Installer manual

Air/water heat pump
NIBE F2120

IHB EN 2214-1
631982

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Important information

Safety information

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

The manual must be left with the customer.

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. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

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

Rights to make any design or technical modifications are reserved.

Electrical installation and wiring must be carried out in accordance with national provisions.

F2120 must be installed via an isolator switch. The cable area has to be dimensioned based on the fuse rating used.

If the supply cable is damaged, only NIBE, its service representative or similar authorised person may replace it to prevent any danger and damage.

Symbols

Explanation of symbols that may be present in this manual.

NOTE

This symbol indicates danger to person or machine.

Caution

This symbol indicates important information about what you should consider when installing or servicing the installation.

TIP

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

Marking

Explanation of symbols that may be present on the product's label(s).

Danger to person or machine.

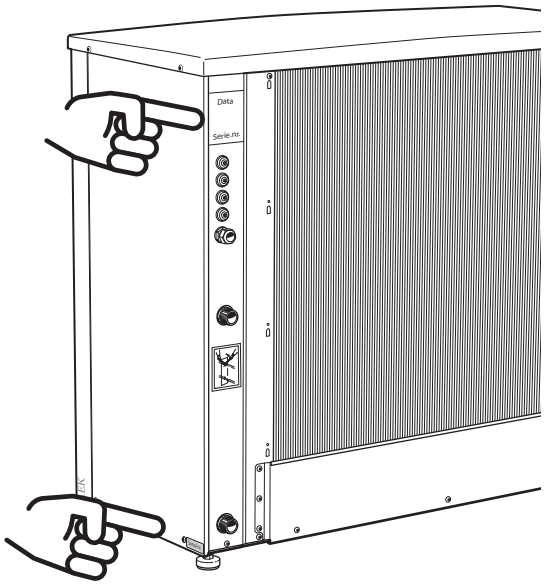
Read the User Manual.

Disconnect the voltage supply before starting work.

Dangerous voltage.

Serial number

The serial number can be found at the top left on the rear cover and at the bottom on the side.



Caution

You need the product's (14 digit) serial number for servicing and support.

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 (see section "Pipe connections")				
	System flushed			
	System vented			
	Particle filter			
	Shut-off and drain valve			
	Charge flow set			
Electricity (see section "Electrical connections")				
	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.

Compatible indoor modules (VVM) and control modules (SMO)

	VVM S320	SMO S40
F2120-16	X	X
F2120-20		X

	VVM 310	VVM 500	SMO 20	SMO 40
F2120-16	X	X	X	X
F2120-20		X	X	X

Indoor module

VVM S320
Stainless steel, 3x230 V
Part no. 069 201

VVM S320
Enamel, 3x400 V
Part no. 069 206

VVM S320
Stainless steel, 3x400 V
Part no. 069 196

VVM 310
Stainless steel, 3x400 V
Part no. 069 430

VVM 310
Stainless steel, 3x400 V
With integrated EMK 310
Part no. 069 084

VVM 500
Stainless steel, 3x400 V
Part no. 069 400

Control module

SMO S40
Control module
Part no. 067 654

SMO 20
Control module
Part no. 067 224

SMO 40
Control module
Part no. 067 225

Delivery and handling

Transport

F2120 must be transported and stored vertically.

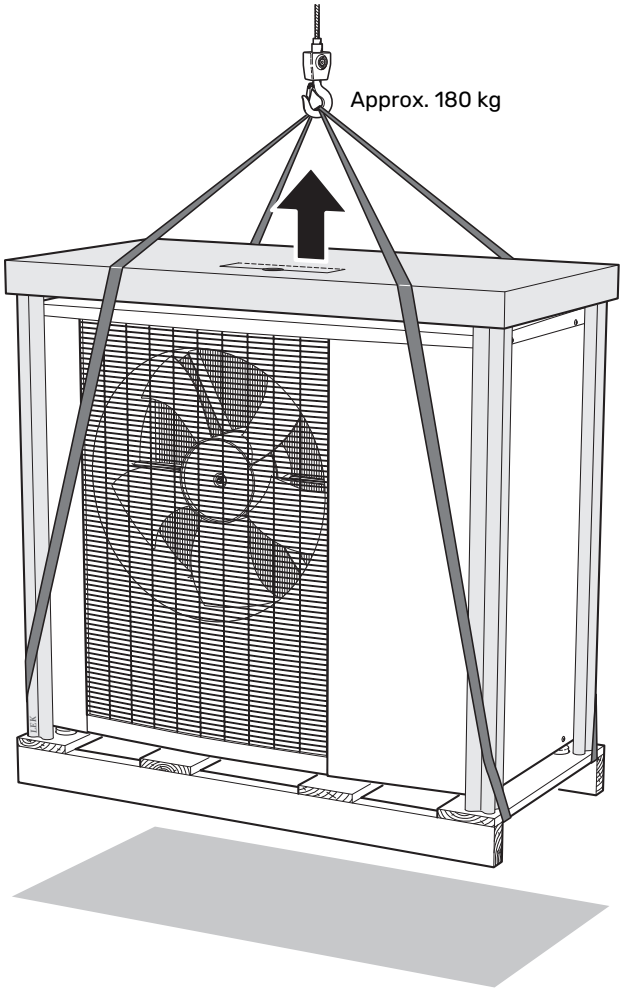
> **NOTE**
>
> Ensure that the heat pump cannot fall over during transport.

Check that the heat pump has not been damaged during transport.

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 using a crane truck that can lift it to the installation location. When F2120 is lifted with a crane, the packaging must be untouched.

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.

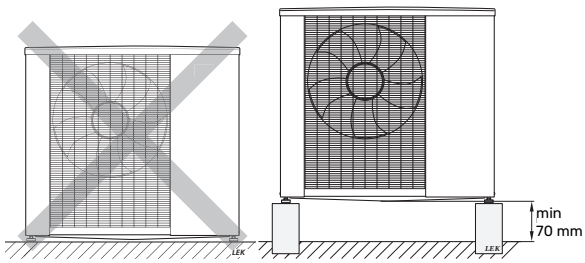
Place lifting straps around each machine foot. Lifting from the pallet to the base requires four persons, one for each lifting strap.

SCRAPPING

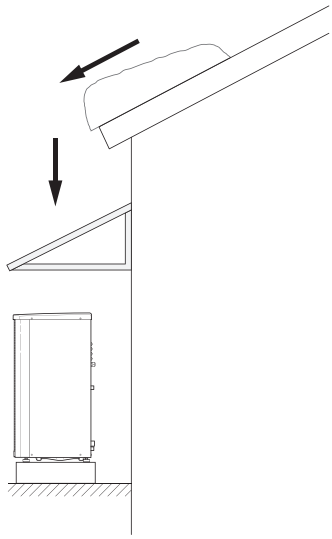
When scrapping, the product is removed in reverse order. Lift by the bottom panel instead of a pallet!

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 lower edge of the evaporator must not be lower than the level of the average local snow depth. The base should be at least 70 mm tall.
- 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 is possible. Recirculation entails reduced power 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.
- A small amount of water may drip from the drainage hole under F2120. Make sure that this water can run away by selecting a suitable material underneath F2120 (see section "Condensation").
- Care must be exercised so that the heat pump is not scratched during installation.



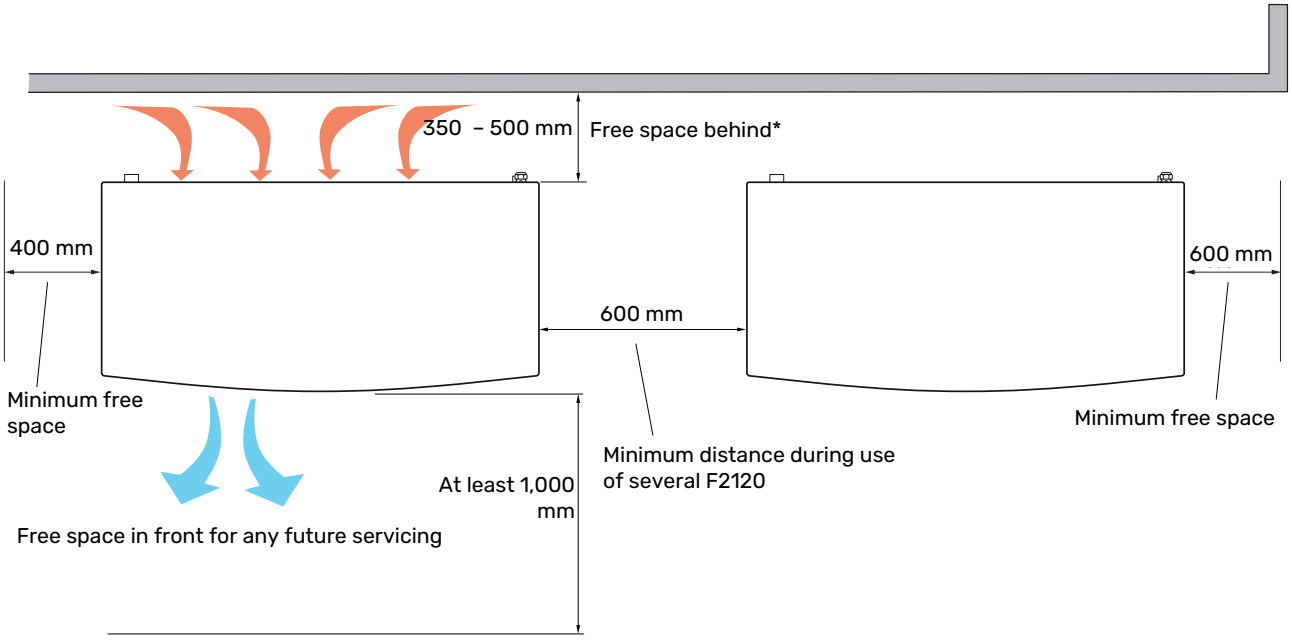
Do not place F2120 directly on the lawn or other non solid surface.



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.

INSTALLATION AREA

The distance between F2120 and the house wall must be at least 350 mm, but not more than 500 mm in locations that are exposed to the wind. The free space above F2120 must be at least 1,000 mm. The free space in front must be at least 1,000 mm for any future servicing.



* The space behind must not exceed 500 mm in locations that are exposed to the wind.

Compressor heater

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

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.

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

Condensation

The condensate drain pan collects and leads away the condensation water.

> **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.
>
> Condensation run-off should be checked regularly, especially during the autumn. Clean if necessary.

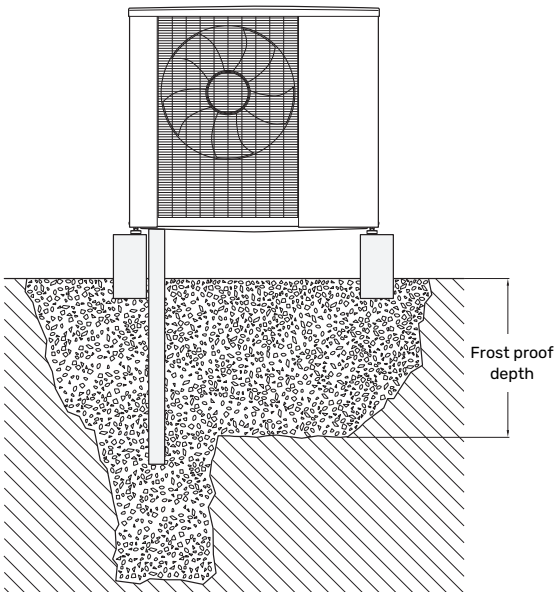
- The condensation water (up to 50 litres/24 hrs) that collects in the trough should be routed away by a pipe to an appropriate drain, it is recommended that the shortest outdoor stretch possible is used.
- The section of the pipe that can be affected by frost must be heated by the heating cable to prevent freezing.

> **TIP**
>
> Pipe with heating cable for draining the condensation water trough is not included.
>
> To ensure the function, the accessory KVR 11 should be used.

- Route the pipe downward from the heat pump.
- 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.

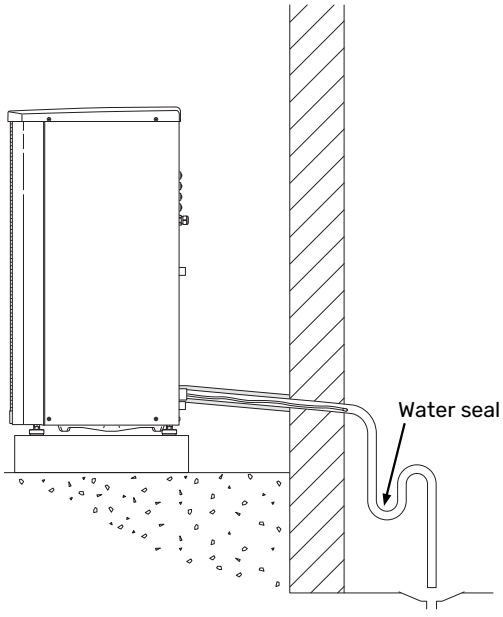
DRAINAGE OF CONDENSATION

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.

Drain indoors



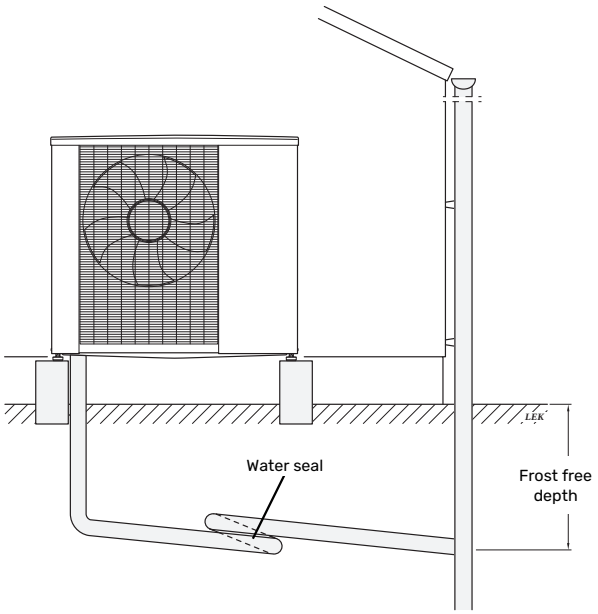
The condensation water is lead to an indoor drain (subject to local rules and regulations).

