

Connection and wiring diagram for contractors



Vitocal 200-A

Type AWMOF-201.A1.06-230-V004 to AWMOF-201.A1.12-230-V004

Type AWMOF-201.A1.06-230-V005 to AWMOF-201.A1.12-230-V005

Outdoor unit for the **Vitocal 200-A** ie air/water heat pump in monoblock design
for room heating, room cooling and DHW heating in heating systems



VITOCAL 200-A



Safety instructions



Please follow these safety instructions closely to prevent accidents and material losses.

Safety instructions explained



Danger

This symbol warns against the risk of injury.



Please note

This symbol warns against the risk of material losses and environmental pollution.

Note

Details identified by the word "Note" contain additional information.

The outdoor unit contains easily flammable refrigerant in safety group A3 according to ISO 817 and ANSI/ASHRAE Standard 34.

Target group

These instructions are exclusively intended for authorised contractors.

- Work on the refrigerant circuit with flammable refrigerant in safety group A3 may only be carried out by authorised contractors. These contractors must be trained in accordance with EN 378 Part 4 or IEC 60335-2-40, section HH. The certificate of competence from an industry-accredited body is required.
- Brazing/soldering work on the refrigerant circuit may only be carried out by contractors certified in accordance with ISO 13585 and AD 2000, data-sheet HP 100R. And only by contractors qualified and certified for the processes to be carried out. The work must fall within the range of applications purchased and be carried out in accordance with the prescribed procedures.

Brazing/soldering work on accumulator connections requires certification of personnel and processes by a notified body according to the Pressure Equipment Directive (2014/68/EU).

- Work on electrical equipment may only be carried out by qualified electricians.
- All safety-relevant points must be checked regularly by the relevant certified contractors, especially before initial commissioning and during maintenance, inspection and decommissioning.
- The system must be commissioned by the system installer or a qualified person authorised by the installer.

Safety instructions (cont.)

Regulations to be observed

- National installation regulations
- Statutory regulations for the prevention of accidents
- Statutory regulations for environmental protection
- Statutory requirements for pressure equipment:
Pressure Equipment Directive
2014/68/EU
- Codes of practice of the relevant trade associations
- Relevant country-specific safety regulations
- Applicable regulations and guidelines for operation, service, maintenance, repair and safety of cooling, air conditioning and heat pump systems containing flammable and explosive refrigerant.

Safety instructions for working on the system

The outdoor unit contains flammable refrigerant R290 (propane C₃H₈). If there is a leak, the escaping refrigerant may form a flammable or explosive atmosphere in the ambient air. A safety zone is defined in the immediate vicinity of the outdoor unit, in which special rules apply when working on the appliance.

Working in the safety zone



Danger

Risk of explosion: Escaping refrigerant may form a flammable or explosive atmosphere in the ambient air.

Take the following measures to prevent fire and explosion in the safety zone:

- Keep ignition sources away, e.g. naked flames, hot surfaces, electrical devices not free of ignition sources, mobile devices with integrated batteries (e.g. mobile phones, fitness watches, robotic lawn mowers, etc.).
- Permissible tools:
All tools for working in the safety zone must be designed and explosion-protected in accordance with the applicable standards and regulations for refrigerant belonging to safety group A3, e.g. brushless machines (cordless screwdrivers), extraction equipment, disposal containers, installation aids, vacuum pumps, conductive hoses, mechanical tools of non-sparking material, etc.

Note

The tools must also be suitable for the pressure ranges in use.

Tools must be in perfect maintenance condition.

- The electrical equipment must meet the requirements for areas at risk of explosion, zone 2. This equipment must not be a source of electrical ignition.
- Do not use flammable materials, e.g. sprays or other flammable gases.

Safety instructions (cont.)

- Discharge static: Before beginning work, touch earthed objects, such as heating or water pipes.
- Do not remove, block or bridge safety equipment.
- Do not make any changes: Do not modify the outdoor unit, inlet/outlet lines, electrical connections/cables or the surroundings. Do not remove any components or seals.

Working on the system

- Switch off the power supply to the indoor unit and outdoor unit, e.g. at a separate fuse or mains isolator. Check that the system is no longer live.

Note

In addition to the control circuit there may be several power circuits.



Danger

Contact with live components can result in severe injuries. Some components on PCBs remain live even after the power supply has been switched off.

Before removing covers from the appliances, wait at least 4 min until the voltage has dropped out.

- Safeguard the system against reconnection.
- Wear suitable personal protective equipment when carrying out any work.



Danger

Hot surfaces and fluids can result in burns or scalding. Cold surfaces may cause frostbite.

- Before maintenance and service work, switch off the appliance and let it cool down or warm up.
- Do not touch hot or cold surfaces on the appliance, fittings or pipe-work.



Please note

Electronic assemblies can be damaged by electrostatic discharge. Before beginning work, touch earthed objects, such as heating or water pipes, to discharge any static.

Working on the refrigerant circuit

R290 refrigerant (propane) is an air displacing, colourless, flammable, odourless gas which forms explosive mixtures with air.

Extracted refrigerant must be properly disposed of by authorised contractors.

Take the following action before beginning work on the refrigerant circuit:

- Check the refrigerant circuit for leaks.
- Ensure very good ventilation especially in the floor area and sustain this for the duration of the work.
- Secure the area surrounding the work area.
- Inform the following persons of the type of work to be carried out:
 - All maintenance personnel
 - All persons in the vicinity of the system.
- Inspect the area immediately around the heat pump for flammable materials and ignition sources: Remove all flammable, movable materials and any ignition sources from the safety zone.
- Before, during and after the work, check the surrounding area for escaping refrigerant using an explosion-proof refrigerant detector suitable for R290. This refrigerant detector must not generate any sparks and must be suitably sealed.

Safety instructions (cont.)

- A CO₂ or powder extinguisher must be to hand in the following cases:
 - Refrigerant is being extracted.
 - Refrigerant is being topped up.
 - Brazing/soldering or welding work is being carried out.
- Display signs prohibiting smoking.

**Danger**

Escaping refrigerant can lead to fire and explosions that result in very serious injuries or death.

- Do not drill or apply heat to a refrigerant circuit filled with refrigerant.
- Do not operate Schrader valves unless a fill valve or extraction equipment is attached.
- Take measures to prevent electrostatic charge.
- No smoking! Prevent naked flames and sparks. Never switch lights or electrical appliances on or off.
- Components that contain or contained refrigerant must be labelled, and stored and transported in well ventilated areas in accordance with the applicable regulations and standards.

**Danger**

Direct contact with liquid and gaseous refrigerant can cause serious damage to health, e.g. frostbite and/or burns. There is a risk of asphyxiation if it is breathed in.

- Prevent direct contact with liquid and gaseous refrigerant.
- Wear personal protective equipment when handling liquid and gaseous refrigerant.
- Never breathe in refrigerant vapours.

**Danger**

Refrigerant is under pressure: Mechanical stress on pipework and components can cause leaks in the refrigerant circuit.

Do not apply loads to the pipework or components, e.g. by leaning on them or placing tools on them.

**Danger**

Hot and cold metallic surfaces of the refrigerant circuit may cause burns or frostbite on contact with skin.

Wear personal protective equipment to protect against burns and frostbite.

**Please note**

When refrigerant is being removed, hydraulic components may freeze. Drain heating water from the heat pump beforehand.

**Danger**

Damage to the refrigerant circuit can cause refrigerant to enter the hydraulic system.

After completion of the work, vent the hydraulic system correctly. When doing so, ensure the area is sufficiently ventilated.

Installation

Frost protection

- ! Please note**
- Frost can cause damage to the heat pump.
 - Thermally insulate all the hydraulic lines.
 - In order to activate the frost protection function, electrically connect the heat pump before filling the secondary circuit. Switch on the power supply. Turn on the ON/OFF switch on the indoor unit.
 - Only fill the secondary circuit with suitable fill water in accordance with VDI 2035, not with media containing antifreeze.

Electrical connecting cables

- ⚠ Danger**
- With short electrical cables, if the refrigerant circuit leaks, gaseous refrigerant may reach the inside of the building.
- Seal the building entry points using the most suitable current technology. Route the lines into the building through, for example, a suitable pipe liner with wall seal flanges.
 - Min. length of the electrical connecting cables between the indoor and outdoor unit: 3 m

Repair work

- ! Please note**
- Repairing components that fulfil a safety function can compromise the safe operation of the system.
- Sealed electrical components must not be repaired.
 - Faulty components must be replaced with original spare parts from the manufacturer.
 - Do not undertake any repairs on the inverter. Replace the inverter if there is a fault.

Auxiliary components, spare and wearing parts

- ! Please note**
- Auxiliary components, spare parts and wearing parts that have not been tested together with the system can compromise its function. Installing non-authorised components and making non-approved modifications or conversions can compromise safety and may limit the warranty.
- For installation and replacement, use only original parts from the manufacturer or spare parts approved by the manufacturer.

