

# Repair instructions

## HPG-I 04-06-08-12-15 S-CS-DS-DCS

### Premium

Version D0000095883-c 10.01.2022

The brine-to-water heat pump is equipped with an integrated "WPM" heat pump manager and a control panel in the top panel of the unit.

The speed-controlled rotary piston compressor is controlled by an inverter. The heat output is adjusted depending on the power. The circulation pumps for the heat source and heat extraction are built into the unit. These are controlled via a PWM signal. The multi-function module "MFG" has a change-over valve and controls the operating modes heating and hot water. Two integrated expansion vessels of 24l each for the brine and heating circuits are located in the unit.

Refrigerant R 454 C safety class A2L (low flammability) is used in the refrigerant circuit.

The "cool" version offers the additional option of passive cooling (without a cooling circuit) by means of an additional plate heat exchanger. This enables the temperature exchange between the heating system and the heat source by means of a switching valve.



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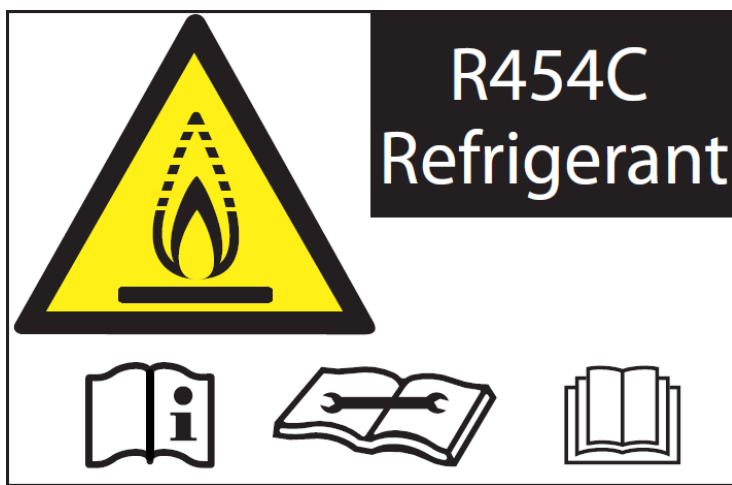
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#### 1. General note

Work on the opened unit and repairs may only be carried out by a person instructed by STIEBEL ELTRON. The current safety instructions in the operating and installation instructions for the unit must be observed.

The units are filled with the refrigerant R454c. The refrigerant belongs to safety group A2L and consists of a mixture of R32 (difluoromethane) and R1234YF (2,3,3,3-tetrafluoropropene). It is non-toxic and hardly flammable and has a very low combustion rate of 1.6 cm/sec. No explosive mixtures can be formed on discharge.

The units are marked on the housing with the corresponding information sticker.



For maintenance and repair work, the country-specific safety data sheets for Opteon XL20 (R-454c) must be observed.

oil in the refrigeration circuit is: DiamondFreeze MA 68

Attention!

- The refrigerant is odourless
- Do not drill or burn parts of the appliance.
- The unit should only be stored or operated in rooms without permanent sources of ignition.
- Only agents recommended by STIEBEL ELTRON may be used for cleaning.

#### 2. Applicable information / substitute notes

|                                                        |             |
|--------------------------------------------------------|-------------|
| Operation and installation HPG-I_04-15_(C)S Premium_en | 344827      |
| Operation and installation HPG-I_04-15_(C)S Premium_fr | 344780      |
| Operation WPM                                          | 324276      |
| Commissioning WPM                                      | 324278      |
| Repair instructions WPM                                | D0000072411 |
| Special requirements for the use of R454C refrigerant  | D0000095843 |
| KD-Info "Leakage at MFG and MFG3"                      | D0000062134 |
| KD- Info "Retrofitting edge protection"                | D0000097035 |

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Info "Replacing the valve assembly on the MFG".

D0000050953

Special requirements for the use of R454c refrigerant

### 3. Affected devices

| Device               | Mat. no. | HP ID | Variant |
|----------------------|----------|-------|---------|
| HPG-I 04 S Premium   | 202617   |       | A       |
| HPG-I 06 S Premium   | 202618   |       | A       |
| HPG-I 08 S Premium   | 202619   |       | A       |
| HPG-I 11 S Premium   | 202620   |       | A       |
| HPG-I 15 S Premium   | 202621   |       | A       |
| HPG-I 04 CS Premium  | 202627   |       | B       |
| HPG-I 06 CS Premium  | 202628   |       | B       |
| HPG-I 08 CS Premium  | 202629   |       | B       |
| HPG-I 11 CS Premium  | 202630   |       | B       |
| HPG-I 15 CS Premium  | 202631   |       | B       |
| HPG-I 04 DS Premium  | 202622   |       | C       |
| HPG-I 06 DS Premium  | 202623   |       | C       |
| HPG-I 08 DS Premium  | 202624   |       | C       |
| HPG-I 12 DS Premium  | 202625   |       | C       |
| HPG-I 15 DS Premium  | 202626   |       | C       |
| HPG-I 04 DCS Premium | 202632   |       | D       |
| HPG-I 06 DCS Premium | 202633   |       | D       |
| HPG-I 08 DCS Premium | 202634   |       | D       |
| HPG-I 12 DCS Premium | 202635   |       | D       |
| HPG-I 15 DCS Premium | 202636   |       | D       |

### 4. Variants

The heat pumps are divided into four variants.

|           |     |                                        |
|-----------|-----|----------------------------------------|
| Variant A | H   | Heating                                |
| Variant B | HK  | Heating / Cooling                      |
| Variant C | HW  | Heating / hot water                    |
| Variant D | HKW | Heating / cooling / domestic hot water |

The safety valve of the heat source must be installed externally.

### 5. Functional description

#### 5.1 Heating and hot water operation

As soon as the heat pump control recognises a request for heating or DHW operation, the changeover valve (MA12) in the multifunction module (MFG) moves to the corresponding position. The following components are controlled depending on the output: the heat source pump (MA25) starts with flow, then the compressor (MA01) and the circulation pump (MA10) are switched on.

The thermodynamic refrigeration circuit extracts heat from the source medium through the evaporating refrigerant. The compressor compresses the aspirated refrigerant vapour and brings the refrigerant to a higher temperature level. When the gaseous refrigerant is liquefied, the heat energy is transferred to the

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source medium.

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heat system. Once the set point is reached, the capacity is reduced until the compressor (MA01) and the circulation pump (MA10) stop, the heat source pump (MA25) is switched off delay.

#### 5.2 Compressor control

A specific heat demand is determined based on the parameterisation of the heating controller. The Compressor is controlled in a frequency range of 20...120Hz depending on the model.

The inverter installed in the heat pump controls the compressor. A compressor speed increase requested by the capacity controller is limited by a speed dependent on the HP type. A requested compressor speed reduction is not limited; the compressor is switched off immediately from any speed.

When the compressor is started, the start speed (40 rpm/sec) is operated as the minimum speed for a period of time (30 sec). Furthermore, a range control is integrated, which only allows a speed change after the delay time.

| Operating status     | Slope ramp  | Base speed   | Duration |
|----------------------|-------------|--------------|----------|
| Compressor start     | 0.3 Hz/sec. | 40 U/sec.    | 30s      |
| Operation            | 0.3 Hz/sec. | Target speed | -        |
| Shut down compressor | 0           | -            | -        |

#### 5.3 Compressor locked

If the temperature of the heating flow or heating return is below 15°C, the compressor is not started. Until this temperature is reached, the supplementary heating switches and takes over the heating operation.

#### 5.4 Passive cooling mode (variant B and D)

If a room remote control (FE7 or FET) is connected to the heat pump manager (WPM), the  
If the "PASSIVE COOLING" parameter and "Summer mode" are active, passive cooling is possible.

If the set temperature "ROOM SET POOL COOL" is exceeded, the cooling output and the heating circuit pump switch on, the internal changeover valve moves into position "COOL". If the cooling temperature exceeds "SUPPLY SET + HYSTERESIS", the source and buffer circulation pumps switch on, if the cooling temperature falls below "SUPPLY SET" or the calculated dew point temperature +2K, both pumps stop.

If the temperature falls below the set "ROOM SETTING COOLING" -2K, all pumps stop and the cooling output is switched off with a delay of 5 minutes. The minimum running and standstill time of the source pump is 5 minutes each.

For surface cooling, dew point monitoring by means of room remote control (FET) is required.

- Cooling only works in conjunction with an FE7 as a minimum solution. No dew point monitoring is available here. An extension with FET when using an FE7 is not possible.

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- If several circuits are required for cooling, this is only possible with FETs. The cooling tank is passively cooled to the lowest setpoint temperature.
- Summer mode must be activated. The control unit must be in automatic mode.

## 6. Device description

### 6.1 Housing

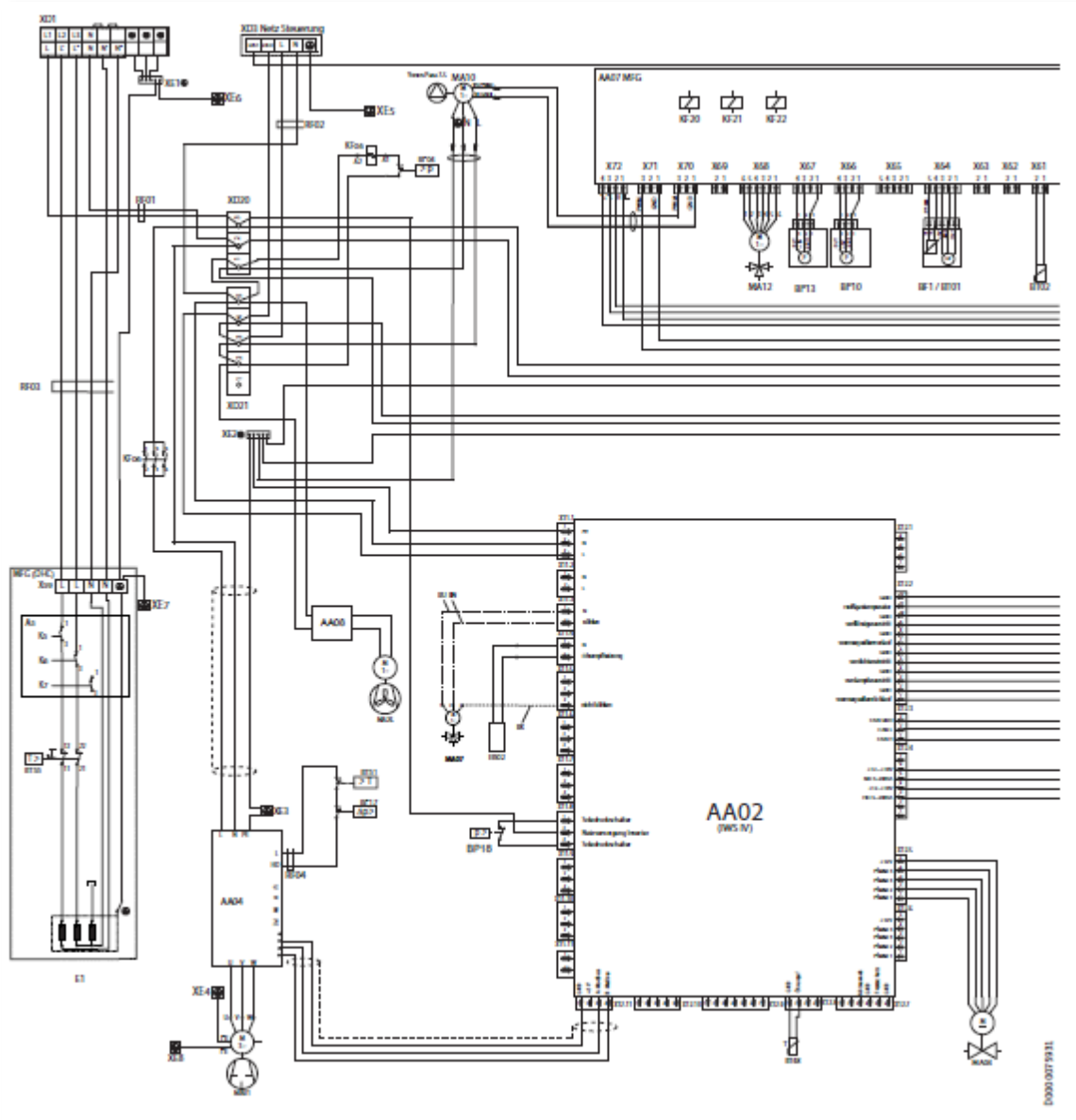
The enclosure concept consists of a frame with a closed rear wall and recessed grips for transport. The symmetrical side panels are hooked into hinges of the frame. The front wall is attached in the upper area via sliding hooks. The hooks are secured with screws. The top cover is designed to slide and allows easy electrical connection after removal of the rear top cover strip. The enclosure is tightly sealed by a built-in fan with pressure monitoring. A test port is located on the rear wall of the unit.