When routing pipes indoors, condensation water pipes must be insulated against condensation.

Route the pipe downward from the heat pump.

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

Gutter drainage



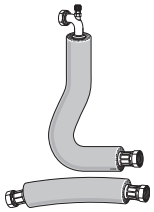
Route the pipe downward from the heat pump.

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

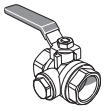
> **Caution**
>
> If none of the recommended alternatives is used good lead off of condensation water must be assured.

Supplied components

F2120-16, F2120-20



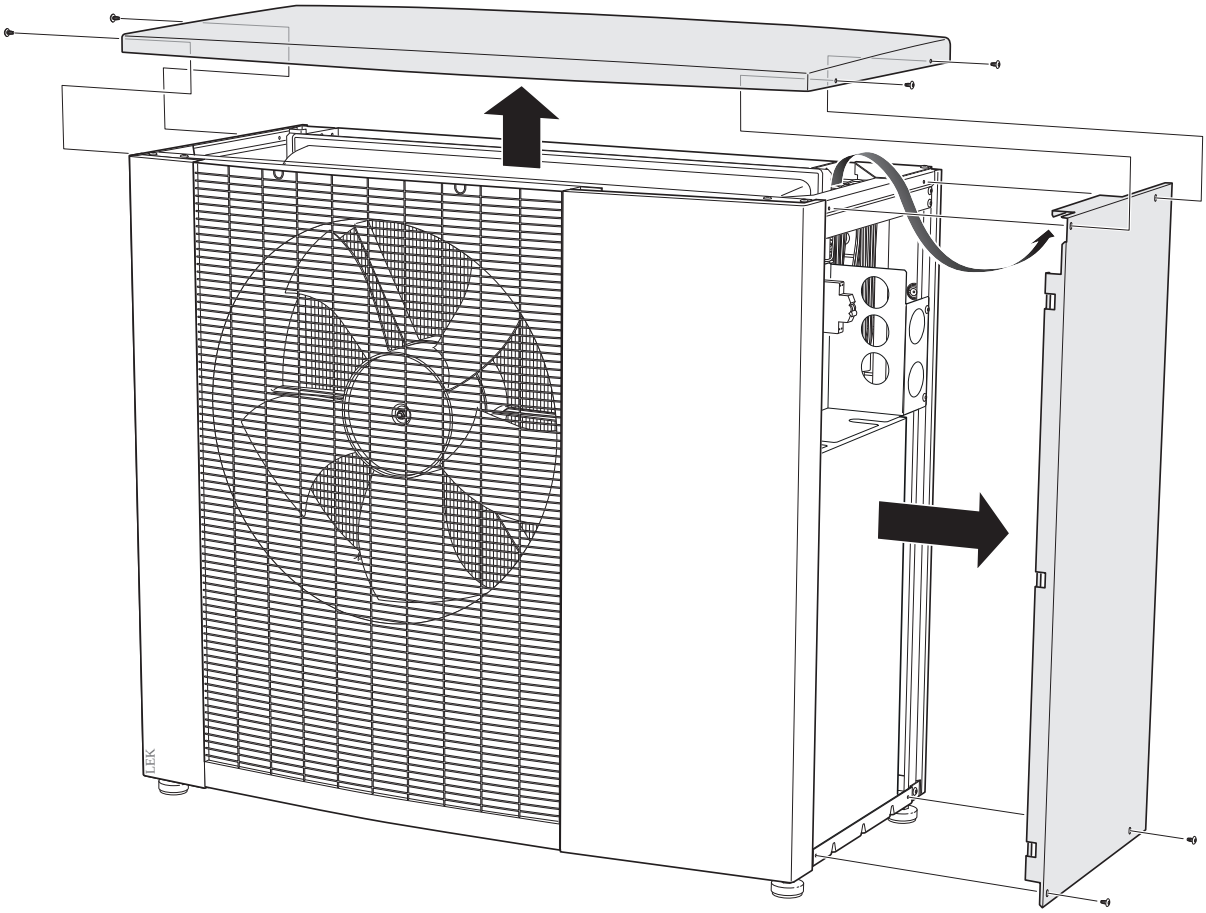
2 x flexible pipes (DN25, G1 1/4") with 4 x gaskets.



Filterball (G1 1/4").

Removing the side panel and top panel

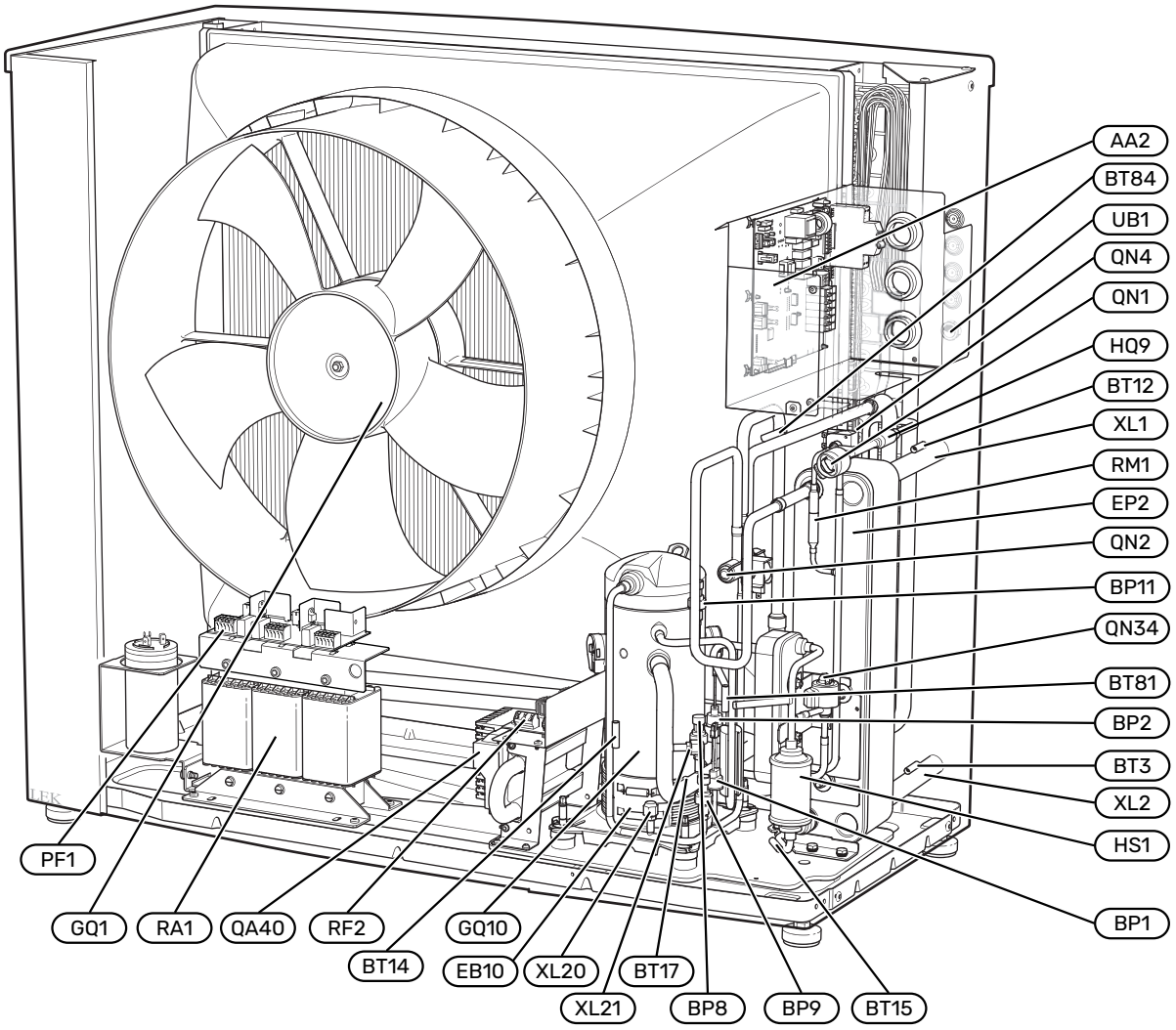
Unscrew the screws and lift off the top panel.

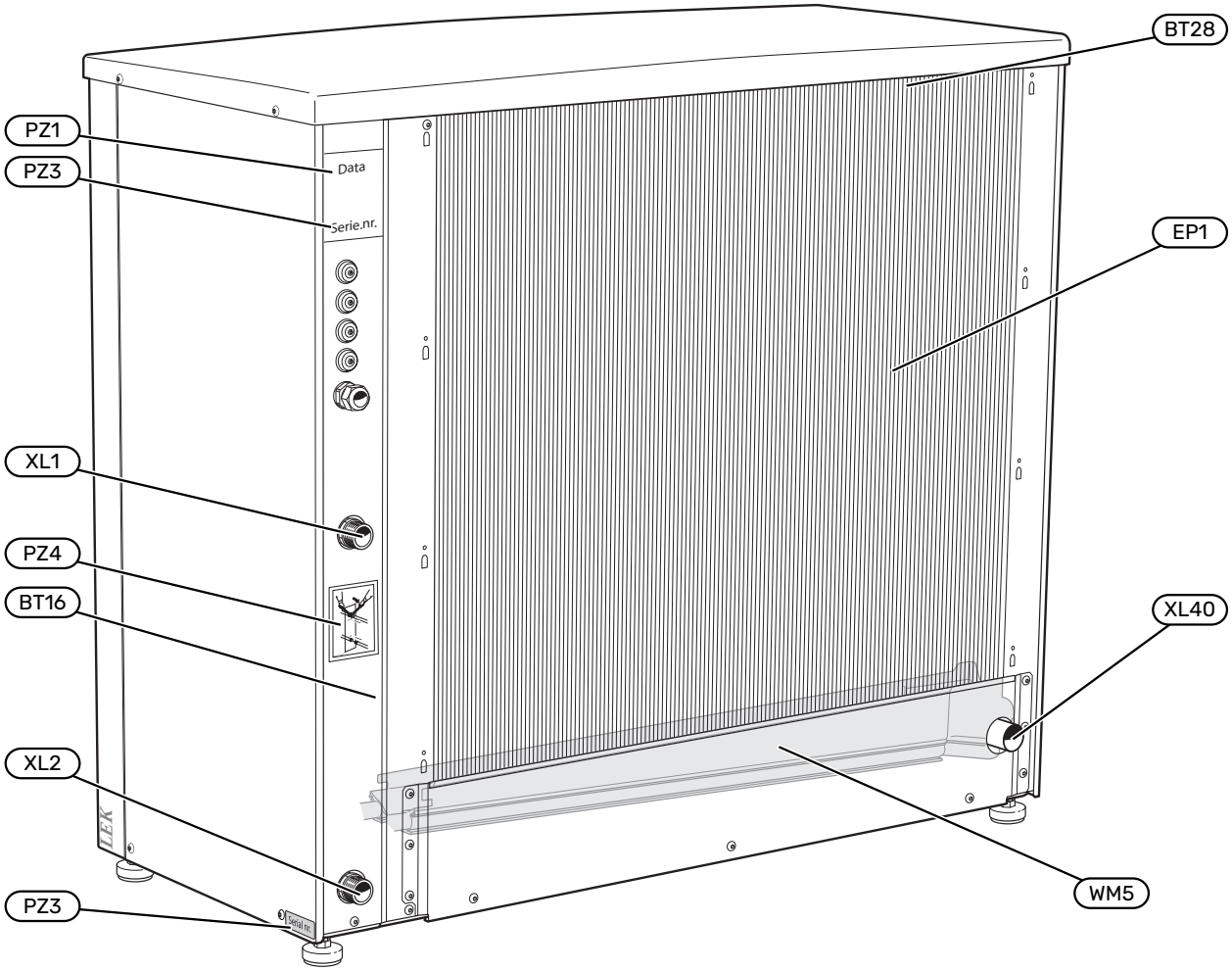


The heat pump design

General

F2120 (3x400V)




BT28
PZ1
PZ3
Data
Serie.nr.
EP1
XL1
PZ4
BT16
XL40
XL2
WM5
PZ3

Pipe connections

XL1	Heating medium connection, supply (from F2120)
XL2	Heating medium connection, return (to F2120)
XL20	Service connection, high pressure
XL21	Service connection, low pressure
XL40	Connection, drain condensation water trough

HVAC components

WM5	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
BT84	Temperature sensor, suction gas evaporator

Electrical components

AA2	Base card
EB10	Compressor heater
GQ1	Fan
PF1	Signal lamp (LED 201)
QA40	Inverter
RA1	Harmonic filter (3x400V)
RF2	EMC filter (3x400V)

Cooling components

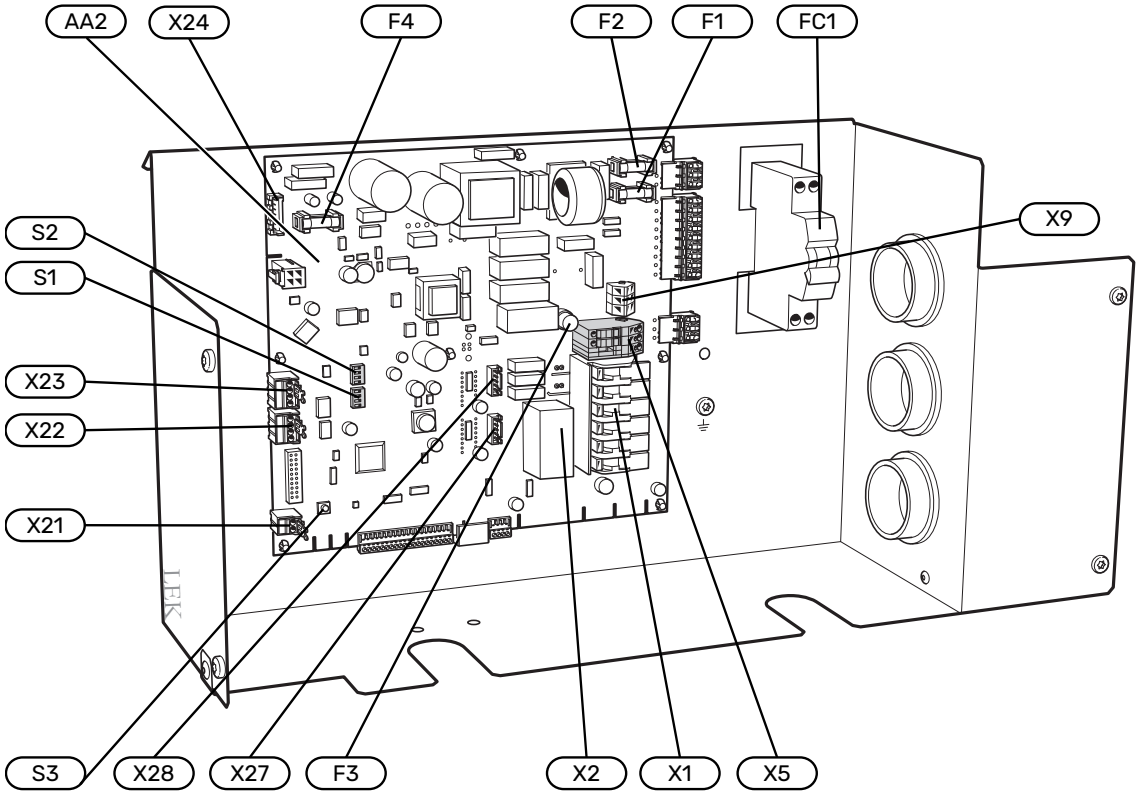
EP1	Evaporator
EP2	Condenser
GQ10	Compressor
HQ9	Particle filter
HS1	Drying filter
QN1	Expansion valve
QN2	4-way valve
QN4	Bypass valve
QN34	Expansion valve, subcooling
RM1	Non-return valve

Miscellaneous

PZ1	Type plate
PZ3	Serial number
PZ4	Sign, pipe connections
UB1	Cable gland, incoming supply

Designations according to standard EN 81346-2.