Safety instructions for operating the system

What to do if refrigerant escapes

- ⚠ Danger**
- Escaping refrigerant can lead to fire and explosions that result in very serious injuries or death. Take the following measures to prevent fire and explosion:

- Ensure very good ventilation especially in the floor area of the outdoor unit.
- No smoking! Prevent naked flames and sparks. Never switch lights or electrical appliances on or off.
- Evacuate any people from the danger zone.

Safety instructions (cont.)

- From a safe position, switch off the power supply to all system components.
- Remove ignition sources from the danger zone.
- Let the system user know that no ignition source may be brought into the danger zone for the duration of the repair.
- Repair work must be carried out by an authorised contractor.
- Do not restart the system until repairs and a leak test have been carried out. Perform a leak test for both the refrigerant circuit and the connections on the heating water side.

 **Danger**
Direct contact with liquid and gaseous refrigerant can cause serious damage to health, e.g. frostbite and/or burns.
Prevent direct contact with liquid and gaseous refrigerant.

 **Danger**
Breathing in refrigerant may cause suffocation.
Never breathe in refrigerant vapours.

If water escapes from the appliance

 **Danger**
If water escapes from the appliance there is a risk of electric shock.
Switch off the heating system at the external isolator (e.g. fuse box, domestic distribution board).

 **Danger**
If water escapes from the appliance, there is a risk of scalding.
Never touch hot heating water.

What to do if the outdoor unit ices up

 **Please note**
A build-up of ice in the condensate pan and in the fan area of the outdoor unit can cause damage to the equipment.
Please note the following:

- Do not use mechanical items/aids for the removal of ice.
- Before using electrical heating appliances, check the refrigerant circuit for leaks with a suitable measuring device.
 - The heating appliance should not be a source of ignition.
 - The heating appliance must meet the requirements of EN 60335-2-30.
- If ice regularly builds up on the outdoor unit (e.g. in areas where frost and heavy fog occur frequently), install a fan ring heater that is suitable for refrigerant R290 and/or an electric ribbon heater in the condensate pan (accessories or factory-fitted).

Safety instructions for storage of the outdoor unit

The outdoor unit is charged at the factory with refrigerant R290 (propane).

Safety instructions (cont.)



Danger

Escaping refrigerant can lead to fire and explosions that result in very serious injuries or death. There is a risk of asphyxiation if it is breathed in.

Store the outdoor unit in the following conditions:

- An explosion prevention plan must be in place for storage.
- Ensure there is sufficient ventilation at the storage location.
- Temperature range for storage: –25 °C bis 70 °C
- Only store the outdoor unit in its ex-factory protective packaging.
- Protect the outdoor unit against damage.
- The maximum number of outdoor units that may be stored in one place is determined by local conditions.

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Notes

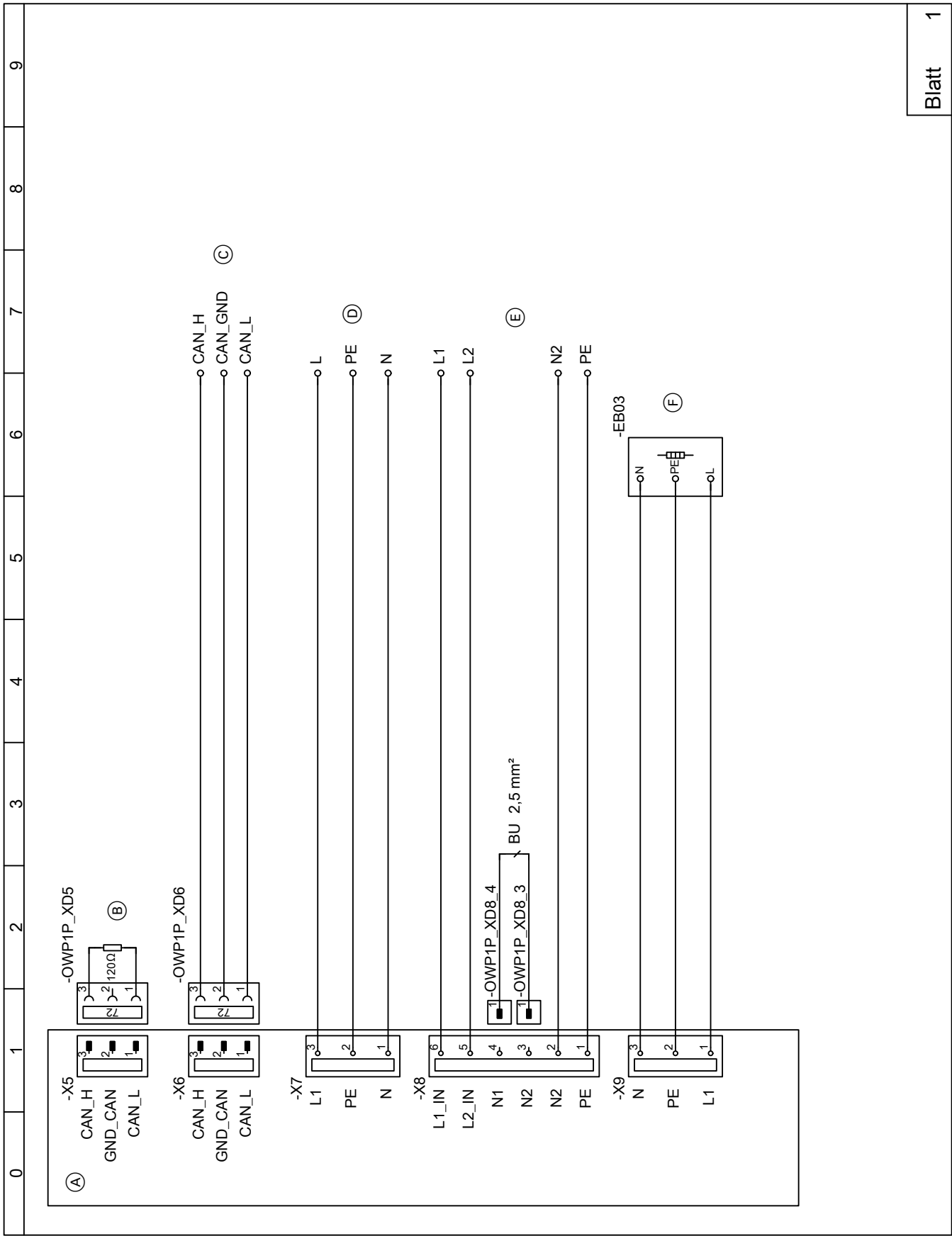
- Observe the information on electrical connections in the installation and service instructions.
- In the case of a power supply with power-OFF facility, the power to the control circuit (heat pump control unit) must be supplied without interruption by the power supply utility.
- Example for reading the references to other sheets
Example: /7.5
/ = cross-reference
7. = sheet number
5 = current path

Colour coding

BK	Black
BN	Brown
BU	Blue
GN	Green
GNYE	Green/yellow

GY	Grey
RD	Red
WH	White
YE	Yellow

Sheet 1: Mains connection PCB OWP1P, plugs X5, X6, X7, X8, X9



Blatt 1

Service

Fig. 1

- (A) Mains connection PCB OWP1P
- (B) Terminals for CAN bus connection of another outdoor unit in a heat pump cascade (delivered condition: with terminator)
- (C) CAN bus cable to the heat pump control unit

Sheet 1: Mains connection PCB OWP1P, plugs ... (cont.)

- Ⓓ Power supply to the outdoor unit (refrigerant circuit controller, compressor, etc.)
Only for types ...-V004:
Includes power supply for the instantaneous heating water heater (protective function)
- Ⓔ Only for types ...-V005:
Mains connection to the instantaneous heating water heater (comfort function)
- Ⓕ Electric ribbon heater for condensate pan (accessories)

