Electrical wiring

REMKO WKF series

Smart heat pumps
Air/water system for heating and cooling

WKF 80, WKF 100, WKF 130, WKF 170
WKF-compact 80, WKF-compact 100, WKF-compact 130, WKF-compact 170
WKF 130 Duo, WKF 170 Duo

Instructions for Technicians

0280-2021-09 Edition 1, en_GB

Read the instructions prior to performing any task!

CE

Read these operating instructions carefully before commissioning / using this device!

These instructions are an integral part of the system and must always be kept near or on the device.

Subject to modifications; No liability accepted for errors or misprints!

Translation of the original

Table of contents

1 Safety and usage instructions

1.1 General safety notes

Carefully read the operating manual before commissioning the units or their components for the first time. It provides useful tips and notes such as hazard warnings to prevent injury and material damage. Failure to follow the directions in this manual can endanger persons, the environment and the equipment itself or its components and will void any claims for liability.

Store this manual and the information required for the operation of this system (e.g. refrigerant datasheet) in the vicinity of the unit.

The refrigerant used in the system is flammable. If applicable, observe the local safety conditions.

Warning of inflammable substances!

CAUTION!

This device can be used by children above the age of 8, as well as by people with impaired physical, sensory or mental capabilities or a lack of experience and knowledge if they are supervised or have received instruction in the safe operation of the device, and if they understand the associated potential hazards. Children must never play with the device. Cleaning and user maintenance must not be carried out by unsupervised children.

- The electrical and device installation must be done only by a professional technician.
- During installation and first commissioning, the professional technician is responsible for adherence to applicable regulations.
- Operate the device only when fully installed and with all safety equipment.
- Protect the unit from dust and dirt during the building phase.

1.2 Identification of notes

This section provides an overview of all important safety aspects for proper protection of people and safe and fault-free operation.The instructions and safety notes contained within this manual must be observed in order to prevent accidents, personal injury and material damage.

Notes attached directly to the units must be observed in their entirety and be kept in a fully legible condition.

Safety notes in this manual are indicated by symbols. Safety notes are introduced with signal words which help to highlight the magnitude of the danger in question.

DANGER!

Contact with live parts poses an immediate danger of death due to electric shock. Damage to the insulation or individual components may pose a danger of death.

DANGER!

This combination of symbol and signal word warns of a situation in which there is immediate danger, which if not avoided may be fatal or cause serious injury.

WARNING!

This combination of symbol and signal word warns of a potentially hazardous situation, which if not avoided may be fatal or cause serious injury.

CAUTION!

This combination of symbol and signal word warns of a potentially hazardous situation, which if not avoided may cause injury or material and environmental damage.

NOTICE!

This combination of symbol and signal word warns of a potentially hazardous situation, which if not avoided may cause material and environmental damage.

This symbol highlights useful tips and recommendations as well as information for efficient and fault-free operation.

1.3 Personnel qualifications

Personnel responsible for commissioning, operation, maintenance, inspection and installation must be able to demonstrate that they hold a qualification which proves their ability to undertake the work.

1.4 Dangers of failure to observe the safety notes

Failure to observe the safety notes may pose a risk to people, the environment and the units. Failure to observe the safety notes may void any claims for damages.

In particular, failure to observe the safety notes may pose the following risks:

- The failure of important unit functions.
- The failure of prescribed methods of maintenance and repair.
- Danger to people on account of electrical and mechanical effects.

1.5 Safety-conscious working

The safety notes contained in this manual, the existing national regulations concerning accident prevention as well as any internal company working, operating and safety regulations must be observed.

1.6 Safety notes for the operator

The operational safety of the units and components is only assured providing they are used as intended and in a fully assembled state.

- The units and components may only be set up, installed and maintained by qualified personnel.
- Protective covers (grille) over moving parts must not be removed from units that are in operation.
- Do not operate units or components with obvious defects or signs of damage.
- Contact with certain unit parts or components may lead to burns or injury.
- The units and components must not be exposed to any mechanical load, extreme levels of humidity or extreme temperature.
- Spaces in which refrigerant can leak sufficient to load and vent. Otherwise there is danger of suffocation.
- All housing parts and device openings, e.g. air inlets and outlets, must be free from foreign objects, fluids or gases.
- The units must be inspected by a service technician at least once annually. Visual inspections and cleaning may be performed by the operator when the units are disconnected from the mains.

1.7 Safety notes for installation, maintenance and inspection

- Appropriate hazard prevention measures must be taken to prevent risks to people when performing installation, repair, maintenance or cleaning work on the units.
- The setup, connection and operation of the units and its components must be undertaken in accordance with the usage and operating conditions stipulated in this manual and comply with all applicable regional regulations.
- Local regulations and laws such as Water Ecology Act must be observed.
- The power supply should be adapted to the requirements of the units.
- Units may only be mounted at the points provided for this purpose at the factory. The units may only be secured or mounted on stable structures, walls or floors.
- Mobile units must be set up securely on suitable surfaces and in an upright position. Stationary units must be permanently installed for operation.
- The units and components should not be operated in areas where there is a heightened risk of damage. Observe the minimum clearances.
- The units and components must be kept at an adequate distance from flammable, explosive, combustible, abrasive and dirty areas or atmospheres.
- Safety devices must not be altered or bypassed.

1.8 Unauthorised modification and changes

Modifications or changes to units and components are not permitted and may cause malfunctions. Safety devices may not be modified or bypassed. Original replacement parts and accessories authorised by the manufactured ensure safety. The use of other parts may invalidate liability for resulting consequences.

1.9 Intended use

Depending on the model, the equipment and the additional fittings with which it is equipped is only intended to be used as an air-conditioner for the purpose of cooling or heating the air in an enclosed room.

Any different or additional use shall be classed as non-intended use. The manufacturer/supplier assumes no liability for damages arising from such use. The user bears the sole risk in such cases. Intended use also includes working in accordance with the operating and installation instructions and complying with the maintenance requirements.

Under no circumstances should the threshold values specified in the technical data be exceeded.

1.10 Warranty

For warranty claims to be considered, it is essential that the ordering party or its representative complete and return the "certificate of warranty" to REMKO GmbH & Co. KG at the time when the units are purchased and commissioned.

The warranty conditions are detailed in the "General business and delivery conditions". Furthermore, only the parties to a contract can conclude special agreements beyond these conditions. In this case, contact your contractual partner in the first instance.

1.11 Transport and packaging

The devices are supplied in a sturdy shipping container. Please check the equipment immediately upon delivery and note any damage or missing parts on the delivery and inform the shipper and your contractual partner. For later complaints can not be guaranteed.

⚠ WARNING!

Plastic films and bags etc. are dangerous toys for children!

Why:

- Leave packaging material are not around.

- Packaging material may not be accessible to children!

1.12 Environmental protection and recycling

Disposal of packaging

All products are packed for transport in environmentally friendly materials. Make a valuable contribution to reducing waste and sustaining raw materials. Only dispose of packaging at approved collection points.

Disposal of equipment and components

Only recyclable materials are used in the manufacture of the devices and components. Help protect the environment by ensuring that the devices or components (for example batteries) are not disposed in household waste, but only in accordance with local regulations and in an environmentally safe manner, e.g. using certified firms and recycling specialists or at collection points.

2 Electrical wiring WKF/WKF compact 80 to 170

2.1 System layout WKF/WKF-compact 80

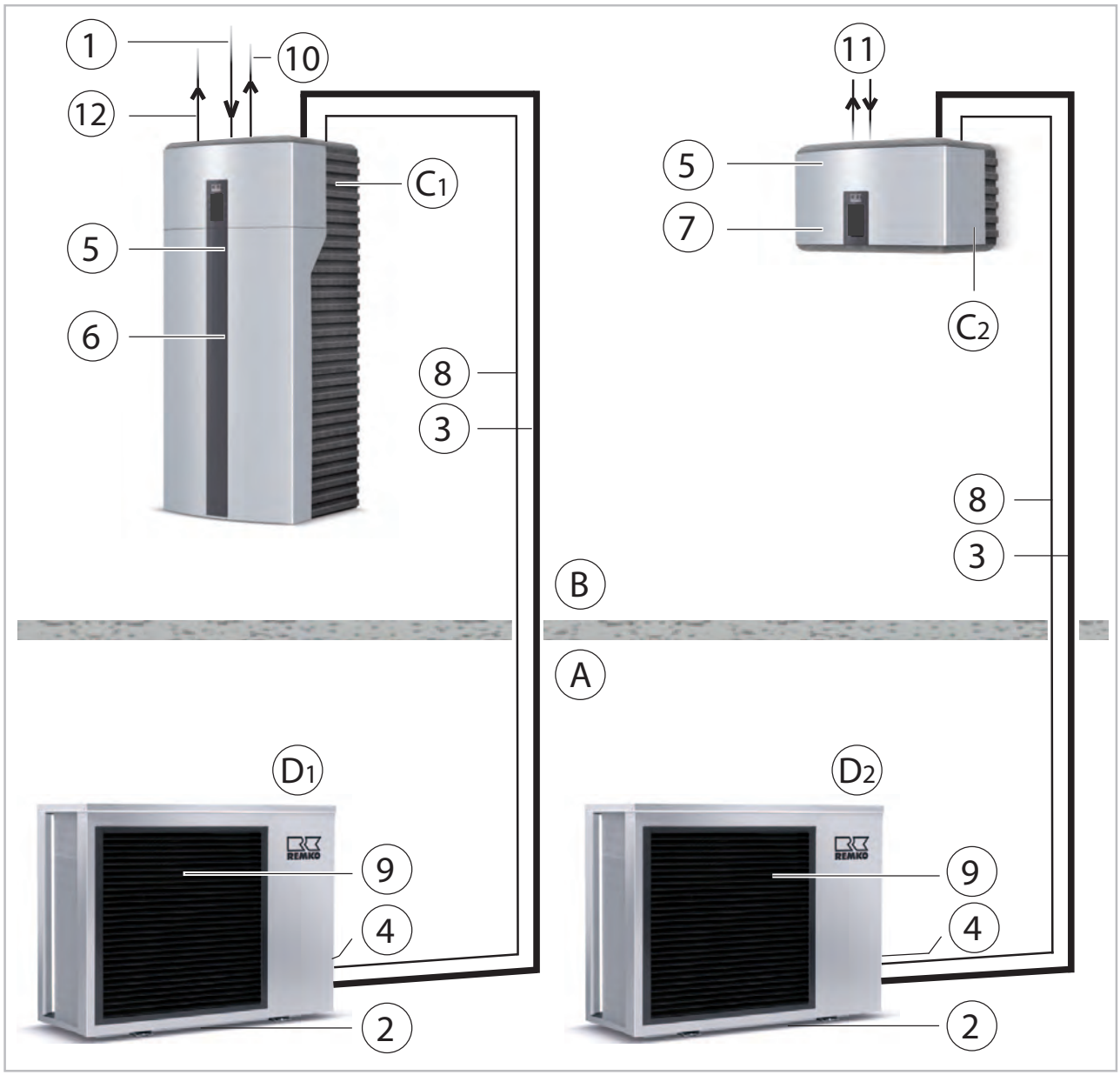


Fig. 1: System layout

A: Outdoor area
B: Indoor area
C1: Indoor unit WKF-compact 80
C2: Indoor unit WKF 80
D1: Outdoor unit WKF-compact 80
D2: Outdoor unit WKF 80
1: Common return flow (DN 25)
2: Condensate drain, outdoor unit (must contain anti-freeze!)
3: Refrigerant lines $^1/_4$" and $^1/_2$"
4: Outdoor unit power supply = 230V/1~/50Hz 16A (e.g. 3x1.5 mm^2)
5: Indoor unit power supply = 230V/1~/50Hz 10A (e.g. 3x1.5 mm^2)
6: Power supply for electrical auxiliary heater 6 kW (e.g. 5x2.5 mm^2)
7: Power supply for electrical auxiliary heater 6 kW (optional) (e.g. 5x2.5 mm^2)
8: Control line shielded (e.g. 2x1 mm^2)
9: Fan
10: Inlet for heating (DN 32)
11: Hot-water supply and return pipes (DN 32)
12: Inlet for hot-water tank (DN 32)

2.2 System layout WKF/WKF-compact 100/130

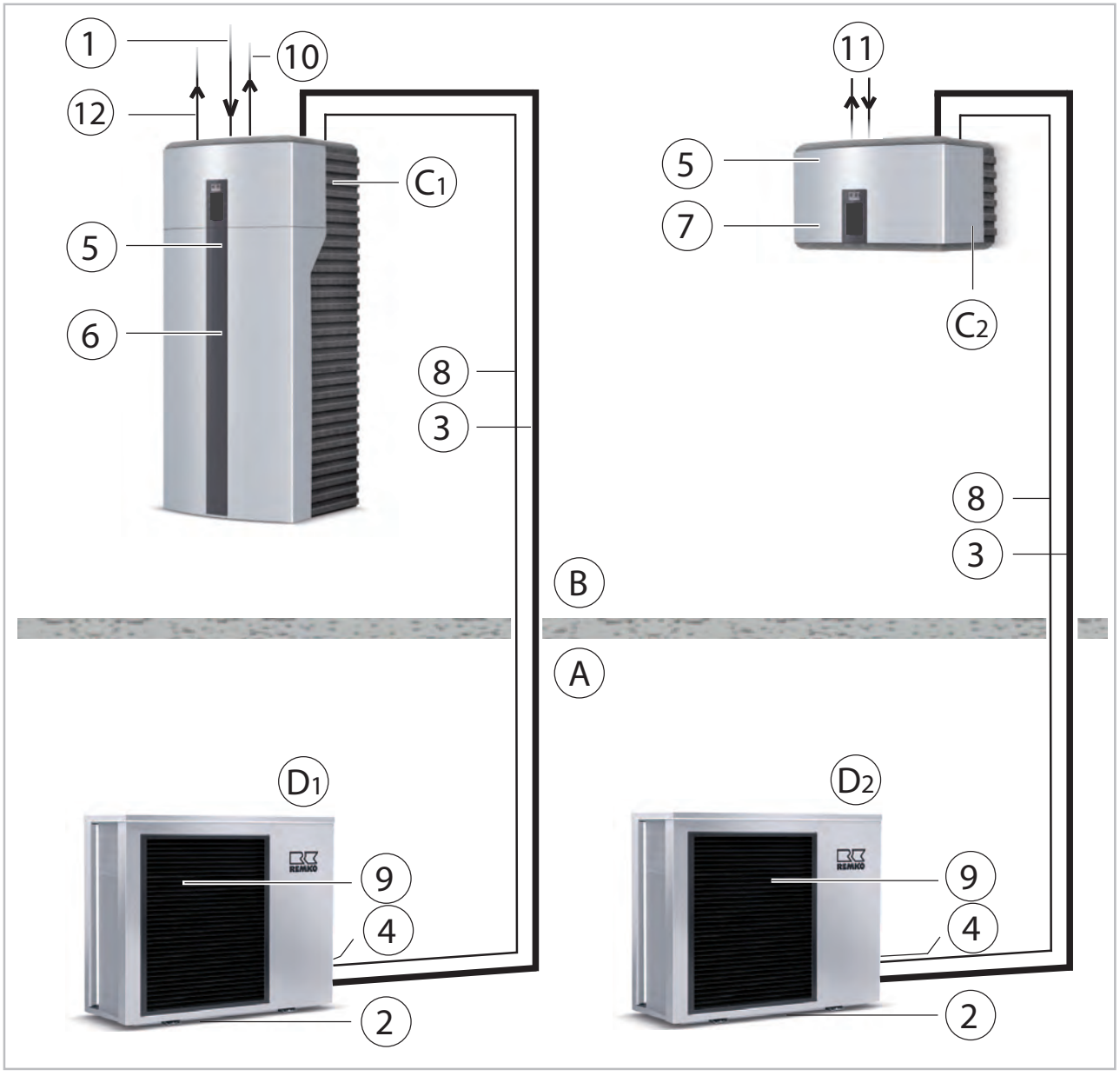


Fig. 2: System layout

A: Outdoor area
B: Indoor area
C1: Indoor unit WKF-compact 100/130
C2: Indoor unit WKF 100/130
D1: Outdoor unit WKF-compact 100/130
D2: Outdoor unit WKF 100/130
1: Common return flow (DN 25)
2: Condensate drain, outdoor unit (must contain anti-freeze!)
3: Refrigerant lines $^{3}/_{8}$" and $^{5}/_{8}$"
4: Outdoor unit power supply = 230V/1~/50Hz 20A (e.g. 3x2.5 mm^2)
5: Indoor unit power supply = 230V/1~/50Hz 16A (e.g. 3x1.5 mm^2)
6: Power supply for electrical auxiliary heater 6 kW (e.g. 5x2.5 mm^2)
7: Power supply for electrical auxiliary heater 6 kW (optional) (e.g. 5x2.5 mm^2)
8: Control line shielded (e.g. 2x1 mm^2)
9: Fan
10: Inlet for heating (DN 32)
11: Hot-water supply and return pipes (DN 32)
12: Inlet for hot-water tank (DN 32)

