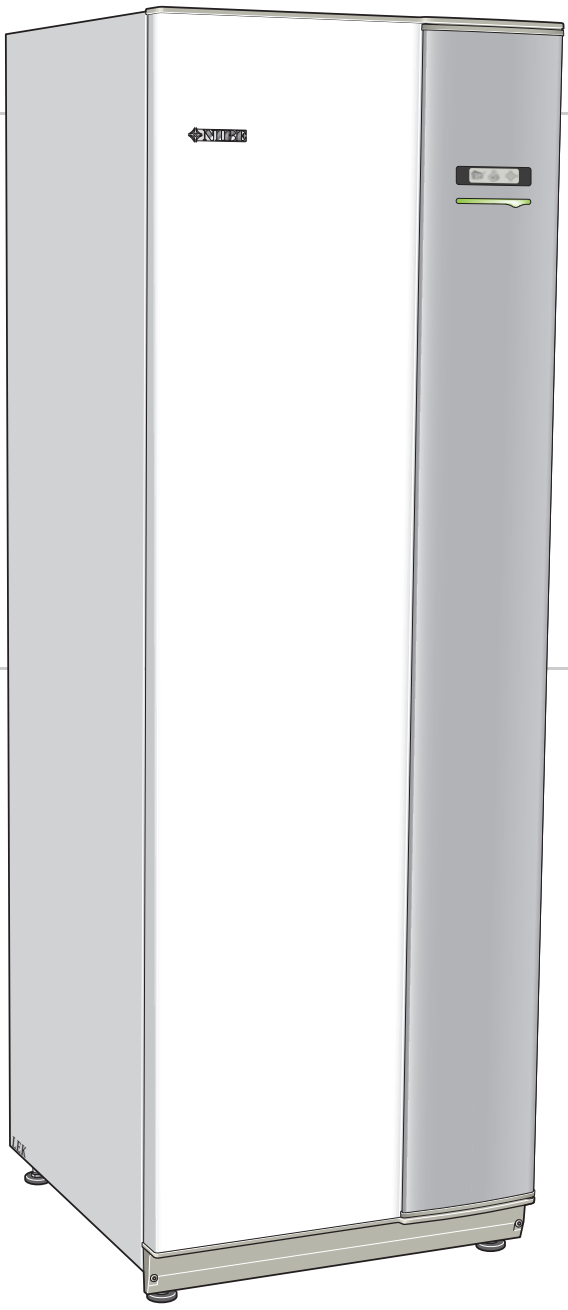


Service manual

F1245

Ground source heat pump

SEM GB 1720-2
431504

Table of Contents

1 Important information

Document information

This technical manual is a complement to the Installer handbook for F1245, containing:

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

The document applies to heat pumps with software version 7968R2.

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.

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

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.

IP21 Classification of enclosure of electro-technical equipment.

Danger to person or machine.

Read the User Manual.

Serial number

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

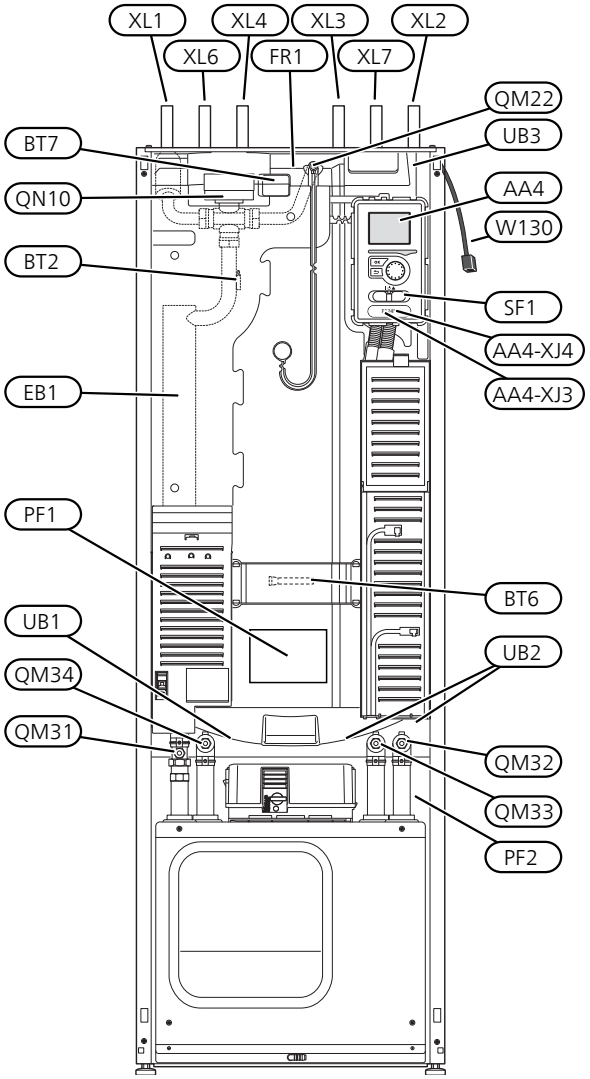
Caution

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

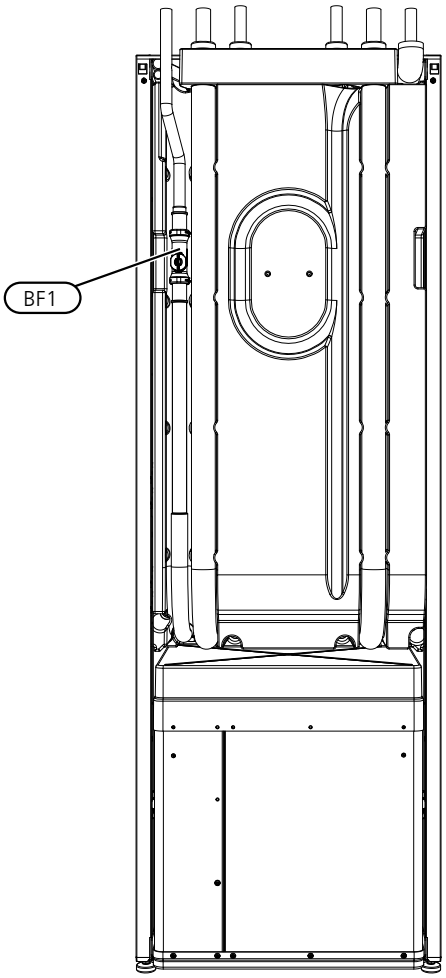
2 The heat pump design

The heat pump design

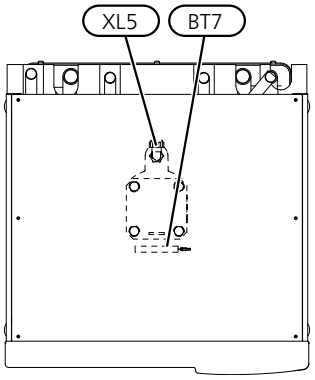
General



View from behind



View from above



Pipe connections

XL1 Connection, heating medium flow
XL2 Connection, heating medium return
XL3 Connection, cold water
XL4 Connection, hot water
XL5 Connection, HWC*
XL6 Connection, brine in
XL7 Connection, brine out

* Only heat pumps with enamelled or stainless steel vessel.

HVAC components

QM22 Venting, coil
QM31 Shut-off valve, heating medium flow
QM32 Shut off valve, heating medium return
QM33 Shut off valve, brine out
QM34 Shut-off valve, brine in
QN10 Shuttle valve, climate system/water heater

Sensors etc.

BF1 Flow meter**
BT1 Outdoor temperature sensor*
BT2 Temperature sensors, heating medium flow
BT6 Temperature sensor, hot water charging
BT7 Temperature sensor, hot water top

**Only heat pumps with energy meter

* Not illustrated

Electrical components

AA4 Display unit
AA4-XJ3 USB socket
AA4-XJ4 Service outlet (No function)
EB1 Immersion heater
FR1 El. anode*
SF1 Switch
W130 Network cable for NIBE Uplink

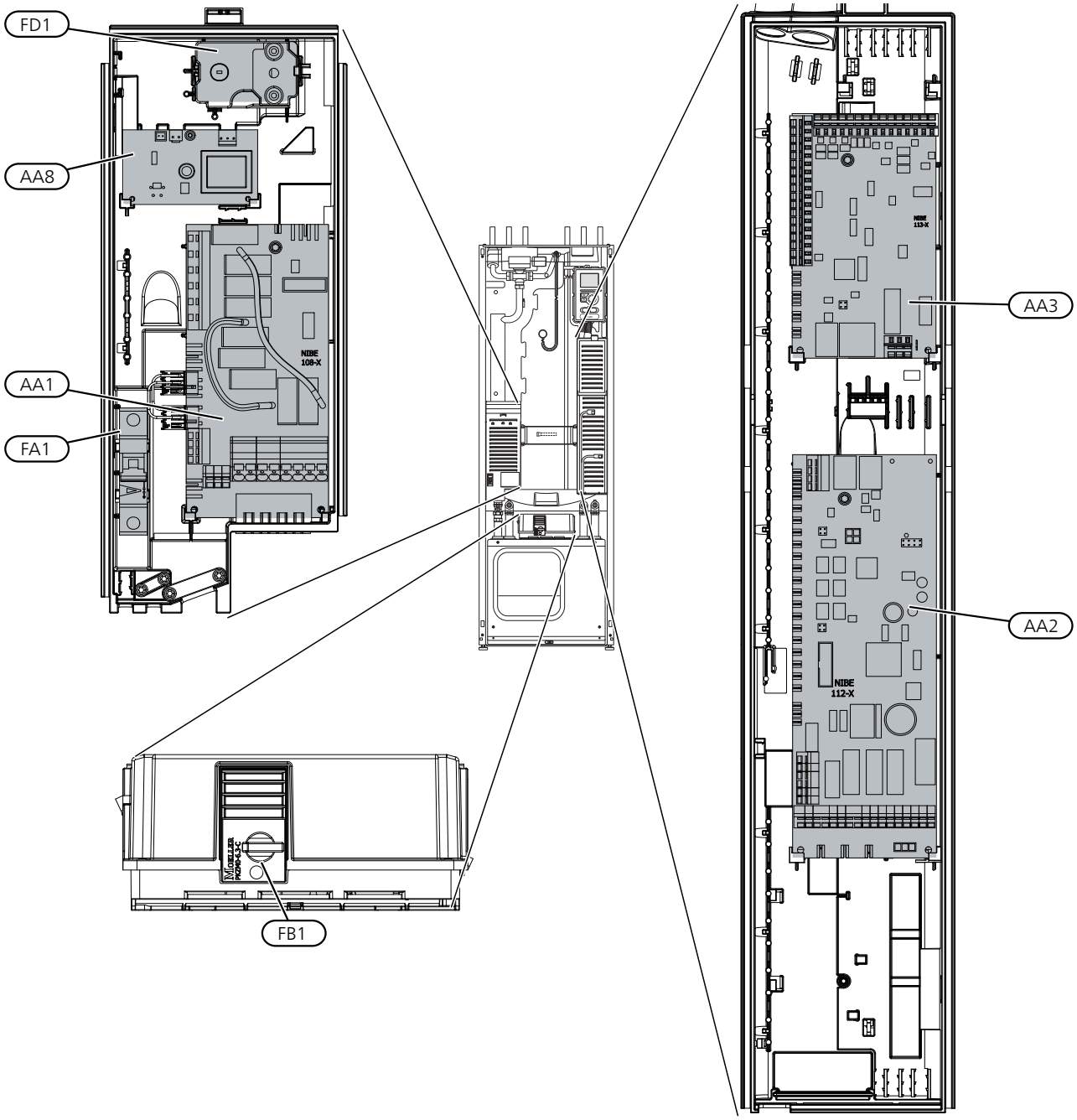
* Only heat pump with enamelled vessel.

Miscellaneous

PF1 Rating plate
PF2 Type plate, cooling section
UB1 Cable gland, incoming electricity
UB2 Cable gland
UB3 Cable gland, rear side, sensor

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

Distribution boxes



Electrical components

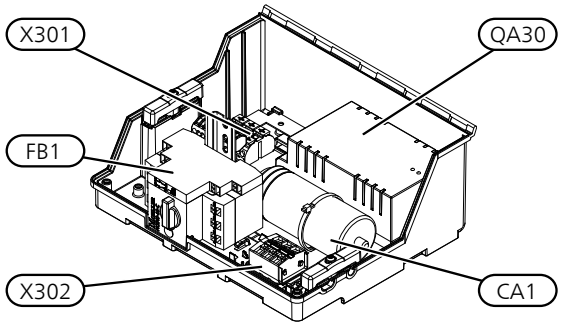
AA1	Immersion heater card
AA2	Base card
AA3	Input circuit board
AA8	Electrical anode board*
FA1	Miniature circuit-breaker
FB1	Motor cut-out**
FD1	Temperature limiter/Emergency mode thermostat

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

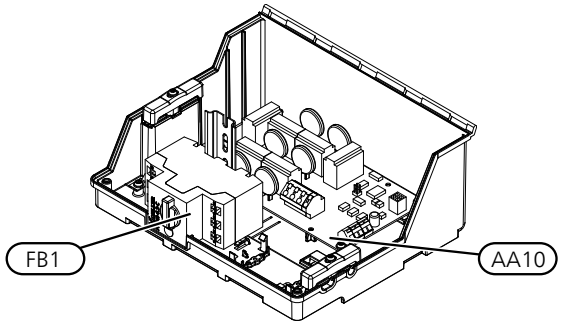
* Only heat pump with enamelled vessel.

** 1x230 V, 3x230 V 6-10 kW, 3x400V 5 kW has auxiliary switch for motor cut-out.

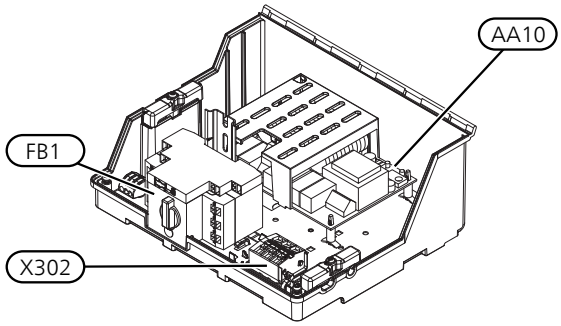
1x230 V 5-12 kW
3x400 V 5 kW



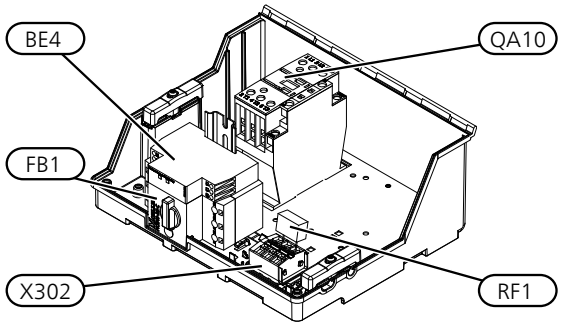
3x400 V 6-12 kW



3x230 V 6-10 kW



3x230 V 12 kW



Electrical components

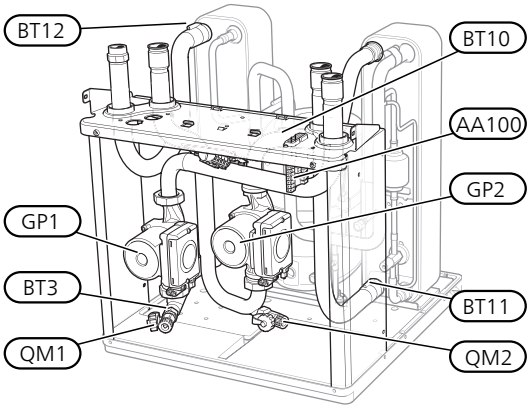
AA10	Soft-start card
BE4	Phase sequence monitor (3-phase)
CA1	Capacitor
FB1	Motor cut-out**
QA10	Contactor, compressor
QA30	Soft-starter
RF1	Suppression capacitor
X301	Terminal block
X302	Terminal block

** 1x230 V, 3x230 V 6-10 kW, 3x400V 5 kW has auxiliary switch for motor cut-out.

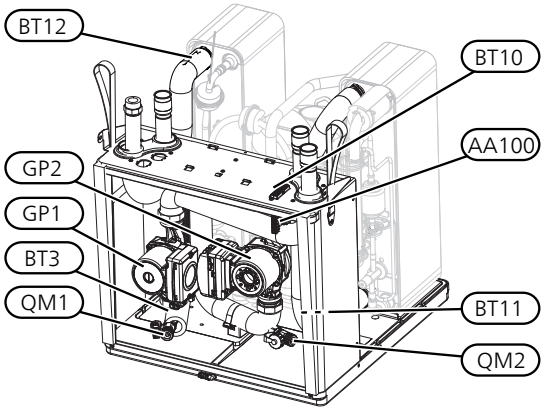
Designations in component locations according to standard IEC 81346-1 and 81346-2.

Cooling section

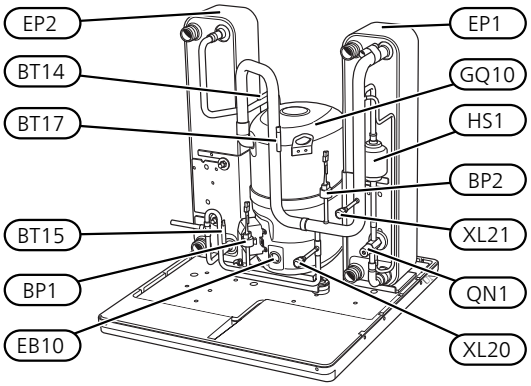
5 - 8 kW



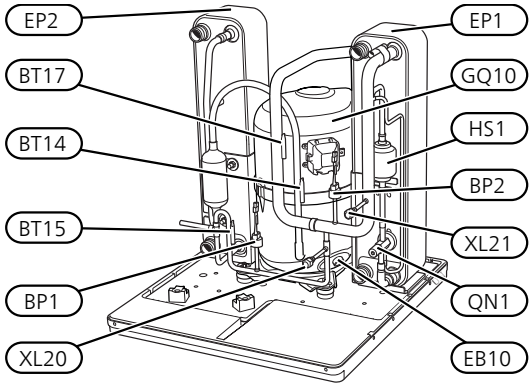
10 & 12 kW



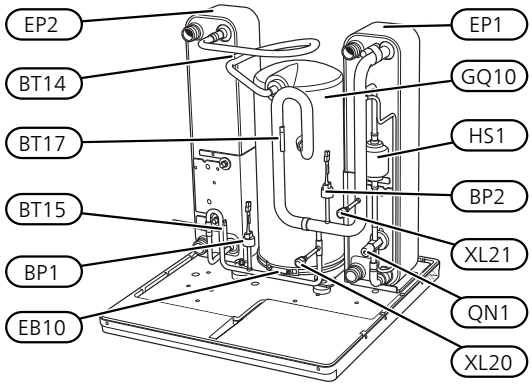
1x230 V 5 kW
3x400 V 5 kW



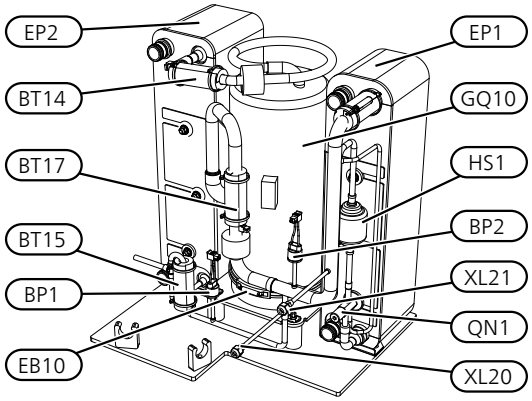
3x230 V 6-10 kW
3x400 V 6-10 kW



1x230 V 8-12 kW
3x400 V 12 kW



3x230 V 12 kW



Pipe connections

XL20	Service connection, high pressure
XL21	Service connection, low pressure

HVAC components

GP1	Circulation pump
GP2	Brine pump
QM1	Drainage, climate system
QM2	Draining, brine side

Sensors etc.