Sheet 2: Mains connection PCB OWP1P, plugs X1, X2, X3, X4, X10 and X11

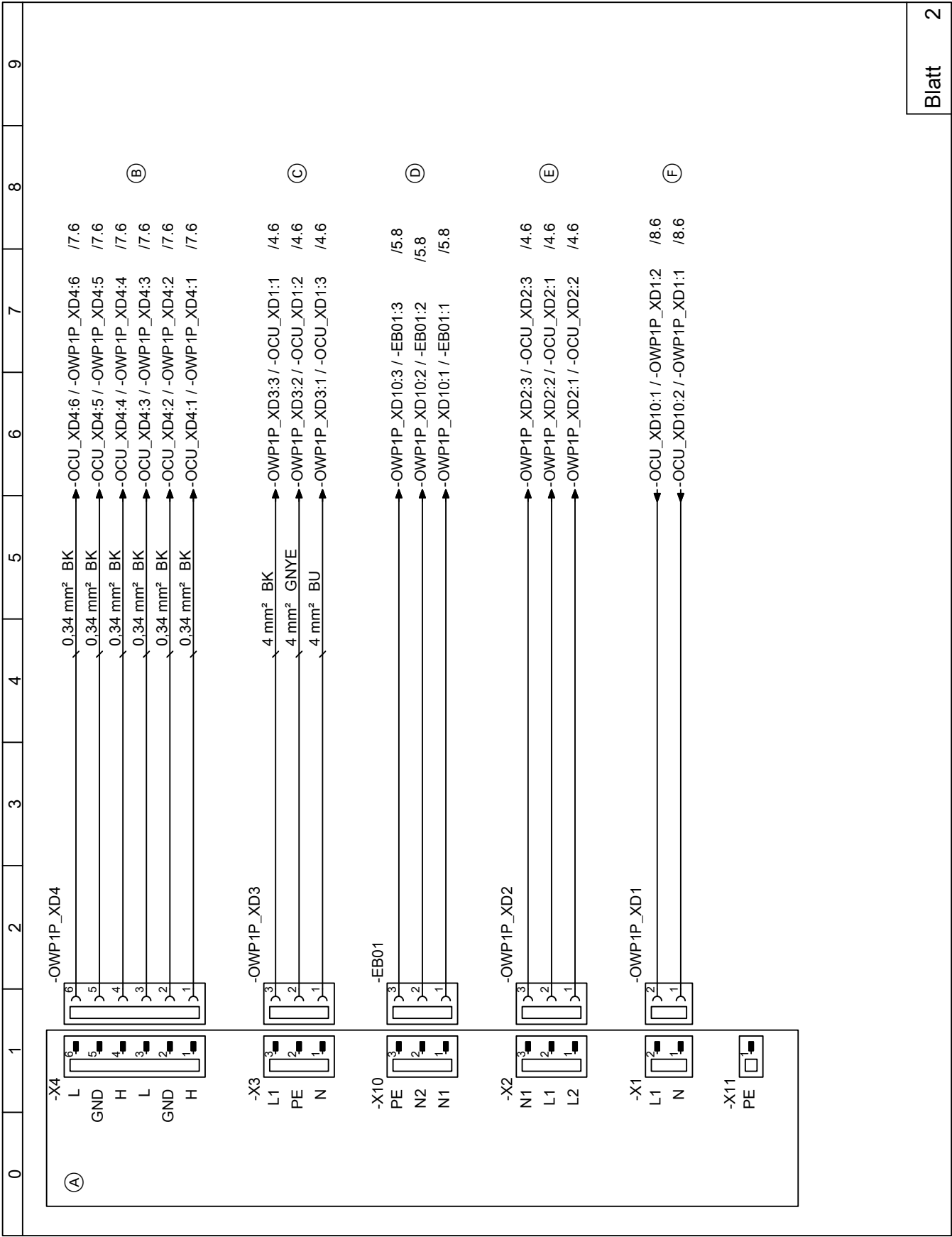
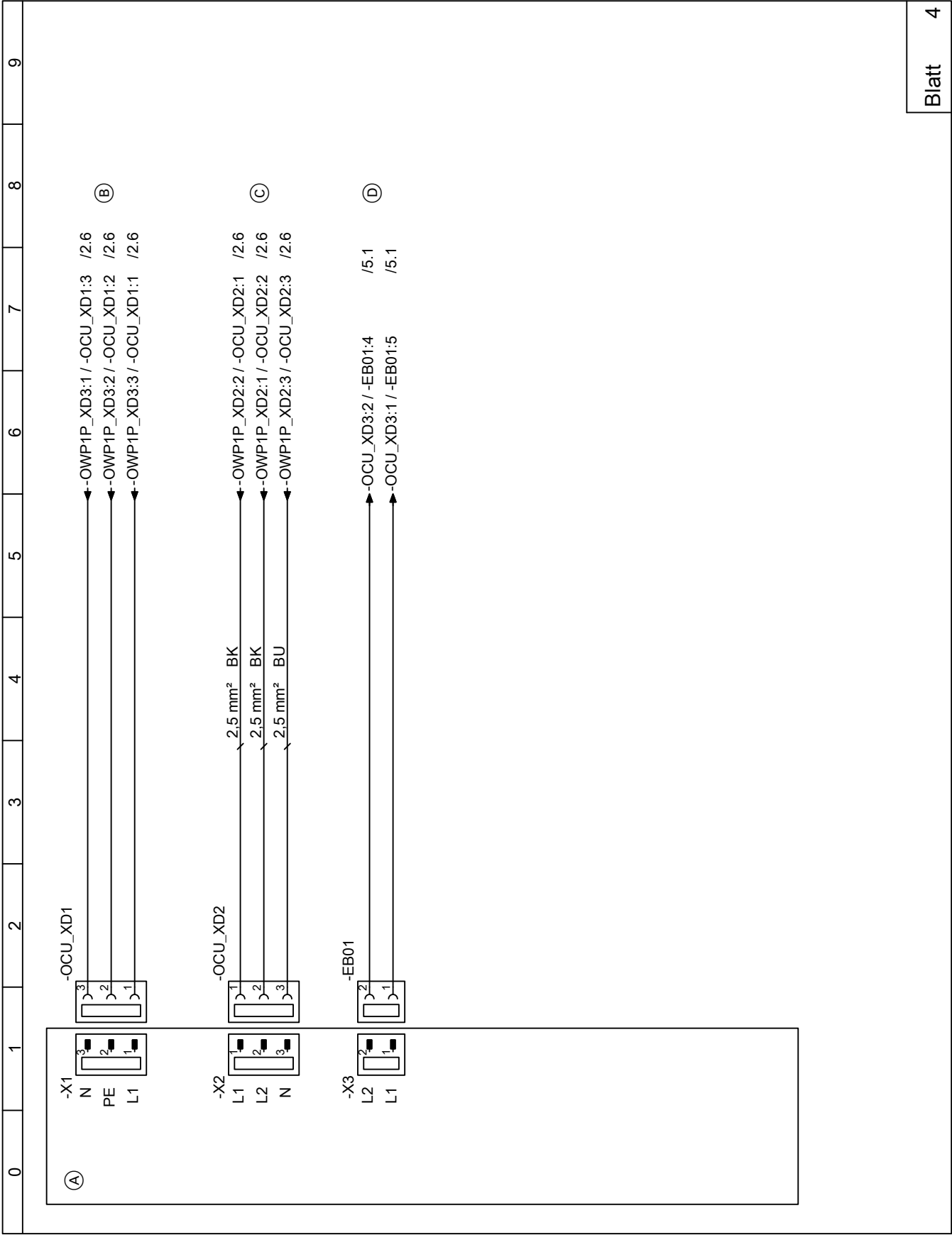


Fig. 2

- (A) Mains connection PCB OWP1P
(B) CAN bus cable to the OCU refrigerant circuit controller
(C) Power supply to the OCU refrigerant circuit controller and compressor

- Ⓓ Power supply to the instantaneous heating water heater
- Ⓔ Power supply to the instantaneous heating water heater
- Ⓕ Connecting cable to the OCU refrigerant circuit controller for the integrated ribbon heater for condensate pan (accessories)