2.3 System layout WKF/WKF-compact 170

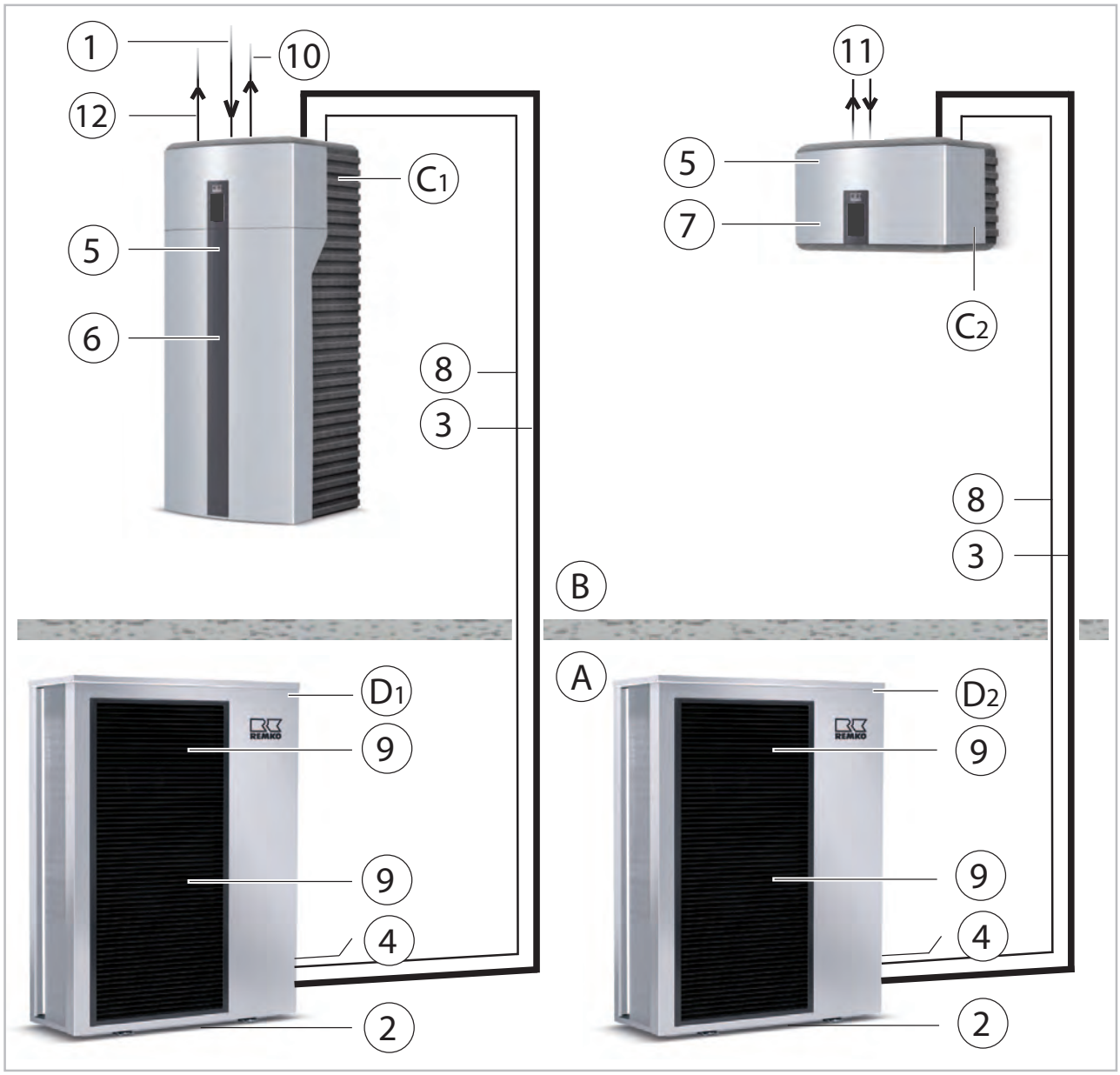


Fig. 3: System layout

A: Outdoor area
B: Indoor area
C1: Indoor unit WKF-compact 170
C2: Indoor unit WKF 170
D1: Outdoor unit WKF-compact 170
D2: Outdoor unit WKF 170
1: Common return flow (DN 25)
2: Condensate drain, outdoor unit (must contain anti-freeze!)
3: Refrigerant lines $^3/_8$" and $^3/_4$"
4: Outdoor unit power supply = 400V/3~/50Hz 3x20A (e.g. 5x2.5 mm^2)
5: Indoor unit power supply = 230V/1~/50Hz 16A (e.g. 3x1.5 mm^2)
6: Power supply for electrical auxiliary heater 9 kW (e.g. 5x2.5 mm^2)
7: Power supply for electrical auxiliary heater 9 kW (optional) (e.g. 5x2.5 mm^2)
8: Control line shielded (e.g. 2x1 mm^2)
9: Fan
10: Inlet for heating (DN 32)
11: Hot-water supply and return pipes (DN 32)
12: Inlet for hot-water tank (DN 32)

2.4 System layout WKF 130 Duo

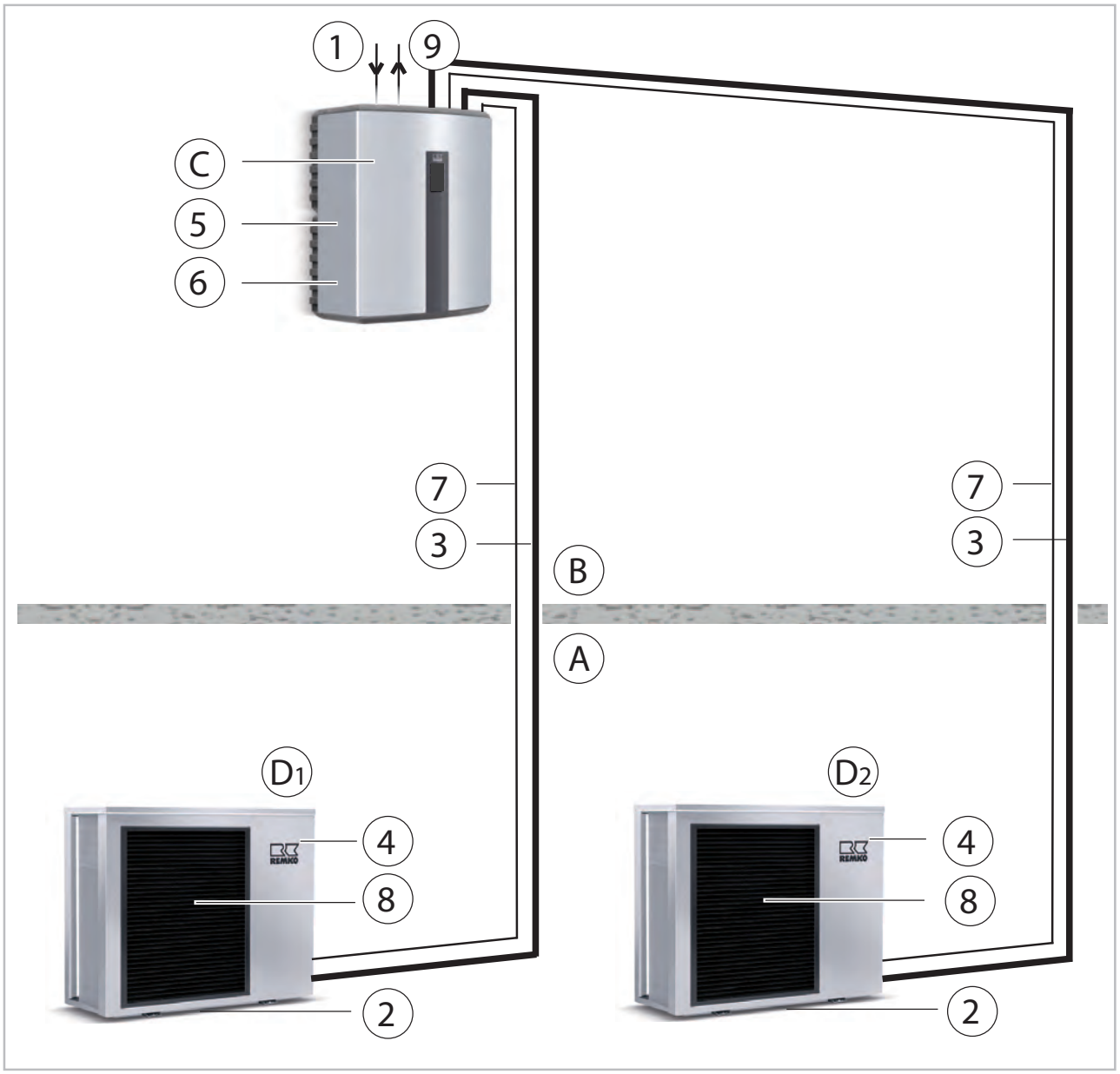


Fig. 4: System layout

A: Outdoor area
B: Indoor area
C: Indoor unit WKF 130 Duo
D1: Outdoor unit 1 WKF 130 Duo
D2: Outdoor unit 2 WKF 130 Duo
1: Common return flow
2: Condensate drain, outdoor unit (must contain anti-freeze!)
3: Refrigerant lines $^{3}/_{8}$" and $^{5}/_{8}$“
4: Outdoor unit power supply = 230V/1~/50Hz 20A (e.g. 3x2.5 mm^2)
5: Indoor unit power supply = 230V/1~/50Hz 16A (e.g. 3x1.5 mm^2)
6: Power supply for electrical auxiliary heater 9 kW (optional) (e.g. 5x2.5 mm^2)
7: Control line shielded (e.g. 2x1 mm^2)
8: Fan
9: Inlet for heating

2.5 System layout WKF 170 Duo

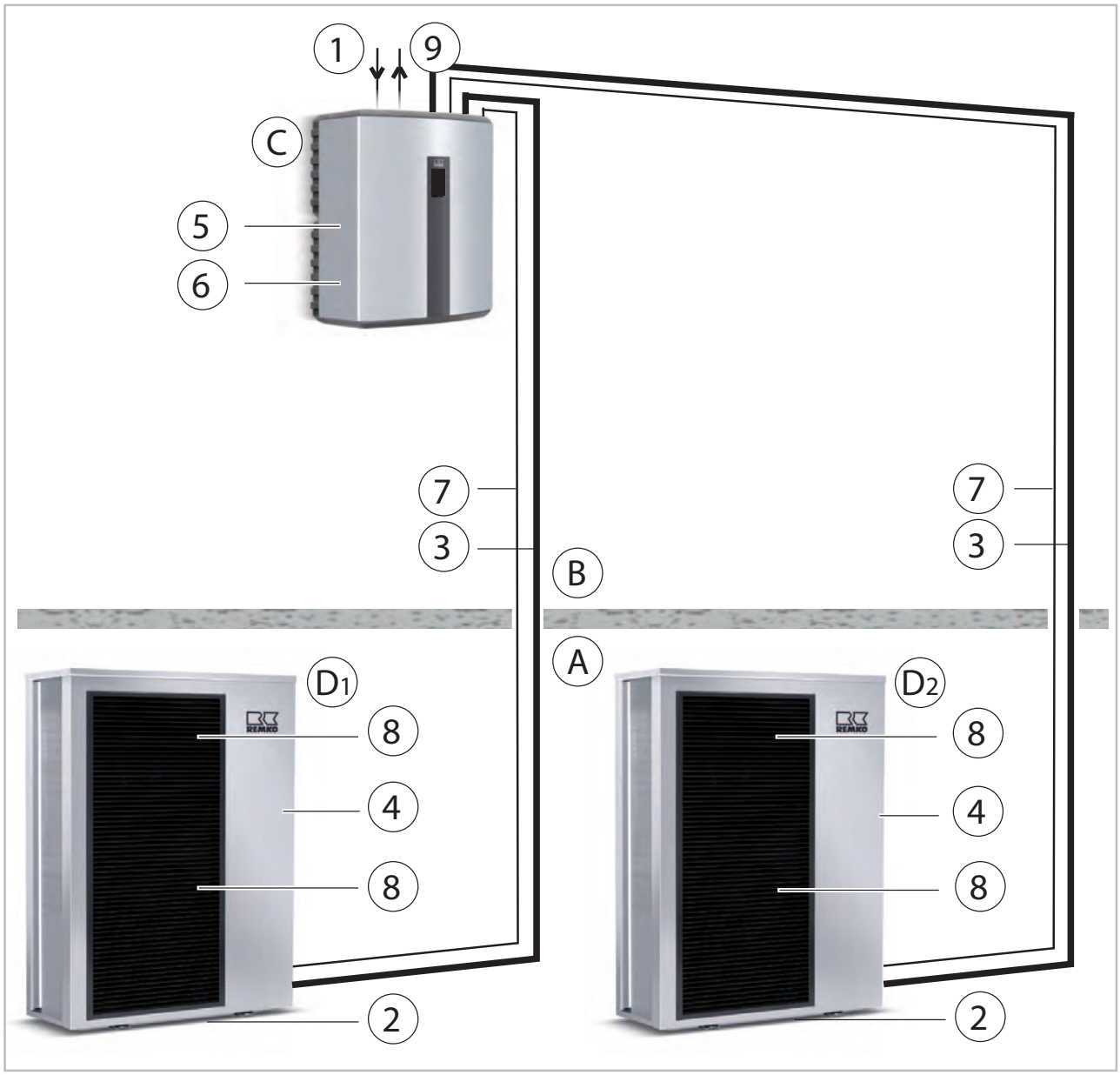


Fig. 5: System layout

A: Outdoor area
B: Indoor area
C: Indoor unit WKF 170 Duo
D1: Outdoor unit 1 WKF 170 Duo
D2: Outdoor unit 2 WKF 170 Duo
1: Common return flow
2: Condensate drain, outdoor unit (must contain anti-freeze!)
3: Refrigerant lines $^3/_8$" and $^3/_4$"
4: Outdoor unit power supply = 400V/3~/50Hz 3x16A (e.g. 5x1.5 mm^2)
5: Indoor unit power supply = 230V/1~/50Hz 16A (e.g. 3x1.5 mm^2)
6: Power supply for electrical auxiliary heater 9 kW (e.g. 5x2.5 mm^2)
7: Control line shielded (e.g. 2x1 mm^2)
8: Fan
9: Inlet for heating

2.6 Overview of electrical cables

WKF/WKF compact 80/100/130

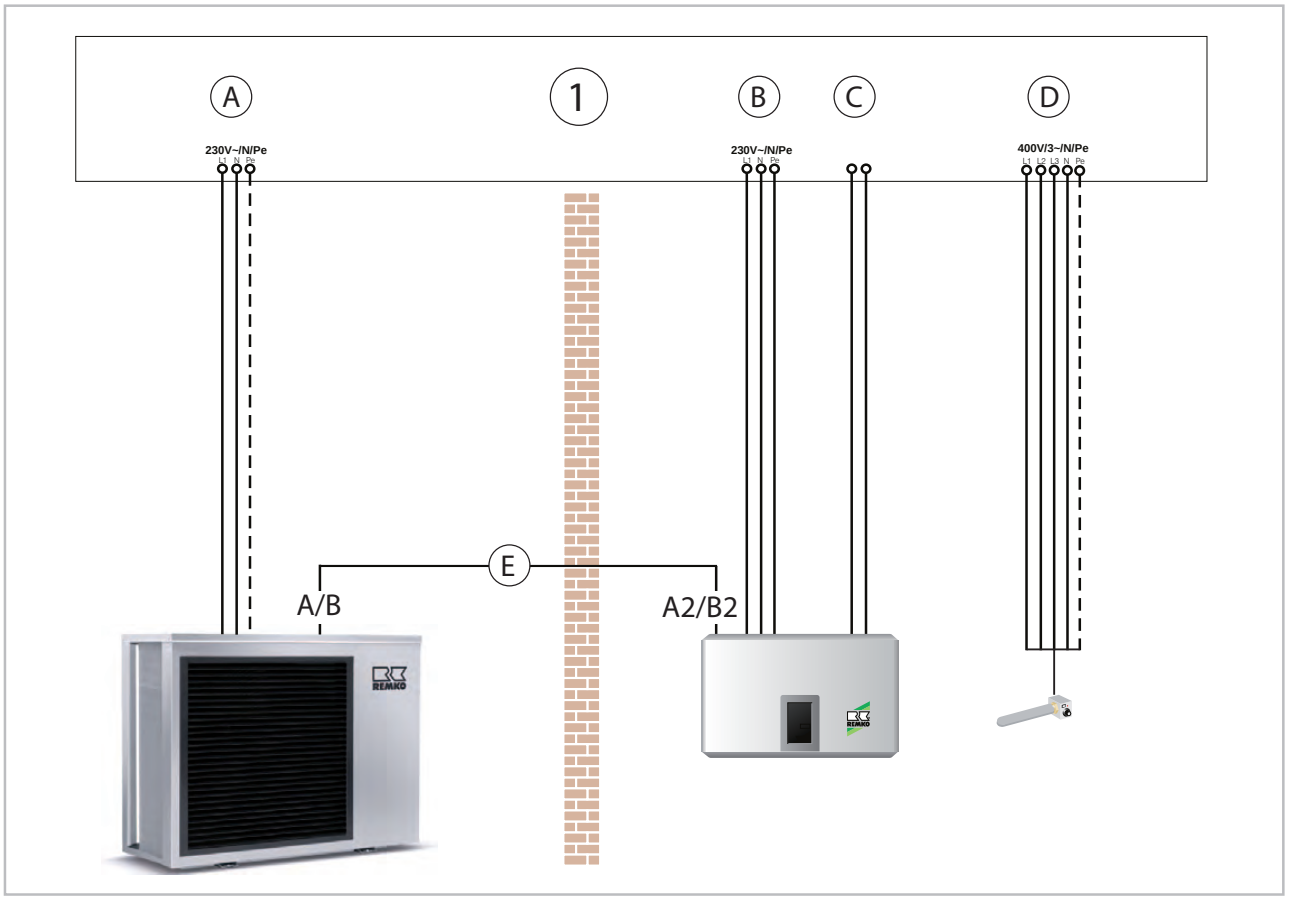


Fig. 6: Overview of electrical cables

1: Main distribution
A: Power supply outdoor unit
B: Power supply indoor unit
C: Power utility disable signal, potential-free / open = locked
D: Power supply heating coil, 6 kW indoor unit
E: Modbus communication,
outdoor unit = terminal A/B
indoor unit (I/O-module) terminal A2/B2

WKF/WKF compact 170

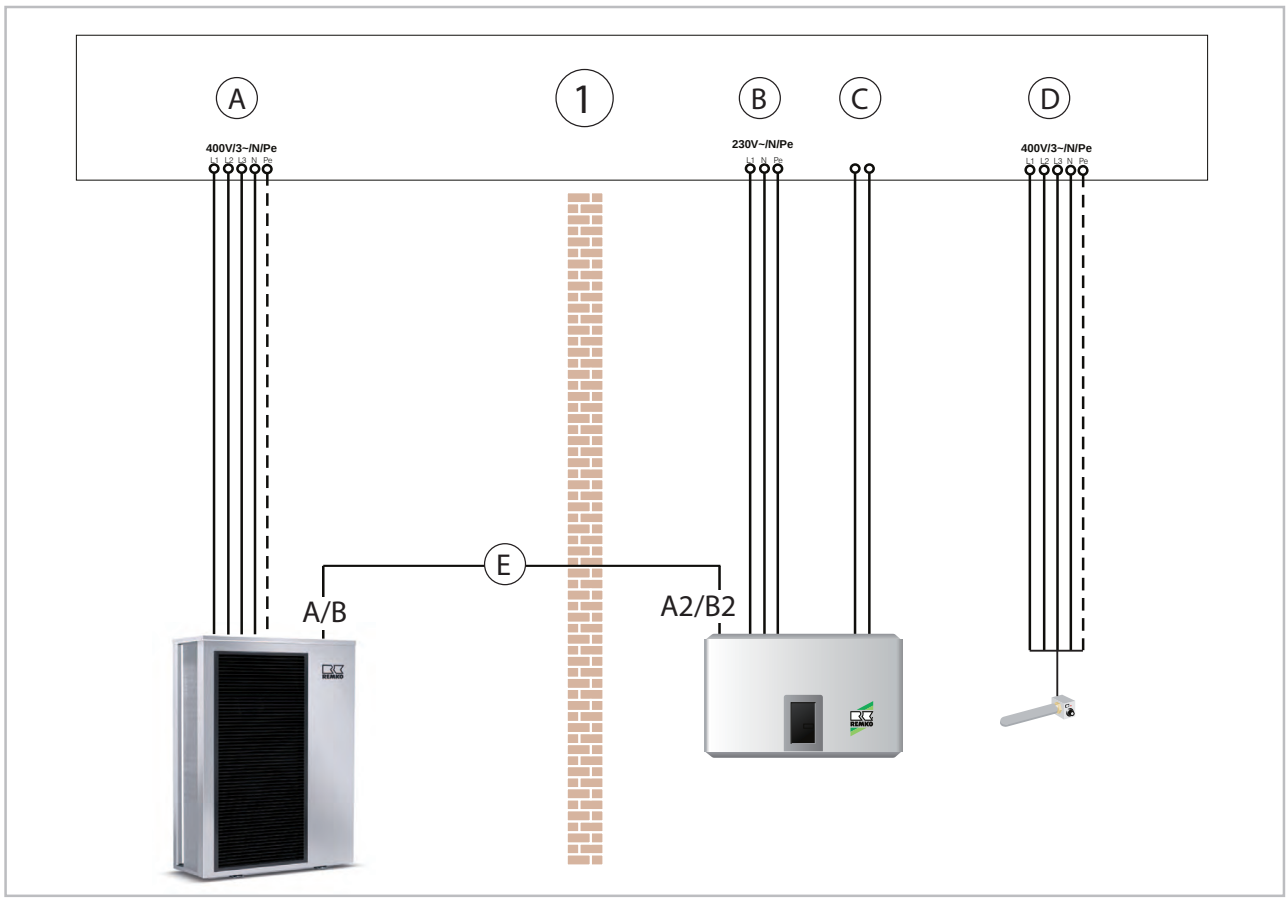


Fig. 7: Overview of electrical cables

1: Main distribution
A: Power supply outdoor unit
B: Power supply indoor unit
C: Power utility disable signal, potential-free / open = AM locked
D: Power supply heating coil, 9 kW indoor unit
E: Modbus communication, outdoor unit = terminal A/B indoor unit (I/O-module) terminal A2/B2

2.7 Electrical connection general notes

- It is necessary to lay a mains cable both to the outdoor unit and, separately, to the indoor unit.
- Power to the indoor units may not be disconnected by the power company when fitted with an off-period circuit (anti-freeze protection).
- All indoor units require a single-phase 230V/1~/50 Hz power supply.

