

Service manual
F2120
Air/water heat pump

Table of Contents

1 Important information	3
Document information	3
Safety information	3
2 The heat pump design	4
General	4
Distribution box	9
3 System description	10
Principle of operation	10
System diagram	11
4 Component description	14
Compressor (GQ10)	14
Inverter	14
The base board	15
Base board's contacts	17
Electronic expansion valve	18
Other components	18
Sensor placement	19
5 Troubleshooting	21
Basic actions	21
Low hot water temperature or a lack of hot water	21
Low room temperature	21
High room temperature	21
Ice build-up in the fan, grille and/or fan cone on the outdoor module	21
Large amount of water below F2120	21
Alarm list	22
6 Removing the covers	27
Basic	27
7 Technical data	28
Dimensions and setting-out coordinates	28
Technical specifications	29
Accessories	34
Item register	35

1 Important information

Document information

This technical manual is a complement to the Installer handbook for F2120, containing:

- Description of functions and component description.
- Information to facilitate fault-tracing.
- Instructions for replacing components.
- Supplementary technical information.

The document applies to F2120 with software versions up to and including 473.

The heat pump software version can be found in the info menu on the indoor module/control module (menu 3.1).

Safety information

Symbols



NOTE

This symbol indicates danger to person or machine.



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

CE The CE mark is obligatory for most products sold in the EU, regardless of where they are made.

IP24 Classification of enclosure of electro-technical equipment.



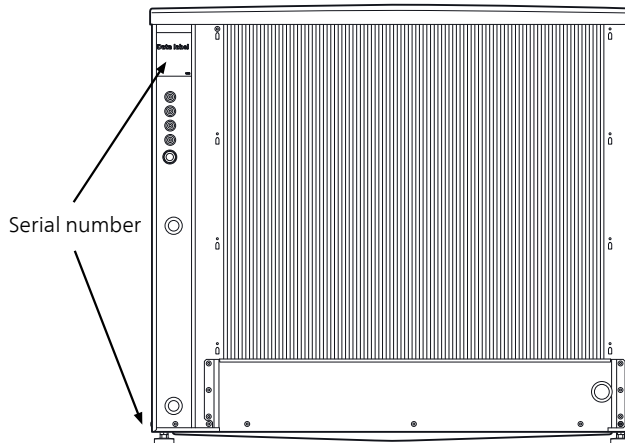
Danger to person or machine.



Read the Installer Manual.