BP1	High pressure pressostat
BP2	Low pressure pressostat
BT3	Temperature sensors, heating medium return
BT10	Temperature sensor, brine in
BT11	Temperature sensor, brine out
BT12	Temperature sensor, condenser supply line
BT14	Temperature sensor, hot gas
BT15	Temperature sensor, fluid pipe
BT17	Temperature sensor, suction gas

Electrical components

AA100	Joint card
EB 10	Compressor heater

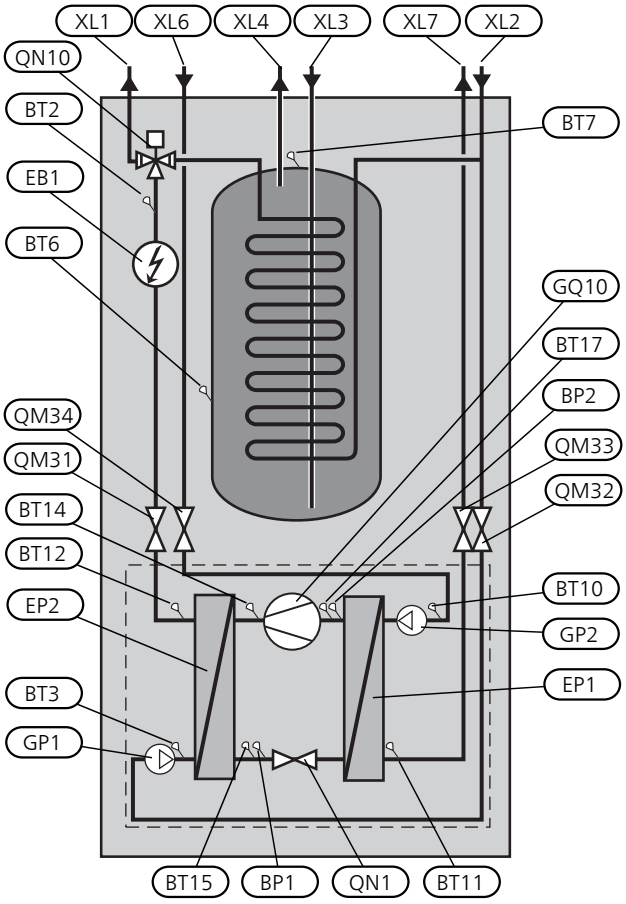
Cooling components

EP1	Evaporator
EP2	Condenser
GQ10	Compressor
HS1	Drying filter
QN1	Expansion valve

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

3 System description

Principle of operation



List of components

Pipe connections

XL 1 Connection, heating medium flow
XL 2 Connection, heating medium return
XL 3 Connection, cold water
XL 4 Connection, hot water
XL 6 Connection, brine in
XL 7 Connection, brine out

Cooling components

EP 1 Evaporator
EP 2 Condenser
GQ 10 Compressor
QN 1 Expansion valve

HVAC components

GP 1 Circulation pump
GP 2 Brine pump
QM 31 Shut-off valve, heating medium flow
QM 32 Shut off valve, heating medium return
QM 33 Shut off valve, brine out
QM 34 Shut-off valve, brine in
QN 10 Shuttle valve, climate system/water heater

Sensors etc.

Internal

	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.
BT1*	Outside sensor	Outdoor, shaded location on north side of the house.	Set point values for heating and cooling demand calculation. Operating mode change.
BT2	Flow pipe	On supply line after immersion heater (EB1).	Calculation of DM. If BT25 is installed, only view.
BT3	Return pipe	On return line between circulation pump (GP1) and condenser (EP2).	Stopping the compressor at high temperature.
BT6	Hot water, charging	On water heater lower section.	Stop and start of hot water charging.
BT7	Hot water, top	At water heater peak.	View.
BT10	Brine in	On incoming brine line before circulation pump (GP2).	View. Stops compressor at high temperature. Controls brine pump speed together with BT11
BT11	Brine out	On outgoing brine line after evaporator (EP1).	Stopping the compressor at low temperature. Controls brine pump speed together with BT10
BT12	Condenser flow line	On supply line between condenser (EP2) and immersion heater (EB1).	Stopping the compressor at high temperature.
BT14	Discharge	On hot gas line after compressor (GQ10).	Stopping the compressor at high temperature.
BT15	Fluid pipe	On the liquid line after the condenser (EP2).	View.
BT17	Suction gas	On suction gas line before the compressor (GQ10).	View.
BT25*	External flow line	Externally on the flow line to the heating system.	Calculation of DM. Actual value for additional shunt.
BT50*	Room sensor	In suitable indoor location.	Correction of the indoor temperature.

* Externally mounted (not included in outline diagram).

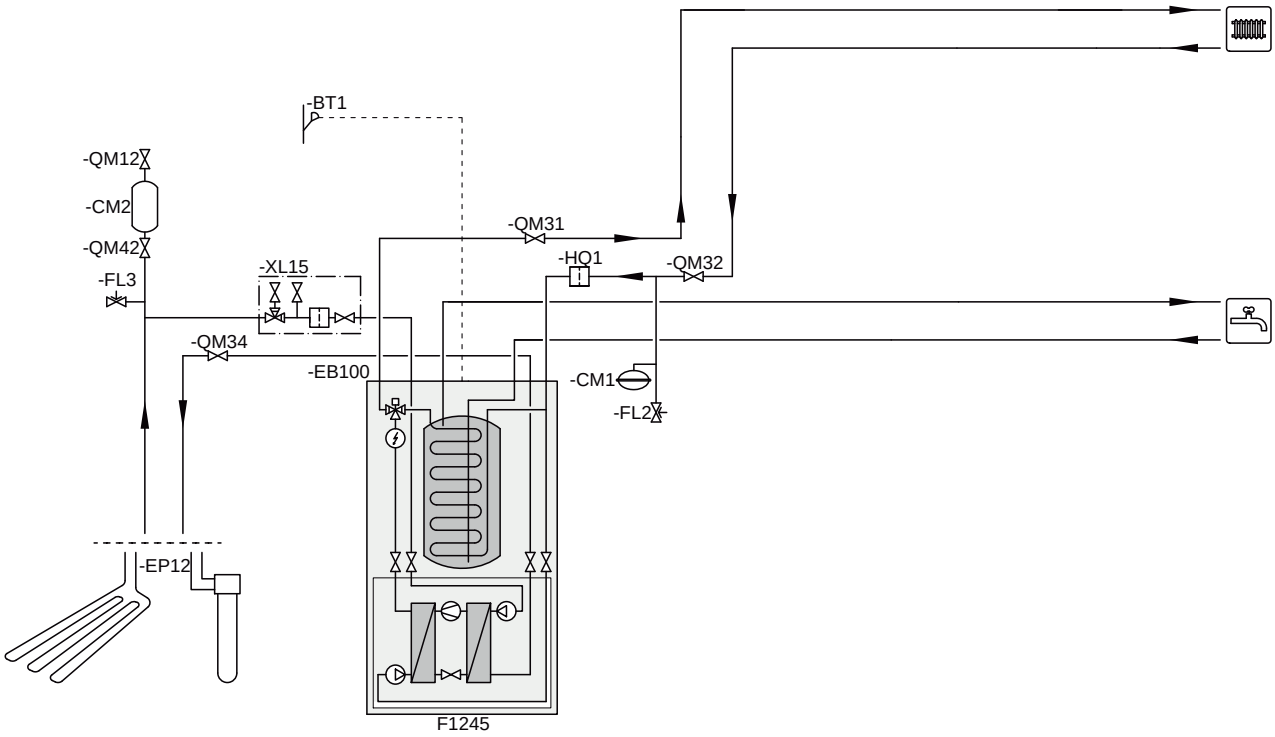
External

	Name	Location	Function
CL11-BT51	Pool sensor	On pool water pipe in heat exchanger.	Stop and start of pool charging.
EP30-BT53	Solar panel sensor	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.
EQ1-BT64	Flow line, cooling	On flow line, cooling	Actual value for mixing valve cooling (EQ1-QN18)
EQ1-BT65	Return line, cooling	On return line, cooling	View
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.
EP24-BT2	Flow line, extra climate system	On supply line to extra climate system 5.	Actual value for shunt valve, climate system 5.
EP24-BT3	Return line, extra climate system	On return line from extra climate system 5.	View
EP25-BT2	Flow line, extra climate system	On supply line to extra climate system 6.	Actual value for shunt valve, climate system 6.
EP25-BT3	Return line, extra climate system	On return line from extra climate system 6.	View
EP26-BT2	Flow line, extra climate system	On supply line to extra climate system 7.	Actual value for shunt valve, climate system 7.
EP26-BT3	Return line, extra climate system	On return line from extra climate system 7.	View
EP27-BT2	Flow line, extra climate system	On supply line to extra climate system 8.	Actual value for shunt valve, climate system 8.
EP27-BT3	Return line, extra climate system	On return line from extra climate system 8.	View
AZ1-BT20	Exhaust air	In exhaust air in FLM.	View.

	Name	Location	Function
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.

System diagram

Heating



Lables according to IEC 61346-2

Function

The heat pump prioritises hot water charging. The circulation pump GP1 runs at a set speed.

TIP

More system principles are on www.nibe.eu.

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

Installation requirements

Heating medium side

1x230 V

		5 kW	8 kW	10 kW	12 kW
Max system pressure	Bar	4			
Min recommended volume heating system*	l	75	120	150	180
Min flow**	l/s	0.08	0.13	0.16	0.19
Nominal flow	l/s	0.10	0.18	0.22	0.27
Max recommended flow	l/s	0.13	0.23	0.29	0.35
Max external available pressure at nom flow***	kPa	68	64	64	58
Min/max temperature	°C	See diagram page 76.			

3x230 V

		6 kW	8 kW	10 kW	12 kW
Max system pressure	Bar	4			
Min recommended volume heating system*	l	90	120	150	180
Min flow**	l/s	0.10	0.13	0.16	0.19
Nominal flow	l/s	0.13	0.18	0.22	0.27
Max recommended flow	l/s	0.17	0.23	0.29	0.35
Max external available pressure at nom flow***	kPa	67	64	64	58
Min/max temperature	°C	See diagram page 76.			

3x400 V

		5 kW	6 kW	8 kW	10 kW	12 kW
Max system pressure	Bar	4				
Min recommended volume heating system*	l	75	90	120	150	180
Min flow**	l/s	0.08	0.10	0.13	0.16	0.19
Nominal flow	l/s	0.10	0.13	0.18	0.22	0.27
Max recommended flow	l/s	0.13	0.17	0.23	0.29	0.35
Max external available pressure at nom flow***	kPa	68	67	64	64	58
Min/max temperature	°C	See diagram page 76.				

* 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

1x230 V

		5 kW	8 kW	10 kW	12 kW
Max system pressure	Bar	3			
Min flow	l/s	0.19	0.33	0.40	0.47
Nominal flow	l/s	0.23	0.42	0.51	0.65
Max external available pressure at nom flow	kPa	62	48	85	69
Max/min incoming temperature	°C	See diagram page 76.			
Min outgoing temperature	°C	-12			

3x230 V

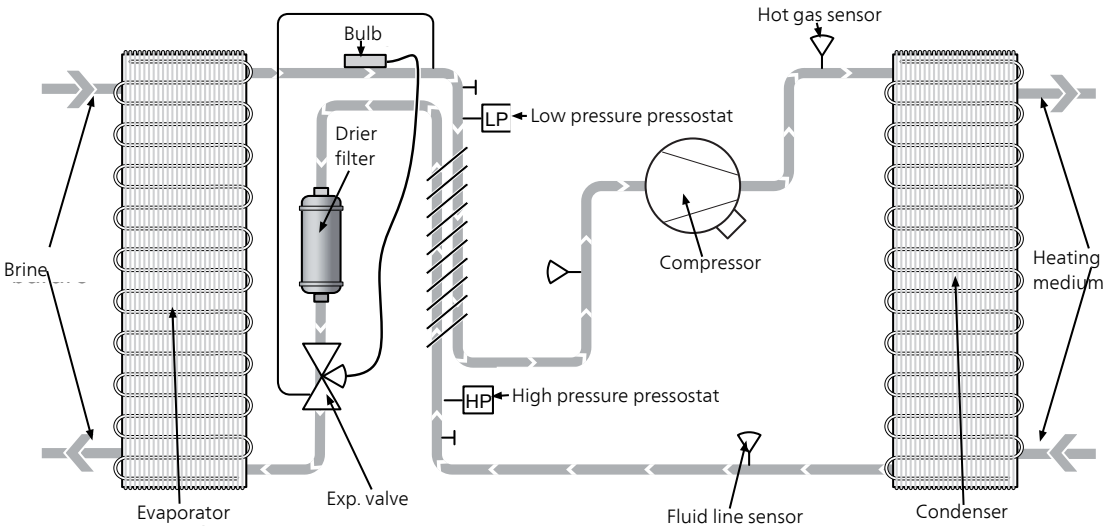
		6 kW	8 kW	10 kW	12 kW
Max system pressure	Bar	3			
Min flow	l/s	0.25	0.33	0.40	0.47
Nominal flow	l/s	0.30	0.42	0.51	0.65
Max external available pressure at nom flow	kPa	58	48	85	69
Max/min incoming temperature	°C	See diagram page 76.			
Min outgoing temperature	°C	-12			

3x400 V

		5 kW	6 kW	8 kW	10 kW	12 kW
Max system pressure	Bar	3				
Min flow	l/s	0.19	0.25	0.33	0.40	0.47
Nominal flow	l/s	0.23	0.30	0.42	0.51	0.65
Max external available pressure at nom flow	kPa	62	58	48	85	69
Max/min incoming temperature	°C	See diagram page 76.				
Min outgoing temperature	°C	-12				

4 Cooling circuit

Outline diagram



Compressor control

High pressure pressostat

Stop with manual restart:

- The above has occurred 2 times within 150 minutes.
- More than 300 minutes have passed since the above stop occurred.

Low pressure pressostat

Stop with manual restart:

- The compressor stops when the pressure is below 1.5 bar, and can restart when the pressure is above 3 bar.

  The function is blocked for 1 minutes after switching between charging type HW and heatingand pool

Motor protection

Tripped motor protection is reset manually on the motor protection breaker.

F1245	Setting 1 x 230 V	Setting 3 x 230 V	Setting 3 x 400 V
5 kW	9.0 A		9.0 A
6 kW		8.0 A	4.0 A
8 kW	15.0 A	10.0 A	6.0 A
10 kW		13.0 A	6.3 A
12 kW	22.5 A	16.0 A	9.0 A

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 76

Time conditions

Minimum time from start to stop to start is 20 min.

Compressor heater

The compressor heater is active when relay (K4) on the base card is in unaffected mode.

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.

F1245	superheat
5 kW	4 - 6 °C
6 kW	4 - 6 °C
8 kW	4 - 6 °C
10 kW	4 - 6 °C
12 kW	4 - 6 °C

5 Component description

Compressor (GQ10)

1 x 230 V

Size	Type	Resistance range (Ω at 20 °C +/- 10 %)		
		T1-T3[C-R]	T1-T2[C-S]	T2-T3[S-R]
5	Piston	1.7	4.18	5.88
8	Piston	0.94	2.07	3.01
12	Scroll	0.60	1.90	2.50

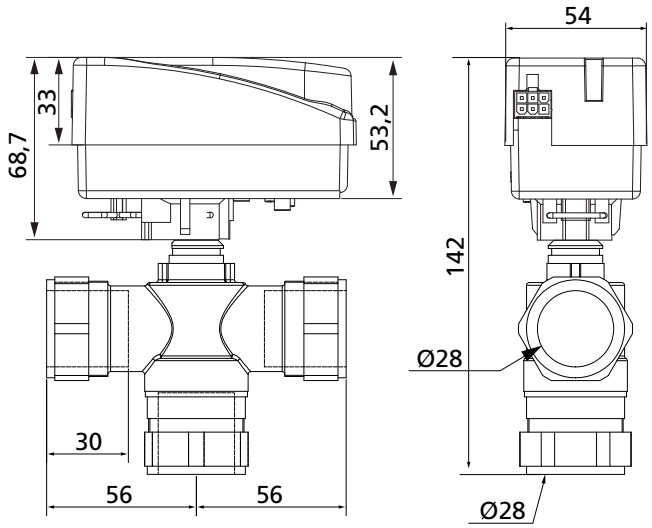
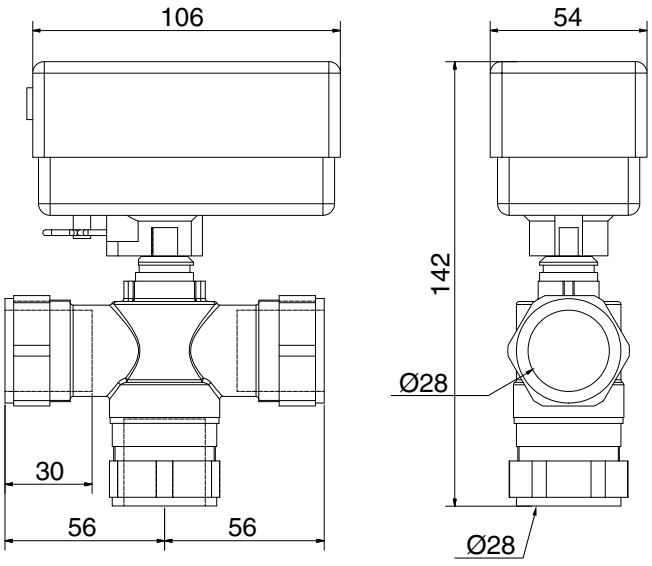
3 x 230 V

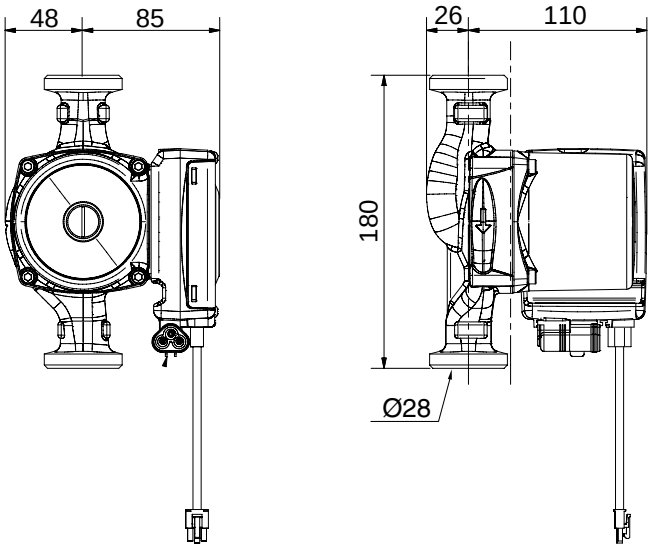
Size	Type	Resistance range (Ω at 20 °C +/- 10 %)		
		T1-T3[C-R]	T1-T2[C-S]	T2-T3[S-R]
5	Piston	1.7	4.18	5.88
6	Piston	1.36	1.36	1.36
8	Piston	1.13	1.13	1.13
10	Piston	0.93	0.93	0.93
12	Scroll	1.12	1.12	1.12

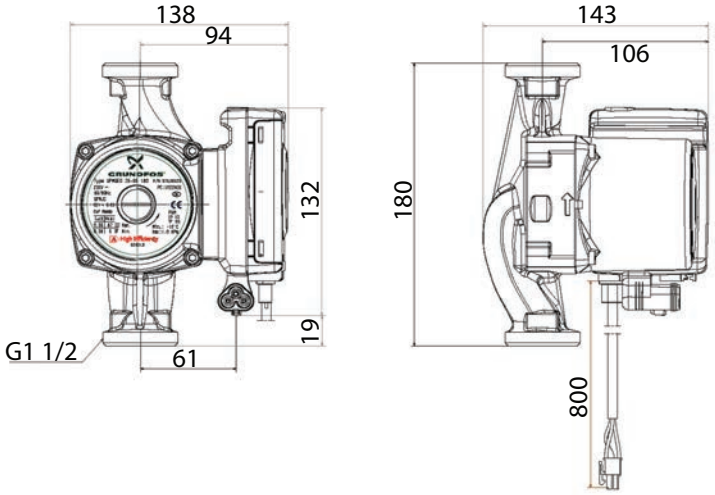
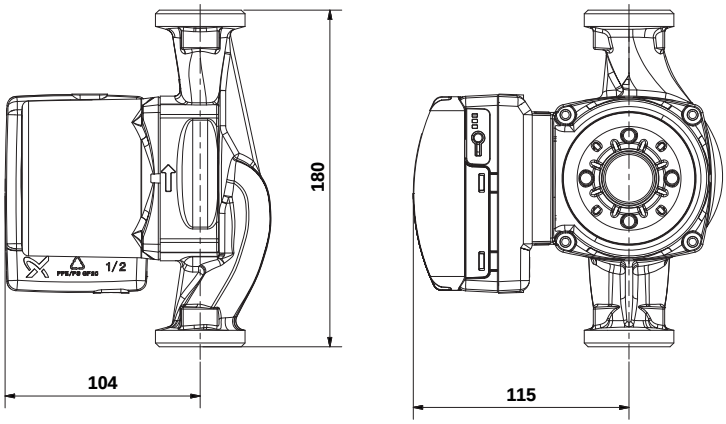
3 x 400 V

Size (kW)	Type	Resistance range (Ω at 20 °C +/- 10 %)		
		W-V[C-R]	W-U[C-S]	U-V[S-R]
5	Piston	1.7	4.18	5.88
6	Piston	5.19	5.19	5.19
8	Piston	3.56	3.56	3.56
10	Piston	3.59	3.59	3.59
12	Scroll	3.64	3.64	3.64

Other components

Component	Description
Immersion heater (EB1)	1x230 V and 3x400 V White coil (1/3 kW), internal resistance: 55 ohm Brown coils (3 x 2 kW), internal resistance: 27 ohm
	3x230 V White coil (3 kW), internal resistance 18 ohm Red coil (2 kW), internal resistance 27 ohm Brown coil (2 kW), internal resistance 27 ohm Black coil (2 kW), internal resistance 27 ohm
Reversing valve (QN10)	Actuator motor: 7 VA, 230/24 VAC, 50 Hz, IP 40. Running time approx 8 seconds Max. operating pressure: 1.0 MPa Operating temperature: 5 - 80 °C (90 °C briefly) *From September 2012*  *Before September 2012* 

Component	Description
Heating medium pump (GP1)	Grundfos UPM Max lift height: 7.5 m Control signal: PWM 0-10 V DC (max-min speed) 

Component	Description
Brine pump (GP2)	**5 - 8 kW** Grundfos UPM GEO Max lift height: 8.5 m Control signal: PWM 0-10 V DC (max-min speed)  **10 - 12 kW** Grundfos UPM XL Max. lift height: 12 m Control signal: PWM 0-10 V DC (max-min speed) 
High pressure switch (BP1)	Breaking value: 29 bar Reconnection differential: -7 bar
Low pressure switch (BP2)	Breaking value: 1.5 bar Reconnection differential: 1.5 bar
Compressor heater	Output (5-10): 30 W Output (12-17): 40 W

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

Immersion heater card (AA1)

LED	Indication
K1 - K10: Orange	A steady light means that the relevant relay is engaged.