  The outdoor units of the WKF/WKF compact 80 to 130 series require a single-phase power supply of 230V/1~/50 Hz and the outdoor units of the WKF/WKF compact 170 series require a three-phase power supply of 400V/3~/50 Hz.
- The electrical connection between outdoor and indoor units is made using a sheathed two-wire control line.

  On the outdoor unit, the control line is connected to terminals A/B and on the indoor unit, to terminals A2/B2 directly on the I/O module.
- Where applicable, another three-phase 400V/3~/50 Hz power supply shall be provided to the indoor module for auxiliary heater.
- The Smart-Control needs to know from the power-company whether the power supply is enabled or a blocking period is in effect. A potential-free switch must be provided by the customer for this purpose and connected to contact S16. (Contact closed signifies enabled, while contact open signifies a blocking period).
- A connection schematic along with corresponding circuit diagrams can be found in the “Electrical layout” and “Circuit plans” chapters of this manual.
- Special rates for the operation of heat pumps may be offered by the power utility.
- Ask your local power utility about the details of any rates that might be available.

DANGER!

All electrical installation work must be done by an electrician.

WARNING!

Always note the currently applicable VDE guidelines and the notes in TAB 2007. The size and type of the fuse are to be taken from the technical data.

WARNING!

All cable sizes are to be selected according to VDE 0100. Special attention should be given to cable lengths, cable type and the kind of installation. The information in the connection diagram and in the system overview are to be seen as an acceptable installation possibility only in a standard case!

NOTICE!

Make sure to connect the outdoor unit neutral connector properly, otherwise the varistors on the line-filter circuit board will be destroyed.

NOTICE!

The electrical connection for the units must be made at a separate feedpoint with a residual current device in accordance with local regulations and should be laid out by an electrician.

Check all plugged and clamped terminals to verify that they are seated correctly and make permanent contact. Tighten as required.

2.8 Electrical connection - indoor unit

The following instructions describe the electrical connection of the WKF/WKF compact and WKF Duo series.

1. Remove the housing from the upper section by pressing it upwards and pulling it forwards out of the rear groove.
2. Guide the supply cable to the indoor units through the cable openings, and also route the control line between indoor and outdoor units and the cables for external devices and probes into the indoor unit. Note that the cable openings in the WKF/WKF compact series are located above rather than below.
3. Connect the power supply of the indoor units to the terminals.
4. Connect the control lines to terminals A2/B2 directly on the I/O module.
5. Connect all secondary consumers (HGM,HGU, changeover valves etc.) to the I/O module.

! NOTICE!

Attach cables in accordance with the connection schematic and/or the circuit diagram in the control box.

! NOTICE!

Ensure correct polarity when connecting the electrical leads, especially the control cable.

The number of lines and the sensors is dependent on the configuration of the heating system and the components.

Make sure to use enough cable when installing the indoor unit so that the control box can be fully lowered for future maintenance.

At the site, avoid adding cable inlets.

2.9 Electrical connection - outdoor unit

- To connect up the electrics, remove the right cladding panel after unfastening the screws.

Fig. 8: WKF/WKF compact 80/100/130 series - remove the cover by unfastening the screw

1: Screw

Fig. 9: WKF/WKF compact 170 series - remove the trim panel by unfastening the screws

1: Screw

- Electrical protection for the system is implemented in accordance with the information in the Technical Data. Observe the required conductor cross-sections!
- All cables must be connected with the correct polarity and strain relief.
- The power supply must be connected to terminal L (phase) / N (neutral conductor) and PE (earth conductor).

- Follow the connection schematic and the circuit diagrams.
- The two-wire control line is to be connected to terminals A/B and the earth terminal.
- When connecting the control line, make sure that polarity is correct.
- If the outdoor unit is installed on a roof, it and the supporting structure must be earthed separately (connection to lightning conductors or foundation earth/ground feature).
- With the WKF/WKF compact 170 series, make sure that only terminals L1(R), L2(S), L3(T) and N are connected (see Fig. 11).

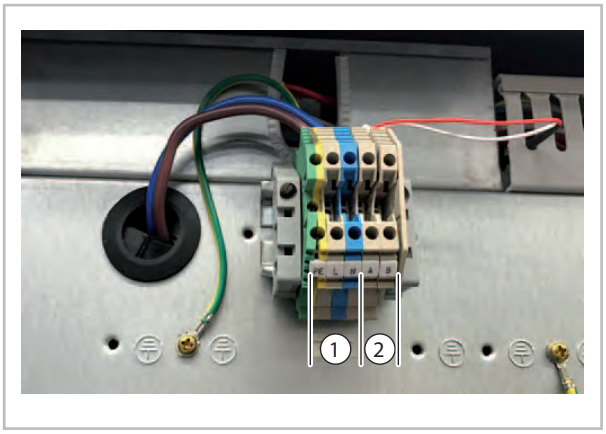


Fig. 10: WKF/WKF compact 80/100/130 outdoor unit connection terminals

1: Power supply 230V/1~/50Hz
2: Control line A/B

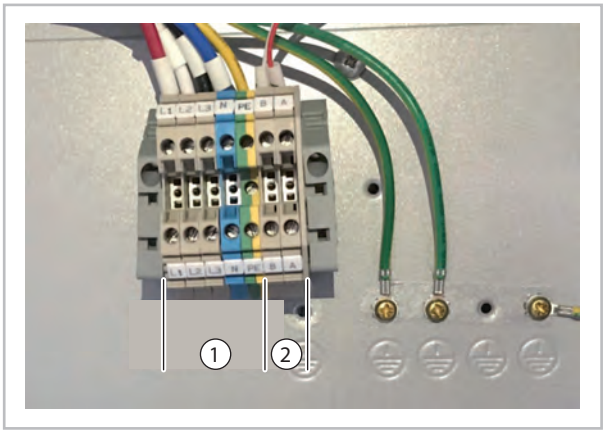


Fig. 11: WKF/WKF compact 170 outdoor unit connection terminal

1: Power supply 400V/3~/50Hz
2: Control line A/B

! NOTICE!

Make sure to connect the outdoor unit neutral connector properly, otherwise the varistors on the line-filter circuit board will be destroyed.

Temperature probes

- The number of probes required can vary with the type of system.
- Observe the relevant notes for the probe position found in the hydraulic circuit diagram.
- The standard scope of delivery includes the outdoor probes (S10), an immersion probe (provided for use as a domestic hot water probe - (S08) as well as a probe for the complete inlet in the indoor unit.
- When connecting up a solar plant, use a PT-1000 probe (S01) as a collector probe and a PT-1000 probe (S02) as the lower storage tank probe.
- All probes are to be connected to the indoor units switch cabinet in accordance with the terminal assignment diagram.

Contact probe

Contact probes can be mounted on the pipes, to measure the heating-circuit temperatures, for example.

- The contact probes are fastened to a pipe with the trapezoidal brackets and retaining strap provided.
- Clean the appropriate point. Subsequently a thermal compound (A) is applied and the probe is fixed in position.

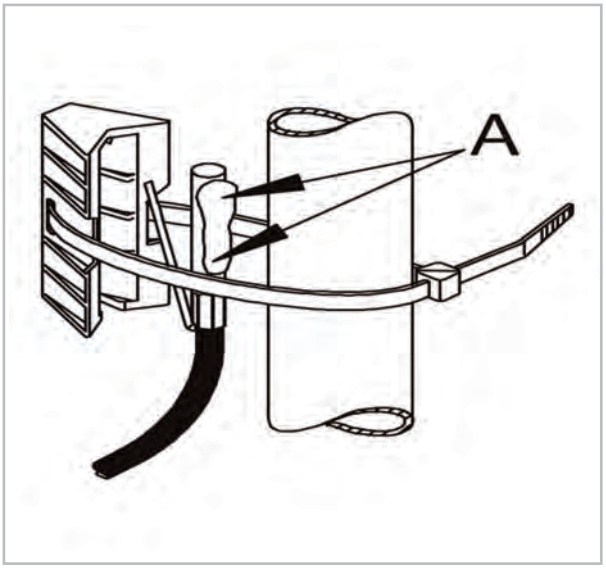


Fig. 12: Securing the inductive sensor

If the sensor cables are too short, they can be extended up to a maximum of 100m with wire having a cross-section of 1.5 mm².

External probe

The connection of an outdoor sensor is always required for Smart Control.

- Mount the external probe pointing skyward, in a north-easterly direction, about 2.5 metres above the ground. It may not be subjected to direct sunlight and is to be protected against excessive wind. Installation above windows or air ducts is to be avoided.
- In order to carry out the installation, remove the cover and secure the probe with the screw provided.
- A cable with a wire cross-section of min. 0.5 mm^2 provided by the customer is recommended for connecting the probe.

Fig. 13: External probe

2.10 Electrical drawings for outdoor units

WKF/WKF compact 80 to 130 and WKF 130 Duo outdoor units

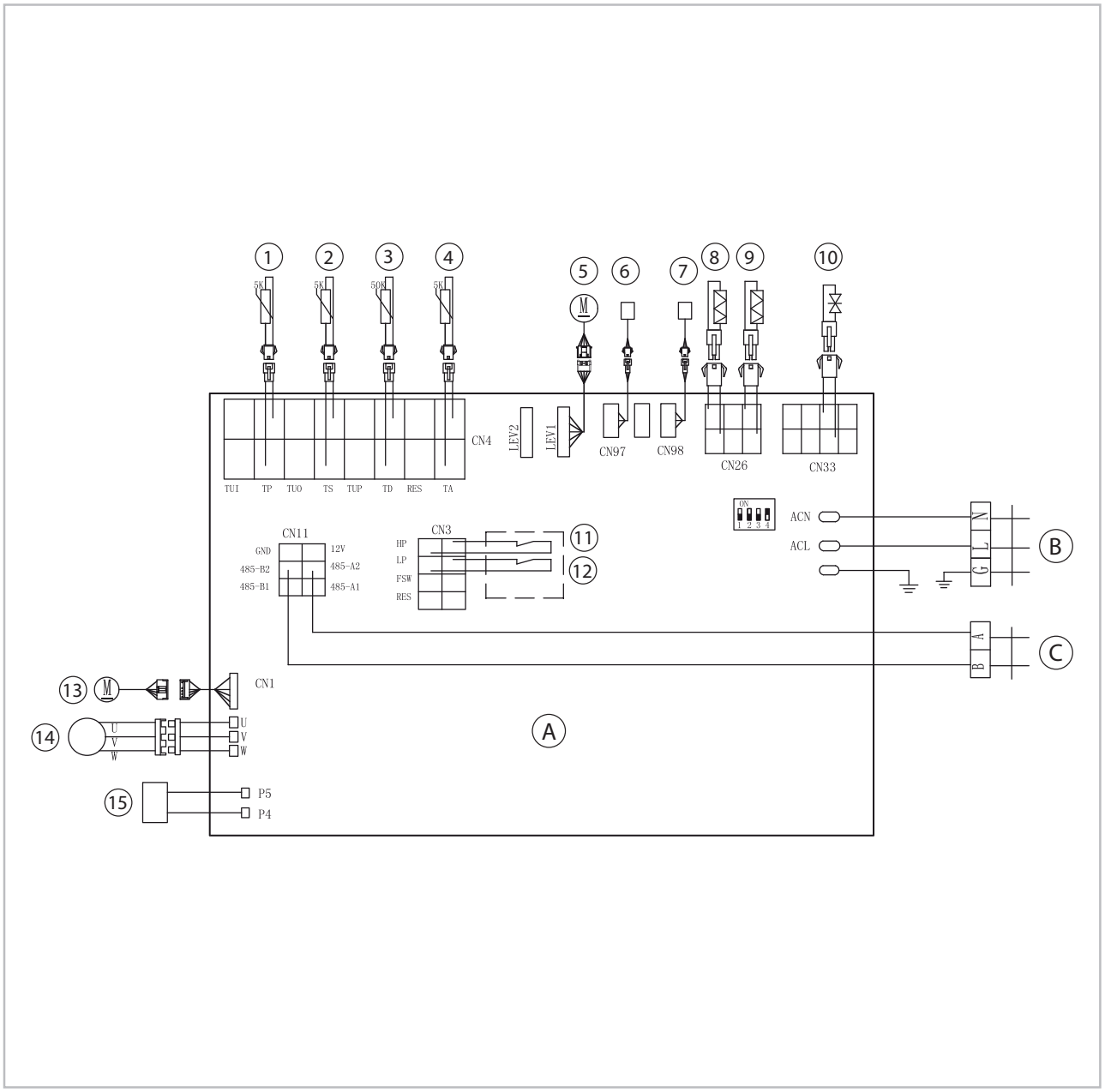


Fig. 14: Electrical drawings for outdoor units

A: Motherboard
B: Power supply cable
C: Communication line to indoor unit
1: TP evaporator probe
2: TS suction pipe probe
3: Sensor, TD heat gas
4: Sensor, TA air suction
5: Electric expansion valve
6: High pressure transducer
7: Low pressure transducer
8: Crankcase heating, compressor
9: Condensate tray heating
10: 4-way valve
11: Not connected
12: Not connected
13: Fan motor
14: Compressor
15: Choke

