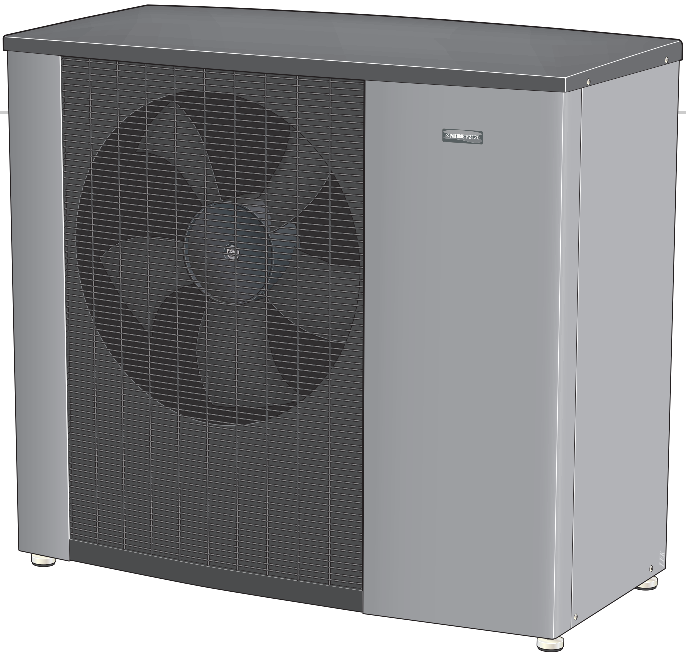


Installer manual

# NIBE™ F2120

**8, 12, 16, 20**

Air/water heat pump

IHB GB 1621-1
331385

# Table of Contents

# 1 Important information

## Safety information

This manual describes installation and service procedures for implementation by specialists.

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. The product is intended for use by experts or trained users in shops, hotels, light industry, farming and similar environments.

Children must be instructed/supervised to ensure that they do not play with the appliance.

Do not allow children to clean or maintain the appliance unsupervised.

This is an original manual. It may not be translated without the approval of NIBE.

We reserve the right to make design modifications without prior notice.



### Balance temperature

The balance temperature is the outdoor temperature when the heat pump's stated output is equal to the building's output requirement. This means that the heat pump covers the whole building's output requirement down to this temperature.

### Stop temperature

If the ambient temperature is below the stop temperature, heating must occur with additional heat.

### Compressor heater

F2120 is equipped with two compressor heaters that heat the compressor before start-up and when the compressor is cold.

> **NOTE**
>
> The compressor heater must have been active for approx. 3 hours before the first start, see section "Start-up and inspection" on page 31.

### Symbols

> **NOTE**
>
> This symbol indicates danger to machine or person.

> **Caution**
>
> This symbol indicates important information about what you should observe when maintaining your installation.

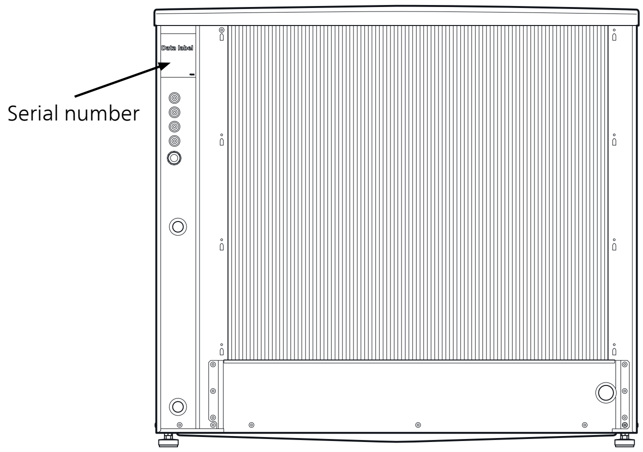
> **TIP**
>
> This symbol indicates tips on how to facilitate using the product.

### Marking

The CE marking means that NIBE ensures that the product meets all regulations that are placed on it based on relevant EU directives. The CE mark is obligatory for most products sold in the EU, regardless where they are made.

### Serial number

The serial number can be found at the top left on the rear.




> **Caution**
>
> Always give the product's serial number when reporting a fault.

### Recovery

Leave the disposal of the packaging to the installer who installed the product or to special waste stations.

Do not dispose of used products with normal household waste. It must be disposed of at a special waste station or dealer who provides this type of service.

Improper disposal of the product by the user results in administrative penalties in accordance with current legislation.

## Country specific information

### *Installer manual*

This installer manual must be left with the customer.

## Safety precautions

### *Caution*

**Install the system in full accordance with this installation manual.**
Incorrect installation can cause bursts, personal injury, water leaks, refrigerant leaks, electric shocks and fire.

**Observe the measurement values before working on the cooling system, especially when installing in small rooms, so that the limit for the refrigerant's density is not exceeded.**
Consult an expert to interpret the measurement values. If the refrigerant density exceeds the limit, lack of oxygen can occur in the event of any leak, which can cause serious accidents.

**Use original accessories and the stated components for the installation.**
If parts other than those stated by us are used, water leaks, electric shocks, fire and personal injury may occur as the unit may not work properly.

**Ventilate the working area well – refrigerant leakage may occur during service work.**
If the refrigerant comes into contact with naked flames, poisonous gas is created.

**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. Installation without sufficient support can also cause vibrations and noise.

**Ensure that 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.

**The electrical installation must be carried out by a qualified electrician and the system must be connected as a separate circuit.**
Power supply with insufficient capacity and incorrect function can cause electric shocks and fire.

**Use the stated cables for the electrical connection, tighten the cables securely in the terminal blocks and relieve the wiring correctly to prevent overloading the terminal blocks.**
Loose connections or cable mountings can cause abnormal heat production or fire.

**Check, after completed installation or service, that no refrigerant leaks from the system in gas form.**
If refrigerant gas leaks into the house and comes into contact with an aerotemp, an oven or other hot surface, poisonous gases are produced.

**Switch off the compressor before opening/breaching the refrigerant circuit.**
If the refrigerant circuit is breached /opened whilst the compressor is running, air can enter the process circuit. This can cause unusually high pressure in the process circuit, which can cause bursts and personal injury.

**Switch off the power supply in the event of a service or inspection.**
If the power supply is not shut off, there is a risk of electric shocks and damage due to the rotating fan.

**Do not run the unit with removed panels or protection.**
Touching rotating equipment, hot surfaces or high voltage parts can cause personal injury due to entrapment, burns or electric shocks.

**Cut the power before starting electrical work.**
Failure to cut the power can cause electric shocks, damage and incorrect function of the equipment.

### *Care*

**Carry out the electrical installation 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.

**Use main switch with sufficient breaking capacity.**
If the switch does not have sufficient breaking capacity, malfunctions and fire can occur.

**Always use a fuse with the correct rating in the locations where fuses are to be used.**
Connecting the unit with copper wire or other metal thread can cause unit breakdown and fire.

**Cables must be routed so that they are not damaged by metal edges or trapped by panels.**
Incorrect installation can cause electric shocks, heat generation and fire.

**Do not install the unit in close proximity to locations where leakage of combustible gases can occur.**
If leaking gases collect around the unit, fire may occur.

**Do not install the unit where corrosive gas (for example nitrous fumes) or combustible gas or steam (for example thinner and petroleum gases) can build up or collect, or where volatile combustible substances are handled.**
Corrosive gas can cause corrosion to the heat exchanger, breaks in plastic parts etc. and combustible gas or steam can cause fire.

**Do not use the unit where water splashes may occur, for example in laundries.**
The indoor section is not waterproof and electric shocks and fire can therefore occur.

**Do not use the unit for specialist purposes such as for storing food, cooling precision instruments, freeze-conservation of animals, plants or art.**
This can damage the items.

**Do not install and use the system close to equipment that generates electromagnetic fields or high frequency harmonics.**
Equipment such as inverters, standby sets, medical high frequency equipment and telecommunications equipment can affect the unit and cause malfunctions and breakdowns. The unit can also affect medical equipment and telecommunications equipment, so that it functions incorrectly or not at all.

**Do not install the outdoor unit in the locations stated below.**
- Locations where leakage of combustible gas can occur.
- Locations where carbon fibre, metal powder or other powder that can enter the air.
- Locations where substances that can affect the unit, for example, sulphide gas, chlorine, acid or alkaline substances can occur.
- Locations with direct exposure to oil mist or steam.
- Vehicles and ships.
- Locations where machines that generate high frequency harmonics are used.
- Locations where cosmetic or special sprays are often used.
- Locations that can be subjected to direct salty atmospheres. In this case, the outdoor unit must be protected against direct intakes of salty air.
- Locations where large amounts of snow occur.
- Locations where the system is exposed to chimney smoke.

**If the bottom frame of the outdoor section is corroded, or in any other way damaged, due to long periods of operation, it must not be used.**
Using an old and damaged frame can cause the unit to fall and cause personal injury.

**If soldering near the unit, ensure that solder residue does not damage the drip tray.**
If solder residue enters the unit during soldering, small holes can appear in the tray resulting in water leakage. To prevent damage, keep the indoor unit in its packing or cover it.

**Do not allow the drainage pipe to exit into channels where poisonous gases, containing sulphides for example, can occur.**
If the pipe exits into such a channel, any poisonous gases will flow into the room and seriously affect the user's health and safety.

**Insulate the unit's connection pipes so that the ambient air moisture does not condense on them.**
Insufficient insulation can cause condensation, which can lead to moisture damage on the roof, floor, furniture and valuable personal property.

**Do not install the outdoor unit in a location where insects and small animals can inhabit.**

Insects and small animals can enter the electronic parts and cause damage and fire. Instruct the user to keep the surrounding equipment clean.

**Take care when carrying the unit by hand.**
If the unit weights more than 20 kg, it must be carried by two people. Use gloves to minimize the risk of cuts.

**Dispose of any packaging material correctly.**
Any remaining packaging material can cause personal injury as it may contain nails and wood.

**Do not touch any buttons with wet hands.**
This can cause electric shocks.

**Do not touch any refrigerant pipes with your hands when the system is in operation.**
During operation the pipes become extremely hot or extremely cold, depending on the method of operation. This can cause burn injuries or frost injuries.

**Do not shut off the power supply immediately after operation has start.**
Wait at least 5 minutes, otherwise there is a risk of water leakage or breakdown.

**Do not control the system with the main switch.**
This can cause fire or water leakage. In addition, the fan can start unexpectedly, which can cause personal injury.

## *Especially for units intended for R410A*

- Do not use other refrigerants than R410A. R410A means that the pressure is about 1.6 times as high as conventional refrigerants.

- Do not use charging bottles. These types of bottles change the composition of the refrigerant, which makes the performance of the system worse.

- When filling refrigerant, the refrigerant must always leave the bottle in liquid form.

## 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. Fill in the page for information about installation data in the User manual.

| ✔ | Description | Notes | Signature | Date |
|---|---|---|---|---|
| Heating medium (side 21) | | | | |
| | System flushed | | | |
| | System vented | | | |
| | Particle filter | | | |
| | Shut-off and drain valve | | | |
| | Charge flow set | | | |
| Power (page 23) | | | | |
| | Fuses property | | | |
| | Safety breaker | | | |
| | Earth circuit-breaker | | | |
| | Heating cable type/effect | | | |
| | Fuse size, heating cable (F3) | | | |
| | Communication cable connected | | | |
| | F2120 addressed (only when cascade connection) | | | |
| | Connections | | | |
| | Main voltage | | | |
| | Phase voltage | | | |
| Miscellaneous | | | | |
| | Condensation water pipe | | | |
| | Insulation condensation water pipe, thickness (if KVR 10 is not used) | | | |

> **NOTE**
> Check the connections, main voltage and phase voltage before the machine is started, to prevent damage to the heat pump electronics.

## Contact information

| | |
|---|---|
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| CH | **NIBE Wärmetechnik c/o ait Schweiz AG**, Industriepark, CH-6246 Altishofen<br>Tel: (52) 647 00 30 Fax: (52) 647 00 31 E-mail: info@nibe.ch www.nibe.ch |
| CZ | **Druzstevni zavody Drazice s.r.o**, Drazice 69, CZ - 294 71 Benatky nad Jizerou<br>Tel: +420 326 373 801 Fax: +420 326 373 803 E-mail: nibe@nibe.cz www.nibe.cz |
| DE | **NIBE Systemtechnik GmbH**, Am Reiherpfahl 3, 29223 Celle<br>Tel: 05141/7546-0 Fax: 05141/7546-99 E-mail: info@nibe.de www.nibe.de |
| DK | **Vølund Varmeteknik A/S**, Member of the Nibe Group, Brogårdsvej 7, 6920 Videbæk<br>Tel: 97 17 20 33 Fax: 97 17 29 33 E-mail: info@volundvt.dk www.volundvt.dk |
| FI | **NIBE Energy Systems OY**, Juurakkotie 3, 01510 Vantaa<br>Puh: 09-274 697 0 Fax: 09-274 697 40 E-mail: info@nibe.fi www.nibe.fi |
| FR | **NIBE Energy Systems France Sarl,** Zone industrielle RD 28, Rue du Pou du Ciel, 01600 Reyrieux<br>Tel : 04 74 00 92 92 Fax : 04 74 00 42 00 E-mail: info@nibe.fr www.nibe.fr |
| GB | **NIBE Energy Systems Ltd**, 3C Broom Business Park, Bridge Way, Chesterfield S41 9QG<br>Tel: 0845 095 1200 Fax: 0845 095 1201 E-mail: info@nibe.co.uk www.nibe.co.uk |
| NL | **NIBE Energietechniek B.V.**, Postbus 634, NL 4900 AP Oosterhout<br>Tel: 0168 477722 Fax: 0168 476998 E-mail: info@nibenl.nl www.nibenl.nl |
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| PL | **NIBE-BIAWAR Sp. z o. o.** Aleja Jana Pawła II 57, 15-703 BIAŁYSTOK<br>Tel: 085 662 84 90 Fax: 085 662 84 14 E-mail: sekretariat@biawar.com.pl www.biawar.com.pl |
| RU | © **"EVAN"** 17, per. Boynovskiy, Nizhny Novgorod<br>Tel./fax +7 831 419 57 06 E-mail: info@evan.ru www.nibe-evan.ru |
| SE | **NIBE AB Sweden**, Box 14, Hannabadsvägen 5, SE-285 21 Markaryd<br>Tel: +46-(0)433-73 000 Fax: +46-(0)433-73 190 E-mail: info@nibe.se www.nibe.se |

For countries not mention in this list, please contact Nibe Sweden or check www.nibe.eu for more information.

# 2 Delivery and handling

## Transport and storage

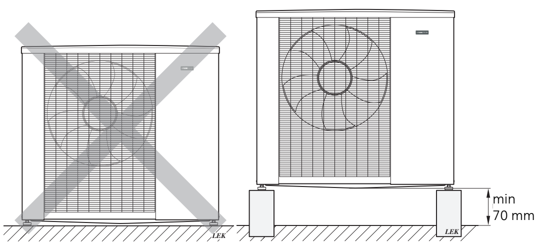
F2120 must be transported and stored vertically.

> **NOTE**
>
> Ensure that the heat pump cannot fall over during transport.

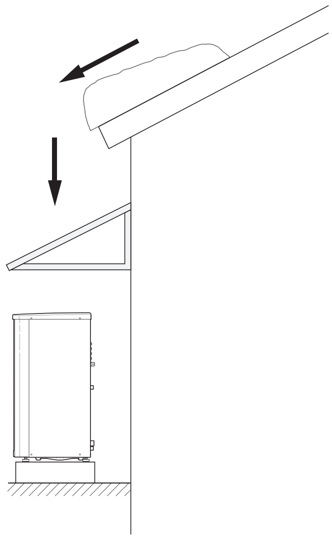
Ensure that the heat pump cannot be damaged during transportation.

## Assembly

- Place F2120 outdoors on a solid level base that can take the weight, preferably a concrete foundation. If concrete slabs are used they must rest on asphalt or shingle.
- The concrete foundation or slabs must be at least 70 mm high so that the lower edge of the evaporator is at the level of the average local snow depth, however a minimum height of 300 mm.
- F2120 should not be positioned next to noise sensitive walls, for example, next to a bedroom.
- Also ensure that the placement does not inconvenience the neighbours.
- F2120 must not be placed so that recirculation of the outdoor air can occur. This causes lower output and impaired efficiency.
- The evaporator must be sheltered from direct wind / , which negatively affects the defrosting function. Place F2120 protected from wind  / against the evaporator.
- Large amounts of condensation water, as well as melt water from defrosting, can be produced. Condensation water must be led off to a drain or similar (see page 12).
- Care must be exercised so that the heat pump is not scratched during installation.




Do not place F2120 directly on the lawn or other non solid surface.

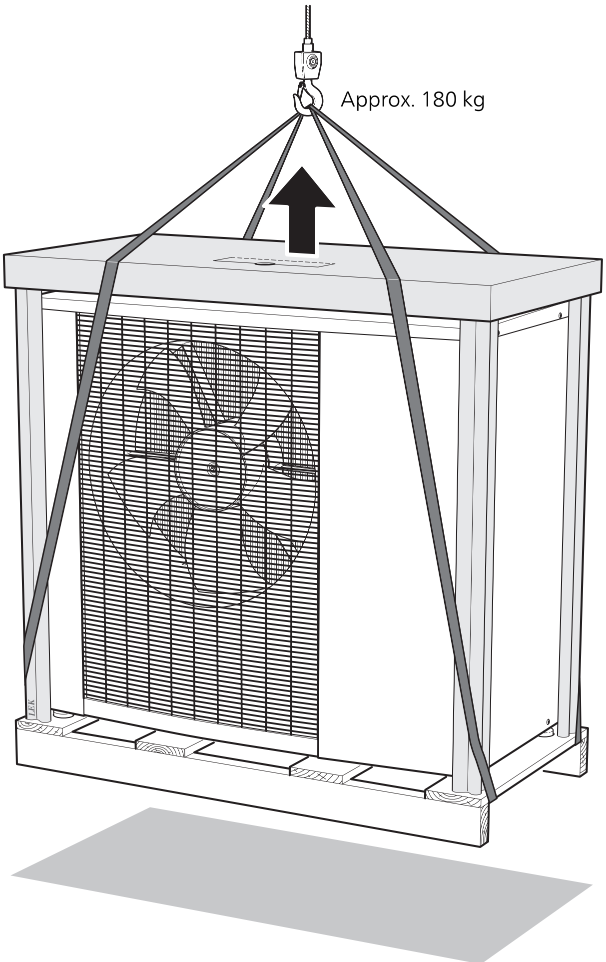


If there is a risk of snow slip from roof, a protective roof or cover must be erected to protect the heat pump, pipes and wiring.

## Lift from the street to the set up location

If the base allows, the simplest thing is to use a pallet truck to move the F2120 to the set up location.

> **NOTE**
>
> The centre of gravity is offset to one side (see print on the packaging).




If F2120 needs to be transported across soft ground, such as a lawn, we recommend that a crane is used that can lift the unit to the installation location. When F2120 is lifted with a crane, the packaging must be undisturbed, see the illustration above.

If a crane vehicle cannot be used the F2120 can be transported on an extended sack truck. F2120 must be taken from its heaviest side and two people are required to lift F2120.

## Lift from the pallet to final positioning

Before lifting remove the packaging and the securing strap to the pallet.

Place lifting straps around each machine foot. Lifting from the pallet to the base requires four persons, one for each lifting strap.

## Scrapping

When scrapping, the product is removed in reverse order. Lift by the bottom panel instead of a pallet!

# Condensation

The condensation water trough collects and leads away most of the condensation water from the heat pump.

> **NOTE**
>
> It is important to the heat pump function that condensation water is led away and that the drain for the condensation water run off is not positioned so that it can cause damage to the house.

> **NOTE**
>
> Pipe with heating cable for draining the condensation water trough is not included.

> **NOTE**
>
> To ensure this function the accessory KVR 10 should be used.

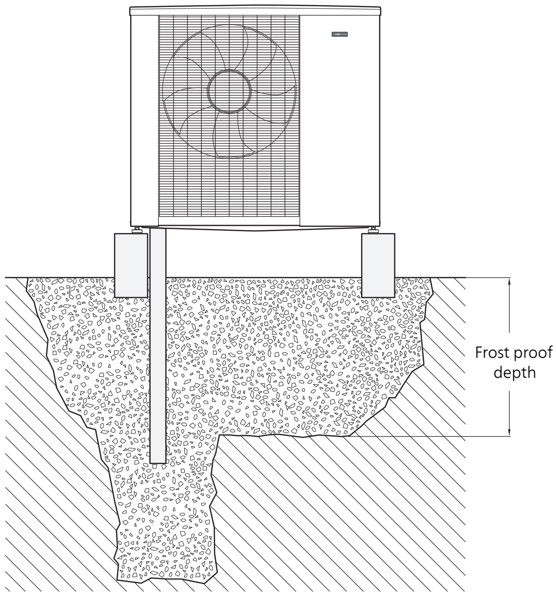
> **NOTE**
>
> Condensation runoff should be checked regularly, especially during the autumn. Clean if necessary.

> **NOTE**
>
> The electrical installation and wiring must be carried out under the supervision of an authorised electrician.

- The condensation water (up to 50 litres/24 hrs) that collects in the trough should be routed away by a pipe to an appropriate drain, it is recommended that the shortest outdoor stretch possible is used.
- The section of the pipe that can be affected by frost must be heated by the heating cable to prevent freezing.
- Route the pipe downward from F2120.
- The outlet of the condensation water pipe must be at a depth that is frost free or alternatively indoors (with reservation for local ordinances and regulations).
- Use a water trap for installations where air circulation may occur in the condensation water pipe.
- The insulation must seal against the bottom of the condensation water trough.

