Service manual

NIBE™ VVM 500

Indoor module

Table of Contents

1 Important information

Document information

This technical manual is a complement to the Installer handbook for VVM 500, containing:

- Component description.
- Information to facilitate fault-tracing.
- Instructions for replacing components.
- Wiring diagram.
- Supplementary technical information.

The document applies to VVM 500 with software versions up to and including **v4272R5**.

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.

Rights to make any design or technical modifications are reserved.

©NIBE 2015.

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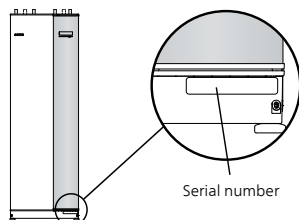
Serial number

> ☞ **Caution**
>
> Always give the product's serial number (14 digits) 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

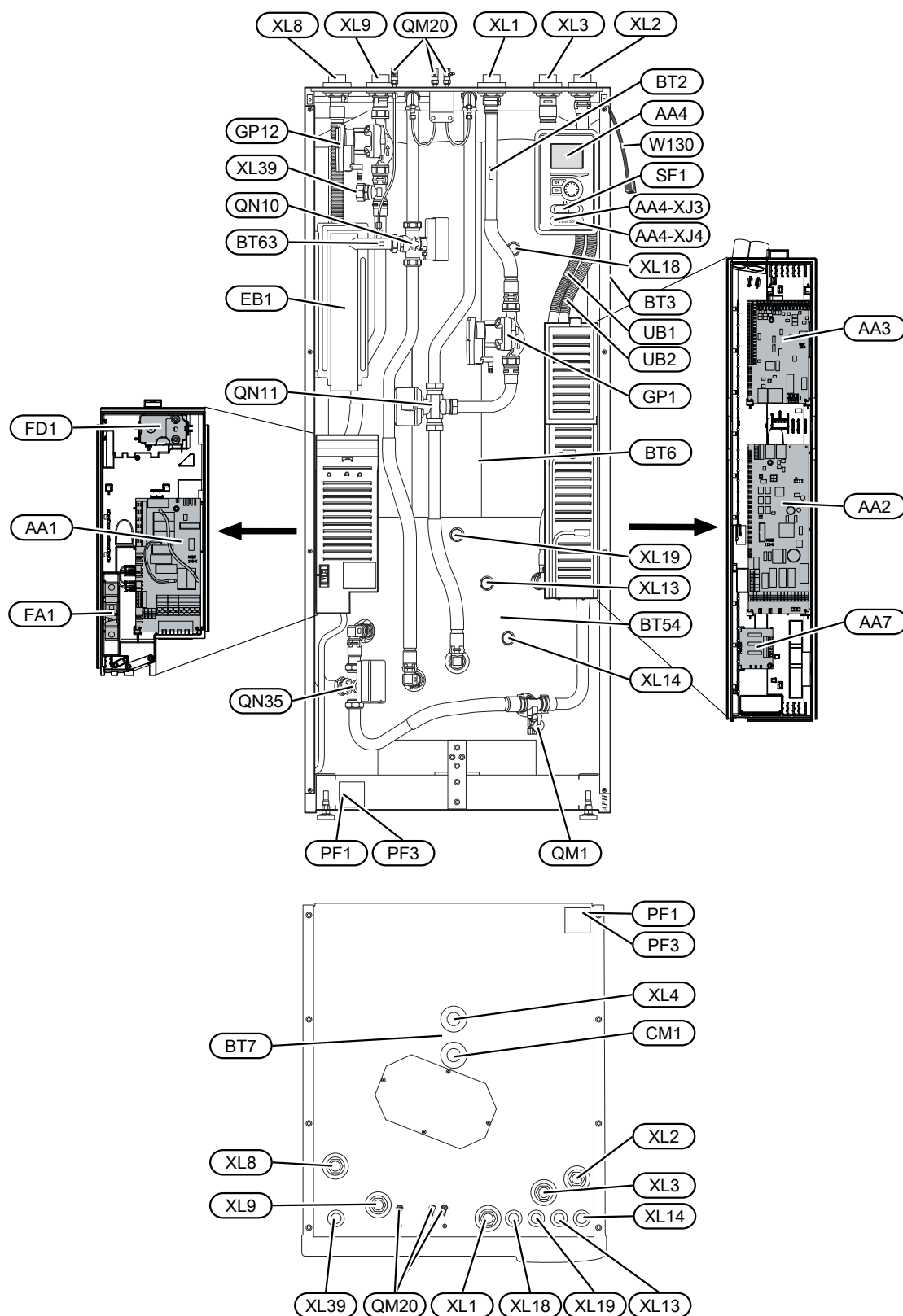Tel./fax +7 831 419 57 06 E-mail: info@evan.ru www.nibe-evan.ru

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 Indoor module's design

VVM 500

Pipe connections

XL1	Connection, heating medium flow line
XL2	Connection, heating medium return line
XL3	Connection, cold water
XL4	Connection, hot water
XL8	Connection, docking in heating medium
XL9	Connection, docking out heating medium
XL13	Connection, solar system flow line
XL14	Connection, solar system return line
XL18	Connection, docking in high temp
XL19	Connection, docking out high temp
XL39	Connection, docking pool

HVAC components

CM1	Expansion tank (connection)
GP1	Circulation pump
GP12	Charge pump
QM1	Drain valve, water heater
QM20	Venting, climate system
QN10	Shuttle valve, climate system/water heater, flow line
QN11	Shunt valve
QN35	Shuttle valve, climate system/water heater, return line

Sensors etc.

BT2	Temperature sensors, heating medium flow
BT3	Temperature sensors, heating medium return
BT6	Temperature sensor, hot water, control
BT7	Temperature sensor, hot water, display
BT54	Temperature sensor, solar coil
BT63	Temperature sensor, heating medium supply after immersion heater

Electrical components

AA 1	Immersion heater card
AA 2	Base card
AA 3	Input circuit board
AA 4	Display unit
	AA4-XJ3 USB socket
	AA4-XJ4 Service socket
AA 7	Extra relay circuit board
EB 1	Immersion heater
FA 1	Miniature circuit-breaker
FD 1	Temperature limiter
SF 1	Switch

Miscellaneous

PF 1	Rating plate
PF 3	Serial number plate
UB1	Cable gland
UB2	Cable gland

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

3 System description

Principle of operation
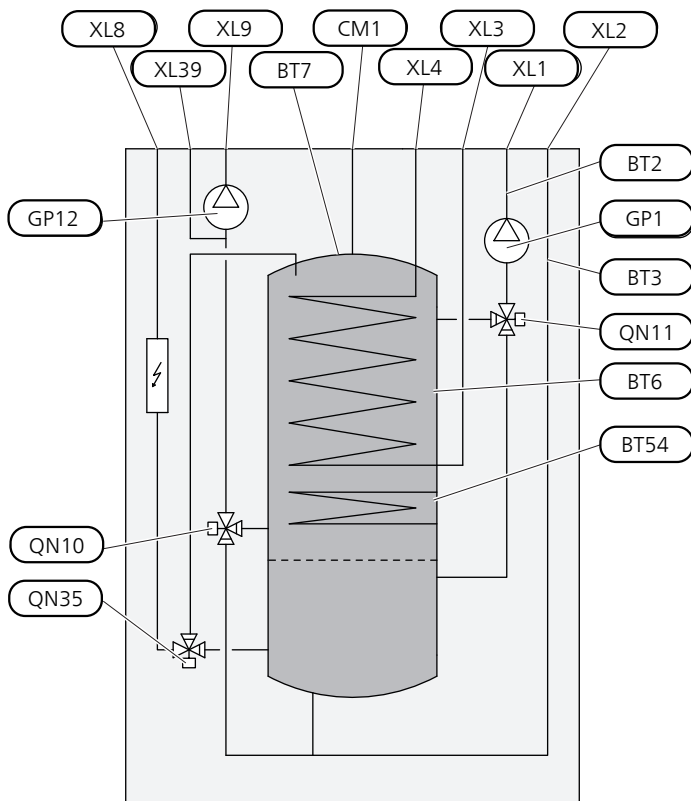
List of components

Pipe connections

XL1   Connection, heating medium flow line
XL2   Connection, heating medium return line
XL3   Connection, cold water
XL4   Connection, hot water
XL8   Connection, docking in heating medium
XL9   Connection, docking out heating medium
XL39   Connection, docking pool

HVAC components

CM1   Expansion tank (connection)
GP1   Circulation pump
GP12   Charge pump
QN10   Shuttle valve, climate system/water heater, flow line
QN11   Shunt valve
QN35   Shuttle valve, climate system/water heater, return line

Sensors

BT2   Temperature sensors, heating medium flow
BT3   Temperature sensors, heating medium return
BT6   Temperature sensor, hot water, control
BT7   Temperature sensor, hot water, display
BT54   Temperature sensor, solar coil

System diagram
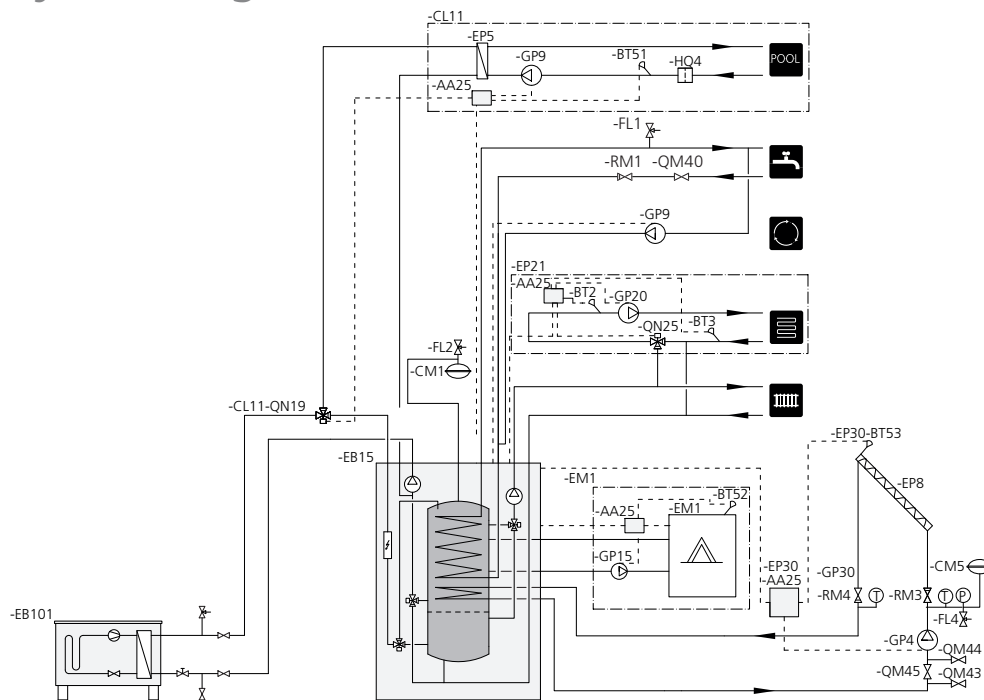
AA 5	Accessory card	EP 21	Climate system
AA 25	Control unit	EP 30	Solar kit SCA 30
BT 2	Temperature sensors, heating medium flow	FL 2	Safety valve, climate system
BT 3	Temperature sensors, heating medium return	FL 4	Safety valve, solar
BT 51	Temperature sensor, pool	GP 4	Circulation pump, solar
BT 52	Temperature sensor, boiler	GP 9	Circulation pump, pool
BT 53	Temperature sensor, solar panel	GP 15	Circulation pump, external heat source
CL 11	Pool kit POOL 500	GP 20	Circulation pump
CM 1	Expansion vessel, heating medium	GP 30	Pump station SPS 10, SPS 20
CM 5	Expansion vessel, solar	HQ 4	Particle filter
EB 15	VVM 500	QM 4X	Shut-off valve
EB 100	F20XX/F2300	QN 11	Shunt valve
EM 1	Oil, gas, or electric boiler	QN 19	Three way valve, pool
EP 5	Exchanger, pool	RM X	Non-return valve
EP 8	Solar panel		

4 Current circuit

Load monitor

The current sensors are connected to AA3-X4:1-4.