Output	1x230 V	3x230 V	3x400 V
K1	Supply L1	Supply L1	Supply L1
K2	Supply L1	Supply L2	Supply L2
K3	Supply L1	Supply L2	Supply L3
K4	Immersion heater 2 kW	Supply L3	Immersion heater 2 kW
K5	No function	Supply L3	No function
K6	Immersion heater 2 kW	Immersion heater 2 kW	Immersion heater 2 kW
K7	No function	Immersion heater 2 kW	Immersion heater 3 kW on K9
K8	Immersion heater 2 kW	Immersion heater 3 kW	Immersion heater 2 kW
K9	Immersion heater 1 kW	Immersion heater 2 kW	Immersion heater 1/3 kW
K10	No function	No function	No function

Base card (AA2)

LED	Indication
Power: Green	A steady light means that 12 V 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
PWM1	Control signal HM pump (GP1)
PWM2	Control signal brine pump (GP2)
K1	Reversing valve (QN10)
K2	Brine pump (GP2)
K3	HM pump (GP1)
K4	Compressor heater (EB10) (inverted signal)

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)

Soft-start card (AA10)

3x230 V 6 - 10 kW

LED	Indication
On: Yellow	A steady light indicates that there is control voltage (230 V).
Bypass: Yellow	Steady light during compressor operation but first 7 seconds after the compressor starts.

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 Continuous light: Incorrect phase sequence
Compr. on: Orange	Steady light when the compressor is active.
Bypass: Orange	Bypass bridge installed (alarm ignored).

Soft-start card (QA30)

LED	Indication
Power: Green	A steady light indicates correct control voltage 230 V+/- 15%. A flashing light indicates that control voltage is < 90 V.
Error: Red	Shows alarm status. **2 flash:** Low incoming voltage (<190 V for 1sec). Automatic reset with 5 minutes recovery. **3 flash:** If an over current is detected under the ramp. 2x automatic resets with 5 minutes recovery, requires that the control voltage is broken for 1 minute. **4 flash:** Indicates defective start condenser/relay. **5 flash:** Unsuccessful voltage stepping. 2x automatic resets with 5 minutes recovery, requires that the control voltage is broken for 1 minute.

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

In event of an alarm, the red lamp on the front lights up and an alarm icon is displayed. First go through the suggested actions shown in the display.

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.	Repairers action
1	Sensor fault: BT1 outdoor temperature sensor	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	Calculated supply temp is set to "min supply".	See fault-tracing schedule page 37.
2	Sensor fault: BT2 supply temperature sensor 1	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	* BT12 is used to calculate degree minutes. *Additional heat is blocked. *If BT2 about internally controlled addition is active and GP1 is regulated go to manual operation	See fault-tracing schedule page 38.
3	Sensor fault: BT3 return line sensor 1	Sensor not connected/defective (heating medium return).	Compressor blocked during hot water charging.	See fault-tracing schedule page 39.
10	Sensor fault BT10 brine in	Sensor not connected/defective (brine in).	GP2 switches to manual speed if auto controlled is selected.	See fault-tracing schedule page 39.
11	Sensor fault BT11 brine out	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	Compressor blocked. GP2 switches to manual speed if auto controlled is selected.	See fault-tracing schedule page 39.
12	Sensor fault BT12 condenser out	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	Compressor blocked. GP2 switches to manual speed if auto controlled is selected.	See fault-tracing schedule page 39.
20	Sensor fault AZ1-BT20	Sensor not connected/defective (exhaust air).	Circulation pump (AZ1-GP2) in FLM is blocked.	See fault-tracing schedule page 40.
21	Sensor fault AZ1-BT21	Sensor not connected/defective (extract air).	Circulation pump (AZ1-GP2) in FLM is blocked.	See fault-tracing schedule page 40.
23	Sensor fault AZ30-BT22 Supply air sensor	Sensor not connected/defective (Supply air)	Blocks the compressor. Stops all fans and opens QN40	
26	Sensor fault AZ1-BT26	Sensor not connected/defective (brine, collector in).	Circulation pump (AZ1-GP2) in FLM is blocked.	See fault-tracing schedule page 40.

Alarm no.	Alarm text on the display	Cause	Heat pump action.	Repairers action
28	Sensor fault BT71	Sensor not connected/defective (external return sensor)	No action. Together with alarm 25, heating is blocked	Check the sensor connection.
33	Sensor fault EP30-BT53	Sensor not connected/defective (solar panels).	Solar accessory is blocked.	See fault-tracing schedule page 41.
34	Sensor fault EP30-BT54	Sensor not connected/defective (solar coil)	Solar accessory is blocked.	See fault-tracing schedule page 41.
35	Sensor fault EM1-BT52	Sensor not connected/defective (boiler).	Shunt closes. Burner stops.	See fault-tracing schedule page 41.
36	Sensor fault EP21_BT2	Sensor not connected/defective (flow line sensor, heating system 2)	Controls the return sensor (EP21-BT3).	See fault-tracing schedule page 41.
37	Sensor fault EP22_BT2	Sensor not connected/defective (flow line sensor, heating system 3)	Controls the return sensor (EP22-BT3).	See fault-tracing schedule page 41.
38	Sensor fault EP23_BT2	Sensor not connected/defective (flow line sensor, heating system 4)	Controls the return sensor (EP23-BT3).	See fault-tracing schedule page 41.
39	Sensor fault EQ1-BT64	Sensor not connected/defective (cooling, flow line).	Cooling blocked. Cooling shunt closes.	See fault-tracing schedule page 41.
40	Compressor phase 1 missing	The compressor phase mentioned has been below 160 V for 30 min.	Compressor blocked.	Reset the phase.
41	Compressor phase 2 missing			
42	Compressor phase 3 missing			
43	Incorrect phase sequence	The phases are connected in the wrong order.	Compressor blocked.	Reconnect the phase sequence for incoming electricity.
45	Phase fault	Incorrect phase sequence or missing phase has been detected.	Compressor blocked. The heat pump switches to alarm operation.	The motor protection on single phase machines may have tripped.

Alarm no.	Alarm text on the display	Cause	Heat pump action.	Repairers action
50	High pressure alarm	The high pressure switch has deployed 2 times within 150 minutes or has been deployed for 300 minutes continuously.	Compressor blocked.	See fault-tracing schedule page 42.
51	Low pressure alarm	Low pressure switch has tripped. The alarm is blocked for 1 minute at each switch between operating modes.	Compressor blocked.	See fault-tracing schedule page 43.
52	Temperature limiter	Temperature limiter has tripped	Internal electrical addition is blocked.	See fault-tracing schedule page 44.
53	Level monitor	Brine level switch/ pressure switch has tripped.	Compressor and brine pump blocked.	Fill up and seal off any leakage in the collector circuit
54	Motor protection	The motor protection breaker has tripped.	Compressor blocked.	See fault-tracing schedule page 45.
55	Hot gas alarm	The compressor has been stopped 3 times in 240 min because the hot gas has exceeded 135°C for 20 mins or temporarily exceeded 150°°C.	Compressor blocked.	Call a qualified refrigeration technician.
56	Incorrect serial number	Heat pump program and serial number do not match each other.	Compressor blocked, relay activated.	
57	Incorrect program	Heat pump program and serial number do not match each other.	Compressor blocked, relay activated.	
60	Low HTFout	The temperature of the outgoing brine goes below the set min-temperature and the alarm is selected to be permanent.	Compressor blocked.	Bad circulation in the brine circuit. - Check the brine pump. - Check that the brine is bled. - Check the brine's freezing point.
70	Perm. Com. error input card	Communication with the input board has been missing for 60 seconds.	Calculated flow is set to min flow.	See fault-tracing schedule page 45.
71	Perm. Com. error base card	Communication with the base board has been missing for 15 seconds.	Compressor blocked.	See fault-tracing schedule page 46.
72	Perm. com. fault soft-start card	Communication with the soft-start board has been missing for 15 seconds.	Compressor blocked.	See fault-tracing schedule page 46.

Alarm no.	Alarm text on the display	Cause	Heat pump action.	Repairers action
73-95	Perm. com. fault (accessory)	Communication with the accessory board has been missing for 15 seconds.	Accessory is blocked.	Check communication cables. Check the setting of the dip switch.
96-99	Perm. com. error (room unit)	Communication with the room unit has been missing for 15 seconds.	Room unit is blocked.	Check communication cables.
130–133	Perm. com. fault (Climate system 5-8)	Communication with the climate system has been missing for 15 seconds.		
185	Anti freeze alarm supply air	Anti-freeze supply air.	Fans are switched off. Automatic reset when BT1 and BT23 > +3°C	
206	Com. fault with HW comfort	Communication with the accessory has been missing for 15 seconds.	Manual reset	
236	Sensor fault AZ2-BT20 - FLM2	Sensor not connected/defective (exhaust air)	Accessory blocked. The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	
237	Sensor fault AZ2-BT21 - FLM2	Sensor not connected/defective (extract air)	Accessory blocked. The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	
238	Sensor fault AZ2-BT26 - FLM2	Sensor not connected/defective (collector in)	Accessory blocked. The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	
239	Sensor fault AZ2-BT26 - FLM3	Sensor not connected/defective (collector in)	Accessory blocked. The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	
240	Sensor fault AZ2-BT26 - FLM3	Sensor not connected/defective (collector in)	Accessory blocked. The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	
241	Sensor fault AZ2-BT26 - FLM3	Sensor not connected/defective (collector in)	Accessory blocked. The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	

Alarm no.	Alarm text on the display	Cause	Heat pump action.	Repairers action
242	Sensor fault AZ2-BT26 - FLM4	Sensor not connected/defective (collector in)	Accessory blocked. The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	
243	Sensor fault AZ2-BT26 - FLM4	Sensor not connected/defective (collector in)	Accessory blocked. The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	
244	Sensor fault AZ2-BT26 - FLM4	Sensor not connected/defective (collector in)	Accessory blocked. The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	
250	Com. fault SMS	Communication with the accessory has been missing for 15 seconds.	Accessory blocked. Manual reset.	
251	Com. fault Modbus	Communication with the accessory has been missing for 15 seconds.	Accessory blocked. Manual reset.	
257	Com. fault ACS45	Communication with the accessory has been missing for 15 seconds.	Accessory blocked. Manual reset	
258	Sensor fault EQ1-BT57	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	Accessory blocked. Manual reset	
259	Sensor fault EQ1-BT75	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	Accessory blocked. Manual reset	
293	Low extract air temp.	BT21 < 0°C for 10 minutes	Supply and exhaust air fan switched off and QN40 opened. Manual reset.	
297	Com. fault with FTX	No communication with FTX.	Manual reset	
301–308	Communication fault with slave 1-8	Communication with the slave has been missing for 15 seconds.	Compressor blocked at relevant slave, manual resetting of relevant slave. (Alarm at slave level facilitates logging)	
311–318	Slave alarm from slave 1-8	Alarm from the slave has been detected.	Compressor blocked at relevant slave, manual resetting of relevant slave. (Alarm at slave level facilitates logging)	

Alarm no.	Alarm text on the display	Cause	Heat pump action.	Repairers action
323	Com. error HPAC	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	Cooling degree minutes set to zero.	
328	Com. fault ACS	Communication with the accessory board on ACS_Thermostat has been missing for 15 seconds.	Accessory is blocked. Manual reset.	
331	Com. fault Reversing valve	Communication with the reversing valve has been missing for 10 seconds.	Operation blocked.	
336–339	Sensor fault EP44-EP47 BT2	The input for the sensor receives unreasonably high or low value for longer than 2 seconds.	The sensor signal is replaced by "EPXX-BT2" - 10K during shunt control. At no BT3, the accessory is blocked.	
357	Com. fault OPT	Communication with the accessory board OPT has been missing for 60 seconds.	None	
358	Internal OPT fault	Alarm generated by the gas boiler.	None	

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.	Information in display	Cause	Heat pump action.	May be due to
107	Sensor fault: BT7 HW sensor top	Sensor temporarily missing	Only information	■ The sensor and its connections
110	Sensor fault: BT10brine in	Sensor temporarily missing	Only information	■ The sensor and its connections
123	Sensor fault BT23	Sensor temporarily missing	Only information	■ The sensor and its connections
138	Sensor fault EP23-BT2	Sensor temporarily missing	Only information	■ The sensor and its connections
139	Sensor fault EQ1-BT64	Sensor temporarily missing	Only information	■ The sensor and its connections
140	Compressor phase 1 missing	Compressor phase 1 has been briefly missing.	Only information	■ Phase fuse ■ Cable connections
141	Compressor phase 2 missing	Compressor phase 2 has been briefly missing.	Only information	■ Phase fuse ■ Cable connections
142	Compressor phase 3 missing	Compressor phase 3 has been briefly missing.		■ Phase fuse ■ Cable connections
145	Temporary general phase fault	Temporary problem with the communication from the base card to the motor protection		■ Communication cables.
150	Temporary HP alarm	High pressure switch has tripped once		■ No action necessary
151	Sensor fault CL11-BT51	Sensor temporarily missing	Only information	■ The sensor and its connections
155	Hot gas alarm	The hot gas (BT14) has been temporarily above 135 °C	The compressor is stopped	- Contact an authorised refrigeration technician
160	Low temp brine out	BT11 < Minimum value of brine out	Resets automatically when the temp has fallen 1 °C	■ Settings
161	High HTFin	Brine in has reached set max temperature.		■ Settings
162	High condenser out	Condenser out has reached max permitted temperature		■ Settings
162	High condenser out temperature	Condenser out has reached max permitted temperature	Resets automatically when condenser in has fallen two degrees	■ Settings
163	High condenser in temperature	Condenser in has reached max permitted temperature	Resets automatically when condenser in has fallen two degrees	■ Settings

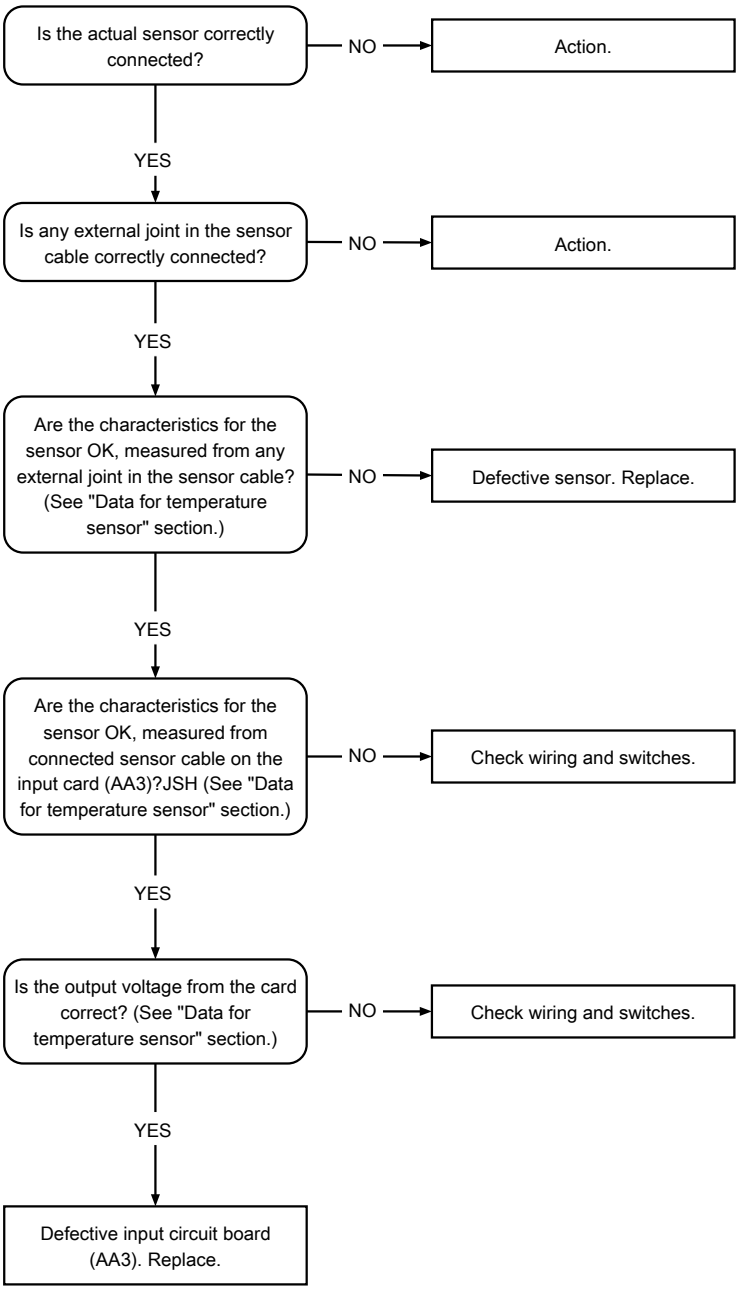
No.	Information in display	Cause	Heat pump action.	May be due to
164	Low exhaust air temperature	Exhaust air temperature has reached permitted min temperature		
166	Electrical anode incorrect	Fault in the electrical anode		
170	Com. error input card	Communication with the input card is temporarily missing.	Only information	■ Communication cables and connections
171	Com. error base card	Communication with the base card is temporarily missing.	Only information	■ Communication cables and connections
172	Com. error soft-start card	Communication with the soft-start card is temporarily missing.	Only information	■ Communication cables and connections
173	Com. error heating system2	Communication with accessory card for climate system 2 temporarily missing	Only information	■ Communication cables and connections
174	Com. error heating system3	Communication with accessory card for climate system 3 temporarily missing	Only information	■ Communication cables and connections
175	Start-up of soft-start card	The soft-start board is started up. Takes approx. 20 seconds.	Only information	■ Communication cables and connections
176	Com. error heating system4	Communication with accessory card for climate system 4 temporarily missing	Only information	■ Communication cables and connections
177	Com. error addition with mixing valve	Communication with accessory card for mixing valve controlled additional heat temporarily missing	Only information	■ Communication cables and connections
178	Com. error pool	Communication with accessory card for pool temporarily missing	Only information	■ Communication cables and connections
179	Com. fault FLM	Communication with the accessory FLM is temporarily missing.	Only information	■ Communication cables and connections
180	Freeze prot	Anti-freeze active. Occurs if the outdoor temperature is below 3 °C and no heating is permitted	Permits room heating	■ Operating settings
181	Unsuccessful periodic increase	Periodic increase did not reach the stop temperature in five hours.	Only information	■ Operating settings