Sheet 4: OCU refrigerant circuit controller, plugs X1, X2, X3



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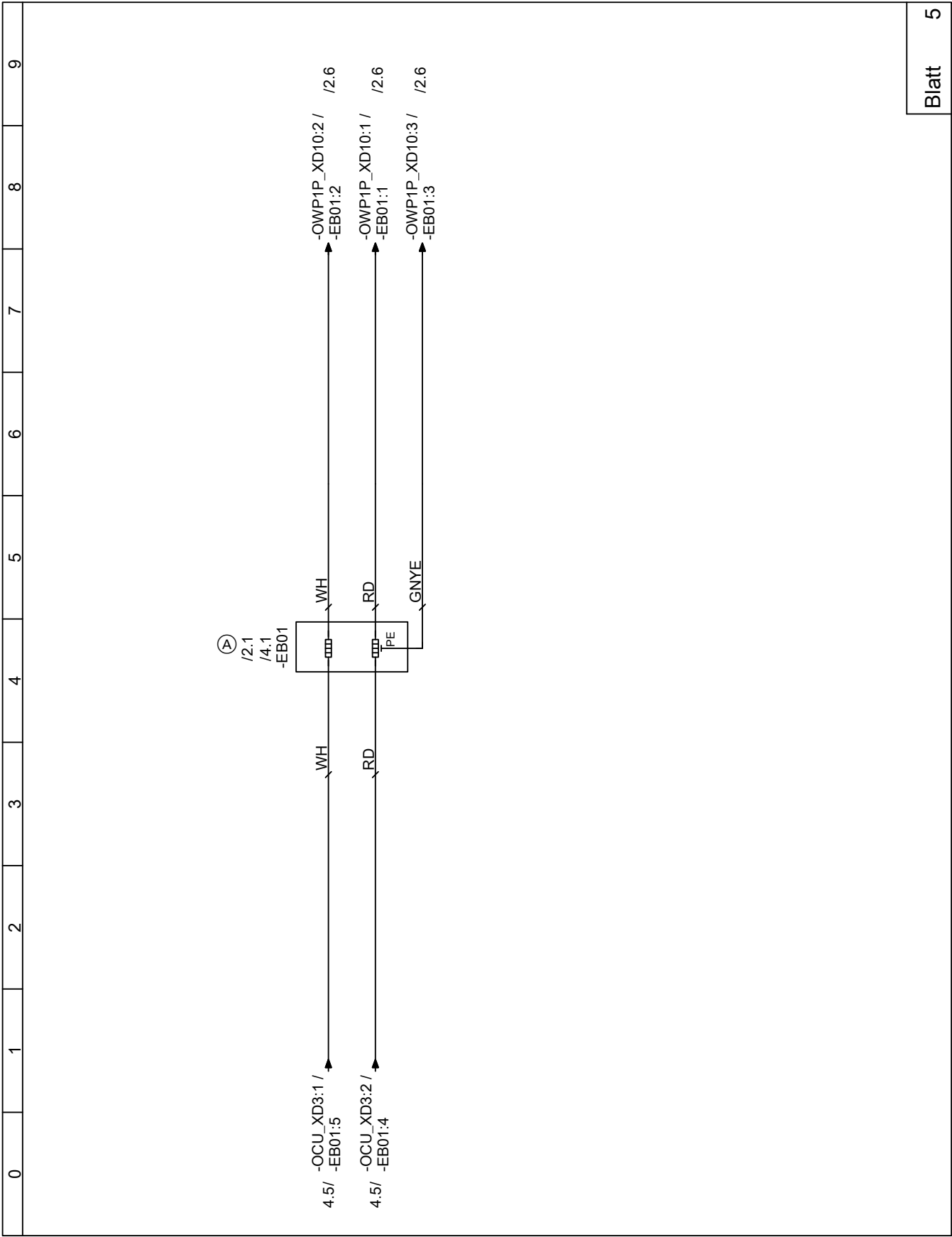
Service

Fig. 3

- (A) OCU refrigerant circuit controller
- (B) Power supply to the OCU refrigerant circuit controller and compressor

- Ⓒ Power supply to the instantaneous heating water heater
- Ⓓ Switched power supply for instantaneous heating water heaters

Sheet 5: Instantaneous heating water heater



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Service

Fig. 4

(A) Instantaneous heating water heater

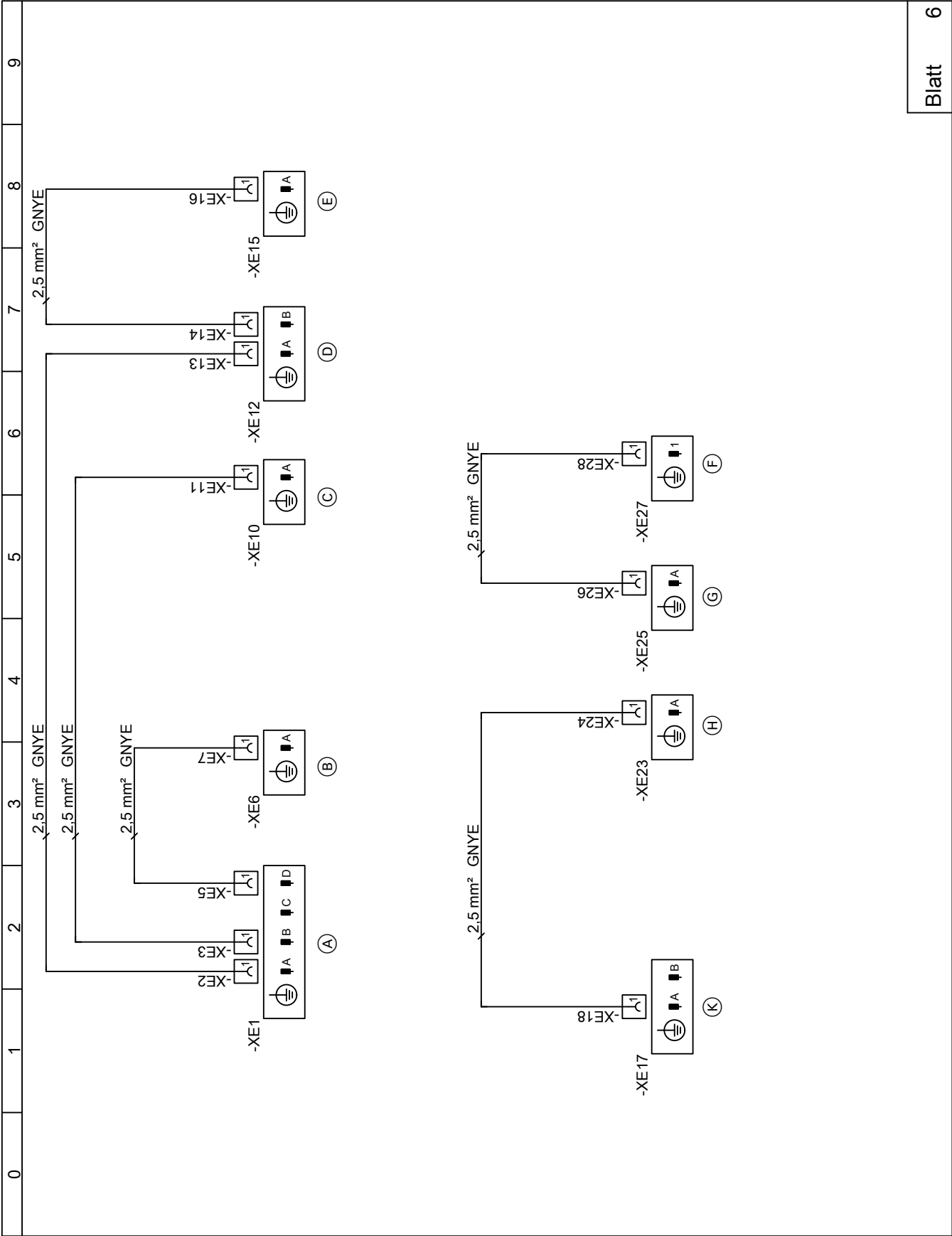


Fig. 5

- (A) Support panel for OCU refrigerant circuit controller
- (B) Sealing panel
- (C) Back panel
- (D) Junction box
- (E) Connection box cover
- (F) Support panel

Sheet 6: Earthing connections (cont.)

- Ⓔ Separating plate
- Ⓕ Separating plate
- Ⓖ Support panel for refrigerant circuit