WKF/WKF compact 170 and WKF 170 Duo outdoor units

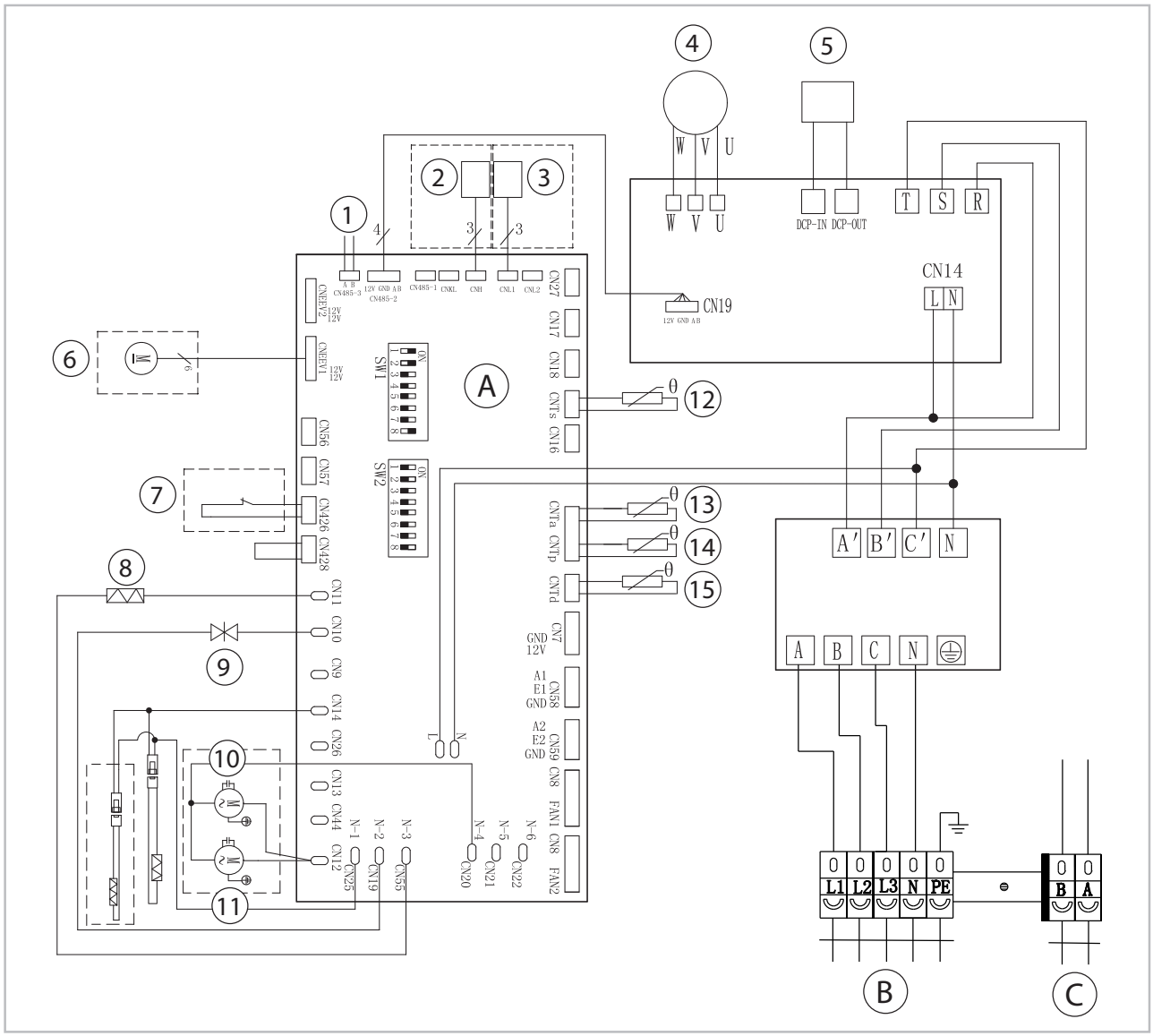
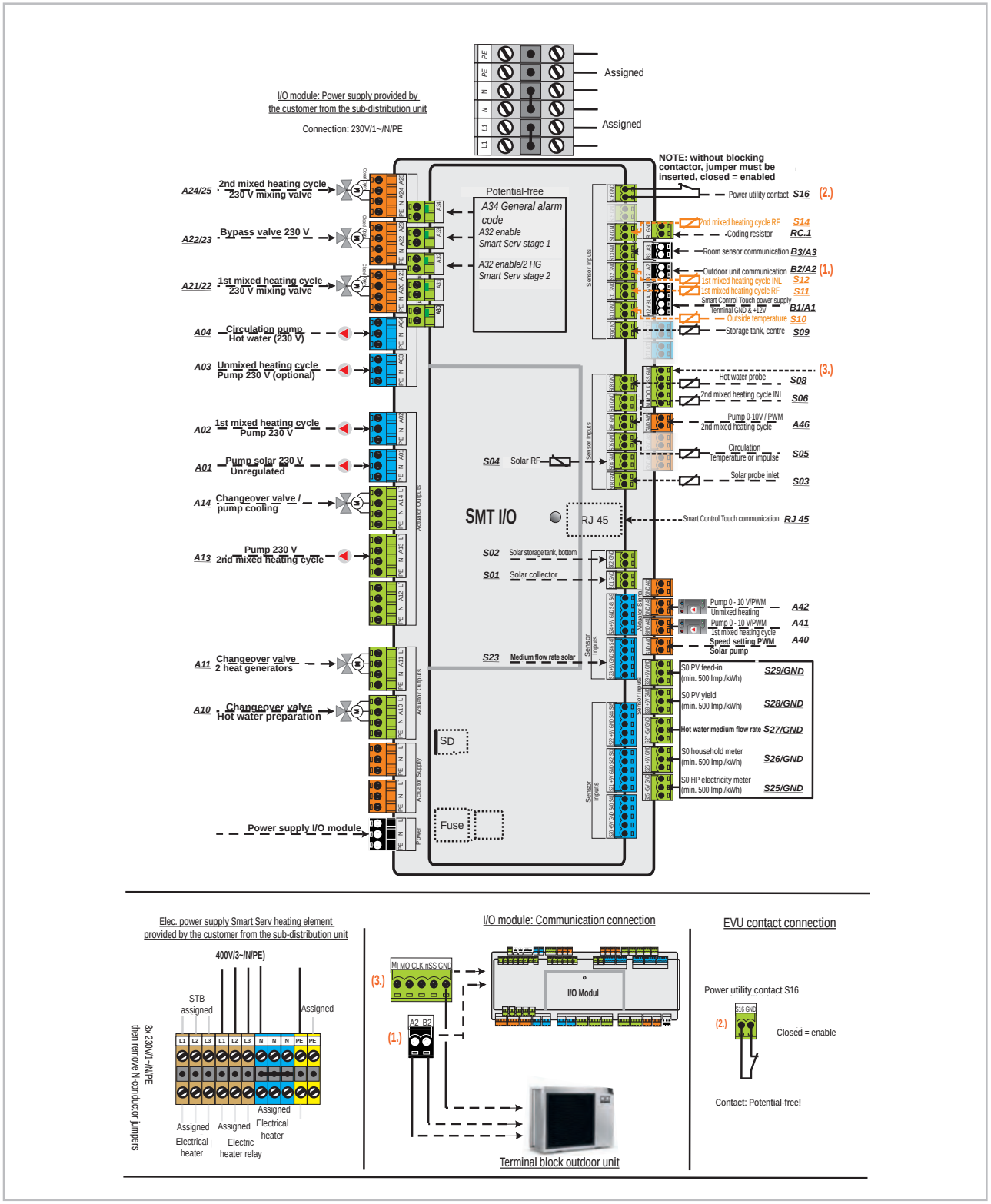


Fig. 15: Electrical drawings for outdoor units

A: Inverter control board
B: Power supply 400V/3~/50Hz
C: Communication to indoor unit
1: Indoor unit communication
2: High pressure transducer
3: Low pressure transducer
4: Compressor
5: Transformer
6: Electric expansion valve
7: High pressure switch
8: Crankcase heating, compressor
9: 4-way valve
10: Fan motor 1
11: Fan motor 2
12: TS suction pipe probe
13: Sensor, TA air suction
14: TP evaporator probe
15: Sensor, TD heat gas

2.11 Electrical configuration - I/O module - WKF/WKF compact 80 to 170

Use wire gauge corresponding with the connection cable supplied!
Lay load lines separately to measuring lines!



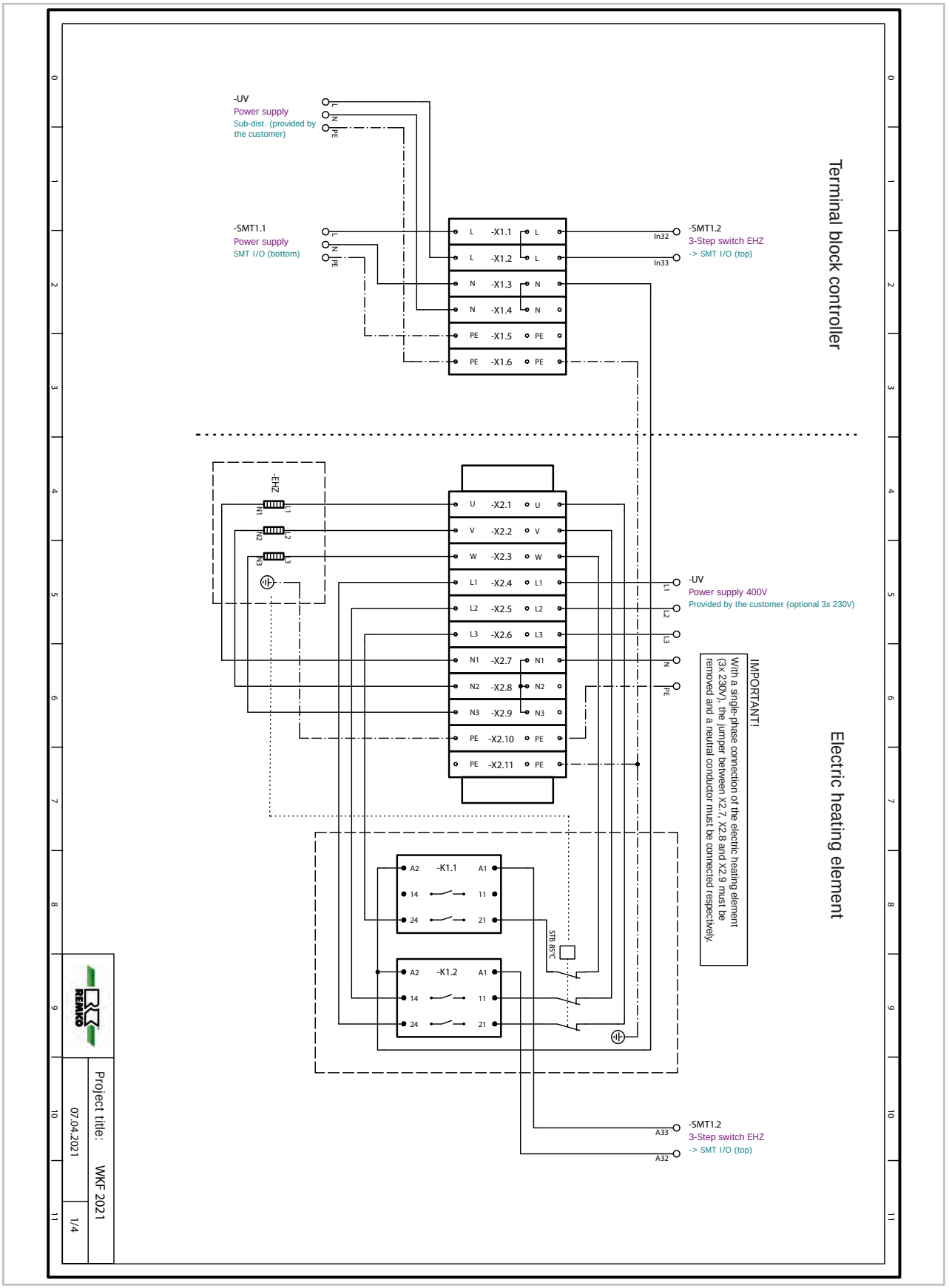
2.12 Terminal assignment / legend - WKF/WKF compact 80 to 170

Designation	Input	Output	Signal	Description
PW	X			Power supply I/O 230V
PP		X		Power supply primary pump, indoor unit
S01	X			Solar probe collector
S02	X			Solar probe storage tank, bottom
S03	X			Solar probe inlet HM solar
S04	X			Solar probe RF HM solar
S05	X			Circulation RF temp./impulse
S06	X			2nd mixed HC, INL probe
S07	X			Probe refrigerant piping
S08	X			Domestic hot-water tank
S09	X			Probe storage tank centre (storage energy acquisition)
S10	X			External probe
S11	X			1st mixed HC, RF probe
S12	X			1st mixed HC, INL probe
S13	X			Heat pump inlet
S14	X			2nd mixed HC, RF probe
S15	X			Heat pump RF
S16	X			Energy supplier contact (NC) / dew point monitoring (external)
S20	X			Not connected
S21	X			Not connected
S22	X			Not connected
S23	X			Ultrasonic flow rate meter Solar, pulse rate
S24	X			Ultrasonic flow rate meter HP, impulse rate
S25	X			HP electricity meter S0
S26	X			Household electricity S0
S27	X			Flow probe
S28	X			PV yield electricity meter S0
S29	X			PV in-feed electricity meter S0
A01		X		Solar pump unregulated (230 V)
A02		X		1st mixed HC, pump (230 V) switched
A03		X		Unmixed HC, pump (230 V) switched
A04		X		Circulation pump
A10		X		Changeover valve, drinking water

REMKO WKF series

Designation	Input	Output	Signal	Description
A11		X		Changeover valve 2nd WE
A12		X		Not connected
A13		X		2nd mixed HC, pump (230 V) switched
A14		X		Changeover valve / pump cooling
A20		X		1st mixed HC, mixing valve open (230 V)
A21		X		1st mix. HC, mixing valve switched to closed (230V)
A22		X		Bypass mixer open
A23		X		Bypass mixer closed
A24		X		2nd mixed HC, mixing valve open (230 V)
A25		X		2nd mix. HC, mixing valve switched to closed (230V)
A30		X		Not connected
A31		X		Not connected
A32		X		Enable 2 WE booster heating or boiler
A33		X		Not connected
A34		X		Alarm codes
A40			X	Speed setting solar pump PWM
A41			X	Speed specification, 1st mixed HC (0-10V)
A42			X	Speed specification, unmixed HC (0-10V)
A43			X	Speed setting primary pump indoor unit (PWM)
A44			X	Not connected
A45			X	Non functional
A46			X	Speed specification, 2nd mixed HC (0-10V)
MI				Non functional
MO				
CLK				
nSS				
GND				
OT 1 (2x)				Not connected
OT 2 (2x)				Non functional
B1, A1 +12 Volt, GND				Operating module
B2 / A2				Communication outdoor module
B3 / A2				RS 485_3
R				RC code resistance WKF 80/100/130/170

2.13 Circuit diagram - WKF/WKF compact 80-170



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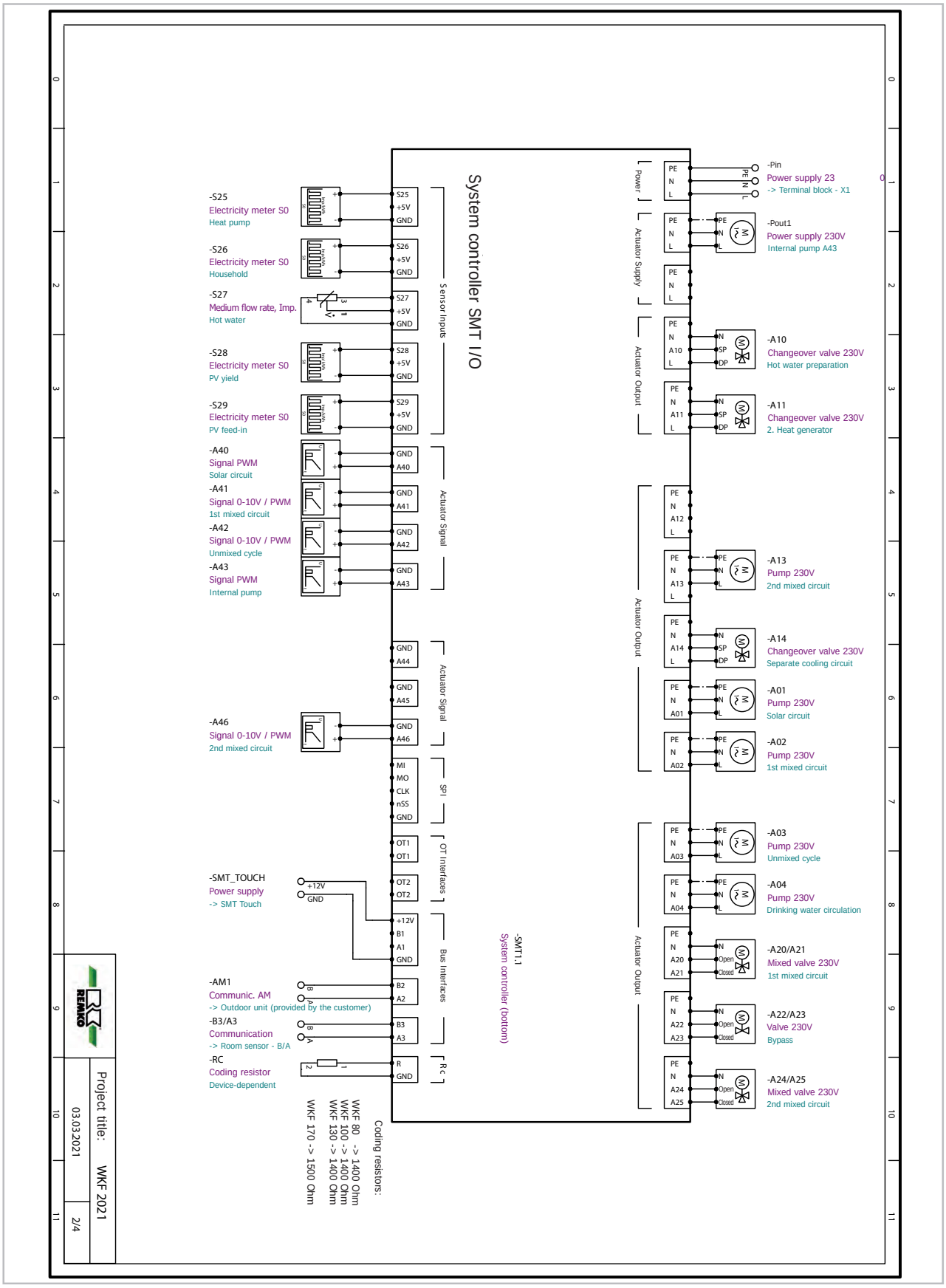