Function:

- If any of the internal phases exceed the set value and the phase sequence is not detected, electrical power is disconnected from one of the internal phases. Because the phase sequence is not detected this can mean that the incorrect phase sequence is disconnected, so that the output is still too high. The heat pump continues by disconnecting another phase, until the current does not exceed the set value. If the current still exceeds the set value when all internal phases are disconnected, the same process is performed for external additional heat, if applicable and is set to step-controlled additional heat.

> **!** **NOTE**
>
> Do not disconnect the external additional heat if it is set to give additional heat in one step.

.

- If the phase sequence is detected the electrical output is disconnected in the phase that exceeds the set value. This will also handle any external additional heat.
- If disconnecting the phases does not work, the heat pump will finally disengage.
- Reconnection occurs when the current has fallen to a value low enough to permit reconnection.
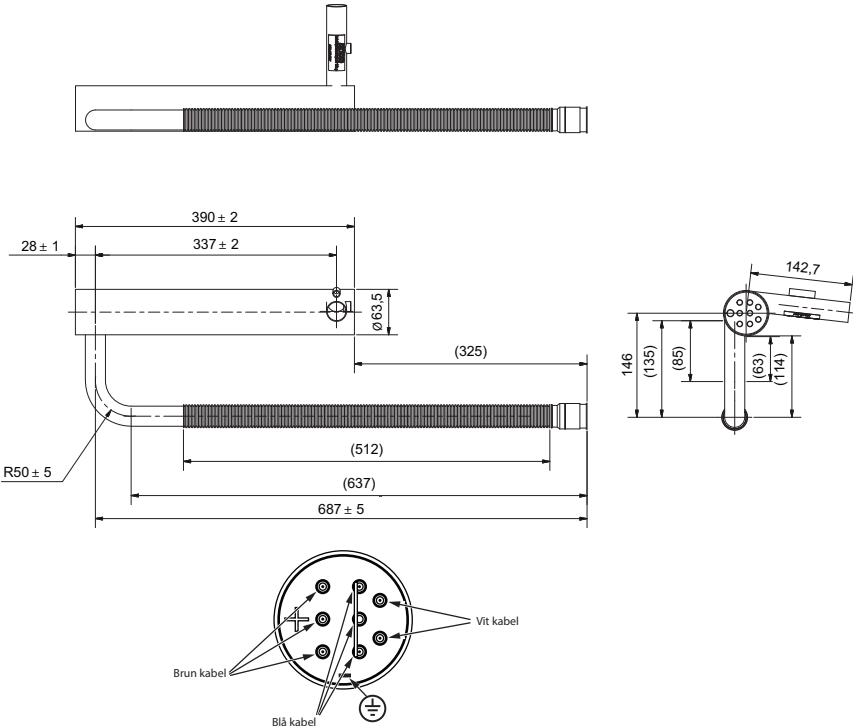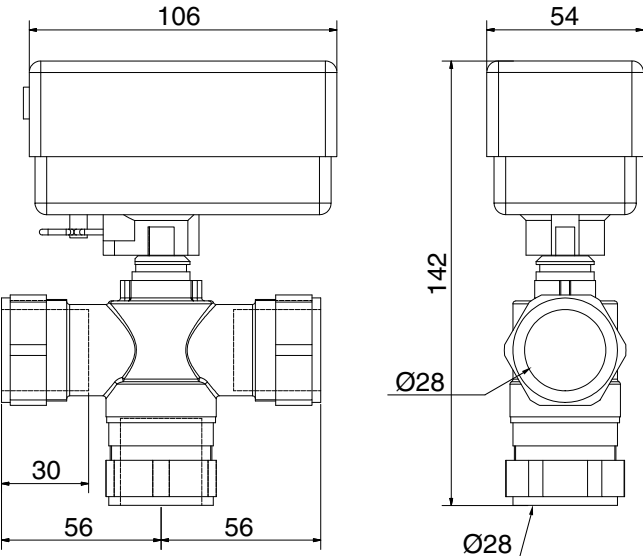
> **!** **NOTE**
>
> VVM 500 must be filled with water before the phase sequence is detected.
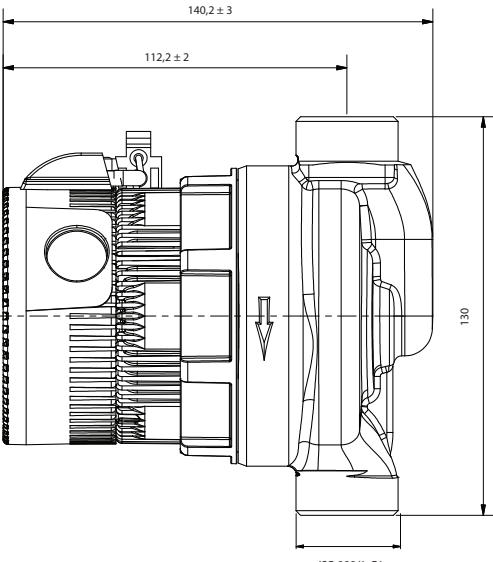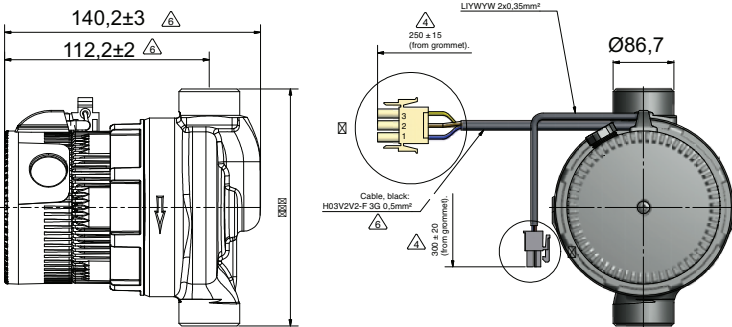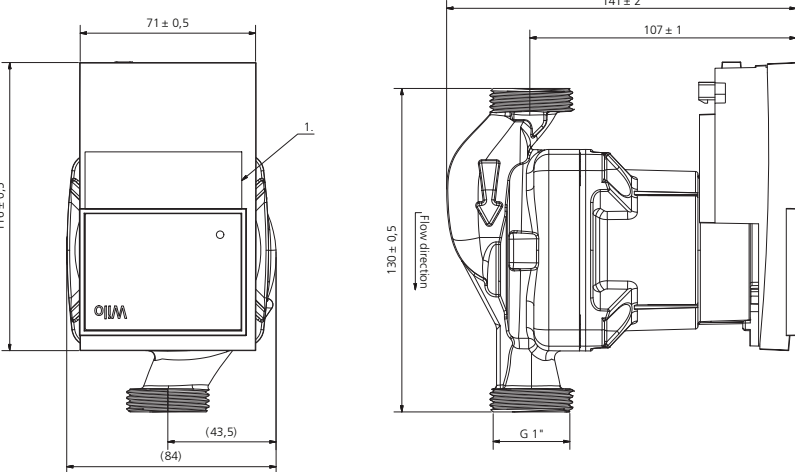
For the heat pump to disconnect the electrical output in the correct phase, the phase sequence must have been detected during the installation. In the menu 5.1.12 the phase sequence must be detected afterwards. An unsuccessful detection may be due to the current sensors not being correctly connected or that other electrical equipment started or stopped during detection.

Menu	Name	Factory setting
5.1.12	fuse size	16A
	detect phase order	

5 Component description

Components

Component	Description
Immersion heater (EB1)	Between brown cable and blue cable 26.38 ohm Between the white cables 53.20 ohm
Reversing valve (QN10, QN35)	Actuator motor: 7 VA, 230/24 VAC, 50 Hz, IP 40. Running time approx 8 sec. Max. operating pressure: 1.0 MPa Operating temperature: 5 - 80 °C (90 °C briefly)

Component	Description
Heating medium pump (GP1) and **Charge pump (GP12)**	E6PWM7-15/130G NIBE STRONG
	Control signal: PWM 0-10 V DC (max-min speed)

140,2 ± 3
112,2 ± 2
130
ISO 228/1-G1

GP1 to 2014-04

140,2±3
112,2±2
250 ± 15 (from grommet).
Cable, black: LIYWYW 2x0,35mm²
Ø86,7
Cable, black: H03V2V2-F 3G 0,5mm²
300 ± 20 (from grommet).

GP1 from and including 2014-04

71 ± 0,5
116 ± 0,5
1.
(43,5)
(84)

141 ± 2
107 ± 1
130 ± 0,5
Flow direction
G 1"

Sensors

Data temperature sensor

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
120	0.380	0.250
150	0.180	0.120

Electronics

Immersion heater card (AA1)

LED	Indication
K1 - K9: Orange	A steady light means that the relevant relay is engaged.

Output	Function
K1	Supply L1
K2	Supply L2
K3	Supply L3
K4	Immersion heater EB1 2 kW
K5	Not used
K6	Immersion heater EB1 2 kW
K7	Immersion heater EB1 only at 3 kW
K8	Immersion heater EB1 2 kW
K9	Immersion heater EB1 1 kW or 3 kW

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.

Outputs

Output	Function
PWM1	Control signal HM pump (GP1)
PWM2	Control signal charge pump (GP12)
K1	Reversing valve (QN10).
K2	Charge pump (GP12).
K3	Circ-pump (GP1).

Output	Function
K4	No function.

Input circuit board (AA3)

Inputs	Function
X4-1	Current sensor input (GND).
X4-2	Current sensor input (BE1).
X4-3	Current sensor input (BE2).
X4-4	Current sensor input (BE3).
X6:1- 2	Outdoor sensor input (BT1).
X6:3-4	Room sensor input (BT50).
X6:9-10	AUX1
X6:11-12	AUX2
X6:13-14	AUX3
X6:15-16	AUX4
X6:17-18	AUX5

Output		Function
X7:1	K1	Potential free relay Common
X7:2	K1	Potential free relay NO
X7:3	K1	Potential free relay NC

Display unit (AA4)

The display unit consists of:
- a colour screen where all information is displayed.
- a status lamp.
- navigation buttons (OK button, Back button and Control knob).
- a USB socket.
- a service socket.

Status lamp	Function
Lights green	Normal function
Lights yellow	Emergency mode activated
Lights red	Alarm tripped

Extra relay circuit board (AA7)

LED	Indication
K1 - K3: Orange	A steady light means that the relevant relay is engaged.

Output	Function
K1	Shunt valve close (QN11)
K2	Shunt valve open (QN11)
K3	Reversing valve (QN35)

6 Troubleshooting

Alarm list

A-alarm

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

Alarm no.	Alarm text on the display	Cause	Heat pump action.	May be due to
1	Sensor fault BT1	Sensor not connected/defective (outdoor sensor)	Calculated flow temperature is set to min supply line (menu 1.9.3).	See fault-tracing schedule page 23.
2	Sensor fault BT2	Sensor not connected/defective (heating medium supply)	Uses BT3 if available. If BT3 is not available, BT63 is used.	See fault-tracing schedule page 24.
3	Sensor fault BT3	Sensor not connected/defective (heating medium return)	No action	See fault-tracing schedule page 24.
6	Sensor fault BT6	Sensor not connected/defective (hot water, controlling)	Uses BT54	See fault-tracing schedule page 24.
25	Sensor fault BT25	Sensor not connected/defective (heating medium flow, external)	Automatic reset.	See fault-tracing schedule page 23.
31	Sensor fault BT63	Sensor not connected/defective	Blocks internal electrical addition.	See fault-tracing schedule page 24.
33	Sensor fault EP30 - BT53	Sensor not connected/defective (solar panel)	Switches off solar function.	See fault-tracing schedule page 25.
34	Sensor fault EP30 - BT54	Sensor not connected/defective (solar coil)	Switches off solar function.	See fault-tracing schedule page 25.
35	Sensor fault EM1 - BT52	Sensor not connected/defective (boiler)	Shunt closes. Burner stops.	See fault-tracing schedule page 25.
36	Sensor fault EP21 - BT2	Sensor not connected/defective (supply temperature sensor, extra climate system 1)	Controls the return sensor (EP21-BT3)	See fault-tracing schedule page 25.
37	Sensor fault EP22 - BT2	Sensor not connected/defective (supply temperature sensor, extra climate system 2)	Controls the return sensor (EP22-BT3)	See fault-tracing schedule page 25.

