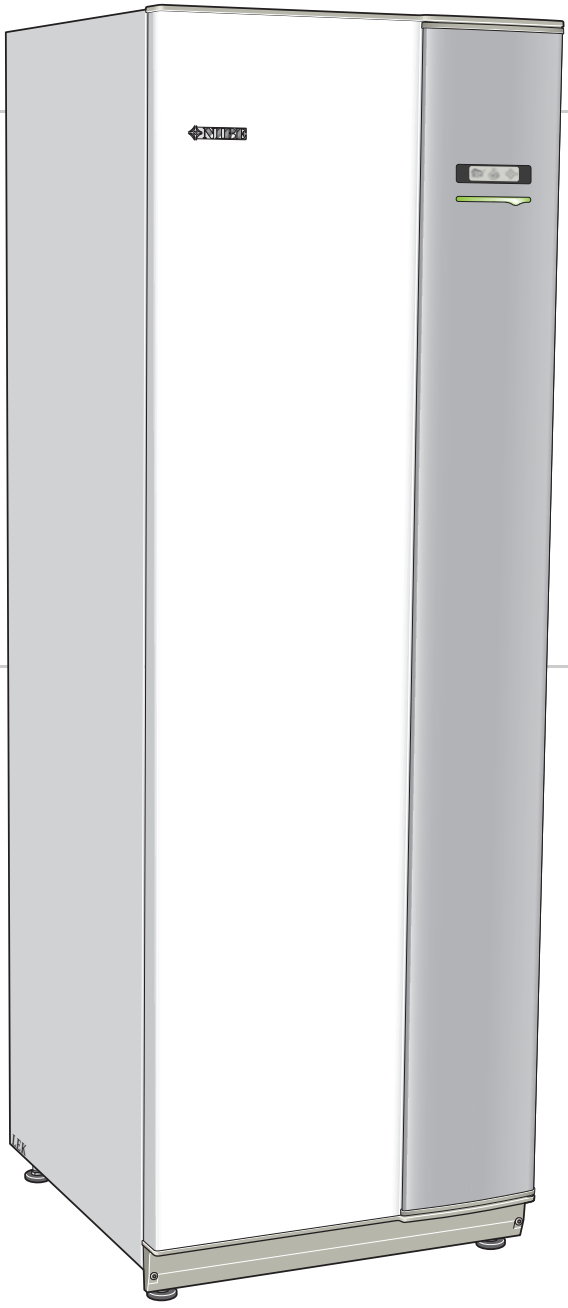


Service manual

F1345

Ground source heat pump

SEM GB 1714-2
431514

Table of Contents

1 Important information

Document information

This technical manual is a complement to the Installer handbook for F1345, containing:

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

The document applies to heat pumps with part no.:

24 kW	065 297
30 kW	065 298
40 kW	065 299
60 kW	065 300

The heat pump software version can be found in the info menu (menu 3.1).

Safety information

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

SEMKO text

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

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

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

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

F1345 is CE marked and fulfils IP21.

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

IP21 means that objects with a diameter larger than or equivalent to 12.5 mm cannot penetrate and cause damage and that the product is protected against vertically falling drops of water.

Safety precautions

Caution

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

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

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

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

Install the unit in a location with good support.
Unsuitable installation locations can cause the unit to fall and cause material damage and personal injury. Installation without sufficient support can also cause vibrations and noise.

Ensure that the unit is stable when installed, so that it can withstand earthquakes and strong winds.
Unsuitable installation locations can cause the unit to fall and cause material damage and personal injury.

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

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

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

Use types of pipe and tools stated for this type of refrigerant.
Using existing parts for other refrigerants can cause breakdowns and serious accidents due to process circuit bursts.

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

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

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

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

Care

Carry out the electrical installation with care.
Do not connect the ground lead to the gas line, water line, lightning conductor or telephone line's ground lead. Incorrect grounding can cause unit faults such as electric shocks due to short-circuiting.

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

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

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

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

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

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

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

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

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

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

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

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

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

Especially for units intended for R407C and R410A

- Do not use other refrigerants that those intended for the unit.

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

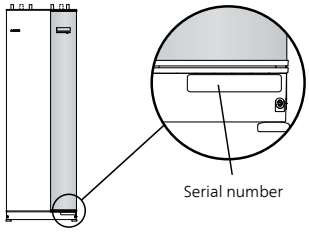
- When filling refrigerant, the refrigerant must always leave the bottle in liquid form.

- R410A means that the pressure is about 1.6 times as high as for conventional refrigerants.

- The filling connections on units with R410A are different sizes, to prevent the system being filled with the incorrect refrigerant by mistake.

Serial number

The serial number can be found at the bottom right of the front cover and in the info menu (menu 3.1) and on the type plate (PF1).



Caution

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

Recovery

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

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

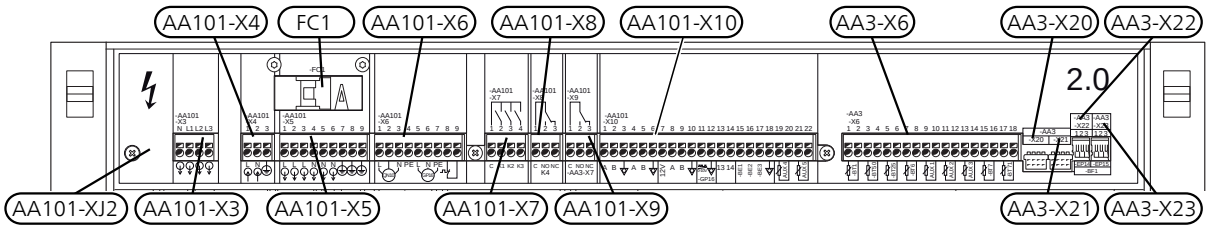
Improper disposal of the product by the user results in administrative penalties in accordance with current legislation.

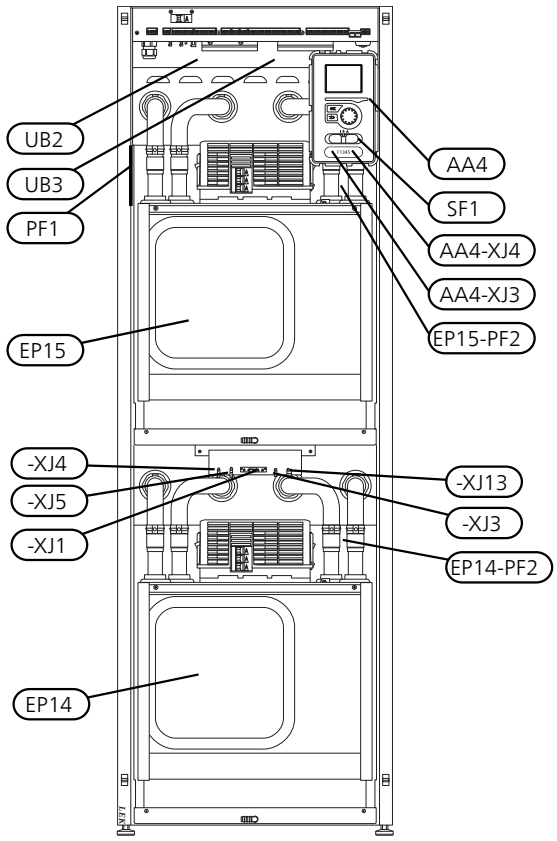
Environmental information

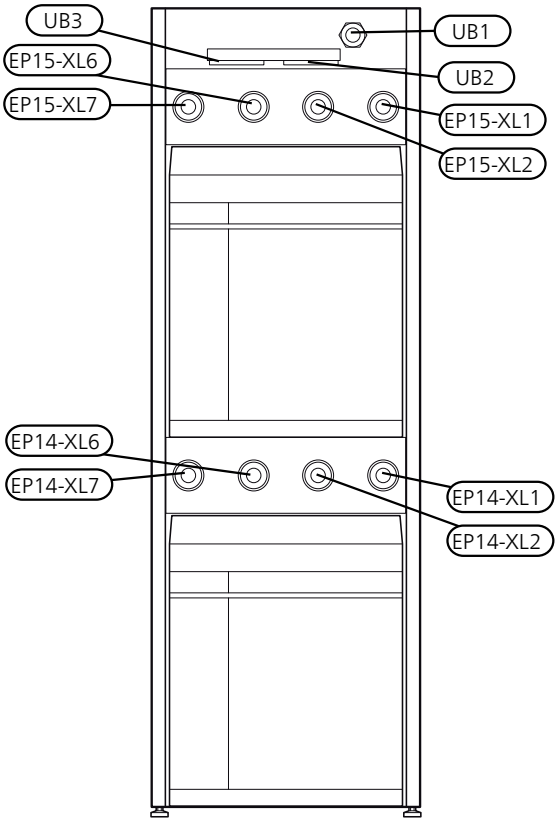
The equipment contains R407C or R410A, fluorinated greenhouse gases with GWP values (Global Warming Potential) of 1774 and 2088 respectively. Do not release R407C or R410A into the atmosphere.

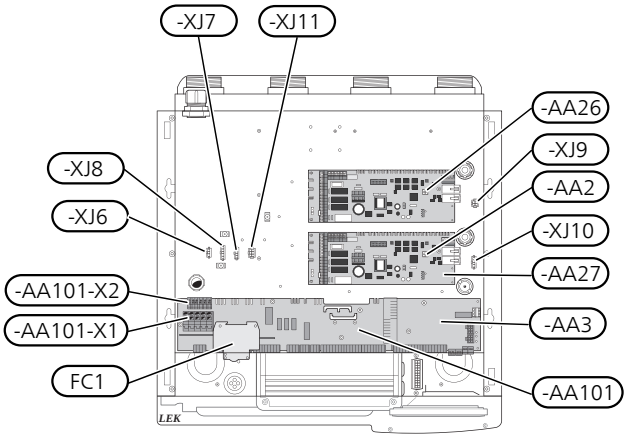
2 The heat pump design

General









Pipe connections

XL 1	Connection, heating medium flow
XL 2	Connection, heating medium return
XL 6	Connection, brine in
XL 7	Connection, brine out

HVAC components

EP 14	Cooling module
EP 15	Cooling module

Sensors etc.

BT 1	Outside sensor

Electrical components

-AA 2	Base card
-AA 3	Input circuit board
AA3-X 6	Terminal block, sensor
AA3-X 20	Terminal block -EP14 -BP8
AA3-X 21	Terminal block -EP15 -BP8
AA3-X 22	Terminal block, flow meter -EP14 -BF1
AA3-X 23	Terminal block, flow meter -EP15 -BF1
-AA 4	Display unit
	-AA4-XJ3 USB outlet (no function)
	-AA4-XJ4 Service outlet (No function)
-AA 26	Base card 2
-AA 27	Relay board for base
AA101	Interface board
AA101-X 1	Terminal block, incoming electrical supply
AA101-X 2	Terminal block, supply -EP14
AA101-X 3	Terminal block, operating voltage out -X4
AA101-X 4	Terminal block, operating voltage in (tariff option)
AA101-X 5	Terminal block, supply, external accessories.
AA101-X 6	Terminal block, -QN10 and -GP16
AA101-X 7	Terminal block, step controlled or shunted additional heat.
AA101-X 8	Emergency mode relay
AA101-X 9	Alarm relay, AUX relay
AA101-X 10	Communication, PWM, Power supply
-FC 1	Miniature circuit-breaker
-SF 1	Switch on Display -AA4
-XJ 1	Connector, electrical supply to compressor, cooling module -EP14
AA101-XJ 2	Connector, electrical supply to compressor, cooling module -EP15
-XJ 3	Compressor heater -EP14
-XJ 4	Connector, brine pump, cooling module -EP14 (only 24 and 30 kW)
-XJ 5	Connector, heating medium pump, cooling module -EP14
-XJ 6	Compressor heater-EP15
-XJ 7	Connector, brine pump, cooling module -EP15 (only 24 and 30 kW)
-XJ 8	Connector, heating medium pump, cooling module -EP15
-XJ 9	Communication motor module -EP15
-XJ 10	Communication motor module -EP14
-XJ 11	Pumps, compressor heater -EP14
-XJ 13	Communication motor module -EP14

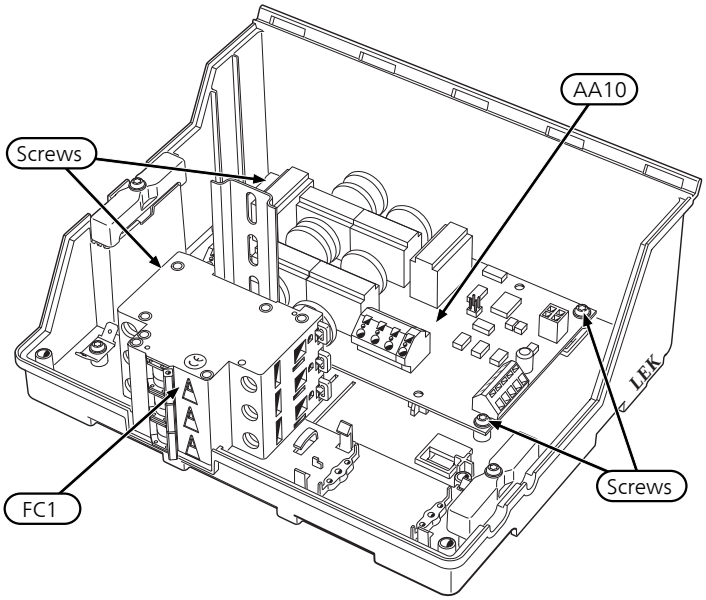
Miscellaneous

PF 1	Rating plate
PF 2	Type plate, cooling section
PF 3	Serial number plate
UB 1	Cable gland, incoming electricity
UB 2	Cable gland, power
UB 3	Cable gland, signal

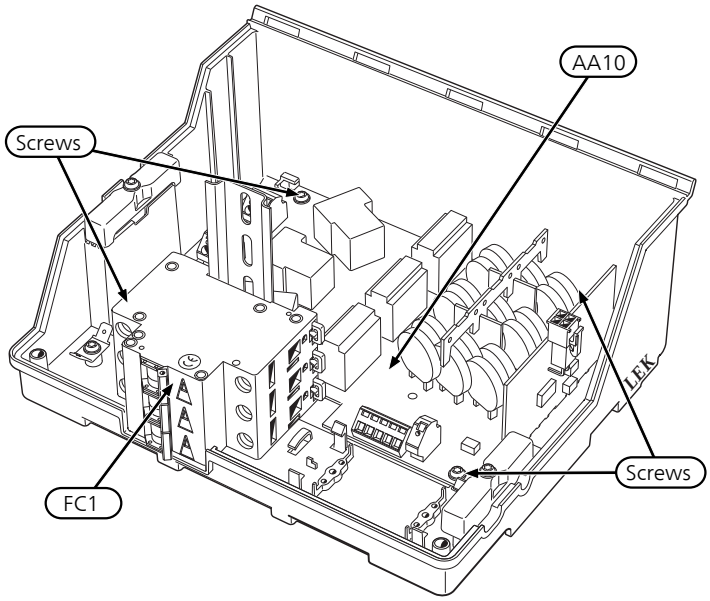
Designations in component locations according to standard IEC 81346-1 and 81346-2.

Electrical cabinets

F1345 24 kW, 3x400 V



F1345 30, 40 and 60 kW, 3x400 V



Electrical components

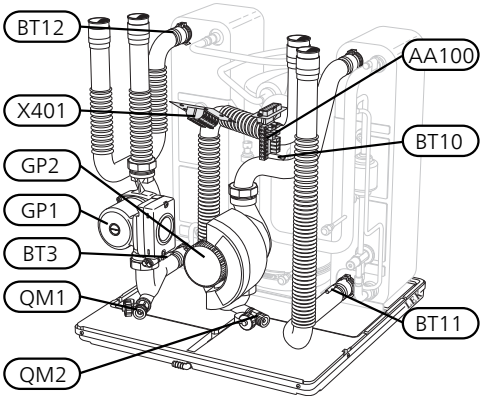
AA 10 Soft-start card

FC 1 Miniature circuit-breaker

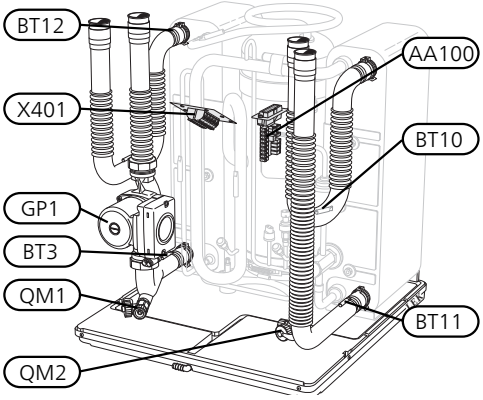
Designations in component locations according to standard IEC 81346-1 and 81346-2.

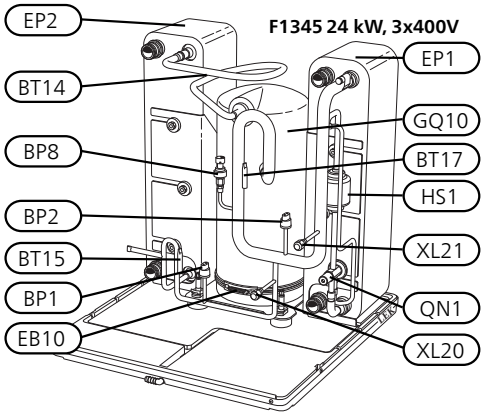
Cooling section

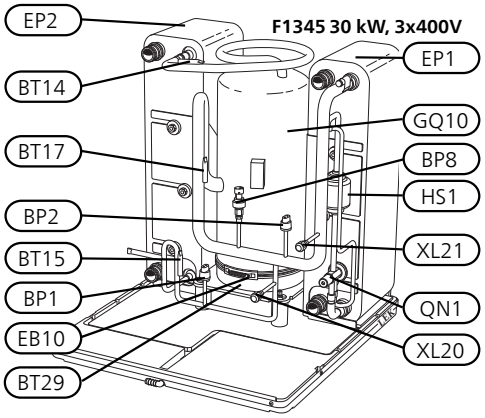
F1345 24 and 30 kW, 3x400 V

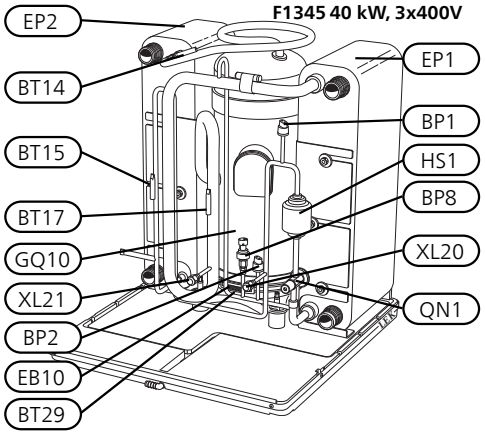


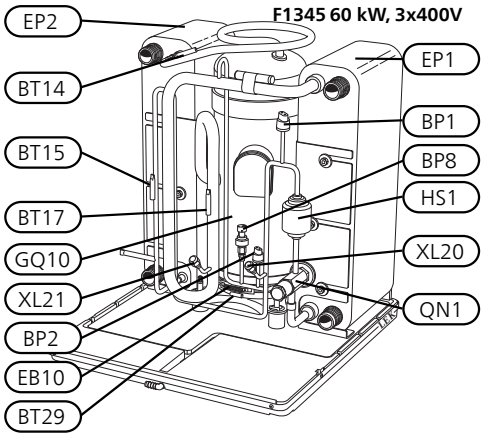
F1345 40 and 60 kW, 3x400 V











Pipe connections

XL 20 Service connection, high pressure
XL 21 Service connection, low pressure

HVAC components

GP 1 Circulation pump
GP 2 Brine pump
QM 1 Drainage, climate system
QM 2 Draining, brine side

Sensors etc.

