an ideal tomorrow

Operating Manual

Wall-mounted controller WR 2.1

Accessory for heat pumps

UK

www.aitgroup.com

83058800gUK

Table of contents

1 About this operating manual

This operating manual is part of the unit.

► Before working on or with the unit, read the operating manual carefully and follow it for all activities at all times, especially the warnings and safety instructions.

► Keep the operating manual to hand at the unit and pass on to the new owner if the unit changes hands.

► If you have any questions or anything is unclear, ask the manufacturer's local partner or the factory's customer service.

► Note and follow all other reference documents.

1.1 Validity

This operating manual refers solely to the unit identified by the nameplate.

1.2 Reference documents

The following documents contain additional information to this operating manual:

- Planning & design manual, hydraulic integration
- Operating manual of the heat pump
- Operating manual of the heating and heat pump controller
- Brief description of the heat pump controller
- Operating manual of the expansion board (accessory)
- Logbook

1.3 Symbols and markings

Identification of warnings

Symbol	Meaning
	Safety-relevant information. Warning of physical injuries.
	Safety-relevant information. Warning of physical injuries. Flammable materials / flammable (primary) refrigerant
	Safety-relevant information. Warning of physical injuries. Flammable materials / flammable (primary) refrigerant
	Safety-relevant information. Warning of physical injuries. Danger of fatal injury due to electric current.
DANGER	Indicates imminent danger resulting in severe injuries or death.
WARNING	Indicates a potentially dangerous situation, which can result in severe injuries or death.
CAUTION	Indicates a potentially dangerous situation, which can result in moderate or minor injuries.
IMPORTANT	Indicates a potentially dangerous situation, which can result in property damage.

Symbols in the document

Symbol	Meaning
	Information for qualified personnel
	Information for the owner/operator
✓	Requirement for action
▶	Procedural instructions: Single step action prompt
1., 2., 3., …	Procedural instructions: Numbered step within a multi-step action prompt. Keep to the given order.
	Additional information, e.g. a tip on making work easier, information on standards
→	Reference to further information elsewhere in the operating manual or in another document
●	Listing
	Secure connections against twisting

1.4 Contact

Addresses for purchasing accessories, for service cases or for answers to questions about the unit and this operating manual can be found on the internet and are kept up-to-date:

- www.aitgroup.com

2 Safety

Only use the unit when it is in flawless technical condition and only use it as intended, safely and aware of the hazards, and follow this operating manual.

2.1 Intended use

The unit is designed for household use and, combined with a compatible air/water heat pump, is solely intended for the following purposes

- Heating
- Domestic hot water preparation
- Cooling (flow temperature of down to 7 °C)

► Intended use includes complying with the operating conditions (→ “Technical data / Scope of supply”, page 11) and the operating manual and observing and following the reference documents.

► When using the local regulations note: laws, standards, guidelines, directives.

All other uses of the unit are not as intended.

2.2 Personnel qualifications

The operating manuals supplied with the product are intended for all users of the product.

The operation of the product via the heating and heat pump control and work on the product which is intended for end customers / operators is suitable for all age groups of persons who are able to understand the activities and the resulting consequences and can carry out the necessary activities.

Children and adults who are not experienced in handling the product and do not understand the necessary activities and the resulting consequences must be instructed and, if necessary, supervised by persons experienced in handling the product and who are responsible for safety.

Children must not play with the product.

The product may only be opened by qualified personnel.

All procedural instructions in this operating manual is solely directed at qualified, skilled personnel.

Only qualified, skilled personnel are able to carry out the work on the unit safely and correctly. Interference by unqualified personnel can cause life-threatening injuries and damage to property.

► Ensure that the personnel is familiar with the local regulations, especially those on safe and hazard-aware working.

► Ensure that the personnel are qualified to handle flammable (primary) refrigerant.

- Work on the refrigerating circuit may only be carried out by qualified personnel with appropriate qualifications for refrigeration system installation.
- Work on the electrics and electronics may only be carried out by electrical technicians.
- Any other work on the system may only be carried out by qualified personnel (heating installer, plumbing installer).

During the warranty and guarantee period, service work and repairs may only be carried out by personnel authorised by the manufacturer.

2.3 Personal protective equipment

During transport and work on the unit, there is a risk of cuts due to the sharp edges of the unit.

► Wear cut-resistant protective gloves.

During transport and work on the unit, there is a risk of foot injuries.

► Wear safety shoes.

When working on liquid-conveying lines, there is a risk of injury to the eyes due to leakage of liquids.

► Wear safety goggles.

2.4 Residual risks

Injuries caused by electric shock

Components in the unit are energised with life-threatening voltage. Before working on the unit:

► Disconnect unit from power supply.

► Secure unit against being switched back on again.

Existing earthing connections within housings or on mounting plates must not be altered. If this should nevertheless be necessary in the course of repair or assembly work:

► Restore earthing connections to their original condition after completion of the work.

Safety instructions and warning symbols

► Observe the safety instructions and warning symbols on the packaging and on and in the unit.

3 Operation and maintenance

NOTE
The unit is operated via the control panel of the heating and heat pump controller (→ operating manual of the heating and heat pump controller).

3.1 Energy and environmentally-conscious operation

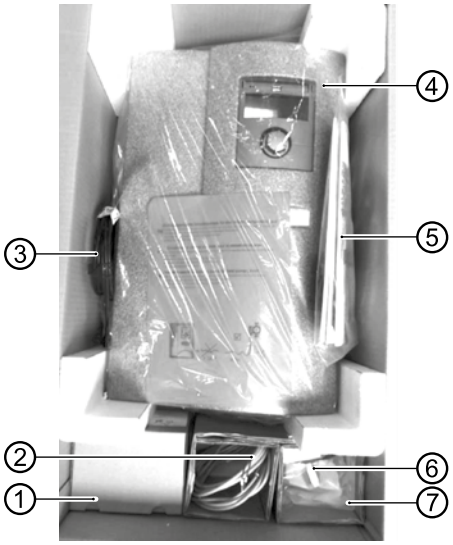
The generally accepted requirements for an energy-conscious and environmentally-conscious operation of a heating system also apply to use of a heat pump. The most important measures include:

- No unnecessarily high flow temperature
- No unnecessarily high domestic hot water temperature
- Do not open windows with just a gap or tilt open (continuous ventilation); instead, open wide for a short time (shock ventilation).
- Always ensure that the controller settings are correct

3.2 Maintenance

Wipe down the outside of the unit only using a damp cloth or cloth with mild cleaning agent (washing-up liquid, neutral cleaning agent). Do not use any harsh, abrasive, acid or chlorine-based cleaning products

4 Scope of supply



1 Box with recirculating pump
2 2x insertion sensors
3 Pump cable
4 Wall-mounted controller with control panel
5 Operating manual, installation materials
6 Outdoor sensor
7 Thermal compound

1. Check the delivery for outwardly visible signs of damage.
2. Check the scope of supply for completeness. Any defects or incorrect deliveries must be reported immediately.