Sheet 7: OCU refrigerant circuit controller, plugs X4, X5, X6

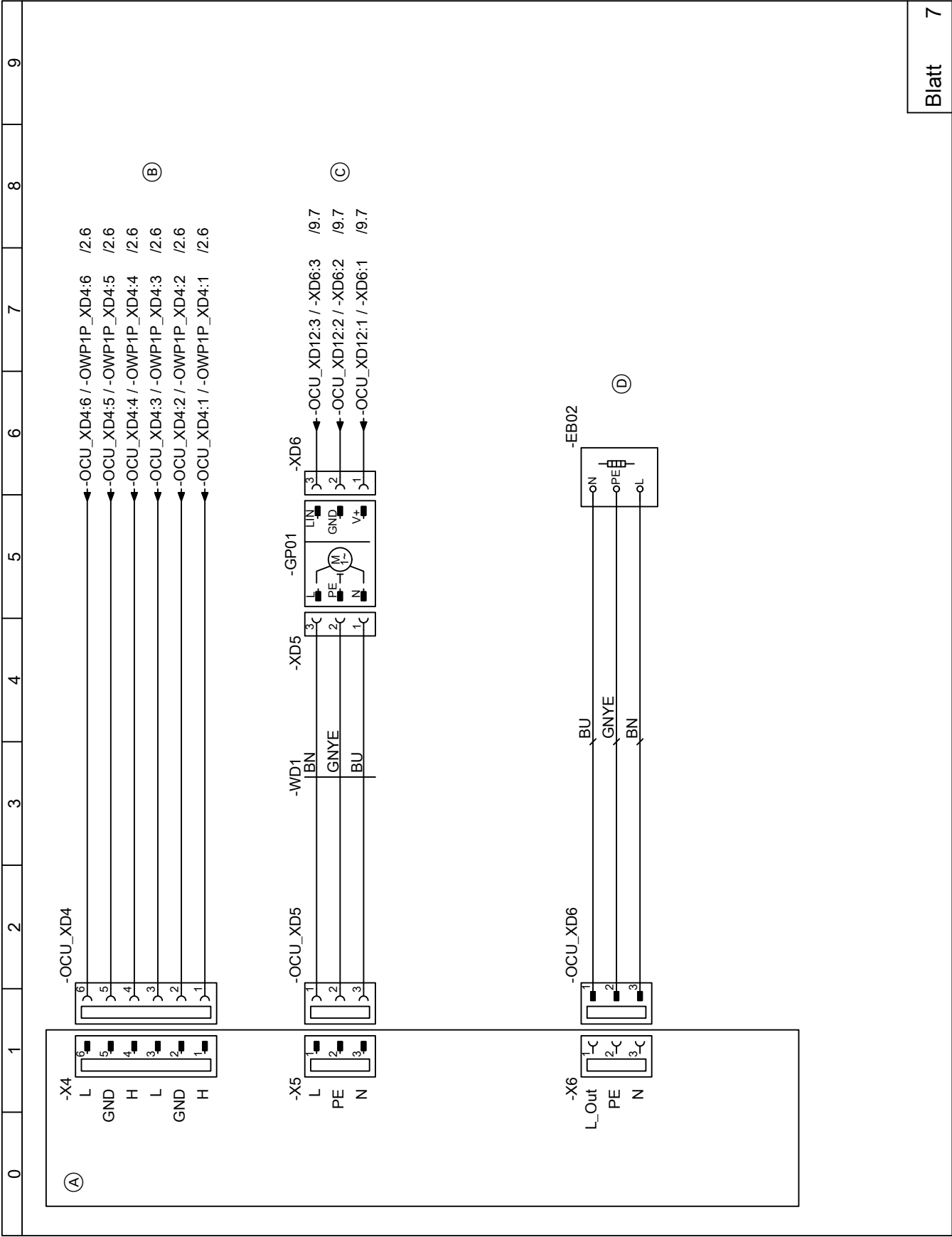
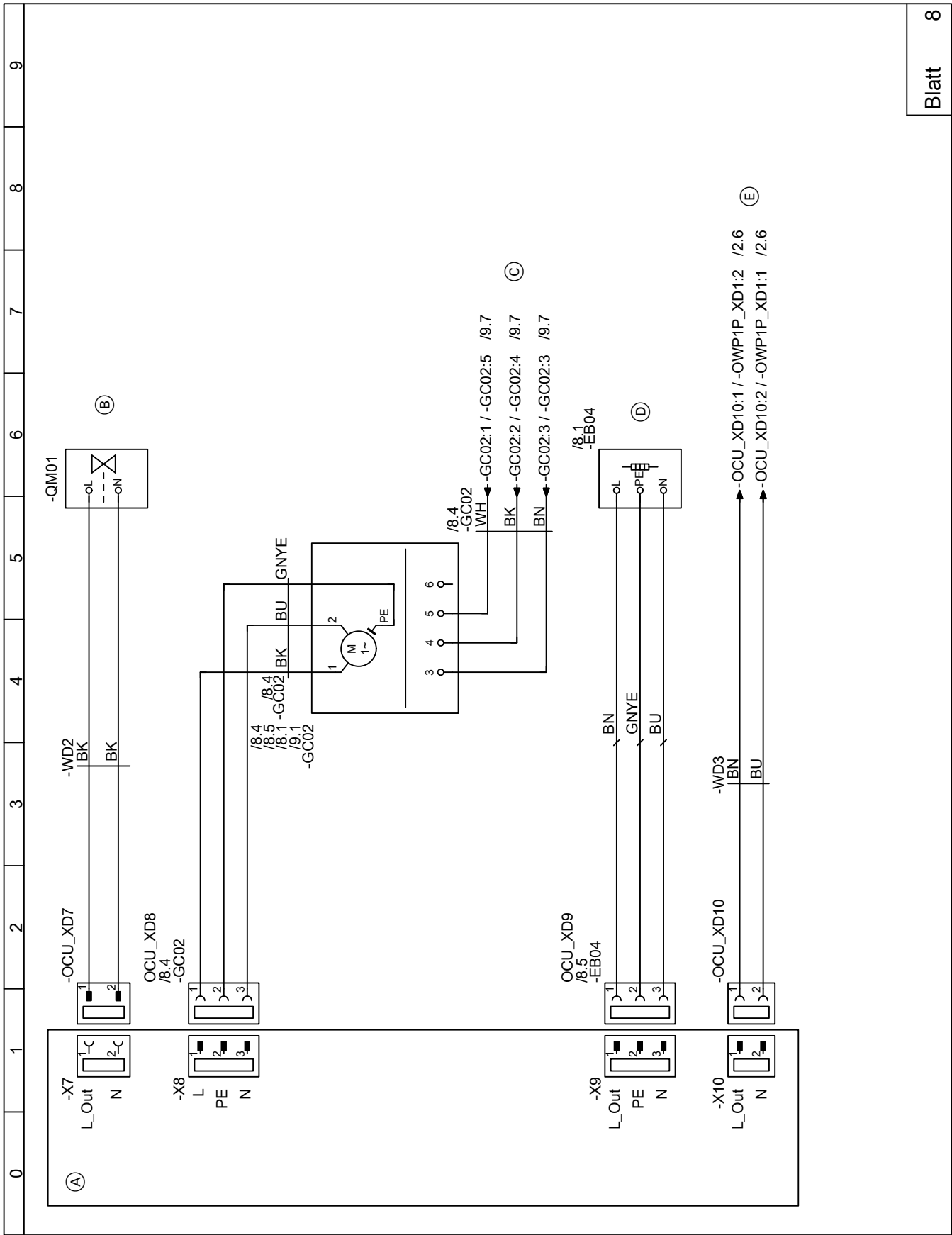


Fig. 6

- (A) OCU refrigerant circuit controller
- (B) CAN bus cable to the mains connection PCB OWP1P
- (C) Power supply to the central circulation pump (secondary pump)
- (D) Oil sump heater

Sheet 8: OCU refrigerant circuit controller, plugs X7, X8, X9, X10



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Service

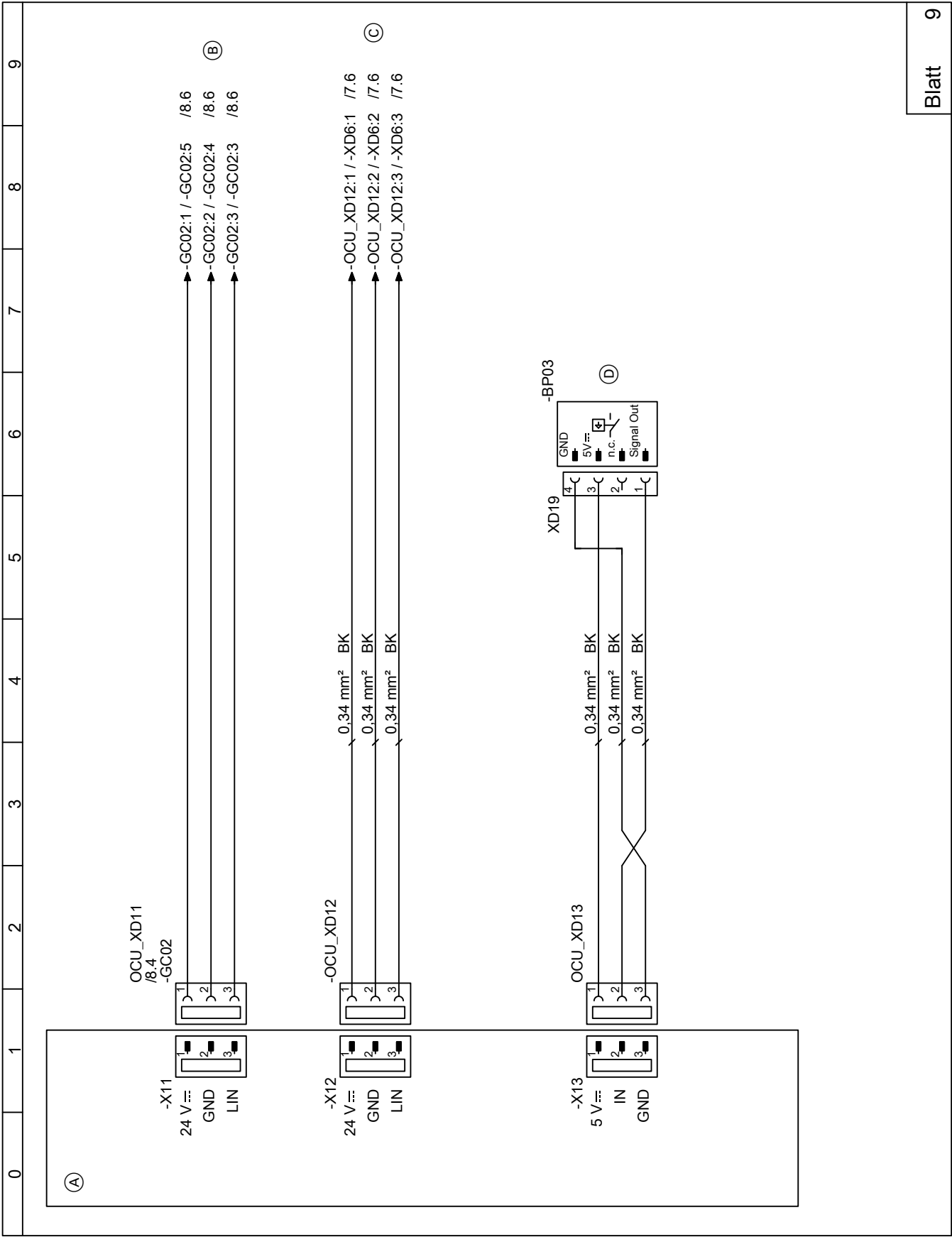
Fig. 7

- (A) OCU refrigerant circuit controller
- (B) 4-way diverter valve
- (C) Fan

Sheet 8: OCU refrigerant circuit controller,... (cont.)