No.	Information in display	Cause	Heat pump action.	May be due to
182	Load monitor activated	One or more power steps cannot be activated because the current in at least one phase is too high	Only information	■ Phase load. ■ It may require a larger main fuse
183	Defrosting	Defrosting in progress	Only information	■ No action
184	Filter alarm	Air filter needs cleaning		
187	Com. error step controlled additional heat	Temporary communication fault with accessory card with step controlled additional heat	Only information	■ Communication cables and connections
188	Com.fault solar	Temporary communication fault with accessory card with solar	Only information	■ Communication cables and connections
189	Com. error HPAC	Temporary communication fault with accessory card with HPAC	Only information	■ Communication cables and connections
190	Com. error ground water pump	Temporary communication fault with accessory card with ground water pump	Only information	■ Communication cables and connections
191	Com. error WWC	Temporary communication fault with accessory card with hot water circulation	Only information	■ Communication cables and connections
192	Com. error 2 pipe cooling	Temporary communication fault with accessory card with 2 pipe cooling	Only information	■ Communication cables and connections
194	Com. error PCS44	Temporary communication fault with accessory card with 4 pipe cooling	Only information	■ Communication cables and connections
196	Comm. room unit, zone 1	Temporary communication fault with room unit zone 1	Only information	■ Communication cables and connections
197	Comm. room unit, zone 2	Temporary communication fault with room unit zone 2	Only information	■ Communication cables and connections
198	Comm. room unit, zone 3	Temporary communication fault with room unit zone 3	Only information	■ Communication cables and connections
199	Comm. room unit, zone 4	Temporary communication fault with room unit zone 4	Only information	■ Communication cables and connections
322	SPA not updated	Electricity spot price cannot be obtained.	An average value of the most recently obtained prices is used.	
350	Sensor fault BT50	Sensor fault BT50 room sensor	Only information	The sensor and its connections

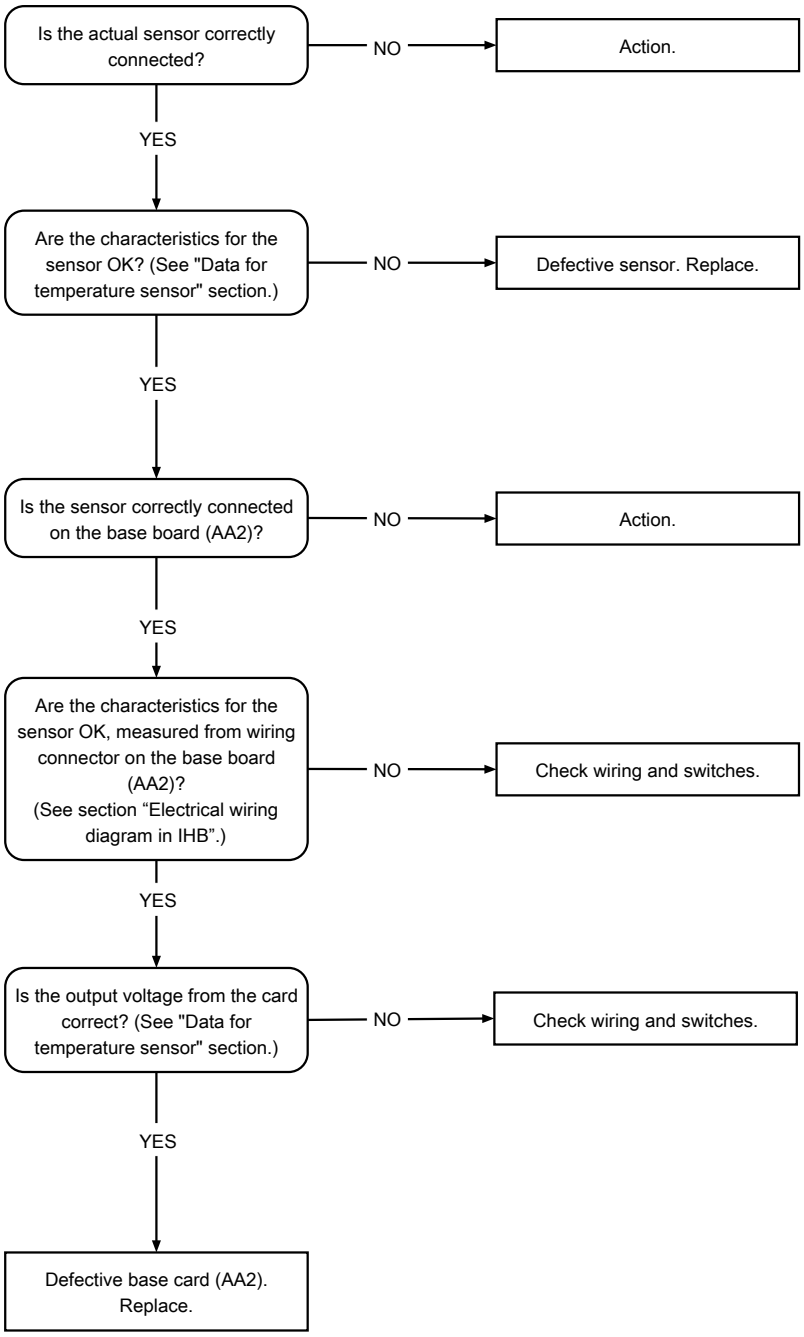
No.	Information in display	Cause	Heat pump action.	May be due to
351	Uncertain sensor accuracy	Uncertain sensor accuracy of brine sensors BT10, BT11. Difference of more than 2K between them at calibration.	GP2 switches to manual speed if auto controlled is selected.	■ Connections to sensor BT10, BT11
353	Uncertain sensor accuracy	Uncertain sensor accuracy of heating medium sensors BT3, BT12. Difference of more than 2K between them at calibration.	GP1 switches to manual speed if auto controlled is selected.	■ Connections to sensor BT3, BT12
359	Int temp OPT error	A temporary alarm from OPT	Resets when OPT is not issuing an alarm	
900	Country not defined.	Stops in the position reached when the message was displayed.	Resets when country is selected in menu 5.12.	
990	Country not defined	Country not selected	Only info. Resets when country is selected in menu 5.12	
995	External alarm	An alarm according to selected function on AUX input.	Only info.	■ Check any external connection functions.
996	Blocked	Additional heat is externally blocked via AUX input.	Additional heat is blocked	■ Check any external connection functions.
997	Blocked	Additional heat is externally blocked via AUX input.	Compressor is blocked	■ Check any external connection functions.

Troubleshooting guide

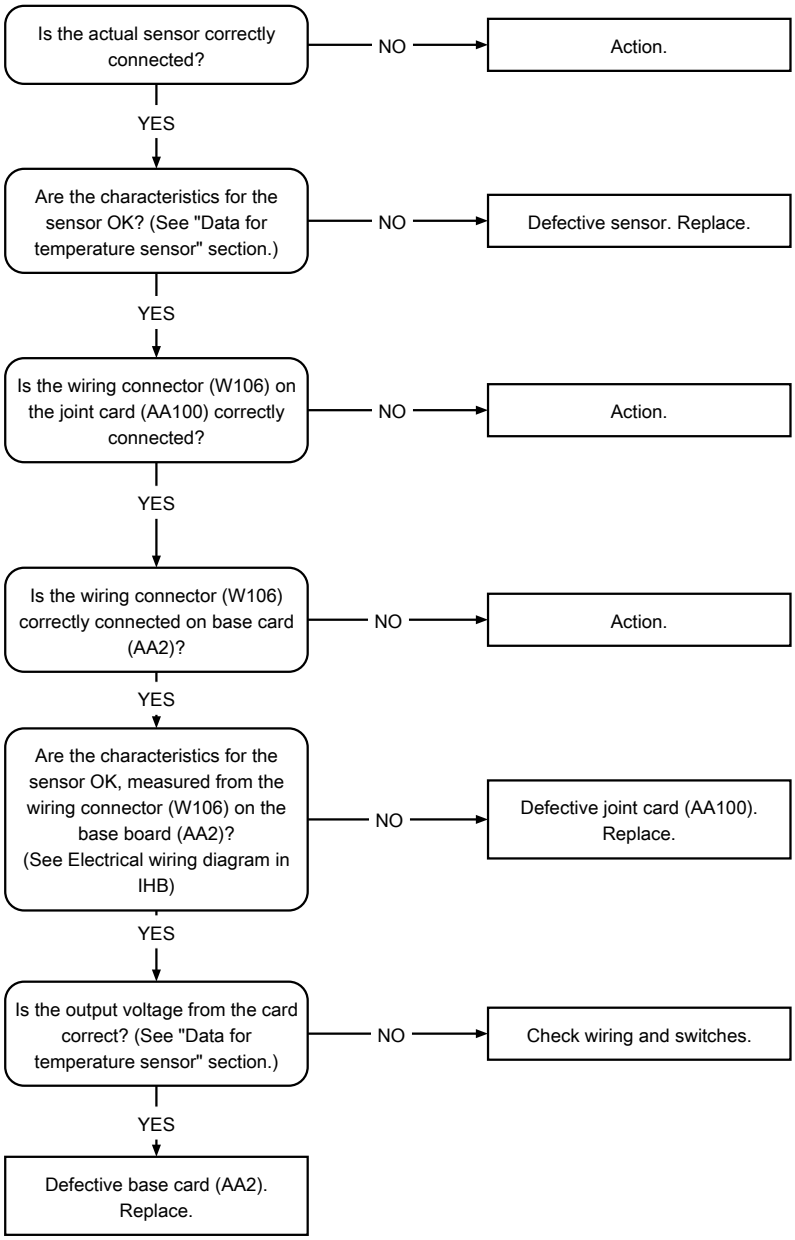
Alarm 1, 25 – sensor fault



Alarm 2 – sensor fault

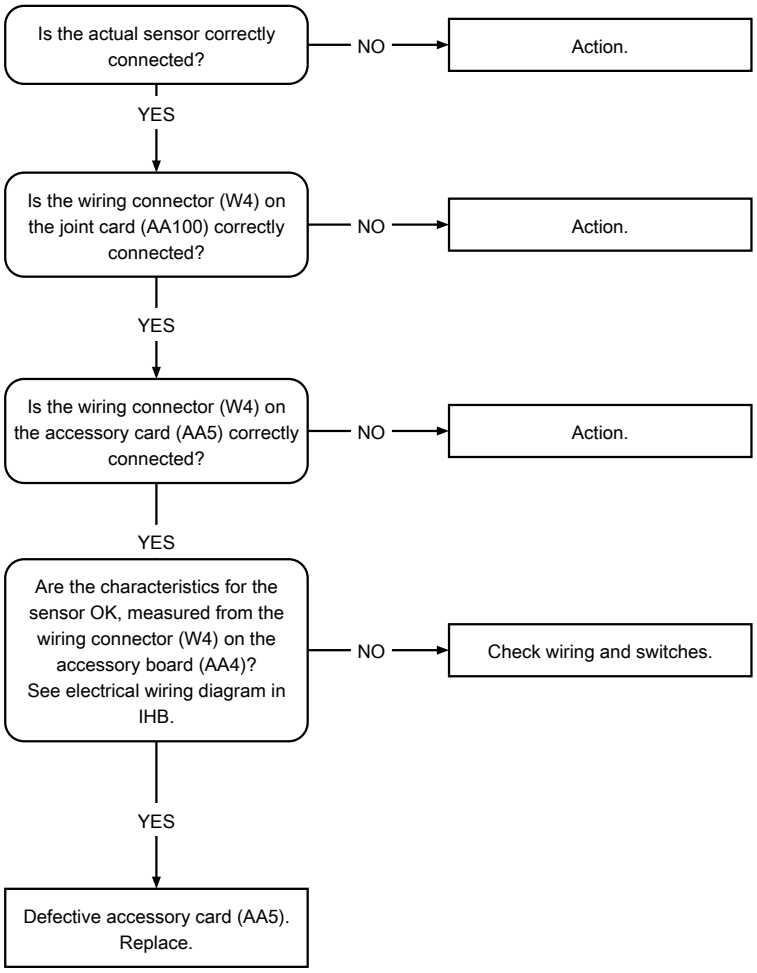


Alarm 3, 11, 12 – sensor fault



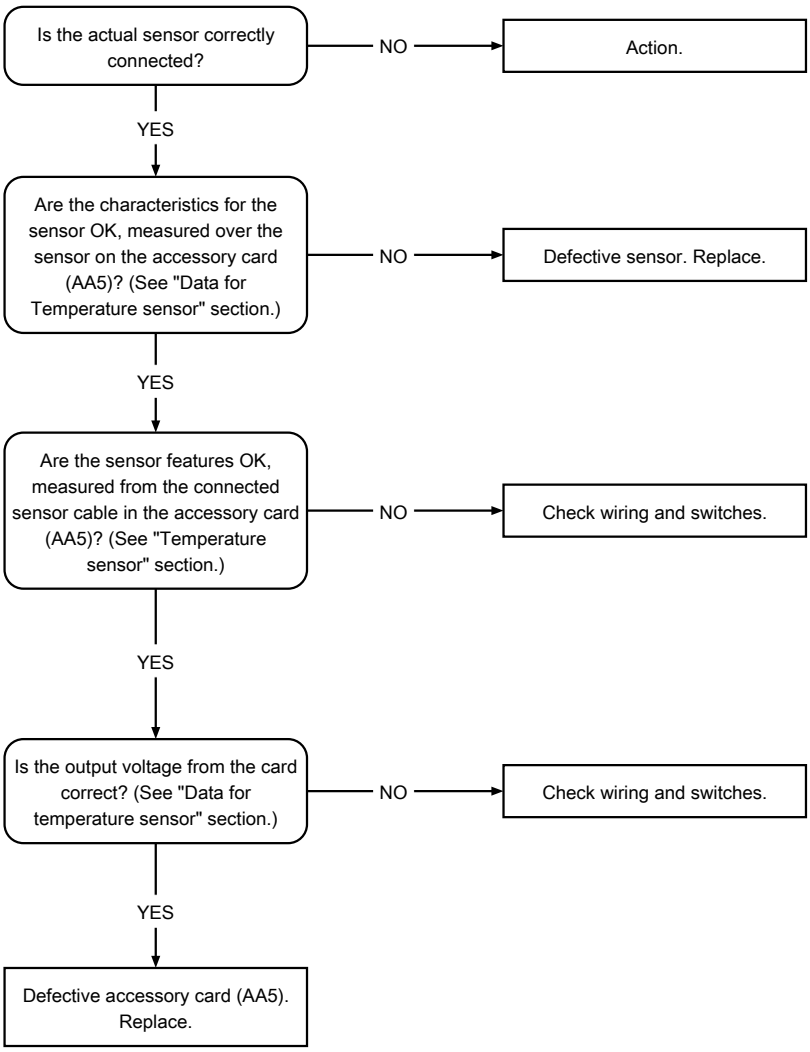
Alarm 20, 21, 26 – sensor fault

Fault-tracing in NIBE FLM

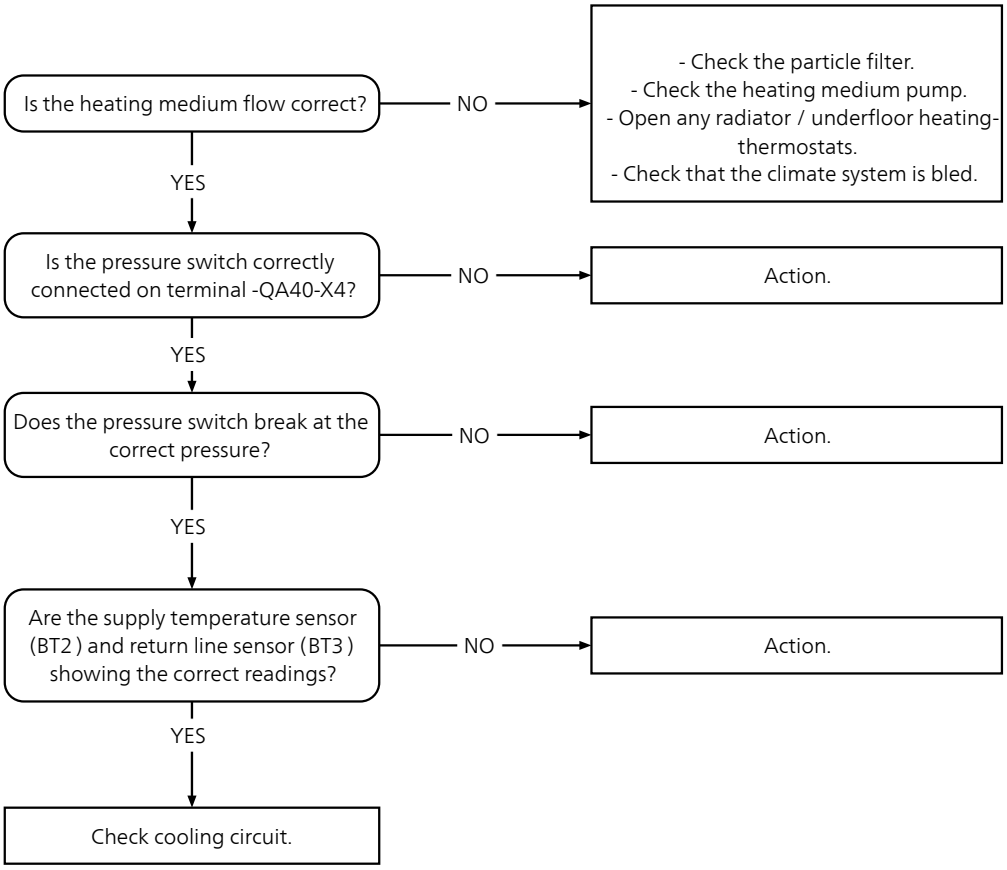


Alarm 33-39 – sensor fault

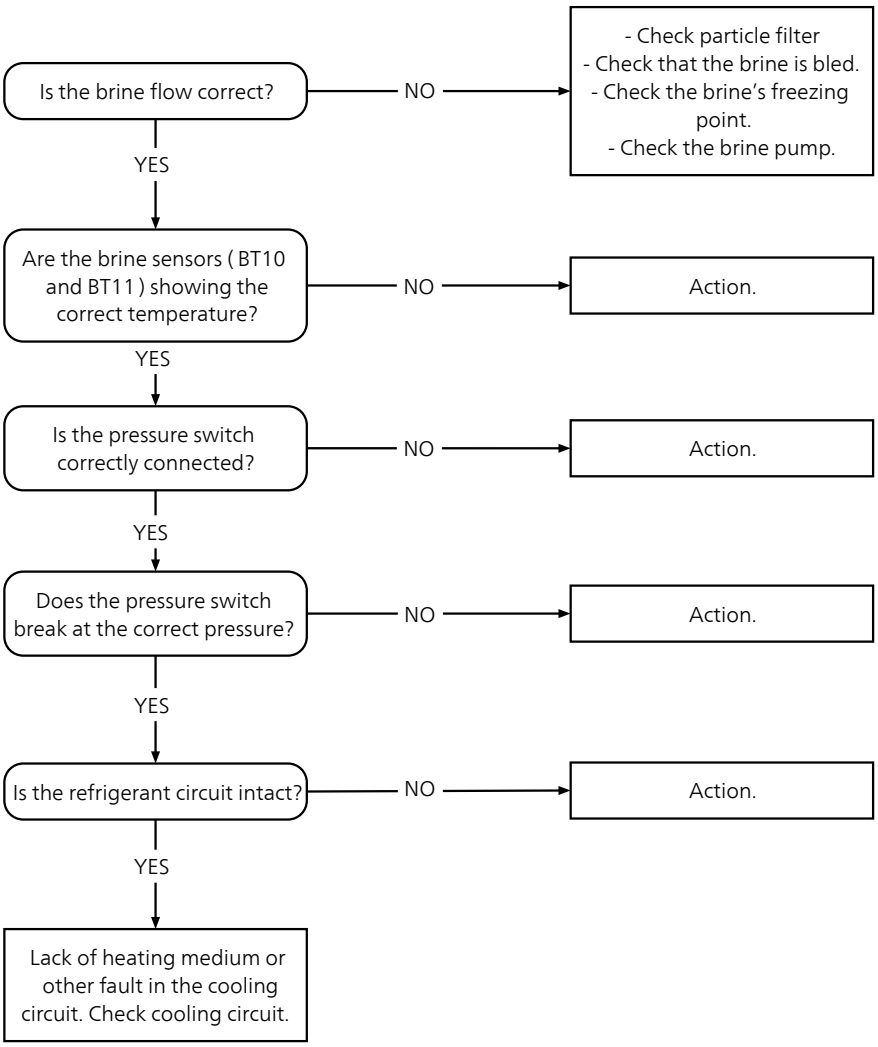
Fault-tracing in accessory card.