Alarm no.	Alarm text on the display	Cause	Heat pump action.	May be due to
38	Sensor fault EP23- BT2	Sensor not connected/defective (supply temperature sensor, extra climate system 3)	Controls the return sensor (EP23-BT3)	See fault-tracing schedule page 25.
39	Sensor fault EQ1–BT64	Sensor BT64 not connected, defective.	Shuts off cooling, Closes shunt (QN18) for cooling.	See fault-tracing schedule page 25.
45		Motor protection on one phase (Norway) machine has probably blown.		
52	The temperature limiter has tripped	Temperature limiter has tripped	Internal electrical addition is blocked.	
56	Incorrect program	Serial number and program do not match	The compressor stops, all relay outputs are set to 0 V	Check serial number
57	Incorrect program	Serial number and program do not match each other.	Compressor blocked. All relay outputs are set to 0 V.	
70	Communication fault with PCA input EB15	Communication with the input card missing for 60 secs.	Blocking the relevant compressor. Calculated flow temperature is set to min supply line.	See fault-tracing schedule on page 26.
71	Communication fault with PCA base-AA2	Communication with the base card missing for 15 secs.	Compressor (EB101) blocked.	See fault-tracing schedule on page 27.
73 - 95	Existing communication fault with "accessory".	Communication with the accessory card missing for 15 secs.	Accessory is blocked.	- Check communication cables - Check the setting of the dipswitch.
96 - 99	Existing communication fault with "room unit".	Communication with room unit zone 1-4 missing for 60 secs.	Accessory is blocked.	- Check communication cables
206	Com. error Acc - QZ1	Temporary communication fault HW comfort.	Accessory blocked.	Check fuses, voltages to the accessory card . Check that the communication cables are correctly connected. Check the setting of the dipswitch.
208	Communication fault ACC EB1.	Communication with the accessory card missing for 15 secs.	Switches off step controlled additional heat.	- Check the communication cables. - Check settings on the dipswitch.
220	High pressure alarm.	See relevant manual.	Compressor blocked.	See relevant manual.

Alarm no.	Alarm text on the display	Cause	Heat pump action.	May be due to
221	Low pressure alarm.	See relevant manual.	Compressor blocked.	See relevant manual.
222	Motor protection alarm.	See relevant manual.	Compressor blocked.	See relevant manual.
223	Sensor fault.	See relevant manual.	Compressor blocked.	See relevant manual.
224	Fan alarm.	See relevant manual.	Compressor blocked.	See relevant manual.
225	Supply/return line.	See relevant manual.	Compressor blocked.	See relevant manual.
227	Sensor fault.	See relevant manual.	Compressor blocked.	See relevant manual.
228	Defrosting fault.	See relevant manual.	Compressor blocked.	See relevant manual.
229	Short operating time.	See relevant manual.	Compressor blocked.	See relevant manual.
230	Hot gas alarm.	See relevant manual.	Compressor blocked.	See relevant manual.
231	Phase sequence fault.	See relevant manual.	Compressor blocked.	See relevant manual.
232	Low evaporation.	See relevant manual.	Compressor blocked.	See relevant manual.
250	Communication fault ACC SMS40.	Communication with the accessory card missing for 15 secs.	Accessory is blocked.	See IHB SMS40 for fault tracing.
251	Communication fault ACC Modbus40.	Communication with the accessory card missing for 15 secs.	Accessory is blocked.	See IHB Modbus40 for fault tracing.
252	Slave heat pump 1 comm fault.	Communication with heat pump missing.	Compressor blocked.	Faulty communication cable
261	This alarm is generated by the heat pump	High VVX temp (E35)	Compressor blocked.	See relevant manual.
262	This alarm is generated by the heat pump	Inverter fault, high temperature.	Compressor blocked.	See relevant manual.
263	This alarm is generated by the heat pump	Inverter error, high current (E47)	Compressor blocked.	See relevant manual.
264	This alarm is generated by the heat pump	inverter error, com (E45)	Compressor blocked.	See relevant manual.
265	This alarm is generated by the heat pump	inverter fault, pcb (E46)	Compressor blocked.	See relevant manual.

Alarm no.	Alarm text on the display	Cause	Heat pump action.	May be due to
266	This alarm is generated by the heat pump	Low refrigerant amount (E57)	Compressor blocked.	See relevant manual.
267	This alarm is generated by the heat pump	Inverter error, start error (E59)	Compressor blocked.	See relevant manual.
268	This alarm is generated by the heat pump	Inverter fault, conv	Compressor blocked.	See relevant manual.
277	This alarm is generated by the heat pump	Sensor fault MHI exchange, (E37)	Compressor blocked.	See relevant manual.
278	This alarm is generated by the heat pump	Sensor fault MHI ambient air, (E38)	Compressor blocked.	See relevant manual.
279	This alarm is generated by the heat pump	Sensor fault MHI discharge, (E39)	Compressor blocked.	See relevant manual.
280	This alarm is generated by the heat pump	Sensor fault MHI suction, (E53)	Compressor blocked.	See relevant manual.
281	This alarm is generated by the heat pump	Sensor fault MHI LP, (E54)	Compressor blocked.	See relevant manual.
283	Com. error Acc. –EQ1	Temporary Comm. Fault Active 4-pipe cooling ULVP	Accessory is blocked.	Check communication cables Check settings of the dipswitch
301	Perm. comm. to a slave unit - EB102	Communication with the slave missing for 15 secs.	Master blocks relevant compressor. The compressors are stopped on the slave.	Check communication cables.
403	Sensor fault on EB101	Sensor fault detected on the slave Off Com-interface MHI-EMMY	Compressor blocked.	See relevant manual.
404	Sensor fault on EB101	Sensor fault detected on the slave Off Com-interface MHI-EMMY	Compressor blocked.	See relevant manual.
412	Sensor fault on EB101-BT12	Sensor fault detected on the slave Off Com-interface MHI-EMMY	Compressor blocked.	See relevant manual.
415	Sensor fault on EB101-BT15	Sensor fault detected on the slave Off Com-interface MHI-EMMY	Compressor blocked.	See relevant manual.

B alarm

In the event of a B alarm the green light lights up on the front and a symbol with a service technician is displayed in the information window until the alarm is reset. All alarms are automatically reset if the cause is rectified.

Alarm no.	Alarm text on the display	Cause	Action	May be due to
101	Sensor fault BT1			Alarm 101-120. See A-alarm 1-20.
103	Sensor fault BT3			
106	Sensor fault BT6			
107	Sensor fault BT7	Sensor temporarily missing	Replace display of BT7 temperature with "---"	Resets automatically when the sensor has worked continuously for 60 s.
112	Sensor fault BT12			
114	Sensor fault BT14			
115	Sensor fault BT15			
116	Sensor fault BT16			
117	Sensor fault BT17			
120	Sensor fault BT20			
150	Temporary HP alarm			See alarm 50.
162	High condenser out			The temperature of BT12 has exceeded 59 °C. The alarm is reset when the Temperature has dropped below 59 °C and condenser return (BT3) has dropped 2K since the alarm.
163	High condenser in			The return temperature (BT3) has exceeded 58 °C. It is reset when the temperature has dropped to 56 °C.
166	Electrical anode incorrect	Electrical anode fault		Suggestion: Check electrical anode, circuit board at the electrical anode as well as cables to the electrical anode.
170	Com. error input card			Temporary communication fault. See alarm 70.
171	Com. error base card			Temporary communication fault. See alarm 71.
173	Com. error heating system2			Temporary communication fault. See alarm 73.
174	Com. error heating system3			Temporary communication fault. See alarm 74.
176	Com. error heating system4			Temporary communication fault. See alarm 76.

Alarm no.	Alarm text on the display	Cause	Action	May be due to
178	Com. error Acc. –Cl11	3 communication errors in succession have occurred on the pool accessory card	Block accessory	Check the Communication cables. Check settings of the dipswitch
180	Freeze prot			Activates if the heating is blocked and the outdoor temperature (BT1) falls below 3 ºC. Heating is permitted and controlled by min. supply.
181	Unsuccessful periodic increase			Periodic increase has failed to reach stop temp. within 5 hours.
182	Load monitor activated			One or more power steps blocked due to high current measured on current sensor.
183	Defrosting			Defrosting in progress.
184	Filter alarm			Reminder to check filter. The machine has not been stopped for the number of months set in menu 5.1.99.
191	Com. error WWC			Temporary communication fault. See alarm 91.
193	Com. Error DEW			Temporary communication fault. See alarm 93.
196	Comm. room unit, zone 1			Temporary communication fault. See alarm 96.
197	Comm. room unit, zone 2			Temporary communication fault. See alarm 97.
198	Comm. room unit, zone 3			Temporary communication fault. See alarm 98.
199	Comm. room unit, zone 4			Temporary communication fault. See alarm 99.
200	Com.Error inverter			Temporary communication fault. See alarm 100.
201	Inverter alarm			Inverter indicates alarm See alarm log menu 3.4 for error code .
202	Inverter errors			Inverter indicates error See alarm log menu 3.4 for error code .

Alarm no.	Alarm text on the display	Cause	Action	May be due to
213	Inverter error type I			Temporary inverter fault. Switches to alarm 203 after 60 minutes.
214	Inverter error type II			Temporary inverter fault. Switches to alarm 204 after 60 minutes or if activated 3 times in less than 120 minutes.
215	Inverter error type III			Temporary inverter fault. Switches to alarm 205 if activated 2 times in less than 60 minutes.
271	Cold outdoor air EB 101	EB 101 sends an error message to the control	Blocks the compressor	See relevant manual
272	Hot outdoor air EB 101	EB 101 sends an error message to the control	Blocks the compressor	See relevant manual
273	HW-start and HW-stop have reset to default	Adjustment of the hot water-settings due to short run times	HW-start and HW-stop for economy and normal have been set to default	See relevant manual
274	The compressor's phase has been overloaded	Load monitor has caused the compressor not to run at the desired frequency	None	Load monitor has prevented compressor running at desired frequency (F2040-12 additional heat: and been below 85Hz) for at least an hour (corresponding)
275	The compressor's phase has been overloaded for a long time	Load monitor has caused the compressor not to run at the desired frequency	None	Load monitor has prevented compressor running at desired frequency (F2040-12 additional heat: and been below 85Hz) for longer than 5% of the total operating time for the compressor. This first detects the total number of operating hours by which the compressor exceeds 1000h.
282	Com. error Acc. –EQ1	3 communication errors in succession have occurred on the accessory card.	Accessory is blocked	Temporary communication fault
323	Sensor fault EQ1-BT25.	Resets automatically when the sensor has worked continuously for 60 s.	CoolingDM calculated with EQ1-BT25 set to 0.	Sensor EQ1-BT25 not connected, defective.

