Operating and installation instructions

REMKO MWL series

Modular residential heat pump

MWL 35

Instructions for Technicians

0264-2021-10 Edition 2, en_GB

Read the instructions prior to performing any task!

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 **5**
- 1.1 General safety notes 5
- 1.2 Identification of notes 5
- 1.3 Personnel qualifications 5
- 1.4 Dangers of failure to observe the safety notes 5
- 1.5 Safety-conscious working 5
- 1.6 Safety notes for the operator 6
- 1.7 Safety notes for installation, maintenance and inspection 6
- 1.8 Unauthorised modification and changes 6
- 1.9 Intended use 6
- 1.10 Warranty 6
- 1.11 Transport and packaging 7
- 1.12 Environmental protection and recycling 7

2 Technical data **8**
- 2.1 Unit data 8
- 2.2 Unit dimensions 11

3 Unit description and system layout **12**

4 Assembly **25**
- 4.1 General installation notes 25
- 4.2 Assembly and installation 25

5 Hydraulic connection **32**

6 Ventilation connection **35**

7 Corrosion protection **36**

8 Electrical wiring **38**
- 8.1 Cable installation diagram and connection of EC-1 controller 38
- 8.2 Circuit diagrams 40

9 Before commissioning **50**

10 Commissioning **51**

11 Care and maintenance **51**

12 Troubleshooting and customer service **51**

13 View of the unit **52**
- 13.1 Unit representation of the overall unit 52
- 13.2 Spare parts for the entire unit 53
- 13.3 Unit representation of the frame 54
- 13.4 Spare parts for the frame 54
- 13.5 Unit representation of the frame with attachments 55
- 13.6 Spare parts for the frame with attachments 56
- 13.7 Unit representation of MWP 35 heat pump module 57
- 13.8 Spare parts for MWP 35 heat pump module 58
- 13.9 Unit representation of MLG 70 ventilation module 59
- 13.10 Spare parts for MLG 70 ventilation module 60
- 13.11 Unit representation of MEL 35 electric module 61
- 13.12 Spare parts for MEL 35 electric module 62
- 13.13 Unit representation of MTS 150 storage tank module 63
- 13.14 Spare parts for MTS 150 storage tank module 64

14 General terms....... 65
15 Index....... 67

1 Safety and usage instructions

1.1 General safety notes

Carefully read the operating manual before commissioning the units for the first time. It contains useful tips and notes such as hazard warnings to prevent personal injury and material damage. Failure to follow the directions in this manual not only presents a danger to people, the environment and the system itself, but will void any claims for liability.

Keep this operating manual and the refrigerant data sheet near to the units.

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 Technical data

2.1 Unit data

Overall system

Series		MWL 35
System		Water/water heat pump incl. central living space ventilation
Function		Heating, domestic hot water and ventilation
Power supply	V/Ph/Hz	400/3~/50
Max. current consumption (heat pump/heat pump with auxiliary heating)	A	3.7/9.75
Max. power consumption (heat pump/heat pump with auxiliary heating)	kW	0.75/3.75
Sound power level in acc. with DIN EN 12102:2008-09 and ISO 9614-2	dB(A)	37
Sound pressure level LpA	dB(A)	32
Electrical protection provided by customer	A slow-acting	3 x 16
Dimensions (H/W/D)	mm	2042/600/615
Weight	kg	150

MWP 35 heat pump module

System		Water/water heat pump
Function		Heating and hot water preparation
Inverter technology		Series
Compressor technology		Scroll
Heat pump manager		Internet / Series
Electrical auxiliary heater/heating capacity	kW	Series/3.0
Domestic hot-water heating (changeover valve)		Series
Temperature operating limit (heat source, heating)	°C	10-35
Inlet temperature, heating water, max.	°C	60
Heating capacity max.	kW	3.2
Heating capacity / compressor frequency / COP [1]		
with 10/W35	kW/Hz/COP	2.5/5.72
with W20/W35	kW/Hz/COP	3.2/8.18
Cooling cycle		Hermetically sealed
Refrigerant		R410A

Heat pump module/cooling cycle basic fill volume	kg	0.27
Power supply	V/Ph/Hz	230/1~/50
Max. current consumption	A	9.75
Rated current consumption for W10/20/W35	A	2.22/2.03
Rated current consumption for W10/20/W55	A	3.39/3.44
Rated power consumption for W10/20/W35	kW	0.47/0.44
Rated power consumption for W10/20/W55	kW	0.69/0.71
Max. power consumption	kW	3.75
Heat pump temperature setting range	°C	up to 60
Medium flow rate, water (according to EN 14511, at Δt 5 K) W10 W35/W20 W35	m^3/h	0.44/0.58
Pressure drop at condenser	kPa	7.67
Pressure loss at evaporator	kPa	18.9
Max. operating pressure, water	bar	3.0
Hydraulic connection inlet/return flow (flat-sealing)	Inches (mm)	3/4 (19.05)
Sound power level in acc. with DIN EN 12102:2008-09 and ISO 9614-2	dB(A)	37
Sound pressure level LpA	dB(A)	24
Dimensions (H/W/D)	mm	443/481/500
Enclosure class	--	
Weight	kg	40