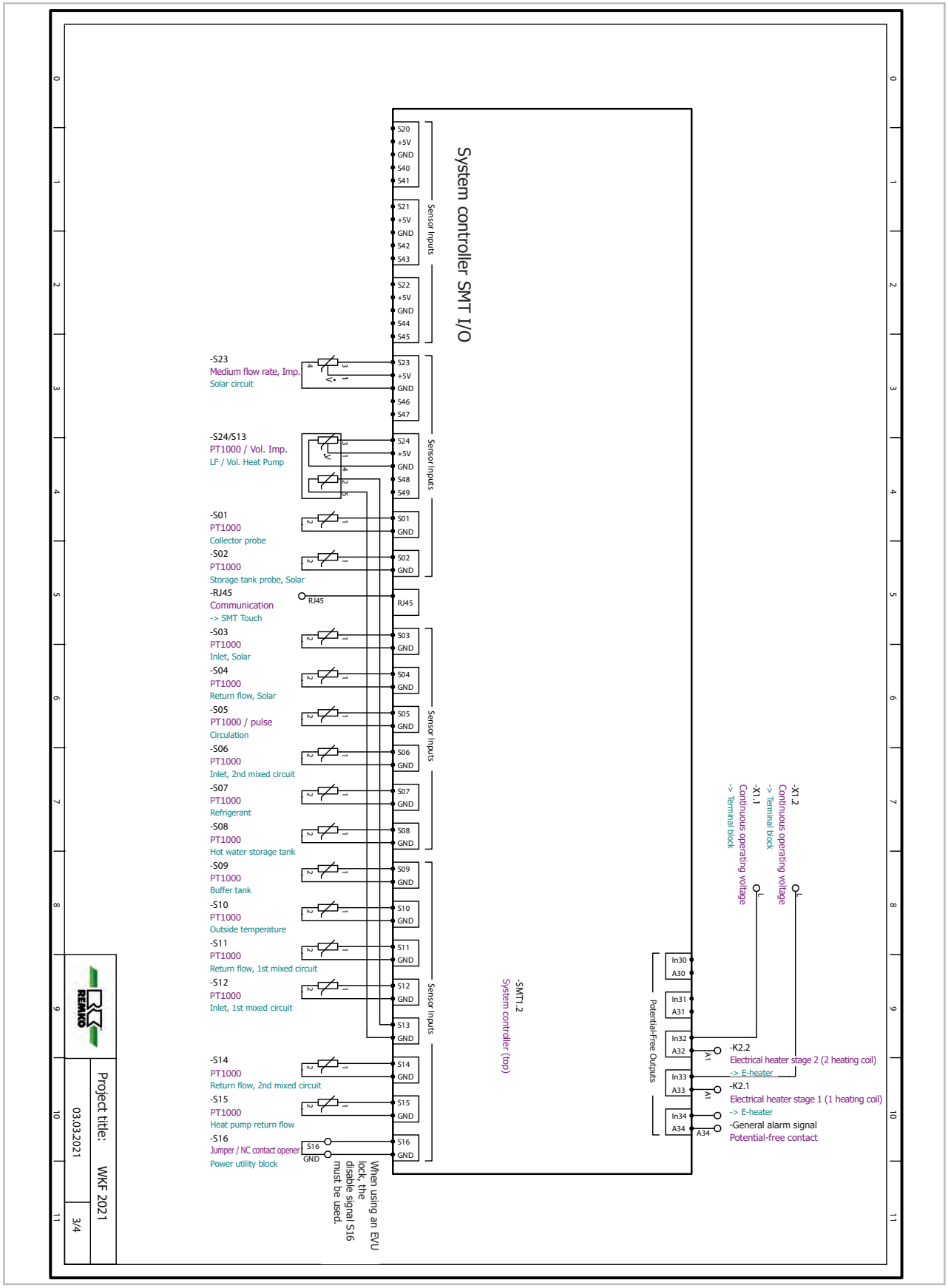
System controller SMT I/O
Sensor Inputs
S20
+5V
GND
S40
S41
S21
+5V
GND
S42
S43
S22
+5V
GND
S44
S45
-S23
Medium flow rate, Imp.
Solar circuit
S23
+5V
GND
S46
S47
-S24/S13
PT1000 / Vol. Imp.
LF / Vol. Heat Pump
S24
+5V
GND
S48
S49
-S01
PT1000
Collector probe
S01
GND
-S02
PT1000
Storage tank probe, Solar
S02
GND
-RJ45
Communication
-> SMT Touch
RJ45
RJ45
-S03
PT1000
Inlet, Solar
S03
GND
-S04
PT1000
Return flow, Solar
S04
GND
-S05
PT1000 / pulse
Circulation
S05
GND
-S06
PT1000
Inlet, 2nd mixed circuit
S06
GND
-S07
PT1000
Refrigerant
S07
GND
-S08
PT1000
Hot water storage tank
S08
GND
-S09
PT1000
Buffer tank
S09
GND
-S10
PT1000
Outside temperature
S10
GND
-S11
PT1000
Return flow, 1st mixed circuit
S11
GND
-S12
PT1000
Inlet, 1st mixed circuit
S12
GND
S13
GND
-S14
PT1000
Return flow, 2nd mixed circuit
S14
GND
-S15
PT1000
Heat pump return flow
S15
GND
-S16
Jumper / NC contact opener
Power utility block
S16
GND
S16
GND
When using an EVU lock, the disable signal S16 must be used.
-SMT1.2
System controller (top)
Potential-Free Outputs
In30
A30
In31
A31
In32
A32
In33
A33
In34
A34
A1
A1
A34
-X1.2
Continuous operating voltage
-> Terminal block
-X1.1
Continuous operating voltage
-> Terminal block
-K2.2
Electrical heater stage 2 (2 heating coil)
-> E-heater
-K2.1
Electrical heater stage 1 (1 heating coil)
-> E-heater
-General alarm signal
Potential-free contact
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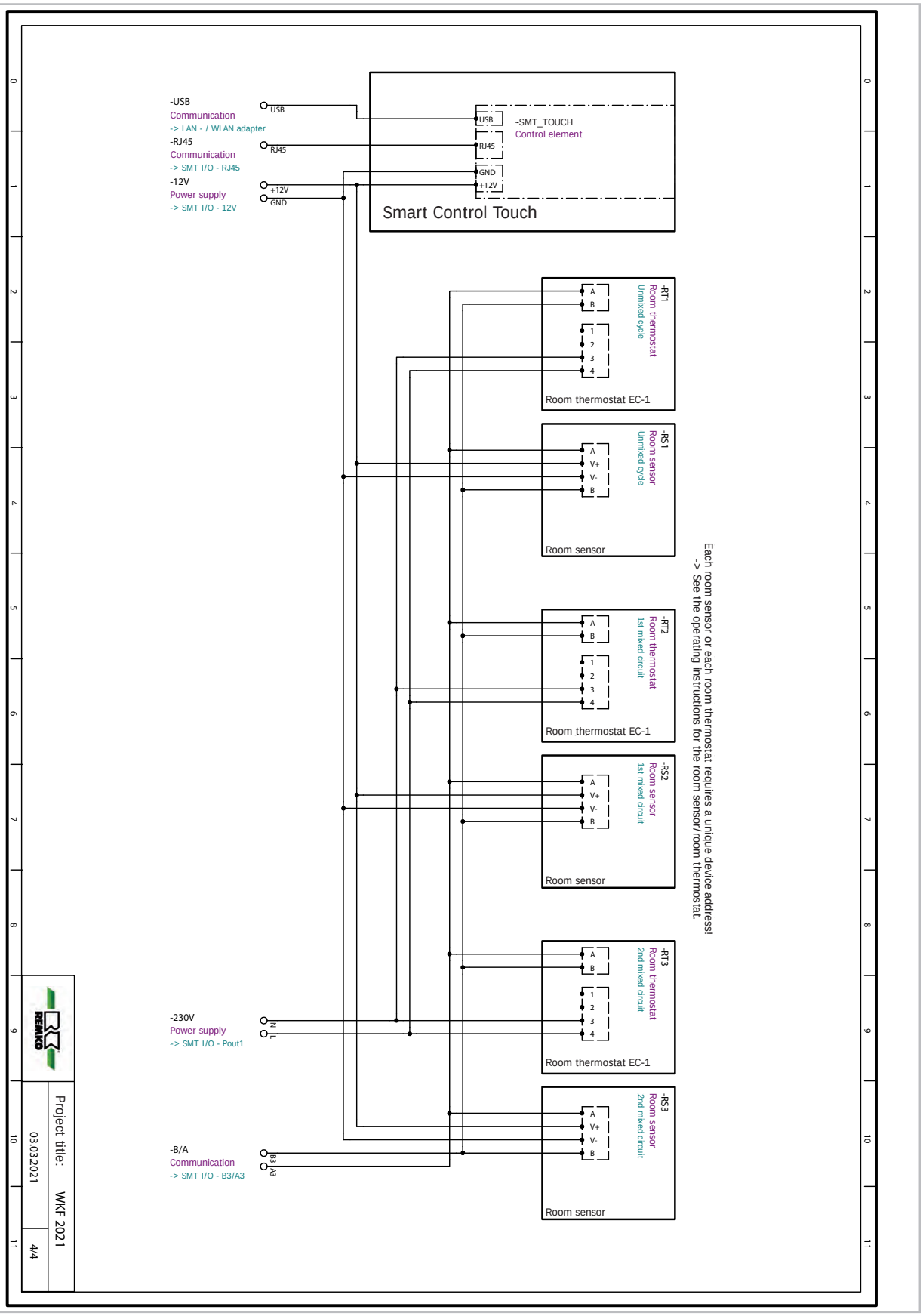


Legend for the circuit diagrams

Abbreviations:

E-heater:	Electric heating element
EHZ:	Electric heating element
EVU:	Electrical power company / power utility
Gem.:	Mixed
HC:	Heating cycle
HTG:	Heating
Imp.:	Impulse
PV:	Photovoltaic
PWM:	Pulse width modulation
RL:	Return flow
Unmixed	Unmixed
VL:	Inlet
Vol.:	Medium flow rate
Circ.:	Circulation

3 WKF 130/170 Duo electrical wiring

3.1 System layout WKF 130 Duo

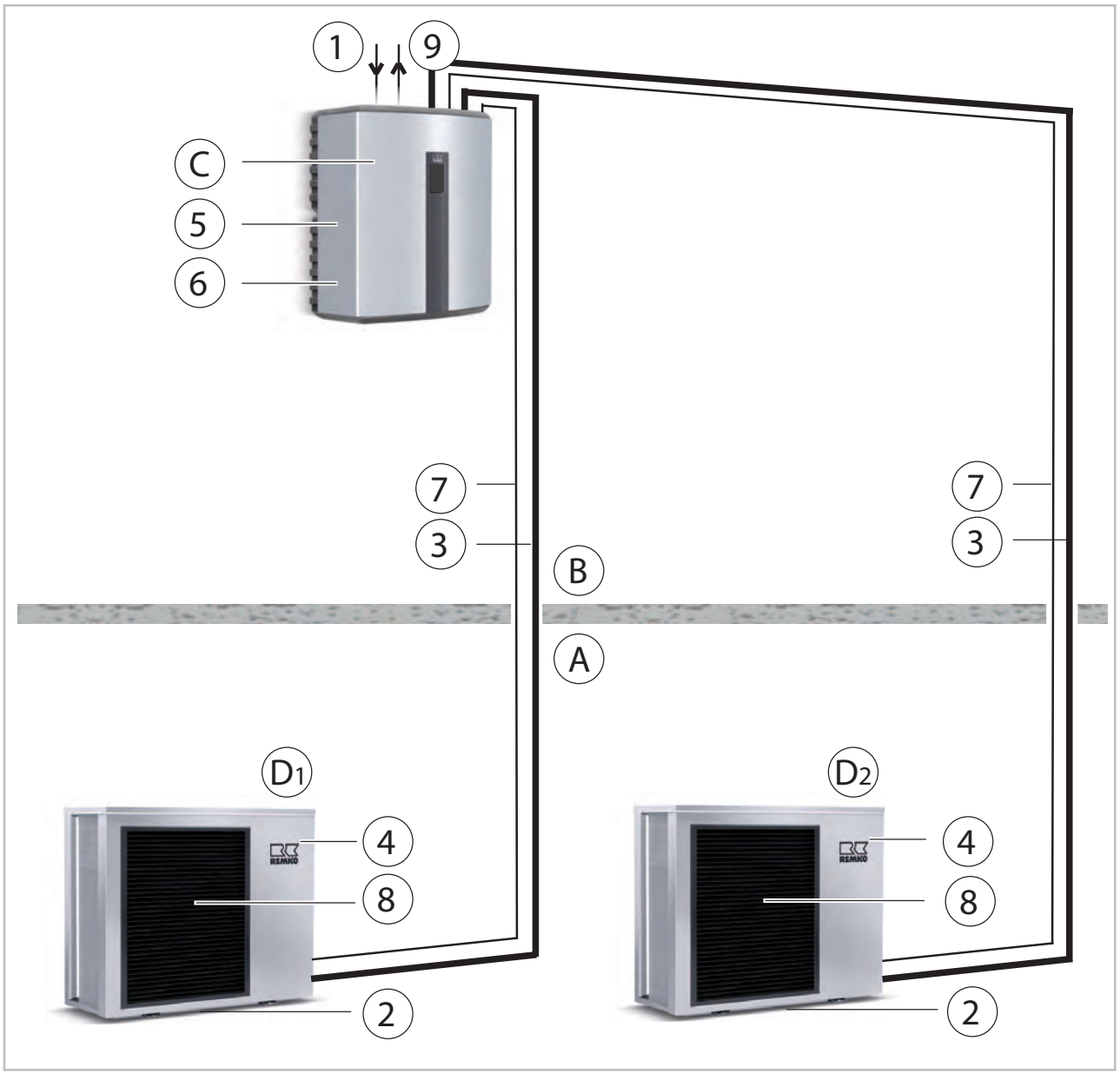


Fig. 16: System layout

A: Outdoor area
B: Indoor area
C: Indoor unit WKF 130 Duo
D1: Outdoor unit 1 WKF 130 Duo
D2: Outdoor unit 2 WKF 130 Duo
1: Common return flow
2: Condensate drain, outdoor unit (must contain anti-freeze!)
3: Refrigerant lines $^{3}/_{8}$" and $^{5}/_{8}$“
4: Outdoor unit power supply = 230V/1~/50Hz 20A (e.g. 3x2.5 mm^2)
5: Indoor unit power supply = 230V/1~/50Hz 16A (e.g. 3x1.5 mm^2)
6: Power supply for electrical auxiliary heater 9 kW (optional) (e.g. 5x2.5 mm^2)
7: Control line shielded (e.g. 2x1 mm^2)
8: Fan
9: Inlet for heating

3.2 System layout WKF 170 Duo

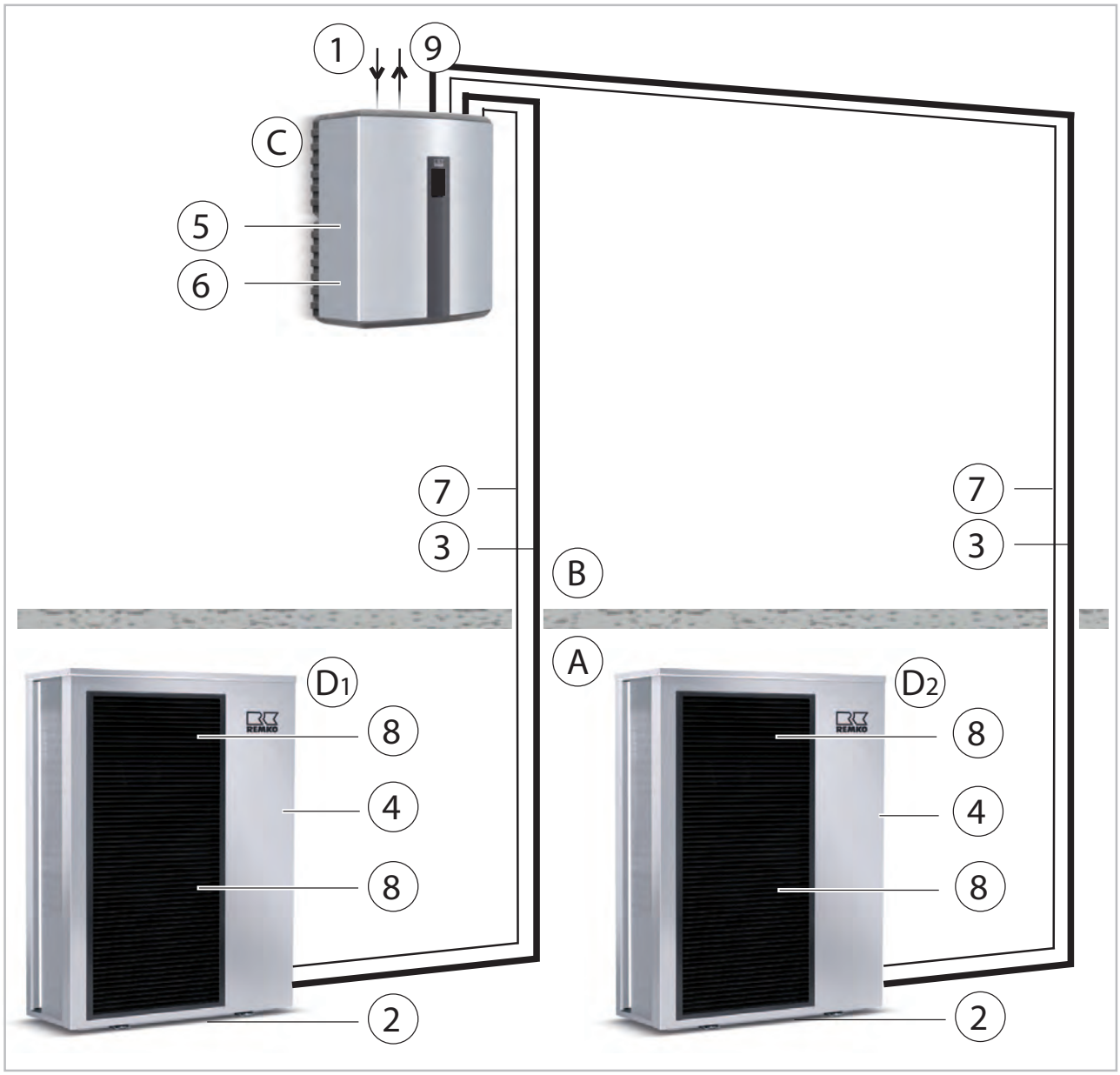


Fig. 17: System layout

A: Outdoor area
B: Indoor area
C: Indoor unit WKF 170 Duo
D1: Outdoor unit 1 WKF 170 Duo
D2: Outdoor unit 2 WKF 170 Duo
1: Common return flow
2: Condensate drain, outdoor unit (must contain anti-freeze!)
3: Refrigerant lines $^3/_8$" and $^3/_4$"
4: Outdoor unit power supply = 400V/3~/50Hz 3x16A (e.g. 5x1.5 mm^2)
5: Indoor unit power supply = 230V/1~/50Hz 16A (e.g. 3x1.5 mm^2)
6: Power supply for electrical auxiliary heater 9 kW (e.g. 5x2.5 mm^2)
7: Control line shielded (e.g. 2x1 mm^2)
8: Fan
9: Inlet for heating

3.3 Overview of electrical cables

WKF 130 Duo

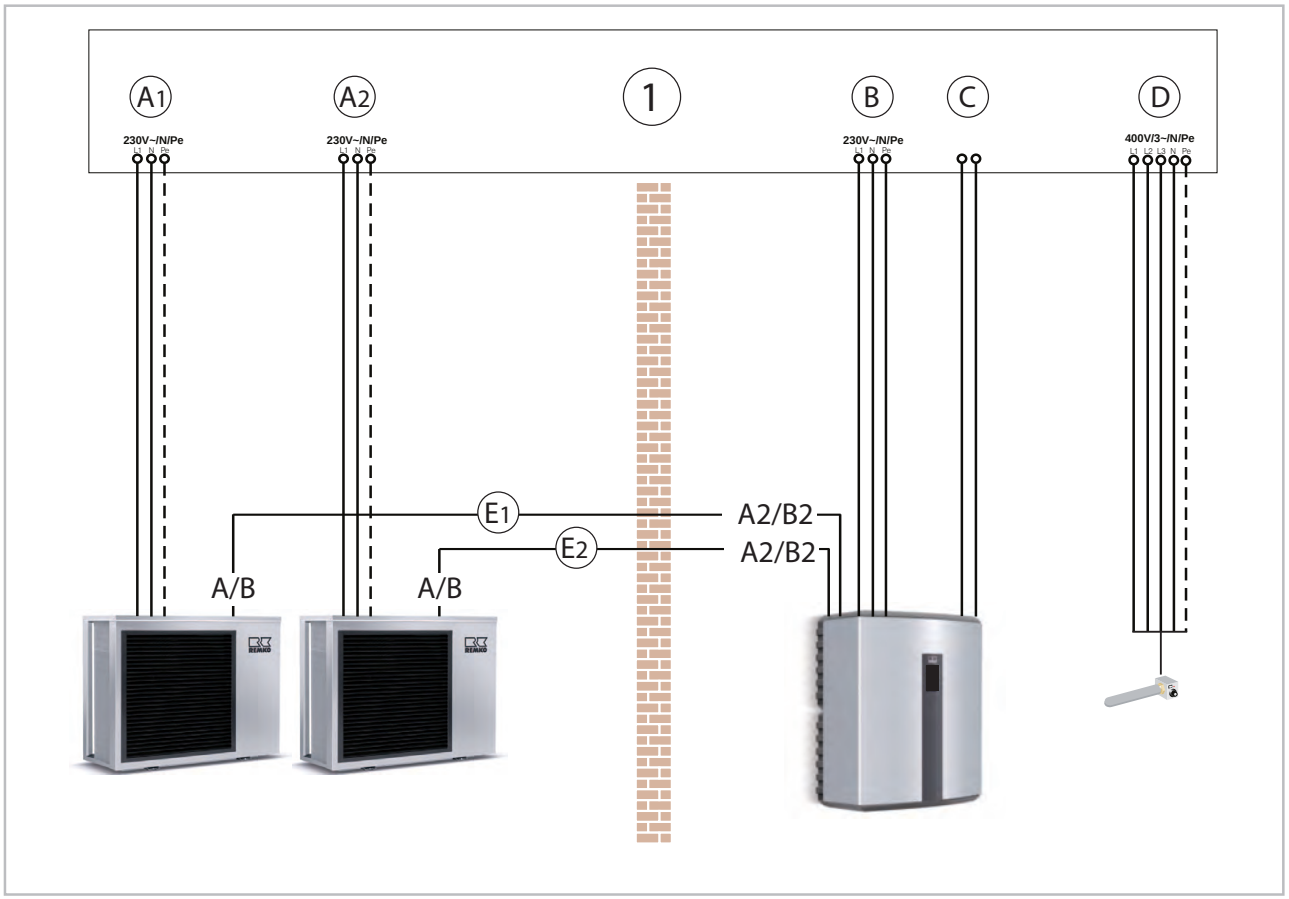


Fig. 18: Overview of electrical cables

1: Main distribution
A1: Power supply outdoor unit 1
A2: Power supply outdoor unit 2
B: Power supply indoor unit
C: Power utility disable signal, potential-free / open = AM locked
D: Power supply heating coil, 9 kW indoor unit