Alarm no.	Alarm text on the display	Cause	Action	May be due to
354	Slave EB101: Delta BT2-BT3>|2K| during calibration. Resets to manual circulation pump speed	Delta BT3-BT12 greater than |2K| after calibration	Change from auto to manual pump speed	Uncertain sensor accuracy
355	Slave EB101: Delta BT3-BT63>|2K| during calibration. Resets to manual circulation pump speed	Delta BT3-BT2 greater than |2K| after calibration	Change from auto to manual pump speed	Uncertain sensor accuracy
995	alarm from external input	External alarm	None	Status AUX-in
996	Additional heat external blocked	Signal via AUX input	None	Status AUX-in
997	The compressor is externally blocked	The compressor is externally blocked	None	Status AUX-in
998	Starts	Display has restarted	The display/product has restarted	The display/product has restarted

Troubleshooting guide

Alarm 1 - sensor fault

```
┌─────────────────────────┐
│ Is the actual sensor    │  NO    ┌──────────────────────┐
│ correctly connected?    ├──────▶ │      Action.         │
└───────────┬─────────────┘        └──────────────────────┘
            │ YES
            ▼
┌─────────────────────────┐
│ Is any external joint in│  NO    ┌──────────────────────┐
│ the sensor cable        ├──────▶ │      Action.         │
│ correctly connected?    │        └──────────────────────┘
└───────────┬─────────────┘
            │ YES
            ▼
┌─────────────────────────┐
│ Are the characteristics │
│ for the sensor OK,      │  NO    ┌──────────────────────┐
│ measured from any       ├──────▶ │ Defective sensor.    │
│ external joint in the   │        │ Replace.             │
│ sensor cable?           │        └──────────────────────┘
│ (See "Data for          │
│ temperature sensor"     │
│ section.)               │
└───────────┬─────────────┘
            │ YES
            ▼
┌─────────────────────────┐
│ Are the characteristics │
│ for the sensor OK,      │  NO    ┌──────────────────────┐
│ measured from connected ├──────▶ │ Check wiring and     │
│ sensor cable on the     │        │ switches.            │
│ input card (AA3)?JSH    │        └──────────────────────┘
│ (See "Data for          │
│ temperature sensor"     │
│ section.)               │
└───────────┬─────────────┘
            │ YES
            ▼
┌─────────────────────────┐
│ Is the output voltage   │  NO    ┌──────────────────────┐
│ from the card correct?  ├──────▶ │ Check wiring and     │
│ (See "Data for          │        │ switches.            │
│ temperature sensor"     │        └──────────────────────┘
│ section.)               │
└───────────┬─────────────┘
            │ YES
            ▼
┌─────────────────────────┐
│ Defective input circuit │
│ board (AA3). Replace.   │
└─────────────────────────┘
```

Alarm 2, 3, 6, 31 - sensor fault

```
┌─────────────────────────┐
│ Is the actual sensor    │──── NO ───►┌──────────────────────┐
│ correctly connected?    │            │ Action.              │
└─────────────────────────┘            └──────────────────────┘
              │
             YES
              │
              ▼
┌─────────────────────────┐
│ Are the characteristics │
│ for the sensor OK? (See │──── NO ───►┌──────────────────────┐
│ "Data for temperature   │            │ Defective sensor.    │
│ sensor" section.)       │            │ Replace.             │
└─────────────────────────┘            └──────────────────────┘
              │
             YES
              │
              ▼
┌─────────────────────────┐
│ Is the wiring connector │
│ (W103) correctly        │──── NO ───►┌──────────────────────┐
│ connected on base card  │            │ Action.              │
│ (AA2)?                  │            └──────────────────────┘
└─────────────────────────┘
              │
             YES
              │
              ▼
┌─────────────────────────┐
│ Are the characteristics │
│ for the sensor OK,      │
│ measured from wiring    │──── NO ───►┌──────────────────────┐
│ connector (W103) in the │            │ Check wiring and     │
│ base card (AA2)?        │            │ switches.            │
│ (See the "Wiring        │            └──────────────────────┘
│ diagram" section.)      │
└─────────────────────────┘
              │
             YES
              │
              ▼
┌─────────────────────────┐
│ Is the output voltage   │
│ from the card correct?  │──── NO ───►┌──────────────────────┐
│ (See "Data for          │            │ Check wiring and     │
│ temperature sensor"     │            │ switches.            │
│ section.)               │            └──────────────────────┘
└─────────────────────────┘
              │
             YES
              │
              ▼
┌─────────────────────────┐
│ Defective base card     │
│ (AA2). Replace.         │
└─────────────────────────┘
```

Alarm 33-38 – sensor fault

Fault-tracing in accessory card.

```
┌─────────────────────────┐
│ Is the actual sensor     │         ┌──────────────────────────┐
│ correctly connected?     │── NO ──▶│         Action.          │
└─────────────────────────┘         └──────────────────────────┘
            │
           YES
            │
            ▼
┌─────────────────────────┐
│ Are the characteristics  │         ┌──────────────────────────┐
│ for the sensor OK,       │── NO ──▶│ Defective sensor. Replace.│
│ measured over the sensor │         └──────────────────────────┘
│ on the accessory card    │
│ (AA5)? (See "Data for    │
│ Temperature sensor"      │
│ section.)                │
└─────────────────────────┘
            │
           YES
            │
            ▼
┌─────────────────────────┐
│ Are the sensor features  │         ┌──────────────────────────┐
│ OK, measured from the    │── NO ──▶│ Check wiring and switches.│
│ connected sensor cable   │         └──────────────────────────┘
│ in the accessory card    │
│ (AA5)? (See "Temperature │
│ sensor" section.)        │
└─────────────────────────┘
            │
           YES
            │
            ▼
┌─────────────────────────┐
│ Is the output voltage    │         ┌──────────────────────────┐
│ from the card correct?   │── NO ──▶│ Check wiring and switches.│
│ (See "Data for           │         └──────────────────────────┘
│ temperature sensor"      │
│ section.)                │
└─────────────────────────┘
            │
           YES
            │
            ▼
┌─────────────────────────┐
│ Defective accessory card │
│ (AA5). Replace.          │
└─────────────────────────┘
```

Alarm 70 - perm. com.error input card

```
┌─────────────────────────────┐
│ Is the wiring connector (W105) │
│ correctly connected on input   │  NO ──────▶  ┌──────────────────────┐
│ circuit board (AA3-X2) and on  │              │      Action.         │
│ the display card (AA4-X8)?     │              └──────────────────────┘
└─────────────────────────────┘
              │
             YES
              │
              ▼
┌─────────────────────────────┐
│ Replace the input circuit     │
│ board (AA3).                  │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│ Has the fault been corrected? │  NO ──────▶  ┌──────────────────────────────┐
└─────────────────────────────┘              │ Replace the display card (AA4). │
              │                               └──────────────────────────────┘
             YES
              │
              ▼
┌─────────────────────────────┐
│            OK.               │
└─────────────────────────────┘
```

Alarm 71 - perm. com.error input card

```
┌─────────────────────────┐
│ Is the wiring connector │          ┌──────────────────┐
│ (W109) correctly        │   NO     │                  │
│ connected on base card  ├────────► │     Action.      │
│ (AA2-X5) and on the     │          │                  │
│ input card (AA3-X1)?    │          └──────────────────┘
└───────────┬─────────────┘
            │ YES
            ▼
┌─────────────────────────┐
│ Is the wiring connector │          ┌──────────────────┐
│ (W105) correctly        │   NO     │                  │
│ connected on input      ├────────► │     Action.      │
│ circuit board (AA3-X2)  │          │                  │
│ and on the display      │          └──────────────────┘
│ card (AA4-X8)?          │
└───────────┬─────────────┘
            │ YES
            ▼
┌─────────────────────────┐
│ Replace the base card   │
│ (AA2).                  │
└───────────┬─────────────┘
            │
            ▼
┌─────────────────────────┐          ┌──────────────────┐
│ Has the fault been      │   YES    │                  │
│ corrected?              ├────────► │       OK.        │
└───────────┬─────────────┘          └──────────────────┘
            │ NO
            ▼
┌─────────────────────────┐
│ Replace the input       │
│ circuit board (AA3).    │
└───────────┬─────────────┘
            │
            ▼
┌─────────────────────────┐          ┌──────────────────┐
│ Has the fault been      │   YES    │                  │
│ corrected?              ├────────► │       OK.        │
└───────────┬─────────────┘          └──────────────────┘
            │ NO
            ▼
┌─────────────────────────┐
│ Replace the display     │
│ card (AA4).             │
└─────────────────────────┘
```

Function check, 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.

AA2 Base card

Output	Function
AA2-K1 (reversing valve)	QN10
AA2-K2 (GP12)	Charge pump (GP12)
Charge pump speed	Setting in %
AA2-K3 (GP1)	Heating medium pump (GP1)
Heating medium pump speed	Setting in %
Compressor (request)	Off/On
QN35	Reversing valve QN35
QN11 (close)	Off/On

AA1 Immersion heater card

Output	Function
AA1-K4	EB1/1.33 kW
AA1-K5	EB1/2.67 kW
AA1-K6	EB1/1.33 kW
AA1-K7	EB1/2.67 kW
AA1-K8	EB1/1.33 kW
AA1-K9	EB1/2.67 kW

AA3 Input circuit board

Output	Function
AA3-X7	AUX output

Climate system 2 (ECS 40/ECS 41)

Output	Function
EB21-AA5-K2	Mixing valve, close
EB21-AA5-K3	Mixing valve, open
EB21-AA5-K4	External circulation pump

Climate system 3 (ECS 40/ECS 41)

Output	Function
EB22-AA5-K2	Mixing valve, close
EB22-AA5-K3	Mixing valve, open
EB22-AA5-K4	External circulation pump

Climate system 4 (ECS 40/ECS 41)

Output	Function
EB23-AA5-K2	Mixing valve, close
EB23-AA5-K3	Mixing valve, open
EB23-AA5-K4	External circulation pump

Pool (POOL 500)

Output	Function
CL11-AA5-K1	Not used
CL11-AA5-K2	Not used
CL11-AA5-K3	Reversing valve, pool QN19 as well as circulation pump, cooling GP14
CL11-AA5-K4	Circulation pump, pool GP9

Solar control (SCA 30)

Output	Function
EP8-AA5-K1	Circulation pumps GP4-GP15
EP8-AA5-K2	Solar panel cooling
EP8-AA5-K3	Circulation pump GP14 / cooling to pool.
EP8-AA5-K4	Not used

External additional heater Gas/Electric/Oil fired boiler

Output	Function
EB1-AA5-K1	Control EM1
EB1-AA5-K2	Not used
EB1-AA5-K3	Not used
EB1- AA5-K4	Circulation pump GP15

External additional heat, Electric heater

Output	Function
EB1-AA5-K1	Contactor 1
EB1-AA5-K2	Contactor 2
EB1-AA5-K3	Contactor 3
EB1- AA5-K4	Circulation pump GP15

Cooling

Output	Function
EQ1-AA5-K1	Reversing valve QN12
EQ1-AA5-K2	Circulation pump GP13
EQ1-AA5-K3	Circulation pump GP12
EQ1-AA5-K4	Not used

Function check, circulation pumps

With forced control of the circulation pumps it is necessary to check the supply (230 V AC) and the control signal (0-10 V DC).

Heating medium pump (GP1)

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

Charge pump (GP12)

Pump speed GP12	PVM2, X2:3-4	LED PWM2 on Card AA2
100 %	approx 0 V DC	Not lit
50 %	approx 5 V DC	Half lit
0 %	approx 10 V DC	Lit

7 Component replacement

Basic

Removing the covers

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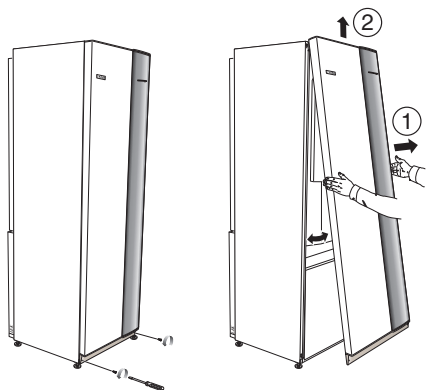
1. Remove the screws from the lower edge of the front cover.
2. Lift the cover out at the bottom edge and up.