Serial number

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



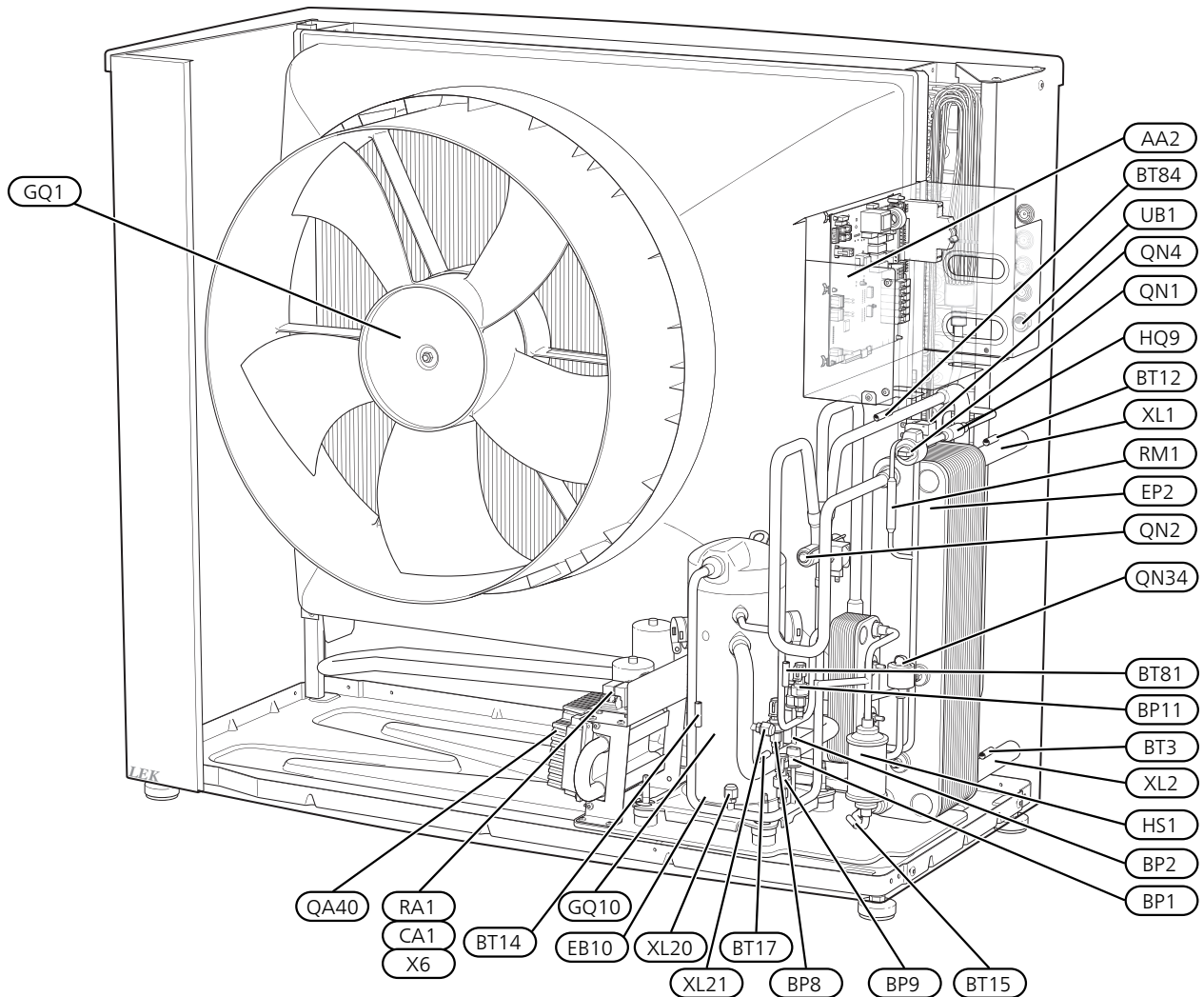
Caution

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

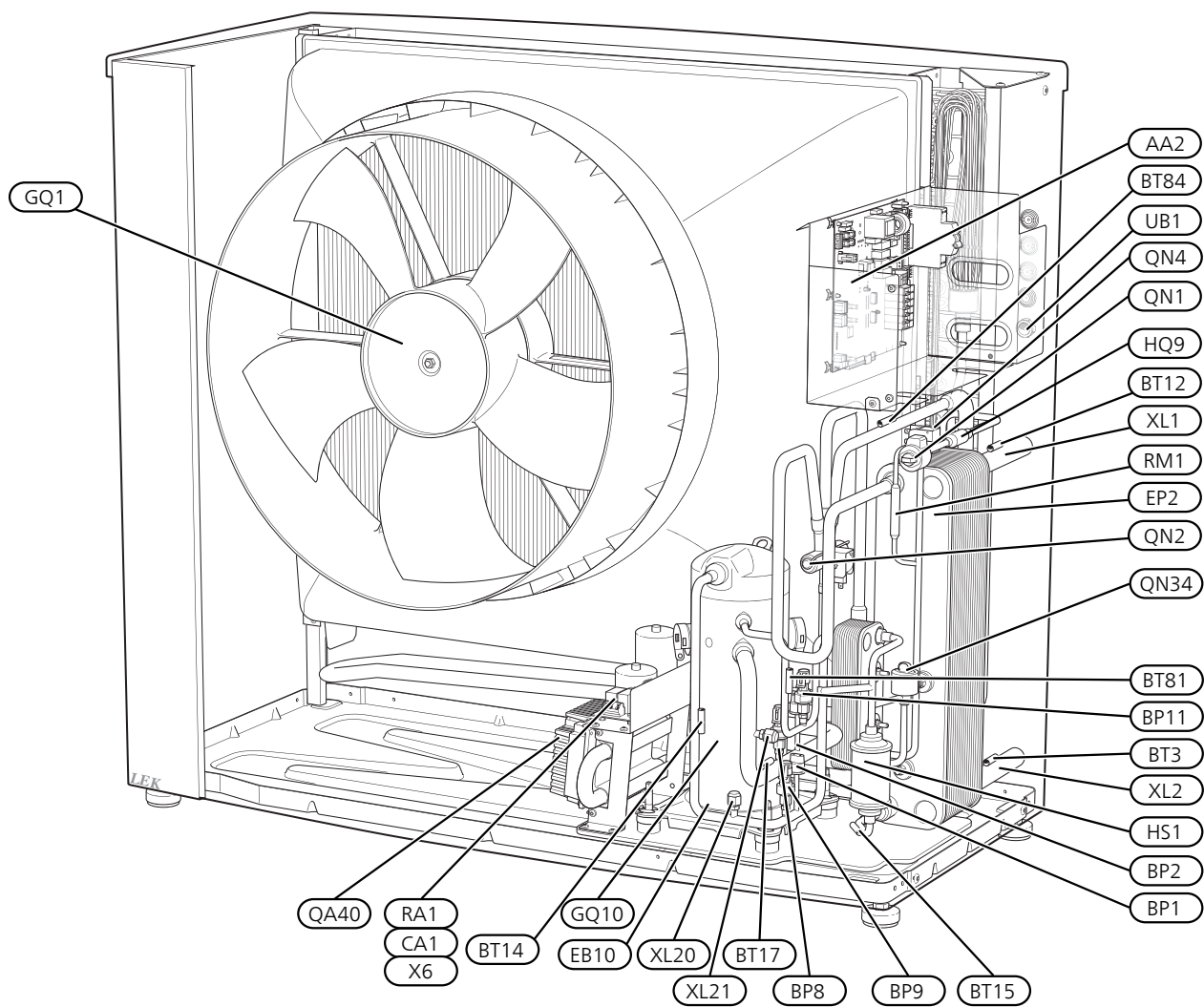
2 The heat pump design

General

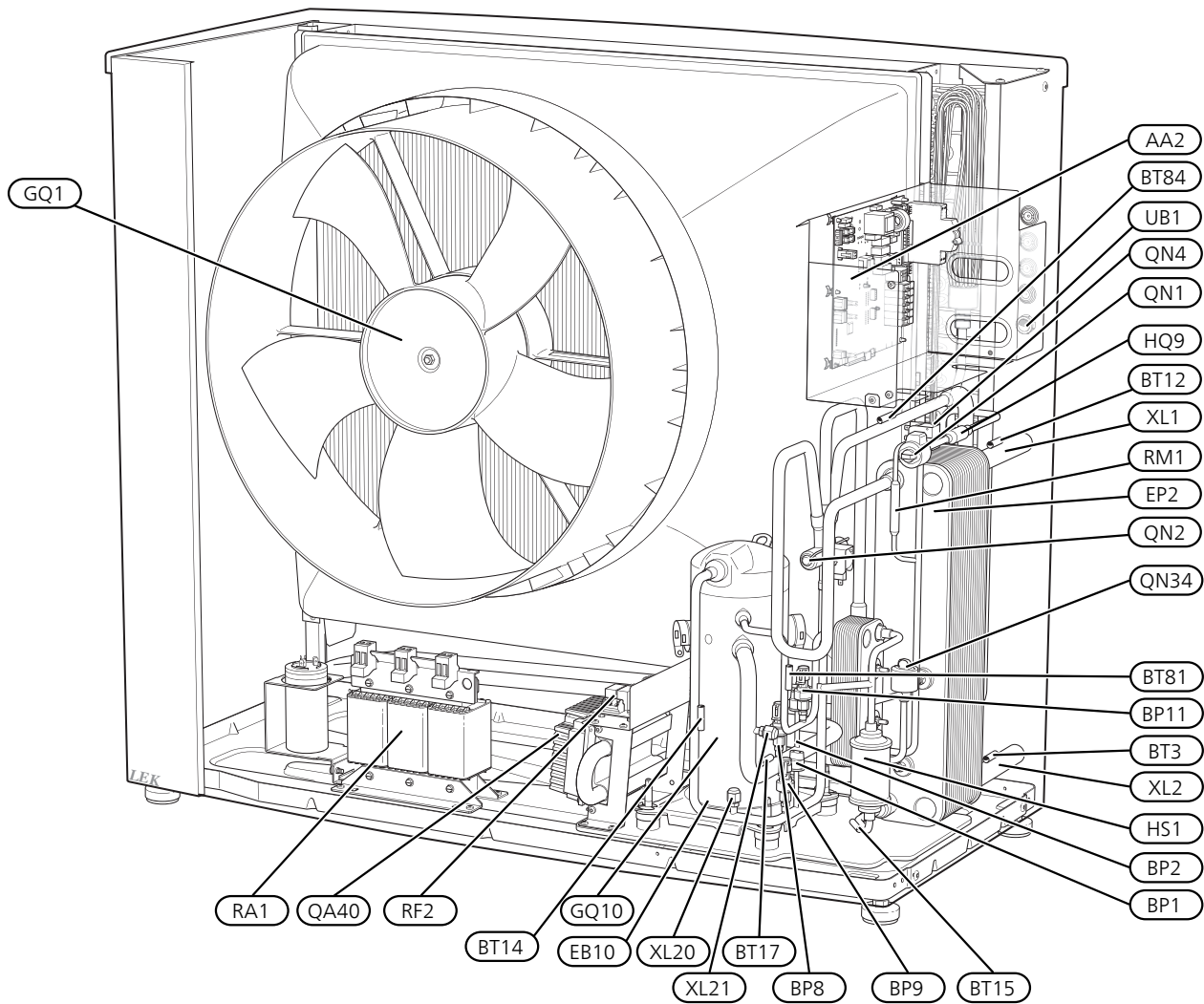
F2120 (1x230V)

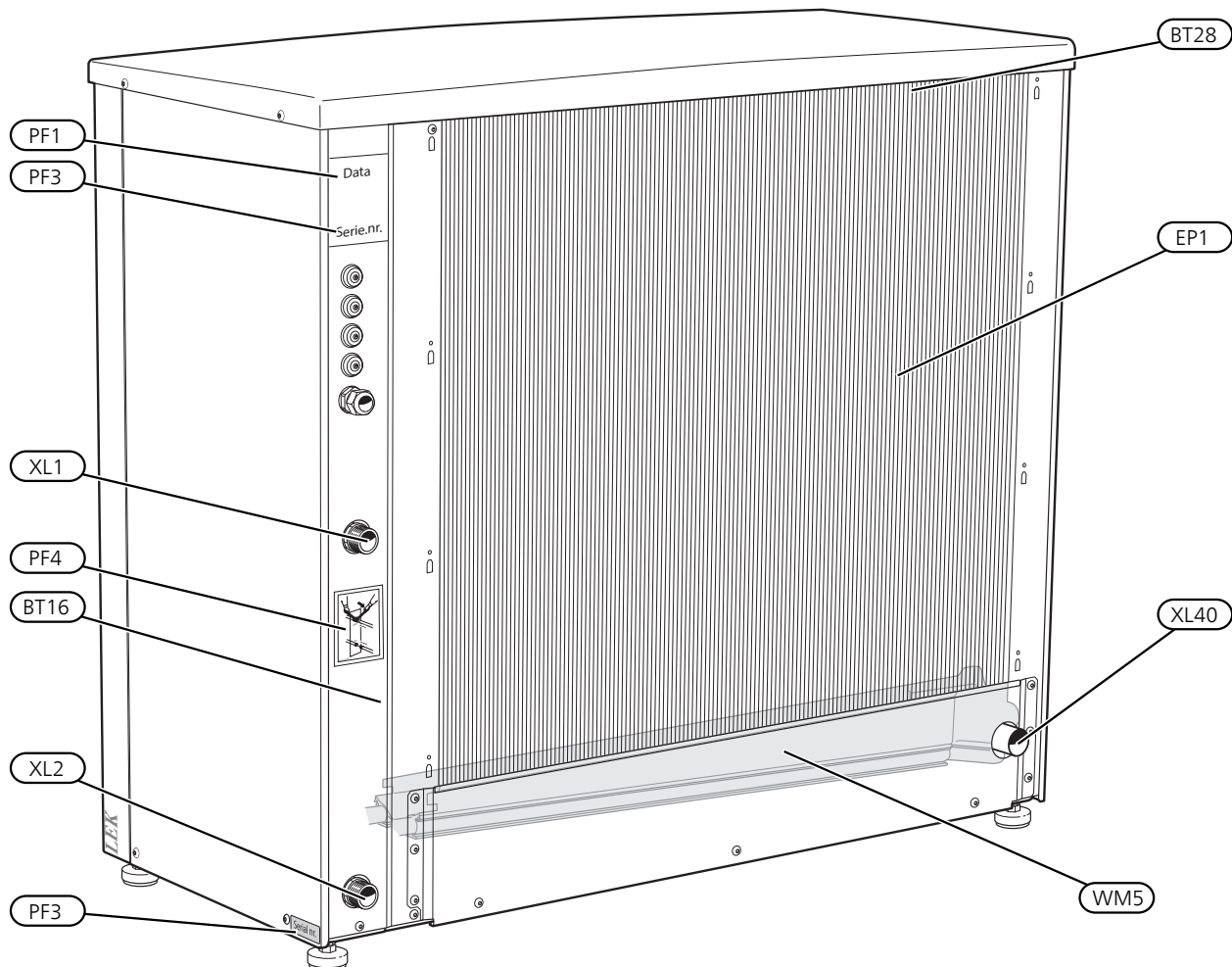


F2120 (2x230V)



F2120 (3x400V)





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)
CA1	Capacitor (2x230V)
EB10	Compressor heater
GQ1	Fan
QA40	Inverter
RA1	Harmonic filter (3x400V)
RA1	Choke (1x230V)
RA1	Choke (2x230V)
RF2	EMC filter (3x400V)
X6	Terminal block (1x230V)
X6	Terminal block (2x230V)