E1: Communication, 2x1 mm^2 sheathed
Outdoor unit 1 = terminal A/B
Indoor unit (I/O-module) = terminal A2/B2
E2: Communication, 2x1 mm^2 sheathed
Outdoor unit 2 = terminal A/B
Indoor unit (I/O-module) = terminal A2/B2

WKF 170 Duo

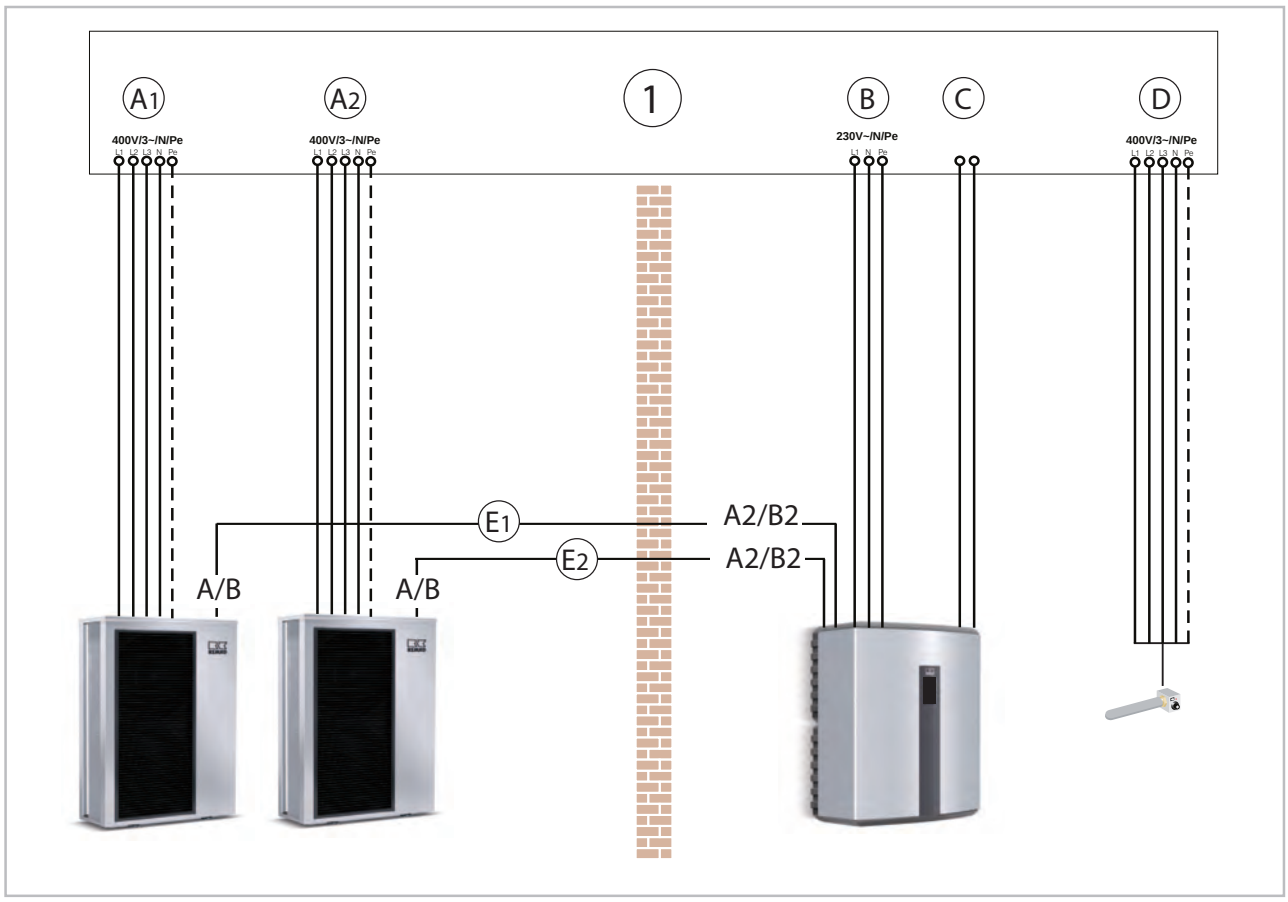


Fig. 19: Overview of electrical cables

1: Main distribution
A1: Power supply outdoor unit 1
A2: Power supply outdoor unit 2
B: Power supply indoor unit
C: Power utility disable signal, potential-free / open = AM locked
D: Power supply heating coil, 9 kW indoor unit

E1: Communication, 2x1 mm^2 sheathed
Outdoor unit 1 = terminal A/B
Indoor unit (I/O-module) = terminal A2/B2
E2: Communication, 2x1 mm^2 sheathed
Outdoor unit 2 = terminal A/B
Indoor unit (I/O-module) = terminal A2/B2

3.4 Electrical connection general notes

- It is necessary to lay a mains cable both to the outdoor unit and, separately, to the indoor unit.
- The indoor unit requires a single-phase 230V/1~/50 Hz power supply.
  The outdoor units of the WKF 130 Duo require a 230V/1~/50 Hz power supply.
  The outdoor units of the WKF 170 Duo require a three-phase 400V/3~/50 Hz power supply.
- The electrical connection between outdoor and indoor units is made using a sheathed two-wire control line.
- Where applicable, a separate power supply shall be provided to the indoor unit for the auxiliary heater (400V/3~/50Hz).
- Power to the indoor units may not be disconnected by the power company when fitted with an off-period circuit (anti-freeze protection).
- The heat-pump manager needs to know whether a power-company enable or off-period is in effect. A potential-free switch for the S16 must be provided by the customer for this purpose. (Contact closed signifies enabled, while contact open signifies a blocking period).
- Interrupting the power supply (hard shutdown) of the outdoor unit is advised against.
- A connection schematic along with corresponding circuit diagrams can be found in the “Electrical layout” and “Circuit plans” chapters of this manual.
- Special rates for the operation of heat pumps may be offered by the power utility.
- Ask your local power utility about the details of any rates that might be available.

DANGER!

All electrical installation work must be done by an electrician.

WARNING!

Always note the currently applicable VDE guidelines and the notes in TAB 2007. The size and type of the fuse are to be taken from the technical data.

WARNING!

All cable sizes are to be selected according to VDE 0100. Special attention should be given to cable lengths, cable type and the kind of installation. The information in the connection diagram and in the system overview are to be seen as an acceptable installation possibility only in a standard case!

NOTICE!

Make sure to connect the outdoor unit neutral connector properly, otherwise the varistors on the line-filter circuit board will be destroyed.

NOTICE!

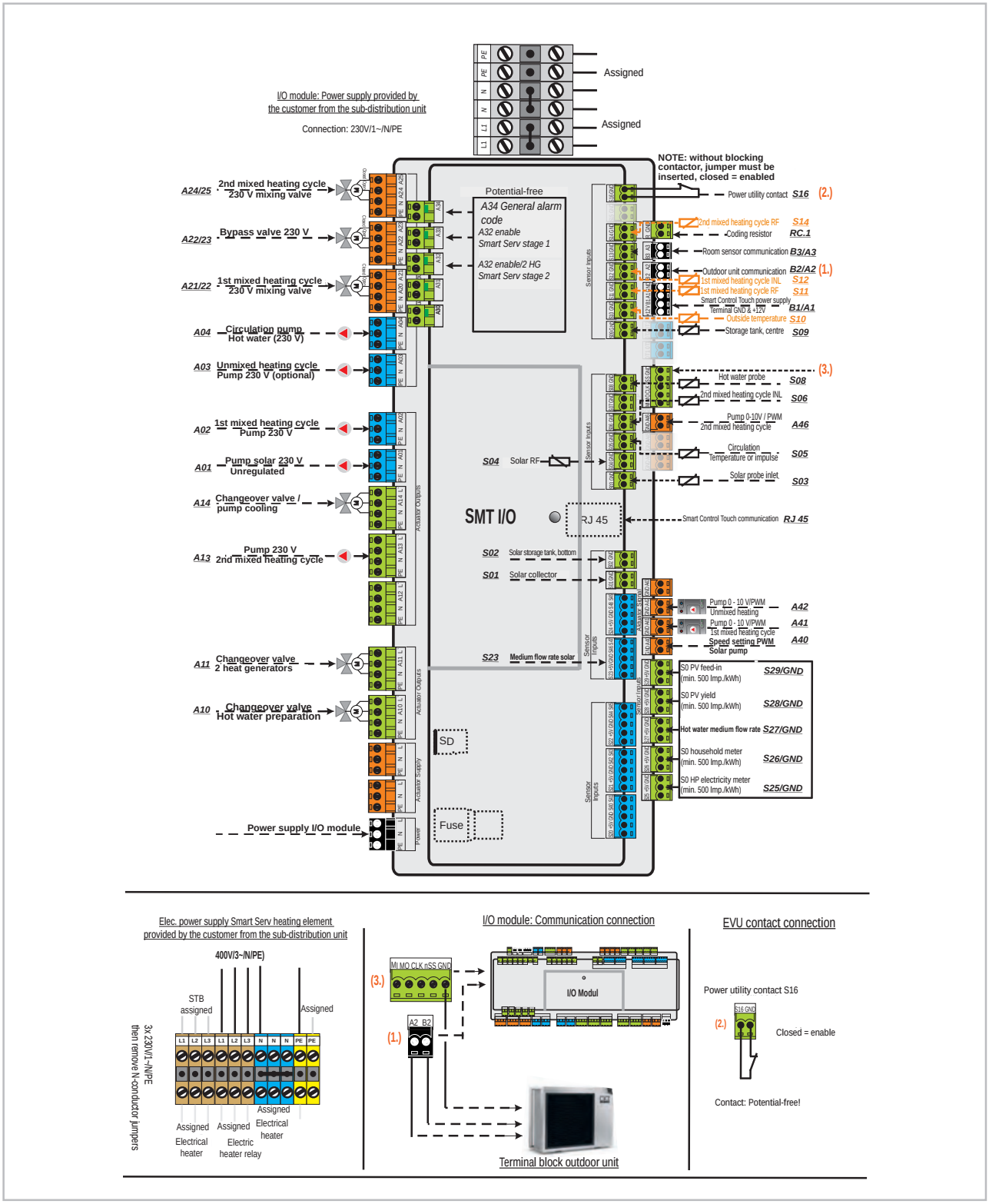
The electrical connection for the units must be made at a separate feedpoint with a residual current device in accordance with local regulations and should be laid out by an electrician.

Check all plugged and clamped terminals to verify that they are seated correctly and make permanent contact. Tighten as required.

Further information about the electrical wiring of the indoor and outdoor units can be found in the corresponding WKF/WKF compact series chapters.

3.5 Electrical configuration - I/O module 01 - WKF 130/170 Duo

Use wire gauge corresponding with the connection cable supplied!
Lay load lines separately to measuring lines!



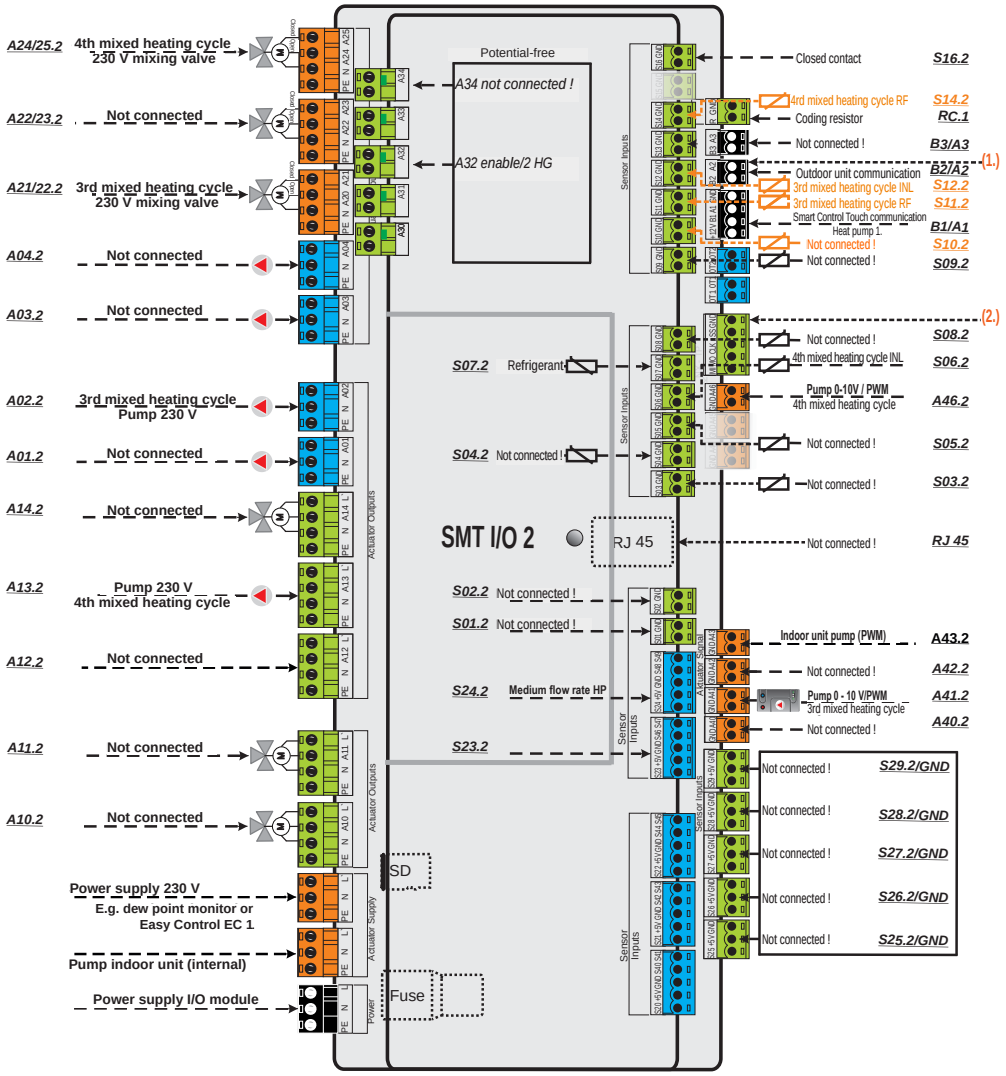
3.6 Terminal assignment / legend - I/O module 01 - WKF 130/170 Duo

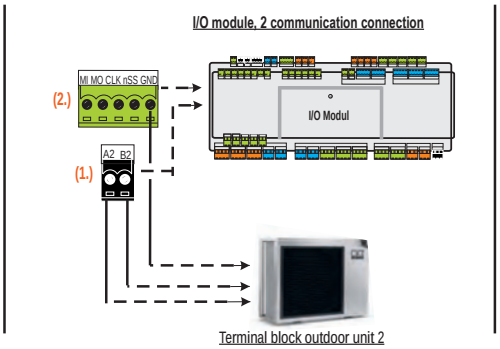
Designation	Input	Output	Signal	Description
Power	X			Power supply I/O 230V
PP		X		Power supply primary pump, indoor unit
S01.1	X			Solar probe collector
S02.1	X			Solar probe storage tank, bottom
S03.1	X			Solar probe inlet HM solar
S04.1	X			Solar probe RF HM solar
S05.1	X			Circulation RF temp./impulse
S06.1	X			2nd mixed heating cycle inlet probe
S07.1	X			Probe refrigerant piping
S08.1	X			Domestic hot-water tank
S09.1	X			Probe storage tank centre (storage energy acquisition)
S10.1	X			External probe
S11.1	X			1st mixed heating cycle RF probe
S12.1	X			1st mixed heating cycle inlet probe
S13.1	X			Heat pump inlet
S14.1	X			2nd mixed heating cycle RF probe
S15.1	X			Heat pump RF
S16.1	X			Energy supplier contact (NC) / dew point monitoring
S20.1	X			Not connected
S21.1	X			Not connected
S22.1	X			Not connected
S23.1	X			Ultrasonic flow rate meter Solar, pulse rate
S24.1	X			Ultrasonic flow rate meter HP, impulse rate
S25.1	X			HP electricity meter S0
S26.1	X			Household electricity S0
S27.1	X			Flow probe
S28.1	X			PV yield electricity meter S0
S29.1	X			PV in-feed electricity meter S0
A01.1		X		Solar pump unregulated (230V)
A02.1		X		1st mixed heating cycle pump (230V) switched
A03.1		X		Unmixed heating cycle pump (230V)
A04.1		X		Circulation pump (230V)
A10.1		X		Changeover valve, hot water preparation
A11.1		X		Changeover valve 2nd WE Smart BVT

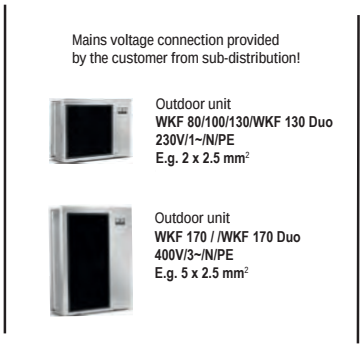
Designation	Input	Output	Signal	Description
A12.1		X		Not connected
A13.1		X		2nd mixed heating cycle pump (230V) switched
A14.1		X		Changeover valve / pump cooling (230V)
A20.1		X		1st mixed heating cycle mixer open (230V)
A21.1		X		1st mixed heating cycle mixing valve closed (230V)
A22.1		X		Bypass valve indoor unit closed (230V)
A23.1		X		Bypass valve indoor unit open (230V)
A24.1		X		2nd mixed heating cycle mixing valve open (230V)
A25.1		X		2nd mixed heating cycle mixing valve closed (230V)
A30.1		X		Non functional
A31.1		X		Non functional
A32.1		X		Enable 2nd WE booster heating or boiler
A33.1		X		Non functional
A34.1		X		Alarm codes
A40.1			X	Speed setting solar pump PWM
A41.1			X	Speed setting 1st mixed heating cycle (0-10V)
A42.1			X	Speed setting unmixed heating cycle (0-10V)
A43.1			X	Speed setting primary pump indoor unit (PWM)
A44.1			X	Not connected
A45.1			X	Not connected
A46.1			X	Pump second mixed heating cycle
MI				Non functional
MO				
CLK				
nSS				
GND				
OT 1 (2x)				Non functional
OT 2 (2x)				Non functional
B1, A1 +12 Volt, GND				Operating mod. SMT 1 and communic. I/0 module 2
B2 / A2				Communication outdoor module 1
B3 / A2				Non functional
RC.1				RC coding resistance WKF 130/170 Duo

3.7 Electrical configuration - I/O module 02 - WKF 130/170 Duo

Use wire gauge corresponding with the connection cable supplied!
Lay load lines separately to measuring lines!