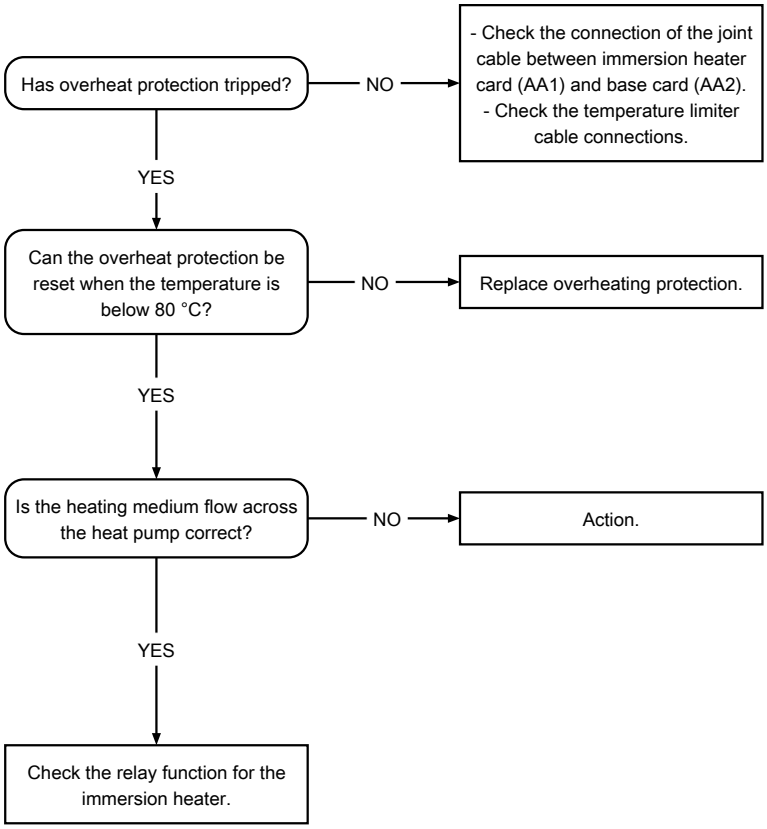
Alarm 50 – high pressure alarm



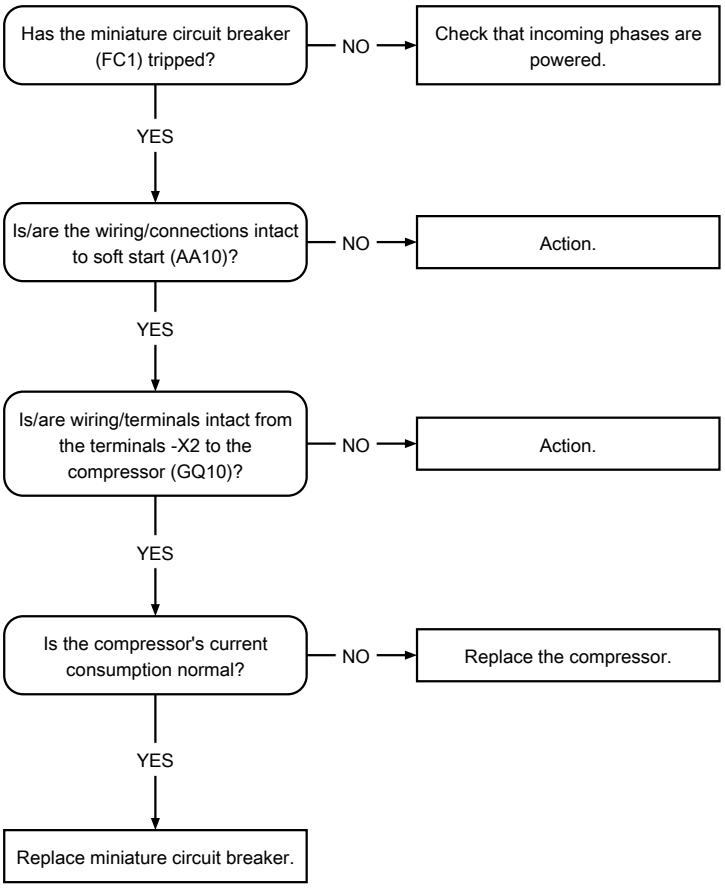
Alarm 51 – low pressure alarm



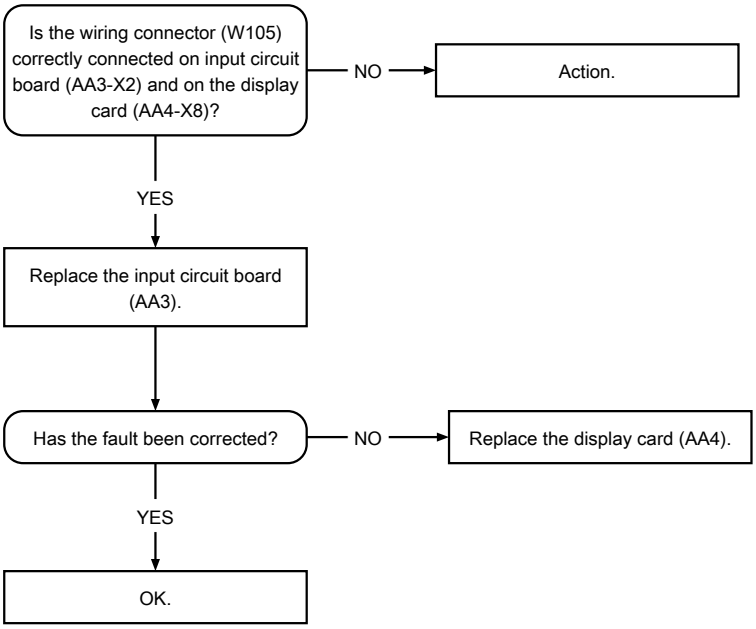
Alarm 52 – temperature limiter



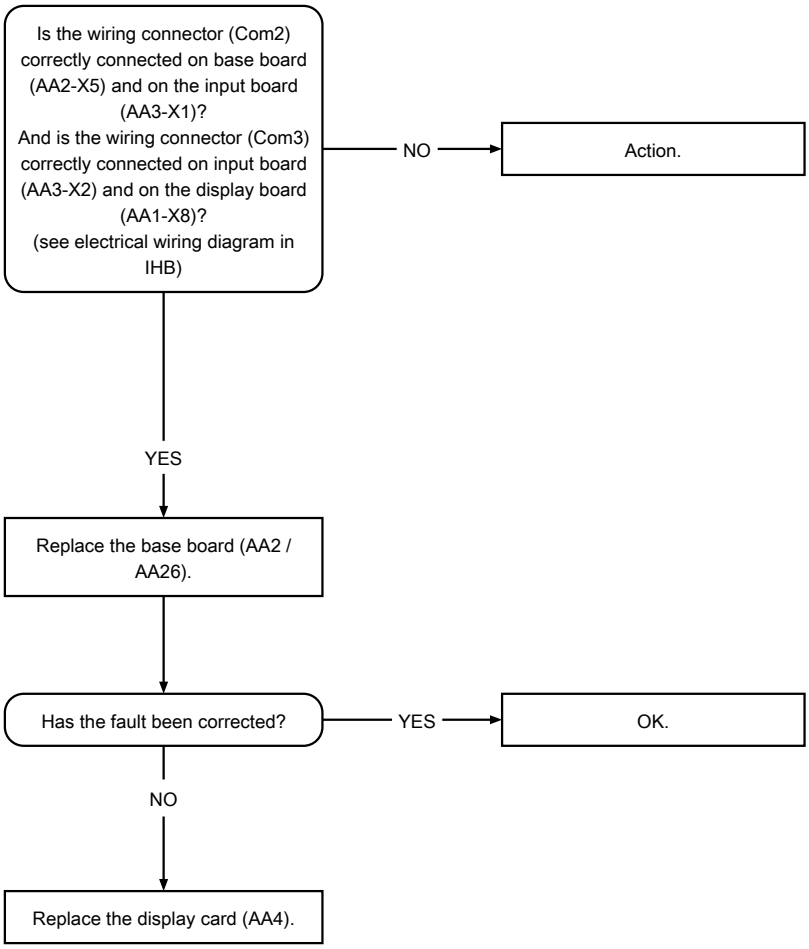
Alarm 54 – motor protection



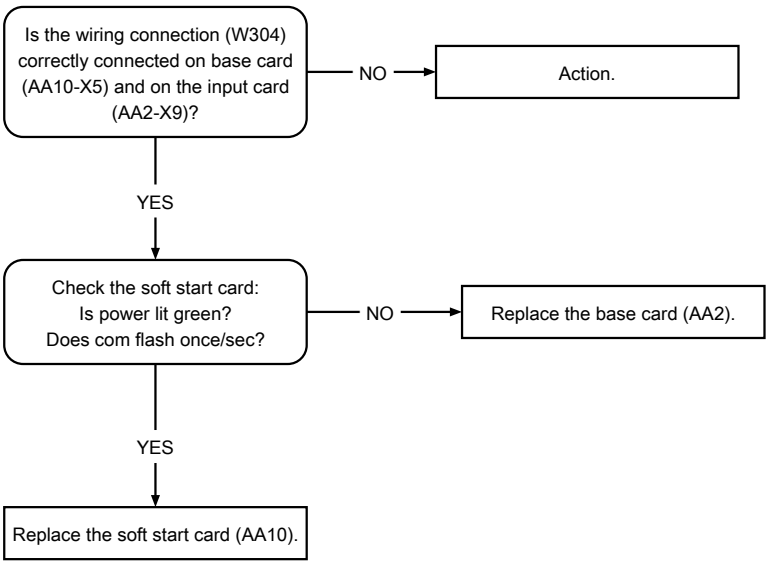
Alarm 70 - perm. com.error input card



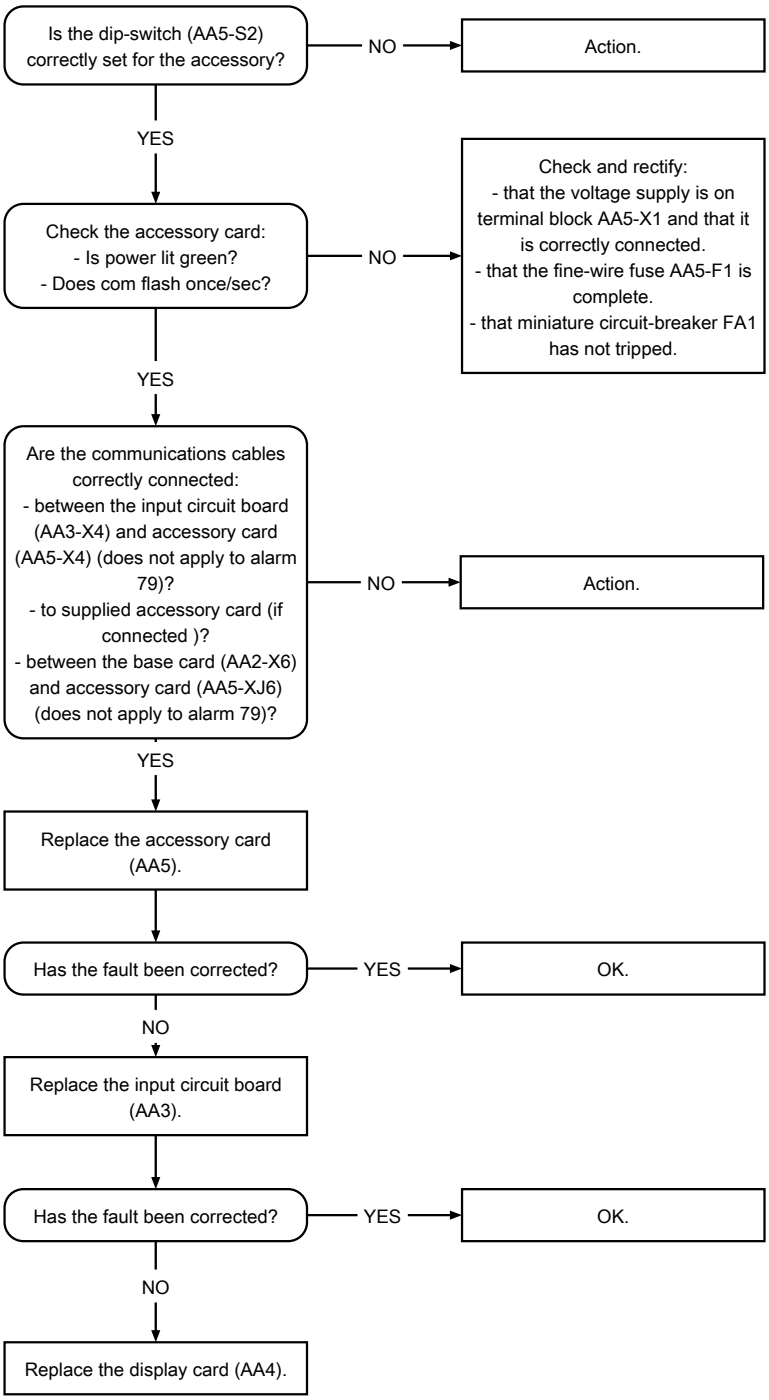
Alarm 71 - perm. com.error input card



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 pumps 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
AA10	Compressor (GQ10)
AA2-K1	Reversing valve (QN10)
AA2-K2	Brine pump (GP1)
AA2-K3	Heating medium pump (GP2)
AA2-K4	Compressor relay
AA1-K4	Immersion heater 2 kW
AA1-K5	No function
AA1-K6	Immersion heater 2 kW
AA1-K7	Immersion heater 3 kW on K9
AA1-K8	Immersion heater 2 kW
AA1-K9	Immersion heater 1/3 kW

Climate system 2 (ECS 40/41)

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

Climate system 3 (ECS 40/41)

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

Climate system 4 (ECS 40/41)

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

Climate system 5 (ECS 40/41)

Output	Function
EP44-AA5-K2	Mixing valve, close
EP44-AA5-K3	Mixing valve, open
EP44-AA5-K4	External circulation pump

Climate system 6 (ECS 40/41)

Output	Function
EP45-AA5-K2	Mixing valve, close
EP45-AA5-K3	Mixing valve, open
EP45-AA5-K4	External circulation pump

Climate system 7 (ECS 40/41)

Output	Function
EP46-AA5-K2	Mixing valve, close
EP46-AA5-K3	Mixing valve, open
EP46-AA5-K4	External circulation pump

Climate system 8 (ECS 40/41)

Output	Function
EP47-AA5-K2	Mixing valve, close
EP47-AA5-K3	Mixing valve, open
EP47-AA5-K4	External circulation pump

Mixing valve controlled additional heat (AXC 40)

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	Brine pump FLM

Ground water pump (AXC 40)

Output	Function
EP12-AA5-K4	Groundwater pump

Hot water circulation (AXC 40)

Output	Function
GP11-AA5-K4	HWC pump

Passive cooling 2-pipe (PCM40/PCM42)

Output	Function
EQ1-AA5-K1	Circulation pump
EQ1-AA5-K2	Shunt valve, (QN18) close
EQ1-AA5-K3	Shunt valve, (QN18) open
EQ1-AA5-K4	Reversing valve (QN12)

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, ACS45)

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

Step controlled additional heat (AXC40)

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

Solar control (SOLAR40)

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.

Brine pump (GP2) Grundfos

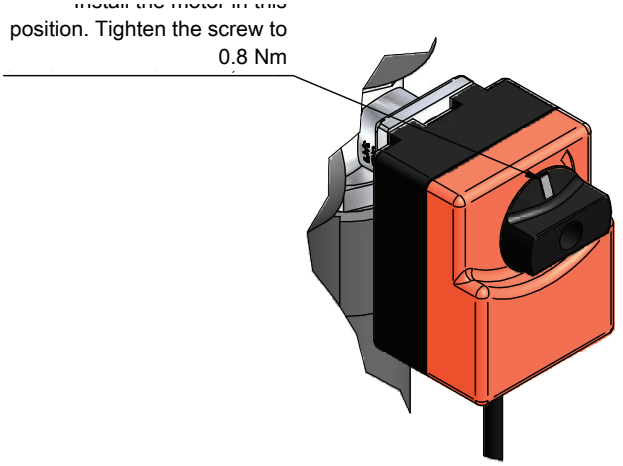
Pump speed GP2	PVM2, X2:3-4	LED PWM2 on Board AA2
100 %	approx 0 V DC	Not lit
50 %	approx 5 V DC	Half lit
0 %	approx 10 V DC	Lit

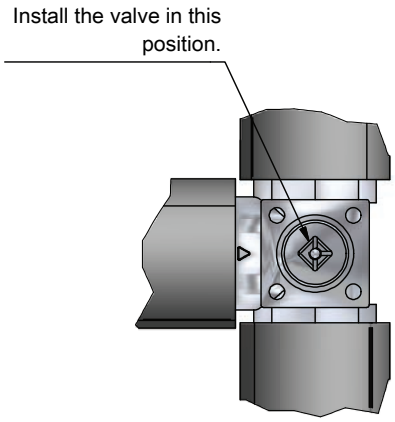
Heating medium pump (GP1) Grundfos

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

Test of reversing valve cooling (only F1245PC)

1. Select manual mode, cooling in menu 4.2. (Untick the addition and heating)
2. Reduce the time between cooling and heating to 0 in menu 1.9.5.
3. Check that the flow temperature in menu 3.1, tab 2 falls during cooling operation after approx 1 minute, the mixing valve is open in cooling mode.
4. Cooling medium temperature out in menu 3.1, tab 1 must rise during cooling operation.
5. If points 3 and 4 correspond, remove the mixing valve motor to see if the spindle is as illustrated below.
6. Select manual mode, cooling in menu 4.2, untick cooling and tick addition and heating.
7. Check that the flow temperature in menu 3.1, tab 2 rises during heating operation after a few minutes. Cooling medium temperature in menu 3.1, tab 1 must not rise during heating operation. The mixing valve is open to heating mode.





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.

F1245 can contain liquids at high temperature and under high pressure.

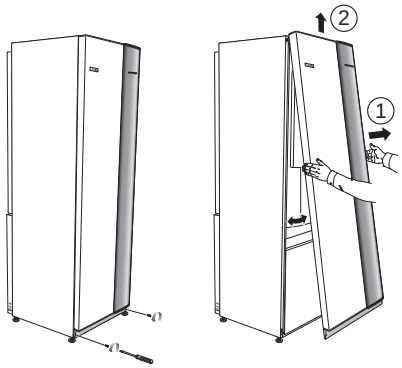
When replacing components on F1245 only replacement parts from NIBE may be used.

An ESD bracelet must be worn when replacing the card.

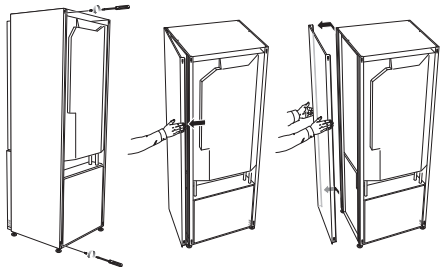
Basic

Removing the covers

Front cover



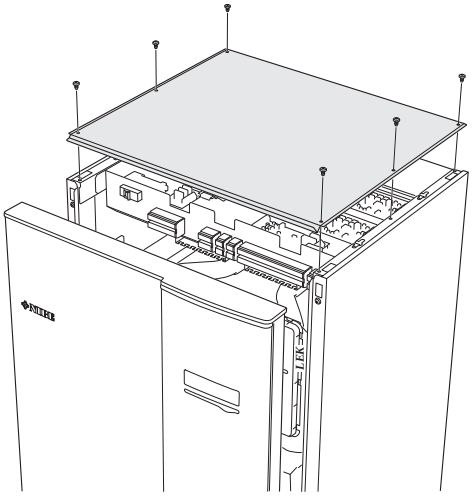
1. Remove the screws from the lower edge of the front panel.
2. Lift the panel out at the bottom edge and up.