Cooling components

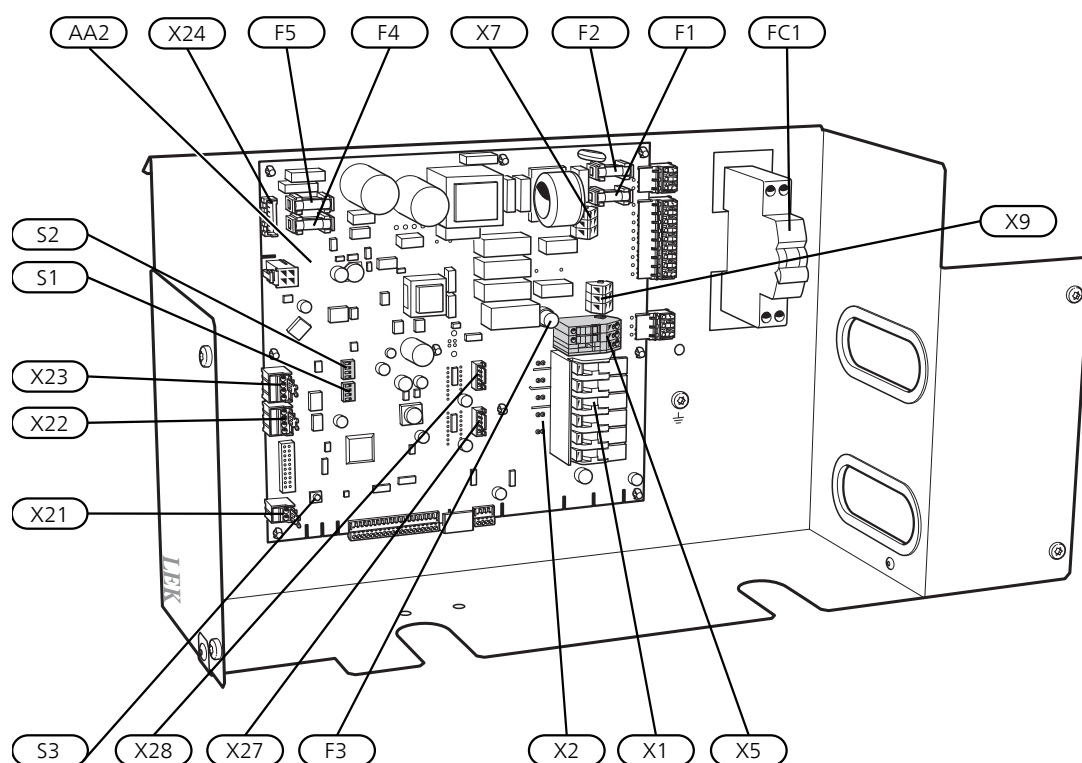
EP1	Evaporator
EP2	Condenser
GQ10	Compressor
HQ9	Particle filter
HS1	Drying filter
QN1	Expansion valve
QN4	Bypass valve
QN2	4-way valve
QN34	Expansion valve, subcooling
RM1	Non-return valve

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

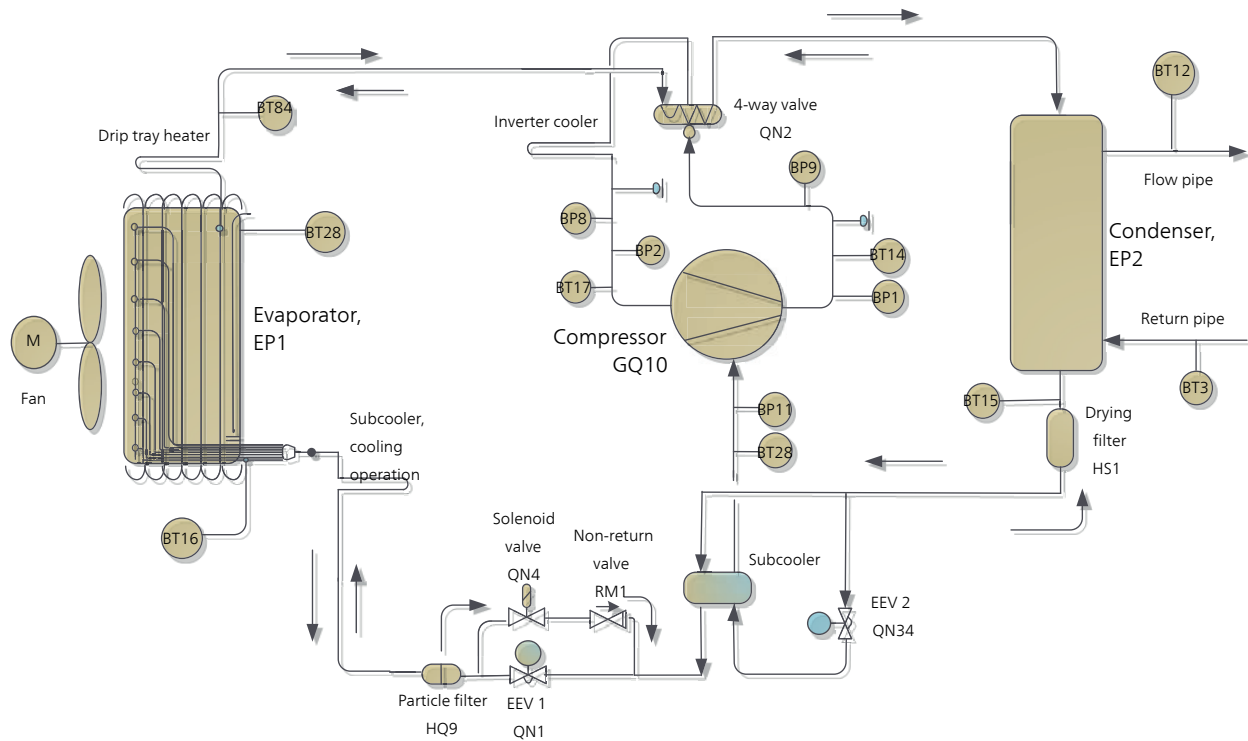
S2 DIP switch, different options

S3 Reset button

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

3 System description

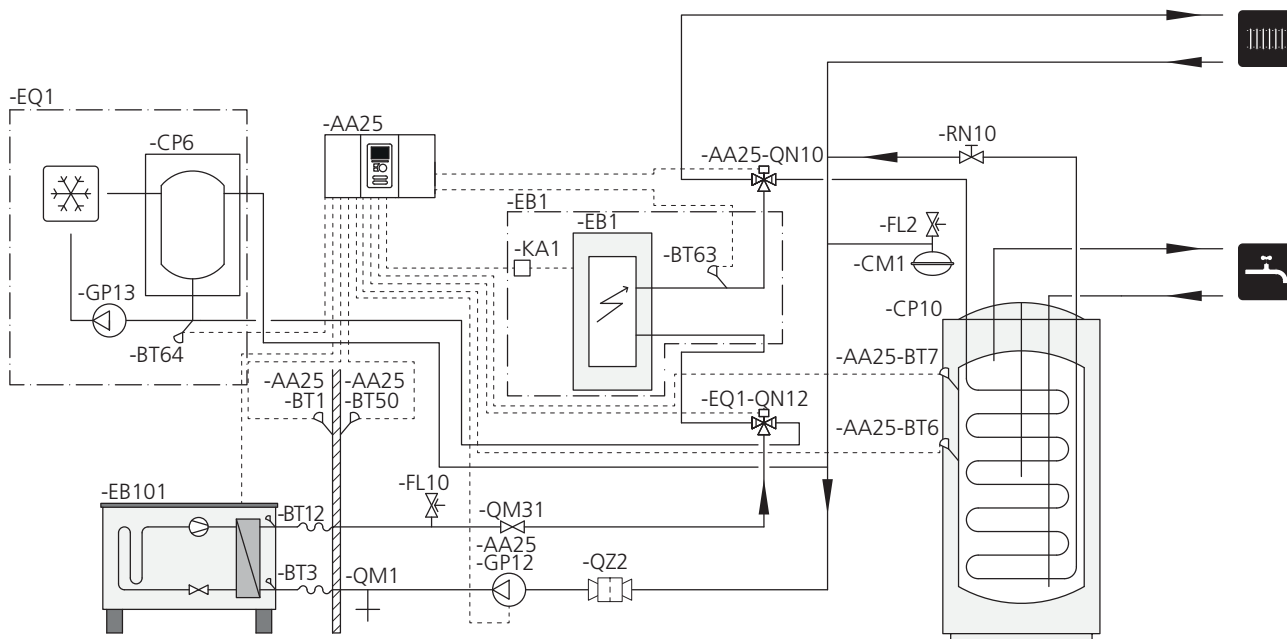
Principle of operation



Designation	Information	Designation	Information
BP1	High pressure switch (45 bar)	EP1	Evaporator
BP2	Low pressure switch (1.2 bar)	EP2	Condenser
BP8	Low pressure transmitter	GQ10	Compressor
BP9	High pressure sensor	HS1	Drying filter
BP11	Pressure sensor, injection	M	Fan motor
BT3	Temperature sensor, return	QN1	Expansion valve
BT12	Temperature sensor, condenser supply line	QN2	4-way valve
BT14	Temperature sensor, hot gas	QN4	Shut off valve
BT15	Temperature sensor, fluid pipe	QN34	Expansion valve, subcooler
BT16	Temperature sensor, evaporator in	RM1	Non-return valve
BT17	Temperature sensor, suction gas		Condensation water trough heater
BT28	Temperature sensor, ambient		Inverter cooler
BT81	Temperature sensor, injection		Subcooler
BT84	Temperature sensor, suction gas evaporator	HQ9	Particle filter
			Subcooler, cooling operation

