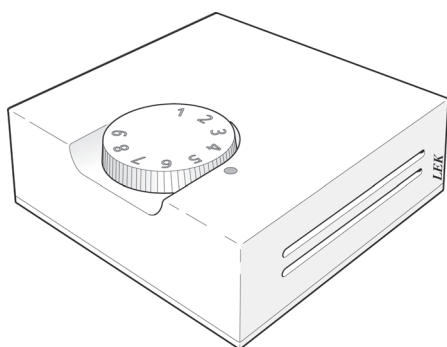
ROOM SENSOR MH-RG 10 is used together with MHI air to water heat pump system.

The room sensor can correct the temperature to radiators or floor loops depending on the increased indoor temperature in connection with solar incident radiation, heating from another heat source or increased indoor activity.

The room sensor can also quickly correct the temperature in connection with the reconnection of disconnected power output, for example, centralised load control.

The room sensor must be positioned with care to work correctly, see the Installation section.

Mounting & Installation



It is important that the room sensor is not disturbed by any other heat source, for example, lamps, TV or other warm objects. Curtains should not block the sensor.

Install in a neutral position where the set temperature is required. A suitable place is on a free inner wall in a hall approx. 1.5 m above the floor. However, the sensor must not be prevented from measuring the correct indoor temperature, for example, by placing in a niche, between shelves, behind a curtain, above or close to a heat source or the like. Also consider any draughts from exterior doors. Neither must the unit be affected by solar incident radiation.

The conduit should be sealed next to the sensor to prevent a draught in the pipe, which could affect the sensor.

Setting

This room sensor measures the temperature in homes and regulates the heat/cool to the climate system.

If there are thermostat valves on the radiators in the same room as the room sensor these should be fully open in order for the room sensor to work correctly.

However, radiator valves in areas such as bedrooms, where a slightly lower temperature is required, should be set to the required temperature.

The required temperature can be set using the knob on the room sensor unit. The scale is graduated 1 – 9, where 5 equals approximately 21 °C (house type relevant setting of curve slope and parallel displacement). Reading the set temperature can be done on the display screen on the apparatus. The maximum room temperature setting is 30 °C and the lowest setting is approximately 10 °C.

If the room temperature changes the room sensor senses this and compensates the flow temperature to the climate system to maintain the required temperature in the room.

The reason for the lower temperature can be intensive airing or disconnection of the power during specific pe-riods of the year, i.e. centralised load control. Centralised load control is designed to save and redistribute electrical power during periods when power consumption is high and means that the immersion heaters in heating installations do not get the necessary power to maintain a specific room temperature. Under normal conditions the room temperature does not change that much.

Mechanical design

Room temperature sensor MH-RG 10 is intended for wall mounting. Installation can either be surface mounted or using recessed connection boxes. The connection cable can be either recessed or surface mounted. It should be a shielded three wire cable, where the shield is connected to the signal ground.

The enclosure is manufactured of plastic and consists of a bottom section with terminal blocks and components for setting and measuring the room temperature and a knob to set the required temperature.

The temperature sensing element is made up of an NTC-resistor.

Connecting

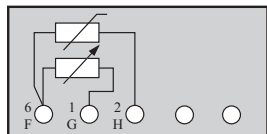
Positions on MH-RG 10:

F : 6 Signalground

G : 1 Setting (set point value)

H : 2 Room temp (actual value)

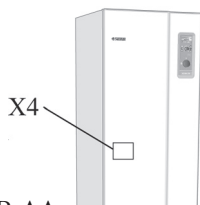
MH-RG 10 is connected as follows. (See corresponding Installation and Maintenance Instructions for terminal block positions.)



F -> Terminal block X4, 2

G -> Terminal block X4, 1

H -> Terminal block X4, 3



Terminal block X4 is located on the PCB-AA.

Adjustment during installation

The room sensor is primarily intended to correct decreases in room temperature due to causes other than changes in the outdoor temperature, for example, centralised load control.

The room sensor corrects the curve slope so that the flow temperature changes. If the room temperature changes the room sensor senses this and lets the processor change the flow temperature.

Any radiator valves ought to be fully open in areas where the room sensor is installed.

Activation

MH-RG10 must be activated in the menu.

Menu 6.2, 9.3.5, 9.3.6.

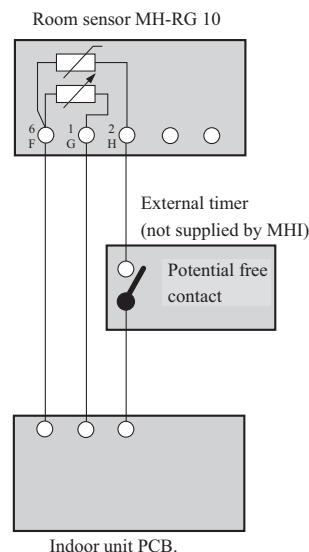
NOTE

Work behind screwed covers may only be carried out under the supervision of a qualified installation engineer.

External control of the room temperature, extra option

The room temperature can be altered between two preset values. If the room sensor connection is supplemented with an external potential free contact function, for example telephone switch or clock, the preset values can be used. When the contact function is made the room sensor is connected and influences the flow temperature.

Example: The basic setting gives a specific flow temperature. The room sensor is set to a lower temperature. When the contact is made, the lower temperature applies until the contact will be broken again.



AIR TO WATER HEAT PUMP



MITSUBISHI HEAVY INDUSTRIES THERMAL SYSTEMS, LTD.

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