## 7. Circuit diagram

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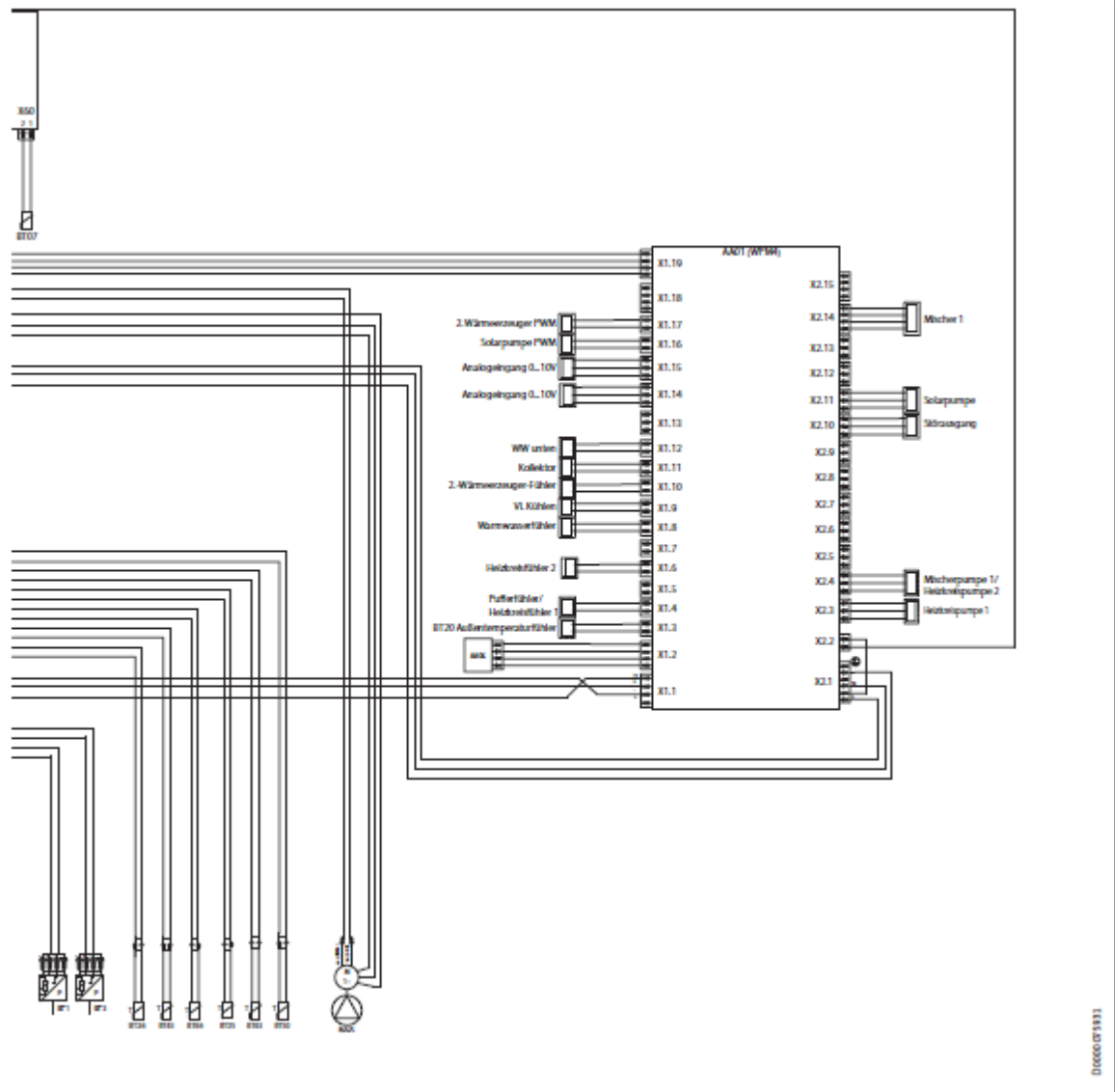
## HPG-I 04-06-08-12-15 S-CS-DS-DCS Premium

### 7.1 Variant A and B (up to 9555)



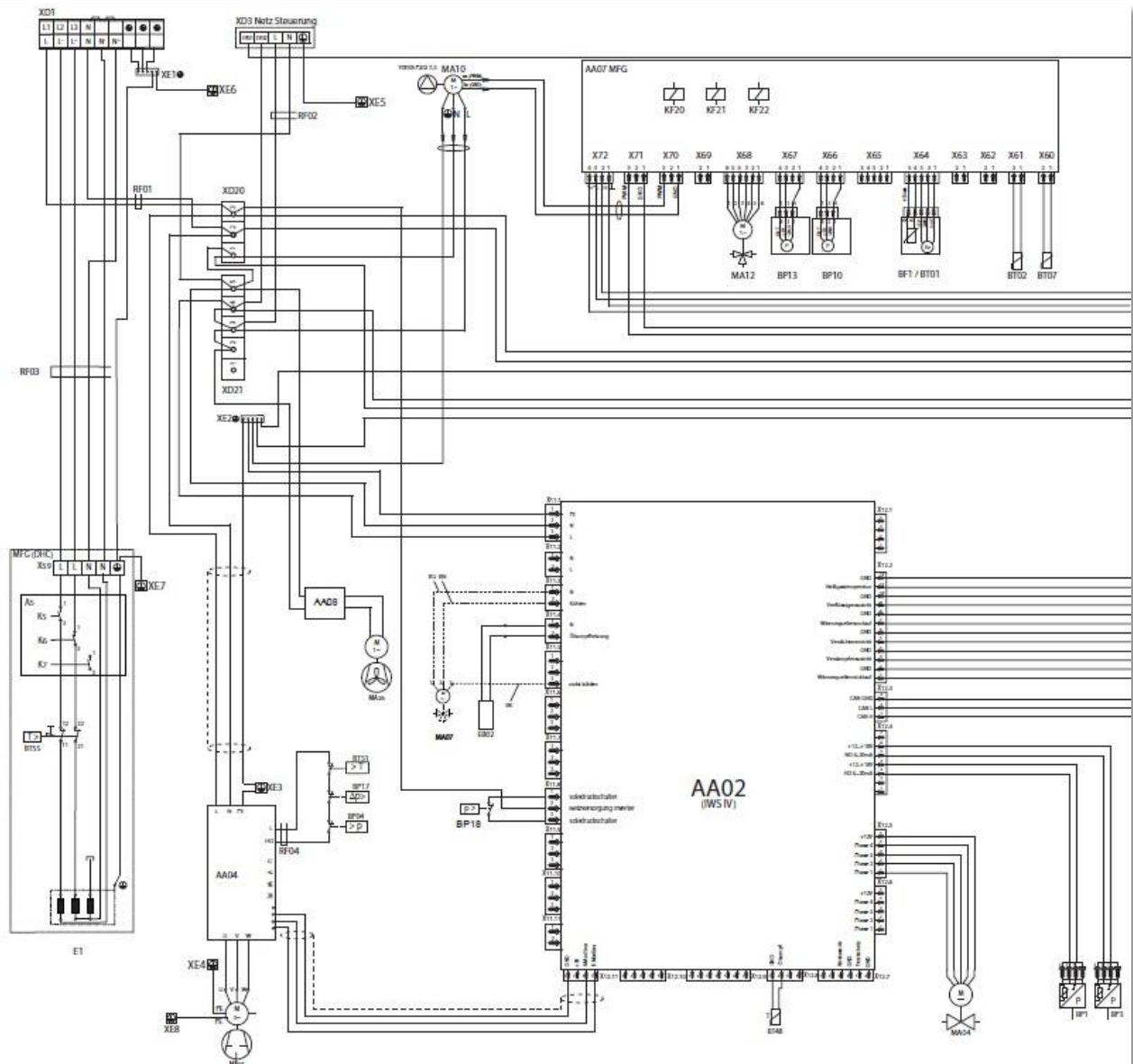
# Repair instructions HPG-I 04-06-08-12-15 S-CS-DS-DCS Premium

## 7.2 Variant A and B (up to 9555)



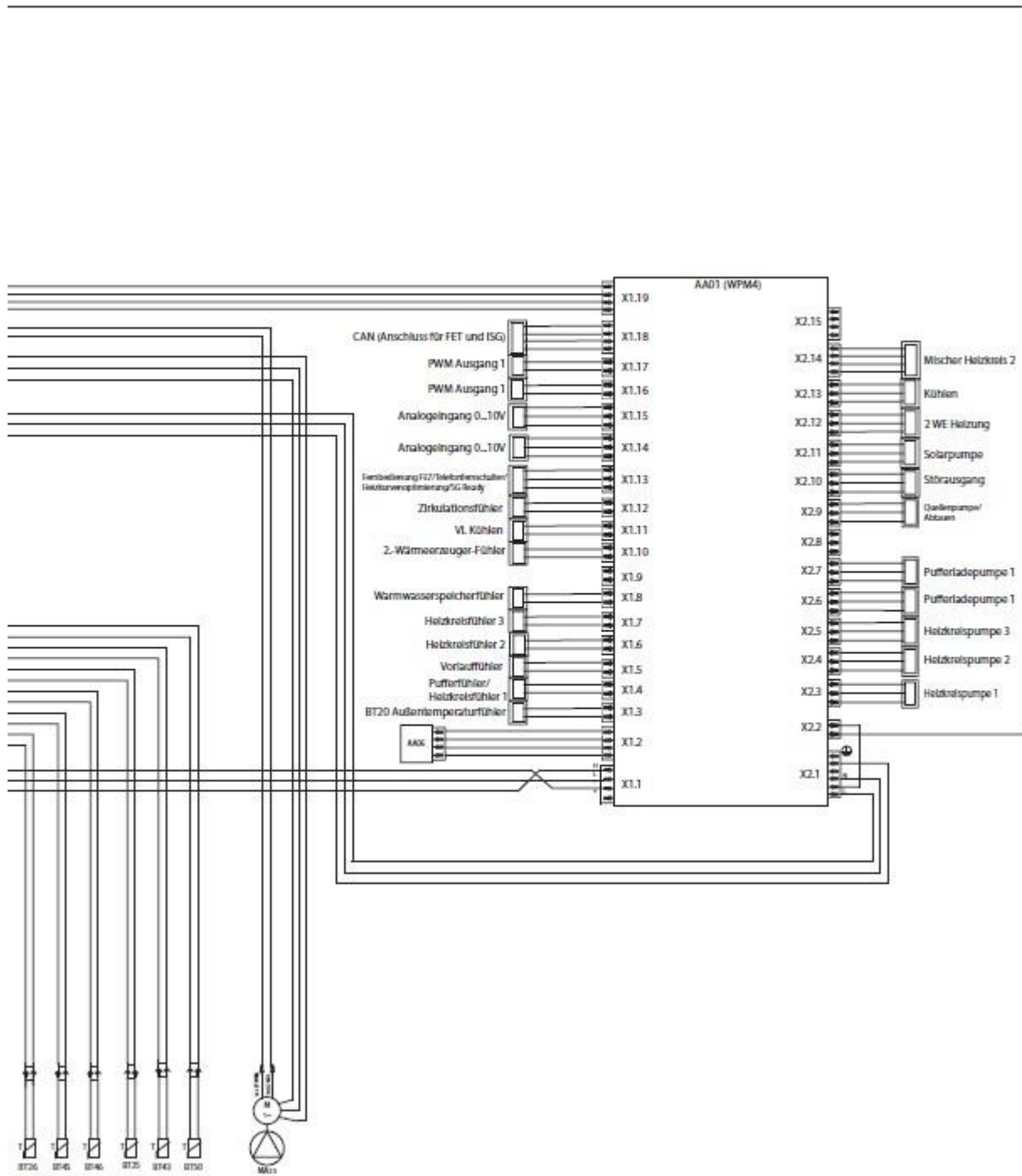
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### 7.3 Variant A and B (from 9556)



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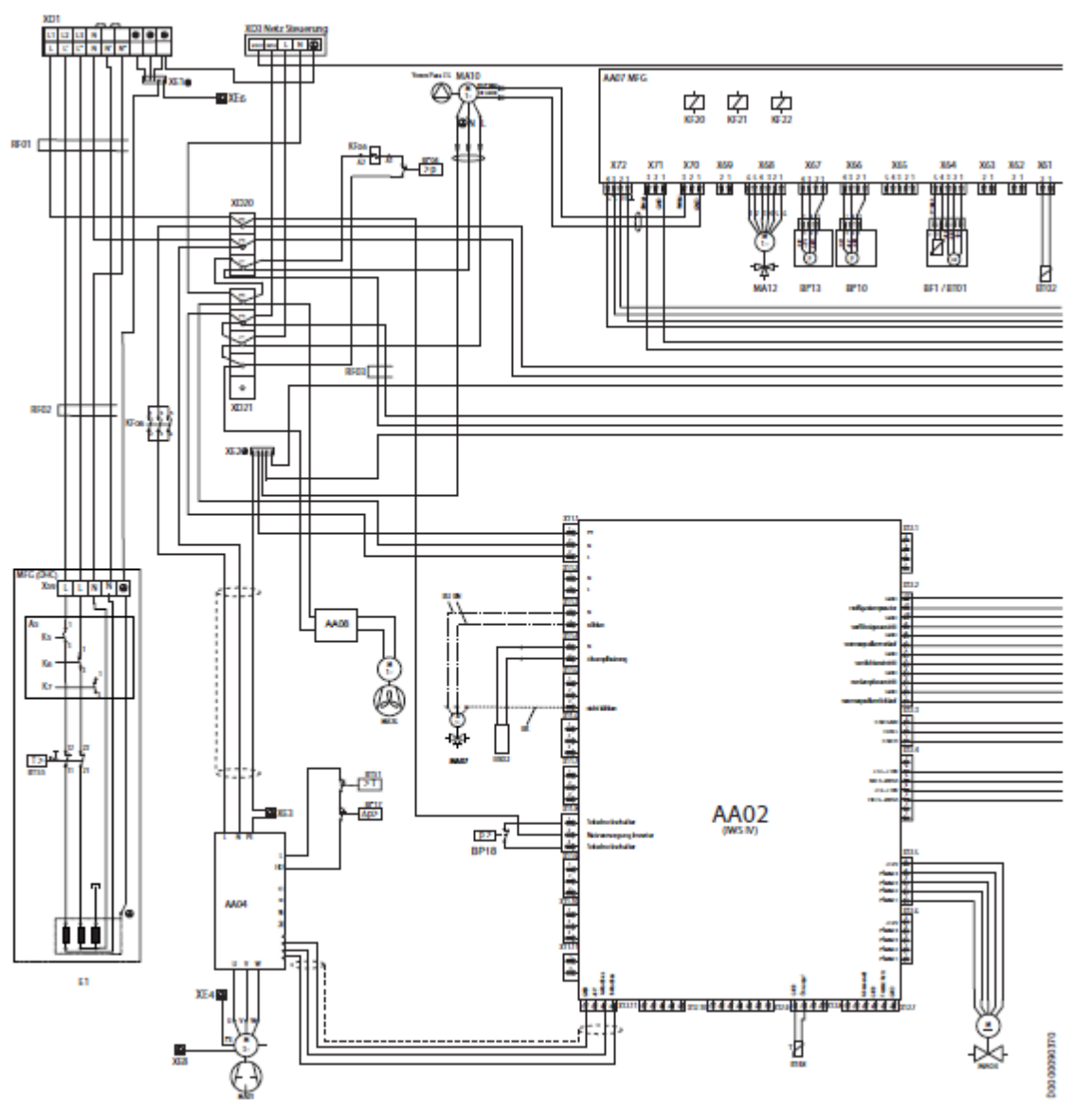
## 7.4 Variant A and B (from 9556)