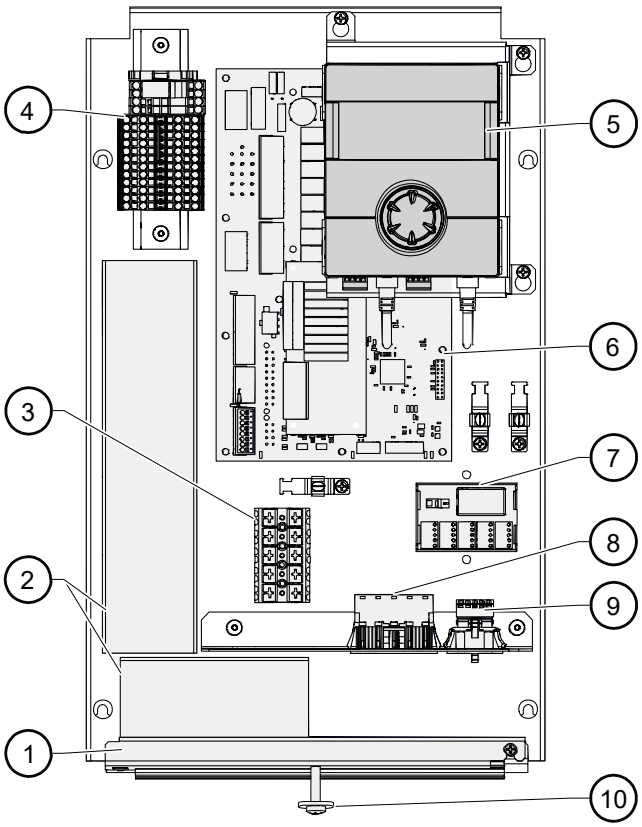
- Outdoor sensor
- Recirculating pump with seals
- Supply sensor, 6 m cable
- Return sensor, 6 m cable
- Load and signal cable for recirculating pump (5 m each, it is not permitted to extend the cable).
- Thermal compound
- Fasteners for sensors

4.1 Accessories

The following accessories are available for the unit through the manufacturer's local partner:

- Expansion board with various additional functions
- Room control unit for controlling the main functions from the living room
- Electrical connection kit EVS or EVS 8
- Domestic hot water tank
- Buffer tank
- Immersion heater

4.2 Components of the unit



1 Cable entry with clamp
2 Cable glands
3 Device connection terminals
4 Connection terminals load cable / control voltage
5 Control panel
6 Circuit board of heating and heat pump control
7 Modbus hub distributor
8 Load cable connection socket *)
9 Bus cable connection socket *)
10 Closure of the unit front hood

*) for accessories electrical connection kit EVS or EVS 8

Nameplate

A nameplate is attached to the outside of the unit at the factory.

The nameplate contains the following information at the very top:

- Model, item number
- Serial number

The nameplate also contains an overview of the most important technical data.

5 Storage, transport, installation

5.1 Storage

► Store unit protected against:

- Moisture/damp
- Frost
- Dust and dirt

5.2 Transport and unpacking

Notes on safe transport

There is a risk of injuries or damage to property if the unit falls or overturns.

NOTE
To prevent damage during transport, always transport the unit to final installation location in its original packaging.

Carrying the unit

► Transport the wall-mounted controller to the installation location.

Unpacking

1. Remove plastic films and cardboard. Ensure that you do not damage the unit.
2. Dispose of the transport and packaging material in an environmentally friendly way and in accordance with local regulations.

5.3 Installation

Installation location

IMPORTANT
Install the unit inside buildings only.

The installation area must be frost-free and dry. It must fulfil the relevant local regulations.

Observe safety and service clearances.

→ “Installation plan“, page 13, and “Dimensioned drawings“, page 12

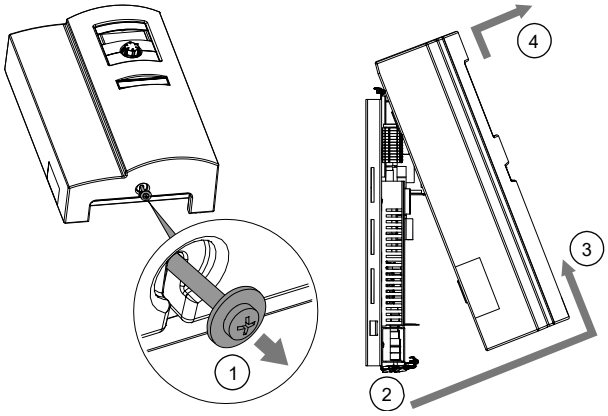
Assembly

IMPORTANT
The load-bearing capacity of the wall must be guaranteed.

1. Align drill pattern, mark drill holes and drill.

→ “Drill pattern“, page 12

2. Take off the front hood.



3. Set aside the front hood so that it is protected from damage.

4. Use the plugs and screws supplied to fix the wall-mounted controller onto the wall:

The plugs supplied are only suitable for use with the following types of walls:

- Concrete
- Solid lightweight concrete blocks
- Cavity block made of lightweight concrete
- Cellular concrete
- Prestressed concrete - hollow ceiling/floor slabs
- Natural stone with dense, close-grained microstructure
- Solid calcium silicate blocks
- Perforated calcium silicate blocks
- Solid bricks
- Vertically perforated (honeycomb) bricks
- Hollow floors/ceilings made of clay bricks, concrete or similar
- Solid gypsum boards
- Gypsum boards and gypsum fibre boards
- Particle boards

The board material must be dimensioned with sufficient thickness to ensure secure fixing.
Appropriate fixing material must be provided on site for other types of wall constructions.

IMPORTANT
The gap between the unit and the wall helps back ventilation. It may not be sealed or closed off.

5. Lay cable glands at a distance of at least 2 cm from the wall-mounted controller.

6 Install the hydraulic connections

IMPORTANT
Avoid open heating systems and / or heating systems that are not oxygen diffusion-tight.
If this is not possible, a system separation must be installed.

Depending on the dimensioning of the heat exchanger and the additionally required circulation pump, the system separation worsens the energy efficiency of the system.

IMPORTANT
Dirt and deposits in the (existing) hydraulic system can cause damage to the heat pump.

► Ensure that a air / magnetic sludge separator is installed in the heating circuit.

► Rinse the hydraulic system thoroughly prior to establishing the hydraulic connection of the heat pump.

✓ Cross-sections and lengths of the pipes for the heating circuit are adequately dimensioned.

✓ The free pressing of the recirculating pump produces at least the minimum throughput required for the unit type (→ “Technical data / Scope of supply”, page 11).

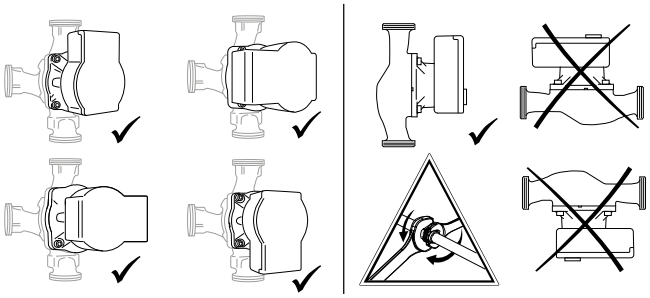
6.1 Circulation pump

NOTE
Install shut-off devices in front of and behind the circulation pump to facilitate pump replacement when required.

IMPORTANT
Maintain a settling section (straight piping) of at least 5 x DN of the pump flange in front of and behind the circulation pump.

1. Install the circulation pump in the heating circuit return to the heat pump inside the building.

   Permitted installation positions:



2. Carry out electrical connection work on the circulation pump.

→ Installation manual of the circulation pump

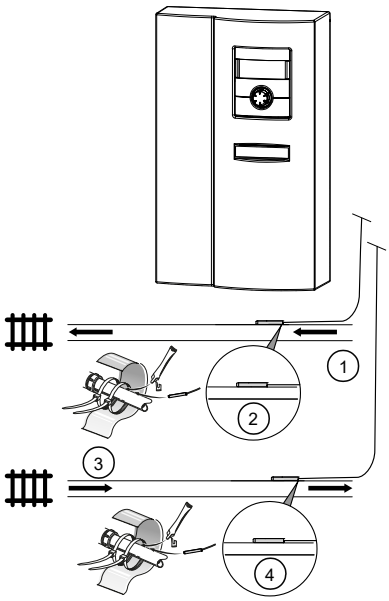
3. Lay the power and signal cables to the wall-mounted controller.

IMPORTANT
Do not shorten the power and signal cables.

NOTE
The minimum pressure loss (Δpmin) of the system should be 0.01 bar at 0.17 m³/h to ensure effective control of the circulating pump.