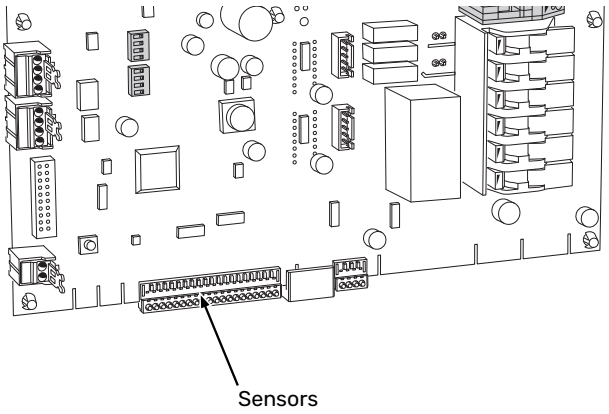
Distribution box

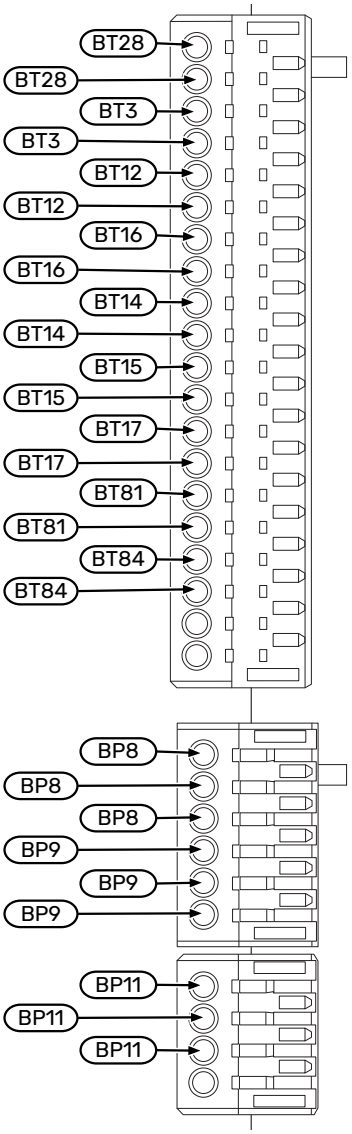


Electrical components

AA2	Base card	
	X1	Terminal block, incoming supply
	X2	Terminal block, compressor supply
	X5	Terminal block, external control voltage
	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
F1	Fuse, operating 230V~, 4A	
F2	Fuse, operating 230V~, 4A	
F3	Fuse for external heating cable, KVR, 250mA	
F4	Fuse, fan, 4A	
FC1	Miniature circuit-breaker (Replaced with automatic protection (FB1) when installing accessory KVR 11.)	
RF2	EMC filter for inverter	
S1	DIP switch, addressing heat pump during multi operation	
S2	DIP switch, different options	
S3	Reset button	

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

Pipe connections

General

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

The pipe dimension should not be less than the recommended pipe diameter according to the table. However, each system must be dimensioned individually to manage the recommended system flows.

MINIMUM SYSTEM FLOWS

The installation must be dimensioned to manage at least the minimum defrosting flow at 100% pump operation, see table.

Air/water heat pump	Minimum flow during defrosting (100% pump speed (l/s)	Minimum recommended pipe dimension (DN)	Minimum recommended pipe dimension (mm)
F2120-16 (3x400V)	0.38	25	28
F2120-20 (3x400V)	0.48	32	35

> **NOTE**
>
> An undersized system can result in damage to the product and lead to malfunctions.

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 shut-off valves on the heating medium side, rather 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 your F2120, an available water volume is required to prevent short operating times and to enable defrosting. For the optimum operation of F2120, a minimum available water volume of 10 litres multiplied by the size number is recommended. E.g. F2120-12: 10 litres x 12 = 120 litres. This applies individually to heating and cooling systems.

> **NOTE**
>
> The pipe installation must be flushed out before the heat pump is connected so debris cannot damage component parts.

Symbol key

Symbol	Meaning
	Shut-off valve
	Tapping valve
	Non-return valve
	Circulation pump
	Expansion vessel
	Filterball
	Pressure gauge
	Safety valve
	Trim valve
	Reversing valve/shunt
	Control module
	Air/water heat pump
	Radiator system
	Domestic hot water
	Water heater

Pipe coupling heating medium circuit

CONNECTING THE CLIMATE SYSTEM

Install as follows:

- expansion vessel
- pressure gauge
- safety valves
- drain valve

  For draining the heat pump during prolonged power failures.
- non-return valve

  Installations with only one heat pump: a non-return valve is only required in those cases where the placement of the products in relation to each other can cause self-circulation.

  Cascade installations: each heat pump must be fitted with a non-return valve.

- charge pump
- shut-off valve

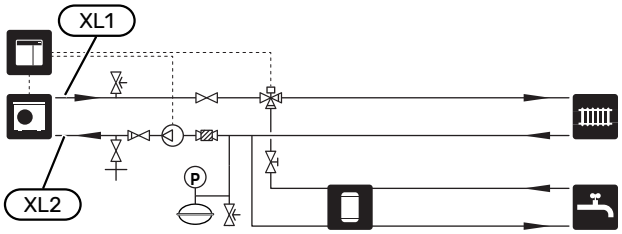
  To facilitate any future servicing.
- enclosed filterball (QZ2)

  Installed before connection "heating medium return" (XL2) (the lower connection) on the vacuum pump.
- reversing valve.

  When connecting to the control module, and if the system is to be able to work with both the climate system and the hot water heater.
- trim valve

  When connecting to control module and hot water heater.

Vent the heat pump by the "heating medium supply" connection (XL1) using the venting nipple on the enclosed flexible hose.



The image shows connection to the control module.

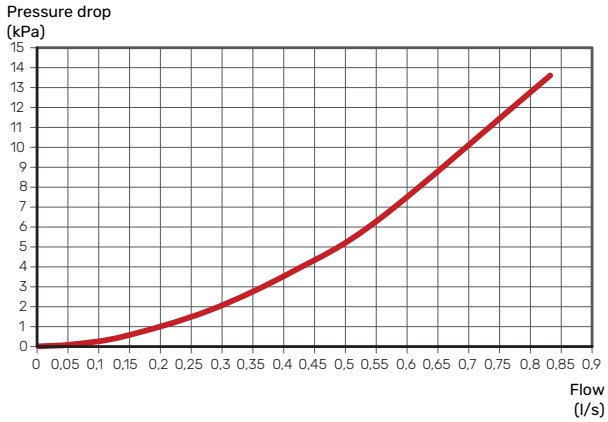
CHARGE PUMP

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

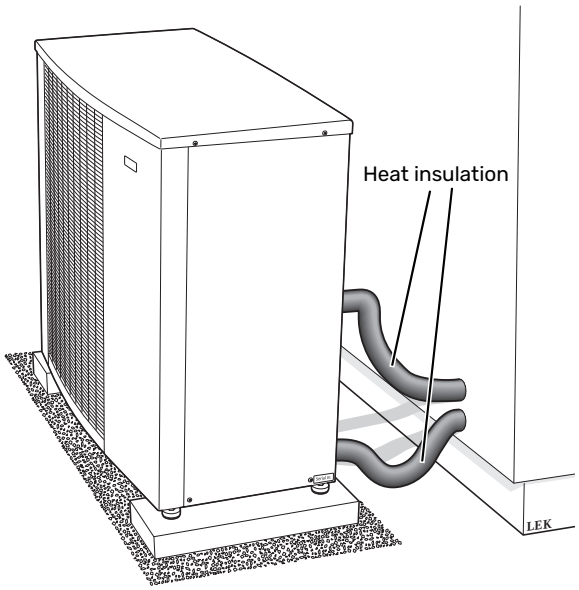
At temperatures below +2 °C the charge pump runs periodically, to prevent the water from freezing in the charge circuit. The function also protects against excess temperatures in the charge circuit.

PRESSURE DROP, CONDENSER

F2120

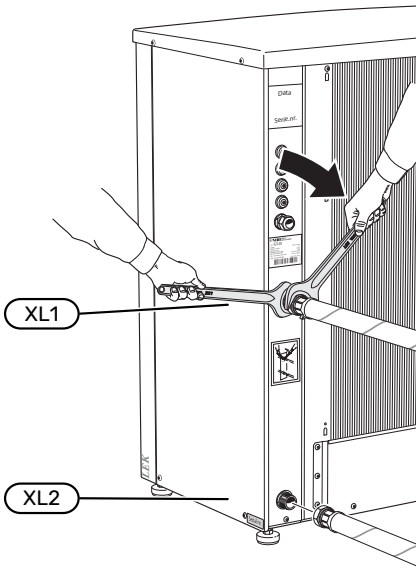


PIPE INSULATION



All outdoor pipes must be insulated with at least 19 mm thick pipe insulation.

INSTALLING FLEX HOSES



Electrical connections

General

- Electrical installation and wiring must be carried out in accordance with national provisions.
- Disconnect F2120 before insulation testing the house wiring.
- If a miniature circuit breaker is used, this must have at least triggering characteristic "C". See section "Technical specifications" for fuse size.
- If the building is equipped with an earth-fault breaker, F2120 should be equipped with a separate one.
- F2120 must be installed via an isolator switch. The cable area has to be dimensioned based on the fuse rating used.

  The RCD should have a nominal tripping current of no more than 30 mA. The incoming supply must be 400V 3N~ 50Hz via an electrical distribution unit with fuses.
- 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 screened cable with three conductors.
- 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 any servicing must be carried out under the supervision of a qualified electrician. Disconnect the current using the circuit breaker before carrying out any servicing.

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

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

> **NOTE**
>
> If the supply cable is damaged, only NIBE, its service representative or similar authorised person may replace it to prevent any danger and damage.

> **NOTE**
>
> Do not start the system before filling up with water. Components in the system could be damaged.

> **NOTE**
>
> To prevent interference, sensor cables to external connections must not be laid close to high voltage cables.

Accessibility, electrical connection

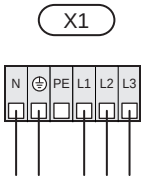
See section "Removing the side panel and top panel".

Connections

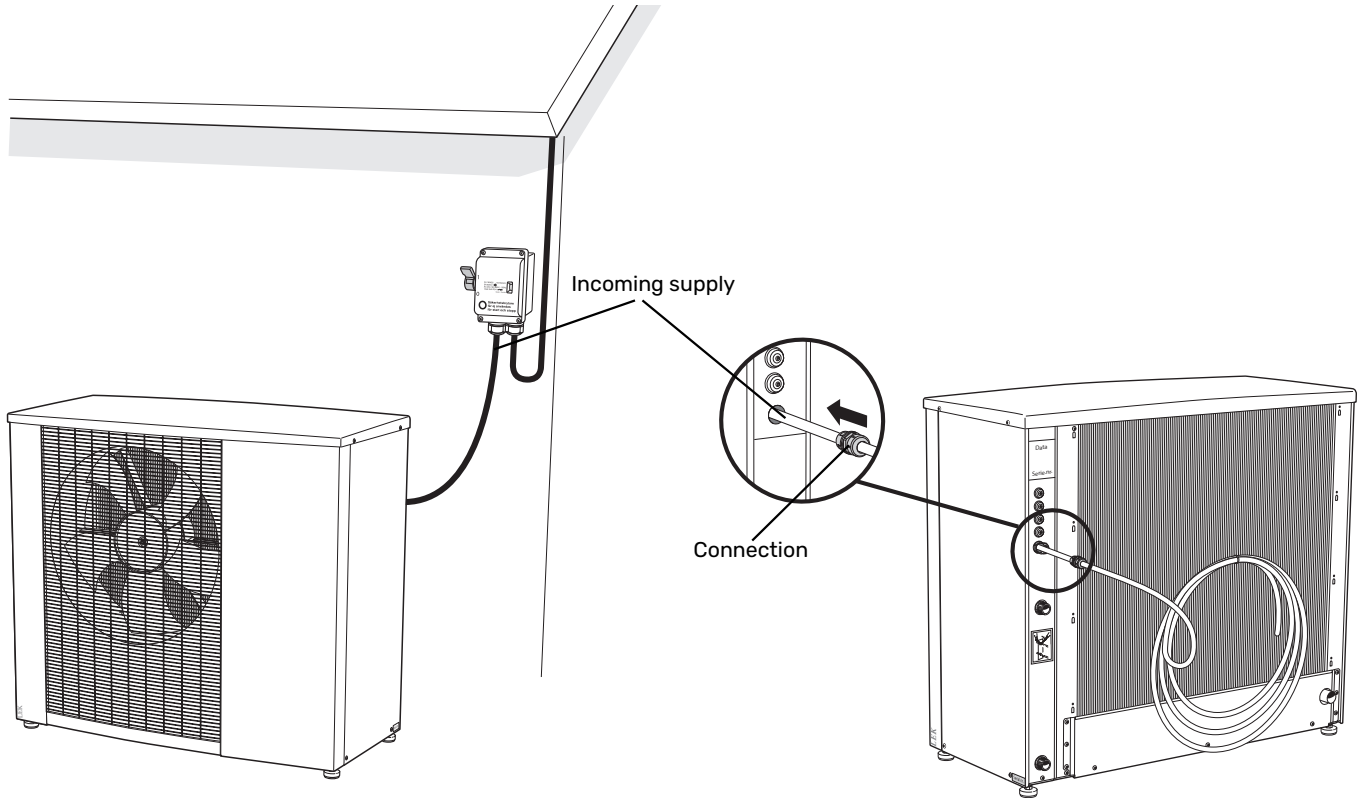
POWER CONNECTION

The enclosed cable (length 1.8 m) for incoming electricity is connected to terminal block X1. Outside the heat pump there is approx. 1.8 m of cable available.