BP 1 High pressure pressostat
BP 2 Low pressure pressostat
BP 8 Sensor, low pressure
BT 3 Temperature sensors, heating medium return
BT 10 Temperature sensor, brine in
BT 11 Temperature sensor, brine out
BT 12 Temperature sensor, condenser supply line
BT 14 Temperature sensor, hot gas
BT 15 Temperature sensor, fluid pipe
BT 17 Temperature sensor, suction gas
BT 29 Temperature sensor, compressor

Electrical components

AA 100 Joint card
EB 10 Compressor heater
X 401 Joint connector, compressor and motor module

Cooling components

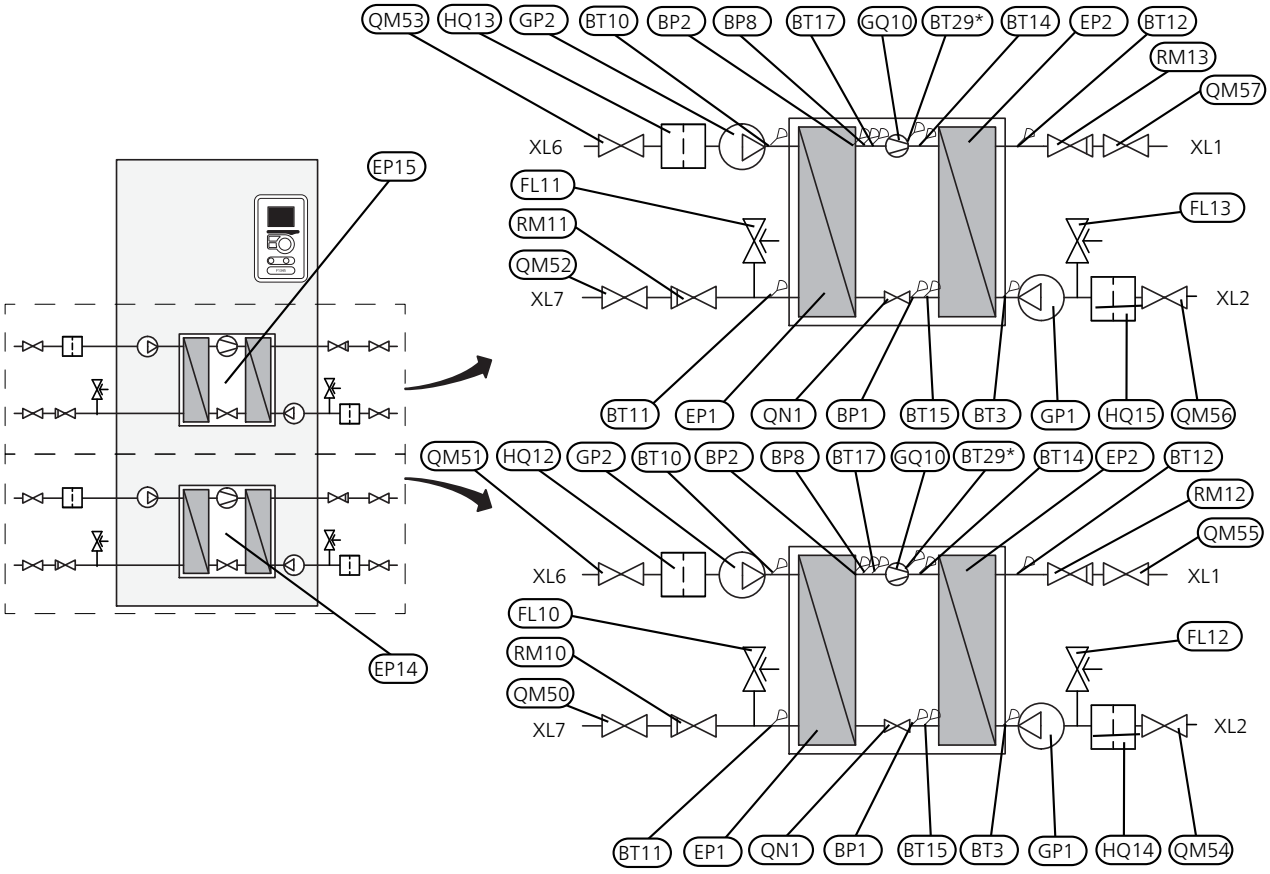
EP 1 Evaporator
EP 2 Condenser
GQ 10 Compressor
HS 1 Drying filter
QN 1 Expansion valve

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

3 System description

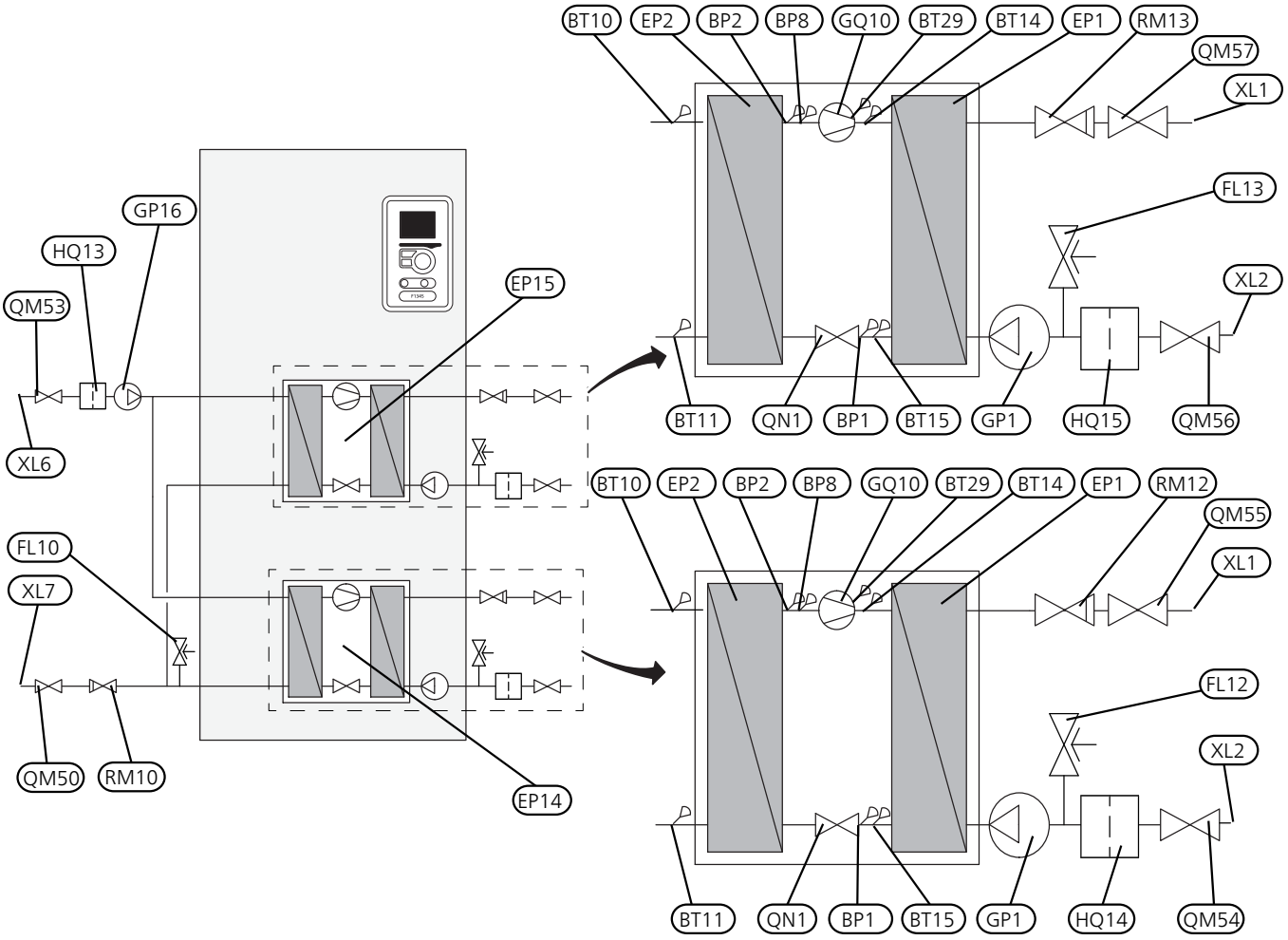
Principle of operation

F1345 24 and 30 kW, 3x400 V



* Only on F1345 30 kW

F1345 40-60 kW, 3x400V



List of components

The different components are on both EP14 and EP15.

Pipe connections

XL 1	Connection, heating medium flow
XL 2	Connection, heating medium return
XL 6	Connection, brine in
XL 7	Connection, brine out

Cooling components

EP 1	Evaporator
EP 2	Condenser
GQ 10	Compressor
HS1	Drying filter
QN 1	Expansion valve

HVAC components

EP14	Cooling module B
EP15	Cooling module A
GP1	Circulation pump
GP2	Brine pump
QM1	Draining, Climate system
QM2	Draining, Brine system
HQ12 - 15	Particle filter
RM10 - 13	Non-return valve
QM50 - 53	Shut-off valve, Brine side
QM54 - 57	Shut-off valve, heating medium side
FL10 - 11	Safety valve, collector side
FL12 - 13	Safety valve, heating medium side

Sensors etc.

Sensors connected internally

	Name	Location	Function
BP1	High pressure pressostat	On the liquid line.	Protects the compressor against pressures that are too high.
BP2	Low pressure pressostat	On suction gas line.	Protects the compressor against pressures that are too low.
BP8	Low pressure transmitter	On suction gas line.	Controls preheating of compressor in relation to BT29.
BT1*	Outside sensor	Outdoor, shaded location on north side of the house.	Set point values for heating and cooling demand calculation. Operating mode change.
BT3	Return pipe	On return line between circulation pump (GP1) and condenser (EP2).	Stopping the compressor at high temp.
BT6*	Hot water, charging	On accumulator tank lower section.	Start and stop of hot water charging.
BT7*	Hot water, top	On accumulator tank top.	Display only.
BT10	Brine in	On incoming brine, at 24 - 30 kW before circulation pump (GP2) and on 40 - 60 kW after externally installed circulation pump.	Stopping the compressor at high temp.
BT11	Brine out	On outgoing HTF after evaporator.	Stopping the compressor at low temp.
BT12	Condenser flow line	On the supply line after the condenser ((EP2).	Stopping the compressor at high temp.
BT14	Discharge	On hot gas line after the compressor (GQ10)).	Stopping the compressor at high temp.
BT15	Fluid pipe	On the fluid line after the condenser ((EP2).	View.
BT17	Suction gas	On suction gas line before the compressor (GQ10).	View.
BT25*	External flow line	On the heating system supply line.	Calculating DM for heating and cooling.
BT29**	Oil temp.	On the compressor.	Controls preheating of compressor in relation to BP8. Display of oil temperature during operation.
BT50*	Room sensor	In suitable indoor location.	Correction of indoor temperature.
BT71*	External return line sensor	On the heating system return line.	View.

* Externally mounted (not included in outline diagram).

** Not on 24 kW.

External

	Name	Location	Function
CL11-BT51	Pool sensor	On pool water pipe in heat exchanger.	Stop and start of pool charging.
EP30-BT53	Solar panel temp	On the solar panel.	In relation to BT54, stop and start of solar charging.
EP30-BT54	Solar tank, bottom	On solar tank bottom.	In relation to BT53, stop and start of solar charging.
EM1-BT52	Boiler sensor	In additional heat boiler.	Closes additional heat mixing valve when boiler is cold. Controls additional heat shunt at boiler to give desired supply temperature.
EQ1-BT57	Cooling dump sensor	On supply line, cooling.	Calculation of cooling DM.
EQ1-BT64	Flow line, cooling	On supply line, cooling.	Actual value for shunt valve cooling (EQ1-QN18).
EQ1-BT65	Return line, cooling	On return line, cooling.	View.
EQ1-BT75	Heating dump sensor	On collector in.	Actual value for cooling dumping.
EP21-BT2	Flow line, extra climate system	On flow line to extra climate system 2.	Actual value for mixing valve, climate system 2.
EP21-BT3	Return line, extra climate system	On return line from extra climate system 2.	View.
EP22-BT2	Flow line, extra climate system	On flow line to extra climate system 3.	Actual value for mixing valve, climate system 3.
EP22-BT3	Return line, extra climate system	On return line from extra climate system 3.	View.
EP23-BT2	Flow line, extra climate system	On flow line to extra climate system 4.	Actual value for mixing valve, climate system 4.
EP23-BT3	Return line, extra climate system	On return line from extra climate system 4.	View.
AZ1-BT20	Exhaust air	In exhaust air in FLM.	View.
AZ1-BT21	Extract air	In extract air in FLM.	Controls defrosting
AZ1-BT26	Collector in	On incoming collector line in FLM.	View.
AZ1-BT27	Collector out	On outgoing collector line in FLM.	View.
AZ2-BT20	Exhaust air	In exhaust air.	View.
AZ2-BT21	Extract air	In extract air.	Controls defrosting
AZ2-BT26	Collector in	On incoming collector line.	View.
AZ2-BT27	Collector out	On outgoing collector line.	View.
AZ3-BT20	Exhaust air	In exhaust air.	View.
AZ3-BT21	Extract air	In extract air.	Controls defrosting
AZ3-BT26	Collector in	On incoming collector line.	View.

	Name	Location	Function
AZ3-BT27	Collector out	On outgoing collector line.	View.
AZ4-BT20	Exhaust air	In exhaust air.	View.
AZ4-BT21	Extract air	In extract air.	Controls defrosting
AZ4-BT26	Collector in	On incoming collector line.	View.
AZ4-BT27	Collector out	On outgoing collector line.	View.
QZ1-BT70	Outgoing hot water	On outgoing HWC pipe.	Actual value for mixer valve.
EQ1-BT82	HWC Return	On HWC return.	Only display.
EQ1-BT83	Water heater	On top of additional water heater.	Only display.

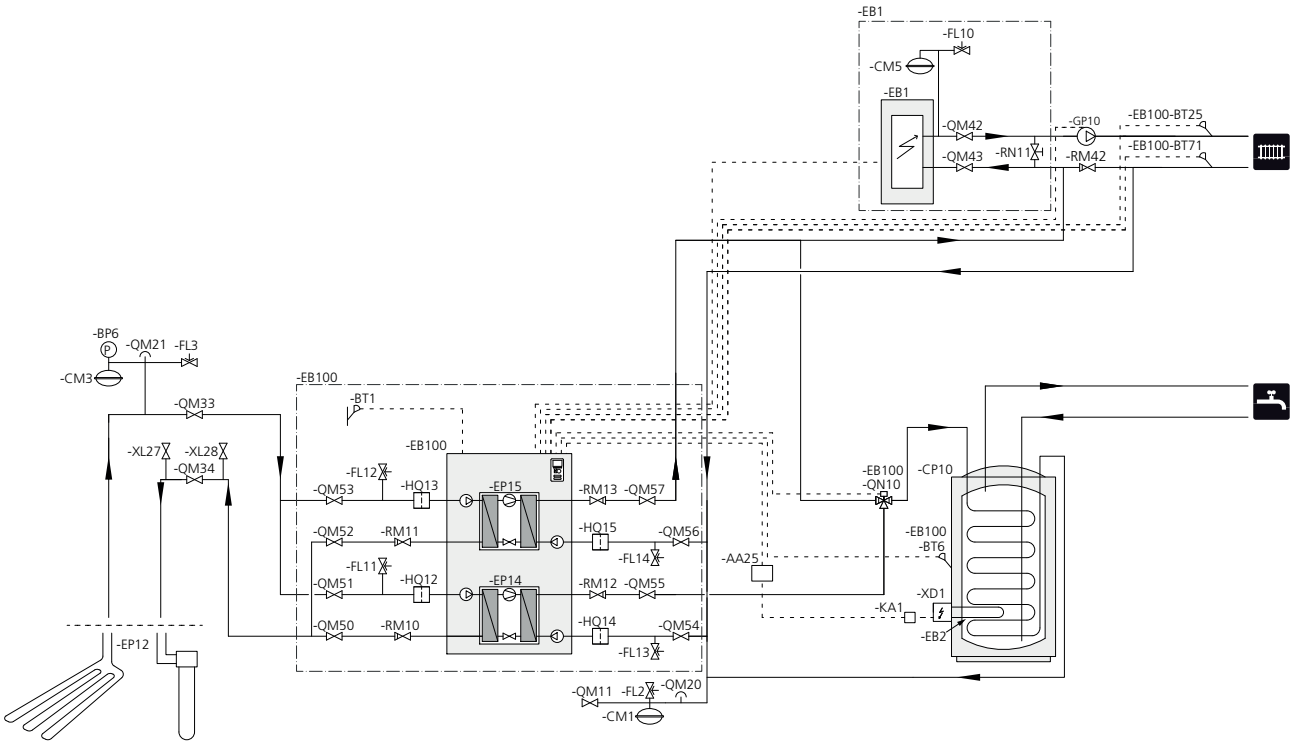
System diagram

Heating

This is an example of an outline diagram. Actual installation must be project planned according to applicable norms!

NOTE

Components within the hatched area designated -EB100 or - EB1 all have -EB100 or - EB1 as suffix. For example -EB100-RM13.



