Service manual

NIBE™ F2040

Air/water heat pump

SEM GB 1503-1
431526

Table of Contents

1 Important information

Document information

This technical manual is a complement to the Installer handbook for F2040, containing:

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

Safety information

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

This appliance is designed for use in a home environment and not intended to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. This in accordance to applicable parts of the low-voltage directive 2006/95/EC, LVD. The appliance is also intended for use by experts or trained users in shops, hotels, light industry, on farms and in similar environments. This in accordance to applicable parts of the machinery directive 2006/42/EC.

Children should be supervised to ensure that they do not play with the appliance.

This is an original instruction manual. Translation is not allowed without approval from NIBE.

Rights to make any design or technical modifications are reserved.

Symbols

NOTE

This symbol indicates danger to machine or person.

Caution

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

TIP

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

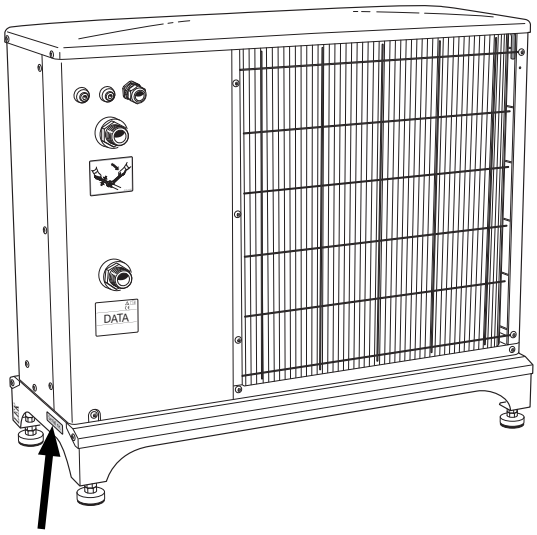
Marking

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

Serial number

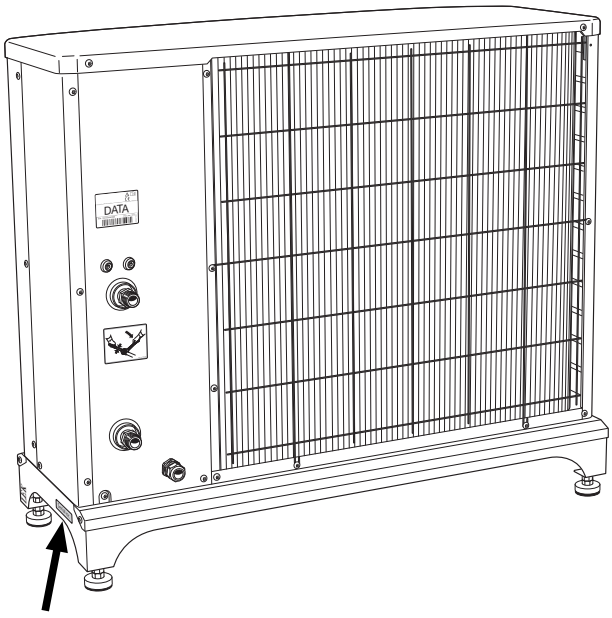
The serial number for F2040 can be found on the side of the foot.

F2040-8



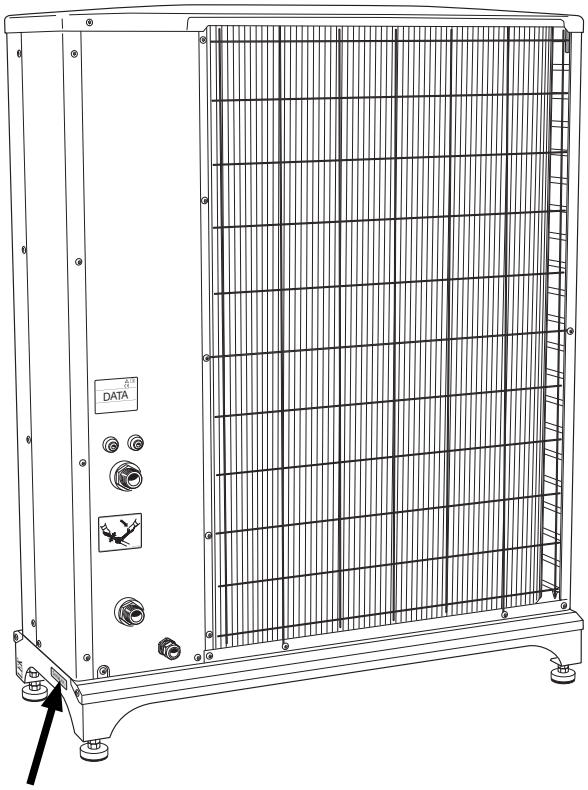
Serial number

F2040-12



Serial number

F2040-16



Serial number

Caution

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

Contact information

AT **KNV Energietechnik GmbH**, Gahberggasse 11, 4861 Schörfling

Tel: +43 (0)7662 8963-0 Fax: +43 (0)7662 8963-44 E-mail: mail@knv.at www.knv.at

CH **NIBE Wärmetechnik AG**, Winterthurerstrasse 710, CH-8247 Flurlingen

Tel: (52) 647 00 30 Fax: (52) 647 00 31 E-mail: info@nibe.ch www.nibe.ch

CZ **Druzstevni zavody Drazice s.r.o**, Drazice 69, CZ - 294 71 Benatky nad Jizerou

Tel: +420 326 373 801 Fax: +420 326 373 803 E-mail: nibe@nibe.cz www.nibe.cz

DE **NIBE Systemtechnik GmbH**, Am Reiherpfahl 3, 29223 Celle

Tel: 05141/7546-0 Fax: 05141/7546-99 E-mail: info@nibe.de www.nibe.de

DK **Vølund Varmeteknik A/S**, Member of the Nibe Group, Brogårdsvej 7, 6920 Videbæk

Tel: 97 17 20 33 Fax: 97 17 29 33 E-mail: info@volundvt.dk www.volundvt.dk

FI **NIBE Energy Systems OY**, Juurakkotie 3, 01510 Vantaa

Puh: 09-274 697 0 Fax: 09-274 697 40 E-mail: info@nibe.fi www.nibe.fi

FR **NIBE Energy Systems France Sarl,** Zone industrielle RD 28, Rue du Pou du Ciel, 01600 Reyrieux

Tel : 04 74 00 92 92 Fax : 04 74 00 42 00 E-mail: info@nibe.fr www.nibe.fr

GB **NIBE Energy Systems Ltd**, 3C Broom Business Park, Bridge Way, Chesterfield S41 9QG

Tel: 0845 095 1200 Fax: 0845 095 1201 E-mail: info@nibe.co.uk www.nibe.co.uk

NL **NIBE Energietechniek B.V.**, Postbus 634, NL 4900 AP Oosterhout

Tel: 0168 477722 Fax: 0168 476998 E-mail: info@nibenl.nl www.nibenl.nl

NO **ABK AS**, Brobekkveien 80, 0582 Oslo, Postadresse: Postboks 64 Vollebekk, 0516 Oslo

Tel. sentralbord: +47 23 17 05 20 E-mail: post@abkklima.no www.nibeenergysystems.no

PL **NIBE-BIAWAR Sp. z o. o.** Aleja Jana Pawła II 57, 15-703 BIAŁYSTOK

Tel: 085 662 84 90 Fax: 085 662 84 14 E-mail: sekretariat@biawar.com.pl www.biawar.com.pl

RU © **"EVAN"** 17, per. Boynovskiy, Nizhny Novgorod

Tel./fax +7 831 419 57 06 E-mail: info@evan.ru www.nibe-evan.ru

SE **NIBE AB Sweden**, Box 14, Hannabadsvägen 5, SE-285 21 Markaryd

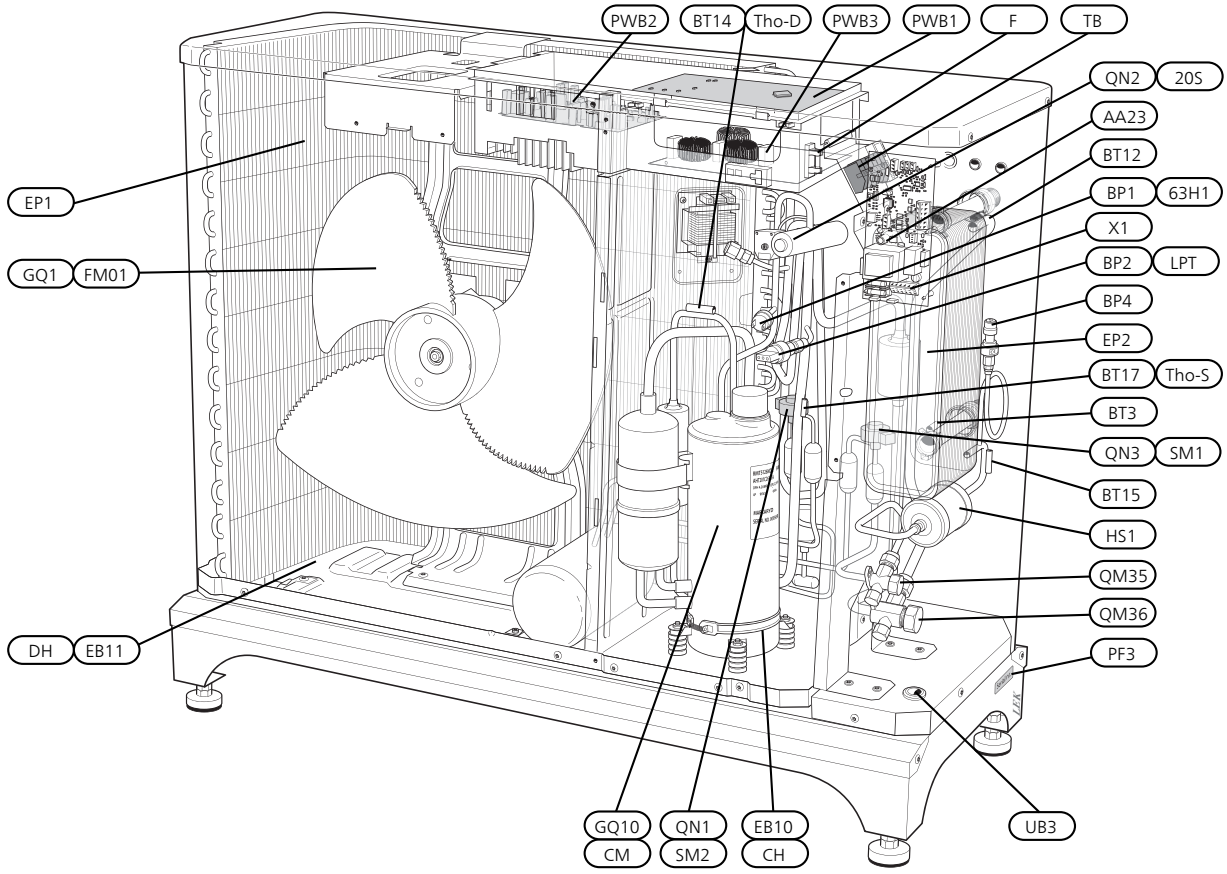
Tel: +46-(0)433-73 000 Fax: +46-(0)433-73 190 E-mail: info@nibe.se www.nibe.se

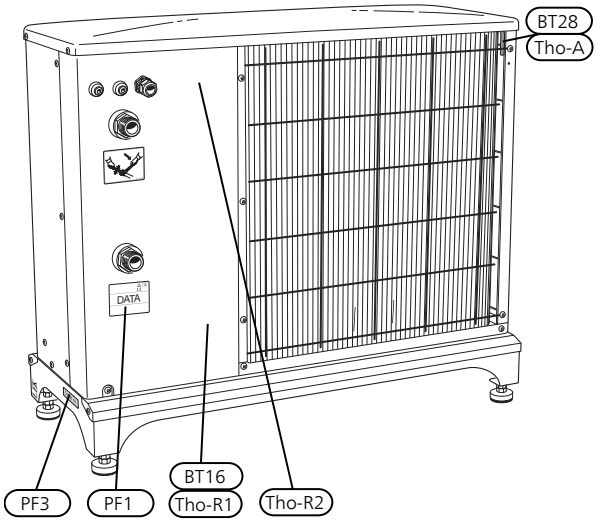
For countries not mention in this list, please contact Nibe Sweden or check www.nibe.eu for more information.

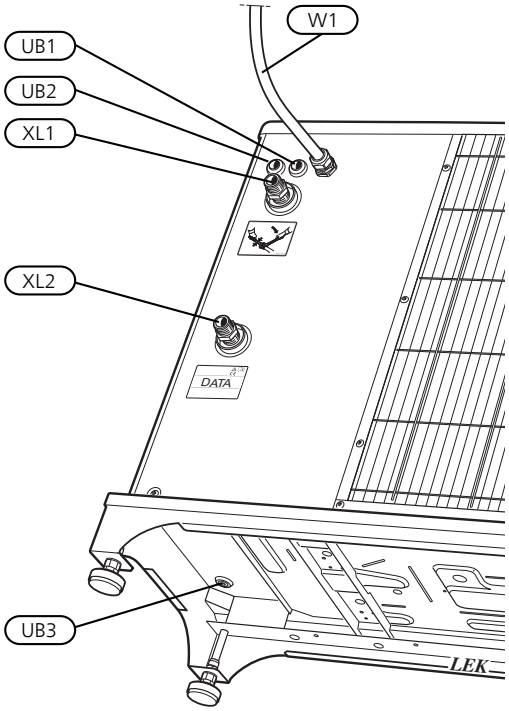
2 The heat pump design

General

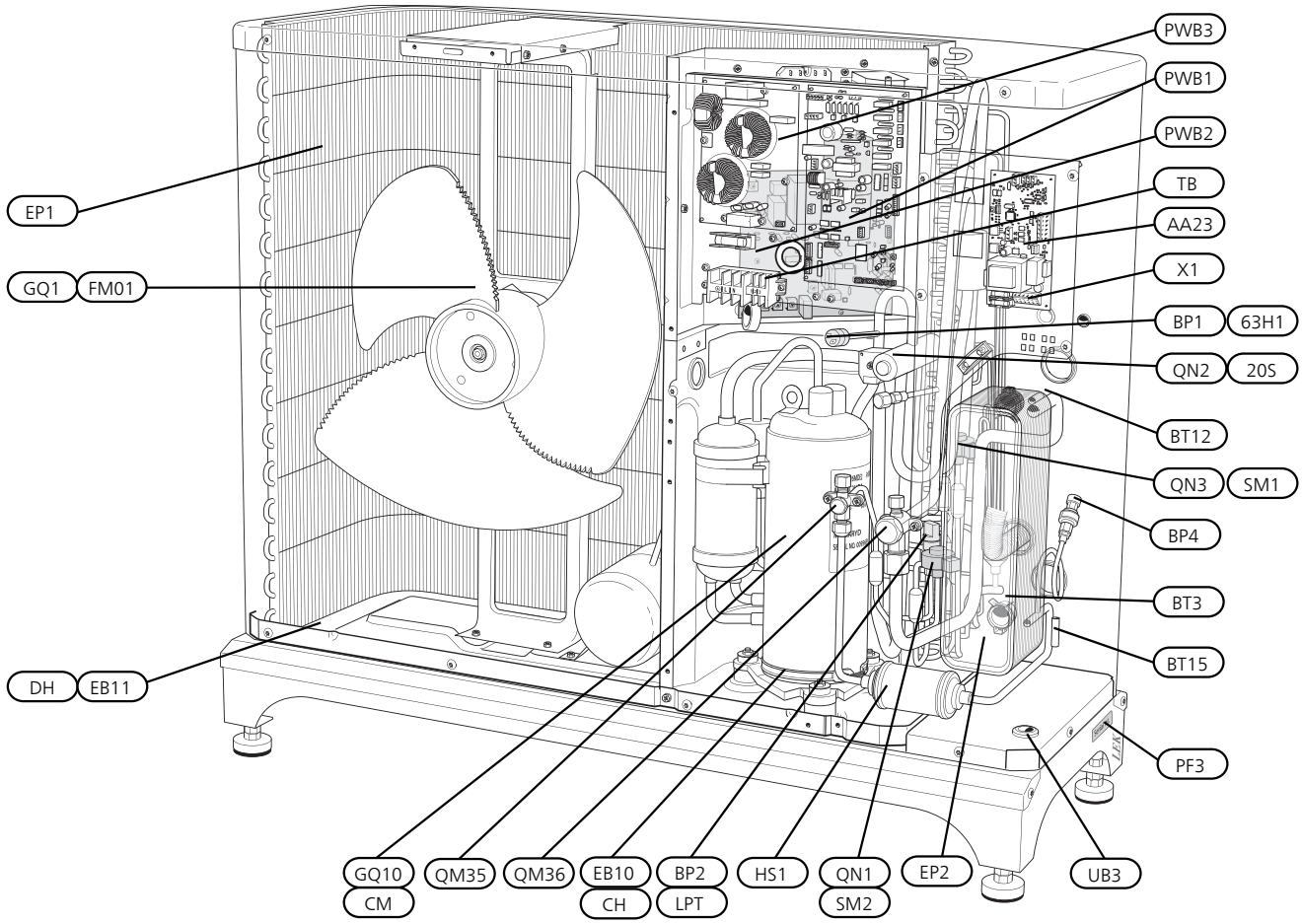
F2040-8

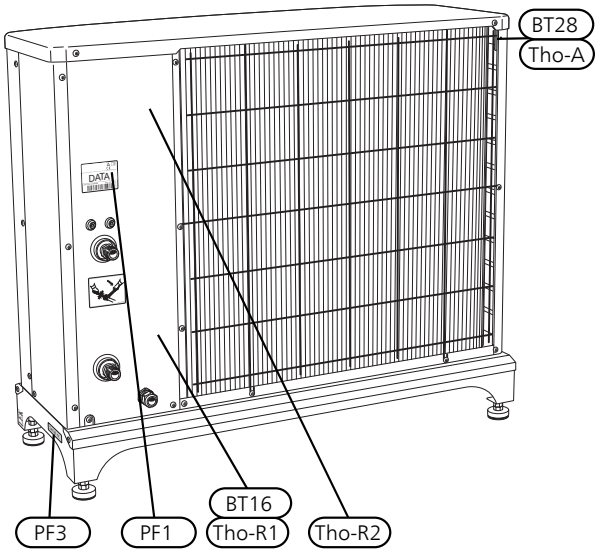


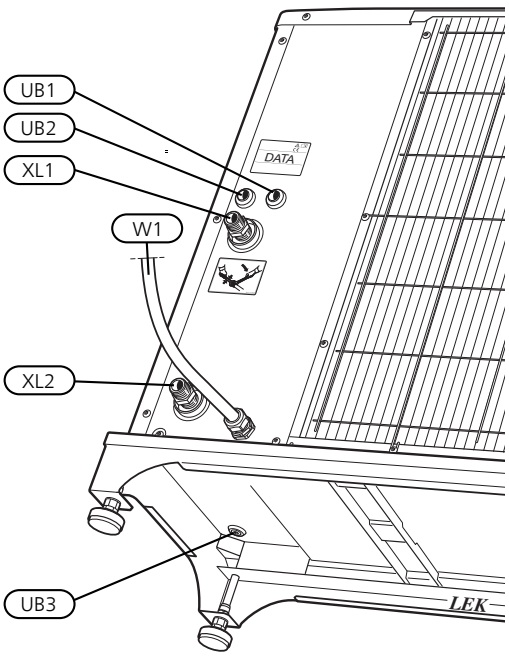




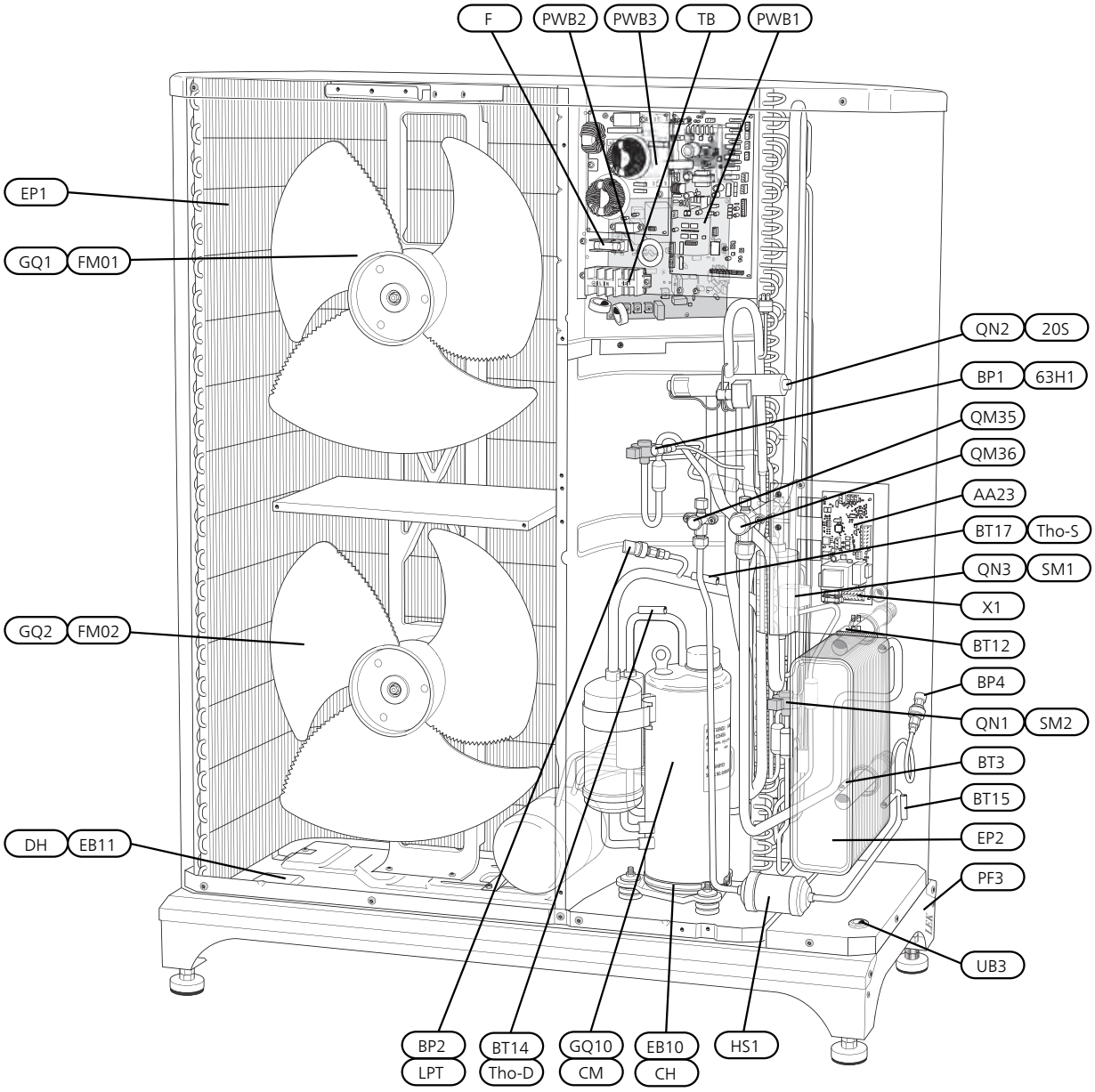
F2040-12

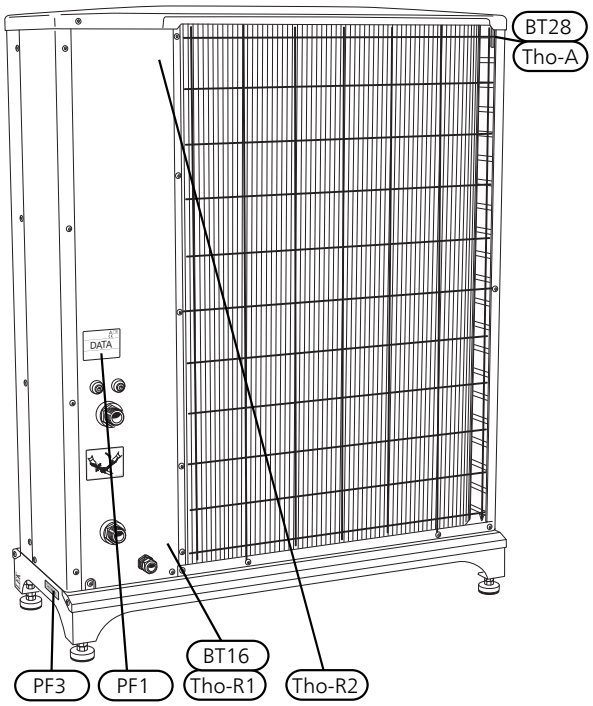

PWB3
PWB1
PWB2
TB
AA23
X1
BP1
63H1
QN2
20S
BT12
QN3
SM1
BP4
BT3
BT15
PF3
EP1
GQ1
FM01
DH
EB11
GQ10
CM
QM35
QM36
EB10
CH
BP2
LPT
HS1
QN1
SM2
EP2
UB3

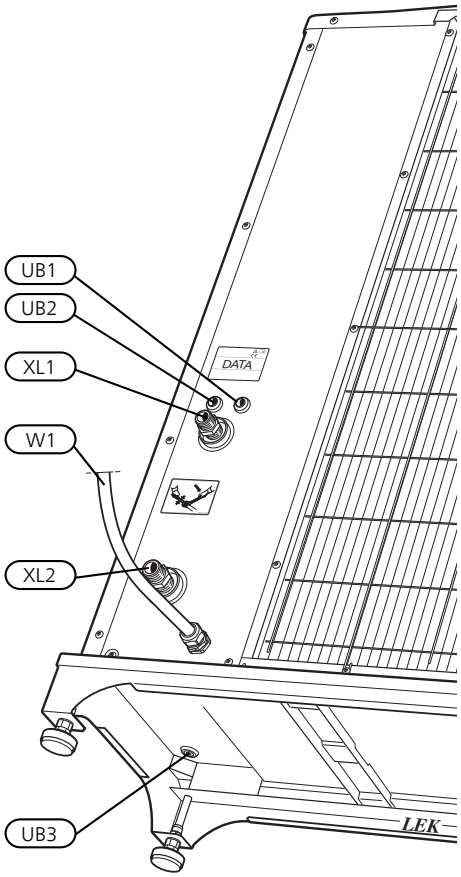

BT28
Tho-A
BT16
Tho-R1
PF3
PF1
Tho-R2


UB1
UB2
XL1
W1
XL2
UB3

F2040-16


F
PWB2
PWB3
TB
PWB1
EP1
GQ1
FM01
GQ2
FM02
DH
EB11
QN2
20S
BP1
63H1
QM35
QM36
AA23
BT17
Tho-S
QN3
SM1
X1
BT12
BP4
QN1
SM2
BT3
BT15
EP2
PF3
UB3
BP2
LPT
BT14
Tho-D
GQ10
CM
EB10
CH
HS1


BT28
Tho-A
DATA
PF3
PF1
BT16
Tho-R1
Tho-R2


UB1
UB2
XL1
W1
XL2
UB3
DATA
LEK

List of components F2040-8, -12, -16

Pipe connections

QM35	Service valve, liquid side
QM36	Service valve, gas side
XL1	Connection, heating medium out ofF2040, G1" (Ø28 mm)
XL2	Connection, heating medium in to F2040, G1" (Ø28 mm)

Sensors etc.