Connection 3 x 400 V



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.

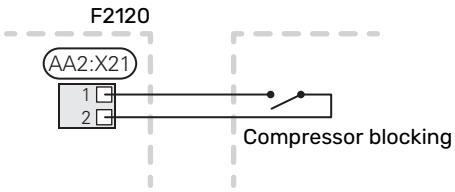


TARIFF CONTROL

> **NOTE**
> All supply circuits must be disconnected, because the compressor and the control system may have separate power supplies.

If the control is to be powered separately from other components in the heat pump (e.g. for tariff connection), a separate operating cable must be connected to terminal block (X5).

If external control voltage is used during tariff control, a closing contact must be connected to connection X21:1 and X21:2 (compressor blocking) to prevent an alarm. Compressor blocking must be performed either on the indoor module/control module or on the air/water heat pump, not on both simultaneously.

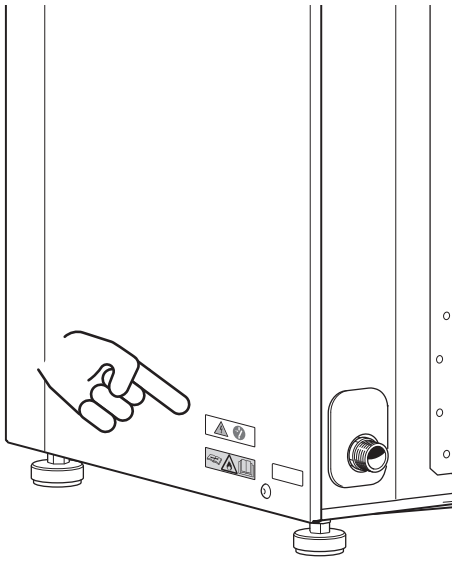


Placement of labels

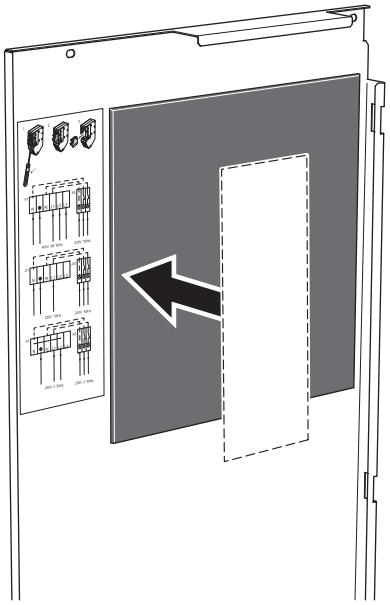
> **Caution**
> These labels should only be placed on the heat pump in those cases where the heat pump has a tariff connection with an external supply voltage.

Two labels should be placed on F2120. The labels are enclosed with the manuals.

The small label is placed on the outside of the side panel.



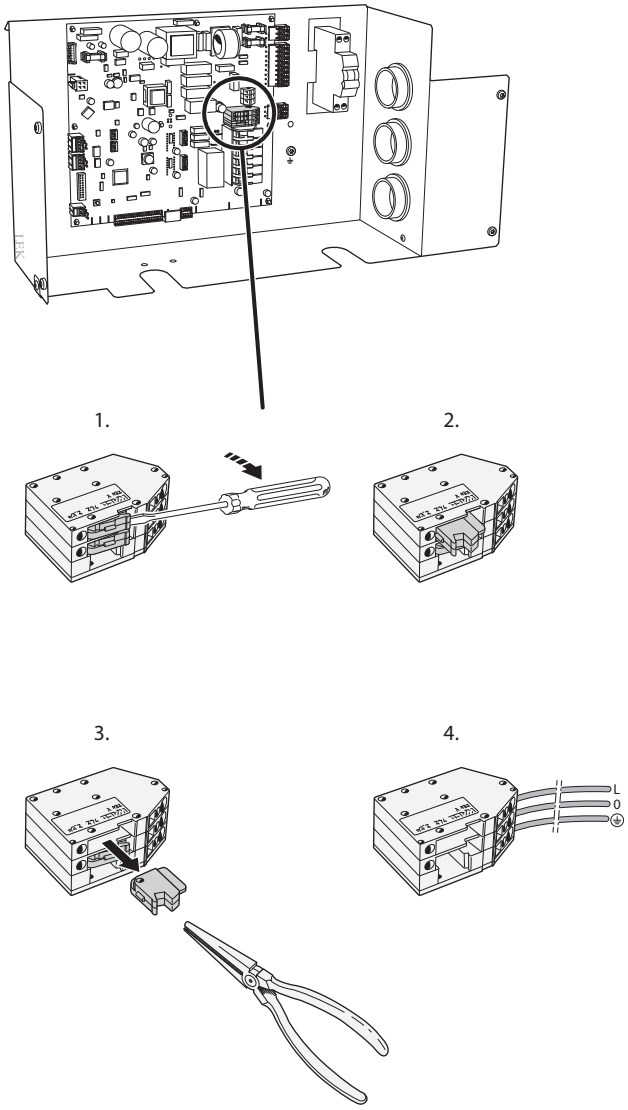
The large label is placed on the inside of the side panel, next to the insulation. See section "Removing the side panel and top panel".



CONNECTING EXTERNAL CONTROL VOLTAGE

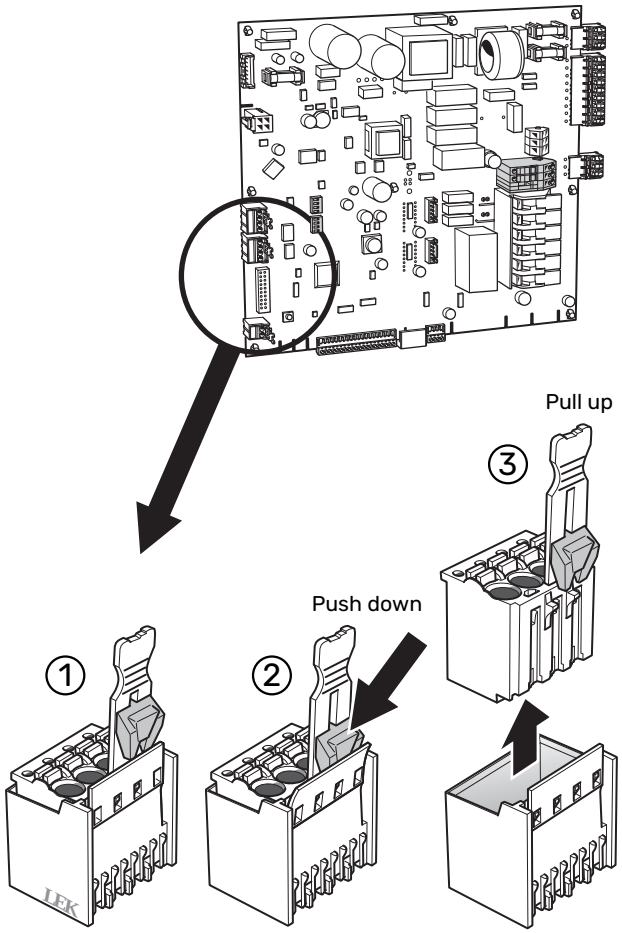
> **NOTE**
> Mark up any junction boxes with warnings for external voltage.

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

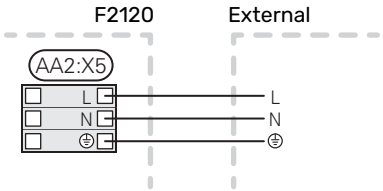


Disconnect the connections in F2120

When connecting communication to an indoor module/control module, you need to disconnect the connectors in F2120.



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



COMMUNICATION

Software version

In order for F2120 to be able to communicate with indoor module (VVM) / control module (SMO) the software version must be according to the table.

Indoor module / Control module	Software version
VVM 310 / VVM 500	v7568R4
VVM 320	v7530R5
SMO 20	v7607R3
SMO 40	v7635R5
VVM 225	v8212R3
VVM S320	All versions

Connection to indoor module/control module

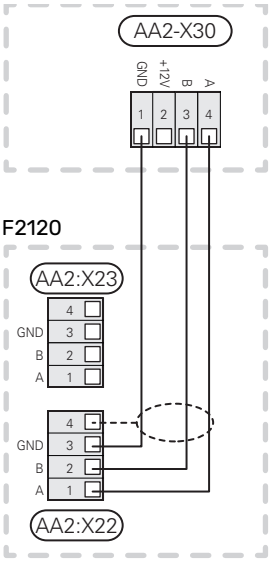
F2120 communicates with NIBE indoor modules/control modules via a screened three-core cable (max area 0.75 mm²) to terminal block X22:1–4.

For connection in the indoor module/control module:

See the Installer Manual for the indoor module/control module.

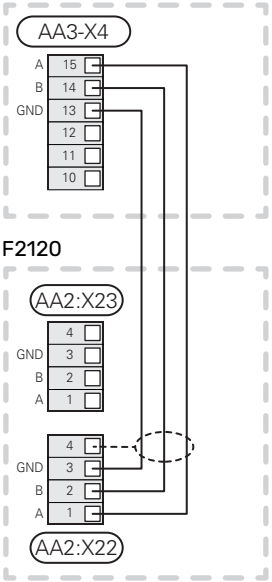
VVM S

Indoor module



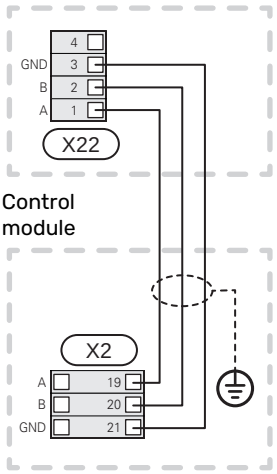
VVM

Indoor module



SMO 20

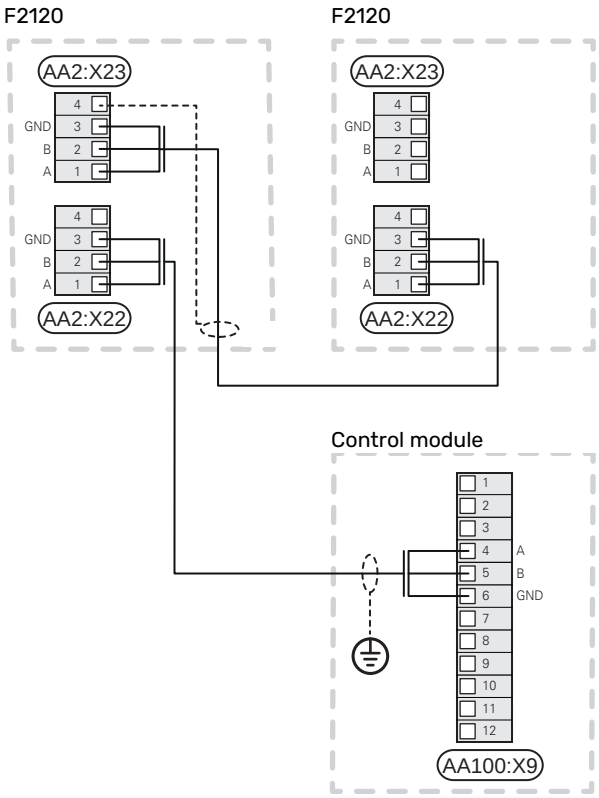
F2120



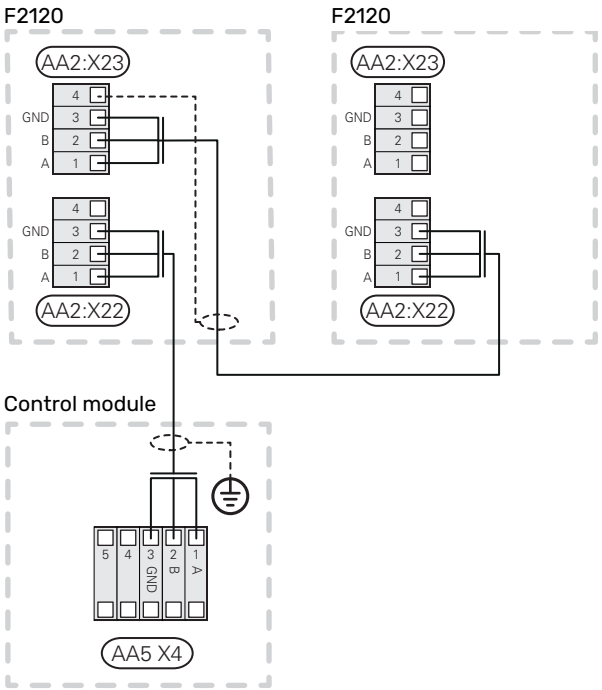
Cascade connection

For cascade connection, connect terminal block X23 with the next heat pump's terminal block X22.

SMO S40



SMO 40



COOLING

F2120 can supply cooling with cooling supply down to +7°C.