- Ⓓ Fan ring heater (accessories)
- Ⓔ Connecting cable to the mains connection
PCB OWP1P for the integrated ribbon heater for
condensate pan (accessories)

Sheet 9: OCU refrigerant circuit controller, plugs X11, X12, X13



Blatt 9

Service

Fig. 8

- (A) OCU refrigerant circuit controller
- (B) Control signal for fan, 24 V $\equiv$

- (C) Control signal for central circulation pump, 24 V $\equiv$
- (D) Heating water pressure sensor (BP03)

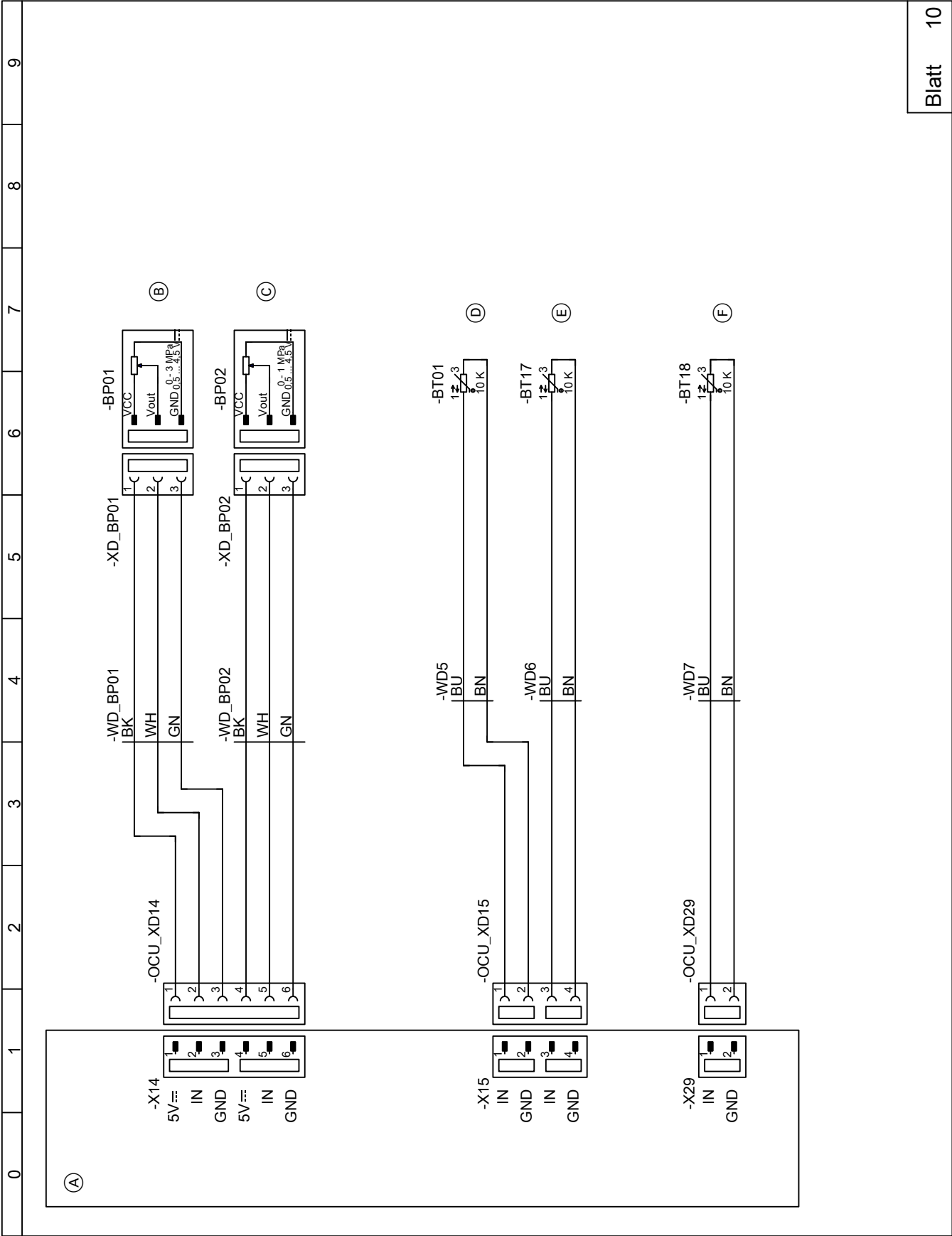


Fig. 9

- (A) OCU refrigerant circuit controller
- (B) High pressure sensor (BP01, black)
- (C) Low pressure sensor (BP02, green)
- (D) Flow temperature sensor, secondary circuit downstream of condenser (BT01)
- (E) Flow temperature sensor, secondary circuit downstream of condenser (BT17)
- (F) Flow temperature sensor, secondary circuit downstream of condenser (BT18)

Sheet 10: OCU refrigerant circuit controller,... (cont.)

- ⑤ Flow temperature sensor for secondary circuit, downstream of instantaneous heating water heater (BT17)
- ⑥ Secondary circuit return temperature sensor (BT18)