## Recommended alternative for leading off condensation water

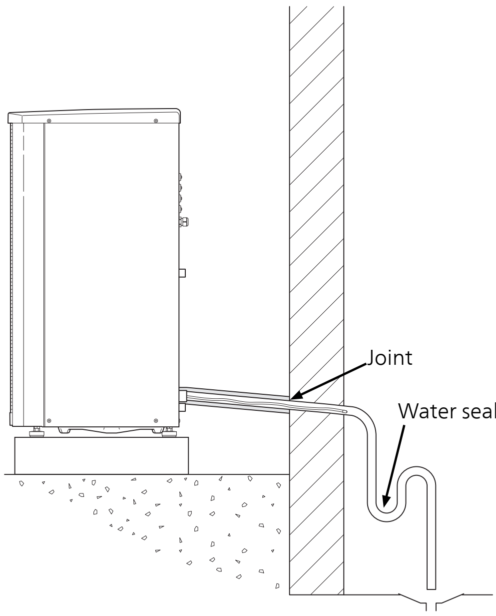
### *Stone caisson*




If the house has a cellar the stone caisson must be positioned so that condensation water does not affect the house. Otherwise the stone caisson can be positioned directly under the heat pump.

The outlet of the condensation water pipe must be at frost free depth.

### *Drain indoors*



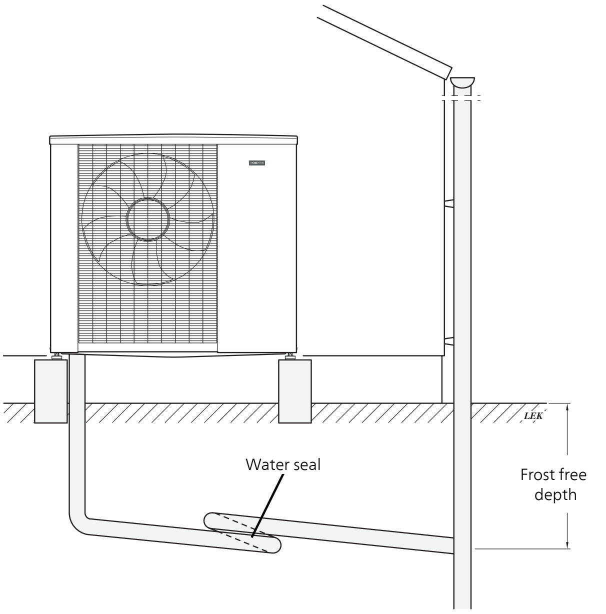

The condensation water is lead to an indoor drain (subject to local rules and regulations).

Route the pipe downward from F2120.

The condensation water pipe must have a water seal to prevent air circulation in the pipe.

KVR 10 spliced as illustrated. Pipe routing inside house not included.

### *Gutter drainage*




The outlet of the condensation water pipe must be at frost free depth.

Route the pipe downward from F2120.

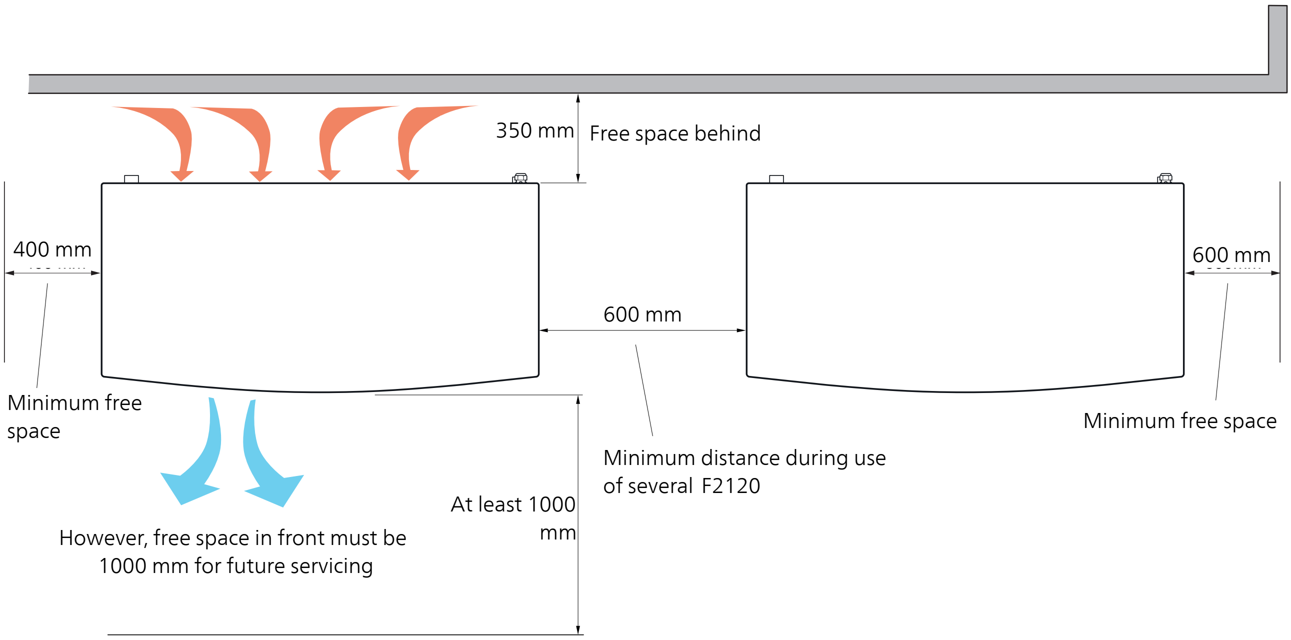
The condensation water pipe must have a water seal to prevent air circulation in the pipe.

**Caution**

If none of the recommended alternatives is used good lead off of condensation water must be assured.

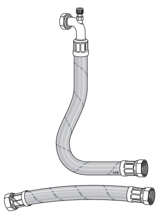
# Installation area

The distance between F2120 and the house wall must be at least 350 mm. Clearance above F2120 should be at least 1,000 mm. However, free space in front must be 1,000mm for future servicing.

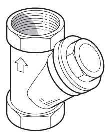



# Supplied components

**Enclosed components for F2120**

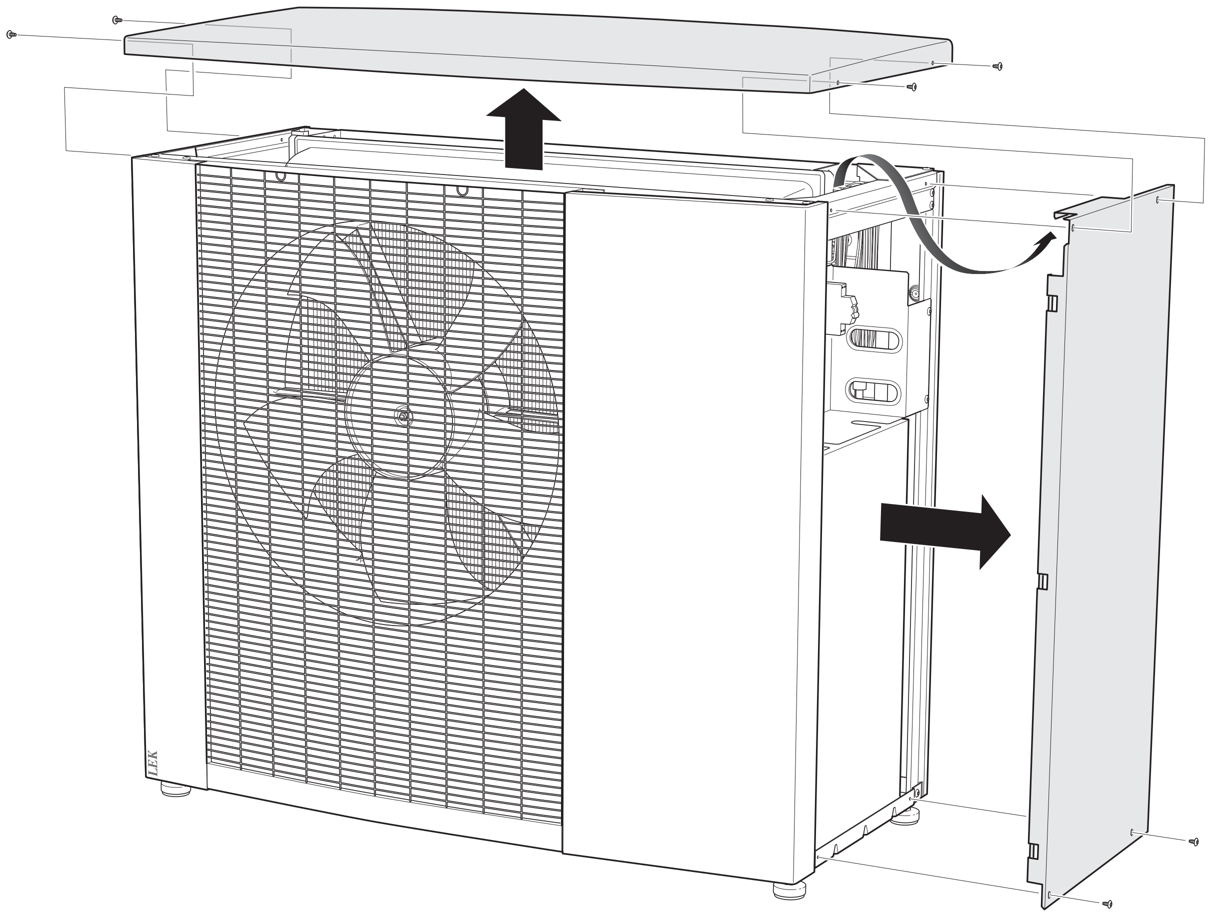


2 x flexible hoses (R32) with 4 seals



Particle filterR32

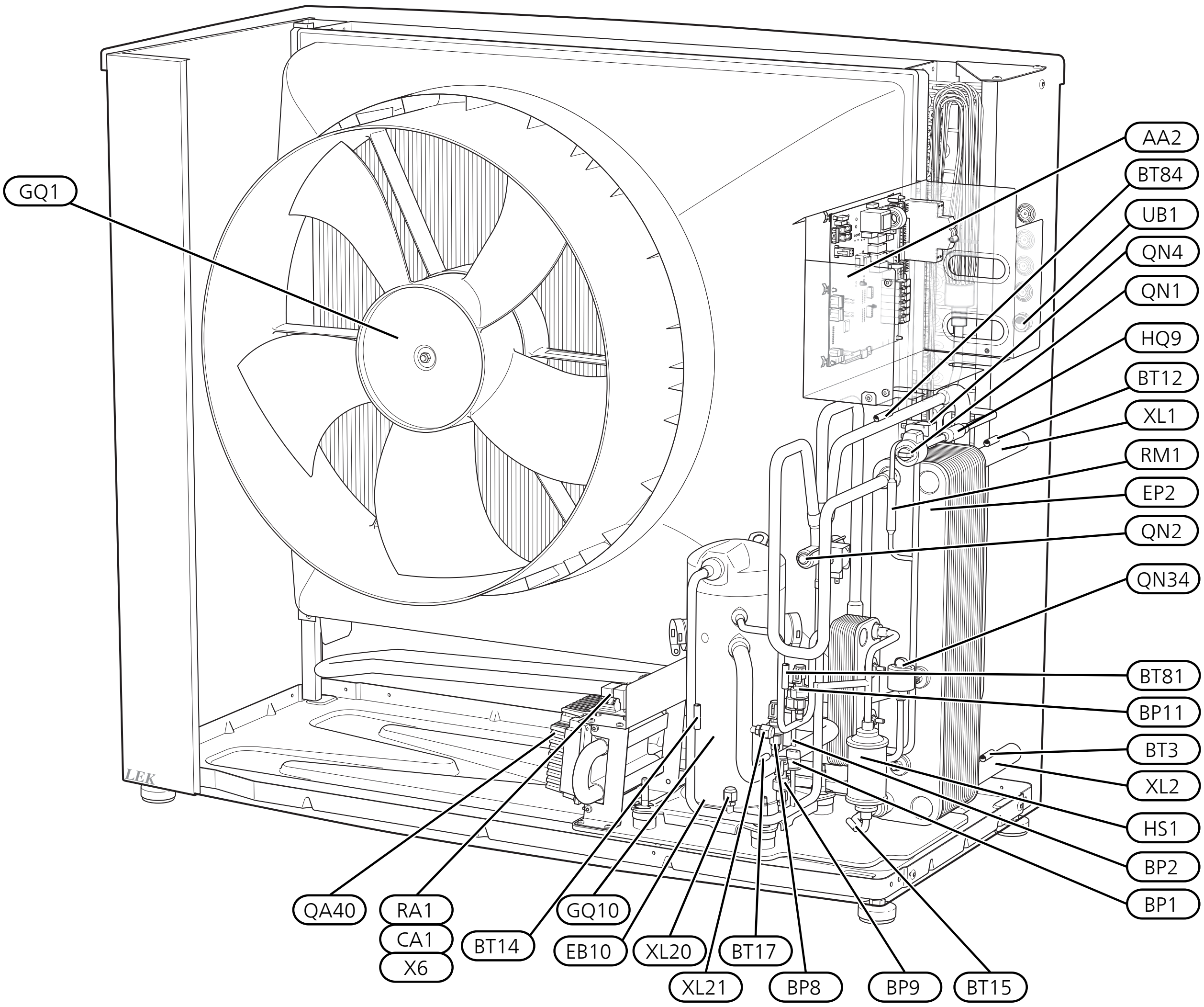
## Removing the side cover



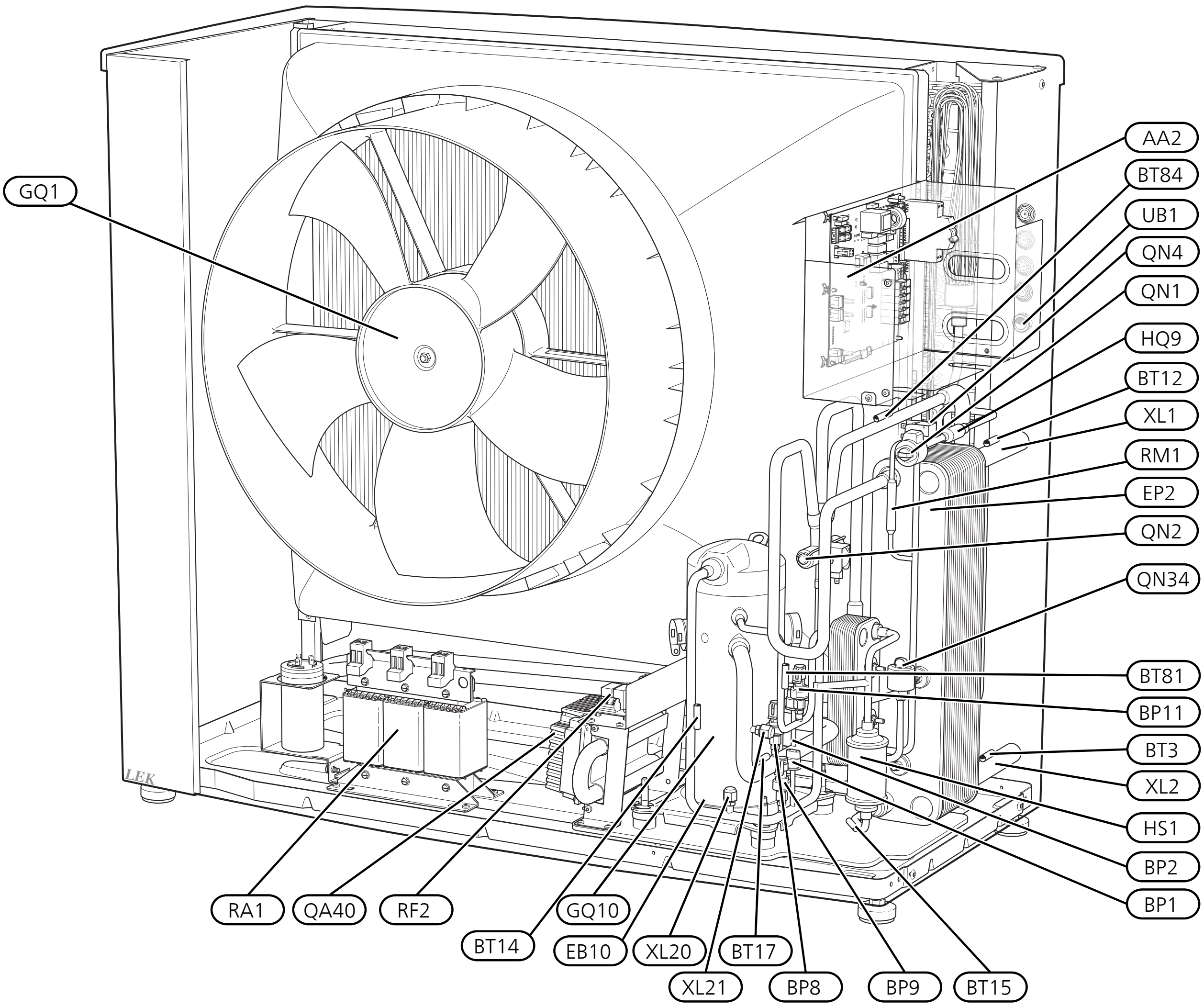
# 3 The heat pump design

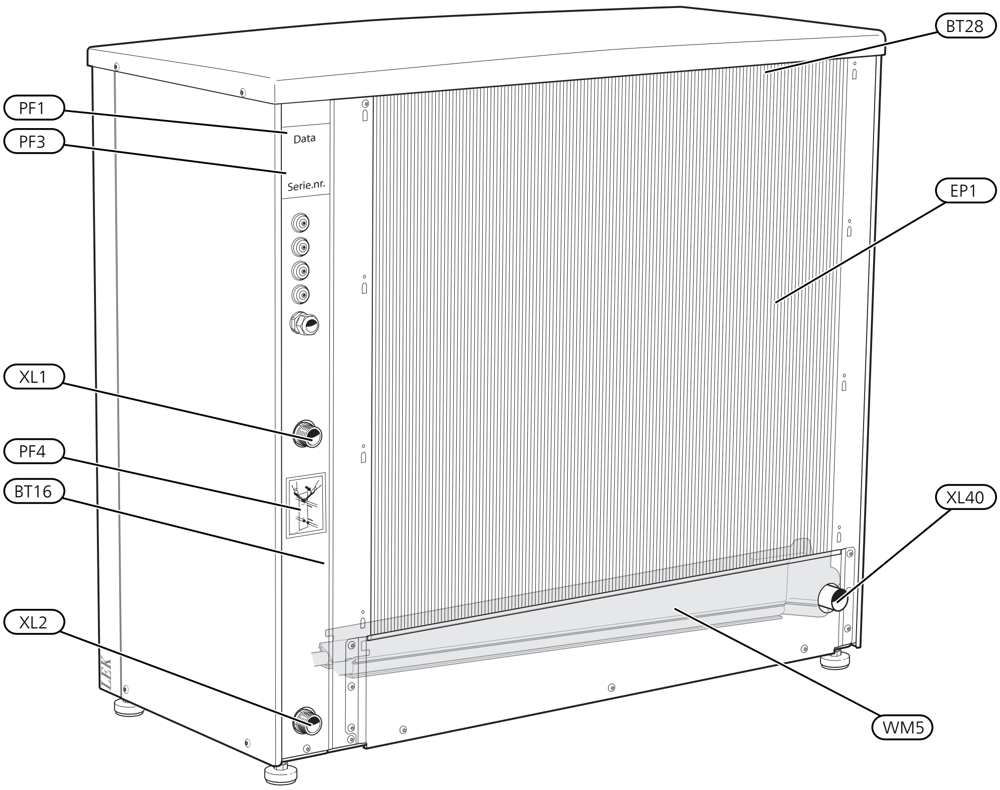
## General

**F2120 (1x230V)**



**F2120 (3x400V)**




BT28
PF1
PF3
Data
Serie.nr.
EP1
XL1
PF4
BT16
XL40
XL2
WM5

### *Pipe connections*

| | |
|---|---|
| XL1 | Connection, heating medium out of F2120 |
| XL2 | Connection, heating medium in to F2120, |
| XL20 | Service connection, high pressure |
| XL21 | Service connection, low pressure |
| XL40 | Connection, drain condensation water trough |

### *Sensors etc.*

| | |
|---|---|
| BP1 | High pressure pressostat |
| BP2 | Low pressure pressostat |
| BP8 | Low pressure transmitter |
| BP9 | High pressure sensor |
| BP11 | Pressure sensor, injection |
| BT3 | Temperature sensor, return |
| BT12 | Temperature sensor, condenser supply line |
| BT14 | Temperature sensor, hot gas |
| BT15 | Temperature sensor, fluid pipe |
| BT16 | Temperature sensor, evaporator |
| BT17 | Temperature sensor, suction gas |
| BT28 | Temperature sensor, ambient |
| BT81 | Temperature sensor, injection, EVI compressor |
| BT84 | Temperature sensor, suction gas evaporator |

### *Electrical components*

| | |
|---|---|
| AA2 | Base card |
| CA1 | Capacitor (1x230V) |
| EB10 | Compressor heater |
| GQ1 | Fan |
| QA40 | Inverter |
| RA1 | Harmonic filter (3x400V) |
| RA1 | Choke (1x230V) |
| RF2 | EMC filter (3x400V) |
| X6 | Terminal block (1x230V) |

### *Cooling components*

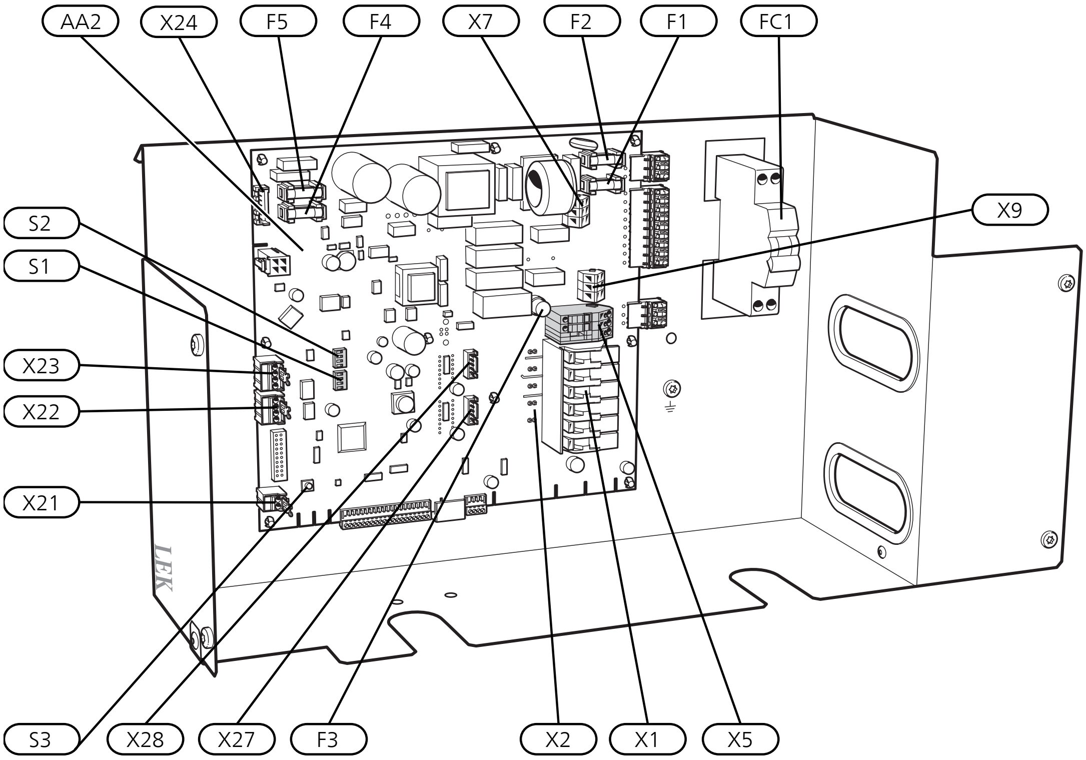
| | |
|---|---|
| EP1 | Evaporator |
| EP2 | Condenser |
| GQ10 | Compressor |
| HQ9 | Particle filter |
| HS1 | Drying filter |
| QN1 | Expansion valve |
| QN4 | Bypass valve |
| QN2 | 4-way valve |
| QN34 | Expansion valve, subcooling |
| RM1 | Non-return valve |

### *Miscellaneous*

| | |
|---|---|
| PF1 | Type plate |
| PF3 | Serial number |
| PF4 | Sign, pipe connections |
| UB1 | Cable gland, incoming supply |
| WM5 | Condensation water trough |

Designations in component locations according to standard IEC 81346-1 and 81346-2.