6.2 Supply and return sensor

1. Fasten the supply volumetric flow meter (②) to the heat-conducting pipe of the supply line coming from the heat pump (①) using cable ties and thermal compound.
2. Fasten the return sensor (④) to the heat-conducting pipe of the return line leading to the heat pump (③) using cable ties and thermal compound.



→ Hydraulic integration documents

3. Lay both sensor cables to the wall-mounted controller.

6.3 Outdoor sensor

→ Operating manual of the heating and heat pump controller, part 2

7 Electrical installation

7.1 Connect the electrical cables

IMPORTANT
Irreparable damage to the compressor due to wrong rotating field!

► Ensure that there is a clockwise rotating field for the compressor load infeed.

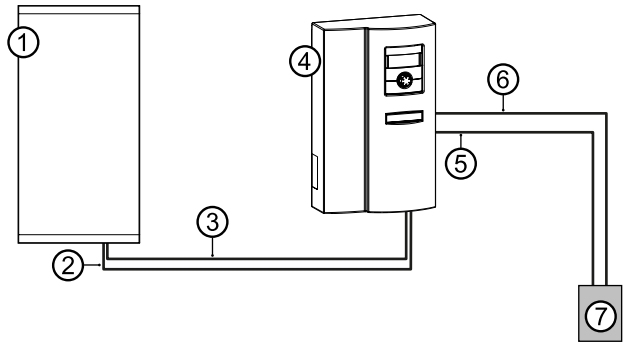
Basic information on the electrical connection

- The specifications of the local energy supply company may apply to electrical connections
- Fit the power supply for the heat pump with an all-pole circuit breaker with at least 3 mm contact spacing (per IEC 60947-2)
- Note the level of the tripping current (→ “Technical data / Scope of supply”, page 11)
- Comply with the electromagnetic compatibility regulations (EMC regulations)
- Lay unshielded power supply cables and shielded cables (bus cable) sufficiently far apart (> 100 mm)
- Maximum line length: 30m

→ Cable extension details see heat pump manual

7.2 Electrical connection

The wall-mounted controller is connected electrically on site according to the following scheme:

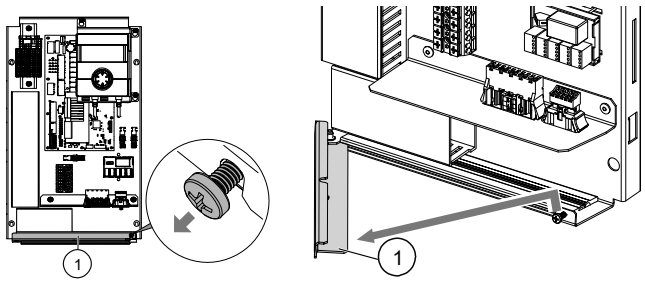


1 Heat pump
2 Bus cable (shielded)
(accessory: electrical connection kit EVS or EVS 8)
3 Load cable compressor
(accessory: electrical connection kit EVS or EVS 8)
4 Wall-mounted controller
5 Control voltage
6 Load cable compressor
7 Sub-distribution

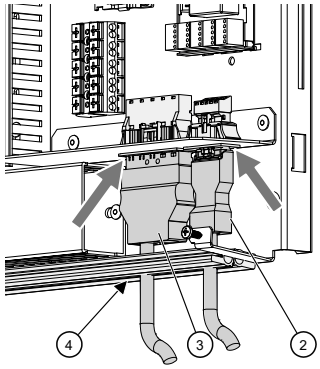
1. Fit the connectors to the bus cable and power cable of the heat pump.

→ Operating manual of the heat pump

2. Open the clamp (①) of the cable entry.



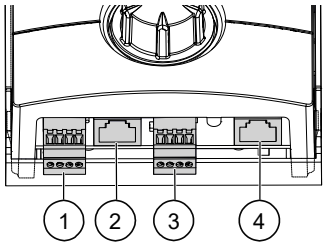
3. Route the wired plugs of the heat pump bus cable (②) and power cable (③) between the two rubber seals (④) and plug them into the corresponding socket in the wall-mounted controller.



4. Strip the control and sensor cable, of the cable for the EVU blocking time as well as the cables of external loads before feeding them into the wall-mounted controller (stripping length of each of the individual wires: 6 mm).
5. Route cables and wires between the two rubber seals (④), route them through the cable ducts in the wall-mounted controller and make the electrical connections in accordance with the terminal diagram.

→ „Terminal diagrams“, from page 14

NOTE
The control panel of the heating and heat pump controller can be connected to a computer or network using a suitable network cable, enabling the heating and heat pump controller to be controlled remotely from there.
If such a connection is desired, route a shielded network cable (category 6, with RJ45 connector) into the wall-mounted controller and plug it to the corresponding socket (②) of the control panel.



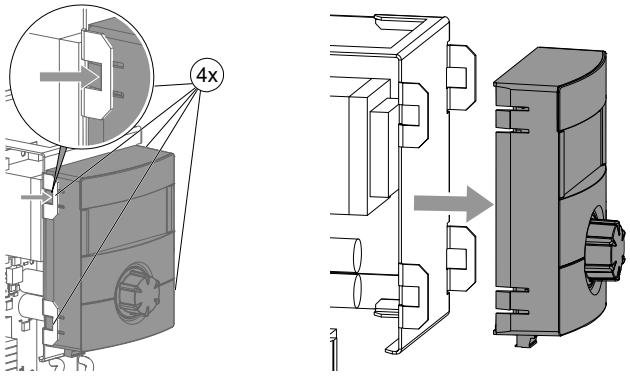
1 RS485 for connecting the room control unit RBE (accessory)
2 RJ45 for network cable connection
3 RS485 LIN bus cable connection to the control board
4 RJ45 connection Modbus cable to Modbus distributor.

6. Close the clamp and screw it tightly in place.
7. Put on the front hood of the unit and screw it tightly in place.

8 Control panel

The control panel is pre-assembled at the factory.
If the control panel needs to be removed for any reason:

1. Disconnect or unplug all connections at the bottom.
2. Lift off the control panel.



► To reattach the control panel, proceed in reverse order.

9 Commissioning

→ Operating manual of the heating and heat pump controller

→ Operating manual of the heat pump

10 Faults

► Read out the cause of the fault via the diagnostics program of the heating and heat pump controller.

► Contact the local partner of the manufacturer or the factory's customer service. Have the fault message and unit number (→ Nameplate) to hand.

11 Dismantling and disposal

11.1 Dismantling

► Separate components by their materials.

11.2 Disposal and recycling

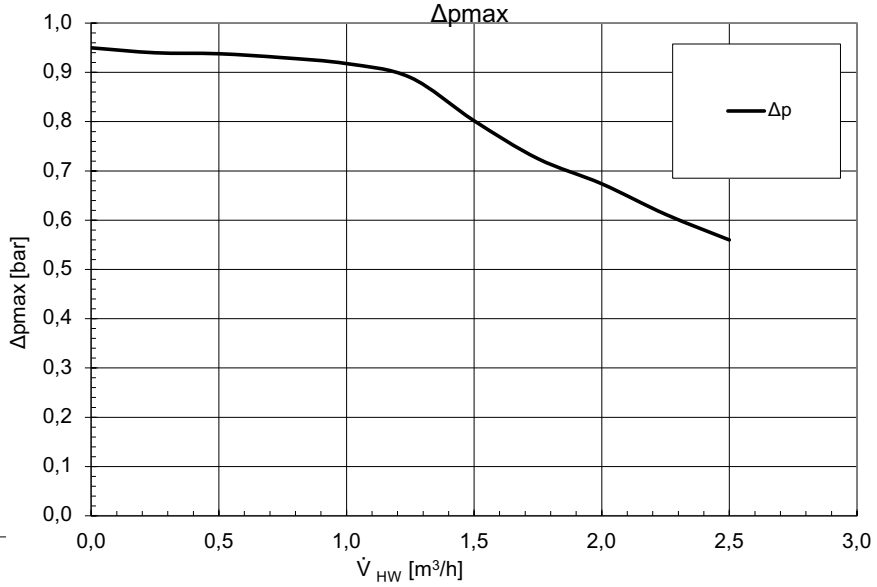
► Recycle or ensure proper disposal of unit components and packaging materials in accordance with local regulations.