BP1 (63H1)	High pressure pressostat
BT3	Temperature sensor, heating medium return line
BT12	Temperature sensor, condenser supply line
BT15	Temperature sensor, fluid pipe
BP2 (LPT)	Low pressure transmitter
BP4	High pressure sensor

Electrical components

AA23	Communication board
AA23-F3	Fuse for external heating cable (250 mA), max 45 W.
AA23-S3	DIP switch, addressing of outdoor unit
AA23-X1	Terminal block, KVR
AA23-X4	Terminal block, communication from indoor module
AA23-X100	Communication with TB
EB10 (CH)	Compressor heater
EB11 (DH)	Drip tray heater
F	Main fuse compressor unit
GQ1 (FM01)	Fan
GQ2 (FM02)	Fan
PWB1	Control board
PWB2	Inverter board
PWB3	Filter board
TB	Terminal block, incoming supply and communication with board AA23

Cooling components

QN2 (20S)	4-way valve
GQ10 (CM)	Compressor
QN3 (SM1)	Expansion valve, cooling
QN1 (SM2)	Expansion valve, heating
EP1	Evaporator (air coil, copper pipe with aluminium flange)
EP2	Condenser (ACH 30, copper/stainless steel)
HS1	Drying filter

Miscellaneous

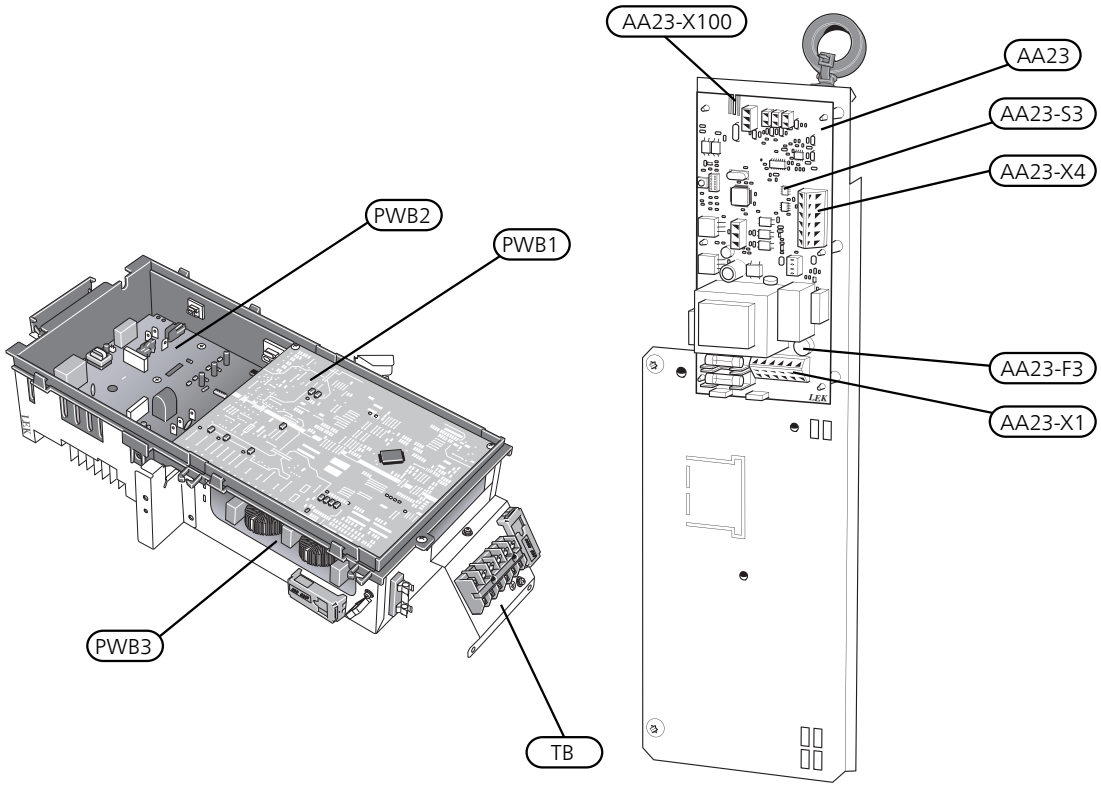
PF1	Type plate
PF3	Serial number
UB1	Cable gland, incoming supply
UB2	Cable grommet, communication
UB3	Cable grommet, heating cable (EB14)
W1	Cable, incoming supply

Electrical connection

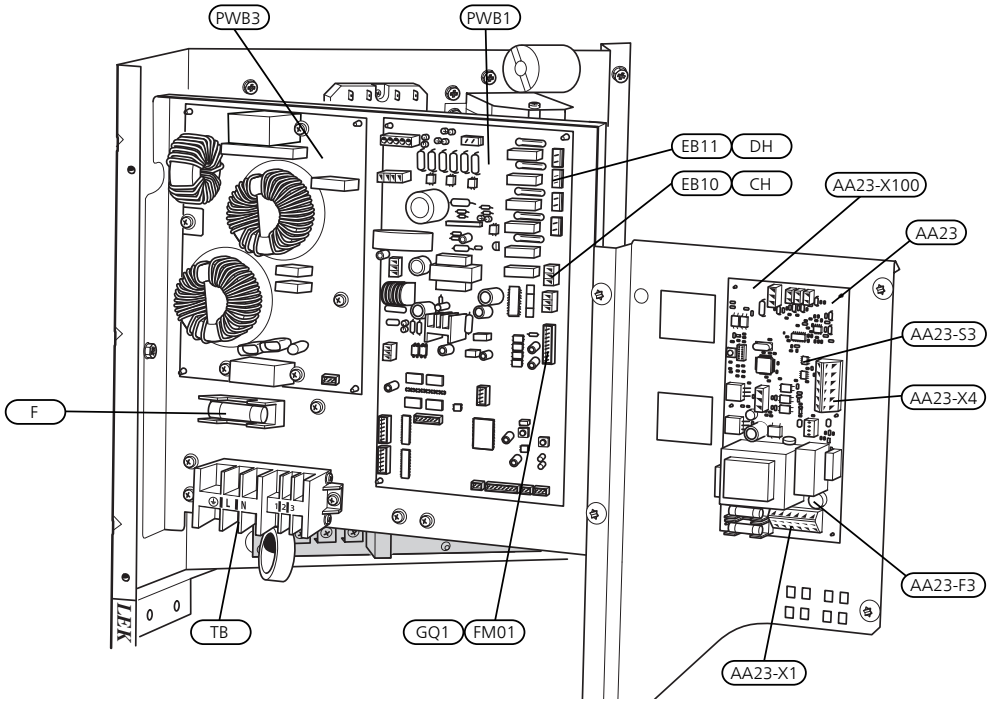
Electrical components

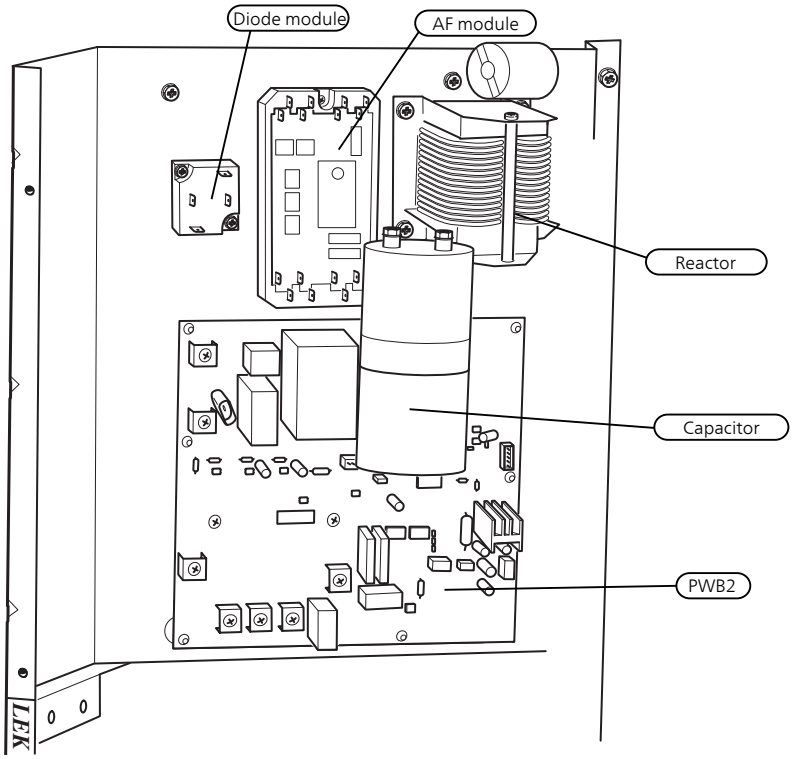
AA23	Communication board
AA23-F3	Fuse for external heating cable (250 mA), max 45 W.
AA23-S3	DIP switch, addressing of outdoor unit
AA23-X1	Terminal block, KVR
AA23-X4	Terminal block, communication from indoor module
AA23-X100	Communication with TB
EB10 (CH)	Compressor heater
EB11 (DH)	Drip tray heater
F	Main fuse compressor unit
GQ1 (FM01)	Fan
GQ2 (FM02)	Fan
PWB1	Control board
PWB2	Inverter board
PWB3	Filter board
TB	Terminal block, incoming supply and communication with board AA23

F2040-8

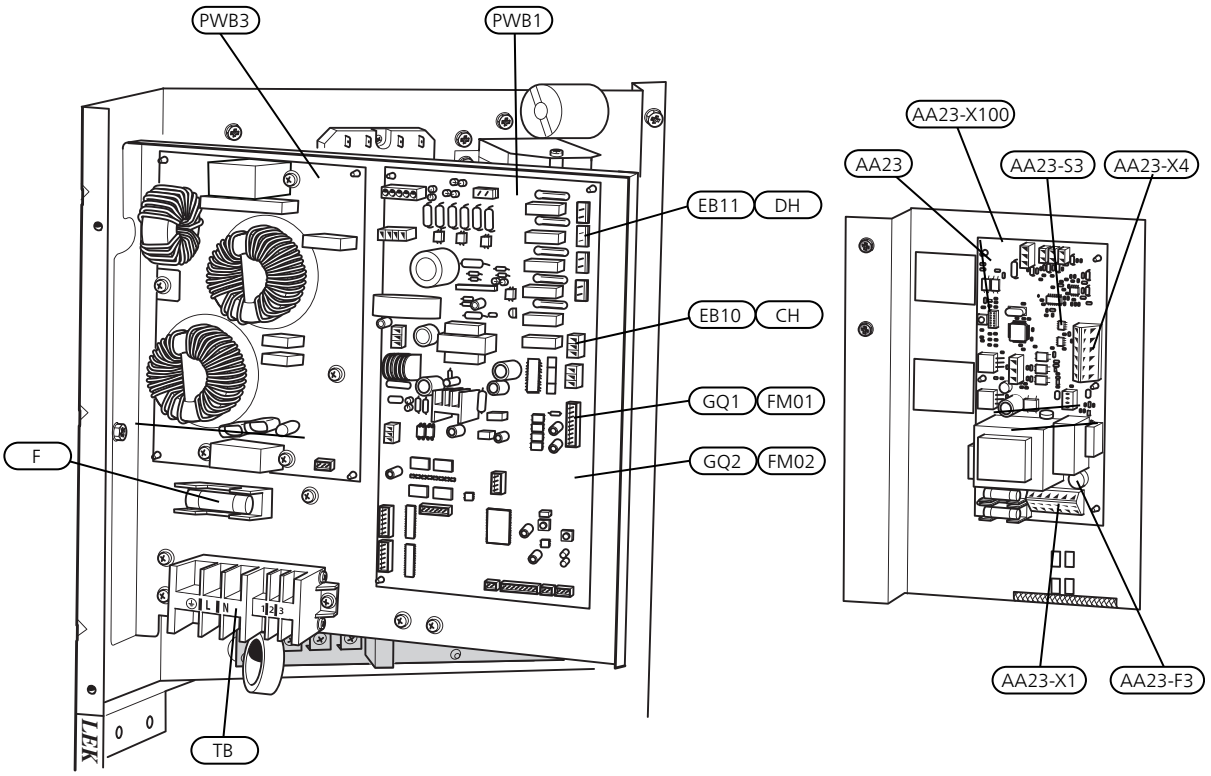


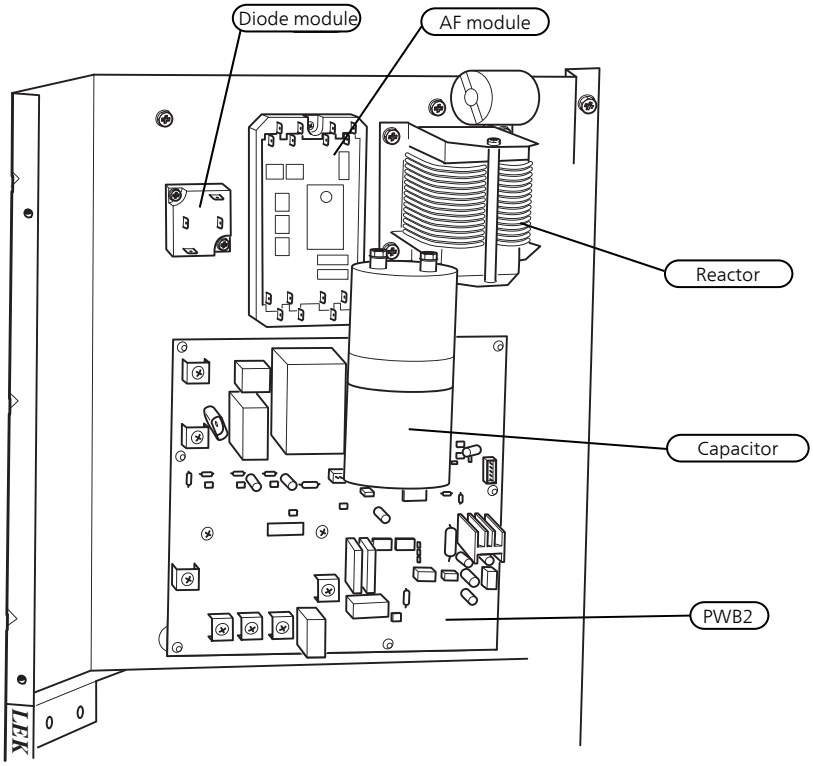
F2040-12


PWB3
PWB1
EB11
DH
EB10
CH
AA23-X100
AA23
AA23-S3
AA23-X4
F
AA23-F3
TB
GQ1
FM01
AA23-X1


Diode module
AF module
Reactor
Capacitor
PWB2

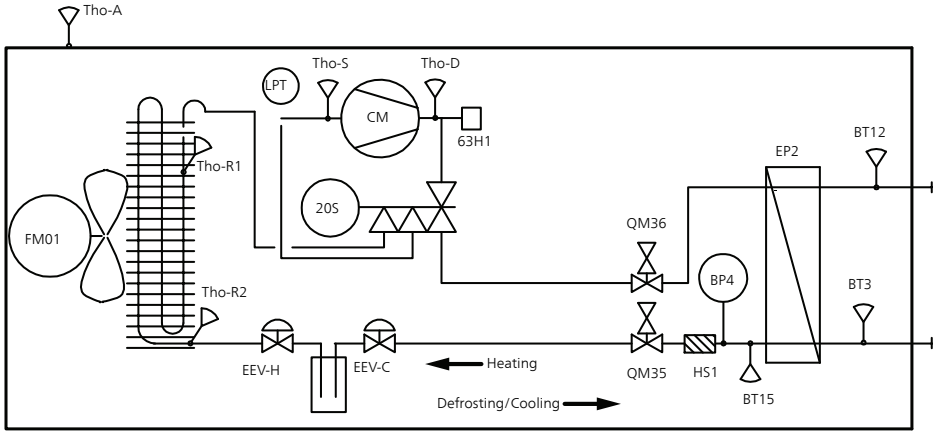
F2040-16


PWB3
PWB1
AA23-X100
AA23
AA23-S3
AA23-X4
EB11
DH
EB10
CH
GQ1
FM01
GQ2
FM02
F
AA23-X1
AA23-F3
TB


Diode module
AF module
Reactor
Capacitor
PWB2

3 System description

Principle of operation



Designation	Information
QN2 (20S)	4-way valve
BP1 (63H1)	High pressure pressostat
BP4	Pressure sensor, condenser
BT3	Temperature sensor, heating medium return line
BT12	Temperature sensor, condenser supply line
BT15	Temperature sensor, fluid pipe
GQ10 (CM)	Compressor
EP2	Condenser
GQ1 (FM01)	Fan

Designation	Information
HS1	Drying filter
BP2 (LPT)	Low pressure transmitter
BT28 (Tho-A)	Temperature sensor, ambient
BT14 (Tho-D)	Temperature sensor, hot gas
BT16 (Tho-R1)	Temperature sensor, heat exchanger out
Tho-R2	Temperature sensor, heat exchanger, in
BT17 (Tho-S)	Temperature sensor, suction gas
QM35	Service valve, liquid side
QM36	Service valve, gas side

Sensor internal

Sensors etc.

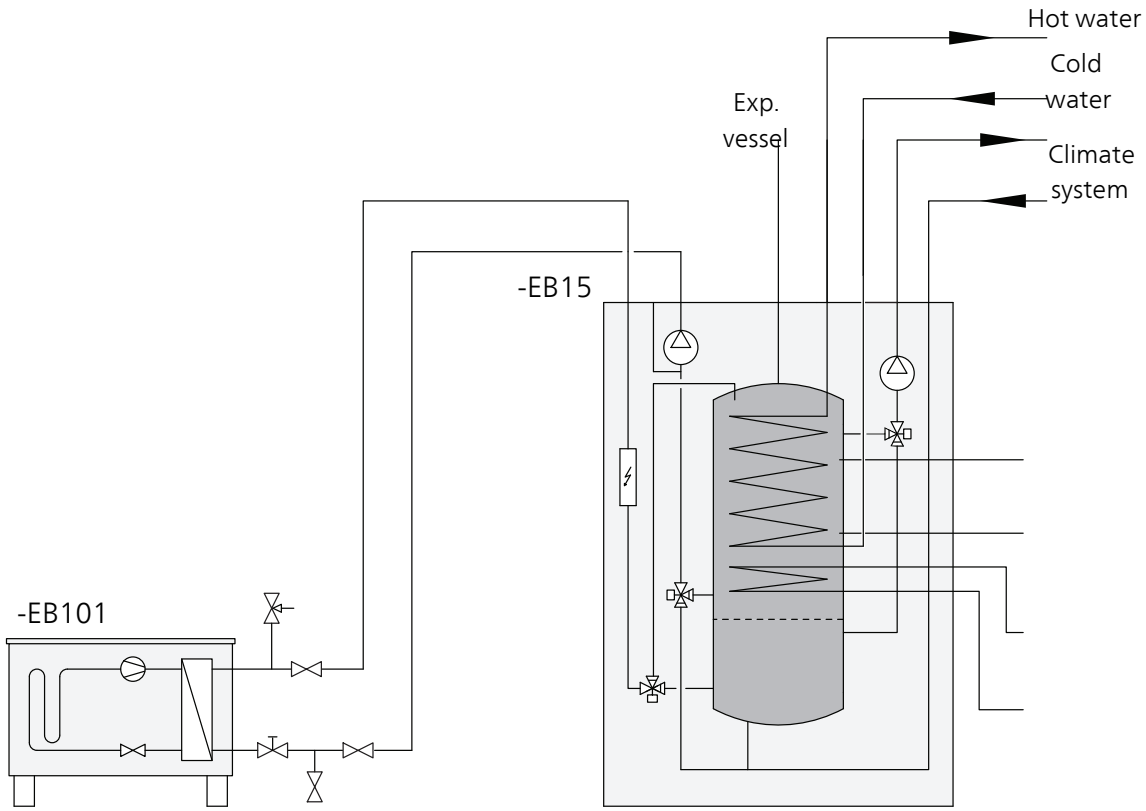
Designation	Name	Location	Function
BP1	High pressure switch (41.5 bar)	On hot gas line.	Protects the compressor against pressures that are too high during normal operation.
BP2	Low pressure transmitter	On suction gas line.	Protects the compressor against pressures that are too low.
BP4	High pressure sensor	On hot gas line.	Stopping the compressor at high pressure.
BT3	Return pipe	On return line at the condenser.	Stopping the compressor at high temp.
BT12	Flow pipe	On supply line at the condenser.	Stopping the compressor at high temp.
BT15	Fluid pipe	On the liquid line after the condenser.	View.

System diagram

System principle Docking

Example of docking F 2040 to VVM 310/VVM 500.

F2040 can also be connected to SMO20, SMO40 and VVM320.



TIP

Several system principles available at www.nibe.se/docking.

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

4 Component description

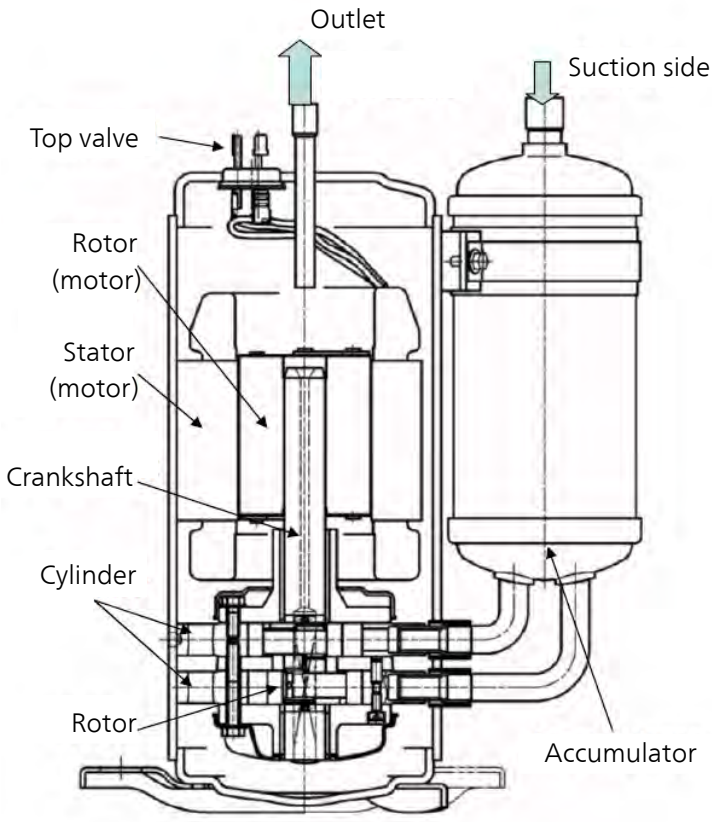
Compressor (GQ10)

Size	Type	Winding resistance*	Max operating current
8 kW	Twin Rotary	1.154 Ω	15 A
12 kW	Twin Rotary	0.293 Ω	22 A
16 kW	Twin Rotary	0.293 Ω	25 A

* at 20 °C +/- 10 %

Size	Type of oil	Oil volume
8 kW	MA68	0.68 l
12 kW	MA68	0.9 l
16 kW	MA68	0.9 l

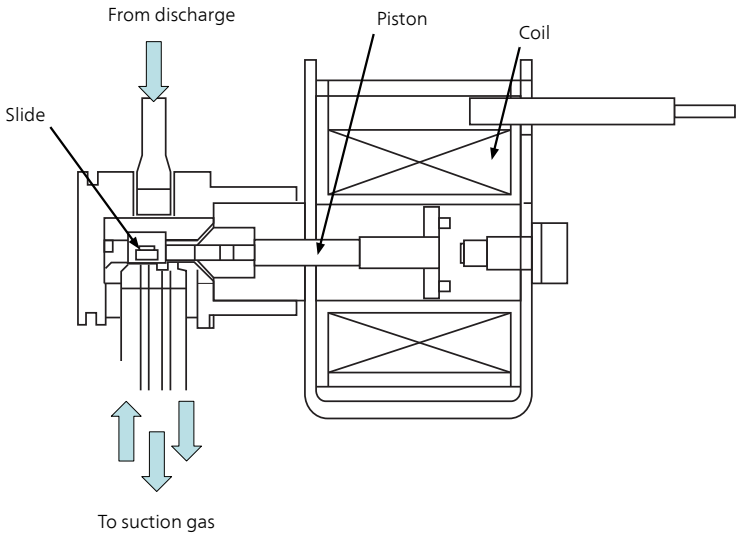
Cut-out value high hot gas	Automatic reset temp. alarm *High hotgas*
115 °C	85 °C



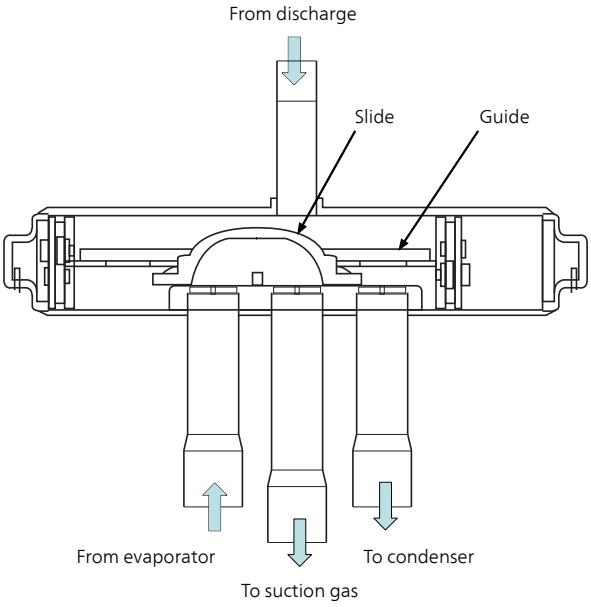
4-way valve

4-way valve

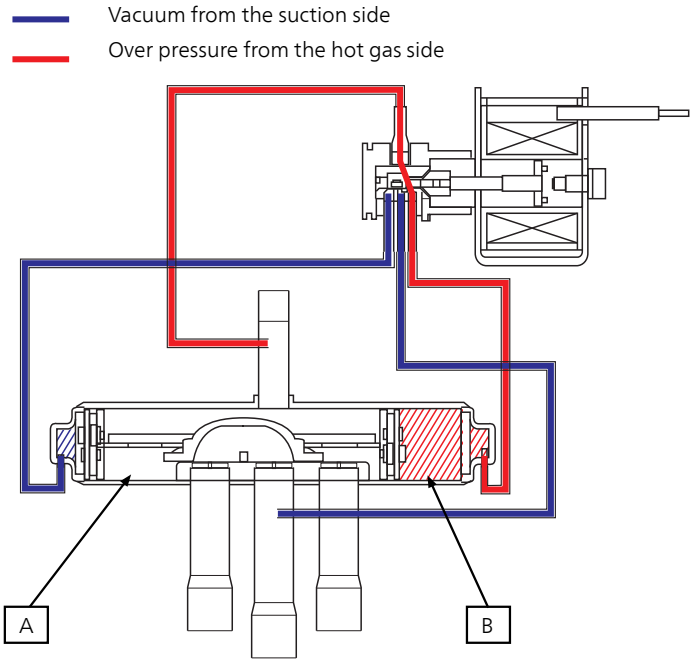
Coil and pilot valve for 4 way valve



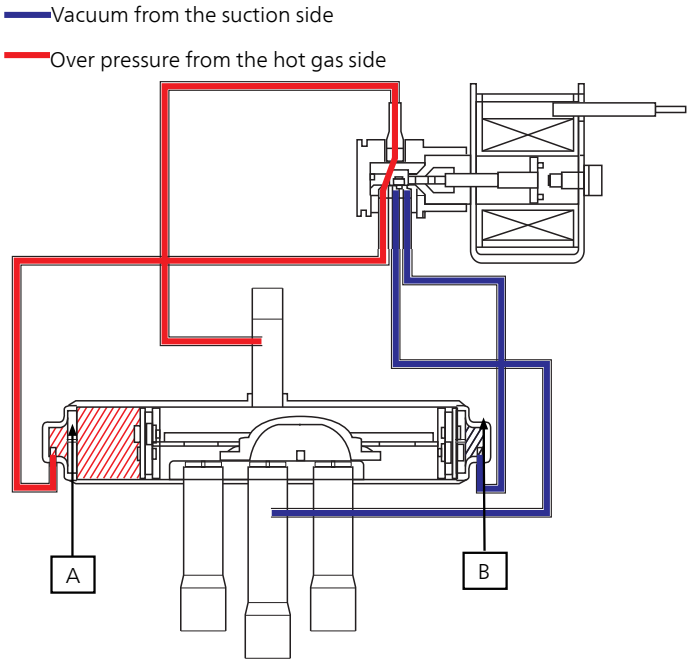
Valve housing



4-way valve function



1. When the current is broken a spring presses the piston to the left.
2. This opens the gas pressure to chamber B and releases the pressure in chamber A.
3. The slide moves to the left which changes how the refrigerant moves. In this case it runs directly from evaporator to suction gas.



1. When the current is switched on a solenoid pulls the piston to the right.
2. This opens the gas pressure to chamber A and releases the pressure in chamber B.
3. The slide moves to the right which changes how the refrigerant moves. In this case it runs directly from suction gas to condenser.

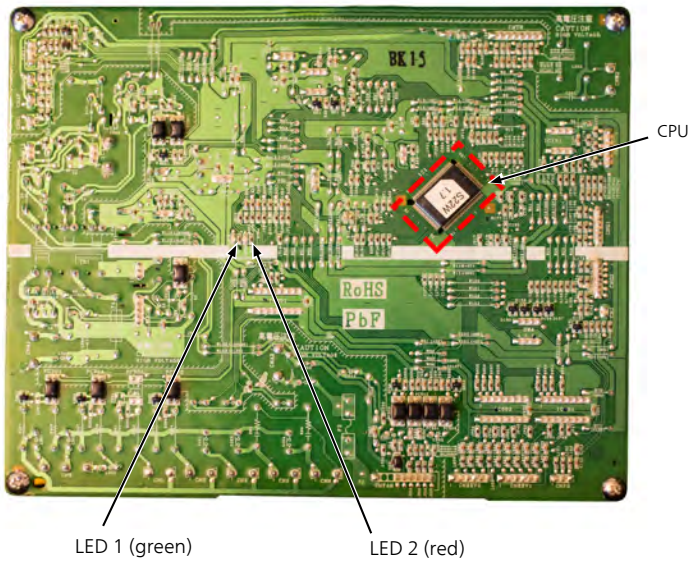
Circuit board

The outdoor unit program is here.

All inputs and outputs for the machine's control functions are connected here.

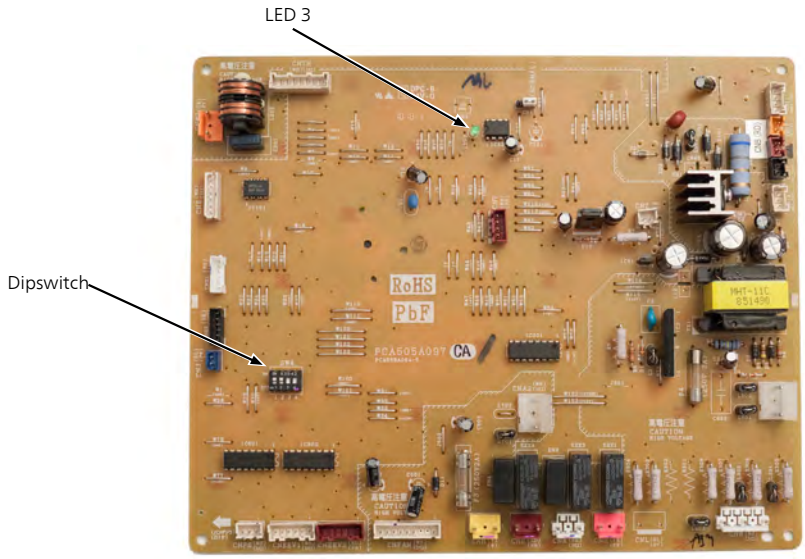
Control board (PWB1)

PWB1 8kW (upper side)



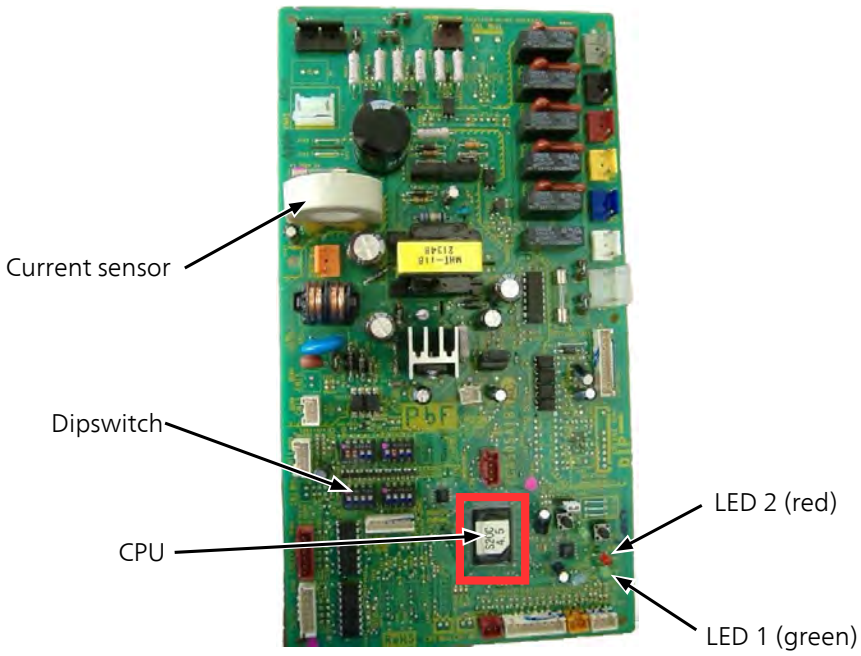
LED 1 (green)	Lit = Normal condition, supply ok.
LED 2 (red)	Flashes = Alarm indication

PWB1 8kW (underside)



LED 3 (green)	Only flashes during software programming.

PWB1 12/16 kW

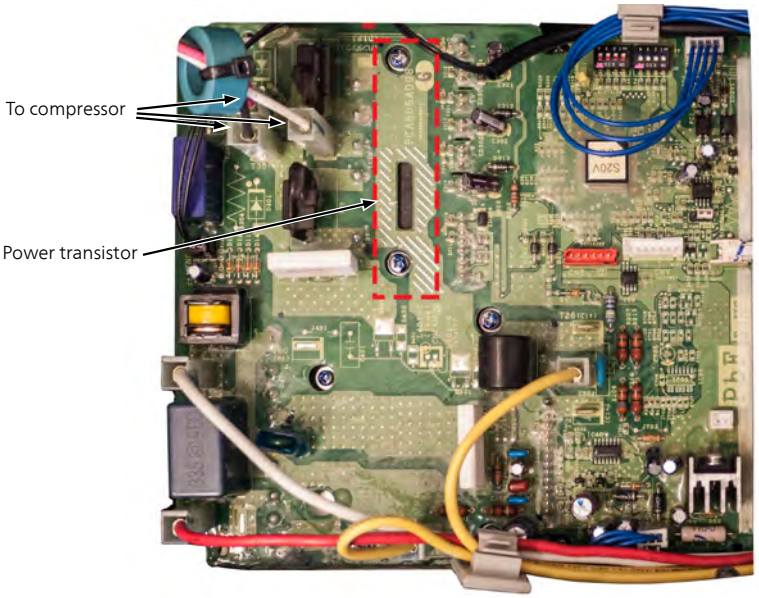


LED 1 (green)	Lit = Normal condition, supply ok.
LED 2 (red)	Flashes = Alarm indication

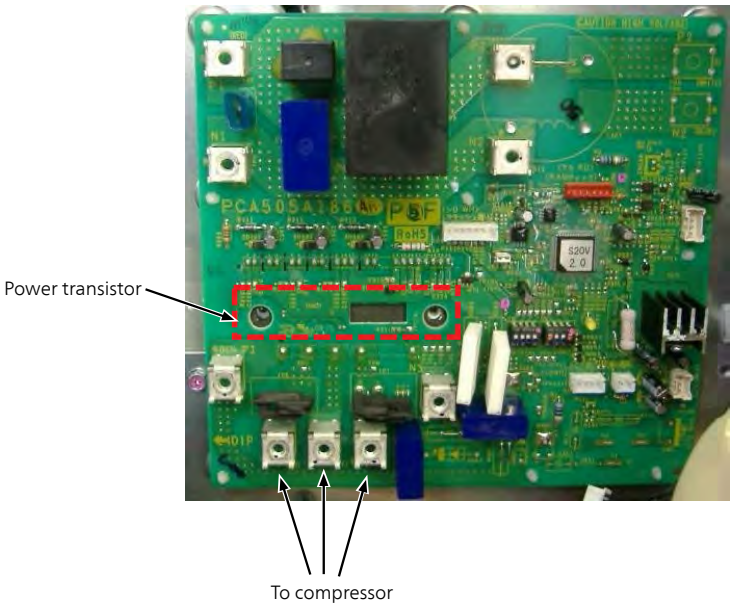
Inverter (PWB2)

Controls the voltage to the compressor.