MTS 150 drinking water storage module

System		Enamelled drinking water tank
Function		Domestic hot water heating
Storage tank volume	l	149.7
Heat exchanger volume	l	16.2
Heat exchanger area	m^2	1.81
Controls / Logic	---	2-sensor technology
Energy efficiency ratio		B
Heat losses	W	45
BEVB	kWh/24h	1.08
Dimensions (H/W/D)	mm	990/590/590
Weight	kg	58

REMKO MWL series

MLG 70 ventilation unit module

Model		MLG 70
Function		Moisture protection
System		Central controlled living space venti-lation with living space unit
Regulation		Demand-driven
Automatic ventilation according to demand		Series
Summer Bypass		-
Ventilation manager		Smartphone app, EC-1, SC-Touch
Power supply	V/Ph/Hz	230/1~/50
Power consumption (Nominal/max.)	W	23.8/41.8
Spec. electr. power consumption according to German DIBt	W/m³/h	0.33
Current consumption (Nominal/max.)	A	0.1/0.18
Enclosure class		IP42
Nominal air volume flow (min./max.)	m³	70 (40-160)
Pressure loss on site	Pa	50
Conveying pressure at air volume flow (boost)	Pa	100
Sound power level (min./max.)	dB(A)	33.1
Sound pressure level LpA	dB(A)	25.1
Sound pressure level, boost function	dB(A)	28
Conveying medium temperature	°C	-15 to +35
Dimensions (H/W/D)	mm	352/564/480
Weight	kg	22
Filter class according to DIN EN 16890		G4/ISO Coarse 90%
Heat recovery		Series/regenerative
Heat recovery efficiency	%	88.5
Energy efficiency ratio		A
Testing		DIBT / TZWL
Dimensions (H/W/D)	mm	350/565/490

[1] COP = coefficient of performance (heating coefficient) in accordance with EN 14511, VDE tested

[2] Contains greenhouse gas according to Kyoto protocol, GWP 1975

[3] Distance 5 m, VDE tested, A7/W55/58 Hz, with full-spherical propagation

2.2 Unit dimensions

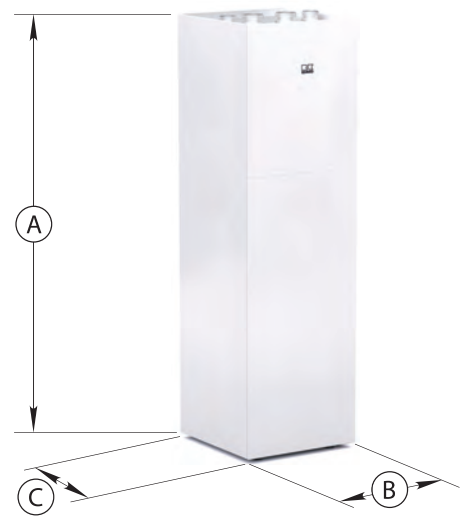


Fig. 1: Dimensions MWL 35

Dimensions in mm	A	B	C
MWL 35	2042	600	615

Dimensions in mm	A	B	C
MLG 70	350	565	490
MWP 35	443	481	500
MTS 150	990	590	590
Electric module	81	484	517

3 Unit description and system layout

With the MWL 35 modular residential heat pump, you have opted for the unique “complete system heat pump with ventilation” from REMKO. Assembled as a multi-component system, the product is used for new builds and renovation - especially for residential construction in the multiple dwelling housing sector. About one third of the living space in Germany is provided by apartment buildings.

The concept of the modular heat pump is designed as an all-in-one solution for one residential unit at a time. The entire unit is constructed on the basis of a frame based on the maintenance- and installation-friendly plug-and-play principle, into which the ventilation module and the heat pump module are “plugged in” individually in the simplest way. The module is plugged/slid into the prepared connections using “Quick-Connect”. This results in a cost-effective and space-saving product by combining three individual systems (hereinafter referred to as modules) into a complete solution. The following itemisation describes the arrangement of the modules (built from top to bottom):