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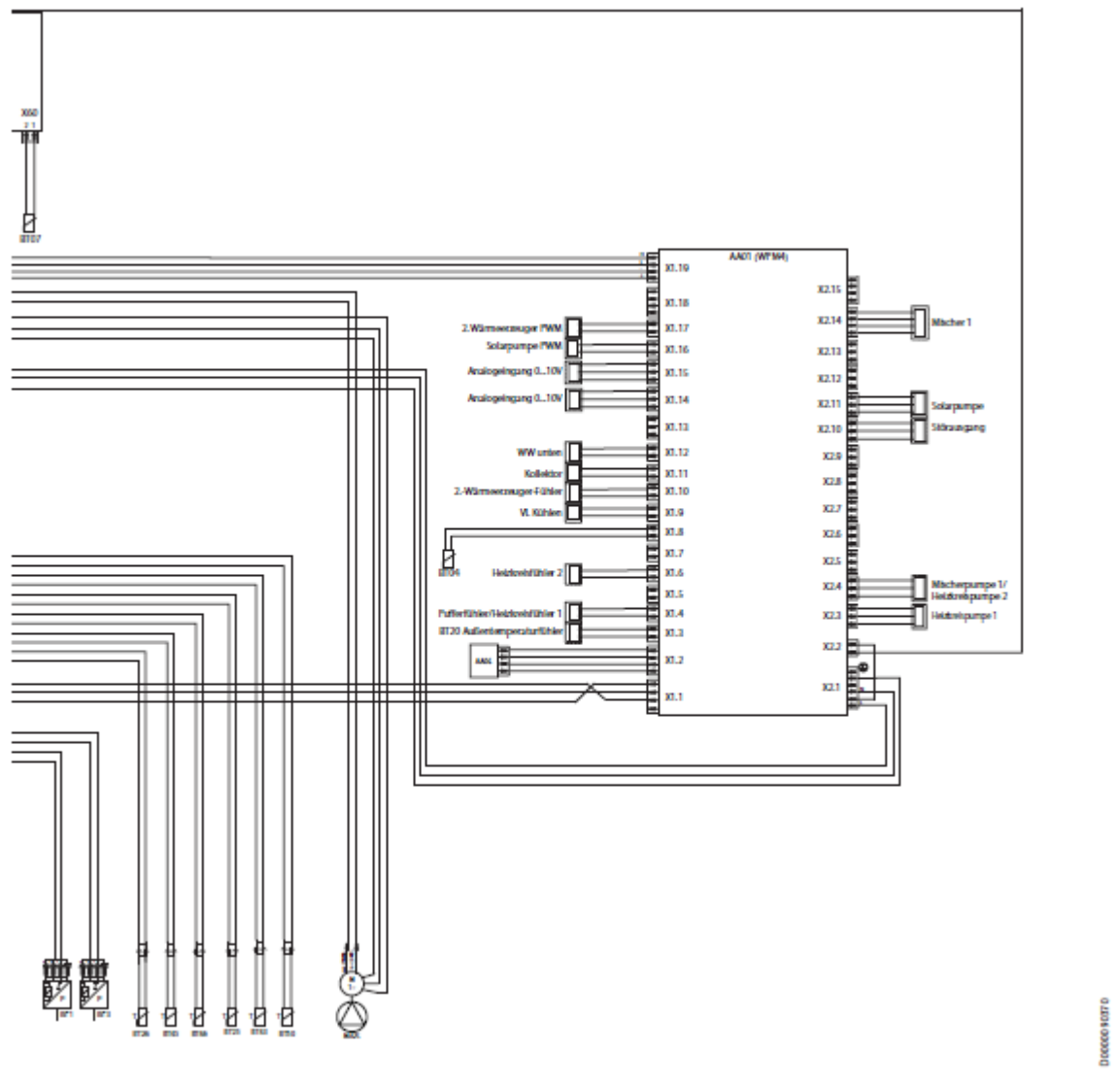
## HPG-I 04-06-08-12-15 S-CS-DS-DCS Premium

### 7.5 Variant C and D (up to 9555)



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## 7.6 Variant C and D (up to 9555)

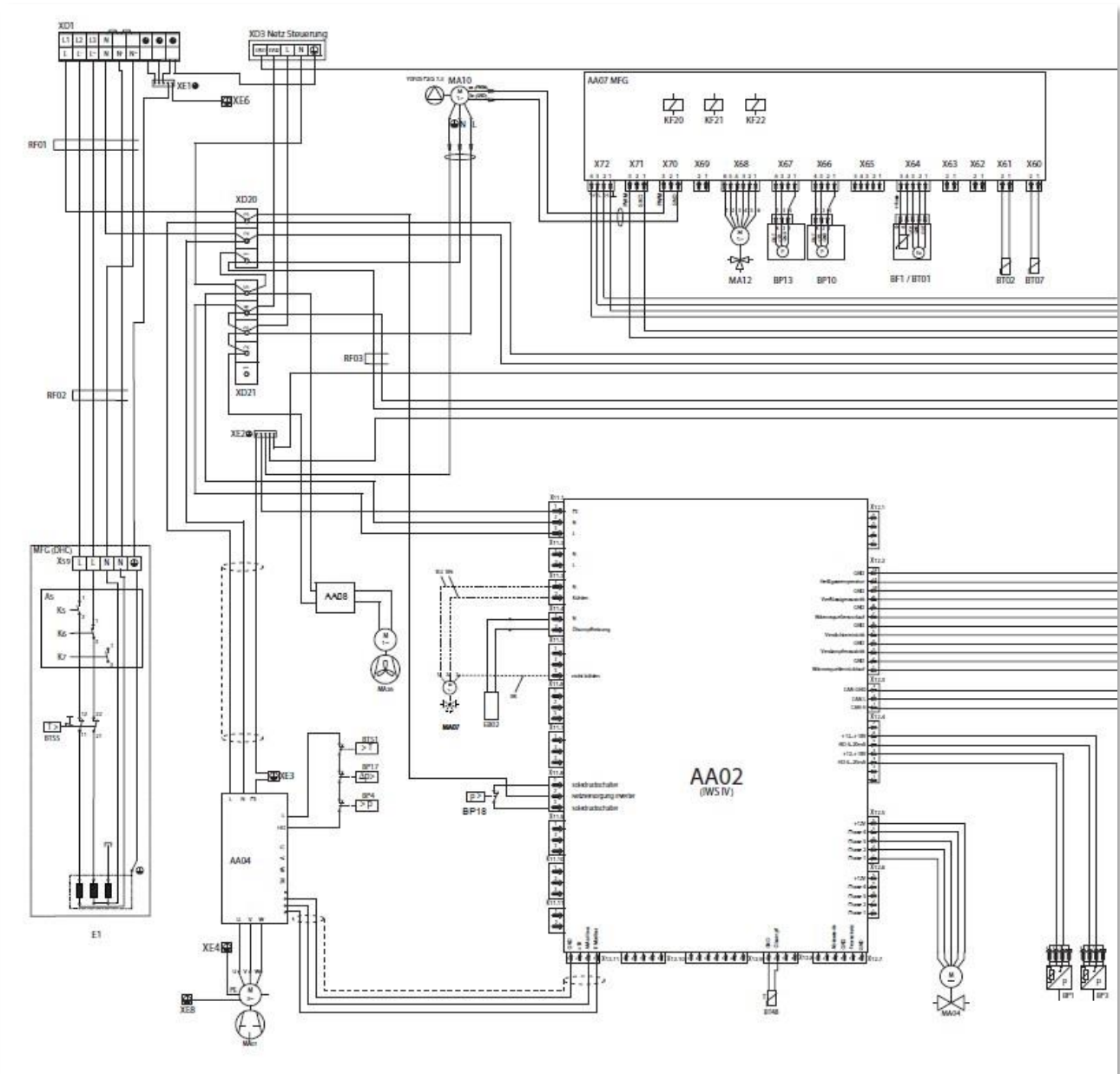


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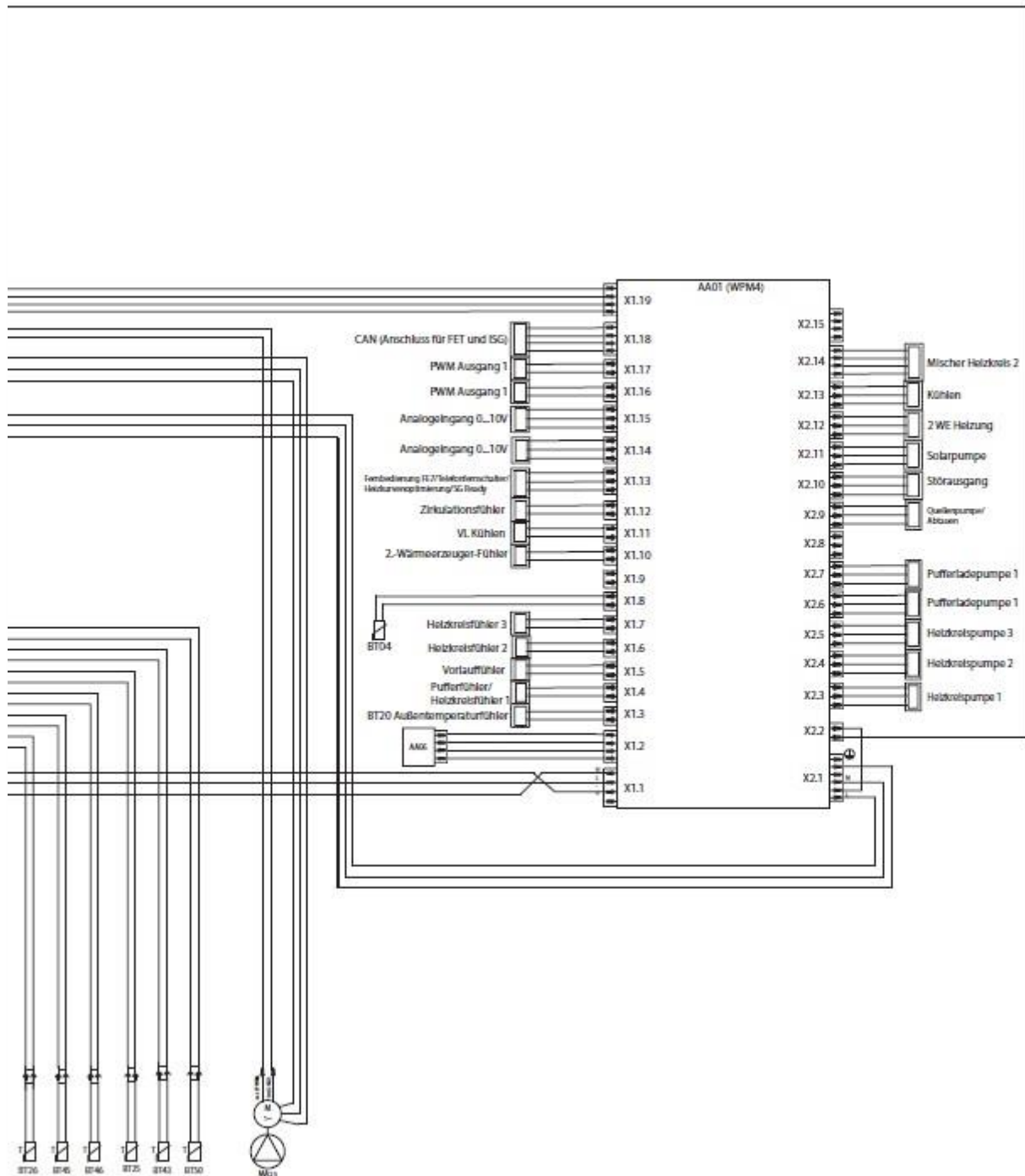
#### 7.7 Variant C and D (from 9556)



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### 7.8 Variant C and D (from 9556)



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#### 7.9 Legend circuit diagram

| Component | Description                                  | Connection | Description                           |
|-----------|----------------------------------------------|------------|---------------------------------------|
| AA01      | Heat Pump Manager (WPM)                      | XE1        | Earthing block                        |
| AA02      | Integrated heat pump control (IWS)           | XE2        | Earthing block                        |
| AA04      | Inverter compressor                          | XE3        | Support point earthing                |
| AA06      | Operating unit                               | XE4        | Support point earthing                |
| AA07      | Multifunction group MFG 3.1                  | XE5        | Support point earthing                |
| AA08      | Power supply fan                             | XE6        | Support point earthing                |
| BF01      | Volume flow sensor heating                   | XE7        | Support point earthing                |
| BL01      | Float switch                                 | XE8        | Support point earthing                |
| BP01      | High pressure sensor (42 bar)                | XE9        | Support point earthing                |
| BP03      | Low pressure sensor (16 bar)                 |            |                                       |
| BP04      | High pressure switch (50 bar)                | X1.1       | WPM CAN IWS                           |
| BP10      | Pressure sensor heating circuit              | X1.2       | WPM CAN control unit                  |
| BP13      | Pressure sensor Heat source                  | X1.3       | WPM Outdoor temperature sensor        |
| BP17      | Pressure box interior vacuum                 | X1.4       | WPM Buffer sensor / HK 1              |
| BP18      | Pressure switch Heat source                  | X1.6       | WPM HK2 Flow sensor                   |
| BT01      | Temperature sensor heating flow PT1000       | X1.8       | WPM Hot water sensor                  |
| BT02      | Temperature sensor heating return PT1000     | X1.9       | WPM VL Cooling                        |
| BT04      | Hot water sensor                             |            |                                       |
| BT07      | Temperature sensor heating flow MFG PT1000   | X1.10      | WPM 2nd heat generator sensor PT 1000 |
| BT20      | Temperature sensor outdoor air PT1000        | X1.11      | WPM Collector sensor PT 1000          |
| BT25      | Temperature sensor heat source flow PT1000   | X1.12      | WPM WW bottom PT1000                  |
| BT26      | Temperature sensor heat source return PT1000 | X1.14      | WPM Analogue input 0...10V            |
| BT43      | Temperature sensor condenser outlet PT1000   | X1.15      | WPM Analogue input 0...10V            |
| BT45      | Klixon HG Compressor                         | X1.16      | WPM Solar pump PWM                    |
| BT46      | Temperature sensor compressor inlet PT1000   | X1.17      | WPM 2nd heat generator PWM            |
| BT48      | Temperature sensor oil sump-PT1000           | X1.19      | WPM CAN MFG                           |
| BT50      | Temperature sensor hot gas PT1000            | X2.1       | WPM Network                           |
| BT55      | Safety temperature limiter MFG               | X2.2       | WPM EVU                               |
| EB02      | Oil sump heating                             | X2.3       | WPM HK pump 1                         |
| KF06      | Isolating contactor inverter                 |            |                                       |
| KF20      | Relay emergency/auxiliary heating MFG        | X2.4       | WPM Mixer pump                        |
| KF21      | Relay emergency/auxiliary heating MFG        | X2.10      | WPM Interference output               |

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| Component | Description                            | Connection | Description                                           |
|-----------|----------------------------------------|------------|-------------------------------------------------------|
| KF22      | Relay emergency/auxiliary heating MFG  | X2.11      | WPM Solar pump                                        |
| MA01      | Motor Compressor                       | X2.14      | WPM Mixer 1                                           |
| MA04      | Stepper motor electric expansion valve | X11.1      | IWS plug 3pin mains control                           |
| MA07      | Motor changeover valve heating/cooling | X11.3      | IWS plug 2pin - defrost valve                         |
| MA10      | Circulating pump                       | X11.4      | IWS plug 2pin - oil sump heater                       |
| MA12      | Motor switch valve WW-heating          | X11.8      | IWS plug 3pol - EVU lock                              |
| MA25      | Motor Pump Heat Source                 | X12.1      | IWS Plug-Rast 4pin - Fan PWM                          |
| MA26      | Extractor fan housing                  | X12.2      | IWS plug detent 12-pin - temperature sensor 1         |
|           |                                        | X12.3      | IWS Plug Rast 3pol - BUS Connection                   |
| XD1       | Connection terminal external mains WP  | X12.4      | IWS Plug-Rast 7pol - HD/ND-Pressure                   |
| XD2       | External connection terminal NHZ       | X12.5      | IWS Plug-Rast 5pol - Expansion valve                  |
| XD3       | External connection terminal Control   | X12.6      | IWS Plug-Rast 5pol - Inverter cooling valve           |
| XD4       | 6x5 block Mains control                | X12.7      | IWS plug latch 6pin - temperature sensor 2            |
|           |                                        | X12.9      | IWS Plug-Rast 7pol - Differential pressure sensor air |
|           |                                        | X12.11     | IWS Plug-Rast 4pin - Modbus Inverter                  |