3.8 Terminal assignment / legend - I/O module 02 - WKF 130/170 Duo

Designation	Input	Output	Signal	Description
Power	X			Power supply I/O 230V
PP		X		Power supply primary pump, indoor unit
S01.2	X			Not connected
S02.2	X			Not connected
S03.2	X			Not connected
S04.2	X			Not connected
S05.2	X			Not connected
S06.2	X			4th mixed heating cycle inlet probe
S07.2	X			Probe refrigerant piping
S08.2	X			Not connected
S09.2	X			Not connected
S10.2	X			Not connected
S11.2	X			3rd mixed heating cycle RF probe
S12.2	X			3rd mixed heating cycle inlet probe
S13.2	X			Heat pump inlet
S14.2	X			4th mixed heating cycle inlet probe
S15.2	X			Not connected
S16.2	X			Not connected
S20.2	X			Not connected
S21.2	X			Not connected
S22.2	X			Not connected
S23.2	X			Not connected
S24.2	X			Ultrasonic flow rate meter HP, impulse rate
S25.2	X			Not connected
S26.2	X			Not connected
S27.2	X			Not connected
S28.2	X			Not connected
S29.2	X			Not connected
A01.2		X		Not connected
A02.2		X		3rd mixed heating cycle pump (230V) switched
A03.2		X		Not connected
A04.2		X		Not connected
A10.2		X		Not connected
A11.2		X		Not connected

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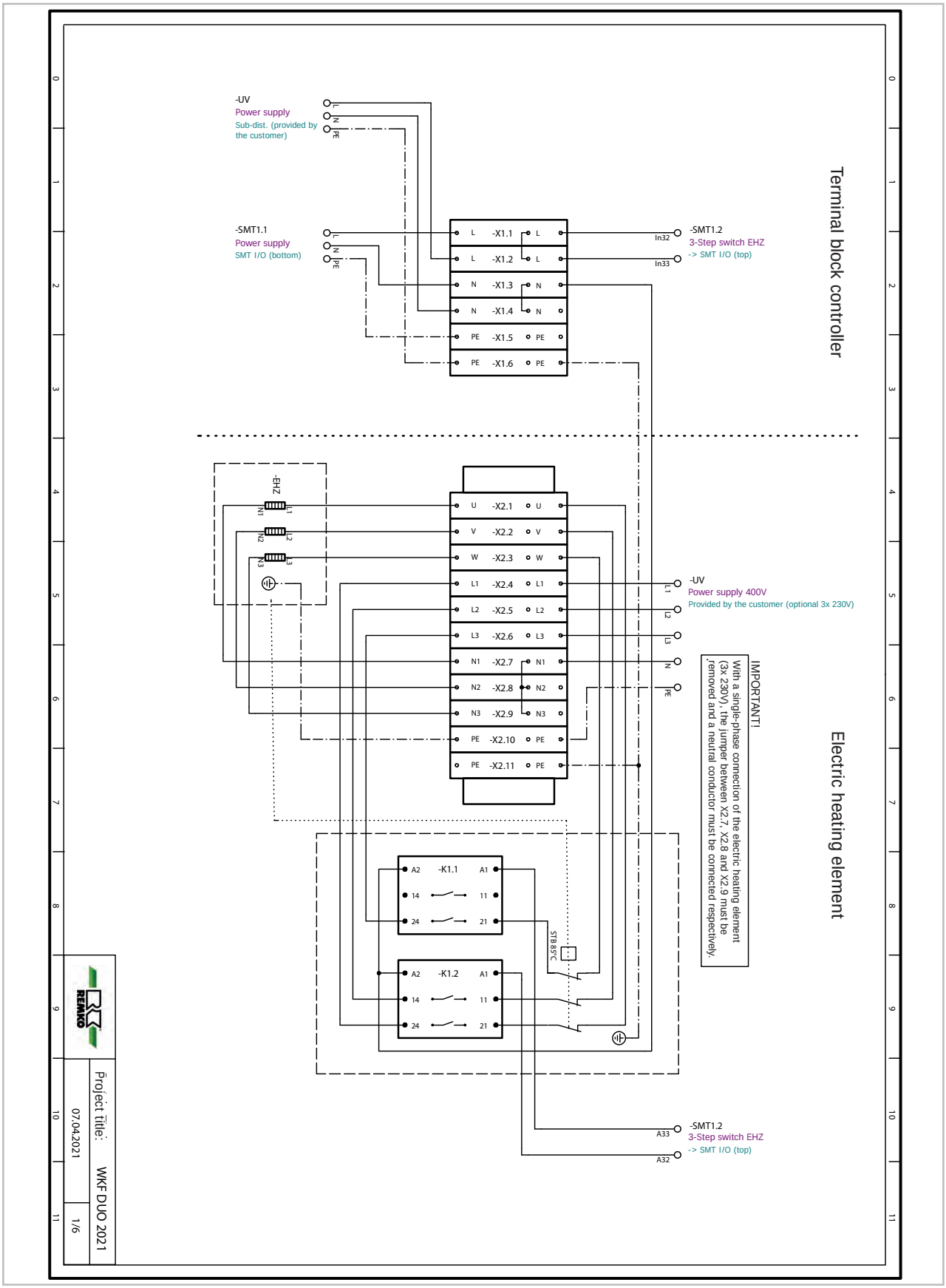
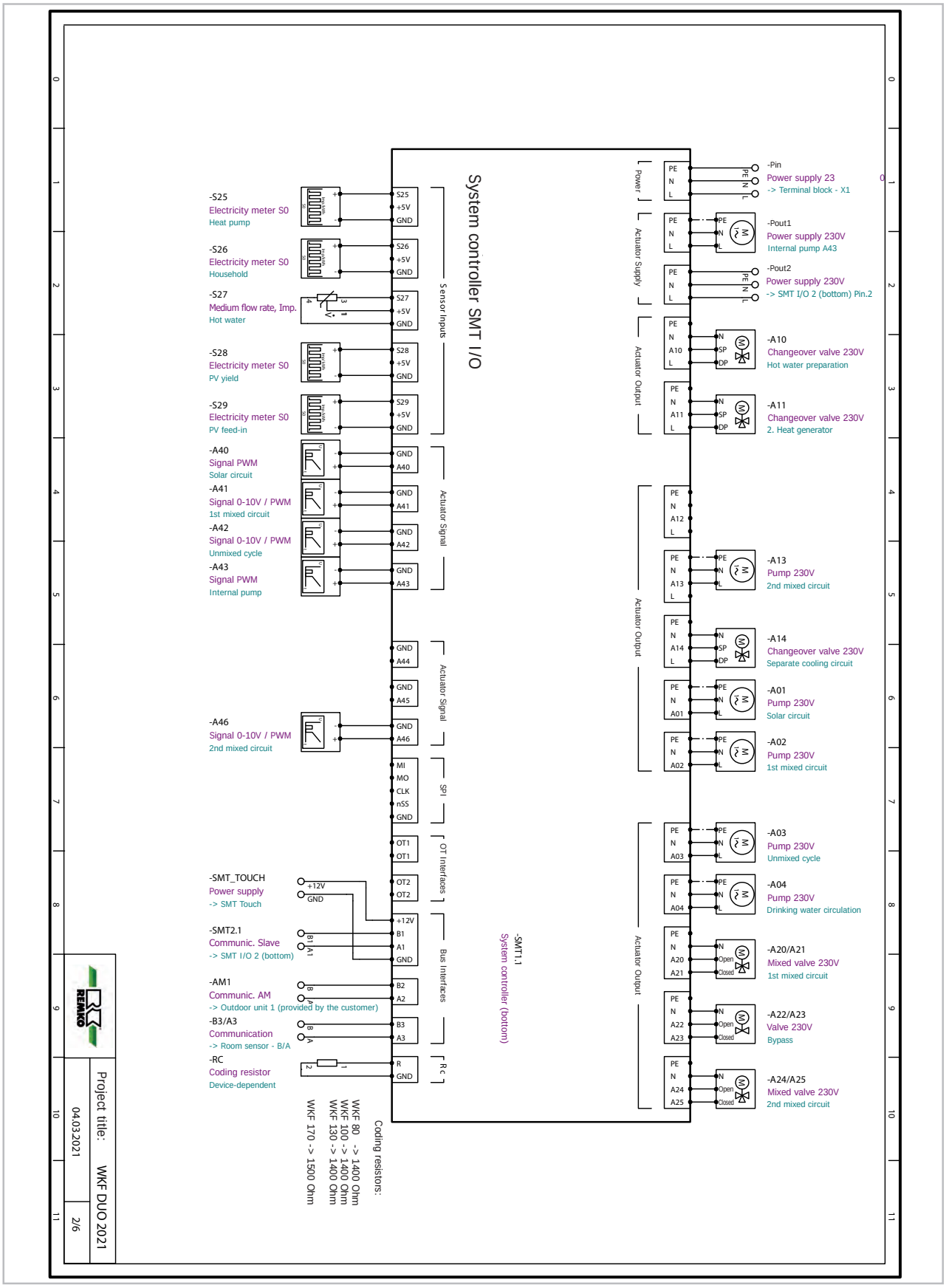
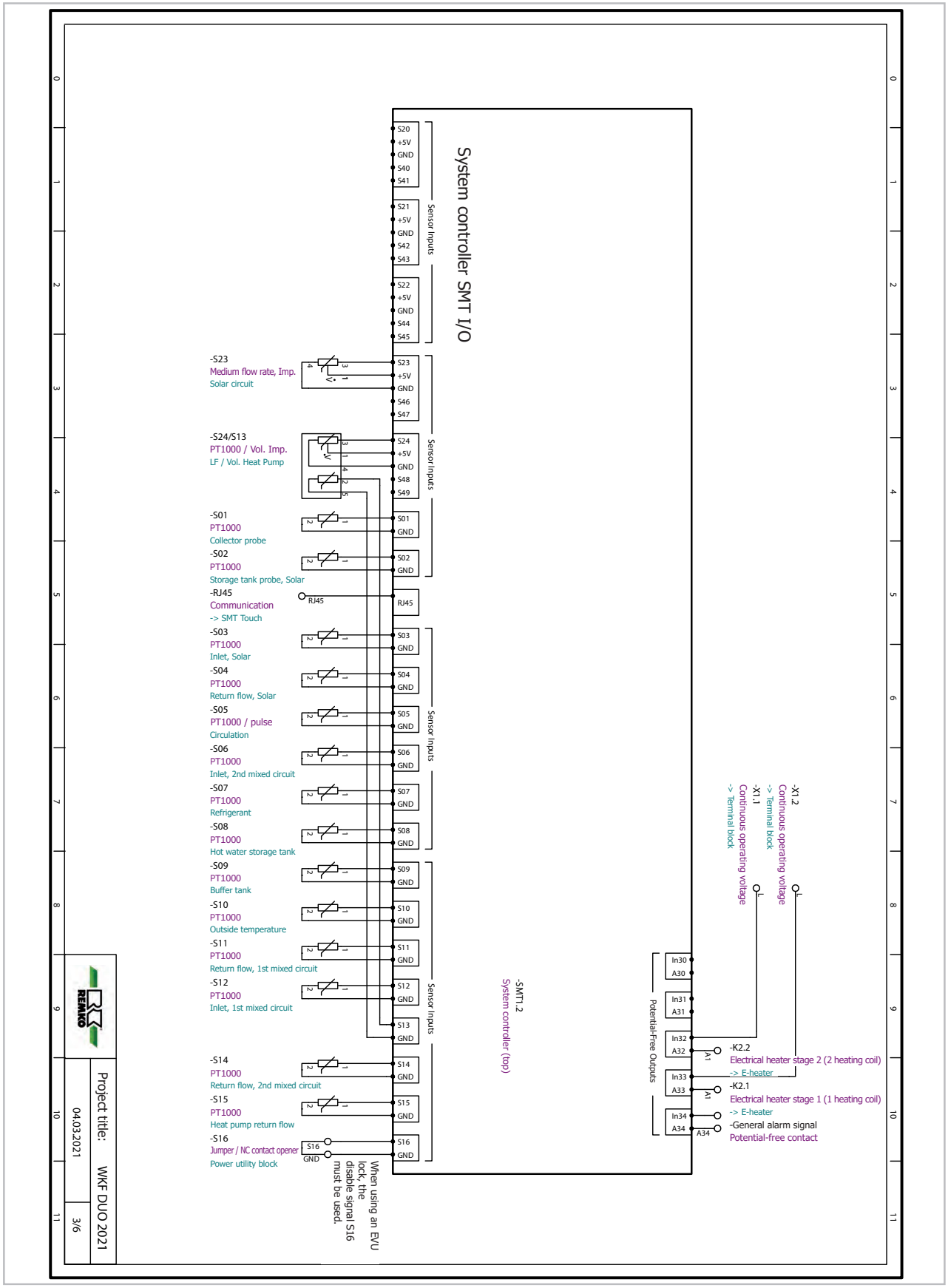
Designation	Input	Output	Signal	Description
A12.2		X		Not connected
A13.2		X		4th mixed heating cycle pump (230V) switched
A14.2		X		Not connected
A20.2		X		3rd mixed heating cycle mixing valve open (230V)
A21.2		X		3rd mixed heating cycle mixing valve closed (230V)
A22.2		X		Not connected
A23.2		X		Not connected
A24.2		X		4th mixed heating cycle mixing valve open (230V)
A25.2		X		4th mixed heating cycle mixing valve closed (230V)
A30.2		X		Not connected
A31.2		X		Not connected
A32.2		X		Not connected
A33.2		X		Not connected
A34.2		X		Not connected
A40.2			X	Not connected
A41.2			X	3rd mixed heating cycle pump (0-10V)
A42.2			X	Not connected
A43.2			X	Speed setting primary pump indoor unit (PWM) I/O-2
A44.2			X	Not connected
A45.2			X	Not connected
A46.2			X	4th mixed heating cycle pump (0-10V)
MI				Non functional
MO				
CLK				
nSS				
GND				
OT 1 (2x)				Non functional
OT 2 (2x)				Non functional
B1, A1 +12 Volt, GND				Communication I/O module 1
B2 / A2				Communication outdoor module 2
B3 / A2				Non functional
RC.2				RC coding resistance slave 1