Sheet 11: OCU refrigerant circuit controller, plugs X16, X17

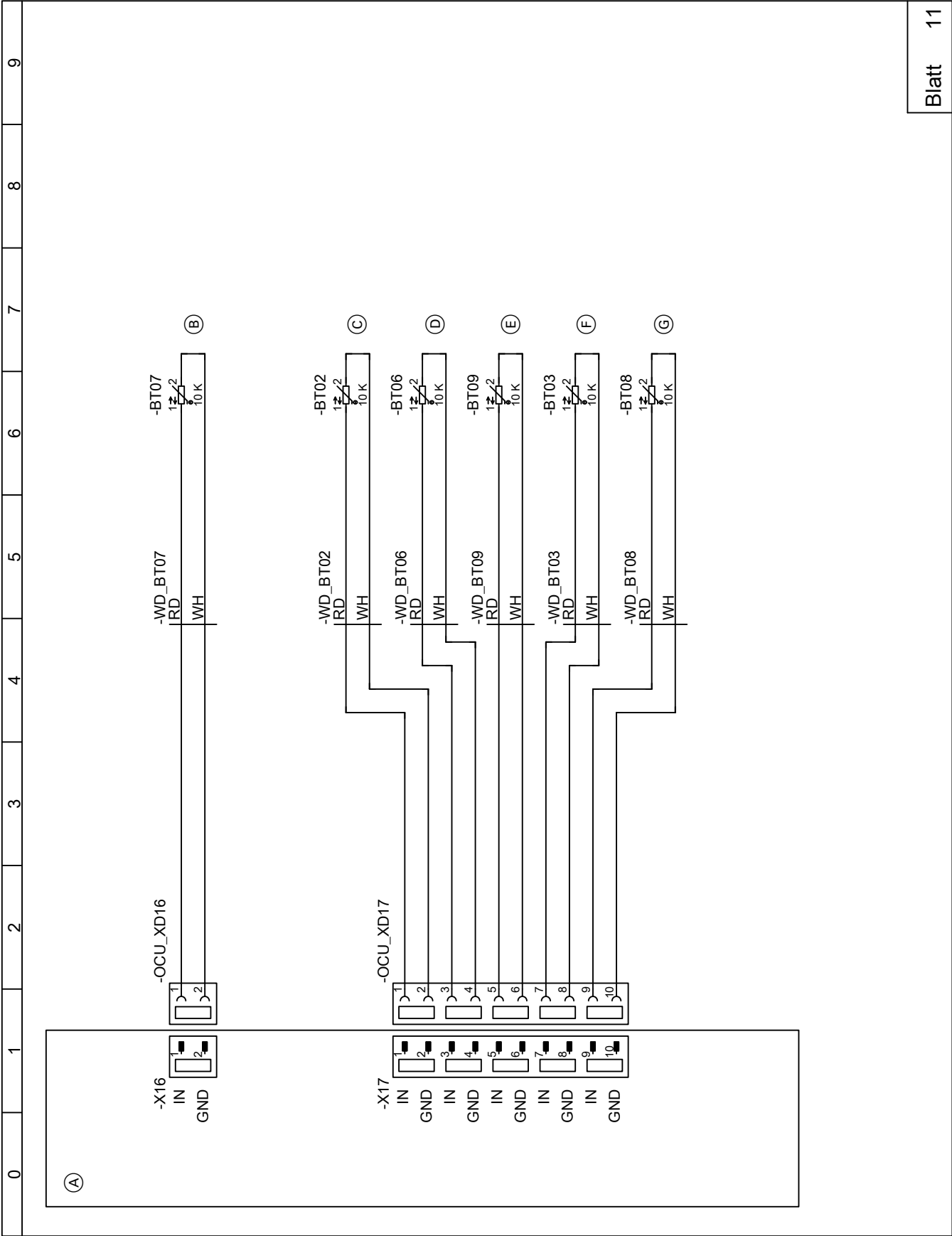


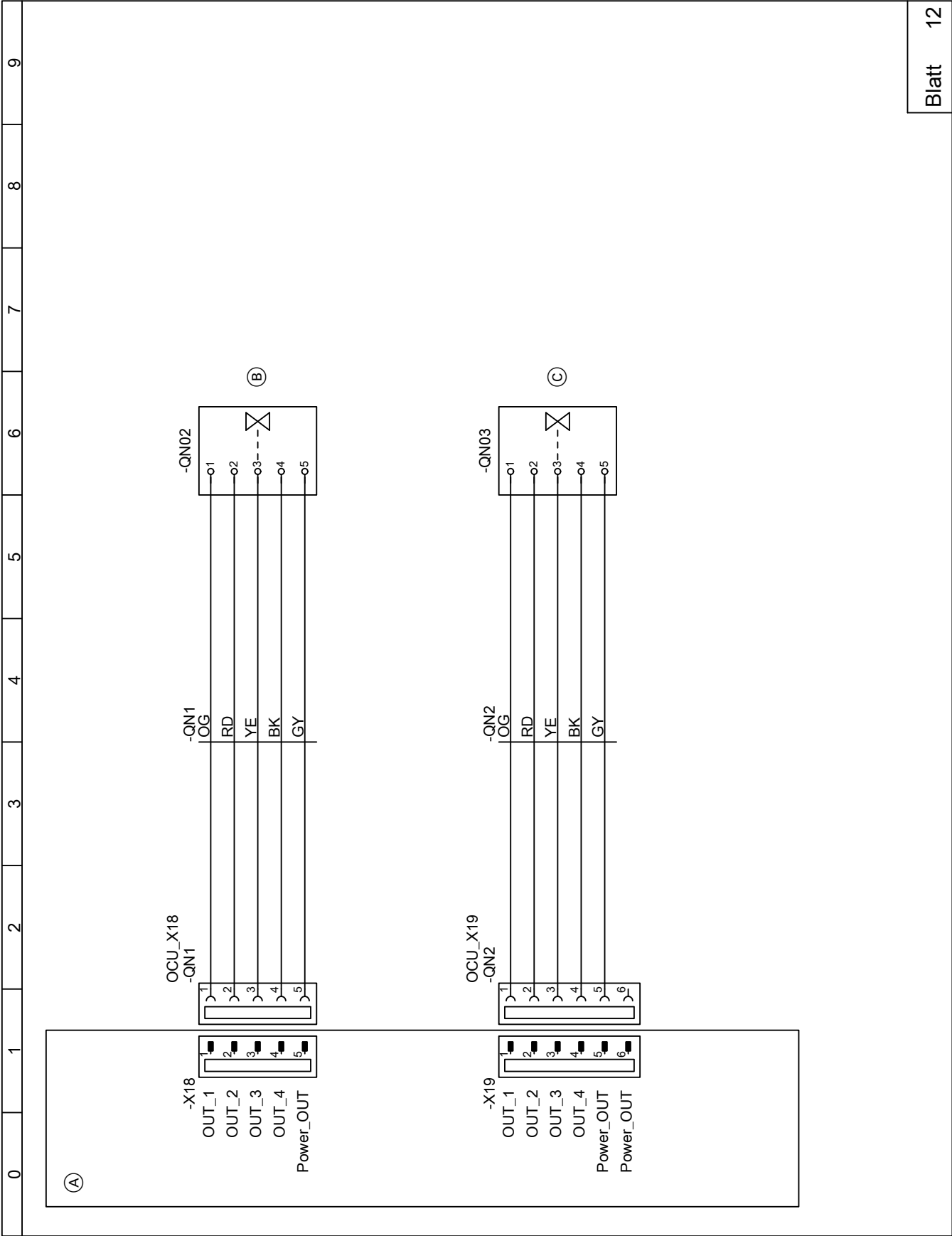
Fig. 10

- (A) OCU refrigerant circuit controller
- (B) Primary circuit inlet temperature sensor (BT07)
- (C) Liquid gas temperature sensor – condenser (BT02)
- (D) Liquid gas temperature sensor – cooling (BT06)

Sheet 11: OCU refrigerant circuit controller,... (cont.)

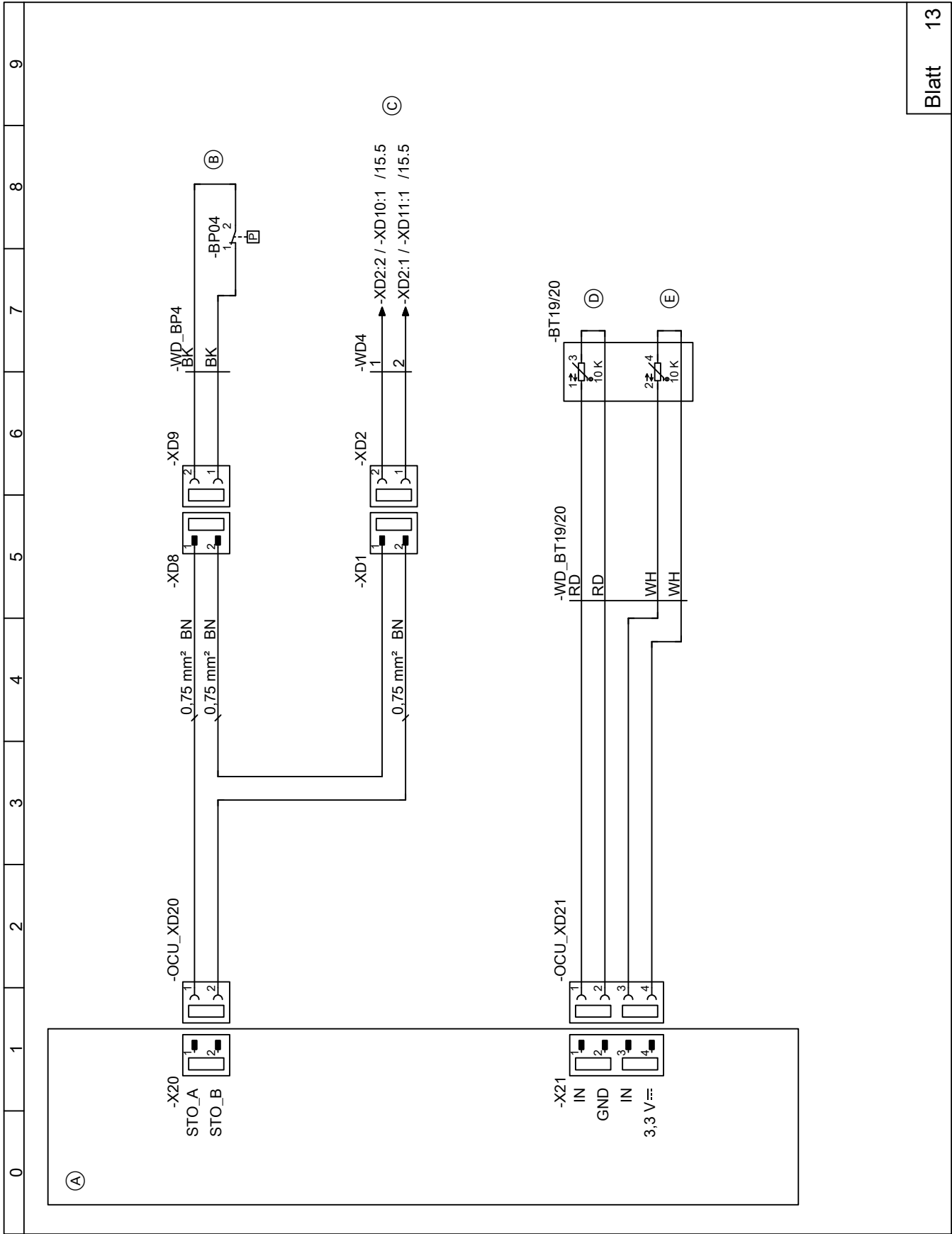
- Ⓔ Ambient temperature sensor, inverter (BT09)
- Ⓕ Evaporator suction gas temperature sensor (BT03)
- Ⓖ Oil sump temperature sensor (BT08)