11.2.1 Removal of the buffer battery

1. Use a screwdriver to push out the buffer battery on the processor board of the control panel.
2. Dispose of the buffer battery (type: CR2032, lithium) in accordance with local regulations.

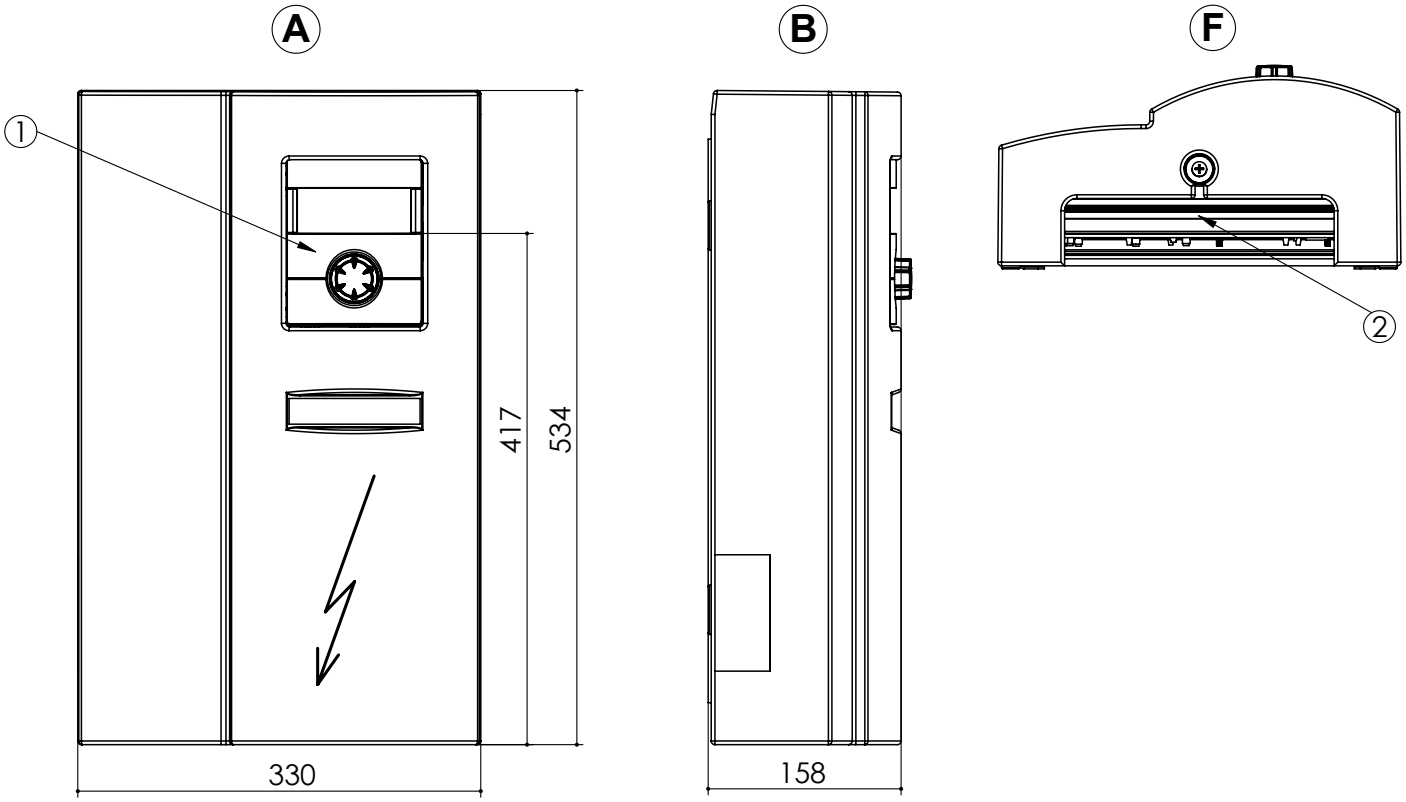
Accessories for heat pump type			WR 2.1-1/3 8kW	WR 2.1-1/3 12kW
Air/water 8 kW output-controlled | Air/water 12 kW output-controlled		• yes – no	• | –	– | •
Air/water Dual output-controlled		• yes – no	– | –	– | –
Installation location				
Room temperature	min. | max.	°C	5 | 35	5 | 35
Relative humidity		%	60	60
Sound				
Sound pressure level at 1 m distance	inside	dB(A)	–	–
Sound power level	inside	dB(A)	–	–
Heating circuit				
Flow rate: minimum | maximum (see heat pump for pipe dimensioning)		l/h | l/h	600 | 1200	600 | 1900
Free pressing | Pressure loss | Flow rate		bar | bar | l/h	0,9 | – | 1200	0,68 | – | 1900
Volume flow: minimum | nominal analogous to A7W35 (partial load operation) | maximum		l/h	600 | 600 | 1200	600 | 850 | 1900
Max. allowable operating pressure		bar	3	3
Circulation pump control range	min. l max.	l/h	600 ı 1200	600 ı 1900
General unit data				
Total weight		kg	5,3	5,3
Weight of individual components		kg | kg | kg	– | – | –	– | – | –
Electrics				
Voltage code | all-pole fuse protection for heat pump *)**)	1 phase	… | A	1~N/PE/230V/50Hz | B16	– | –
Voltage code | all-pole fuse protection for heat pump *)**)	3 phases	… | A	3~N/PE/400V/50Hz | B16	3~N/PE/400V/50Hz | B16
Voltage code | Control voltage fuse protection **)		… | A	1~N/PE/230V/50Hz | B10	1~N/PE/230V/50Hz | B10
Voltage code | Electric heating element fuse protection **)	1 phase	… | A	– | –	– | –
Voltage code | Electric heating element fuse protection **)	3 phases	… | A	– | –	– | –
Degree of protection		IP	20	20
Residual current circuit breaker	if required	type	B	B
Electric heating element output	3 | 2 | 1 phase	kW | kW | kW	– | – | –	– | – | –
Circulation pump power consumption, heating circuit	min. l max.	W	4 | 75	4 | 75
Other unit information				
Safety valve Heating circuit | Response pressure		included in scope of supply: • yes – no | bar	– | –	– | –
Buffer tank | Volume		included in scope of supply: • yes – no | l	– | –	– | –
Diaphragm expansion vessel Heating circuit | Volume | Prepressure		incl. in scope of supply: • yes – no | l | bar	– | – | –	– | – | –
Overflow valve | Changeover valve, heating -Domestic hot water		integrated: • yes – no	– | –	– | –
Vibration decoupling, Heating circuit | Heat source		included in scope of supply or integrated: • yes – no	–	–
Controller | Heat quantity recording | Extension board		included in scope of supply or integrated: • yes – no	• | • | –	• | • | –
*) compressor only, **) note local regulations			813317a	813317a

Free pressing



Key: UK823281

$\dot{V}_{HW}$	Hot water flow rate
Δpmax	Maximum free pressing

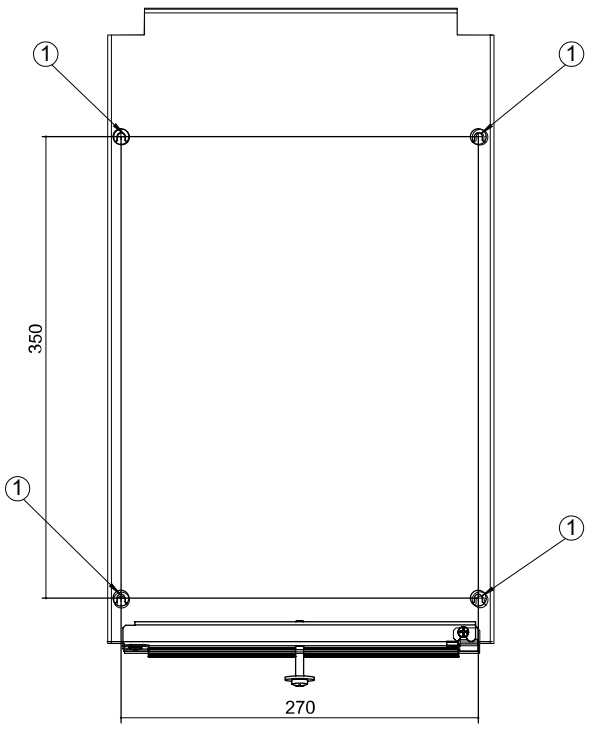


Key: UK819482-
All dimensions in mm.

