

Repair instructions

WPE-I xx H 400 Premium

Version D0000086652-c 12.11.2021

The WPE-I 33, 44, 59, 87H 400 Premium ground source heat pump is an inverter-controlled heating heat pump. Heat pump settings are carried out via the standard touchscreen. To achieve higher outputs, appliances of different output levels can be cascaded. Parameters for pool operation, additional heating circuits with mixer, comprehensive DHW heating and cooling operation can be set using the EM3 auxiliary module. Max. 16 appliances can be used in one cascade.

Launch: April / 2019
Destination countries: For target countries only



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1. General information

Work on an open appliance and repair work may only be carried out by a person trained by STIEBEL ELTRON. Current safety instructions contained in the operating and installation instructions for the appliance must be observed.

2. Further relevant information

Document	Number
WPM G controller operating instructions	339364
Commissioning	339365
Heat pump operating instructions	339363
Spare parts list	D0000085342
ISG web operating instructions	292389
Service bulletin: Faulty inverters	D0000098535

3. Relevant appliances

Appliance	Material no.	Version
WPE-I 33H 400 Premium	201412	A
WPE-I 44H 400 Premium	201413	B
WPE-I 59H 400 Premium	201414	C
WPE-I 87H 400 Premium	201415	D

4. Special features of the appliance series

-none-

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5. Function description

5.1 Compressor speed control

The compressor speed is controlled in specified gears. Ten gears are stored with predefined speeds. The appropriate gear is selected subject to the heat demand. Appliances with a date of manufacture up to 2019 are started at 3000 rpm while appliances with a date of manufacture from May 2020 are started at 1800 rpm. The starting procedure takes ten seconds. Then the speed is regulated to the corresponding gear. Acceleration takes place by running up through the individual gears until the required speed is reached. The compressor is also stopped by running down through the individual gears, which can take a few minutes. Once the compressor reaches the lowest gear, the expansion valve is closed and the compressor is switched off after the pumpdown phase.

Version B, C, D			Version A	
Gear	Rated speed	Range	Rated speed	Range
1	1500	1500-1799	1500	1500-1649
2	2000	1810-2250	1655	1655-1799
3	2500	2251-2750	1850	1800-1999
4	3000	2751-3250	2100	2000-2299
5	3500	3251-3750	2400	2300-2599
6	4000	3751-4250	2700	2600-3000
7	4500	4251-4750	3300	3005-3299
8	5000	4751-5399	3500	3300-3799
9	5500	5410-5700	4000	3800-4199
10	6000	5701-6000	4500	4200-4500

5.2 Heating

The prerequisite for heating mode is that the outside temperatures correspond and a flow sensor (51, T33) has been connected. Based on the heating curve and the set room temperature (room temperature sensor, if required), a set temperature is calculated for the flow. This is used in the demand calculation to determine the required gear for the compressor and to display it on the control unit under "Heating demand" (Main menu – Process data – Graphs – Demand). If the value falls below "-4" (factory setting), as long as the compressor is not blocked by various restrictions (e.g. compressor idle time), the heat pump starts at the start speed. The compressor then runs through the gears until it reaches the speed that corresponds to the heating demand. The calculated demand and the switching delay determine how long it remains in each gear. It is also possible to run through multiple gears without a delay time. This is the case if the calculated demand after the compressor start is significantly below -4. When the "Demand" parameter moves into the positive range (+4), the compressor runs slowly back down through the gears. Here too, it is possible to run straight through the gears subject to the "Demand" parameter without remaining in the individual gears. This appliance series does not support immediate shutdown when a set temperature is reached.

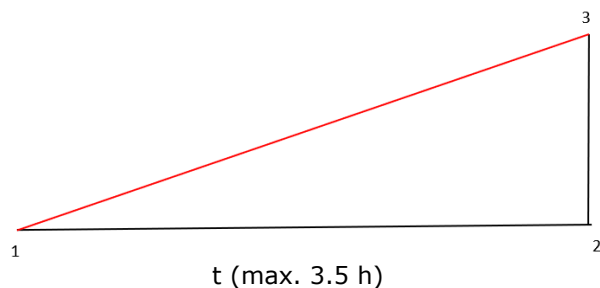
5.3 DHW

A prerequisite for DHW heating is at least one connected sensor T37/sensor in the DHW cylinder at the bottom. Generally, two sensors are connected and installed in the DHW cylinder at the top (T36) and at the bottom (T37). It is possible to select a weighting to balance the actual DHW temperature across the two sensors to ensure optimum DHW heating. The standard value is 0.65. This means that the lower sensor has a weighting of 65 % and the upper sensor has a weighting of 35 %. If only one sensor is installed, the weighted temperature corresponds to the sensor value.

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DHW heating starts when the (weighted) temperature in the DHW cylinder falls below the start temperature. If the temperature falls rapidly, DHW heating can also start before the start temperature is reached. For this, the diverter valve switches over to the DHW cylinder. For DHW heating, the compressor starts in the lowest gear. If there is additional demand, the calculated demand is added to this, so that the compressor immediately runs in a higher gear and the DHW demand is quickly met. Switching up through the gears is also quicker if the temperature at a DHW sensor drops by more than 1 K in a short time or the actual DHW temperature is below the calculated minimum set DHW temperature during DHW heating. The actual DHW temperature curve is expected to correspond at least to the curve shown in the diagram below. This means the diagonal line (red) between the DHW start temperature (1) and the set DHW temperature (3) indicates the expected DHW temperature curve during DHW heating. The maximum available time for this is 3.5 h. If the actual DHW temperature is lower than the expected temperature curve, switching up through the gears is carried out until the line is reached again. No provision has been made for switching down through the gears during DHW heating before the set DHW temperature is reached.

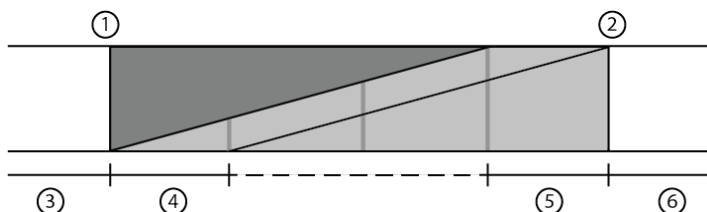


Number	Designation
1	DHW start temperature
2	Time – max. 3.5 hours
3	Set DHW temperature

DHW heating is ended when the set DHW temperature is reached. Internal limits may also lead to shutdown. These include leaving the compressor curve, high pressure > 41.3 bar (absolute) or a hot gas temperature above 127 °C. DHW heating using hot gas extraction is described in the chapter "Hot gas extraction".

5.4 Cooling

Active and passive cooling is only possible with an EM4 extension module (see EM4 connection diagrams, cooling function). The standard setting for start of cooling is an outside temperature of 25 °C. Depending on the outside temperature, the cooling function can be set to between -40 °C and +40 °C. For a cooling time start delay, an integral value of 150 Kelvin minutes is stored. The currently calculated value is displayed under the operating data. The control unit does not generally distinguish between active and passive cooling. If, during passive cooling, there is demand for DHW, for example, then the compressor switches on and carries out active cooling. The diagram below shows the correlation between passive and active cooling. The start temperature for passive cooling and the stop temperature for active cooling are calculated automatically depending on the start/stop temperature setting.



Number	Designation
1	Stop temperature cooling
2	Start temperature cooling
3	Stop passive cooling
4	Stop active cooling
5	Start passive cooling
6	Start active cooling

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Setting example:

Cooling start temperature 18 °C

Cooling stop temperature 15 °C



Number	Designation
1	Stop passive cooling
2	Stop active cooling
3	Start passive cooling
4	Start active cooling

Passive cooling can be activated independently of active cooling. During passive cooling, the brine circulates in the bore hole. If the compressor is already operating and there is passive cooling demand, active cooling is carried out. Active cooling can be activated independently of passive cooling. During active cooling, the compressor is used to cool the brine. The heat that is generated is used wherever possible for heating, DHW or swimming pool. Otherwise, it is routed to the source or an air cooler. The gears are calculated subject to the cooling parameter setting. The Kelvin deviation of each gear is determined by the range between the start/stop temperature and the range between the minimum and maximum gear.

5.5 Hot gas extraction

An integral hot gas heat exchanger enables hot gas energy to be tapped during buffer charging or DHW heating.

Start hot gas extraction

- End temperature of the DHW cylinder not reached and...
- Compressor is running and...
- Hot gas temperature >65 °C factory setting (adjustable from 36 °C – 90 °C)

Stop hot gas extraction

- End temperature of the DHW cylinder reached or...
- Hot gas temperature >125 °C factory setting (adjustable from 50 °C – 125 °C) or...
- Hot gas temperature < 60 °C factory setting (adjustable from 35 °C – 84 °C) or...
- Compressor is not running

The hot gas heat exchanger always receives a flow when the compressor is running. When the circulation pump is switched on, a separate flow and return draw the energy from the heat exchanger. This circulation pump is used to control the extraction of heat from the hot gas.

5.6 Refrigerant circuit control

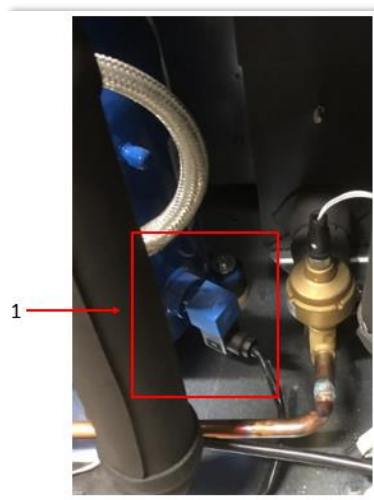
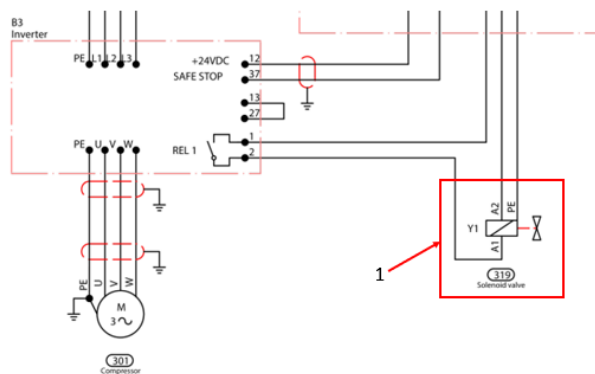
The refrigerant circuit comprises a compressor, evaporator, condenser, hot gas heat exchanger and expansion valve. No intermediate injection is provided. At the beginning, a set opening level is calculated for the expansion valve. When the expansion valve has reached this opening level, the compressor is started. The refrigerant circuit is controlled according to the PINCH principle and not according to a specific superheating process. The high pressure is controlled in relation to the source outlet temperature. A set HP value and a set opening level are calculated.

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5.7 Oil injection control / oil boost function

The compressors are equipped with an oil injection system. This system ensures airtight compression chambers, increasing the isentropic efficiency of the compressor at all speeds. The oil circulation rate is controlled in a similar way. The inverter regulates the oil circulation rate via the oil injection valve on the compressor (1).



The oil injection valve is "closed at zero volt". At low speeds, the valve is not 'live' so that oil is injected into the scroll set suction connector. The control parameters are preset on the inverter and cannot be changed. However, they can be displayed. An insufficient oil level is an indication that oil has collected in the lines. To ensure oil return, time and speed functions are taken into consideration. The predominant function depends on which prerequisite occurs first. The following parameters are preset:

Parameter	Value	Meaning
Compressor start speed	2700 rpm	Selected compressor start speed
Oil return management	On	Oil supply management is switched on
Runtime, low speed	60 minutes	If the compressor speed for this time is consistently below 3000 rpm, it is increased to 4200 rpm (adjustable between 4205 and 4405 rpm).
Interval, speed increase	24 hours	Fixed time interval when the oil boost function switches on irrespective of the compressor speed.
Duration, speed increase	30 seconds	If the oil boost function is switched on, the compressor speed is increased for this duration.

5.8 Pumpdown

Before each compressor stop, a pump down action is carried out.

Pump down is carried out in the lowest gear. The expansion valve closes. This causes residual refrigerant to be drawn out of the evaporator. This prevents liquid refrigerant from being drawn in an uncontrolled manner during the next starting procedure.

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5.9 Cascade control

5.9.1 Commissioning

One unit is configured as the primary unit (master). This unit manages the demand calculations and controls all secondary appliances (slaves) and all connected extension modules (EM). All other heat pumps are configured as secondary appliances.

In the Settings – System settings – Network settings parameter, the IP address of the appliance can be set to static or DHCP (factory setting).

On each appliance in the cascade, switch on the "Cascade control" parameter. The first appliance, which is to assume primary control, must be set as the master. Additional appliances must be programmed as slaves. On the master heat pump, the number of connected slave appliances and any externally controlled heat pumps is entered. For the slave appliances, their position in the cascade is entered. "ID 1" for the first slave, "ID 2" for the second slave, etc. The appliances must have the same port number (e.g. 5871).

From software version 2.01.000 onwards, the network settings are set automatically when the parameter "Assign IP" has been selected. With previous software versions, the data must be entered manually for each appliance.

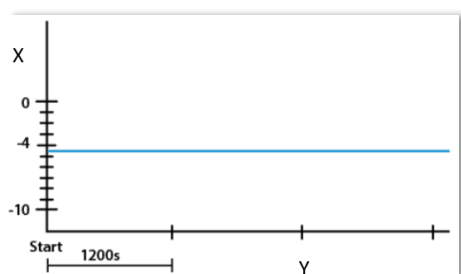
E.g. an IP address for the first (master) appliance of 192.168.178.1, and then successively for subsequent appliances 192.168.178.2, 192.168.178.3, etc.

The network mask is the same for all appliances: 255.255.255.0

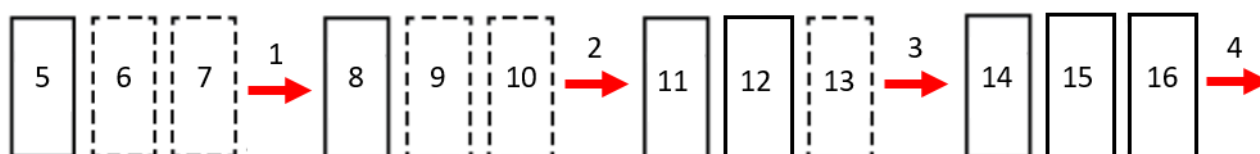
5.9.2 Logic

The secondary appliances (slaves) communicate to the master what demand is being met. Each connected heat pump corresponds to a number of output stages (gears). These gears are added up and correspond to the total number of gears that the master heat pump can allocate to the requirements. The master heat pump calculates how many gears are required for each demand and distributes them among the units that can cover this heat demand. The primary heat pump (master) does not identify the heat pump type of the slave appliances. It is always assumed that all slave appliances are the same as the master heat pump.

Taking a cascade with three heat pumps as an example, assuming all heat pumps have the same runtime:



Axis	Designation
X	Heat demand, constant -4.5, set/actual deviation constant
Y	Time axis subdivided into 1200 sec. (20 minutes)



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Number	Designation	Number	Designation
1	1200 seconds after start phase	9	Slave heat pump (ID 1) OFF
2	2400 seconds after start phase	10	Slave heat pump (ID 2) OFF
3	3600 seconds after start phase	11	Master heat pump (ID 0) stage 5
4	4800 seconds after start phase, etc.	12	Slave heat pump (ID 1) stage 4
5	Master heat pump (ID 0) stage 1	13	Slave heat pump (ID 2) OFF
6	Slave heat pump (ID 1) OFF	14	Master heat pump (ID 0) stage 5
7	Slave heat pump (ID 2) OFF	15	Slave heat pump (ID 1) stage 4
8	Master heat pump (ID 0) stage 5	16	Slave heat pump (ID 2) stage 4

5.9.3 Runtime compensation and stage control

Within a cascade, any appliance can be assigned the required function. Compressor runtime compensation only occurs once all functions have been equally distributed among all heat pumps. The maximum number of heat pumps is limited to six. EM cards can be used to control up to 15 existing heat pumps (Legacy On/Off).

The appliance with the lowest numbers of starts has switch-on priority. The start counter is reset when the primary heat pump (master) is activated or switched on again. If all heat pumps have the same number of starts, the primary unit is prioritised. Slave appliances with the lowest HP ID numbers are then switched on. Lastly, existing (legacy) appliances are activated based on the HP ID numbers.

The sequence in the event of output demand is in accordance with the table below. If stages are no longer required, switch-off occurs in reverse order according to priority.

Start priority	Heat generator	Calculated number of stages
1	Heat pumps	10
2	Existing legacy heat pumps	4
3	Auxiliary heater	6

Another heat pump is started if the heat pump already in operation can no longer accelerate or if demand requires four or more additional gears. A new unit is also started if an individual unit is running in gear 7 or higher and there is still heat demand. Appliances that have been activated for DHW heating are not requested to fulfil demand.

The master heat pump always attempts to balance the speed between the activated heat pumps. No speed compensation occurs for heat pumps that have been activated for DHW heating. No speed balancing occurs if a heat pump would need to run in a gear <4.

5.9.4 Switch-off priority

Appliances working at stage four or higher are stepped down. Appliances showing the highest runtime are switched off first.

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6. Appliance description

The ground source heat pump is an inverter-controlled heating heat pump. If this heat pump is used in conjunction with a DHW cylinder, DHW heating can also be carried out through the appliance. Hot gas extraction enables an additional heat exchanger with continuous flow to be used in the hot gas line. This ensures a high flow temperature subject to the refrigerant circuit data. Heat pump settings are carried out via the standard touchscreen. To achieve higher outputs, appliances of different output levels can be cascaded. Communication between multiple appliances occurs via a LAN connection.

The heat pump is housed in a steel casing painted in alpine white. The inverter is cooled with ambient air via a fan. All heat pump connections are made at the top.

6.1 Casing

The casing is made of sheet steel painted in alpine white. In versions C and D, the left side panel has slots for inverter cooling. From May 2021, the air for inverter cooling is drawn in at the left side panel and discharged via the right side panel. In versions A and B, the slots are located in the back panel.

Ventilation slots for inverter cooling.

1	Air intake
2	Air outlet

Version A, B
Back view

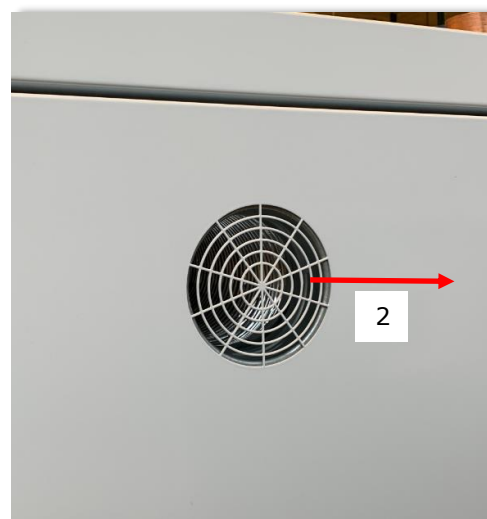


Version C, D up to
May 2021
Back view

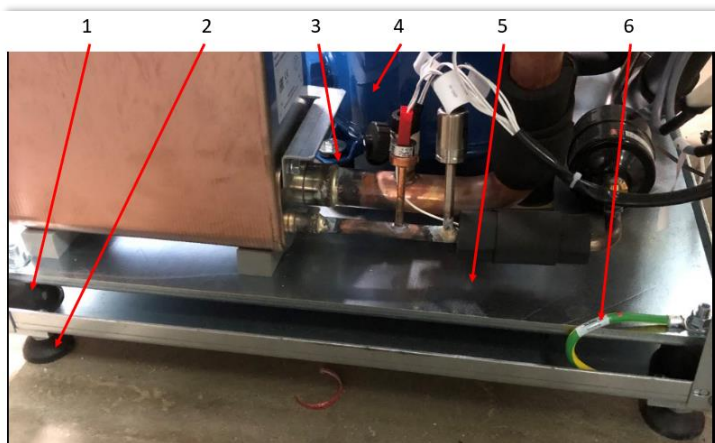


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Version C, D from
June 2021



The hydraulic connections are routed through the top. The appliance is mounted on rubber anti-vibration mounts to reduce sound transmission. The compressor is fixed to a separate oscillation plate, which also rests with rubber anti-vibration mounts on the floor plate. The compressor is secured on rubber anti-vibration mounts on the separate oscillation plate.



Number	Designation
1	Rubber anti-vibration mount, oscillation plate
2	Rubber anti-vibration mount, appliance
3	Rubber anti-vibration mount, compressor
4	Compressor
5	Oscillation plate
6	Earth cable

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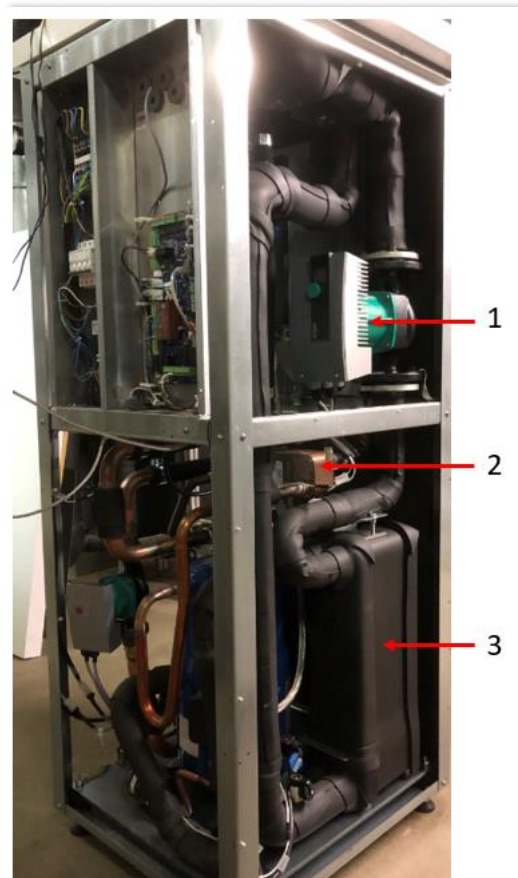
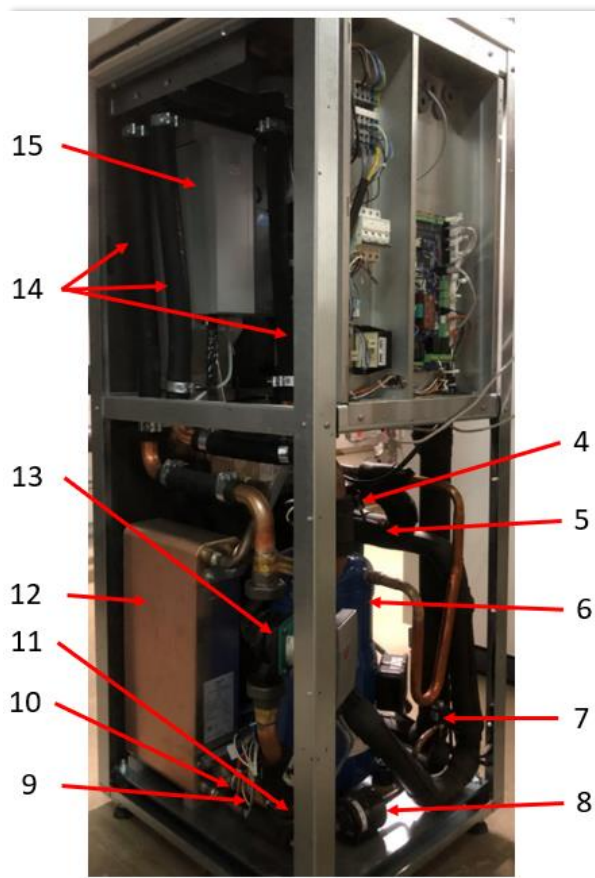
The sheet metal parts have insulating mats for sound-proofing. In versions C and D, the mounting plate is also enclosed by a frame.



The appliance dimensions can be found under "Specification".

6.2 Appliance overview

Version A, B:

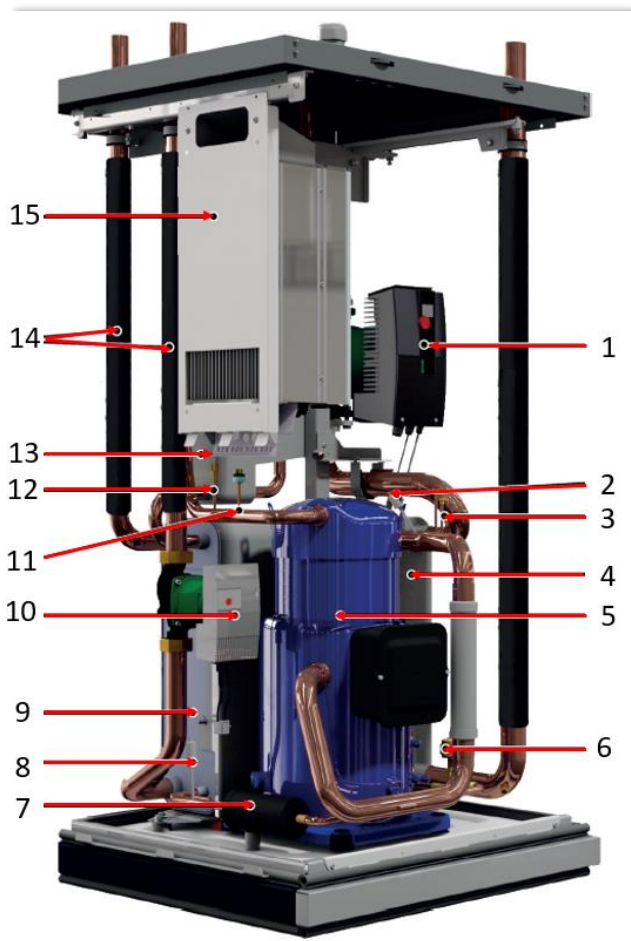


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Number	Designation	Number	Designation
1	Brine pump	9	High pressure sensor
2	Hot gas heat exchanger	10	High pressure switch
3	Evaporator	11	Service connection, high pressure
4	Low pressure sensor	12	Condenser
5	Low pressure service connection	13	Heating/DHW charging pump
6	Compressor	14	Flexible hoses
7	Electronic expansion valve	15	Inverter
8	Filter dryer		

Version C, D:



Number	Designation
1	Brine pump
2	Low pressure sensor
3	Low pressure service connection
4	Evaporator
5	Compressor
6	Electronic expansion valve
7	Filter dryer
8	High pressure sensor
9	Condenser
10	Heating/DHW charging pump
11	High pressure switch
12	Service connection, high pressure
13	Hot gas heat exchanger
14	Flexible hoses
15	Inverter

6.3 Electronic assemblies

The appliance has various electronic components for controlling and entering parameters. The main controller in the programming unit (CM= control module) contains the entire control software. The control PCB in the appliance (BM= building module) controls the inputs and outputs, and includes refrigerant circuit control. For some auxiliary functions such as cooling, pool, heating circuits with mixer 2-5, hot gas extraction, DHW heating function or control of an older or competitor heat pump, an EM auxiliary module (EM = extension module) is required.

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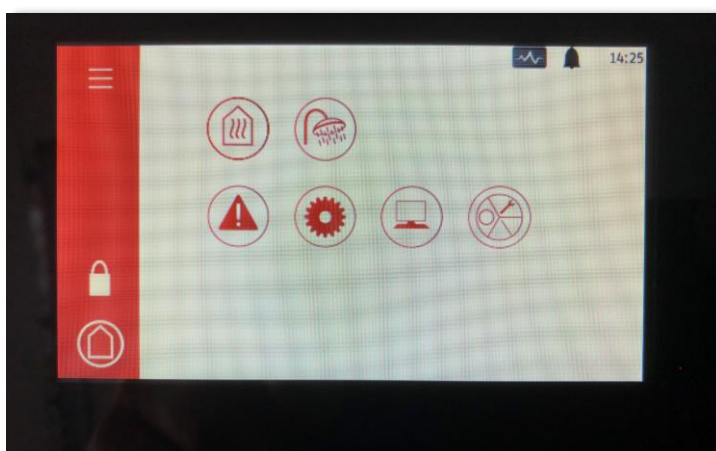
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6.3.1 Programming unit CM module (control module)

The spare parts number for the CM module programming unit is 338836.

The programming unit is used to carry out heat pump settings at various control levels. The PCB on the programming unit is the main control unit with heat pump software "Genesis". A detailed description of the individual parameters can be found in the operating instructions.

The 2 m long connecting cable from the CM module to the BM module is available as spare part no. 335104.



Symbols and their meaning:

Symbol	Meaning
	Open the menu from the start page. Back to the menu from a submenu.
	Confirm a setting. Save an entry.
	Reject a setting. Cancel an entry.
	Scroll back through pages and submenus.
	Scroll forward through pages and submenus.
	Home button. Return to start page from any menu item.
	Alarm symbol. Pressing this symbol changes the display to the alarm history window.
	Active class A or B alarm.

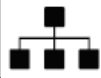
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Symbol	Meaning
	Select operating mode. Pressing this symbol opens a new window to select the operating mode.
	Display menu. Scan of current temperatures, operating statuses, pressures, etc.
	Factory setting. Resets the values of the <u>current menu page</u> to the factory setting.
	Settings menu. Settings of required temperatures, functions, operating modes, etc.
	Back button. Go back to the next highest menu structure.
	Push-pull control. Displayed when raising or lowering parameters. Press and hold the button and slide it left or right to change the value.
	Alternatively,  and  are also displayed and can be used to change a setting.
	Activate/deactivate push-pull control and/or switch functions or parameters on and off. This symbol indicates a function or parameter that is switched on.
	Activate/deactivate push-pull control and/or switch functions or parameters on and off. This symbol indicates a function or parameter that is switched off.
	To avoid unauthorised access, some functions and parameters in the menu are locked. This symbol indicates locked functions. A code is required to unlock them. Customer service: 718293 Qualified contractor: 607080 Any other code returns the programming unit to user mode. Once the code has been entered, the control unit is unlocked for eight hours.
	This symbol indicates unlocked functions. A code has been entered.
	Legionella symbol. Indicates that the pasteurisation function is currently active.
	Compressor symbol. Displayed when the compressor is activated for heating or DHW heating.
	Cooling symbol. Displayed when the heat pump is in cooling mode.
	Symbol for external heat generator 2. This symbol is displayed when the external heat generator (oil boiler, gas boiler, etc.) is being actuated
	Standby mode. If there is no heat demand, this symbol is displayed.

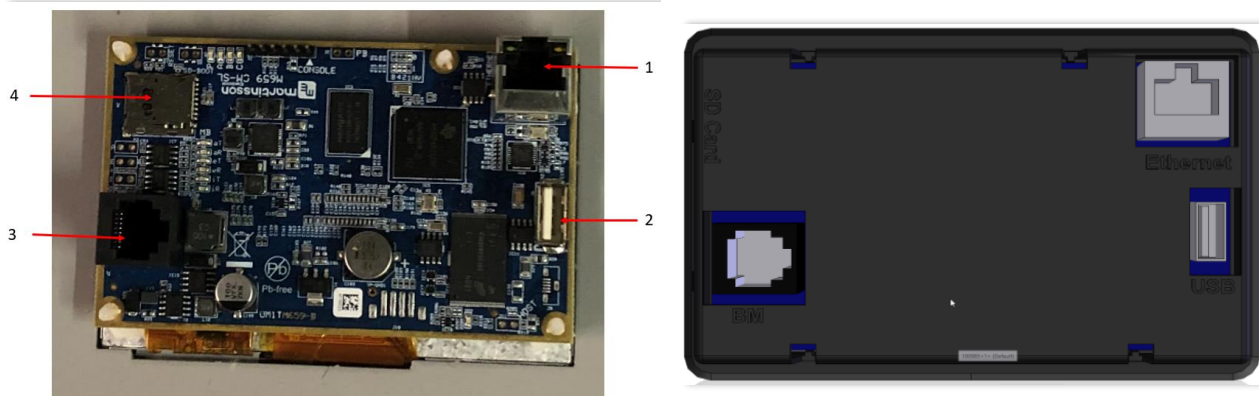
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Symbol	Meaning
	Restart symbol. This symbol is displayed when the heat pump follows a restart command.
	Toggle buttons. Displayed when a function is assigned two switching options.
	Internet symbol. This symbol is displayed when a network with internet access is connected and configured.
	Network symbol. This symbol is displayed when a network is connected and configured.
	Swimming pool symbol. This symbol is displayed when a swimming pool is being heated.
	Heating symbol. This symbol is displayed when the heat pump is in heating mode.
	Timer symbol. This symbol is displayed if the heat pump cannot start yet due to a function or a start condition. This may be a compressor idle time or a maximum temperature that must first be undershot.
	DHW symbol. This symbol is displayed when the heat pump is in DHW mode.
	Keyboard symbol. When this button is pressed, a virtual keyboard is shown.
	Link symbol. This symbol is displayed to establish a connection between one heat pump and another downstream.
	Programmed mode / automatic function active.
	Service function. Can only be selected in cascade mode. The heat pump remains off. All external functions remain active.
	Activate the emergency/auxiliary heater. On activation, the heat pump is off and only the auxiliary heater remains active. Switching on this function on the master appliance results in heat pump shutdown in the entire cascade.
	Operating mode "Off". If this function is switched on within a cascade on a slave appliance, the master heat pump is notified that this heat pump is no longer available.
	Restart. A restart can only be selected if the operating mode is "Off". A service code must be entered. This function restarts the CM module.