- The first (upper) component [A] is the MLG 70 ventilation module - a central ventilation system with recuperative heat recovery, which transfers the heat from the exhaust air directly to the fresh supply air via a cross-flow heat exchanger. The essential task of the ventilation module is moisture protection, which prevents the possible formation of mould within the living unit.
- The second (middle) component [B] is the MWP 35 heat pump module, which is equipped with a water-to-water heat pump. The MWP draws the thermal energy from a central and constantly tempered source storage tank, which is installed in the basement of the apartment building, for example. This source storage tank works as a heat source for all heat pump modules and is heated/charged with a source heat generator (appropriately dimensioned depending on the number of residential units). The heat pump module (Fig. 3) regulates the temperature of the domestic hot water storage module of the apartment to a constant temperature level and thus provides the hot water for the taps of the respective residential unit in a decentralised manner. The heating system is fed directly.
- The third (lower) component [C] is the MTS 150 drinking water storage module with a nominal volume of 149 l. The module heats the freshwater by using a smooth pipe heat exchanger. This means that a decentralised and thus independent DHW heating system is implemented for each individual residential unit.

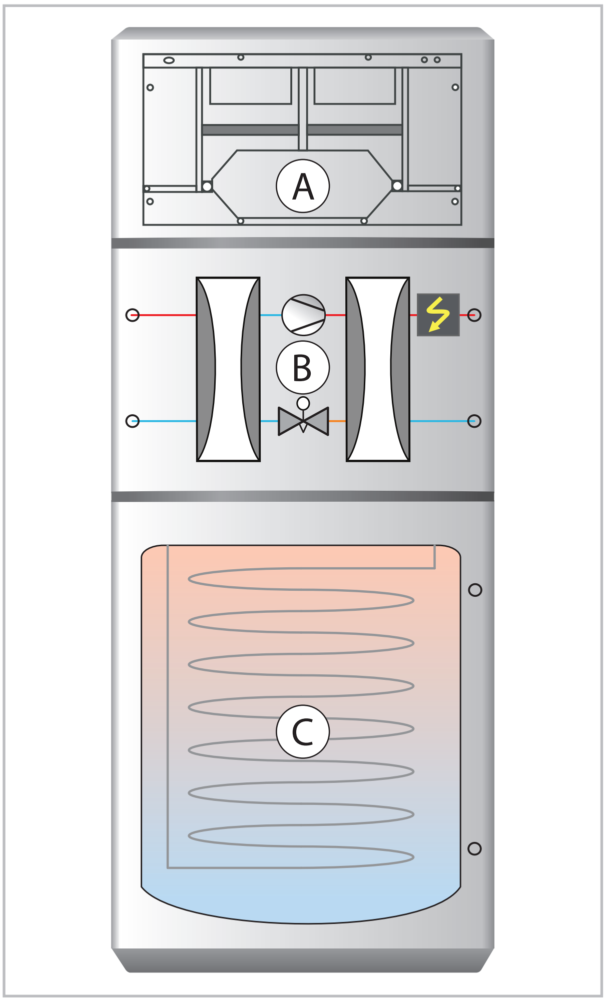


Fig. 2: Installing the heat pump

A: MLG 70 ventilation unit module
B: MWP 35 heat pump module
incl. heating cycle pump and electr. heating element
C: MTS 150 drinking water storage module

Below you will find the descriptions of the individual components.

MWP 35 heat pump module

The heat pump module consists of a fully hermetic - and thus maintenance-free - complete refrigeration unit that contains all the necessary components of the cooling cycle. A quiet and fully modulating compressor (inverter technology) is used, which adapts its output to the heating requirements of the residential unit in an energy-saving manner. This allows each individual MWL to be adjusted to the corresponding living area/heating load. In the fully hermetic cooling cycle, a small amount (compared to other systems) of the refrigerant R410A is used as an energy carrier.

The heat pump with a heating capacity of 2.9 kW is the actual heart of the MWL 35 and works in this system as a water/water heat pump.

The prerequisite is the supply from a flexibly selectable source (smart source), which supplies water at a temperature between 10-20 °C via a feeder pump installed on site. Energy is extracted from this water in the heat exchanger of the heat pump module. The water then returns to the source at about 5K reduced temperature. In the process, the spring water circulates continuously to always provide the necessary thermal energy for the module.

The cooling cycle of the MWL 35 ensures that the heating water is brought to a high temperature level on the secondary side of the cooling cycle. The inlet of the heating water is either directed in the direction of

➜ Heating cycle (underfloor heating/radiators) - temperature-regulated as required by the radiators (example: Underfloor heating → inlet temperature 35 °C - return temperature 28 °C)

or

➜ Hot water preparation / drinking water storage module MTS 150. The changeover valve integrated in the WP module is then switched over accordingly to load the storage tank via the smooth pipe heat exchanger.