Pos.	Name
A	Front view
B	Side view from left
F	View from below

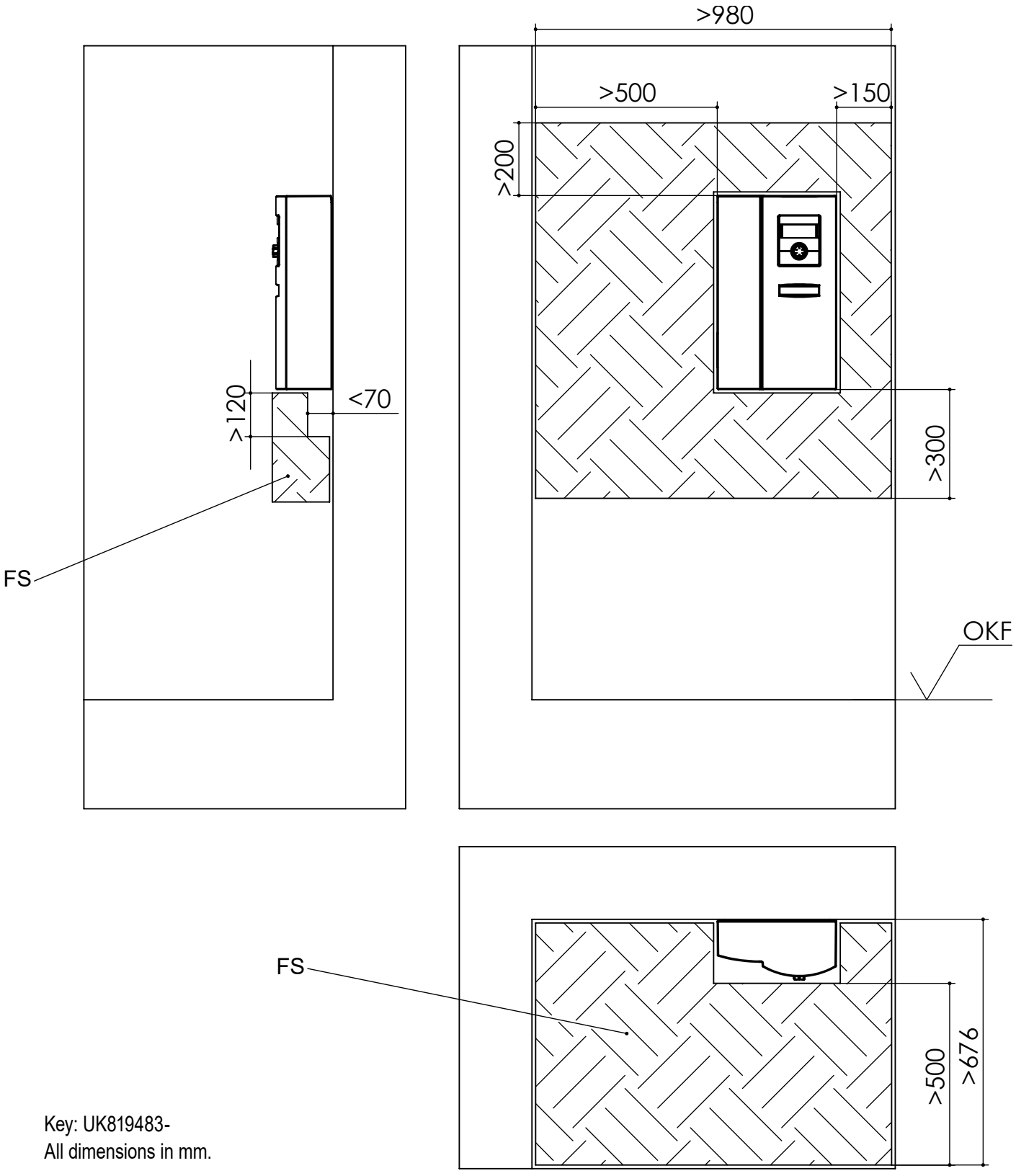
Pos.	Name
1	Control panel
2	Feed-through for electric/sensor cables

Drill pattern



Key: UK819494
All dimensions in mm. Spacing for drill pattern.

Pos.	Name
1	Hole Ø6, for wall/floor plugs (accompanying package)