PWB2 8kW



PWB2 12/16 kW



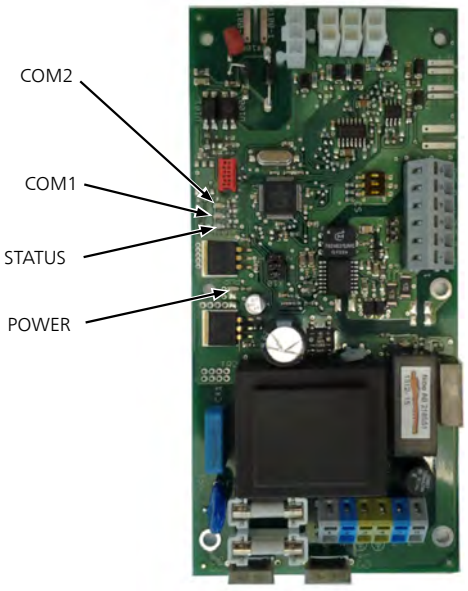
Suppressor filter (PWB3)

PWB3 minimises interruption.

PWB3 8 kW

PWB3 12/16 kW

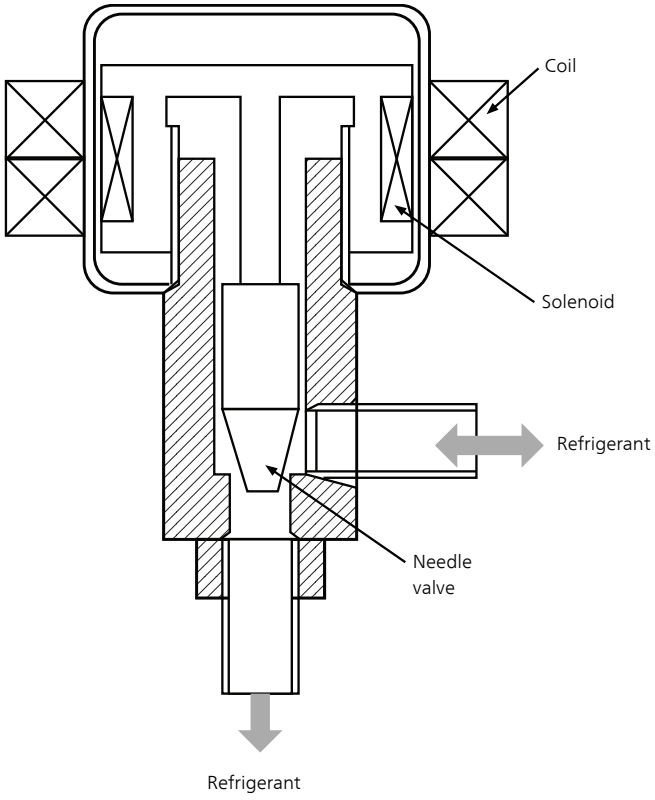
Communication board (AA23)



LED	Status
Status	Flashes=OK
Power	Lit=12V OK
COM1	Flashes=All OK to indoor unit
COM2	Flashes=All OK to outdoor unit

Expansion valve

- The refrigerant is vaporised by reducing the ambient pressure.
- The expansion valve controls the liquid refrigerant flow (480 pulses from completely open to completely closed).



Other components

Component	Pressure range	Working temp.	Connection
High pressure switch (BP1) (63H1)	Breaking value: 41.5 bar Max pressure: 45 bar (4.5 MPa) Reset value: 31.5 bar	-30 – +85 °C	Soldered connection
High pressure sensor (BP4)	1 – 46 bar (0.1 – 4.6 MPa)	Surrounding area: -30 – +100 °C Measurement medium: -30 – +120 °C	1/4'' flare connection with Schrader valve.
Low pressure sensor (LPT)	Cut-out value 0.79 bar Reset value: 1.75 bar		1/4'' flare connection with Schrader valve,

Component	Ohm	Output	Voltage
F2040-8: Bottom drain pan heater (EB 11)	529 Ω	100 W	230 V

Component	Ohm	Output	Voltage
F2040-12/16: Bottom drain pan heater (EB 11)	440 Ω	120 W	230 V

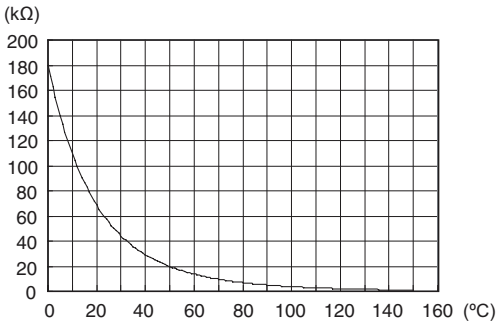
Component	Off	On
Thermostat drain pan heater	35 °C	25 °C (+/- 5 °C)

Component	Ampere	Output
Fuse external heating cable (F3)	250 mA	max 45 W

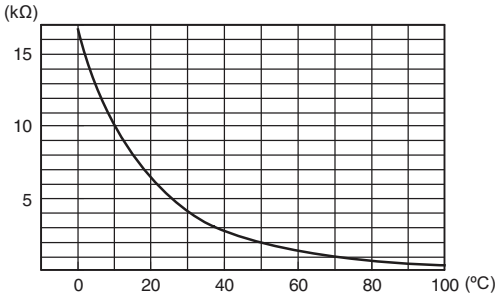
Sensors

Data for temperature sensor in F2040

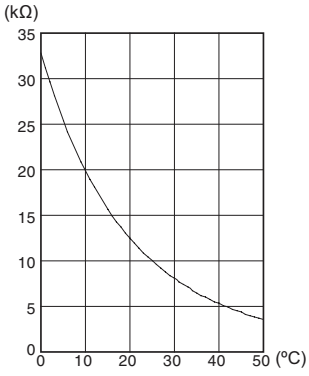
Tho-D



Tho-S, Tho-R1, Tho-R2



Tho-A



Data for return line temperature sensor (BT3), condensor supply (BT12) and fluid pipe (BT15)

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

Reference designation

Name	Description	Sensor type
BP1 (HP) (63H1)	High pressure pressostat	Pressure switch with break value of 41.5 bar
BP2 (LP) (LPT)	Low pressure pressostat	Pressure switch with break value of 0.79 bar
BP4 (HP)	High pressure sensor	
BT3 (T_{return})	Temperature sensor, condenser return line	"EMMY standard sensor"
BT12 (T_{supply})	Temperature sensor, condenser supply line	"EMMY standard sensor"
BT15 (T_{liquid})	Temperature sensor, fluid pipe	"EMMY standard sensor"

5 Troubleshooting

Disturbances in comfort

NOTE

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

NOTE

As F2040 can be connected to a large number of external units, these should also be checked.

NOTE

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

There is no danger in acknowledging an alarm because as long as the cause remains the alarm will return.

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

The following tips can be used to rectify the interference:

Basic actions

Start by checking the following possible fault sources:

- That the heat pump is running or that the supply cable to F2040 is connected.
- Group and main fuses of the accommodation.
- The property's earth circuit breaker.
- The heat pump's motor circuit breaker (F).

Low hot water temperature or a lack of hot water

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

- Large hot water consumption.
  - Wait until the hot water has heated up.
- Incorrect settings in the NIBE indoor module.
  - See the manual for the indoor module.

Low room temperature

- Closed thermostats in several rooms.
  - Set the thermostats to max in as many rooms as possible.
- External switch for changing the room heating activated.
  - Check any external switches.
- Incorrect settings in NIBE SMO or NIBE indoor module
  - See the manual for the indoor module.

High room temperature

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

F2040 is not operational

F2040 communicates all alarms to the indoor module.

- Ensure that the F2040 is connected to the power source.
- Check the indoor module. See section "Disturbances in comfort" in the installation manual for the indoor module.

F2040 does not communicate

- Check that the addressing of F2040 is correct.
- Check that the communication cable has been connected.

Alarm list

Acknowledging alarms

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

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

NOTE

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

F2040 alarm

Following alarm blocks outdoor unit. Addition runs at min permitted supply temperature.

Alarm no. indoor unit	Alarm text on the display	Description	May be due to
3	Sensor fault BT3	Sensor fault. Sensor for incoming cold water in F2040 (BT3).	- Open-circuit or short-circuit on sensor input. - Sensor does not work (see "Disturbances in comfort" section) - Defective control board AA23 in F2040.
12	Sensor fault BT12	Sensor fault. Sensor for outgoing water in F2040 (BT12).	- Open-circuit or short-circuit on sensor input. - Sensor does not work (see "Disturbances in comfort" section) - Defective control board AA23 in F2040.
15	Sensor fault BT15	Sensor fault. Sensor fluid line in F2040 (BT15).	- Open-circuit or short-circuit on sensor input. - Sensor does not work (see "Disturbances in comfort" section) - Defective control board AA23 in F2040.
162	High condenser out.	Too high temperature out from the condenser. Self resetting.	- Low flow in heating operation. - For high set temperatures.
163	High condenser in.	Too high temperature in to the condenser. Self resetting.	Temperature generated by another heat source.
183	Defrosting in progress.	No alarm without an operating status.	Set when the heat pump runs the defrosting procedure.
220	HP alarm	The high pressure pressostat (63H1) deployed 5 times within 60 minutes or under 60 minutes continuously.	- Insufficient air circulation or blocked heat exchanger - Open circuit or short circuit on input for high pressure pressostat (63H1) - Defective high pressure pressostat - Expansion valve not correctly connected - Service valve closed - Defective control board in F2040 - Low or no flow during heating operation - Defective circulation pump - Defective fuse, F(4A)
221	LP alarm	Too low value on the low pressure transmitter 3 times within 60 minutes.	- Open circuit or short circuit on input for low pressure transmitter - Defective low pressure transmitter - Defective control board in F2040 - Open circuit or short circuit on input for suction gas sensor (Tho-S) - Defective suction gas sensor (Tho-S)

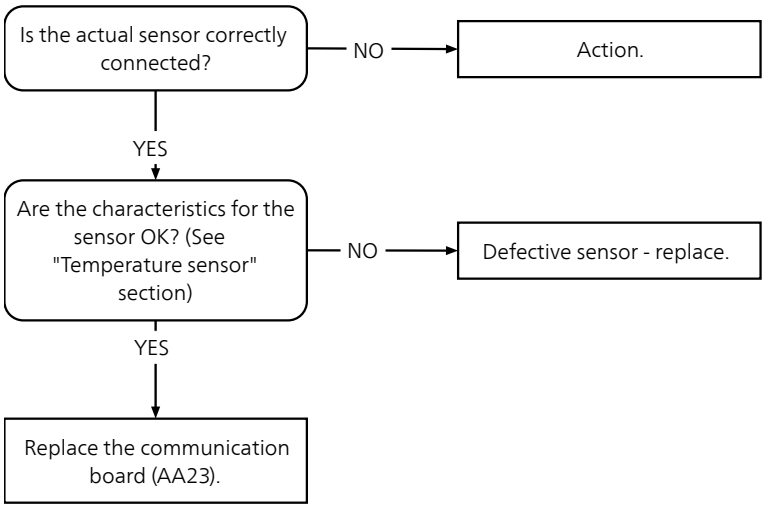
Alarm no. in-door unit	Alarm text on the display	Description	May be due to
223	OU Com. error	Communication between the control board and the communication board is interrupted. There must be 22 volt direct current at the connector CNW2 on the control board (PWB1).	- Any isolator switches for F2040 off - Incorrect cable routing
224	Fan alarm	Deviations in the fan speed in F2040.	- The fan cannot rotate freely - Defective control board in F2040 - Defective fan motor - Control board in F2040 dirty - Fuse (F2) blown
230	Permanent Hot-gas	Temperature deviation on the hot gas sensor (Tho-D) two times within 60 minutes or for 60 minutes continuously.	- Sensor does not work (see "Temperature sensor" section) - Insufficient air circulation or blocked heat exchanger - If the fault persists during cooling, there may be an insufficient amount of refriger-ant. - Defective control board in F2040
254	Communication error.	Communication fault with accessory card.	- F2040 unpowered. - Fault in the communication cable.
261	High HX temp	Temperature deviation on the hot gas sensor (Tho-R1/R2) five times within 60 minutes or for 60 minutes continuously.	- Sensor does not work (see "Disturbances in comfort" section) - Insufficient air circulation or blocked heat exchanger - Defective control board in F2040 - Too much refrigerant
262	Power transistor too hot	When IPM (Intelligent power module) displays FO-signal (Fault Output) five times during a 60-minute period.	Can occur when 15V power supply to the inverter PCB is unstable.
263	Inverter error	Voltage from the inverter outside the parameters four times within 30 minutes.	- Incoming power supply interference - Service valve closed - Insufficient amount of refrigerant - Compressor fault - Defective circuit board for inverter in F2040
264	Inverter error	Communication between circuit board for inverter and control board broken.	- Open-circuit in connection between boards - Defective circuit board for inverter in F2040 - Defective control board in F2040
265	Inverter error	Continuous deviation on power transistor for 15 minutes.	- Defective fan motor - Defective circuit board for inverter in F2040

Alarm no. indoor unit	Alarm text on the display	Description	May be due to
266	Insufficient refrigerant	Insufficient refrigerant is detected upon start-up in cooling mode.	- Service valve closed - Loose connection sensor (BT15, BT3) - Defective sensor (BT15, BT3) - Too little refrigerant
267	Inverter error	Failed start for compressor	- Defective circuit board for inverter in F2040 - Defective control board in F2040 - Compressor fault
268	Inverter error	Overcurrent, Inverter A/F module	- Sudden power failure
271	Cold outdoor air.	Temperature of BT28 below the value that permits operation.	- Cold weather conditions - Sensor fault.
272	Hot outdoor air.	Temperature of BT28 above the value that permits operation.	- Warm weather conditions. - Sensor fault.
277	Sensor fault Tho-R	Sensor fault, heat exchanger in F2040 (Tho-R).	- Open-circuit or short-circuit on sensor input - Sensor does not work (see "Disturbances in comfort" section) - Defective control board in F2040
278	Sensor fault Tho-A	Sensor fault, outdoor sensor in F2040 (Tho-A).	- Open-circuit or short-circuit on sensor input - Sensor does not work (see "Disturbances in comfort" section) - Defective control board in F2040
279	Sensor fault Tho-D	Sensor fault, hot gas in F2040 (Tho-D).	- Open-circuit or short-circuit on sensor input - Sensor does not work (see "Disturbances in comfort" section) - Defective control board in F2040
280	Sensor fault Tho-S	Sensor fault, suction gas in F2040 (Tho-S).	- Open-circuit or short-circuit on sensor input - Sensor does not work (see "Disturbances in comfort" section) - Defective control board in F2040
281	Sensor fault LPT	Sensor fault, low pressure transmitter in F2040.	- Open-circuit or short-circuit on sensor input - Sensor does not work (see "Disturbances in comfort" section) - Defective control board in F2040 - Fault in the refrigerant circuit
294	Incompatible outdoor unit.	Faulty combination of indoor and outdoor units.	Incorrectly set DIP switches on circuit board in outdoor unit.
404	Sensor flt BP4	Sensor fault. Sensor high pressure heating/low pressure cooling in F2040 (BP4).	- Open-circuit or short-circuit on sensor input. - Sensor does not work (see "Disturbances in comfort" section). - Defective control board AA23 in F2040.

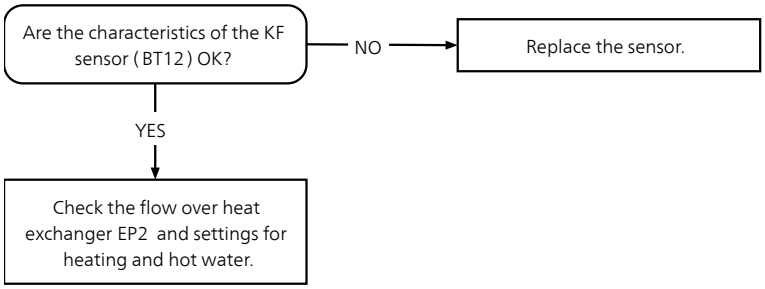
Alarm no. in-door unit	Alarm text on the display	Description	May be due to
998	Starts	Display has restarted.	Temporary dip in power supply.

Troubleshooting guide

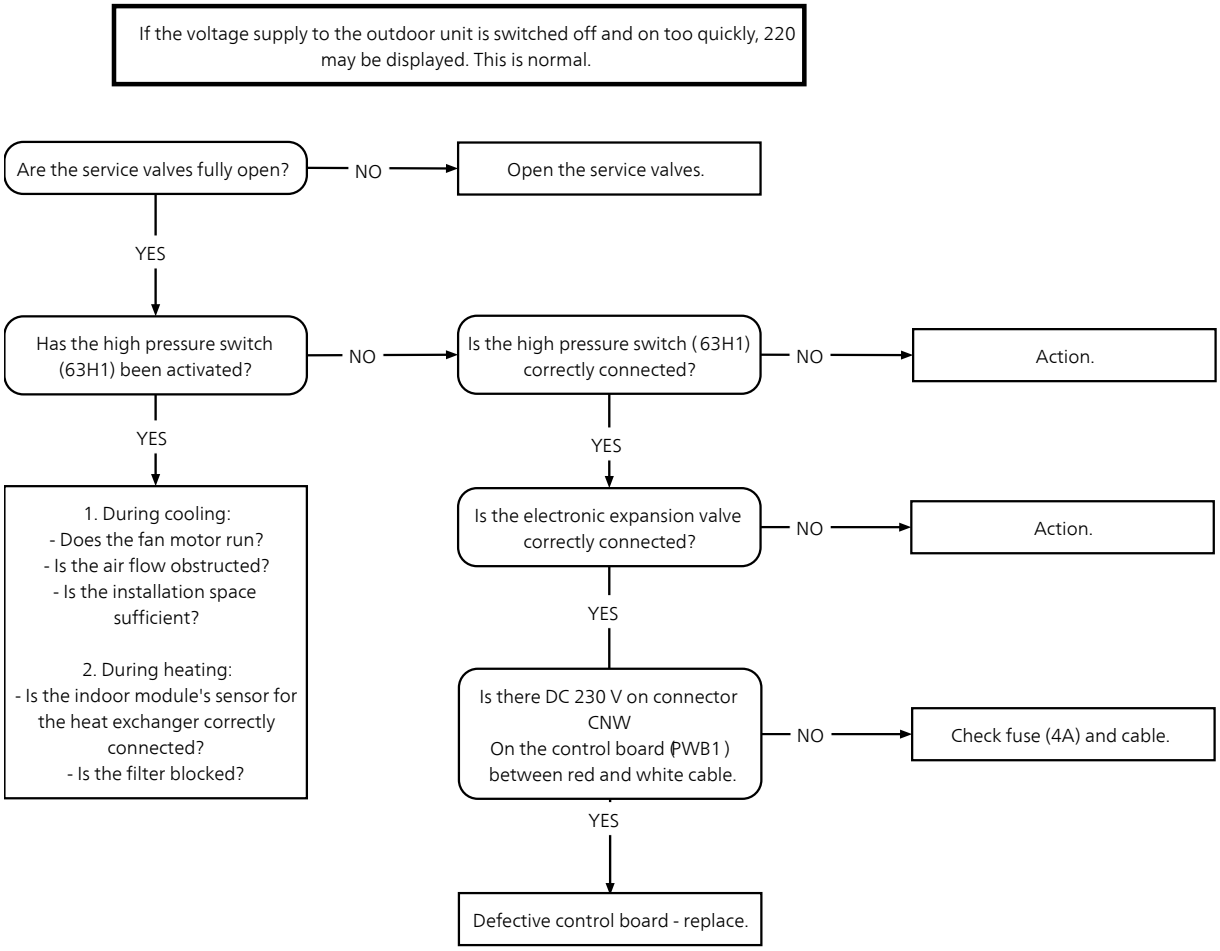
3 - Sensor fault BT3, 12 - Sensor fault BT12, 15 - Sensor fault BT15



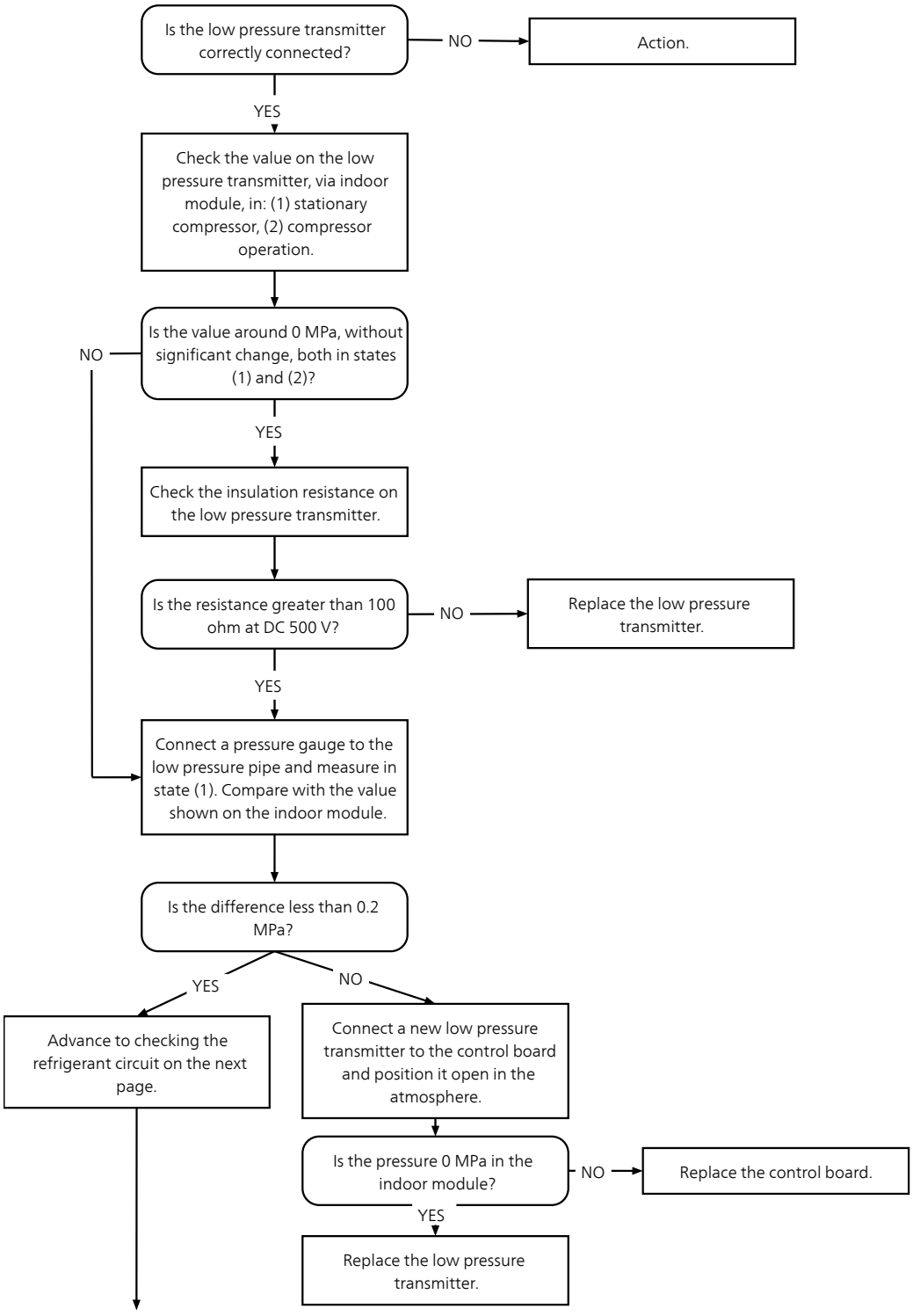
162 - High condenser out

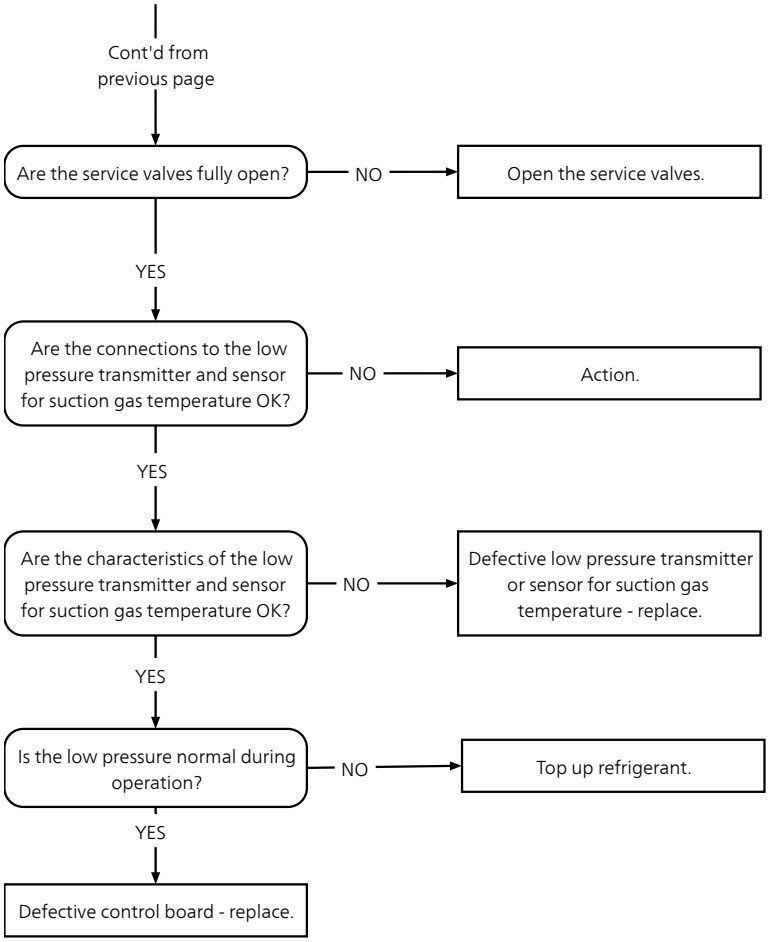


220 - HP alarm


If the voltage supply to the outdoor unit is switched off and on too quickly, 220 may be displayed. This is normal.
Are the service valves fully open?
NO
Open the service valves.
YES
Has the high pressure switch (63H1) been activated?
NO
Is the high pressure switch (63H1) correctly connected?
NO
Action.
YES
YES
1. During cooling:
- Does the fan motor run?
- Is the air flow obstructed?
- Is the installation space sufficient?
2. During heating:
- Is the indoor module's sensor for the heat exchanger correctly connected?
- Is the filter blocked?
Is the electronic expansion valve correctly connected?
NO
Action.
YES
Is there DC 230 V on connector CNW
On the control board (PWB1) between red and white cable.
NO
Check fuse (4A) and cable.
YES
Defective control board - replace.

221 - LP alarm

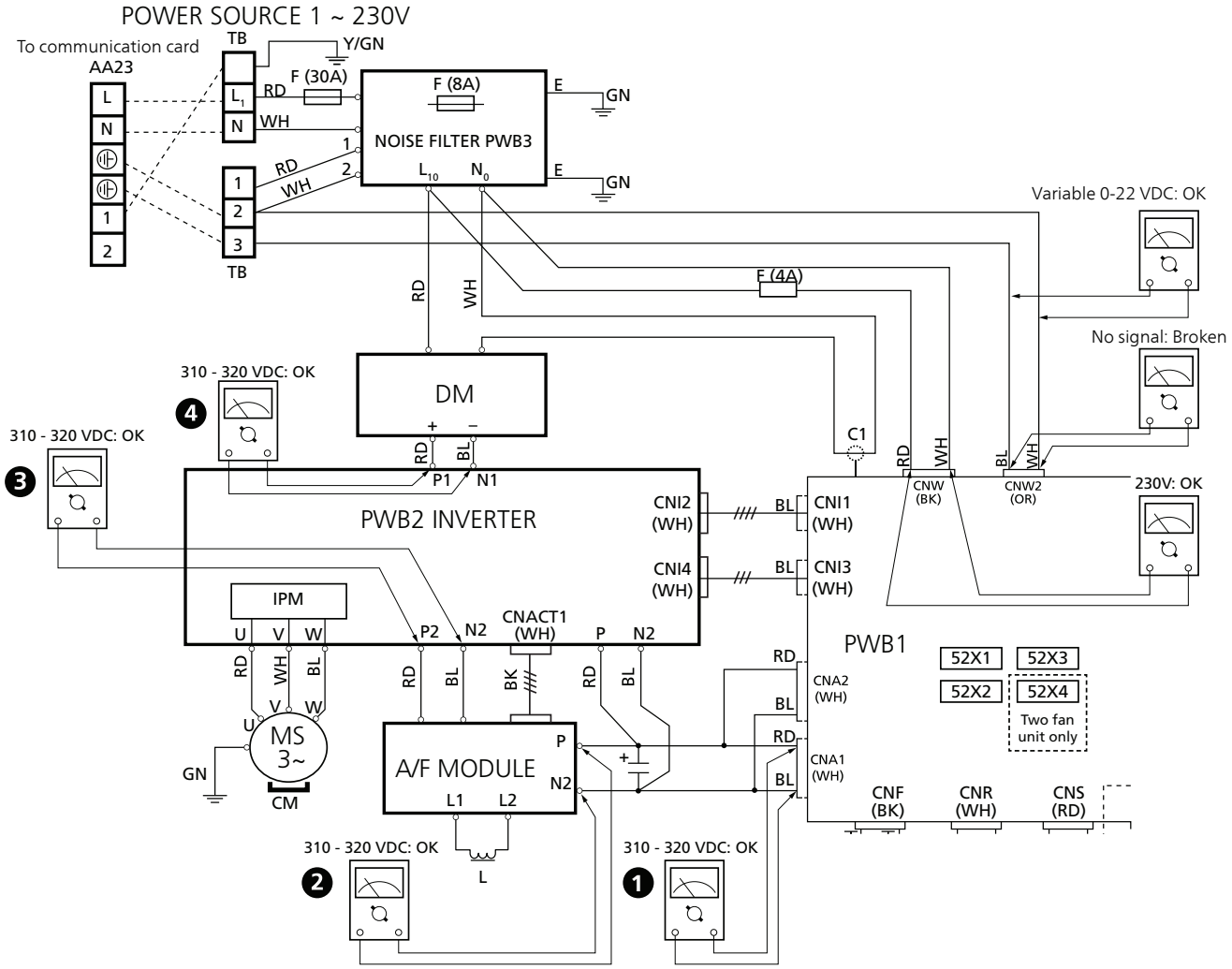

Is the low pressure transmitter correctly connected?
NO
Action.
YES
Check the value on the low pressure transmitter, via indoor module, in: (1) stationary compressor, (2) compressor operation.
Is the value around 0 MPa, without significant change, both in states (1) and (2)?
NO
YES
Check the insulation resistance on the low pressure transmitter.
Is the resistance greater than 100 ohm at DC 500 V?
NO
Replace the low pressure transmitter.
YES
Connect a pressure gauge to the low pressure pipe and measure in state (1). Compare with the value shown on the indoor module.
Is the difference less than 0.2 MPa?
YES
NO
Advance to checking the refrigerant circuit on the next page.
Connect a new low pressure transmitter to the control board and position it open in the atmosphere.
Is the pressure 0 MPa in the indoor module?
NO
Replace the control board.
YES
Replace the low pressure transmitter.