Function

The heat pump (EB100) prioritises charging of hot water with half the power (cooling module EP14) via a reversing valve (QN10). When the water heater/accumulator tank (CP10) are fully charged (QN10) switches to the heating circuit. When there is a heating demand, cooling module (EP15) starts first. For greater demands, cooling module (EP14) also starts for heating operation.

Additional heat (EB1) is connected automatically when the energy demand exceeds the heat pump capacity.

If the water heater/accumulator tank (CP10) is fitted with an immersion heater (IU) and a junction box (K11) the "temporary lux" function can be used. A contactor is required.

TIP

Refer to the Installer manual for description of possible docking alternatives.

Installation requirements

Heating medium side

		24 kW	30 kW	40 kW	60 kW
Max system pressure	Bar	6			
Min recommended volume heating system*	l	360	450	600	900
Min flow**	l/s	0.37	0.50	0.64	0.92
Nominal flow	l/s	0.54	0.73	0.93	1.34
Max recommended flow	l/s	0.70	0.95	1.20	1.74
Max external available pressure at nominal flow***	kPa	78	72	70	50
Min/max temperature	°C	See diagram page 67.			

* min volume refers to circulating flow

** overflow valve must be used if min flow cannot be guaranteed

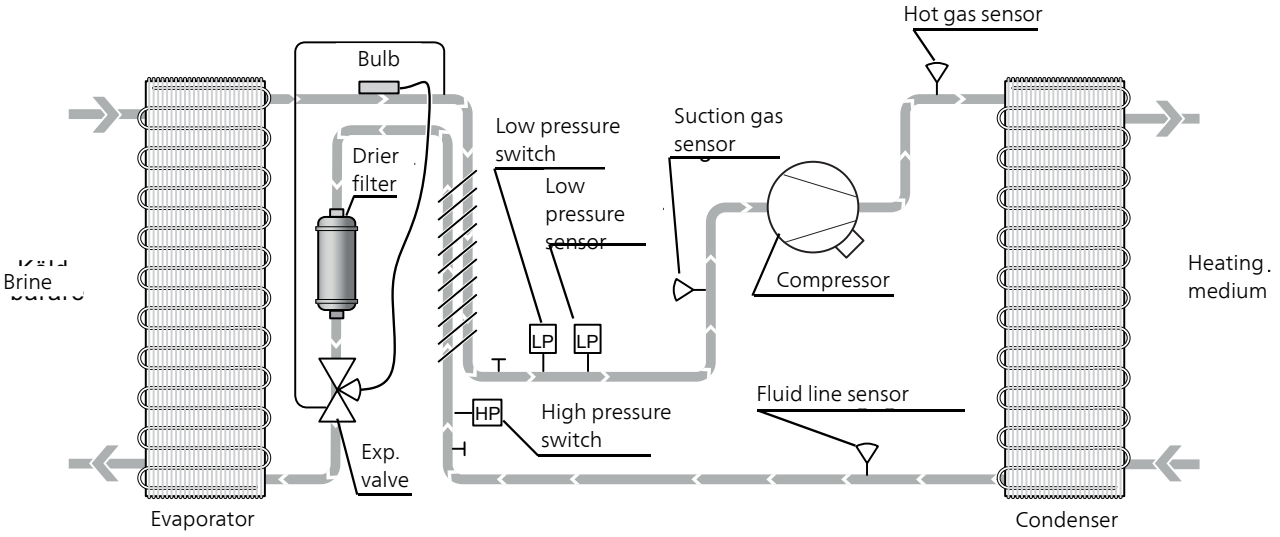
*** external circulation pump must be used when the pressure drop in the system is greater than the available external pressure. In such cases, a bypass line with non-return valve must be installed.

Brine side

		24 kW	30 kW	40 kW	60 kW
Max system pressure	Bar	6			
Min flow	l/s	0.92	1.23	1.59	2.36
Nominal flow	l/s	1.18	1.62	2.09	3.10
Max external available pressure at nominal flow	kPa	95	75	92	78
Max/min incoming temperature	°C	See diagram page 67.			
Min. outgoing brine temperature without/with AMB 30	°C	-12 / -14			

4 Cooling circuit

Outline diagram



Compressor protection

Hot gas temperature

Stop with automatic restart:

- The compressor stops when the temperature exceeds 135 °C in 20 min.
- The compressor stops immediately when the temperature is above 150 °°C.

Stop with manual restart:

- The above has occurred 3 times within 240 minutes.

High pressure pressostat

Stop with manual restart:

Compressor	Stop	Restart
24 - 40 kW	32 bar	25 bar
60 kW	42 bar	35 bar

Low pressure pressostat

Stop with manual restart:

Compressor	Stop	Restart
24 - 40 kW	0.8 bar	1.5 bar
60 kW	2.0 bar	2.7 bar

Low pressure transmitter

30 - 60kW:

Blocking with automatic restart:

- The compressor is blocked for up to 30 minutes at re-start or until BT29 is at least 10 °C above the low pressure sensor temperature.

Stop with manual restart:

Compressor	Stop	Restart
22 - 40 kW	1.3 bar	1.4 bar
60 kW	3.5 bar	3.6 bar

If two phases are missing this is indicated as a motor protection alarm.

Phase monitor

Stop with automatic restart:

- When a phase is below ~160V.
- Incorrect phase sequence.

Stop with manual restart:

- More than 30 minutes have passed since the above events occurred.

Working area

See diagram page 67.

Time conditions

Minimum time between stop and start is 5 min.

Minimum time from start to next start is 20 min.

Compressor heater

When the compressor is inactive the compressor heater is always active.

Expansion valve

Check that overheating occurs by measuring the vapour temperature with a manometer and the suction gas temperature with a service thermometer. The suction gas temperature is measured on the suction pipe at the entrance to the compressor.

Overheating is shown in the table below and must be checked when the temperature of the heating medium flow is 30 - 55 °C and the brine in is -5 - +15 °C.

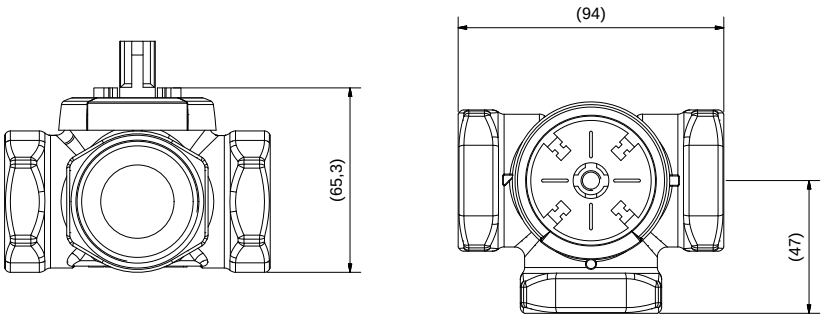
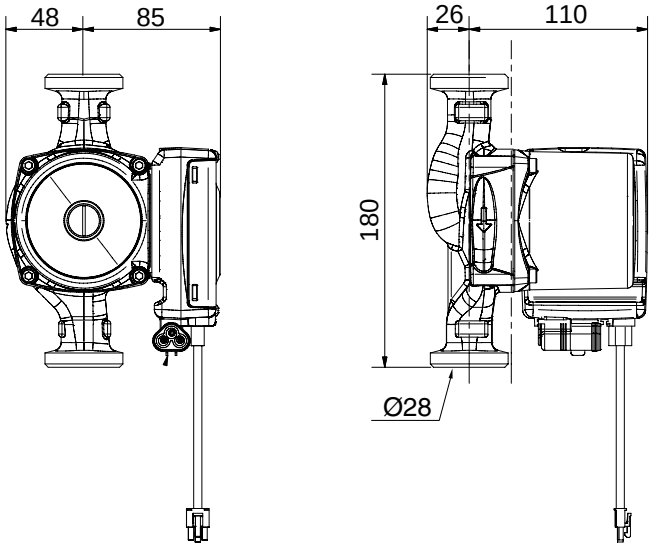
F1345	superheat
24 kW	4 - 6 °C
30 kW	4 - 6 °C
40 kW	4 - 6 °C
60 kW	4 - 6 °C

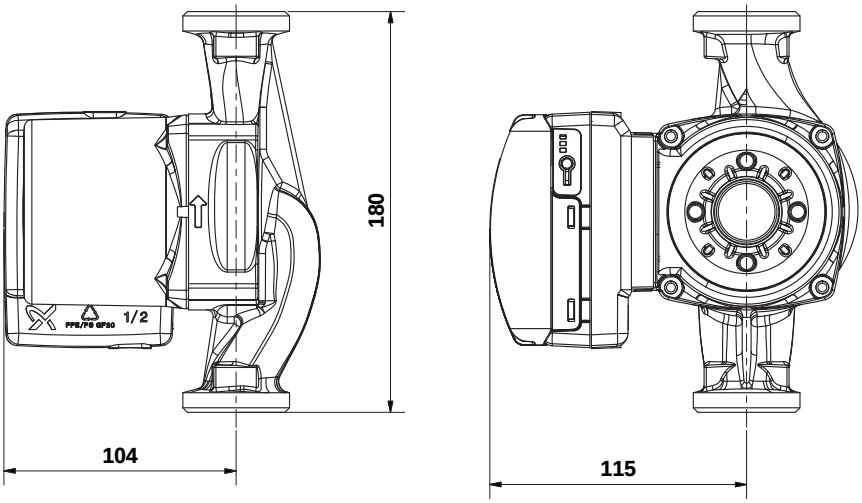
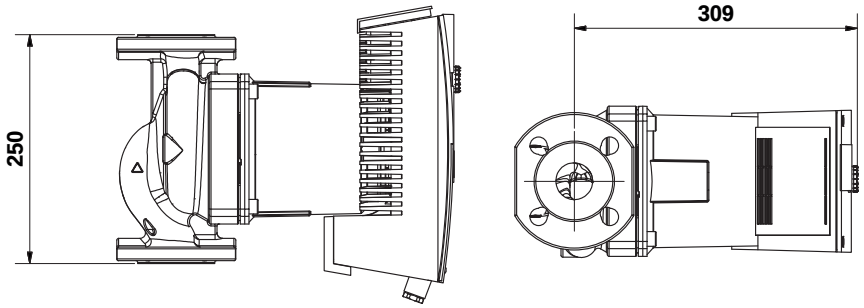
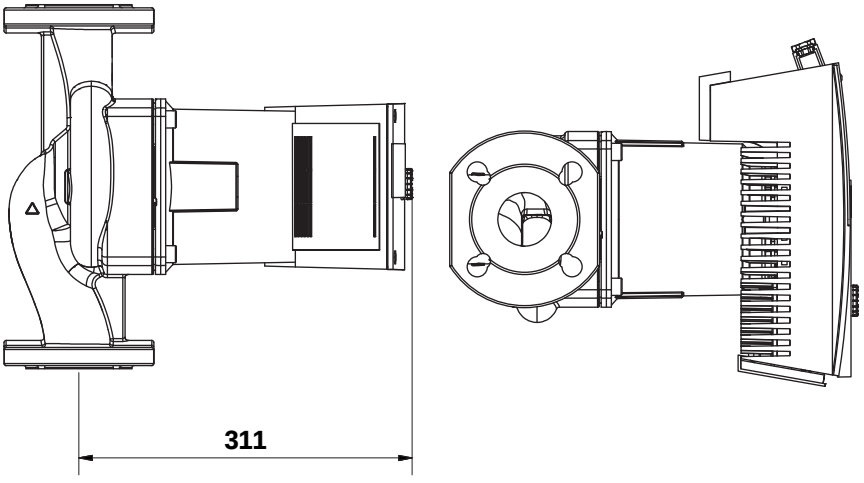
5 Component description

Compressor (GQ10)

Size	Type	Resistance range (Ω at 20 °C +/- 10 %)		
		T1-T3[C-R]	T1-T2[C-S]	T2-T3[S-R]
24	Scroll	3.64	3.64	3.64
30	Scroll	2.52	2.52	2.52
40	Scroll	2.08	2.08	2.08
60	Scroll	1.52	1.52	1.52

Other components

Component	Description
Reversing valve (QN10)	Actuator motor: 7 VA, 230/24 VAC, 50 Hz, IP 40. Running time approx 8 sec. Max. operating pressure: 1.0 MPa Operating temperature: 5 - 80 °C (90 °C briefly) 
Heating medium pump (GP1)	**24 - 60 kW** Max lift height: 7.5 m Control signal: PWM 0-10 V DC (max-min speed) 

Component	Description
Brine pump (GP2)	**24-30 kW** Max lift height: 10 m Control signal: PWM 0-10 V DC (max-min speed) 
Brine pump (GP16)	**40 kW** Max lift height: 18 m 
	60 kW Max lift height: 18 m 

Component	Description
High pressure switch (BP1)	**24-40 kW** Breaking value: 32 bar Reconnection differential: -7 bar **60 kW** Breaking value: 42 bar Reconnection differential: -7 bar
Low pressure switch (BP2)	**24-40 kW** Breaking value: 0.8 bar Reconnection differential: 0.7 bar **60 kW** Breaking value: 2 bar Reconnection differential: 0.7 bar
Compressor heater	Output 2 x 43 W
Low pressure sensor (BP8)	**24-40 kW** Breaking value: 1.3 bar Reconnection differential: 0.1 bar **60 kW** Breaking value: 3.5 bar Reconnection differential: 0.1 bar

Sensors

Temperature sensor data

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

Electronics

Base board (AA2, AA26)

24 - 30 kW

Relay/Output	Function - AA2	Function - AA26
PWM1	Control signal VB pump (EP14 - GP1)	Control signal VB pump (EP15 - GP1)
PWM2	Control signal Brine pump (EP14 - GP2)	Control signal Brine pump (EP15 - GP2)
K1	Reversing valve (EP14 - QN10)	No function
K2	Crankcase heater (EP14 - EB10)	Crankcase heater (EP15 - EB10)
K3	HM pump (EP14 - GP1)	HM pump (EP15 - GP1)
K4	Brine pump (EP14 - GP2)	Brine pump (EP15 - GP2)

40-60 kW

Relay/Output	Function - AA2	Function - AA26
PWM1	Control signal VB pump (EP14 - GP1)	Control signal VB pump (EP15 - GP1)
PWM2	No function	No function
K1	Reversing valve (EP14 - QN10)	No function
K2	Crankcase heater (EP14 - EB10)	Crankcase heater (EP15 - EB10)
K3	HM pump (EP14 - GP1)	HM pump (EP15 - GP1)
K4	Brine pump (EP14 - GP16)	No function

Input circuit board (AA3)

LED	Indication
Power: Green	A steady light means that 12V is OK.
Run: Green	Flashing once/sec. Indicates that the processor is OK.
Com: Green	Flashes irregularly during communication.
PWM1: Orange	Continuous light during active output.
PWM2: Orange	Continuous light during active output.
K1 - K4: Orange	A steady light means that the relevant relay is engaged.

Soft-start card (AA10)

3x400 V

LED	Indication
Power: Green	A steady light means that incoming 12V is OK.
Com: Green	Steady light for approx 10 secs at start-up. Flashes 3 x/3 secs during communication.
Error: Red	Shows alarm status. **1 flash:** Phase 1 missing **2 flash:** Phase L2 missing **3 flash:** Phase L3 missing **4 flash:** Motor protection deployed **5 flash:** Current on K2 is missing (a thermal fuse has probably tripped) **6 flash:** Relay problem Continuous light: Incorrect phase sequence
Compr. on: Orange	Steady light when the compressor is active.
Bypass: Orange	Bypass bridge installed (alarm ignored).

MODBUS 40

LED	Indication
BATT	No function.
RUN	No function.
COM1	Flashes during communication with the heat pump.
LED 4 (-)	No function.
LEV	No function.
COM2	No active communication between Modbus 40 and "external control".
SYNC	No function.
VCC	A steady light means that supply voltage is OK.

SMS 40

LED	Indication
BATT	A steady light if voltage in the battery is above 0 V. Out if the battery is discharged or if no battery is installed.
RUN	No function.
COM1	Flashes during communication with heat pump and at start-up.
LED 4 (-)	A steady light that indicates that 12V is OK.
LEV	Steady light when the GSM signal is OK. Out if the GSM signal is too low.
COM2	Flashes during communication with the GSM modem.
SYNC	Flashes when SMS 40 sends/receives SMS.
VCC	A steady light means that supply voltage is OK.

Accessory card (AA5)

LED	Indication
Power: Green	A steady light means that 12V is OK.
Run: Green	Flashing once/sec. Indicates that the processor is OK.
Com: Green	Flashes irregularly during communication.
PWM1: Orange	Continuous light during active output.
PWM2: Orange	Continuous light during active output.
K1 - K4: Orange	A steady light means that the relevant relay is engaged.

Output	Function
See relevant accessory.	

6 Troubleshooting

Alarm list

Alarm

Functions in the event of alarm:

- Red lamp under the display lights up.
- Alarm icon is shown in the display.
- Alarm relay is activated if AUX output is selected for this.
- If there are several alarms, they are displayed one at a time in numerical order. Scroll between the alarms using the OK button.
- Comfort reduction according to selection in menu 5.1.4.

Resetting alarms:

- Alarm number 1 – 39 resets automatically when the sensor has functioned for 60 seconds or after manual resetting in the menu.
- Alarm 40 – 53, manual resetting in menu.
- Alarm 54, manual resetting of the motor protection breaker and manual resetting in the menu.
- Alarm 55 – 57, manual resetting in menu.
- Alarm 70 – 99 resets automatically when the communication is established.
- Alarms 236 – 244, 253, 258 - 259 are reset automatically when the sensor has functioned for 60 seconds or after manual resetting in the menu.
- Alarm 252, 257, manual resetting in menu.
- Alarm 255 is automatically reset when the input closes again.
- Alarm 301 – 308, manual resetting in menu.

NOTE

The alarm text in the display can vary depending on how many heat pumps are connected to the system.