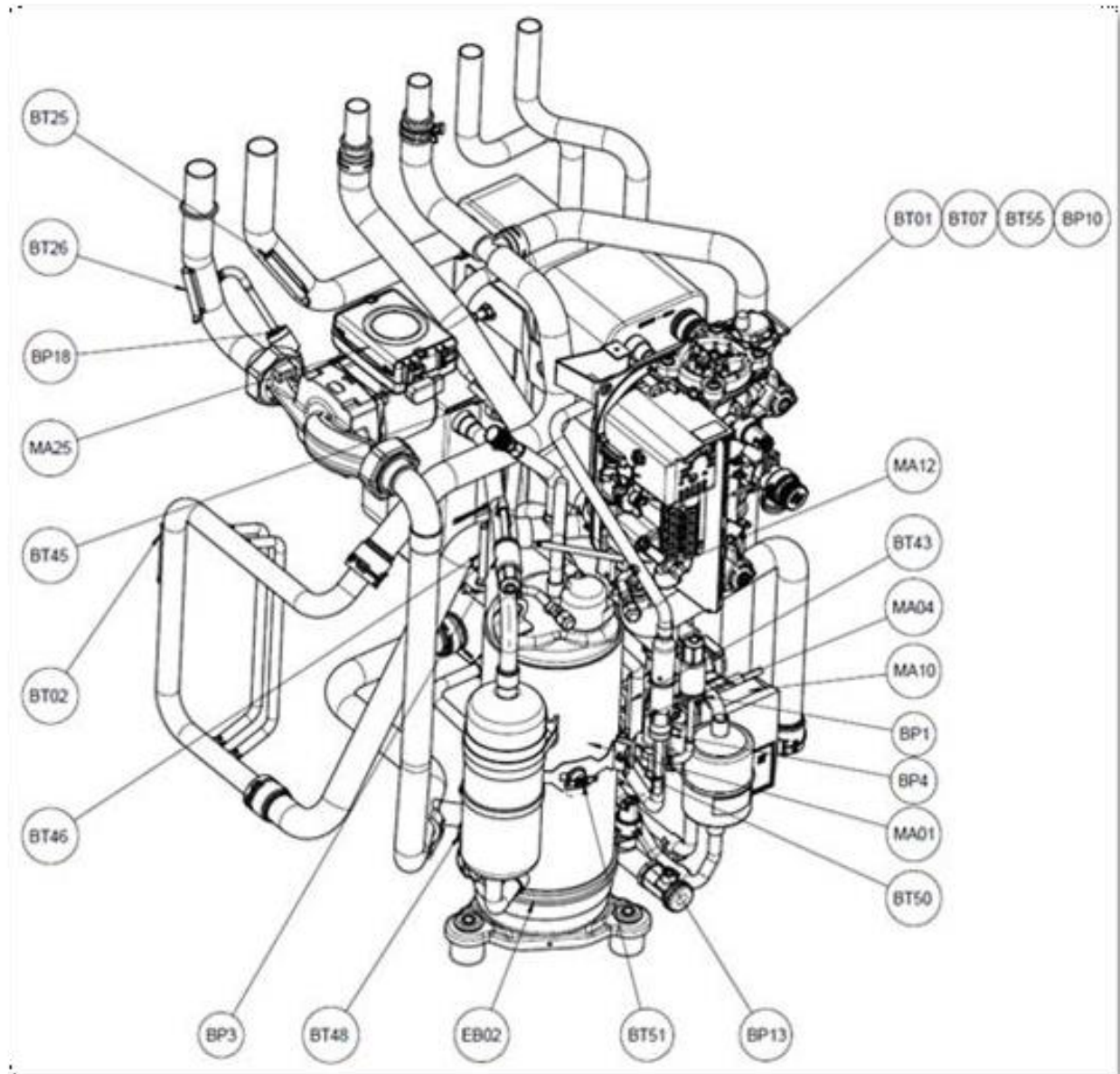
#### 8. Hydraulic plan

- See refrigeration circuit diagram

#### 9. Position of the components

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## 9.1 Variant A / C



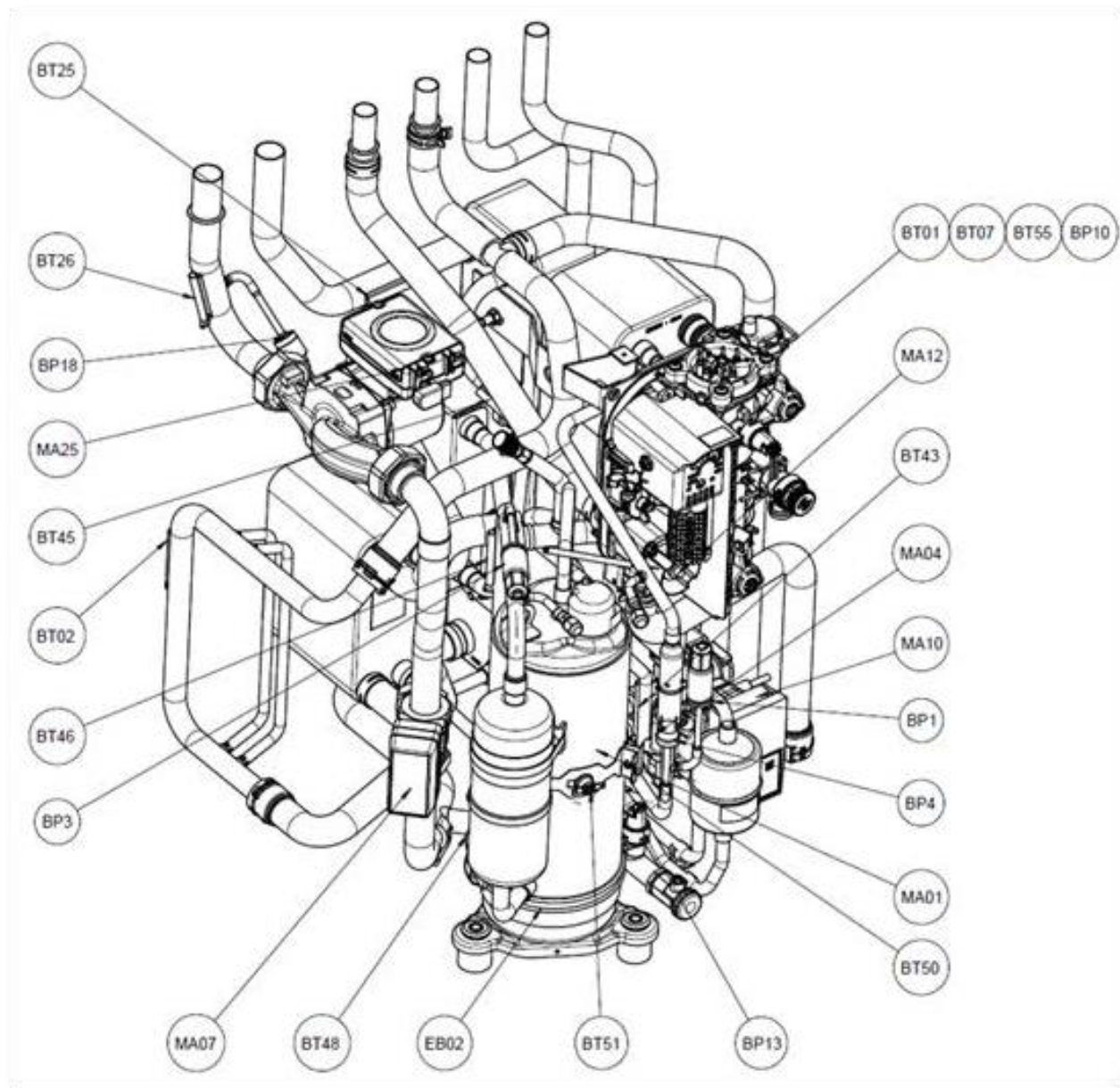
- For legend, see chapter "Refrigerant circuit legend".

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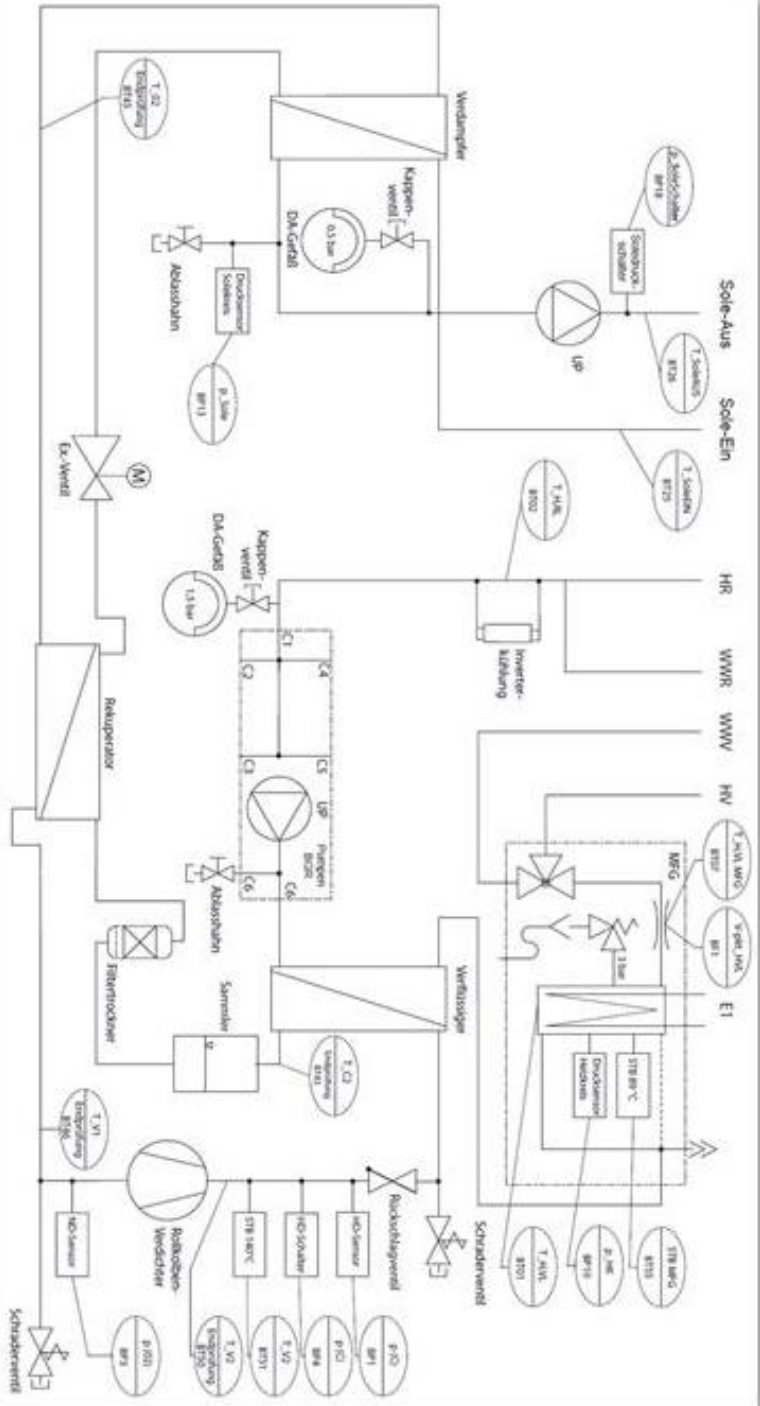
#### 9.2 Variant B / D



- For legend, see chapter "Refrigerant circuit legend".

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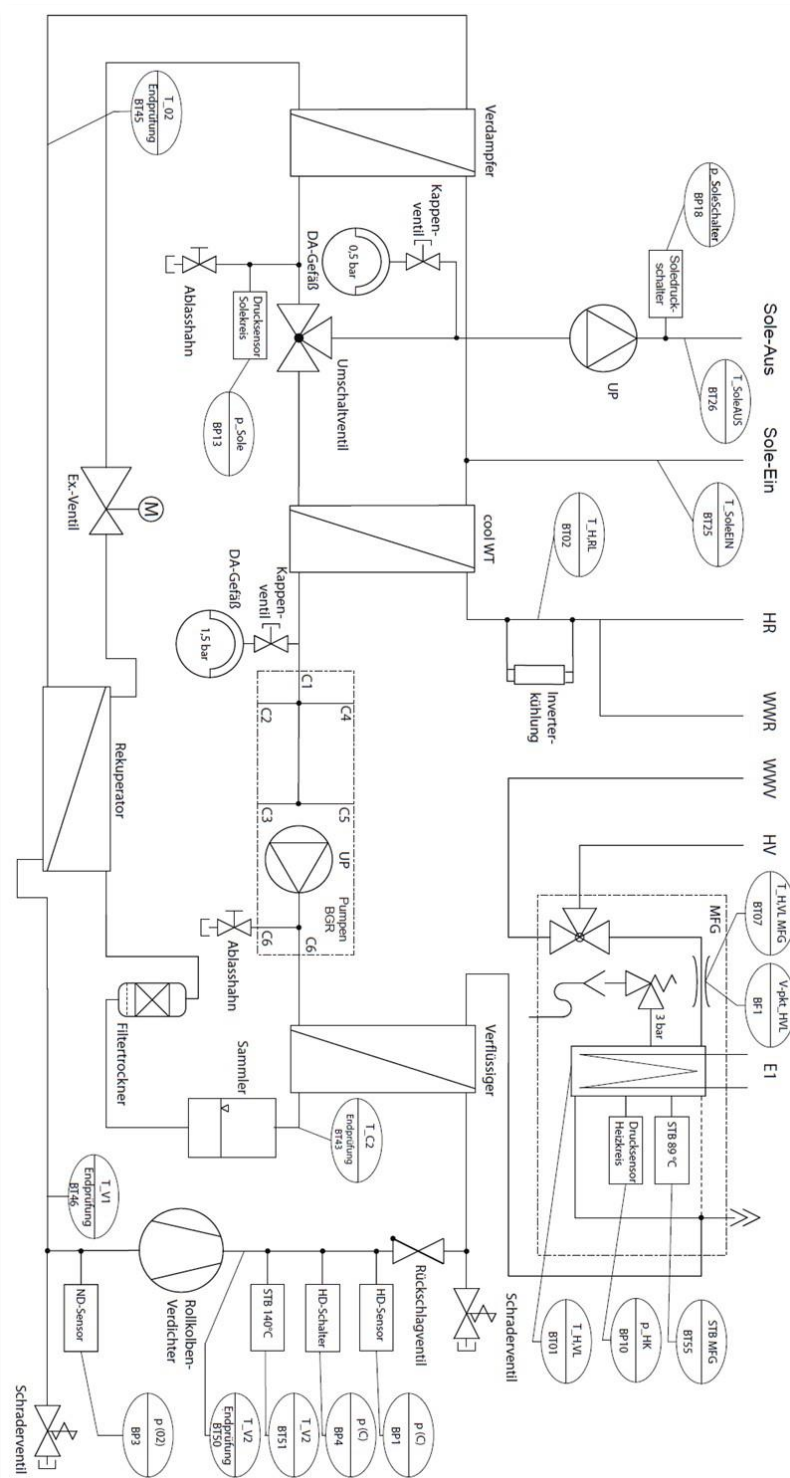
### 10.1 Cooling circuit / hydraulics Variant A (heating)