Cont'd from previous page
Are the service valves fully open?
NO
Open the service valves.
YES
Are the connections to the low pressure transmitter and sensor for suction gas temperature OK?
NO
Action.
YES
Are the characteristics of the low pressure transmitter and sensor for suction gas temperature OK?
NO
Defective low pressure transmitter or sensor for suction gas temperature - replace.
YES
Is the low pressure normal during operation?
NO
Top up refrigerant.
YES
Defective control board - replace.

223 - OU com error

223 OU com error

Test points when PWB1 Control is "dead", no LED lit.

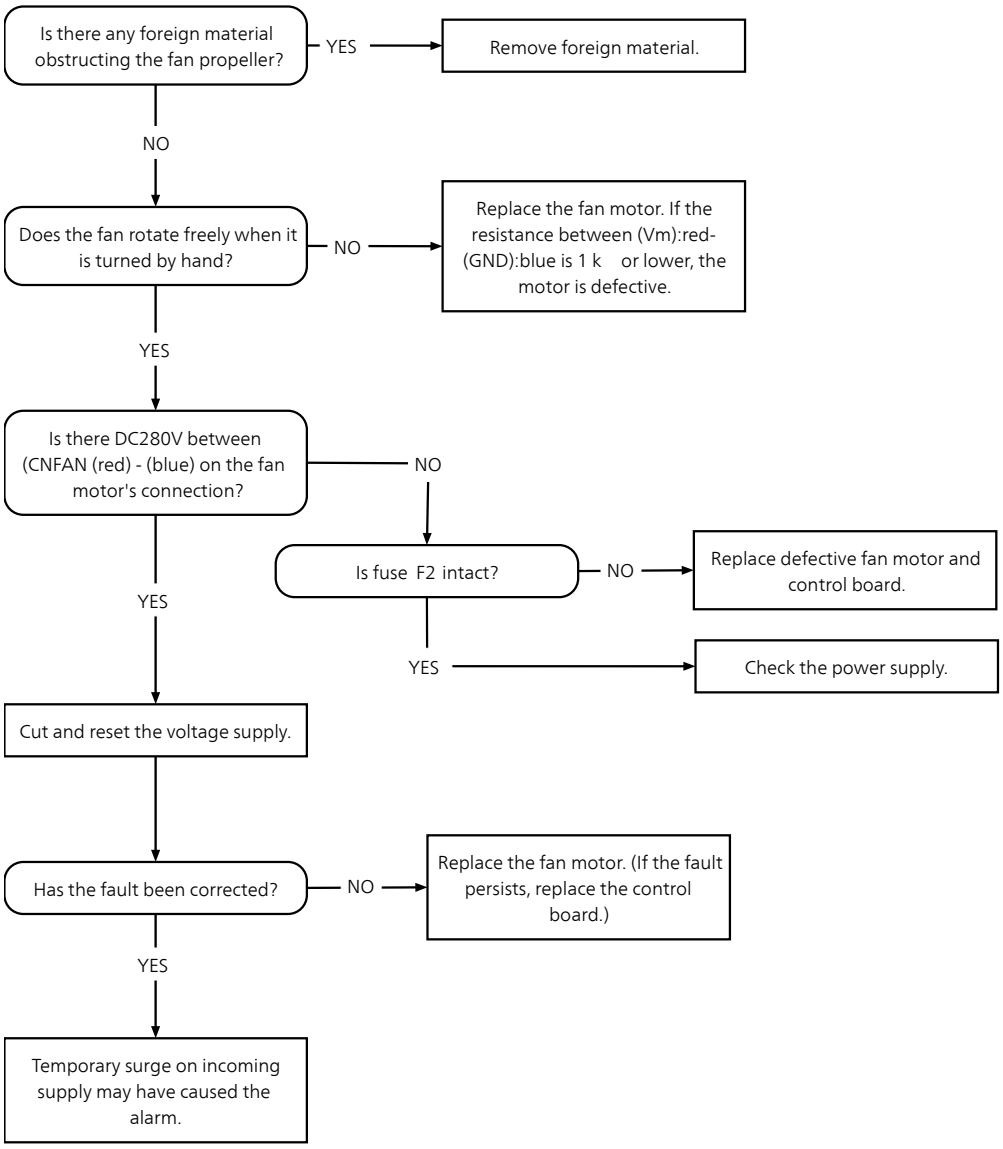


Check the following:

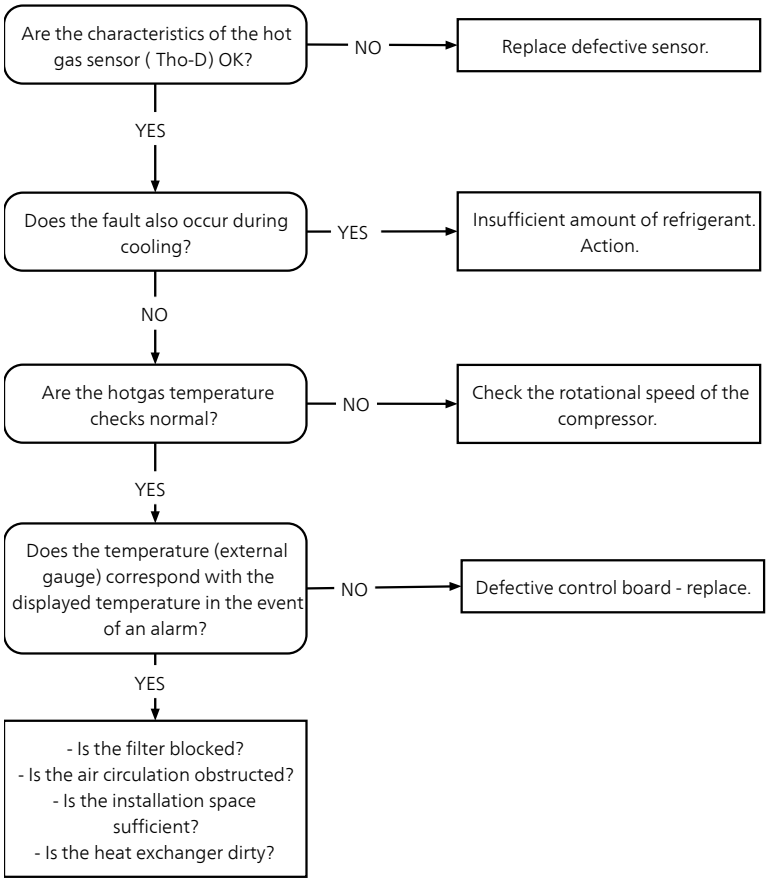
1. Check the voltage between CNA1 (310 - 320 VDC)
2. Check the voltage between P -N2 from AF module to condenser (310 - 320 VDC)
3. Check the voltage between P2-N2 on inverter PCB (310 - 320 VDC)
4. Check the voltage between DM and inverter PCB (310 - 320 VDC)

- CNW2 is connection for the communication cable between the indoor unit and outdoor unit so that there is an oscillating signal 0-22VDC, but there is not a fixed voltage in it. The cable must remain in place while measuring takes place.
- The voltage on CNA1 and CNA2 is approx 310-320VDC with 230V measurement voltage.
- CNA2 is supply voltage to Control PCB then Control PCB creates its own internal control voltage, where voltage to green and red LED is included.
- If the LED on the circuit board is not lit this voltage may be missing. Measure at points 1-4 in turn to establish where the voltage disappears.

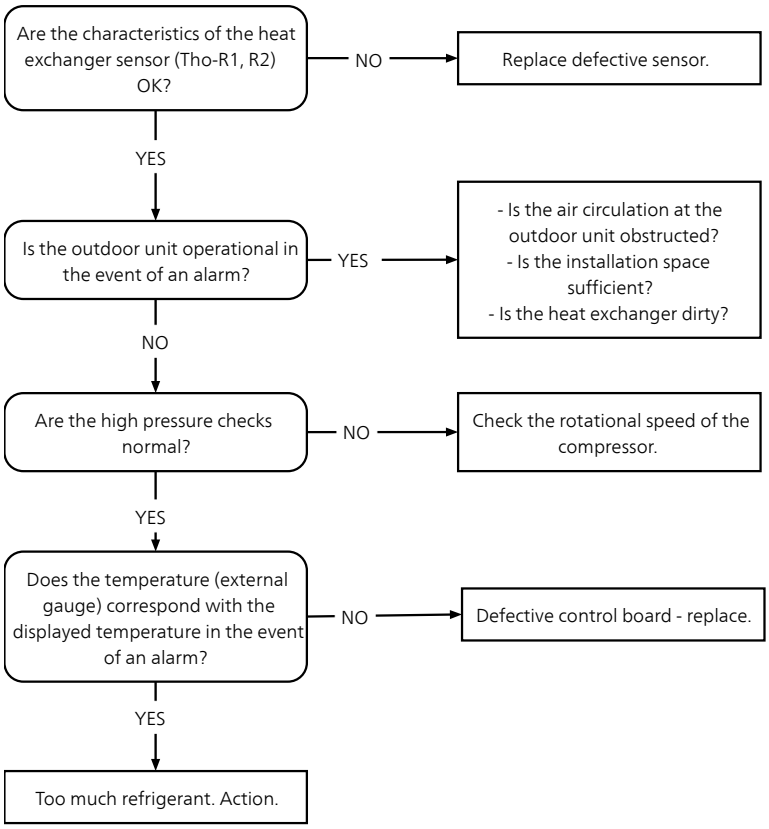
224 - Fan alarm



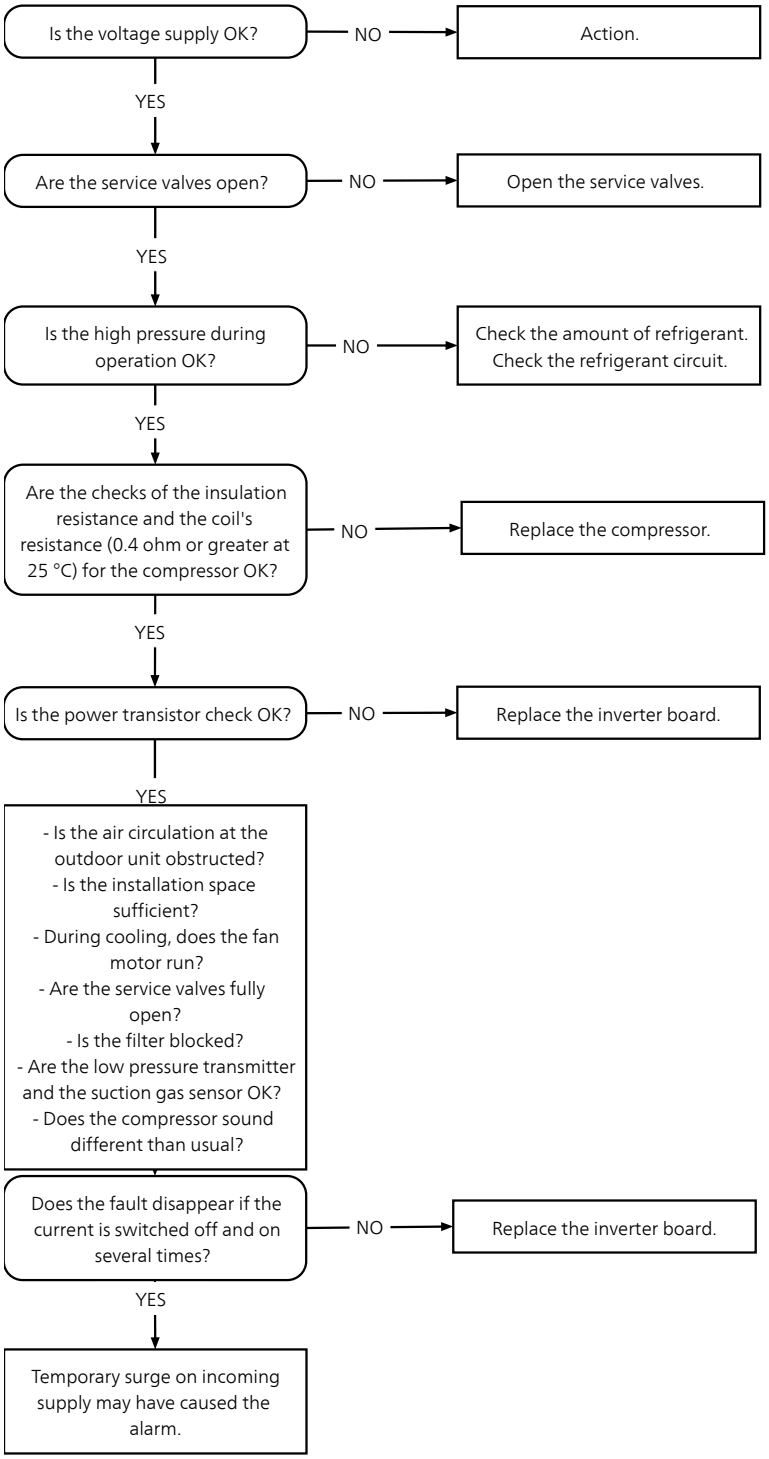
230 - Perm. high hot gas



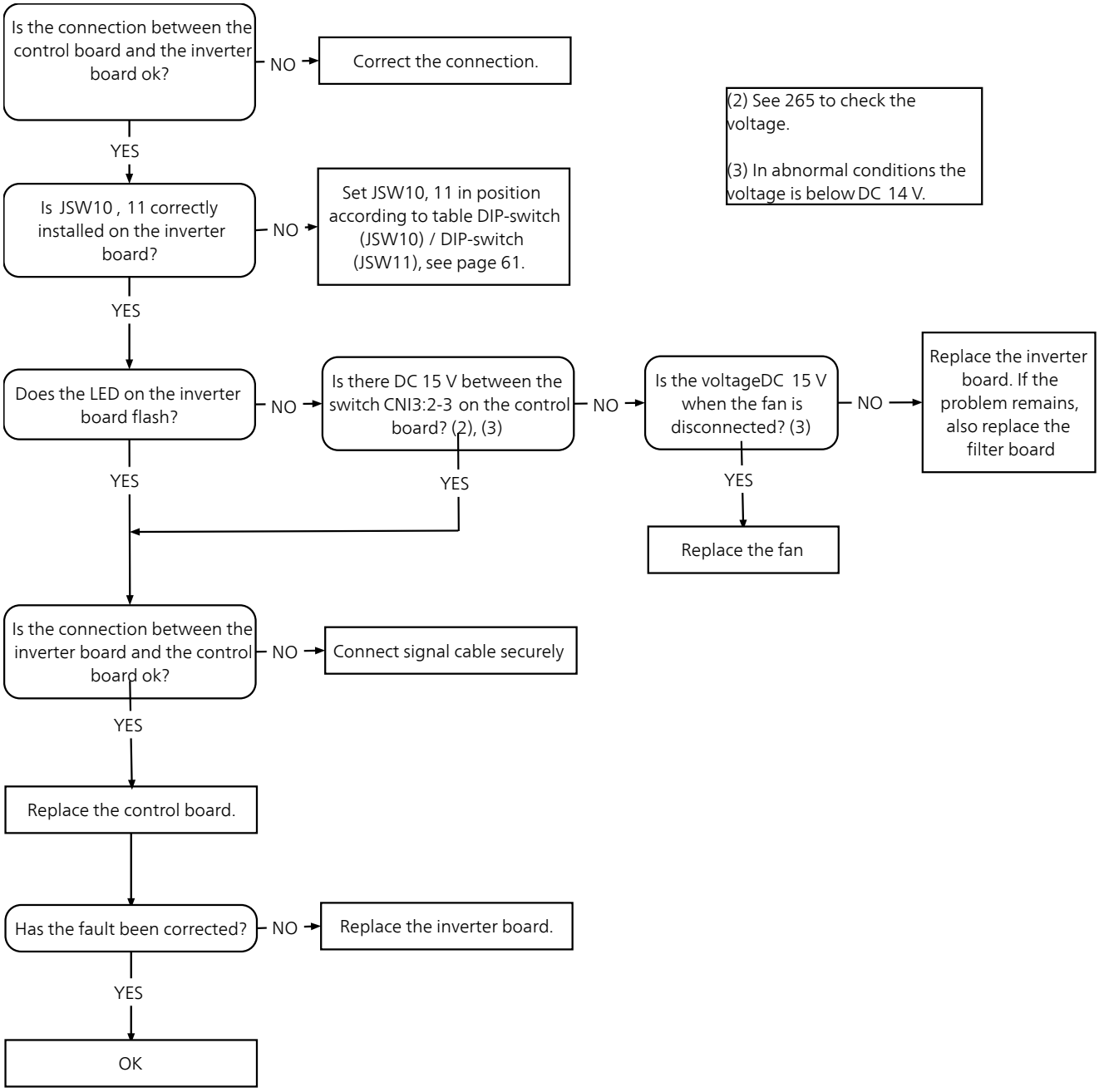
261 - High HWX temp



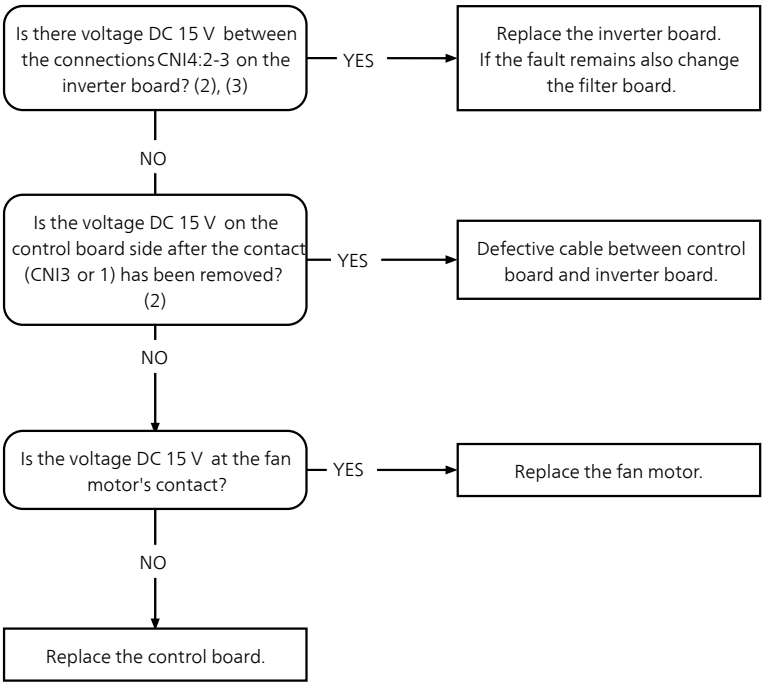
263 - Inverter error



264 - Inverter error



265 - Inverter error

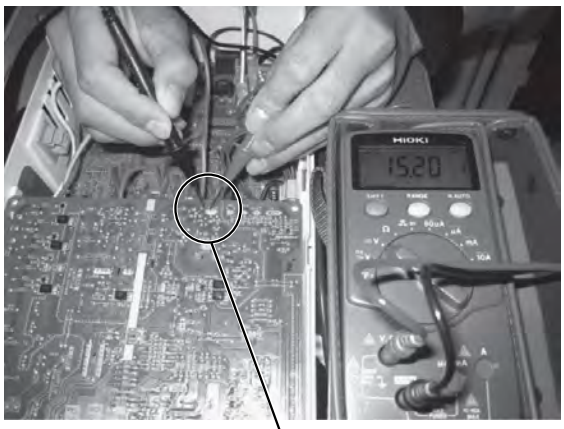


(2) See next page to check the voltage.

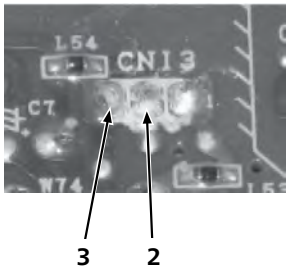
(3) In abnormal conditions the voltage is below DC 14 V .

Measuring between CNI3:2-3 on the control board:

F2040-8

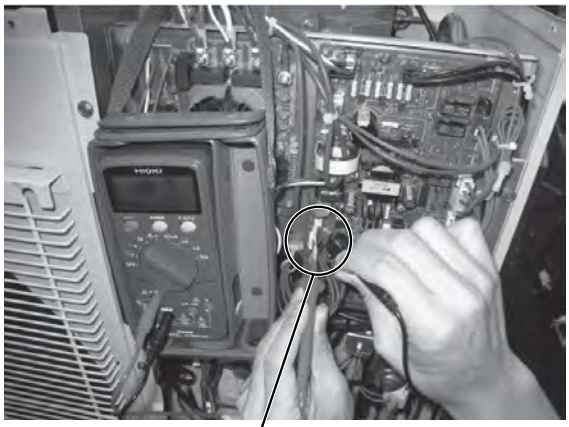


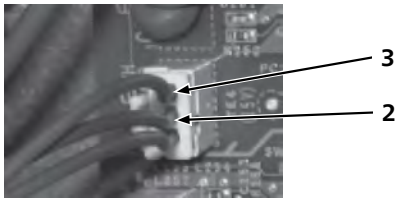
Remove the surface treatment on the soldered points to be measured.



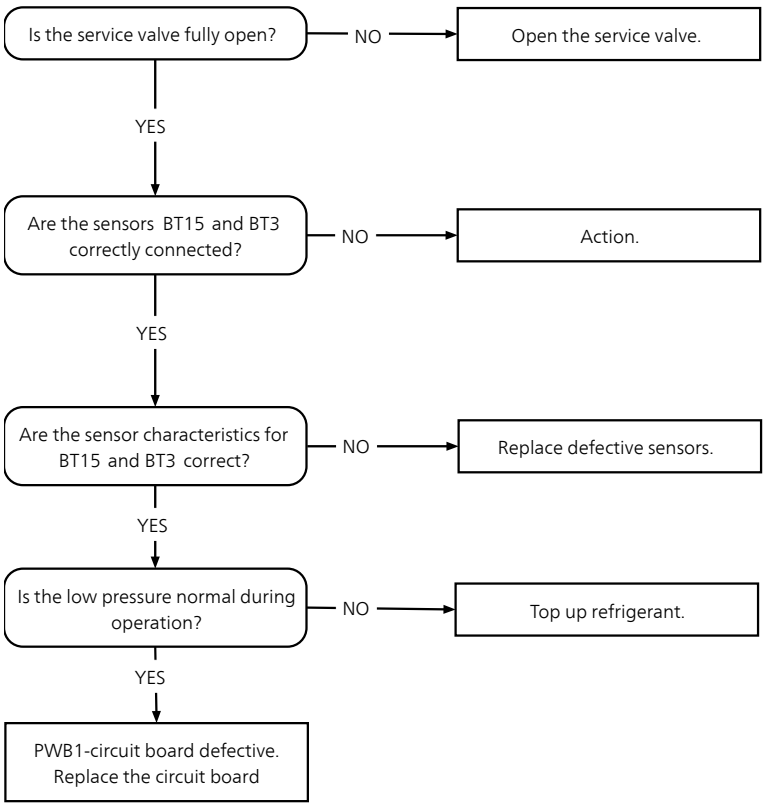
2: 15V (+)
3: GND (-)