A heating rod (Smart-Serv) with a heating capacity of 3 kW is also installed in the inlet of the heat pump module, which can be switched on as a “booster” or in heating mode in the event of high flow rates. The heating element also serves as a safety feature, e.g. if the source fails during maintenance, so that an emergency heating operation can be realised

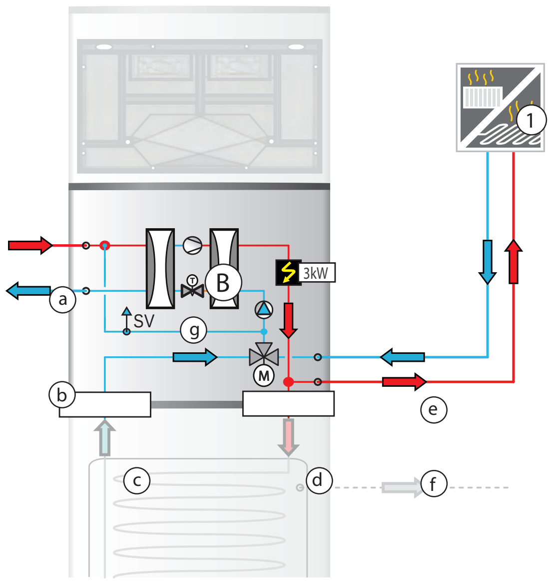


Fig. 3: Heat pump module

B: Heat pump module
1: Radiators/area heating
a: Inlet source
b: Return flow source
c: Storage tank return flow
d: Storage tank inlet
e: Heating cycle return flow
f: Heating cycle inlet
g: Internal bypass line

MTS 150 drinking water storage module

As decentralised hot water preparation, the enamelled drinking water storage module offers a capacity of 149 l of heated domestic water and a smooth-tube heat exchanger with a surface area of 1.8 m^2. The drinking water volume is designed for an average tapping rate of 10l/min. An intelligent heating logic is used here, which ensures rapid switching on and off when hot water is required with the aid of dual-sensor technology.

When hot water withdrawal is active (e.g. when taking a shower), the lower probe registers that cold water is flowing in from the cold water connection. This cools down the lower part of the drinking water in the storage module. The heat pump then switches the changeover valve and immediately starts the hot water preparation and the reheating process of the domestic hot water tank. In this case, the warm inlet flow is directed into the storage module and a warm return flow is generated promptly, as a considerably higher temperature level is used here. Therefore, one probe is installed in the upper part and one in the lower part of the module to realise a short reaction time. In this way, the domestic hot water storage module ensures that the domestic hot water to be tapped is available at the set desired temperature. The 2.9 kW heating capacity of the MWP 35 heat pump module ensures that the MTS 150 is constantly recharged. With the additionally installed 3kW heating rod (Smart-Serv), a so called “Booster function” can be activated to increase the recharging power or the temperature in case of higher consumption.

Due to the decentralised hot water preparation and a central positioning (within the residential unit) of the MWL 35 modular heat pump, the pipe routes to the taps are deliberately so short that one remains below the 3 litre volume within the pipework (from the output of the DHW storage module). This means that you do not fall under the German Drinking Water Ordinance (see chapter 3 “The German Drinking Water Ordinance in connection with REMKO heat pumps”). For this reason, there is no need for an additional circulation line, which - in addition to further installation costs - would result in higher electricity costs and thermal radiation losses. Furthermore, tapping valves and the annual inspection obligation are no longer required.

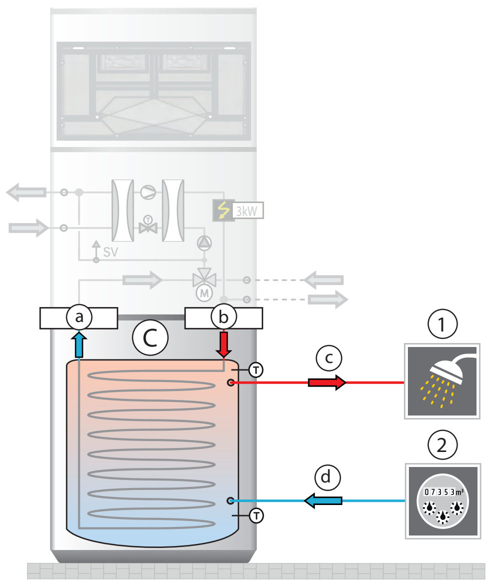


Fig. 4: Drinking water storage module

C: Drinking water storage module
1: Hot water
2: Cold water
a: Storage tank return flow
b: Storage tank inlet
c: Hot water off
d: Hot water on

MLG 70 ventilation unit module

Every property that is renovated and newly built nowadays should be constructed as “airtight” as possible according to today's energy saving regulations. Consequently, modern building envelopes facilitate mould growth within the living spaces more easily if ventilation is inadequate, thus endangering the fabric of the building in the long term. The MLG 70 central ventilation module integrated in the MWL 35 regulates the moisture protection according to demand and thus operates as “controlled living space ventilation” according to demand depending on the relative humidity of the exhaust air.