The side covers can be removed to facilitate the installation.

1. Remove the screws from the upper and lower edges.
2. Twist the cover slightly outward.
3. Move the hatch outwards and backwards.
4. Assembly takes place in the reverse order.

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.

Pulling out the cooling module

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

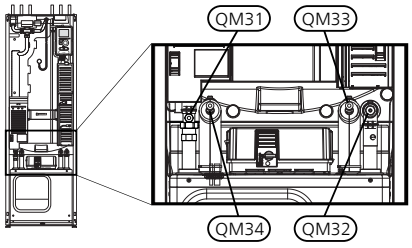
NOTE

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

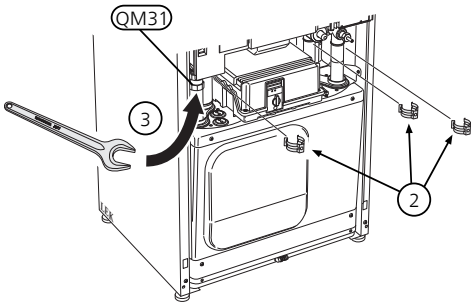
Caution

Drain the cooling module according to IHB to facilitate lifting.

1. Close the shut-off valves (QM31), (QM32), (QM33) and (QM34).

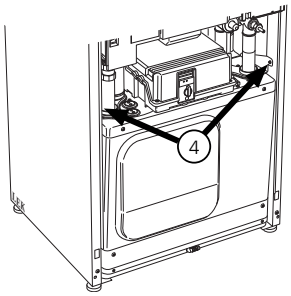


2 Pull off the lock catches.

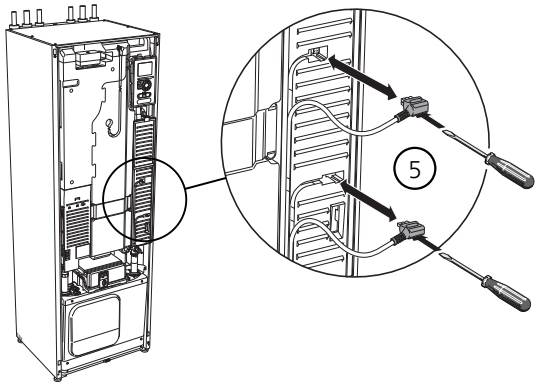


3 Disconnect the pipe connection at the shut-off valve (QM31).

4 Remove the two screws.



5 Remove the connections from the base card (AA2) using a screwdriver.

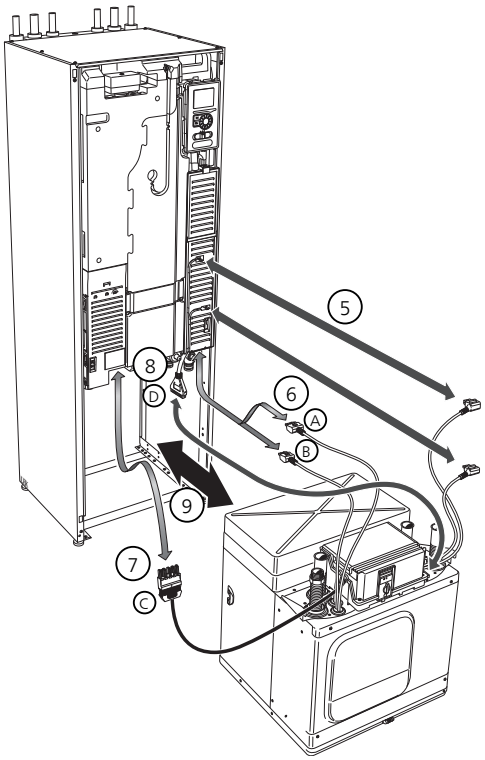


6 Disconnect the connectors (A) and (B) from the underside of the base card cabinet.

7 Disconnect the connector (C) from the immersion heater circuit board (AA1) using a screwdriver.

8 Disconnect the connector (D) from the joint circuit board (AA100).

9 Carefully pull out the cooling module.

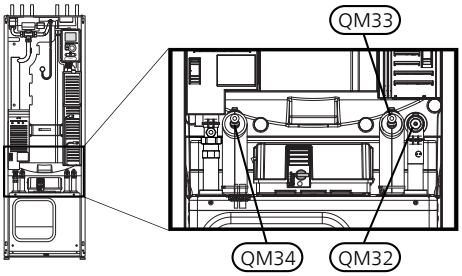


TIP

The cooling module is installed in reverse order.

NOTE

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



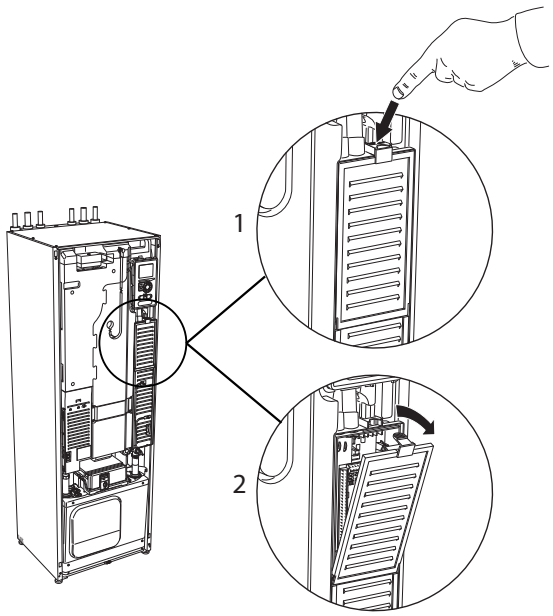
Accessibility, electrical connection

The plastic cap of the electrical boxes is opened using a screwdriver.

NOTE

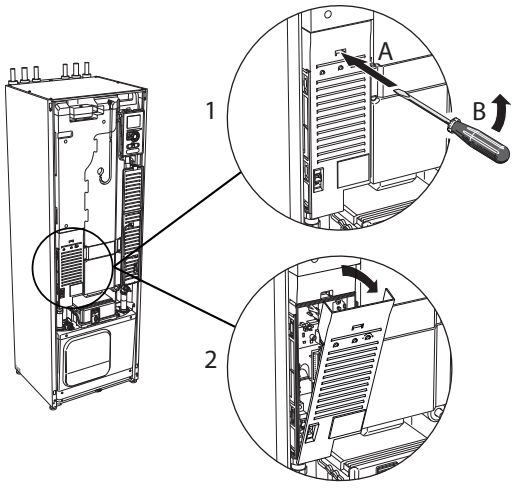
The cover for the input card is opened without a tool.

Removing the cover, input circuit board



1. Push the catch down.
2. Angle out the cover and remove it.

Removing the cover, immersion heater circuit board

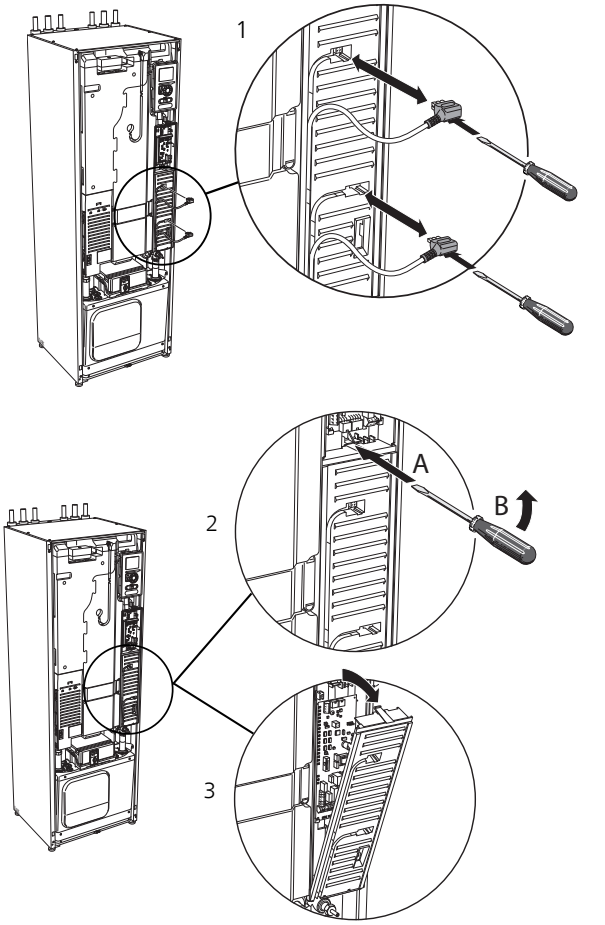


1. Insert the screwdriver (A) and pry the catch carefully downwards (B).
2. Angle out the cover and remove it.

Removing the cover, base board

Caution

To remove the cover for the base board, the cover for the input circuit board must first be removed.



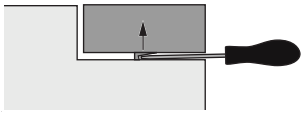
1. Disconnect the switches using a screwdriver.
2. Insert the screwdriver (A) and pry the catch carefully downwards (B).
3. Angle out the cover and remove it.

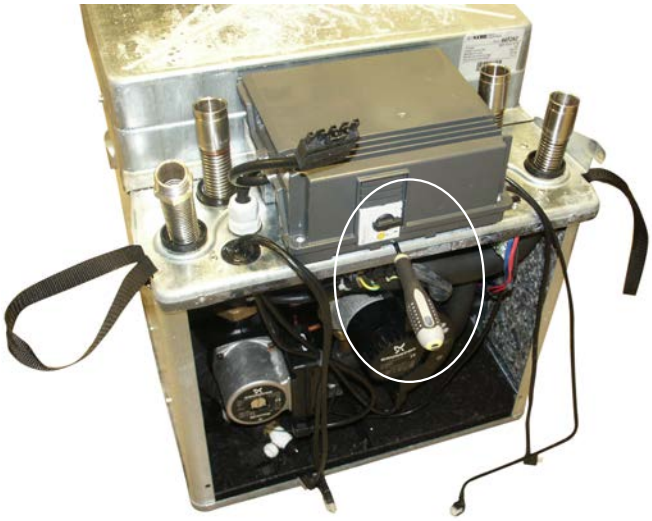
Main components

Compressor (GQ10)

1 Remove the cooling module according to the instruction on page 51.

2 Remove the motor module by inserting a screwdriver and carefully lifting the catch as illustrated.



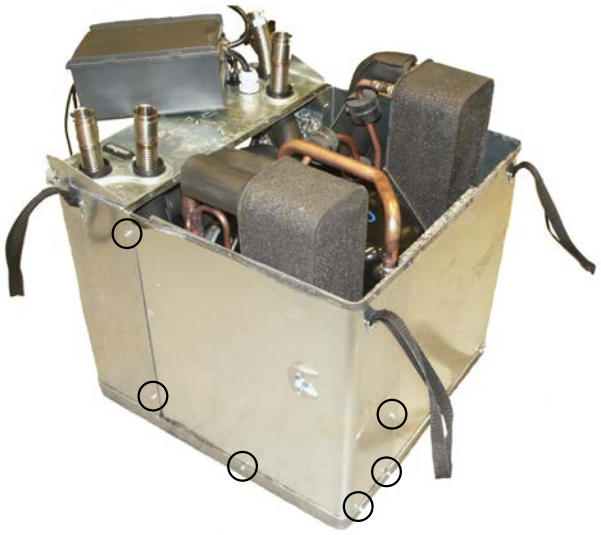


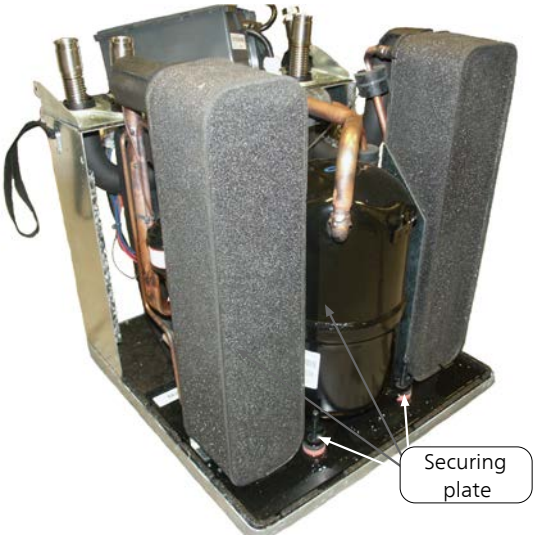
3 Slacken off 10 screws.

4 Remove the cover on the cooling module.

5 Slacken off 6 screws.

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

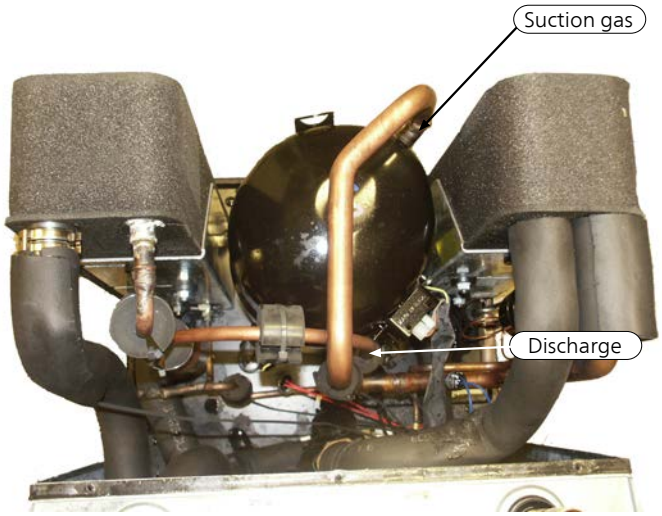


7 Slacken off 6 screws. **8** Remove the left/rear side panel on the cooling module.	
9 Unscrew the ground cable. **10** Disconnect the compressor cables.	
11 Remove the 4 locking plates holding the compressor.	

12 Drain the cooling circuit and ensure that no refrigerant remains before you continue.

13 Disconnect the pipes for suction gas and hot gas.

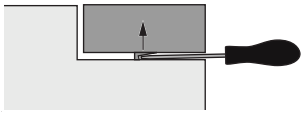
14 Remove the compressor.

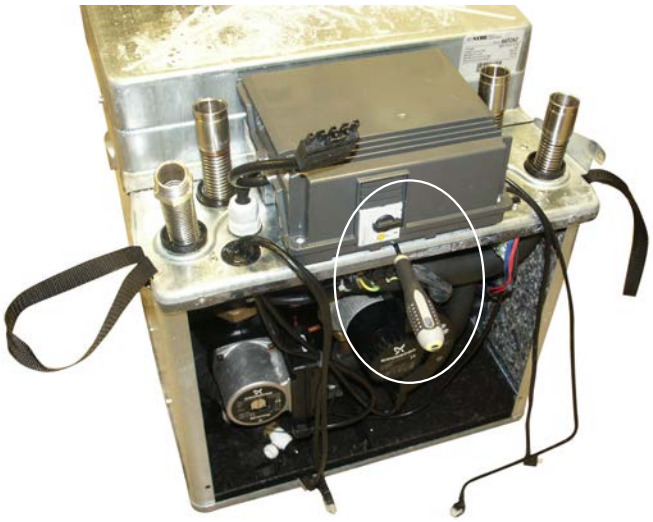


Expansion valve (QN1)

1 Remove the cooling module according to the instruction on page 51.

2 Remove the motor module by inserting a screwdriver and carefully lifting the catch as illustrated.



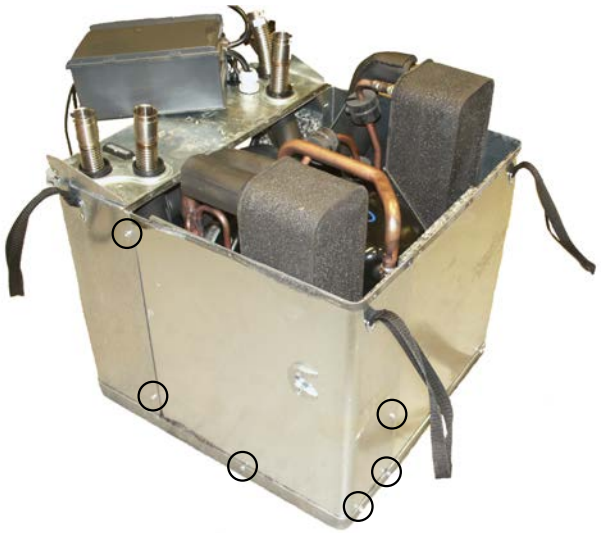


3 Slacken off 10 screws.

4 Remove the cover on the cooling module.

5 Slacken off 6 screws.

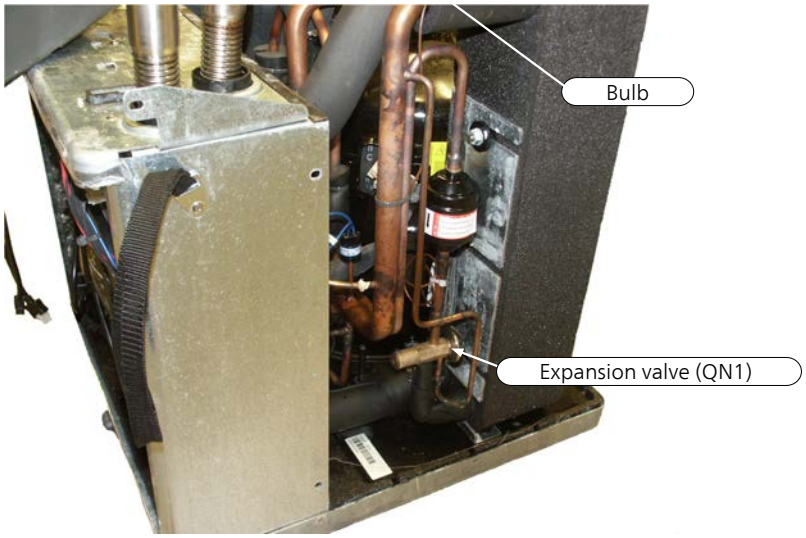
6 Remove the right/rear side panel on the cooling module.



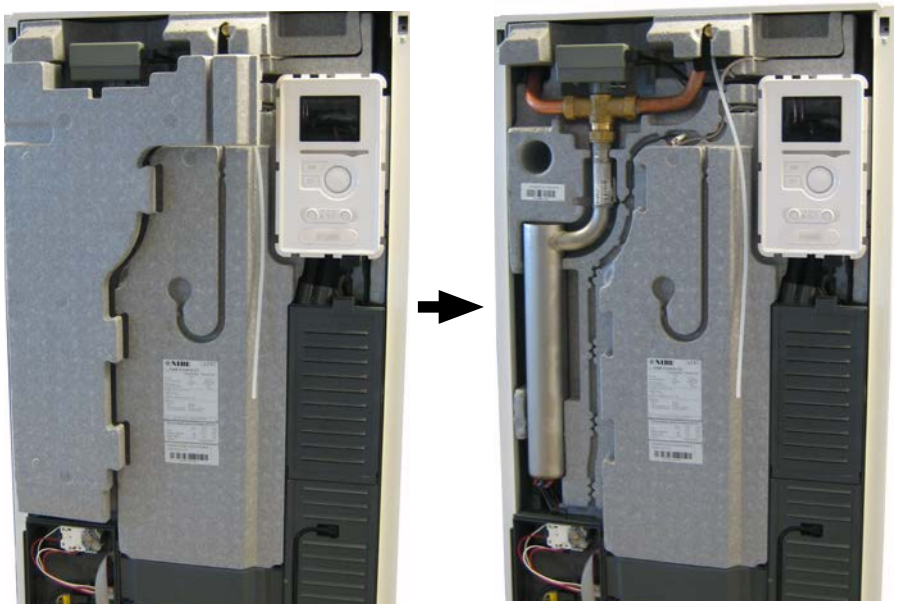
7 Drain the cooling circuit and ensure that no refrigerant remains before you continue.