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Back of programming unit

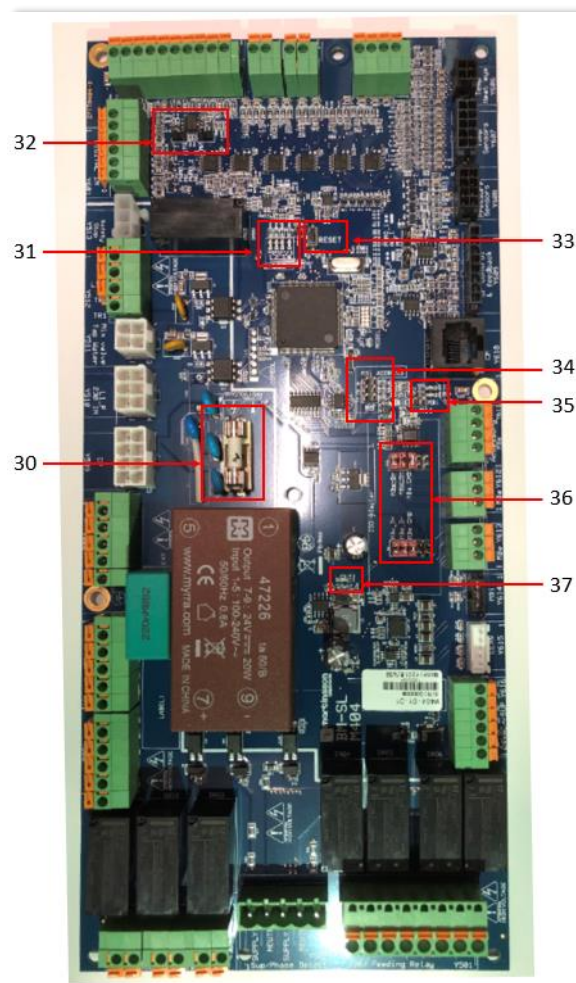
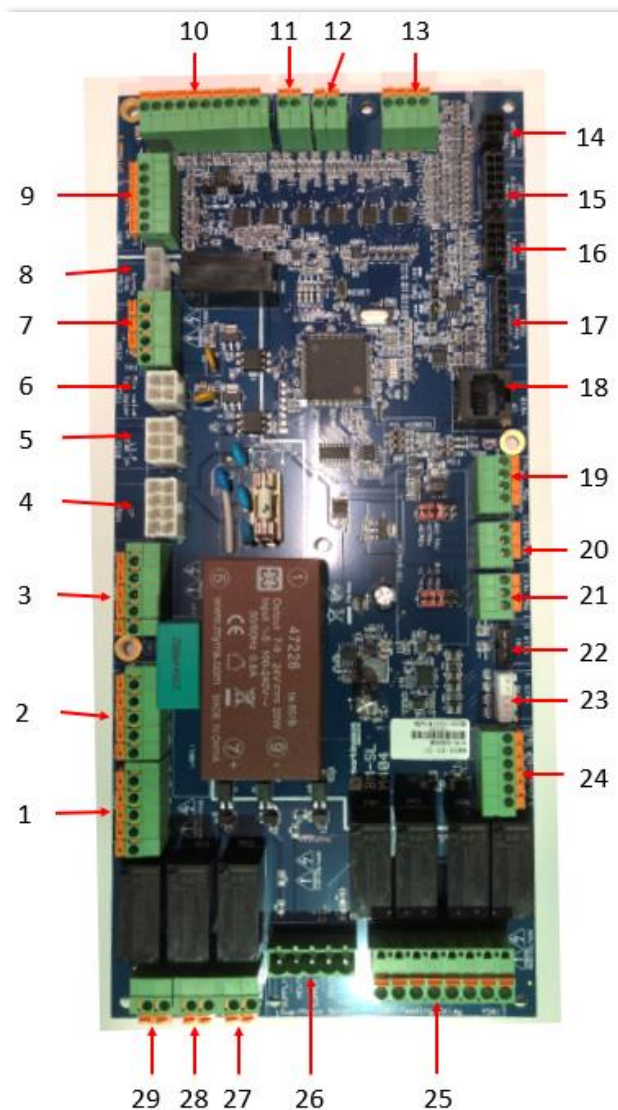


Position	Designation
1	RJ45 connection. Connection of another heat pump. With more than two heat pumps or a connection to an ISG, a network switch is connected. This connection remains free if it is a heat pump without any other network subscribers.
2	• USB slot – if a USB stick is inserted here, after activation of "Logging", all parameters are automatically recorded at one second intervals. • If a USB stick with a software update is inserted, the display switches automatically to the update menu. When the update is confirmed, the update process is started.
3	RJ45 connection for connecting the programming unit to the BM card.
4	Micro SD slot – no function at present.

Repair instructions WPE-I xx H 400 Premium

6.3.2 BM card (building module)

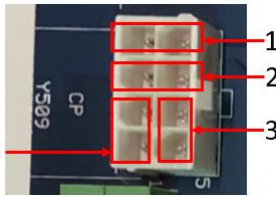
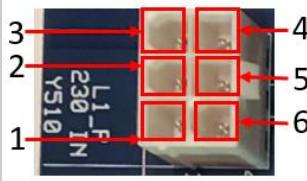
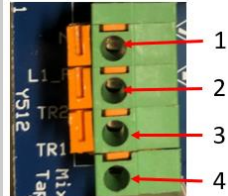
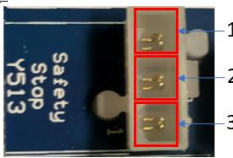
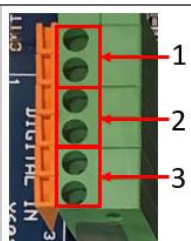
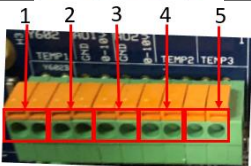
The spare parts number for the BM card is 338837.



Number	Designation	Image	Function
1	X13/Y506 L - 230 V~		5-pole mains terminal
2	X14/Y507 N - neutral		5-pole terminal, neutral conductor

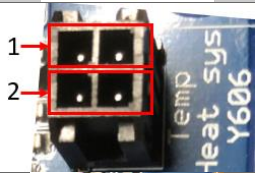
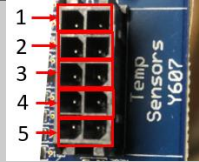
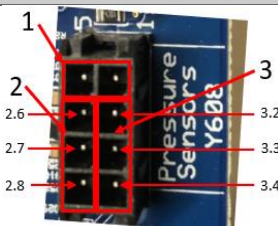
Repair instructions

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Number	Designation	Image	Function
3	X15/Y508 Pe – earth		5-pole earth terminal
4	CP / Y509 network output 1 = Pe 2 = not assigned 3 = L, 230 V output 4 = N, neutral output		8-pole plug-in strip for the supply voltage to the brine circulation pump and buffer/DHW charging pump.
5	L1P / Y510 network input 1 = 230 V input from F2 2 = not assigned 3 = Pe input 4 = 230 V input from EMC 5 = 230 V output to T1 6 = N input		6-pole plug-in strip Supply voltage input for circulation pumps and isolating transformer T1.
6	Mix valve / Y511		Not assigned.
7	Tap water / Y512 1 = N 2 = L 3 = TR2 (L') (triac switching circuit) 4 = TR1 (L') (triac switching circuit)		4-pole terminal for the diverter valve from heating mode to DHW charging via condenser.
8	Safety stop / Y513 1 = 24 V DC from inverter terminal 12 2 = not assigned 3 = return to inverter terminal 37		3-pole plug-in strip Safety stop function
9	Y601 / Digital In 1 = DI1 for connecting a power supply utility circuit or smart grid 1 2 = DI2 for external alarm contact 3 = external N/O contact		6-pole terminal for 3 external actuators. Floating. Optional assignment of all contacts. The functions are not assigned in the delivered condition.
10	Y602 / Temperature sensor and analogue outputs. 1 = buffer cylinder sensor 2 = GND + 0-10 V flow, heating circuit with mixer 1 3 = GND + 0-10 V flow, external heat generator		10-pole terminal for 3 temperature sensors and 2 x 0 – 10 V outputs.

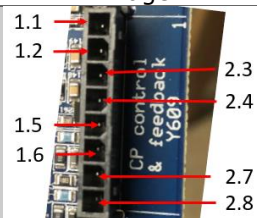
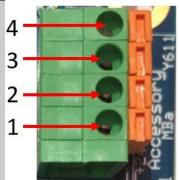
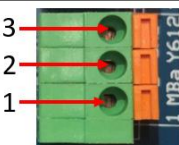
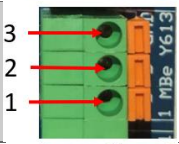
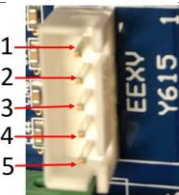
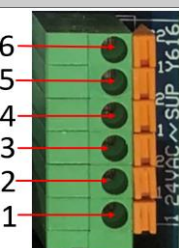
Repair instructions

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Number	Designation	Image	Function
	4 = flow sensor, heating circuit with mixer 1 5 = flow sensor, HP. This sensor is always required for the heat pump function.		
11	Y603 / HGW 1 = from software version 2.00.000, return sensor T34 can be connected here.		2-pole terminal for future functions.
12	Y604 / Outdoor 1 = outside temperature sensor		2-pole terminal for the outside temperature sensor. Not pole-sensitive. If no sensor is connected, the system regulates to 0 °C outside temperature.
13	Y605 / Tap water 1 = DHW temperature sensor, cylinder top 2 = DHW temperature Sensor, cylinder centre		4-pole terminal for DHW temperature sensor.
14	Y606 / Temp heat sys 1 = flow sensor 2 = return sensor		4-pole plug-in strip for temperature sensor of heating system.
15	Y607 / Temp sensors 1 = sensor, source inlet 2 = sensor, source outlet 3 = sensor, compressor inlet 4 = sensor, condenser 5 = sensor, hot gas		10-pole plug-in strip for source and heat pump sensor
16	Y608 / pressure sensors 1 = high pressure switch 2 = high pressure transducer 2.6=earth, 2.7=0-5 V, 2.8=5 V out 2 = low pressure transducer 3.2=0-5 V, 3.3=5 V out, 3.4=earth		8-pole plug-in strip for high pressure switch and refrigerant circuit pressure transducer.

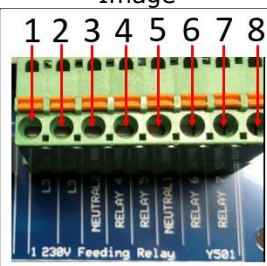
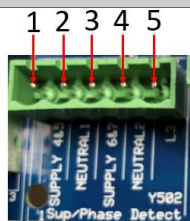
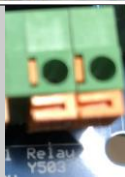
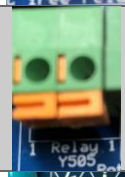
Repair instructions

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Number	Designation	Image	Function												
17	Y609 / CP control & feedback 1.x = control, brine pump 1.1=0-10 V, 1.2=earth, 1.5=feedback, 1.6=earth 2.x = control, DHW/buffer charging pump 2.3=0-10 V, 2.4=earth, 2.7=feedback, 2.8=earth		8-pole plug-in strip for controlling the source pump and the DHW/buffer charging pump. 0-10 V signal												
18	Y610 / CM		RJ45 socket Connection to the programming unit "bottom left"												
19	Y611 / MBa 1 = +24 V out 2 = D+ 3 = D- 4 = earth		4-pole terminal for a room temperature sensor – optional.												
20	Y612 / MBa2 1 = D+ 2 = D- 3 = earth		3-pole terminal for bus connection to EM3.												
21	Y613 / MBc 1 = D+ 2 = D- 3 = earth		3-pole terminal for a building management system (BMS). Not assigned.												
22	Y614 / MBi 1 = MBi D+ 2 = MBi D- 3 = unassigned		3-pole plug-in strip. Communication cable to the inverter at connection 68/69												
23	Y615 / EEXV <table><tr><th>Version A, B</th><th>Version C, D</th></tr><tr><td>1=orange</td><td>1=red</td></tr><tr><td>2=red</td><td>2=green</td></tr><tr><td>3=yellow</td><td>3=white</td></tr><tr><td>4=black</td><td>4=black</td></tr><tr><td>5=grey</td><td>5=empty</td></tr></table>	Version A, B	Version C, D	1=orange	1=red	2=red	2=green	3=yellow	3=white	4=black	4=black	5=grey	5=empty		5-pole plug-in strip. Connection, electronic expansion valve.
Version A, B	Version C, D														
1=orange	1=red														
2=red	2=green														
3=yellow	3=white														
4=black	4=black														
5=grey	5=empty														
24	Y616 / 24 V AC -SUP 1 = 24 VAC1 from transformer T1 2 = 24 VAC2 from transformer T1 3 = 24 VAC1 output 4 = 24 VAC2 output 5 = 24 VAC1 output 6 = 24 VAC2 output		6-pole terminal. 24 V AC power supply. 2 x outputs 24 V AC. Together max. 1 A load capacity.												

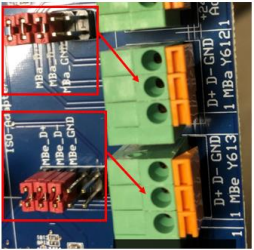
Repair instructions

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Number	Designation	Image	Function												
25	Y501 / Feeding Relay 1 = 230 V AC output 2 = 230 V AC output 3 = N 4 = relay 4 L1/ brine circulation pump (optional) 5 = relay 5 L1/heating circuit 1 6 = N 7 = relay 6 L2/ system circulation pump 8 = relay 7 L2/ circulation pump, hot gas extraction		8-pole terminal. Connection of the power supply for circulation pumps.												
26	Y502 / Sup/Phase Detect 1 = L1, power cable 2 = N1, not assigned 3 = L2, power cable 4 = N2, not assigned 5 = L3, power cable		5-pole plug-in strip. Voltage inputs for relay outputs.												
27	Y503 / Relay 3 Floating contact for switching on external 2nd heat generator.		2-pole terminal. Floating contact. N/O contact. External 2nd heat generator.												
28	Y504 / Relay 2 Floating contact for signal transmission when the compressor is switched on.		2-pole terminal. Floating contact. N/O contact. Signal for compressor switched on.												
29	Y505 / Relay 1 Floating contact for transmission of a heat pump fault. Programmable.		2-pole terminal. Floating contact. N/O contact. Alarm contact.												
30	M3 Fine-wire fuse T2 A, 250 V														
31	LED status display <table><tr><th>LED</th><th>Meaning</th></tr><tr><td>1 2 3 4</td><td></td></tr><tr><td>X</td><td>Standard condition</td></tr><tr><td>X O O O</td><td>High limit safety Stop</td></tr><tr><td>x x x x</td><td>Update mode</td></tr><tr><td></td><td>Frost protection (not used)</td></tr></table>	LED	Meaning	1 2 3 4		X	Standard condition	X O O O	High limit safety Stop	x x x x	Update mode		Frost protection (not used)		Function description X = flashing O = steady light
LED	Meaning														
1 2 3 4															
X	Standard condition														
X O O O	High limit safety Stop														
x x x x	Update mode														
	Frost protection (not used)														

Repair instructions

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Number	Designation	Image	Function
32	Jumper M1 + M2		Use for 0 – 10 V functions of terminals AO 24 and AO 25 / Y602. Jumper set = 0-10 V Open contact = PWM
33	Reset button		Pressing the reset button restarts the BM card. No parameters are changed.
34	Jumper M5 / MBi address Jumper 1 Jumper 2 Jumper 3		
35	Jumper M11		Setting a jumper terminates the MBi bus. This jumper always remains open. Termination of the MBi connection (connection to the inverter) is not carried out on the BM card.
36	Jumper MBa / MBe Jumper MBa. Jumper MBe.		Also see section "Modbus amplifier PCB". The ISO-SL adaptor PCB is plugged in at the factory.
37	LED status display D18		Indicates by flashing that there is communication with the CM card.

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6.3.3 Modbus amplifier PCB (ISO adaptor)

The Modbus amplifier PCB is always required and is preinstalled in the delivered condition.

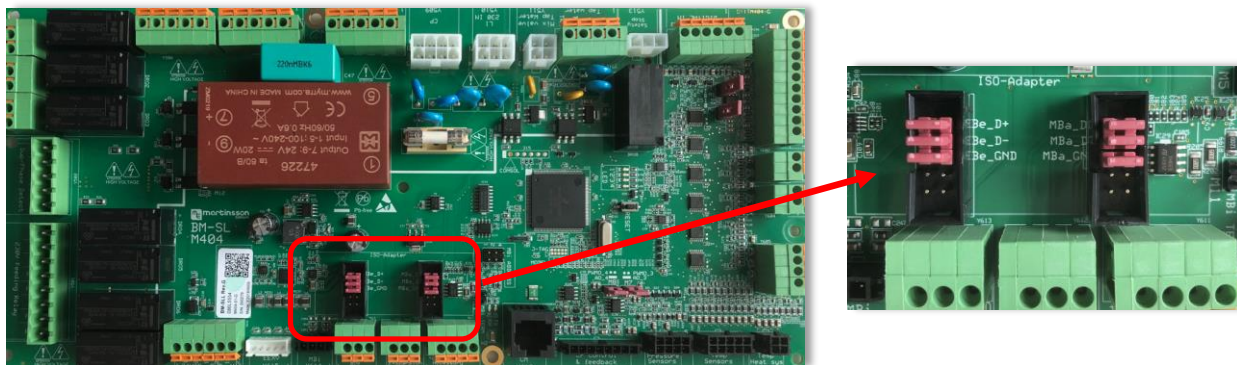
The Modbus amplifier PCB is plugged into the ISO adaptor slot (position 36 on the BM card).

The Modbus amplifier PCB is available from the spare parts store if required. Material number is 352024.

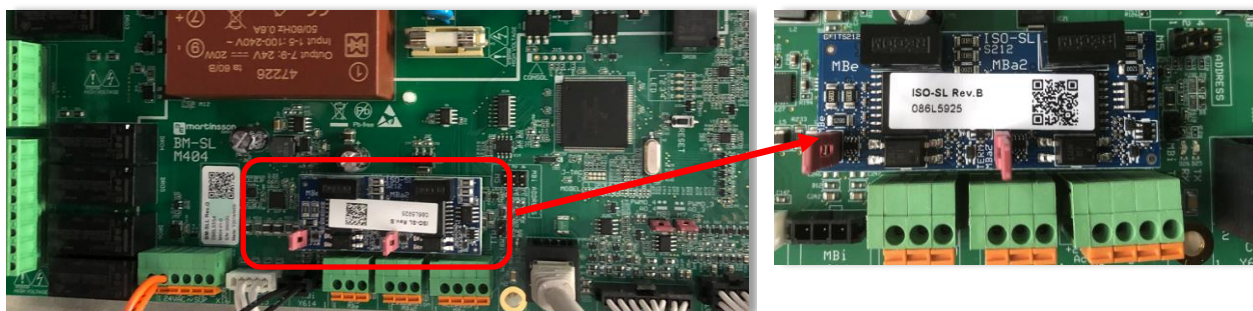


If, when a BM card is replaced, this Modbus amplifier PCB is not plugged into the new BM card, this Modbus amplifier PCB should be taken from the old BM card and plugged into the new BM card. The six preinstalled jumpers on the BM card must be removed for replacement and the Modbus amplifier PCB is pushed with the bi-pin bases, as shown in the figure, on to the plug-in contacts.

Bi-pin base on the BM card with the six jumpers to be removed.



Modbus amplifier PCB plugged in the BM card.

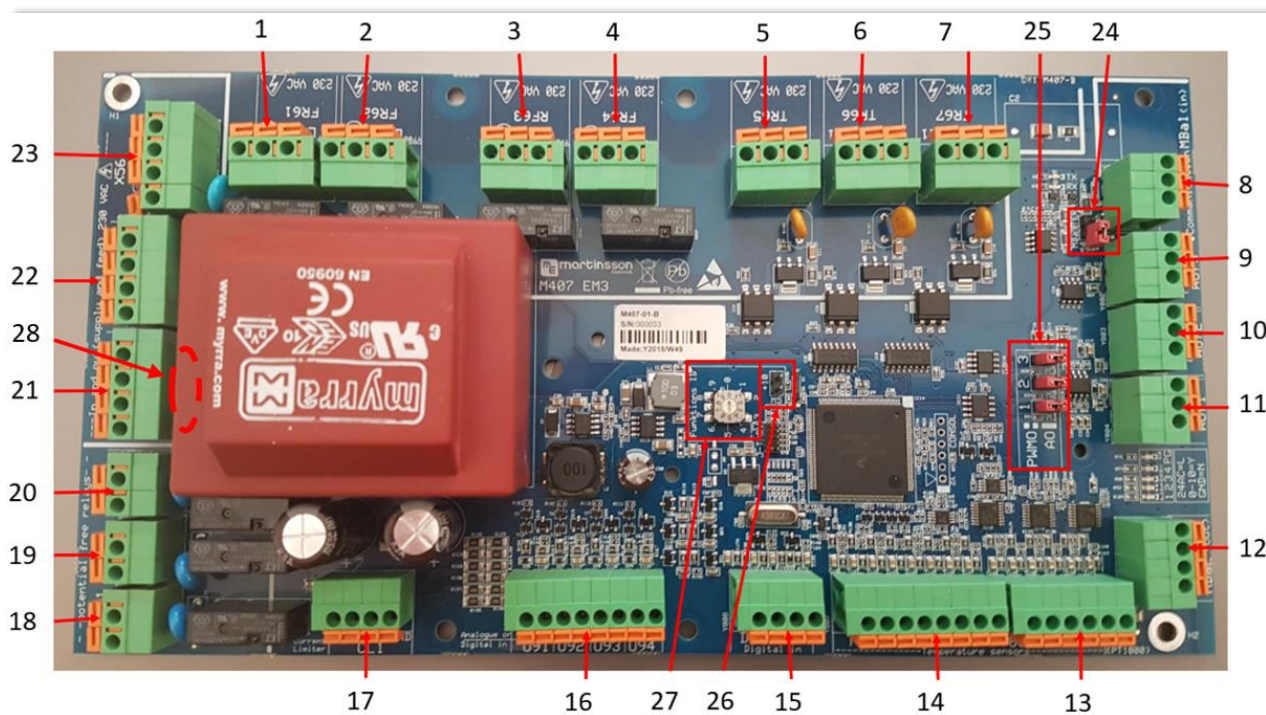


Repair instructions

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6.3.4 Auxiliary module – EM (extension module)

The EM auxiliary module must be used if a DHW function, pool function, cooling function, additional mixer functions or additional heat pumps are also required for standard heat pump function. Irrespective of the relevant selected function of the EM card, the inputs and outputs are switched individually. The part numbers are listed in the section "Accessories".



Number	Designation	Image	Function
1	FR61 Function relay 230 V Output		Connection, circulation pump 1 = 230 V 2 = N 3 = Pe
2	FR62 Function relay 230 V Output		Connection, circulation pump 1 = 230 V 2 = N 3 = Pe
3	FR63 Function relay 230 V Output		Connection, circulation pump 1 = 230 V 2 = N 3 = Pe

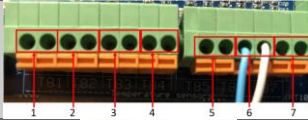
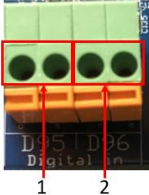
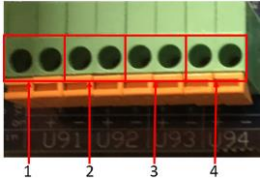
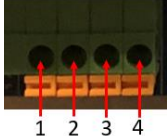
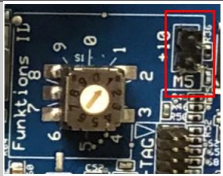
Repair instructions

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Number	Designation	Image	Function
4	FR64 Function relay 230 V Output		Connection, circulation pump 1 = 230 V 2 = N 3 = Pe
5	TR65 Continuous voltage and triac output for switching mixers or diverter valves		Diverter valve L1, N, Y 1 = Y switched via triac, 230 V 2 = N 3 = 230 V continuous voltage
6	TR66 Continuous voltage and triac output for switching mixers or diverter valves		Diverter valve L1, N, Y 1 = Y switched via triac, 230 V 2 = N 3 = 230 V
7	TR67 Continuous voltage and triac output for switching mixers or diverter valves		Diverter valve L1, N, Y 1 = Y switched via triac, 230 V 2 = N 3 = 230 V
8	MBa1 Input/connection with MBa2 – BM card for data transfer		MBa function (input). Jumper M4 set if no additional EM3 card is connected to the bus. 1 = GND 2 = D- 3 = D+
9	A073 Analogue outputs		Connection, mixer, control unit 1 = GND/earth 2 = 0-10 V closed-loop control voltage 3 = 24 V AC open-loop control voltage
10	A072 Analogue outputs		Connection, mixer, control unit 1 = GND/earth 2 = 0-10 V closed-loop control voltage 3 = 24 V AC open-loop control voltage
11	A071 Analogue outputs		Connection, mixer, control unit 1 = GND/earth 2 = 0-10 V closed-loop control voltage 3 = 24 V AC open-loop control voltage
12	MBa2 Output / connection with MBa1 – additional EM card		MBa2 function (output). Control connection to accessory. 1 = GND/earth 2 = D- 3 = D+ 4 = 24 V AC

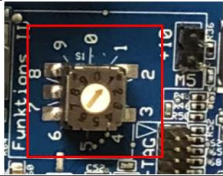
Repair instructions

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Number	Designation	Image	Function
13 / 14	T81, T82, T83, T84, T85, T86, T87		Temperature sensor PT 1000 1 = T81 2 = T82 3 = T83 4 = T84 5 = T85 6 = T86 7 = T87
15	D95, D96 Digital input for transmission of operating status. SG, pressure switch, etc.		Digital input. Contact closed, contact open 1 = D95 2 = D96
16	U91, U92, U93, U94		Analogue and digital input. Contact closed, contact open +/- wired. 1 = U91 +/- 2 = U92 +/- 3 = U93 +/- 4 = U94 +/-
17	CL1		Current limiter. L1, L2, L3 to earth. 1 = L1, 2 = L2, 3 = L3, 4 = earth
18/19/20	R51 / R52 / R53 Connection of external consumers.		Floating relay
21	X54 L = 230 V~		4-pole mains terminal.
22	X55 N = neutral		4-pole terminal, neutral conductor.
23	X56 Pe = earth		4-pole earth terminal.
24	Jumper M4		The jumper must be set if the EM card is placed at the end of the Modbus network.
25	Jumper for AO71, AO72, AO73		Must be used for functions AO71, AO72, AO73 Jumper set = 0-10 V Open contact = PWM
26	Jumper M5 for changeover of Modbus addresses		Depending on the required function of the EM3 card, the jumper must be set or removed. The position is shown in the relevant wiring diagram.

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Number	Designation	Image	Function
27	Rotary selector for function setting		By adjusting the rotary selector and setting the M5 jumper, various functions of the EM are activated. Settings are specified in the wiring diagrams for the relevant functions used.
28	Fine-wire fuse 2 A (slow), 250 V		

Functions of the EM card:

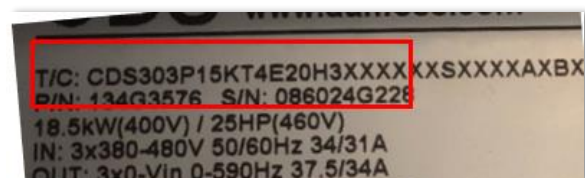
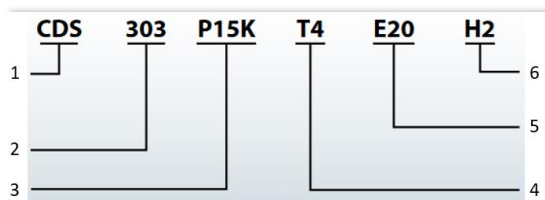
ID	Function	ID	Function
0	Factory delivery / M5 closed	11	Existing HPs 3+4 / position 1 / M5 set
1	DHW functions / M5 open	12	Existing HPs 5+6 / position 0 / M5 set
2	Heating circuits with mixer 2+3 / M5 open	13	Existing HPs 7+8 / position 0 / M5 set
3	Heating circuits with mixer 4+5 / M5 open	14	Existing HPs 9+10 / position 0 / M5 set
4	Cooling function / M5 open	15	Existing HPs 11+12 / position 0 / M5 set
5	Pool function / M5 open	16	Existing HPs 13+14 / position 0 / M5 set
10	Existing HPs 1+2 / position 0 / M5 set	17	Existing HPs 15+16 / position 0 / M5 set

6.3.5 Inverter

If the inverter is replaced, it is important to ensure that the correct inverter is used with regard to date of manufacture.

Appliance	Type	Spare part no.
Version A, B up to 9542	Danfoss CDS303 P15K casing type B3	338832
Version A, B from 95443		203259
Version C up to 9542	Danfoss CDS303 P18.5K casing type B4	339631
Version C from 9543		203260
Version D up to 9542	Danfoss CDS303 P22K casing type B4	202177
Version D from 9543		203261

Type designation code for this inverter series:

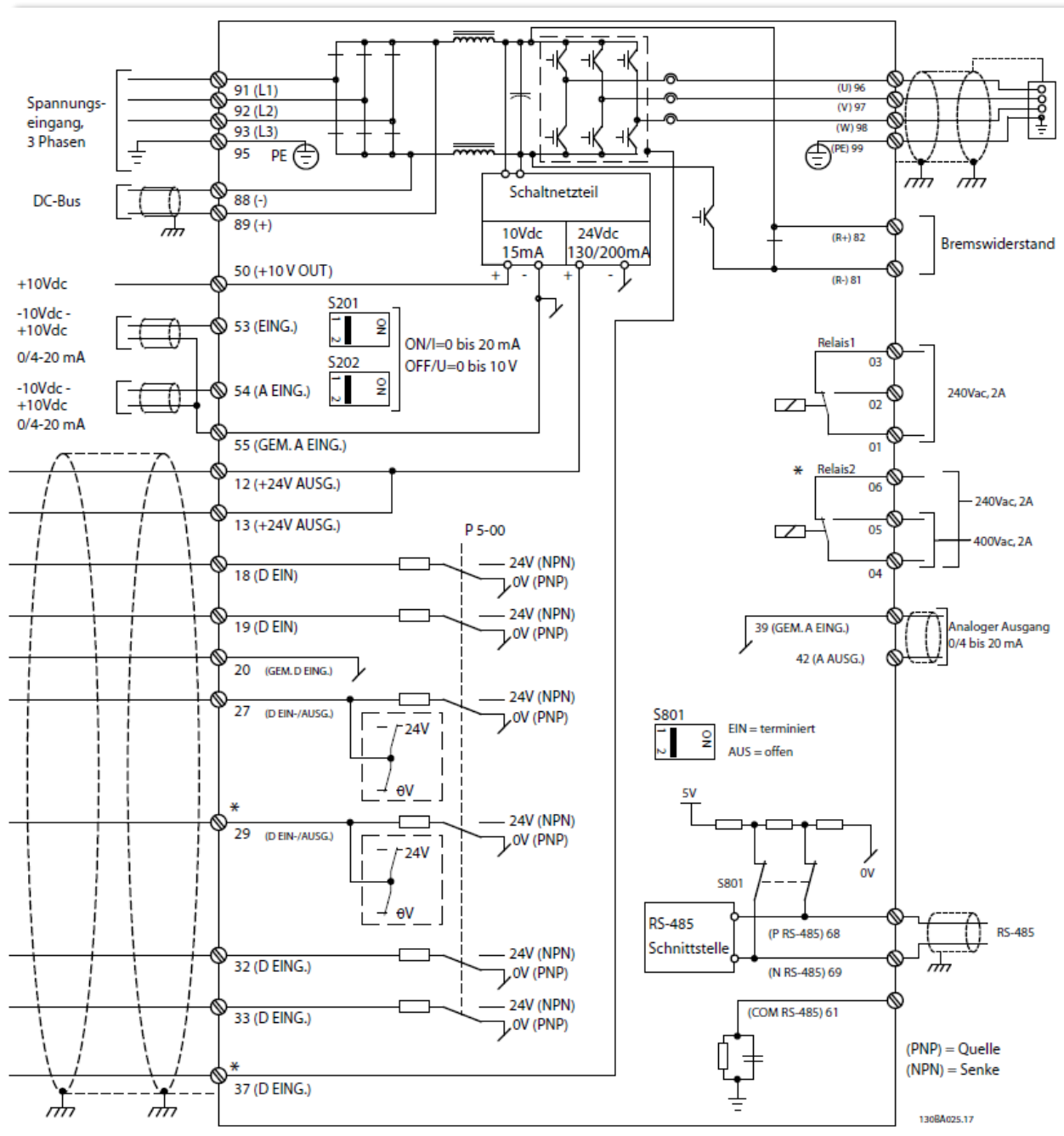


Position	Description	Position	Description
1	Special inverter series for the VZH scroll compressor	6	RFI class
2	Series 303	5	IP rating
3	Output at high overload in KW	4	Mains supply voltage T2= 200-240 V/3~/50&60 Hz T4= 380-480 V/3~/50&60 Hz T6= 525-600 V/3~/50&60 Hz

Repair instructions

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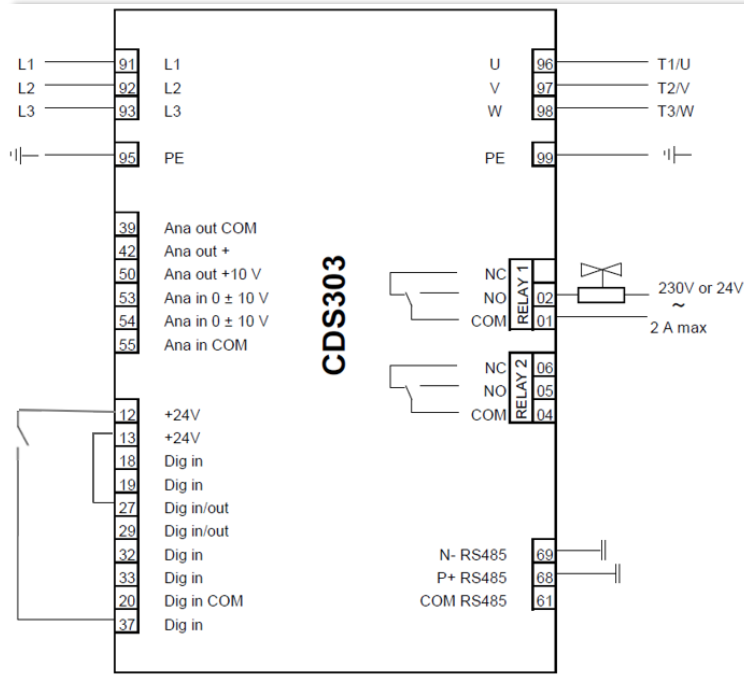
Internal wiring diagram for inverter:



Repair instructions

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Wiring diagram:

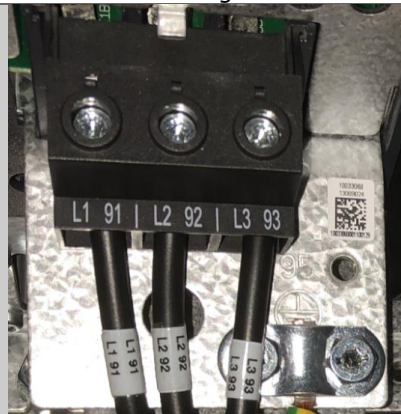


Abbreviation	Meaning
L1, L2, L3	Power supply
U, V, W	Supply line, compressor
Ana	Analogue
Dig	Digital
In	Input
Out	Output
NC	Normal close
NO	Normal open
Com	Common

Connection

91, 92, 93, 95

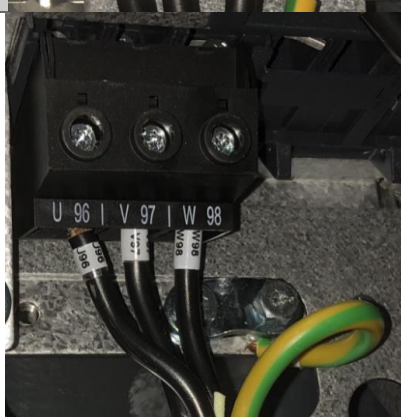
Image



Function

Power supply at inverter from the mains terminal. The figure shows inverter 339631.