F2040-12/16

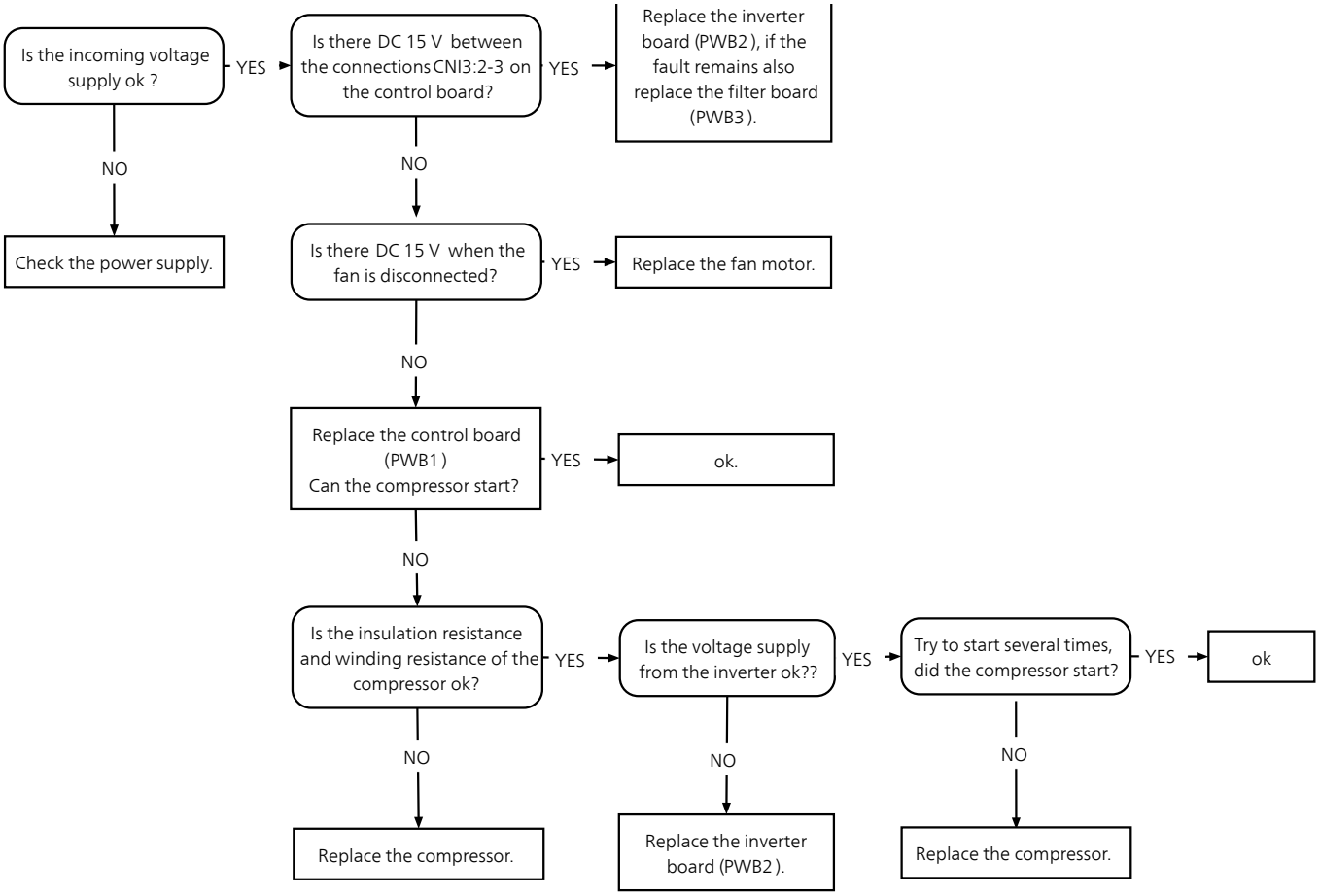




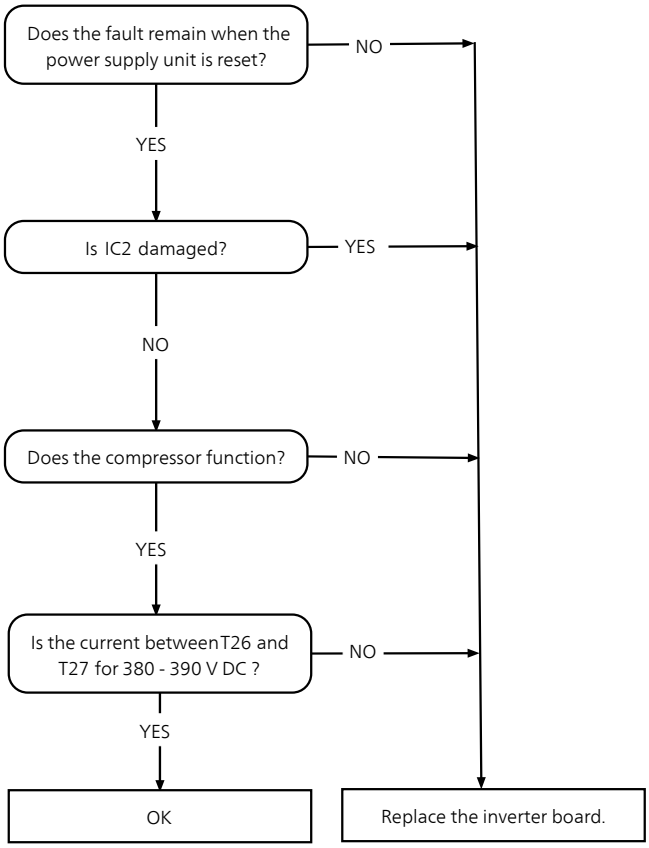
266 - Insufficient refrigerant



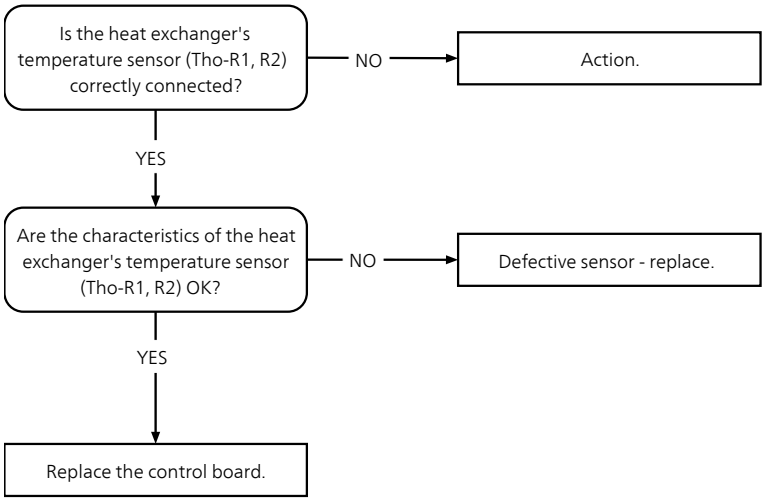
267 - Inverter error



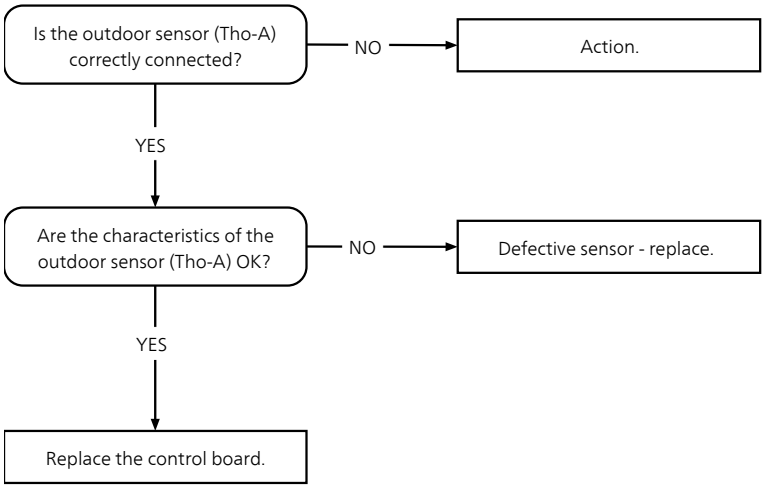
268 - Inverter A/F



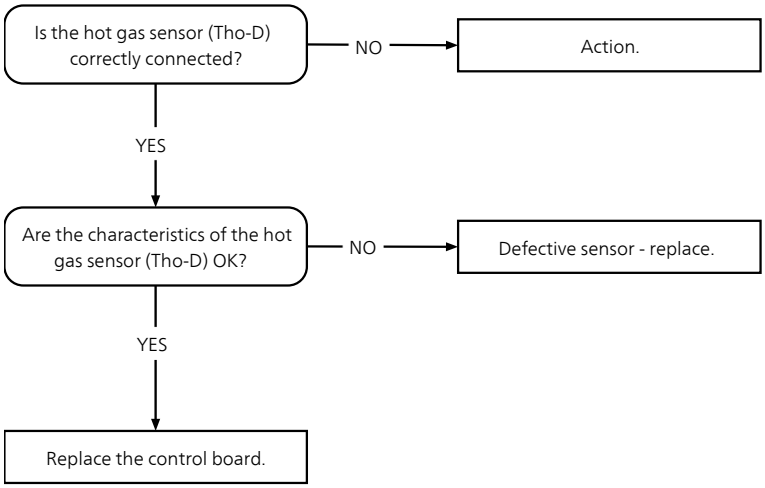
277 - S. fault Tho-R



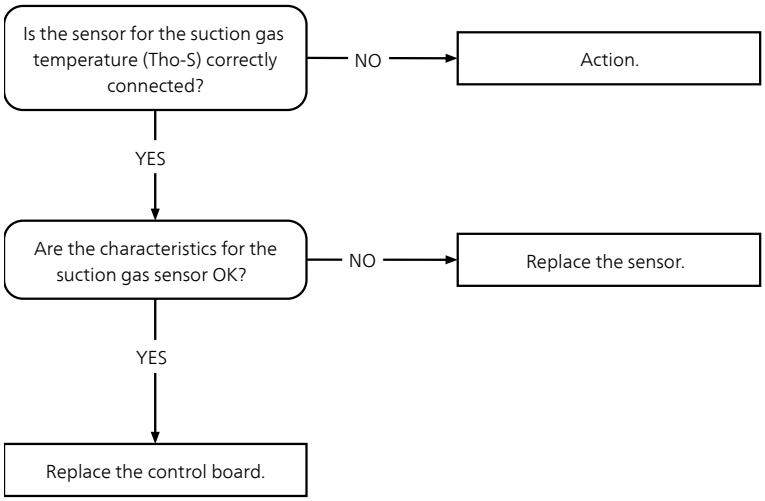
278 - Sensor fault Tho-A



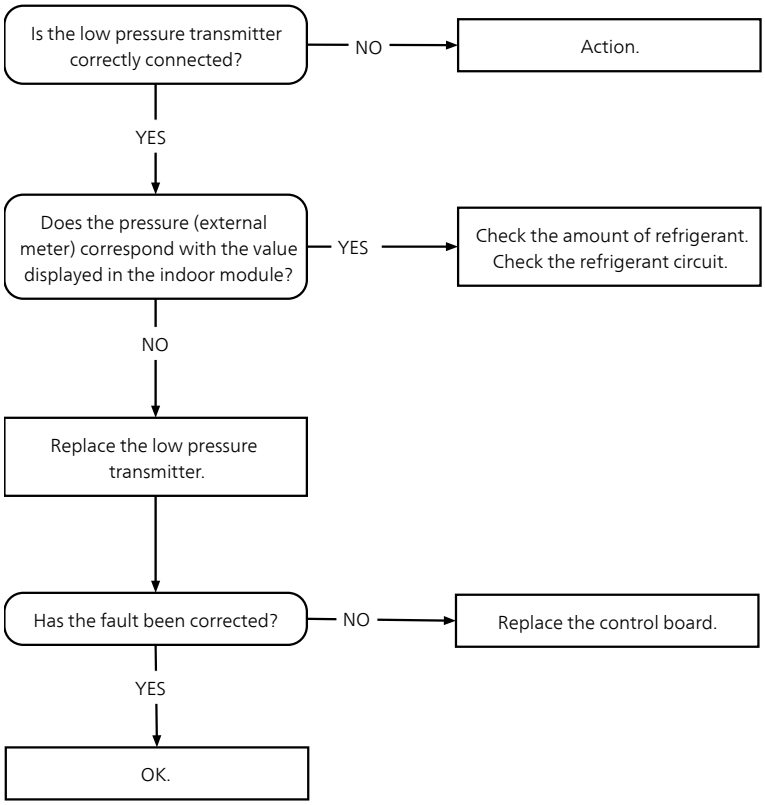
279 - S. fault Tho-D



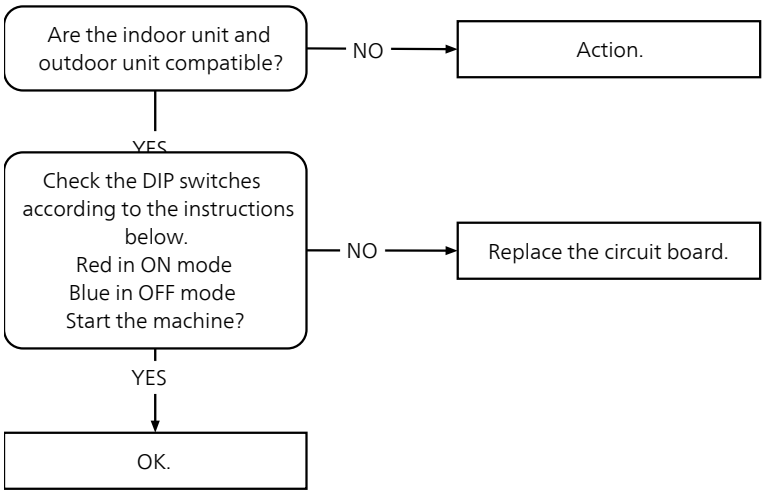
280 - S. fault Tho-S



281 – Sensor fault LPT



294 - NIBE F2040 + VVM 310/320/500 - Incompatible outdoor unit

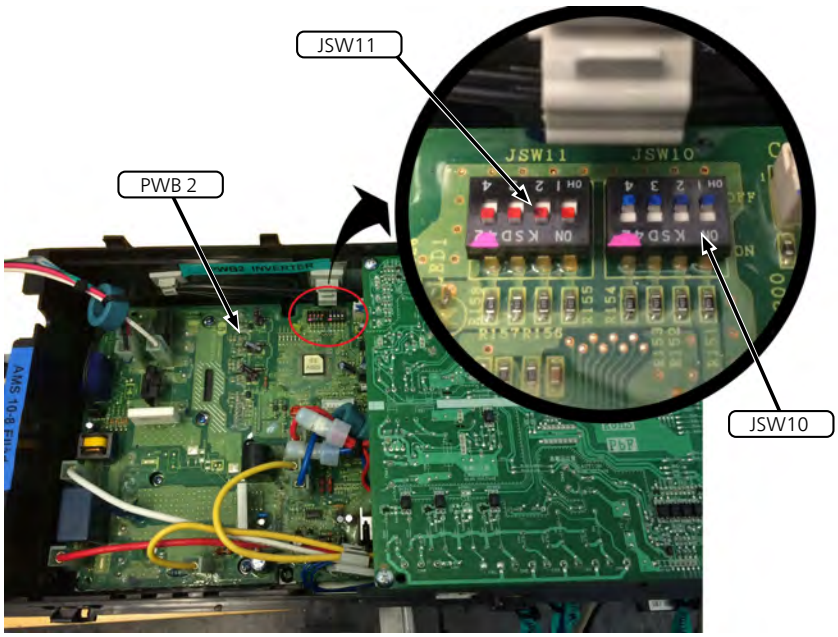


The DIP switches on the circuit board that state capacity of the outdoor unit can move out of position which results in alarm 294.

To rectify this follow the instructions below:

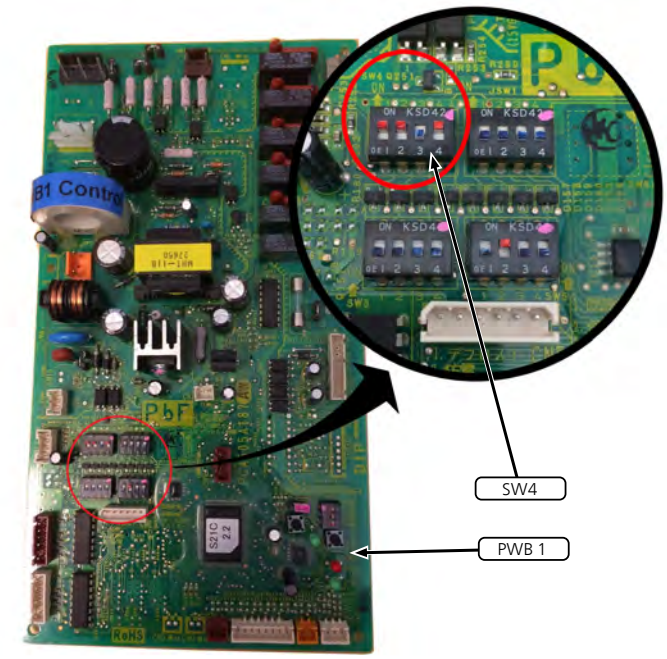
Action F2040-8

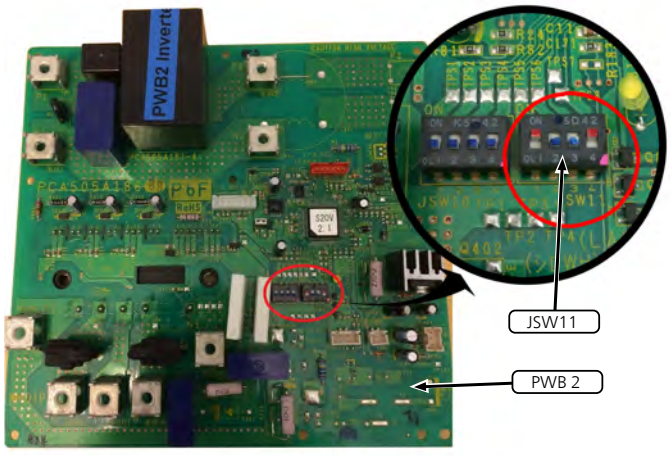
- Cut the power to the machine.
- Open the outdoor unit, remove the cover.
- Slacken off and remove the cover of the electrical distribution box.
- Locate DIP switch JSW10 and JSW11 on the inverter board (PWB2), which is recessed to the left in the junction box (see image).
- Change mode back and forth on the switches several times and reset them to the original position.
- Reinstall the covers.
- Start the machine.



Action F2040-12/16

- Cut the power to the machine.
- Open the outdoor unit, remove the cover and panel in front of the circuit board.
- Locate DIP switch SW4 on the control board (PWB1), which is at the front to the right (see image).
- Change mode back and forth on the switches several times and reset them to the original position.
- Locate DIP switch JSW11 on the inverter board (PWB2), which is on the back panel (see image).
- Change mode back and forth on the switches several times and reset them to the original position.
- Reinstall the panels
- Start the machine.



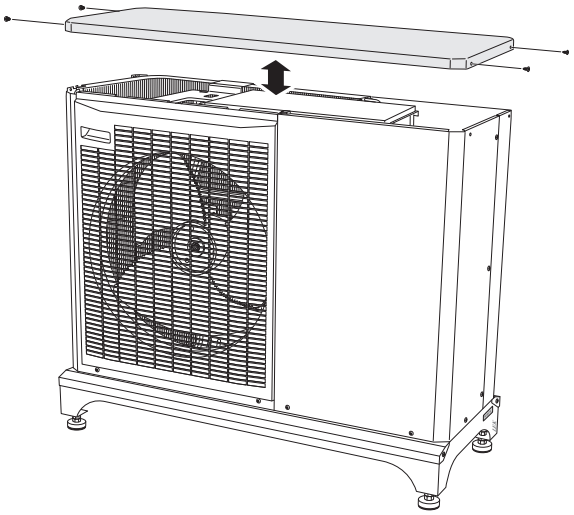


6 Component replacement

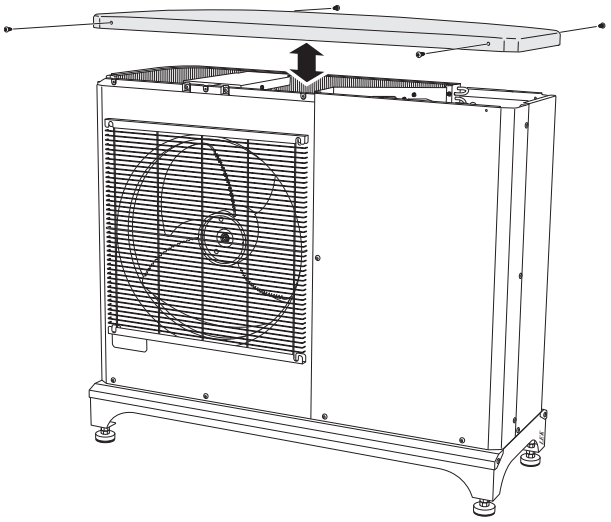
Basic

Removing the covers

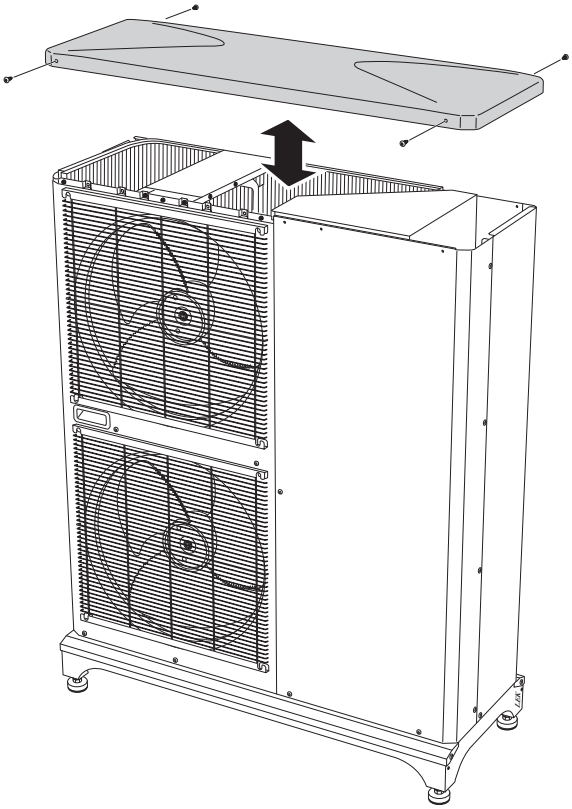
F2040-8



F2040-12

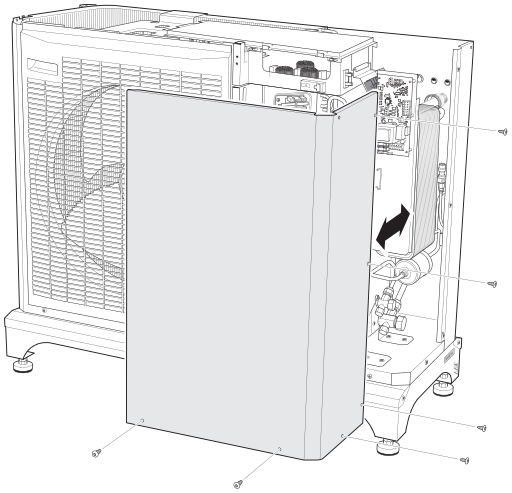


F2040-16

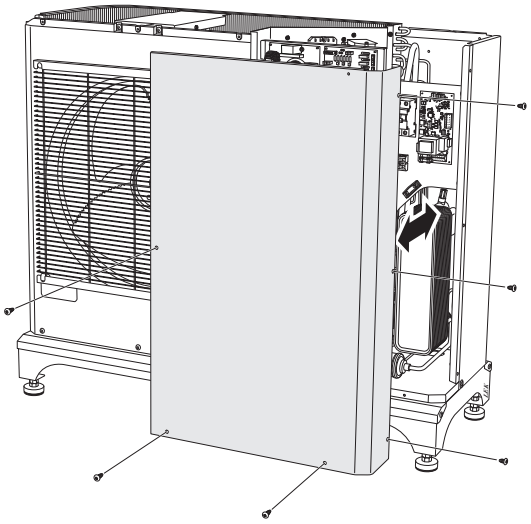


Removing the front panel

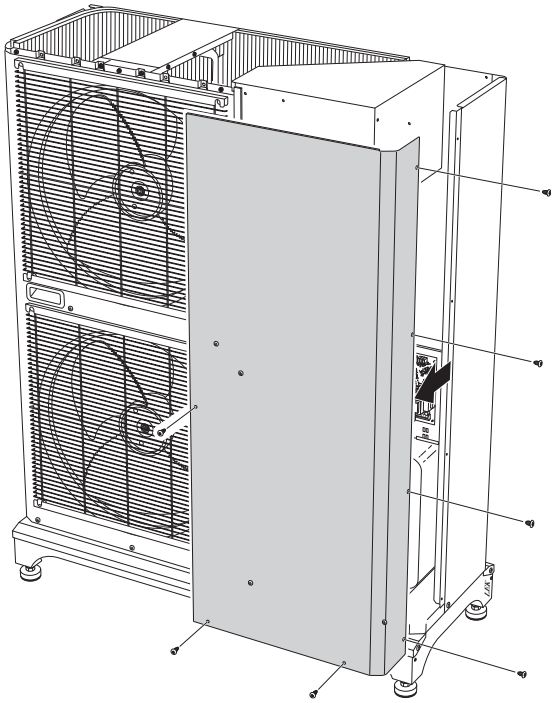
F2040-8



F2040-12

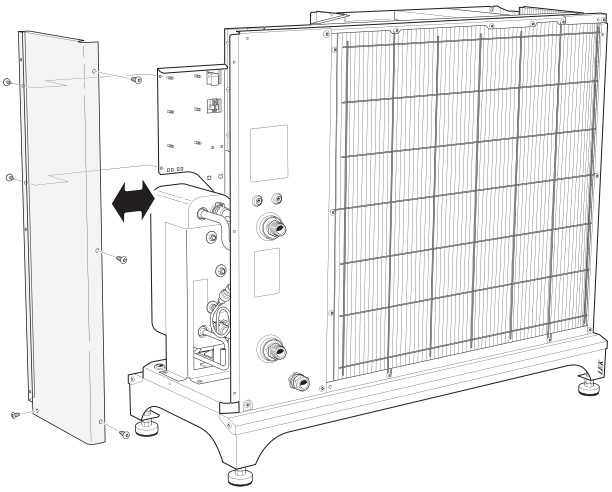


F2040-16

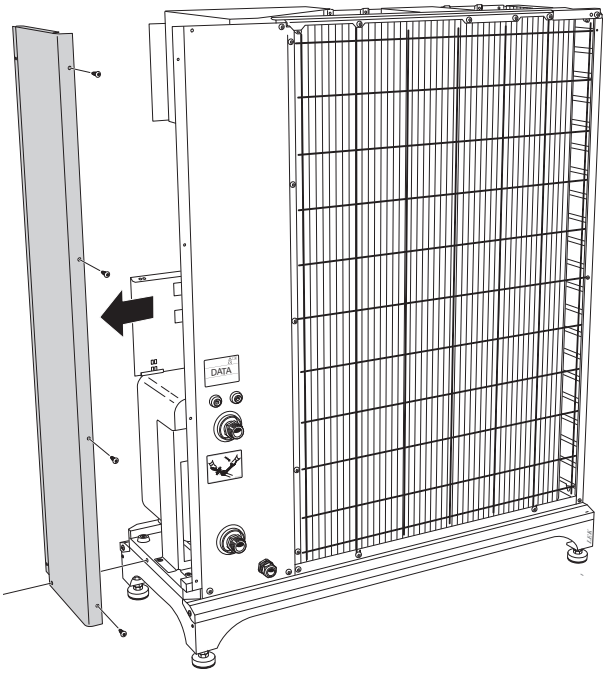


Removing the side panel

F2040-12

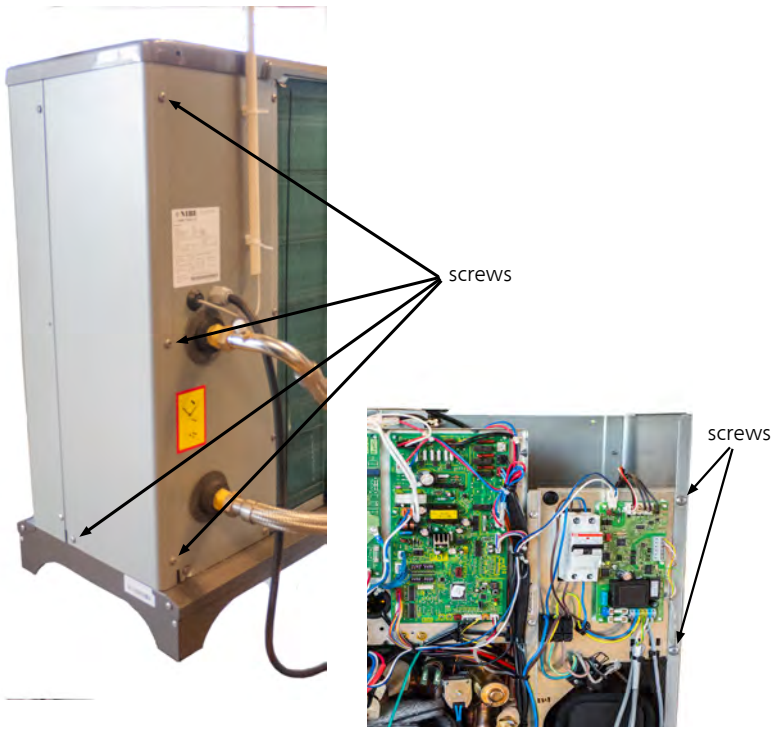
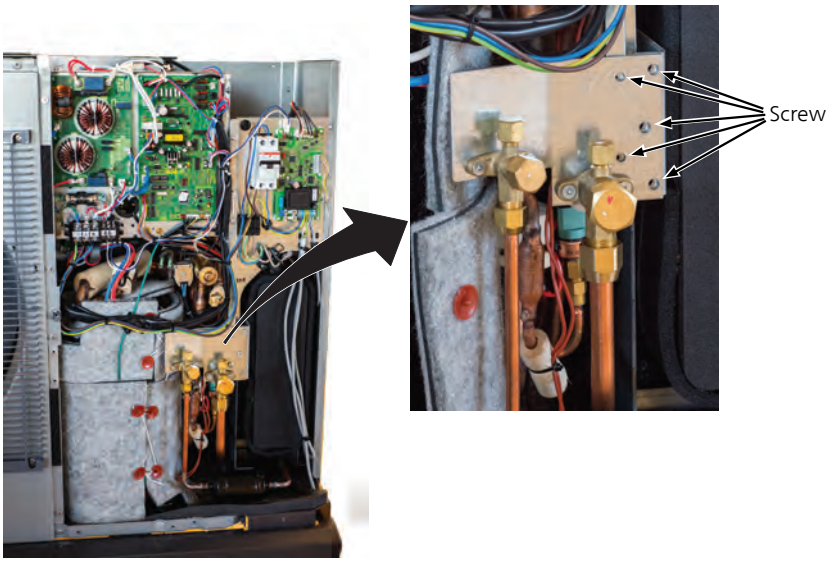


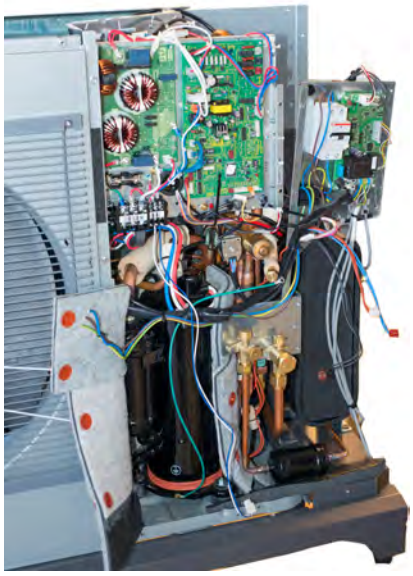
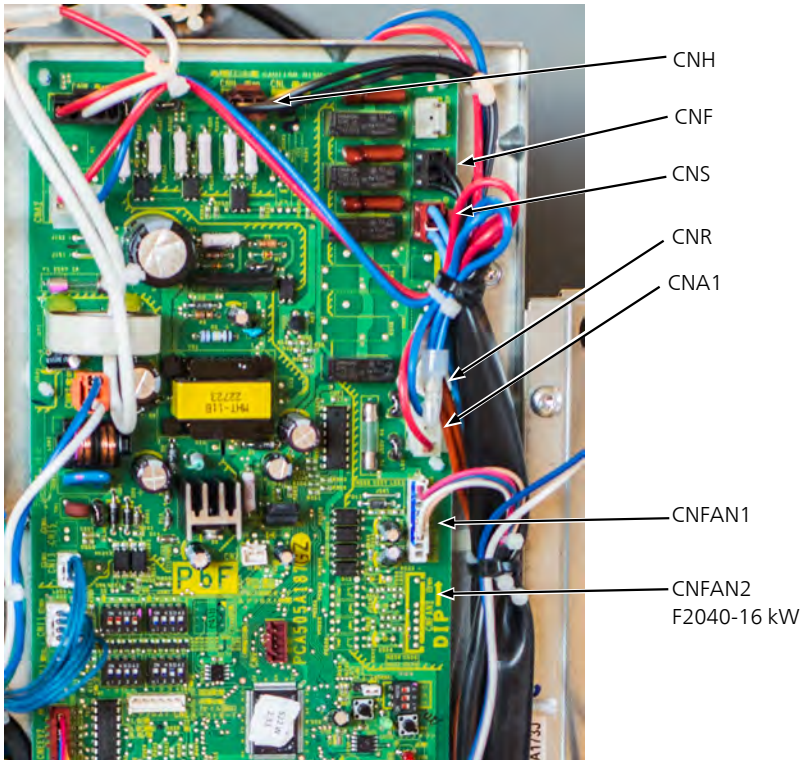
F2040-16

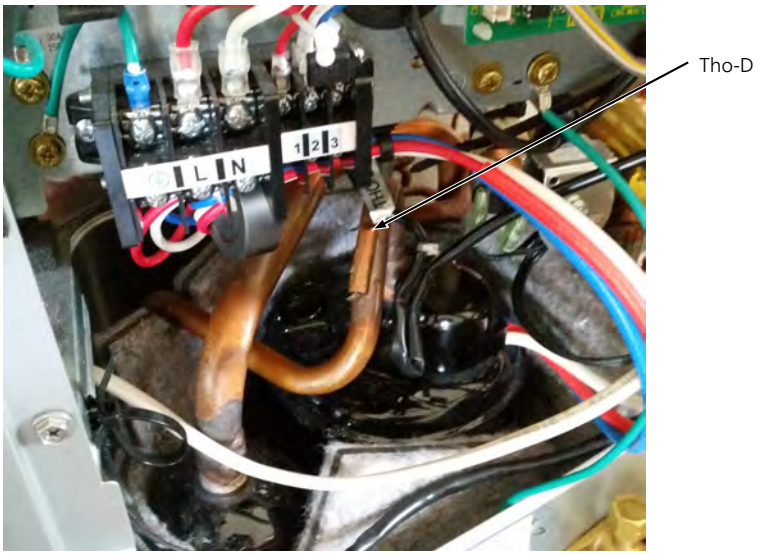
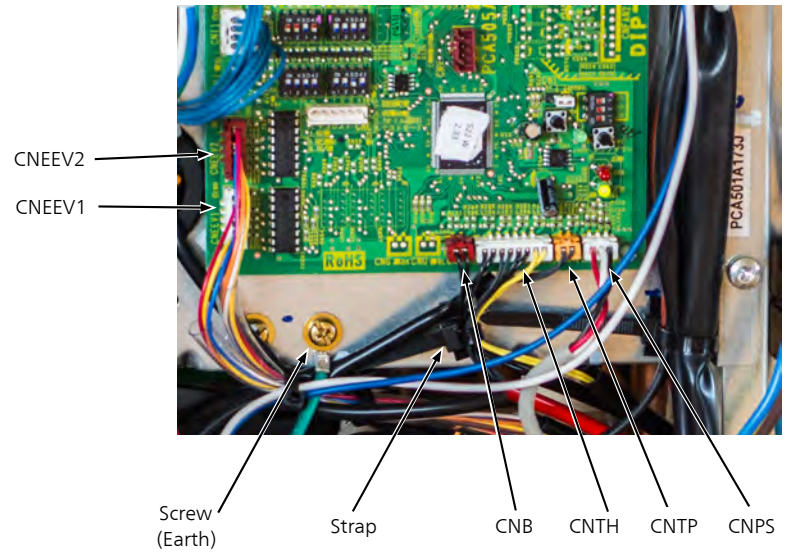
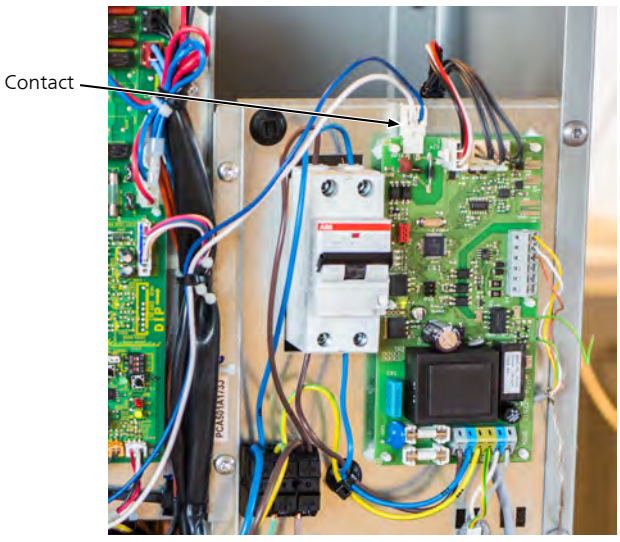


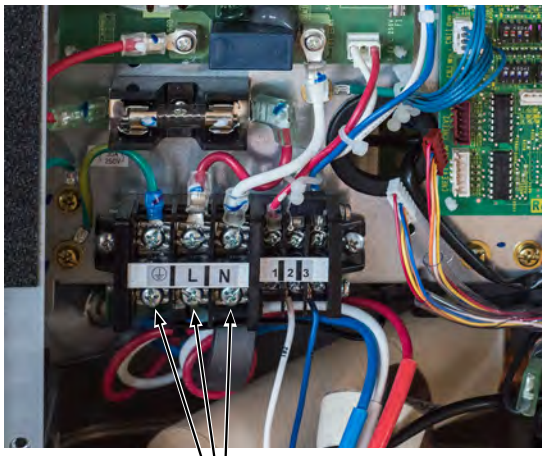
Main components

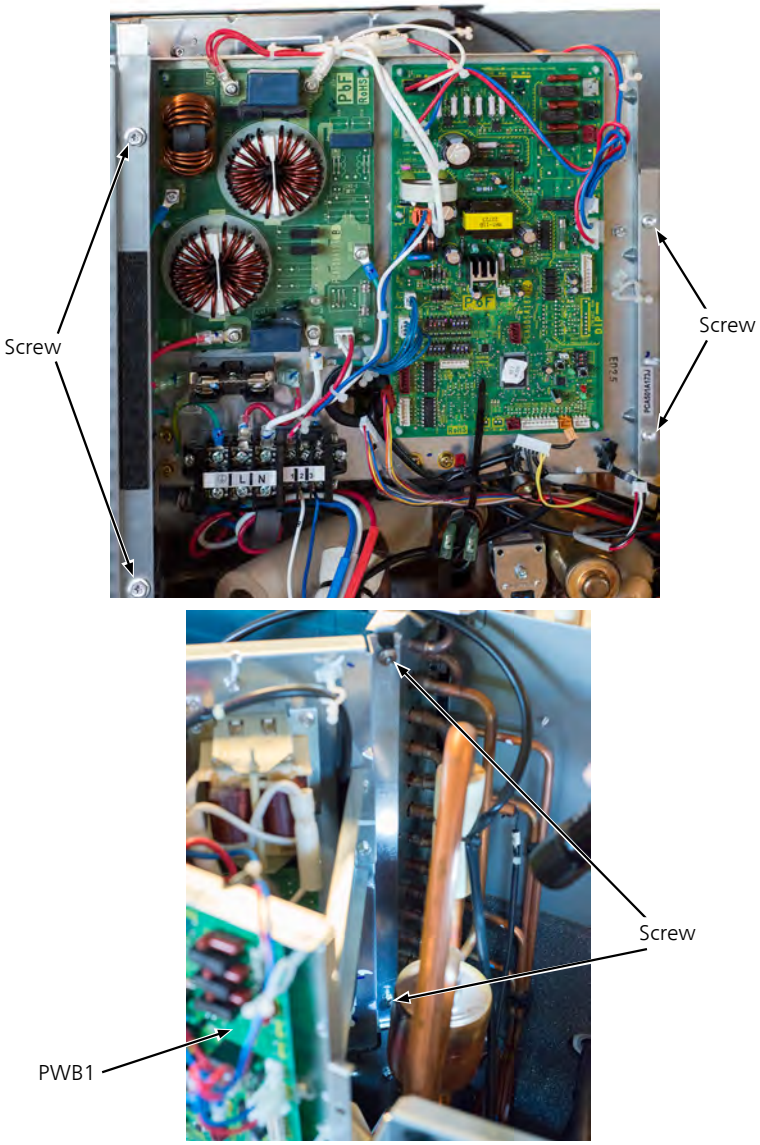
Compressor (CM)

Compressor (CM)	
NOTE Before the compressor is removed, F2040 must be drained of refrigerant. **1** Remove the top panel and front hatch. **2** Slacken off 6 screws for the side panel. **3** Remove the side panel.	
4 Slacken off the 5 screws holding the service valves' mounting plate to the heat pump.	