## Distribution box




### *Electrical components*

| | | | |
|---|---|---|---|
| AA2 | Base card | | |
| | X1 | Terminal block, incoming supply | |
| | X2 | Terminal block, compressor supply | |
| | X5 | Terminal block, external control voltage | |
| | X7 | Terminal block, 230V~ | |
| | X9 | Terminal block, connection KVR | |
| | X21 | Terminal block, Compressor blocking, Tariff | |
| | X22 | Terminal block, communications | |
| | X23 | Terminal block, communications | |
| | X24 | Terminal block, fan | |
| | X27 | Terminal block, expansion valve QN1 | |
| | X28 | Terminal block, subcooling QN34 | |

| | |
|---|---|
| F1 | Fuse, operating 230V~ |
| F2 | Fuse, operating 230V~ |
| F3 | Fuse for external heating cable KVR |
| F4 | Fuse, fan |
| F5 | Fuse, fan |
| FC1 | Miniature circuit breaker (Replaced with automatic protection (FB1) when installing accessory KVR 10.) |
| S1 | DIP switch, addressing heat pump during multi operation |
| S2 | DIP switch, different options |
| S3 | Reset button |

Designations in component locations according to standard IEC 81346-1 and 81346-2.

# 4 Pipe connections

## General

Pipe installation must be carried out in accordance with current norms and directives.

F2120 can only operate up to a return temperature of about 55 °C and an outgoing temperature of about 65 °C from the heat pump.

F2120 is not equipped with external shut off valves on the water side; these must be installed to facilitate any future servicing. The return temperature is limited by the return line sensor.

### Water volumes

Depending on the size of F2120, an available water volume is required to prevent short operating times and to enable defrosting. For optimal operation of F2120, a minimum available water volume of 10 litres times the size number is recommended. E.g. F2120-12: 10 litres x 12 = 120 litres.

> **NOTE**
>
> The pipe work must be flushed before the heat pump is connected, so that any contaminants do not damage the components.

## Pipe coupling heating medium circuit

- F2120 can be connected to the heating system according to one of the system solutions that can be downloaded from the website www.nibe.eu.
- The heat pump must be vented by the upper connection (XL1) using the venting nipple on the enclosed flexible hose.
- Install the enclosed particle filter before the inlet, i.e. the lower connection (XL2) on F2120.
- All outdoor pipes must be thermally insulated with at least 19 mm thick pipe insulation.
- Install shutoff and drain valves so that F2120 can be emptied in the event of prolonged power failures.
- The supplied flexible hoses act as vibration dampers. The flexible pipes are fitted so an elbow is created, thus acting as vibration damping.

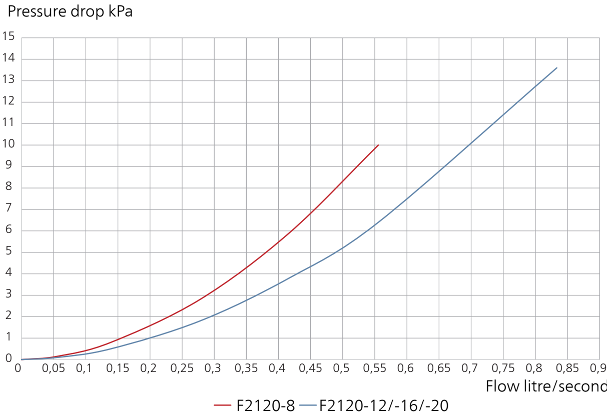
### Charge pump

The charge pump (not included in the product) is powered and controlled from the indoor module/control module. It has a built-in anti-freezing function and must therefore not be switched off when there is a risk of freezing.

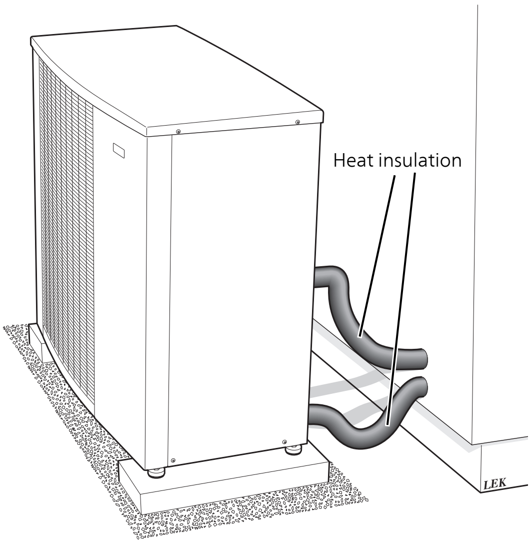
At temperatures below +2 °C the charge pump runs periodically, to prevent the water from freezing in the charge circuit. The function also protects against excess temperatures in the charge circuit.

## Pressure drop, heating medium side

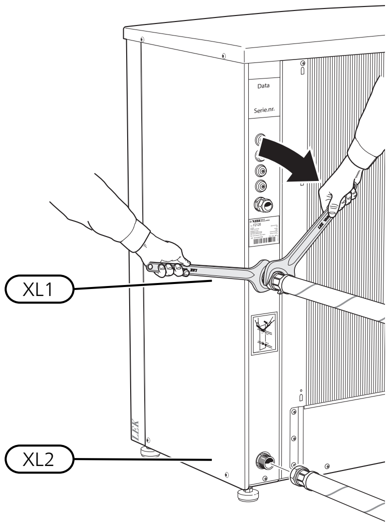
### F2120 -8, -12, -16, -20




## Heat insulation



## Installing flex hoses



# 5 Electrical connections

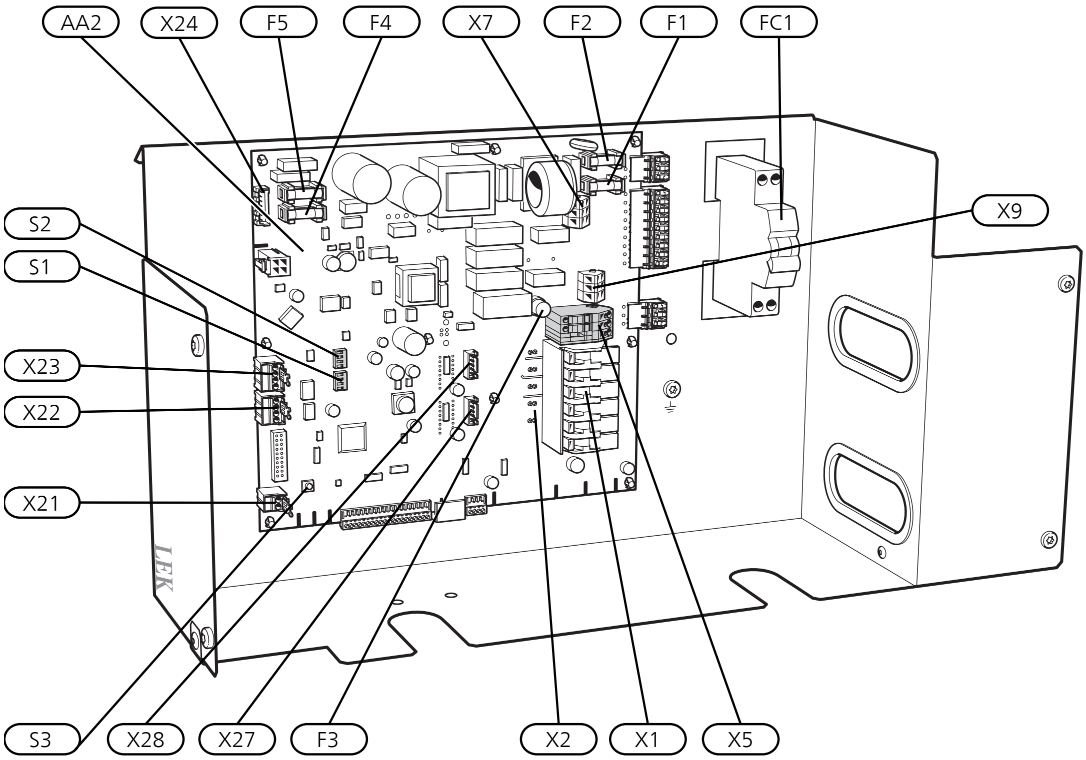
## General

- The heat pump must not be connected without the permission of the electricity supplier and must be connected under the supervision of a qualified electrician.
- If F2120 is fused with a miniature circuit breaker, it must have at least motor characteristic "C". For MCB size see "Technical Specifications".
- F2120 does not include an omnipolar circuit breaker on the incoming power supply. The heat pump's supply cable must be connected to a circuit breaker with at least a 3 mm breaking gap. When the building is equipped with an earth-fault breaker, the heat pump should be equipped with a separate one. The earth-fault breaker should have a nominal tripping current of no more than 30 mA. Incoming supply must be 400V 3N~ 50Hz via electrical distribution units with fuses.

  For 230V~ 50Hz, the incoming supply must be 230V~ 50Hz via distribution box with fuses.
- If an insulation test is to be carried out in the building, disconnect the heat pump.
- If the control is to be supplied separately from other components in the heat pump (e.g. for tariff connection), a separate operating cable must be connected to terminal block (X5).
- The routing of cables for heavy current and signals should be made out through the cable glands on the heat pump's right-hand side, seen from the front.
- The communication cable must be a three core, screened cable and be connected between F2120 terminal block X22 and the indoor module/control module.
- Connect the charge pump to the indoor module/control module. See where the charge pump must be connected in the installation manual for your indoor module/control module.

> **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.

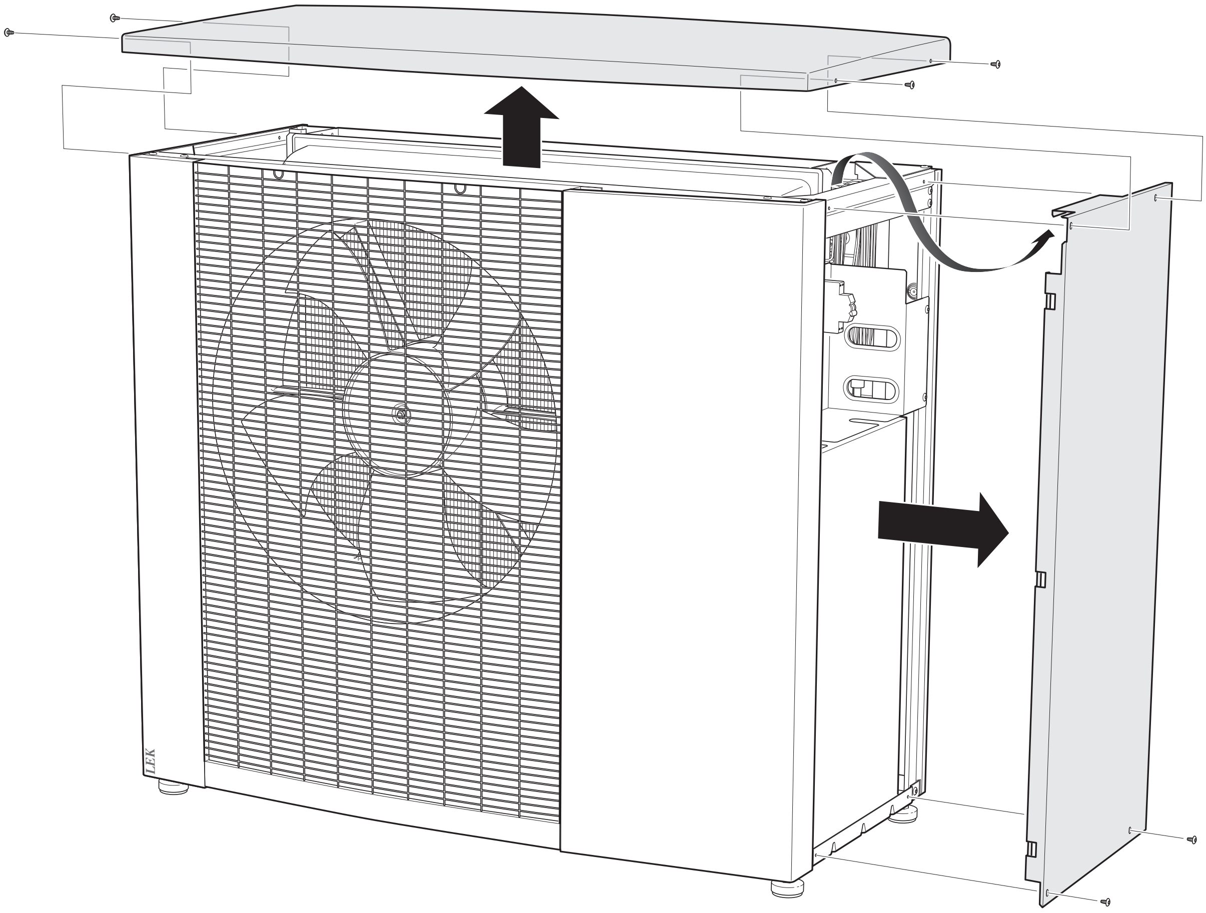
> **NOTE**
>
> The live external control must be taken into consideration when connecting.



## Accessibility, electrical connection

### Removing the side cover

Unscrew the screws and lift off the cover.



## Configuration using dip switch

On the base board (AA2) select the communication address for F2120 against the indoor module / control module. DIP-switch S1 used for configuration of address and functions. For cascade operation with SMO for example, addressing is required. Default has F2120 address **1**. In a cascade connection all F2120 must have a unique address. The address is coded in binary.

| DIP S1 position (1 / 2 / 3) | Slave | Address (com) | Default setting |
|---|---|---|---|
| off / off / off | Slave 1 | 01 | OFF |
| on / off / off | Slave 2 | 02 | OFF |
| off / on / off | Slave 3 | 03 | OFF |
| on / on / off | Slave 4 | 04 | OFF |
| off / off / on | Slave 5 | 05 | OFF |
| on / off / on | Slave 6 | 06 | OFF |
| off / on / on | Slave 7 | 07 | OFF |
| on / on / on | Slave 8 | 08 | OFF |

| DIP S1 position | Setting | Function | Default setting |
|---|---|---|---|
| 4 | ON | Permits cooling | OFF |

| DIP S2 position | Setting | Default setting |
|---|---|---|
| 1 | OFF | OFF |
| 2 | OFF | OFF |
| 3 | OFF | OFF |
| 4 | OFF | OFF |

Switch S3 is the reset button that restarts control.

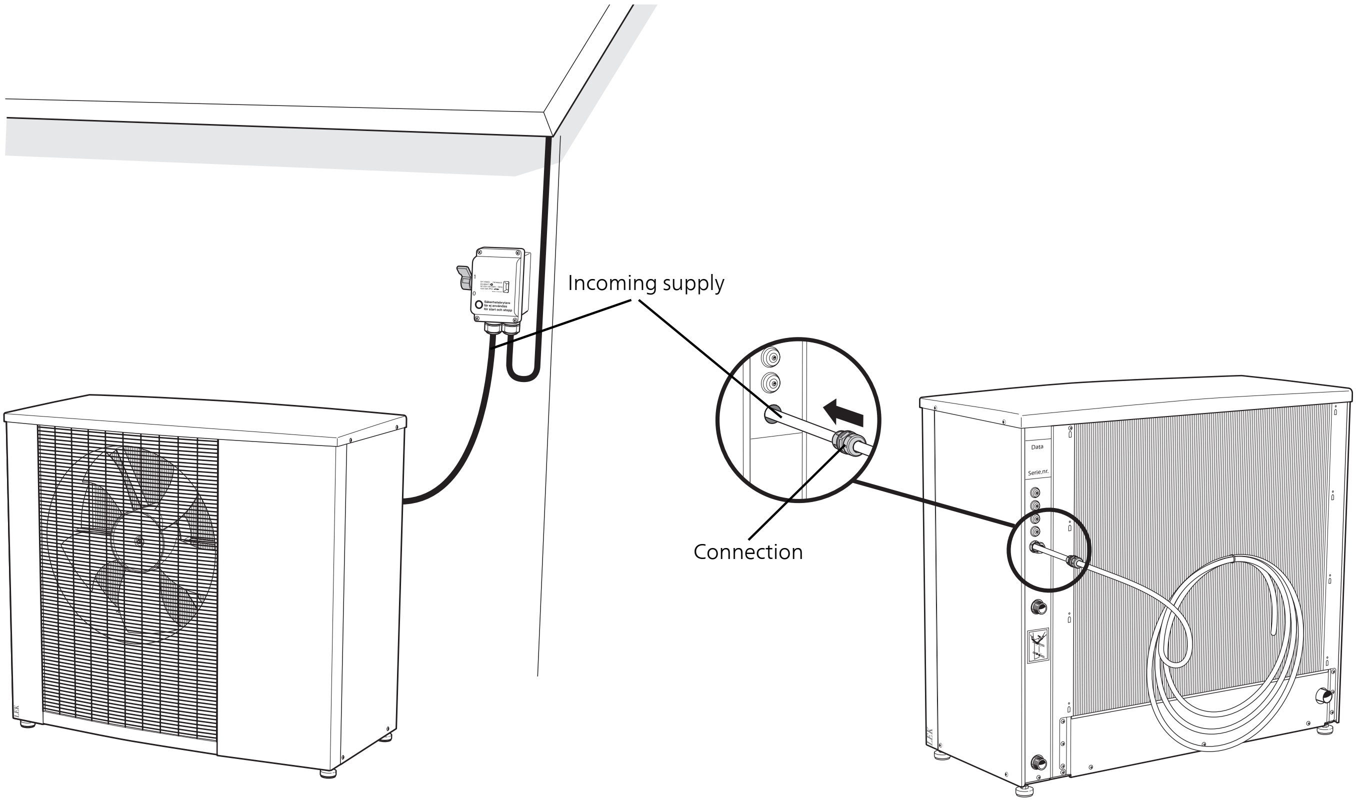
**Caution**

DIP S1 position 4 must be changed to ON in order to run cooling

## Connections

> **NOTE**
>
> To prevent interference, unscreened communication and/or sensor cables to external connections must not be laid closer than 20 cm from high voltage cables.

### Power connection



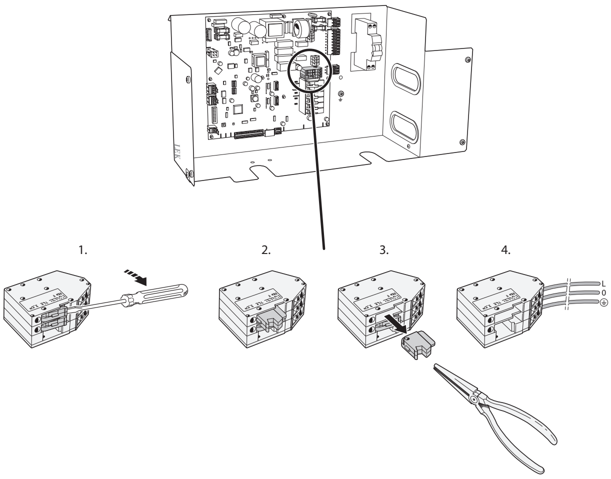

Incoming supply cable is enclosed and factory connected to terminal block X1. Outside the heat pump there is approx. 1.8 m of cable available.

At installation, install the screwed connection on the rear of the heat pump. The part of the screwed joint that tensions the cable must be tightened to a tightening torque above 3.5Nm.