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

CONFIGURATION USING DIP SWITCH

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

> **NOTE**
>
> Only change the DIP switches position when the product is not powered.

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.

CONNECTING ACCESSORIES

Instructions for connecting accessories can be found in the installation instructions provided for the respective accessory. See section "Accessories" for a list of the accessories that can be used with F2120.

Commissioning and adjusting

Preparations

Caution
Check the miniature circuit-breaker (FC1). It could have tripped during transport.

NOTE
Do not start F2120 if there is a risk that the water in the system has frozen.

COMPRESSOR HEATER

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

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.

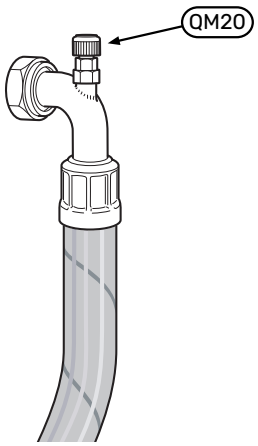
NOTE
The compressor heater must have been active for approx. 3 hours before the first start, see section “Start-up and inspection”.

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.

Filling and venting

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 must be connected.
2. If cooling operation with F2120 is wanted, DIP switch S1 position 4 must be changed according to the description in section "Cooling".
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 the instructions in section "Preparations".
8. Adjust the charge flow according to size. Also see section “Adjustment, charge flow”.
9. Adjust menu settings via the indoor module/control module as necessary.
10. Fill in "Inspection of the installation", in section "Important information".
11. Remove the protective film from the cover on F2120.

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

Post adjustment and venting

Air is initially released from the hot water and venting may be necessary. If bubbling sounds can be heard from the heat pump, the charge pump or radiators, the entire system requires further venting. When the system has stabilised (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

Control

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.

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 a status LED for easy control and troubleshooting.

LED	State	Explanation
PWR (green)	Not lit	Base board without power
	Continuous light	Base board power on
CPU (green)	Not lit	CPU without power
	Flashes	CPU running
	Continuous light	CPU not running correctly
EXT COM (green)	Not lit	No communication with indoor module/control module
	Flashes	Communication with indoor module/control module
INT COM (green)	Not lit	No communication with inverter
	Flashes	Communication with inverter
DEFROST (green)	Not lit	Neither defrosting nor protection is active
	Flashes	Some protection is active
	Continuous light	Defrosting in progress
ERROR (red)	Not lit	No errors
	Flashes	Info alarm (temporary), active
	Continuous light	Continuous alarm, active
K1, K2, K3, K4, K5	Not lit	Relay in de-energised position
	Continuous light	Relay activated
N-RELAY		No function
COMPR. ON		No function
PWR-INV (green)	Not lit	Inverter without power
	Continuous light	Inverter has power

HARMONIC FILTER (RA1)

Harmonic filter (RA1) has a status LED for easy control and troubleshooting.

When the capacitor is in operation, LED 201 is lit with a steady light.

LED	State	Explanation
LED 201 (red)	Not lit	Capacitor disconnected
	Continuous light	Capacitor connected

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

Control conditions

CONTROL CONDITIONS DEFROSTING

- If the temperature of the evaporator sensor (BT16) is below the start temperature for the defrosting function, F2120 counts the time to "active defrosting" for each minute that the compressor is running, to create a defrosting requirement.
- Time until "active defrosting" is shown in minutes on the indoor module / control module. Defrosting starts when this value is 0 minutes.
- "Passive defrosting" is started, if the compressor requirement has been fulfilled, at the same time as there is a defrosting requirement and the outdoor temperature (BT28)is greater than 4 °C.
- Defrosting occurs actively (with compressor on and fan off) or passively (with compressor off and fan on).
- If the evaporator is too cold, a "safety defrost" starts. This defrosting can start earlier than the normal defrosting. If the safety defrosting occurs ten times in a row, the evaporator (EP1) on F2120 must be checked, which is indicated by an alarm.
- If "de-icing fan" is activated in the indoor module/control module, "de-icing fan" starts at the next "active defrosting". "De-icing fan" removes the build-up of ice on the fan blades and the front fan grille.

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 is locked and the high return temperature alarm is blocked for two minutes after defrosting.

Passive defrosting:

1. If there is no compressor demand, passive defrosting can start.
2. The four-way valve does not shift.
3. Fan runs at high speed.
4. If there is a compressor demand, passive defrosting stops and the compressor starts.
5. When passive defrosting is complete, the fan stops.
6. The ambient temperature is locked and the high return temperature alarm is blocked for two minutes after defrosting.

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

- If the temperature of the evaporator sensor has reached its stop value (normal stop).
- 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).
- When the temperature on the return line sensor, BT3, falls below 10 °C.
- If the temperature of the evaporator (BP8) falls below its lowest permitted value. After failing to defrost ten times, F2120 must be checked. This is indicated by an alarm.

Control - Heat pump EB101

S-SERIES – VVM S / SMO S

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

Menu 7.3.2 - Installed heat pump

Here, you make specific settings for the installed heat pump.

Silent mode permitted
Setting range: on/off

Max. frequency 1
Setting range: 25 – 120 Hz

Max. frequency 2
Setting range: 25 – 120 Hz

blockFreq 1
Setting range: on/off

From frequency
Setting range: 25 – 117 Hz

To frequency
Setting range: 28 – 120 Hz

blockFreq 2
Setting range: on/off

From frequency
Setting range: 25 – 117 Hz

To frequency
Setting range: 28 – 120 Hz

Defrosting

Start manual defrosting
Setting range: on/off

Start temperature for defrost function
Setting range: -3 – 3 °C

Cut-out value activation passive defrosting
Setting range: 2 – 10 °C

Defrost more often
Alternatives: Yes / No

Silent mode permitted: Here, you set whether silent mode is to be activated for the heat pump. Please note that you now have the option to schedule when silent mode will be active.

The function should only be used for limited periods, because F2120 possibly may not reach its dimensioned output.

Current limitation: Here, you set whether the current limitation function will be activated for the heat pump, if you have F2120 230V~50Hz. During active function, you can limit the value of the maximum current.

BlockFreq 1: Here, you can select a frequency range within which the heat pump is not permitted to work. This function can be used if certain compressor speeds cause noise disturbance in the house.

BlockFreq 2: Here, you can select a frequency range within which the heat pump is not permitted to work.

Defrosting: Here, you can change the settings that affect the defrost function.

Start manual defrosting: Here, you can start "active defrosting" manually, if the function needs to be tested for servicing or if necessary. This can also be used to accelerate the start of "fan de-icing".

Start temperature for defrost function: Here, you set the temperature (BT16) at which the defrost function will start. The value must only be changed in consultation with the installer.

Cut-out value activation passive defrosting: Here, you set the temperature (BT28) at which "passive defrosting" will 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 the installer.

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

Menu 4.11.3 - Fan de-icing

Fan de-icing
Setting range: off/on

Continuous fan de-icing
Setting range: off/on

Fan de-icing: Here, you set whether the "fan de-icing" function will be activated during the next "active defrosting". This can be activated if ice/snow sticks to the fan, grille or fan cone, which may be noticed due to abnormal fan noise from F2120.

"Fan de-icing" means that the fan, grille and fan cone are heated using hot air from the evaporator (EP1).

Continuous fan de-icing: There is the option to set recurring de-icing. In this case, every tenth defrosting will be "Fan de-icing". (This can increase annual energy consumption.)

F-SERIES – VVM / SMO

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

Menu 5.11.1.1 - heat pump

Here, you make specific settings for the installed heat pump.

Silent mode permitted
Setting range: yes / no

Current limit
Setting range: 6 – 32 A

Factory setting: 32 A

blockFreq 1
Setting range: yes / no

blockFreq 2
Setting range: yes / no

Defrosting

Start manual defrosting
Setting range: on/off

Start temperature for defrost function
Setting range: -3 – 3 °C

Factory setting: -3 °C

Cut-out value activation passive defrosting
Setting range: 2 – 10 °C

Factory setting: 4 °C

Defrost more often
Setting range: Yes / No

Silent mode permitted: Here, you set whether silent mode is to be activated for the heat pump. Please note that you now have the option to schedule when silent mode will be active.

The function should only be used for limited periods, because F2120 possibly may not reach its dimensioned output.

Current limitation: Here, you set whether the current limitation function will be activated for the heat pump, if you have F2120 230V~50Hz. During active function, you can limit the value of the maximum current.

BlockFreq 1: Here, you can select a frequency range within which the heat pump is not permitted to work. This function can be used if certain compressor speeds cause noise disturbance in the house.

BlockFreq 2: Here, you can select a frequency range within which the heat pump is not permitted to work.

Defrosting: Here, you can change the settings that affect the defrost function.

Start manual defrosting: Here, you can manually start an "active defrosting", if the function needs to be tested for servicing or if necessary. This can be justified together with "fan de-icing".

Start temperature for defrost function: Here, you set the temperature (BT16) at which the defrost function will start. The value must only be changed in consultation with the installer.

Cut-out value activation passive defrosting: Here, you set the temperature (BT28) at which "passive defrosting" will 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 the installer.

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

Menu 4.9.7 - tools

Fan de-icing
Setting range: off/on

Continuous fan de-icing
Setting range: off/on

Fan de-icing: Here, you set whether the "fan de-icing" function will be activated during the next "active defrosting". This can be activated if ice/snow sticks to the fan, grille or fan cone, which may be noticed due to abnormal fan noise from F2120.

"Fan de-icing" means that the fan, grille and fan cone are heated using hot air from the evaporator (EP1).

Continuous fan de-icing: There is the option to set recurring de-icing. In this case, every tenth defrosting will be "Fan de-icing". (This can increase annual energy consumption.)

Service

Temperature sensor data

Temperature (°C)	Resistance (kOhm)	Voltage (VDC)
-10	56.20	3.047
0	33.02	2.889
10	20.02	2.673
20	12.51	2.399
30	8.045	2.083
40	5.306	1.752
50	3.583	1.426
60	2.467	1.136
70	1.739	0.891
80	1.246	0.691

Disturbances in comfort

In most cases, the indoor module/control module notes a malfunction (a malfunction can lead to disturbance in comfort) and indicates this with alarms and action instructions in the display.

Troubleshooting

> **NOTE**
> In the event of action to rectify malfunctions that require work within screwed hatches, the incoming supply electricity must be isolated at the safety switch by or under the supervision of a qualified electrician.

If the operational interference is not shown in the display the following tips can be used:

BASIC ACTIONS

Start by checking the following:

- All supply cables to the heat pump are connected.
- Group and main fuses of the accommodation.
- The property's earth circuit breaker.
- The heat pump's fuse / automatic protection. (FC1 / FB1, FB1 only if KVR is installed.)
- The indoor module's/control module's fuses.
- The indoor module's/control module's temperature limiters.
- That the air flow to F2120 is not blocked by foreign objects.
- That F2120 does not have any external damage.

F2120 DOES NOT START

- There is no demand.
  - The indoor module/control module does not call on heating, cooling or hot water.
- Compressor blocked due to the temperature conditions.
  - Wait until the temperature is within the product's working range.
- Minimum time between compressor starts has not been reached.
  - Wait for at least 30 minutes and then check if the compressor has started.
- Alarm tripped.
  - Follow the display instructions.

F2120 NOT COMMUNICATING

- Check that F2120 is correctly installed in the indoor module (VVM) or the control module (SMO).
- Check that the communication cable is correctly connected and working.

LOW HOT WATER TEMPERATURE OR A LACK OF HOT WATER

> **Caution**
> The hot water is always set on the indoor module (VVM) or the control module (SMO).

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 hot water settings in indoor module or control module.
  - See the Installer Manual for the indoor module/control module.
- Clogged particle filter.
  - Switch off the system. 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.
- Incorrect settings in indoor module or control module.
  - See the Installer Manual for the indoor module/control module.
- Air-filled radiators/underfloor heating coils.
  - Bleed the system.

HIGH ROOM TEMPERATURE

- Incorrect settings in indoor module or control module.
  - See the Installer Manual for the indoor module/control module.

ICE BUILD-UP IN THE FAN, GRILLE AND/OR FAN CONE ON F2120

- Activate "fan de-icing" in the indoor module/control module. Alternatively "continuous fan de-icing" if the problem recurs.
- Check that the air flow across the evaporator is correct.

LARGE AMOUNT OF WATER BELOW F2120

- The accessory KVR 11 is required.
- If KVR 11 is installed, check that the water drainage flows freely.

Alarm list

Alarms VVM/SMO (F2120)	Alarms S-series	Alarm text on the display	Description existing alarm	May be due to
156 (80)	212	Low lp cooling	5 repeated alarms for low low-pressure within 4 hours.	Poor flow. Significant wind effect.
224 (182)	233	Fan alarm from heat pump	5 unsuccessful start attempt.	Fan blocked or not connected.
225 (8)	234	Exchange Sensors flow / return	Return is hotter than flow.	Connection, supply line return line switched around,
227 (34) 227 (36) 227 (38) 227 (40) 227 (42) 227 (44) 227 (46) 227 (48) 227 (50) 227 (52) 227 (54) 227 (56)	235	Sensor fault from heat pump	Sensor fault BT3. Sensor fault BT12. Sensor fault BT14. Sensor fault BT15. Sensor fault BT16. Sensor fault BT17. Sensor fault BT28. Sensor fault BT81. Sensor fault BP8. Sensor fault BP9. Sensor fault BP11. Sensor fault BT84.	Open-circuit or short-circuit on sensor input.
228 (2)	236	Unsuccessful defrosting	10 failed consecutive defrostings.	System temperature and/or flow too low. Insufficient available system volume. Significant wind effect.
229 (4)	237	Short run times for compressor	Operation is stopped from the indoor section after less than 5 minutes.	Poor flow, poor heat transfer. Incorrect settings for heating and/or hot water.
230 (78)	238	Hot gas alarm	3 repeated alarms for high discharge within 4 hours.	Disruption in the refrigerant circuit. Lack of refrigerant.
232 (76)	240	Low evaporation temp	5 repeated alarms for low evaporation temperature within 4 hours.	Lack of refrigerant. Blocked expansion valve. Significant wind effect.
264 (204)	254	Communication fault to Inverter	Alarm 203 from the air/water heat pump for 20 seconds.	Poor connection between PCB and inverter. Inverter unpowered or broken.
341 (6)	291	Recurring safety defr.	10 repeated defrostings according to the protection conditions.	Poor airflow, e.g. because of leaves, snow or ice. Lack of refrigerant.
344 (72)	294	Recurring low pressure	5 repeated low pressure alarm within 4 hours.	Lack of refrigerant. Blocked expansion valve. Disruption in the refrigerant circuit.
346 (74)	295	Recurring high pressure	5 repeated high pressure alarm within 4 hours.	Clogged particle filter, air or stoppage in the heating medium flow. Poor system pressure.
400 (207) 400 (209) 400 (211) 400 (213)	314	Unspecified faults	Initiation fault, inverter. The inverter is not compatible Configuration file missing. Charge error configuration.	The inverter is not compatible
421 (104)	319	Comm. fault to inverter	3 repeated communication faults within 2 hours or continuously for 1 hours.	Communication with AA2-X20 interrupted. Poor connection between PCB and inverter.