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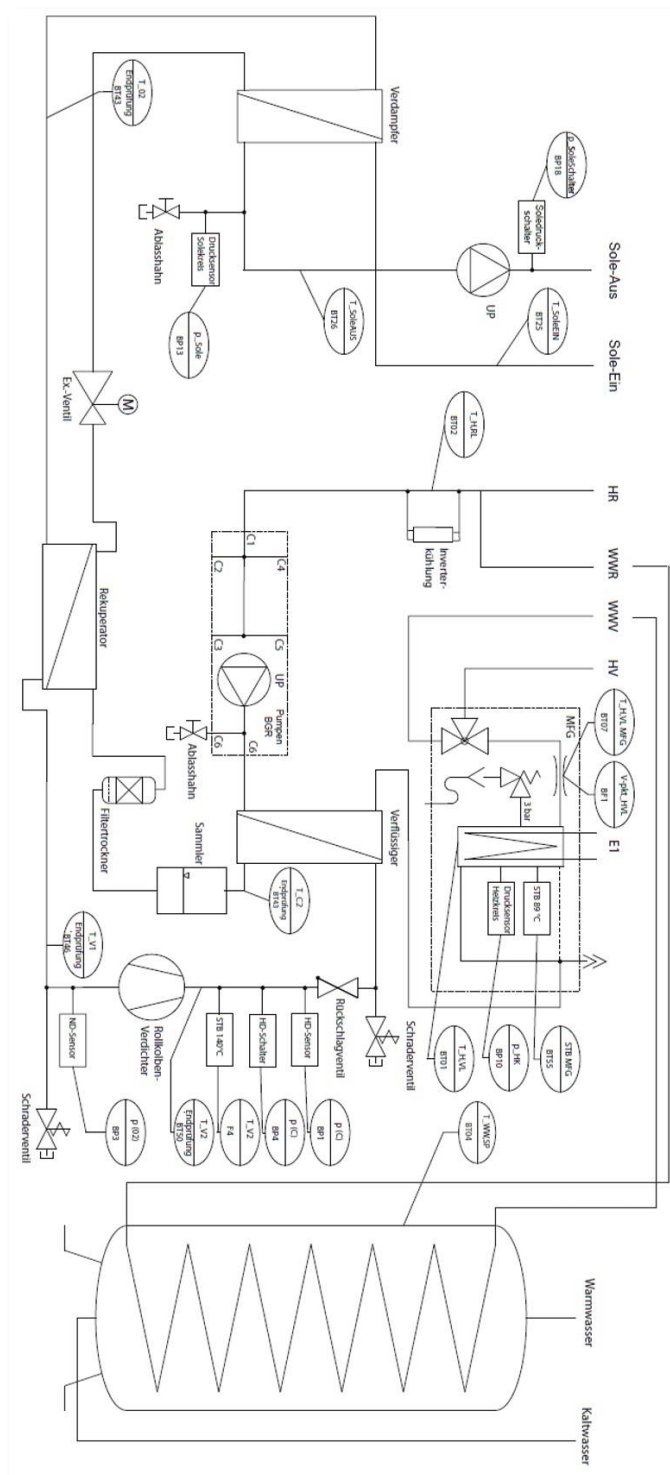
### 10.2 Refrigeration circuit / hydraulics Variant B (heating and cooling)



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## HPG-I 04-06-08-12-15 S-CS-DS-DCS Premium

### 10.3 Refrigerant circuit / hydraulics Variant C (heating / hot water)

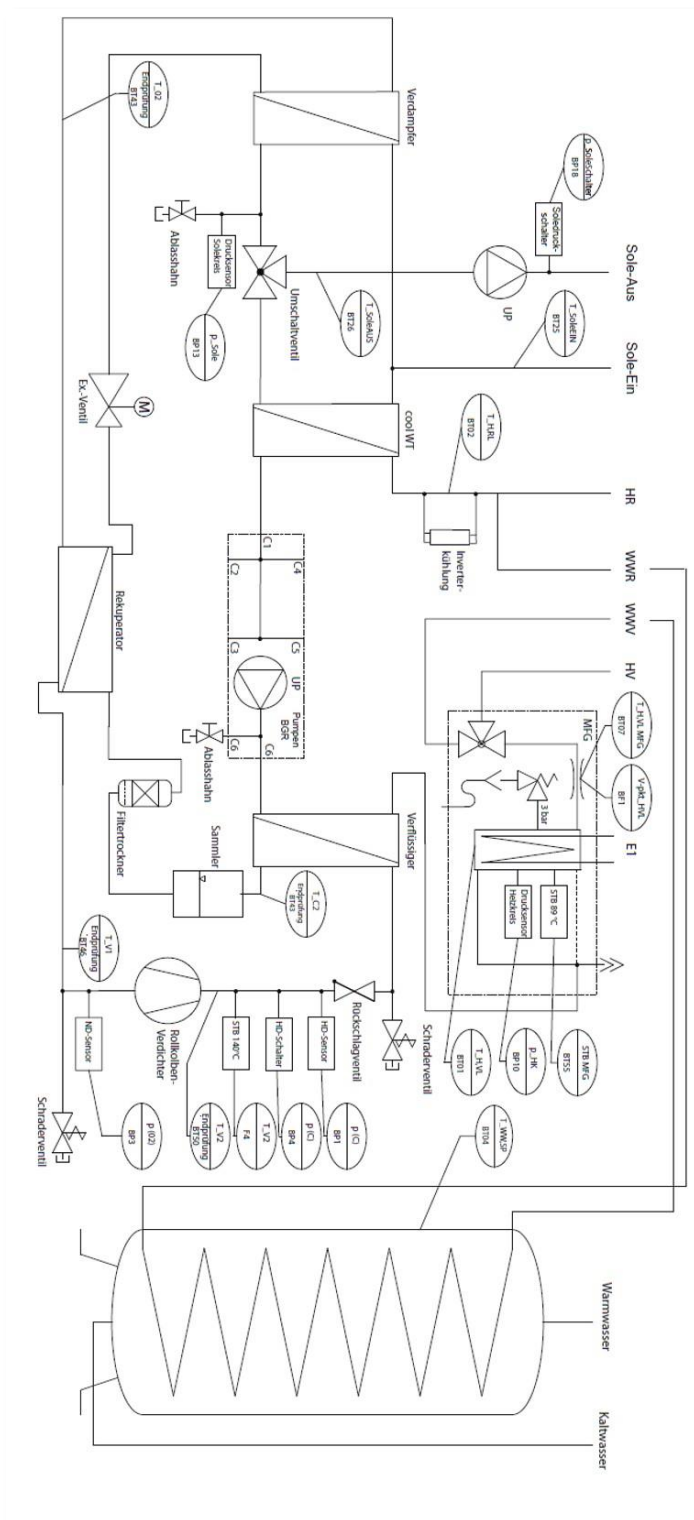


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#### 10.4 Refrigeration circuit / hydraulics Variant D (heating / cooling / hot water)



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#### 10.5 Legend refrigerant circuit

| Designation | Type      | Description                                                         |
|-------------|-----------|---------------------------------------------------------------------|
| BP01        | 34 bar    | Pressure sensor high pressure                                       |
| BP03        | 16 bar    | Pressure sensor low pressure                                        |
| BP04        | 34 bar    | Pressure switch high pressure                                       |
| BP10        | 0-3.5 bar | Pressure sensor heating circuit                                     |
| BP13        | 0-3.5 bar | Pressure sensor Heat source                                         |
| BP18        | 1-4 bar   | Pressure switch heat source (On = 1.0 bar / Off = 0.5 bar)          |
| BT01        | PT100     | Temperature sensor WP flow                                          |
| BT02        | PT100     | Temperature sensor WP return                                        |
| BT04        | PT100     | Temperature sensor hot water tank                                   |
| BT07        | PT100     | Temperature sensor heating flow MFG                                 |
| BT25        | PT100     | Temperature sensor heat source flow                                 |
| BT26        | PT100     | Temperature sensor heat source return                               |
| BT43        | PT100     | Temperature sensor condenser outlet                                 |
| BT45        | PT100     | Temperature sensor evaporator outlet                                |
| BT46        | PT100     | Temperature sensor compressor inlet                                 |
| BT48        | PT100     | Oil sump temperature sensor                                         |
| BT50        | PT100     | Temperature sensor hot gas                                          |
| BT51        | 130°C -8K | Temperature sensor compressor housing                               |
| BT55        | 89°C -8K  | Safety temperature limiter (STB)<br>Emergency/auxiliary heater (E1) |
| BF01        |           | Flow rate WP flow heating                                           |
| EB02        |           | Oil sump heating                                                    |
| MA01        |           | Compressor                                                          |
| MA04        |           | Stepper motor Expansion valve                                       |
| MA07        |           | Motor changeover valve (heating / cooling)                          |
| MA10        |           | Circulating pump                                                    |
| MA12        |           | Motor switch valve (hot water / heating)                            |
| MA25        |           | Circulating pump Heat source                                        |

# Repair instructions

## HPG-I 04-06-08-12-15 S-CS-DS-DCS

### Premium

## 11. Specifications and safety devices

### 11.1 Default room size

Electric heaters and room air-dependent heaters in the installation room and gas cookers next to the unit are prohibited. The safety valve of the brine circuit must be located in the installation room of the heat pump. In the event of a fault, this can cause the fan to mix escaping refrigerant. The information on the room size in the operating instructions must be observed.

### 11.2 Safety chain

The safety chain switches off the compressor in the event of a fault. The following components are integrated in the safety chain. High pressure monitor (BP04), hot gas monitor (BT 51) and the housing pressure monitor (BP17). When a safety device responds, the error message "High pressure" error number issued.

### 11.3 Safety temperature limiter compressor (BT51)

The temperature limiter is located on the outside of the compressor and serves to protect the compressor motor. Software-based safeguards (SOA limits, hot gas limiting, inverter parameters) provide sufficient safety devices to protect the compressor and its motor windings. If these safety devices all fail or the compressor is blocked, the Klixon (STB) will trip (130°C - 8K). A manual reset is required.



The manual reset of the temperature limiter must be carried out in a de-energised state and at temperatures below 65°C!

### 11.4 Safety temperature limiter Emergency/auxiliary heater (BT55)

The safety temperature limiter (STB) for the emergency and supplementary heating in the multifunctional assembly (MFG) switches off the power supply to the electric radiators permanently if the maximum permissible temperature (89°C -8K) is exceeded. The manual reset of the temperature limiter must take place at temperatures below 80°C.

# Repair instructions

## HPG-I 04-06-08-12-15 S-CS-DS-DCS

### Premium

#### 11.5 Safety concept

The units have a safety concept that consists of a sealed housing, fan and vacuum box.

The permanently running fan creates a negative pressure in the unit. The negative pressure is monitored by a pressure cell. If the fan fails or the housing is not sufficiently tight, the pressure box switches off the heat pump.

In the event of a leak in the refrigerant circuit, refrigerant escapes. This is directed into the installation room via an integrated fan. The fan generates a convection to mix the refrigerant with air. This keeps the air/refrigerant mixture below the ignition limit.

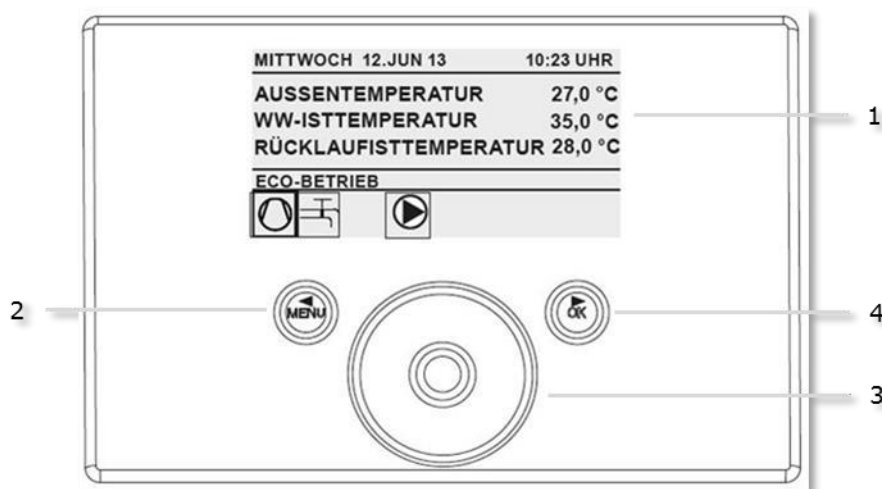
#### 12.Scope of delivery

See "Operation and installation" instructions

#### 13.Status displays

##### 13.1 Operation

The current mode of operation is shown via symbols on the display of the control unit, further Information is described in the "Operation and Installation" manual.



| Position | Description                                                                          |
|----------|--------------------------------------------------------------------------------------|
| 1        | Display - indication of date and time   operating mode   status symbols              |
| 2        | Menu" sensor field - entry into the setting levels   return to the higher-level menu |
| 3        | Operating circle - scrolling through the menu   increasing and decreasing values     |
| 4        | Sensor field "OK" - Selecting parameters   Confirming set values                     |

# Repair instructions

## HPG-I 04-06-08-12-15 S-CS-DS-DCS

### Premium

| Symbol                                                                              | Description                                                                                      |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
|    | Compressor symbol - display when the compressor is in active operation                           |
|    | Symbol Hot water preparation - display when hot water preparation is active                      |
|    | Symbol electric emergency/auxiliary heating - display when emergency/auxiliary heating is active |
|    | Symbol pump heating circuit/buffer - display when the pump is active                             |
|    | Symbol pump mixer circuit - display when the pump is in active operation                         |
|    | Cooling symbol - display when cooling mode is active                                             |
|    | Symbol heating mode - display when heating mode is active                                        |
|   | Symbol heating programme - display when heating programme is active                              |
|  | Symbol summer mode - display when summer mode is active                                          |

### 13.2 Malfunction

Error messages are shown in plain text on the display. The error list can be called up via "DIAGNOSIS / ERROR LIST".