Example: sensor fault -EB1yy _EPxx _BT3. Where yy is the HP number, xx is the cooling module

Alarm no.	Alarm text on the display	Cause	Heat pump action.	May be due to
1	Sensor flt:BT1	No contact with the sensor (temperature sensor, outdoor).	Calculated supply temp is set to min supply.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
3	Sensor flt:BT3	No contact with the sensor (temperature sensor, heating medium return).	Compressor blocked during hot water charging. "Max condenser supply" is set to "max return".	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
6	Sensor flt:BT6	No contact with the sensor (temperature sensor, hot water charging).	Hot water charging is blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
11	Sens flt:BT11	No contact with the sensor (temperature sensor, brine out).	Compressor blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
12	Sens flt:BT12	No contact with the sensor (temperature sensor, condenser supply).	Compressor blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
20	Flt: AZ1-BT20	No contact with the sensor (temperature sensor, exhaust air).	Circulation pump (AZ1-GP2) in FLM is blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor

Alarm no.	Alarm text on the display	Cause	Heat pump action.	May be due to
21	Err: AZ1-BT21	No contact with the sensor (temperature sensor, extract air).	Circulation pump (AZ1-GP2) in FLM is blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
23	Sens fault: AZ2-BT23 outdoor air sensor	No contact with the sensor (temperature sensor, supply air).	■ Compressor blocked. ■ Stops all fans, opens QN40.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
25	Err: BT25	No contact with the sensor (temperature sensor, heating medium supply, external).	■ Additional heat is blocked. ■ New current value = BT71 + 10K	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
26	Err: AZ1-BT26	No contact with the sensor (temperature sensor, brine collector in).	Circulation pump (AZ1-GP2) in FLM is blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
27	Sensor flt:BP8	No contact with the sensor (sensor, low pressure).	Compressor blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
28	Sens flt:BT71	No contact with the sensor (temperature sensor, heating medium return, external).	No action. Together with alarm 25, heating is blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
29	Sens flt:BT29	No contact with the sensor (temperature sensor, compressor).	Compressor blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
33	Flt: BT53	No contact with the sensor (temperature sensor, solar panel).	Solar accessory is blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
34	Flt: BT54	No contact with the sensor (temperature sensor, solar coil).	Solar accessory is blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
35	Flt: BT52	No contact with the sensor (temperature sensor, boiler).	Shunt closes. Burner stops.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
36	Flt: EP21 BT2	No contact with the sensor (temperature sensor, heating medium supply, climate system 2).	Controls the return line sensor (EP21-BT3).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
37	Flt: EP22 BT2	No contact with the sensor (temperature sensor, heating medium supply, climate system 3).	Controls the return line sensor (EP22-BT3).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
38	Flt: EP23 BT2	No contact with the sensor (temperature sensor, heating medium supply, climate system 4).	Controls the return line sensor (EP23-BT3).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor

Alarm no.	Alarm text on the display	Cause	Heat pump action.	May be due to
39	Err: EQ1-BT64	No contact with the sensor (temperature sensor, cooling supply line).	Cooling blocked. Cooling shunt closes.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
40-42	Compr.phs 1-3	The compressor phase mentioned has been below 160 V for 30 min.	Compressor blocked.	Phase failure.
43	In phs seq	The phases are connected in the wrong order.	Compressor blocked.	The phase order of the incoming electrical supply is wrong.
44	Fault in the soft-start fuses.	Fuses on the soft-start board are defective (applies to 30, 40 and 60 kW).	Compressor blocked.	■ Defective fuse. ■ Defective soft start card.
45	Phase fault (incorrect phase sequence or missing phase).	Communication with the soft-start board has been missing continuously for 30 minutes.	Compressor blocked.	Incorrect phase sequence or missing phase.
51	LP alarm	Low pressure sensor transmitter is below cut-out value.	Compressor blocked.	Bad circulation in the brine. ■ Check the brine pump. ■ Check that the brine has been vented. ■ Check the brine's freezing point. Lack of heating medium or other fault in the cooling circuit. ■ Contact an authorised refrigeration technician.
52	Temperature limiter alarm	The temperature limiter has deployed and been "open" for longer than 30 seconds.	None (managed via hardware).	Poor flow. ■ Check the circulation pump. ■ Check that the heating medium has been vented. ■ Check the pressure in the heating medium system.
53	Lvl sen Br	Brine level switch/ pressure switch has tripped.	Compressor and brine pump blocked.	Leakage in the brine circuit.
54	MP alarm	The motor protection breaker has tripped.	Compressor blocked.	■ Phase failure. ■ Defective compressor.
55	Hot gas alarm	The compressor has been stopped 3 times in 240 minutes because the hot gas has exceeded 135 °C.	Compressor blocked.	Defective compressor.
56	Erroneous serial no	The heat pump has a serial number that does not exist.	Compressors are stopped and relay is deactivated.	Incorrectly entered serial number.

Alarm no.	Alarm text on the display	Cause	Heat pump action.	May be due to
57	Erroneous software	The heat pump software and serial numbers do not match each other.	Compressors are stopped and relay is deactivated.	Incorrect software installed.
58	Pressure switch alarm	The high or low pressure switch has tripped.	Compressor blocked.	Bad circulation in the brine or heating medium side.
60	Lo Bri out	The temperature of the outgoing brine (BT11) drops below the set minimum temperature and the alarm is selected to be permanent.	Compressor blocked.	Bad circulation in the brine. ■ Check the brine pump. ■ Check that the brine has been vented. ■ Check the brine's freezing point.
70	Communication fault with PCA Input.	Communication with the input board (AA3) is missing.	Blocking the relevant compressor. If the heat pump is the master, the calculated supply is set to min. supply.	Defective communication cables.
71	Com.flt Base	Communication with the input board (AA2 or AA26) is missing.	Compressor blocked.	Defective communication cables.
72	Comm.flt MC	Communication with the soft-start board (AA10) is missing.	Compressor blocked.	Defective communication cables.
73-94	Com.err. Acc.	Communication with the accessory card is missing.	Accessory is blocked.	■ Defective communication cables. ■ The accessory is activated in the display while not connected with the communication cable. ■ Incorrectly connected communication cable. ■ Incorrectly set dipswitch. ■ No electrical supply to the accessory card.
96-99	Com.err. RMU	Communication with the room unit is missing.	Room unit is blocked.	Defective communication cables.
130-133	Perm. com. error to climate system 5-8	Communication with the accessory board has been missing for 15 seconds.	Accessory is blocked.	Selected accessory not installed.
206	Perm. com. error "HW comfort"	Communication with the room unit has been missing for 15 seconds.	Accessory is blocked.	■ Defective communication cables. ■ Incorrectly set dipswitch.
236	Sensor fault AZ2-BT20	Contact with the sensor has been missing for longer than 60 seconds (exhaust air).	Blocks AZ2-GP2 (FLM2).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor

Alarm no.	Alarm text on the display	Cause	Heat pump action.	May be due to
237	Sensor fault AZ2-BT21	Contact with the sensor has been missing for longer than 60 seconds (extract air).	Blocks AZ2-GP2 (FLM2).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
238	Sensor fault AZ2-BT26	Contact with the sensor has been missing for longer than 60 seconds (extract air).	Blocks AZ2-GP2 (FLM2).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
239	Sensor fault AZ3-BT20	Contact with the sensor has been missing for longer than 60 seconds (exhaust air).	Blocks AZ3-GP2 (FLM3).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
240	Sensor fault AZ3-BT21	Contact with the sensor has been missing for longer than 60 seconds (extract air).	Blocks AZ3-GP2 (FLM3).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
241	Sensor fault AZ3-BT26	Contact with the sensor has been missing for longer than 60 seconds (extract air).	Blocks AZ3-GP2 (FLM3).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
242	Sensor fault AZ4-BT20	Contact with the sensor has been missing for longer than 60 seconds (exhaust air).	Blocks AZ4-GP2 (FLM4).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
243	Sensor fault AZ4-BT21	Contact with the sensor has been missing for longer than 60 seconds (extract air).	Blocks AZ4-GP2 (FLM4).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
244	Sensor fault AZ4-BT26	Contact with the sensor has been missing for longer than 60 seconds (brine in).	Blocks AZ4-GP2 (FLM4).	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
245 - 251	Perm. com. error "accessory"	Communication with the accessory board has been missing for 15 seconds.	Accessory is blocked.	■ Defective communication cables. ■ Incorrectly set dipswitch.
252	Slave heat pump com. error.1-8	Communication with the slave is missing.	Compressor blocked in the slave.	Defective communication cables.
253	Flt: QZ1-BT70	No contact with the sensor (temperature sensor, hot water, supply line).	The mixing valve is closed and only cold water is permitted.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
255	Motor protection brine pump deployed	On heat pump with 40/60 kW, terminal block X3 1-2 on the input board is open (normally closed).	Relevant compressor blocked. Automatic return at closed input.	
257	Perm. com. error "ACS45"	Communication with the accessory board has been missing for 15 seconds.	Accessory is blocked.	■ Defective communication cables. ■ Incorrectly set dipswitch.

Alarm no.	Alarm text on the display	Cause	Heat pump action.	May be due to
258	Sensor fault EQ1 - BT57	Contact with the sensor has been missing for longer than 60 seconds (temperature sensor cooling, brine).	Relevant compressor blocked.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
259	Sensor fault EQ1 - BT75	Contact with the sensor has been missing for longer than 60 seconds (temperature sensor cooling, supply line heating dump).	Controls on BT50.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
301 - 308	Perm. com. error “Slave” 1-8	Communication with the slave has been missing for 15 seconds.	Slave compressor blocked.	Defective communication cables.
324	Perm. com. error BM1	Communication with BM1 has been missing for 15 seconds.	Set min. calculated cooling supply to 18 °C	Defective communication cables.
336-339	Sensor fault EPXX-BT2	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	The sensor signal is replaced by EPXX-BT3-10K during shunt control.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
357	Com. error PCA Accessory	Communication with the accessory board OPT has been missing for 60 seconds.	None.	Defective communication cables.
358	GBM alarm	Alarm from GBM (OPT) This alarm was generated by the gas boiler	None.	Check the gas boiler.
372	Perm. com. error pool 2	Communication with Pool 2 has been missing for 15 seconds.	Accessory is blocked.	Defective communication cables.

Information messages

In the event of an information message, the green light lights up on the front, and a symbol with a service technician is displayed in the information window, until the message is reset. All information messages are automatically reset, if the cause is rectified. These messages are not registered in the alarm log.

No.	Text in display	Cause	Heat pump action.	Resets automatically when	May be due to
107	Sensor flt:BT7	The input for the sensor receives unreasonably high or low value for longer than 2 seconds and connected to VPB.	The display of BT7 is replaced by "---".	When the sensor has worked continuously for 60 s.	Sensor not connected Open-circuit or defective sensor
123	Sen flt: AZ30-BT23 out air s	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	QN38 closes.	When the sensor has worked continuously for 60 s.	Sensor not connected Open-circuit or defective sensor
140-142	compressor phase1-3 missing	Phase 1 to the compressor has been briefly absent.	Compressor blocked.	The phase returns.	Any check of ■ Phase fuses ■ Cable connections
145	Phase fault (incorrect phase sequence or missing phase).	Incorrect phase sequence or missing phase has been detected.	Compressor blocked.	Communication is restored. Otherwise switches to a permanent alarm, 45.	Check the fuses
150	Temporary HP alarm	The high pressure switch has tripped once during a 150 min period.	Compressor is blocked	When the HP pressure switch resets itself.	Check the flow
151	Sen flt: CL11-BT51 pool temp sensor	Defective for more than 5 sec.	Pool pump stops	When the sensor has worked continuously for 60 s.	Sensor not connected Open-circuit or defective sensor
152	Sen flt: CL12-BT51 pool temperature sensor	Defective for more than 5 sec.	Pool pump stops	When the sensor has worked continuously for 60 s.	Sensor not connected Open-circuit or defective sensor
155	High hot gas temperature	The temperature exceeds the product's maximum permitted hot gas temperature	None	When BT14<90 °C	
160	Lo Bri out	Brine out has reached set min temperature.	Compressor blocked.	The brine temperature has been raised 1 C at brine in during a start attempt.	Possible incorrect settings
161	High Brine in	Brine out has reached set max temperature.	Compressor blocked.	The brine temperature has fallen 1°C at brine in during a start attempt.	Possible incorrect settings

No.	Text in display	Cause	Heat pump action.	Resets automatically when	May be due to
162	Hi cond. out	Brine out has reached max permitted temperature.	Compressor blocked.	The heating medium temperature has fallen 2 °C at heating medium in during a start attempt.	Possible incorrect settings
163	High cond. in	Condenser in has reached max permitted temperature.	Compressor blocked.	The heating medium temperature has fallen 2 °C at heating medium in during a start attempt.	Possible incorrect settings
170	Comm.fault In	Communication fault has occurred with entry card. AA3.	Only information	Communication has resumed.	Check any communication cables and connections.
171	Com.flt Base	Communication fault has occurred with base card AA2 or AA26.	Only information	Communication has resumed.	Check any communication cables and connections.
172	Comm.flt MC	Communication fault has occurred with soft start card AA10.	Only information	Communication has resumed.	Check any communication cables and connections.
173-179	Com.err. Acc.	Communication fault has occurred with the accessory card.	Accessory is blocked	Communication has resumed.	■ Defective communication cables. ■ The accessory is activated in the display while not connected with the communication cable. ■ Incorrectly connected communication cable. ■ Incorrectly set dipswitch. ■ No electrical supply to the accessory card.

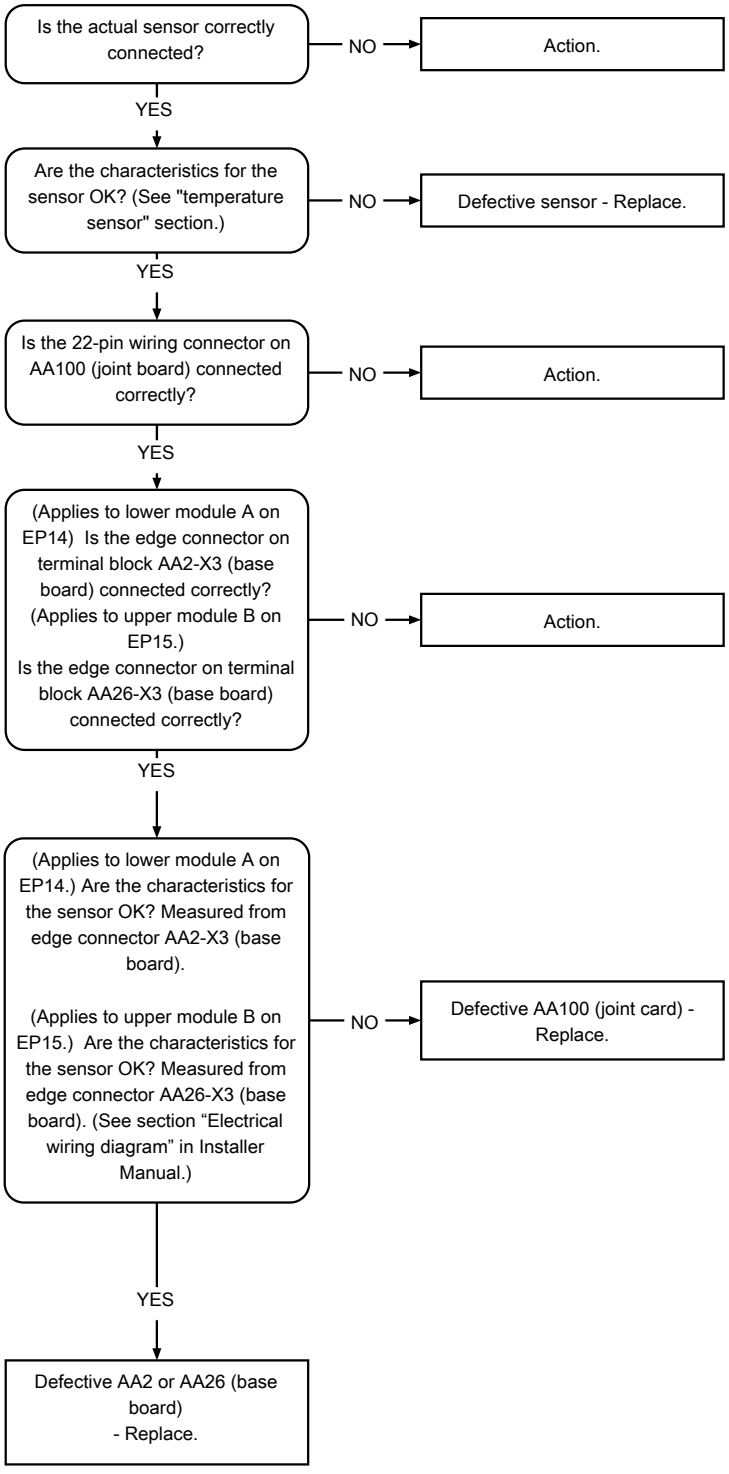
No.	Text in display	Cause	Heat pump action.	Resets automatically when	May be due to
180	Anti-freeze	■ Outdoor temperature is below +3 °C at the same time as heating is blocked. ■ Outdoor temperature is below +3 °C at the same time as the compressor is blocked by the alarm and additional heat is not permitted. ■ Temperature sensor, outdoor (BT1) is missing.	Heating is permitted and the calculated supply temperature is set to min supply temperature.	The outdoor temperature exceeds +3 °C or heating is permitted.	Incorrect settings
181	Problems at periodic increasing	Periodic hot water increase did not reach the stop temperature in 5 hours.	Only information	Information is shown in the display.	Incorrect settings
182	Load monitor active	Measured power consumption exceeds set fuse size in menu 5.1.12.	The heat pump disconnects the electrical steps for the electrical additional heat step by step.	Power consumption reduced to below set fuse size in menu 5.1.12.	-
183	Defrosting in progress		Defrosting in progress		
184	Filter alarm	Time set in menu 5.3.1 has expired.	Only information	-	-
188-194	Com.err. Acc.	Communication fault has occurred with the accessory card.	Accessory is blocked	Communication has resumed.	■ Defective communication cables. ■ Incorrectly set dipswitch.
207	Com.flt PCA Accessory	3 communication errors in succession have occurred.	Only information	Communication has resumed.	■ Defective communication cables. ■ Incorrectly set dipswitch.
270	Compr. preheat in progress	Preheating of compressor	Compressor is blocked	Stopped at the same time as compressor heater/crankcase heater.	
322	SPA not updated	Current spot price is not available.	Can influence the installation's priorities.	Check connection to the Internet.	