Side covers
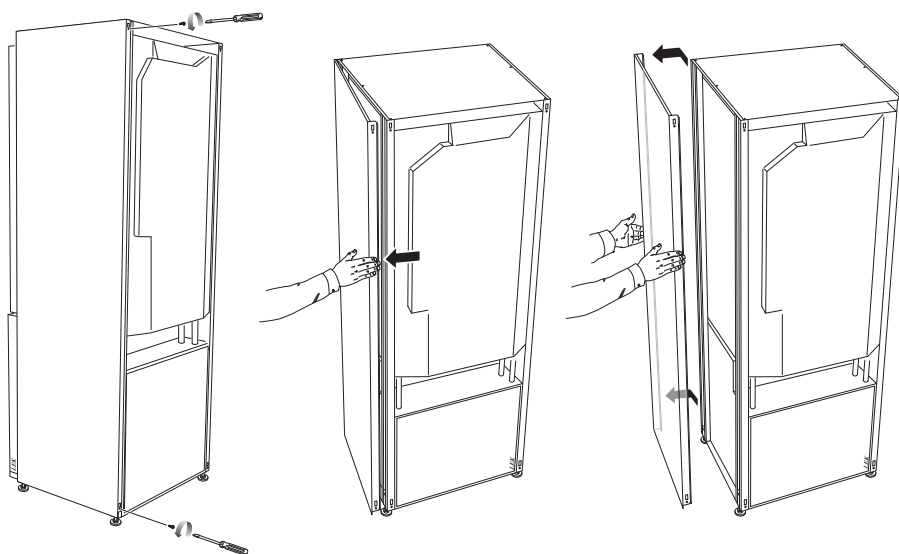
The side covers can be removed to facilitate the installation.
1. Remove the screws from the upper and lower edges.
2. Twist the cover slightly outward.
3. Move the hatch backwards and slightly to the side.
4. Pull the cover to one side.
5. Pull the hatch forwards.

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
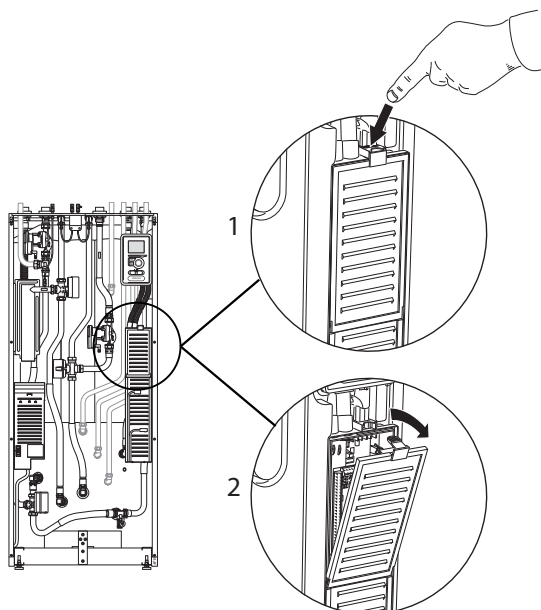
1. Push the catch down.
2. Angle out the cover and remove it.
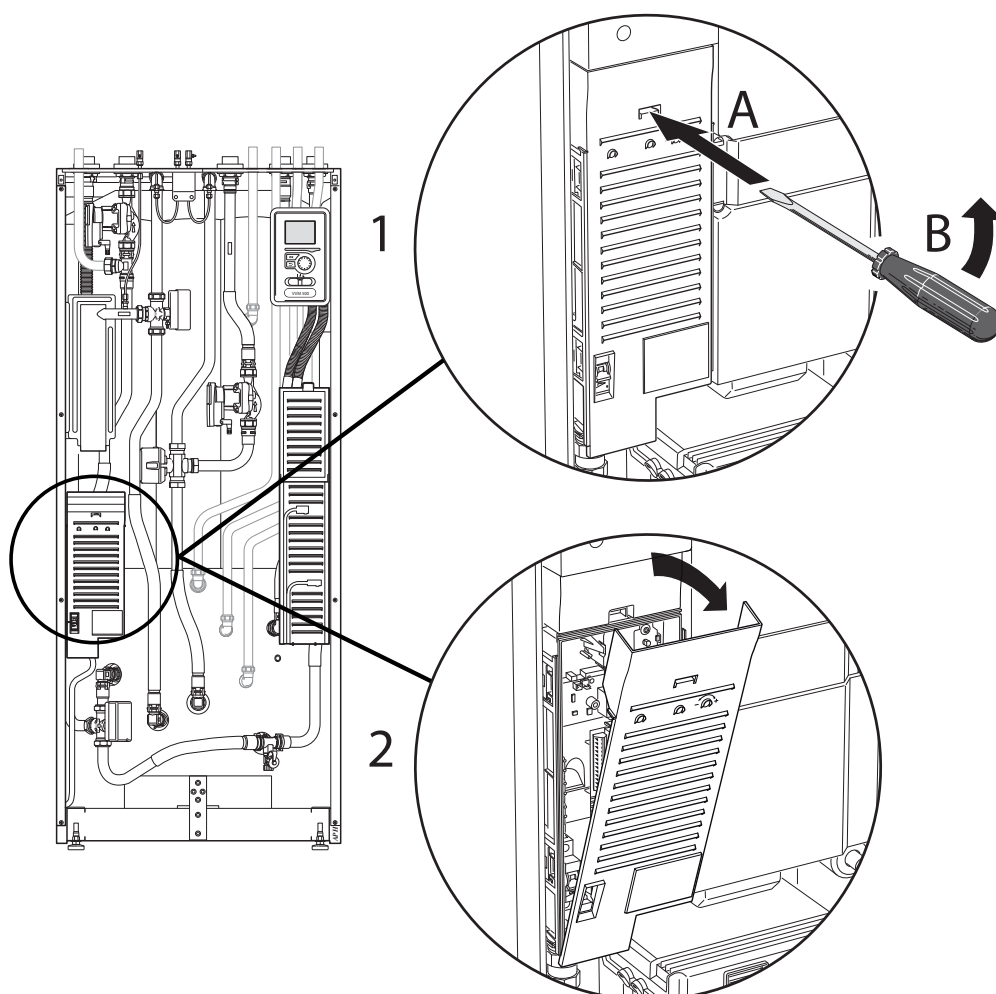
Removing the cover, immersion heater circuit board

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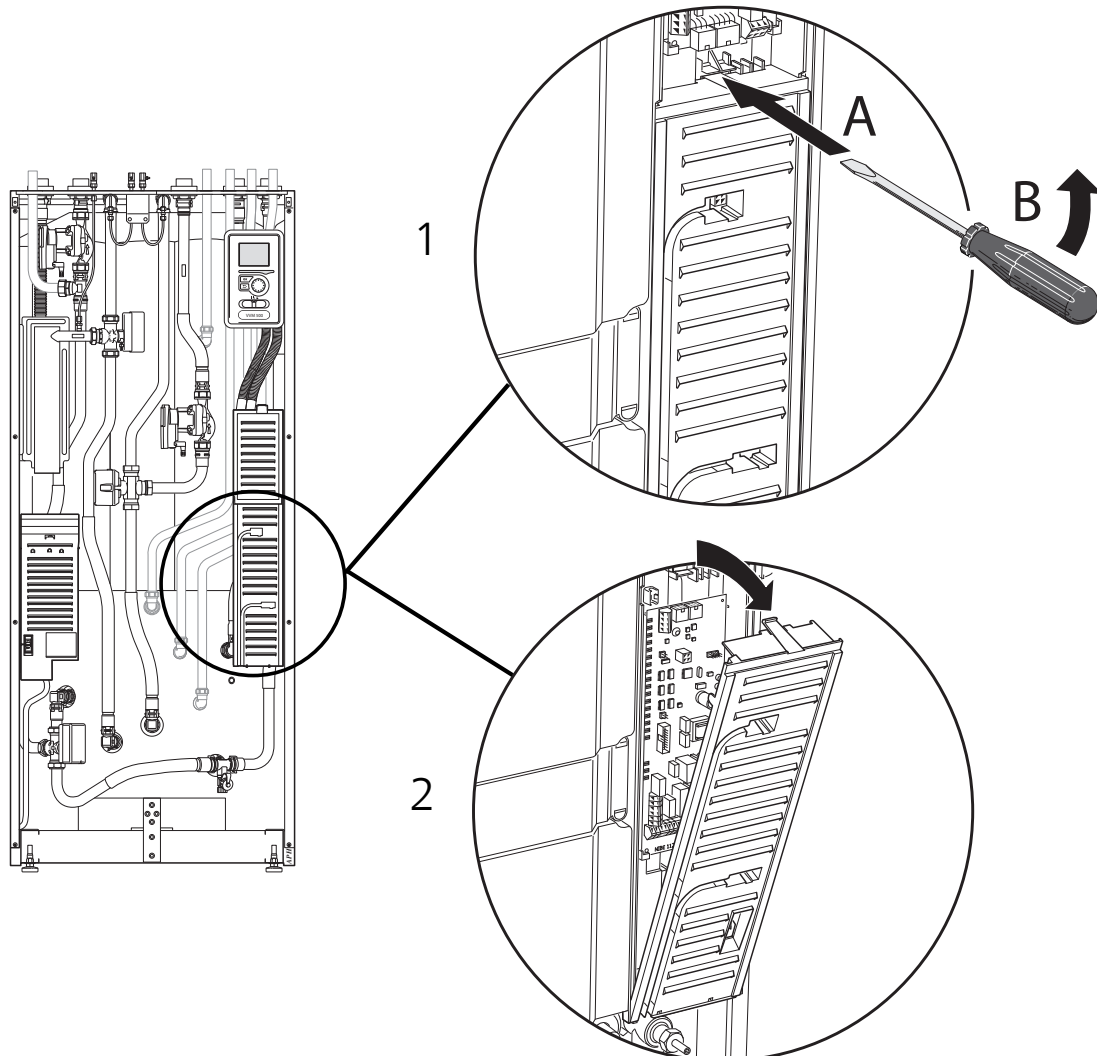
1. Insert the screwdriver (A) and pry the catch carefully downwards (B).
2. Angle out the cover and remove it.

Cable lock

Use a suitable tool to release/lock cables in the indoor module terminal blocks.
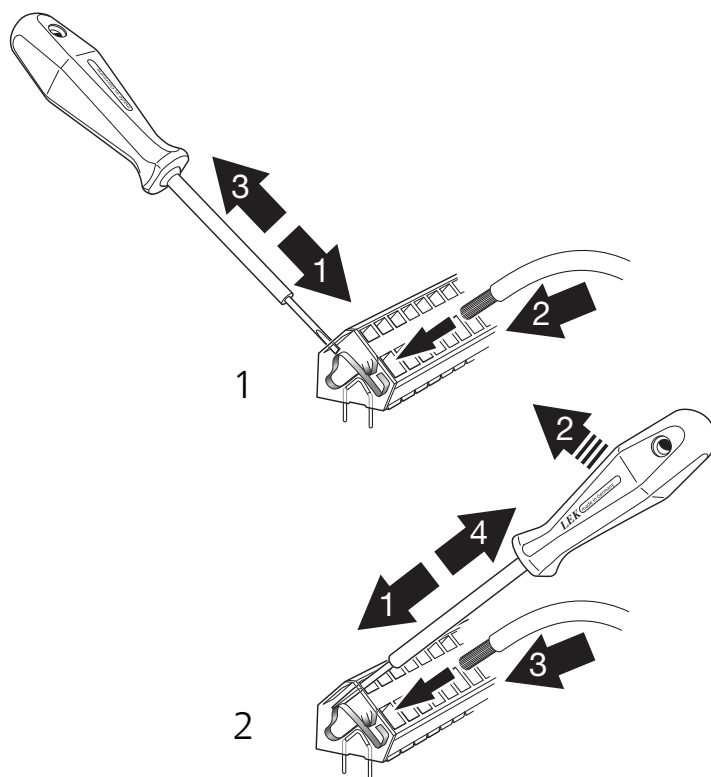
Main components