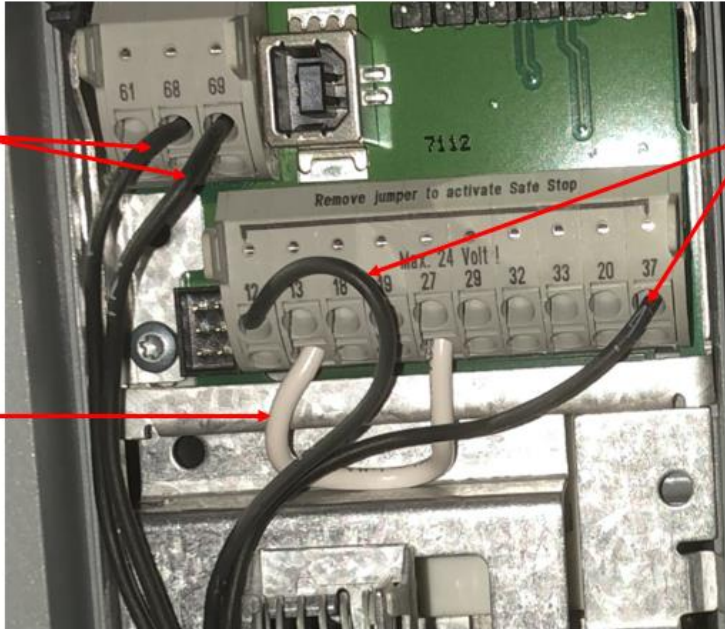
96, 97, 98, 99



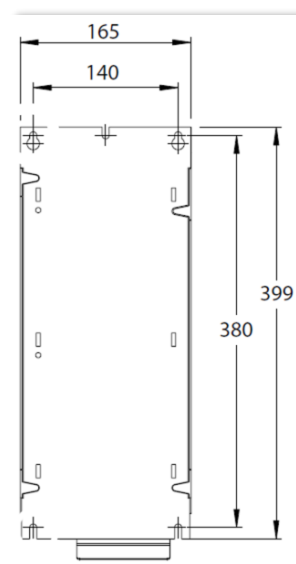
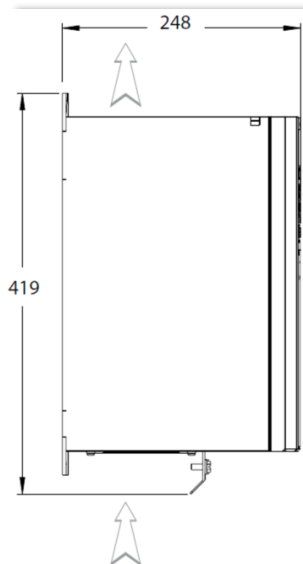
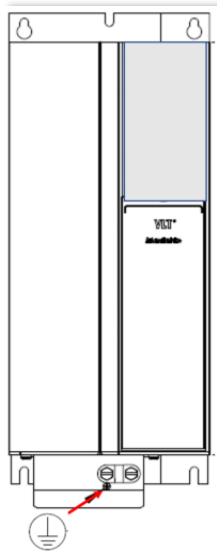
Power supply to the compressor. The figure shows inverter 339631.

Repair instructions

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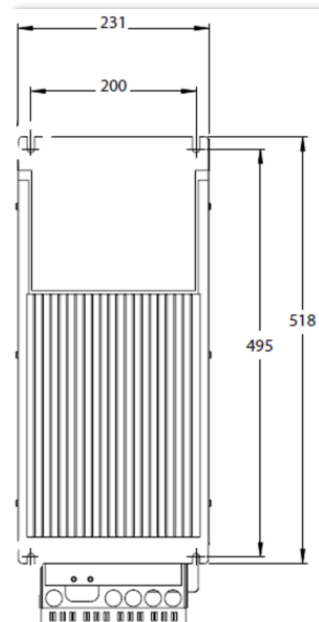
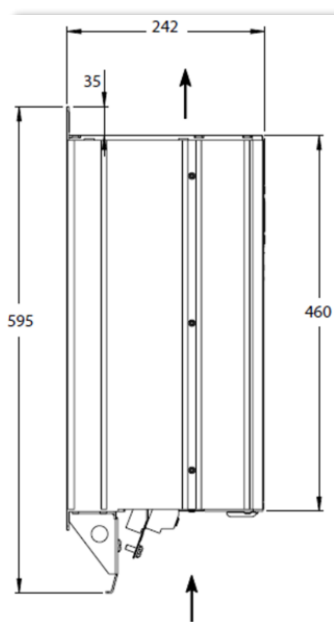
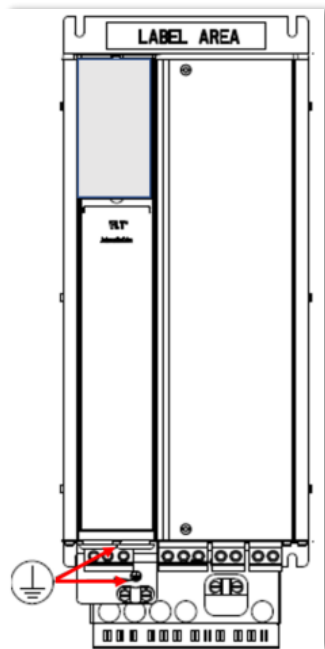
Connection	Image	Function
Relay 1, terminal 01 / 02		Connection to solenoid valve at compressor for oil lubrication. Figure shows inverter 339631.
1 = terminal 68, 69. Connecting cable for Modbus connection with BM card at connection Y614. 2 = terminal 12, 37. Connecting cable for safety stop function to BM card at connection Y513. 3 = terminal 13, 27. This heat pump ON/OFF function is not used and is therefore disabled with a jumper. Figures show inverter 338832.		

Casing B3, weight 13 kg



Repair instructions WPE-I xx H 400 Premium

Casing B4, weight 24 kg



Repair instructions

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6.4 Electrical assemblies

6.4.1 Compressor

From May 2020, a new compressor has been fitted in the appliance series. Compressors for appliances from date of manufacture 9543 can also be used in appliances up to date of manufacture 9542 if required. In the event of repairs, however, compressors for appliances up to date of manufacture 9542 may not be used in appliances with a date of manufacture after 9543.

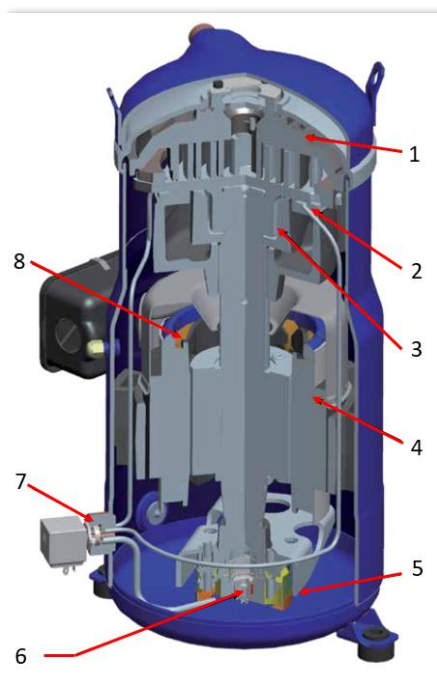
If an older inverter is replaced with a new one, the compressor must always be replaced too, as inverter control is programmed to the new series compressor characteristics.

Compressors from serial number 9543 have the following features:

- Improved oil pump for better compressor lubrication.
- Higher oil fill level for even better lubrication.
- Wider SOA range.
- Maximum flow temperature of 65 °C is achieved from a source temperature of just 0 °C (previously only from 5 °C source temperature).

Appliance	Type	Spare part no.
Version A, B up to 9542	VZH 088 AGANA Danfoss	201536
Version A, B from 9543	VZH 088 CGANA Danfoss	341967
Version C up to 9542	VZH 117 AGANA Danfoss	201537
Version C from 9543	VZH 170 CGANA Danfoss	344155
Version D up to 9542	VZH 170 AGANA Danfoss	201538
Version D from 9543	VZH 170 CGANA Danfoss	342685

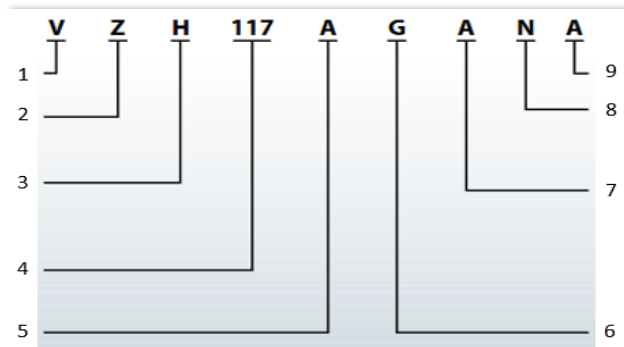
Schematic layout of Danfoss scroll compressors:



Position	Description
1	Scroll set made of reinforced cast iron.
2	Patented oil injection system for better scroll set sealing and optimum efficiency at low speeds.
3	Lead-free polymer bearings.
4	Permanent magnet motor
5	Oil filter
6	Gear oil pump
7	Oil injection control for optimum oil circulation.
8	Oil and gas flows are routed through an oil return line to the oil sump.

Repair instructions WPE-I xx H 400 Premium

Type code for the compressor:



Position	Description	Position	Description
1	Variable speed	9	Generation code
2	Product series	8	Type of motor protection. N= no internal motor protection (motor protection via inverter).
3	Lubricant POE-oil, refrigerant R410A	7	Equipment A= solder connections, oil sight glass with thread, without oil level switch B= solder connections, without oil sight glass, oil level switch with thread
4	Displaced volume in cm ³ /rev	6	Motor voltage code for the mains supply voltage for the inverter. G= 380-480 V/3~/50&60 Hz H= 525-600 V/3~/50&60 Hz J= 200-240 V/3~/50&60 Hz
5	Design pressure ratio A=high pressure ratio B=low pressure ratio		

Version A, B up to 9542



Repair instructions

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Parameter	Specification	Parameter	Specification
Weight	59.75 kg	Oil quantity	3.3 l
Technology	Scroll compressor	LRA	37.5 A
Supply voltage	380-480/3/50-60	No. of starts per hour	12 (maximum)
Speed at 50 Hz	3000 [rpm]	Winding resistance	0.10 Ohm
Speed at 60 Hz	3600 [rpm]	Voltage range	342 V – 528 V
Frequency	25 – 100 Hz	Rated voltage	380 V – 480 V
Refrigerant	R410A	Displacement volume	88.4 cm ³
Oil type	Polyolester	Nominal cooling capacity	96.59
Motor protection	Via inverter control	Nominal cooling capacity at 50 Hz	21.1

Version C up to 9542



Parameter	Specification	Parameter	Specification
Weight	65.17 kg	Oil quantity	3.6 l
Technology	Scroll compressor	LRA	44 A
Supply voltage	380-480/3/50-60	No. of starts per hour	12 (maximum)
Speed at 50 Hz	3000 [rpm]	Winding resistance	0.08 Ohm
Speed at 60 Hz	3600 [rpm]	Voltage range	342 V – 528 V
Frequency	25 – 100 Hz	Rated voltage	380 V – 480 V
Refrigerant	R410A	Displacement volume	116.9 cm ³
Oil type	Polyolester	Nominal cooling capacity	129.35 KBTU/H
Motor protection	Via inverter control	Nominal cooling capacity at 50 Hz	28.3 KBTU/H

Repair instructions WPE-I xx H 400 Premium

Version D up to 9542

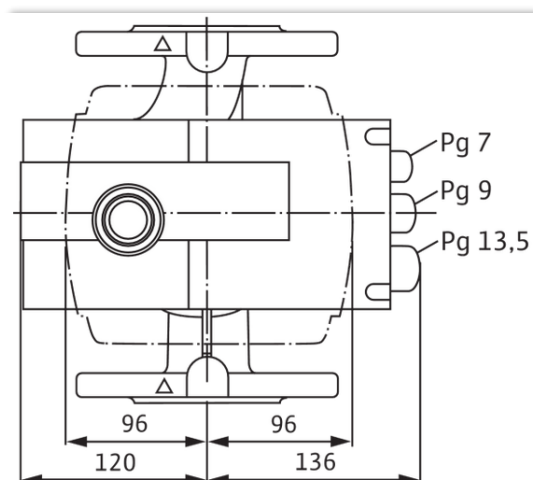


Parameter	Specification	Parameter	Specification
Weight	113.5 kg	Oil quantity	6.7 l
Technology	Scroll compressor	LRA	61 A
Supply voltage	380-480/3/50-60	No. of starts per hour	12 (maximum)
Speed at 50 Hz	3000 [rpm]	Winding resistance	0.05 Ohm
Speed at 60 Hz	3600 [rpm]	Voltage range	342 V – 528 V
Frequency	25 – 100 Hz	Rated voltage	380 V – 480 V
Refrigerant	R410A	Displacement volume	170.2 cm ³
Oil type	Polyolester	Nominal cooling capacity	189.08 KBTU/H
Motor protection	Via inverter control	Nominal cooling capacity at 50 Hz	40.8 KBTU/H

6.4.2 Brine circulation pump

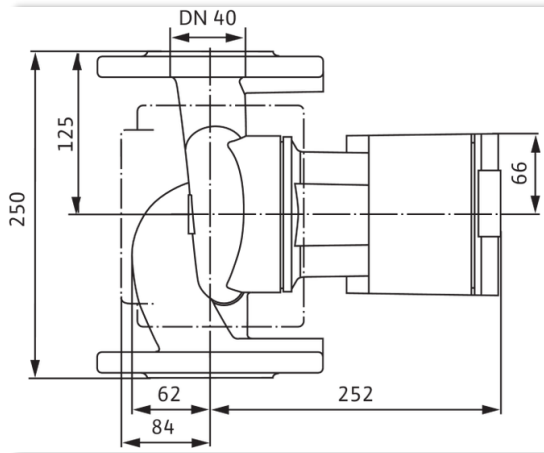
Appliance	Type	Spare part no.
Version A, B	Wilo Stratos 40/1-12 DA	334437
Version C, D	Wilo Stratos 40/1-16 DA	334471

Version A, B

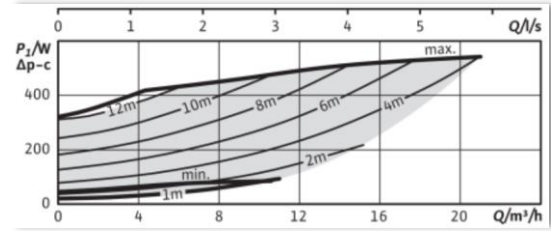
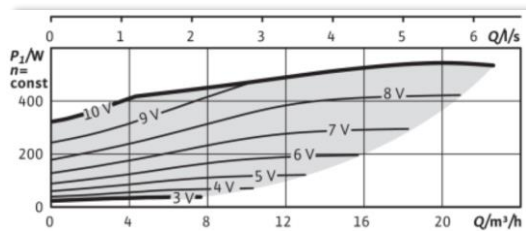
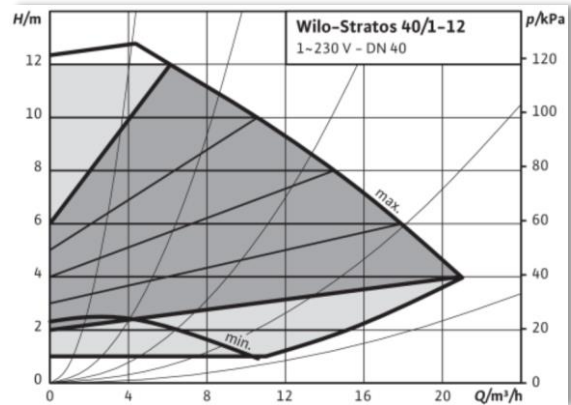
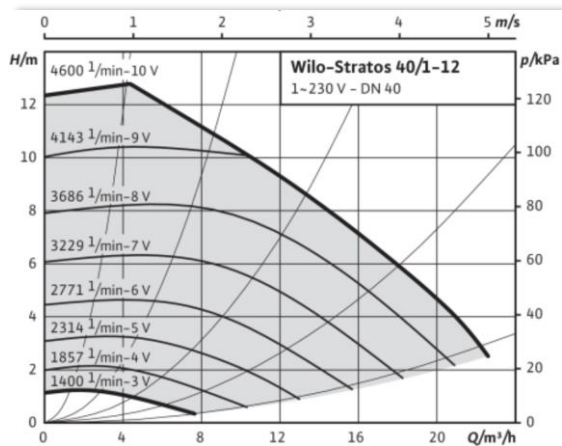


Repair instructions

WPE-I xx H 400 Premium



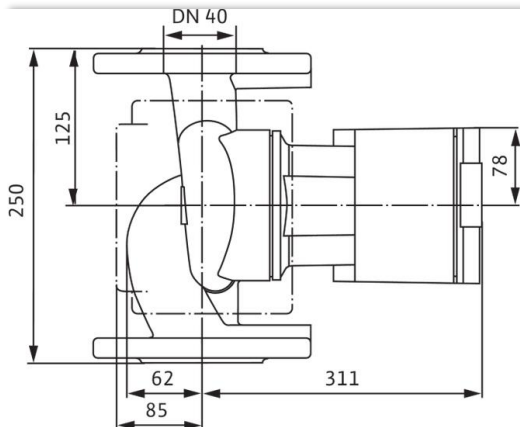
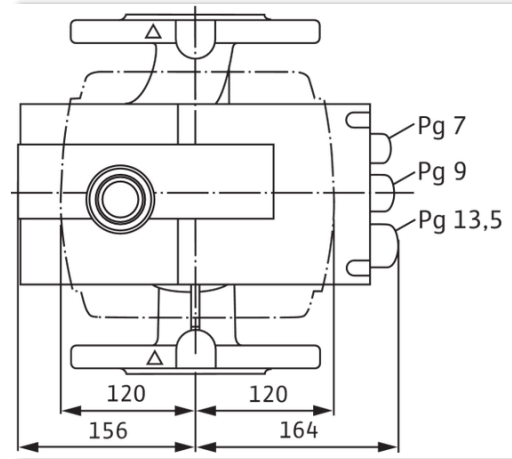
Parameter	Specification
Max. pump rate	22.6 m ³ /h
Max. head	12 m
Energy efficiency index	0.2
Max. operating pressure	16 bar
Ambient temperature	-10 °C to +40 °C
Media temperature	-10 °C to +110 °C
Power consumption	25 W – 550 W
Power consumption	0.2 A – 2.4 A
Speed	1400 – 4600 rpm
Weight	14 kg



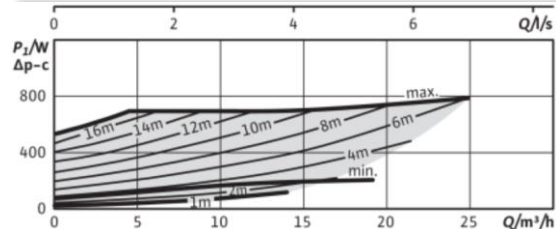
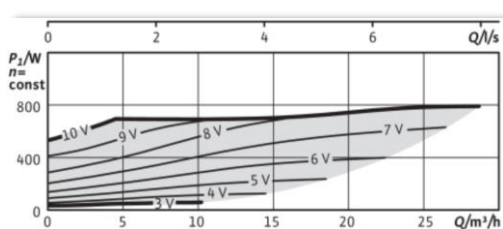
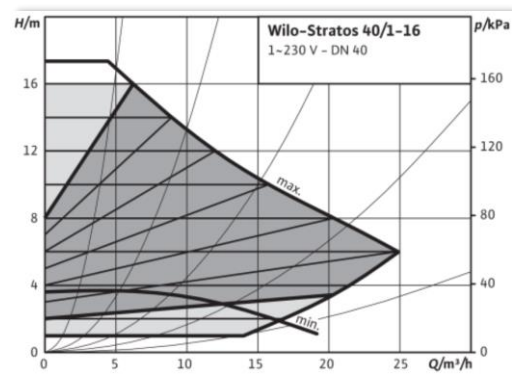
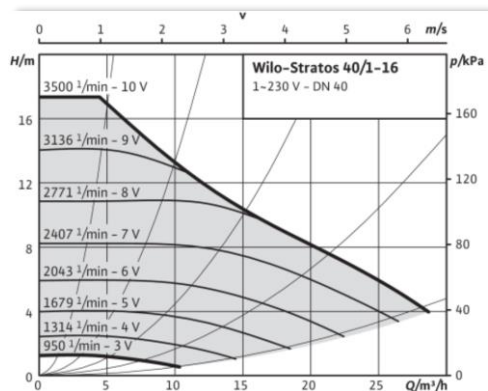
Repair instructions

WPE-I xx H 400 Premium

Version C, D



Parameter	Specification
Max. pump rate	28.7 m ³ /h
Max. head	16 m
Energy efficiency index	0.2
Max. operating pressure	10 bar
Ambient temperature	-10 °C to +40 °C
Media temperature	-10 °C to +110 °C
Power consumption	35 W – 800 W
Power consumption	0.3 A – 3.5 A
Speed	950 – 3500 rpm
Weight	24 kg



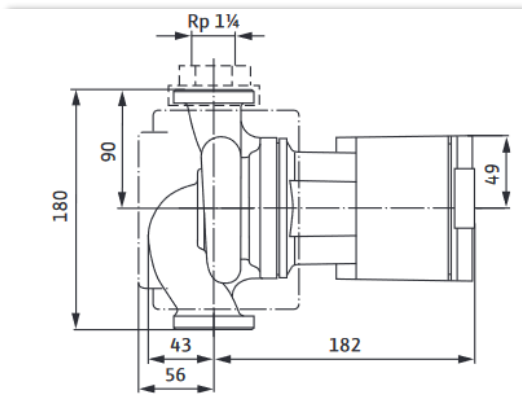
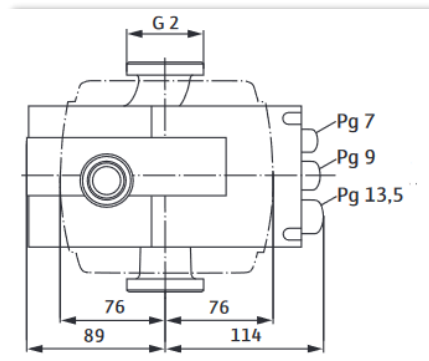
Repair instructions

WPE-I xx H 400 Premium

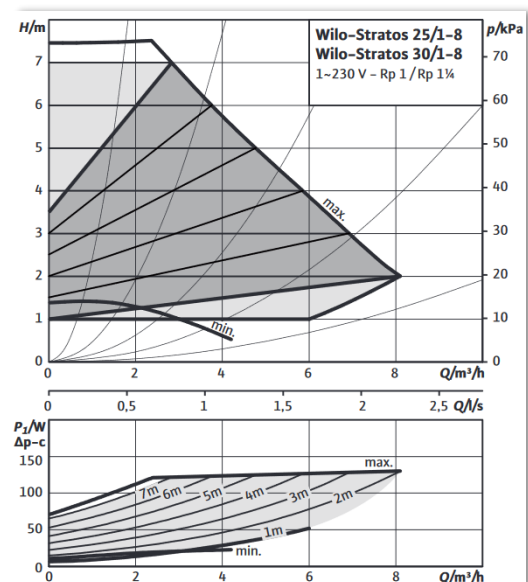
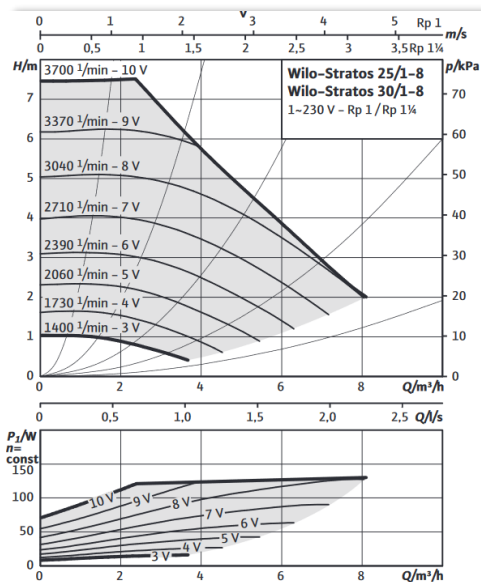
6.4.3 Buffer/DHW charging pump

Appliance	Type	Spare part no.
Version A, B	Wilo Para 30/1 - 8 T1	334436
Version C, D	Wilo Para 30/1 -12 T1	334435

Version A, B



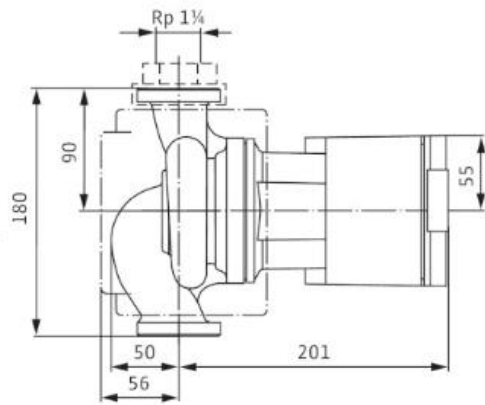
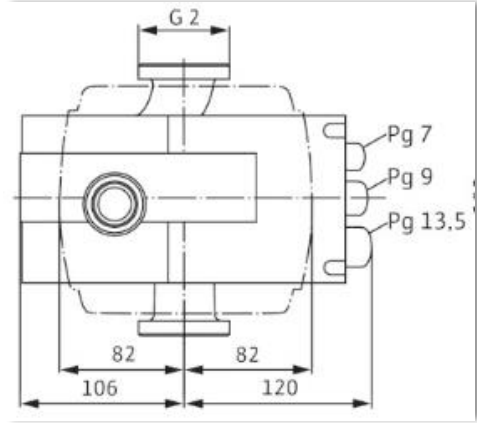
Parameter	Specification
Max. pump rate	8 m³/h
Max. head	7 m
Energy efficiency index	≤0.23
Max. operating pressure	16 bar
Ambient temperature	-10 °C to +40 °C
Media temperature	-10 °C to +110 °C
Power consumption	9 W – 130 W
Power consumption	0.13 A – 1.2 A
Speed	1400 – 3700 rpm
Weight	4 kg



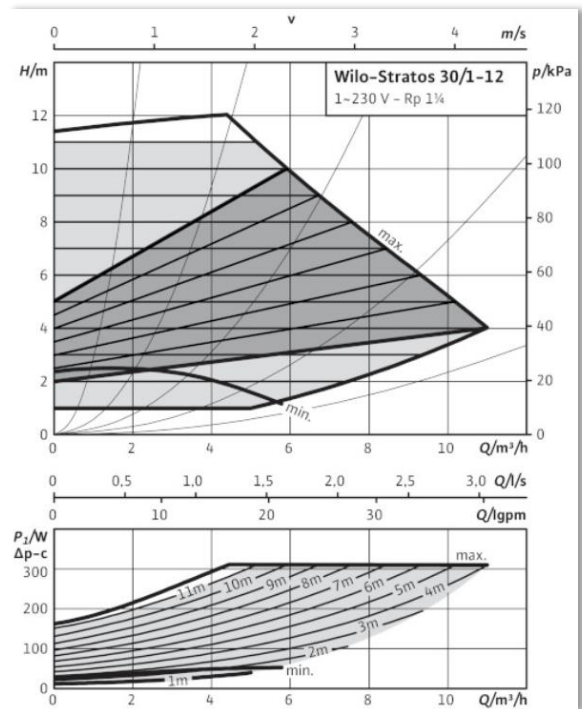
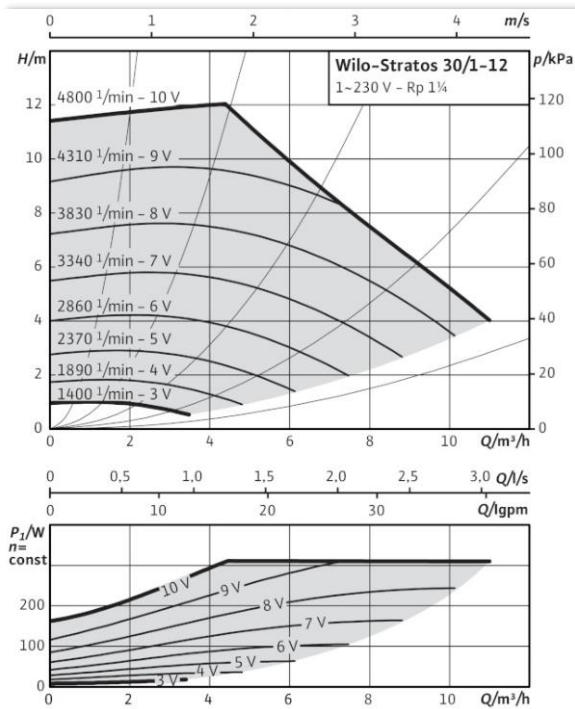
Repair instructions

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Version C, D



Parameter	Specification
Max. pump rate	8 m³/h
Max. head	7 m
Energy efficiency index	≤0.23
Max. operating pressure	10 bar
Ambient temperature	-10 °C to +40 °C
Media temperature	-10 °C to +110 °C
Power consumption	12 W – 310 W
Power consumption	0.22 A – 1.37 A
Speed	1400 – 4800 rpm
Weight	5.5 kg



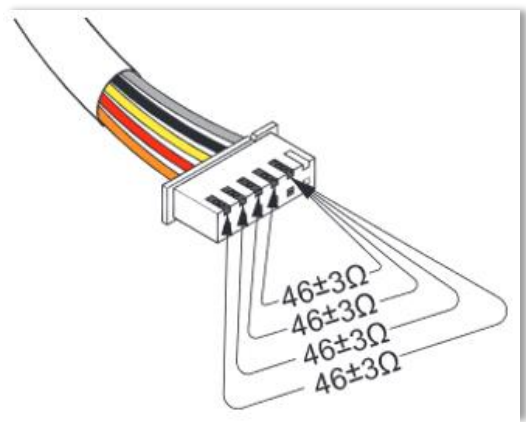
Repair instructions

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6.4.4 Expansion valve

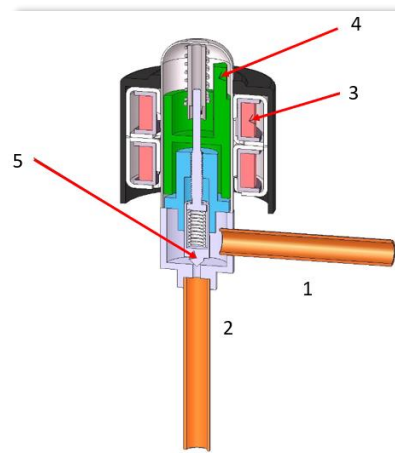
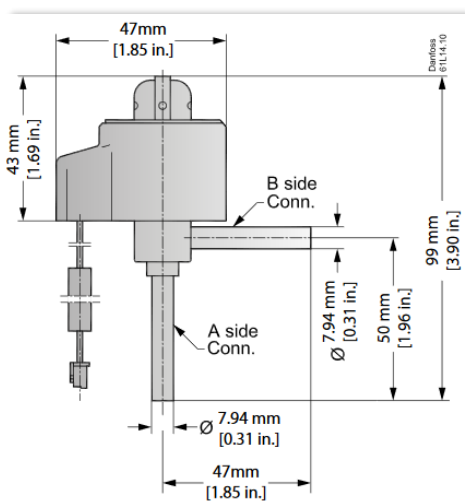
Appliance	Type	Spare part no.
Version A, B	Danfoss ETS 6-32	201484
	Drive for ETS 6	201504
Version C, D	Danfoss ETS 12.5	201481
	Molex connector (connecting cable)	339627

Version A, B



Designation	Data
Expansion valve ETS 6-32	034G5055
Solder terminals	5/16"
Maximum operating pressure	47 bar

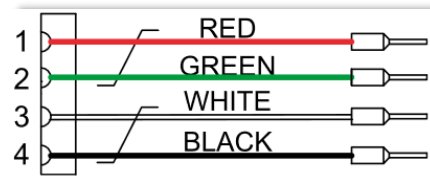
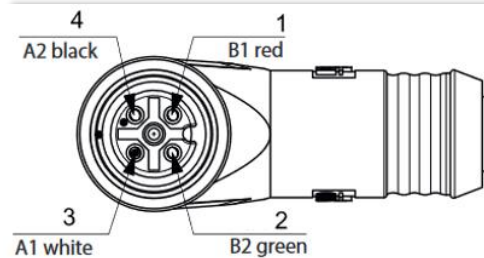
Designation	Data
Expansion valve drive	034G5140
Voltage	12 V DC
Output	3 W
Service magnet	034G5199
Service drive	034G0013



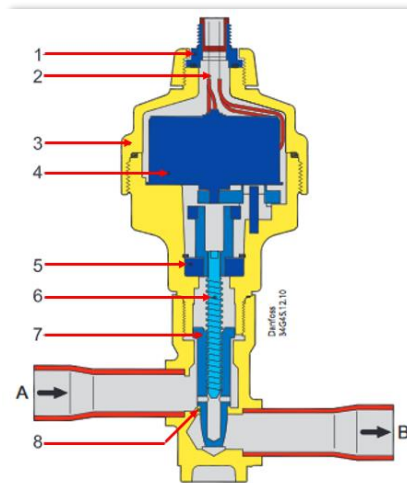
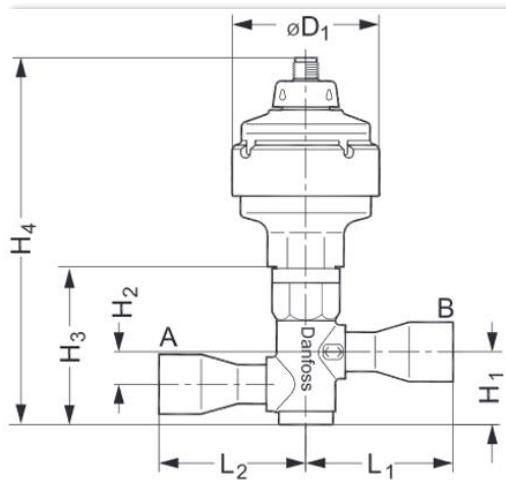
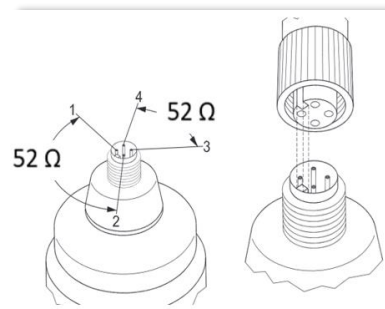
Position	Designation	Position	Designation
1	Inlet	4	Permanent magnet
2	Outlet	5	Valve needle
3	Winding		

Repair instructions WPE-I xx H 400 Premium

Version C, D



Designation	Data
Expansion valve ETS 12.5	034G4210
Solder terminals	12 mm
Maximum operating pressure	45.5 bar



Position	Data	Position	Data
H1	30 mm	L1	60 mm
H2	13 mm	L2	60 mm
H3	64 mm	ØD1	60 mm
H4	150 mm	Weight	0.7 kg

Position	Data	Position	Data
1	M12 connection	6	Spindle
2	Glass gasket	7	Tapered and guide nut
3	Drive casing	8	Valve seat
4	Stepper motor	A	Inlet
5	Storage area	B	Outlet

Repair instructions

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6.4.5 Pressure sensors

Appliance	Type	Spare part no.
Version A, B, C, D High pressure	Huba Control 520.933S075LONW	338833
Version A, B, C, D Low pressure	Huba Control 520.931S075LONW	338835

High pressure transducer



10 – 46 bar

Low pressure transducer



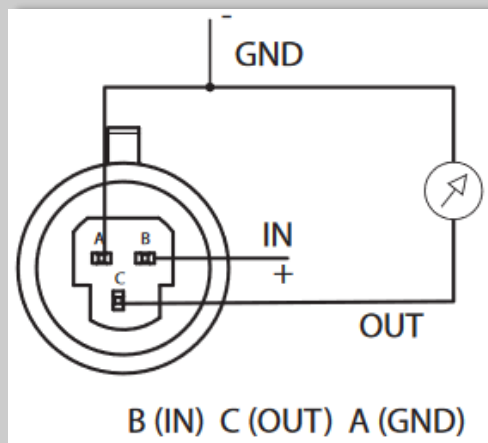
1.5 – 14 bar

Overpressure

Supply voltage 5 V DC $\pm 10\%$ (In)

Output 0 – 5 V (10 – 90 % ratio / 0.5 V – 4.5 V)

Electrical connection Metri Pack 150 P2S Series



Repair instructions

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6.4.6 Temperature sensors

All sensors used by the BM module or EM module are PT 1000 sensors.