Compressor (CM)	
5 Remove the compressor insulation	
6 Remove cable ties and disconnect the connectors in the image (PWB1).	

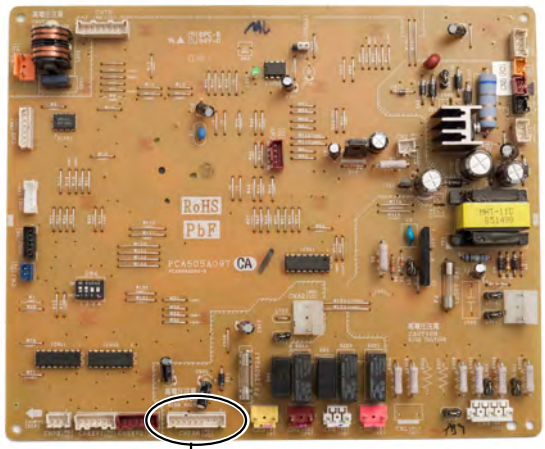
Compressor (CM)	
7 Cut off the two cable ties and pull out the sensor (Tho-D).	
8 Disconnect the contacts as illustrated (PWB1). **9** Unscrew the ground cable. **10** Disconnect the blue-white connector on the terminal board.	 

Compressor (CM)	
11 Disconnect the electrical connections.	 Electrical connections

Compressor (CM)	
12 Remove the four screws at the front edge of the electrical connection module. **13** Remove the two screws at the rear edge of the electrical connection module	

Compressor (CM)	
14 Lift the electrical connection module and place it to one side (see image). **15** The compressor is now released and can be removed.	

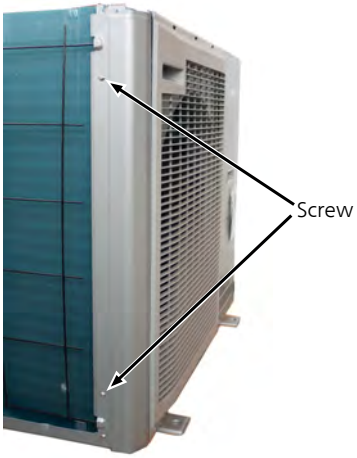
Fan (GQ1)

1 Remove the top cover. **2** Remove the front panel.	
3. Disconnect the fan cable's electrical connector CNFAN1. F2040-16 has two fans, disconnect the switch for the one to be replaced. The upper fan has the designation CNFAN1 and the lower has the designation CNFAN2.	F2040-8  F2040-12/16 

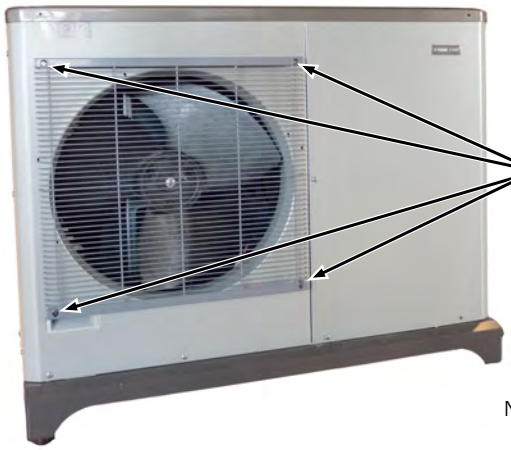
4 Remove the fan grille by removing the four screws (On the F2040-8 the whole front panel must be removed).

5 Remove the nut and then the fan propeller from the shaft.

F2040-8



F2040-12/16

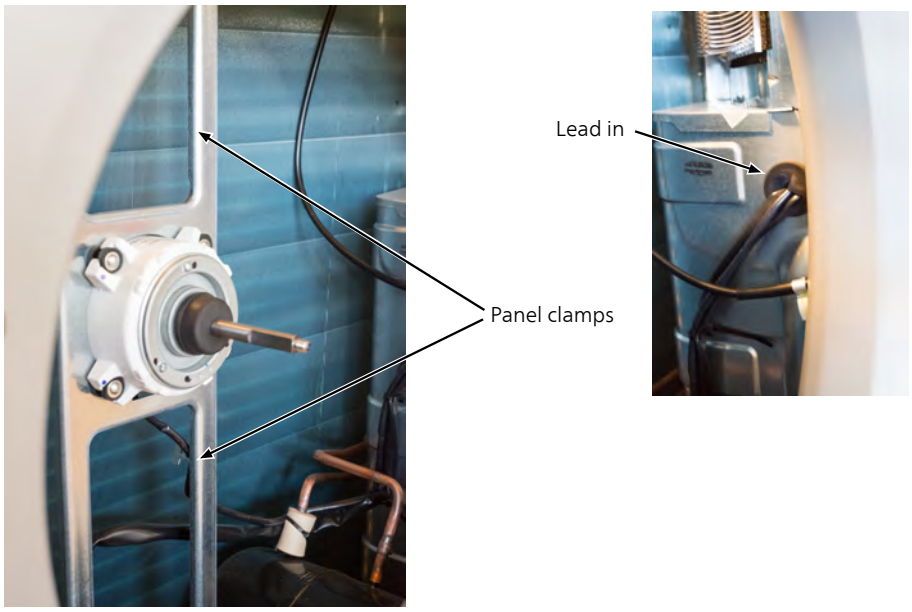


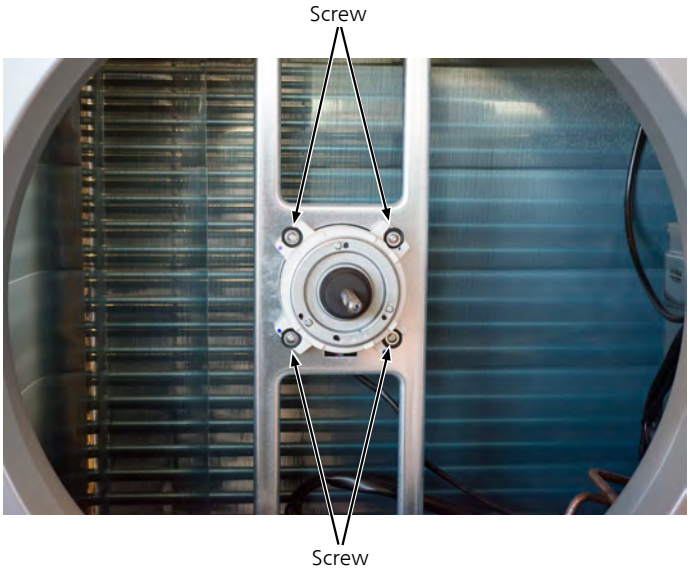
6. Bend up the panel clamps, on the rear of the fan mounting, that hold the electrical cable in position.

7. Route the fan cable through the lead-in to the fan motor.

7. Slacken off/remove the four screws holding the fan motor in place and remove it forwards.

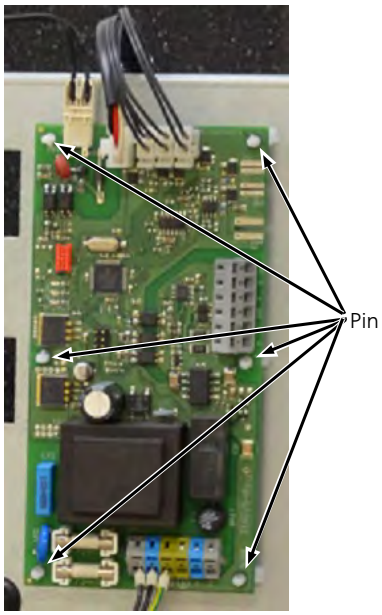
8. Assembly takes place in the reverse order.



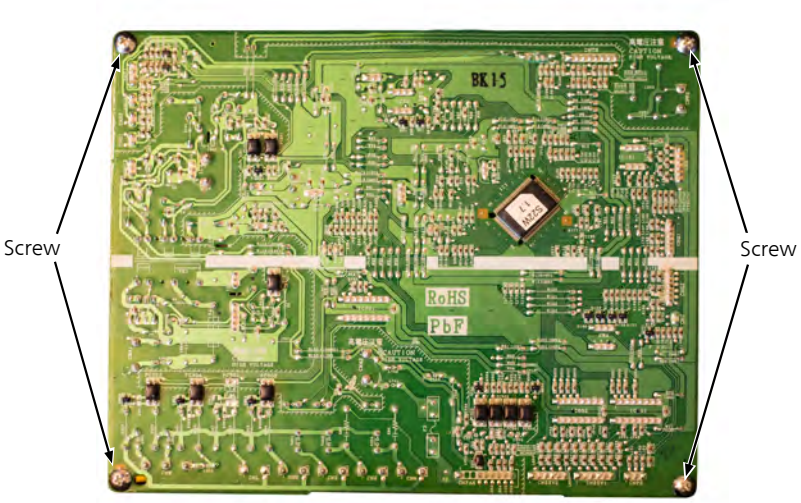
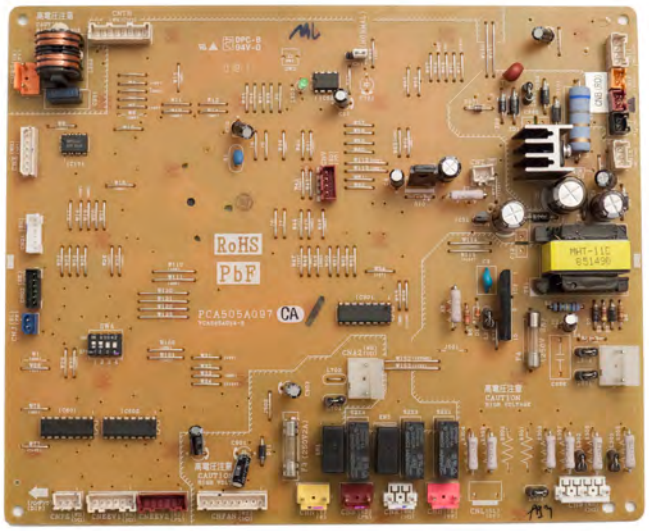


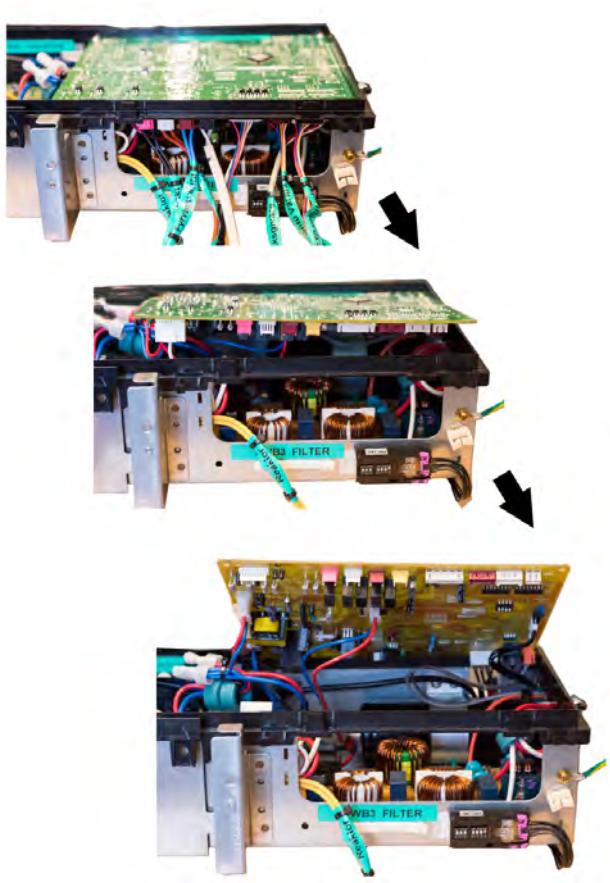
Circuit board and electronics

Communication board (AA23)

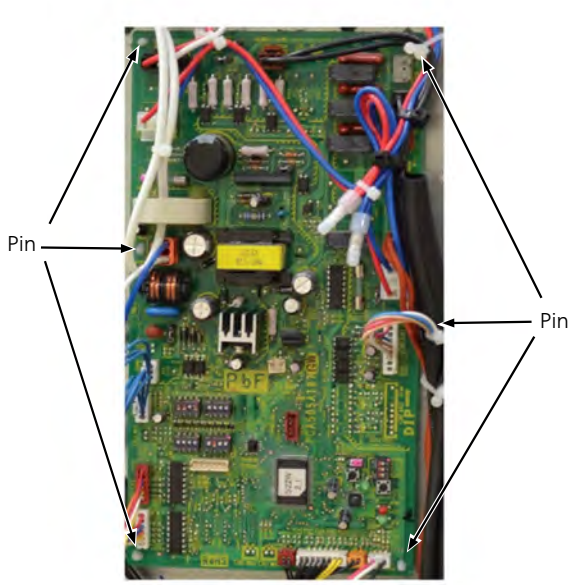
1 Remove the top cover. **2** Remove the front panel.	
3. Disconnect the cables. **4.** Remove the six pins and remove the circuit board.	
5. Assembly takes place in the reverse order.	

Control board (PWB1) 8 kW

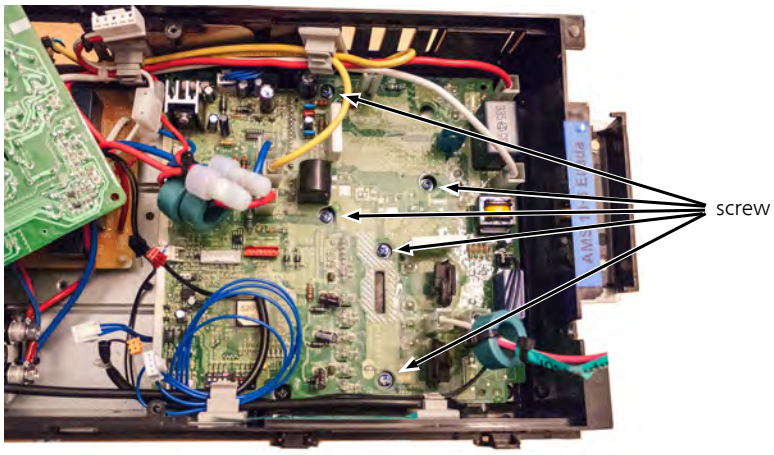
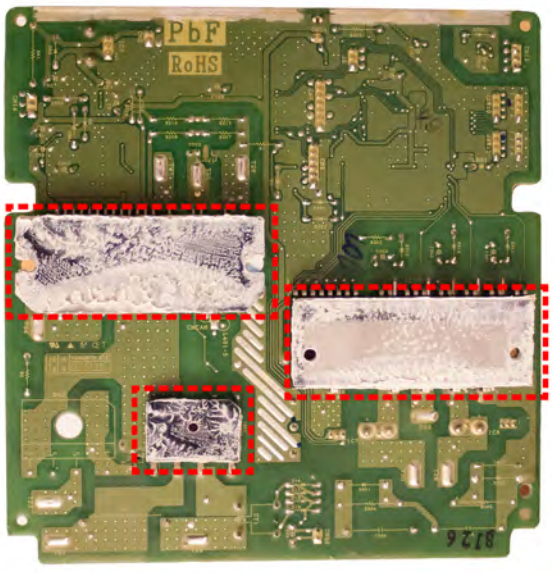
1 Remove the top cover. **2** Remove the front panel.	
3. Remove the screws in the corners of the board.	**F2040 8 kW (upper side)**  **F2040 8 kW (underside)** 

4. Disconnect the cables from their mountings so that the card can lifted slightly. **5.** Count and note the number of disconnected cables. **6.** Carefully lift the side circuit board nearest you and disconnect the connectors one after the other, continue with the connectors along the left side of the circuit board. **7.** The circuit board can be further removed and more cables disconnected. **8.** Continue until all cables are disconnected.	
9. Assembly takes place in the reverse order. **10.** Check that the all cables are installed.	

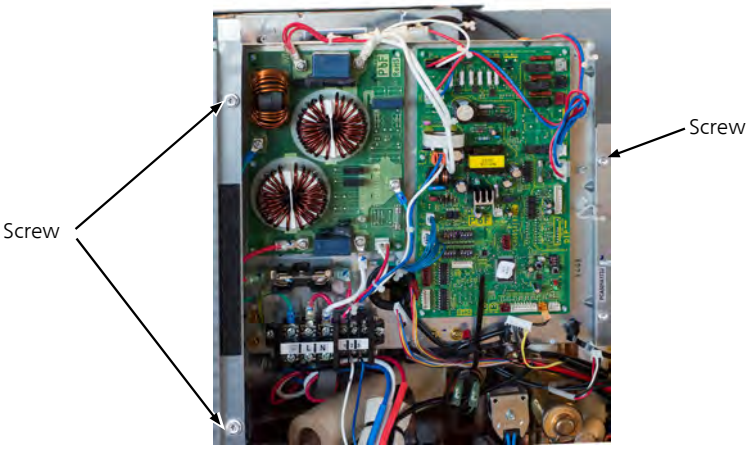
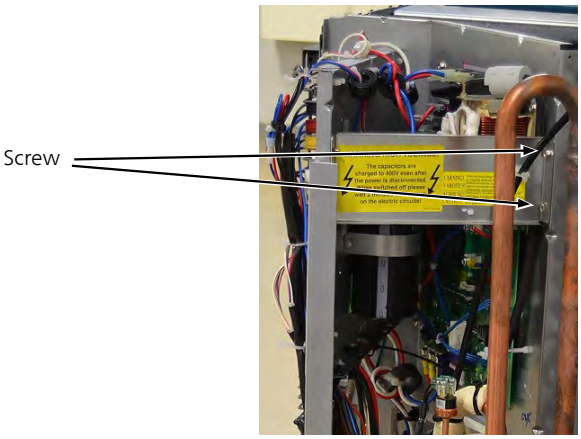
Control board (PWB1) 12/16 kW

1 Remove the top cover. **2** Remove the front panel.	
3. Disconnect the cables. **4.** Count and note the number of disconnected cables. **5.** Remove the six pins and remove the card.	F2040 12/16 kW 
6. Assembly takes place in the reverse order.	

Inverter board (PWB2 (F2040-8))

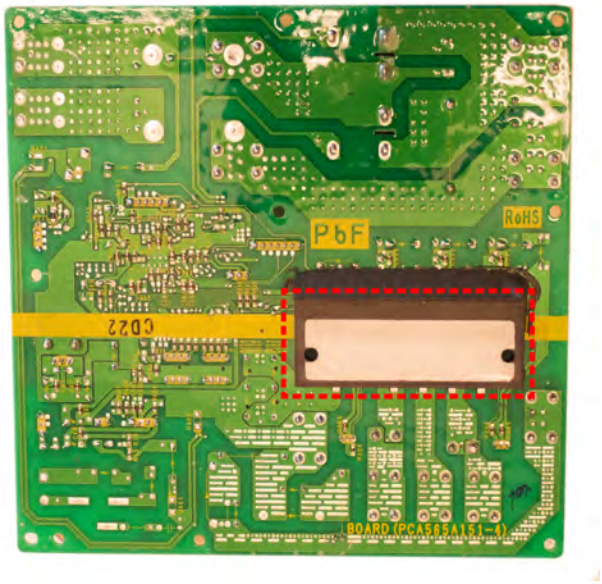
1 Remove the top cover. **2** Remove the front and side panels. **3** Remove the control board (PWB1).	
4. Disconnect the cables on PWB 2. **5.** Remove the five screws, remove the board.	
6. Assembly takes place in the reverse order. **NOTE** New heat transfer paste must be applied to the three contact surfaces of the cooling flange.	

Inverter board (PWB2 (F2040-12/16))

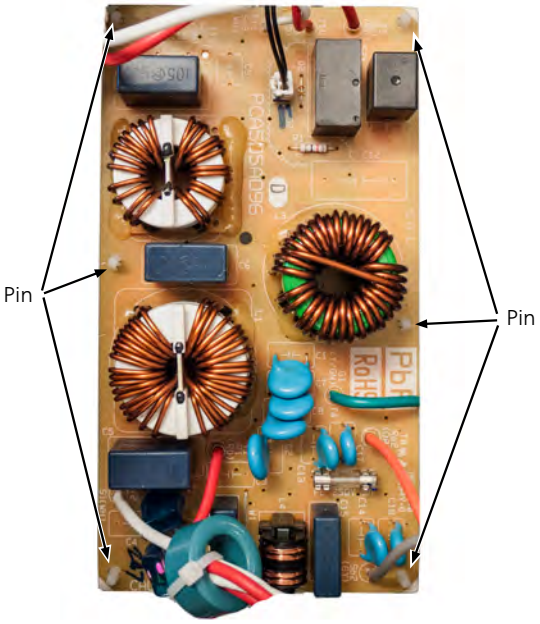
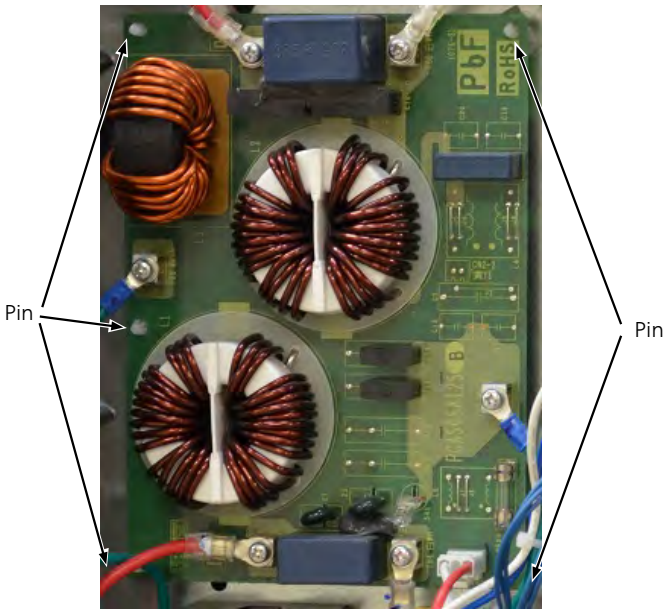
1 Remove the top cover. **2** Remove the front and side panels.	
3. Slacken off 5 screws on the electrical connection module. **4.** Angle PWB1 out slightly to access the Inverter board PWB2. **5.** Disconnect the cables on PWB 2. **6.** Remove the screws and the 6 pins, remove the circuit board.	  

7. Assembly takes place in the reverse order.

> **NOTE**
>
> New heat transfer paste must be applied to the contact surfaces of the cooling flange.



Filter board (PWB3)

1. Remove the top cover. **2** Slacken off six screws for front panel.	
3. Disconnect the cables. **4.** Remove the 6 pins and remove the circuit board.	8 kW  12/16 kW 
5. Assembly takes place in the reverse order.	

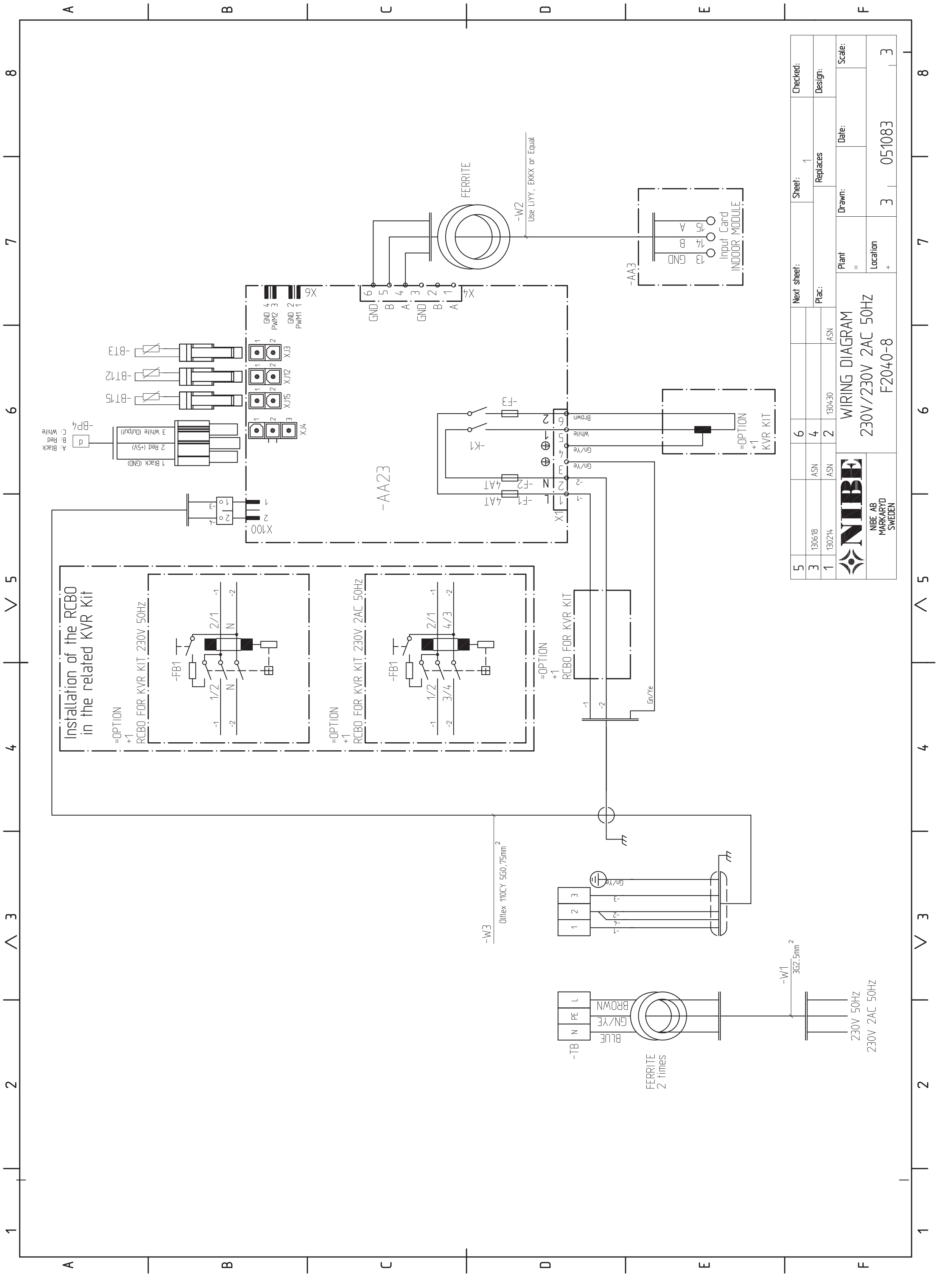
7 Technical data

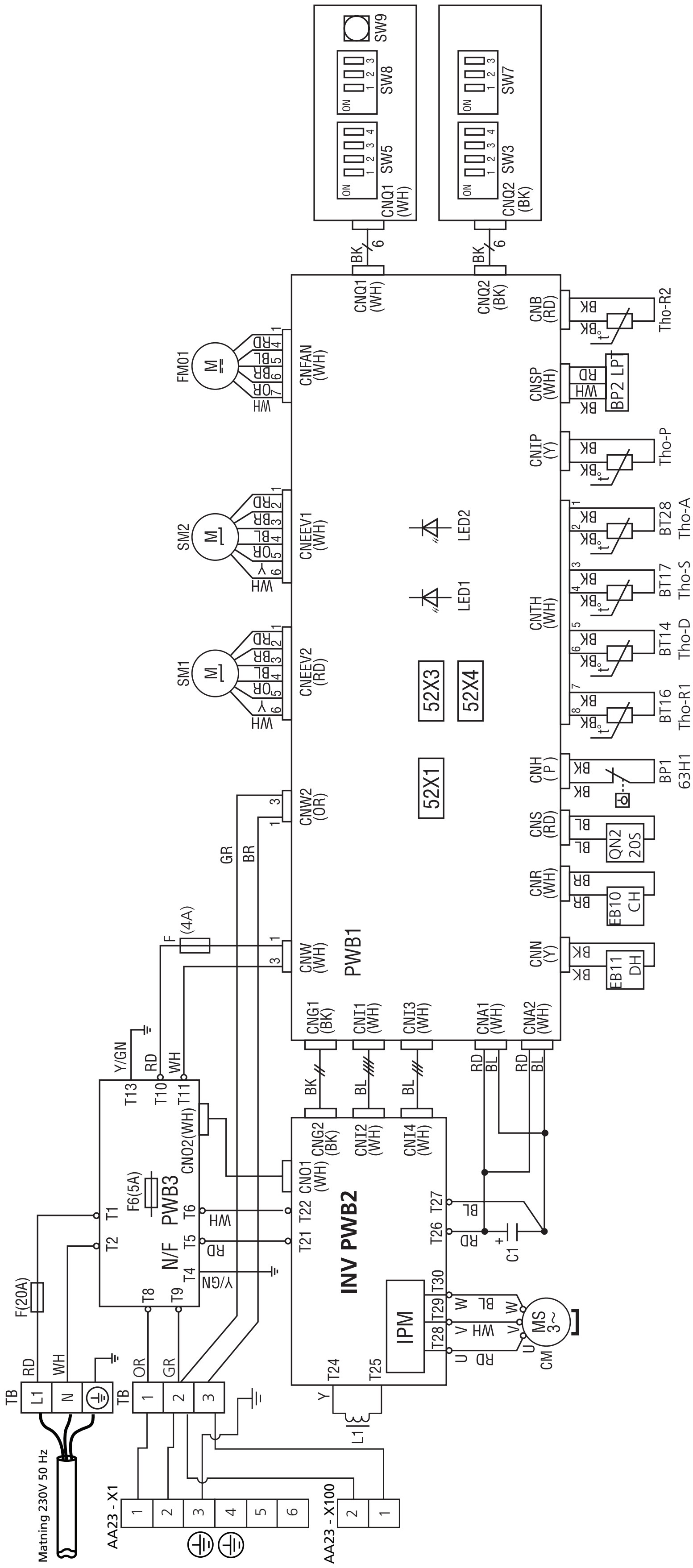
Electrical circuit diagram

Designation	Description
20S	Solenoid for 4-way valve
52X1	Help relay (for CH)
52X3	Help relay (for 20S)
52X4	Auxiliary relay (for DH)
63H1	High pressure pressostat
C1	Capacitor
CH	Compressor heater
CM	Compressor motor
CnA~Z	Terminal block
CT	Current sensor
DH	Drain pan heater
DM	Diode module
F	Fuse
FM01	Fan motor
FM02 (only F2040-16)	Fan motor 2
IPM	Inverter power module
L/L1	Induction coil
LED1	Indicator lamp (green for F2040-8, red for F2040-12/16)