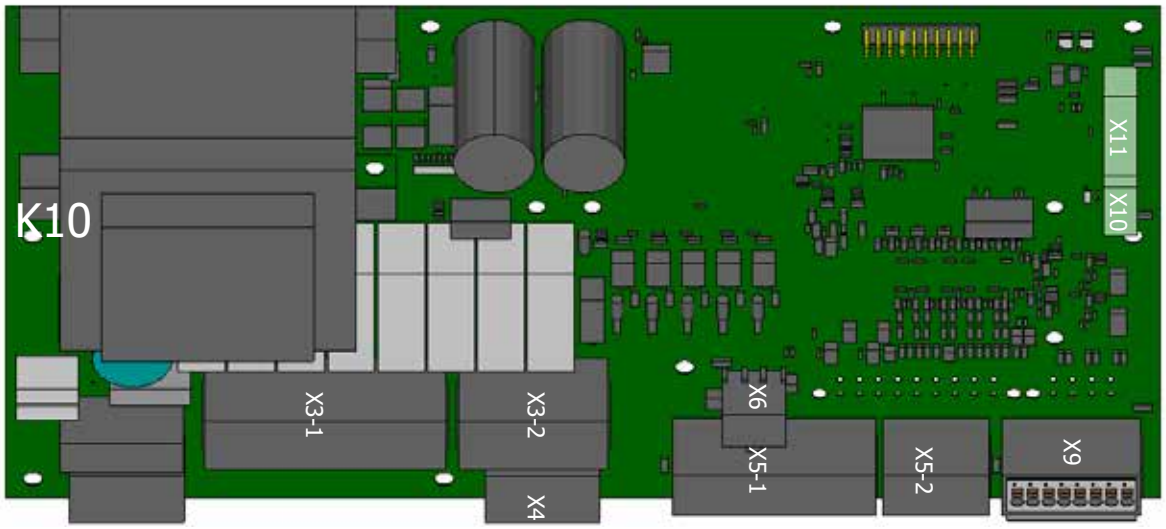


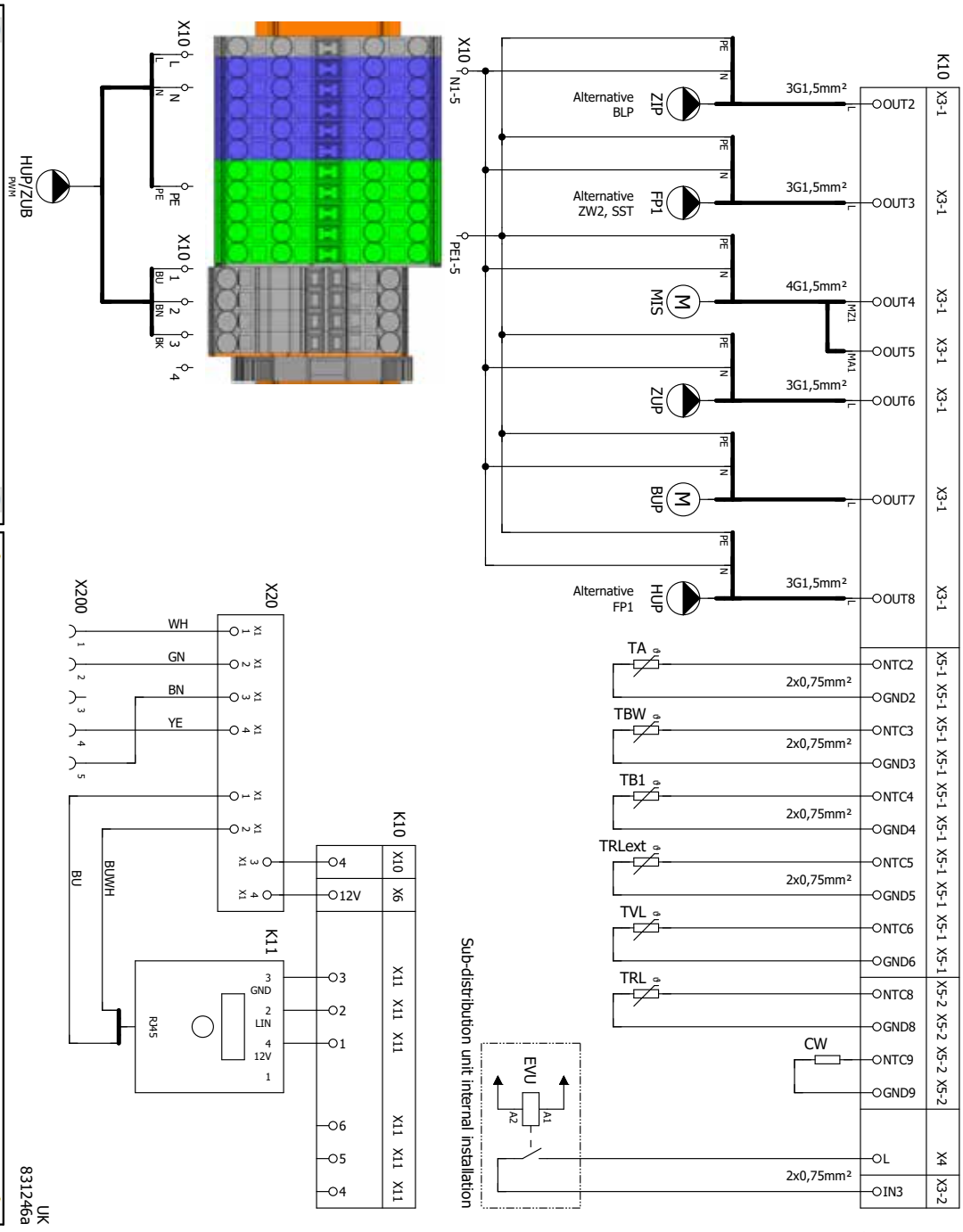
Key: UK819483-
All dimensions in mm.

Pos.	Name
FS	Free space for service purposes
OKF	Top edge of the finished floor

Terminal diagram 1/2

WR 2.1





NOTE

The illustration shows the connection of a pump with PWM signal and continuous voltage. In this case, the switching between HUP and ZUP is done in the software. For pumps without PWM signal, observe the upper illustration.

IMPORTANT

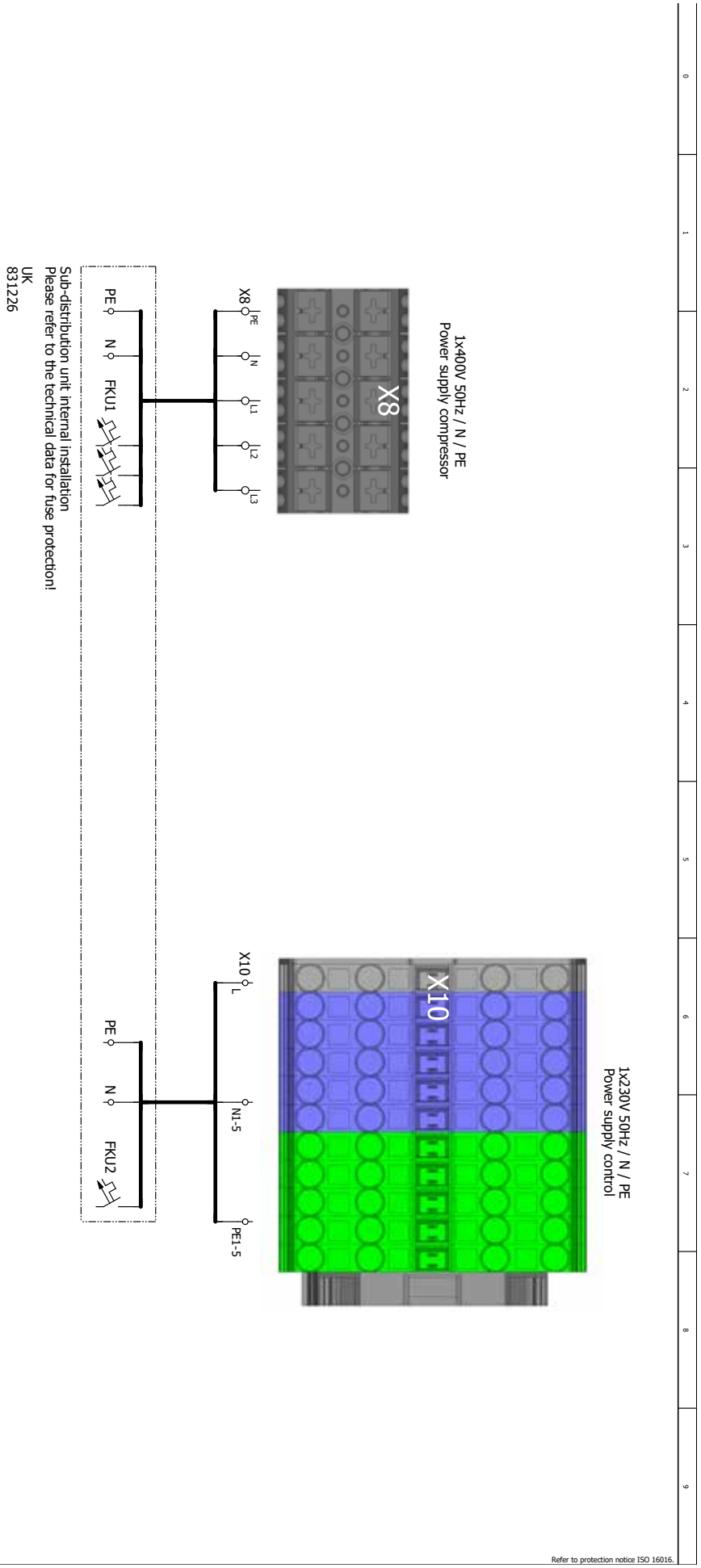
The cable cross-sections shown are only intended as a guideline for the electrician! They must be adapted to the regional regulations and the conditions of use (e.g. cable length, current carrying capacity, ambient temperature, type of installation)!