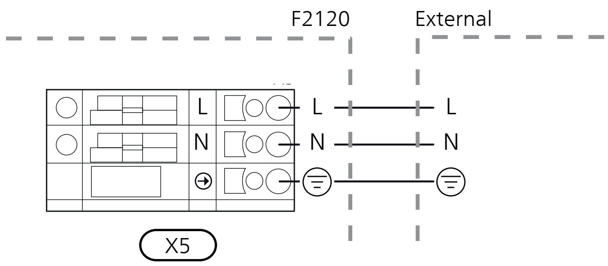
## Connecting external control voltage

> **NOTE**
>
> Mark up any junction boxes with warnings for external voltage.

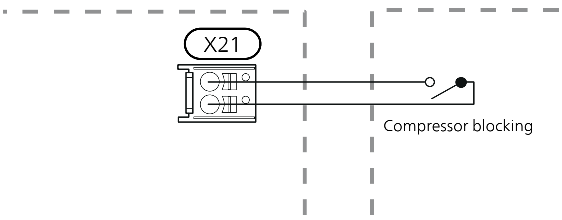
When connecting external control voltage, remove the bridges from terminal block X5 (see image).




Connect external control voltage (230V~ 50Hz) to terminal block X5:L, X5:N and X5:PE (as illustrated).




If external control voltage is used during tariff control, connect a closing contact to terminal X21:1 and X21:2 (compressor blocking) to prevent an alarm.




## External heating cable in condensation water pipe (KVR 10)

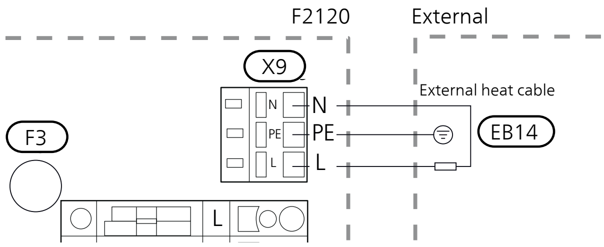
F2120 is equipped with a plinth for external heating cable (EB14, not enclosed). The connection is fused with 250 mA (F3) at the factory. If another heating cable is to be used the fuse must be replaced with a suitable one.

| Length (m) | Total output (W) | Fuse (F3) | NIBE Part no. |
|---|---|---|---|
| 1 | 15 | T100mA/250V | 718085 |
| 3 | 45 | T250mA/250V | 518900* |
| 6 | 90 | T500mA/250V | 718086 |

* Fitted at the factory.

Replace the MCB (FC1) for automatic protection (FB1) when installing KVR 10 if there is no external automatic protection for the installation. Automatic protection (FB1) is available as enclosed component for KVR 10.

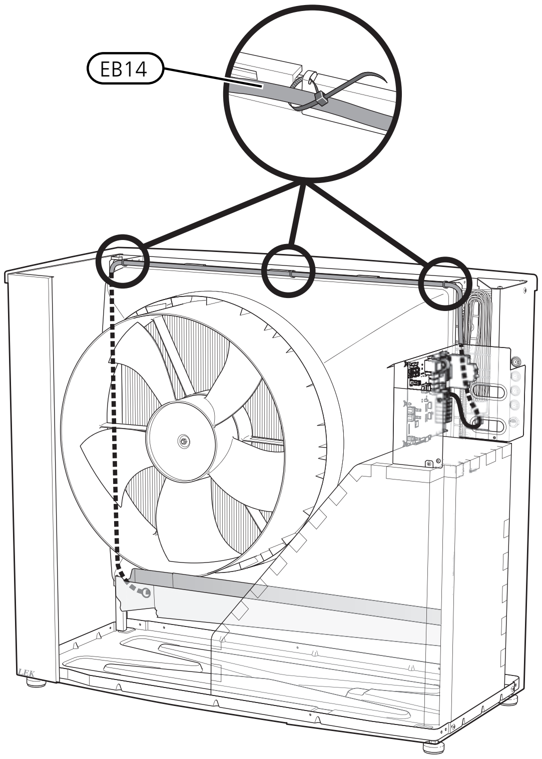
Connect external heating cable (EB14) to terminal block X9:L and X9:N. If there is a ground cable connect it to X9:PE. See following image and read further in the installer manual for KVR 10.

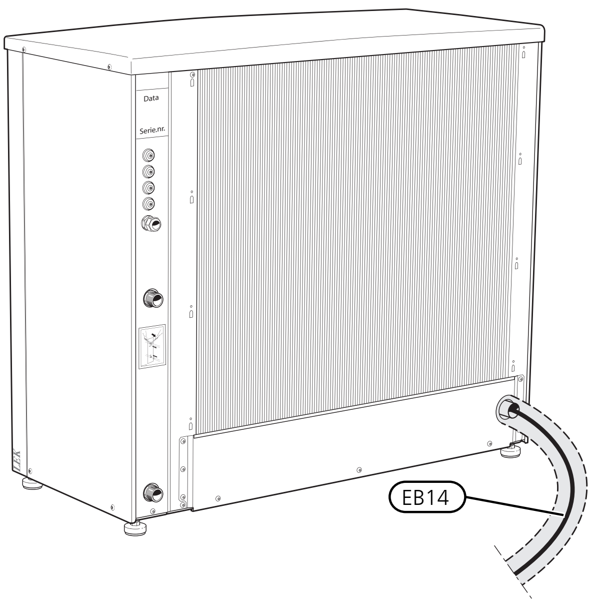



> **NOTE**
>
> The pipe must be able to withstand the heat from the heating cable.
>
> To ensure this function the accessory KVR 10 should be used.

### *Cable routing*

The following image shows recommended cable routing from the distribution box to the condensation water trough on the inside of F2120. Transition between the electrical cable and the heating cable must occur after the lead-in to the condensation water trough. The distance between the distribution box and the lead-in to the condensation water trough is approx. 1,600 mm.



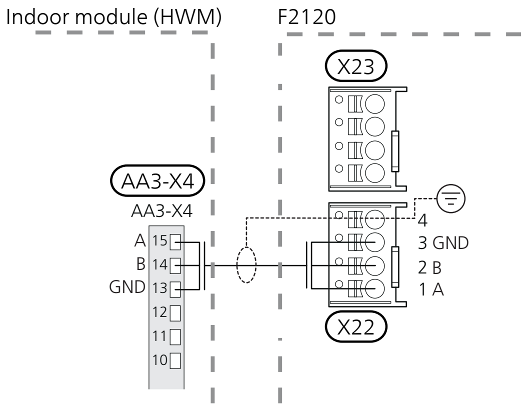



# Optional connections

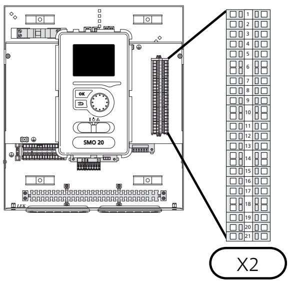
## Communication

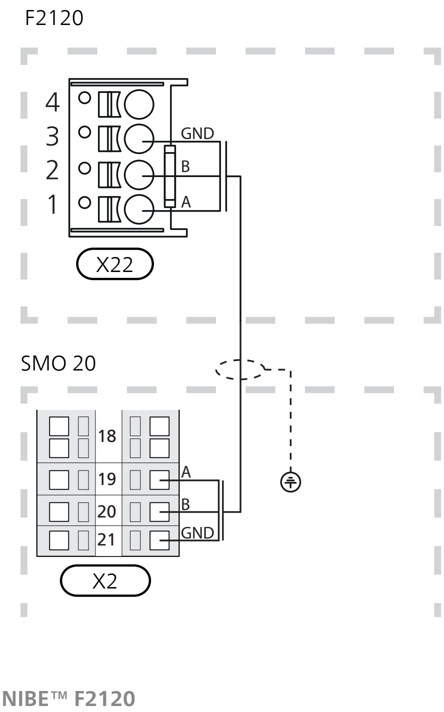
F2120 communicates with NIBE indoor modules/control modules by connecting a three-core, screened cable to terminal block X22:1–4, as shown in the following image.
For cascade connection, join terminal block X23 with X22 to the next heat pump.

### *VVM*

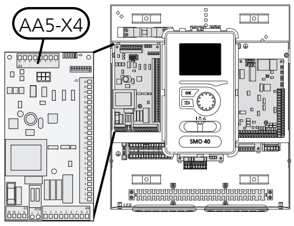


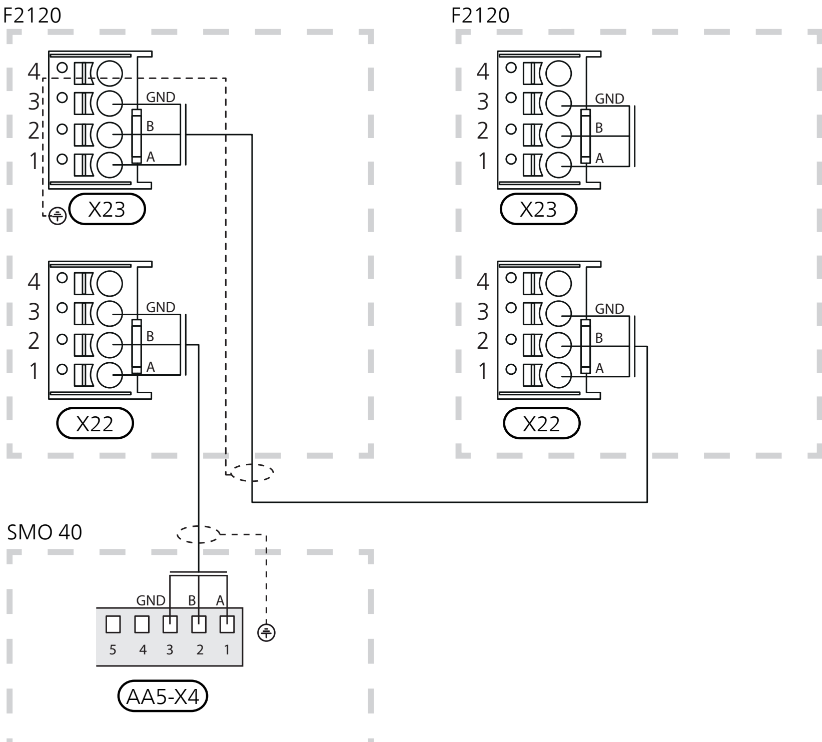

### *SMO 20*



### *SMO 40*




For connection of indoor module/control module, see relevant manual on www.nibe.eu.

## Connecting accessories

Instructions for connecting accessories are in the installation instructions provided for the respective accessory. See page 39 for the list of the accessories that can be used with F2120.

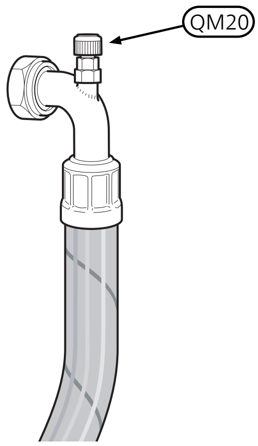
# 6 Commissioning and adjusting

## Preparations

- Check that the pipe system is prepared.
- Check the pipe system for leaks.
- Check that the electrical installation is prepared.
- Check that the electrical supply is connected so that the compressor can be warmed up.
- The compressor heater (EB10) must have been active for at least 3 hours before compressor operation can be initiated. This is done by connecting control voltage. F2120 permits compressor start after the compressor has been warmed up. This can take up to 3 hours.

## Filling and venting the heating medium system

1. Fill the heating medium system to the necessary pressure.
2. Vent the system using the venting nipple on the flex hose (enclosed) and possibly the circulation pump.




## Start-up and inspection

1. Communication cable, terminal block (X22:1-4) must be connected.
2. If cooling operation with F2120 is wanted, DIP switch S1 position 4 must be changed according to the description below on page 25.
3. Turn the isolator switch on.
4. Ensure that the F2120 is connected to the power source.
5. Check that fuse (FC1) is on.
6. Reinstall the removed panels and cover.
7. After the power to F2120 has been switched on and there is a compressor demand from the indoor module/control module, the compressor starts once it has warmed up, after max 180 minutes. The length of this time delay depends on whether the compressor has been warmed up previously. See chapter Preparations on page 31.
8. Adjust the charge flow according to size. Also see section "Adjustment, charge flow" on page 32.
9. Adjust menu settings via the indoor module/control module as necessary.
10. Fill in the commissioning report in the user manual.
11. Remove the protective film from the cover on F2120.

> **NOTE**
>
> The external control must be taken into consideration when connecting.

## Readjusting, heating medium side

Air is initially released from the hot water and venting may be necessary. If bubbling sounds can be heard from the heat pump, the circulation pump and radiators the entire system will require further venting. When the system is stable (correct pressure and all air eliminated) the automatic heating control system can be set as required.

## Adjustment, charge flow

For correct function of the heat pump over the entire year, the charge flow must be correctly adjusted.

If an NIBE indoor module VVM or accessory controlled charge pump is used for the control module SMO, the control tries to maintain an optimal flow across the heat pump.

Adjustment may be required, especially for charging a separate water heater. It is therefore recommended to have the option of adjusting the flow across the water heater using a trim valve.

1. Recommendation if there is insufficient hot water and information message "high condenser out" during hot water charging: increase the flow
2. Recommendation if there is insufficient hot water and information message "high condenser in" during hot water charging: reduce the flow

# 7 Control - Introduction

## General

F2120 is equipped with an internal electronic controller that handles all functions necessary for operation of the heat pump, e. g. defrosting, stop at max/min temperature, connection of the compressor heater, and protective functions during operation.

Temperatures, number of starts and run time, are read off in the indoor module/control module.

The integrated control shows information via status-LEDs and can be used during servicing.

Under normal operating conditions the home owner does not need to have access to the controller.

F2120 communicates with the NIBE indoor module/control module, which means that all settings and measurement values from F2120 are adjusted and read off on the indoor module/control module.

## LED status

The base board (AA2) has six status LEDs for easy control and fault tracing.

| LED | State | Explanation |
|---|---|---|
| PWR (green) | Not lit | Control board without power |
| | Continuous light | Control board power on |
| CPU (green) | Not lit | CPU without power |
| | Flashes | CPU running |
| | Continuous light | CPU running incorrectly |
| EXT COMM (green) | Not lit | No communication with indoor module/control module |
| | Flashes | Communication with indoor module/control module |
| INT COMM (green) | Not lit | No communication with inverter |
| | Flashes | Communication with inverter |
| DEFROST (green) | Not lit | No defrosting or protection active |
| | Flashes | Some protection is active |
| | Continuous light | Defrosting in progress |
| ERROR (red) | Not lit | No errors |
| | Flashes | B-alarm, active |
| | Continuous light | A-alarm, active |
| K1, K2, K3, K4, K5 | Not lit | Relay in de-energised position |
| | Continuous light | Relay engaged |
| N-RELAY | | No function |
| COMPR. ON | | No function |

## Master control

To control F2120, a NIBE indoor module/control module is required, which calls upon F2120 according to demand. All settings for F2120 are made via the indoor module/control module. It also shows the status and sensor values from F2120.

| Description | Value | Parameter space | Unit |
|---|---|---|---|
| Cut-out value activation passive defrosting | 4 | 4 – 14 | °C |
| Start temperature BT16 to calculate index | -3 | -5 – 5 | °C |
| Permit fan de-icing | No | Yes / No | (1 / 0) |
| Permit silent mode | No | Yes / No | (1 / 0) |
| Permit defrost more often | No | Yes / No | (1 / 0) |

# Control conditions

## Control conditions defrosting

- Defrosting occurs actively (with compressor on and fan off) or passively (with compressor off and fan on).
- A time counter counts up every minute if the compressor is running and the temperature of the evaporator sensor (BT16) falls below a threshold value.
- Time until defrosting in minutes appears on the indoor module/control module. Defrosting starts when this value is 0 minutes.
- If "de-icing fan" is activated in menu 5.11.1.1, fan de-icing starts during defrosting. De-icing fan prevents the build-up of ice on the fan blades and the front fan grille.
- If the evaporator is too cold, a "safety defrost" starts. This defrosting can be started earlier than when the normal defrosting would start. If 10 safety defrosts in a row occur, an alarm 341 is activated which is a permanent alarm.
- If defrosting is necessary, passive defrosting starts if temperature sensor BT28 is greater than 4 °C and the compressor has stopped because the heating requirement has been met.

**Active defrosting:**

1. The four way valve shifts to defrosting.
2. The fan stops and the compressor continues to run.
3. When defrosting is complete, the four-way valve switches back to heating operation. The compressor speed is locked for a short period.
4. The ambient temperature sensor is locked and the high return temperature alarm is blocked for two minutes after defrosting.

**Passive defrosting:**

1. The compressor stops.
2. The four way valve does not shift.
3. Fan runs at high speed.
4. When passive defrosting is complete, the fan stops.
5. The ambient temperature sensor is locked and the high return temperature alarm is blocked for two minutes after defrosting.
6. If there is a heat demand, passive defrosting stops and the compressor starts.

***There are several possible reasons for an active defrosting to end:***

1. If the temperature of the evaporator sensor has reached its stop value (normal stop).
2. When defrosting has gone on for longer than 15 minutes. This may be due to too little energy in the heat source, too strong a wind effect on the evaporator and/or that the sensor on the evaporator is not correct and therefore displays too low a temperature (at cold outdoor air).
3. When the temperature on the return line sensor channel BT3 falls below 10 °C.
4. If the temperature of the evaporator (BP8) falls below its lowest permitted value. After ten failed defrosts, an alarm occurs: 228.

# Control - Heat pump EB101

## Heat pump menu

### *Menu 5.11.1.1*

These settings are made on the display on the indoor module/control module.

**Silent mode permitted**

Set whether silent mode is to be activated for the heat pump here. Note that it is possible to schedule when silent mode is to be active.

**Detect compressor phase**

This shows on which the phase the heat pump has detected whether you have F2120 230V~50Hz. Phase detection normally occurs automatically in connection with start-up of the indoor module/control module. This setting can be changed manually.

**Current limit**

Set whether the current limiting function is to be activated for the heat pump here. During active function you can limit the value of the maximum current.

Setting range: 6 – 32 A

Factory setting: 32 A

**blockFreq 1**

Select a frequency range within which the heat pump may work here.

**blockFreq 2**

Select a frequency range within which the heat pump may work here.

**Defrosting**

Here you can change the settings that affect the defrost function.

**Start temperature for defrost function**

Here you can set at which temperature (BT16) the defrost function is to start. The value must only be changed in consultation with your installer.

Setting range: -5 – 5 °C

Factory setting: -3 °C

**Cut-out value activation passive defrosting**

Here you can set at which temperature (BT28) passive defrosting is to be activated. During passive defrosting, the ice is melted by the energy from the ambient air. The fan is active during passive defrosting. The value must only be changed in consultation with your installer.

Setting range: 2 – 10 °C

Factory setting: 4 °C

**Permit defrost more often**

Here you activate whether defrosting is to occur more frequently than normal. The selection can be made again if the heat pump receives an alarm due to build-up of ice during operation caused by snow, for example.

**Permit fan de-icing**

Set whether the "de-icing fan" function is to be activated for the heat pump here. This can be activated if ice/snow accumulates on the fan, grille or fan cone.

# 8 Disturbances in comfort

## Troubleshooting

> **NOTE**
> Work behind covers secured by screws may only be carried out by, or under the supervision of, a qualified installation engineer.

> **NOTE**
> As F2120 can be connected to a large number of external units, these should also be checked.

> **NOTE**
> In the event of action to rectify malfunctions that require work within screwed hatches the incoming electricity must isolated at the safety switch.

> **NOTE**
> The alarm is acknowledged on the indoor module/control module (VVM / SMO) or by the voltage to the heat pump being interrupted and then restarted.

The following tips can be used to rectify comfort disruption:

### Basic actions

Start by checking the following possible fault sources:

- That the heat pump is running or that the supply cable to F2120 is connected.
- Group and main fuses of the accommodation.
- The property's earth circuit breaker.
- The heat pump's miniature circuit breaker (FC1).
- Heat pump's earth-fault breaker.
- F2120 automatic protection (FB1). (Only if KVR 10 is installed.)

### Low hot water temperature or a lack of hot water

This part of the fault-tracing chapter only applies if the heat pump is docked to the hot water heater.

- Large hot water consumption.
  - Wait until the hot water has heated up.
- Incorrect settings indoor module or control module.
  - See the manual for the indoor module or control module.
- Clogged particle filter.
  - Check whether alarm high condenser out (162) is in the alarm log. Check and clean the particle filter.

### Low room temperature

- Closed thermostats in several rooms.
  - Set the thermostats to max in as many rooms as possible.
- External switch for changing the room heating activated.
  - Check any external switches.
- Incorrect settings in indoor module or control module.
  - See the manual for the indoor module / control module (VVM / SMO).
- Incorrectly adjusted flow across the heat pump.
  - Check whether alarm high condenser in (163) or high condenser out (162) is in the alarm log. Follow the instructions for adjusting charge flow.

### High room temperature

- External switch for changing the room heating activated.
  - Check any external switches.
- Incorrect settings in indoor module or control module.
  - See the manual for the indoor module or control module.

### F2120 not in operation

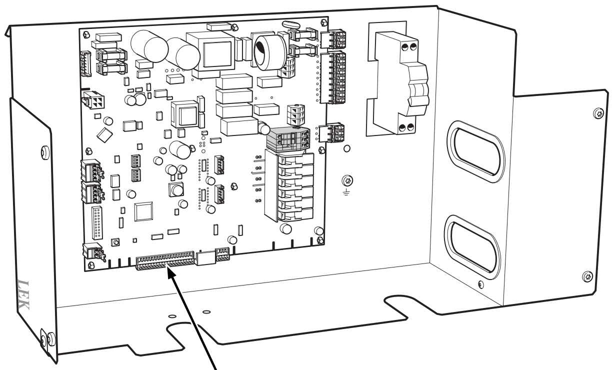
F2120 communicates all alarms to the indoor module/control module (VVM / SMO).