Replacement of immersion heater

|	
1 Set the switch (SF1) to stand by mode and wait approx. 30 secs	
2 Turn off the power supply to the heat pump.	
3 Close the shut-off valves to the heating system and heat pump.	
4 Drain the water by opening the drain valve (QM1) and allow air to enter via the vents (QM20) until the level is below the reversing valve (QN10).	QM20 Drain valve (QM1)

5 Remove the plastic cover above (AA1) using a screwdriver.	
6 Cut off the two cable ties and remove the insulation from in front of the immersion heater.	
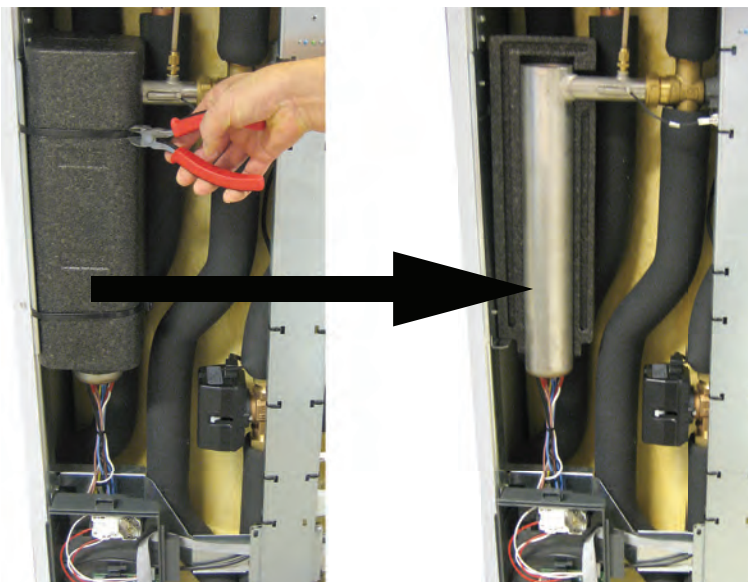
7 Disconnect the two blue cables, the two white cables and the three brown cables from terminal block X3 and X7 on (AA1). **8** Pull out the two bulbs from the immersion heater.	 Bulb and capillary tube AA1:X3 AA1:X7
9 Disconnect the immersion heater at the marked couplings. **10** Remove the box for the immersion heater circuit board (AA1). **11** Remove the immersion heater.	 Vent connection Compression ring coupling
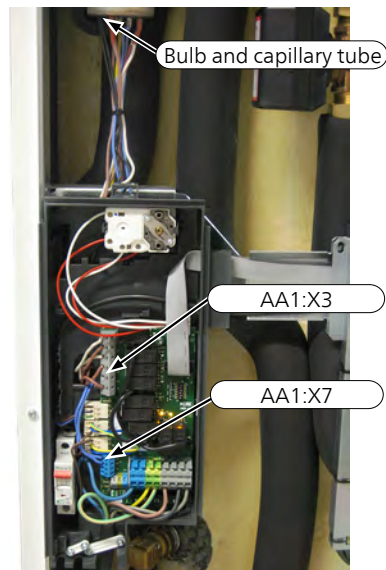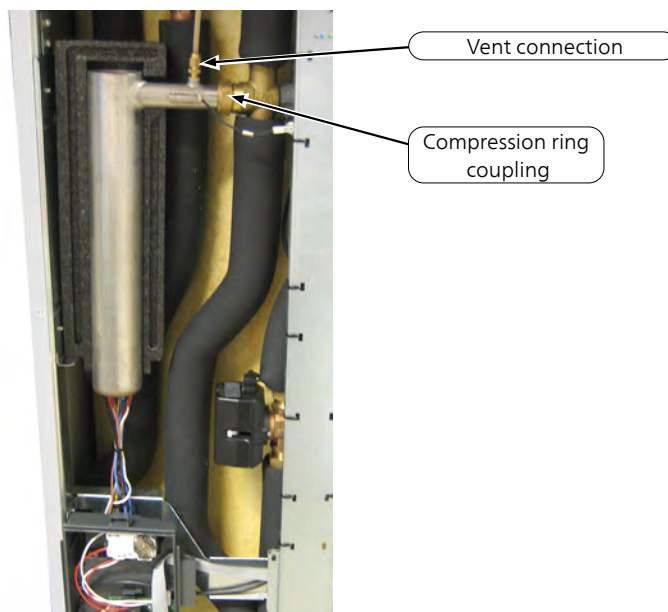
Replacement of shunt valve QN11

|	
1 Set the switch (SF2) to "stand by" mode and wait approx. 30 secs	
2 Turn off the power supply to VVM 500 and EB 101.	
3 Drain the water by opening the drain valve (QM1) and allow air in via the vent (QM20) until VVM500 is empty.	QM20 Reversing valve (QN11) Drain valve (QM1)
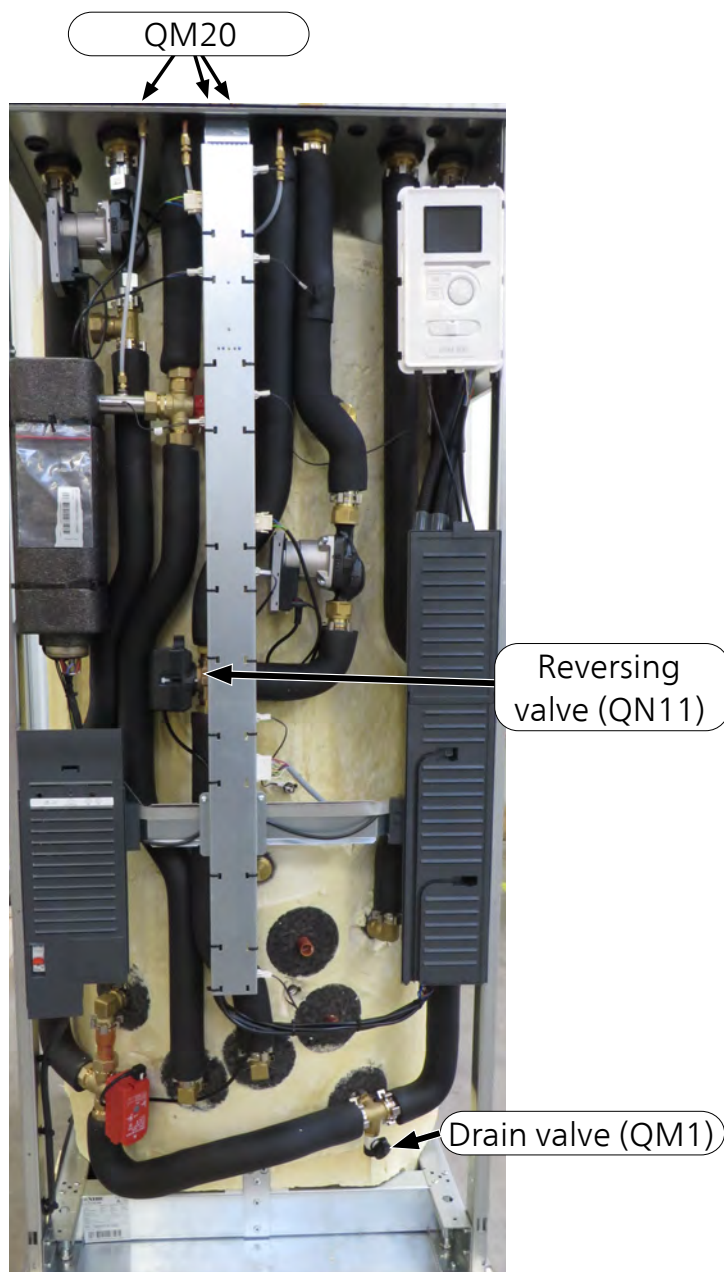
4 Remove the switch on the actuator.

5 Remove the actuator by pressing in the button and turning anticlockwise.

QN11

Contact

Button
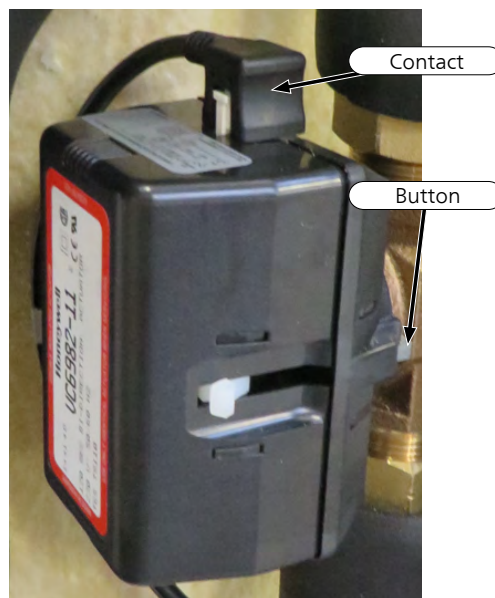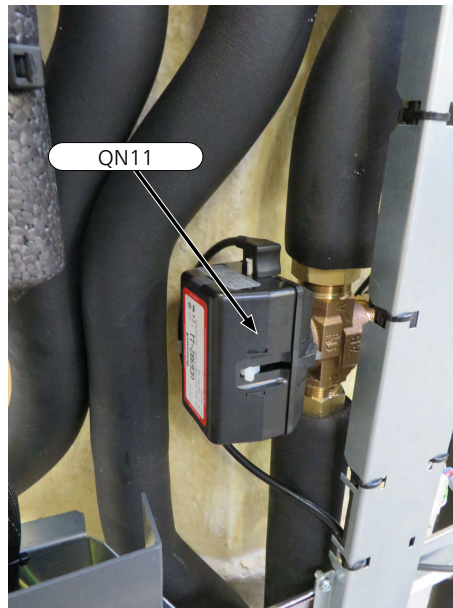
6 Disconnect the connections.	 Connections
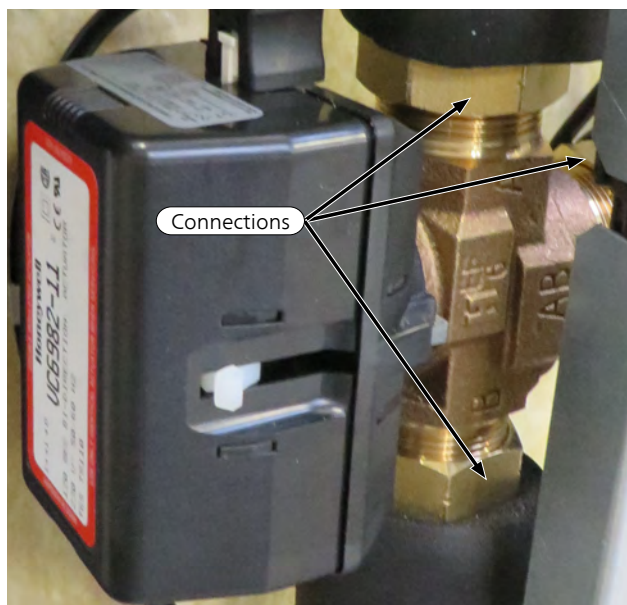
Replacement of reversing valves QN 10 and QN 35