|                                     |                      |
|-------------------------------------|----------------------|
| <input checked="" type="checkbox"/> | DIAGNOSIS            |
| <input type="checkbox"/>            | STATUS APPENDIX      |
| <input type="checkbox"/>            | STATUS HEAT PUMP     |
| <input type="checkbox"/>            | SYSTEM               |
| <input type="checkbox"/>            | INTERNAL CALCULATION |
| <input type="checkbox"/>            | <b>ERROR LIST</b>    |
| <input type="checkbox"/>            | RELAY TEST SYSTEM    |

The heat pump can be deactivated via "START-UP / RESET HEAT PUMP", this requires the entry of the code "1000".

|                                     |                        |
|-------------------------------------|------------------------|
| <input checked="" type="checkbox"/> | COMMISSIONING          |
| <input type="checkbox"/>            | ENTER CODE             |
| <input type="checkbox"/>            | LANGUAGE               |
| <input type="checkbox"/>            | SOURCE                 |
| <input type="checkbox"/>            | HEAT                   |
| <input type="checkbox"/>            | HOT WATER              |
| <input type="checkbox"/>            | VERDICHTER             |
| <input type="checkbox"/>            | EMERGENCY OPERATION    |
| <input type="checkbox"/>            | <b>RESET HEAT PUMP</b> |
| <input type="checkbox"/>            | RESET ERROR LIST       |
| <input type="checkbox"/>            | RESET SYSTEM           |

# Repair instructions

## HPG-I 04-06-08-12-15 S-CS-DS-DCS

### Premium

The error list can be deleted via "START-UP / RESET ERROR LIST", this requires the entry of the code "1000".

|                          |                         |
|--------------------------|-------------------------|
| <input type="checkbox"/> | COMMISSIONING           |
| <input type="checkbox"/> | ENTER CODE              |
| <input type="checkbox"/> | LANGUAGE                |
| <input type="checkbox"/> | SOURCE                  |
| <input type="checkbox"/> | HEAT                    |
| <input type="checkbox"/> | HOT WATER               |
| <input type="checkbox"/> | VERDICHTER              |
| <input type="checkbox"/> | EMERGENCY OPERATION     |
| <input type="checkbox"/> | RESET HEAT PUMP         |
| <input type="checkbox"/> | <b>RESET ERROR LIST</b> |
| <input type="checkbox"/> | RESET SYSTEM            |

#### 14. List of entries

| Message code | Reason for the message                                                                                                                                                                          | Possible remedy                                                                                  |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 1-0003       | The pressure sensor for minimum low pressure has triggered (0.9 bar abs.).                                                                                                                      | Refrigerant has escaped. Expansion valve does not open.                                          |
| 1-0004       | The maximum high pressure monitor has switched (OFF 34 -2 bar ON 25 +- 2 bar).                                                                                                                  | Check volume flow and sensor coupling of the heating side.                                       |
| 1-0013       | The pressure sensor for minimum low pressure < 0.9 bar absolute has triggered.                                                                                                                  | Refrigerant leaked, expansion valve does not open.                                               |
| 1-0019       | Sensor value of the outdoor temperature sensor is outside the permissible range of values.                                                                                                      | sensor, its wiring and the Check the associated connector, replace if defective.                 |
| 1-0023       | The maximum high pressure monitor has switched (OFF 34 -2 bar ON 25 +- 2 bar).                                                                                                                  | Volume flow of the heating too small, Set room temperature / heating curve too high.             |
| 1-0024       | Hot gas temperature has exceeded limit (130 °C +- 4K).                                                                                                                                          | Injection valve not working properly. Expansion valve not working properly, lack of refrigerant. |
| 1-0025       | The sensor value of the high pressure sensor is outside the permissible range. Value range.                                                                                                     | Check the sensor, its wiring and the associated connectors, Replace if defective.                |
| 1-0026       | Sensor value of the low pressure sensor outside the permissible value range.                                                                                                                    | Check the sensor, its wiring and the associated connectors, replace if defective.                |
| 1-0027       | High pressure does not rise significantly above Low pressure after compressor start-up and a waiting period.                                                                                    | Fuse of the heat pump connection has blown. Remedy the cause. Then perform a reset on the WPM.   |
| 1-0028       | Overheating of the refrigerant at the evaporator outlet or at the compressor inlet for too long below the permitted limit value (overheating is < minimum value overheating within 10 minutes). | Expansion valve is not working properly.                                                         |
| 1-0029       | Unexpectedly high deviation of the expansion valve opening degree from the pilot curve.                                                                                                         | Refrigerant leakage. Expansion valve is not working properly.                                    |

# Repair instructions

## HPG-I 04-06-08-12-15 S-CS-DS-DCS

### Premium

| Message code | Reason for the message                                                                                                        | Possible remedy                                                                        |
|--------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1-0042       | Condenser outlet sensor value is outside the permissible value range.                                                         | Check the sensor, its wiring and the associated connectors, replace if defective.      |
| 1-0099       | Sensor value of oil sump temperature sensor is out of range of the permissible range of values.                               | Check the sensor, its wiring and the associated connectors, Replace if defective.      |
| 1-0115       | The communication with the FES does not work correctly.                                                                       | Check the terminal point of the communication cable or change the communication cable. |
| 1-0128       | Superheating of the refrigerant at the evaporator outlet or at the Compressor inlet too long below the permitted limit value. | Expansion valve is not working properly.                                               |
| 1-0129       | Unexpectedly high deviation of the expansion valve opening degree from the pilot curve.                                       | Refrigerant leakage. Expansion valve is not working properly.                          |
| 1-0134       | Volume flow monitoring from heating output, flow temperature and return temperature.                                          | Check the volume flow.                                                                 |
| 2-0045       | Compressor speed deviation between setpoint and actual value.                                                                 | Frequency converter or compressor not working correctly                                |
| 2-0057       | Inverter main fault: Inverter IGBT overcurrent.                                                                               | Inverter error                                                                         |
| 2-0058       | Inverter main fault: PFC IGBT overcurrent.                                                                                    | Inverter error                                                                         |
| 2-0059       | Inverter main fault: DC link overvoltage.                                                                                     | Inverter error                                                                         |
| 2-0060       | Inverter main fault: DC link undervoltage.                                                                                    | Inverter error                                                                         |
| 2-0061       | Inverter main fault: AC voltage input Undervoltage.                                                                           | Inverter error                                                                         |
| 2-0062       | Inverter main fault: AC voltage input overvoltage.                                                                            | Inverter error                                                                         |
| 2-0063       | Inverter main fault: Voltage differences between the three input phases.                                                      | Inverter error                                                                         |
| 2-0064       | Inverter main fault: Desaturation                                                                                             | Inverter error                                                                         |
| 2-0065       | Inverter main fault: Inverter IGBT overtemperature.                                                                           | Inverter error                                                                         |
| 2-0066       | Inverter main fault: Inverter PFC IGBT overtemperature.                                                                       | Inverter error                                                                         |
| 2-0067       | Inverter main error: Rotor does not rotate as expected.                                                                       | Inverter error                                                                         |
| 2-0068       | Inverter main error: Arithmetic error in the measurement and analysis process.                                                | Inverter error                                                                         |
| 2-0069       | Inverter main fault: Input relay open.                                                                                        | Inverter error                                                                         |
| 2-0070       | Inverter main fault: Current differences between the three inverter IGBTs.                                                    | Inverter error                                                                         |
| 2-0071       | Inverter main fault: Current differences between the three inverter PFC IGBTs.                                                | Inverter error                                                                         |
| 2-0072       | Inverter main error: Low voltage range exceeded.                                                                              | Inverter error                                                                         |

# Repair instructions

## HPG-I 04-06-08-12-15 S-CS-DS-DCS

### Premium

| Message code | Reason for the message                                                                                                              | Possible remedy                                                                      |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 2-0073       | Inverter main fault: Motor overspeed.                                                                                               | Inverter error                                                                       |
| 2-0074       | Inverter secondary fault: DC link undervoltage.                                                                                     | Inverter error                                                                       |
| 2-0075       | Inverter secondary fault: Torque limit reached.                                                                                     | Inverter error                                                                       |
| 2-0076       | Inverter secondary error: Modbus communication disturbed.                                                                           | Inverter error                                                                       |
| 2-0077       | Inverter secondary fault: Compressor scroll overtemperature.                                                                        | Inverter error                                                                       |
| 2-0078       | Inverter secondary fault: Compressor motor overtemperature.                                                                         | Inverter error                                                                       |
| 2-0079       | Inverter secondary fault: circuit overtemperature.                                                                                  | Inverter error                                                                       |
| 2-0080       | Inverter secondary fault: Inverter IGBT's overtemperature.                                                                          | Inverter error                                                                       |
| 2-0081       | Inverter secondary fault: Inverter PFC IGBT's overtemperature.                                                                      | Inverter error                                                                       |
| 2-0084       | Inverter secondary fault: Temperature differences between the three inverter IGBTs.                                                 | Inverter error                                                                       |
| 2-0085       | Inverter secondary error: Temperature differences between the three inverter PFC IGBTs.                                             | Inverter error                                                                       |
| 2-0091       | Inverter secondary error: communication between analogue-digital converter and Secondary processor disturbed.                       | Inverter error                                                                       |
| 2-0093       | Inverter secondary error: Low-relevant communication objects between IWS and inverter were not correctly transmitted several times. | Inverter error Check the wiring and the associated connectors, replace if defective. |
| 2-0095       | Inverter main error: Collective error 1                                                                                             | Inverter error                                                                       |
| 2-0096       | Inverter main error: Collective error 2                                                                                             | Inverter error                                                                       |
| 2-0097       | Inverter secondary error: Collective error 1                                                                                        | Inverter error                                                                       |
| 2-0098       | Inverter secondary error: Collective error 2                                                                                        | Inverter error                                                                       |
| 2-0100       | Low pressure falls below SOA ND limit for unacceptable time period.                                                                 | Refrigerant circuit cannot shift operating conditions into SOA range of compressor.  |
| 2-0101       | Low pressure exceeds SOA ND limit for unacceptable time period.                                                                     | Refrigerant circuit cannot shift operating conditions into SOA range of compressor.  |
| 2-0102       | SOA Range overrun.                                                                                                                  | Refrigerant circuit cannot shift operating conditions into SOA range of compressor.  |
| 2-0103       | High pressure falls below SOA HD limit for unacceptable time period.                                                                | Refrigerant circuit cannot shift operating conditions into SOA range of compressor.  |
| 2-0104       | High pressure falls below SOA ND limit for unacceptable time period.                                                                | Refrigerant circuit cannot shift operating conditions into SOA range of compressor.  |
| 2-0105       | SOA Range overrun.                                                                                                                  | Refrigerant circuit cannot shift operating conditions into SOA range of compressor.  |
| 2-0135       | Inverter main fault: Input current limitation.                                                                                      | Inverter error                                                                       |
| 2-0136       | Inverter main fault: Output current limitation.                                                                                     | Inverter error                                                                       |
| 2-0137       | Inverter main fault: Phase loss.                                                                                                    | Inverter error                                                                       |
| 2-0138       | Inverter main fault: Power module.                                                                                                  | Inverter error                                                                       |

# Repair instructions

## HPG-I 04-06-08-12-15 S-CS-DS-DCS

### Premium

2-0139

Inverter main fault: Mains voltage  
sensor.

Inverter error

# Repair instructions

## HPG-I 04-06-08-12-15 S-CS-DS-DCS

### Premium

| Message code | Reason for the message                                                              | Possible remedy                                                                                       |
|--------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| 2-0140       | Inverter main fault: Motor current offset.                                          | Inverter error                                                                                        |
| 2-0141       | Inverter main fault: PFC current offset.                                            | Inverter error                                                                                        |
| 2-0142       | Inverter main error: Measurement of motor inductance.                               | Inverter error                                                                                        |
| 2-0143       | Inverter main fault: Motor phase resistance.                                        | Inverter error                                                                                        |
| 2-0144       | Inverter main fault: Restart                                                        | Inverter error                                                                                        |
| 2-0145       | Inverter main fault: Motor overcurrent shutdown function.                           | Inverter error                                                                                        |
| 2-0146       | Inverter main fault: IGBT US short circuit.                                         | Inverter error                                                                                        |
| 2-0147       | Inverter main fault: IGBT OS short circuit.                                         | Inverter error                                                                                        |
| 2-0148       | Inverter main fault: Motor phase short circuit.                                     | Inverter error                                                                                        |
| 2-0149       | Inverter main error: SVM function                                                   | Inverter error                                                                                        |
| 2-0232       | Inverter main fault: PFC overcurrent shutdown function.                             | Inverter error                                                                                        |
| 2-0233       | Inverter secondary fault: Inverter temperature control.                             | Inverter error                                                                                        |
| 2-0234       | Inverter secondary fault: Input current control.                                    | Inverter error                                                                                        |
| 2-0235       | Inverter main fault: High pressure sensor underrange.                               | Inverter error                                                                                        |
| 2-0236       | Inverter main fault: Compressor type configuration.                                 | Inverter error                                                                                        |
| 2-0237       | Inverter main fault: High pressure sensor configuration.                            | Inverter error                                                                                        |
| 2-0241       | WPM update carried out                                                              | Information                                                                                           |
| 2-0242       | FES update carried out                                                              | Information                                                                                           |
| 2-0243       | FET update carried out                                                              | Information                                                                                           |
| 2-0244       | WPM update failed                                                                   | Start update again                                                                                    |
| 2-0245       | FES update failed                                                                   | Start update again                                                                                    |
| 2-0246       | FET update failed                                                                   | Start update again                                                                                    |
| 3-0007       | Insufficient pressure in the heat source circuit.                                   | Check heat source for pressure maintenance. OFF 0.5 bar ON 1.0 bar                                    |
| 3-0008       | Switch WP type of the IWS is not set correctly.                                     | Switch off the mains voltage of the heat pump and set the switch correctly.                           |
| 3-0010       | Sensor value of "FE7" outside the permissible value range                           | Check the sensor, its wiring and the associated connectors, replace if defective. Terminal: WPM X1.13 |
| 3-0011       | Version conflict FES                                                                | The FES needs a software update. Have an update carried out.                                          |
| 3-0012       | Version conflict WPE                                                                | The WPE needs a software update. Carry out the update.                                                |
| 3-0013       | Version conflict FET                                                                | The FET needs a software update. Carry out the update.                                                |
| 3-0014       | Version conflict WPM                                                                | The WPM needs a software update. Carry out the update.                                                |
| 3-0016       | Sensor value of the hot gas temperature sensor outside the permissible value range. | Check the sensor, its wiring and the associated connectors, replace if defective.                     |