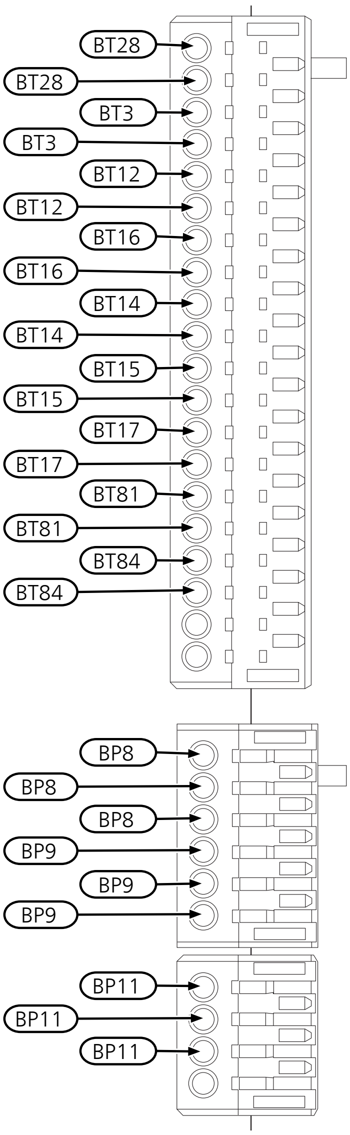
- Ensure that the F2120 is connected to the power source.
- Check the indoor module/control module (VVM / SMO). See section "Disturbances in comfort" in the Installer Manual for the indoor module/control module (VVM / SMO).

### F2120 does not communicate

- Check that the addressing of F2120 is correct.
- Check that the communication cable has been connected.

## Sensor placement




| | |
|---|---|
| BP8 | Low pressure transmitter |
| BP9 | High pressure sensor |
| BP11 | Pressure sensor, injection |
| BT3 | Temperature sensor, return |
| BT12 | Temperature sensor, condenser supply line |
| BT14 | Temperature sensor, hot gas |
| BT15 | Temperature sensor, fluid pipe |
| BT16 | Temperature sensor, evaporator |
| BT17 | Temperature sensor, suction gas |
| BT28 | Temperature sensor, ambient |
| BT81 | Temperature sensor, injection, EVI compressor |
| BT84 | Temperature sensor, suction gas, evaporator |

### *Data for temperature sensor return line (BT3), condenser supply (BT12), fluid pipe (BT15) and injection (BT81)*

| Temperature (°C) | Resistance (kOhm) | Voltage (VDC) |
|---|---|---|
| -40 | 351.0 | 3.256 |
| -35 | 251.6 | 3.240 |
| -30 | 182.5 | 3.218 |
| -25 | 133.8 | 3.189 |
| -20 | 99.22 | 3.150 |
| -15 | 74.32 | 3.105 |
| -10 | 56.20 | 3.047 |
| -5 | 42.89 | 2.976 |
| 0 | 33.02 | 2.889 |
| 5 | 25.61 | 2.789 |
| 10 | 20.02 | 2.673 |
| 15 | 15.77 | 2.541 |
| 20 | 12.51 | 2.399 |
| 25 | 10.00 | 2.245 |
| 30 | 8.045 | 2.083 |
| 35 | 6.514 | 1.916 |
| 40 | 5.306 | 1.752 |
| 45 | 4.348 | 1.587 |
| 50 | 3.583 | 1.426 |
| 55 | 2.968 | 1.278 |
| 60 | 2.467 | 1.136 |
| 65 | 2.068 | 1.007 |
| 70 | 1.739 | 0.891 |
| 75 | 1.469 | 0.785 |
| 80 | 1.246 | 0.691 |
| 85 | 1.061 | 0.607 |
| 90 | 0.908 | 0.533 |
| 95 | 0.779 | 0.469 |
| 100 | 0.672 | 0.414 |

### *Data for hot gas sensor (BT14)*

| Temperature (°C) | Resistance (kOhm) | Voltage (V) |
|---|---|---|
| 40 | 118.7 | 4.81 |
| 45 | 96.13 | 4.77 |
| 50 | 78.30 | 4.72 |
| 55 | 64.11 | 4.66 |
| 60 | 52.76 | 4.59 |
| 65 | 43.64 | 4.51 |
| 70 | 36.26 | 4.43 |
| 75 | 30.27 | 4.33 |
| 80 | 25.38 | 4.22 |
| 85 | 21.37 | 4.10 |
| 90 | 18.07 | 3.97 |
| 95 | 15.33 | 3.83 |
| 100 | 13.06 | 3.68 |
| 105 | 11.17 | 3.52 |
| 110 | 9.59 | 3.36 |
| 115 | 8.26 | 3.19 |
| 120 | 7.13 | 3.01 |
| 125 | 6.18 | 2.84 |
| 130 | 5.37 | 2.67 |
| 135 | 4.69 | 2.50 |
| 140 | 4.10 | 2.33 |

### *Data for evaporator sensor (BT16), ambient sensor (BT28), suction gas sensor (BT17) and suction gas, evaporator (BT84)*

| Temperature (°C) | Resistance (kOhm) | Voltage (VDC) |
|---|---|---|
| -50 | 77.58 | 4.71 |
| -45 | 57.69 | 4.62 |
| -40 | 43.34 | 4.51 |
| -35 | 32.87 | 4.37 |
| -30 | 25.17 | 4.21 |
| -25 | 19.43 | 4.03 |
| -20 | 15.13 | 3.82 |
| -15 | 11.88 | 3.58 |
| -10 | 9.392 | 3.33 |
| -5 | 7.481 | 3.07 |
| 0 | 6.000 | 2.80 |
| 5 | 4.844 | 2.54 |
| 10 | 3.935 | 2.28 |
| 15 | 3.217 | 2.03 |
| 20 | 2.644 | 1.80 |
| 25 | 2.186 | 1.59 |
| 30 | 1.817 | 1.39 |
| 35 | 1.518 | 1.22 |
| 40 | 1.274 | 1.07 |
| 45 | 1.075 | 0.93 |
| 50 | 0.911 | 0.81 |
| 55 | 0.775 | 0.71 |
| 60 | 0.662 | 0.62 |
| 65 | 0.568 | 0.54 |
| 70 | 0.490 | 0.47 |
| 75 | 0.4233 | 0.41 |
| 80 | 0.367 | 0.36 |
| 85 | 0.320 | 0.32 |
| 90 | 0.280 | 0.28 |
| 95 | 0.245 | 0.25 |
| 100 | 0.216 | 0.22 |

# 9 Accessories

## Condensation water pipe

Condensation water pipe, different lengths.

***KVR 10-10 F2120***

1 metres
Part no. 067 549

***KVR 10-30 F2120***

3 metres
Part no. 067 550

***KVR 10-60 F2120***

6 metres
Part no. 067 551

## Control module

***SMO 20***

Control module

Part no. 067 224

***SMO 40***

Control module

Part no. 067 225

## Indoor module

***VVM 310***

Part no. 069 430

**VVM 310**

With integrated EMK 310

Part no. 069 084

***VVM320***

**Copper, 3 x 400 V**

Part no. 069 108

**Stainless Steel, 3 x 400 V**

Part no. 069 109

**Enamel, 3 x 400 V**

With integrated EMK 300

Part no. 069 110

**Stainless Steel, 1 x 230 V**

Part no. 069 111

**Stainless Steel, 1 x 230 V**

With T&P valve

Part no. 069 112

***VVM 325***

**Copper, 3 x 400 V**

Part no. 069 154

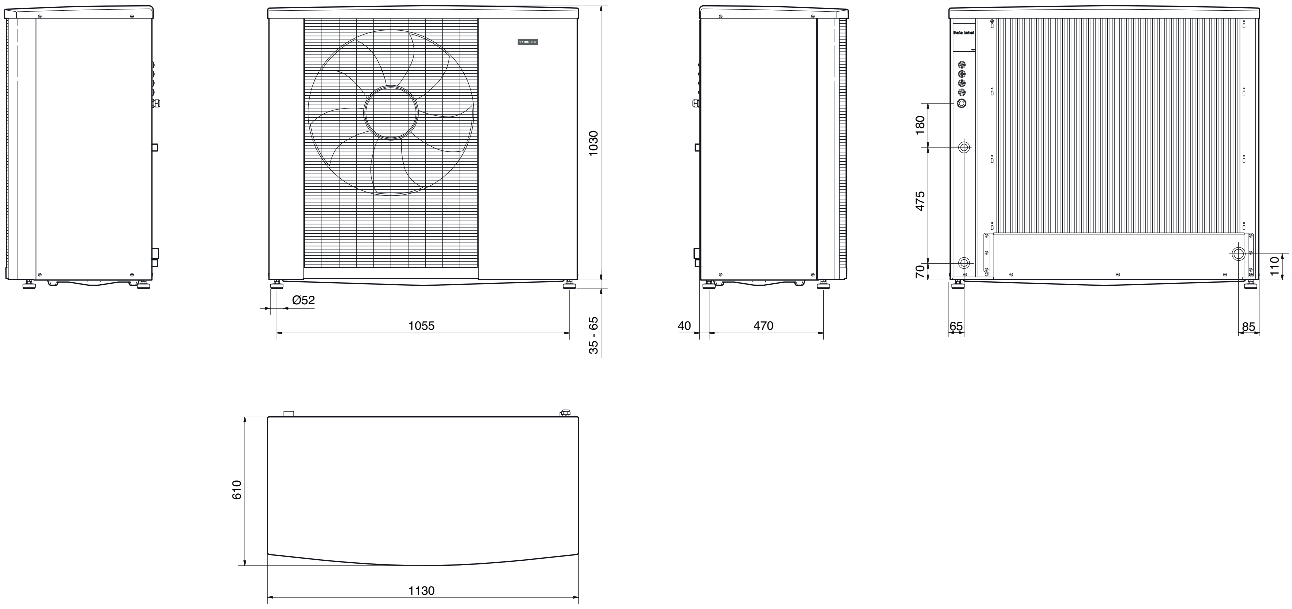
***VVM 500***

Part no. 069 400

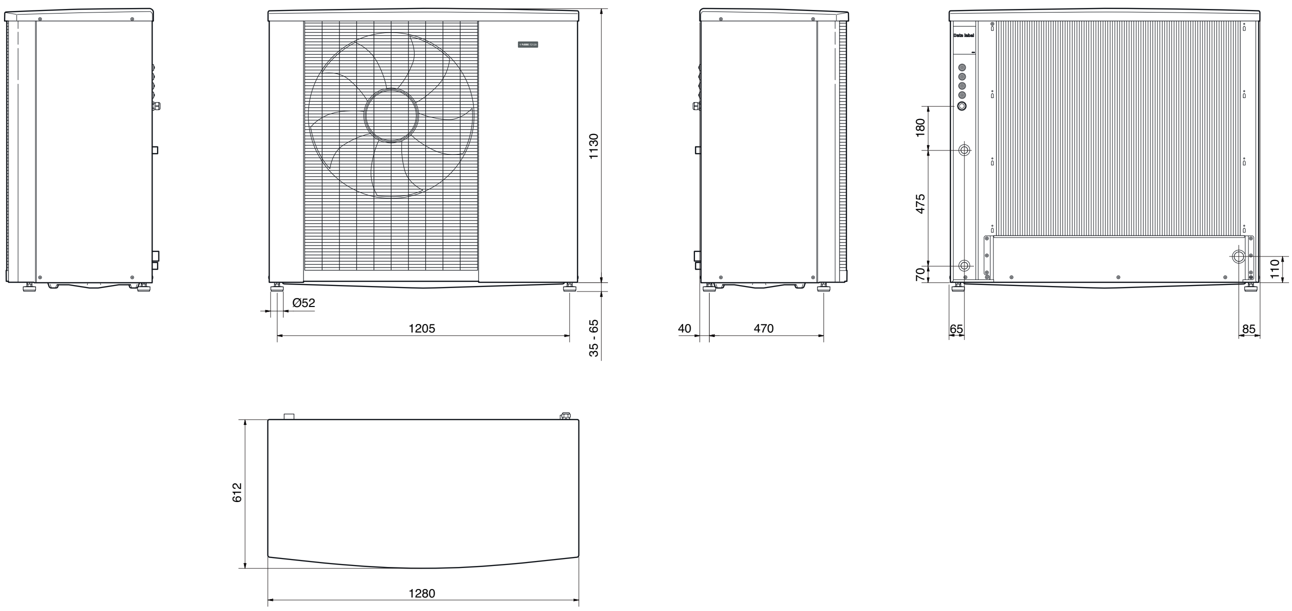
# 10 Technical data

## Dimensions

### F2120-8



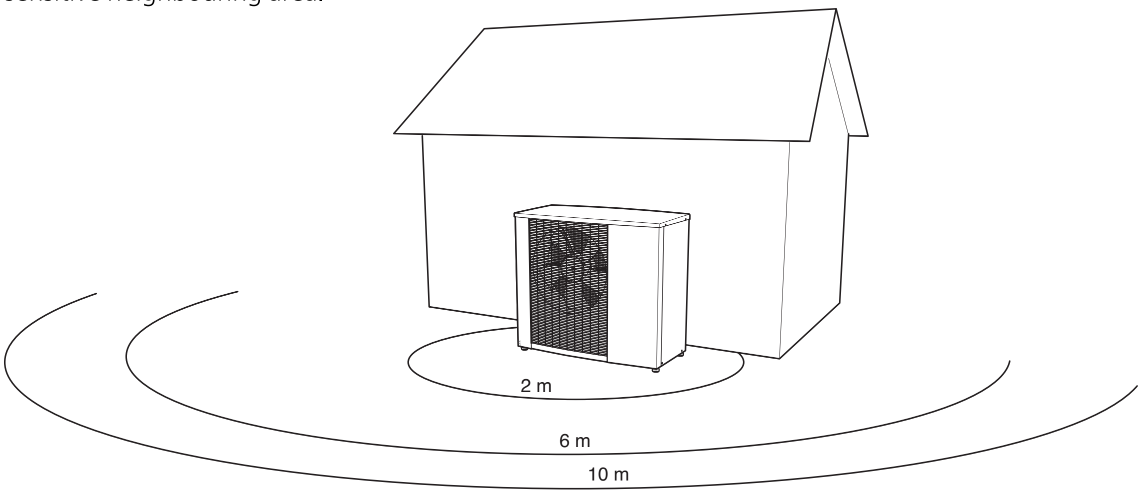

### F2120-12, -16, -20



## Sound pressure levels

F2120 is usually placed next to a house wall, which gives a directed sound distribution that should be considered. Accordingly, you should always attempt when positioning to choose the side that faces the least sound sensitive neighbouring area.

The sound pressure levels are further affected by walls, bricks, differences in ground level, etc and should therefore only be seen as guide values.




| F2120 | | 12 | 16 | 20 |
|---|---|---|---|---|
| Sound power level ($L_{WA}$), according to EN12102 at 7 / 45 (nominal) | $L_W$(A) | 53 | 53 | 53 |
| Sound pressure level ($L_{PA}$) at 2 m* | dB(A) | 39 | 39 | 39 |
| Sound pressure level ($L_{PA}$) at 6 m* | dB(A) | 29.5 | 29.5 | 29.5 |
| Sound pressure level ($L_{PA}$) at 10 m* | dB(A) | 25 | 25 | 25 |

*Free space.

## Technical specifications

| F2120 – 1x230V | | 8 | 12 |
|---|---|---|---|
| **Heating** | | | |
| **Output data according to EN 14511, partial load**[1)] | | | |
| **7/35** Rated output / Supplied power / $COP_{EN14511}$ | kW/kW/- | | 3.54 / 0.69 / 5.12 |
| **7/45** Rated output / Supplied power / $COP_{EN14511}$ | kW/kW/- | | 3.64 / 0.91 / 4.00 |
| **2/35** Rated output / Supplied power / $COP_{EN14511}$ | kW/kW/- | | 5.21/ 1.22 / 4.27 |
| **2/45** Rated output / Supplied power / $COP_{EN14511}$ | kW/kW/- | | 5.27 / 1.49 / 3.54 |
| | | | |
| **Cooling** | Outd. temp: / Supply temp. | Max | Max |
| **Output data according to EN14511 ΔT5K** Specified/supplied power/EER | 35 / 7 °C | | 4.69 / 1.70 / 2.76 |
| | 35 / 18 °C | | 5.44 / 1.73 / 3.15 |
| | | | |
| **Electrical data** | | | |
| Rated voltage | | 230V~50Hz | |
| Max operating current, heat pump | $A_{rms}$ | | 16 |
| Max operating current, compressor | $A_{rms}$ | | 15 |
| Max output, fan | W | | 45 |
| Fuse | $A_{rms}$ | | 16 |
| | | | |
| **Refrigerant circuit** | | | |
| Type of refrigerant | | R410A | |
| Type of compressor | | Scroll | |
| Volume | kg | 2.4 | 2.6 |
| Cut-out value pressure switch HP (BP1) | MPa | 4.5 | |
| Difference pressostat HP | MPa | 0.7 | |
| Cut-out value pressostat LP | MPa | 0.12 | |
| Difference pressostat LP | MPa | 0.7 | |
| | | | |
| **Brine** | | | |
| Max airflow | $m^3$/h | 2,400 | 3,400 |
| Min/Max air temp, max | °C | -25 / 43 | |
| Defrosting system | | reverse cycle | |
| | | | |
| **Heating medium** | | | |
| Max system pressure heating medium | MPa | 0.45 (4.5 bar) | |
| Min/Max flow | l/s | 0.08/0.32 | 0.11/0.44 |
| Max/Min heating medium temp continuous operation | °C | 65 / 25 | |
| Connection heating medium F2120 | | G1 1/4" external thread (Ø35 mm) | |
| Connection heating medium flex pipe | | G1 1/4" external thread (Ø35 mm) | |
| | | | |
| **Dimensions and weight** | | | |
| Width | mm | 1,130 | 1,280 |
| Depth | mm | 610 | 612 |
| Height with stand | mm | 1,070 | 1,165 |
| Weight (excl. packaging) | kg | 150 | 160 |
| | | | |

| F2120 – 1x230V | | 8 | 12 |
|---|---|---|---|
| **Miscellaneous** | | | |
| Enclosure class | | IP24 | |
| Colour | | grey | |
| Part No. | | 064 134 | 064 136 |

| F2120 – 3x400V | | 8 | 12 | 16 | 20 |
|---|---|---|---|---|---|
| **Heating** | | | | | |
| **Output data according to EN 14511, partial load**[1] | | | | | |
| **7/35** Rated output / Supplied power / $COP_{EN14511}$ | kW/kW/- | | 3.54/0.69/5.12 | 5.17/1.01/5.11 | 5.17/1.01/5.11 |
| **7/45** Rated output / Supplied power / $COP_{EN14511}$ | kW/kW/- | | 3.64/0.91/4.00 | 5.49/1.33/4.14 | 5.49/1.33/4.14 |
| **2/35** Rated output / Supplied power / $COP_{EN14511}$ | kW/kW/- | | 5.21/1.22/4.27 | 7.80/1.79/4.36 | 9.95/2.36/4.22 |
| **2/45** Rated output / Supplied power / $COP_{EN14511}$ | kW/kW/- | | 5.27/1.49/3.54 | 7.97/2.24/3.56 | 10.41/2.88/3.61 |
| | | | | | |
| **Cooling** | Outd. temp: / Supply temp. | Max | Max | Max | Max |
| **Output data according to EN14511 ∆T5K** Specified/supplied power/EER | 35 / 7 °C | | 4.69/1.70/2.76 | 7.09/2.72/2.61 | 8.10/3.50/2.31 |
| | 35 / 18 °C | | 5.44/1.73/3.15 | 8.19/2.83/2.90 | 9.26/3.64/2.54 |
| | | | | | |
| **Electrical data** | | | | | |
| Rated voltage | | 400V 3N~50Hz | | | |
| Max operating current, heat pump | $A_{rms}$ | 6 | 7 | 9.5 | 11 |
| Max operating current, compressor | $A_{rms}$ | 5 | 6 | 8.5 | 10 |
| Max output, fan | W | | 45 | 68 | 80 |
| Fuse | $A_{rms}$ | 10 | 10 | 10 | 13 |
| | | | | | |
| **Refrigerant circuit** | | | | | |
| Type of refrigerant | | R410A | | | |
| Type of compressor | | Scroll | | | |
| Volume | kg | 2.4 | 2.6 | 3 | 3 |
| Cut-out value pressure switch HP (BP1) | MPa | 4.5 | | | |
| Difference pressostat HP | MPa | 0.7 | | | |
| Cut-out value pressostat LP | MPa | 0.12 | | | |
| Difference pressostat LP | MPa | 0.7 | | | |
| | | | | | |
| **Airflow** | | | | | |
| Max airflow | $m^3$/h | 2,400 | 3,400 | 4,150 | 4,500 |
| Min/Max air temp, max | °C | -25 / 43 | | | |
| | | | | | |
| **Water flow** | | | | | |
| Max system pressure heating medium | MPa | 0.45 (4.5 bar) | | | |
| Min/Max flow | l/s | 0.08/0.32 | 0.11/0.44 | 0.15/0.60 | 0.19/0.75 |
| Min flow defrosting (100 % pump speed) | l/s | 0.27 | 0.35 | 0.38 | 0.48 |
| Max/Min heating medium temp continuous operation | °C | 65 / 25 | | | |
| Connection heating medium F2120 | | G1 1/4" external thread (Ø35 mm) | | | |
| Connection heating medium flex pipe | | G1 1/4" external thread (Ø35 mm) | | | |
| | | | | | |
| **Dimensions and weight** | | | | | |
| Width | mm | 1,130 | 1,280 | | |
| Depth | mm | 610 | 612 | | |
| Height with stand | mm | 1,070 | 1,165 | | |
| Weight (excl. packaging) | kg | 167 | 177 | 183 | |