1 Set the switch (SF1) to stand by mode and wait approx. 30 secs	
2 Turn off the power supply to the heat pump.	
3 Close the shut-off valves to the heating system and heat pump.	
4 Drain the water by opening the drain valve (QM1) and allow air to enter via the vents (QM20) until the level is below the part to be replaced.	 QM20 QN10 QN11 QM35 QM1
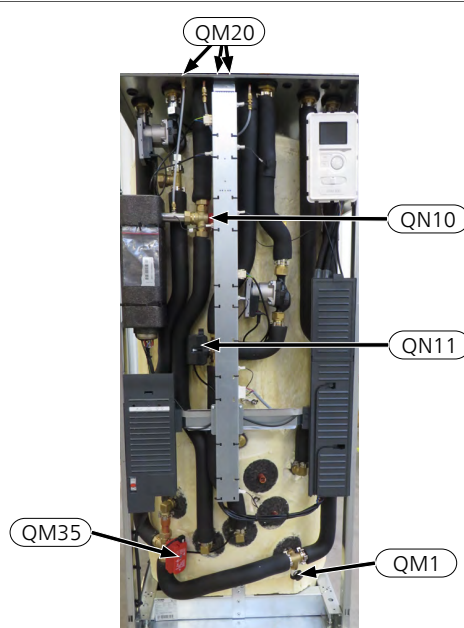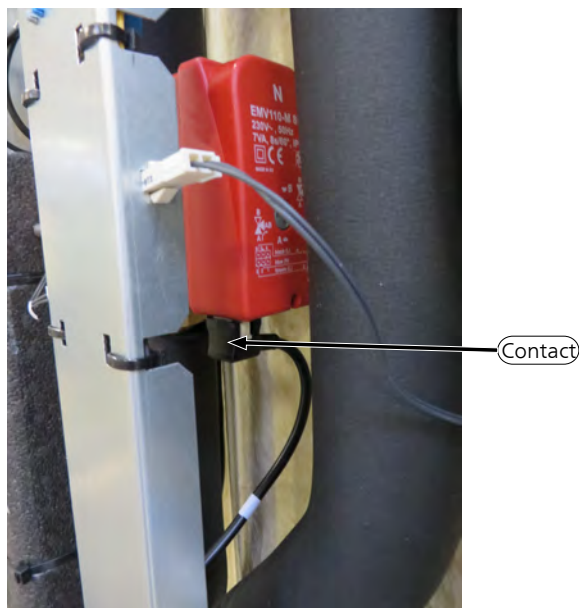
5 Remove the switch on the actuator.	
6 Remove the pin and remove the actuator. **7** Disconnect and remove the reversing valve.	
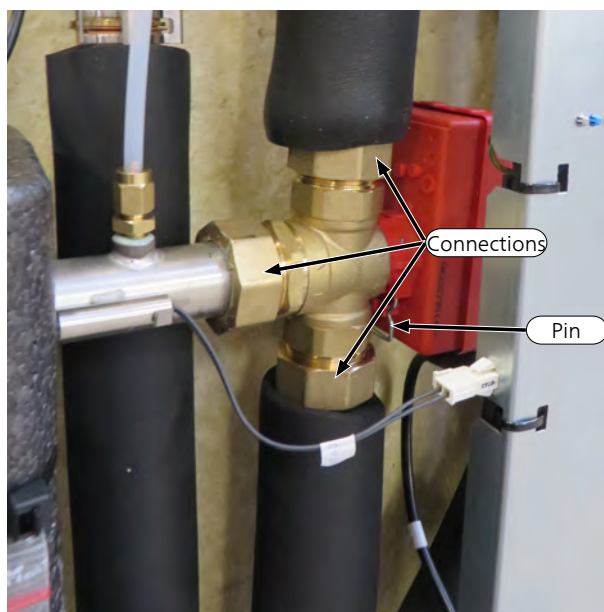
8 At reassembly, the actuator can be used if the valve needs turning the right way.

Actuator
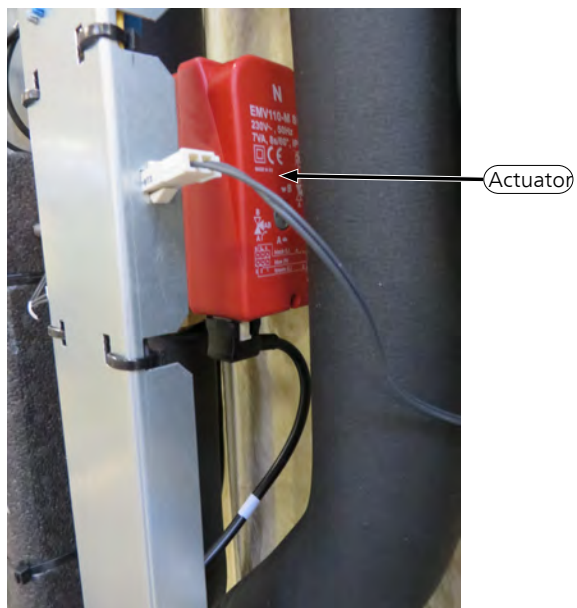
Replacement of circulation pump GP1 and GP12

1 Set the switch (SF2) to "stand by" mode and wait approx. 30 secs	
2 Cut the power supply to VVM 500 and EB 101.	
3 Drain the water by opening the drain valve (QM1) and allow air in via the vent (QM20) until VVM 500 is empty.	

4 Circulation pumps GP1 and GP12	
5 Disconnect the cables and connections on the circulation pump GP1.	
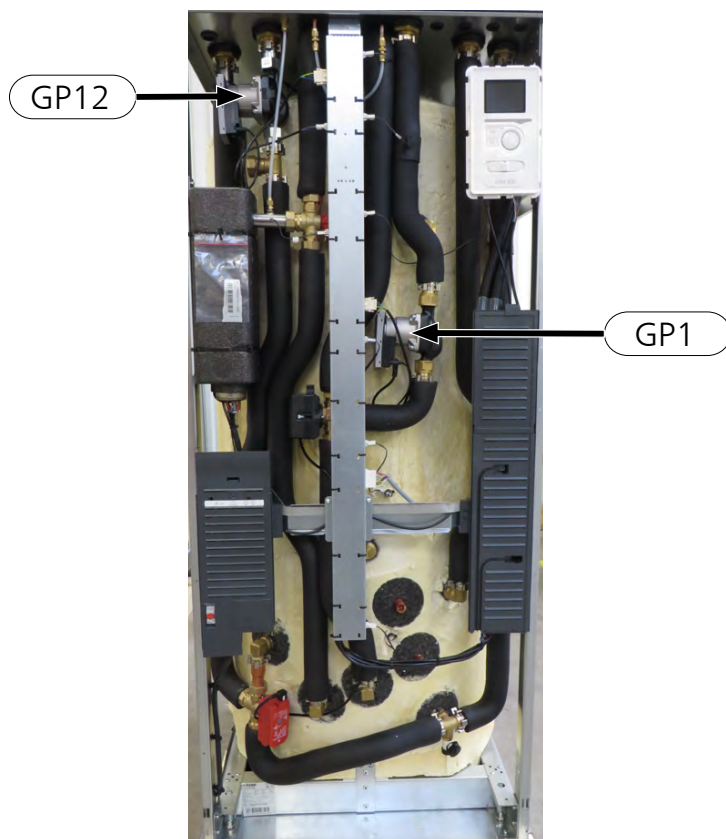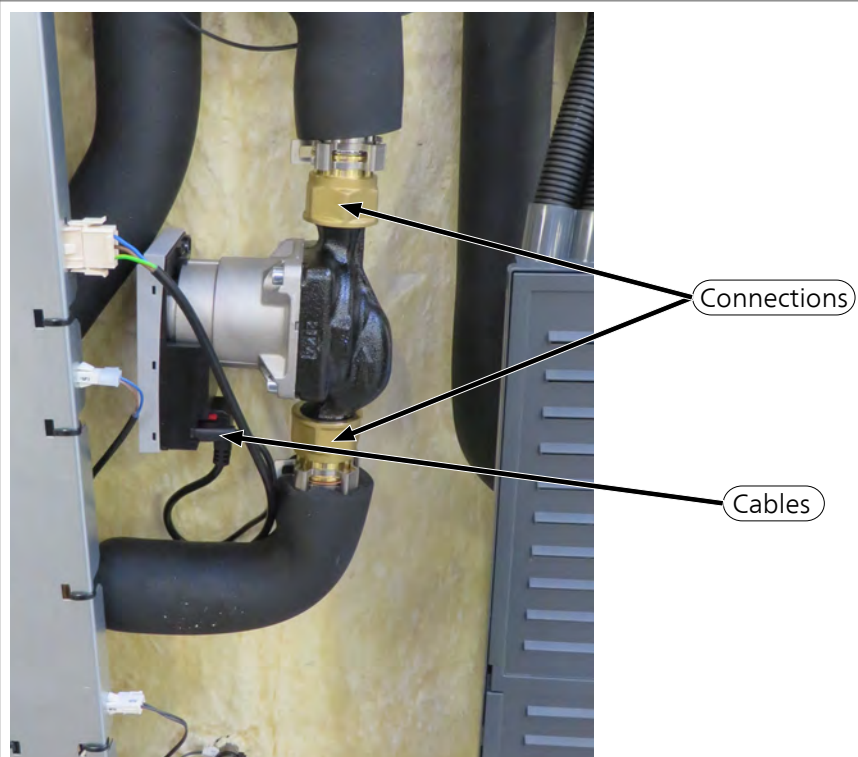
6 Disconnect the cables and connections on the circulation pump GP12.

Connections

Cables
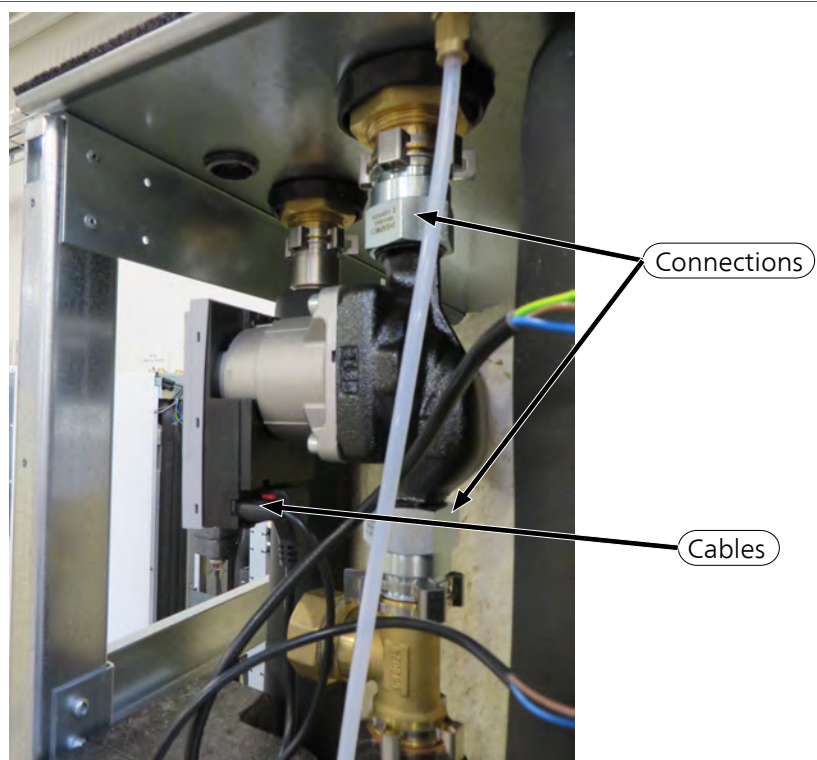
Circuit board and electronics

> **! NOTE**
> Cut all power to the product prior to carrying out work on the circuit board and electrical components.

> **! NOTE**
> During all the work on circuit boards and electronics ensure that the components are not damaged by electro static discharge (ESD).