Temperature in °C	PT 1000 sensor resistance in Ω
-30	843
-20	922
-10	961
0	1000
10	1039
20	1078
25	1097
30	1117
40	1155
50	1194
60	1232
70	1271
80	1309
90	1347
100	1385
110	1423
120	1461

Name and number	Function
System supply line Flow sensor in the hydraulics Y602 T33 51	Calculation of heat demand. Alarm if system temperatures too low or too high.
Condenser out Condenser outlet in heat pump Y607 4 9 431	Calculation of heat demand. Calculation of the expansion valve control. Alarm if system temperatures too low or too high. Calculation of the supercooling.
Condenser in Condenser inlet in heat pump	Calculation of heat demand. Calculation of the expansion valve control. Switch-on of hot gas extraction system under certain operating conditions. Alarm if system return temperatures are too high.
Brine in Source inlet Y607 1 6 413	Calculation of the expansion valve control. Source temperature monitoring. Source protection function. Alarm if source temperature differential is too high. Reference temperature in active cooling for source changeover.
Brine out Source outlet Y607 2 7 412	Calculation of the expansion valve control. Source temperature monitoring. Source protection function. Alarm if source temperature differential is too high. Compressor speed calculation in active cooling mode.
Suction gas line Evaporator outlet Y607 3 8 421	Calculation of superheating. Calculation of the expansion valve control.
Discharge pipe Hot gas sensor Y607 5 10 416	Hot gas extraction start, stop and control. Alarm if the hot gas temperature is too high. Calculation of the expansion valve control. If the hot gas temperature is too high, superheating is reduced.
Outdoor sensor Outside temperature sensor Y604 T35 50	Set temperature calculation in heating mode. Changeover summer (cooling mode)/winter operation (heating mode). If there is no sensor, a substitute value of 0 °C is used.
Buffer tank	Calculation of heat demand in the buffer cylinder.

Repair instructions

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Name and number	Function
Buffer sensor Y602 T31 136	
Distribution circuit 1 Heating circuit with mixer 1 Y602 T32 108	Control of heating circuit with mixer 1.
Hot water DHW sensor (bottom) Y605 T37 53	If only this DHW sensor is connected, heating is carried out without calculation of the DHW according to this sensor.
Hot water DHW sensor (top) Y605 T36 55	If this sensor is used in addition to the bottom DHW sensor, the two sensors are used for interpolation. The weighting between these two sensors can be adjusted.

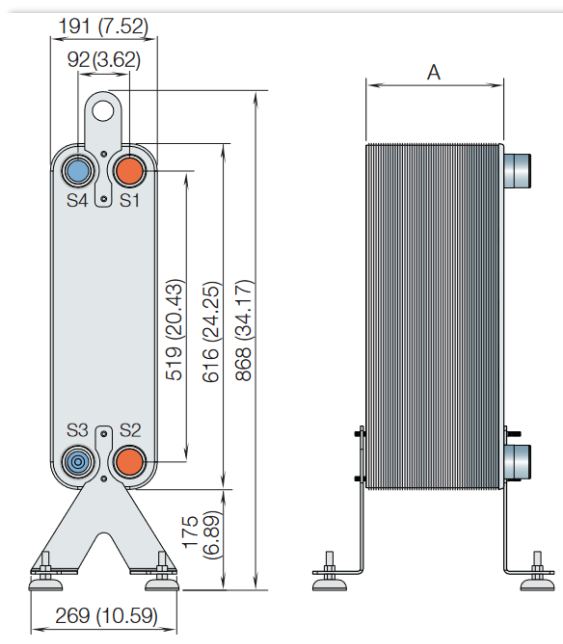
6.5 Mechanical and hydraulic assemblies

6.5.1 Evaporator

Evaporators are available on request from the spare parts store. Low demand means that evaporators are only requested once an order has been received.

Version	Spare part no.
A	204430
B	204433
C	204436
D	204439

Evaporator



mm (inches)

Designation	Data
Plates, connections	Stainless steel
Solder	Copper
Number of plates	n
Dimension A in mm	$16 + (2.07 * n)$
Weight in kg	$4.82 + (0.35 * n)$
Max. particle size	1 mm

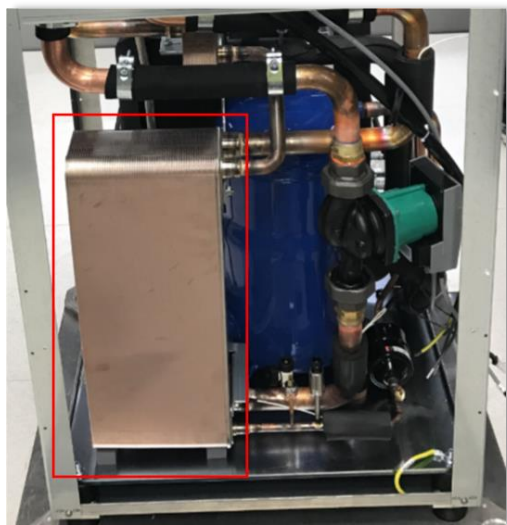
Version C uses an Alfa Laval heat exchanger with the designation AC112-70 AMDS-G with a number of plates of $n=70$. The connections for evaporators of all versions are the same. They only differ based on the number of plates.

Repair instructions

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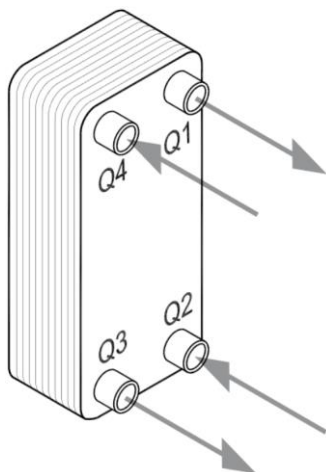
6.5.2 Condenser

Version	Type	Spare part no.
A		204428
B	Danfoss H62L cx 140	204431
C	Danfoss H116L c 104	204434
D		204437



Danfoss H62L cx 140

Designation	Specification
Weight	19.5 Kg
Solder material	Copper
Danfoss designation	021H0200
Temperature min./max.	-196 °C/+200 °C
Max. operating pressure	48 bar
Number of plates	120
Connections	
Q1	1 3/8" solder connection
Q2	1 3/8" solder connection
Q3	1/2" solder connection
Q4	5/8" solder connection



Danfoss H116L c 104

Designation	Specification
Weight	26.38 Kg
Solder material	Copper
Danfoss designation	021H9266
Temperature min./max.	-196 °C/+200 °C
Max. operating pressure	48 bar
Number of plates	140
Connections	
Q1	1 3/8" solder connection
Q2	1 3/8" solder connection
Q3	1/2" solder connection
Q4	5/8" solder connection

Repair instructions

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6.5.3 Hot gas heat exchanger

Version	Type	Spare part no.
A		204429
B	Danfoss H30L-c46	204432
C	Danfoss H30L-c56	204435
D		204438

H30L-c46			
Temperature range	-196 °C to +200 °C	Max. permissible operating pressure	48 bar
Plate material	Stainless steel AISI 316L	Weight	5.6 kg
Solder material	Copper	Number of plates	46
H1	R1 ½"	Q1	7/8" solder connection
H3	28.2 mm solder connection	Q2	7/8" solder connection
H4	28.2 mm solder connection	Danfoss designation	021H4102

H30L-c56			
Temperature range	-196 °C to +200 °C	Max. permissible operating pressure	45 bar
Plate material	Stainless steel AISI 316L	Weight	4.98 kg
Solder material	Copper	Number of plates	56
H1	R1 ½"	Q1	7/8" solder connection
H3	28.2 mm solder connection	Q2	7/8" solder connection
H4	28.2 mm solder connection	Danfoss designation	

6.5.4 Filter dryer

Version	Type	Spare part no.
A, B	Danfoss DML 164S 023Z4830	201476
C, D	Danfoss DML 305S 023Z4833	201477



DML 164S			
Temperature range	-40 °C to +70 °C	Max. permissible operating pressure	46 bar
Casing material	Steel	Weight	0.94 kg
Connection	½"/12 mm solder connection	Casing volume	0.35 l

DML 305S			
Temperature range	-40 °C to +70 °C	Max. permissible operating pressure	46 bar
Casing material	Steel	Weight	1.48 kg
Connection	5/8"/16 mm solder connection	Casing volume	0.72 l

6.5.5 Pipe assemblies

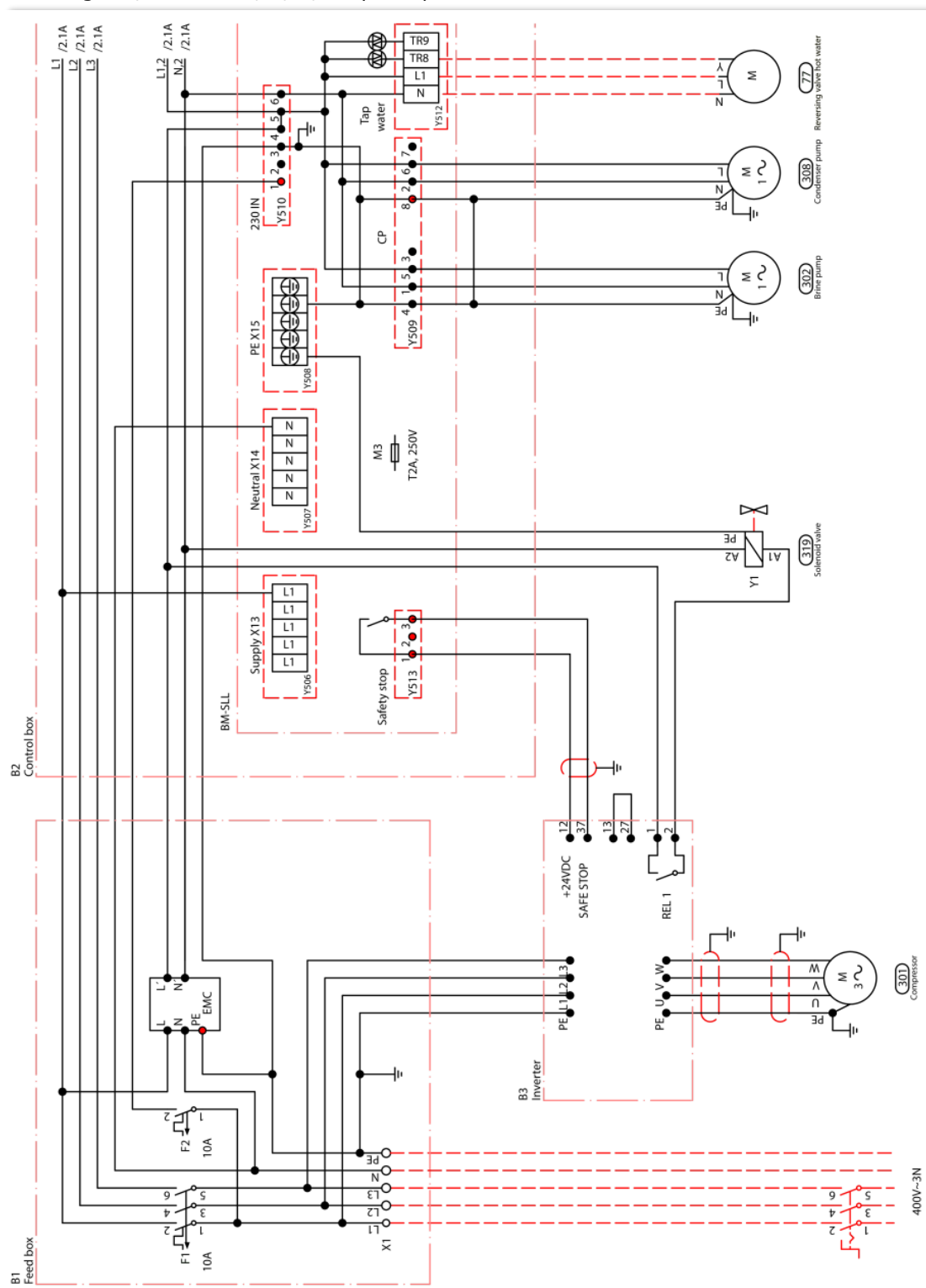
Pipe assemblies are not installed for these appliances.

Repair instructions

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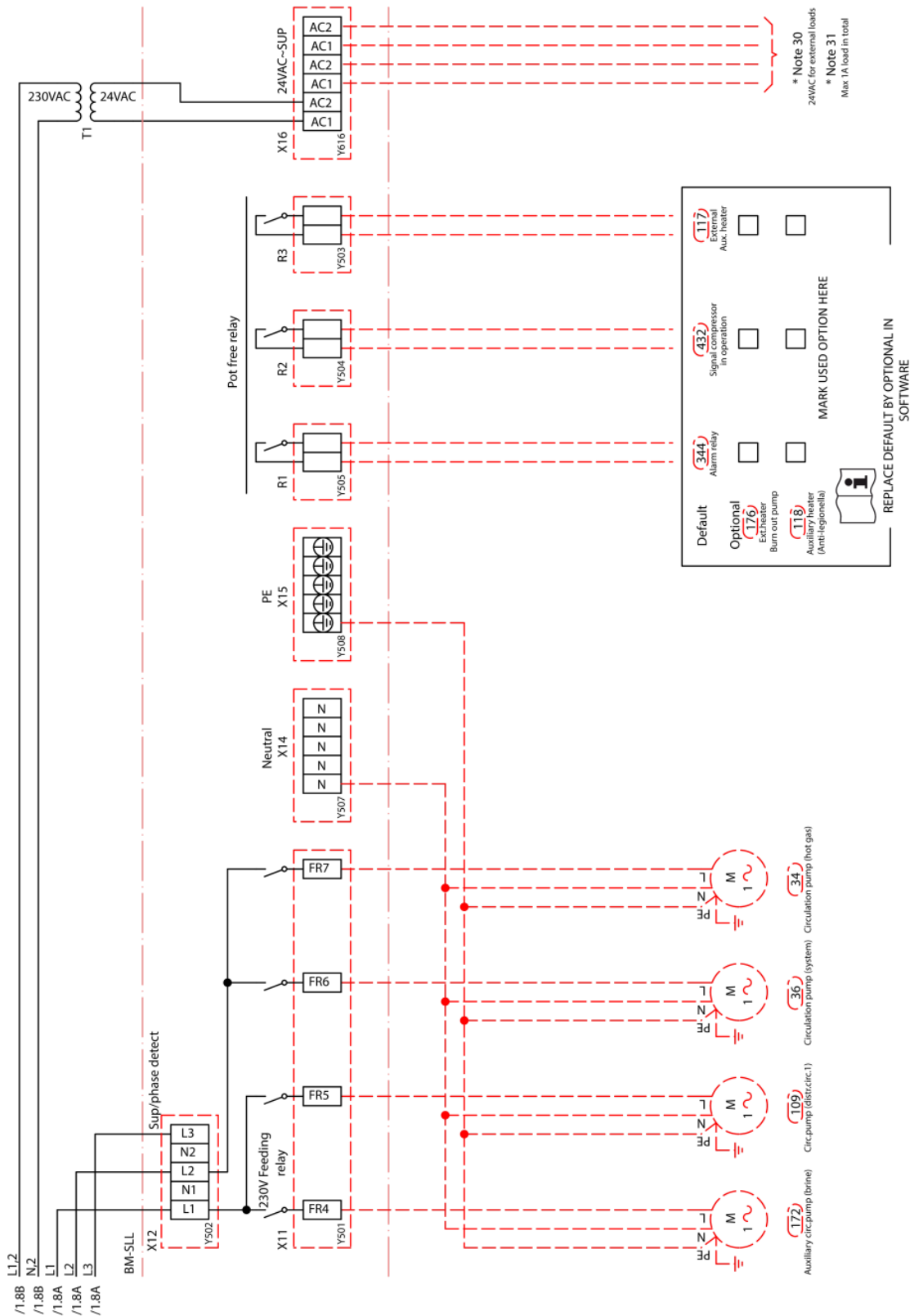
6.6 Wiring diagram

Connection diagram, versions A, B, C, D up to April 2019



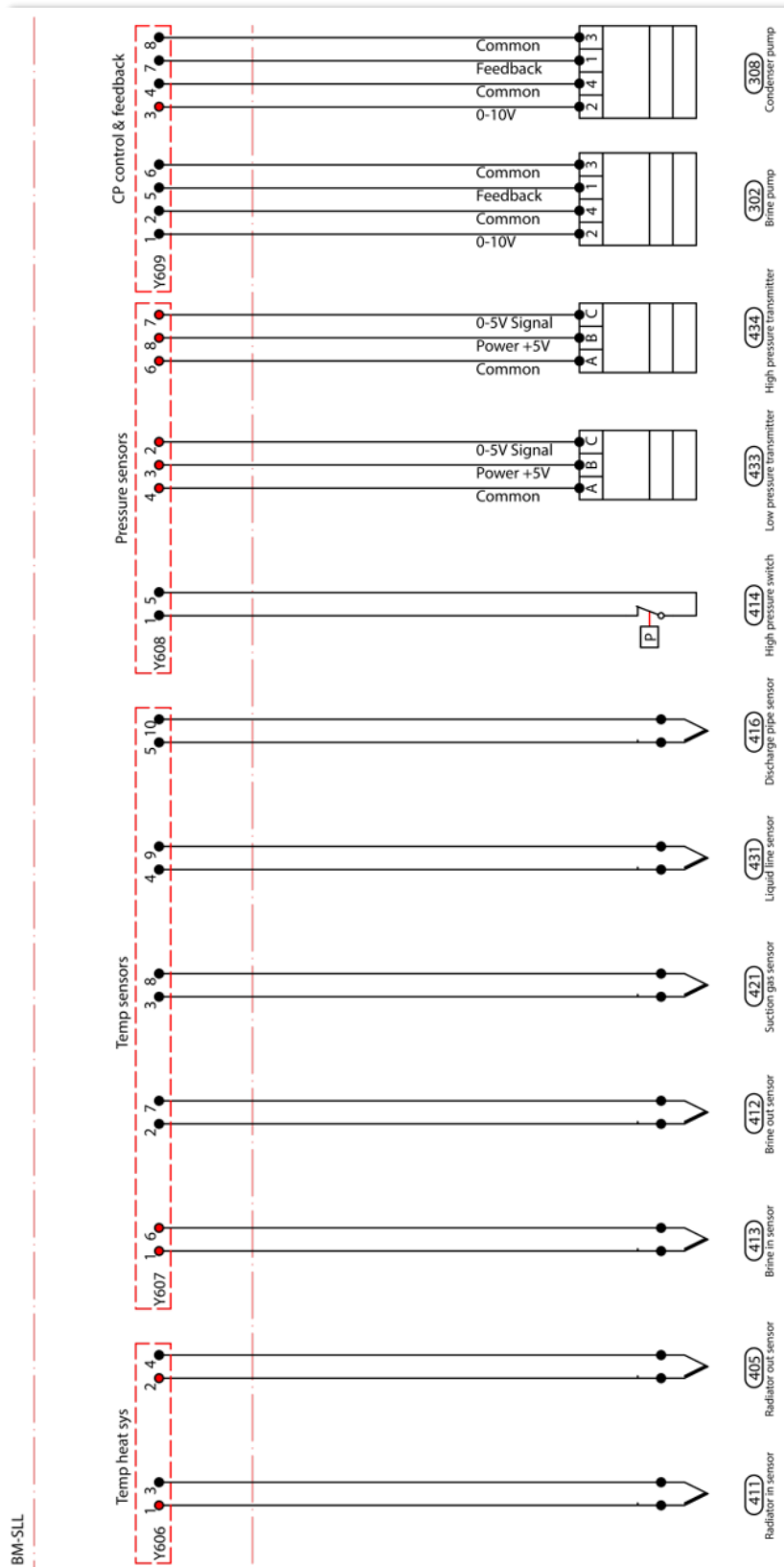
Repair instructions

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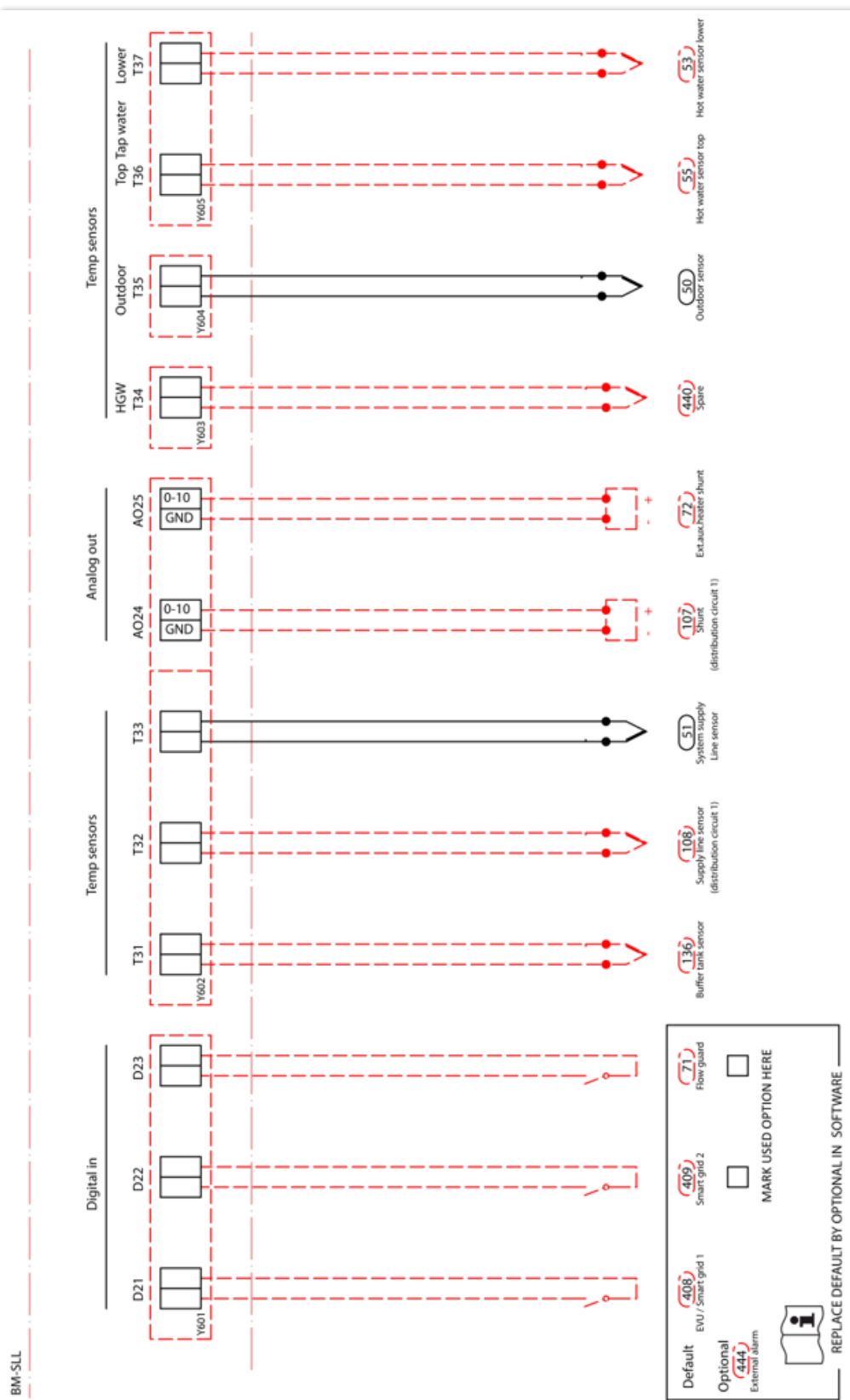
Repair instructions

WPE-I xx H 400 Premium



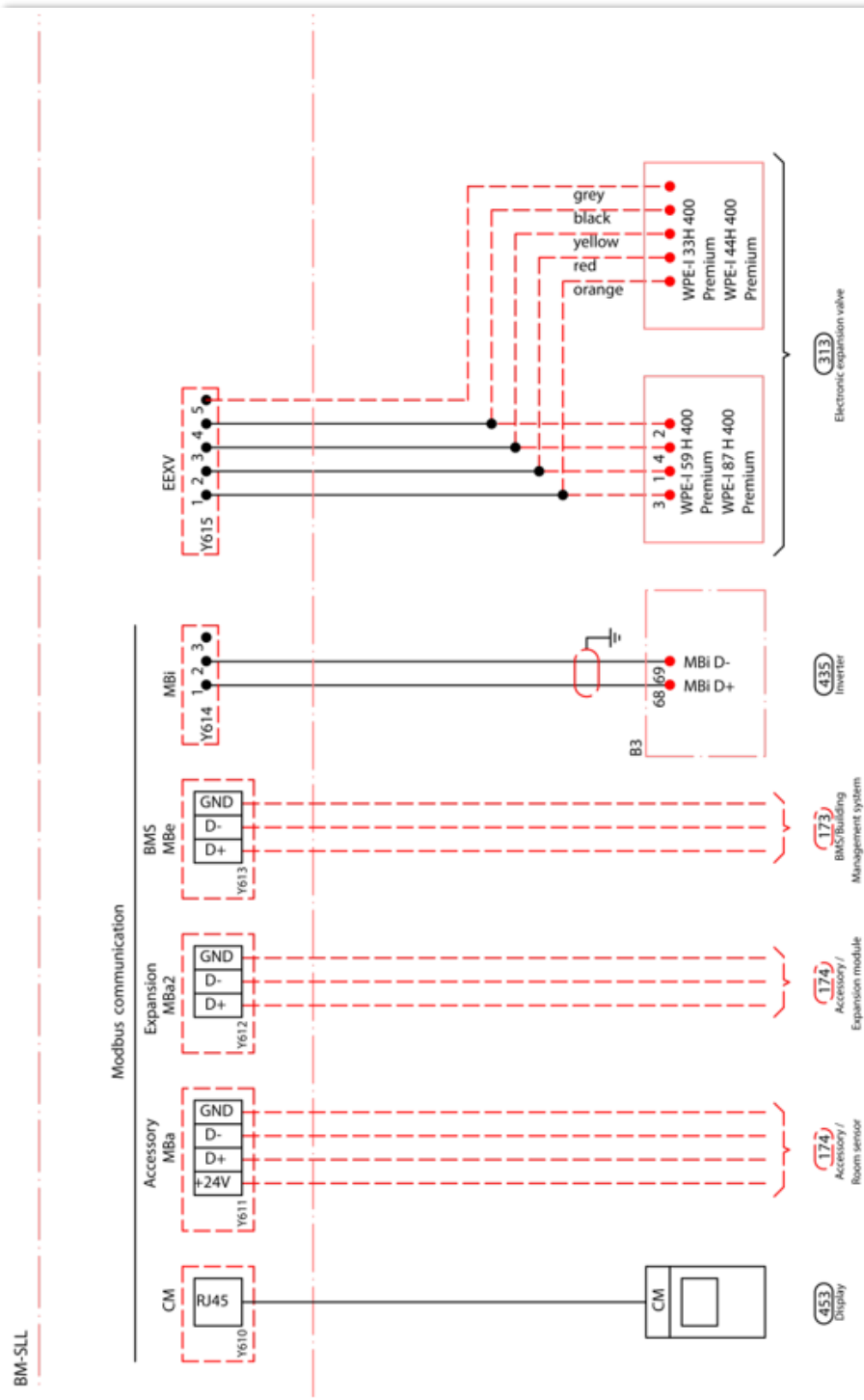
Repair instructions

WPE-I xx H 400 Premium



Repair instructions

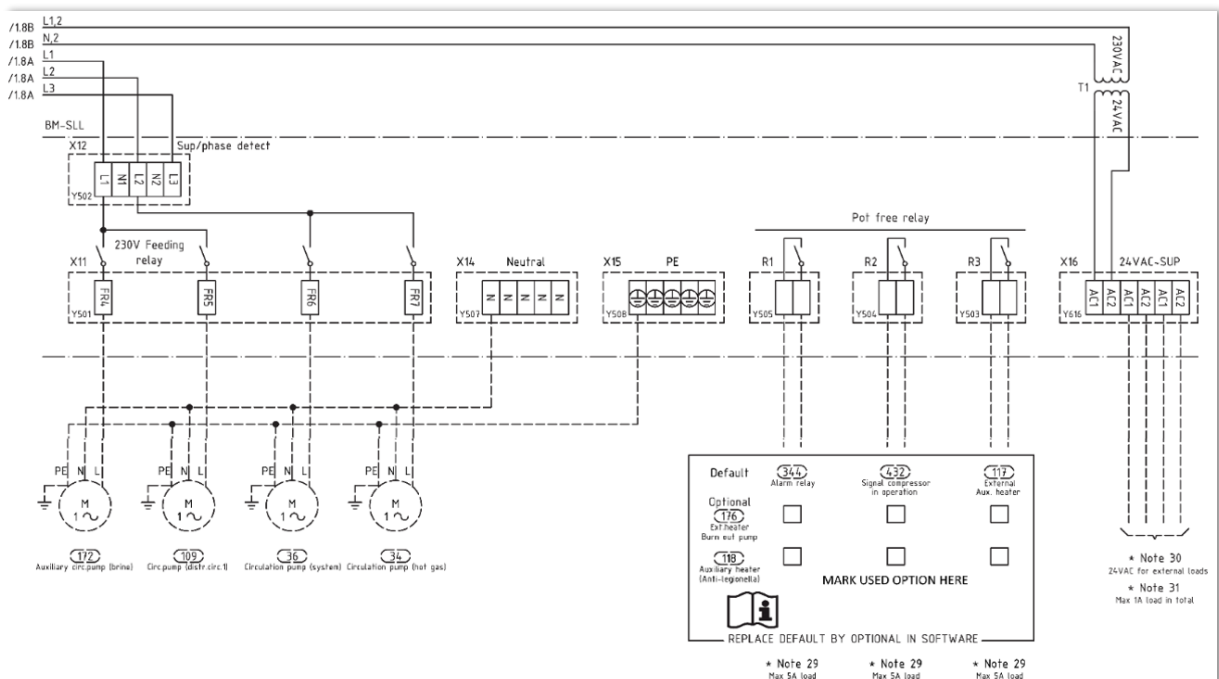
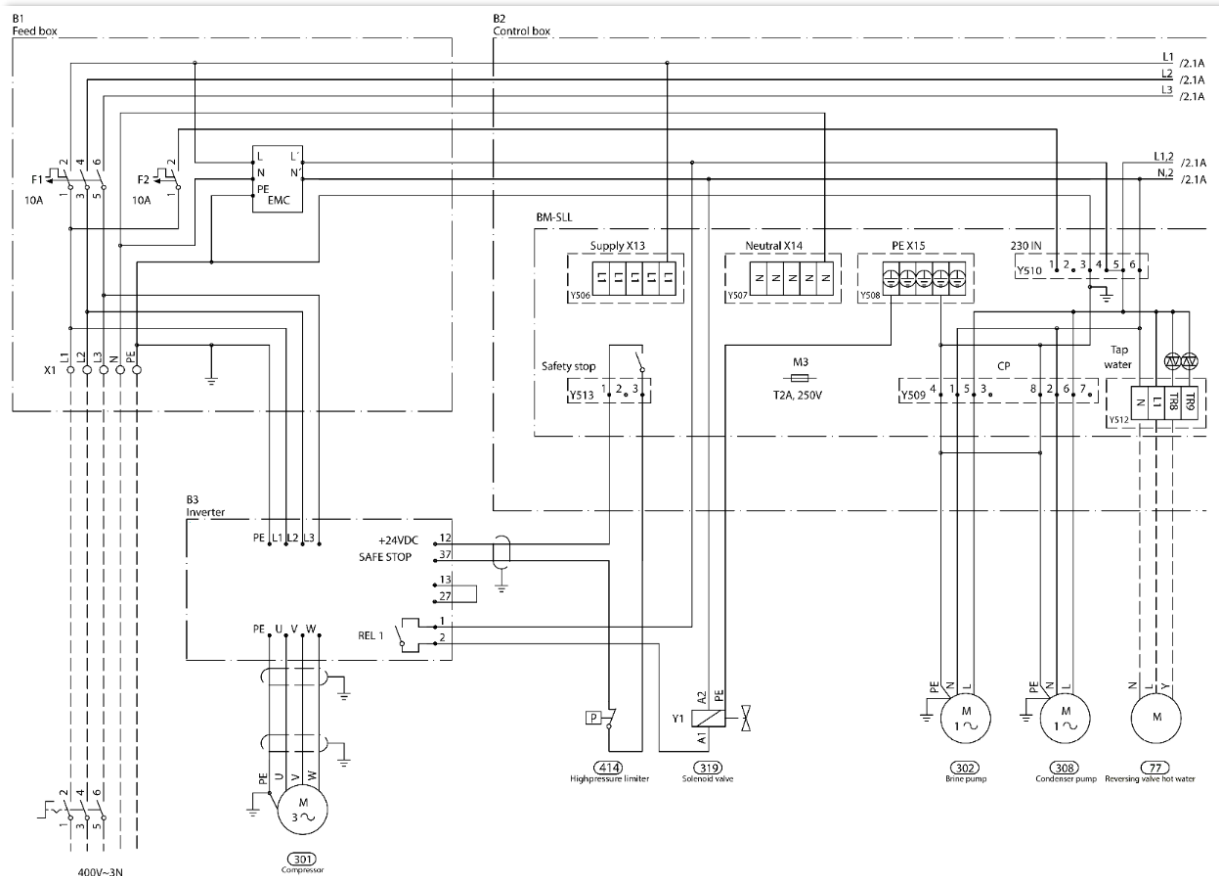
WPE-I xx H 400 Premium



Repair instructions

WPE-I xx H 400 Premium

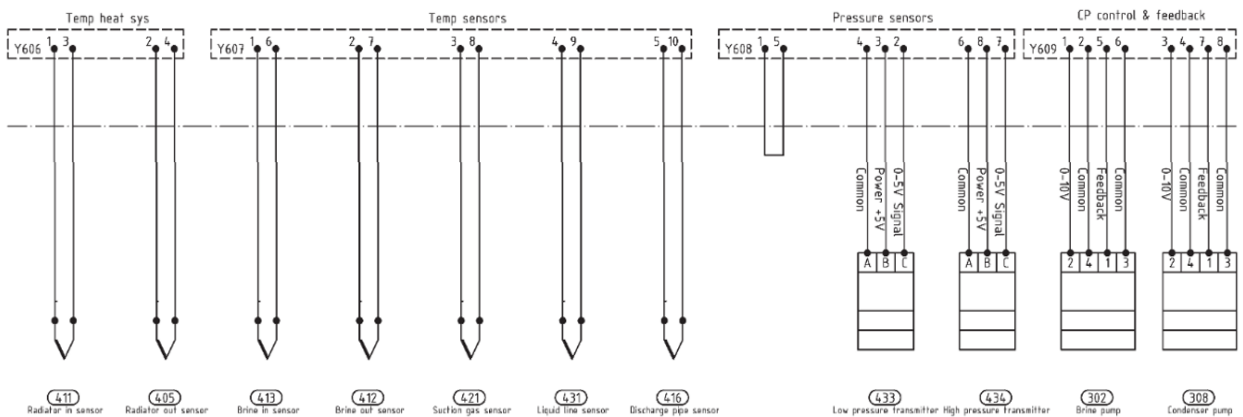
Connection diagram, versions A, B, C, D from May 2019