Designation	Description
LED2	Indicator lamp (red for F2040-8, green for F2040-12/16)
LPT	Low pressure transmitter
SM1	Expansion valve for cooling
SM2	Expansion valve for heating
SV1 (only F2040-16)	Bypass valve
SW1, 9	Pump down
SW3, 5, 7, 8	Local settings
TB	Terminal block
Tho-A	Temperature sensor, outdoor air
Tho-D	Temperature sensor, hot gas
Tho-IPM	Temperature sensor, IPM
Tho-R1	Temperature sensor, heat exchanger out
Tho-R2	Temperature sensor, heat exchanger, in
Tho-S	Temperature sensor, suction gas

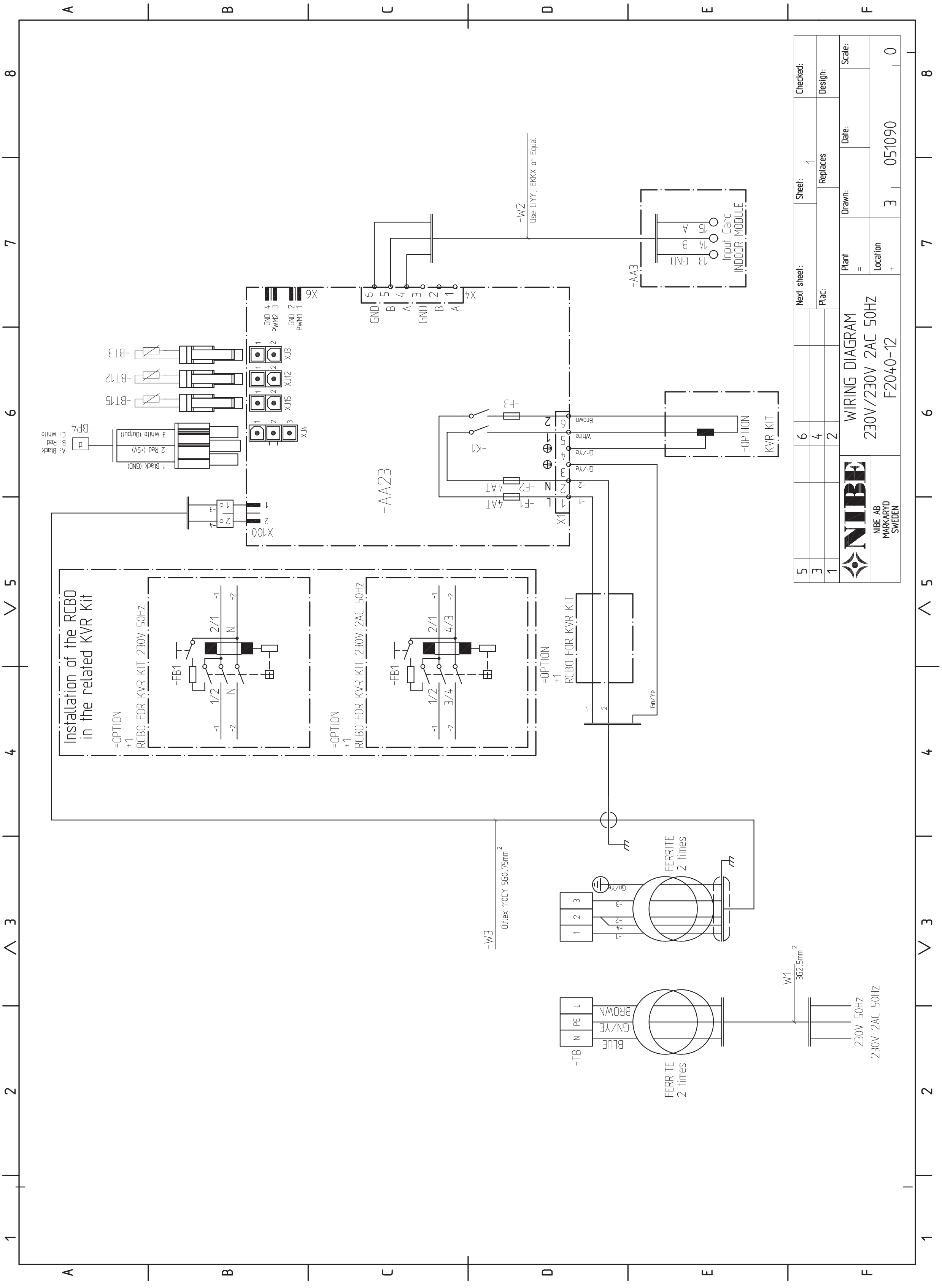
F2040-8


WIRING DIAGRAM
230V/230V 2AC 50Hz
F2040-8
NIBE AB
MARKARYD
SWEDEN
Installation of the RCBO
in the related KVR Kit
=OPTION
+1
RCBO FOR KVR KIT 230V 50Hz
RCBO FOR KVR KIT 230V 2AC 50Hz
RCBO FOR KVR KIT
KVR KIT
-AA23
-AA3
Input Card
INDOOR MODULE
FERRITE
Use LiYY, EKKX or Equal
Olflex 110CY 5G0,75mm²
3G2,5mm²
230V 50Hz
230V 2AC 50Hz
FERRITE
2 times
BROWN
GN/YE
BLUE
-BT3
-BT12
-BT15
-BP4
-K1
-F1
-F2
-F3
4AT
-FB1
-W1
-W2
-W3
-TB
051083

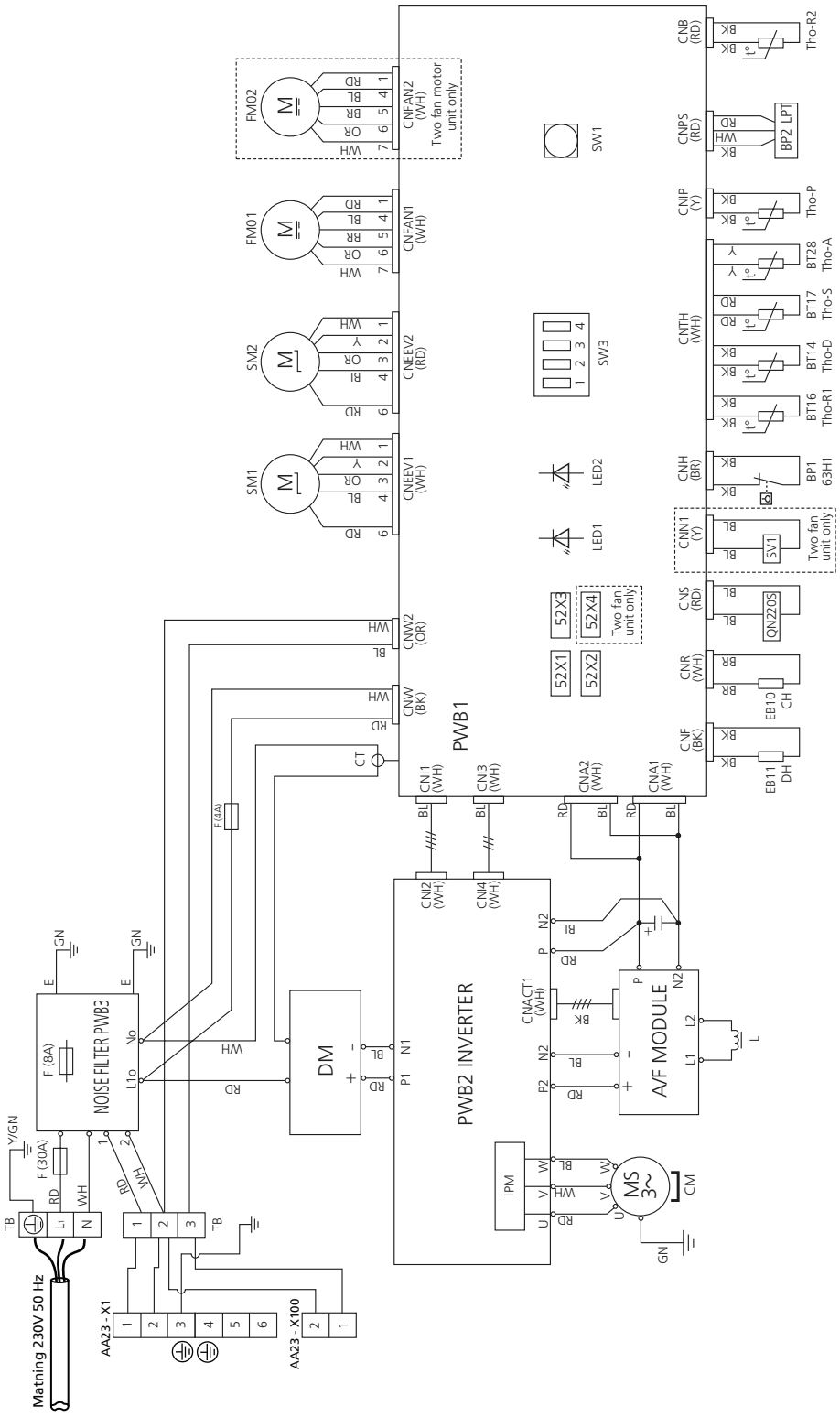


SW9
SW8
SW5
SW7
SW3
CNQ1 (WH)
CNQ2 (BK)
FM01
SM2
SM1
CNFAN (WH)
CNEEV1 (WH)
CNEEV2 (RD)
CNW2 (OR)
CNW (WH)
PWB1
52X3
52X4
52X1
LED1
LED2
CNB (RD)
Tho-R2
CNSP (WH)
BP2 LPT
CNTP (Y)
Tho-P
CNTH (WH)
BT28 Tho-A
BT17 Tho-S
BT14 Tho-D
BT16 Tho-R1
CNH (P)
BP1 63H1
CNS (RD)
QN2 20S
CNR (WH)
EB10 CH
CNN (Y)
EB11 DH
CNG1 (BK)
CNI1 (WH)
CNI3 (WH)
CNA1 (WH)
CNA2 (WH)
F (4A)
N/F PWB3
F6(5A)
CNO2(WH)
CNO1 (WH)
CNG2 (BK)
CNI2 (WH)
CNI4 (WH)
INV PWB2
IPM
C1
MS 3~
CM
L1
F(20A)
TB
Matning 230V 50 Hz
AA23 - X1
AA23 - X100

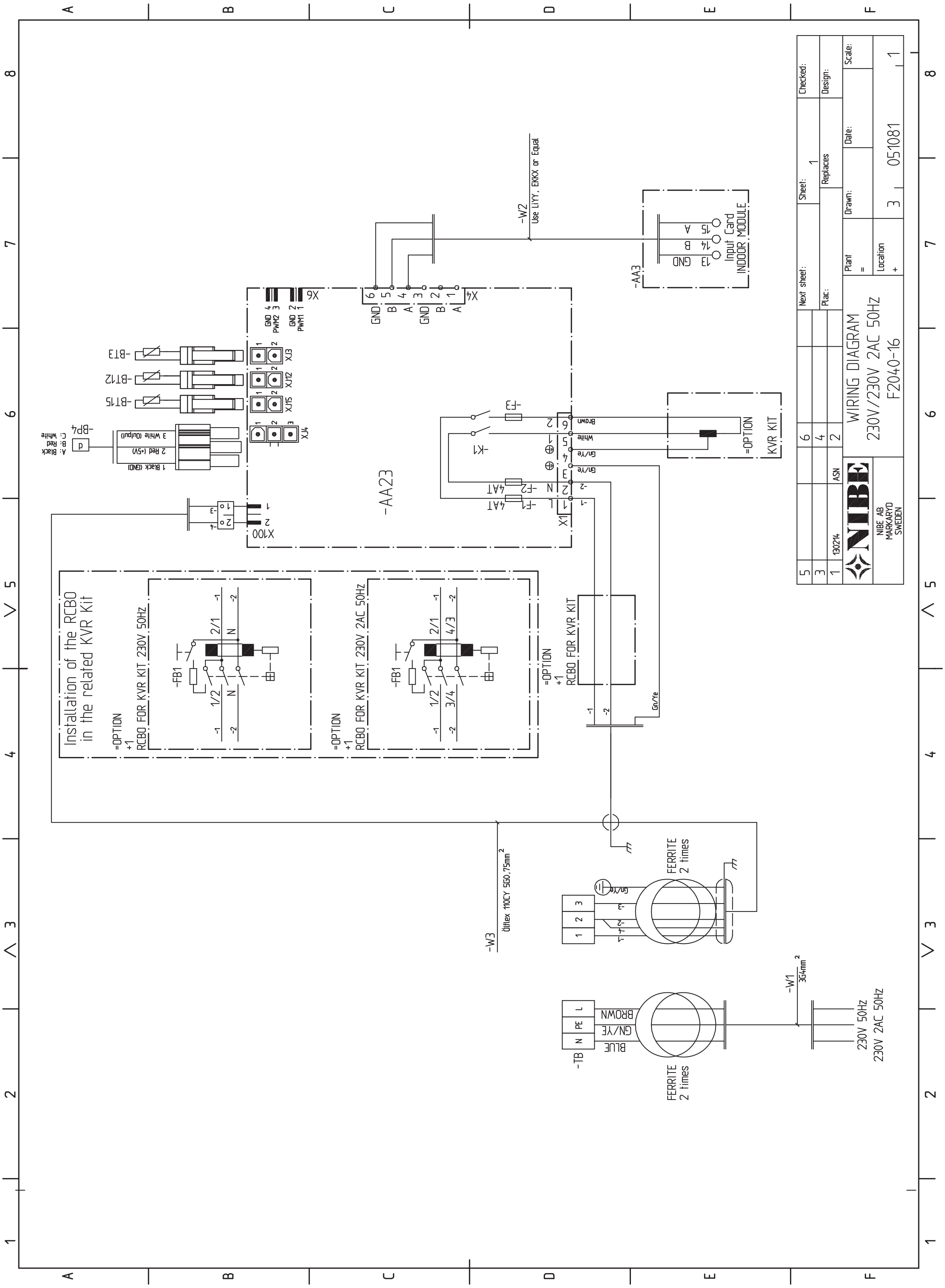
F2040-12



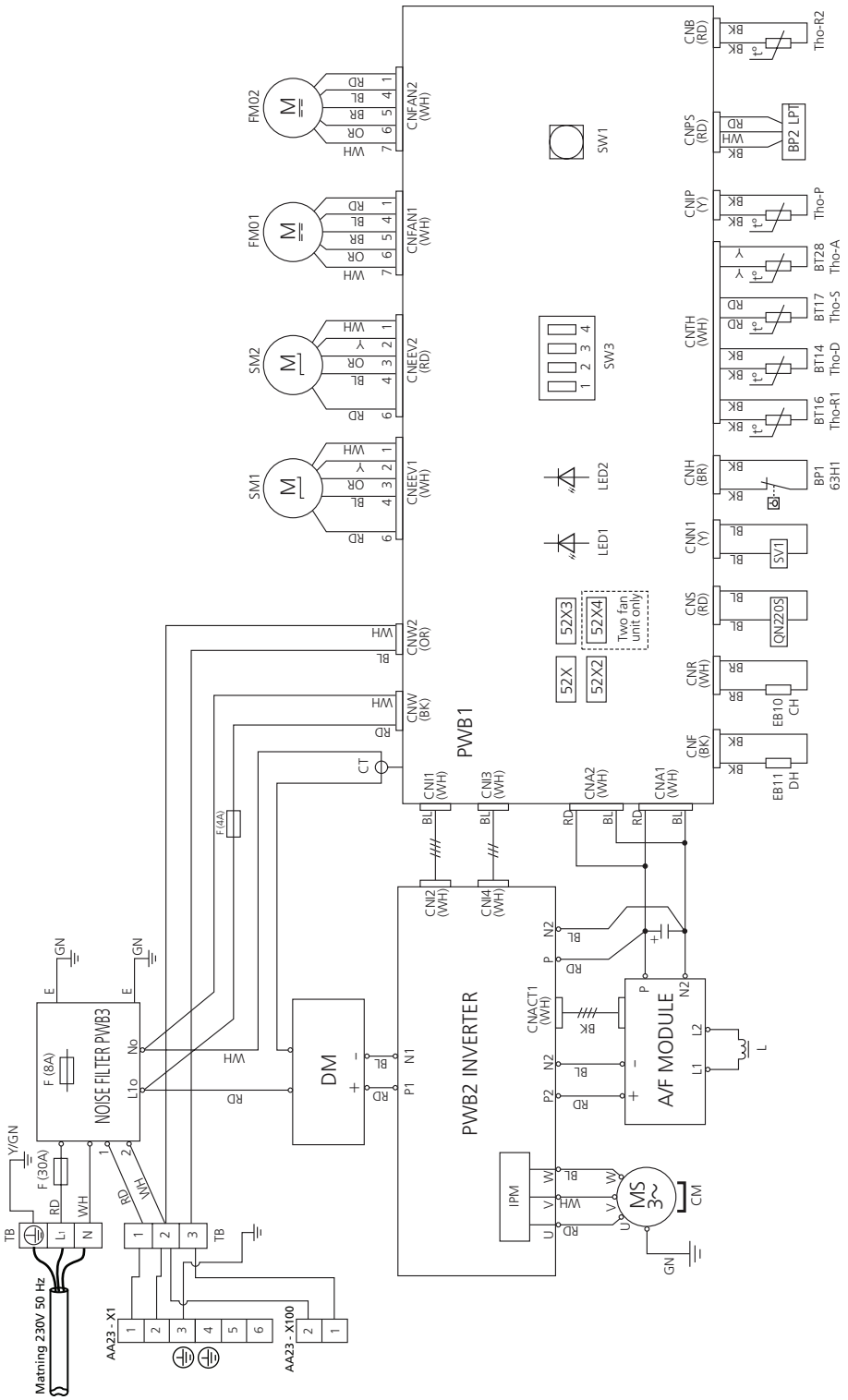
WIRING DIAGRAM
230V/230V 2AC 50Hz
F2040-12
NIBE AB
MARKARYD
SWEDEN
-AA23
-AA3
Input Card
INDOOR MODULE
=OPTION
KVR KIT
Installation of the RCBO
in the related KVR Kit
RCBO FOR KVR KIT 230V 50Hz
RCBO FOR KVR KIT 230V 2AC 50Hz
RCBO FOR KVR KIT
FERRITE
2 times
230V 50Hz
230V 2AC 50Hz


Matning 230V 50 Hz
TB
L
N
Y/GN
F (30A)
RD
WH
NOISE FILTER PWB3
F (8A)
No
L1o
E
GN
AA23 - X1
AA23 - X100
DM
CT
F (4A)
PWB1
PWB2 INVERTER
A/F MODULE
IPM
MS 3~
CM
L
SW1
SW3
LED1
LED2
52X1
52X2
52X3
52X4
Two fan unit only
CNI1 (WH)
CNI2 (WH)
CNI3 (WH)
CNI4 (WH)
CNA1 (WH)
CNA2 (WH)
CNW (BK)
CNW2 (OR)
CNF (BK)
CNR (WH)
CNS (RD)
CNN1 (Y)
CNH (BR)
CNTH (WH)
CNIP (Y)
CNPS (RD)
CNB (RD)
CNACT1 (WH)
CNEEV1 (WH)
CNEEV2 (RD)
CNFAN1 (WH)
CNFAN2 (WH)
Two fan motor unit only
SM1
SM2
FM01
FM02
EB11 DH
EB10 CH
QN2205
SV1
BP1 63H1
BP2 LPT
BT16 Tho-R1
BT14 Tho-D
BT17 Tho-S
BT28 Tho-A
Tho-P
Tho-R2

F2040-16

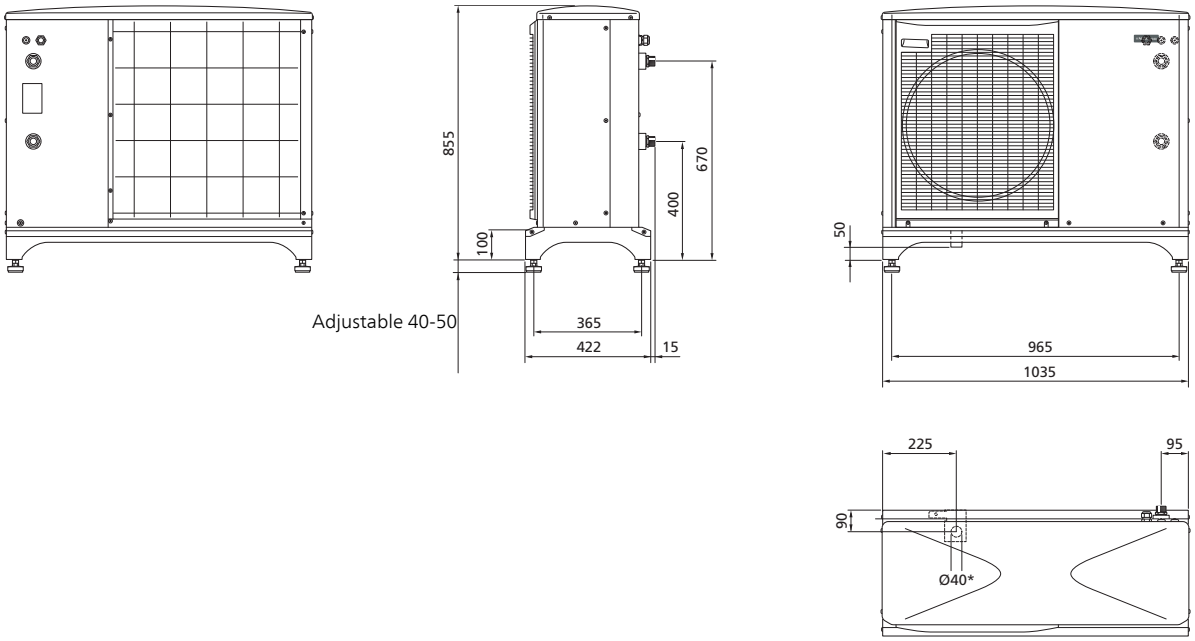


WIRING DIAGRAM
230V/230V 2AC 50Hz
F2040-16
NIBE AB
MARKARYD
SWEDEN
051081
-AA23
-AA3
Input Card
INDOOR MODULE
=OPTION
KVR KIT
Installation of the RCBO
in the related KVR Kit
RCBO FOR KVR KIT 230V 50Hz
RCBO FOR KVR KIT 230V 2AC 50Hz
RCBO FOR KVR KIT
FERRITE
2 times
-W1
-W2
Use LIYY, EKKX or Equal
-W3
230V 50Hz
230V 2AC 50Hz
-TB
BROWN
GN/YE
BLUE
-BT3
-BT12
-BT15
-BP4
-K1
-F1
-F2
-F3
4AT
X100


Matning 230V 50 Hz
TB
L
N
F (30A)
Y/GN
RD
WH
NOISE FILTER PWB3
F (8A)
GN
AA23 - X1
AA23 - X100
DM
CT
F (4A)
PWB1
PWB2 INVERTER
A/F MODULE
IPM
MS 3~
CM
L
SW1
SW3
LED1
LED2
52X
52X2
52X3
52X4
Two fan unit only
SM1
SM2
FM01
FM02
CNEEV1 (WH)
CNEEV2 (RD)
CNFAN1 (WH)
CNFAN2 (WH)
CNW (BK)
CNW2 (OR)
CNI1 (WH)
CNI2 (WH)
CNI3 (WH)
CNI4 (WH)
CNA1 (WH)
CNA2 (WH)
CNACT1 (WH)
CNF (BK)
CNR (WH)
CNS (RD)
CNN1 (Y)
CNH (BR)
CNTH (WH)
CNIP (Y)
CNPS (RD)
CNB (RD)
EB11 DH
EB10 CH
QN2205
SV1
BP1 63H1
BT16 Tho-R1
BT14 Tho-D
BT17 Tho-S
BT28 Tho-A
Tho-P
BP2 LPT
Tho-R2

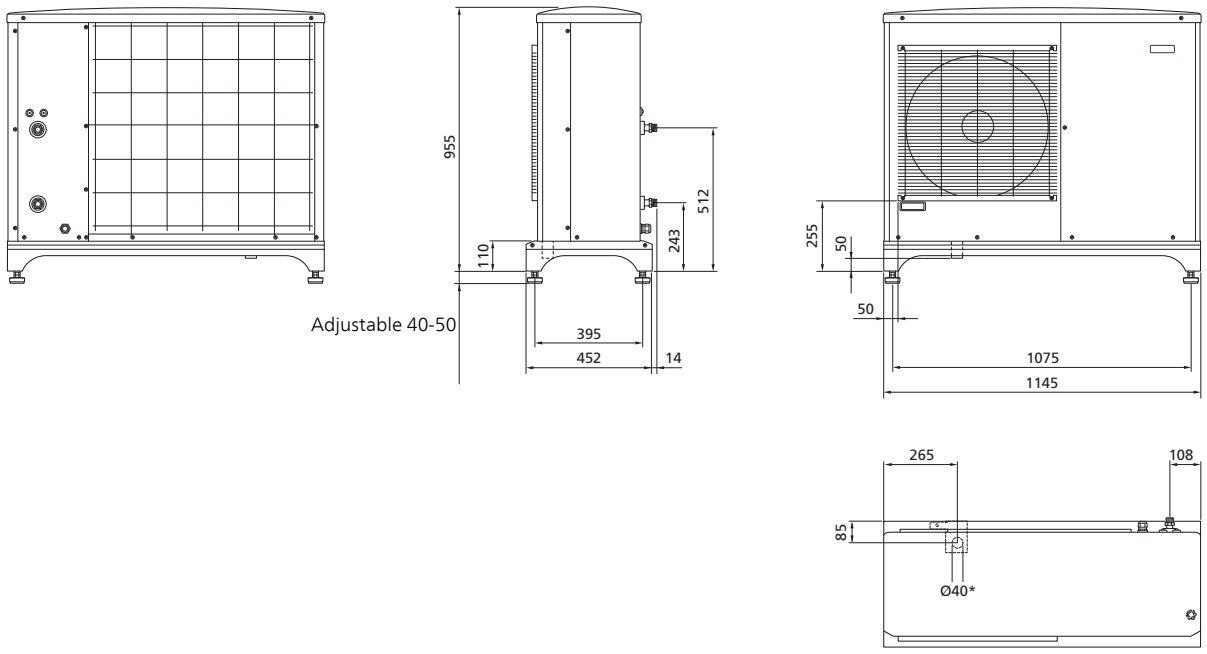
Dimensions and setting-out coordinates

F2040-8



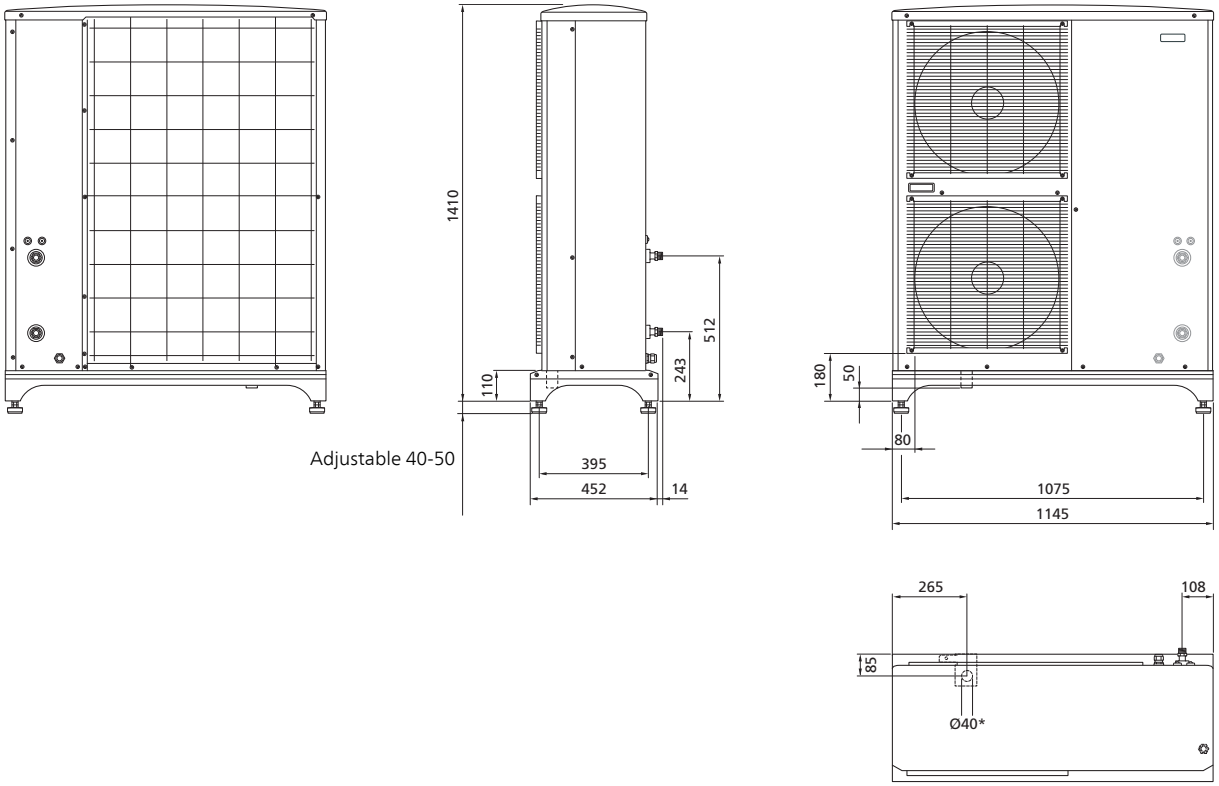
* Accessory KVR 10-xx F2040 is required.