No.	Text in display	Cause	Heat pump action.	Resets automatically when	May be due to
323	Flt: EQ1-BT25	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	Calculation of cooling DM performed with EQ1-BT25 is set to 0.		■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
350	Sensor fault on BT50 room sensor.	The input for the sensor receives unreasonably high or low value for longer than 2 seconds when the sensor is activated.		Resets automatically when the sensor has worked continuously for 60 s.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
351	Failed sensor calibration	Delta BT10-BT11>|2K| after calibration	Change from auto to manual brine pump speed	Manual	
353	Failed sensor calibration	Delta BT3-BT12>|2K| after calibration	Change from auto to manual pump speed	Manual	
359	Int temp OPT error	Alarm from the gas boiler (GBM)	None	Manual	
361-367	Sensor fault: EPxx-BT3 return line sensor	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.		Resets automatically when the sensor has worked continuously for 60 s.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
369-370	Sensor fault: EP12-BT57/BT58	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	None	Resets automatically when the sensor has worked continuously for 60 s.	■ Open-circuit or short-circuit on sensor input. ■ Defective sensor
371	Freeze risk EP12-BT58	Ground water sensor BT58 is below its limit	Blocks operation	Reset automatically when the temperature rises above its limit value +2°	
900	Country not selected	Country not defined.	Stops in the position reached when the message was displayed.	Resets when country is selected in menu 5.12.	
995	ext. alarm	Status on AUX-in	None	-	
996	blocked	Additional heat external blocked	None	-	
997	blocked	The compressor is externally blocked	None	-	
998	starts	Display has restarted	None	-	

Troubleshooting guide

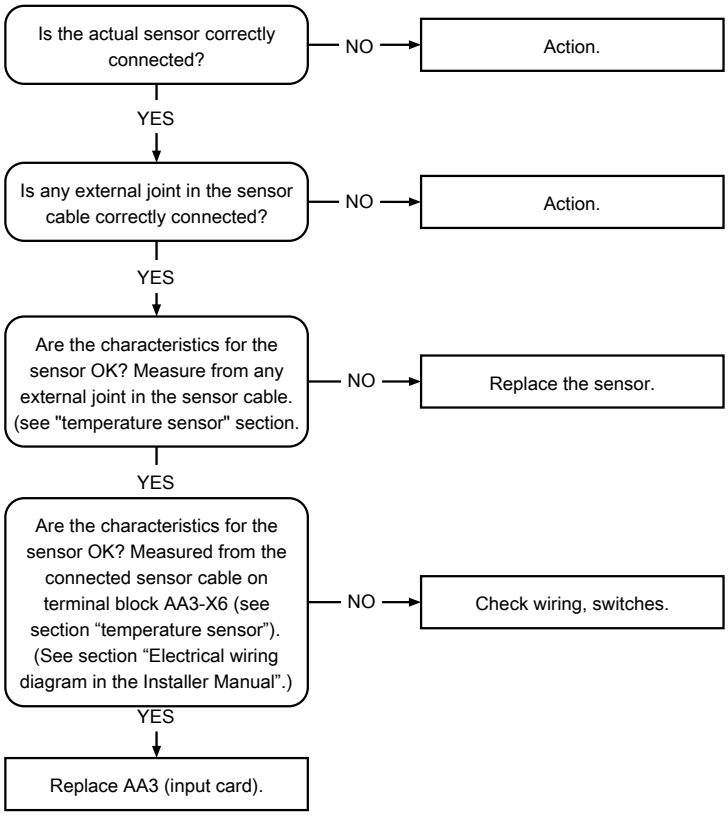
Alarm 3, 10, 11, 12, 14, 15, 17, 29 - sensor fault

Applies to sensor fault BT 3,BT10,BT11,BT12,BT14,BT15,BT17,BT29.



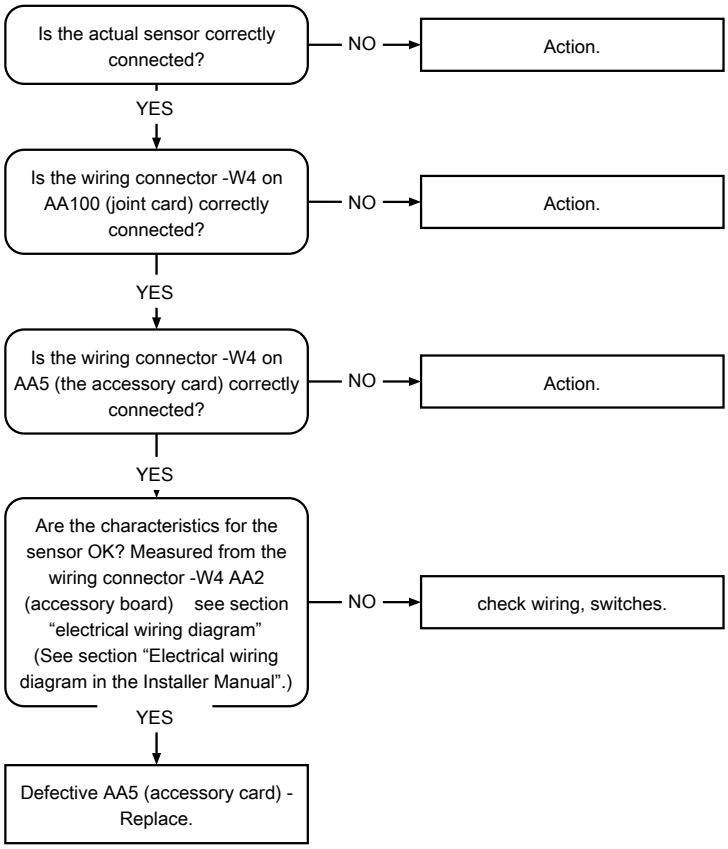
Alarm 1, 6, 7, 25, 50 - sensor fault

Applies to sensor fault BT1,BT6,BT7,BT25,BT50.



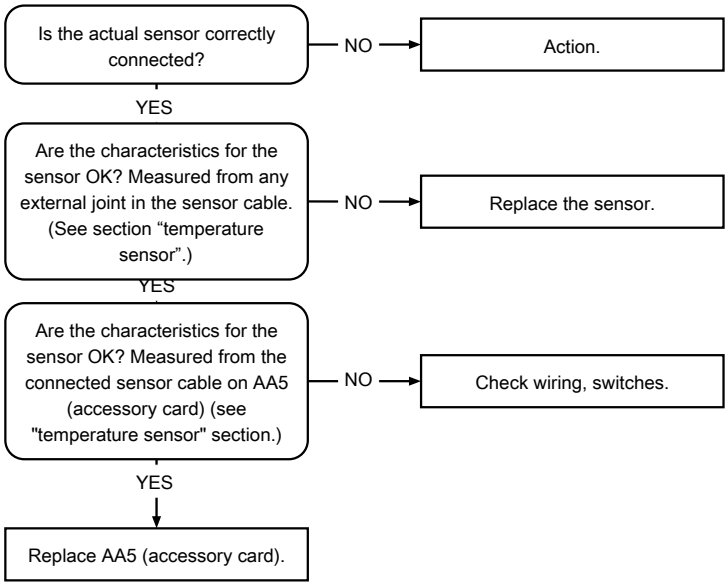
Alarm 20, 21, 26 – sensor fault

Fault-tracing in FLM:

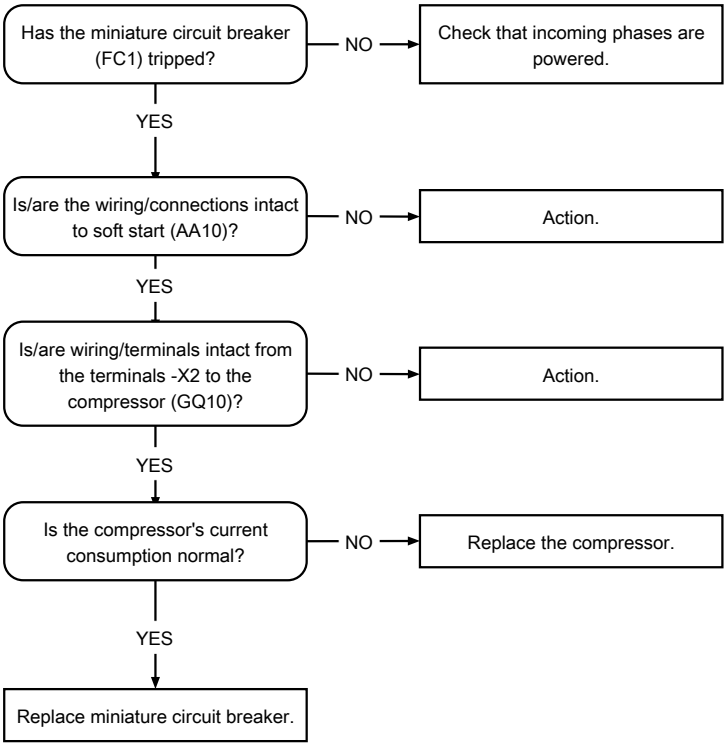


Alarm 33, 39 – sensor fault

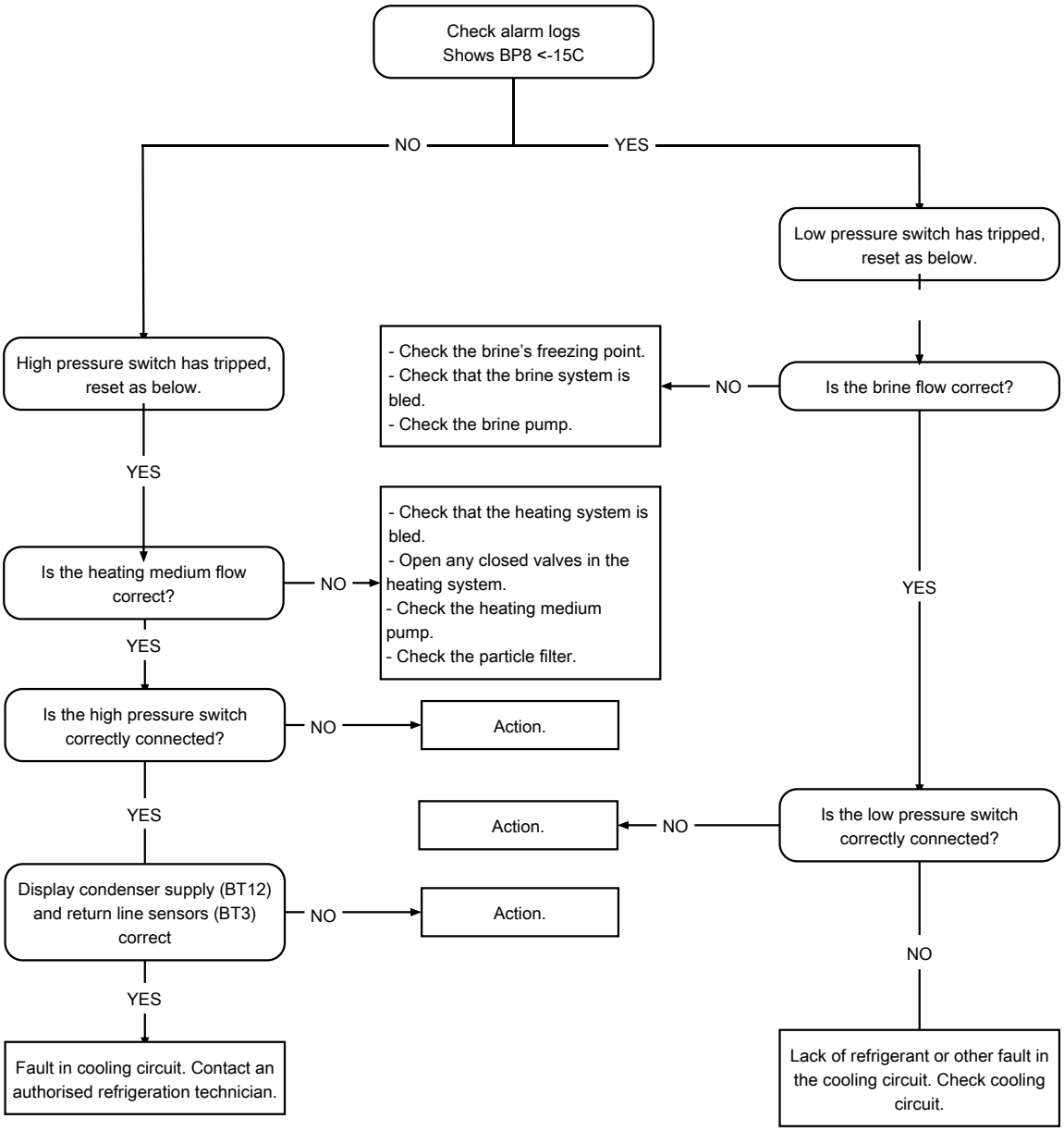
Fault-tracing in accessory card.



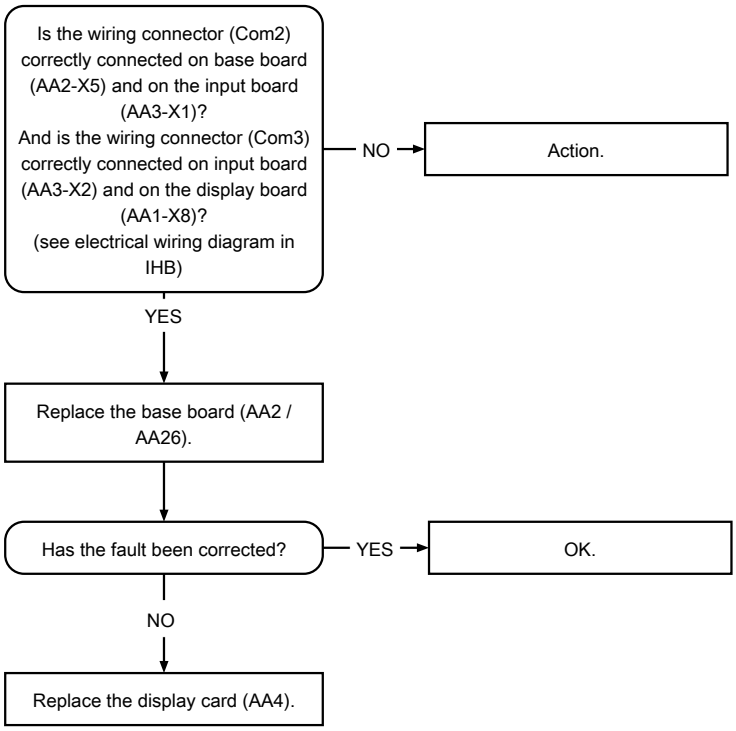
Alarm 54 – motor protection



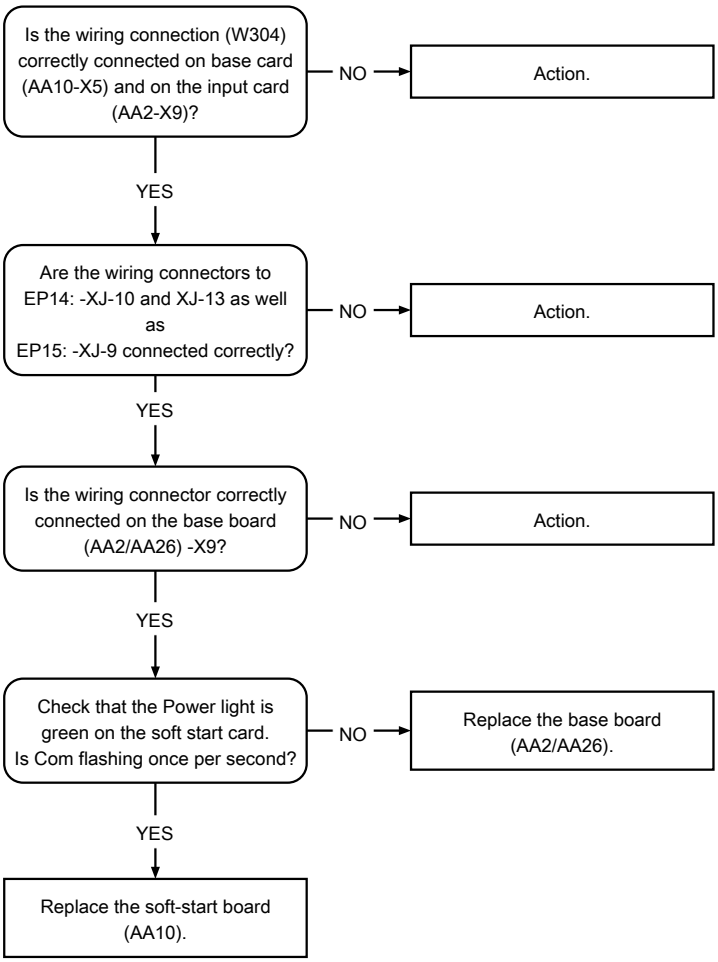
Alarm 58 - pressure switch alarm



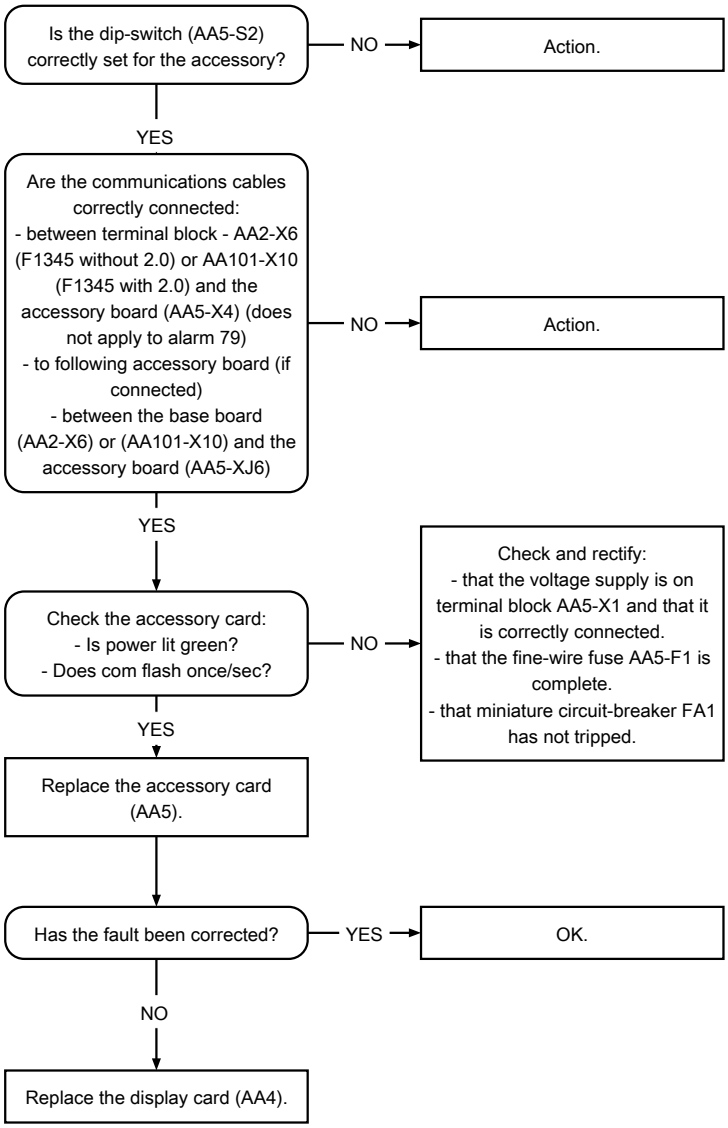
Alarm 71 - perm. com.error input card



Alarm 72 - perm. com. error soft-start card



Alarm 73-95 - perm. com. error accessory card



Function check, relays/components

Relay test - forced control

The heat pump's relay outputs can be force-controlled from menu 5.6.