UK
831246a

Terminal diagram 2/2

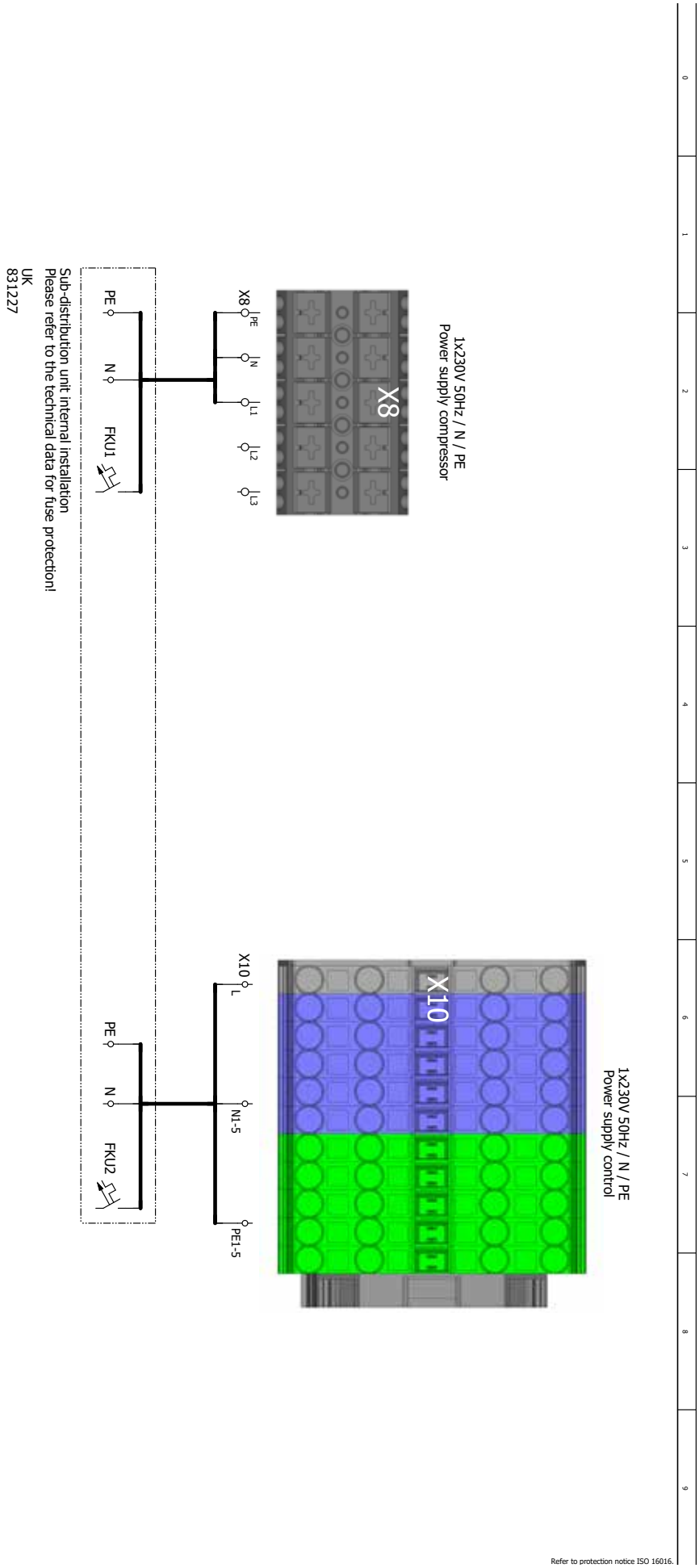
Equipement	Description	Wired
BLP	Domestic hot water charging pump	
BUP	Domestic hot water circulation pump / switching valve	
CW	Coding resistor	X
EVU / SG 1	Block by power supply company (jumper if no blocking time) / Smart Grid control 1	X
SG 2	Smart Grid control 2	
FP1	Mixing circuit 1 circulation pump	
HUP	Heating circuit circulation pump	
K10	Controller circuit board; Caution: I max = 6.3A/230VAC	X
K11	Control panel	
MZ1	Mixing circuit 1 closed (discharge mixer / cooling mixer / charge mixer)	
MA1	Mixing circuit 1 open (discharge mixer / cooling mixer / charge mixer)	
TA	Outdoor temperature sensor	
TB1	Temperature sensor, mixing circuit 1	
TBW	Domestic hot water temperature sensor / domestic hot water thermostat	
TRL	Temperature sensor, return	
TRLext.	Temperature sensor, external return	
TVL	Temperature sensor supply	
VBO	Fan	
X10	Control voltage feed	X
X20	MODBUS circuit board	X
X200	MODBUS	
ZIP	DHW circulation pump / cooling signal / domestic hot water charge pump	
ZUP	Additional (feeder) circulation pump	
ZW2/SST	Additional heat generator 2 / group fault	

Terminal diagram mains connection heat pump 3~400V WR 2.1



Equipement	Description
FKU1	Circuit breaker compressor
FKU2	Circuit breaker control
X8	Terminal for compressor
X10	Terminal for control

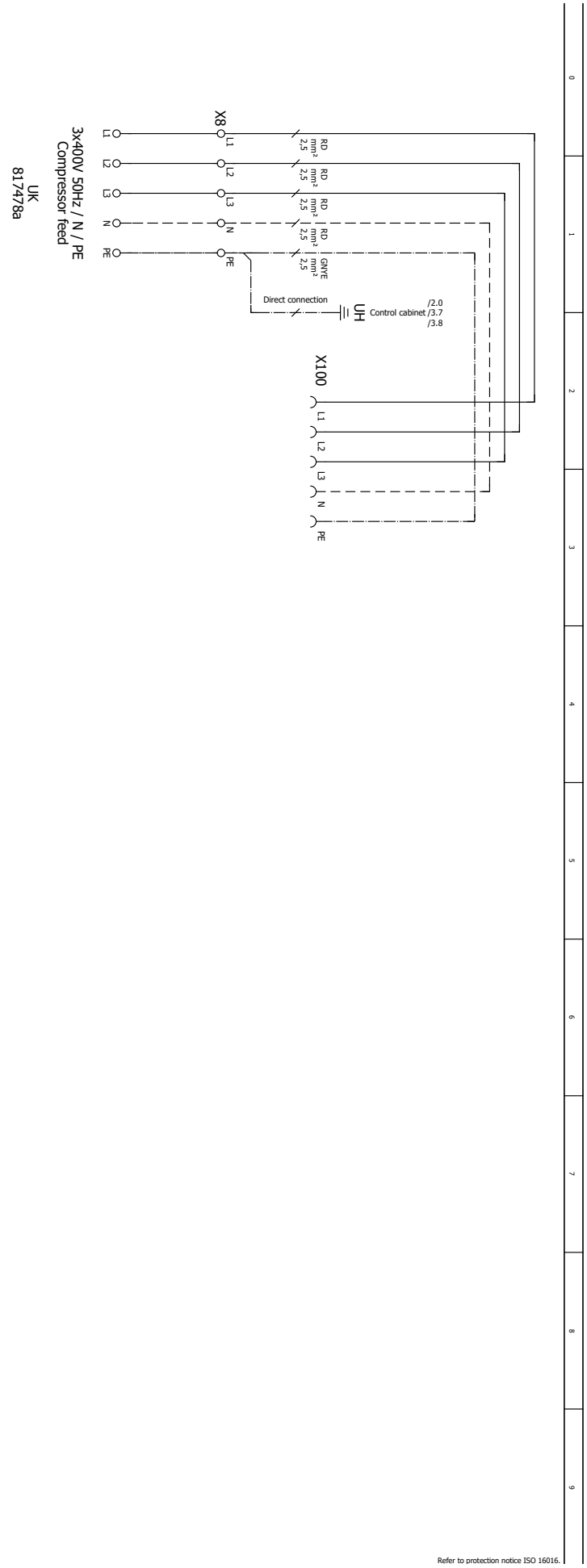
WR 2.1 Terminal diagram mains connection heat pump 1~230V