With this system, moisture protection is based on the lowest possible air exchange, i.e. when moisture actually occurs or the relative humidity in the living unit rises above a certain value. In this case, the fans of the MLG 70 modulate to a higher speed. The module provides regular intermittent/pulsating minimum air circulation beforehand to check the moisture in the room air/exhaust air.

In summary, the MLG 70 ventilation module was developed to be relatively small, space-saving, quiet and to prevent possible mould formation. Furthermore, a cross-flow heat exchanger was installed, which achieves a recuperative heat recovery of 88.5 %.

Describing the path of the air flow, first the outside air (fresh air) is drawn in by the outside air fan of the MLG 70 and thus directed into the ventilation module. Here, the system absorbs the existing heat from the exhaust air (from the kitchen and bathroom) through the built-in cross-flow heat exchanger and then directs the heated supply air into the living rooms and bedrooms. The drawing represents a small (required) overflow made possible by small air outlets (e.g. door slots) in the flat. The air is extracted directly from the kitchen and bathroom, i.e. from the rooms where higher humidity tends to prevail and is caused. The path of the extracted air (exhaust air) is again via the cross-flow heat exchanger, in which there are two separate chambers - so there is no short-circuit here in terms of air technology. The exhaust air is then returned to the outside air as cooled outgoing air.

Due to the possible strong cooling of the warm humid exhaust air, condensate may form inside the ventilation module. The condensate collects in the condensate tray integrated there and is fed into the main condensate tray of the MWL via a pre-installed condensate drainage line. This is previously routed to the house drain on site, e.g. via a funnel siphon.

A slight overpressure is created in the living rooms and bedrooms by supplying “fresh” air. The excess pressure causes the air to flow through air outlets installed on site or slots in the door into the remaining rooms (kitchen, bathroom and utility room). There, the existing humid room air is simultaneously extracted and thus a certain under-pressure is created. Consequently, the overflow takes place through the physical balancing of over and under-pressure within the living unit. This process usually describes the common operation of ventilation units.

The air ducts are installed as round or flat ducts under or in the ceiling (connections 80mm). The duct lengths must be selected so that the specified pressure drops are not exceeded in order to guarantee the minimum air volume flow.

Changing the filter at the annual maintenance interval (with normal air quality) can be carried out particularly quickly and easily thanks to the tool-free access. (see “Maintenance” chapter→ Changing the air filter).

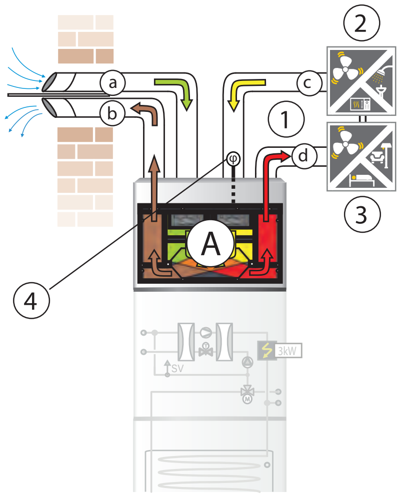


Fig. 5: How the ventilation module works

A: Ventilation module
1: Overflow air vents
2: Kitchen / Bathroom
3: Bedrooms and living rooms
4: Probe rel. humidity

a: Outside air
b: Outgoing air
c: Exhaust air
d: Supply air

General overview of residential unit

In the following consideration of the entire residential unit, we summarise the points already presented.

The following are presented:

- The heat pump module with energy from a source buffer tank
- Cold water supply from the public utility company
- Hot water supply to the kitchens and bathrooms
- Ventilation module with supply and exhaust air from the premises and to the outside