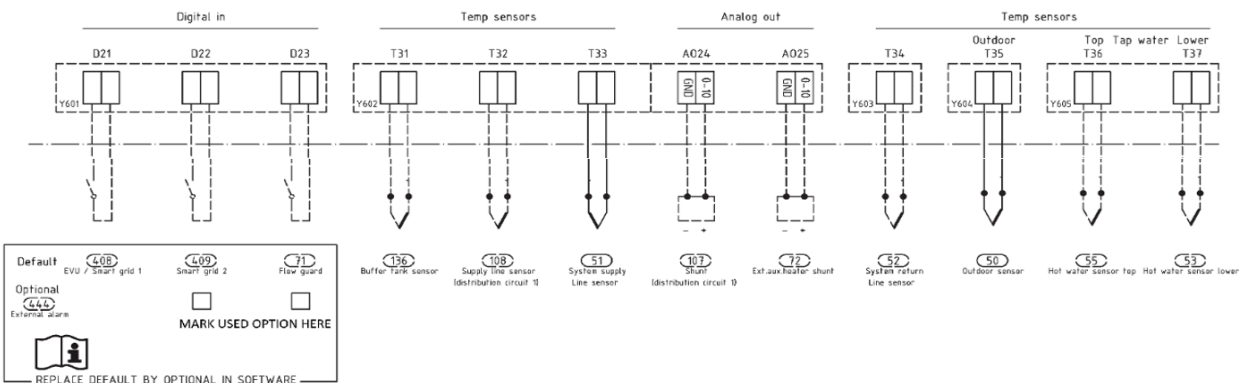
Repair instructions

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BM-SLL

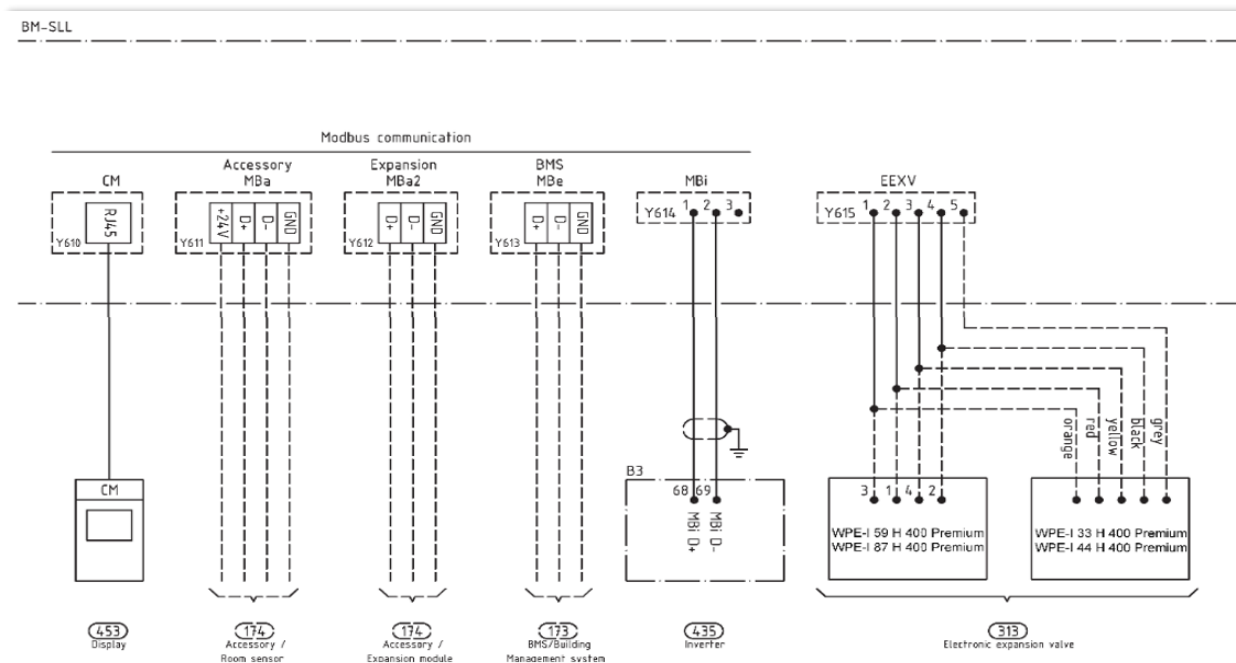


BM-SLL



Repair instructions

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Key to connection diagram, heat pump versions A, B, C, D

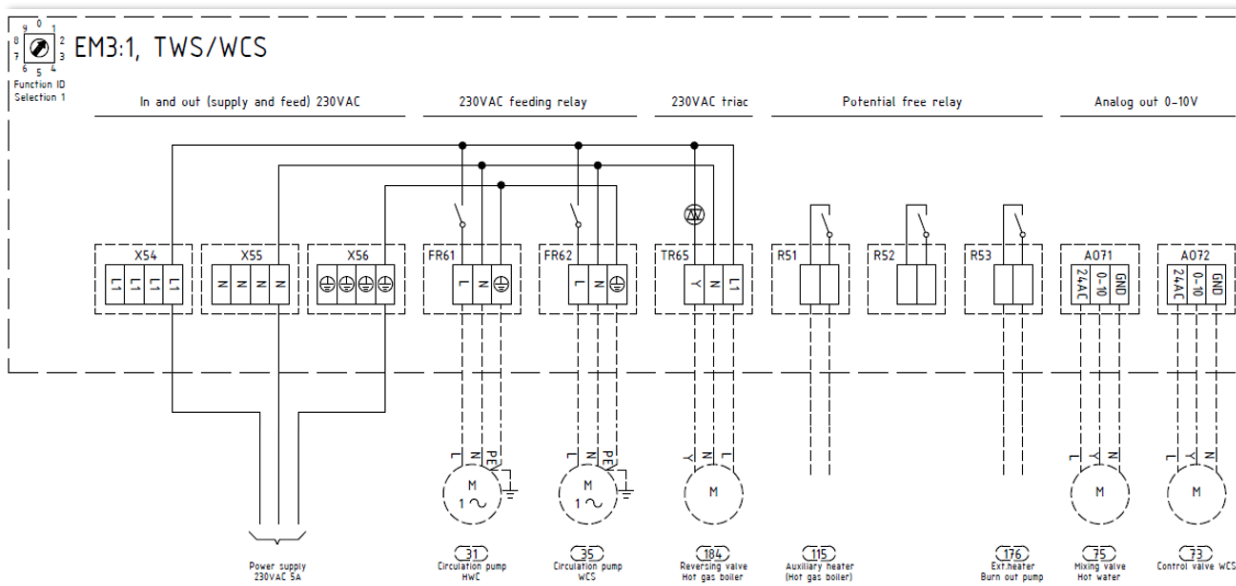
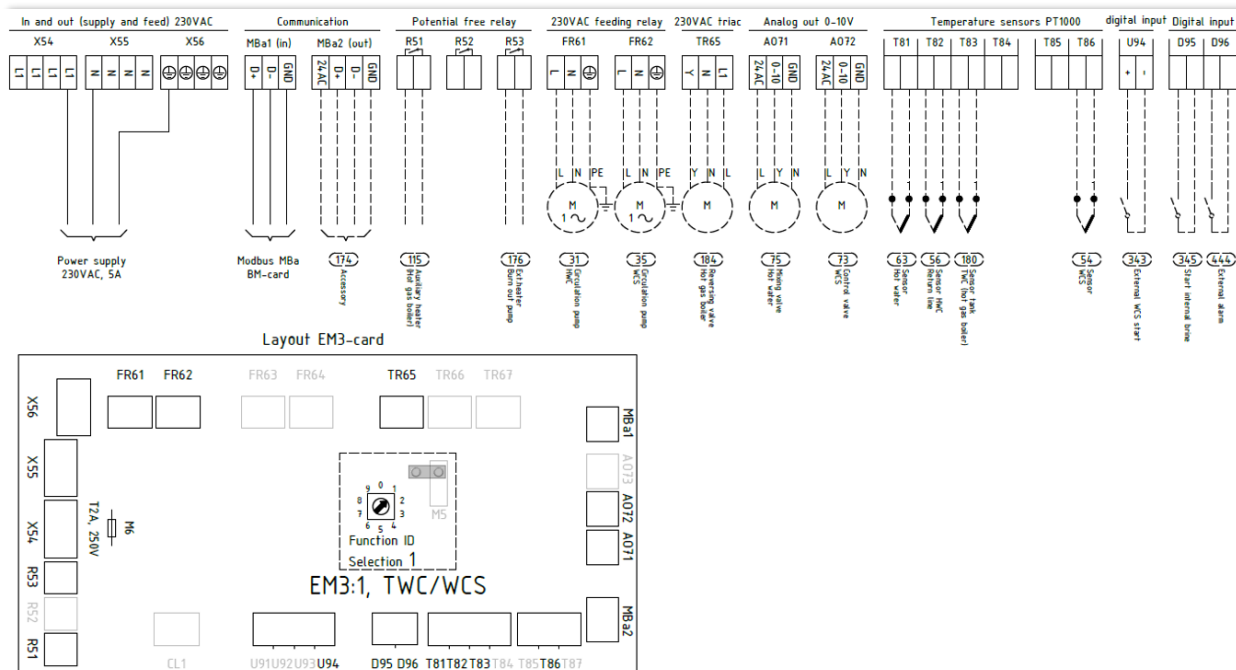
Number / terminal	Description	Number / terminal	Description
34 / FR7 / Y501	Circulation pump, hot gas	319	Valve, compressor lubrication
36 / FR6 / Y501	Circulation pump, heating circuit	344 / R1 / Y505	Output, alarm
50 / T35 / Y604	Outside sensor	405 / Y606	Flow sensor
51 / T33 / Y602	Flow sensor, system	407 / T32 / Y602	Flow sensor, hot gas
52 / T34 / Y603	Return sensor, system	408 / D21 / Y601	PSU / smart grid 1
53 / T37 / Y605	DHW sensor, bottom	409 / D22 / Y601	Smart grid 2
55 / T36 / Y605	DHW sensor, top	411 / Y606	Return sensor
71 / D23 / Y601	Flow switch (option)	412 / Y607	Sensor, source outlet
72 / AO25 / Y602	2nd heat generator 0-10 V	413 / Y607	Sensor, source inlet
77 / TR8 / Y512	Diverter valve, heating/DHW	414 / Y513	High pressure switch
107 / AO24 / Y602	Mixing valve, heating circuit 1	416 / Y607	Hot gas sensor
108 / T32 / Y602	Flow sensor, heating circuit 1	421 / Y607	Suction gas sensor
109 / FR5 / Y501	Circulation pump, heating circuit 1	431 / Y607	Sensor, condenser
117 / R3 / Y503	Auxiliary heater HZG	432 / R2 / Y504	Signal compressor running
118 / R1 / Y505	Auxiliary heater WW	433 / Y608	Low pressure sensor
136 / T31 / Y602	Buffer cylinder sensor	434 / Y608	High pressure sensor
172 / FR4 / Y501	Source pump, external	435 / Y614	Inverter
173 / Y613	Modbus BMS, not used	444	External alarm (option)
174 / Y612	Connection, EM card	453 / Y610	CM module (display)
175 / Y611	Connection, FE room controller	B1	Control panel, power supply
176 / (R1, R2, R3)	External heat generator	B2	Control panel, BM card
186 / TR9 / Y512	Diverter valve, pool	B3	Inverter
301	Compressor	F1	10 A circuit breakers
302 / Y509	Pump, source (power supply)	F2	10 A circuit breaker
308 / Y509	System pump (power supply)	EMC	EMC mains filter
313	Electronic expansion valve	T1	Transformer 230/24 V AC

Repair instructions

WPE-I xx H 400 Premium

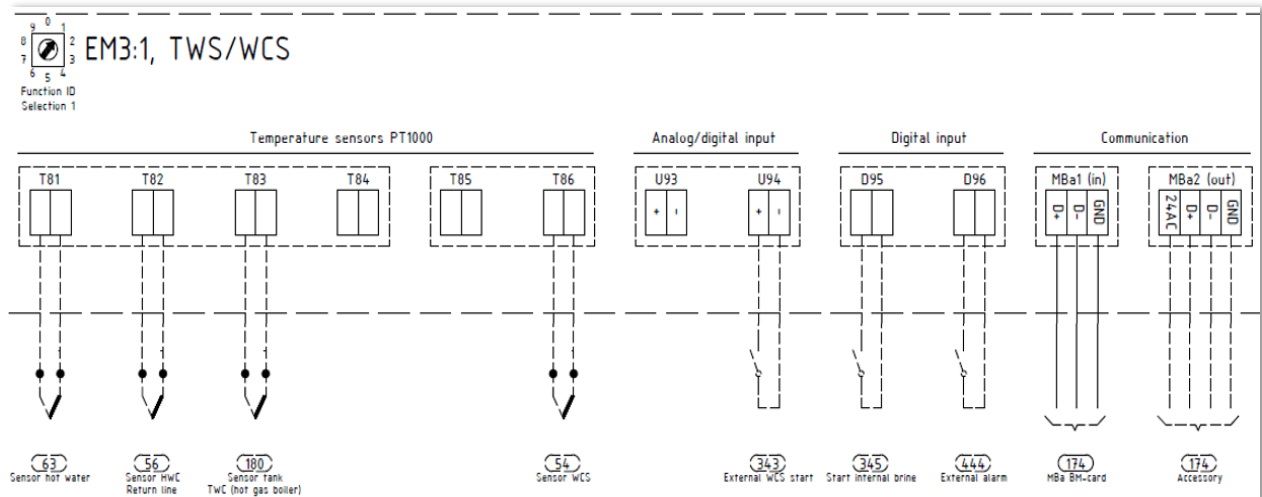
6.6.1 Connection diagrams EM

DHW functions, WCS / TWC (TWS)



Repair instructions

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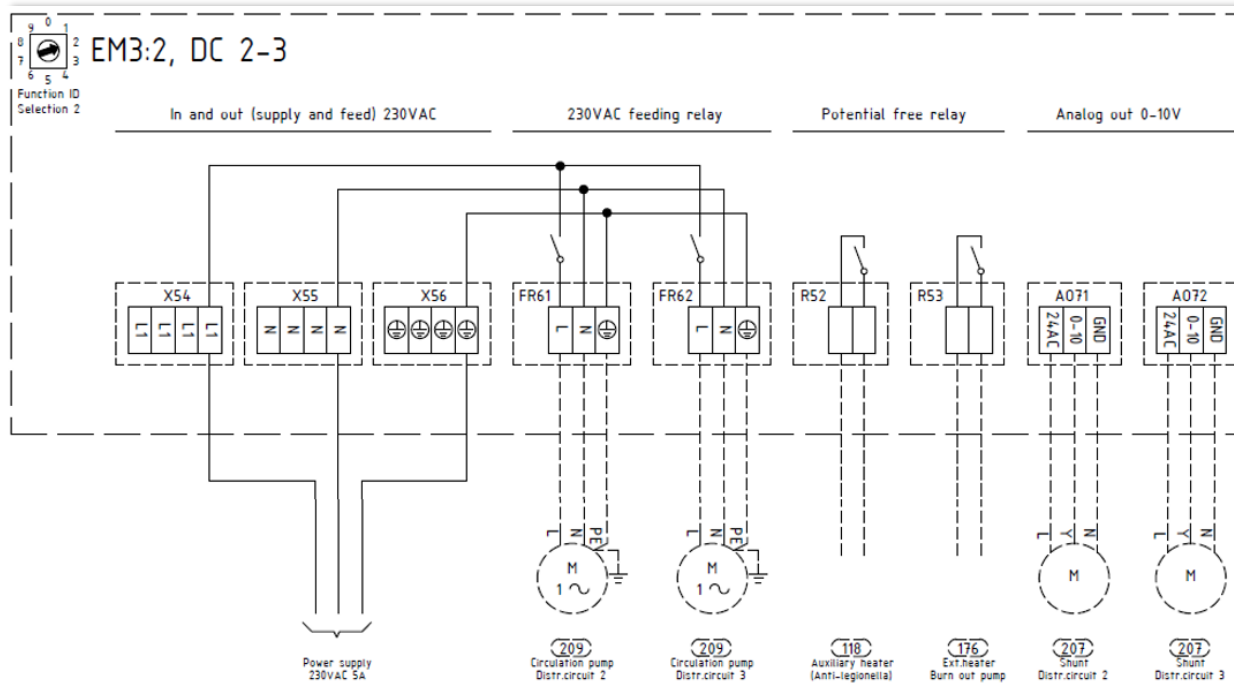
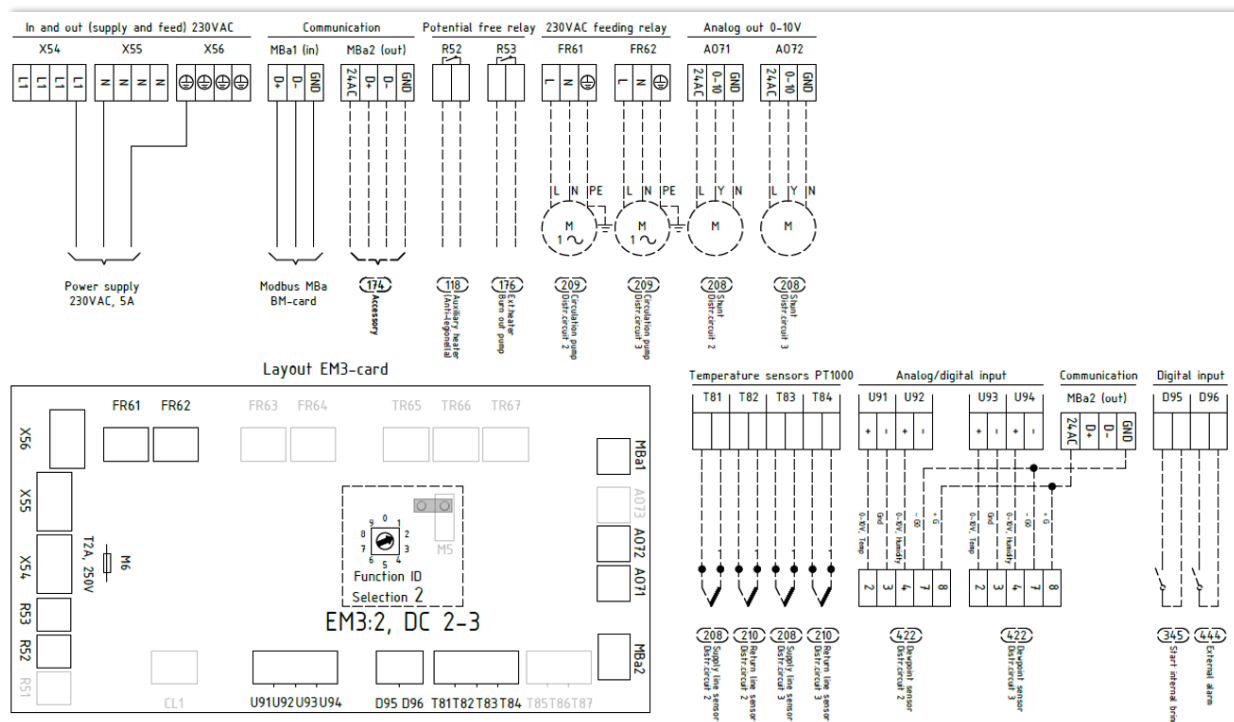
Key, EM card switch position 1, DHW functions

Number / terminal	Description	Number / terminal	Description
31 / FR61	Pump, DHW circulation	180 / T83	DHW cylinder sensor top
35 / FR62	Pump, water charging system	184 / TR65	Diverter valves, hot gas charging
54 / T86	Sensor, water charging system return	343 / U94	External start, water charging system
56 / T82	Sensor, DHW circulation return	345 / D95	External start, internal source pump
63 / T81	Sensor DHW flow	444 / D96	External alarm contact
73 / AO72	Mixing valve, water charging system	T84	Source sensor, inlet, primary
75 / AO71	Mixing valve, DHW circulation	T85	Source sensor, outlet, primary
115 / R51	Auxiliary heater, DHW cylinder		
174	Modbus In/Out BM card / accessories	AO73	Source pump, primary, variable speed
176 / R53	External auxiliary heater		

Repair instructions

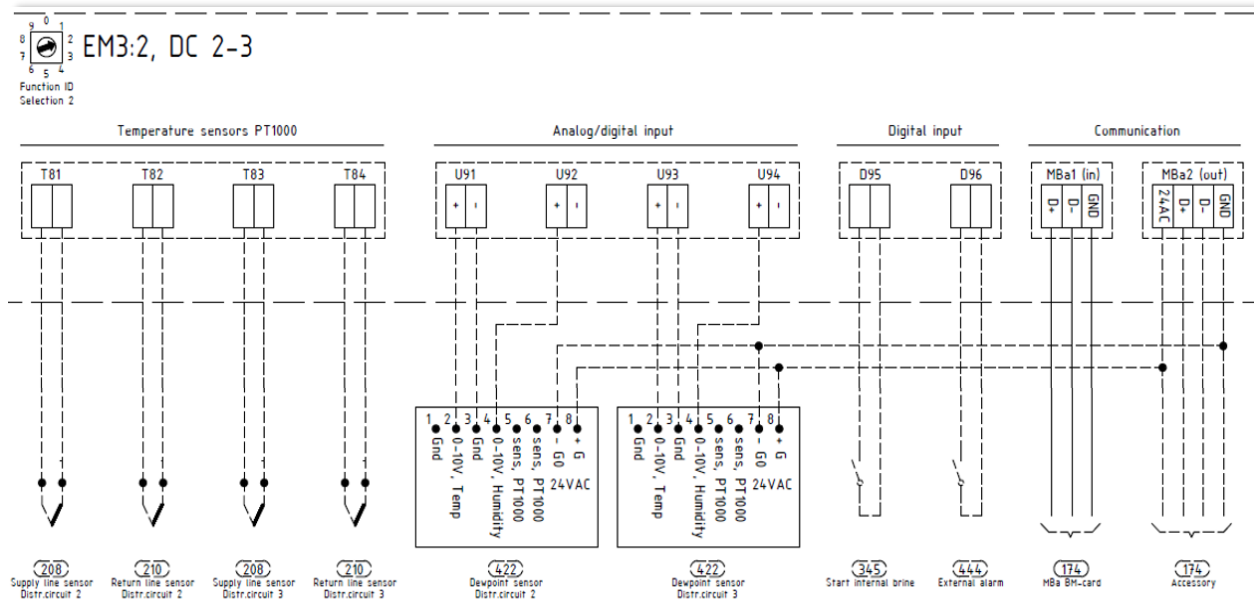
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Heating circuits with mixer 2 and 3, DC 2-3



Repair instructions

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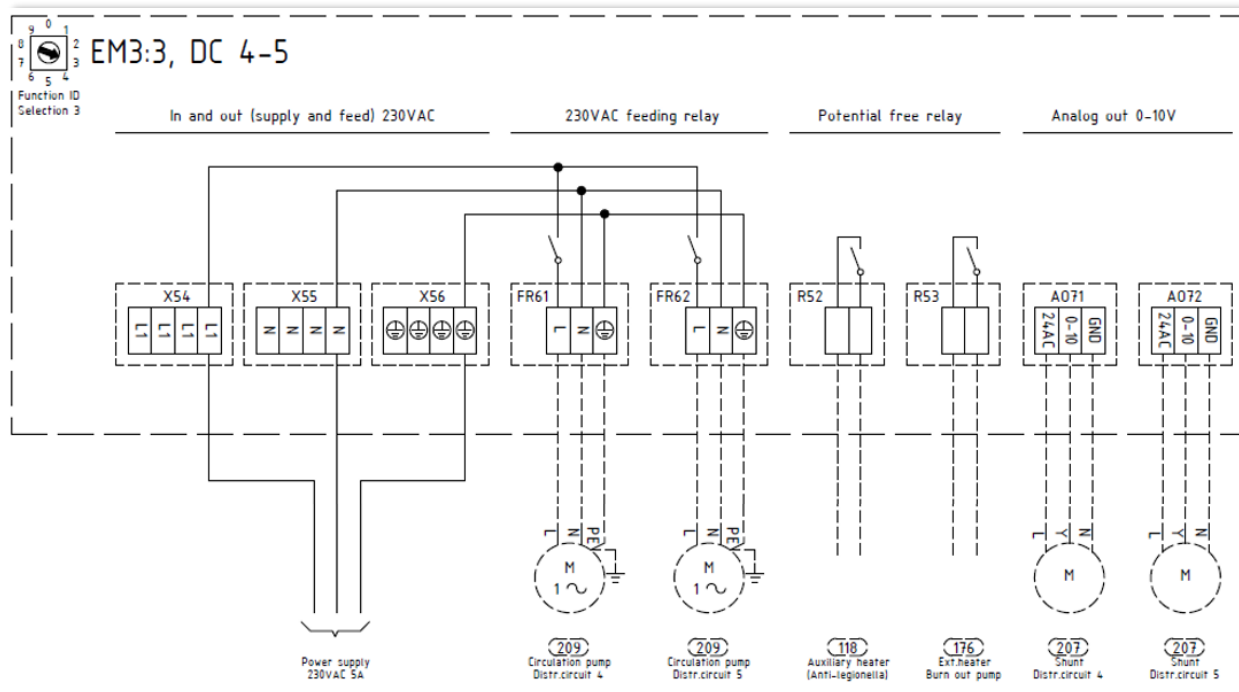
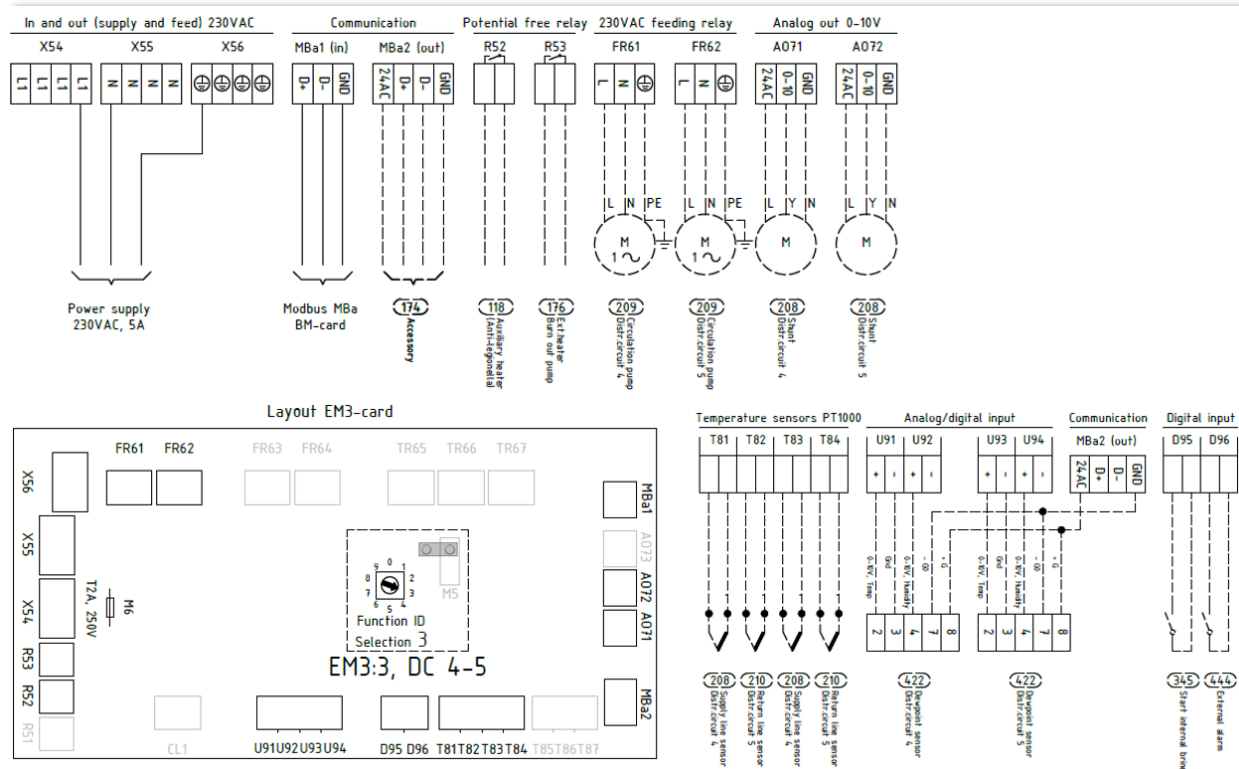
Key, EM card switch position 2, heating circuits 2 and 3

Number / terminal	Description	Number / terminal	Description
118 / R52	Auxiliary heater	210 / T82	Sensor, heating circuit 2, return
174	Modbus In/Out BM card / accessories	210 / T84	Sensor, heating circuit 3, return
176 / R53	External auxiliary heater	345 / D95	External start, internal source pump
207 / AO71	Mixing valve, heating circuit 2	422 / U91	Dew point sensor, heating circuit 2
207 / AO72	Mixing valve, heating circuit 3	422 / U92	Dew point sensor, heating circuit 2
208 / T81	Sensor, heating circuit 2, flow	422 / U93	Dew point sensor, heating circuit 3
208 / T83	Sensor, heating circuit 3, flow	422 / U94	Dew point sensor, heating circuit 3
209 / FR61	Pump, heating circuit 2	444 / D96	External alarm contact
209 / FR62	Pump, heating circuit 3	TR65	Heating/cooling, heating circuit 2
		TR66	Heating/cooling, heating circuit 3

Repair instructions

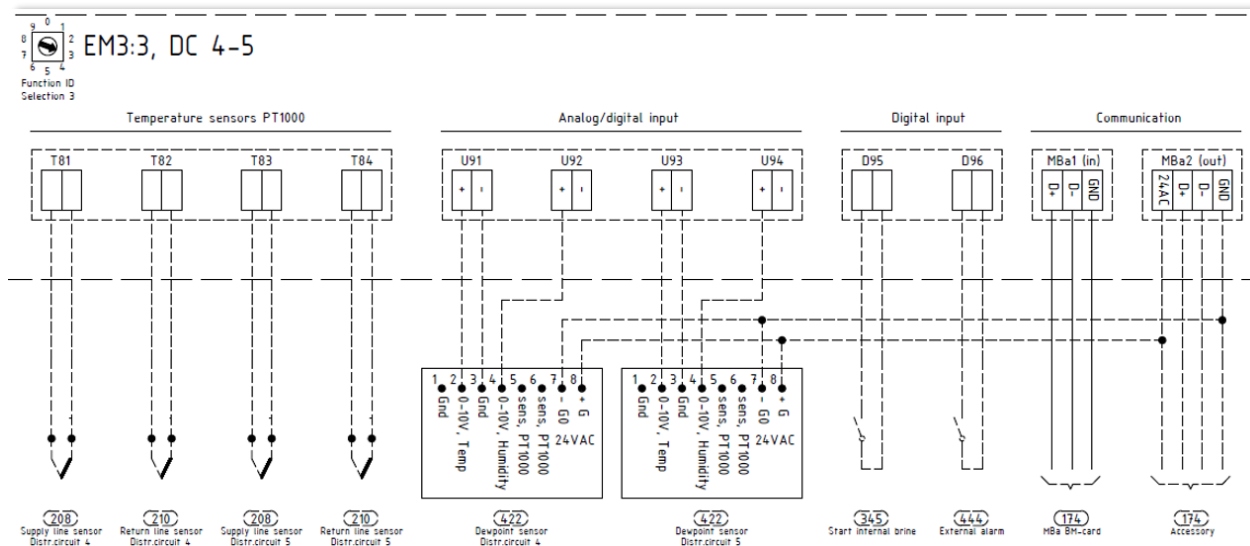
WPE-I xx H 400 Premium

Heating circuits with mixer 4 and 5, DC 4-5



Repair instructions

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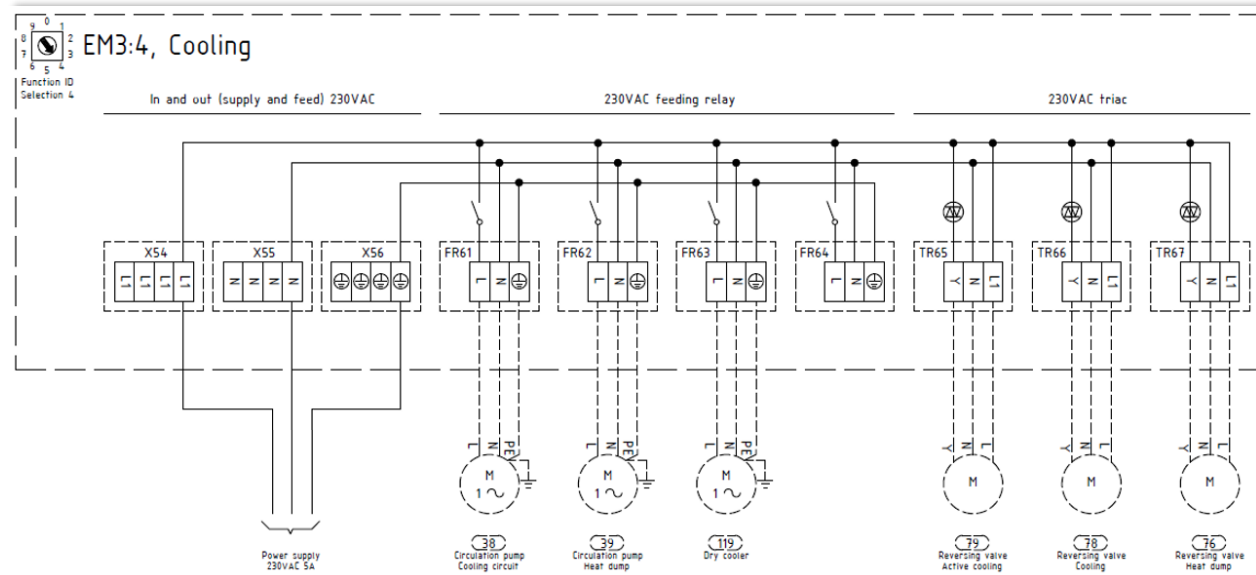
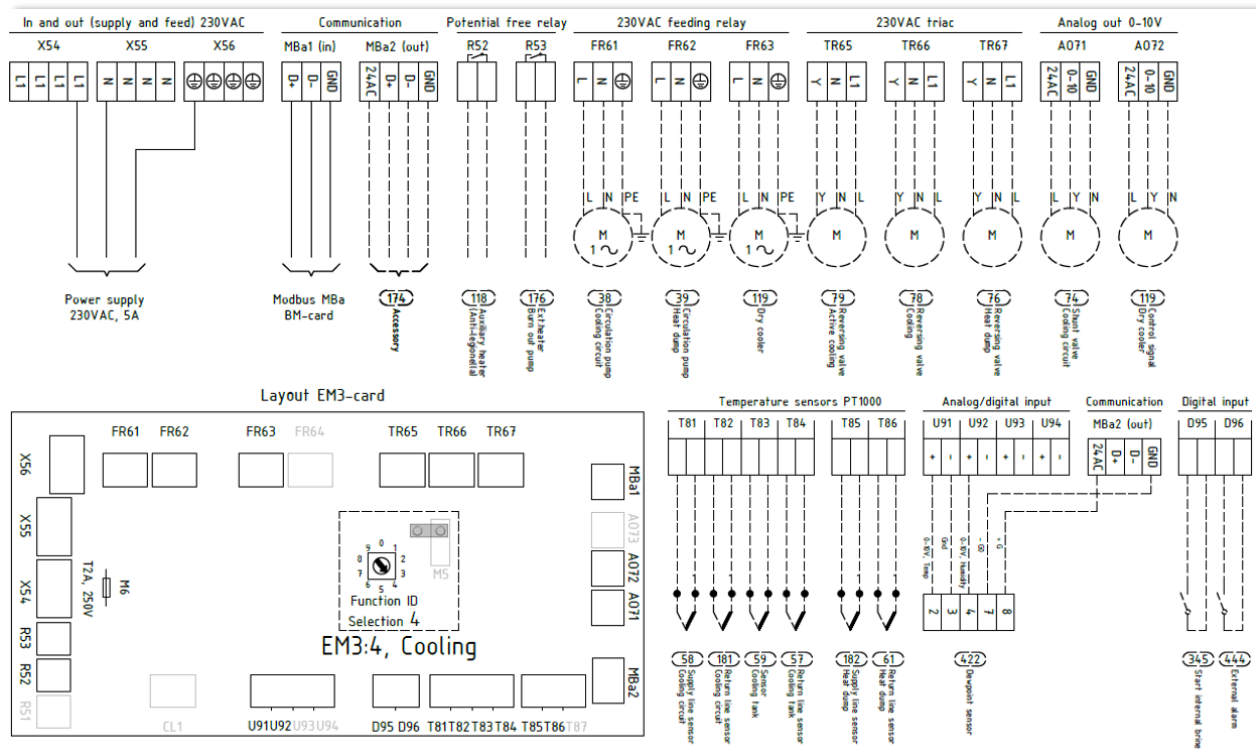