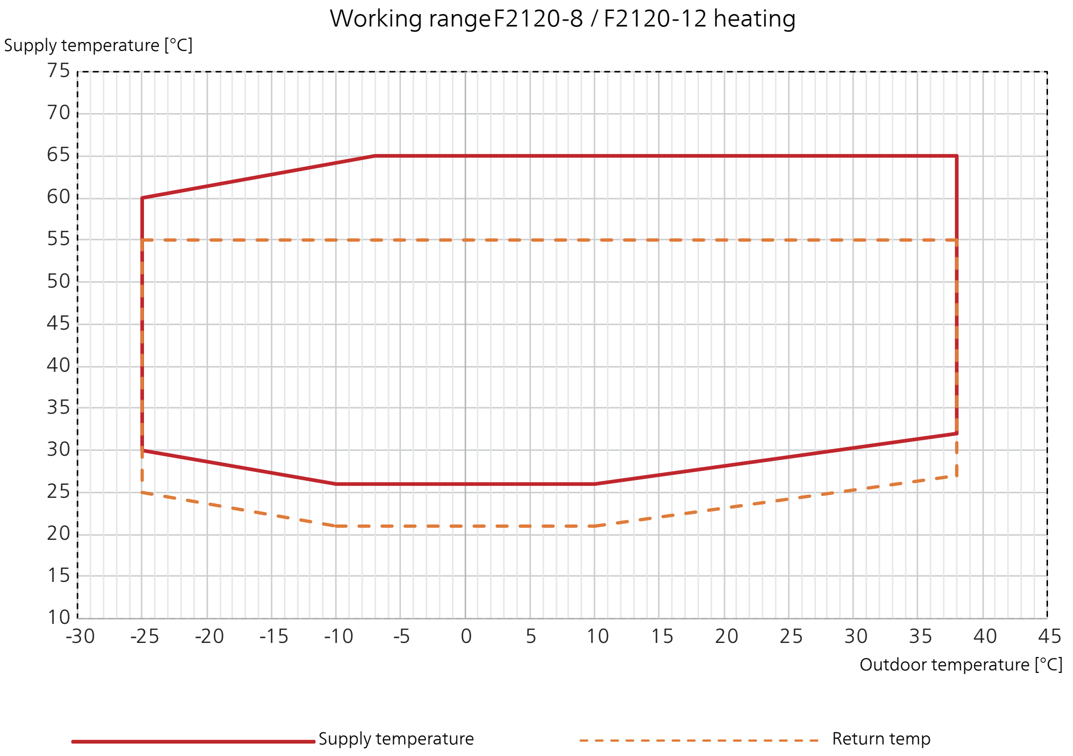
| F2120 – 3x400V | | 8 | 12 | 16 | 20 |
|---|---|---|---|---|---|
| **Miscellaneous** | | | | | |
| Defrosting system | | reverse cycle | | | |
| Enclosure class | | IP24 | | | |
| Colour | | Grey | | | |
| Part No. | | 064 135 | 064 137 | 064139 | 064 141 |

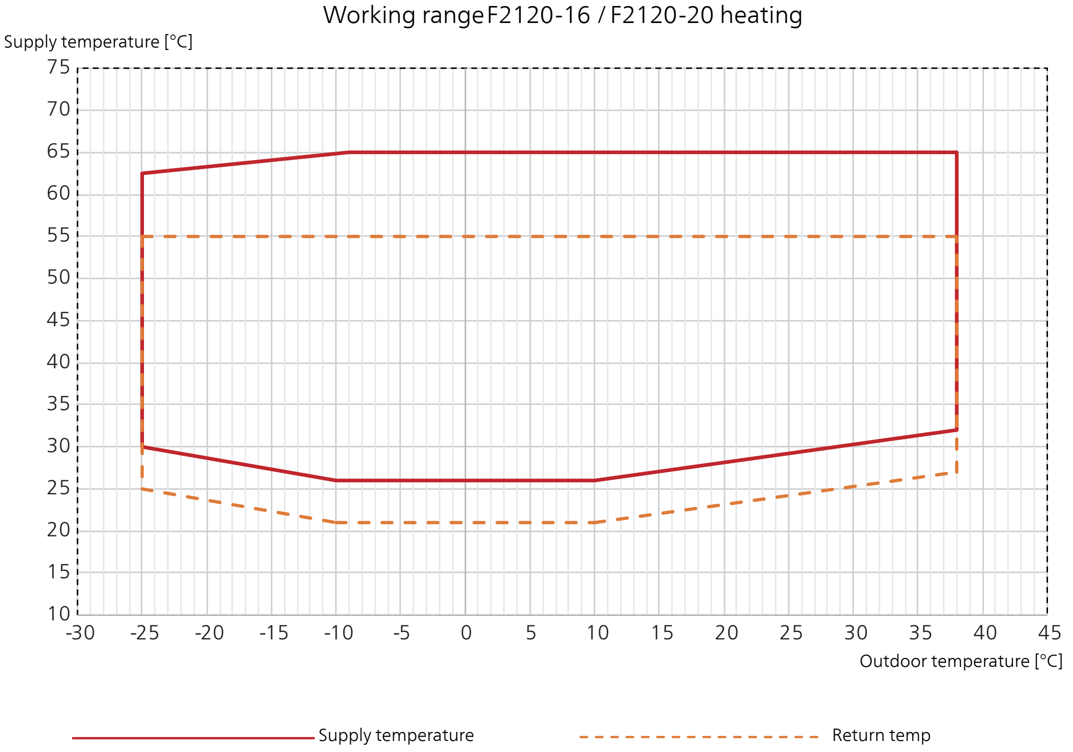
| SCOP & Pdesign F2120 according to EN 14825 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| F2120 | 8 | | 12 | | 16 | | 20 | |
| | Pdesign | SCOP | Pdesign | SCOP | Pdesign | SCOP | Pdesign | SCOP |
| SCOP 35 Average climate (Europe) | | | 8 | 4.83 | 11 | 5.05 | 11 | 5.05 |
| SCOP 55 Average climate (Europe) | | | 8.3 | 3.78 | 12.3 | 3.9 | 12.3 | 3.9 |
| SCOP 35 Cold climate | | | 9.3 | 4.05 | 13 | 4.25 | 13 | 4.25 |
| SCOP 55 Cold climate | | | 9.8 | 3.33 | 14 | 3.53 | 14 | 3.53 |
| SCOP 35 Warm climate | | | 9.2 | 5.48 | 13 | 5.5 | 13 | 5.5 |
| SCOP 55 Warm climate | | | 9.2 | 4.48 | 13 | 4.5 | 13 | 4.5 |

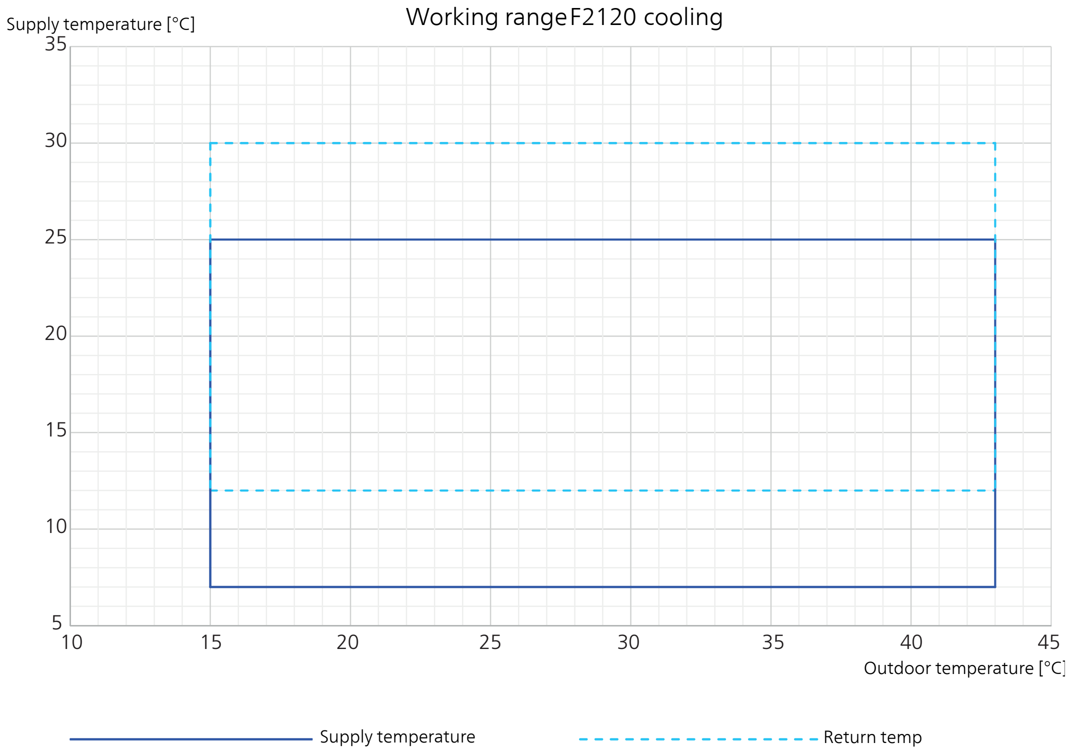
1)Power statements including defrosting according to EN14511
at heating medium supply corresponding to DT=5 K at 7 / 45.

2)Nominal flow corresponds to DT=10 K at 7 / 45.

## Working area





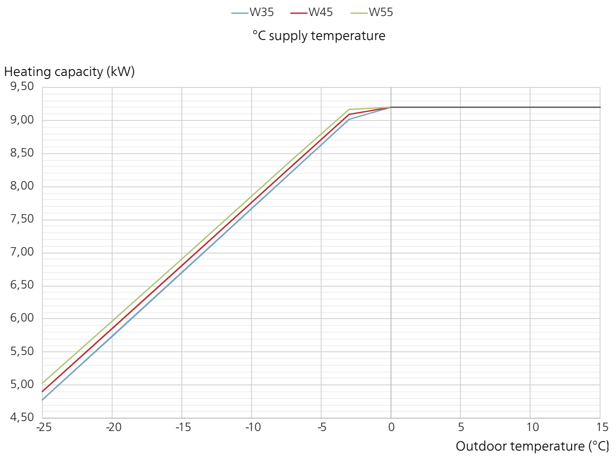

During shorter time it is allowed to have lower working temperatures on the water side, e.g. during start up.

# Heating

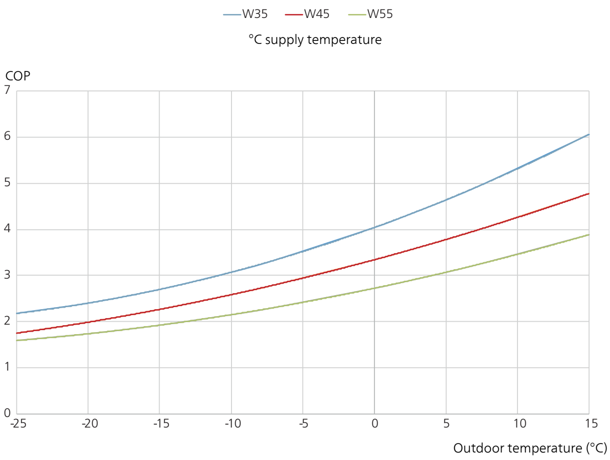
## Output and COP at different supply temperatures

### *F2120-12*

F2120-12 Max. heating capacity

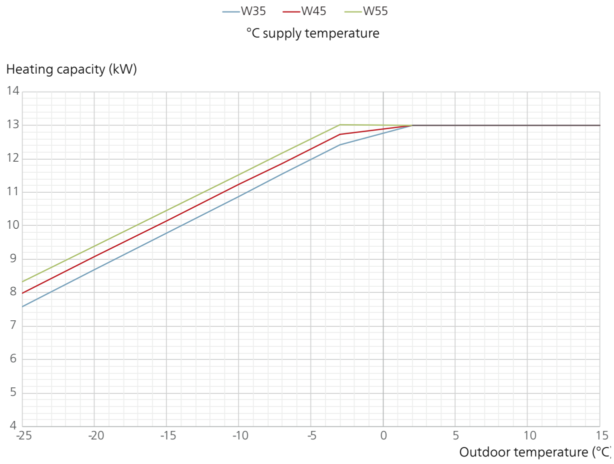



F2120-12 COP

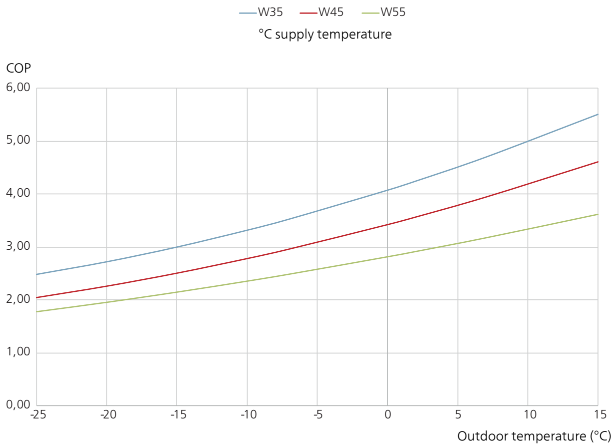



### *F2120-16*

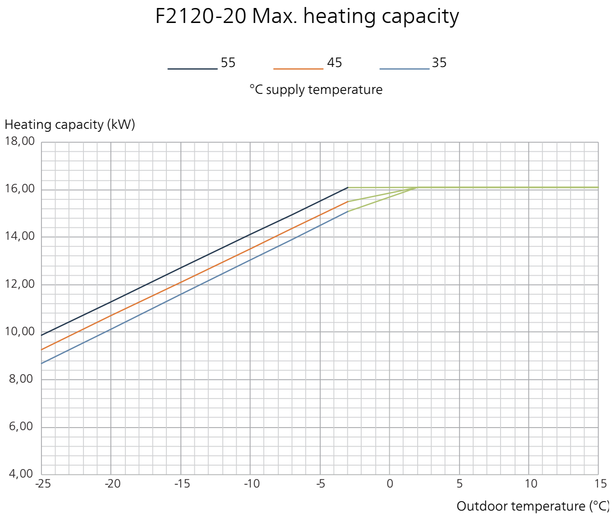
F2120-16 Max. heating capacity

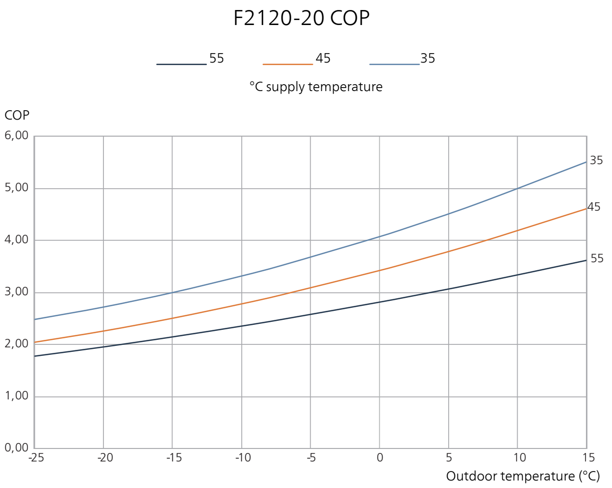



F2120-16 COP



## *F2120-20*

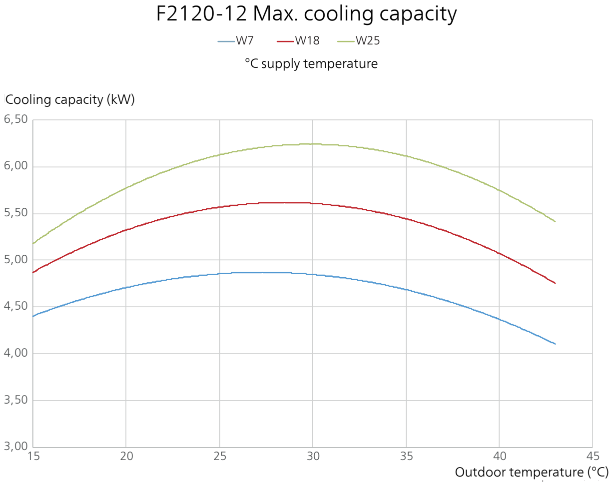

F2120-20 Max. heating capacity
55
45
35
°C supply temperature
Heating capacity (kW)
18,00
16,00
14,00
12,00
10,00
8,00
6,00
4,00
-25
-20
-15
-10
-5
0
5
10
15
Outdoor temperature (°C)


F2120-20 COP
55
45
35
°C supply temperature
COP
6,00
5,00
4,00
3,00
2,00
1,00
0,00
35
45
55
-25
-20
-15
-10
-5
0
5
10
15
Outdoor temperature (°C)

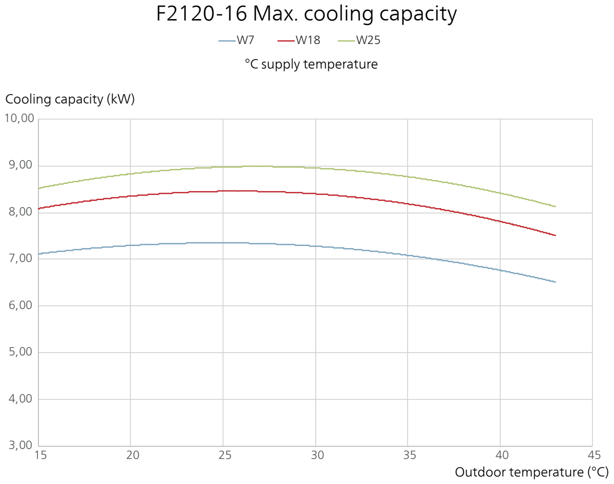
# Cooling

## Output at different supply temperatures (cooling)

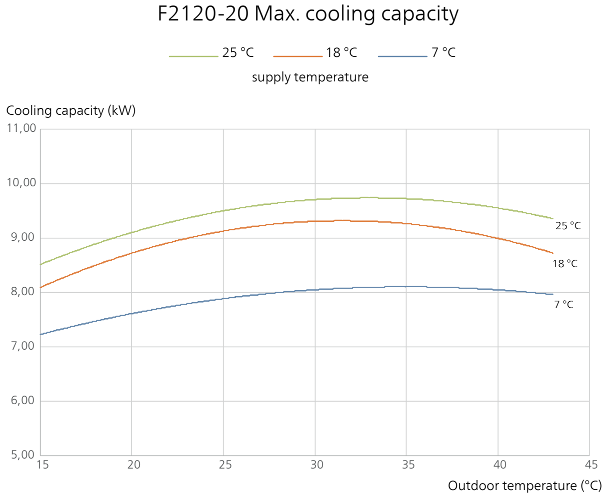
### *F2120-12*




### *F2120-16*




### *F2120-20*



# Energy labelling

## Information sheet

| Supplier | | NIBE | | |
|---|---|---|---|---|
| **Model** | | **F2120-12** | **F2120-16** | **F2120-20** |
| **Model hot water heater** | | **VVM 320** | **VVM 500** | **VVM 500** |
| **Temperature application** | **°C** | **35 / 55** | **35 / 55** | **35 / 55** |
| Declared load profile for water heating | | **XL** | **XXL** | **XXL** |
| Seasonal space heating energy efficiency class, average climate | | **A++ / A++** | **A++ / A++** | **A++ / A++** |
| Water heating energy efficiency class, average climate | | **A** | **A** | **A** |
| Rated heat output (Pdesignh), average climate | kW | 8.0 / 8.3 | 11.0 / 12.3 | 11.0 / 12.3 |
| Annual energy consumption space heating, average climate | kWh | 8,3 | 12,3 | 12,3 |
| Annual energy consumption water heating, average climate | kWh | 1661 | 2096 | 2096 |
| Seasonal space heating energy efficiency, average climate | % | 190 / 148 | 199 / 153 | 199 / 153 |
| Water heating energy efficiency, average climate | % | 101 | 103 | 103 |
| Sound power level $L_{WA}$ indoors | dB | 35 | 35 | 35 |
| Rated heat output (Pdesignh), cold climate | kW | 9.3 / 9.8 | 13.0 / 14.0 | 13.0 / 14.0 |
| Rated heat output (Pdesignh), warm climate | kW | 9.2 / 9.2 | 13.0 / 13.0 | 13.0 / 13.0 |
| Annual energy consumption space heating, cold climate | kWh | 5,666 / 7,239 | 7,543 / 9,765 | 7,543 / 9,765 |
| Annual energy consumption water heating, cold climate | kWh | 1895 | 2284 | 2284 |
| Annual energy consumption space heating, warm climate | kWh | 2,241 / 2,741 | 3,153 / 3,867 | 3,153 / 3,867 |
| Annual energy consumption water heating, warm climate | kWh | 1473 | 1873 | 1873 |
| Seasonal space heating energy efficiency, cold climate | % | 159 / 130 | 167 / 138 | 167 / 138 |
| Water heating energy efficiency, cold climate | % | 88 | 94 | 94 |
| Seasonal space heating energy efficiency, warm climate | % | 216 / 176 | 217 / 177 | 217 / 177 |
| Water heating energy efficiency, warm climate | % | 114 | 115 | 115 |
| Sound power level $L_{WA}$ outdoors | dB | 53 | 53 | 53 |

## Data for energy efficiency of the package

| Model | | F2120-12 | F2120-16 | F2120-20 |
|---|---|---|---|---|
| **Model hot water heater** | | **VVM 320** | **VVM 500** | **VVM 500** |
| **Temperature application** | **°C** | **35 / 55** | **35 / 55** | **35 / 55** |
| Controller, class | | VI | | |
| Controller, contribution to efficiency | % | 4.0 | | |
| Seasonal space heating energy efficiency of the package, average climate | % | 194 / 152 | 203 / 157 | 203 / 157 |
| Seasonal space heating energy efficiency class of the package, average climate | | **A+++ / A+++** | **A+++ / A+++** | **A+++ / A+++** |
| Seasonal space heating energy efficiency of the package, cold climate | % | 163 / 134 | 171 / 142 | 171 / 142 |
| Seasonal space heating energy efficiency of the package, warm climate | % | 220 / 180 | 221 / 181 | 221 / 181 |

The reported efficiency of the package also takes the controller into account. If an external supplementary boiler or solar heating is added to the package, the overall efficiency of the package should be recalculated.