3.9 WKF 130/170 Duo circuit diagram



REMKO WKF series




System controller SMT I/O
Sensor Inputs
S20
+5V
GND
S40
S41
S21
+5V
GND
S42
S43
S22
+5V
GND
S44
S45
-S23
Medium flow rate, Imp.
Solar circuit
S23
+5V
GND
S46
S47
-S24/S13
PT1000 / Vol. Imp.
LF / Vol. Heat Pump
S24
+5V
GND
S48
S49
-S01
PT1000
Collector probe
S01
GND
-S02
PT1000
Storage tank probe, Solar
S02
GND
-RJ45
Communication
-> SMT Touch
RJ45
RJ45
-S03
PT1000
Inlet, Solar
S03
GND
-S04
PT1000
Return flow, Solar
S04
GND
-S05
PT1000 / pulse
Circulation
S05
GND
-S06
PT1000
Inlet, 2nd mixed circuit
S06
GND
-S07
PT1000
Refrigerant
S07
GND
-S08
PT1000
Hot water storage tank
S08
GND
-S09
PT1000
Buffer tank
S09
GND
-S10
PT1000
Outside temperature
S10
GND
-S11
PT1000
Return flow, 1st mixed circuit
S11
GND
-S12
PT1000
Inlet, 1st mixed circuit
S12
GND
S13
GND
-S14
PT1000
Return flow, 2nd mixed circuit
S14
GND
-S15
PT1000
Heat pump return flow
S15
GND
-S16
Jumper / NC contact opener
Power utility block
S16
GND
S16
GND
When using an EVU lock, the disable signal S16 must be used.
-SMT1.2
System controller (top)
Potential-Free Outputs
In30
A30
In31
A31
In32
A32
A1
-K2.2
Electrical heater stage 2 (2 heating coil)
-> E-heater
In33
A33
A1
-K2.1
Electrical heater stage 1 (1 heating coil)
-> E-heater
In34
A34
A34
-General alarm signal
Potential-free contact
-X1.2
Continuous operating voltage
-> Terminal block
-X1.1
Continuous operating voltage
-> Terminal block
Project title: WKF DUO 2021
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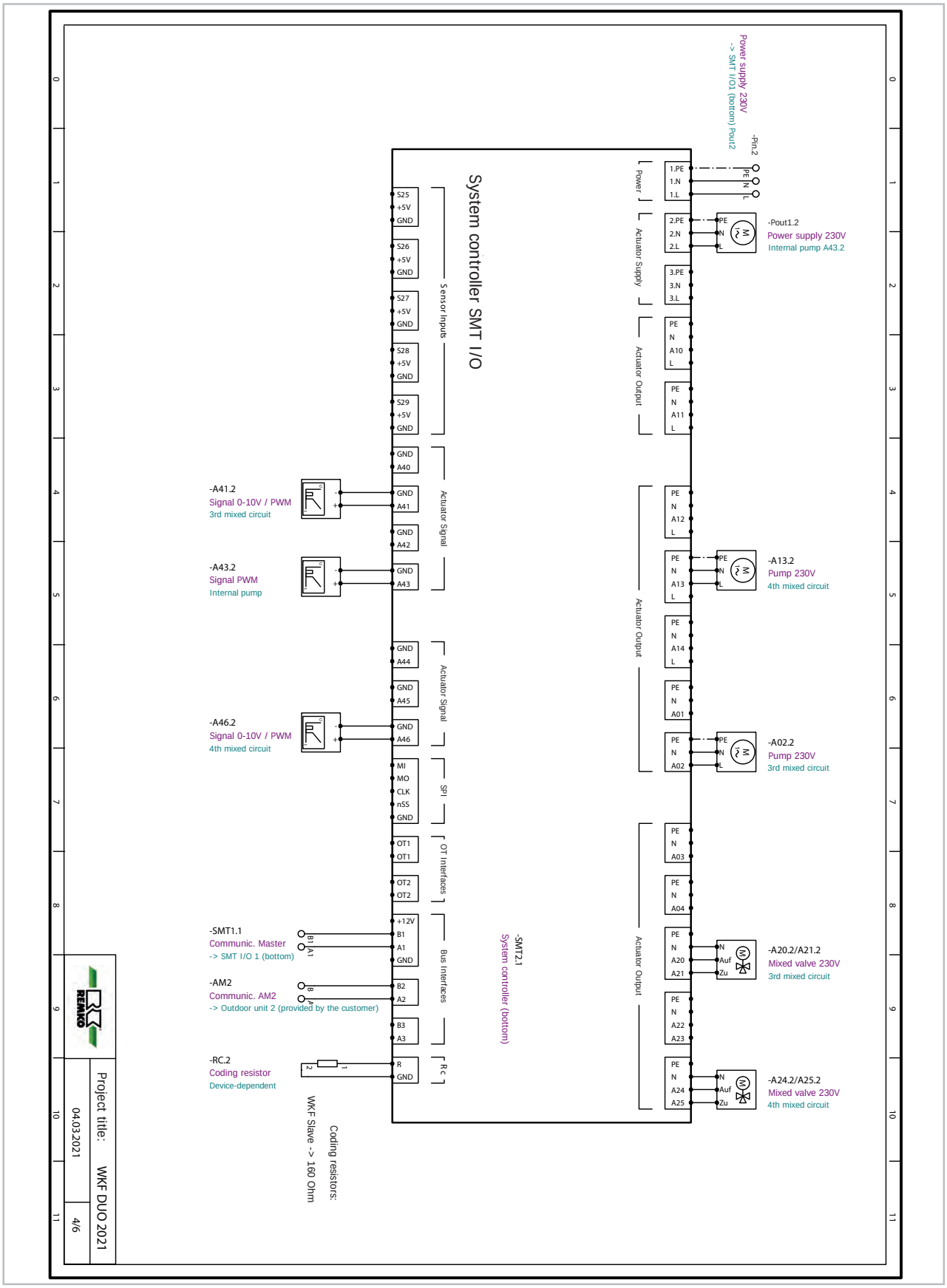

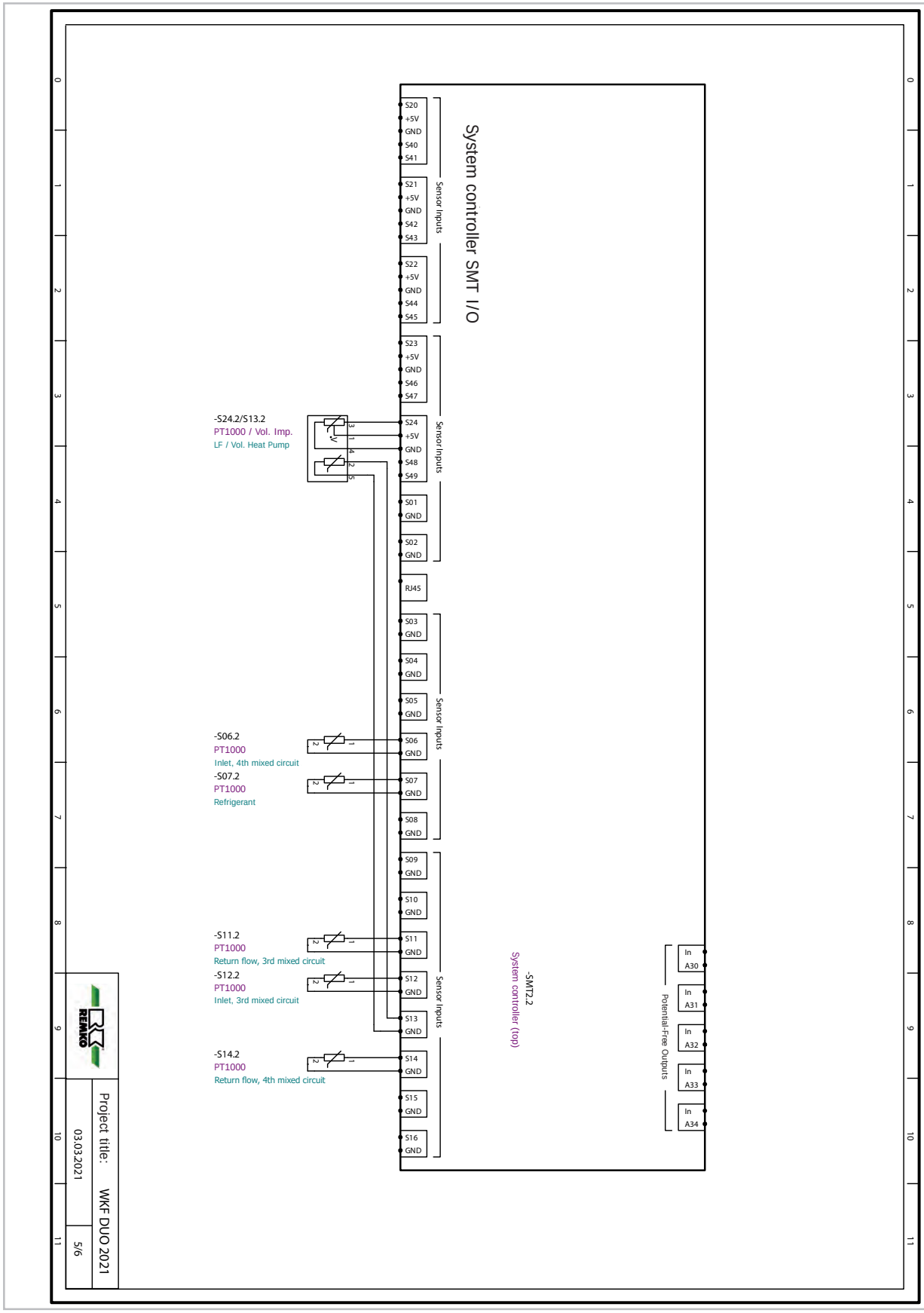
System controller SMT I/O
-SMT2.2
System controller (top)
Sensor Inputs
Potential-Free Outputs
S20
+5V
GND
S40
S41
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In A30
In A31
In A32
In A33
In A34
-S24.2/S13.2
PT1000 / Vol. Imp.
LF / Vol. Heat Pump
-S06.2
PT1000
Inlet, 4th mixed circuit
-S07.2
PT1000
Refrigerant
-S11.2
PT1000
Return flow, 3rd mixed circuit
-S12.2
PT1000
Inlet, 3rd mixed circuit
-S14.2
PT1000
Return flow, 4th mixed circuit
Project title: WKF DUO 2021
03.03.2021
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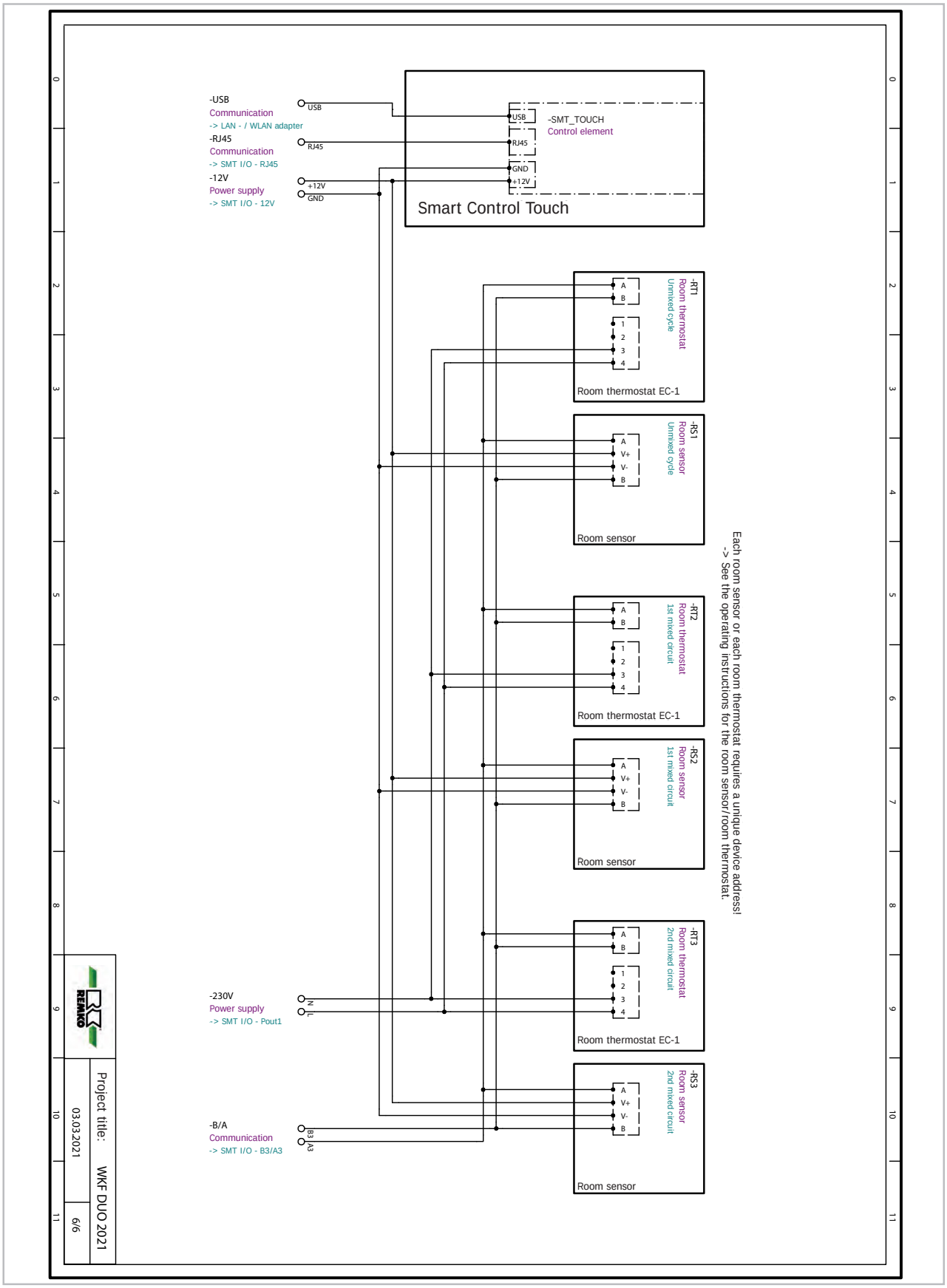
REMKO WKF series



Legend for the circuit diagrams

Abbreviations:

E-heater:	Electric heating element
EHZ:	Electric heating element
EVU:	Electrical power company / power utility
Gem.:	Mixed
HC:	Heating cycle
HTG:	Heating
Imp.:	Impulse
PV:	Photovoltaic
PWM:	Pulse width modulation
RL:	Return flow
Unmixed	Unmixed
Sub-dist:	sub-distribution
VL:	Inlet
Vol.:	Medium flow rate
Circ.:	Circulation

4 Resistances of the temperature probes

Evaporator probe, suction gas probe, air inlet probe

Temp. (°C)	Resistance (K)	Temp. (°C)	Resistance (K)
-20	37, 4111	12	8, 4377
-19	35, 5384	13	8, 0925
-18	33, 7705	14	7, 7635
-17	32, 1009	15	7, 4498
-16	30, 5237	16	7, 1506
-15	29, 0333	17	6, 8652
-14	27, 6246	18	6, 5928
-13	26, 2927	19	6, 3328
-12	25, 0330	20	6, 0846
-11	23, 8412	21	5, 8475
-10	22, 7133	22	5, 6210
-9	21, 6456	23	5, 4046
-8	20, 6345	24	5, 1978
-7	19, 6768	25	5, 0000
-6	18, 7693	26	4, 8109
-5	17, 9092	27	4, 6300
-4	17, 0937	28	4, 4569
-3	16, 3203	29	4, 2912
-2	15, 5866	30	4, 1327
-1	14, 8903	31	3, 9808
0	14, 2293	32	3, 8354
1	13, 6017	33	3, 6961
2	13, 0055	34	3, 5626
3	12, 4391	35	3, 4346
4	11, 9008	36	3, 3120
5	11, 3890	37	3, 1943
6	10, 9023	38	3, 0815
7	10, 4393	39	2, 9733
8	9, 9987	40	2, 8694
9	9, 5794	41	2, 7697
10	9, 1801	42	2, 6740
11	8, 7999	43	2, 5821
44	2, 4939	56	1, 6663
45	2, 4091	57	1, 6131
46	2, 3276	58	1, 5618
47	2, 2493	59	1, 5123
48	2, 1740	60	1, 4647
49	2, 1017	61	1, 4188
50	2, 0320	62	1, 3746
51	1, 9651	63	1, 3319
52	1, 9007	64	1, 2908
53	1, 8387	65	1, 2511
54	1, 7790	66	1, 2128
55	1, 7216		

Heat gas probe

Temp. (°C)	Resistance (K)	Temp. (°C)	Resistance (K)
-30	866.96	-10	274.78
-29	815.70	-9	260.40
-28	767.71	-8	246.85
-27	722.87	-7	234.08
-26	680.87	-6	222.02
-25	641.59	-5	210.69
-24	604.82	-4	199.98
-23	570.34	-3	189.86
-22	538.03	-2	180.34
-21	507.74	-1	171.33
-20	479.34	0	162.81
-19	452.68	1	154.78
-18	427.67	2	147.19
-17	404.17	3	140.00
-16	382.11	4	133.21
-15	361.35	5	126.79
-14	341.86	6	120.72
-13	323.53	7	114.96
-12	306.29	8	109.51
-11	290.06	9	104.34

Heat gas probe (continued)

Temp. (°C)	Resistance (K)	Temp. (°C)	Resistance (K)
10	99.456	45	21.773
11	94.826	46	20.935
12	90.426	47	20.134
13	86.262	48	19.368
14	82.312	49	18.635
15	78.561	50	17.932
16	75.001	51	17.260
17	71.625	52	16.616
18	68.416	53	16.001
19	65.368	54	15.410
20	62.474	55	14.844
21	59.719	56	14.302
22	57.104	57	13.782
23	54.620	58	13.284
24	52.253	59	12.807
25	50.000	60	12.348
26	47.857	61	11.909
27	45.817	62	11.487
28	43.877	63	11.083
29	42.027	64	10.694
30	40.265	65	10.321
31	38.585	66	9.9628
32	36.987	67	9.6187
33	35.462	68	9.2882
34	34.007	69	8.9706
35	32.619	70	8.6655
36	31.297	71	8.3723
37	30.034	72	8.0903
38	28.827	73	7.8193
39	27.677	74	7.5586
40	26.578	75	7.3077
41	25.528	76	7.0667
42	24.524	77	6.8345
43	23.566	78	6.6109
44	22.648	79	6.3960

Temp. (°C)	Resistance (K)	Temp. (°C)	Resistance (K)
80	6.1890	115	2.1522
81	5.9894	116	2.0934
82	5.7976	117	2.0365
83	5.6126	118	1.9814
84	5.4346	119	1.9280
85	5.2629	120	1.8764
86	5.0974	121	1.8263
87	4.9379	122	1.7778
88	4.7842	123	1.7308
89	4.6359	124	1.6852
90	4.4931	125	1.6411
91	4.3552	126	1.5983
92	4.2222	127	1.5567
93	4.0939	128	1.5165
94	3.9700	129	1.4774
95	3.8506	130	1.4396
96	3.7351	131	1.4028
97	3.6238	132	1.3672
98	3.5162	133	1.3327
99	3.4123	134	1.2991
100	3.3120	135	1.2665
101	3.2150	136	1.2349
102	3.1214	137	1.2042
103	3.0310	138	1.1744
104	2.9435	139	1.1455
105	2.8589	140	1.1174
106	2.7772	141	1.0901
107	2.6982	142	1.0636
108	2.6218	143	1.0379
109	2.5479	144	1.0128
110	2.4764	145	0.9886
111	2.4072	146	0.9649
112	2,3403,	147	0.942
113	2.2755	148	0.9197
114	2.2128	149	0.898

REMKO WKF series

Heat gas probe (continued)

Temp. (°C)	Resistance (K)	Temp. (°C)	Resistance (K)
150	0.8769	185	0.4054
151	0.8564	186	0.3972
152	0.8364	187	0.3892
153	0.817	188	0.3814
154	0.7982	189	0.3738
155	0.7798	190	0.3664
156	0.7620	191	0.3591
157	0.7446	192	0.352
158	0.7277	193	0.3451
159	0.7112	194	0.3383
160	0.6952	195	0.3317
161	0.6796	196	0.3253
162	0.6645	197	0.319
163	0.6497	198	0.3128
164	0.6353	199	0.3068
165	0.6213	200	0.3009
166	0.6077	201	0.2952
167	0.5944	202	0.2896
168	0.5814	203	0.2841
169	0.5688	204	0.2787
170	0.5566	205	0.2735
171	0.5446	206	0.2684
172	0.5329	207	0.2634
173	0.5216	208	0.2585
174	0.5105	209	0.2537
175	0.4997	210	0.2491
176	0.4892	211	0.2445
177	0.4789	212	0.2400
178	0.4689	213	0.2357
179	0.4591	214	0.2314
180	0.4496	215	0.2272
181	0.4403	216	0.2231
182	0.4313	217	0.2191
183	0.4225	218	0.2152
184	0.4138	219	0.2114
220	0.2076	236	0.1574
221	0.204	237	0.1548
222	0.2004	238	0.1522
223	0.1969	239	0.1497
224	0.1934	240	0.1472
225	0.1901	241	0.1448
226	0.1868	242	0.1425
227	0.1836	243	0.1401
228	0.1804	244	0.1379
229	0.1773	245	0.1356
230	0.1743	246	0.1335
231	0.1713	247	0.1313
232	0.1684	248	0.1292
233	0.1656	249	0.1272
234	0.1628	250	0.1252
235	0.1601		

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REMKO WKF series

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