System diagram

F2120 – docking step-controlled additional heat before reversing valve for hot water and cooling function (4 pipe system)



NOTE

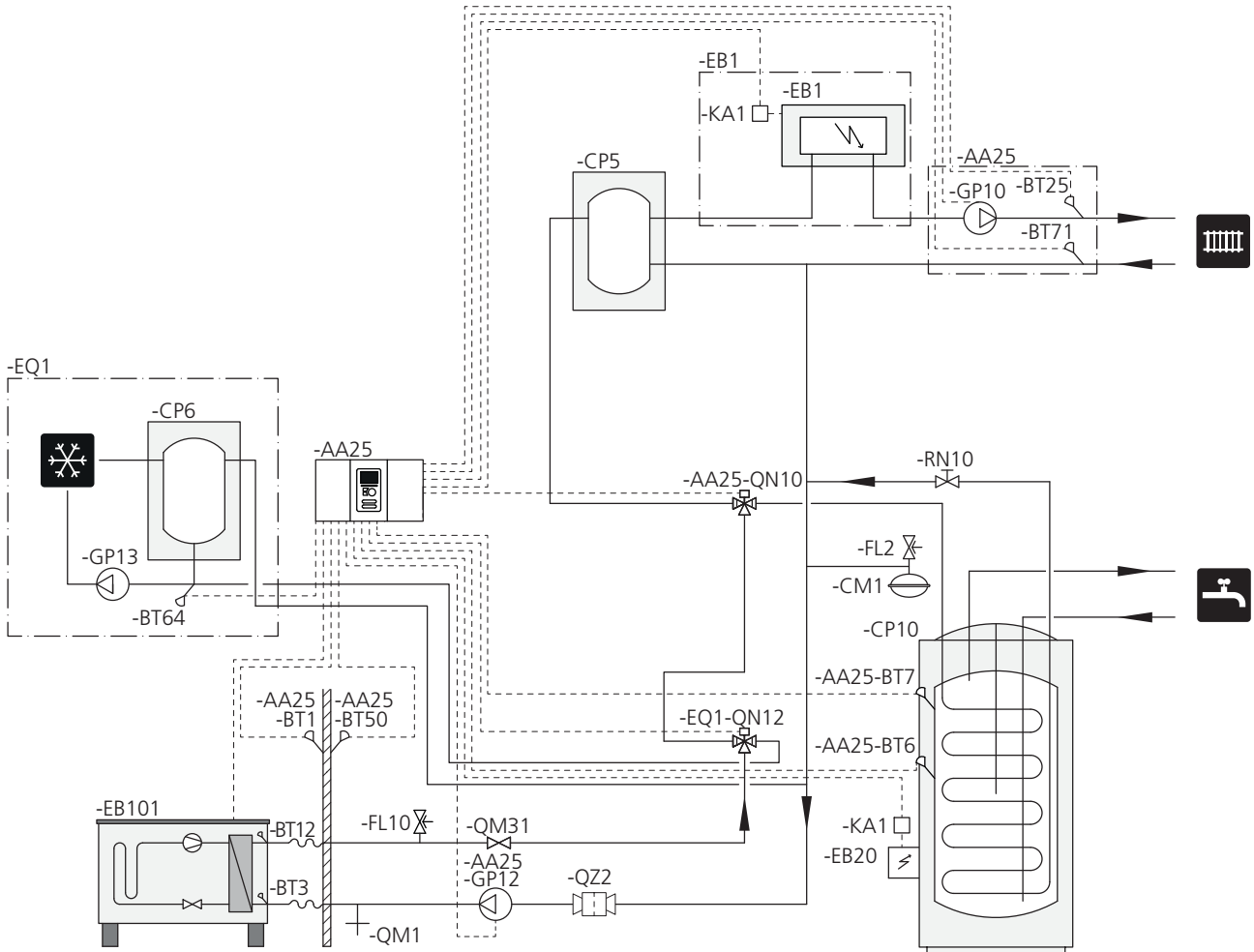
NIBE does not supply all components in this outline diagram.

SMO20/40 (AA25) starts and stops the heat pump (F2120) to meet the heat and hot water demand of the installation. At simultaneous heating and hot water demand, the reversing valve (AA25-QN10) switches periodically between the climate system and the water heater/accumulator tank (CP10). When the hot water heater/accumulator tank is fully charged (CP10), the reversing valve (AA25-QN10) switches to the climate system.

Additional heat (EB1) is connected automatically when the power demand for the installation exceeds the heat pump capacity. This is used for both heating and charging hot water.

The additional heat can also be used if a higher temperature in the hot water is required than the heat pump can produce.

F2120 – docking step-controlled additional heat after reversing valve for hot water and cooling function (4 pipe system)



This installations alternative is suitable for more complex installations with a focus on comfort.

SMO20/40 (AA25) starts and stops the heat pump (F2120) to meet the heat and hot water demand of the installation. The heat pump works to a calculated set point value on the supply line. At simultaneous heating and hot water demand, the reversing valve (AA25-QN10) switches periodically between the climate system and the water heater/accumulator tank (CP10). The heat pump prioritises hot water charging. When the water heater/accumulator tank (CP10) is fully charged, the reversing valve (AA25-QN10) switches to the climate systems and pool (pool only possible with SMO40)). When the pool needs heating, the reversing valve (CL11-QN19) switches from the climate system to the pool system (applies to SMO40). Additional heat (EB1) is connected automatically when the energy demand for the installation exceeds the heat pump capacity. Immersion heater (EB20) in the water heater/accumulator tank (CP10) is used in the meantime to produce hot water, if the heat pump (EB101) is being used at the same time to heat the building. The immersion heater (EB20) can also be used if a higher temperature of hot water is required than the heat pump can produce.

Ensure that the minimum permitted defrosting flow is achieved. F2120 will initially defrost towards the heating system. If heating is blocked or there is insufficient energy, defrosting will take place towards hot water if it is activated.



Caution

During cooling:

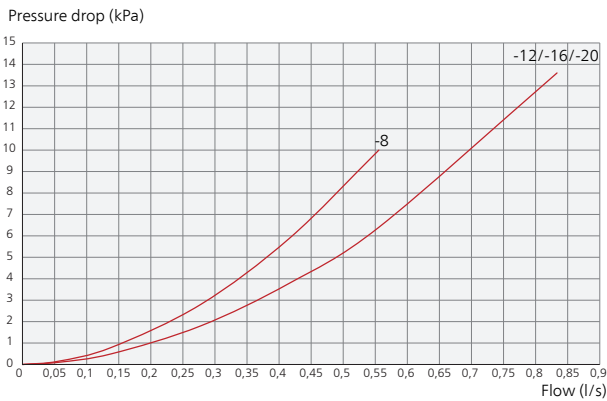
The shared pipework up to the cooling reversing valve needs to be insulated in the event of alternating heating/cooling operation.

In the event of a hot water demand, hot water is used until cooling is permitted again in order to minimise condensation.

Installation requirements heating medium

		8 kW	12 kW	16 kW	20 kW
Min/Max system pressure heating medium	MPa Bar	0.05/0.45 0.5/4.5		0.05/0.45 0.5/4.5	
Min flow	l/s	0.08	0.11	0.15	0.19
Max flow	l/s	0.32	0.44	0.60	0.75
Internal pressure drop at 10 K flow	kPa	1.1	1.1	2.0	3.0

Pressure drop, heating medium side



4 Component description

Compressor (GQ10)

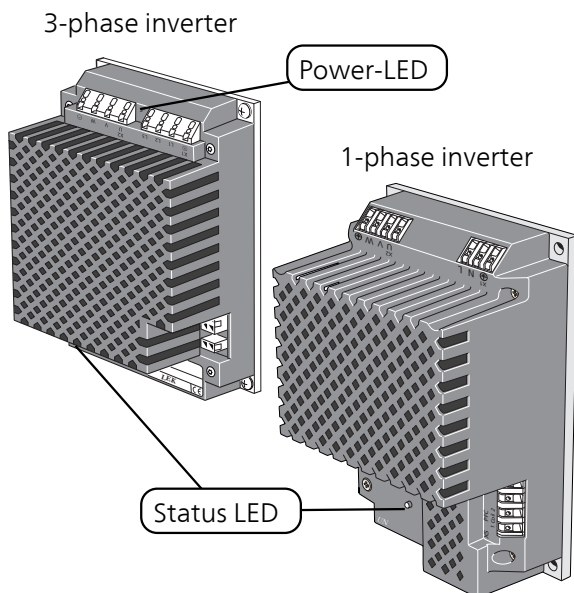
Manufacturer and model	Type	Winding resistance (at 20 °C)	Max operating current	Used in
Copeland ZHW015	Scroll	0.68 Ω	17 A	F2120-8 F2120-12
Copeland ZHW030	Scroll	0.20 Ω	33 A	F2120-16 F2120-20