## Technical documentation

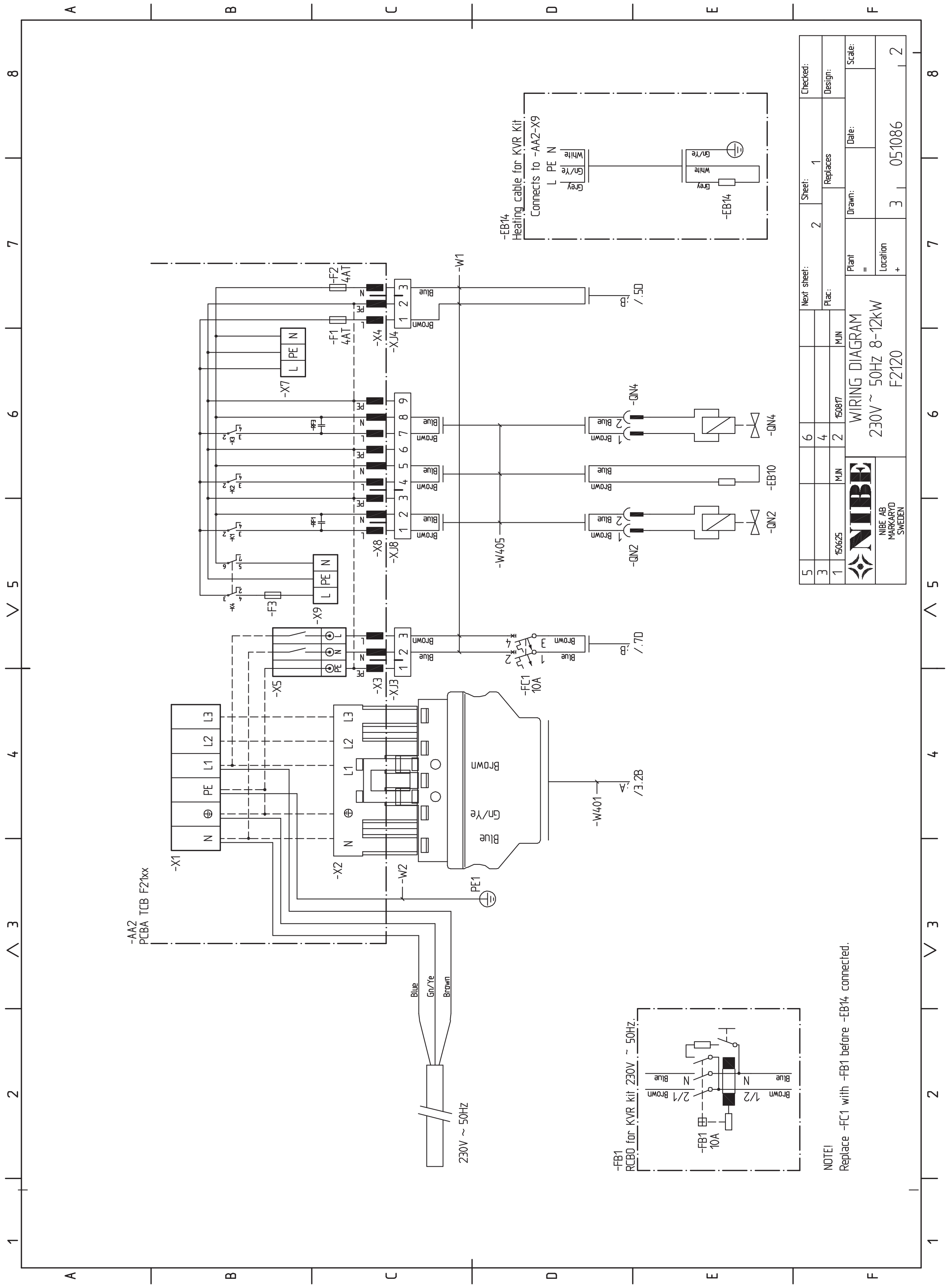
| Model | | | | F2120-12 | | | |
|---|---|---|---|---|---|---|---|
| **Model hot water heater** | | | | **VVM 320** | | | |
| Type of heat pump | | | | ☒ Air-water<br>☐ Exhaust-water<br>☐ Brine-water<br>☐ Water-water | | | |
| Low-temperature heat pump | | | | ☐ Yes ☒ No | | | |
| Integrated immersion heater for additional heat | | | | ☐ Yes ☒ No | | | |
| Heat pump combination heater | | | | ☒ Yes ☐ No | | | |
| Climate | | | | ☒ Average ☐ Cold ☐ Warm | | | |
| Temperature application | | | | ☒ Average (55 °C) ☐ Low (35 °C) | | | |
| Applied standards | | | | EN14825 / EN14511 / EN16147 / EN12102 | | | |
| **Rated heat output** | Prated | 8,3 | kW | **Seasonal space heating energy efficiency** | $\eta_s$ | 148 | % |
| *Declared capacity for space heating at part load and at outdoor temperature Tj* | | | | *Declared coefficient of performance for space heating at part load and at outdoor temperature Tj* | | | |
| Tj = -7 °C | Pdh | 7.3 | kW | Tj = -7 °C | COPd | 2.39 | - |
| Tj = +2 °C | Pdh | 4.7 | kW | Tj = +2 °C | COPd | 3.85 | - |
| Tj = +7 °C | Pdh | 2.9 | kW | Tj = +7 °C | COPd | 4.48 | - |
| Tj = +12 °C | Pdh | 3.3 | kW | Tj = +12 °C | COPd | 5.30 | - |
| Tj = biv | Pdh | 7.3 | kW | Tj = biv | COPd | 2.39 | - |
| Tj = TOL | Pdh | 7.8 | kW | Tj = TOL | COPd | 2.28 | - |
| Tj = -15 °C (if TOL < -20 °C) | Pdh | | kW | Tj = -15 °C (if TOL < -20 °C) | COPd | | - |
| | | | | | | | |
| Bivalent temperature | $T_{biv}$ | -7 | °C | Min. outdoor air temperature | TOL | -10 | °C |
| Cycling interval capacity | Pcych | | kW | Cycling interval efficiency | COPcyc | | - |
| Degradation coefficient | Cdh | 0.99 | - | Max supply temperature | WTOL | 65 | °C |
| *Power consumption in modes other than active mode* | | | | *Additional heat* | | | |
| Off mode | $P_{OFF}$ | 0.025 | kW | Rated heat output | Psup | 0.5 | kW |
| Thermostat-off mode | $P_{TO}$ | 0.007 | kW | | | | |
| Standby mode | $P_{SB}$ | 0.025 | kW | Type of energy input | Electric | | |
| Crankcase heater mode | $P_{CK}$ | 0.037 | kW | | | | |
| *Other items* | | | | | | | |
| Capacity control | Variable | | | Rated airflow (air-water) | | 3,400 | $m^3/h$ |
| Sound power level, indoors/outdoors | $L_{WA}$ | 35 / 53 | dB | Nominal heating medium flow | | | $m^3/h$ |
| Annual energy consumption | $Q_{HE}$ | 4,529 | kWh | Brine flow brine-water or water-water heat pumps | | | $m^3/h$ |
| *For heat pump combination heater* | | | | | | | |
| **Declared load profile for water heating** | XL | | | **Water heating energy efficiency** | $\eta_{wh}$ | 101 | % |
| Daily energy consumption | $Q_{elec}$ | 7.56 | kWh | Daily fuel consumption | $Q_{fuel}$ | | kWh |
| Annual energy consumption | AEC | 1,661 | kWh | Annual fuel consumption | AFC | | GJ |

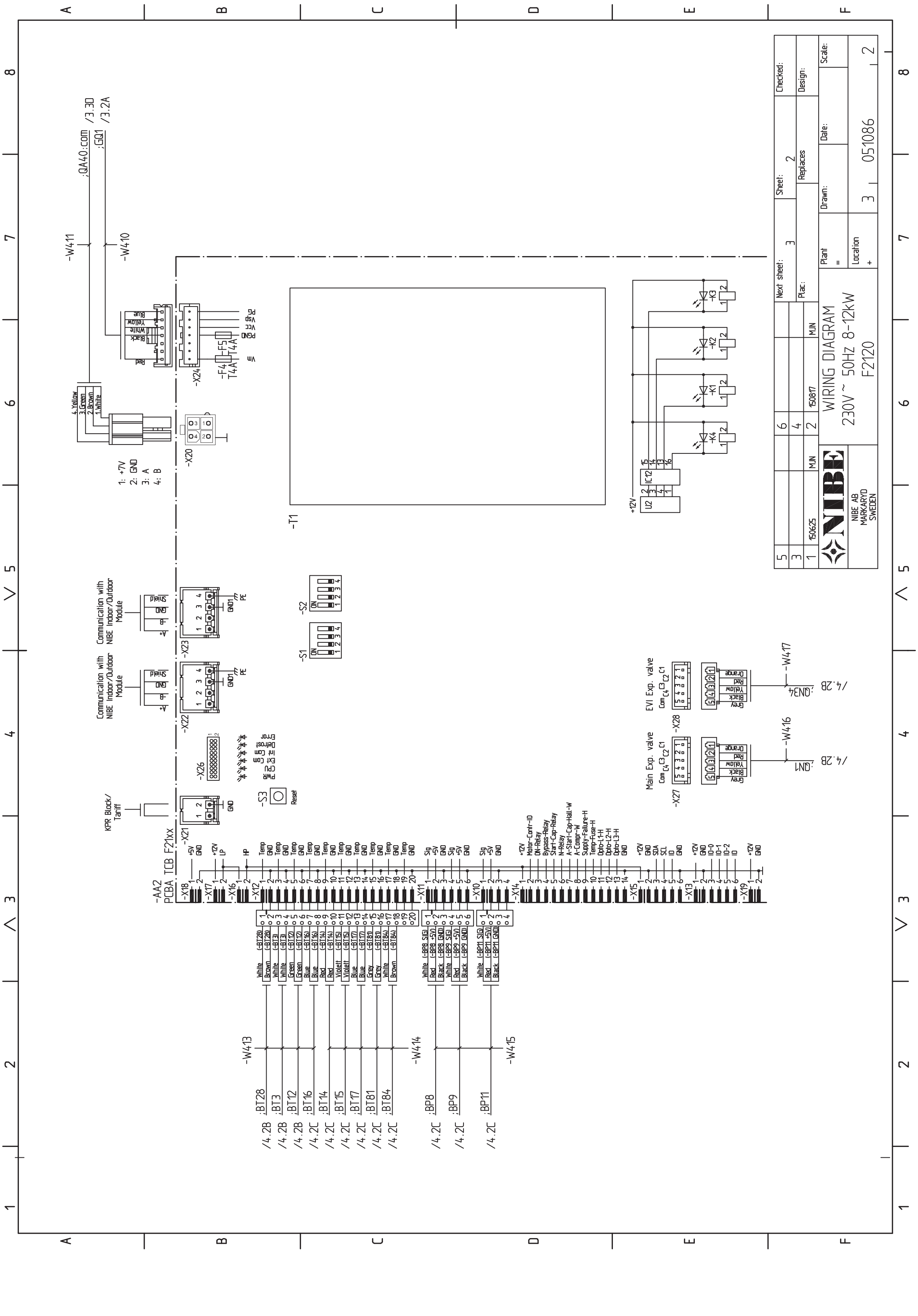
| Model | | | | | F2120-16 | | | |
|---|---|---|---|---|---|---|---|---|
| **Model hot water heater** | | | | | **VVM 500** | | | |
| Type of heat pump | | ☒ Air-water<br>☐ Exhaust-water<br>☐ Brine-water<br>☐ Water-water | | | | | | |
| Low-temperature heat pump | | ☐ Yes ☒ No | | | | | | |
| Integrated immersion heater for additional heat | | ☐ Yes ☒ No | | | | | | |
| Heat pump combination heater | | ☒ Yes ☐ No | | | | | | |
| Climate | | ☒ Average ☐ Cold ☐ Warm | | | | | | |
| Temperature application | | ☒ Average (55 °C) ☐ Low (35 °C) | | | | | | |
| Applied standards | | EN14825 / EN14511 / EN16147 / EN12102 | | | | | | |
| **Rated heat output** | Prated | 12,3 | kW | | **Seasonal space heating energy efficiency** | $\eta_s$ | 153 | % |
| *Declared capacity for space heating at part load and at outdoor temperature Tj* | | | | | *Declared coefficient of performance for space heating at part load and at outdoor temperature Tj* | | | |
| Tj = -7 °C | Pdh | 10.9 | kW | | Tj = -7 °C | COPd | 2.48 | - |
| Tj = +2 °C | Pdh | 6.7 | kW | | Tj = +2 °C | COPd | 3.96 | - |
| Tj = +7 °C | Pdh | 5.9 | kW | | Tj = +7 °C | COPd | 4.67 | - |
| Tj = +12 °C | Pdh | 6.5 | kW | | Tj = +12 °C | COPd | 5.67 | - |
| Tj = biv | Pdh | 10.9 | kW | | Tj = biv | COPd | 2.48 | - |
| Tj = TOL | Pdh | 11.6 | kW | | Tj = TOL | COPd | 2.40 | - |
| Tj = -15 °C (if TOL < -20 °C) | Pdh | | kW | | Tj = -15 °C (if TOL < -20 °C) | COPd | | - |
| | | | | | | | | |
| Bivalent temperature | $T_{biv}$ | -7 | °C | | Min. outdoor air temperature | TOL | -10 | °C |
| Cycling interval capacity | Pcych | | kW | | Cycling interval efficiency | COPcyc | | - |
| Degradation coefficient | Cdh | 0.99 | - | | Max supply temperature | WTOL | 65 | °C |
| *Power consumption in modes other than active mode* | | | | | *Additional heat* | | | |
| Off mode | $P_{OFF}$ | 0.025 | kW | | Rated heat output | Psup | 0.7 | kW |
| Thermostat-off mode | $P_{TO}$ | 0.007 | kW | | | | | |
| Standby mode | $P_{SB}$ | 0.025 | kW | | Type of energy input | Electric | | |
| Crankcase heater mode | $P_{CK}$ | 0.037 | kW | | | | | |
| *Other items* | | | | | | | | |
| Capacity control | Variable | | | | Rated airflow (air-water) | | 4,150 | $m^3/h$ |
| Sound power level, indoors/outdoors | $L_{WA}$ | 35 / 53 | dB | | Nominal heating medium flow | | | $m^3/h$ |
| Annual energy consumption | $Q_{HE}$ | 6,524 | kWh | | Brine flow brine-water or water-water heat pumps | | | $m^3/h$ |
| *For heat pump combination heater* | | | | | | | | |
| **Declared load profile for water heating** | XXL | | | | **Water heating energy efficiency** | $\eta_{wh}$ | 103 | % |
| Daily energy consumption | $Q_{elec}$ | 9.54 | kWh | | Daily fuel consumption | $Q_{fuel}$ | | kWh |
| Annual energy consumption | AEC | 2,096 | kWh | | Annual fuel consumption | AFC | | GJ |

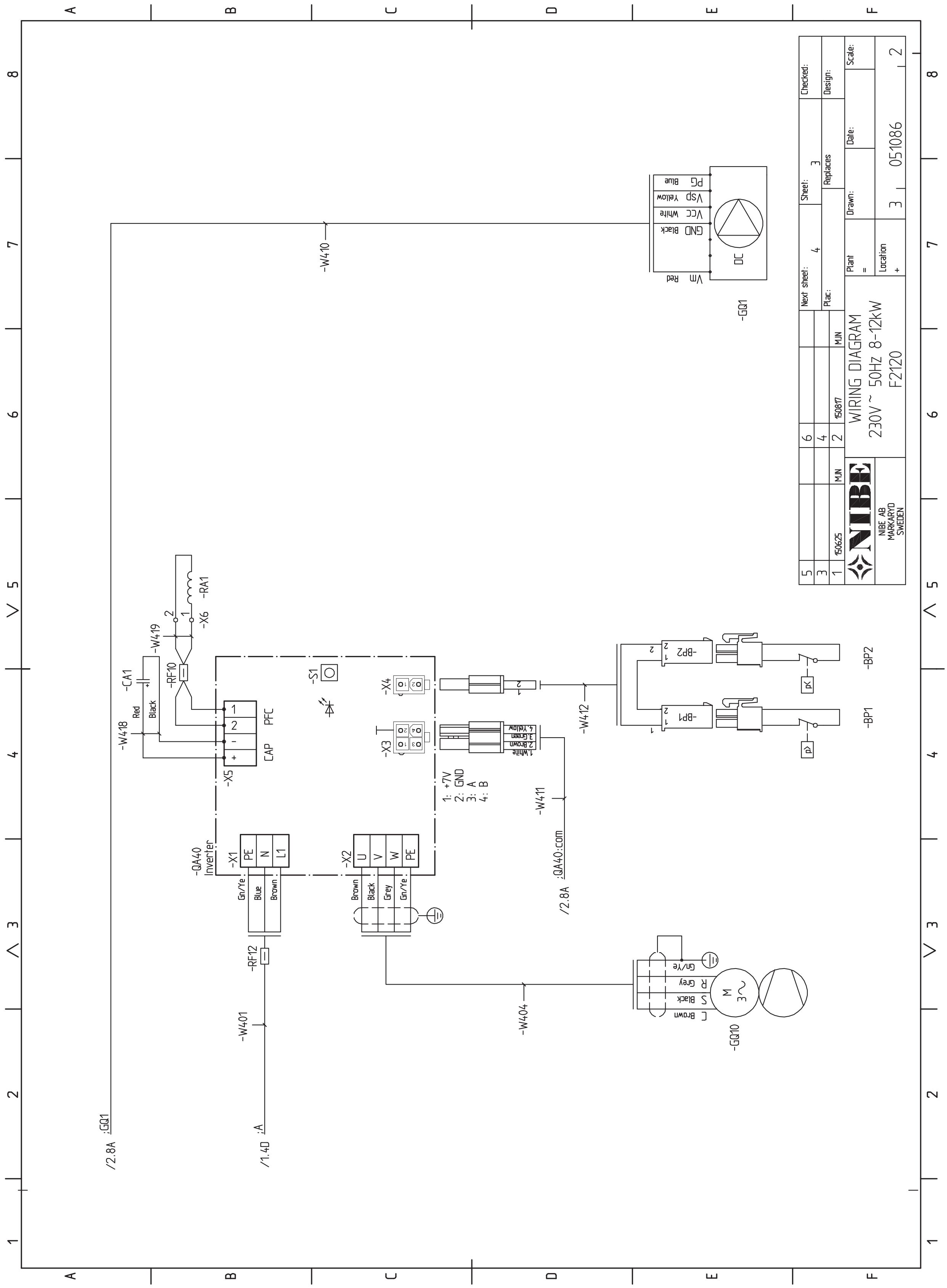
| Model | | | | F2120-20 | | | |
|---|---|---|---|---|---|---|---|
| **Model hot water heater** | | | | **VVM 500** | | | |
| Type of heat pump | | | | ☒ Air-water<br>☐ Exhaust-water<br>☐ Brine-water<br>☐ Water-water | | | |
| Low-temperature heat pump | | | | ☐ Yes ☒ No | | | |
| Integrated immersion heater for additional heat | | | | ☐ Yes ☒ No | | | |
| Heat pump combination heater | | | | ☒ Yes ☐ No | | | |
| Climate | | | | ☒ Average ☐ Cold ☐ Warm | | | |
| Temperature application | | | | ☒ Average (55 °C) ☐ Low (35 °C) | | | |
| Applied standards | | | | EN14825 / EN14511 / EN16147 / EN12102 | | | |
| **Rated heat output** | Prated | 12,3 | kW | **Seasonal space heating energy efficiency** | $\eta_s$ | 153 | % |
| *Declared capacity for space heating at part load and at outdoor temperature Tj* | | | | *Declared coefficient of performance for space heating at part load and at outdoor temperature Tj* | | | |
| Tj = -7 °C | Pdh | 10.9 | kW | Tj = -7 °C | COPd | 2.48 | - |
| Tj = +2 °C | Pdh | 6.7 | kW | Tj = +2 °C | COPd | 3.96 | - |
| Tj = +7 °C | Pdh | 5.9 | kW | Tj = +7 °C | COPd | 4.67 | - |
| Tj = +12 °C | Pdh | 6.5 | kW | Tj = +12 °C | COPd | 5.67 | - |
| Tj = biv | Pdh | 10.9 | kW | Tj = biv | COPd | 2.48 | - |
| Tj = TOL | Pdh | 11.6 | kW | Tj = TOL | COPd | 2.40 | - |
| Tj = -15 °C (if TOL < -20 °C) | Pdh | | kW | Tj = -15 °C (if TOL < -20 °C) | COPd | | - |
| | | | | | | | |
| Bivalent temperature | $T_{biv}$ | -7 | °C | Min. outdoor air temperature | TOL | -10 | °C |
| Cycling interval capacity | Pcych | | kW | Cycling interval efficiency | COPcyc | | - |
| Degradation coefficient | Cdh | 0.99 | - | Max supply temperature | WTOL | 65 | °C |
| *Power consumption in modes other than active mode* | | | | *Additional heat* | | | |
| Off mode | $P_{OFF}$ | 0.025 | kW | Rated heat output | Psup | 0.7 | kW |
| Thermostat-off mode | $P_{TO}$ | 0.007 | kW | | | | |
| Standby mode | $P_{SB}$ | 0.025 | kW | Type of energy input | Electric | | |
| Crankcase heater mode | $P_{CK}$ | 0.037 | kW | | | | |
| *Other items* | | | | | | | |
| Capacity control | Variable | | | Rated airflow (air-water) | | 4,150 | $m^3/h$ |
| Sound power level, indoors/outdoors | $L_{WA}$ | 35 / 53 | dB | Nominal heating medium flow | | | $m^3/h$ |
| Annual energy consumption | $Q_{HE}$ | 6,524 | kWh | Brine flow brine-water or water-water heat pumps | | | $m^3/h$ |
| *For heat pump combination heater* | | | | | | | |
| **Declared load profile for water heating** | XXL | | | **Water heating energy efficiency** | $\eta_{wh}$ | 103 | % |
| Daily energy consumption | $Q_{elec}$ | 9.54 | kWh | Daily fuel consumption | $Q_{fuel}$ | | kWh |
| Annual energy consumption | AEC | 2,096 | kWh | Annual fuel consumption | AFC | | GJ |