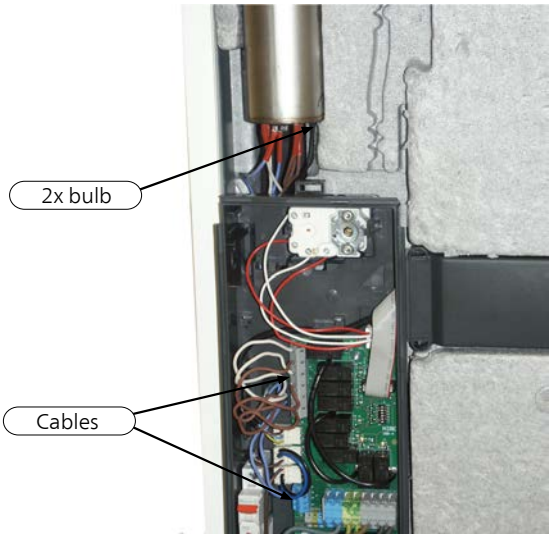
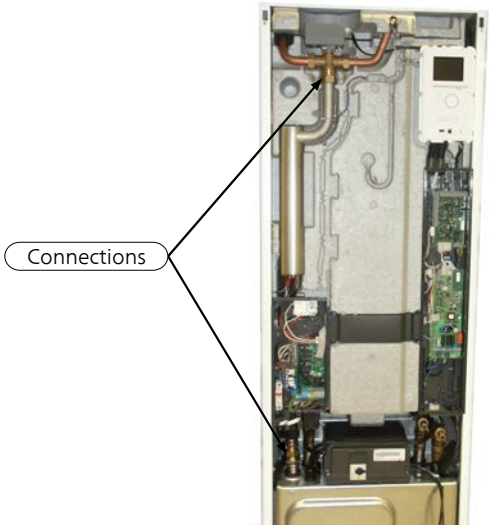
8 Slacken off the bulb for the expansion valve.

9 Disconnect the pipes and remove the valve.

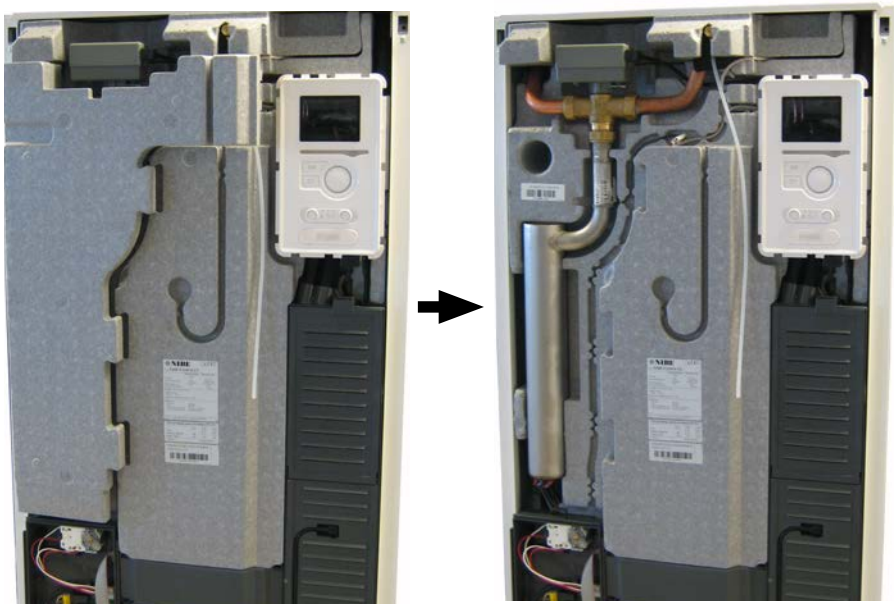


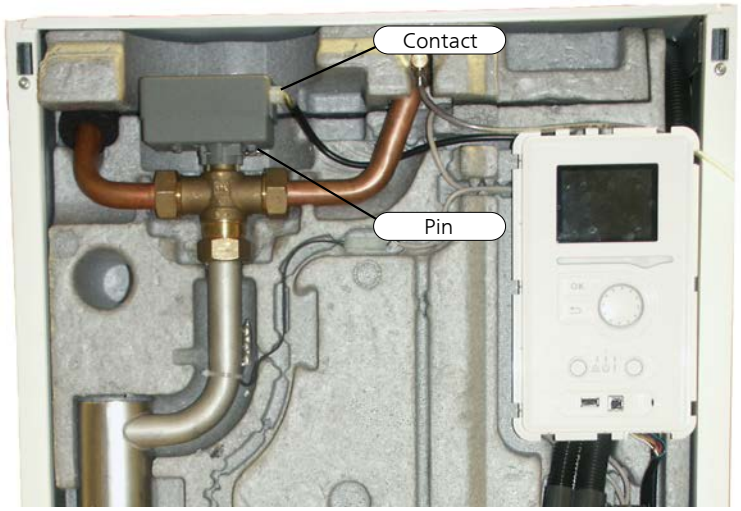
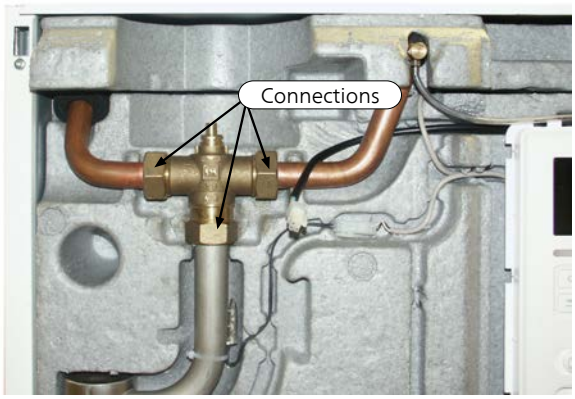
Immersion heater (EB1)

1 Drain the heating medium system.	
2 Remove the plastic cap over (AA1) using a screwdriver.	
3 Remove the insulation in front of the immersion heater.	

4 Ensure that the heat pump is unpowered before continuing. **5** Disconnect the 2 blue cables, the 2 white and the 3 brown cables from the terminal block X3 and X7 on (AA1). **6** Pull out the two bulbs from the immersion heater.	
7 Disconnect the immersion heater at the marked couplings. **8** Remove the box for the immersion heater circuit board (AA1). **9** Remove the immersion heater.	

Reversing valve (QN10)

1 Drain the heating medium system.	
2 Remove the plastic cap over (AA1) using a screw-driver.	
3 Remove the insulation.	

4 Remove the switch on the actuator. **5** Remove the pin and remove the actuator.	
6 Disconnect and remove the three way valve.	

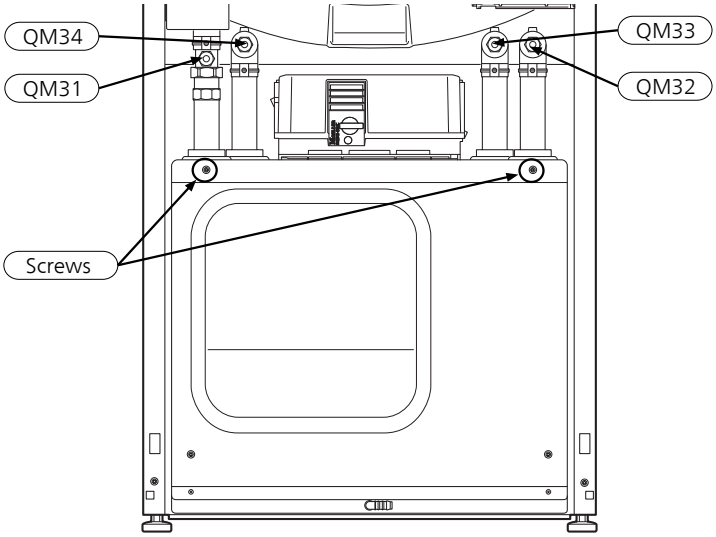
Heating medium pump (GP1)

1 Close the valves QM31, QM32, QM33 and QM34.

2 Slacken off 2 x screws.

3 Remove the front hatch on the cooling module.

4 Close the shut-off valves.

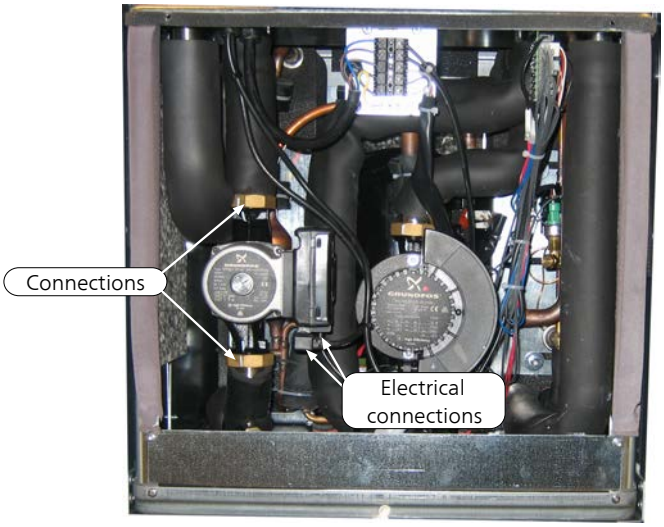


5 Remove the switch on the circulation pump.

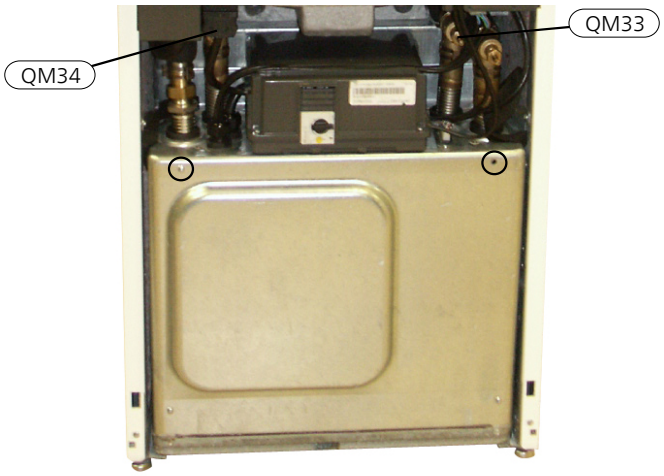
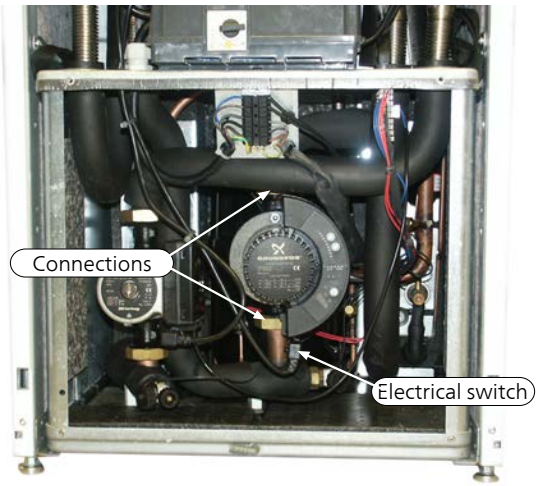
6 Disconnect the electrical connector for the control cable on the circulation pump.

7 Release the pressure by carefully opening the connections to the circulation pump.

8 Disconnect and remove the circulation pump.

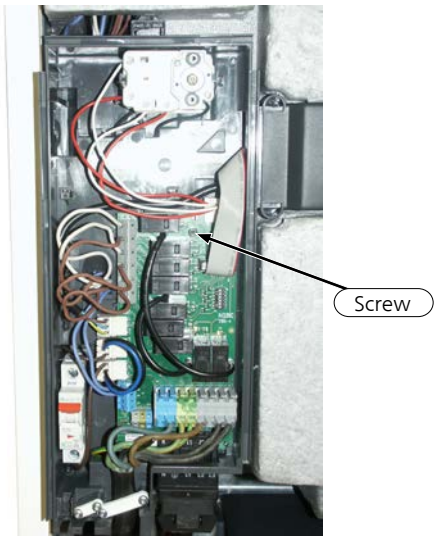


Brine pump (GP2)

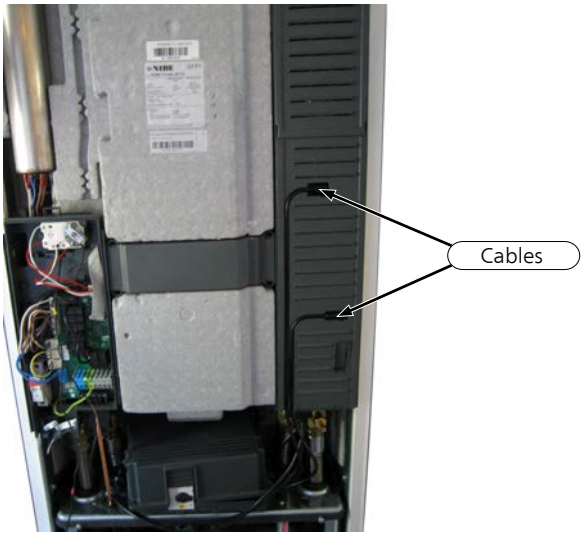
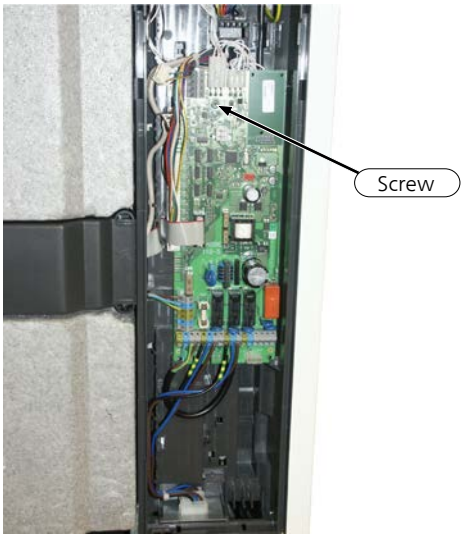
1 Slacken off 2 x screws. **2** Remove the front hatch on the cooling module. **3** Close the shut-off valves (QM33) and (QM34). **4** Drain the brine system.	
5 Remove the switch on the circulation pump. **6** Disconnect and remove the circulation pump.	

Circuit board and electronics

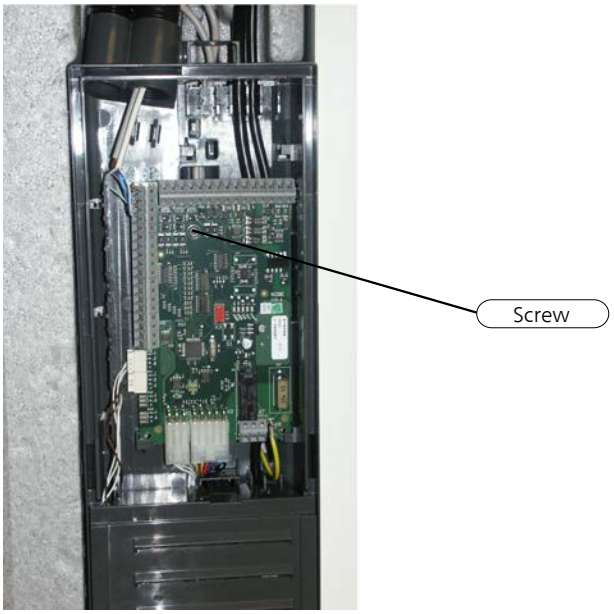
Immersion heater card (AA1)

1 Remove the plastic cap over (AA1) using a screw-driver.	
2 Disconnect the cables and screws holding the card in position.	
3 Remove the immersion heater card (.AA1).	

Base card (AA2)

1 Remove the plastic cover over (AA3. See page 53.	
2 Disconnect the two cables through the cover in front of (AA2).	
3 Remove the plastic cover over (AA2).	
4 Disconnect the cables and screws holding the card in position.	
5 Remove the base card (AA2).	

Input circuit board (AA3)

1 Remove the plastic cover over (AA3. See page 53.	
2 Disconnect the cables and screws holding the card in position. **3** Remove the input card (AA3).	

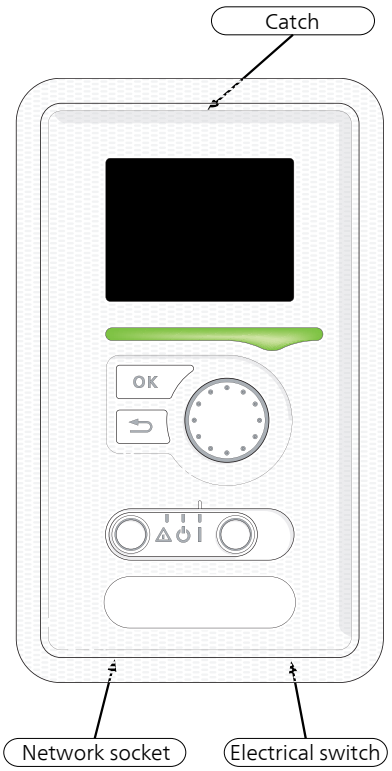
Display unit (AA4)

1 Disconnect the electrical connector from the underside of the display unit.

2 Disconnect the network cable from the network socket.

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

4 Remove the display unit.



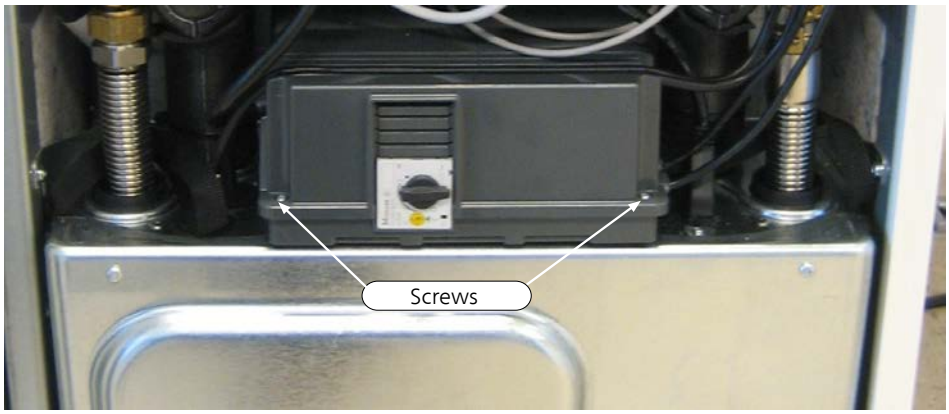
Soft-start card (AA10)/Soft-start card (AA5)

1 Remove the two screws in the motor module.

2 Open the motor module.

3 Disconnect all cables.

4 Replace the card



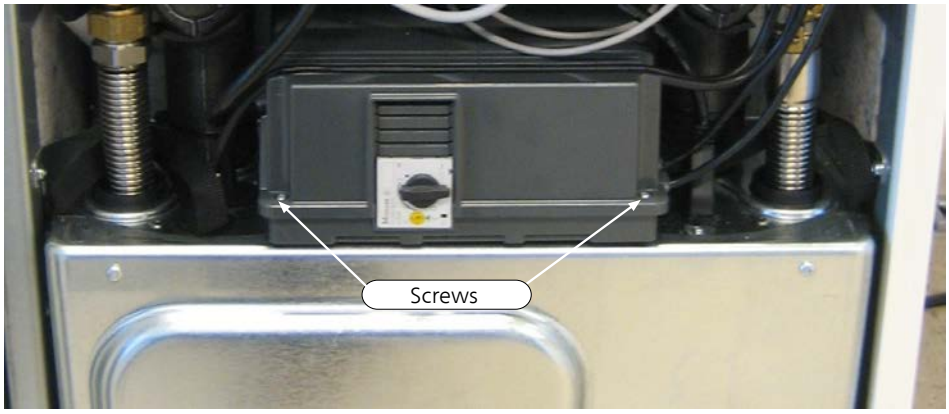
Soft-start card (QA30)

1 Remove the two screws in the motor module.

2 Open the motor module.

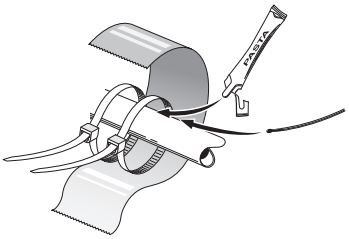
3 Disconnect all cables.