Inverter

The inverter's Status-LED indicates acc. to the table below:

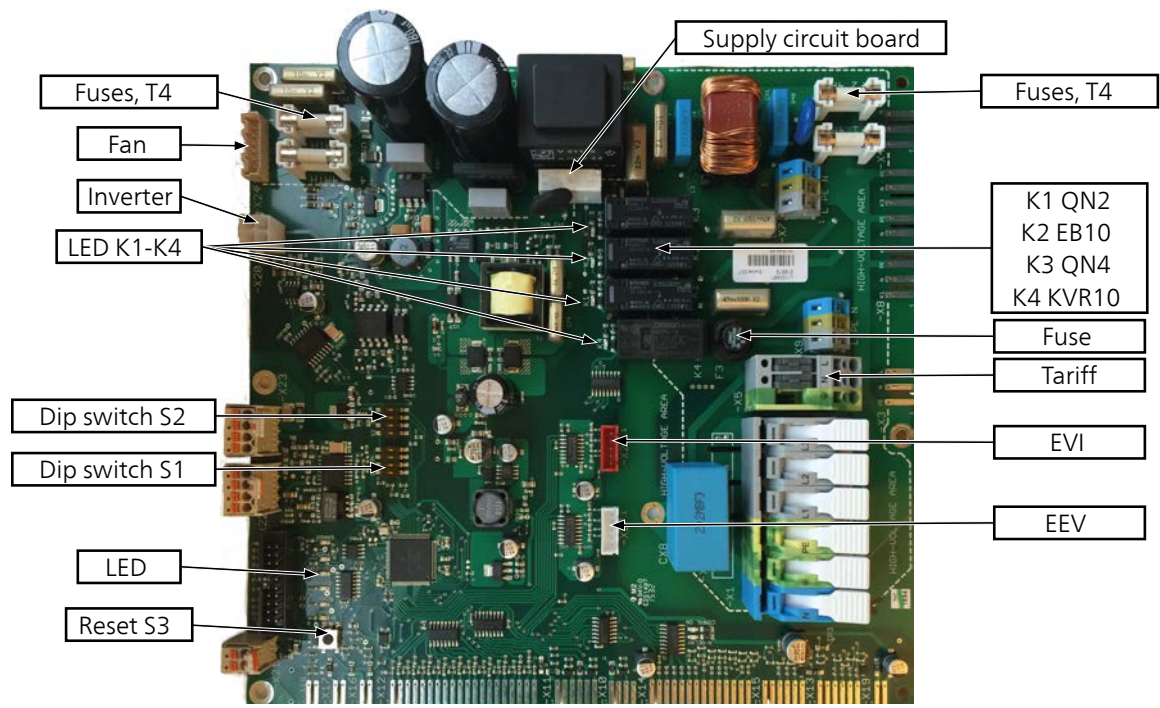
Status LED	Status
Green, steady	The compressor stopped, OK
Green, flashing	The compressor stopped, OK
Orange, steady	Compressor is operational, OK
Red, steady	Alarm
Red, flashing	Broken circuit on terminal block X4

The inverter's power LED lights orange continuously when the inverter is powered. (Applies only to F2120-16 and 20)



Voltage	Inverter size	Used in
1x230 V	2.9	F2120-8
	4.4	F2120-12
3x400 V	5.5	F2120-8 F2120-12
	7.5	F2120-16
		F2120-20

The base board



Base board AA2

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 Continuous light	CPU running CPU running incorrectly
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	No defrosting or protection active
	Flashes	Some protection is active
	Continuous light	Defrosting in progress
ERROR (red)	Not lit	No errors
	Flashes	Infoalarm (temporary), active
	Continuous light	Continuous 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

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.

The dip switches are entered at start-up and therefore have to be adjusted when the installation is switched off.

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

DIP S1:	Setting	Function	Default setting
4	ON	Permits cooling	OFF

Relay test

The relay test is solely for troubleshooting base boards or components in the cooling circuit. The function is controlled via a dip switch.

The dip switches are entered at start-up and therefore have to be adjusted when the installation is switched off.

By setting switch S2:1 in position ON, all operation is blocked and all relays are set in turn in position ON for 10 seconds followed by 1 second in OFF.

The function is stopped when S2:1 is entered as OFF when starting the installation. The function requires software version **447** or higher in F2120.

DIP S2:	Relay	Function	Output	Default setting
1	K1	QN2	AA2-X8:1-2	OFF
	K2	EB10	AA2-X8:4-5	
	K3	QN4	AA2-X8:7-8	
	K4	KVR10	AA2-X8:9	

Draining cooling circuit

This function must be used if the cooling circuit needs to be drained. It opens valves that are normally closed in order to facilitate draining of the entire cooling circuit.

The function is controlled by setting switch S2:2 in position ON. The compressor is switched off and blocked in this position.

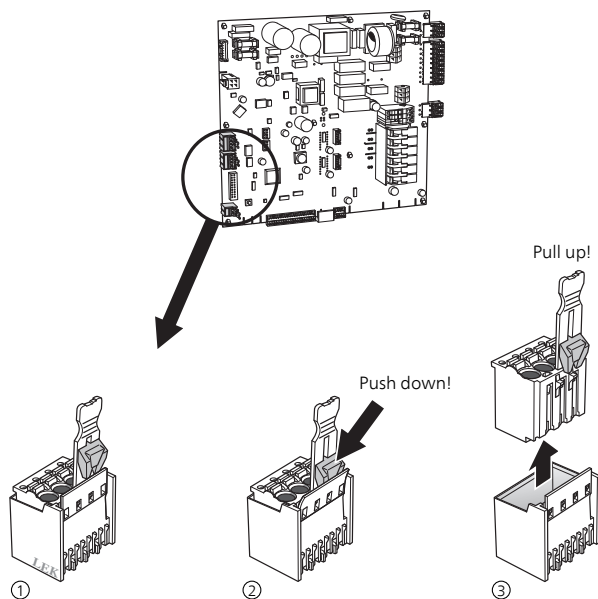
QN1 and QN34 is opened fully and QN4 is opened. The dip switches are entered at start-up and therefore have to be adjusted when the installation is switched off.

The function is stopped when S2:2 is entered as OFF when starting the installation. The function requires software version 447 or higher in F2120.

DIP S2:	Relay	Function	Output	Default setting
2	Step	QN1	AA2-X27	OFF
	Step	QN34	AA2-X28	
	K3	QN4	AA2-X8:7-8	

DIP S2:	Function
3 and 4	No function
S3	Reset

Base board's contacts



Electronic expansion valve

QN1 (EEV)

Supplier	Designation	Type	Used in
Danfoss	EEV 034G5010	ETS6-14	F2120-8 F2120-12
	EEV 034G5070	ETS6-18	F2120-16 F2120-20

QN34 (EVI)

Supplier	Designation	Type	Used in
Danfoss	EEV 034G5000	ETS6-10	F2120-8 F2120-12
	EEV 034G5010	ETS6-14	F2120-16 F2120-20

Other components

Component	Description
Low pressure sensor (BP8)	0-20 bar
High pressure sensor (BP9)	0-46 bar
Pressure sensor, injection (BP11)	0-30 bar

Component	Description
High pressure switch (BP1)	Breaking value: 45 bar Reconnection differential: -7 bar
Low pressure switch (BP2)	Breaking value: 1.2 bar Reconnection differential: 0.7 bar

Component	Output	Voltage
Compressor heater (EB10)	2x35 W	230 V

Component	Resistor	Output	Fuse	Voltage
KVR 10-10 (EB14)	3527 Ω	15 W	T100mA	230 V
KVR 10-30 (EB14)	1175 Ω	45 W	T250mA	230 V
KVR 10-60 (EB14)	588 Ω	90 W	T500mA	230 V

Sensor placement

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

5 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.



Caution

Alarms are acknowledged on the indoor module / control module (VVM / SMO).

The following tips can be used to rectify comfort disruption:

Basic actions

Start by checking any alarm messages in the info menu on the indoor module (VVM) / control module (SMO). Follow the instructions on the display on the indoor module (VVM) / control module (SMO).

F2120 not in operation

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

- Check LED status on the base board (AA2), see page 15.
- Ensure that the F2120 is connected to the power source and that compressor operation is required.
- 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 LED status on the base board (AA2), see page 15.
- 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



NOTE

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.
- The hot water settings are adjusted on the display on the indoor module / control module.
 - See the manual for the indoor module or control module.
- Clogged particle filter.
 - Check whether alarm "high condenser out" (162) is an information message. 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 manual for the indoor module / control module (VVM / SMO).
- Incorrect flow across the heat pump.
 - Check whether alarm "high condenser in" (163) or "high condenser out" (162) are info messages. Follow the instructions for adjusting charge flow.