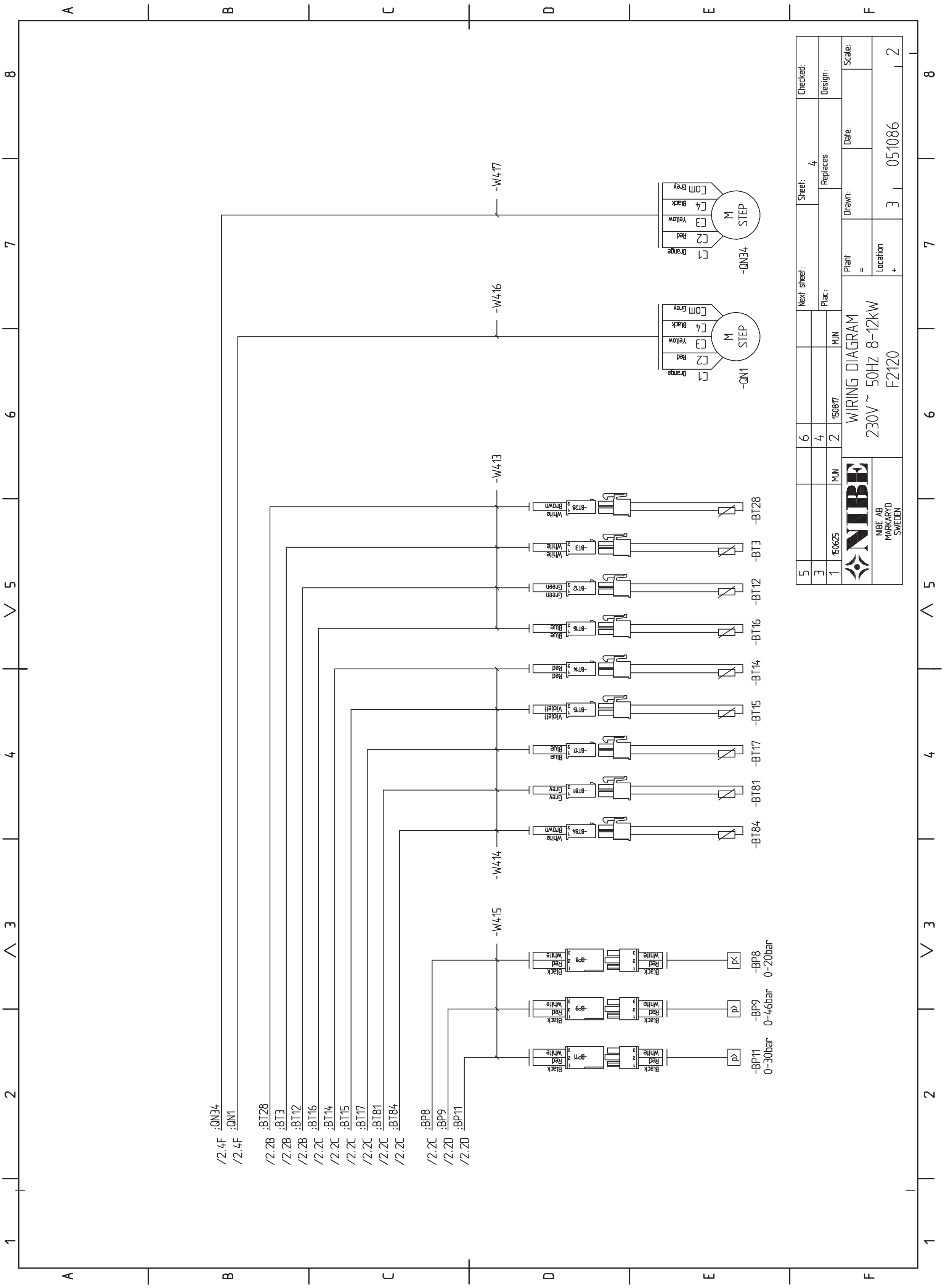
# Electrical circuit diagram

## 1x230V

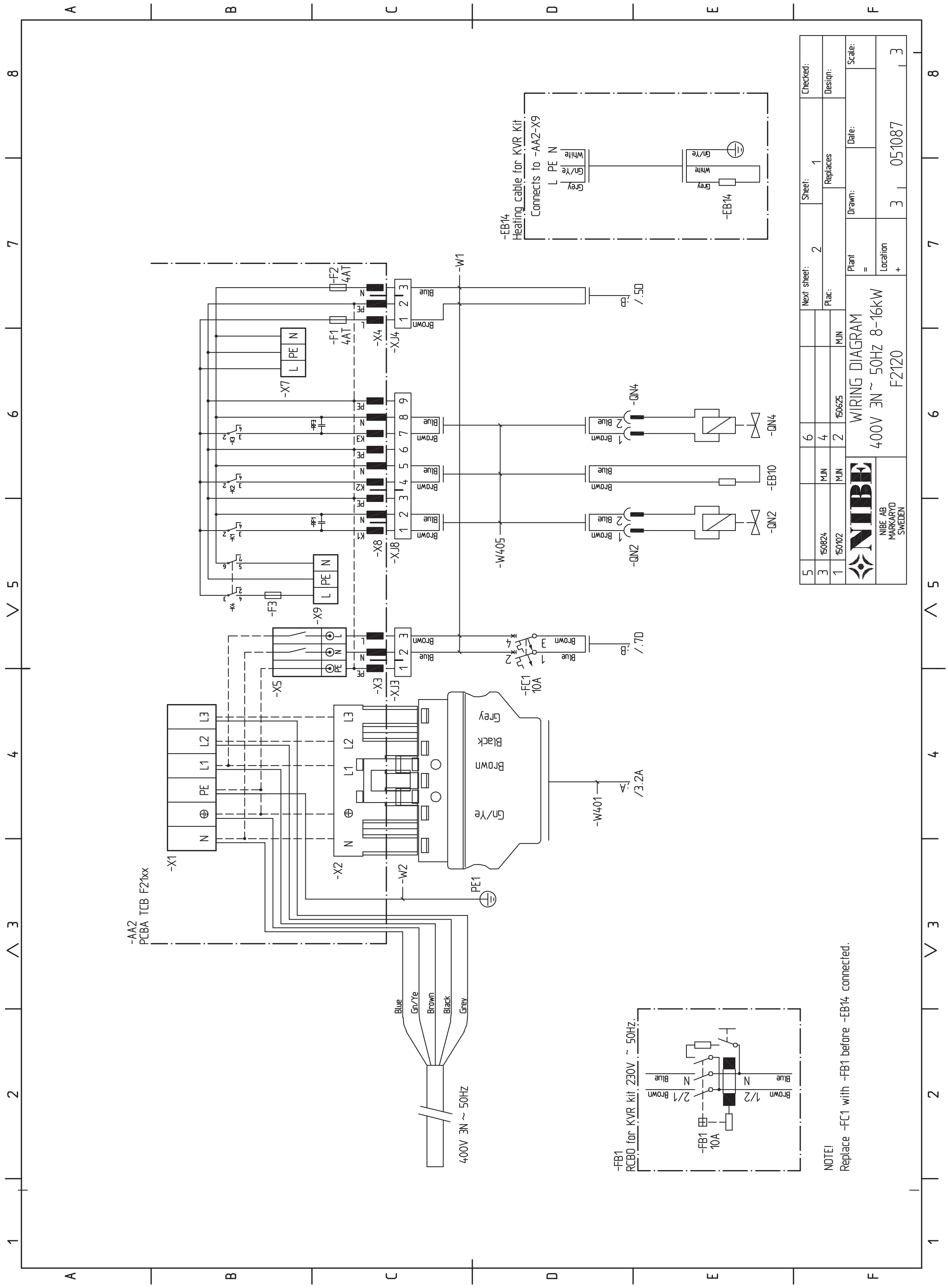



WIRING DIAGRAM
230V~ 50Hz 8-12kW
F2120
NIBE AB
MARKARYD
SWEDEN
051086

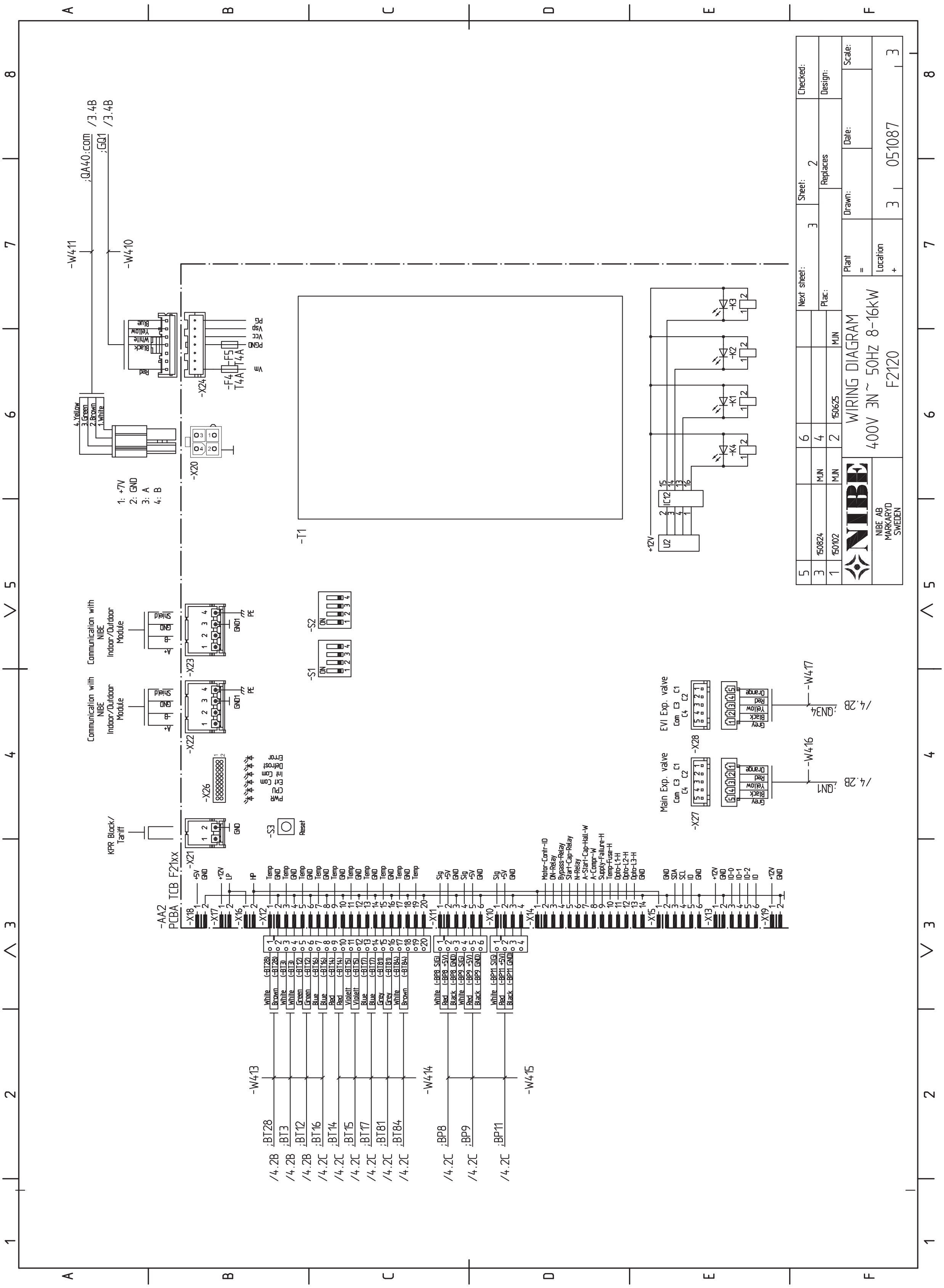

WIRING DIAGRAM
230V~ 50Hz 8-12kW
F2120
NIBE AB
MARKARYD
SWEDEN
051086
-QA40
Inverter
-GQ1
-GQ10
-BP1
-BP2
-RA1
-CA1
-RF10
-RF12
-S1
-W401
-W404
-W410
-W411
-W412
-W418
-W419
1: +7V
2: GND
3: A
4: B

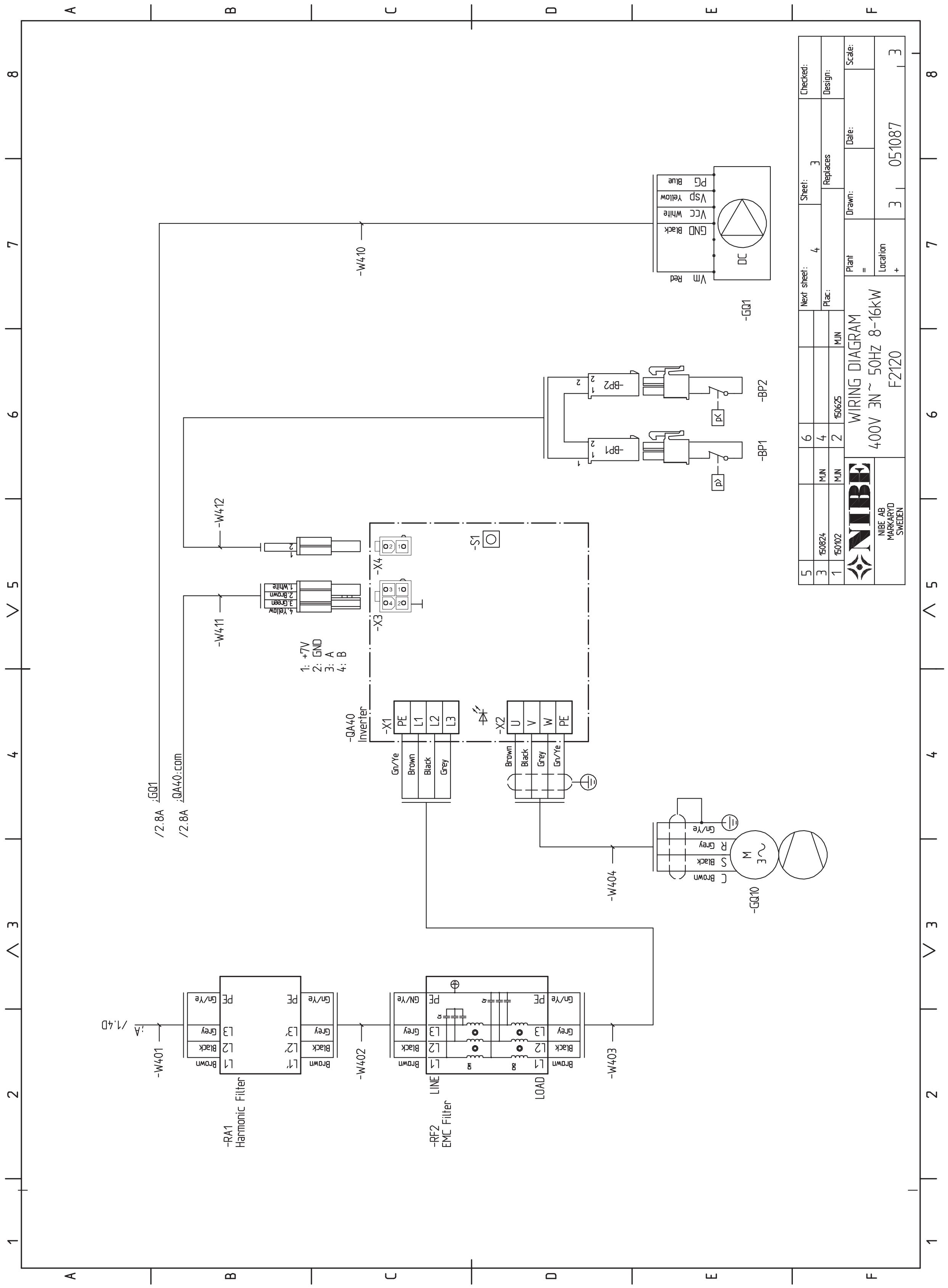

WIRING DIAGRAM
230V~ 50Hz 8-12kW
F2120
NIBE AB
MARKARYD
SWEDEN
051086
-QN1
-QN34
-W413
-W414
-W415
-W416
-W417
-BT28
-BT3
-BT12
-BT16
-BT14
-BT15
-BT17
-BT81
-BT84
-BP8 0-20bar
-BP9 0-46bar
-BP11 0-30bar

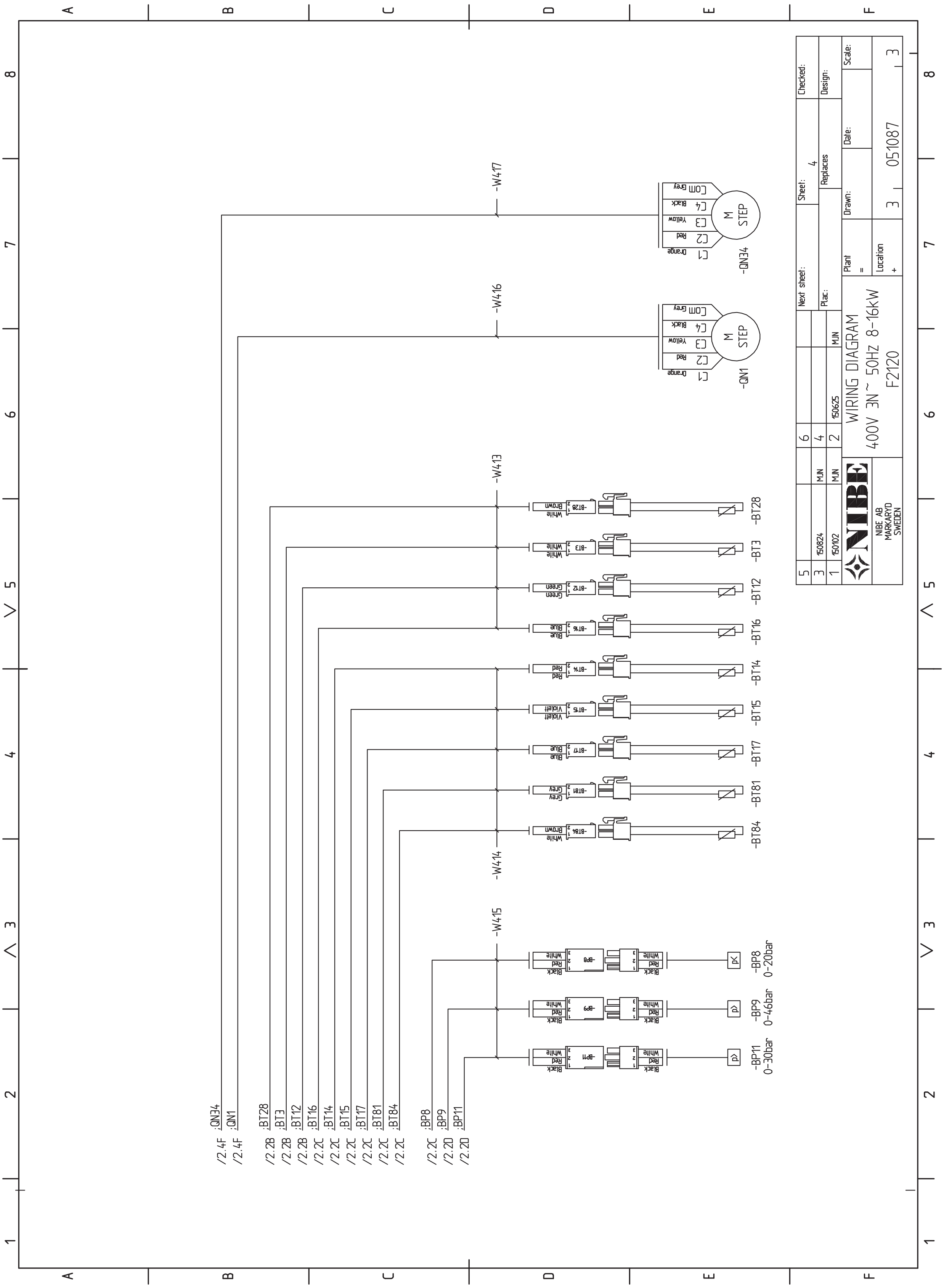
## 3x400V



WIRING DIAGRAM
400V 3N~ 50Hz 8-16kW
F2120
051087
NIBE AB
MARKARYD
SWEDEN
-EB14
Heating cable for KVR Kit
Connects to -AA2-X9
-AA2
PCBA TCB F21xx
400V 3N ~ 50Hz
-FB1
RCBO for KVR kit 230V ~ 50Hz.
NOTE!
Replace -FC1 with -FB1 before -EB14 connected.


WIRING DIAGRAM
400V 3N~ 50Hz 8-16kW
F2120
NIBE AB
MARKARYD
SWEDEN
051087


WIRING DIAGRAM
400V 3N~ 50HZ 8-16kW
F2120
051087
NIBE AB
MARKARYD
SWEDEN



-W417
-W416
-W413
-W414
-W415
-QN34
-QN1
M STEP
C1 C2 C3 C4 COM
-BT28
-BT3
-BT12
-BT16
-BT14
-BT15
-BT17
-BT81
-BT84
-BP8 0-20bar
-BP9 0-46bar
-BP11 0-30bar
/2.4F :QN34
/2.4F :QN1
/2.2B :BT28
/2.2B :BT3
/2.2B :BT12
/2.2C :BT16
/2.2C :BT14
/2.2C :BT15
/2.2C :BT17
/2.2C :BT81
/2.2C :BT84
/2.2C :BP8
/2.2D :BP9
/2.2D :BP11
WIRING DIAGRAM
400V 3N~ 50Hz 8-16kW
F2120
NIBE AB
MARKARYD
SWEDEN
051087

# 11 Item register

## Item register

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331385