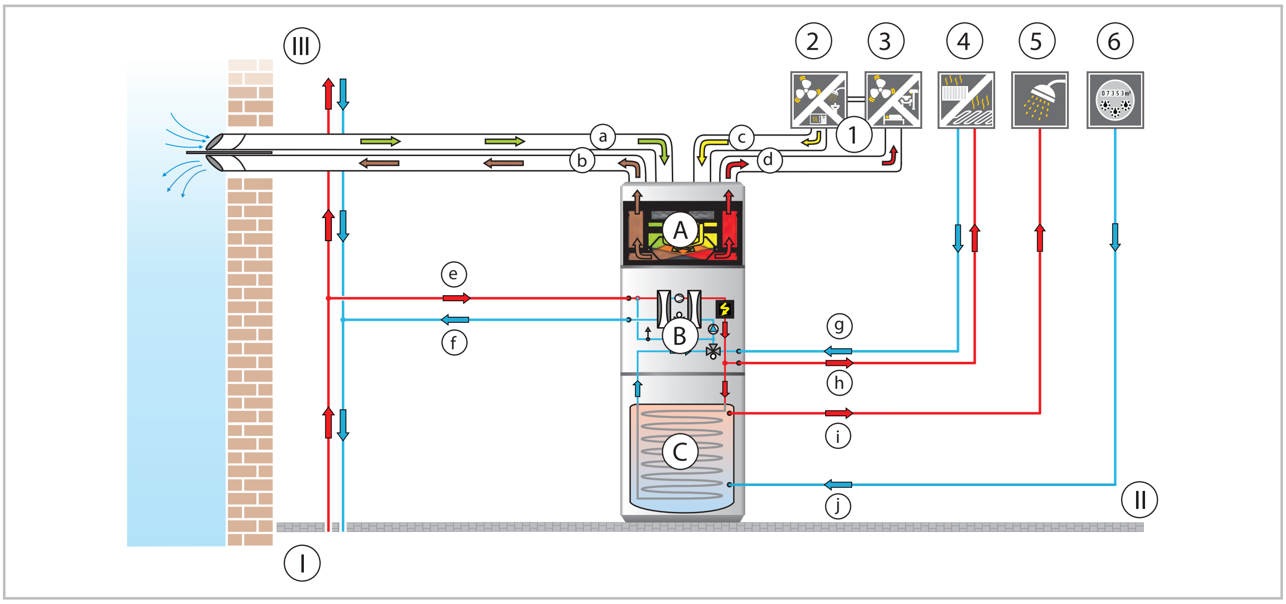


Fig. 6: General overview of residential unit

I: Source/heating room
II: 1. Residential unit
III: Further residential units (congruent)
A: Ventilation unit module
B: Heat pump module
C: Drinking water storage module
1: Overflow air vents
2: Kitchen/bathroom/utility room
3: Bedrooms and living rooms
4: Floor heating
5: Hot water
6: Cold water
a: Outside air
b: Outgoing air
c: Exhaust air
d: Supply air
e: Source inlet
f: Source return flow
g: Heating cycle return flow
h: Heating cycle inlet
i: Hot water off
j: Cold water on

The REMKO MWL 35 modular heat pump is installed as centrally as possible in the utility room/kitchen tall cupboard within the residential unit so that the pipelines (hot water and ventilation) can be kept short, resulting in less installation work.

REMKO MWL series

Source

Outside the residential units, a heat pump is used as a heat generator on the primary side of the source, which keeps the sufficiently dimensioned (vapour diffusion-tight) source buffer tank (depending on the number and size of the residential units) at a constant 20 °C, for example. All REMKO heat pump series can be used for this purpose, depending on the power requirement. The buffer tank generally provides the usual dimensions that can be accommodated in any technical or heating room.

From the source buffer tank on the secondary side of the source, a ring line is laid in the house with respective spur lines to each individual residential unit, from which the respective modular residential heat pump can draw the necessary energy when required. As explained before for the heat pump module, the 20 °C warm source water returns to the source buffer tank after energy is released at 15 °C, where it is heated up again to the necessary 20 °C. The source water is then stored in the source buffer tank.

If, for example, a PV system is used as an option, this system can be combined/coupled with the regulation of the MWL 35 and used so that - as soon as there is a demand for own electricity - the source buffer tank is not heated up to 20 °C but to 50 °C, for example. In this case, however, the temperature would be too high for the heat pump. For this reason, a mixing valve is then used in the secondary hydraulic cycle between the source buffer tank and the residential heat pump. The inlet is thus always kept at 20 °C by always adding cold water. This means that at this point there is not 100 % flow from the source buffer tank, but only 40 %, for example, and the remaining 60 % goes back into the return flow. The PV current is thus converted into thermal energy in the form of hot water (e.g. with the help of the heating rod). As a side effect, the heating rod additionally serves as a heat generator in case of failure of the source heat pump.

In this case, we call the buffer tank “source buffer”, as this component is in principle the central point for the collection of all heat generators - whether PV, a heat pump, a stack with water pocket (for e.g. detached houses), a pellet boiler, CHP, a gas boiler, a solar plant, etc. Any type of (thermal) energy can be fed into this buffer tank and stored there continuously so that it can subsequently be distributed centrally from here.

The diaphragm expansion vessel [8] can be designed for the entire heating system due to an internal bypass line within the MWL.