High room temperature

- Incorrect settings in indoor module or control module.
 - See the manual for the indoor module or control module.

Ice build-up in the fan, grille and/or fan cone on the outdoor module

- Activate "de-icing fan" (menu 5.11.1.1).
- Check that the air flow across the evaporator is correct.

Large amount of water below F2120

- KVR 10 is required.
- If KVR 10 is installed, check that the water drainage flows freely.

Alarm list

Acknowledging alarms

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

- Alarm codes are displayed in the connected indoor unit, see alarm list for connected indoor unit.



NOTE

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

F2120-Alarm

The following alarm blocks the outdoor unit. The additional heat is controlled by the indoor module/control module so that the min. permitted supply temperature is achieved.

In the event of an alarm in the outdoor unit, a red lamp with the text "Error" will light on the base board, see image above the base board on page 15.

Alarm, indoor unit	Alarm, outdoor unit	Text in display	Description	May be due to
156	80	Low LP cooling operation	Low pressure alarm 5 times within 4 hours.	Low flow
224	182	Fan alarm	Deviations in the fan speed in F2120.	- The fan cannot spin freely or is not connected.
225	8	Flow/Return	The return is higher than the supply temperature.	-Flow/Return in wrong direction. -The sensors are incorrectly placed.
227	34 36 38 40 42 44 46 48 50 52 54 56	Sensor fault	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	Defrosting fault	Defrosting could not be completed 10 times in a row.	System temperature and/or flow too low, external wind effect, problem in cooling circuit
229	4	Short operation time	Compressor operation has been shorter than 5 minutes 3 times in a row.	Flow problem or incorrect settings HWM/SMO
230	78	Permanent Hotgas	High hot gas alarm 3 times in a row within 4 hours.	- Sensor does not work (see "Temperature sensor" section) - Insufficient air circulation or blocked heat exchanger - Refrigerant leak - Defective compressor
232	76	Low evaporation	Low evaporation temperature 5 times in 4 hours.	- External wind effect - Defective evaporation sensor - Refrigerant leak - Defective expansion valve

Alarm, in-door unit	Alarm, outdoor unit	Text in display	Description	May be due to
264	204	Inverter error	Communication between circuit board for inverter and control board broken.	<ul style="list-style-type: none"> - Inverter disconnected - Loose cables between inverter and base board - Defective circuit board for inverter in F2120 - Defective base board in F2120
341	6	Recurring safety defrost	Safety defrost 10 times in a row.	<ul style="list-style-type: none"> - Air flow through evaporator - Strong wind against fan - Fault in cooling circuit
344	72	Recurring low pressure alarm	BP8 below the limit value, 5 low pressure alarms within 4 hours.	<ul style="list-style-type: none"> - Wind effect - Refrigerant leak - Defective expansion valve
346	74	Recurring high pressure alarm	BP9 above the limit value, 5 high pressure alarms within 4 hours.	<ul style="list-style-type: none"> - Wind effect - Air in system - Low system pressure - Defective expansion valve
421	104	Inverter alarm type II	Communication fault to AA2, 3 repeated communication faults within 2 hours.	Loose cabling
425	108	Triggered pressure switch LP/HP	2 repeated LP/HP pressure switch alarms within 2.5 hours	<ul style="list-style-type: none"> - Poor heating medium flow. - Refrigerant leak.
429	112	Inverter alarm type II	Temporary error message from inverter, 3 times within 2 hours.	Multiple alarms at the same time
431	114	Inverter alarm type II	Phase voltage to inverter too high, 3 times within 2 hours or persistently high for 1 hour.	High voltage in to F2120.
433	116	Inverter alarm type II	Phase voltage to inverter too low, below 180V, 3 times within 2 hours or persistently low for 1 hour.	<ul style="list-style-type: none"> - Low voltage - Phase drop to F2120.
435	118	Inverter alarm type II	One compressor phase has been missing 3 times within 2 hours or missing continuously for 1 hour.	At least one compressor phase is missing
437	120	Inverter alarm type II	High current to inverter 3 times within 2 hours.	Overcurrent protection tripped (1x230V products).
439	122	Inverter alarm type II	Inverter temporarily above max. working temperature 3 times within 2 hours.	<ul style="list-style-type: none"> - Poor circulation in heating medium circuit. - Poor position of inverter against cooling plate.
441	124	Inverter alarm type II	High current to inverter 3 times within 2 hours.	Too high current to inverter
443	126	Inverter alarm type II	Inverter temporarily above max. working temperature 3 times within 2 hours.	<ul style="list-style-type: none"> - Poor circulation in heating medium circuit. - Poor position of inverter against cooling plate.

Alarm, in-door unit	Alarm, outdoor unit	Text in display	Description	May be due to
445	128	Inverter alarm type II	Temporary fault in inverter, 3 times within 2 hours.	<ul style="list-style-type: none"> - Interruption in voltage supply to the inverter. - Defective EMC board (TDI) - Defective compressor
447	130	Inverter alarm type II	One compressor phase has been missing 3 times within 2 hours or missing continuously for 1 hour.	<ul style="list-style-type: none"> - Interruption in voltage supply to the inverter. - Unsuccessful start attempt
449	132	Inverter alarm type II	Compressor has run at lower speed than permitted 3 times within 2 hours.	<ul style="list-style-type: none"> - Start fault, compressor - Low voltage
453	136	Inverter alarm type II	Current from inverter to compressor temporarily high, 3 times within 2 hours.	Voltage fault to F2120.
455	138	Inverter alarm type II	Capacity from inverter temporarily too high, 3 times within 2 hours.	Problem with voltage in to F2120.
467	140	Inverter error	Too low incoming voltage temperature to F2120.	Incoming voltage too low (1x230V product).
501	184	Failed start	Incorrect pressure setup during compressor start between BP8 and BP9	<ul style="list-style-type: none"> - Problem in cooling circuit - Defective pressure sensors
503	186	Compr. speed too low	Compressor has run at lower speed than permitted 3 times within 2 hours.	Low voltage, compressor limit

F2120- Information messages

The following information messages can block the outdoor unit. The additional heat is controlled by the indoor module/control module so that the min. permitted supply temperature is achieved.

In the event of information messages in the outdoor unit, a red lamp with the text "Error" will flash on the base board, see image above the base board on page 15.

Info, indoor unit	Info, outdoor unit	Text in display	Description	May be due to
56	205	Incorrect serial number	The heat pump has an incorrect serial number	Incorrect software in outdoor unit or incompatible outdoor unit.
157	81	Low LP cooling operation	Low pressure alarm 5 times within 4 hours.	Low flow
162	69	High condenser out		- Normal in certain operating conditions - Low flow - Incorrect settings
163	65	High condenser in		- Normal in certain operating conditions - Low flow - Incorrect settings
271	63 87	- Low outdoor temp - Low outdoor temp, cooling		- Outdoor temperature outside of operating range - Defective outdoor temperature sensor
272	61 85	- High outdoor temperature - High outdoor temp, cooling		- Outdoor temperature outside of operating range - Defective outdoor temperature sensor
342	67	- Low temp. in		- Low system temperature - Defective return sensor
343	71	Low temp. out		- Low system temperature - Defective return sensor
345	73	Recurring low pressure alarm	BP8 below the limit value, 5 low pressure alarms within 4 hours	- Wind effect - Refrigerant leak - Defective expansion valve
347	75	Recurring high pressure alarm	BP9 above the limit value, 5 high pressure alarms within 4 hours.	- Wind effect - Air in system - Low system pressure - Defective expansion valve
401	207 209 211 213	Unspecified inverter fault		Initiation fault, inverter Inverter not compatible Configuration file missing Charge error configuration
420	103	Inverter alarm type II	Communication fault to AA2, 3 repeated communication faults within 2 hours.	Loose cabling
424	107	Deployed pressure switch	2 repeated LP/HP pressure switch alarms within 2.5 hours	- Poor heating medium flow. - Refrigerant leak.