Alarms VVM/SMO (F2120)	Alarms S-series	Alarm text on the display	Description existing alarm	May be due to
425 (108)	322	Persistent pressure switch or over-temperature alarm.	2 repeated LP/HP/FQ alarms within 2.5 hours.	Poor heating medium flow. Lack of refrigerant. For FQ14, the following applies: High temperature 120 °C compressor peak.
427 (110)	323	Safety stop, inverter	Temporary fault in inverter, 2 times within 60 minutes.	Disruption in supply voltage.
429 (112)	324	Safety stop, inverter	Temporary fault in inverter, 3 times within 2 hours.	Disruption in supply voltage.
431 (114)	325	High mains voltage	Phase voltage to inverter too high, 3 times within 3 hours or persistent for 1 hour.	Disruption in supply voltage.
433 (116)	326	Low mains voltage	Phase voltage to inverter too low, 3 times within 3 hours or continuously for 1 hour.	Low supply voltage or phase loss.
435 (118)	327	Phase missing	Phase L2 has been missing 3 times within 3 hours or continuously for 1 hour.	Phase loss for phase L2.
437 (120)	328	Mains disturbance	Temporary fault in inverter, 3 times within 2 hours or continuously for 1 hour.	Disruption in supply voltage. Incorrect connection in the inverter's terminal block X1.
439 (122)	329	Overheated inverter	The inverter has temporarily reached max working temperature, due to poor cooling 3 times within 2 hours or continuously for 1 hour.	Poor cooling of inverter. Defective inverter.
441 (124)	330	Current too high	Current to inverter too high, 3 times within 2 hours or continuously for 1 hour.	Too high current to inverter. Low supply voltage.
443 (126)	331	Overheated inverter	The inverter has temporarily reached max working temperature, due to poor cooling 3 times within 2 hours or continuously for 1 hour.	Poor cooling of inverter. Defective inverter.
445 (128)	332	Inverter protection	The inverter detects a temporary fault within 10 seconds after compressor start, 5 times in a row.	Disruption in supply voltage. Defective compressor.
447 (130)	333	Phase failure	Compressor phase is missing, 3 times within 2 hours or continuously for 1 minute.	Disruption in supply voltage. Incorrectly connected compressor cable.
449 (132)	334	Failed compressor starts	Compressor does not start when required, 3 times within 2 hours.	Defective inverter. Defective compressor.
453 (136)	336	High current load, compressor	The output current from the inverter to the compressor has been temporarily too high 3 times within 2 hours or continuously for 1 hour.	Disruption in supply voltage. Poor heating medium flow. Defective compressor.
455 (138)	337	High power load, compressor	The power output from the inverter has been too high 3 times within 2 hours or continuously for 1 hour.	Disruption in supply voltage. Poor heating medium flow. Defective compressor.
501 (184)	353	Failed start, no pressure diff.	The pressure difference between BP9 and BP8 has been too low at compressor start 3 times within 30 minutes.	Fault in pressure sensor BP8, BP9. The compressor does not compress the refrigerant sufficiently. Compressor breakdown.
503 (186)	354	Compressor speed too low	Compressor speed below lowest permitted speed.	The inverter's safety function reduces the speed outside of the compressor's working range.

Accessories

Detailed information about the accessories and complete accessories list available at nibe.eu.

Not all accessories are available on all markets.

CONDENSATION WATER PIPE

Condensation water pipe, different lengths.

KVR 11-10
1 metres
Part no. 067 823

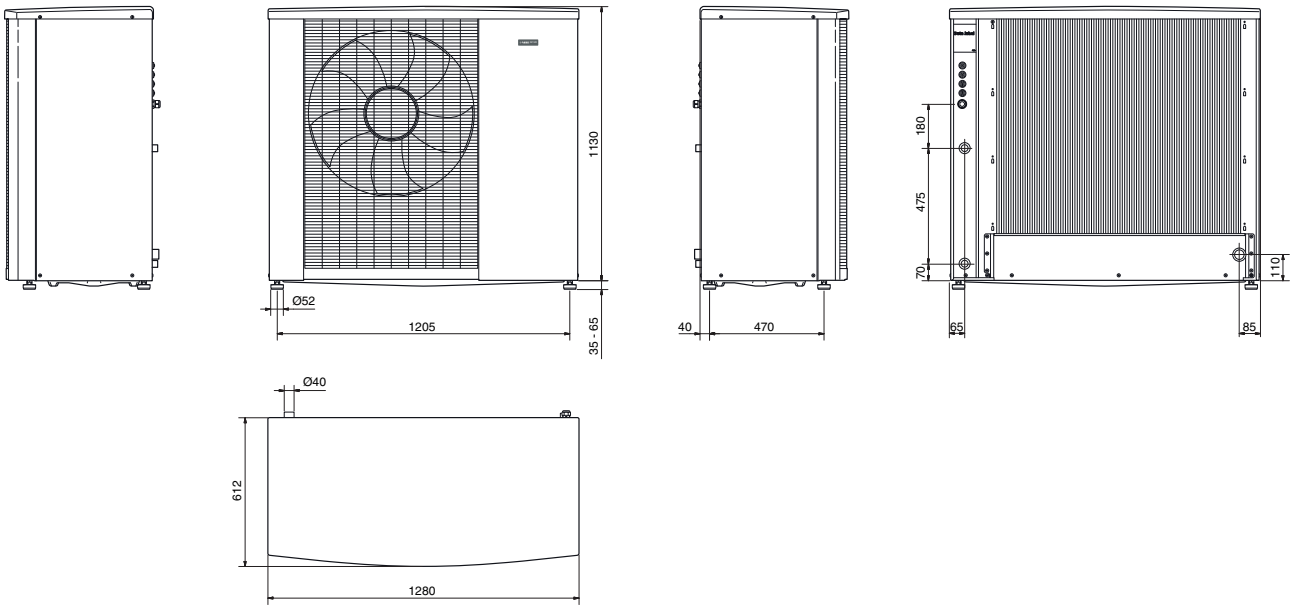
KVR 11-30
3 metres
Part no. 067 824

KVR 11-60
6 metres
Part no. 067 825

Technical data

Dimensions

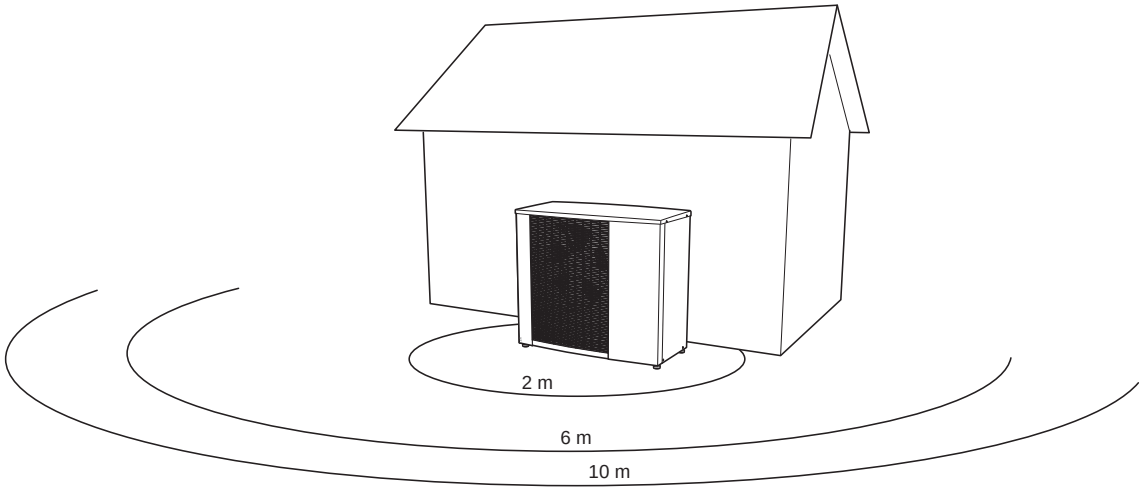
F2120



Sound 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.

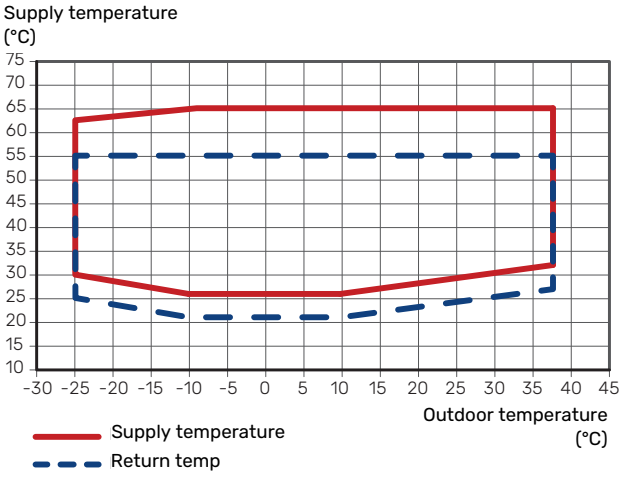


F2120		16	20
Sound power level (L_{WA}), according to EN12102 at 7 / 45 (nominal)	L_W(A)	55	55
Sound pressure level (L_{PA}) at 2 m*	dB(A)	41	41
Sound pressure level (L_{PA}) at 6 m*	dB(A)	31.5	31.5
Sound pressure level (L_{PA}) at 10 m*	dB(A)	27	27

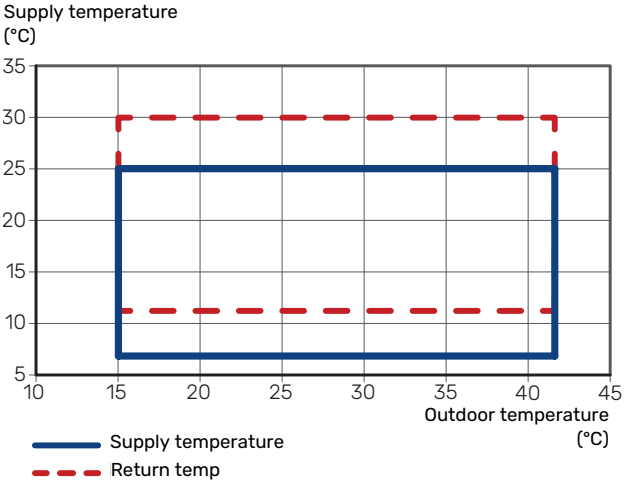
* Free space.

Technical specifications

WORKING RANGE, HEATING



WORKING RANGE, COOLING

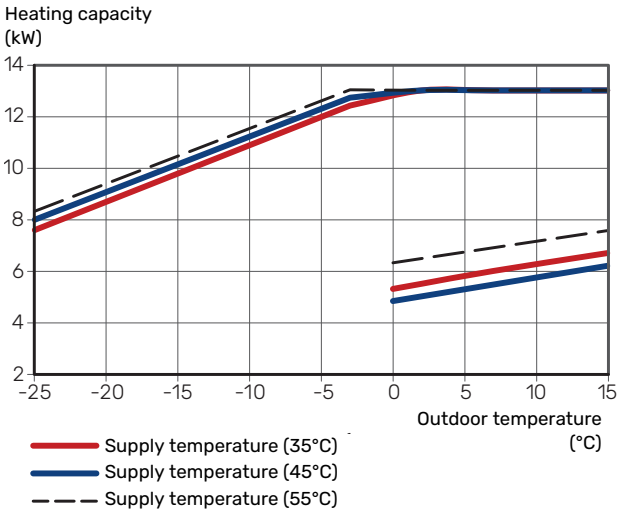


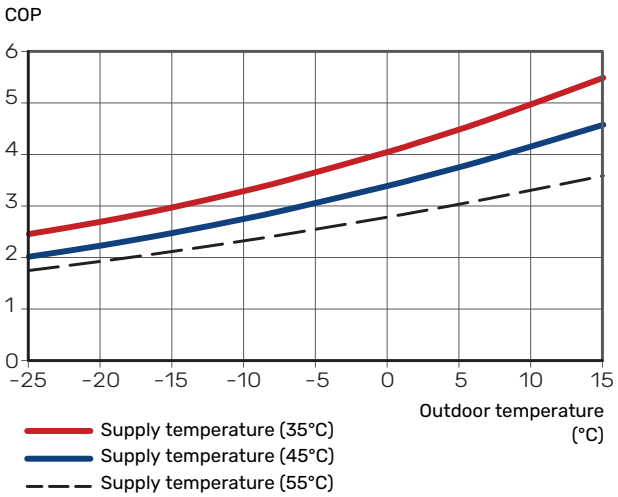
The working temperature of the heating medium is allowed to be lower for a short period, e.g. at start-up.

POWER DURING HEATING OPERATION AND COP

Maximum capacity during continuous operation. Defrosting is not included.