4 Remove the soft-starter.



Temperature sensor

Mounting

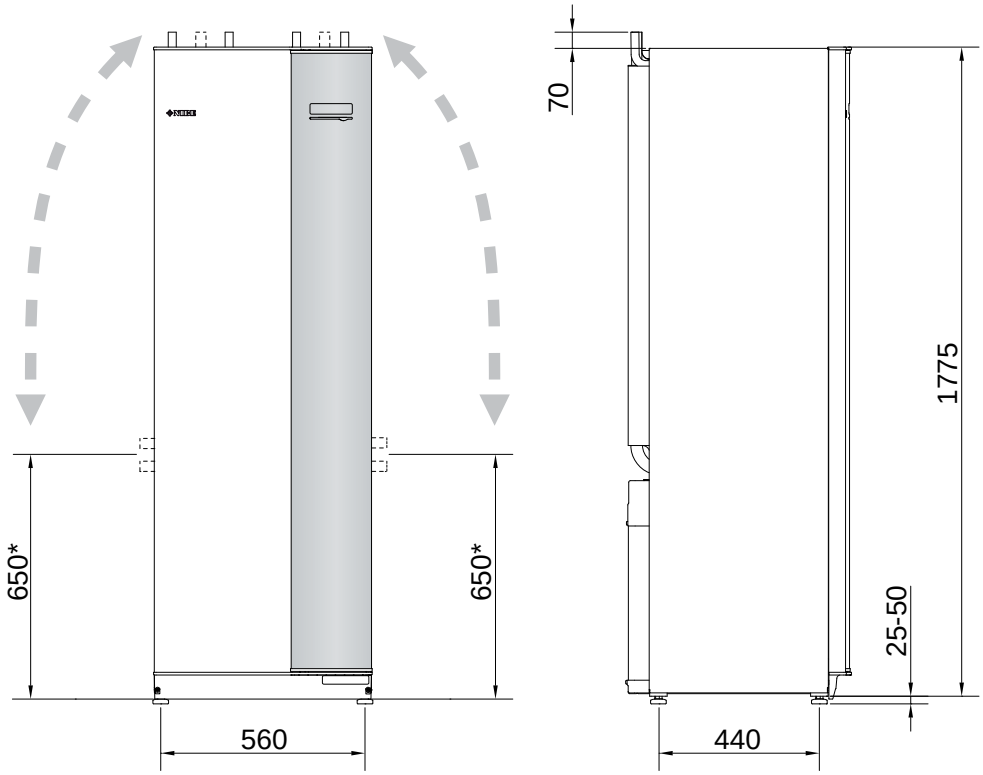


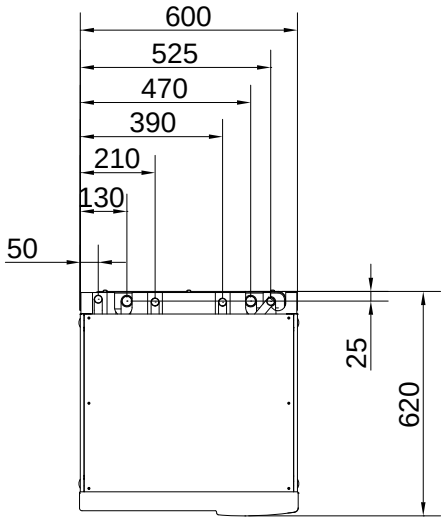
Install the temperature sensor with cable ties with the heat conducting paste and aluminium tape.

Then insulate with supplied insulation tape.

8 Technical specifications

Dimensions and setting-out coordinates





* This dimension applies at 90° angle on the brine pipes (side connection). The dimension can vary approx. ±100 mm in height as the brine pipes partially consist of flexible pipes.

CE IP 21

1x230V

1x230 V		5	8	10	12
Output data according to EN 14511					
0/35					
Rated output (P_H)	kW	4.65	8.15	9.69	11.60
Supplied power (P_E)	kW	1.08	1.78	2.07	2.64
$COP_{EN14511}$	-	4.30	4.58	4.68	4.39
0/45					
Rated output (P_H)	kW	3.98	7.75	8.67	10.99
Supplied power (P_E)	kW	1.17	2.11	2.30	3.11
$COP_{EN14511}$	-	3.40	3.67	3.76	3.53
Additional power	kW	1/2/3/4/5/6/7			
SCOP according to EN 14825					
Nominal heating output (designh)	kW	6 / 5	10 / 9	12 / 10	14 / 14
$SCOP_{EN14825}$ cold climate 35 °C / 55 °C		4.6 / 3.5	5.0 / 3.9	5.0 / 4.0	4.7 / 3.7
$SCOP_{EN14825}$ average climate, 35 °C / 55 °C		4.5 / 3.4	4.8 / 3.7	4.9 / 3.9	4.6 / 3.6
Energy rating, average climate					
Efficiency class for space heating 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++
Efficiency class hot water / charging profile		A / XL	A / XL	A / XL	A / XL
Electrical data					
Rated voltage		230V ~ 50Hz			
Max operating current compressor (including control system and circulation pumps)	A_{rms}	9.5	15	21	22.5
Starting current	A_{rms}	23	32	40	40
Max permitted impedance at connection point [2)]	ohm	-	-	-	-
Max operating current heat pump including 1 – 2 kW immersion heater (Recommended fuse rating)	A_{rms}	18(20)	24(25)	29(32)	31(32)
Max operating current heat pump including 3 – 4 kW immersion heater (Recommended fuse rating)	A_{rms}	27(32)	32(32)	38(40)	40(40)
Max operating current heat pump including 5 – 6 kW immersion heater (Recommended fuse rating)	A_{rms}	36(40)	41(50)	47(50)	49(50)
Max operating current heat pump including 7 – kW immersion heater (recommended fuse rating)	A_{rms}	40(40)	46(50)	51(63)	53(63)
Output, Brine pump	W	30 – 87	30 – 87	35 – 185	35 – 185
Output, Heating medium pump	W	7 – 67	7 – 67	7 – 67	7 – 67
IP class		IP21			
Refrigerant circuit					
Type of refrigerant		R407C			
GWP refrigerant		1,774			
Volume	kg	1.2	1.7	2.1	2.0
CO_2 equivalent	ton	2.13	3.02	3.73	3.55
Cut-out value pressure switch HP / LP	MPa	2.9 (29 bar) / 0.15 (1.5 bar)			
Difference pressure switch HP / LP	MPa	0.7 (-7 bar) / 0.15 (1.5 bar)			

1x230 V		5	8	10	12
Brine circuit					
Min/max system pressure brine	MPa	0.05 (0.5 bar) / 0.3 (3 bar)			
Min flow	l/s	0.19	0.33	0.40	0.47
Nominal flow	l/s	0.23	0.42	0.51	0.65
Max external avail. press at nom flow	kPa	62	48	85	69
Min/Max incoming Brine temp	°C	see diagram			
Min. outgoing brine temp.	°C	-12			
Heating medium circuit					
Min/Max system pressure heating medium	MPa	0.05 (0.5 bar) / 0.4 (4 bar)			
Min flow	l/s	0.08	0.13	0.16	0.19
Nominal flow	l/s	0.10	0.18	0.22	0.27
Max external avail. press at nom flow	kPa	68	64	64	58
Min/max HM-temp	°C	see diagram			
Sound power level (L_{WA}) acc to EN 12102 at 0/35	dB(A)	37	43	43	43
Sound pressure level (L_{PA}) calculated values according to EN ISO 11203 at 0/35 and 1m range	dB(A)	21.5	28	28	28
Pipe connections					
Brine ext diam. CU pipe	mm	28			
Heating medium ext diam. CU pipes	mm	22			28
Hot water connection external diam	mm	22			
Cold water connection external diam	mm	22			

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 could 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.

3x230V

3x230 V		6	8	10	12
Output data according to EN 14511					
0/35					
Rated output (P_H)	kW	6.05	7.86	9.46	11.74
Supplied power (P_E)	kW	1.35	1.69	2.1	2.68
$COP_{EN14511}$	-	4.48	4.65	4.50	4.38
0/45					
Rated output (P_H)	kW	5.14	6.99	8.47	11.27
Supplied power (P_E)	kW	1.46	1.87	2.28	3.22
$COP_{EN14511}$	-	3.52	3.74	3.71	3.50
Additional power	kW	2/4/6/9			
SCOP according to EN 14825					
Nominal heating output (designh)	kW	7 / 6	9 / 8	12 / 10	14 / 14
$SCOP_{EN14825}$ cold climate 35 °C / 55 °C	-	5.0 / 3.7	5.1 / 3.8	5.1 / 3.9	4.8 / 3.7
$SCOP_{EN14825}$ average climate, 35 °C / 55 °C	-	4.8 / 3.6	4.9 / 3.7	5.0 / 3.8	4.7 / 367
Energy rating, average climate					
Efficiency class for space heating 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++
Efficiency class hot water / charging profile	-	A / XL	A / XL	A / XL	A / XL

3x230 V		6	8	10	12
Electrical data					
Rated voltage		230V 3 ~ 50Hz			
Max operating current compressor (including control system and circulation pumps)	A_{rms}	8.0	10.4	13.0	14.4
Starting current (with soft start)	A_{rms}	52(20.3)	57(20.8)	65.5(23)	73.5
Max permitted impedance at connection point [2)]	ohm	-	-	-	-
Max operating current heat pump including 2 – kW immersion heater (recommended fuse rating)	A_{rms}	17.5(20)	20(20)	22(25)	24(25)
Max operating current heat pump including 4 – kW immersion heater (recommended fuse rating)	A_{rms}	24(25)	26(32)	28(32)	30(32)
Max operating current heat pump including 6 – kW immersion heater (recommended fuse rating)	A_{rms}	24(25)	26(32)	28(32)	30(32)
Max operating current heat pump including 9 – kW immersion heater (recommended fuse rating)	A_{rms}	36(40)	38(40)	40(40)	42(50)
Output, Brine pump	W	30 – 87	30 – 87	35 – 185	35 – 185
Output, Heating medium pump	W	7 – 67	7 – 67	7 – 67	7 – 67
IP class		IP21			
Refrigerant circuit					
Type of refrigerant		R407C			
GWP refrigerant		1,774			
Volume	kg	1.5	1.8	2.1	2.0
CO_2 equivalent	ton	2.66	3.19	3.73	3.55
Cut-out value pressure switch HP / LP	MPa	2.9 (29 bar) / 0.15 (1.5 bar)			
Difference pressure switch HP / LP	MPa	0.7 (-7 bar) / 0.15 (1.5 bar)			
Brine circuit					
Min/max system pressure brine	MPa	0.05 (0.5 bar) / 0.3 (3 bar)			
Min flow	l/s	0.25	0.33	0.39	0.47
Nominal flow	l/s	0.30	0.42	0.51	0.65
Max external avail. press at nom flow	kPa	58	48	85	69
Min/Max incoming Brine temp	°C	see diagram			
Min. outgoing brine temp.	°C	-12			
Heating medium circuit					
Min/Max system pressure heating medium	MPa	0.05 (0.5 bar) / 0.4 (4 bar)			
Min flow	l/s	0.10	0.13	0.16	0.19
Nominal flow	l/s	0.13	0.18	0.22	0.27
Max external avail. press at nom flow	kPa	67	64	64	58
Min/max HM-temp	°C	see diagram			
Sound power level (L_{WA}) acc to EN 12102 at 0/35	dB(A)	42	43	43	43
Sound pressure level (L_{PA}) calculated values according to EN ISO 11203 at 0/35 and 1m range	dB(A)	27	28	28	28
Pipe connections					
Brine ext diam. CU pipe	mm	28			
Heating medium ext diam. CU pipes	mm	22			28
Hot water connection external diam	mm	22			
Cold water connection external diam	mm	22			

[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 could 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.

3x400 V

3x400 V		5	6	8	10	12
Output data according to EN 14511						
0/35						
Rated output (P_H)	kW	4.65	6.07	7.67	9.66	11.48
Supplied power (P_E)	kW	1.08	1.32	1.64	2.01	2.51
$COP_{EN14511}$	-	4.30	4.59	4.68	4.81	4.57
0/45						
Rated output (P_H)	kW	3.98	5.19	6.70	8.55	10.99
Supplied power (P_E)	kW	1.17	1.46	1.83	2.27	3.02
$COP_{EN14511}$	-	3.40	3.56	3.67	3.77	3.64
Additional power	kW	1/2/3/4/5/6/7 (switchable to 2/4/6/9)				
SCOP according to EN 14825						
Nominal heating output (designh)	kW	6 / 5	7 / 6	9 / 8	12 / 10	14 / 14
$SCOP_{EN14825}$ cold climate 35 °C / 55 °C	-	4.6 / 3.5	5.0 / 3.7	5.1 / 3.8	5.2 / 4.0	4.9 / 3.8
$SCOP_{EN14825}$ average climate, 35 °C / 55 °C	-	4.5 / 3.4	4.8 / 3.6	4.9 / 3.3	5.1 / 3.9	4.8 / 3.7
Energy rating, average climate						
Efficiency class for space heating 35 °C / 55 °C	-	A++ / A++	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+++	A+++ / A++
Efficiency class hot water / charging profile	-	A / XL	A / XL	A / XL	A / XL	A / XL
Electrical data						
Rated voltage		400V 3N ~ 50Hz				
Max. operating current compressor, including control system, circulation pumps and 0 kW immersion heater (Recommended fuse rating)	A_{rms}	9.5(1 phase) (16)	4.6(16)	6.6(16)	6.9(16)	9(16)
Starting current	A_{rms}	23	18	23	23	29
Max permitted impedance at connection point [2)]	ohm	-	-	-	-	-
Max operating current heat pump including 1 – 2 kW immersion heater (Recommended fuse rating)	A_{rms}	18(20)	13(16)	15(16)	15(16)	18(20)
Max operating current heat pump incl. 3 – 4 kW immersion heater (Recommended fuse rating)	A_{rms}	18(20)	13(16)	15(16)	15(16)	18(20)
Max operating current heat pump incl. 5 – 6 kW immersion heater (Recommended fuse rating)	A_{rms}	18(20)	13(16)	15(16)	15(16)	18(20)
Max operating current heat pump including 7 kW immersion heater, connected upon delivery (Recommended fuse rating)	A_{rms}	18(20)	19(20)	21(25)	21(25)	23(25)
Max operating current heat pump including 9 kW immersion heater, requires connection (Recommended fuse rating)	A_{rms}	24(25)	19(20)	22(25)	22(25)	24(25)
Output, Brine pump	W	30 – 87	30 – 87	30 – 87	35 – 185	35 – 185
Output, Heating medium pump	W	7 – 67	7 – 67	7 – 67	7 – 67	7 – 67
Enclosure class		IP21				

3x400 V		5	6	8	10	12
Refrigerant circuit						
Type of refrigerant		R407C				
GWP refrigerant		1,774				
Volume	kg	1.2	1.5	1.8	2.1	2.0
CO_2 equivalent	ton	2.13	2.66	3.19	3.73	3.55
Cut-out value pressure switch HP / LP	MPa	2.9 (29 bar) / 0.15 (1.5 bar)				
Difference pressure switch HP / LP	MPa	0.7 (-7 bar) / 0.15 (1.5 bar)				
Brine circuit						
Min/max system pressure brine	MPa	0.05 (0.5 bar) / 0.3 (3 bar)				
Min flow	l/s	0.19	0.25	0.33	0.40	0.47
Nominal flow	l/s	0.23	0.30	0.42	0.51	0.65
Max external avail. press at nom flow	kPa	62	58	48	85	69
Min/Max incoming Brine temp	°C	see diagram				
Min. outgoing brine temp.	°C	-12				
Heating medium circuit						
Min/Max system pressure heating medium	MPa	0.05 (0.5 bar) / 0.4 (4 bar)				
Min flow	l/s	0.08	0.10	0.13	0.16	0.19
Nominal flow	l/s	0.10	0.13	0.18	0.22	0.27
Max external avail. press at nom flow	kPa	68	67	64	64	58
Min/max HM-temp	°C	see diagram				
Sound power level (L_{WA}) acc to EN 12102 at 0/35	dB(A)	37	42	43	43	43
Sound pressure level (L_{PA}) calculated values according to EN ISO 11203 at 0/35 and 1m range	dB(A)	21.5	27	28	28	28
Pipe connections						
Brine ext diam. CU pipe	mm	28				
Heating medium ext diam. CU pipes	mm	22				28
Hot water connection external diam	mm	22				
Cold water connection external diam	mm	22				

[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 could 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.

Miscellaneous

Other		5	6	8	10	12
Water heater						
Volume water heater	l	180				
Max pressure in water heater	MPa	1.0 (10 bar)				
Capacity hot water heating (comfort mode Normal) According to EN16147						
Amount of hot water (40 °C)		240	240	235	235	230
COP_{DHW} (load profile XL), 1x230V		2.7	-	2.7	2.7	2.6
COP_{DHW} (load profile XL), 3x230V		-	2.8	2.8	2.8	2.6
COP_{DHW} (load profile XL), 3x400V		2.7	2.8	2.8	2.8	2.6
Dimensions and weight						

Other		5			6			8			10			12		
Width	mm	600														
Depth	mm	620														
Height	mm	1800														
Required ceiling height [1)]	mm	1950														
Corrosion protection [2)]		Cu	E	Rf	Cu	E	Rf	Cu	E	Rf	Cu	E	Rf	Cu	E	Rf
Weight complete heat pump	kg	235	250	215	240	255	220	250	265	230	255	270	235	260	275	240
Weight only cooling module	kg	103			110			115			121			126		
Part no. 1x230V, Stainless steel		065 146			-			065 147			065 148			065 149		
Part no. 3x230V, Stainless steel		-			065 142			065 143			065 144			065 145		
Part number, 3x400V, Enamel (with energy meter)		065 104			065 105			065 106			065 107			065 108		
Part no., 3x400V, Enamel		-			065 084			065 085			065 086			065 087		
Part no. 3x400V, Stainless steel		065 079			065 080			065 081			065 082			065 083		
Part number, 3x400V, Stainless steel (with energy meter)		065 309			065 310			065 311			065 312			065 313		
Part no. 3x400V, Copper		065 065			065 075			065 076			065 077			065 078		

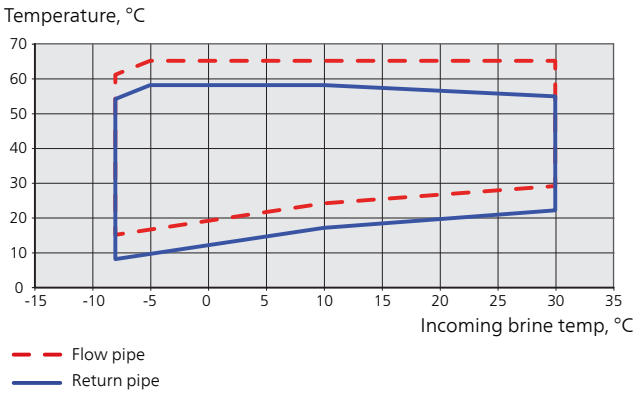
[1)]With feet removed, the height is approx. 1930 mm.

[3)]Cu: copper, Rf: stainless steel, E: enamel.

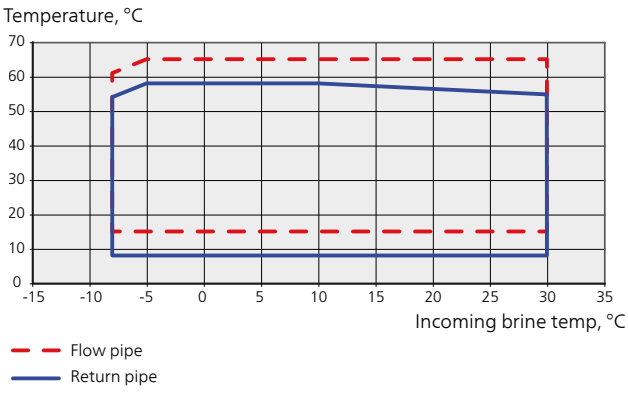
Working range heat pump, compressor operation

The compressor provides a supply temperature up to 65 °C, at 0 °C incoming brine temperature, the remainder (up to 70°C) is obtained using the additional heat.

12 kW 3x400V, 8-12 kW 1x230V



Other



9 Item register

Item register

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