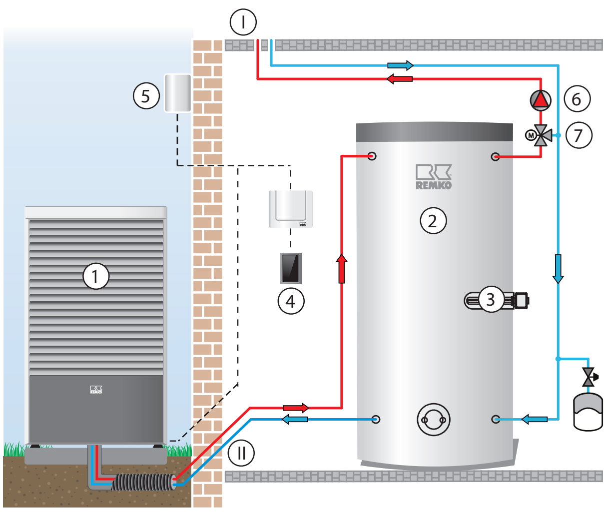


Fig. 7: Source

I: Residential unit
II: Heating room
1: Air/water heat pump type LWM (incl. circulating pump)
2: Source buffer 20 °C
3: PV current E-heater
4: Smart Control Touch
5: External probe
6: Source pump (pressure controlled)
7: Mixing valve optional with multiple sources
8: Diaphragm expansion vessel

In combination with the MWL 35 modular heat pump, the entire system shown below can thus be described as “heating in two stages”.

REMKO heat pumps as source heat generators

- SQW 400, LWM or HTS series as a possible powerful option for heating larger buildings, e.g. apartment buildings.
- Since heat pumps are limited in both end temperature and power (peak load), the overall system of the MWL 35 Modular Residential Heat Pump is an excellent solution to this challenge.
- This is a 2-pipe system that is fed constantly at 20 °C from a source buffer tank.
- The source heat pump is operated in monoenergetic design.
- The continuous operation of the built-in heating cycle pump ensures that a constant temperature of the source heating water is present at the inlet of the MWL 35 modular residential heat pump.
- The MWL 35 can thus realise higher hot water temperatures (with e.g. 45 °C) with a comparatively low energy expenditure. User-defined hot water temperatures can be conveniently programmed via the heat pump manager.

The following table shows an initial overview of which REMKO heat pumps can be used as source heat generators - depending on the installed MWL 35.

Example: For 10 residential units and thus 10 installed MWL 35 heat pumps, a WKF 120 Duo would be selected as the source heat pump.

Source heat pump type	Heating application area	MWL 35 Q20/W40 heating capacity	Max. MWL 35 to be connected
WKF 70	7.00	2.5	3
WKF 120	12.00		5
WKF 180	18.00		7
WKF 120 Duo	25.00		10
WKF 180 Duo	32.00		13
LWM 80	7.00		3
LWM 110	10.00		4
LWM 150	13.00		5
LWM 110 Duo	20.00		8
LWM 150 Duo	26.00		10
HTS 80	7.00		3
HTS 110	11.00		4
HTS 90	8.00		3
HTS 130	13.00		5
HTS 200	18.00		7
HTS 260	23.00		9
HTS 200 Duo	36.00		14
HTS 260 Duo	46.00		18

REMKO MWL series

Source heat pump type	Heating application area	MWL 35 Q20/W40 heating capacity	Max. MWL 35 to be connected
WSP 80	6.00		2
WSP 110	8.00		3
WSP 140	10.00		4
WSP 180	17.00		7
WSP 140 Duo	20.00		8
WSP 180 Duo	34.00	**2.5**	14
SQW 400 Single	45.00		18
SQW 400 Duo	70.00		28
SQW 400 Triple	100.00		40
SQW 400 Quattro	130.00		52

Energetic result in the overall system view:

every heat pump works particularly efficiently if the target temperatures/water temperatures are set as low as possible.

The source heat pump in the first stage generates an ideal source temperature of 20 °C for the MWP 35 water/water heat pump module in the second stage.

If we now look at the entire system, each heat pump works extremely effectively and in the optimum energy range for itself.

Due to the source temperature of 20 °C, no radiation losses occur at normal room temperatures. This prevents overheating of shafts and passageways. In addition, heat losses are reduced to almost zero.

In this example, a diaphragm expansion vessel [8] is used. It then protects the primary circuit and the secondary circuit (heating cycles downstream of MWL 35). The diaphragm expansion vessel must then be dimensioned accordingly.