1. Tick "activated". Forced control is then activated for 10 minutes.
2. Tick the outputs that you want to activate.
3. Check the relay/component function.

WARNING!

Forced control must only be used by users familiar with the system. When forced control is activated, the alarm functions are disabled.

Internal outputs

Output	Function
AA2-K1	Reversing valve (QN10)
AA2-K2	Compressor heater (EB10)
AA2-K3	Heating medium pump (GP1)
AA2-K4	Brine pump (GP2)
AA26-K1	-
AA26-K2	Compressor heater (EB10)
AA26-K3	Heating medium pump (GP1)
AA26-K4	Brine pump (GP2) (not 40-60 kW)
AA101-K1	Step 1 - Additional heat, start.
AA101-K2	Step 2 - Shunt valve, close.
AA101-K3	Step 3 - Shunt valve, open.
AA101-K4	Emergency mode
AA101-K5	Brine pump (GP16)

Climate system 2 (AXC50)

Output	Function
EP21-AA5-K2	Mixing valve, close
EP21-AA5-K3	Mixing valve, open
EP21-AA5-K4	External circulation pump

Climate system 3 (AXC50)

Output	Function
EP22-AA5-K2	Mixing valve, close
EP22-AA5-K3	Mixing valve, open
EP22-AA5-K4	External circulation pump

Climate system 4 (AXC50)

Output	Function
EP23-AA5-K2	Mixing valve, close
EP23-AA5-K3	Mixing valve, open
EP23-AA5-K4	External circulation pump

Mixing valve controlled additional heat (AXC50)

Output	Function
EM1-AA5-K1	External addition (burner) permitted
EM1-AA5-K2	Mixing valve, close
EM1-AA5-K3	Mixing valve, open
EM1-AA5-K4	External circulation pump

Pool (POOL 40)

Output	Function
CL11-A5-K1	External circulation pump
CL11-A5-K3	Pool reversing valve
CL11-A5-K4	Pool pump

Exhaust air module (FLM)

Output	Function
EP16-AA5-K3	Fan (relay)
EP16-AA5-K4	HTF pump FLM

Groundwater pump (AXC50)

Output	Function
EP12-AA5-K4	Groundwater pump

Hot water circulation(AXC50)

Output	Function
GP11-AA5-K4	HWC pump

Passive cooling 2-pipe (PCM40/PCM42)

Output	Function
EQ1-AA5-K1	Circulation pump
EQ1-AA5-K2	Mixing valve, close
EQ1-AA5-K3	Mixing valve, open
EQ1-AA5-K4	Shuttle valve

Passive cooling 4-pipe (PCS44)

Output	Function
EQ1-AA5-K1	Circulation pump cooling (GP13)
EQ1-AA5-K2	Mixing valve (QN18), close
EQ1-AA5-K3	Mixing valve (QN18), open

Passive/active cooling (HPAC)

Output	Function
EQ1-AA5-K1	AC
EQ1-AA5-K2	PC
EQ1-AA5-K4	External circulation pump

Step controlled additional heat (AXC50)

Output	Function
EB1-AA5-K1	Step 1
EB1-AA5-K2	Step 2
EB1-AA5-K3	Step 3

Solar control (SOLAR 40)

Output	Function
EP8-AA5-K1	Circulation pump, solar coil (GP4)
EP8-AA5-K2	Cooling
EP8-AA5-K3	Reversing valve HW/heating

Function check, circulation pumps

With forced control of the heating medium pump (GP1) or the brine pump (GP2) it can be necessary to check the supply (230 V AC) and the control signal (0-10 V DC) to the circulation pump.

Heating medium pump (GP1) Grundfos 24-60 kW

Pump speed GP1	PVM1, X2:1-2	LED PWM1 on Board AA2
100 %	approx 0 V DC	Not lit
50 %	approx 5 V DC	Half lit
0 %	approx 10 V DC	Lit

Brine pump (GP2) Grundfos 24-30 kW

Pump speed GP2	PVM2, X2:3-4	LED PWM2 on Board AA2
100 %	approx 0 V DC	Not lit
50 %	approx 5 V DC	Half lit
0 %	approx 10 V DC	Lit

Brine pump (GP16) Wilo 40-60 kW

Pump speed GP1	PVM2, X2:3-4	LED PWM2 on Board AA2
0 %	approx 0 V DC	Not lit
50 %	approx 5 V DC	Half lit
100 %	approx 10 V DC	Lit

Fan (GQ10) FLM

Fan speed GQ10	PVM2, X2:3-4	LED PWM2 on Board AA2
100 %	approx 0 V DC	Not lit
50 %	approx 5 V DC	Half lit
0 %	approx 10 V DC	Lit

7 Component replacement

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.

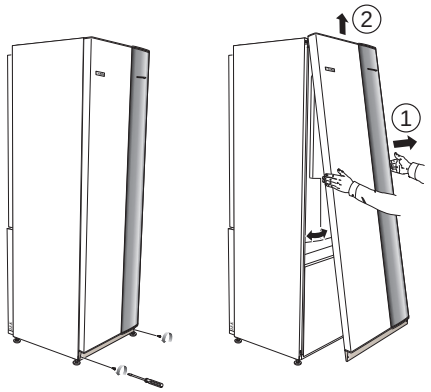
F1345 can contain liquids at high temperature and under high pressure.

When replacing components on F1345 only replacement parts from NIBE may be used.

An ESD bracelet must be worn when replacing the card.

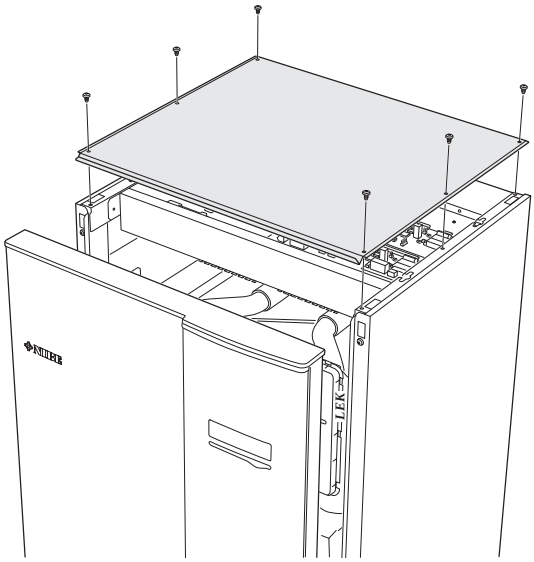
Basic

Front cover



1. Remove the screws from the lower edge of the front cover.
2. Lift the cover out at the bottom edge and up.

Top panel



1. Lift off the front cover, according to the previous instructions.
2. Remove the six screws in the top panel.
3. Lift the top panel straight up.

Extracting the cooling modules

The cooling modules can be pulled out for service and transport.

NOTE

The heat pump must not be moved when only the lower cooling module has been pulled out. If the heat pump is not secured in position the upper cooling module must always be removed before the lower one can be pulled out.

Caution

The cooling modules are easier to remove if drained first.

Weight of the cooling module

Type (F1345)	Weight (kg)
24 kW	130
30 kW	135
40 kW	143.5
60 kW	144

NOTE

Shut off the heat pump and turn off the current on the safety breaker.

Caution

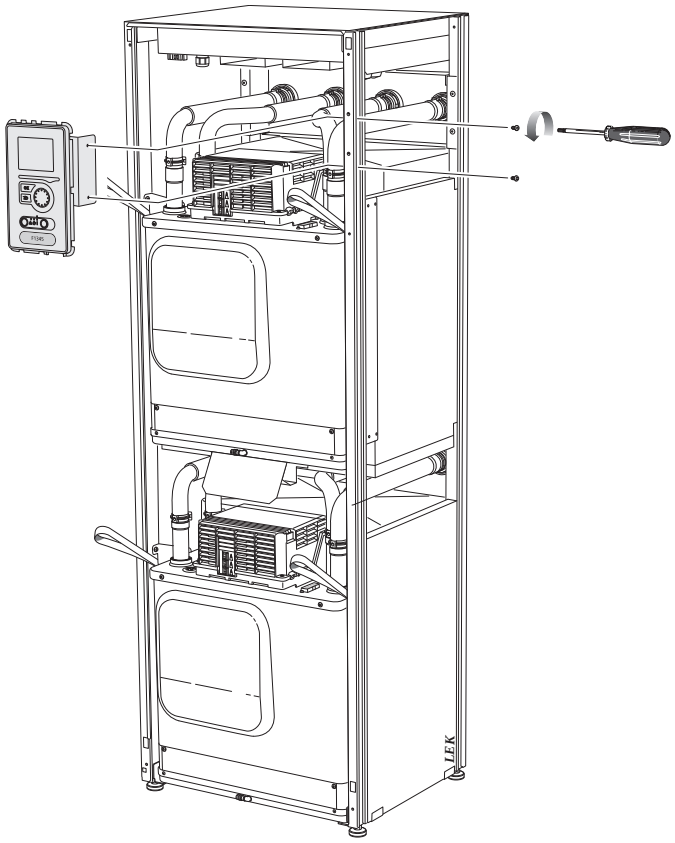
Remove the front cover according to the description in the installer manual.

1 Close the shut-off valves outside the heat pump.

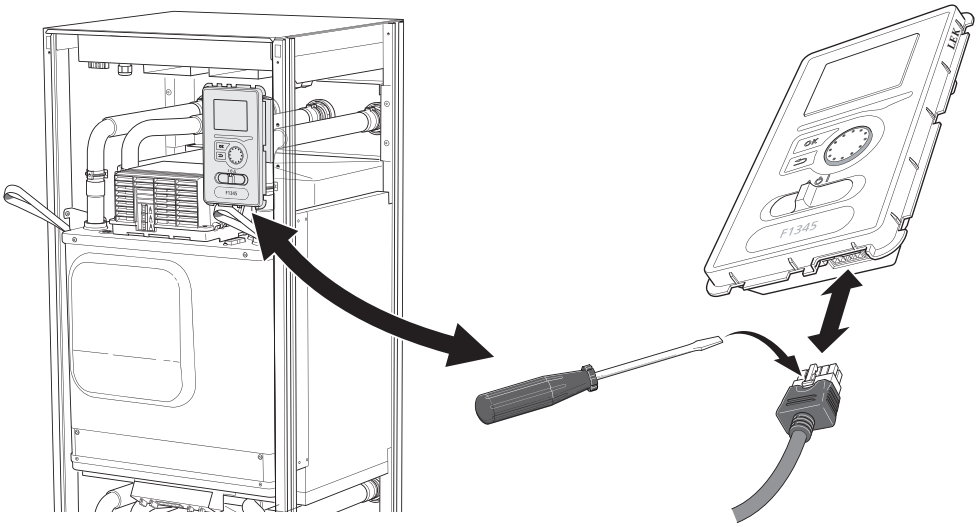
Drain the refrigerant from the cooling module(s).

2 Remove the side panel to be able to remove the display unit (this procedure need only be done if you are going to pull out the upper cooling module).

3 Remove the two screws holding the display unit in the frame (this procedure only needs to be done if you are going to pull out the upper cooling module).



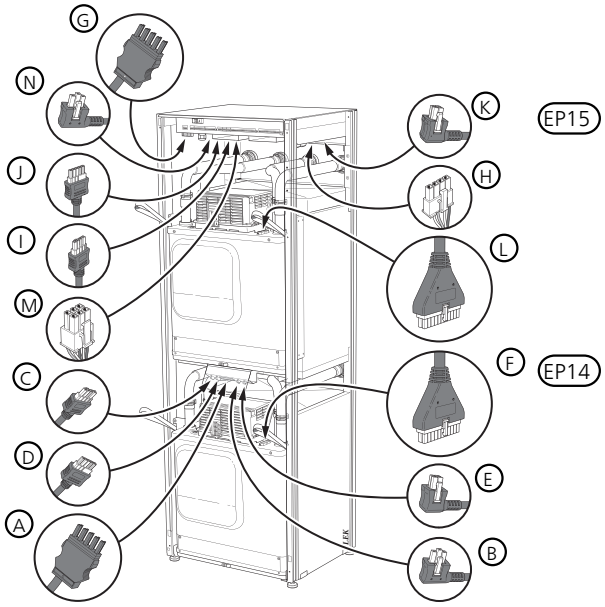
4 Remove the connector from the underside of the display unit (this procedure need only be done if you are going to pull out the upper cooling module).



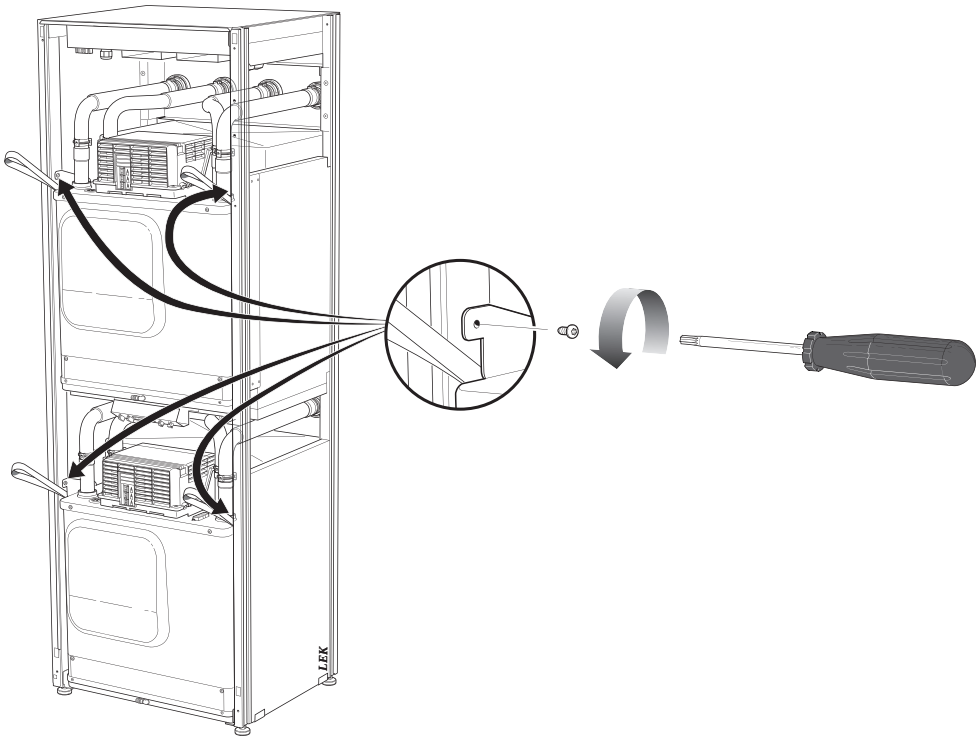
5 Disconnect the connectors for the relevant cooling module.

Cooling module EP14 (lower): XJ1 (A), XJ3 (B), XJ4 (C), XJ5 (D), XJ10 (E) and EP14-AA100:XJ1 (F).

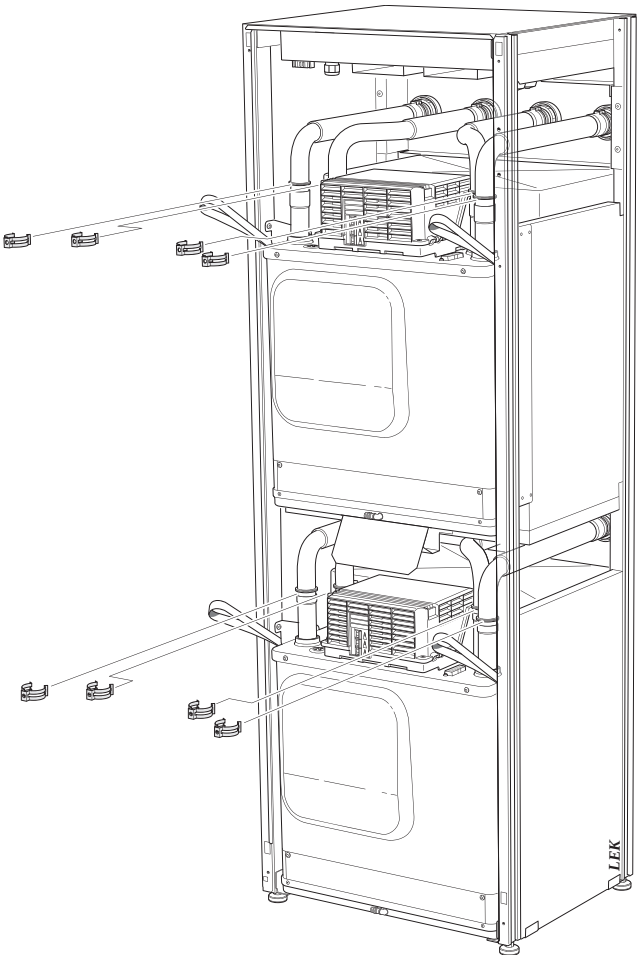
Cooling module EP15 (upper): XJ2 (G), XJ6 (H), XJ7 (I), XJ8 (J), XJ9 (K) and EP15-AA100:XJ1 (L).