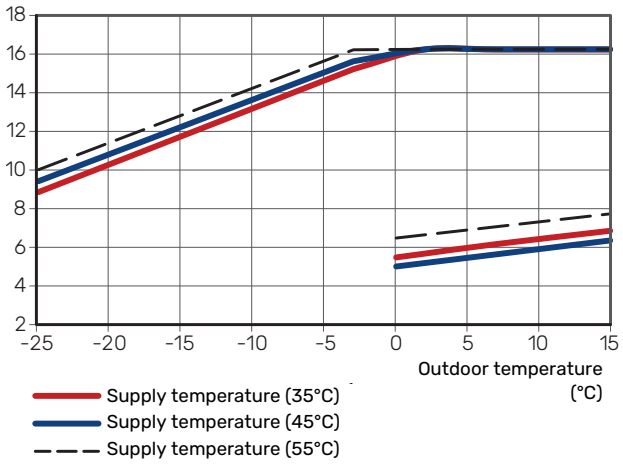
F2120-16



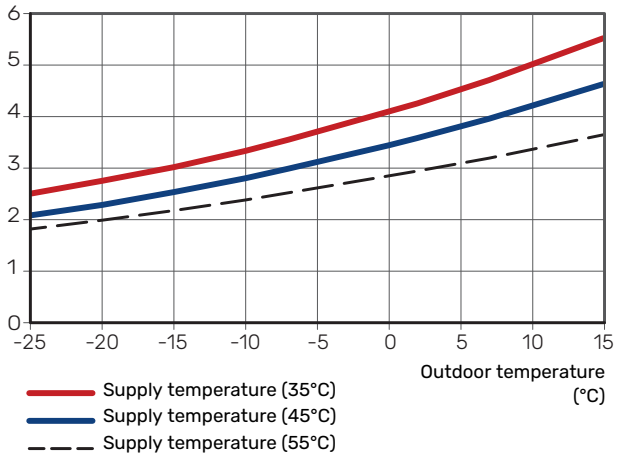


F2120-20

Heating capacity
(kW)



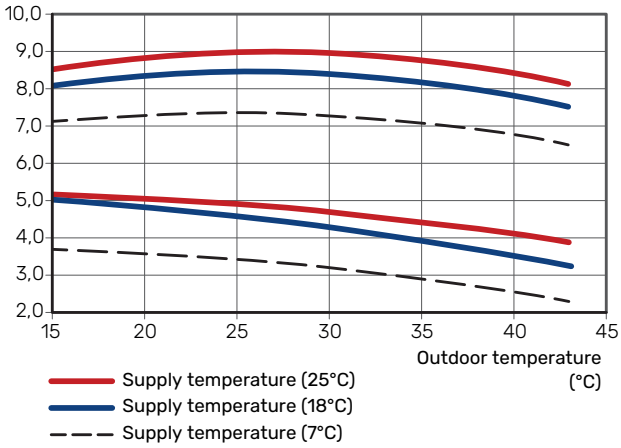
COP



POWER DURING COOLING OPERATION

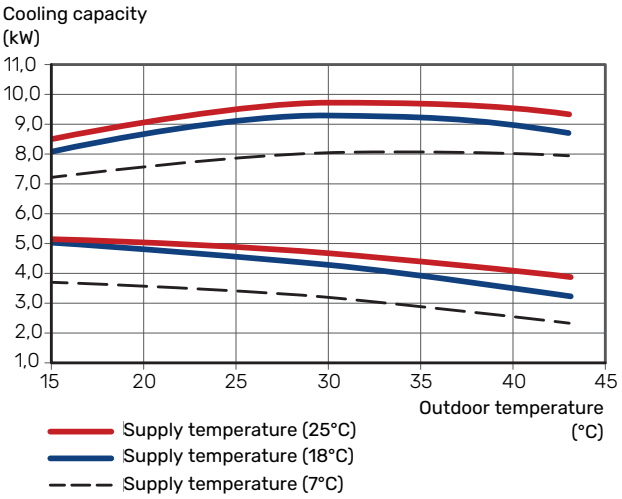
F2120-16

Cooling capacity
(kW)



F2120-20

Cooling capacity
(kW)



F2120		16	20
Voltage		**3 x 400 V**	
Output data according to EN 14 511, partial load [1]			
Heating Capacity / power input / COP (kW/kW/-) at nominal flow Outdoor temp: / Supply temp.	-7 / 35 °C	10.13 / 3.33 / 3.04	13.50 / 4.70 / 2.87
	2 / 35 °C	7.80 / 1.79 / 4.36	9.95 / 2.36 / 4.22
	2 / 45 °C	7.97 / 2.24 / 3.56	10.41 / 2.88 / 3.61
	7 / 35 °C	5.17 / 1.01 / 5.11	5.17 / 1.01 / 5.11
	7 / 45 °C	5.49 / 1.33 / 4.14	5.49 / 1.33 / 4.14
Cooling Capacity / power input / EER (kW/kW/-) at maximum flow Outdoor temp: / Supply temp.	35 / 7 °C	7.09 / 2.72 / 2.61	8.10 / 3.50 / 2.31
	35 / 18 °C	8.19 / 2.83 / 2.90	9.26 / 3.64 / 2.54
SCOP according to EN 14825			
Nominal heat output ($P_{designh}$) average climate 35 °C / 55 °C (Europe)	kW	11.00 / 12.30	11.00 / 12.30
Nominal heat output ($P_{designh}$) cold climate 35 °C / 55 °C	kW	13.00 / 14.00	13.00 / 14.00
Nominal heat output ($P_{designh}$) warm climate 35 °C / 55 °C	kW	13.00 / 13.00	13.00 / 13.00
SCOP average climate, 35 °C / 55 °C (Europe)		5.05 / 3.90	5.05 / 3.90
SCOP cold climate, 35 °C / 55 °C		4.25 / 3.53	4.25 / 3.53
SCOP warm climate, 35 °C / 55 °C		5.50 / 4.50	5.50 / 4.50
Energy rating, average climate [2]			
The product's room heating efficiency class 35 °C / 55 °C [3]		A+++ / A+++	
The system's room heating efficiency class 35 °C / 55 °C [4]		A+++ / A+++	
Electrical data			
Rated voltage		400 V 3N ~ 50 Hz	
Max operating current, heat pump	A_{rms}	9.5	11
Max operating current, compressor	A_{rms}	8.5	10
Max. power, fan	W	68	80
Fuse	A_{rms}	10	13
Enclosure class		IP24	
Refrigerant circuit			
Type of refrigerant		R410A	
GWP refrigerant		2088	
Volume	kg	3.0	
Type of compressor		Scroll	
CO_2-equivalent (The cooling circuit is hermetically sealed.)	t	6.26	
Cut-out value pressure switch HP (BP1)	MPa	4.5	
Difference pressostat HP	MPa	0.7	
Cut-out value pressure switch LP (BP2)	MPa	0.12	
Difference pressostat LP	MPa	0.7	
Airflow			
Max airflow	m^3/h	4,150	4,500
Working area			
Min./max. air temperature, heating	°C	-25 / 38	
Min./max. air temperature, cooling	°C	15 / 43	
Defrosting system		Reverse cycle	
Heating medium circuit			
Max system pressure heating medium	MPa	0.45 (4.5)	
Recommended flow interval, heating operation	l/s	0.15 – 0.60	0.19 – 0.75
Min. design flow, defrosting (100% pump speed)	l/s	0.38	0.48
Min./max. HM temp, continuous operation	°C	26 / 65	
Connection heating medium F2120		G1 1/4" external thread	
Connection heating medium flex pipe		G1 1/4" external thread	
Min. recommended pipe dimension (system)	DN (mm)	25 (28)	32 (35)
Dimensions and weight			
Width	mm	1,280	
Depth	mm	612	
Height	mm	1,165	
Weight	kg	185	
Miscellaneous			
Part no.		064 139	064 141

1 Power statements including defrosting according to EN 14511 at heating medium supply corresponding to DT=5 K at 7 / 45.

2 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.

3 Scale for the product's room heating efficiency class A++ to G. Control module model SMO S

4 Scale for the system's room heating efficiency class A+++ to G. Control module model SMO S

Energy labelling

INFORMATION SHEET

Supplier		NIBE	
Model		**F2120-16**	**F2120-20**
Temperature application	°C	35 / 55	35 / 55
Seasonal space heating energy efficiency class, average climate		A+++ / A+++	A+++ / A+++
Rated heat output ($P_{designh}$), average climate	kW	11.0 / 12.3	11.0 / 12.3
Annual energy consumption space heating, average climate	kWh	4,502 / 6,524	4,502 / 6,524
Seasonal space heating energy efficiency, average climate	%	199 / 153	199 / 153
Sound power level L_{WA} indoors	dB	35	35
Rated heat output ($P_{designh}$), cold climate	kW	13.0 / 14.0	13.0 / 14.0
Rated heat output ($P_{designh}$), warm climate	kW	13.0 / 13.0	13.0 / 13.0
Annual energy consumption space heating, cold climate	kWh	7,543 / 9,765	7,543 / 9,765
Annual energy consumption space heating, warm climate	kWh	3,153 / 3,867	3,153 / 3,867
Seasonal space heating energy efficiency, cold climate	%	167 / 138	167 / 138
Seasonal space heating energy efficiency, warm climate	%	217 / 177	217 / 177
Sound power level L_{WA} outdoors	dB	55	55

DATA FOR ENERGY EFFICIENCY OF THE PACKAGE

Model		F2120-16	F2120-20
Control module model		**SMO**	**SMO**
Temperature application	°C	35 / 55	35 / 55
Controller, class		VI	
Controller, contribution to efficiency	%	4.0	
Seasonal space heating energy efficiency of the package, average climate	%	203 / 157	203 / 157
Seasonal space heating energy efficiency class of the package, average climate		**A+++ / A+++**	**A+++ / A+++**
Seasonal space heating energy efficiency of the package, cold climate	%	171 / 142	171 / 142
Seasonal space heating energy efficiency of the package, warm climate	%	221 / 181	221 / 181

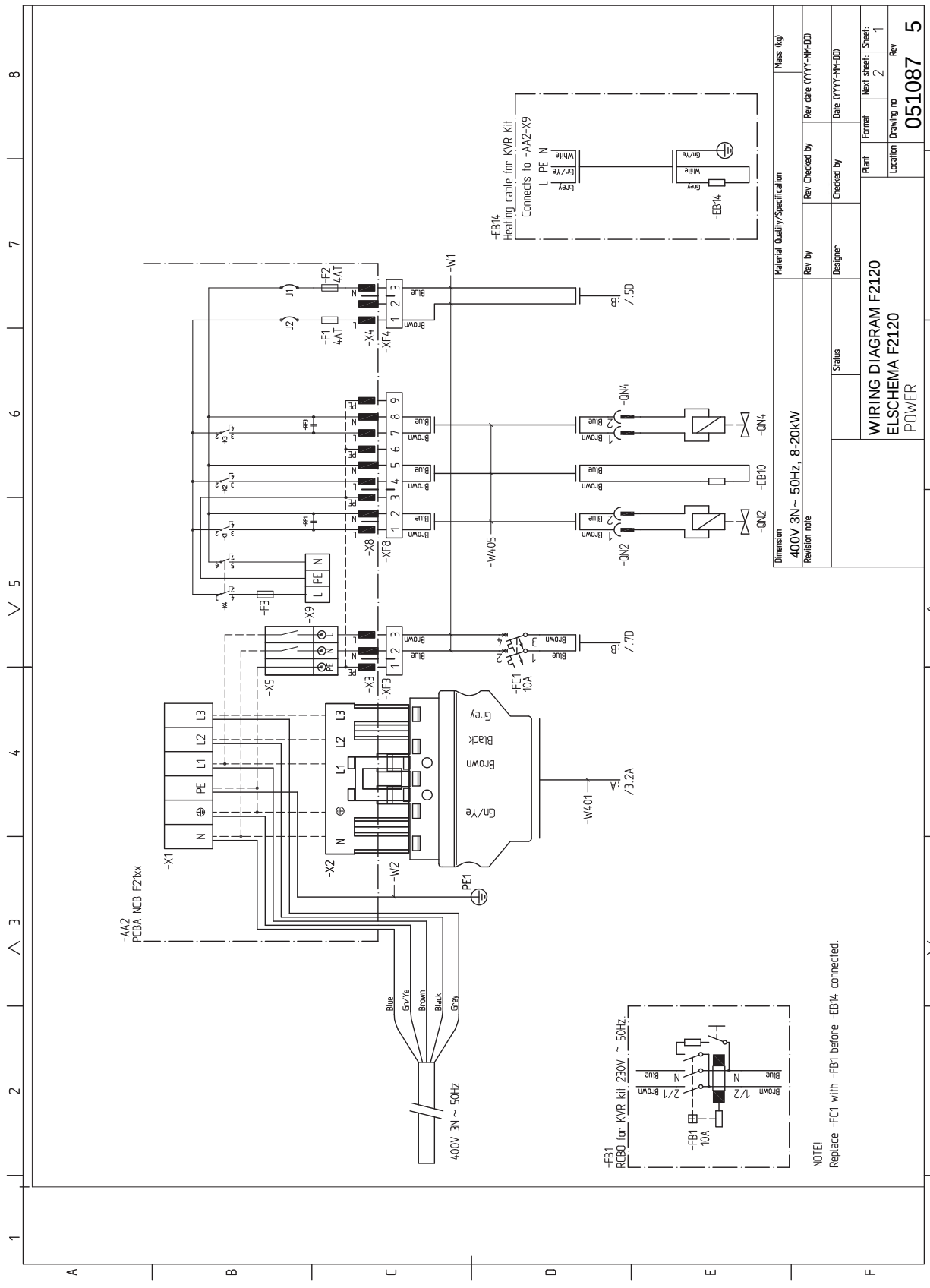
The reported efficiency of the package also takes the controller into account. If an external supplementary boiler or solar heating is added to the package, the overall efficiency of the package should be recalculated.