F2040-12

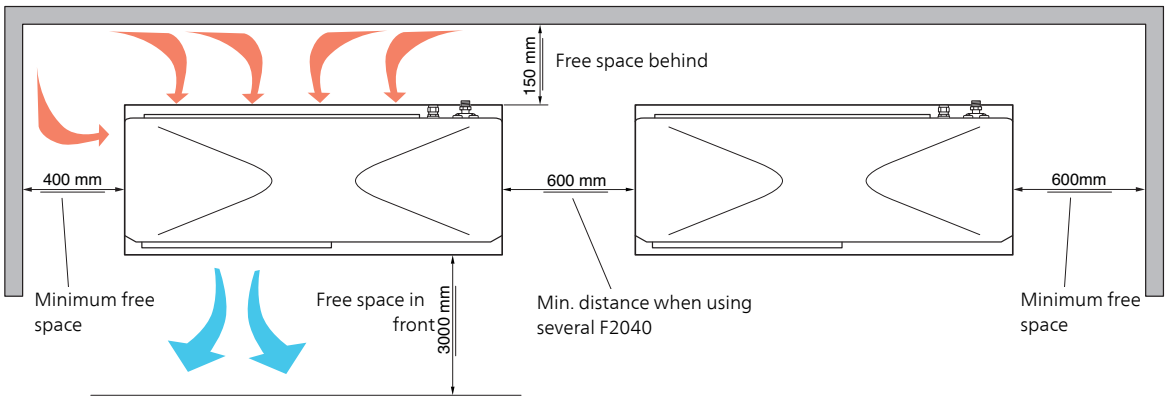


* Accessory KVR 10-xx F2040 is required.

F2040-16



* Accessory KVR 10-xx F2040 is required.



Technical specifications

Air-water heat pump		F2040-8	F2040-12	F2040-16
Heating	Outd. temp: / Supply temp.	Nominal	Nominal	Nominal
Output data according to EN14511 ΔT5K Specified/supplied power/COP (kW/kW/-)	7/35 °C (floor)	3.86/0.83/4.65	5.21/1.09/4.78	7.03/1.45/4.85
	2/35 °C (floor)	5.11/1.36/3.76	6.91/1.79/3.86	9.33/2.38/3.92
	-7/35 °C (floor)	6.64/2.48/2.68	8.98/3.26/2.75	12.12/4.33/2.80
	2/55 °C	4.75/2.07/2.29	6.42/2.72/2.36	8.67/3.62/2.40
	7/45 °C	3.70/1.00/3.70	5.00/1.31/3.82	6.75/1.74/3.88
	2/45 °C	5.03/1.70/2.96	6.80/2.24/3.04	9.18/2.98/3.08
	-7/45 °C	6.58/3.06/2.15	8.90/4.03/2.21	12.01/5.36/2.24
	-15/45 °C	5.13/3.03/1.69	6.94/3.99/1.74	9.36/5.31/1.76
	7/55 °C	3.50/1.17/2.99	4.73/1.54/3.07	6.38/2.04/3.13
	-7/55 °C	5.29/2.68/1.97	7.15/3.53/2.03	9.66/4.69/2.06
Cooling	Outd. temp: / Supply temp.	Max	Max	Max
Output data according to EN14511 ΔT5K Specified/supplied power/EER	27/7 °C	7.52/2.37/3.17	9.87/3.16/3.13	13.30/3.99/3.33
	27/18 °C	11.20/3.20/3.50	11.70/3.32/3.52	17.70/4.52/3.91
	35/7 °C	7.10/2.65/2.68	9.45/3.41/2.77	13.04/4.53/2.88
	35/18 °C	9.19/2.98/3.08	11.20/3.58/3.12	15.70/5.04/3.12
Electrical data				
Rated voltage		230V 50 Hz, 230V 2AC 50Hz		
Max operating current, heat pump	A_{rms}	16	23	25
Max operating current, compressor	A_{rms}	15	22	24
Starting current	A_{rms}	5	5	5
Max permitted impedance at connection point [1]	Ohm	-	-	-
Nominal output, fan	W	86	86	2 x 86
Fuse [2]	A_{rms}	16	25	25
Refrigerant circuit				
Type of refrigerant		R410A		
Type of compressor		Twin Rotary		
Compressor oil		M-MA68		
Volume	kg	2.55	2.9	4.0
Cut-out value pressostat HP	MPa	4.15 (41.5 bar)		
Cut-out value pressostat LP	MPa	0.079 (0.79 bar)		
Brine				
Airflow	m^3/h	3000	4380	6000
Max/Min air temp	°C	-20/43		
Defrosting system		reverse cycle		
Heating medium				
Min/Max system pressure heating medium	MPa	0.05/0.25 (0.5/2.5bar)		
Min volume, climate system, heating/cooling	l	50	80	150
Min volume, climate system, under floor cooling	l	80	100	150
Max flow, climate system	l/s	0.38	0.57	0.79

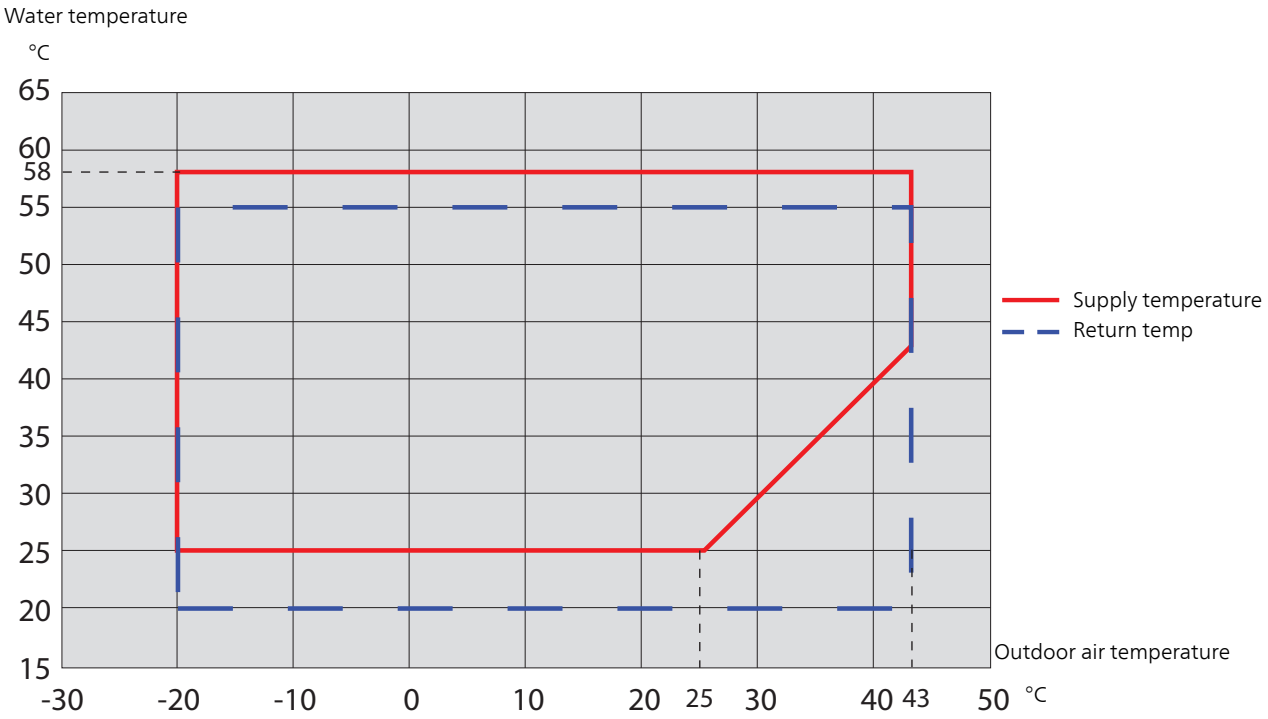
Air-water heat pump		F2040-8	F2040-12	F2040-16
Min flow, climate system, at 100% circulation pump speed (defrosting flow)	l/s	0.19	0.29	0.39
Min flow, heating	l/s	0.12	0.15	0.25
Min flow, cooling	l/s	0.15	0.20	0.32
Max/Min heating medium temp continuous operation	°C	58/25		
Connection heating medium ext thread		G1"		
Dimensions and weight				
Width	mm	1035	1145	1145
Depth	mm	422	452	452
Height with stand	mm	895 (+50/-0)	995 (+50/-0)	1450 (+50/-0)
Weight (excl. packaging)	kg	90	105	135
Miscellaneous				
Enclosure class		IP 24		
Colour		dark grey		
Part No.		064 109	064 092	064 108

1)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.

2)Specified output is limited with lower fusing.

Working range, compressor operation - heating

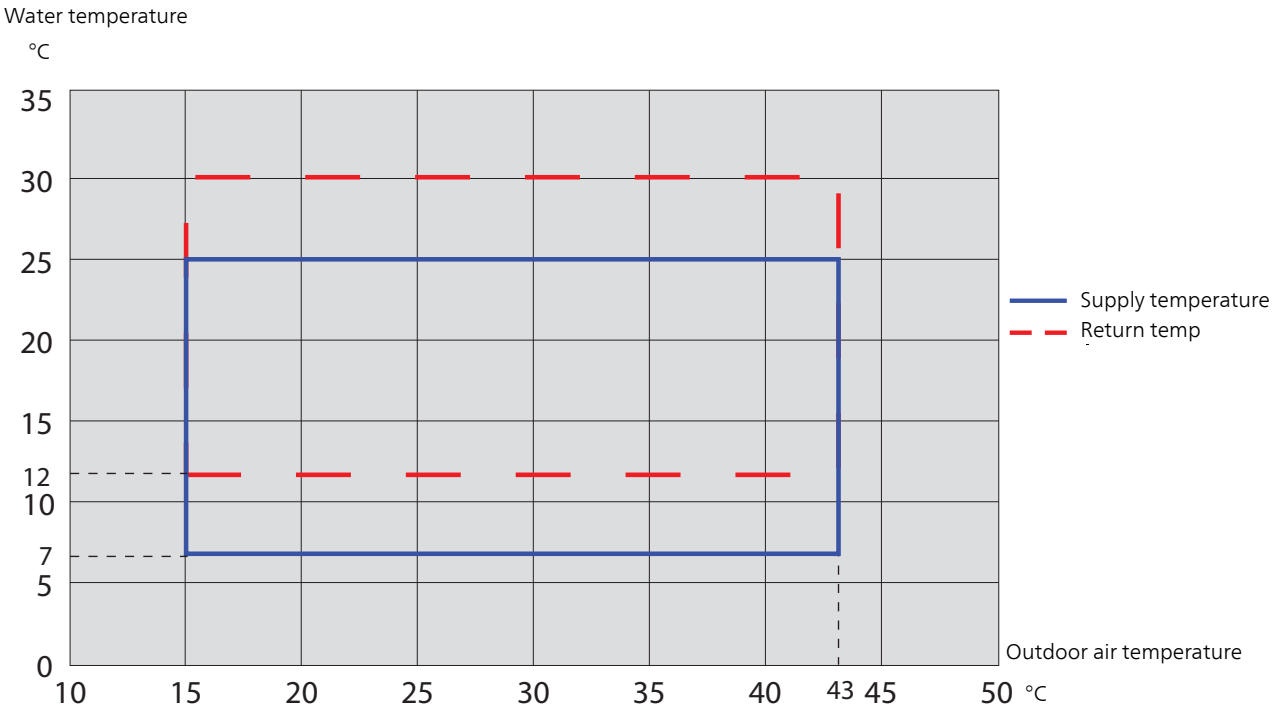
F2040-8, -12. -16



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

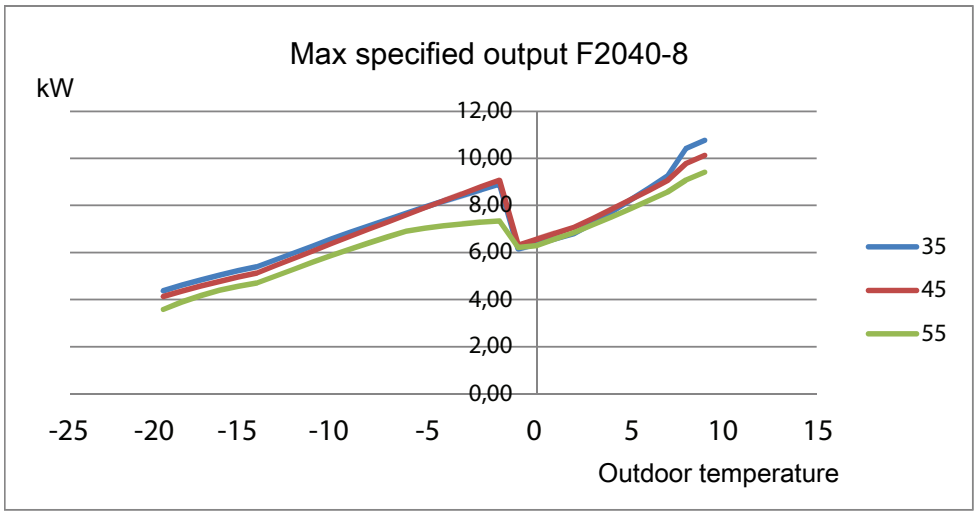
Working range, compressor operation - cooling

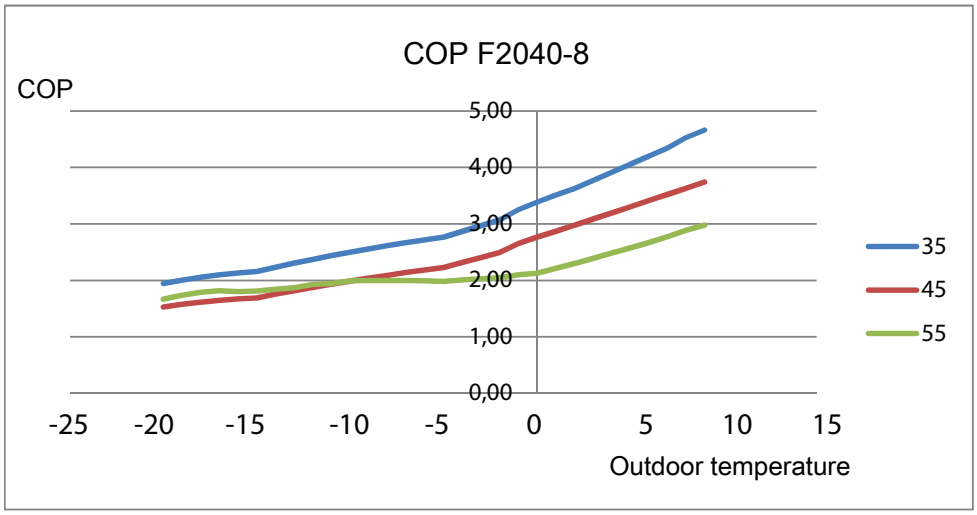
F2040-8, -12, -16



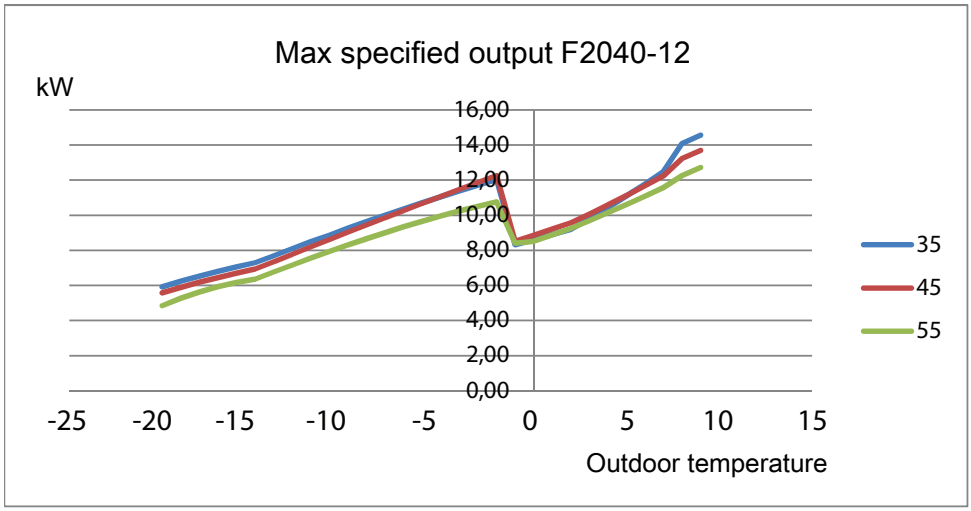
Output and COP at different temperatures

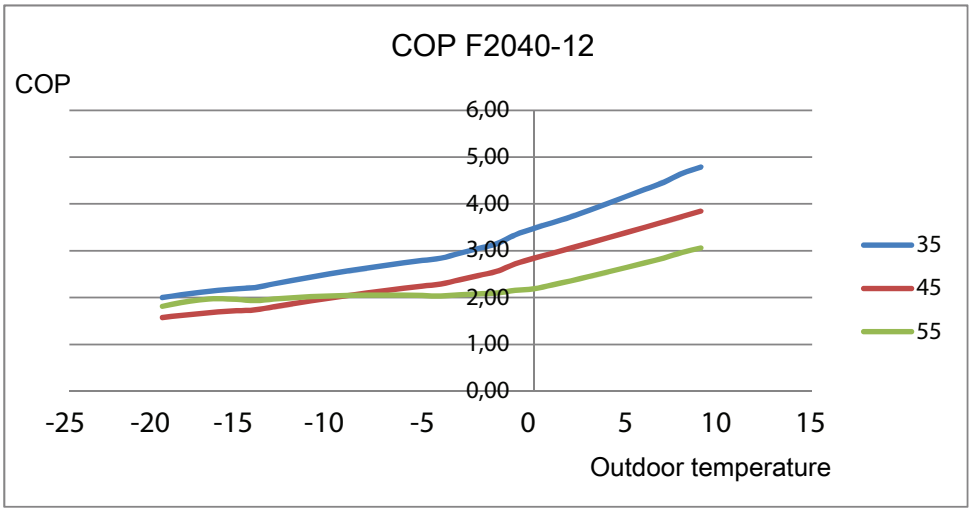
F2040-8



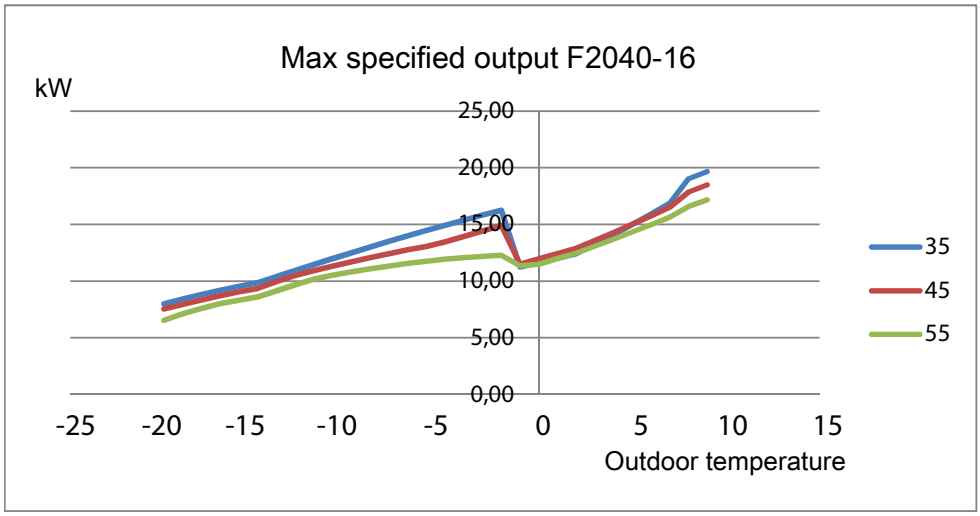


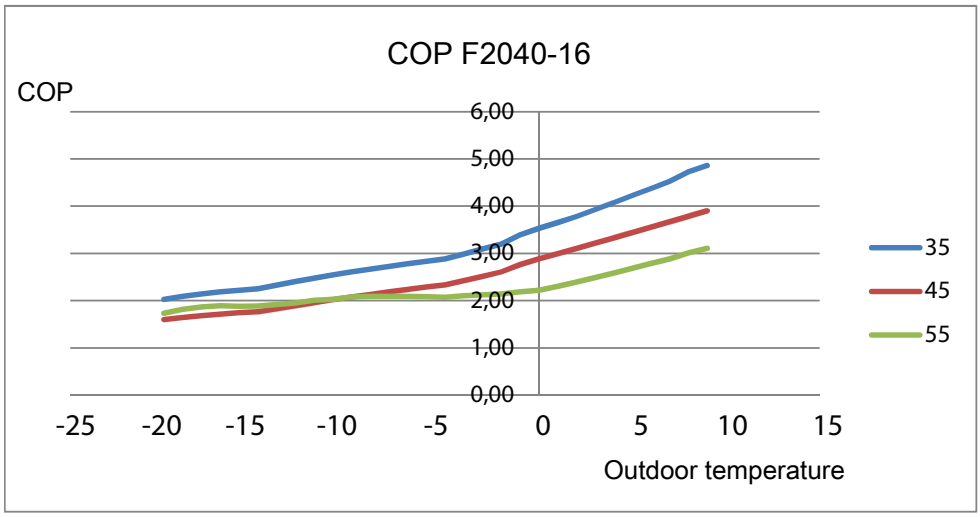
F2040-12


Max specified output F2040-12
kW
16,00
14,00
12,00
10,00
8,00
6,00
4,00
2,00
0,00
-25
-20
-15
-10
-5
0
5
10
15
Outdoor temperature
35
45
55


COP F2040-12
COP
6,00
5,00
4,00
3,00
2,00
1,00
0,00
-25
-20
-15
-10
-5
0
5
10
15
Outdoor temperature
35
45
55

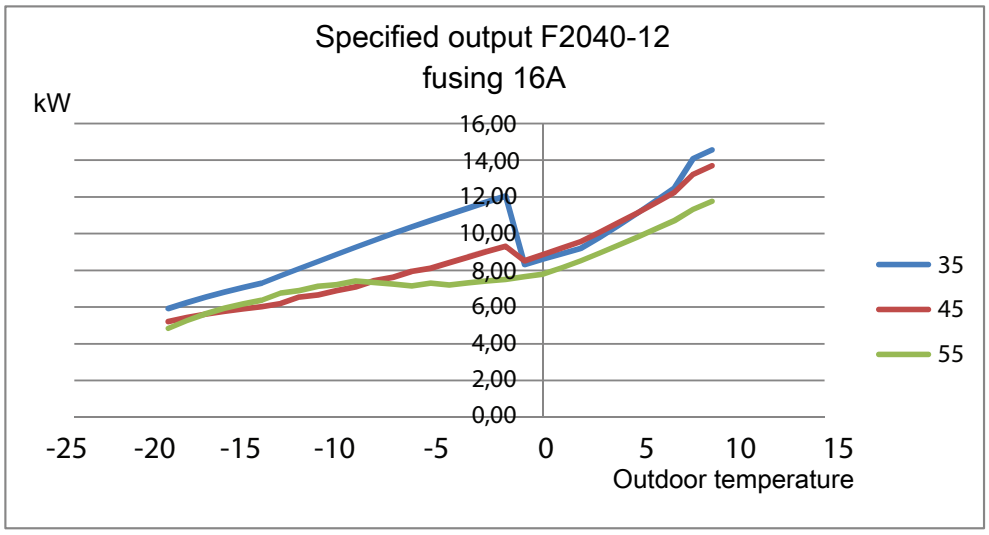
F2040-16

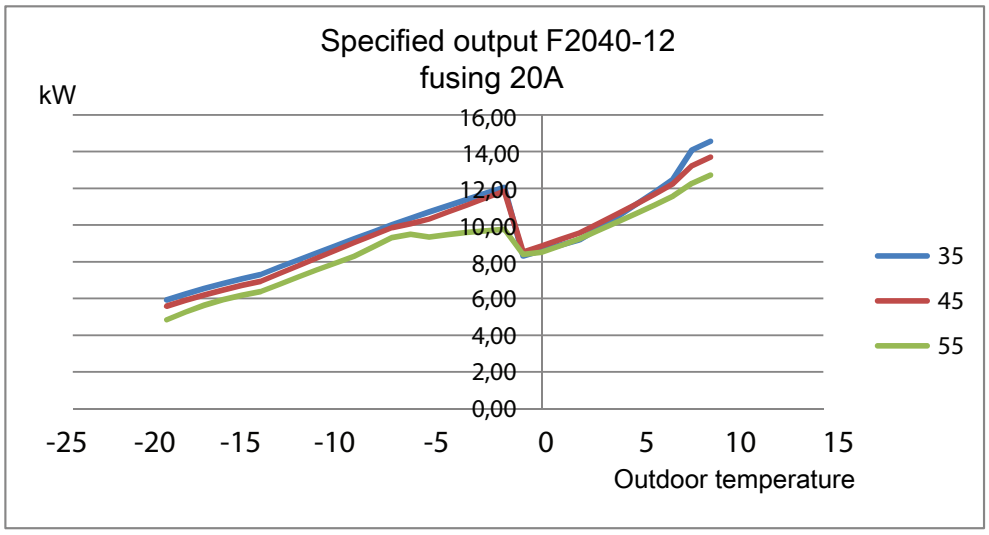

Max specified output F2040-16
kW
25,00
20,00
15,00
10,00
5,00
0,00
-25
-20
-15
-10
-5
0
5
10
15
Outdoor temperature
35
45
55

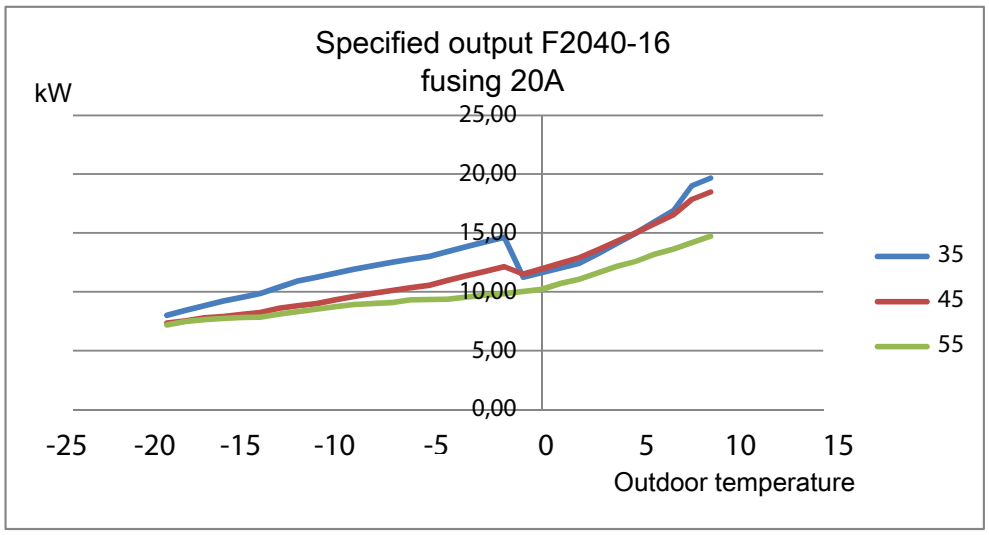

COP F2040-16
COP
6,00
5,00
4,00
3,00
2,00
1,00
0,00
-25
-20
-15
-10
-5
0
5
10
15
Outdoor temperature
35
45
55

Output with lower fuse rating than recommended

F2040-12/16





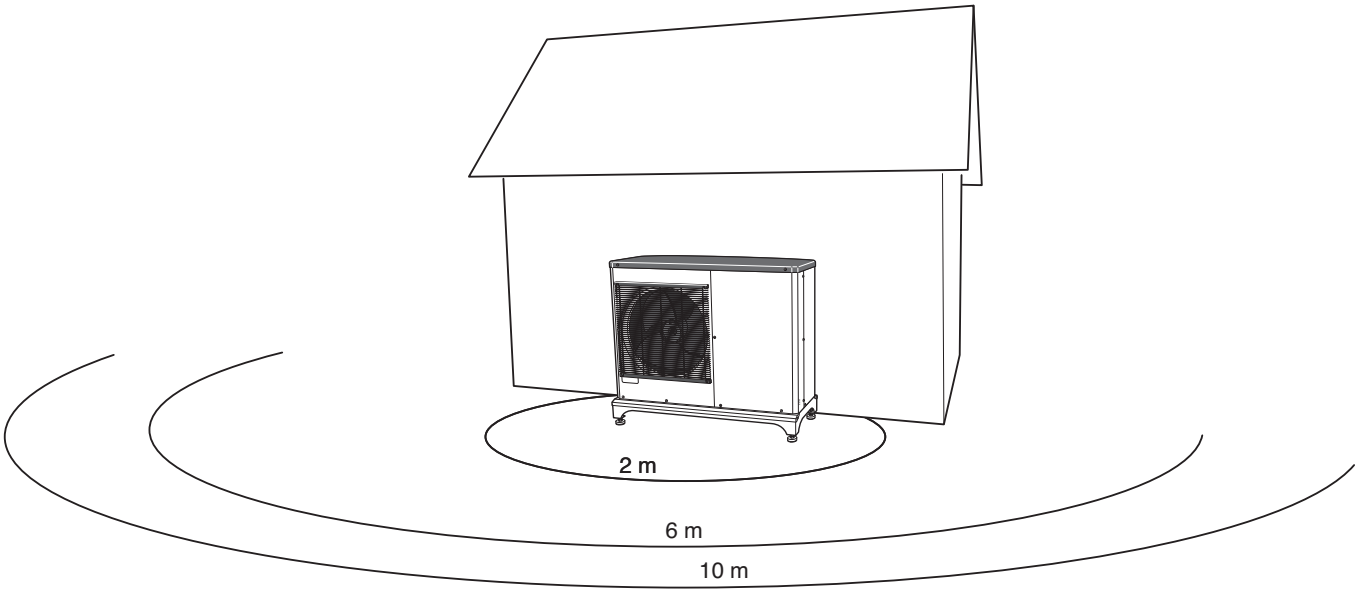


Sound pressure levels

F2040 is usually placed next to a house wall, which gives a directed sound distribution that should be considered. Accordingly, you should always attempt when positioning to choose the side that faces the least sound sensitive neighbouring area.

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

F2040 adjusts the fan speed depending on the ambient temperature and evaporation temperature.



Air-water heat pump		F2040-8	F2040-12	F2040-16
Sound power level* According to EN12102 at 7/45 (nominal)	L_W(A)	54	57	68
Sound pressure level at 2 m free standing.*	dB(A)	40	43	54
Sound pressure level at 6 m free standing.*	dB(A)	30.5	33.5	44.5
Sound pressure level at 10 m free standing.*	dB(A)	26	29	40

* Free space.

8 Item register

Item register

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