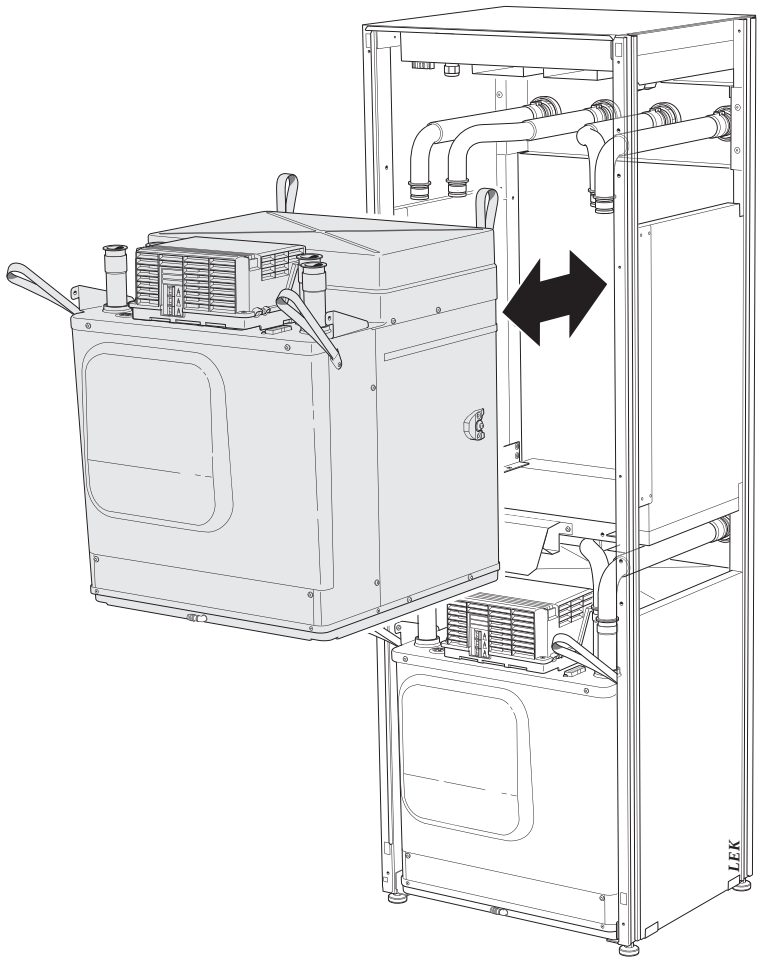
6 Remove the screws (two for each cooling module).



7 Pull off the clips (four for each cooling module) and separate the pipes carefully.

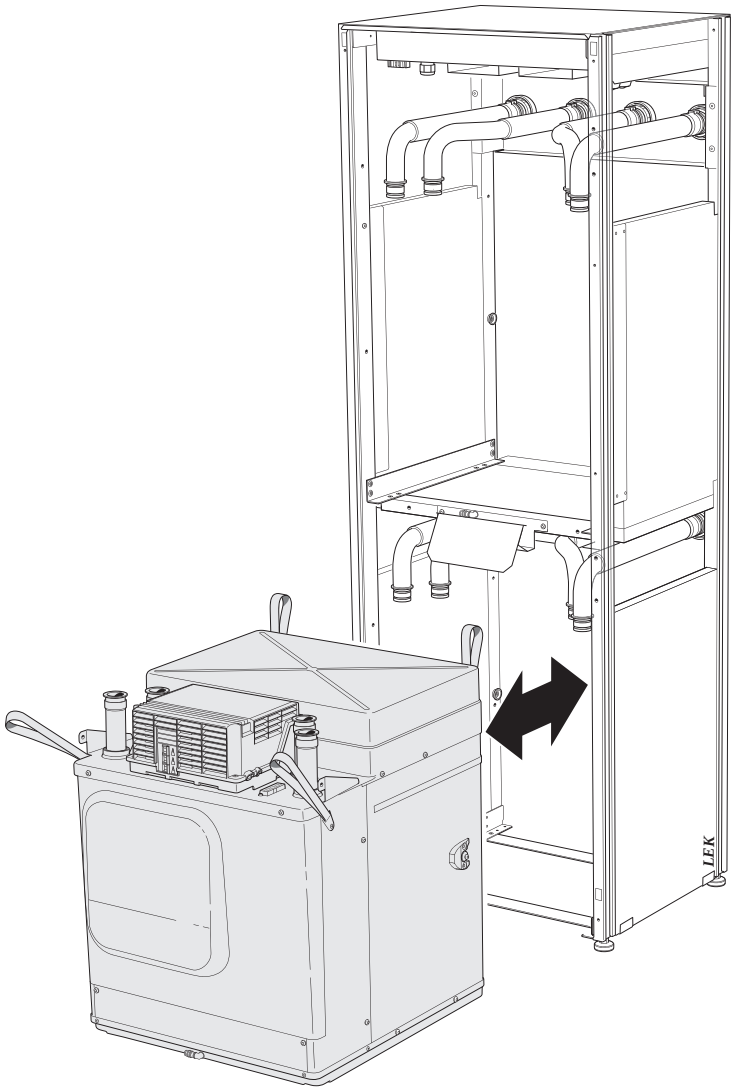


8 Carefully pull out the upper cooling module (EP15) using the module's lifting eyelets.
Use a height adjustable relief surface for this procedure.



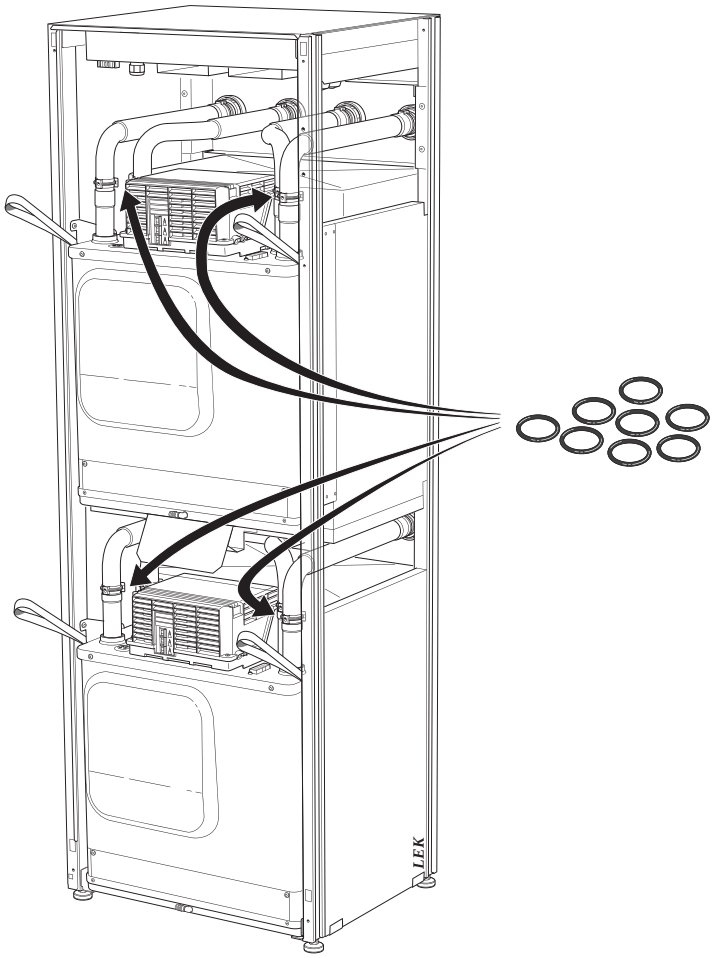
9 Carefully pull out the lower cooling module (EP14) using the module's lifting eyelets.

If the heat pump is not secured in position the upper cooling module must always be removed before the lower one can be pulled out.



TIP
The cooling module is installed in reverse order.

NOTE
At reinstallation, new O-rings must replace the existing ones at the connections to the heat pump (see image).

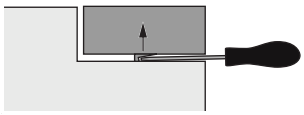


Main components

Compressor (GQ10)

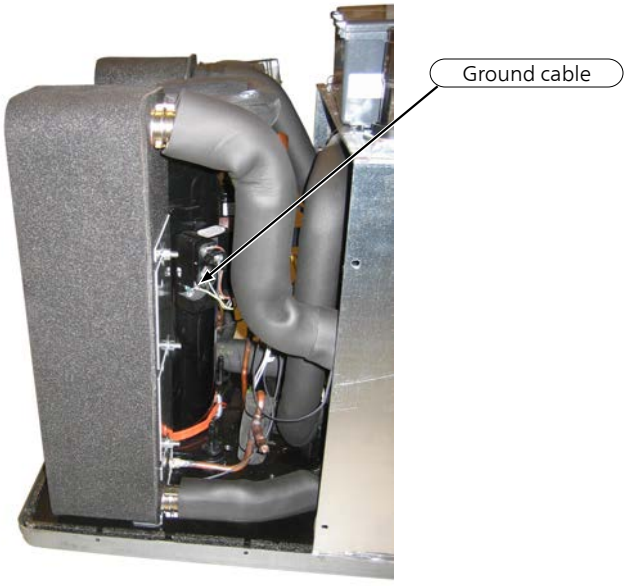
1 Remove the cooling module according to the instruction on page 46.

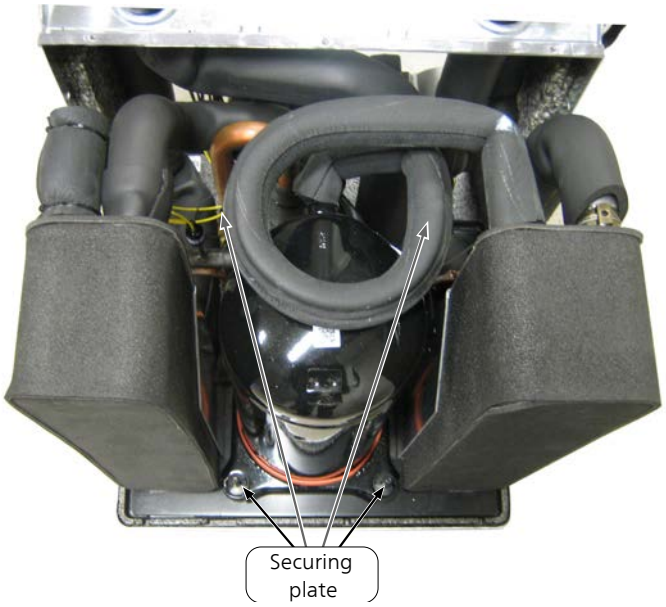
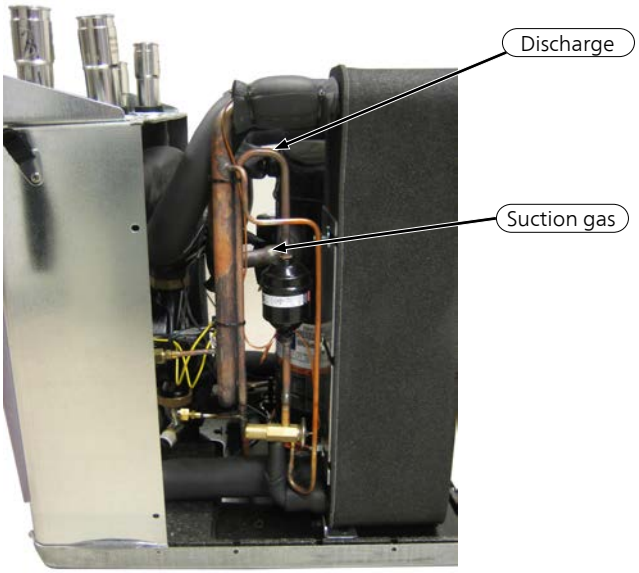
2 Remove the cooling module junction box by inserting a screwdriver and carefully lifting the catch as illustrated.



3 Slacken off 12 screws. (Dotted line means that the screw is not visible from this side.)

4 Remove the cover on the cooling module.

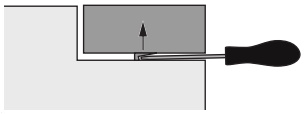
5 Slacken off 8 screws. **6** Remove the right/rear side panel on the cooling module.	
7 Slacken off 7 screws. **8** Remove the left/rear side panel on the cooling module.	
9 Unscrew the compressor's cables (3x phases + ground). **10** Disconnect the compressor cables.	

11 Remove the 4 locking plates holding the compressor.	
12 Drain the cooling circuit and ensure that no refrigerant remains before you continue. Remove any existing pipe insulation around the hot gas pipe. **13** Disconnect the pipes for suction gas and hot gas. **14** Remove the compressor.	

Expansion valve (QN1)

1 Remove the cooling module according to the instruction on page 46.

2 Remove the cooling module junction box by inserting a screwdriver and carefully lifting the catch as illustrated.



3 Slacken off 12 screws.

4 Remove the cover on the cooling module.

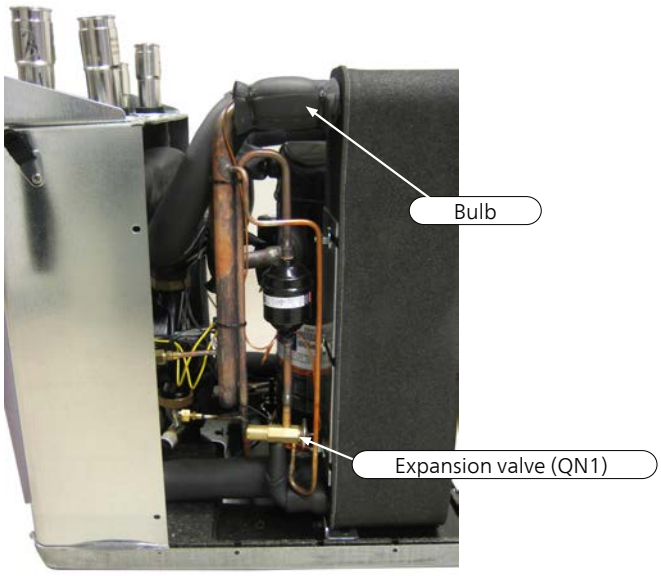
5 Slacken off 8 screws.

6 Remove the right/rear side panel on the cooling module.

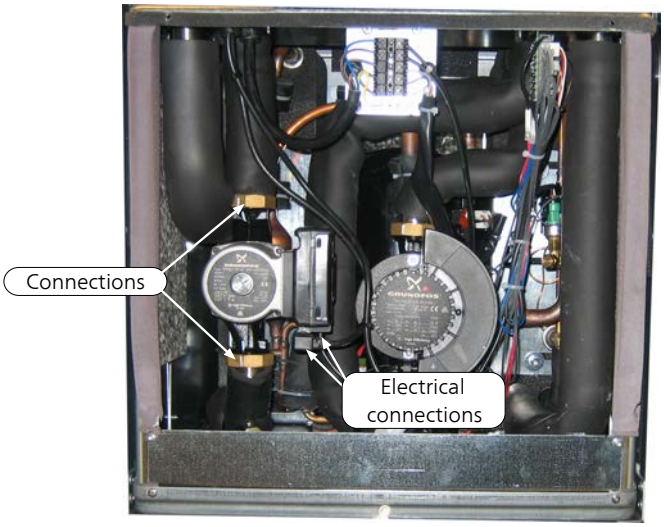
7 Drain the cooling circuit and ensure that no refrigerant remains before you continue. Remove any insulation.

8 Slacken off the bulb for the expansion valve.

9 Disconnect the pipes and remove the valve.



Heating medium pump (GP1, 24-60 kW)

1 Close the heating system shut-off valves outside the heat pump for the relevant cooling module. **2** Remove the front cover on the cooling module by unscrewing the two screws at the top edge of the cover. **3** Draining the heating medium system in the cooling module.	
4 Remove the electric switch on the circulation pump. **5** Remove the electric switch for the control cable for the circulation pump. **6** Disconnect and remove the circulation pump.	

Brine pump (GP2, 24-30 kW)

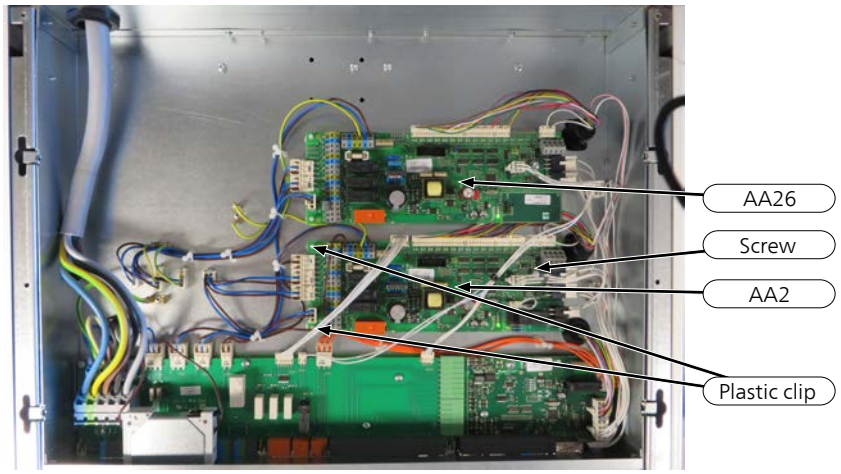
1 Close the brine system shut-off valves outside the heat pump for the relevant cooling module. **2** Remove the front cover on the cooling module by un-screwing the two screws at the top edge of the cover. **3** Draining the brine system in the cooling module.	
4 Remove the electric switch on the circulation pump. **5** Remove the electric switch for the control cable for the circulation pump. **6** Disconnect and remove the circulation pump.	

Circuit board and electronics

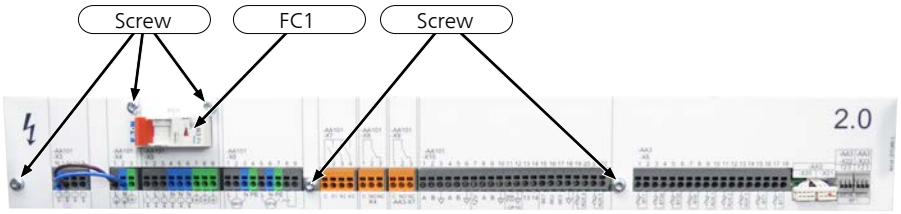
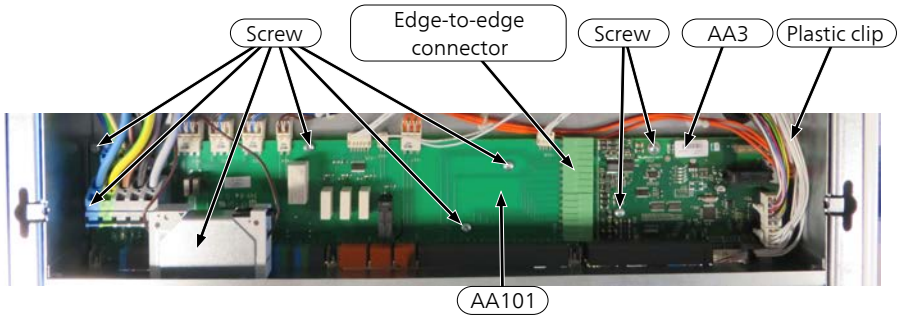
NOTE

An ESD bracelet must be worn when replacing the card.

Base card (AA2 och AA26)

1 Remove top panel on the heat pump (6x screws). See instruction page 46.	
2 Disconnect the cables and connectors to the card. **3** Remove the screws that secure the card.	
4 Remove the card from the plastic clips (2x) by holding in the clip hooks and pulling the card upwards. **5** Replace the card.	