# Repair instructions

## HPG-I 04-06-08-12-15 S-CS-DS-DCS

### Premium

| Message code | Reason for the message                                                                                                   | Possible remedy                                                                                            |
|--------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| 3-0017       | Sensor value of the evaporator temperature sensor outside the permissible value range.                                   | Check the sensor, its wiring and the associated connectors, replace if defective.                          |
| 3-0018       | Sensor value of the "cooling sensor/recuperator sensor" outside the permissible range. Value range.                      | Check the sensor, its wiring and the associated connectors, replace if defective.                          |
| 3-0019       | Sensor value of the "outdoor temperature sensor" outside the permissible value range.                                    | Check the sensor, its wiring and the associated connectors, replace if defective.                          |
| 3-0020       | Sensor value of the "frost protection temperature sensor" outside the permissible value range.                           | Check the sensor, its wiring and the associated connectors, replace if defective.                          |
| 3-0026       | Sensor value of the low pressure sensor outside the permissible range of values.                                         | sensor, its wiring and the Check the associated connector, replace if defective.                           |
| 3-0031       | Sensor value of the flow temperature sensor outside the permissible value range.                                         | Check the sensor, its wiring and the associated connectors, replace if defective.                          |
| 3-0032       | Sensor value of the return temperature sensor outside the permissible value range.                                       | Check the sensor, its wiring and the associated connectors, replace if defective.                          |
| 3-0082       | Inverter secondary error: communication between signal processor and Main processor disturbed.                           | Inverter error                                                                                             |
| 3-0083       | Inverter secondary error: Communication between signal processor and main processor disturbed.                           | Inverter error                                                                                             |
| 3-0086       | Inverter secondary error: Temperature sensor error Scroll temperature outside the permissible range. Value range.        | Inverter error                                                                                             |
| 3-0087       | Inverter secondary error: Temperature sensor error Motor temperature outside the permissible range Value range.          | Inverter error                                                                                             |
| 3-0088       | Inverter secondary error: Temperature sensor error internal circuit temperature outside the permissible range of values. | Inverter error                                                                                             |
| 3-0089       | Inverter secondary error: Temperature sensor error Inverter IGBT's outside the permissible value range.                  | Inverter error                                                                                             |
| 3-0090       | Inverter secondary error: Temperature sensor error Inverter PFC IGBT's outside the permissible value range.              | Inverter error                                                                                             |
| 3-0092       | Inverter secondary fault: Inverter Error limit has been reached and inverter has been locked.                            | Inverter error                                                                                             |
| 3-0094       | Higher-relevant communication objects between IWS and Inverters were not transmitted correctly several times.            | Check wiring and associated connectors, replace if defective;<br>Check the voltage supply of the inverter. |

## Repair instructions

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| Message code | Reason for the message                                                                        | Possible remedy                                                                   |
|--------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 3-0125       | MFG Sensor value "Return temperature WP" outside the permissible value range.                 | The sensor, its wiring and the associated Check connector, replace if defective.  |
| 3-0126       | MFG Sensor value "Flow temperature WP" outside the permissible value range.                   | The sensor, its wiring and the associated Check connector, replace if defective.  |
| 3-0127       | MFG Sensor value "Volume flow sensor WP" outside the permissible value range.                 | The sensor, its wiring and the associated Check connector, replace if defective.  |
| 3-0128       | The communication to the "Return temperature sensor WP" in the MFG does not work correctly.   | The sensor, its wiring and the associated Check connector, replace if defective.  |
| 3-0129       | The communication to the "Flow temperature sensor WP" in the MFG does not work correctly.     | The sensor, its wiring and the associated Check connector, replace if defective.  |
| 3-0130       | The communication to the "Heating circuit volume flow sensor" in MFG does not work correctly. | The sensor, its wiring and the associated Check connector, replace if defective.  |
| 5-0003       | Multiple occurrence of error message: 1-0003                                                  | Remedy the cause. Then perform a reset on the WPM.                                |
| 5-0004       | Multiple occurrence of error message: 1-0004                                                  | Remedy the cause. Then perform a reset on the WPM.                                |
| 5-0026       | Sensor value of the low pressure sensor outside the permissible value range.                  | Check the sensor, its wiring and the associated connectors, replace if defective. |
| 5-0027       | Multiple occurrence of error message: 1-0027                                                  | Remedy the cause. Then perform a reset on the WPM.                                |
| 5-0049       | Multiple occurrence of error message: 1-0049                                                  | Remedy the cause. Then perform a reset on the WPM.                                |

# Repair instructions

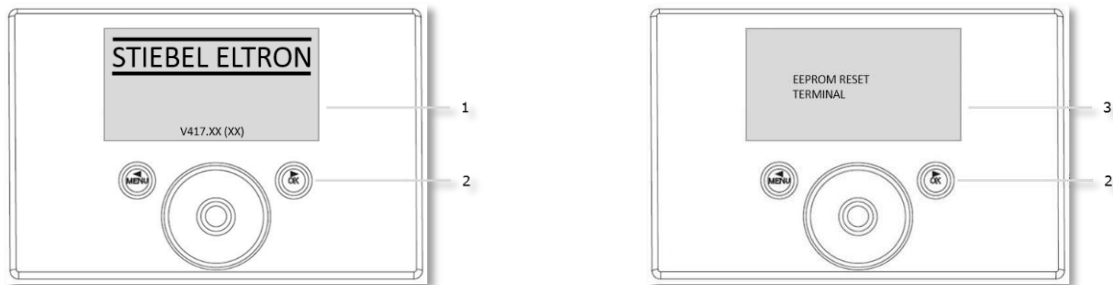
## HPG-I 04-06-08-12-15 S-CS-DS-DCS

### Premium

#### 15. Further notes on troubleshooting and fault rectification

##### 15.1 Reset control unit (FES)

If display problems occur, the EEPROM memory of the control unit can be deleted.



To reset the control unit, the following steps must be carried out.

- Briefly interrupt the power supply to the control unit
- Connect the power supply to the control unit, the start screen is displayed. Keep sensor field "OK" pressed while the start screen is displayed
- After a successful reset, "EEPROM RESET TERMINAL" is displayed.
- Release the "OK" sensor field. The EEPROM reset is now complete

##### 15.2 Reset Heat Pump Manager (WPM)

Via "START-UP / RESET SYSTEM" the heat pump manager can be reset to the delivery state. The code "7777" must be entered for this purpose.

Notice!  
All settings and the set heat pump type "WPF MFG" are lost!

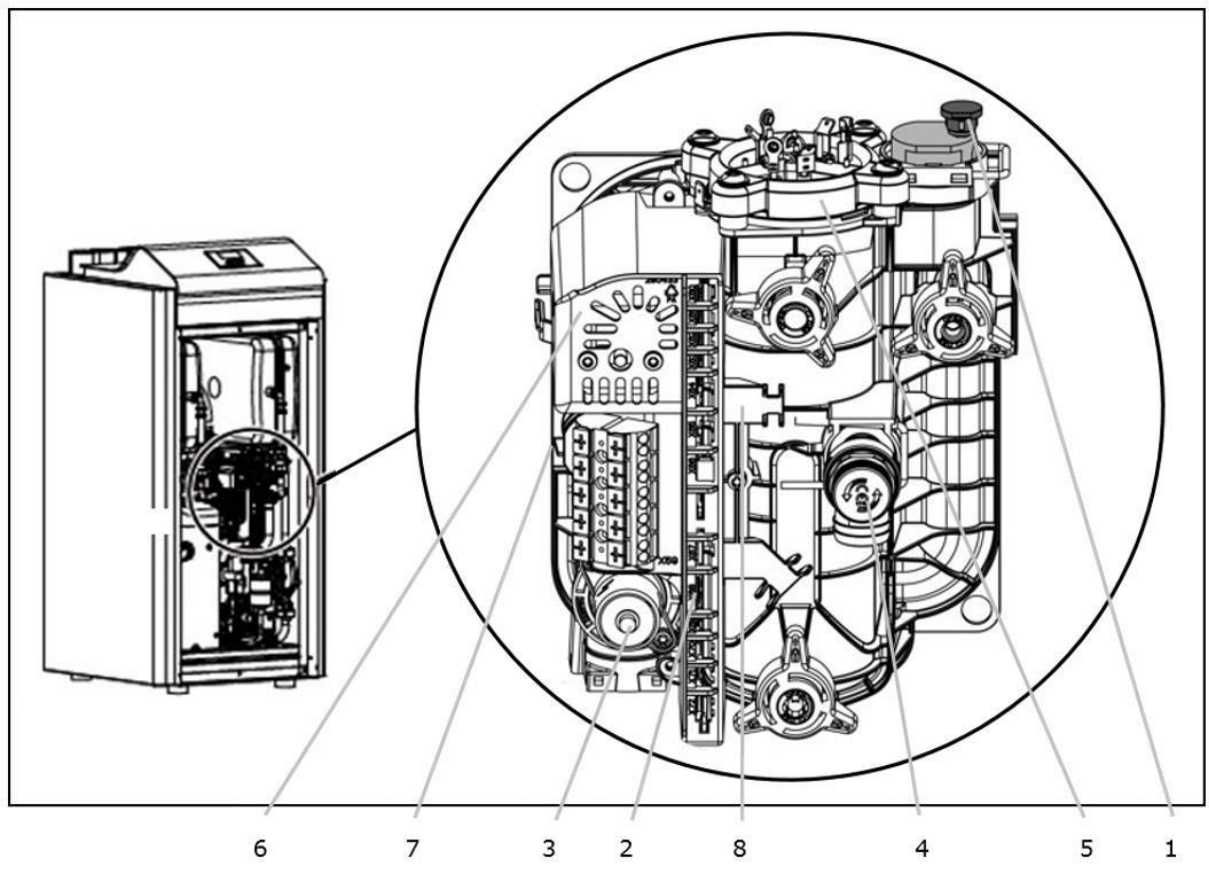
|                          |                     |
|--------------------------|---------------------|
| <input type="checkbox"/> | COMMISSIONING       |
| <input type="checkbox"/> | ENTER CODE          |
| <input type="checkbox"/> | LANGUAGE            |
| <input type="checkbox"/> | SOURCE              |
| <input type="checkbox"/> | HEAT                |
| <input type="checkbox"/> | HOT WATER           |
| <input type="checkbox"/> | VERDICHTER          |
| <input type="checkbox"/> | EMERGENCY OPERATION |
| <input type="checkbox"/> | RESET HEAT PUMP     |
| <input type="checkbox"/> | RESET ERROR LIST    |
| <input type="checkbox"/> | RESET SYSTEM        |

## Repair instructions

### HPG-I 04-06-08-12-15 S-CS-DS-DCS Premium

#### 15.3 Multifunctional Assembly (MFG)

##### 15.3.1 Overview of the components of the multifunctional assembly (MFG)



| Position | Description                                                   |
|----------|---------------------------------------------------------------|
| 1        | Automatic air vent (close during operation!)                  |
| 2        | Electronics board (AA07) with plug-in connections             |
| 3        | Switching valve (MA12)                                        |
| 4        | Overpressure safety valve (3bar)                              |
| 5        | Emergency/auxiliary heating (E1)                              |
| 6        | Safety temperature limiter (BT55) with manual release         |
| 7        | Flow rate and temperature sensor, heating circuit (BF01/BT07) |
| 8        | Pressure sensor heating circuit (BT10)                        |

##### 15.3.2 Incorrect circulation during DHW charging or heating operation

Depending on the operating mode, the flow temperature into the heating circuit should increase significantly during DHW charging and vice versa. not  
If there is  
a significant temperature increase,  
there is a fault on the changeover valve in the multifunction group (AA07). Check the function of the multifunction group.

##### 15.3.3 Frequent WW charging in cooling mode

## Repair instructions

### HPG-I 04-06-08-12-15 S-CS-DS-DCS Premium

In cooling mode, incorrect circulation at the changeover valve (MA12) can cause the DHW storage tank to cool down, the system frequently interrupts cooling mode and recharges the DHW storage tank. Insufficient cooling and higher energy costs are the result. Check the function of the multifunction group.

#### 15.3.4 Noises when bypassing the change-over valve

If there is no PWM signal at the internal circulation pump, the pump runs constantly at 100%, the automatic speed reduction before switching over is ineffective. Faulty plug connections, interruptions in the lines, a pump defect or a fault in the MFG electronics are possible causes.

If the operating mode changes from heating/cooling to hot water or from hot water to heating/cooling, the following sequence is active:

- Compressor is switched off
- Buffer charging pump/hot water charging pump is switched off
- Switching valve on the MFG moves to the defined position
- Source pump, buffer charging pump/hot water charging pump is switched on
- Compressor is switched on

The switchover takes about 6 minutes, there is no indication in the display.

If the operating mode changes from the standstill of the heat pump, there is no pump standstill while the valve moves to the new position.

#### 15.3.5 Water leakage at the motor of the changeover valve (MA12)

In connection with deposits on the motor shaft of the changeover valve, heating water may escape. If a defect occurs here, the water quality in the heating circuit must be checked.

#### 15.3.6 Blocking the DHC stages if the volume flow is too low

If the measured volume flow is less than 5l/min, the electric heating element (E1) in the multifunctional assembly (AA07) is blocked and emergency operation is not possible.

The blocking can be triggered by the following causes:

- Control or voltage supply of circulating pump (MA10) faulty
- Circulation pump (MA10) blocked/defective
- Volume flow sensor (BF01 / BT07) defective or wiring faulty

#### 15.4 Internal brine pressure switch (BP18)

The brine pressure switch is connected to the AA02 board; if the contact is open, an error message is triggered.

| Brine pressure switch (BP18) | AA02 (X11.8 terminal 1/3) | Pressure sensor (BP13) | Control unit display (AA06) |
|------------------------------|---------------------------|------------------------|-----------------------------|
| open                         |                           | < 0.5 bar              | 3-0007                      |
| closed                       |                           | > 1.0 bar              | No message                  |
|                              |                           |                        |                             |

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### Premium

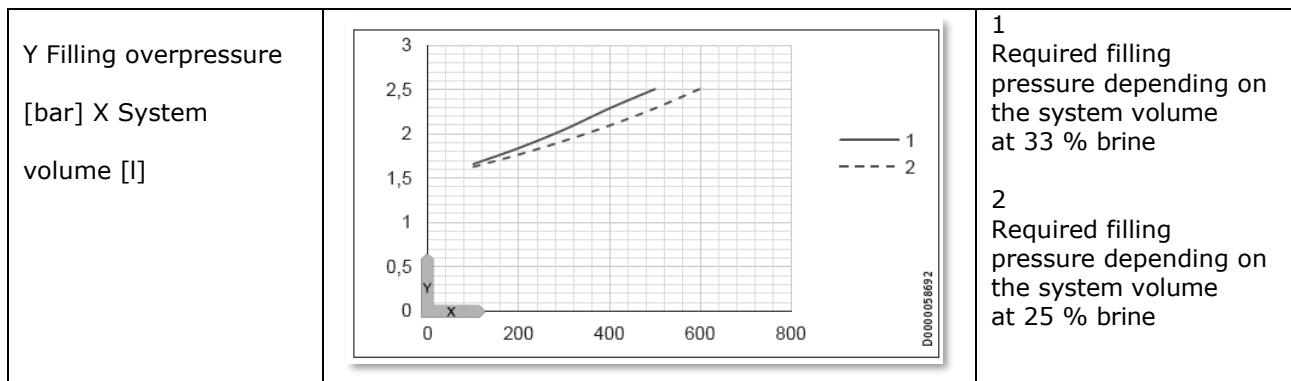
#### 15.5 Source Min

The heat source is monitored via the source outlet temperature. If the message Source min. appears in the message list, the heat source must be checked. The switch-off value of the heat source can be set in the heat pump manager.