- (A) OCU refrigerant circuit controller
- (B) Electronic expansion valve 1
- (C) Electronic expansion valve 2

Sheet 13: OCU refrigerant circuit controller, plugs X20, X21



Blatt 13

Service

Fig. 12

- (A) OCU refrigerant circuit controller
- (B) Safety high pressure switch PSH (BP04)
- (C) Protective temperature limiter (BT11)

- Ⓓ Safety temperature sensor 1, instantaneous heating water heater (BT19)
- Ⓔ Safety temperature sensor 2, instantaneous heating water heater (BT20)

Sheet 14: OCU refrigerant circuit controller, plugs X22, X23

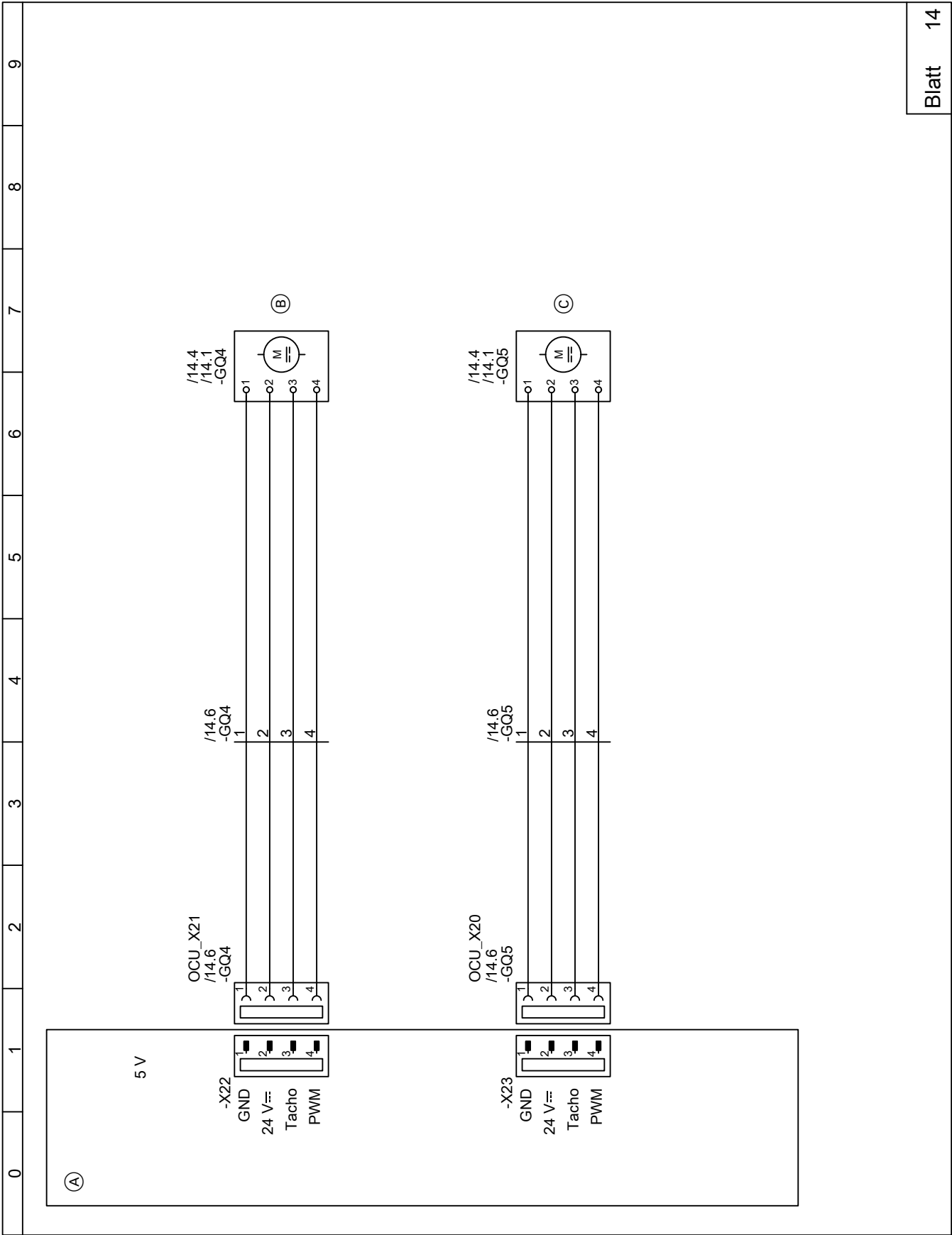


Fig. 13

- (A) OCU refrigerant circuit controller
- (B) Inverter fan
- (C) Fan

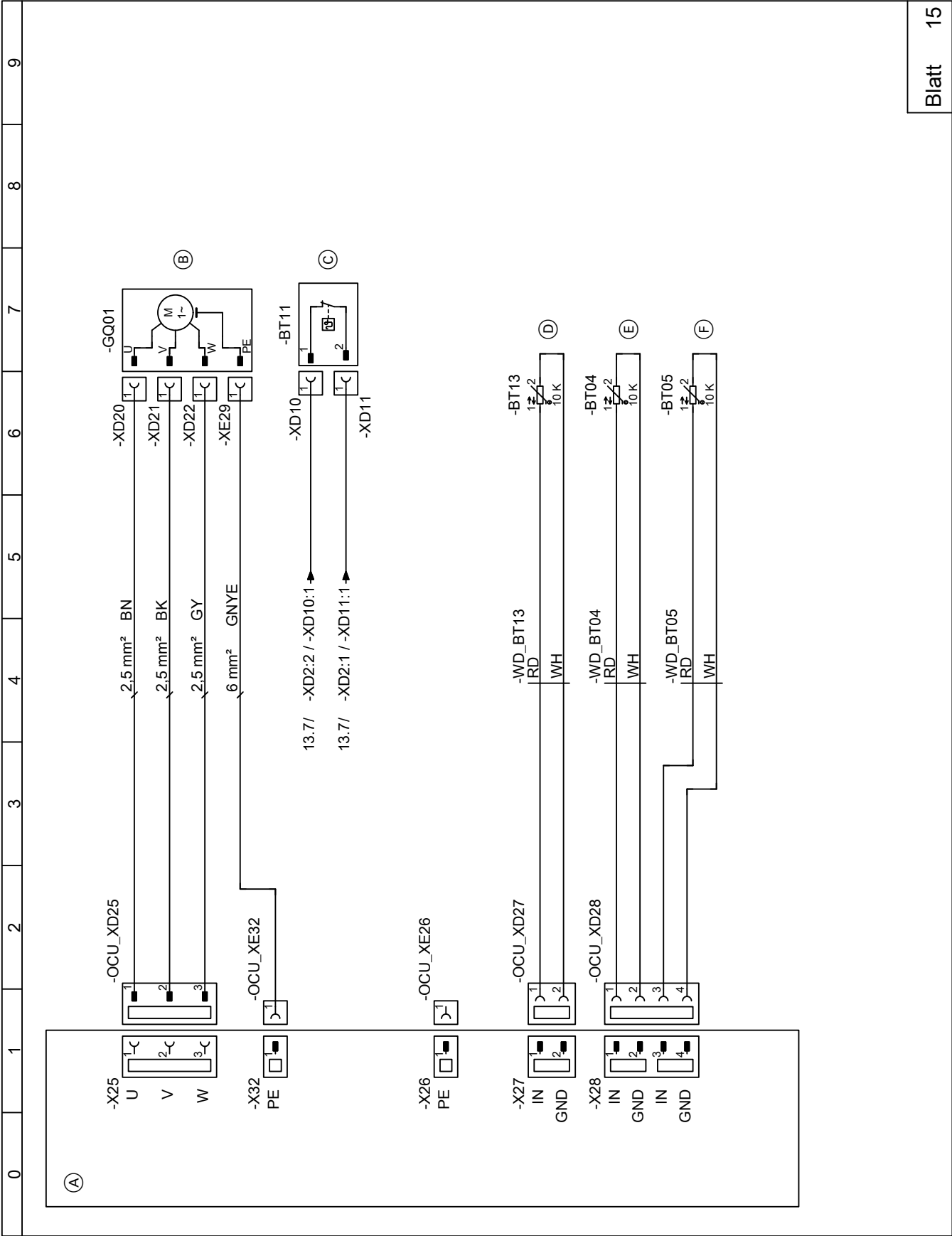


Fig. 14

- (A) OCU refrigerant circuit controller
- (B) Compressor
- (C) Protective temperature limiter (BT11)

- (D) Evaporator inlet temperature sensor (BT13)

Sheet 15: OCU refrigerant circuit controller,... (cont.)

- ⑤ Hot gas temperature sensor for compressor
(BT04)
- ⑥ Suction gas temperature sensor – compressor
(BT05)



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