Key, EM card switch position 3, heating circuits 4 and 5

Number / terminal	Description	Number / terminal	Description
118 / R52	Auxiliary heater	210 / T82	Sensor, heating circuit 4, return
174	Modbus In/Out BM card / accessories	210 / T84	Sensor, heating circuit 5, return
176 / R53	External auxiliary heater	345 / D95	External start, internal source pump
207 / AO71	Mixing valve, heating circuit 4	422 / U91	Dew point sensor, heating circuit 4
207 / AO72	Mixing valve, heating circuit 5	422 / U92	Dew point sensor, heating circuit 4
208 / T81	Sensor, heating circuit 4, flow	422 / U93	Dew point sensor, heating circuit 5
208 / T83	Sensor, heating circuit 5, flow	422 / U94	Dew point sensor, heating circuit 5
209 / FR61	Pump, heating circuit 4	444 / D96	External alarm contact
209 / FR62	Pump, heating circuit 5	TR65	Heating/cooling, heating circuit 4
		TR66	Heating/cooling, heating circuit 5

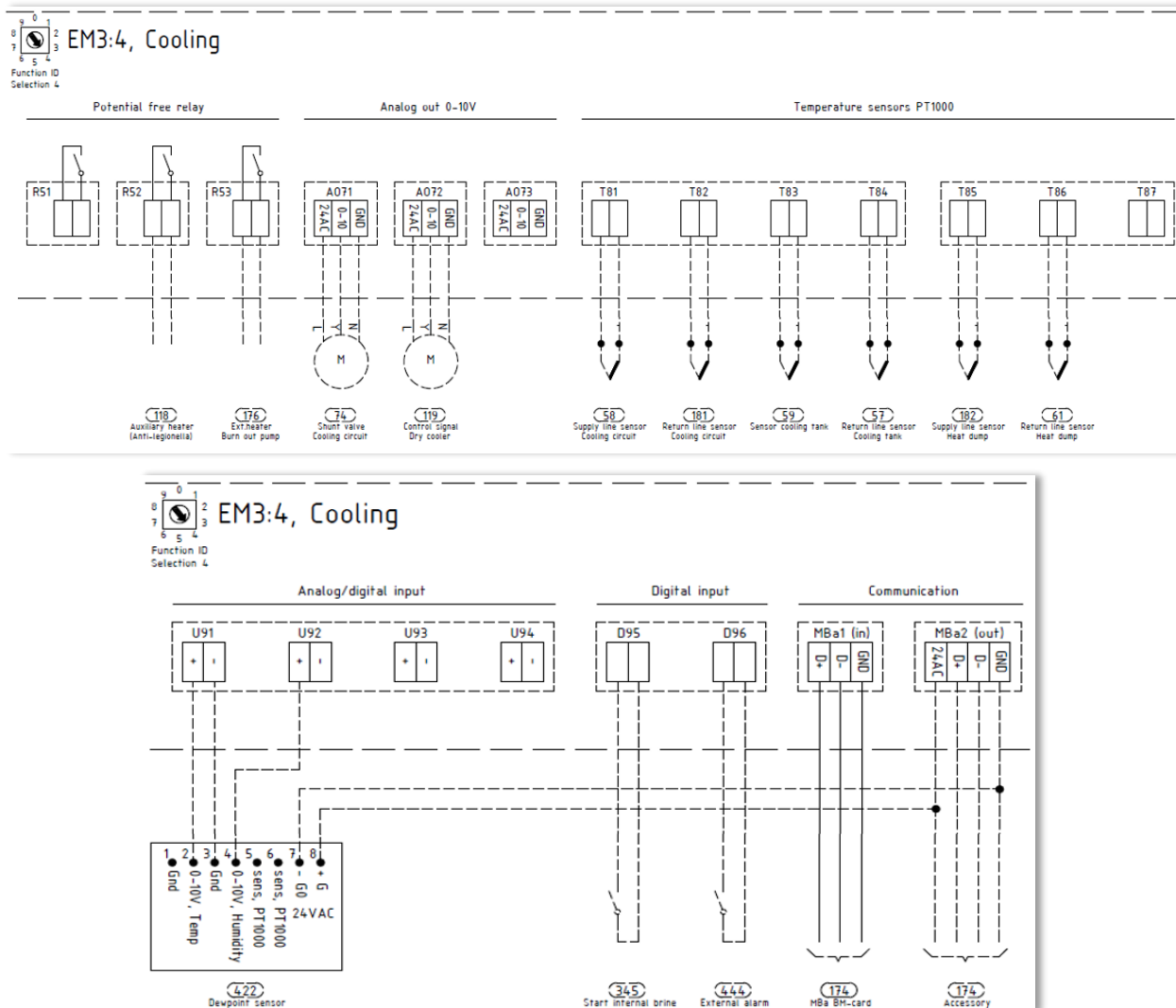
Repair instructions WPE-I xx H 400 Premium

Cooling function: Cooling



Repair instructions

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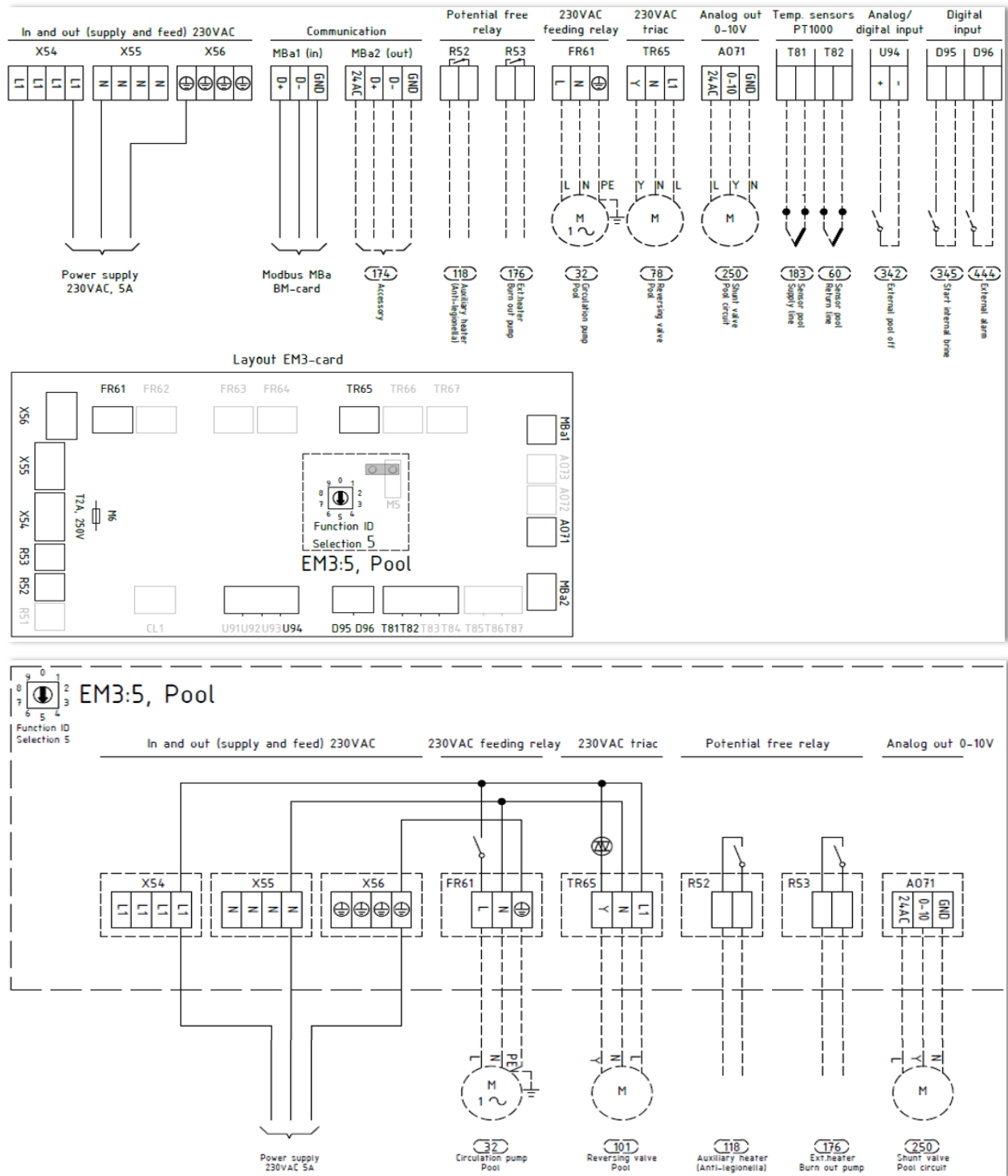
Key, EM card switch position 4, cooling

Number / terminal	Description	Number / terminal	Description
38 / FR61	Pump, cooling circuit	119 / FR63	Output, heat dissipation
39 / FR62	Pump, heat dissipation	119 / AO72	Heat dissipation, control unit
57 / T84	Sensor, buffer, cooling, top	AO73	Excess heat, mixing valve
58 / T81	Sensor, cooling circuit, flow	174	Modbus In/Out BM card / accessories
59 / T83	Sensor, buffer, cooling, bottom	176 / R53	Auxiliary heater
61 / T86	Sensor, heat dissipation, cold side	181 / T82	Sensor, cooling circuit, return
74 / AO71	Mixing valve, cooling circuit	182 / T85	Sensor, heat dissipation, hot side
76 / TR67	Diverter valve, heat dissipation	345 / D95	External switch-on, internal source pump
78 / TR66	Diverter valve, passive cooling	422 / U91	Dew point sensor, cooling circuit
79 / TR65	Diverter valve, active cooling	422 / U92	Dew point sensor, cooling circuit
118 / R52	Auxiliary heater / pasteurisation	444 / D96	External alarm contact

Repair instructions

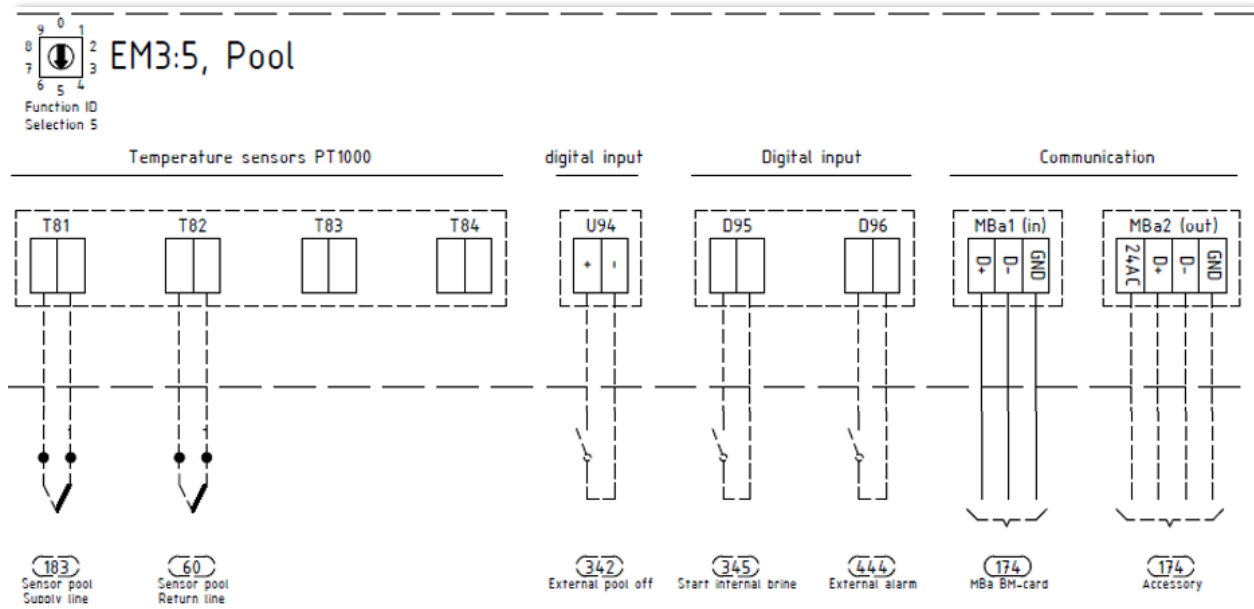
WPE-I xx H 400 Premium

Pool operation: Pool



Repair instructions

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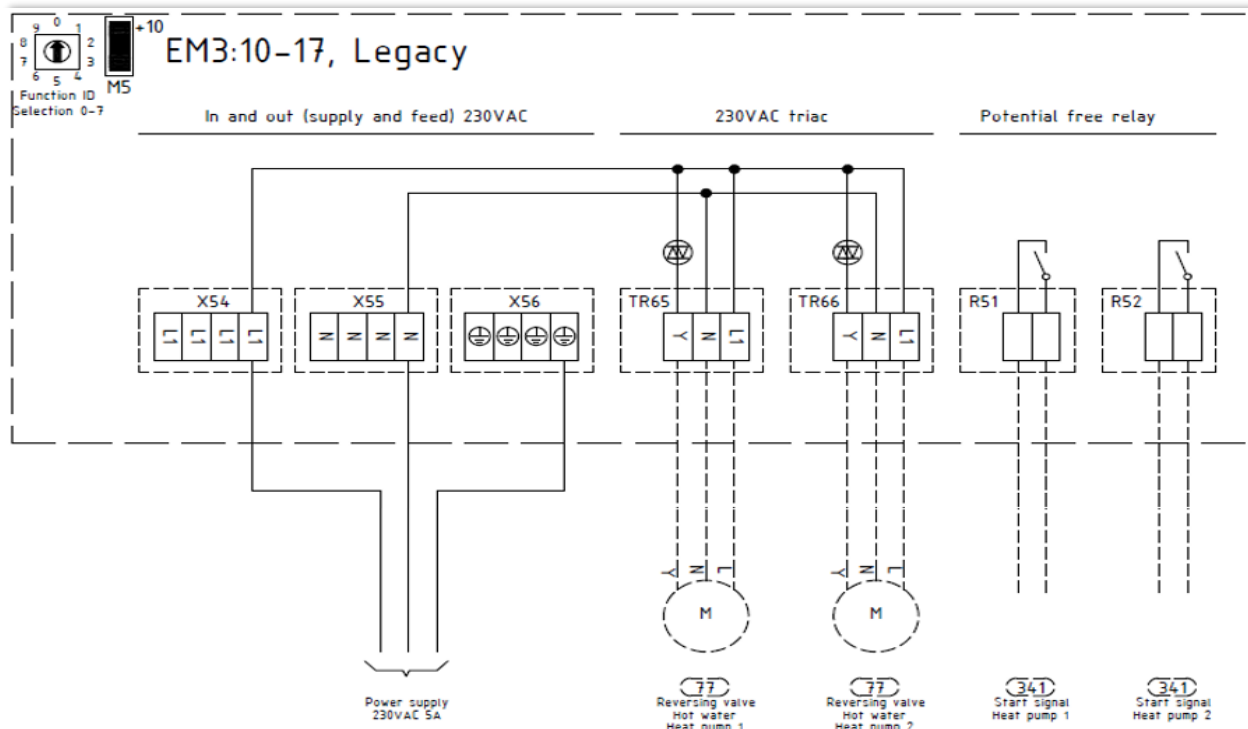
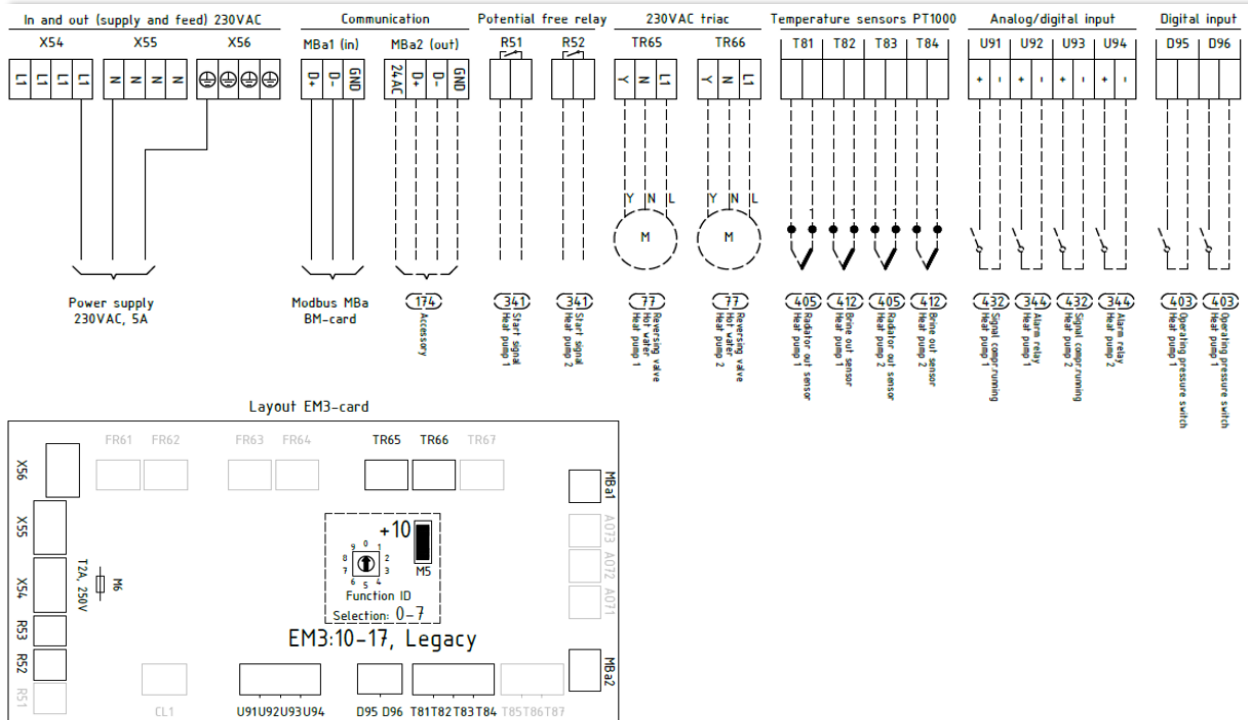
Key, EM card switch position 5, pool

Number / terminal	Description	Number / terminal	Description
32 / FR61	Pool charging pump	174	Modbus In/Out BM card / accessories
60 / T82	Sensor, pool return	176 / R53	Auxiliary heater
78(101) / TR65	Diverter valve, heating / pool	250 / AO71	Mixing valve
103 / T81	Sensor, pool, flow	342 / U94	External, pool, off
118 / R52	Auxiliary heater / pasteurisation	345 / D95	External switch-on, internal source pump
		444 / D96	External alarm contact

Repair instructions

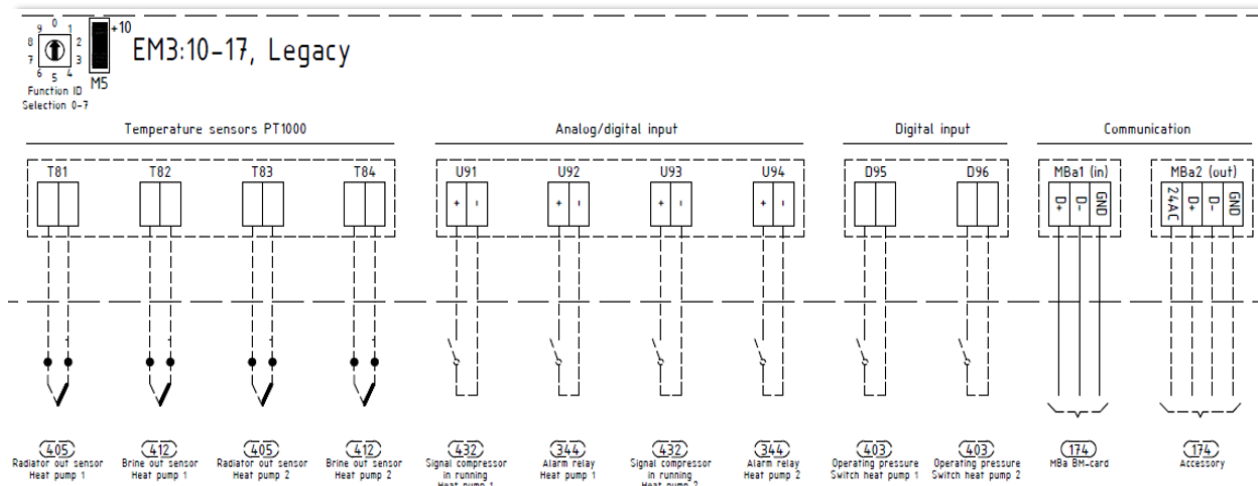
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External heat pump: Legacy



Repair instructions

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Key, EM card switch position 6-15, existing (legacy) heat pump

Number / terminal	Description	Number / terminal	Description
77 / TR65	Diverter valve, heating/DHW, HP 1	403 / D95	Pressure switch, external input, HP 1
77 / TR66	Diverter valve, heating/DHW, HP 2	403 / D96	Pressure switch, external input, HP 2
174	Modbus In/Out BM card	405 / T81	Flow sensor, HP 1
341 / R51	Output, start, HP 1	405 / T83	Flow sensor, HP 2
341 / R52	Output, start, HP 2	412 / T82	Sensor, source outlet, HP 1
344 / U92	External alarm input, HP 1	412 / T84	Sensor, source outlet, HP 2
344 / U94	External alarm input, HP 2	432 / U91	External input, compressor running, HP 1
		432 / U93	External input, compressor running, HP 2

Repair instructions

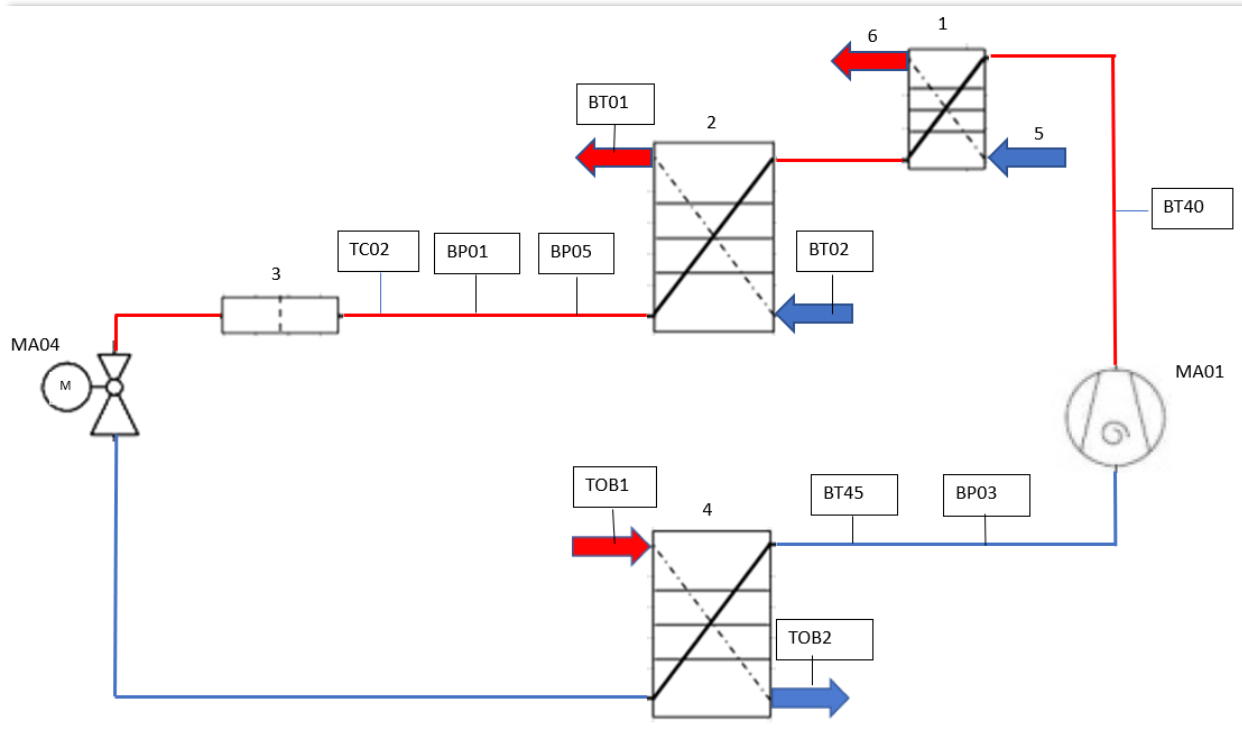
WPE-I xx H 400 Premium

6.7 Hydraulic diagram

The internal hydraulic scheme can be found on the refrigerant circuit diagram.

System hydraulic schemes can be found in the Toolbox.

6.8 Refrigerant circuit diagram



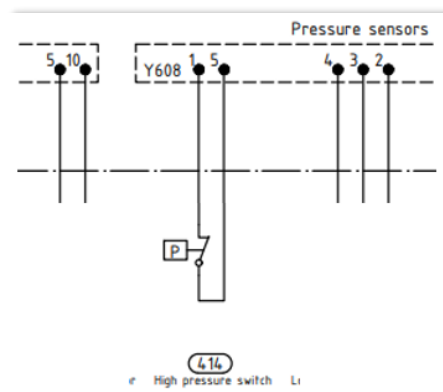
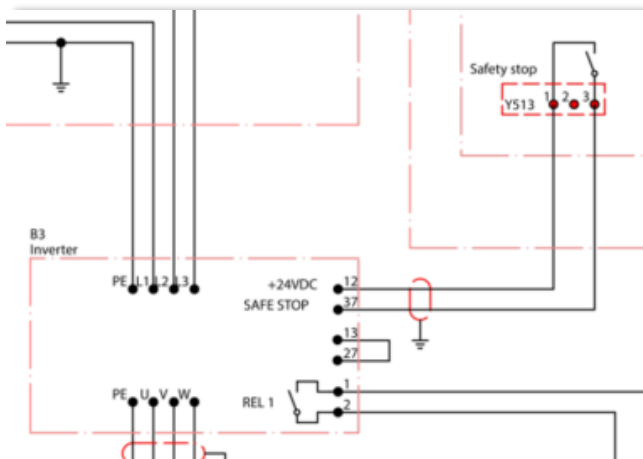
Number	Designation	Number	Designation
MA01	Compressor	3	Filter dryer
MA04	Electronic expansion valve	4	Evaporator
BT40	Hot gas sensor, 416	5	Return, heating water
BT01	Flow, heating circuit, 405	6	Flow, heating water
BT02	Return, heating circuit, 411	BP05	High pressure switch
TOB1	Sensor, source inlet, 413	BP01	High pressure transducer
TOB2	Sensor, source outlet, 412	BP03	Low pressure transducer
1	Hot gas heat exchanger	TC02	Condenser sensor, 431
2	Condenser	BT45	Evaporator sensor, 421

Repair instructions

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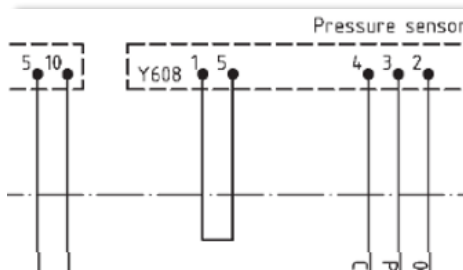
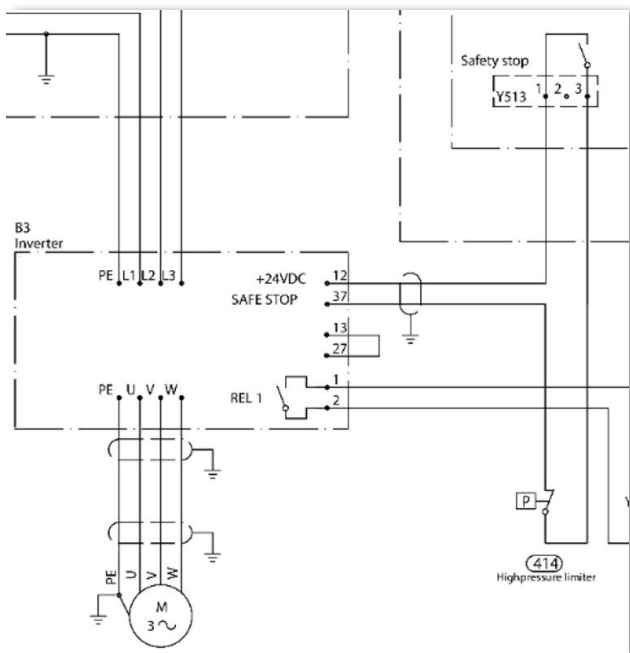
6.9 Safety equipment

Up to April 2019, the refrigerant circuit protection function is activated via the "Safety stop" function of the BM card and ensured via the inverter. The actual high pressure switch is connected on the BM card to terminal Y608, 1-5 (pos. 414).



If an impermissible temperature or pressure outside the measuring range is determined by the BM card, the contact Y513, 1-3 is closed and the safety stop function is activated by the inverter.

From May 2019, the high pressure switch is integrated directly into the inverter safety loop. The previously used input Y608, 1-5 of the high pressure switch has been replaced by a wire jumper. When the high pressure switch is tripped, this directly triggers a high pressure message. Perfect function should be checked annually and documented.



Repair instructions

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High pressure switch

Appliance	Type	Spare part no.
Version A, B, C, D	Danfoss ACB-4U B87	338834

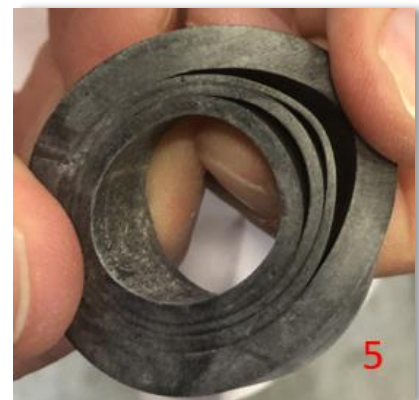


Type	Danfoss ACB-4U B87
Response pressure	45 bar
Bursting pressure	140 bar
Reset	Automatic
Electrical connection	6.35 mm tab
Mechanical connection	6 mm solder
Medium temperature	-55 - +135 °C

6.10 Standard delivery

The following are delivered with the appliance:

- 1x outside sensor (1)
- 1x immersion or contact sensor (2)
- 1x split ferrite (3)
- Fixing materials (4)
- Rubber gasket for PE fitting of cable grommet (5)



Repair instructions

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7. Status indicators

See chapter BM card.

7.1 Operation

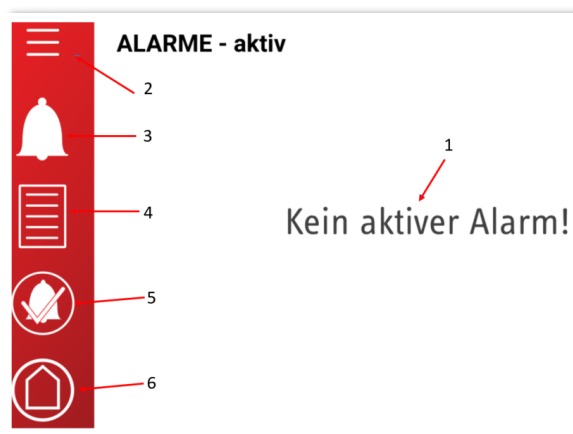
Detailed information about the status displays can be found in the operating instructions.

7.2 Fault

A class A or B fault is indicated with the alarm symbol and a brief description of the fault on the start screen. Tapping on the "!" symbol on the start screen takes you to the fault message level.



If there is no message, "No active alarm!" is displayed in the following menu.



Position	Description	Position	Description
1	Message display. If there is no fault, "No active alarm" is displayed	4	Show alarm history.
2	Back to selection menu.	5	Acknowledge alarm message.
3	Show other active alarms.	6	"Home button" to toggle to the start display.

Repair instructions

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8. Fault descriptions

The appliance function can be stopped by various factors. All messages are divided into categories. Depending on the importance of the message, a follow-up action is then carried out.

Category	Follow-up action
A	Faults of this category switch off the compressor immediately. The fault must be acknowledged. An exception to this are faults in the power supply. They are reset automatically. After a shutdown, reheating is carried out via the external heat generator unless the fault message relates to the external heat source.
B	These messages must be acknowledged.
C	Messages of this category are reset automatically. These are often messages with a limiter function. Messages of this category are often maximum flow temperature, high return temperature or room temperature reached.
D	Messages of this category are reset automatically. The messages relate to communication and information between Genesis versions within a cascade. These messages interrupt the DHW function of the secondary heat pumps.
E	Messages of this category are reset automatically. They relate to information output by secondary (legacy) competitor heat pumps.

No.	Fault	Category	Fault detection	Fault cause
1	High pressure switch	A	Contacts for the high pressure switch on the BM module are not closed.	High pressure switch has responded or is not connected.
2	High pressure	A	High pressure transducer has transmitted a pressure of ≥ 41.5 bar five times in maximum five hours.	No heat transfer to the heating system. Faulty pressure transducer. Problem in the refrigerant circuit.
3	Low pressure	A	Low pressure transducer has transmitted a pressure of ≤ 2.3 bar five times in maximum five hours.	Insufficient heat transfer from the heat source. Faulty pressure transducer. Problem in the refrigerant circuit.
4	BM card communication	A	Communication from the BM card to the CM card is disrupted.	The CM card has lost the connection to the BM card. This message overwrites all other messages until the connection is restored.
4	Pressure differential	A	Pressure differential between low and high pressure at the compressor is too high.	Faulty pressure transducer. Problem in the refrigerant circuit. Actuation of circulation pumps malfunctioning.
5	Modbus communication	A	Modbus communication between inverter and BM module malfunctioning.	Faulty or disconnected connecting cable. Faulty inverter. Faulty BM module.
6	Inverter	A	Three inverter alarms occurred in two hours.	Faulty inverter. Connection between BM module and inverter malfunctioning. Defective power supply.
7	IO calibration AI	A	Calibration of pressure transducer failed.	Faulty BM card. Pressure transducer not connected.
8	I/O stepper motor	A	Calibration of expansion valve failed.	Faulty BM module. Expansion valve not connected.
9	I/O temperature calibration	A	Calibration of temperature sensor failed.	Faulty BM module. Temperature sensor not connected.

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No.	Fault	Category	Fault detection	Fault cause
10	I/O phase detection	A	Incorrect phase sequence or missing phase.	Reset automatically as soon as the power supply is stable again. If this occurs frequently without actual voltage problems, the BM module must be replaced.
11	I/O settings	A	BM module is configured incorrectly.	An incorrect appliance type has been selected.
12	Sensor, condenser Y607 4 9 431	A	Sensor alarm from BM module.	Check sensor and connection to BM module, and replace if required.
13	Sensor, suction gas Y607 3 8 421	A	Sensor alarm from BM module.	Check sensor and connection to BM module, and replace if required.
14	Sensor, hot gas Y607 5 10 416	A	Sensor alarm from BM module.	Check sensor and connection to BM module, and replace if required.
15	Flow sensor/brine pressure switch	A	Flow sensor of source or brine pressure switch has responded. Only active if connection 71 is used and the function is switched on.	Check sensors and connection. Check brine pressure and source pump. Message only appears if this function is enabled.
16	Source temperature, minimum	A	The minimum source temperature was reached five times in five hours.	Check source pressure and source pump. Check source sensor Y607 1 6 and 2 7 413 and 412.
17	Maximum hot gas temperature	A	The maximum hot gas temperature was exceeded three times in eight hours.	Check settings. Discharge to heating system malfunctioning. Check temperature sensor Y607 5 10 416
18	Low compressor speed	A	Compressor speed falls below 880 rpm five times in five hours.	This fault does not occur in this appliance type. Select correct appliance type.
19	Minimum superheating	A	Superheating fell below 1 K (below the set superheating?) five times in five hours.	Faulty expansion valve. Faulty evaporator sensor.
20	Parameters exceeded	A	The appliance was outside the parameters at the lowest enabled compressor stage for 40 seconds five times in five hours.	Check temperature sensor. Check settings. Check refrigerant circuit.
21	Appliance profile	A	An incorrect appliance profile has been selected.	Check selected appliance profile, and correct.
22	Maximum time, pasteurisation function	B	Pasteurisation function was not ended within 3.5 hours.	Check the system hydraulics. Check temperature sensor.
23	Sensor, source inlet	B	Sensor fault on the BM module. Y607 1 6 413	Check sensor and connection to BM module, and replace if required.
24	Sensor, source outlet	B	Sensor fault on the BM module. Y607 2 7 412	Check sensor and connection to BM module, and replace if required.