#### 15.6 Diaphragm expansion vessel (MAG) Heat source leaking

If the diaphragm expansion vessel on the brine side leaks, the antifreeze content of the brine liquid must be checked. Pressure specifications should be calculated specifically for the system. Please refer to chapter 9.4 of the operation and installation manual.

- Incorrect pressure maintenance can lead to the seals being pulled in. Here, a calculation is absolutely necessary to avoid further leakage.
- If the brine concentration is too low (<25%), it must be corrected.



#### 15.7 Pressure monitoring Unit housing

The heat pump is equipped with a fan for venting the housing. If the unit is opened during operation or is leaking, a pressure monitor switches off the heat pump. Make sure that the fan creates a negative pressure of > 50 Pa. The pressure box switches off the heat pump < 20 Pa.

After opening the heat pump, the housing seal should be checked and replaced if necessary.

### 16. Testing components

#### 16.1 Internal circulation pump

The volume flow is automatically controlled by the heat pump manager. Manual adjustment of the circulation pump is possible, via the spread control in the parameter Commissioning / Heating.

The internal pump has a positive interference behaviour; without a PWM control signal, it operates at maximum speed (100%). If the voltage signal is measurable when the PWM pump plug is removed and collapses when it is plugged in, there is probably a fault in the pump electronics.

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If no voltage can be measured, the voltage signal at the connector of the MFG board (X70 1-3) and the wiring must be checked. A bent PIN in the plug socket (PWM input) of the pump may be the cause.

#### 16.2 Internal heat source pump

The volume flow is automatically controlled by the heat pump manager. Manual adjustment of the heat source pump is not possible.

The internal pump has a positive interference behaviour; without a PWM control signal, it operates at maximum speed (100%). If the voltage signal is measurable when the PWM pump plug is removed and collapses when it is plugged in, there is probably a fault in the pump electronics.

If no voltage can be measured, the voltage signal at the connector of the MFG board (X71 1-3) must be and the wiring must be checked. A bent PIN in the socket (PWM input) of the pump may be the cause.

#### 16.3 Temperature sensor

The connected temperature sensors are PT1000 sensors; an interruption is indicated in the display of the control unit is displayed with "---".

A test is carried out by measuring the resistance value at the currently prevailing temperature, the connecting cables, plug-in and clamp connections are to be included.

| Sensor temperature<br>(temperature in °C) | Sensor type PT 1000<br>(resistance in $\Omega$ ) |
|-------------------------------------------|--------------------------------------------------|
| -20                                       | 922                                              |
| -10                                       | 961                                              |
| 0                                         | 1000                                             |
| 10                                        | 1039                                             |
| 20                                        | 1078                                             |
| 30                                        | 1117                                             |
| 40                                        | 1155                                             |
| 50                                        | 1194                                             |
| 60                                        | 1232                                             |
| 70                                        | 1271                                             |
| 80                                        | 1309                                             |
| 90                                        | 1347                                             |
| 100                                       | 1385                                             |
| 110                                       | 1423                                             |
| 120                                       | 1461                                             |

#### 16.4 Pressure sensors

The pressure sensors in the refrigerant circuit connected to the WPM operate with a value of 4-20mA, a Interruption is indicated in the display of the control unit with "---".

Read sensor values for high or low pressure via "Main menu / Info / Heat pump / Process data". and check for plausibility. The values displayed in the controller are absolute pressures. Display values during operation

/ Observe standstill and mechanically move line connections and joints. This can detect contact problems or interruptions. If the sensor values change abruptly, the wiring or the sensor is defective.

#### 16.5 Pressure socket connection Pressure monitoring

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The pressure socket for monitoring the housing pressure is integrated into the safety chain via a NO contact. If the unit is opened, this interrupts the safety chain. Two different messages are written to the message list.

- |                 |             |                            |
|-----------------|-------------|----------------------------|
| • Service level | CODE 2-0248 | Pressure monitoring Faulty |
| • Expert level  | CODE 1-0004 | High pressure              |
| • Expert level  | CODE 2-0248 | Pressure monitoring Faulty |

Picture pressure socket connection



Electrical connection Pneumatic connection

## 17. Special repair specifications

### 17.1 Check housing tightness

If the front panel or the side panel have been opened, always check the respective sealing tape on the corresponding panel for damage and replace it if necessary. The sealing tape is available as a spare part.

The unit must be checked for leaks after the cladding parts have been fitted:

- The electrical power supply must be established
- Open the measuring socket on the back of the unit.
- A pressure gauge is to be connected to the measuring socket via a pressure measuring hose
- The negative pressure must be at least 40 Pa.

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Closed measuring socket on the rear of the unit



Pressure gauge connected to the measuring socket

### 18. Software versions

The software status is queried in the menu "DIAGNOSIS / SYSTEM / BUS PARTNERS".

|                                     |                  |
|-------------------------------------|------------------|
| <input checked="" type="checkbox"/> | DIAGNOSIS        |
| <input type="checkbox"/>            | STATUS APPENDIX  |
| <input type="checkbox"/>            | STATUS HEAT PUMP |
| <input type="checkbox"/>            | SYSTEM           |
| <input type="checkbox"/>            | BUS PARTICIPANTS |
| <input type="checkbox"/>            | PARTICIPANTS     |
| <input type="checkbox"/>            | SOFTWARE NO.     |

#### 18.1 Minimum software levels

| Version   | Device                          |
|-----------|---------------------------------|
| 449.05    | Heat pump manager WPM           |
| 502.03    | Control unit heat pump manager  |
| 502.03    | Operating unit room control FET |
| 445-00    | IWS 3 MOD LC                    |
| 796611-00 | Inverter                        |
| 1V8PO     | Multifunctional assembly MFG    |
| 12.1.0    | ISG                             |

#### 18.2 Software history

| Version | Device | Date       | Change                              |
|---------|--------|------------|-------------------------------------|
|         |        | 14.09.2020 | See chapter Minimum software status |

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### 19. Maintenance

The units have a hermetically sealed refrigeration circuit. The annual maintenance period is not only limited to newly constructed units but also to existing units and depends on the CO<sub>2</sub> equivalent. The obligation to comply with the leakage checks lies with the operator of the unit. A double logbook obligation applies: the company carrying out the leakage test must fill in the logbook at the customer's premises and keep the same at the company for at least five years. According to the F-Gases Regulation EU No. 517/2014, this looks as follows for the units:

The heat pumps are produced with two different refrigerant charge quantities.

| Device      | Refrigerant | Filling quantity | GWP Value | CO <sub>2</sub> Equivalent | Hermetic | Annual leak test |
|-------------|-------------|------------------|-----------|----------------------------|----------|------------------|
| 04 / 06 /08 | R454 C      | 2,2 kg           | 148       | 0,33 t                     | yes      | no               |
| 12 / 15     | R454 C      | 3,1 kg           | 148       | 0,46 t                     | yes      | no               |

In the course of maintenance, the specifications of the "Operation and Installation" manual as well as the specifications of the of the maintenance checklists.

To complete maintenance work on the unit, check the housing for leaks. See chapter "Special repair specifications".

### 20. Technical data

#### 20.1 Performance data

| Type | Brine temperature (°C) | Heat output (KW) | Power consumption Electrical (KW) | COP Value | Water (°C) |
|------|------------------------|------------------|-----------------------------------|-----------|------------|
| 04   | -5                     | 3,55             | 0,91                              | 3,91      | 35         |
|      | 0                      | 4,18             | 0,94                              | 4,46      | 35         |
|      | 5                      | 4,88             | 0,96                              | 5,11      | 35         |
| 06   | -5                     | 5,63             | 1,55                              | 3,64      | 35         |
|      | 0                      | 6,57             | 1,63                              | 4,04      | 35         |
|      | 5                      | 7,64             | 1,71                              | 4,47      | 35         |
| 08   | -5                     | 6,47             | 1,85                              | 3,5       | 35         |
|      | 0                      | 7,64             | 1,98                              | 3,86      | 35         |
|      | 5                      | 8,76             | 2,07                              | 4,22      | 35         |
| 12   | -5                     | 10,48            | 2,98                              | 3,52      | 35         |
|      | 0                      | 12,66            | 3,28                              | 3,86      | 35         |
|      | 5                      | 14,10            | 3,27                              | 4,31      | 35         |
| 15   | -5                     | 12,79            | 3,88                              | 3,30      | 35         |
|      | 0                      | 14,78            | 4,25                              | 3,48      | 35         |
|      | 5                      | 16,85            | 4,42                              | 3,81      | 35         |

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#### 21.Refrigerant circuit Special features

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#### 21.1 Evaporation temperature

The manometric evaporation temperature ( $t_0$ ) essentially depends on the brine inlet temperature ( $t_{oS1}$ ), the superheat ( $\Delta t_{oh}$ ) and the power to be transferred in the evaporator. Simplified, it can be said that  $t_0 = t_{oS1} - \Delta t_{oh} - x$ .  
x is approximately the temperature difference between brine inlet temperature  $t_{oS1}$  and evaporator outlet temperature  $t_{oh}$ .

#### 21.2 Condensing temperature

The condensing temperature  $t_c$  is essentially dependent on the heating return temperature, the hot gas temperature  $t_{Vh}$  and the power to be transferred in the condenser. At higher capacities, the condensing temperature increases somewhat compared to low capacities. Due to the temperature glide of  $\sim 8K$  for R454C in the wet steam region, the condensing temperature is dependent on the return temperature. Therefore, a larger spread of 8K to 15K is advantageous, especially at high flow temperatures.

#### 21.3 Overheating at the evaporator

In connection with the recuperator, the expansion valve is controlled in such a way that the refrigerant is not yet completely superheated when it leaves the evaporator, especially at operating points with a high pressure difference. In the recuperator, the refrigerant is re-evaporated and the minimum superheat of 2K is ensured.

#### 21.4 Definition

| Naming          | Unit of measurement | Explanation                            |
|-----------------|---------------------|----------------------------------------|
| $t_0$           | °C                  | Evaporation temperature (manometric)   |
| $t_{oh}$        | °C                  | Evaporation temperature (thermometric) |
| $t_c$           | °C                  | Condensing temperature (manometric)    |
| $t_{cu}$        | °C                  | Condensing temperature (thermometric)  |
| $\Delta t_{oh}$ | K                   | Overheating refrigerant vapour         |
| $\Delta t_{cu}$ | K                   | Subcooling refrigerant                 |
| $t_{Vh}$        | °C                  | Hot gas temperature                    |
| $t_{oS1}$       | °C                  | Heat source temperature inlet          |
| $t_{oS2}$       | °C                  | Heat source temperature outlet         |

# Repair instructions

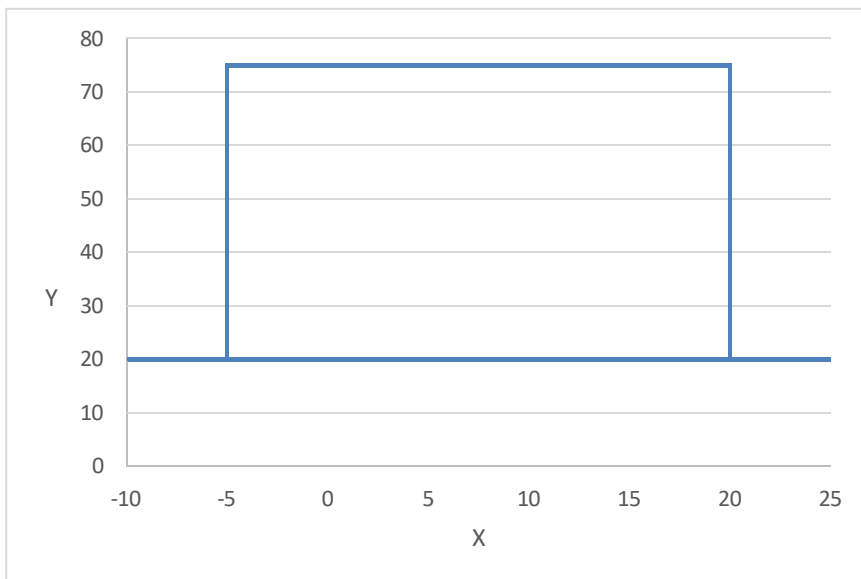
## HPG-I 04-06-08-12-15 S-CS-DS-DCS

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## 22. Application limits

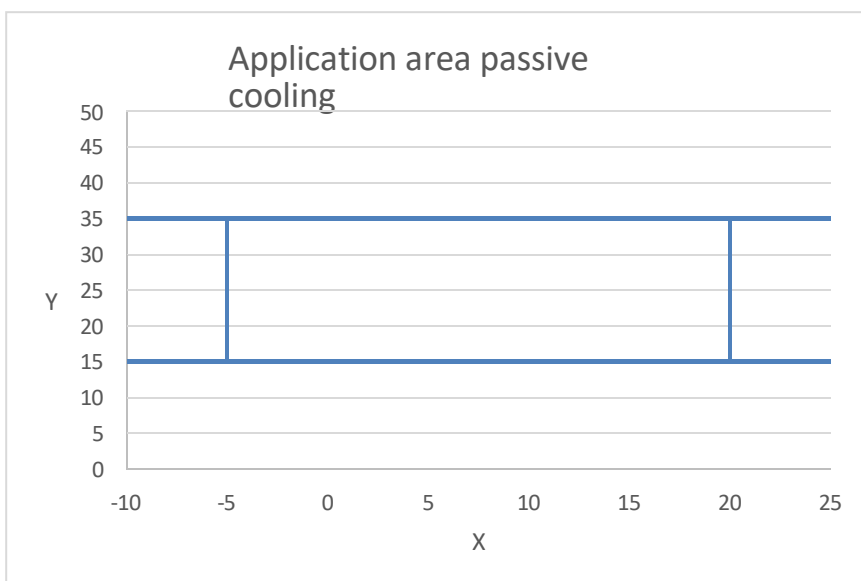
### 22.1 Application limit heating

Compressor speed 20 ... 120 Hz



X Source temperature  
[°C] Y Flow temperature  
[°C]

### 22.2 Application limit passive cooling



X Ambient temperature [°C] Y  
Flow temperature [°C]

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#### 23.Change history

| Version       | Change                                                                                                          | Published  |
|---------------|-----------------------------------------------------------------------------------------------------------------|------------|
| D0000095543-b | 28.072020                                                                                                       | 28.07.2020 |
| D0000095543-c | 27.12.2020<br>Extension of pressure<br>monitoring Addition of wiring<br>diagram change<br>5.3 Compressor locked |            |