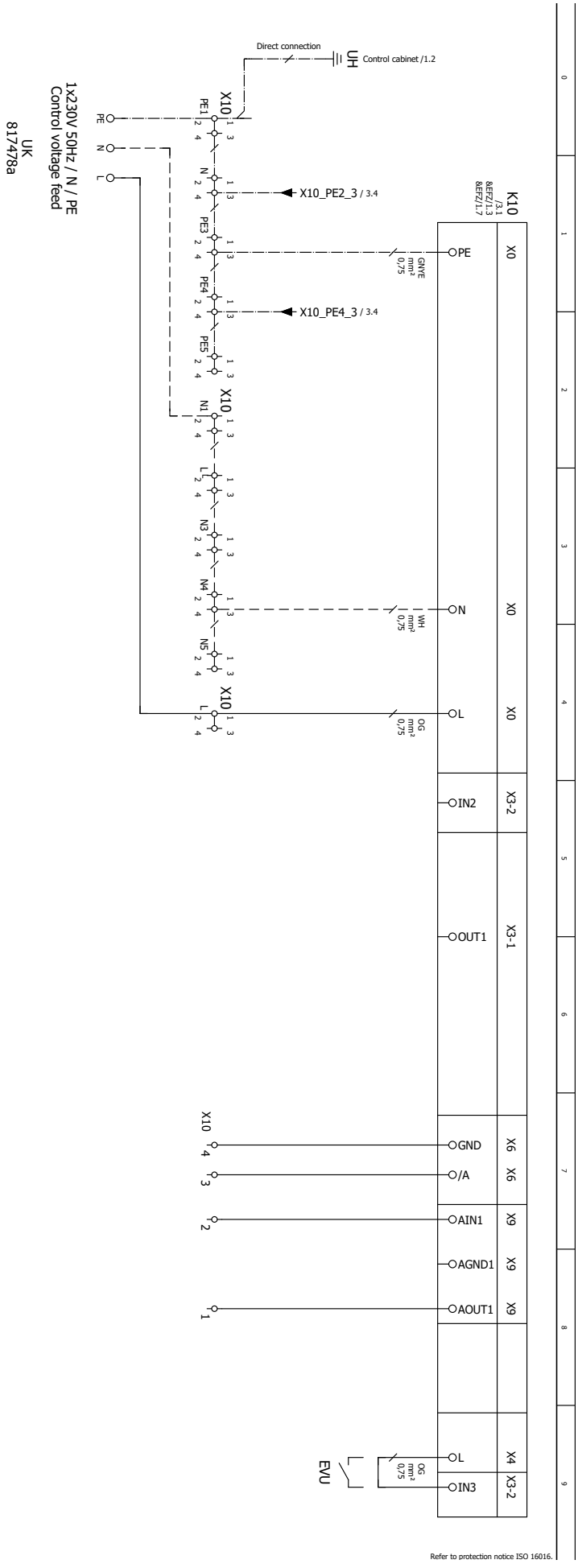
Equipement	Description
FKU1	Circuit breaker compressor
FKU2	Circuit breaker control
X8	Terminal for compressor
X10	Terminal for control

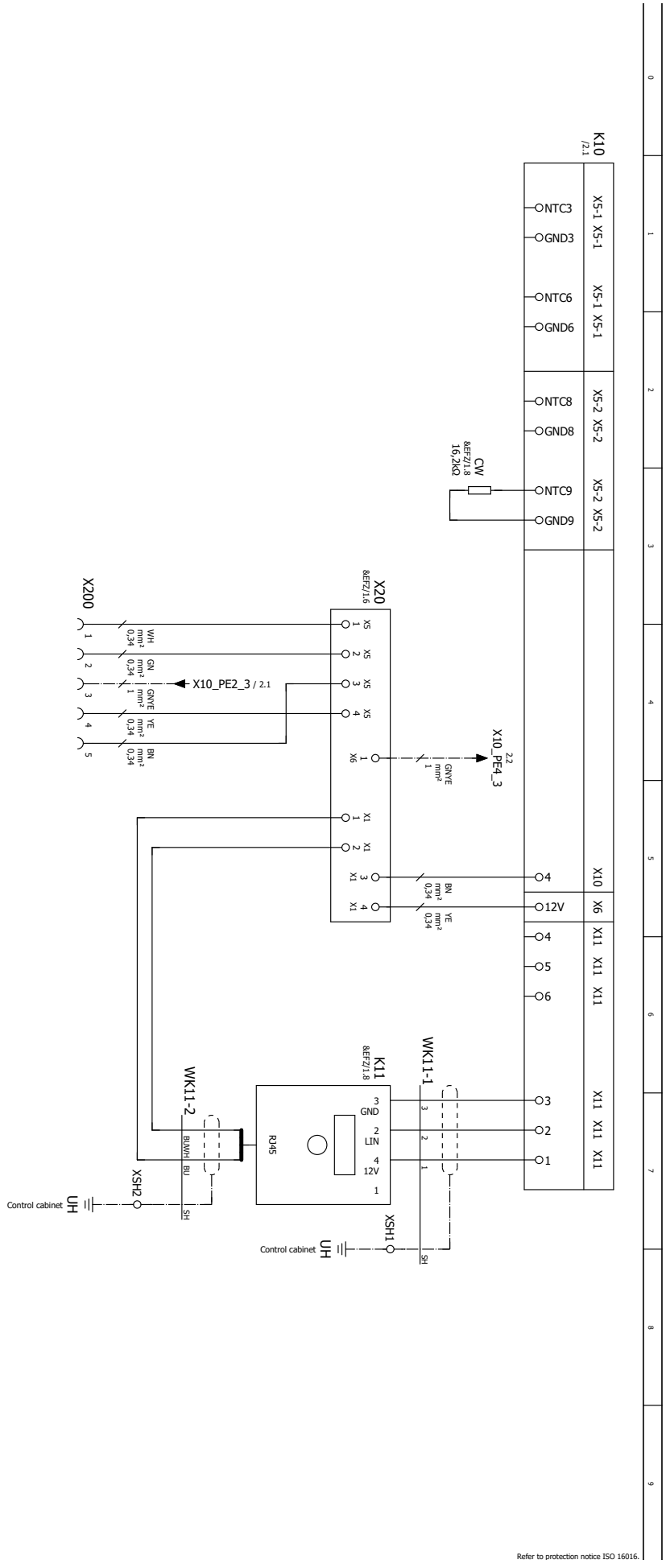
Circuit diagram 1/4

WR 2.1



Circuit diagram 2/4




K10
/2.1
X5-1
X5-2
NTC3
GND3
NTC6
GND6
NTC8
GND8
NTC9
GND9
CW
&EFZ/1.8
16,2kΩ
X10
X6
X11
4
12V
4
5
6
X20
&EFZ/1.6
X200
WH
GN
GN/YE
YE
BN
0,34 mm²
X10_PE2_3 / 2.1
X10_PE4_3
2.2
K11
&EFZ/1.8
GND
LIN
12V
RJ45
WK11-1
WK11-2
BU/WH
BU
SH
XSH1
XSH2
Control cabinet
UH
Refer to protection notice ISO 16016.

817478a

Equipement	Description
EVU / SG 1	Block by power supply company (jumper if no blocking time) / Smart Grid control 1
K10	Controller circuit board; Caution: I max = 6.3A/230VAC
K11	Control panel
R3	Domestic hot water temperature sensor / domestic hot water thermostat
R4	Temperature sensor, return
R5	Temperature sensor supply
R9	Coding resistor; 16,2kOhm
WK11-1	Control panel connection cable
WK11-2	Control panel connection cable
X10	Control voltage feed
X20	MODBUS circuit board
X100	Power supply WP
X200	MODBUS
X300	Power supply controller 230V
XSE	Sensorcard
XSH	Control panel shielding terminal
+MR1	Machine room

Refer to protection notice ISO 16016.

an ideal tomorrow

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