Info, in-door unit	Info, out-door unit	Text in display	Description	May be due to
428	111	Inverter alarm type II	Temporary error message from inverter, 3 times within 2 hours.	Multiple alarms at the same time
430	113	Inverter alarm type II	Phase voltage to inverter too high, 3 times within 2 hours or persistently high for 1 hour.	High voltage in to F2120.
432	115	Inverter alarm type II	Phase voltage to inverter too low, below 180V, 3 times within 2 hours or persistently low for 1 hour.	- Low voltage - Phase drop to F2120.
434	117	Inverter alarm type II	One compressor phase has been missing 3 times within 2 hours or missing continuously for 1 hour.	At least one compressor phase is missing
436	119	Inverter alarm type II	High current to inverter 3 times within 2 hours.	Overcurrent protection tripped (1x230V products).
438	121	Inverter alarm type II	Inverter temporarily above max. working temperature 3 times within 2 hours.	- Poor circulation in heating medium circuit. - Poor position of inverter against cooling plate.
440	123	Inverter alarm type II	High current to inverter 3 times within 2 hours.	Too high current to inverter
442	125	Inverter alarm type II	Inverter temporarily above max. working temperature 3 times within 2 hours.	- Poor circulation in heating medium circuit. - Poor position of inverter against cooling plate.
444	127	Inverter alarm type II	Temporary fault in inverter, 3 times within 2 hours.	- Interruption in voltage supply to the inverter. - Defective EMC board (TDI) - Defective compressor
446	129	Inverter alarm type II	One compressor phase has been missing 3 times within 2 hours or missing continuously for 1 hour.	- Interruption in voltage supply to the inverter. - Unsuccessful start attempt
448	131	Inverter alarm type II	Compressor has run at lower speed than permitted 3 times within 2 hours.	- Start fault, compressor - Low voltage
452	135	Inverter alarm type II	Current from inverter to compressor temporarily high, 3 times within 2 hours.	Voltage fault to F2120.
454	137	Inverter alarm type II	Capacity from inverter temporarily too high, 3 times within 2 hours.	Problem with voltage in to F2120.
466	139	Inverter error	Too low incoming voltage temperature to F2120.	Incoming voltage too low (1x230V product).
500	183	Failed start	Incorrect pressure setup during compressor start between BP8 and BP9	- Problem in cooling circuit - Defective pressure sensors
502	185	Compr. speed too low	Compressor has run at lower speed than permitted 3 times within 2 hours.	Low voltage, compressor limit

6 Removing the covers



NOTE

Servicing should only be carried out by persons with the necessary expertise.

Cut the current with the circuit breaker before carrying out any servicing.

F2120 can contain liquids at high temperature and under high pressure.

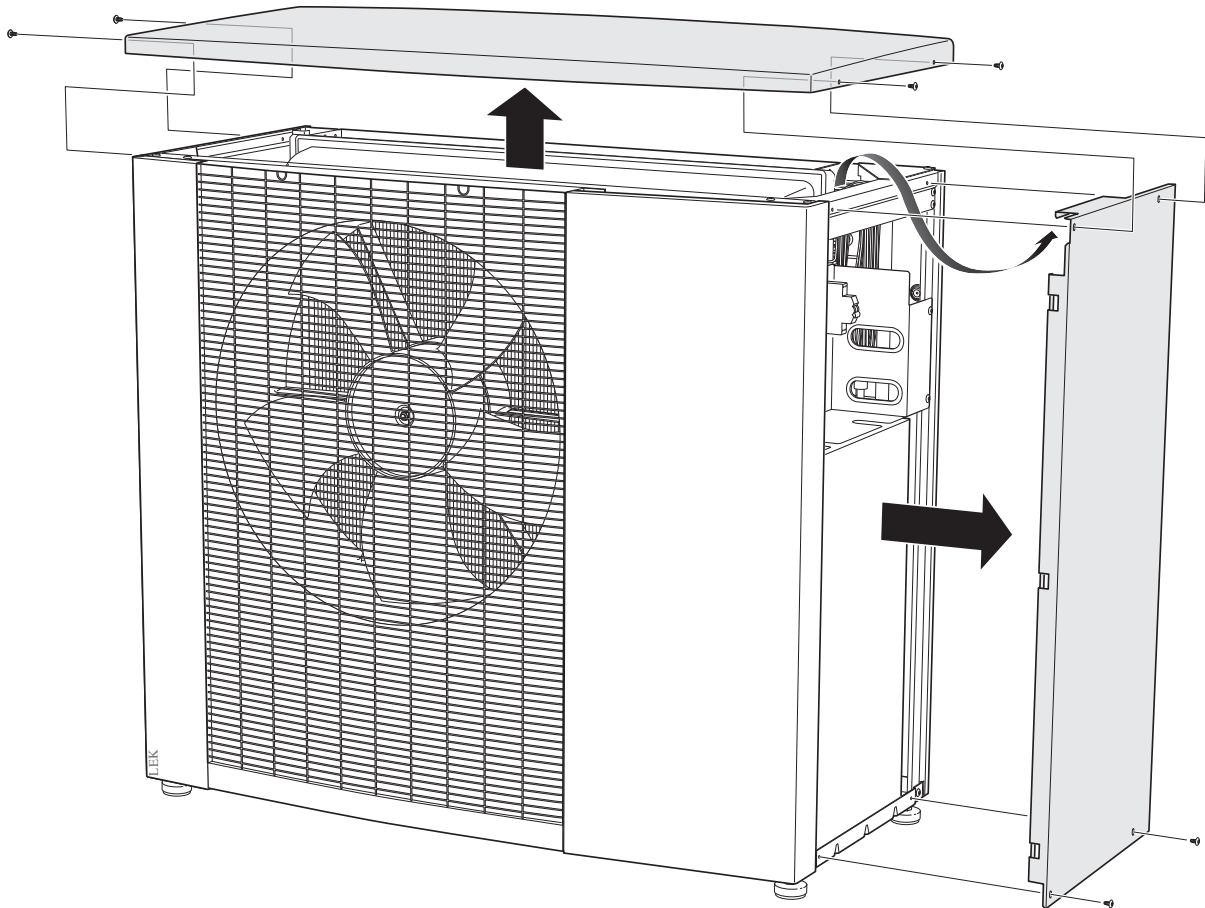
When replacing components on F2120 only replacement parts from NIBE may be used.

An ESD bracelet must be worn when replacing the card.

Basic

Removing the side panel gives access to all the electronics.