Repair instructions

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No.	Fault	Category	Fault detection	Fault cause
25	Condenser in	B	Sensor fault on the BM module.	Check sensor and connection to BM module, and replace if required.
26	Condenser out	B	Sensor fault on the BM module.	Check sensor and connection to BM module, and replace if required.
27	Sensor, cooling	B	Sensor fault on the EM3 module.	Check sensor and connection to EM3 module, and replace if required.
28	Maximum source temperature difference	B	The temperature differential between the source inlet and source outlet exceeds the selected value.	Check sensor and connection to BM module, and replace if required. Check settings. Check the source pump.
29	Sensor mixer circuit 1	B	Sensor of the first heating circuit with mixer has been interrupted or has a short circuit.	Check sensor and connection to BM module, and replace if required. Y602 T32 108
30	Sensor mixer circuit 2	B	Sensor of the second heating circuit with mixer has been interrupted or has a short circuit.	Check sensor and connection to EM3 module, and replace if required.
31	Sensor mixer circuit 3	B	Sensor of the third heating circuit with mixer has been interrupted or has a short circuit.	Check sensor and connection to EM3 module, and replace if required.
32	Sensor mixer circuit 4	B	Sensor of the fourth heating circuit with mixer has been interrupted or has a short circuit.	Check sensor and connection to EM3 module, and replace if required.
33	Sensor mixer circuit 5	B	Sensor of the fifth heating circuit with mixer has been interrupted or has a short circuit.	Check sensor and connection to EM3 module, and replace if required.
34	HG sensor	DHW B	Hot gas DHW sensor has been interrupted or has a short circuit.	Check sensor and connection to BM module, and replace if required. HGW T34 440
35	Internal auxiliary heater	B	High limit safety cut-out of internal auxiliary heater has responded.	These appliances do not have an internal auxiliary heater. Check appliance profile, and correct.
36	Minimum source inlet Temperature	B	Minimum selected temperature for the source inlet was reached at the source inlet sensor.	Check temperature sensor 413. Check the source circuit. Adjust the settings.
37	Minimum source outlet Temperature	B	Minimum selected temperature for the source outlet was reached at the source outlet sensor.	Check temperature sensor 412. Check the source circuit. Adjust the settings.
38	Outside sensor	B	Sensor fault on the BM module. Outdoor T35 50	Check sensor and connection to BM module, and replace if required.
39	Sensor, cooling return	B	Sensor fault on the EM3 module.	Check sensor and connection to EM3 module, and replace if required.

Repair instructions

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No.	Fault	Category	Fault detection	Fault cause
40	Sensor, cooling flow	B	Sensor fault on the EM3 module.	Check sensor and connection to EM3 module, and replace if required.
41	Sensor, cylinder, cooling return	B	Sensor fault on the EM3 module.	Check sensor and connection to EM3 module, and replace if required.
42	Sensor, excess, heating return	B	Sensor fault on the EM3 module.	Check sensor and connection to EM3 module, and replace if required.
43	Sensor, excess, heating flow	B	Sensor fault on the EM3 module.	Check sensor and connection to EM3 module, and replace if required.
44	Sensor, pool return	B	Sensor fault on the EM3 module.	Check sensor and connection to EM3 module, and replace if required.
45	Sensor, system flow	B	Sensor fault on the BM module.	Check sensor and connection to BM module, and replace if required.
46	Sensor, water charging system (WCS)	B	Sensor fault on the EM3 module.	Check sensor and connection to EM3 module, and replace if required.
47	Sensor, water discharging system (TWC)	B	Sensor fault on the EM3 module. DHW flow sensor downstream of mixing valve. AI1	Check sensor and connection to EM3 module, and replace if required.
48	Sensor, DHW, cylinder outlet	B	Sensor fault on the EM3 module. Sensor above auxiliary heating element. Pasteurisation circuit must be enabled. AI4	Check sensor and connection to EM3 module, and replace if required. Check pasteurisation function.
49	Sensor, cylinder, bottom	B	Sensor fault on the BM module.	Check sensor and connection to BM module, and replace if required.
50	Sensor, DHW return	B	Sensor fault on the EM3 module.	Check sensor and connection to EM3 module, and replace if required.
	Buffer configuration	B	Settings of the buffer function or buffer system incorrect.	Correct the buffer settings.
51	Sensor, system flow, minimum	C	The system flow sensor transmits a temperature lower than 70 % of the selected temperature for more than three hours	Check sensor and connection to BM module, and replace if required. Check the selected temperature. Hydraulic problem.
52	Sensor, system flow maximum	C	The system flow sensor transmits a temperature higher than the selected set temperature for more than three hours.	Check sensor and connection to BM module, and replace if required. Check the selected temperature. Hydraulic problem.
53	Sensor, flow, cooling	C	Temperature deviation at the sensor downstream of the mixing valve for the cooling circuit.	Check sensor and connection to EM3 module, and replace if required. Check settings. Check the mixer and control.
54	Coolant buffer monitoring	C	Temperature deviation at the sensor in the coolant buffer.	Check sensor and connection to EM3 module, and replace if required. Check and correct settings.

Repair instructions

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No.	Fault	Category	Fault detection	Fault cause
55	Mixer circuit 1, sensor	C	Selected alarm temperature for mixer circuit 1 was reached.	Check hydraulics for mixer circuit 1. Check and adjust settings. Ensure function and position of sensor.
56	Mixer circuit 2, sensor	C	Selected alarm temperature for mixer circuit 2 was reached.	Check hydraulics for mixer circuit 2. Check and adjust settings. Ensure function and position of sensor.
57	Mixer circuit 3, sensor	C	Selected alarm temperature for mixer circuit 3 was reached.	Check hydraulics for mixer circuit 3. Check and adjust settings. Ensure function and position of sensor.
58	Mixer circuit 4, sensor	C	Selected alarm temperature for mixer circuit 4 was reached.	Check hydraulics for mixer circuit 4. Check and adjust settings. Ensure function and position of sensor.
59	Mixer circuit 5, sensor	C	Selected alarm temperature for mixer circuit 5 was reached.	Check hydraulics for mixer circuit 5. Check and adjust settings. Ensure function and position of sensor.
60	External alarm	C	Alarm contact for an external fault message has responded.	Check function on the BM card. Check settings.
61	Room temperature sensor	C	Communication with room sensor interrupted.	Check settings. Check connection and room sensor.
62	Limit temperature, heat sink	C	Selected temperature deviation for the heat sink has been reached.	Check temperature sensor at EM3. Adjust settings for the cooling cylinder.
63	Minimum DHW temperature	C	The limit for the minimum DHW temperature has been reached at sensor T81 of the EM3.	Check mixer for DHW heating. Check position and function of sensor T801. Check settings. Ensure charging of the DHW cylinder.
64	DHW return temperature, minimum.	C	Selected minimum DHW temperature return has been reached at sensor T82 of the EM3.	Check mixer for DHW heating. Check position and function of sensor T82. Check settings. Ensure charging of the DHW cylinder.
65	Fault communication with primary	D	Communication fault of a secondary heat pump with the primary heat pump.	Check RJ45 connecting cable and settings for communication.
66	Fault, communication with secondary	D	Communication fault of the primary heat pump with a secondary heat pump.	Check RJ45 connecting cable and settings for communication.
67	Number of secondary heat pumps	D	The number of secondary heat pumps communicating with the primary heat pump is lower than expected.	Check RJ45 connecting cable and settings for communication.
68	Secondary heat pump class A	D	A secondary heat pump reports a class A fault. The number of the secondary heat pump is also displayed.	Check the fault list of the secondary heat pump reporting the fault and remedy fault.
69	Secondary heat pump class B	D	A secondary heat pump reports a class B fault. The number of the secondary heat pump is also displayed.	Check the fault list of the secondary heat pump reporting the fault and remedy fault.

Repair instructions

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No.	Fault	Category	Fault detection	Fault cause
70	Legacy heat pump – pressure switch alarm	E	The high or low pressure switch of a competitor heat pump has responded.	This fault only occurs if an EM3 module has been programmed to control a competitor heat pump and this heat pump has triggered the fault contact.
71	Legacy heat pump – central fault	E	A central fault of a competitor heat pump has responded.	This fault only occurs if an EM3 module has been programmed to control a competitor heat pump and this heat pump has triggered a general fault contact.
72	Legacy heat pump – communication fault	E	Communication fault of the EM3 card with the primary heat pump.	This fault only occurs if an EM3 module has been programmed to control a competitor heat pump and communication of the EM3 card with the primary heat pump is malfunctioning.

Repair instructions

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8.1 Stop conditions

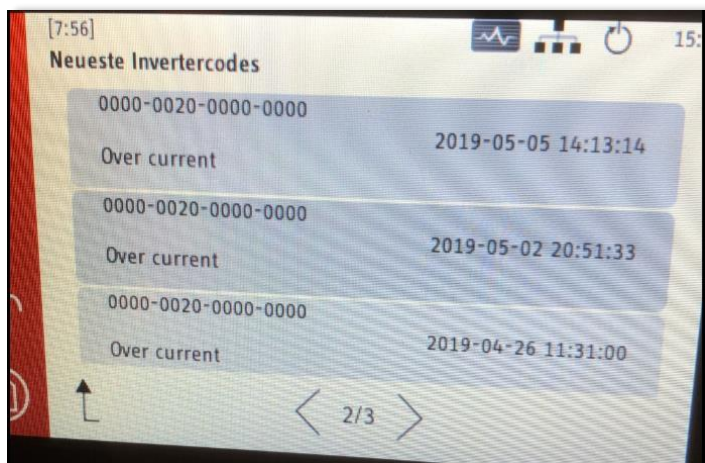
The System information > Stop conditions menu shows why the appliance shut down. Possible causes for appliance shutdowns are:

- No heat demand (standard shutdown condition)
- Appliance running outside of operating range (SOA parameters).
- Insufficient superheating
- Flow temperature too high
- Low pressure
- Pressure differential between high and low pressure too high.
- High pressure
- Inverter transmits stop command.
- Low compressor speed.

8.2 Inverter alarm without fault message

If an inverter alarm occurs without a fault message appearing on the display, the cause may be a faulty Modbus connection or the message was not transmitted to the controller as a fault. The message can be read on the controller in the "Reason for stop" parameter.

Inverter faults are displayed if the inverter detects a fault and transmits this message to the programming unit (CM module). The changeover to inverter fault mode is automatic. The displayed inverter faults are displayed depending on the heat pump profile used. A displayed message is also indicated via an LED on the inverter.



8.3 Trip lock fault (internal inverter fault)

Internal inverter fault or safety-related occurrences are known as "trip lock faults". If this type of fault occurs, a standard fault reset is not sufficient to reboot the appliance.

In such cases, the electrical power supply to the appliance should be switched off. The inverter must be zero volt for at least 30 seconds. Then, the power supply can be restored. Trip lock faults are messages A38 (internal inverter fault) and A72 (safety related).

Repair instructions

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8.4 Inverter fault messages

An inverter fault message is always a "class A" fault. An inverter fault can be displayed in decimal form (A28, A69, A14, etc.) if it is a specific message. Often, an inverter fault is displayed in hexadecimal form (e.g. 0000-4000-0000-0000) because it may be a combination of multiple faults. The hexadecimal code is split into two fault blocks. The display should be read as follows:

0000	0000	0000	0000
Block 1_1	Block 1_2	Block 2_1	Block 2_2
Fault code 1		Fault code 2	

Examples:

Display	Meaning
0000-4000-0000-0000	Phase missing
0000-0000-0000-0004	Overcurrent
A8	DC undervoltage

8.4.1 Inverter fault list

Fault code 1 (hex)	Fault code (dec)	Designation	Remedy
0000-0001	A28	The braking resistor is not connected or is faulty.	Check braking resistors 2-15.
0000-0002	A69	Temperature of output stage too hot or too cold.	Check the ambient temperature. Check air routing for inverter cooling. Test the function of the fan.
0000-0004	A14	An earth fault was detected.	Check inverter, compressor and all connections for an earth fault.
0000-0008	A65	Temperature of control circuit exceeds limit of 80 °C.	Check the ambient temperature. Check air routing for inverter cooling. Test the function of the fan.
0000-0010	A17	Communication time-out	Check function of data cables. Check for EMC problems.
0000-0020	A13	Overcurrent. The current exceeds the rated current by 200 % for 1.5 seconds.	Check compressor for a mechanical problem. Compressor startup ramp malfunctioning or compressor must start up against high pressure in the refrigerant circuit.
0000-0040	A12	Torque maximum.	If the message appears during the inverter acceleration or deceleration ramp, a control problem or refrigeration problem may exist (no pressure equalisation, expansion valve does not open, etc.). If the message appears in every operating mode, there may be a mechanical compressor fault.
0000-0080	A11	Compressor thermistor excess temperature.	Check inverter for incorrect wiring. Check that the correct heat pump type is selected. This fault cannot occur in this appliance series.
0000-0100	A10	Compressor excess temperature.	This fault is displayed if the compressor is actuated at 100 % speed for a long time.

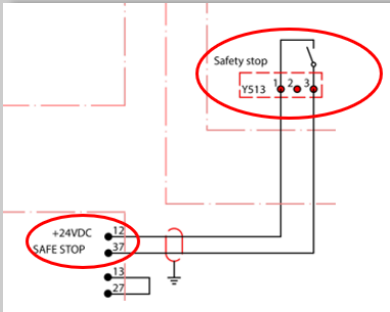
Repair instructions

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Fault code 1 (hex)	Fault code (dec)	Designation	Remedy
0000-0200	A9	Inverter overload	The internal inverter counter reports an overload if the inverter is actuated at full load for too long.
0000-0400	A8	DC undervoltage	Check mains power supply.
0000-0800	A7	DC overvoltage	Check mains power supply.
0000-1000	A16	Compressor short circuit	A short circuit occurred in the compressor or in the power cable to the compressor.
0000-2000	A33	Voltage dip	Check voltage to ensure constant supply. A power-OFF must not interrupt the load voltage to the appliance.
0000-4000	A4	Voltage imbalance and AC minimum	This message occurs if a phase is missing or a phase deviates too greatly from the average of the three individual phases. Check power supply and power cable.
0000-8000		"AMA" (automatic motor adaptation) failed	Calibration to the existing compressor type failed. A communication problem may exist or an incorrect appliance type was selected.
0001-0000	A2	Undervoltage at analogue input.	This function is not supported in this appliance series.
0002-0000	A38	Internal inverter fault	Check power supply and wiring for possible faults.
0004-0000	A26	Brake overload.	This function is not supported in this appliance series.
0008-0000	A30	Phase U missing.	Motor voltage U between inverter and compressor missing.
0010-0000	A31	Phase V missing.	Motor voltage V between inverter and compressor missing.
0020-0000	A32	Phase W missing.	Motor voltage W between inverter and compressor missing.
0040-0000	A34	Fault, bus communication	Bus communication failed. Check the wiring.
0080-0000	A47	Low voltage supply 24 V DC too low.	Check wiring and power supply.
0100-0000	A36	Central fault	Check power supply for irregularities.
0200-0000	A48	1.8 V power supply too low.	The power supply in the 1.8 V DC control circuit is too low. Check wiring and power supply.
0400-0000	A25	Braking resistor	This function is not enabled. This message indicates that the brake function is faulty. The inverter can still be actuated and is functioning.
0800-0000	A27	Brake IGBT	This function is not enabled. This message indicates that the output for the brake function is faulty. The inverter can still be actuated and is operational.
1000-0000	A67	Setting changes have been carried out.	After setting changes, the inverter was not reset with a voltage reset.

Repair instructions

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Fault code 1 (hex)	Fault code (dec)	Designation	Remedy
2000-0000	A80	Inverter was reset.	The inverter has been reset to the factory setting. A power reset is required.
4000-0000	A68	Safety stop	The "Safety stop" function on the BM card has responded. Terminal 37 on the inverter is supplied with 24 V and the message is generated. 
8000-0000	A63	Power consumption minimum	The compressor power consumption is too low. The required current for the "Release brake" function was not reached.

Repair instructions

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Fault code 2 (hex)	Fault code (dec)	Designation	Remedy
0000-0020		No flow rate	This function is not implemented on the inverter.
0000-0040		Pump dry running	This function is not implemented on the inverter.
0000-0080		End of curve	This function is not implemented on the inverter.
0000-0100		Operation outside curve	This function is not implemented on the inverter.
0000-0200	A19	Hot gas temperature, maximum	This function is not implemented on the inverter.
0000-0400	A18	Compressor start failed.	After the compressor start, the compressor could not be accelerated to the defined speed. A mechanical compressor fault may have occurred.
0000-0800	W49	Speed limit.	This message is displayed if the compressor is not in the specified speed band.
0000-1000		External lock	This function is not implemented on the inverter.
0000-2000		Setting combination not permissible.	This function is not implemented on the inverter.
0000-4000	A84	No safety option selected.	This function is not implemented on the inverter.
0002-0000		KTY fault	This function is not implemented on the inverter.
0004-0000		Fan fault	This function is not implemented on the inverter.
0008-0000		ECB Fault	This function is not implemented on the inverter.
0200-0000	A59	Current AC maximum	The power consumption of the compressor is higher than that selected in the inverter settings. Mechanical compressor damage may have occurred.
2000-0000	A90	Encoder loss	This function is not implemented on the inverter.
4000-0000	A74	PTC thermistor	This function is not implemented on the inverter.
8000-0000	A72	Safety alarm	Trip lock fault. One or more safety related inverter faults have occurred.

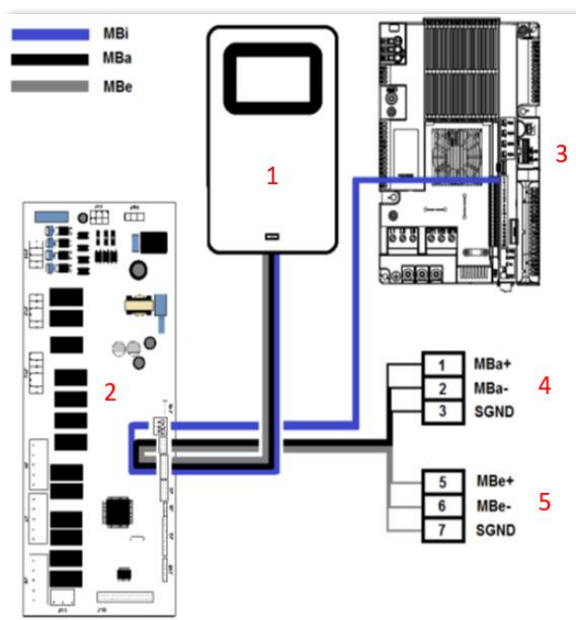
Repair instructions

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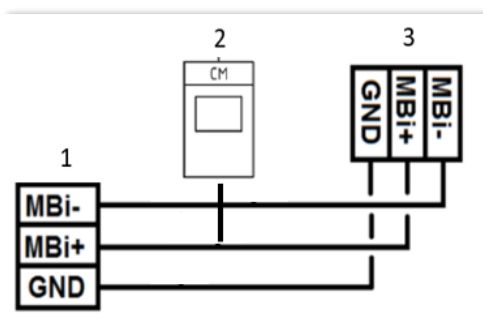
9. Further information on troubleshooting and fault rectification

9.1 Modbus communication malfunctioning

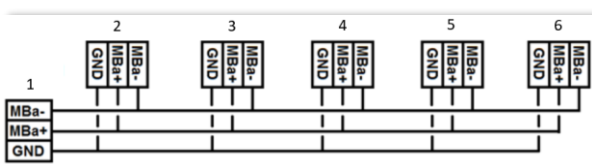
All communication objects are connected via Modbus. Within the Modbus connection, there is always one master (generally the CM module of the first heat pump) and up to 247 slaves with a Modbus ID number from 1 – 247. Slaves are BM modules, inverters or EM3 modules. Maximum 16 heat pumps are enabled. Within a cascade, the first heat pump is the master heat pump. All other heat pumps are slave appliances. A direct external actuation of the heat pumps is not enabled and only permitted with an ISG. Slaves always reply to the master with information. If the "master" heat pump fails, the entire cascade will not function.



Number	Designation
1	CM module (master)
2	BM module (slave)
3	Inverter (slave)
4	MBa bus (slave)
5	MBe bus (slave)
MBi	Modbus internal Communication between CM module, BM module and inverter
MBa	Modbus accessory Communication between CM module and accessories (EM3, room sensor)
MBe	Modbus external A higher ranking control unit can be connected (building management system). The appliance can then be controlled via Modbus RTU (RS-485) or TCP/IP.



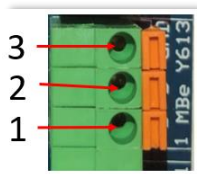
Modbus, internal (MBi)	
1	BM card
2	CM card (connected to RJ45 on BM card)
3	Inverter (slave)



Modbus accessory (MBa) example	
1	BM card (master heat pump!)
2	EM card for DHW functions
3	EM card for cooling mode
4	EM card for pool
5	EM card for legacy heat pump 1+2
	EM card for legacy heat pump 3+4

Repair instructions

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MBe



RJ45

Modbus external (MBe):

In the case of a connection to a higher ranking control unit, the CM module is also a slave!

Activation and settings are carried out via Main menu > Settings > Building management system
Modbus = RTU

If TCP/IP is selected, communication is via the RJ45 socket on the CM module. The MBe connections are no longer active. An ISG can be used.

Address = 1 - 247

Baud rate = 2400 - 115,200 baud

Parity = even, none, odd

Stop bits are set based on the parity.

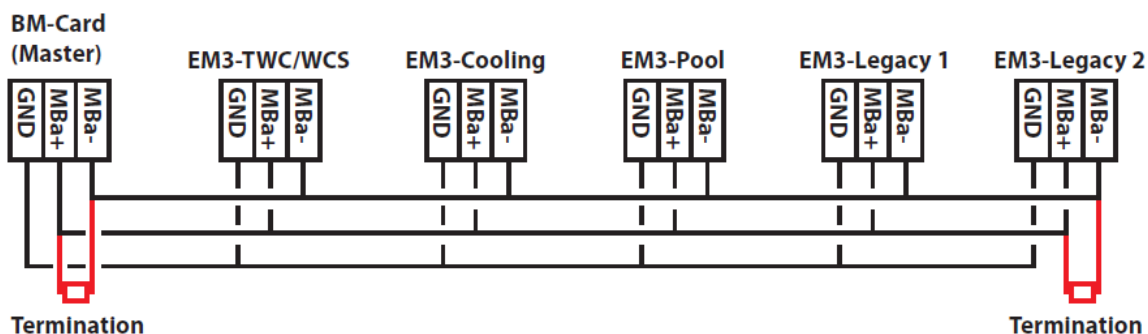
The Settings > Communication analysis parameter shows the quality of the Modbus connection. The quality is calculated according to the following formula:

Quality = packages (transmitted packages to the slaves) / packages + fault (incorrect or faulty replies from slaves) + time-outs (no replies or replies too late from slaves)

In the event of communication faults, check the following

- Check wiring for lead break or short circuit
- Check connection settings (baud rate, address, parity and stop bits)
- Time-out time set too low?
- Earth contacts for bus subscribers correctly wired?
- Incorrect bus subscriber polarity? (+/-, A/B)
- More than one master in the bus connection? Subscribers with the same ID in the system?

To achieve the maximum signal strength, the predefined jumper for the used function should be set at the end of a MBa2 or MBe network. The wiring diagram looks like this:



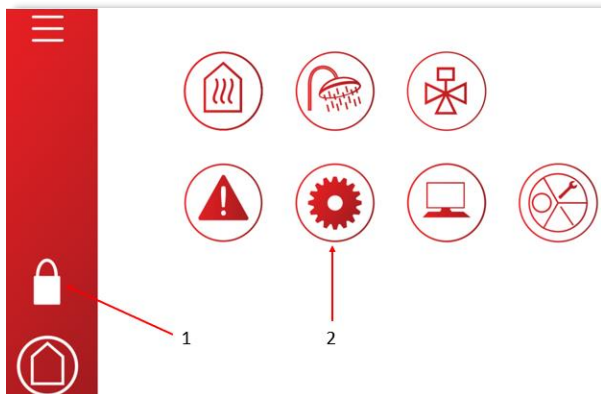
Repair instructions

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10. Checking components

10.1 Relay test

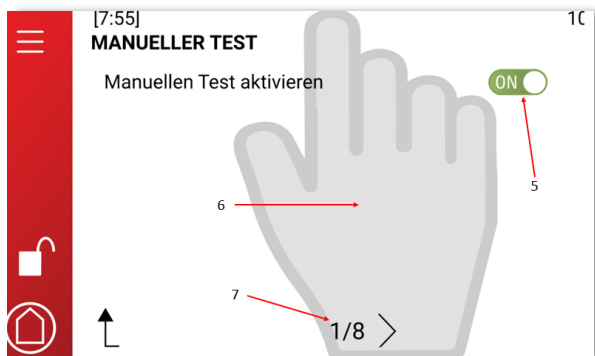
Once a code has been entered, a relay test can be carried out on the system control unit in parameter "Manual test".



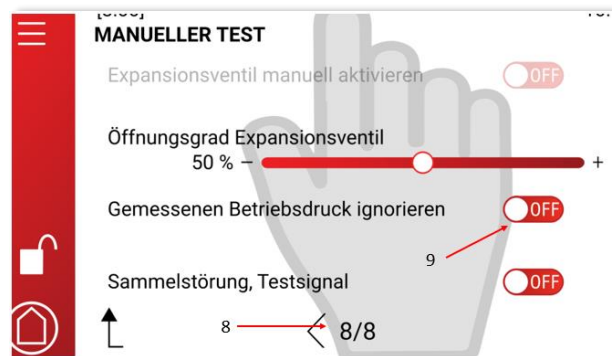
- 1 – Enter code
- 2 – Select system control unit



- 3 – Scroll to page 5
- 4 – Select manual test



- 5 – To switch on relay test, move the DIP switch from "Off" to "On".
- 6 – The active relay test is indicated by a "hand symbol".
- 7 – Scroll through the menu to select and switch on the individual outputs manually.

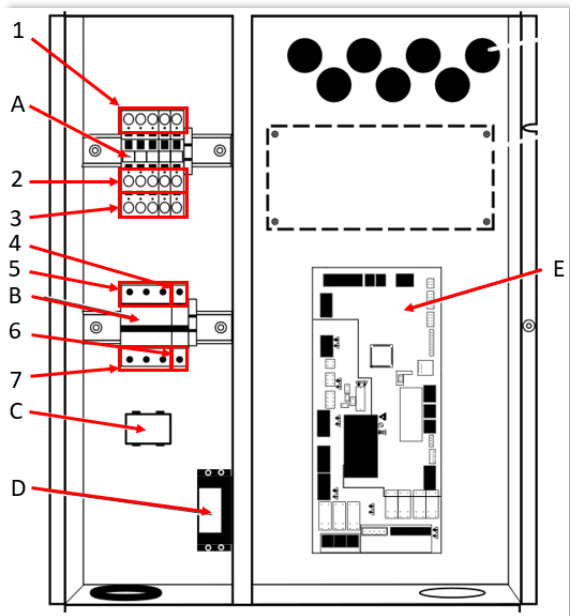


- 8 – Page 8
- 9 – If the function "Ignore operating pressure" is selected on page 8, the high pressure transducer is ignored. A safety shutdown is only carried out via the high pressure switch.

Repair instructions

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10.2 Voltage measurements



Position	Designation
A	Mains terminal, 400 V, N, Pe
B	10 A circuit breaker (3 + 1)
C	EMC filter
D	Transformer 230 V AC – 24 V AC
E	BM module
1	Mains voltage input, 400 V, N, Pe
2	Low voltage output for control. L1, L2, L3, N, Pe
3	400 V, Pe – output for inverter
4	L1 input for power supply to BM module and 24 V AC transformer.
5	L1, L2, L3 voltage input for relay outputs FR4 – FR 7
6	L1 output for power supply to BM module and 24 V AC transformer.
7	L1, L2, L3 voltage output for relay outputs FR4 – FR 7

Power is supplied via a power cable to the appliance. Power must not be interrupted, for example, during a power supply utility blocking time.

When the power supply is interrupted during operation, the following occurs:

- Pumps are no longer actuated. Heat transfer to the system is no longer guaranteed. There is no frost protection.
- Calculation of the heating/cooling integrals is interrupted. Once power is restored, the heating and cooling requirements are recalculated. The heat pump restarts with a delay.
- If the power supply is interrupted when the compressor is in operation, the inverter could be overloaded and irreparably damaged.

Repair instructions

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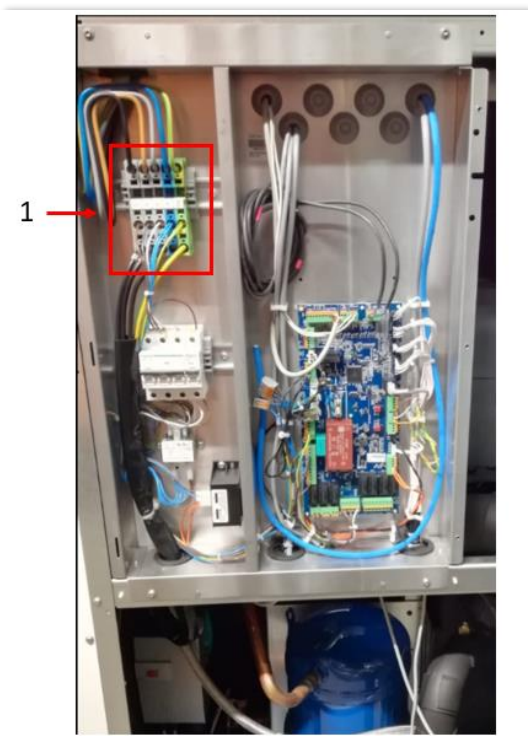
11. Special repair guidelines

11.1 Inverter replacement

Before opening the casing, switch off the power supply to the appliance for at least five minutes and take precautions to prevent startup. In versions A and B, the inverter is behind the back panel. In versions C and D, the inverter is located behind the left side panel. Specialised expertise is required when replacing this component. The zero volt state of the electronic components must always be ascertained after opening the casing.

The inverter was replaced in May 2020. From the new model, the SOA parameters have been adjusted to the new compressor. Expansion valve control is also adjusted when the new inverter software is detected. It is not permissible to use an inverter with a date of manufacture from May 2020 in appliances before April 2020. If this cannot be avoided, then the compressor must also be replaced by the current model.

1. Remove the front cover and the internal control panel cover and check the zero volt state at the connection (1).
2. Remove the left side panel. In versions A and B, remove 3x TX20 screws at the front and back. In versions C and D, three screws are inserted at the front. At the back, the panel is hooked into a guide. Once the screws have been removed, the side section must be pulled forward.



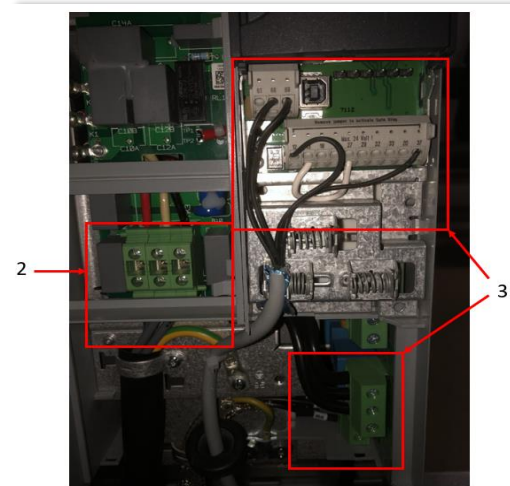
Repair instructions

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3. Only the back panel needs to be removed in versions A and B. Remove the six TX20 screws.



4. Disconnect the compressor connecting cable at the compressor (1), the inverter power cable (2) and all other cables (3) at the inverter.



5. Remove the two TX20 screws to loosen and tilt the inverter support plate.



6. Once the four retaining nuts have been removed, the inverter can now be replaced.



Assemble in reverse order.

Repair instructions

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11.2 Compressor replacement

Before opening the casing, switch off the power supply to the appliance for at least five minutes and take precautions to prevent startup. Work on the refrigerant circuit must be carried out by qualified and trained persons as specified.

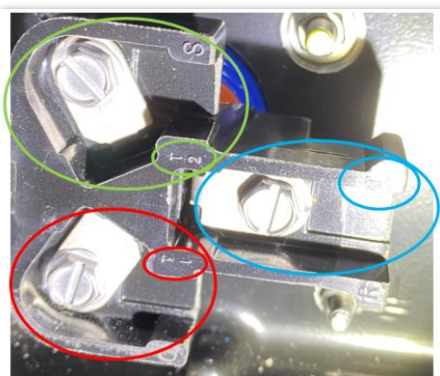
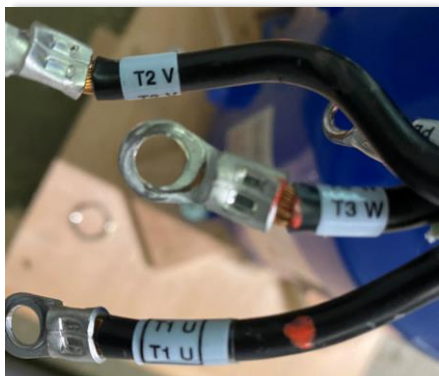
Before and after repairs to the refrigerant circuit, the refrigerant circuit data must be fully documented and stored with the order.

Based on the weight of the compressor, use an appropriate tool and auxiliary aids to carry out repairs. The filter dryer, and the expansion valve if required, should always be replaced too.

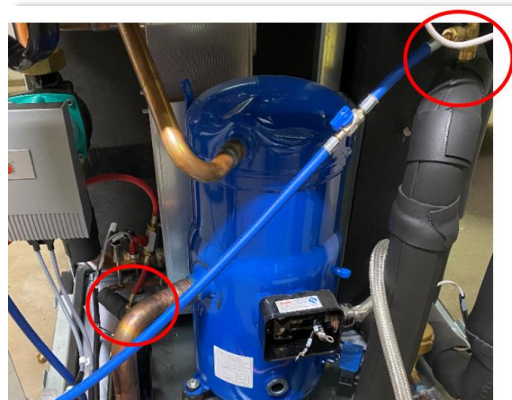
Compressors and inverters have been replaced from May 2020. The current compressor can be used in appliances with a date of manufacture up to April 2020. In appliances manufactured after May 2020, a compressor assigned to this date of manufacture must be used.

The following process is recommended when replacing a compressor:

- Switch off the power, open the appliance and check the zero fault state.
- Disconnect the compressor from the power supply. The power cable is labelled. The wires are also labelled in the compressor junction box. Remove the oil lubrication solenoid valve.



- Draw off refrigerant subject to specification into a container for disposal or recycling. Determine the drawn amount using scales. Use both service valves.