TECHNICAL DOCUMENTATION

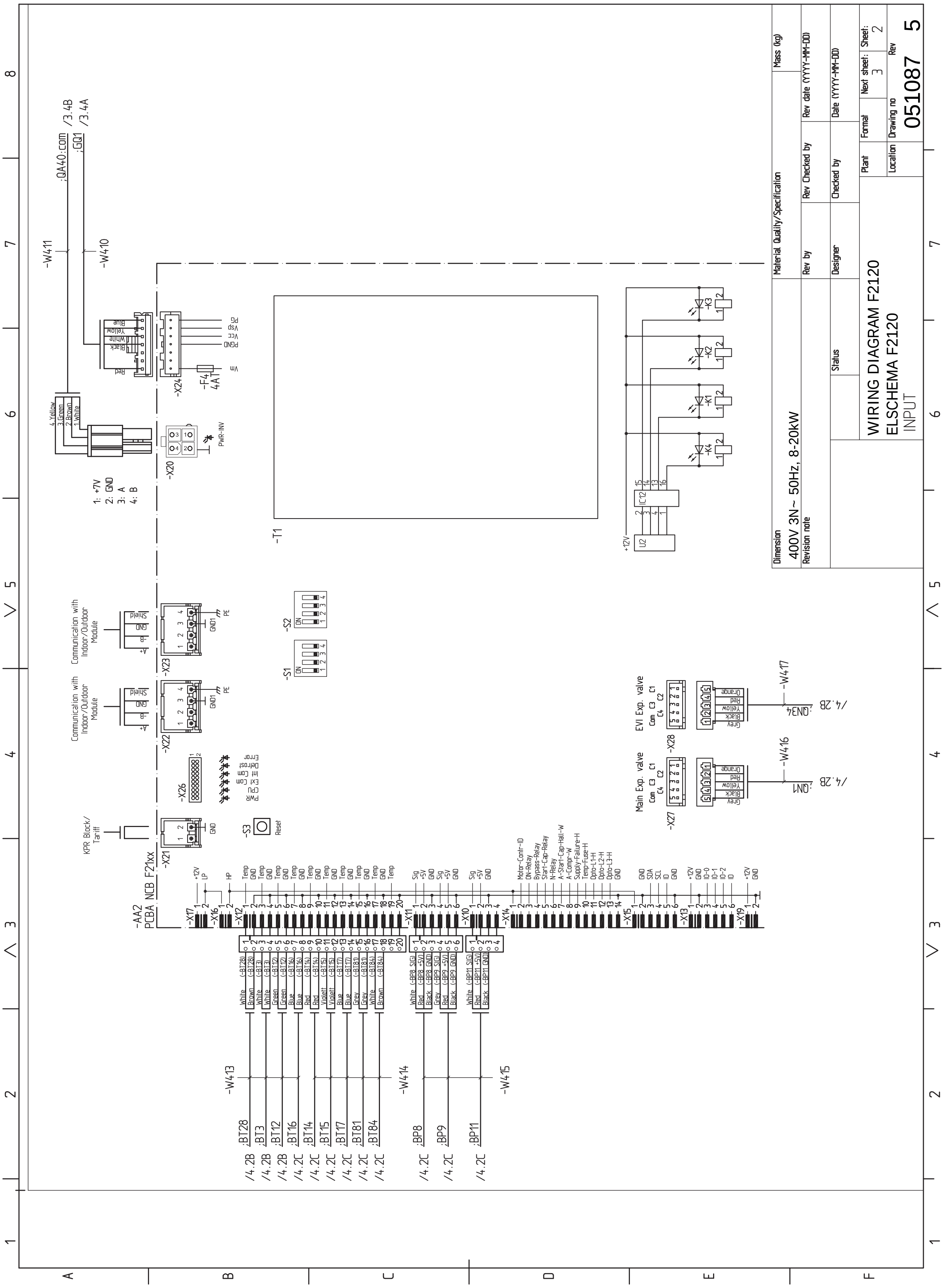
Model		F2120-16					
Type of heat pump	☒ Air-water ☐ Exhaust-water ☐ Brine-water ☐ Water-water						
Low-temperature heat pump	☐ Yes ☒ No						
Integrated immersion heater for additional heat	☐ Yes ☒ No						
Heat pump combination heater	☐ Yes ☒ No						
Climate	☒ Average ☐ Cold ☐ Warm						
Temperature application	☒ Medium (55°C) ☐ Low (35°C)						
Applied standards	EN14825 / EN14511 / EN16147 / EN12102						
Rated heat output	Prated	12,3	kW	*Seasonal space heating energy efficiency*	η_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	m³/h
Sound power level, indoors/outdoors	L_{WA}	35 / 55	dB	Nominal heating medium flow			m³/h
Annual energy consumption	Q_{HE}	6,524	kWh	Brine flow brine-water or water-water heat pumps			m³/h
Contact information	*NIBE Energy Systems – Box 14 – Hannabadsvägen 5 – 285 21 Markaryd – Sweden*						

Model		F2120-20					
Type of heat pump		☒ Air-water ☐ Exhaust-water ☐ Brine-water ☐ 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		☒ Medium (55°C) ☐ Low (35°C)					
Applied standards		EN14825 / EN14511 / EN16147 / EN12102					
Rated heat output	Prated	12,3	kW	*Seasonal space heating energy efficiency*	η_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	m³/h
Sound power level, indoors/outdoors	L_{WA}	35 / 55	dB	Nominal heating medium flow			m³/h
Annual energy consumption	Q_{HE}	6,524	kWh	Brine flow brine-water or water-water heat pumps			m³/h
Contact information	*NIBE Energy Systems – Box 14 – Hannabadsvägen 5 – 285 21 Markaryd – Sweden*						

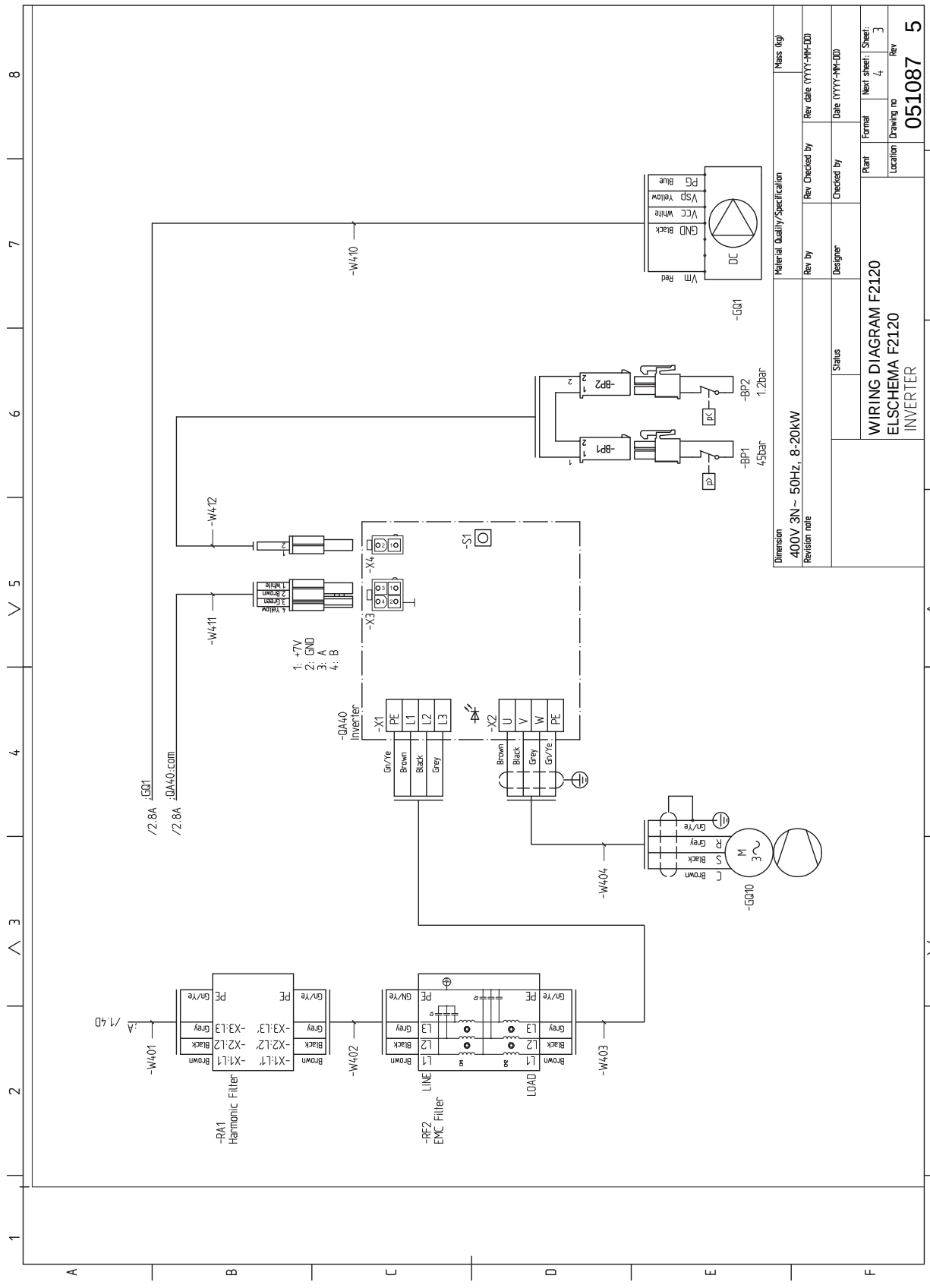
3 X 400 V


WIRING DIAGRAM F2120
ELSCHEMA F2120
POWER
051087 5
400V 3N~ 50Hz, 8-20kW
-AA2 PCBA NCB F21xx
-EB14 Heating cable for KVR Kit
Connects to -AA2->X9
-FB1 RCBO for KVR kit 230V ~ 50Hz
NOTE!
Replace -FC1 with -FB1 before -EB14 connected.
400V 3N ~ 50Hz

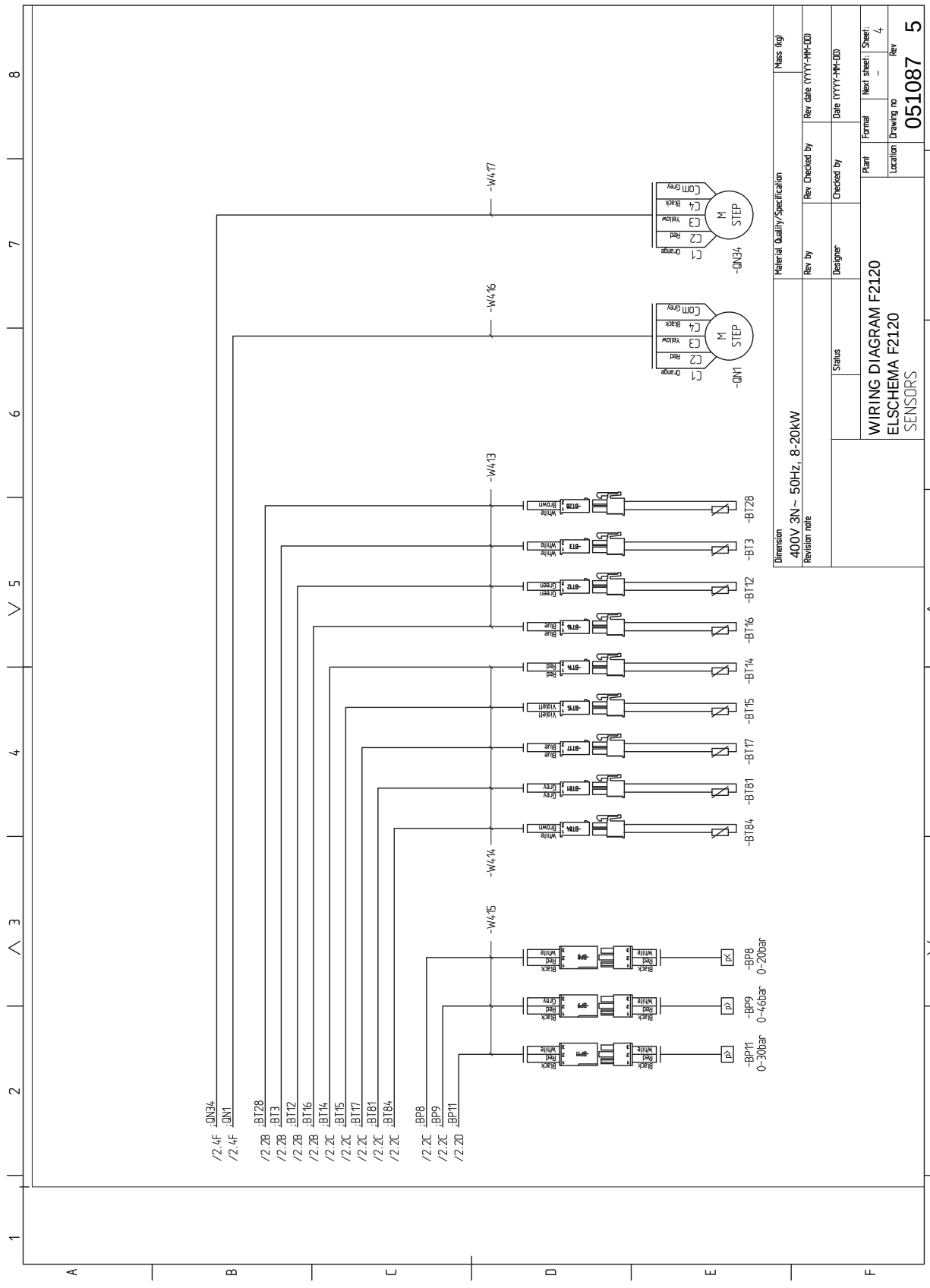
3 X 400 V


WIRING DIAGRAM F2120
ELSCHEMA F2120
INPUT
400V 3N~ 50Hz, 8-20kW
051087
5

3 X 400 V


WIRING DIAGRAM F2120
ELSCHEMA F2120
INVERTER
051087 5
400V 3N~ 50Hz, 8-20kW
-GQ1
-QA40 Inverter
-X1
-X2
-X3
-X4
-S1
-BP1 45bar
-BP2 1.2bar
-GQ10
-RA1 Harmonic Filter
-RF2 EMC Filter
LINE
LOAD
-W401
-W402
-W403
-W404
-W410
-W411
-W412
/2.8A :GQ1
/2.8A :QA40:com
1: +7V
2: GND
3: A
4: B

3 X 400 V


WIRING DIAGRAM F2120
ELSCHEMA F2120
SENSORS
400V 3N~ 50Hz, 8-20kW
051087 5
-QN1
-QN34
-W413
-W414
-W415
-W416
-W417
-BT128
-BT3
-BT112
-BT16
-BT14
-BT15
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IHB EN 2214-1 631982

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