Input board (AA3) / Interface board (AA101)

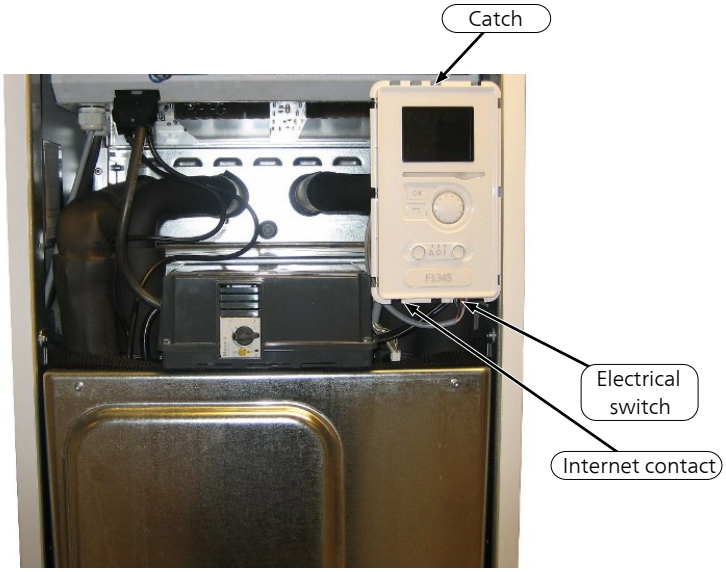
1 Remove top panel on the heat pump (6x screws). See instruction page 46.	
2 Disconnect the cables and connectors to the interface board. **3** Remove the screws (2x) holding the miniature circuit breaker (FC1) on the front of the interface board. **4** Remove the screws (3x) on the front of the interface board.	
5 Disconnect the cables and connectors to the circuit board. **6** Remove the screws (2x) holding the input board (AA3). **7** Remove the screws (6x) holding the interface board (AA101). **8** Remove the board from the plastic clip (1x, under the cables in the image) by holding in the clip's hook and lifting the boards upwards. **9** Separate the boards by separating the edge-to-edge connector. **10** Replace the relevant board. **11** Assemble in reverse order.	

Display unit (AA4)

1 Detach the cable from the lower edge of the display unit.

2 Press the catch on the upper rear side of the display unit towards you.

3 Remove the display unit.

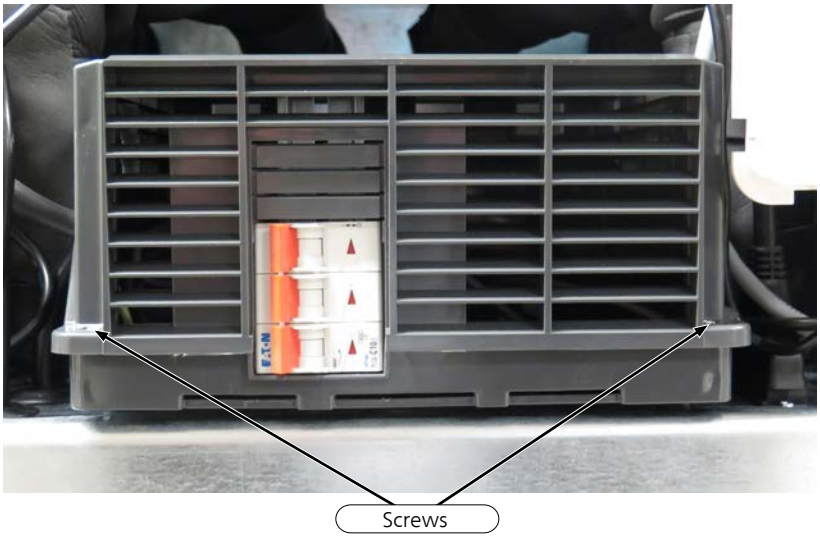


Soft-start card (AA10)

1 Remove the two screws in the motor module.

2 Open the motor module.

3 Disconnect all cables.

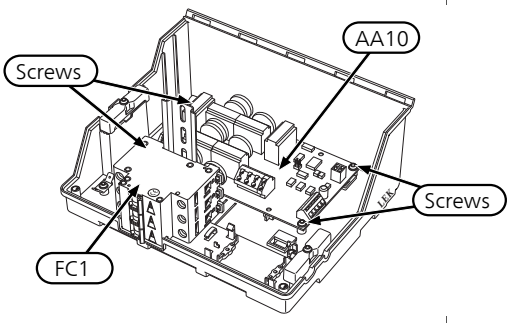


4 Remove the card.

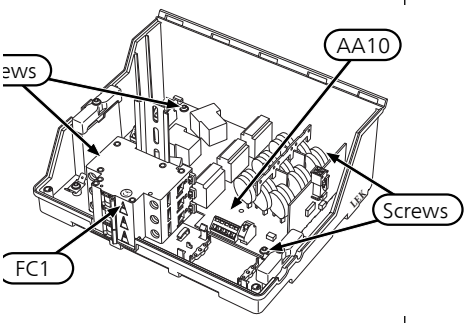
- **24 kW** By unscrewing the screws that hold the board (4x, some screws are hidden in the image).
- **30-60 kW** From the board's plastic clips (4x, some screws are hidden in the image) by holding in the clip hooks and pulling the board upwards.

5 Replace the card.

22-30 kW

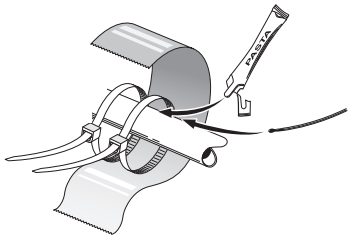


40-60 kW



Sensors

Mounting



Install the temperature sensor with cable ties with the heat conducting paste and aluminium tape.

Then insulate with supplied insulation tape.

Location

See section Sensors etc. on page 13 for sensor location.

8 Technical data

Technical specifications

CE IP 21

3x400 V

3x400 V		24	30	40	60
Output data according to EN 14511					
0/35					
Rated output (P_H)	kW	23.00	30.72	39.94	59.22
Electrical input (P_E)	kW	4.94	6.92	8.90	13.72
$COP_{EN14511}$	-	4.65	4.44	4.49	4.32
0/45					
Rated output (P_H)	kW	21.98	29.74	38.90	56.12
Electrical input (P_E)	kW	5.96	8.34	10.61	16.02
$COP_{EN14511}$	-	3.69	3.57	3.67	3.50
10/35					
Rated output (P_H)	kW	30.04	40.08	51.71	78.32
Electrical input (P_E)	kW	5.30	7.24	9.81	15.08
$COP_{EN14511}$	-	5.67	5.53	5.27	5.19
10/45					
Rated output (P_H)	kW	29.28	39.16	50.79	74.21
Electrical input (P_E)	kW	6.34	8.84	11.82	17.60
$COP_{EN14511}$	-	4.62	4.43	4.30	4.22
Output data according to EN 14825					
Nominal heating output (designh)	kW	28	35	46	67
$SCOP_{EN14825}$ cold climate, 35 °C / 55 °C	-	5.0 / 4.0	4.9 / 3.8	5.0 / 3.9	4.7 / 3.8
$SCOP_{EN14825}$ average climate, 35 °C / 55 °C	-	4.8 / 3.8	4.7 / 3.6	4.8 / 3.8	4.6 / 3.7
Energy rating, average climate					
Space heating efficiency class 35 °C / 55 °C	-	A++ / A++	A++ / A++	A++ / A++	A++ / A++
Space heating efficiency class of the system 35 °C / 55 °C [1)]	-	A+++ / A++	A+++ / A++	A+++ / A++	A+++ / A++
Electrical data					
Rated voltage		400V 3N ~ 50 Hz			
Max operating current, heat pump [3)]	A_{rms}	20.5	25.3	29.5	44.3
Max operating current, compressor	A_{rms}	8.4	11.1	13.1	19.9
Recommended fuse rating	A	25	30	35	50
Starting current	A_{rms}	29	30	42	53
Max permitted impedance at connection point [2)]	ohm	-	-	-	0.4
Total output, Brine pumps [3)]	W	6 – 360	6 – 360	35 – 730	40 – 1250
Total output, HM pumps	W	5 – 174	5 – 174	5 – 174	5 – 174
IP class		IP21			
Refrigerant circuit					
Type of refrigerant		R407C			R410A
Fill amount	kg	2 x 2.0	2 x 2.0	2 x 1.7	2 x 1.7
Cut-out value pressostat HP	MPa	3.2 (32 bar)			4.2 (42 bar)
Difference pressostat HP	MPa	-0.7 (-7 bar)			
Cut-out value pressostat LP	MPa	0.08 (0.8 bar)			0.2 (2 bar)
Difference pressostat LP	MPa	0.07 (0.7 bar)			

3x400 V		24	30	40	60
Cut-out value, pressure transmitter LP	MPa	0.08 (0.8 bar)			0.2 (2.0 bar)
Difference, pressure transmitter LP	MPa	0.01 (0.1 bar)			
Brine circuit					
Max system pressure brine	MPa	0.6 (6 bar)			
Min flow	l/s	0.92	1.23	1.59	2.36
Nominal flow	l/s	1.18	1.62	2.09	3.10
Max external avail. press at nom flow [3)]	kPa	92	75	92	78
Max/Min incoming Brine temp	°C	see diagram			
Min. outgoing brine temp.	°C	-12			
Heating medium circuit					
Max system pressure heating medium	MPa	0.6 (6 bar)			
Min flow	l/s	0.37	0.50	0.64	0.92
Nominal flow	l/s	0.54	0.73	0.93	1.34
Max external avail. press at nom flow	kPa	78	72	70	50
Max/Min heating medium temp	°C	see diagram			
Noise output (L_{WA}) according to EN 12102 at 0/35	dB(A)	47	47	47	47
Sound pressure level (L_{PA}) calculated values according to EN ISO 11203 at 0/35 and a distance of 1 m	dB(A)	32	32	32	32
Pipe connections					
Brine diam. CU pipe		G50 (2" external) / G40 (1 1/2" internal)			
Heating medium diam. CU pipes		G50 (2" external) / G40 (1 1/2" internal)			

Miscellaneous

Miscellaneous		24	30	40	60
Compressor oil					
Oil type		POE	POE	POE	POE
Volume	l	2 x 1.9	2 x 1.1	2 x 1.9	2 x 1.9
Dimensions and weight					
Width	mm	600			
Depth	mm	620			
Height	mm	1800			
Required ceiling height [4)]	mm	1950			
Weight complete heat pump	kg	320	330	345	346
Weight only cooling module	kg	130	135	144	144
Part no., 3x400V[5)]		065 297	065 298	065 299	065 300
Part no., 3x400V[6)]				065 301	065 302

[1)]Reported efficiency for the system takes the product's temperature regulator into account.

[2)]Max. permitted impedance in the mains connected point in accordance with EN 61000-3-11. Start currents can cause short voltage dips that may affect other equipment in unfavourable conditions. If the impedance in the mains connection point is higher than that stated, it is possible that interference will occur. If the impedance in the mains connection point is higher than that stated, check with the power supplier before purchasing the equipment.

[3)]These technical specifications apply to the brine pump supplied for 40 and 60 kW.

[4)]With feet removed, the height is approx. 1930 mm.

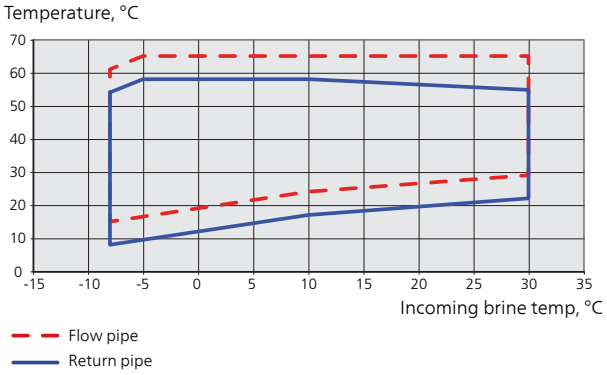
[5)]24 and 30 kW with internal brine pump. 40 and 60 kW with supplied external brine pump.

[6)]40 and 60 kW without supplied external brine pump.

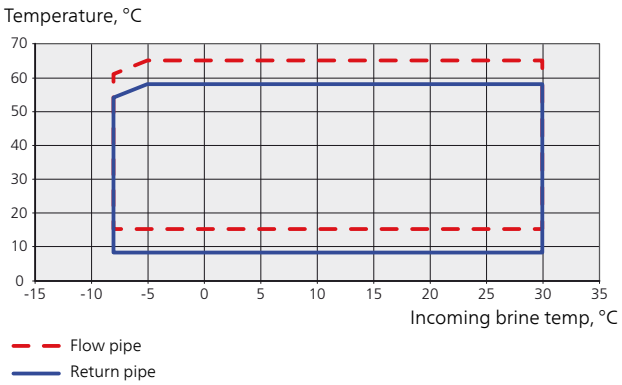
Working range heat pump, compressor operation

The compressor provides a supply temperature up to 65 °C.

3x400V 24 kW



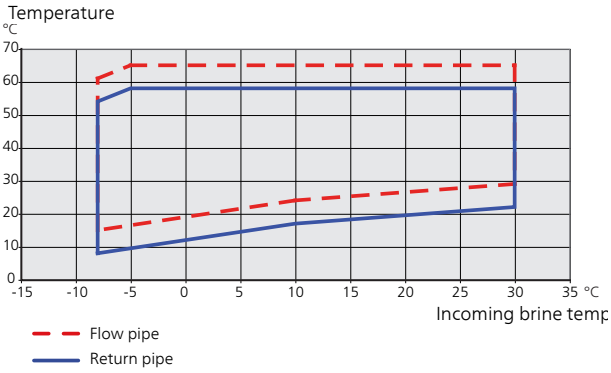
3x400V 30 kW, 40 kW, 60 kW



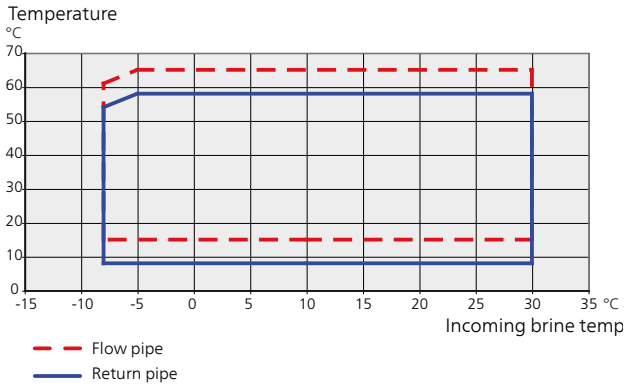
Working range heat pump, compressor operation

The compressor provides a supply temperature up to 65 °C.

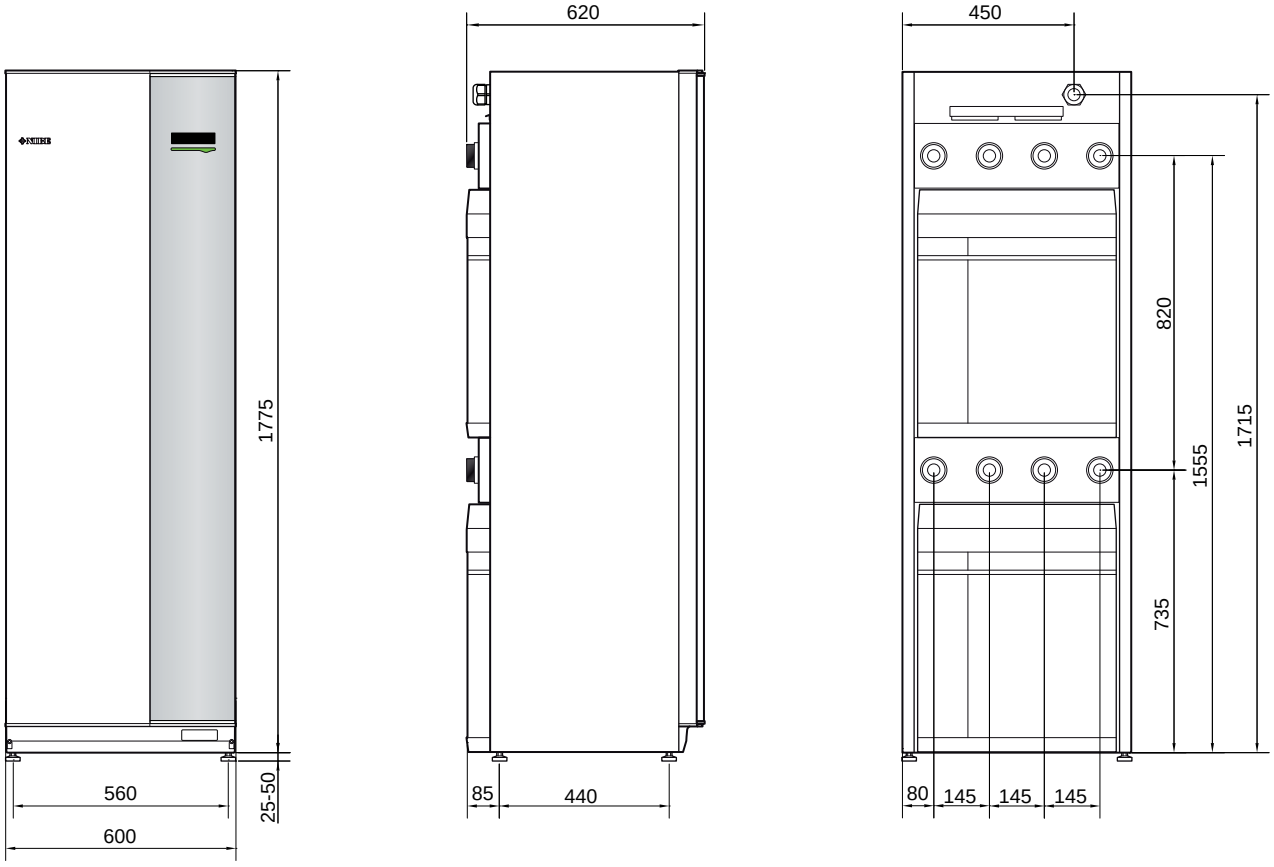
3x400V 24 kW



3x400V 30 kW, 40 kW and60 kW



9 Dimensions and setting-out coordinates



10 Item register

Item register

NIBE AB Sweden
Hannabadsvägen 5
Box 14
SE-285 21 Markaryd
info@nibe.se
www.nibe.eu