Immersion heater card (AA1)

1 Remove the plastic cover over (AA1). See instructions in IHB.	
2 Remove the screw and connect cables.	

Base card (AA2)

1 Remove the plastic cover over (AA3). See instructions in IHB.	
2 Remove the plastic cover over (AA2). See instructions in IHB.	
3 Remove the screw and connect cables.	Screw

Input circuit board (AA3)

1 Remove the plastic cover over (AA3). See instructions in IHB.	
2 Remove the screw and connect cables.	Screw

Display unit (AA4)

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

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

3 Slide the display unit up until it releases from the mounting.

Catch

Network cable
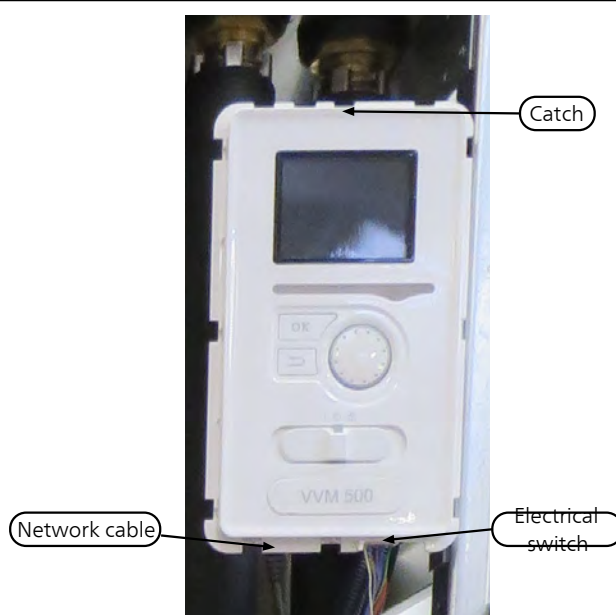
Electrical switch

8 Technical data

Dimensions and setting-out coordinates
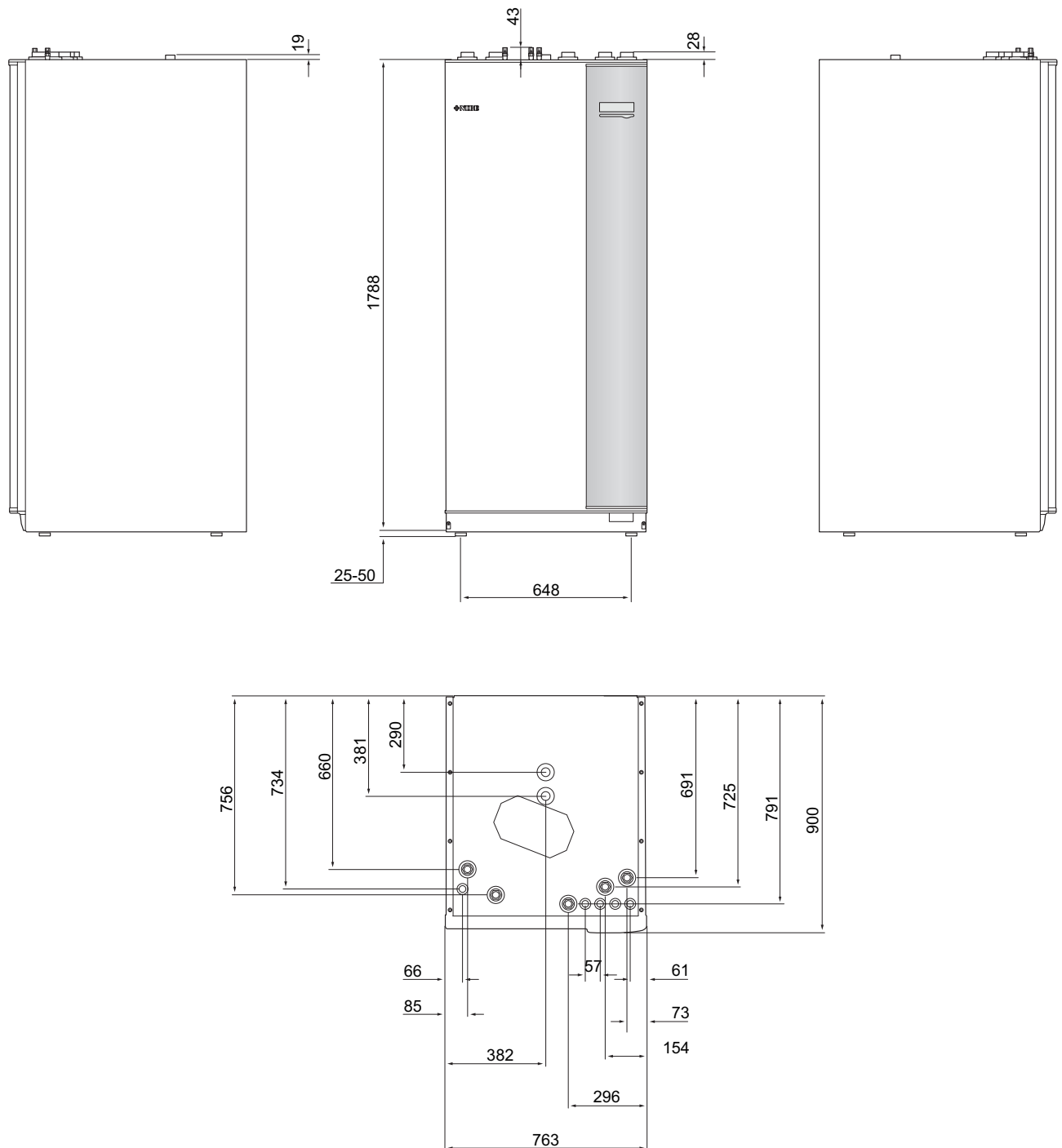
Technical specifications

CE IP 21

3x400V

3x400V		
Max heat pump output [1]	kW	20
Additional power	kW	9
Electrical data		
Rated voltage		400V 3NAC 50 Hz
Max operating current	A	16.2
Fuse	A	16
Output, HM pump (to 2014-04)	W	10 – 110
Output, HM pump (from and including 04 2014)	W	3 – 76
Output, charge pump (to 2014-04)	W	10 – 110
Output, charge pump (from and including 04 2014)	W	3 – 76
IP class		IP 21
Heating medium circuit		
Energy class circ-pump		low energy
Energy class charge pump		low energy
Max system pressure heating medium	MPa	0.3 (3 bar)
Min flow	l/h	500
Max HM temp	°C	70
Pipe connections		
Heating medium, CU pipe	G25	int.
Hot water connection	G25	int.
Cold water connection	G25	int.
Heat pump connections	G25	int.

Miscellaneous		
Indoor module		
Volume loop	l	22.8
Volume, total indoor module	l	500
Volume buffer vessel	l	80
Volume, solar coil	l	2
Cut-off pressure, loop	MPa	1.0 ((10 bar)
Max permitted pressure in indoor module	MPa	0.3 (3 bar)
Capacity hot water heating According to EN 255-3		
Tap volume 40 °C at Eco- comfort	l	235
Tap volume 40 °C at Normal comfort	l	303
Tap volume 40 °C at Lux comfort	l	378
Idle loss according to DIN 4753-8.	W	116
Dimensions and weight		
Width	mm	760
Depth	mm	900
Height	mm	1900
Required ceiling height	mm	2000
Weight (excl packaging)	kg	240

Miscellaneous		
Part no.		069 400
RSK No.		624 23 28

[1]Applies with an outdoor air heat pump at 7/45 °C (outdoor temperature/flow line temperature)

Hot water capacity

Hot water capacity VVM 500

Tap flow (l/min)

Flow (litres)

Economy   Normal   Lux
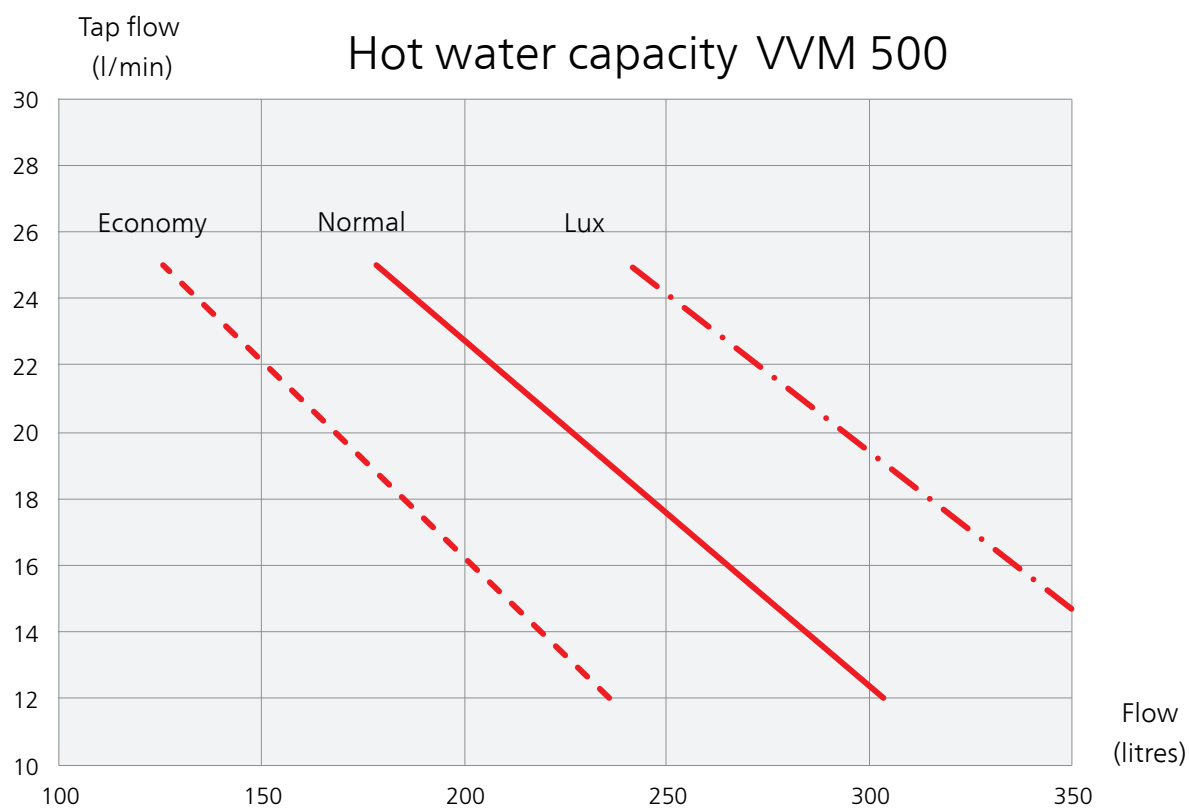
9 Item register

Item register

A
Accessibility, electrical connection, 30
Alarm list, 15

B
Basic, 30
    Front hatch, 30

C
Cable lock, 33
Circuit board and electronics, 45
Component description, 10
    Components, 10
    Sensors, 12
        Temperature sensor data, 12
Component replacement, 30
    Basic, 30
        Front hatch, 30
    Circuit board and electronics, 45
    Main components, 34
Components, 10
Contact information, 4

D
Delivery and handling
    Removing the covers, 30
Description of functions
    Electronics, 13
    Load monitor, 9
Dimensions and setting-out coordinates, 48
Document information, 2

E
Electrical connections
    Accessibility, electrical connection, 30
    Cable lock, 33
    Removing the cover, base board, 32
    Removing the cover, immersion heater circuit board, 31
    Removing the hatch, input circuit board, 31
Electronics, 13

F
Front hatch, 30
Function check, components, 28

H
Hot water capacity, 51

I
Important information, 2
    Document information, 2

Safety information, 2
Indoor module's design
    List of components, 6

L
List of components, 6–7
Load monitor, 9

M
Main components, 34
Marking, 2

P
Principle of operation, 7
    List of components, 7

R
Removing the cover, base board, 32
Removing the cover, immersion heater circuit board, 31
Removing the covers, 30
Removing the hatch, input circuit board, 31

S
Safety information, 2
    Contact information, 4
    Marking, 2
    Serial number, 3
    Symbols, 2
Sensors, 12
    Temperature sensor data, 12
Serial number, 3
Symbols, 2
System description, 7
    Principle of operation, 7
        List of components, 7
    System diagram, 8
System diagram, 8

T
Technical data
    Dimensions and setting-out coordinates, 48
    Hot water capacity, 51
    Technical Data, 49
Technical Data, 49
Temperature sensor data, 12
The heat pump design, 5
Troubleshooting, 15
    Alarm list, 15
    Function check, components, 28
    Troubleshooting guide, 23
Troubleshooting guide, 23