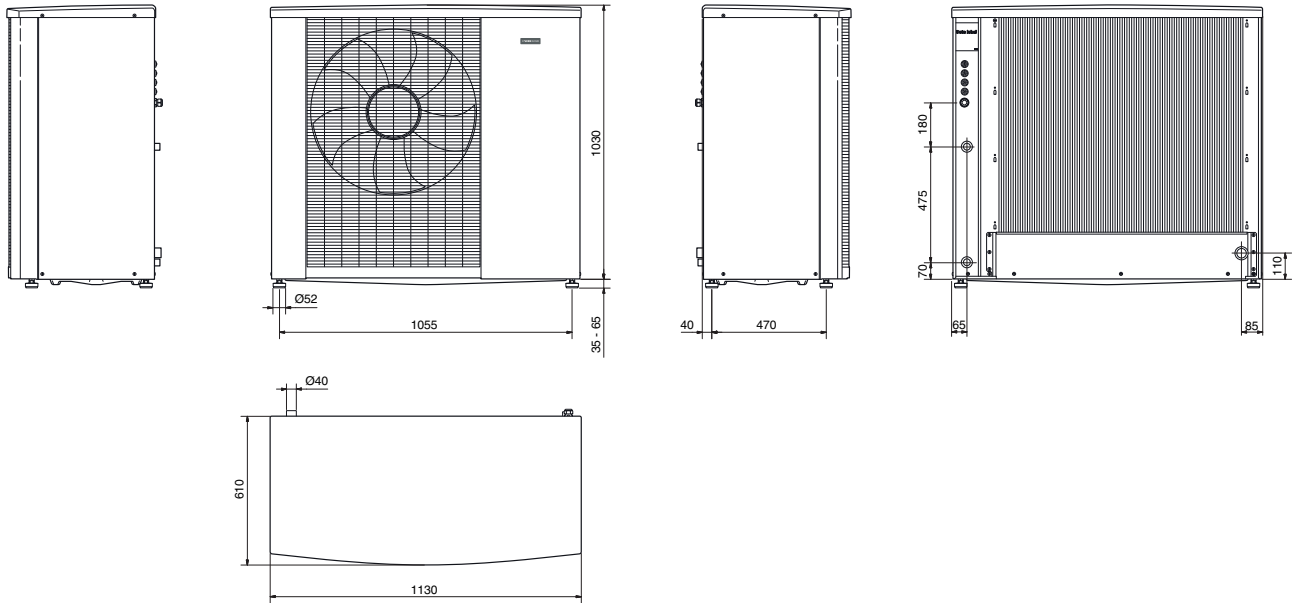
Removing the side cover and top panel



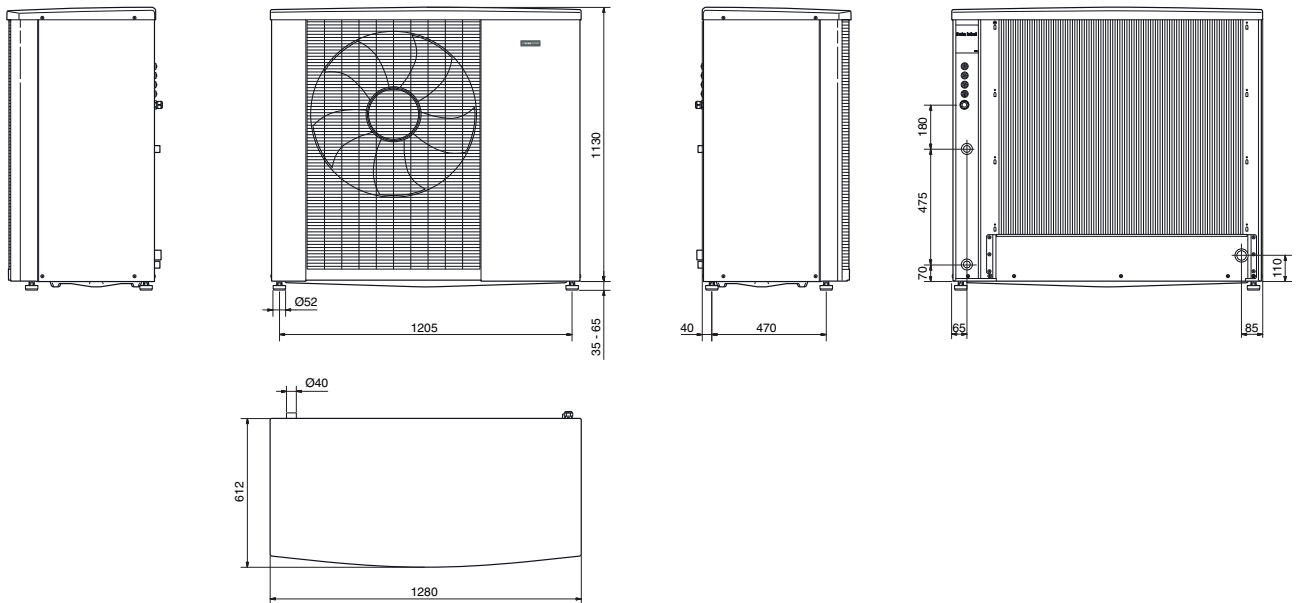
7 Technical data

Dimensions and setting-out coordinates

F2120-8



F2120-12, -16, -20



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/-	3.57 / 0.78 / 4.57	3.54 / 0.69 / 5.12
7/45 Rated output / Supplied power / COP _{EN14511}	kW/kW/-	3.66 / 0.98 / 3.74	3.64 / 0.91 / 4.00
2/35 Rated output / Supplied power / COP _{EN14511}	kW/kW/-	4.03 / 0.91 / 4.43	5.21 / 1.22 / 4.27
2/45 Rated output / Supplied power / COP _{EN14511}	kW/kW/-	4.07 / 1.16 / 3.51	5.27 / 1.49 / 3.54
Cooling	Outd. temp: / Supply temp.	Max	Max
Output data according to EN14511 ΔT5K	35 / 7 °C	3.80 / 1.28 / 2.97	4.69 / 1.70 / 2.76
Specified/supplied power/EER	35 / 18 °C	5.10 / 1.37 / 3.73	5.44 / 1.73 / 3.15
Electrical data			
Rated voltage		230V~50Hz	
Max operating current, heat pump	A _{rms}	14	16
Max operating current, compressor	A _{rms}	13	15
Max output, fan	W	40	45
Fuse	A _{rms}	16	16
Refrigerant circuit			
Type of refrigerant		R410A	
GWP refrigerant		2,088	
Type of compressor		Scroll	
Volume	kg	2.4	2.6
CO ₂ equivalent	t	5.01	5.43
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
Min/Max air temp, max	°C	-25 / 43	
Defrosting system		reverse cycle	
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
Min/Max HM temp continuous operation	°C	26 / 65	
Connection heating medium F2120		G1 1/4" external thread	
Connection heating medium flex pipe		G1 external thread	

F2120 – 1x230V		8	12
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
(excl. packaging)	kg	150	160
Miscellaneous			
Enclosure class		IP24	
Colour		grey	
Part No.		064 134	064 136

F2120 – 2x230V		8	12
Heating			
Output data according to EN 14511, partial load ¹⁾			
7/35 Rated output / Supplied power / COP _{EN14511}	kW/kW/-	3.57 / 0.78 / 4.57	3.54 / 0.69 / 5.12
7/45 Rated output / Supplied power / COP _{EN14511}	kW/kW/-	3.66 / 0.98 / 3.74	3.64 / 0.91 / 4.00
2/35 Rated output / Supplied power / COP _{EN14511}	kW/kW/-	4.03 / 0.91 / 4.43	5.21/ 1.22 / 4.27
2/45 Rated output / Supplied power / COP _{EN14511}	kW/kW/-	4.07 / 1.16 / 3.51	5.27 / 1.49 / 3.54
Cooling	Outd. temp: / Supply temp.	Max	Max
Output data according to EN14511 ΔT5K	35 / 7 °C	3.80 / 1.28 / 2.97	4.69 / 1.70 / 2.76
Specified/supplied power/EER	35 / 18 °C	5.10 / 1.37 / 3.73	5.44 / 1.73 / 3.15
Electrical data			
Rated voltage		230V 2~ 50Hz	
Max operating current, heat pump	A _{rms}	14	16
Max operating current, compressor	A _{rms}	13	15
Max output, fan	W	40	45
Fuse	A _{rms}	16	16
Refrigerant circuit			
Type of refrigerant		R410A	
GWP refrigerant		2,088	
Type of compressor		Scroll	
Volume	kg	2.4	2.6
CO ₂ equivalent	t	5.01	5.43
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
Min/Max air temp, max	°C	-25 / 43	
Defrosting system		reverse cycle	

F2120 – 2x230V		8	12
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
Min/Max HM temp continuous operation	°C	26 / 65	
Connection heating medium F2120		G1 1/4" external thread	
Connection heating medium flex pipe		G1 external thread	
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
(excl. packaging)	kg	150	160
Miscellaneous			
Enclosure class		IP24	
Colour		grey	
Part No.		064 193	064 194

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/-	3.57/0.78/4.57	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/-	3.66/0.98/3.74	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/-	4.03/0.91/4.43	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/-	4.07/1.16/3.51	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 ΔT5K	35 / 7 °C	3.80/1.28/2.97	4.69/1.70/2.76	7.09/2.72/2.61	8.10/3.50/2.31
Specified/supplied power/EER	35 / 18 °C	5.10/1.37/3.73	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	40	45	68	80
Fuse	A _{rms}	10	10	10	13
Refrigerant circuit					
Type of refrigerant		R410A			
GWP refrigerant		2,088			
Type of compressor		Scroll			
Volume	kg	2.4	2.6	3	3
CO ₂ equivalent	t	5.01	5.43	6.26	6.26
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			
Defrosting system		reverse cycle			
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
Min/Max HM temp continuous operation	°C	26 / 65			
Connection heating medium F2120		G1 1/4" external thread			
Connection heating medium flex pipe		G1 external thread		G1 1/4" external thread	
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					
Enclosure class		IP24			
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)	5.9	4.80	8	4.83	11	5.05	11	5.05
SCOP 55 Average climate (Europe)	6.3	3.75	8.3	3.78	12.3	3.9	12.3	3.9
SCOP 35 Cold climate	6.8	4.03	9.3	4.05	13	4.25	13	4.25
SCOP 55 Cold climate	7.4	3.33	9.8	3.33	14	3.53	14	3.53
SCOP 35 Warm climate	5.9	5.43	9.2	5.48	13	5.5	13	5.5
SCOP 55 Warm climate	6.3	4.35	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.

Accessories

Not all accessories are available on all markets.

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, 3x400 V

Part no. 069 108

Stainless steel, 3x400 V

Part no. 069 109

Enamel, 3x400 V

With integrated EMK 300

Part no. 069 110

Stainless steel, 3x230 V

Part no. 069 113

Stainless steel, 1x230 V

Part no. 069 111

Stainless steel, 1x230 V

With T&P valve

Part no. 069 112

VVM 325

Copper, 3x400 V

Part no. 069 154

VVM 500

Part no. 069 400

8 Item register

Item register

A

Accessories, 34
Addressing via multi-heat pump operation, 16

B

Basic actions, 21

C

Control - Introduction
LED status, 16

D

Delivery and handling
Removing the side cover, 27
Dimensions and setting-out coordinates, 28
Disturbances in comfort
Troubleshooting, 21
Document information, 3

E

Electrical cabinet, 9
Electrical connections
Addressing via multi-heat pump operation, 16
Electronics
Extra relay circuit board (AA7), 14
Extra relay circuit board (AA7), 14

F

F2120 does not communicate, 21
F2120 is not operational, 21

H

High room temperature, 21

I

Ice build-up in the fan, grille and/or fan cone, 21
Important information, 3
Document information, 3

L

Large amount of water below F2120, 21
LED status, 16
Low hot water temperature or no hot water, 21
Low room temperature, 21

M

Marking, 3

R

Removing the side cover, 27

S

Safety information
Marking, 3
Symbols, 3
Symbols on F2120, 3
Sensor placement, 19
Symbols, 3
Symbols on F2120, 3

T

Technical data
Dimensions and setting-out coordinates, 28
Technical Data, 29
Technical Data, 29
The heat pump design, 4
Component list electrical cabinet, 9
Component location electrical cabinet, 9
Component locations, 4
List of components, 4, 8
Troubleshooting, 21
Alarm list, 22

Basic actions, 21

F2120 does not communicate, 21

F2120 is not operational, 21

High room temperature, 21

Ice build-up in the fan, grille and/or fan cone, 21

Large amount of water below F2120, 21

Low hot water temperature or no hot water, 21

Low room temperature, 21

Sensor placement, 19

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