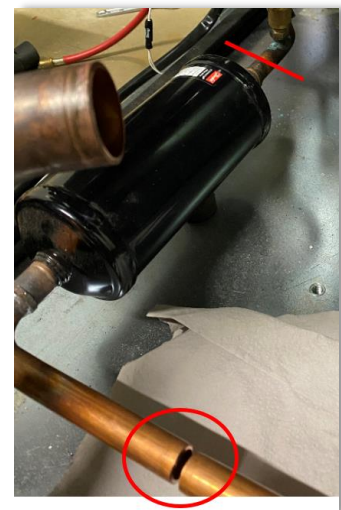


Repair instructions WPE-I xx H 400 Premium

- Purge the refrigerant circuit with nitrogen.



- Use a pipe cutter to separate the filter dryer and compressor from the refrigerant circuit at a suitable place. To reduce the number of female connections, it is possible to unsolder the suction gas pipe for the compressor. The suction gas pipe is connected with a flexible pipe. The pipe has a generous range of movement.



Repair instructions

WPE-I xx H 400 Premium

- Prepare pipe connections depending on the point of separation (deburr and clean) and install the new compressor and filter dryer.
- For soldering, cover all temperature critical parts with a wet cloth and unscrew the element from the service valve if required. While adding nitrogen, solder the prepared connections with brazing solder (silver solder recommended).



- Pressure test with nitrogen at approx. 15 bar to ensure tightness.
- Evacuate the refrigerant circuit up to the daily limit vacuum.
- Purge the refrigerant circuit with nitrogen and evacuate again to the daily limit vacuum.
- Then fill the system with the refrigerant charge volume specified on the type plate. Take refrigerant from the refrigerant bottle in liquid form and add it in gas form.
- Install insulation and electrical connections and commission the appliance.

11.3 Evaporator replacement

Before opening the casing, switch off the power supply to the appliance for at least five minutes and take precautions to prevent startup. Work on the refrigerant circuit must be carried out by qualified and trained persons as specified.

Before and after repairs to the refrigerant circuit, the refrigerant circuit data must be fully documented and stored with the order. Based on the weight of the evaporator, use an appropriate tool and auxiliary aids to carry out repairs. Always replace the filter dryer.

The evaporator is located behind the right side panel. Before cutting out the brine line, shut off the brine circuit. The BDF valve (ball drain & fill valve, see figure 1) can be used to drain any brine from the appliance in a controlled manner.

Pipes that carry brine are connected by means of hoses. We recommend removing the hoses and unsoldering the pipes from the evaporator while detached (figure 2).

Repair instructions WPE-I xx H 400 Premium

The pipes from the refrigerant circuit should be unsoldered from the evaporator while still installed. Ensure that the expansion valve is kept cold (figure 2).



Fig. 1

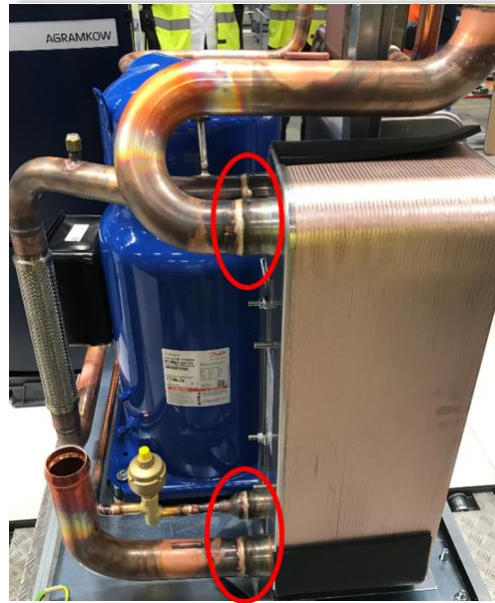


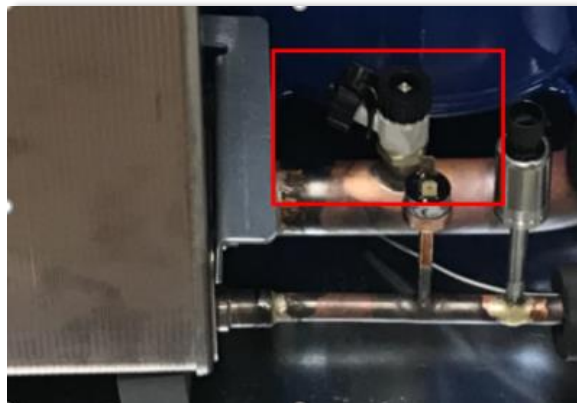
Fig. 2

11.4 Condenser replacement

Before opening the casing, switch off the power supply to the appliance for at least five minutes and take precautions to prevent startup. Work on the refrigerant circuit must be carried out by qualified and trained persons as specified.

Before and after repairs to the refrigerant circuit, the refrigerant circuit data must be fully documented and stored with the order. Based on the weight of the condenser, use an appropriate tool and auxiliary aids to carry out repairs. Always replace the filter dryer.

The condenser is located behind the left side panel. Before cutting out the heating circuit line, shut off the heating circuit. The BDF valve (ball drain & fill valve, see figure) can be used to drain any heating water from the appliance in a controlled manner.



Repair instructions

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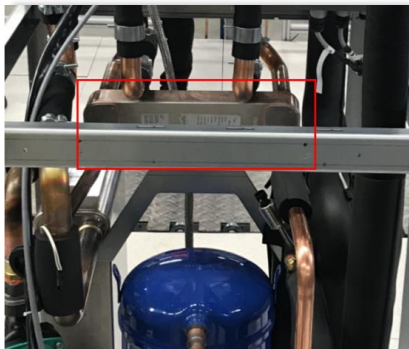
11.5 Hot gas heat exchanger replacement

Before opening the casing, switch off the power supply to the appliance for at least five minutes and take precautions to prevent startup. Work on the refrigerant circuit must be carried out by qualified and trained persons as specified.

Before and after repairs to the refrigerant circuit, the refrigerant circuit data must be fully documented and stored with the order.

Use an appropriate tool and auxiliary aids to carry out repairs. Always replace the filter dryer. The hot gas heat exchanger is located in the centre of the appliance above the condenser. Before cutting out the heating circuit line, shut off the heating circuit. There is no separate drain valve for draining the heat exchanger.

Image from version A, B:



11.6 Expansion valve replacement

Before opening the casing, switch off the power supply to the appliance for at least five minutes and take precautions to prevent startup. Work on the refrigerant circuit must be carried out by qualified and trained persons as specified.

Before and after repairs to the refrigerant circuit, the refrigerant circuit data must be fully documented and stored with the order. If such repairs are carried out, the filter dryer should always be replaced too.

The expansion valve is located at the bottom, at the front right of the appliance. Ensure the correct spare part is used.

Version A, B



Version C, D



Repair instructions

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11.7 Pressure sensor replacement

Before opening the casing, switch off the power supply to the appliance for at least five minutes and take precautions to prevent startup. Work on the refrigerant circuit must be carried out by qualified and trained persons as specified. Before and after repairs to the refrigerant circuit, the refrigerant circuit data must be fully documented and stored with the order. If such repairs are carried out, the filter dryer should always be replaced too.

The position of pressure sensors is documented in the appliance overview. The high and low pressure sensors look the same but the pressure range is different. Never interchange the sensors.

11.8 Circulation pump replacement

Before opening the casing, switch off the power supply to the appliance for at least five minutes and take precautions to prevent startup.

Before replacing the buffer/DHW charging pump, shut off the heating circuit. The BDF valve (ball drain & fill valve, see figure in section 11.4) can be used to drain any heating water from the appliance in a controlled manner.

Before replacing the brine circulation pump, shut off the brine circuit. The BDF valve (ball drain & fill valve, see figure 1, section 11.3) can be used to drain any brine from the appliance in a controlled manner

11.9 Accessing the refrigerant circuit

The refrigerant circuit should only be accessed if all other possible fault causes have been ruled out. Before work is started, refrigerant circuit data must be documented and compared with the following table.

Key points of some refrigerant circuit data at 10 K superheating and 0 K supercooling. To EN 12900.

Model	rpm	rps	To	-25		-20		-15		-10		-5		0		5		10		15	
			Tc	Qo	Pe	Qo	Pe	Qo	Pe	Qo	Pe	Qo	Pe	Qo	Pe	Qo	Pe	Qo	Pe	Qo	Pe
VZH088AG (version A, B)	1500	25	20	-	-	5400	1.47	6600	1.54	8100	1.62	9800	1.68	11800	1.67	14000	1.55	-	-	-	-
			30	-	-	4800	2.04	6000	2.01	7400	2.03	9000	2.08	10800	2.1	12900	2.07	15300	1.95	17900	1.69
			40	-	-	4200	2.92	5300	2.74	6600	2.66	8100	2.65	9800	2.67	11700	2.69	13800	2.65	16200	2.54
			50	-	-	-	-	4500	3.79	5700	3.57	7000	3.47	8500	3.44	10200	3.46	12100	3.47	14300	3.45
			60	-	-	-	-	-	-	-	-	5700	4.59	7000	4.47	8500	4.45	10100	4.47	11900	4.5
			68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3600	60	20	11300	4.19	13800	4.26	16800	4.34	20300	4.42	24500	4.53	29300	4.65	34800	4.8	-	-	-	-
			30	9800	5.04	12200	5.11	15000	5.18	18300	5.26	22200	5.36	26700	5.47	31800	5.6	37600	5.75	44200	5.93
			40	-	-	10700	6.21	13300	6.27	16300	6.34	19900	6.42	23900	6.51	28500	6.61	33800	6.74	39800	6.89
			50	-	-	-	-	11500	7.75	14200	7.79	17300	7.84	20900	7.91	25000	7.98	29700	8.08	35000	8.19
			60	-	-	-	-	-	-	-	-	14400	9.77	17500	9.8	21000	9.84	25000	9.89	29600	9.96
			68	-	-	-	-	-	-	-	-	-	-	-	-	17300	11.76	20800	11.78	24800	11.81
	6000	100	20	-	-	22500	7.65	27400	7.96	33200	8.31	40000	8.71	48000	9.18	57100	9.72	-	-	-	-
			30	-	-	20200	9.04	24900	9.28	30400	9.56	36700	9.88	44100	10.25	52500	10.68	62100	11.18	73000	11.77
			40	-	-	18100	10.85	22300	11.02	27300	11.21	33100	11.44	39800	11.71	47400	12.02	56200	12.4	66000	12.85
			50	-	-	-	-	19500	13.35	23900	13.46	29000	13.59	34900	13.74	41600	13.94	49300	14.18	58000	14.49

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VZH117AG (version C)	1500	25	60	-	-	-	-	-	-	-	-	24200	16.5	29100	16.54	34800	16.61	41300	16.72	48800	16.87
			68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3600	60	20	-	-	7200	1.93	8900	2.03	10800	2.13	13100	2.2	15800	2.19	18800	2.04	-	-	-	-
			30	-	-	6400	2.68	8000	2.64	9900	2.67	12100	2.73	14500	2.76	17300	2.72	20500	2.56	24100	2.22
			40	-	-	5600	3.83	7100	3.59	8900	3.49	10900	3.48	13100	3.51	15700	3.53	18600	3.49	21800	3.33
			50	-	-	-	-	6100	4.97	7700	4.69	9400	4.55	11500	4.52	13700	4.54	16300	4.56	19100	4.54
			60	-	-	-	-	-	-	-	-	7700	6.02	9400	5.88	11400	5.84	13500	5.87	16000	5.92
			68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6000	100	20	15100	5.5	18500	5.59	22500	5.69	27300	5.81	32900	5.95	39300	6.11	46700	6.3	-	-	-	-
			30	13100	6.63	16400	6.71	20200	6.81	24600	6.91	29800	7.04	35800	7.18	42600	7.35	50400	7.55	59300	7.78
			40	-	-	14400	8.16	17900	8.24	21900	8.33	26700	8.43	32100	8.55	38300	8.69	45400	8.85	53400	9.05
			50	-	-	-	-	15500	10.17	19100	10.23	23200	10.3	28000	10.38	33600	10.48	39900	10.61	47000	10.76
			60	-	-	-	-	-	-	-	-	19300	12.83	23400	12.87	28100	12.92	33600	12.99	39800	13.09
			68	-	-	-	-	-	-	-	-	-	-	-	-	23200	15.44	27900	15.47	33300	15.51
	1500	25	20	-	-	30200	10.05	36800	10.45	44600	10.91	53700	11.44	64400	12.05	76600	12.76	-	-	-	-
			30	-	-	27200	11.88	33400	12.19	40700	12.55	49300	12.97	59200	13.46	70500	14.02	83400	14.68	98000	15.45
			40	-	-	24200	14.25	30000	14.47	36700	14.73	44500	15.02	53400	15.37	63700	15.79	75400	16.29	88600	16.88
			50	-	-	-	-	26200	17.54	32100	17.68	38900	17.84	46800	18.05	55800	18.31	66100	18.63	77900	19.03
			60	-	-	-	-	-	-	-	-	32400	21.67	39000	21.72	46700	21.81	55400	21.95	65500	22.16
			68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VZH170AG (version D)	3600	60	20	22900	7.46	27500	7.63	33000	7.81	39700	7.98	47700	8.12	57000	8.19	67700	8.18	-	-	-	-
			30	20200	9.38	24600	9.47	29900	9.61	36200	9.78	43600	9.94	52300	10.08	62300	10.17	73800	10.2	86800	10.12
			40	-	-	21900	11.86	26800	11.9	32500	12.01	39300	12.15	47100	12.3	56200	12.44	66600	12.54	78500	12.58
			50	-	-	-	-	23400	14.82	28500	14.81	34300	14.87	41200	14.97	49200	15.1	58400	15.23	68900	15.33
			60	-	-	-	-	-	-	-	-	28500	18.23	34200	18.23	40900	18.3	48700	18.4	57700	18.51
			68	-	-	-	-	-	-	-	-	-	-	-	-	33200	21.33	39800	21.37	47400	21.45
	6000	100	20	-	-	45100	13.28	54800	13.87	66400	14.52	80100	15.27	95900	16.18	114200	17.3	-	-	-	-
			30	-	-	39900	16.27	49000	16.84	59800	17.39	72400	17.97	87000	18.62	103700	19.39	122800	20.34	144500	21.51
			40	-	-	35600	19.83	44100	20.45	53900	20.97	65300	21.44	78500	21.91	93500	22.42	110800	23.03	130300	23.78
			50	-	-	-	-	38900	24.85	47700	25.42	57800	25.86	69400	26.22	82700	26.55	97800	26.89	115000	27.29
			60	-	-	-	-	-	-	-	-	48900	31.4	58800	31.73	70100	31.94	83100	32.09	97900	32.23
			68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Repair instructions

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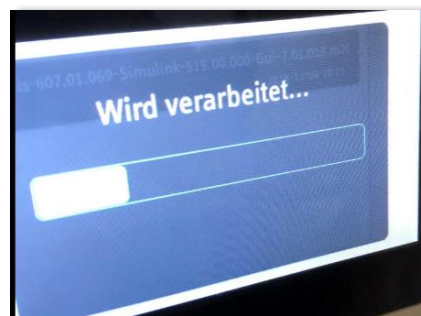
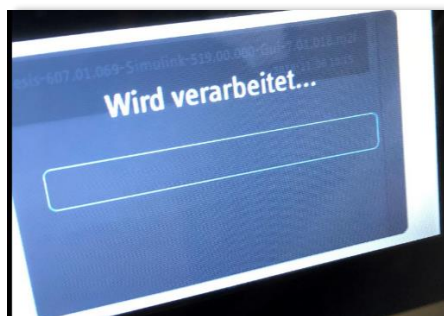
Symbol	Meaning	Symbol	Meaning
To	Evaporation temperature in °C	Qo	Cooling capacity in W
Tc	Condensing temperature in °C	Pe	Power consumption in kW

11.10 Software update

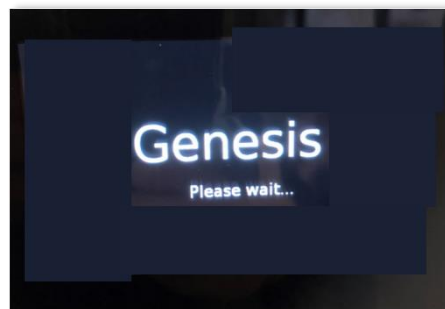
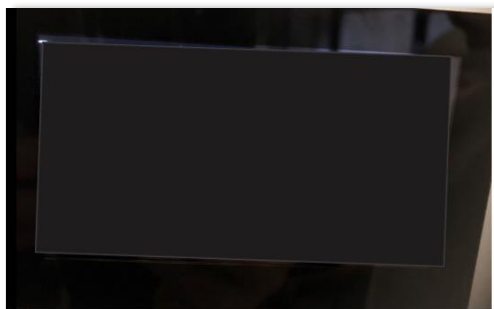
A software update always contains the software package for all connected PCBs. This means that the software updates the CM card, BM card and any connected EM cards. As soon as a USB stick with usable software in the main directory is inserted into the USB port on the back of the CM card, the update compatibility is displayed:



To load the displayed software, confirm with "O.K.". The update progress is displayed:



After a successful update, the controller restarts.



The appliance must not be disconnected from the power supply during the update.
Information about the software version used can be found under:
Display menu – Process data – Version information

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12. Software versions

12.1 Minimum software versions

Control	Software version
CM card, appliances up to December 2018	1.00.004
CM card, appliances from January 2019	1.00.007
CM card, appliances from January 2020	STE 2.00.000
BM card (also includes the EM3 card)	7.01.168
ISG	10.2.0

12.2 Software history

Version	Date	Change
1.00.004	April 2019	Software version at the start of distribution.
1.00.005	May 2019	Small corrections to terms and, in some cases, new translations.
1.00.006	September 2019	Pool control revised.
1.00.007	November 2019	Heat pump names matched in the appliance configuration. Recommended minimum software version for appliances up to April 2020. Required minimum software version to enable updating to versions $\geq$ STE 2.00.000.
1.01.001	January 2020	Text below the menu symbols. Parameter lists rearranged. Process data shows values of EM cards. Information menu can be selected with the "I" button. Touchscreen lock possible. Maximum DHW temperature adjustable up to 60 °C. Mixer circuits 2-5 can cool without EM4 card. Appliance profile is recognised automatically unless the CM card is replaced.
STE 2.00.000	September 2020	Software name changed from m2f to m3f. First, the controller must have at least 1.00.007 software so that this software can be updated. Entire menu structure revised. Recommended minimum software version for appliances from January 2020. External source pump with variable speed. System return sensor can be used. Individual pool heating within a cascade by each slave heat pump. Flow switch can be actuated for each heat pump in a cascade. Current limiter can be connected. Output restriction adjustable. Version A 14-40 kW Version B 16-55 kW Version C 21-90 kW Version D 31-120 kW Buffer systems adjustable. "Change history" parameter available. Monitoring the inverter temperature. Compressor is stepped down when the maximum hot gas temperature is reached (compressor previously stopped immediately). System status can be read out. Functions in manual mode added.
STE 2.01.000	August 2021	Program function heating, DHW, DHW control, cooling available. Pump for hot gas extraction can be used with variable speed. Buffer system 5 can be set. Network setting revised. Heating/cooling prioritisation can be set. Screed drying program / concrete core activation can be set. Response time of DHW circulation line mixing valve can be set from 2-99 s. Fixed value for heating circuits with mixer 1-5 can be set. External switch-on of internal source pump possible. Stage limit revised (now always uses the lowest in case of simultaneous demand). Compressor continues to run in the manual test unless the expansion valve is actuated manually. Cooling buffer faults are only reported when the cooling function is active. Mixers of heating circuits 2-5 can always be actuated in manual mode and not only when the heating function is active.
STE 2.02.003	November 2021	Compatibility for new processor series K21 BGA Chip.

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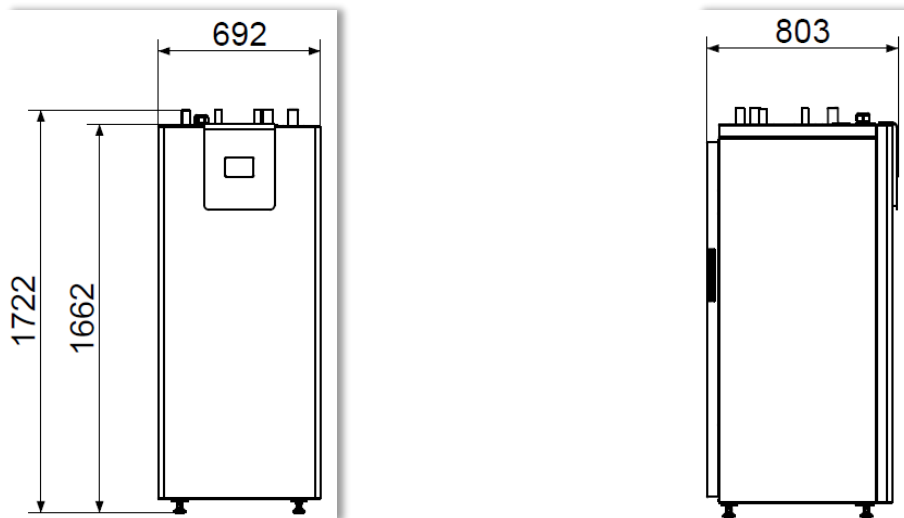
13.Maintenance

For the maintenance of these appliances, observe the maintenance checklist in maintenance manual D0000081136. Work through the maintenance recommendations in the correct order.

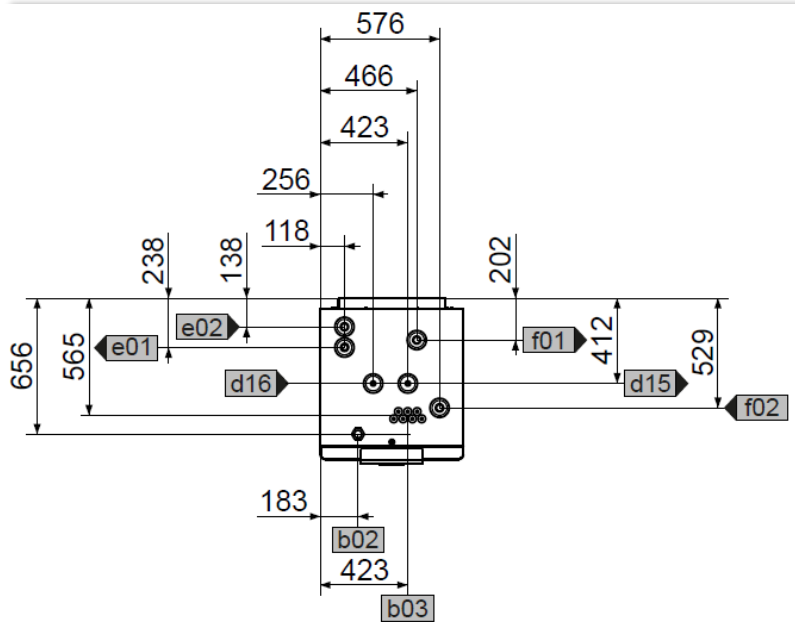
14.Specification

14.1 Dimensions

Version A, B



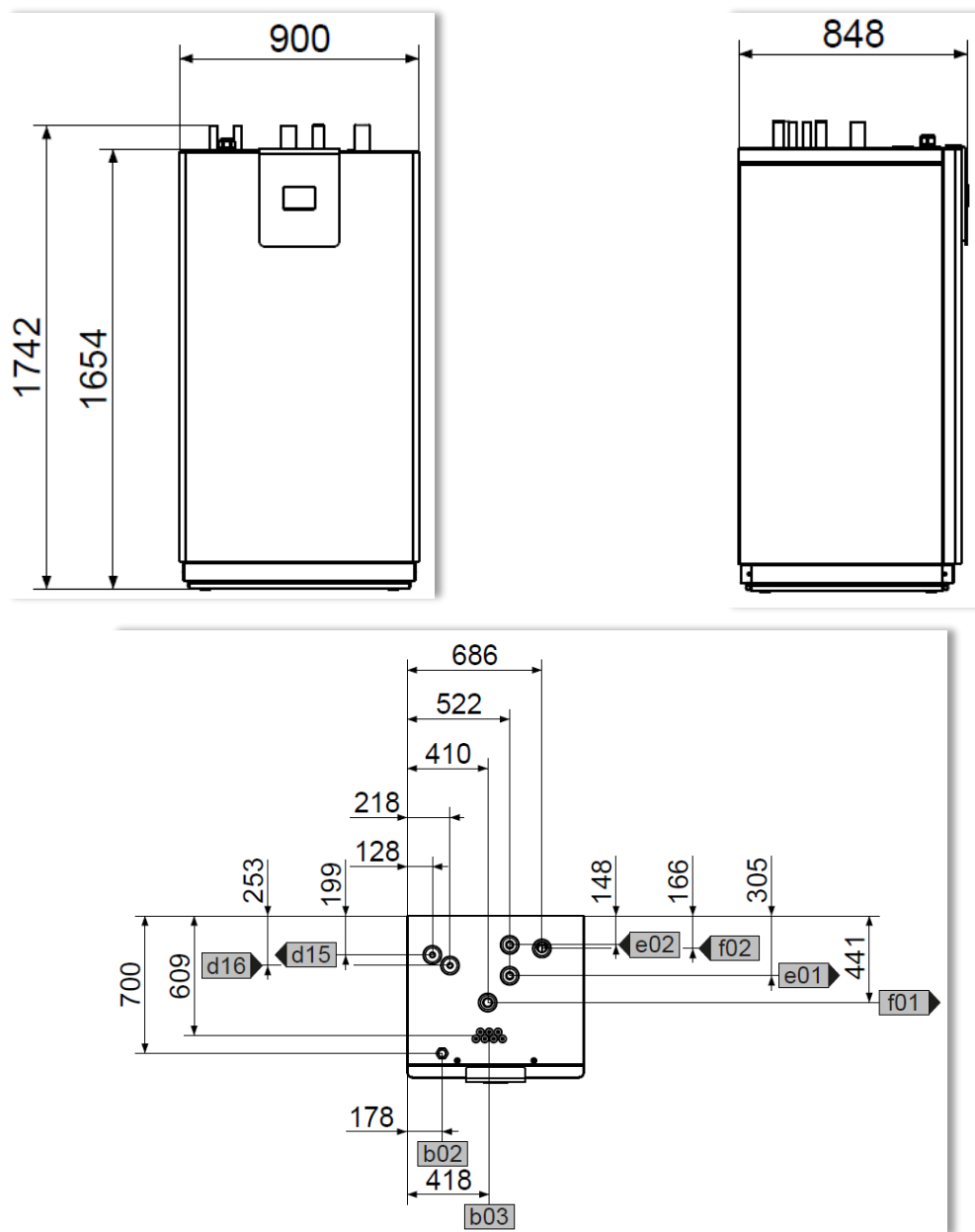
Repair instructions WPE-I xx H 400 Premium



Number	Designation	Dimension
b02	Feed-through bushing, power cable	
b03	Feed-through bushing, sensor and bus cable	
d15	Flow, hot gas extraction, DHW	28 mm Cu
d16	Return, hot gas extraction, DHW	28 mm Cu
e01	Heating flow	35 mm Cu
e02	Heating return	35 mm Cu
f01	Brine outlet	42 mm Cu
f02	Brine inlet	42 mm Cu

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Version C, D



Number	Designation	Dimension
b02	Feed-through bushing, power cable	
b03	Feed-through bushing, sensor and bus cable	
d15	Flow, hot gas extraction, DHW	28 mm Cu
d16	Return, hot gas extraction, DHW	28 mm Cu
e01	Heating flow	42 mm Cu
e02	Heating return	42 mm Cu
f01	Brine outlet	54 mm Cu
f02	Brine inlet	54 mm Cu

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14.2 Specification

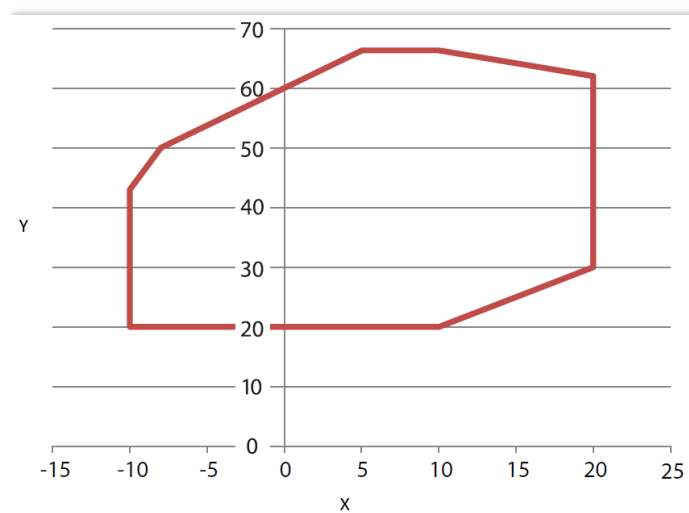
				Version A	Version B	Version C	Version D
Refrigerant							
Type				R410A (GWP 2088)			
Quantity (CO ₂ equivalent)		Kg		4.1 (8560)	5.7 (11692)	8.7 (18165)	
From May 2020					6.3 (13154)	9.0 (18792)	
Maximum operating pressure		mPa		4.3			
Compressor							
Type				Scroll			
Oil				POE			
Electrical data							
Mains voltage		V		400			
Maximum power consumption, compressor		CW		14	17.5	22.2	32.5
Maximum power consumption, circulation pump		CW		0.7	0.7	1	1
Fuse protection		A		C 32	C 40	C 50	C 63
Short circuit capacity (Ssc)		MW			2.1	2.4	3.2
Heat pump data							
COP at B0/W35, EN 14511		COP		4.73	4.6	4.5	4.71
Compressor speed 3600 rpm							
Heating output at B0/W35		CW		20.18	26.73	35.6	52.0
Compressor speed 3600 rpm							
Power consumption at B0/W35		CW		4.26	5.81	7.91	11.0
Compressor speed 3600 rpm							
Output range		CW		10 - 33	11 - 44	14 - 59	21 - 88
Minimum pressure, refrigerant circuit		mPa		0.23			
Maximum pressure, refrigerant circuit		mPa		4.3			
Hydraulic data							
Nominal flow rate, brine ΔT=3 K, compressor speed 3600 rpm		l/min			114	138.6	200.4
Nominal flow rate, heating circuit ΔT=10 K, compressor speed 3600 rpm		l/min			40.2	53.4	77.4
Available external pressure differential, brine		kPa			72	112	77
Available external pressure differential, heating system		kPa			76	116	99
Pressure differential, brine		kPa			63.1	28.4	40.0
Pressure differential, heating system		kPa			10.9	2.9	9.0
Maximum system pressure, brine		mPa		0.6			
Maximum system pressure, heating system		mPa		0.6			
Minimum/maximum brine temperature		°C		-10 °C/20 °C			
Minimum/maximum heating system temperature		°C		20 °C/65 °C			
Sound power level EN 12102, B0/W35, compressor speed 6000 rpm		dB(A)		55	56	61	63
Sound power level EN 12102, B0/W35, compressor speed 1500 rpm		dB(A)		40	40	46	46
Weight		Kg		300	310	430	550

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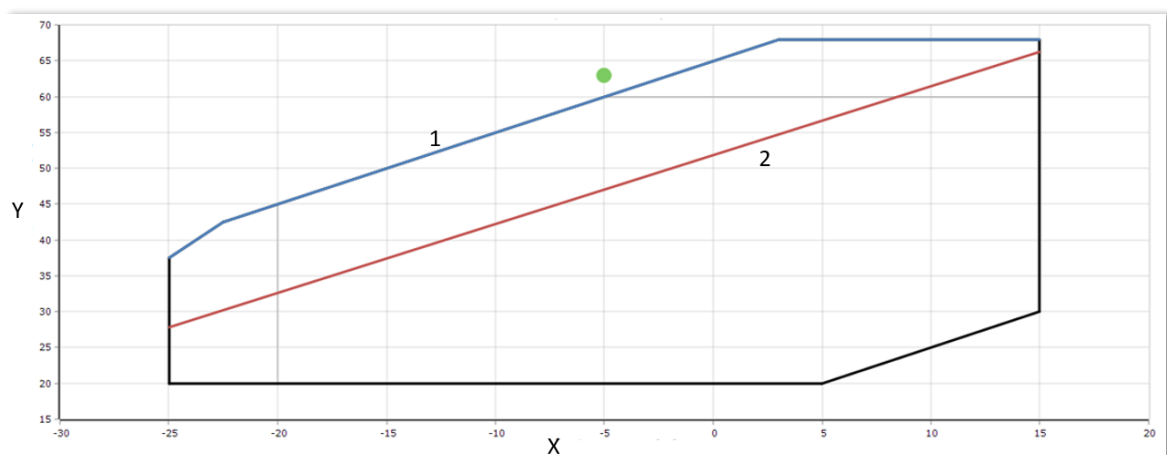
14.3 Operating range

This shows the operating range of the heat pump with the resulting minimum and maximum temperatures for brine and heating water.

Manufacture up to April 2020



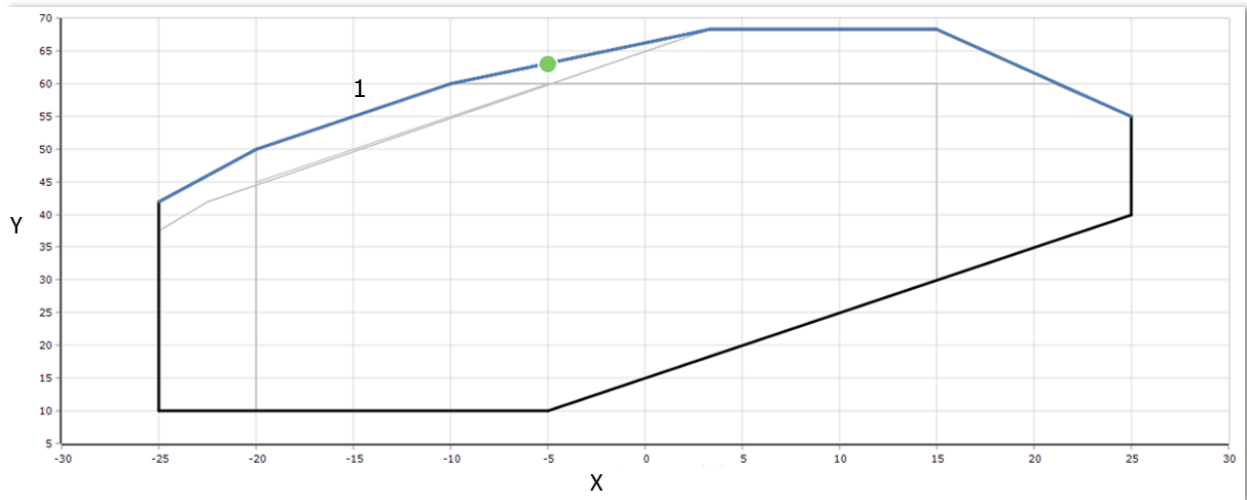
Position	Designation
X	Brine temperature in °C
Y	Heating water temperature in °C



Position	Designation
X	Evaporation temperature in °C
Y	Condensation temperature in °C
1	At 3900 rpm (65 Hz) and 6 K superheating
2	At 3900 rpm (65 Hz) and 30 K superheating

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Manufacture from May 2020



Position	Designation
X	Evaporation temperature in °C
Y	Condensation temperature in °C
1	At 3000 rpm (50 Hz) and 10 K superheating

Observe also the specification in the operating and installation instructions.

15.Change history

Version	Change
D0000086652-b	Document creation
D0000086652-c	Revision of the function description Compressor replacement Spare parts numbers added Text corrections Updating of software versions