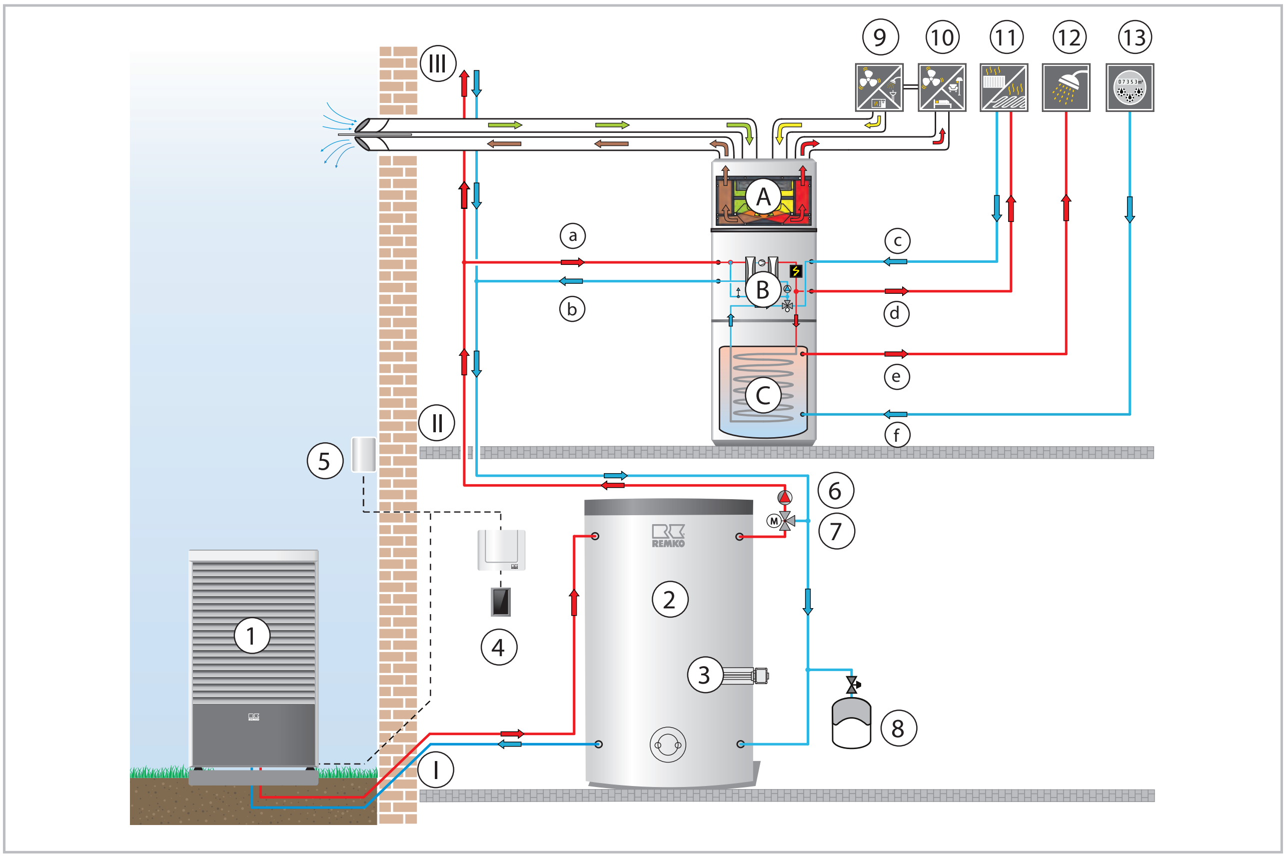


Fig. 8: Overall system

I: Heating room
II: 1. Residential unit
III: Further residential units (congruent)
A: Ventilation unit module
B: Heat pump module
C: Drinking water storage module
1: Heat generator source buffer tank (here as an example: Air/water REMKO LWM heat pump incl. circulating pump)
2: Source buffer 20 °C
3: PV current E-heater
4: Smart Control Touch
5: External probe
6: Source pump (pressure controlled)
7: Mixing valve
8: Diaphragm expansion vessel
9: Kitchen/Bathroom
10: Bedrooms and living rooms
11: Floor heating
12: Hot water
13: Cold water
a: Source inlet
b: Source return flow
c: Heating cycle return flow
d: Heating cycle inlet
e: Hot water off
f: Cold water on

REMKO MWL series

REMKO inverter technology

The heat pump's compressor is equipped with are equipped with a speed control system, as needed. The power control on conventional heat pumps provides only two states, either ON (full output) or OFF (no output). The heat pump turns on below a specified temperature and turns off when this temperature is reached. This kind of heat regulation is very inefficient. Heat regulation in the REMKO inverter heat pump is modulated to the actual need and is adjusted to suit actual needs. The electronics system has an integrated frequency-converter which serves to modify the compressor speed and the speed of the fan as required. The compressor works at a higher speed when under full load than under partial load. The lower speeds ensure a longer operational lifetime for the components, improved coefficient of performance and lower noise. Lower speeds also result in lower energy consumption (electricity) and longer service life. I.e.: inverter heat-pumps will run practically throughout the heating season. In all, the highest efficiency possible.

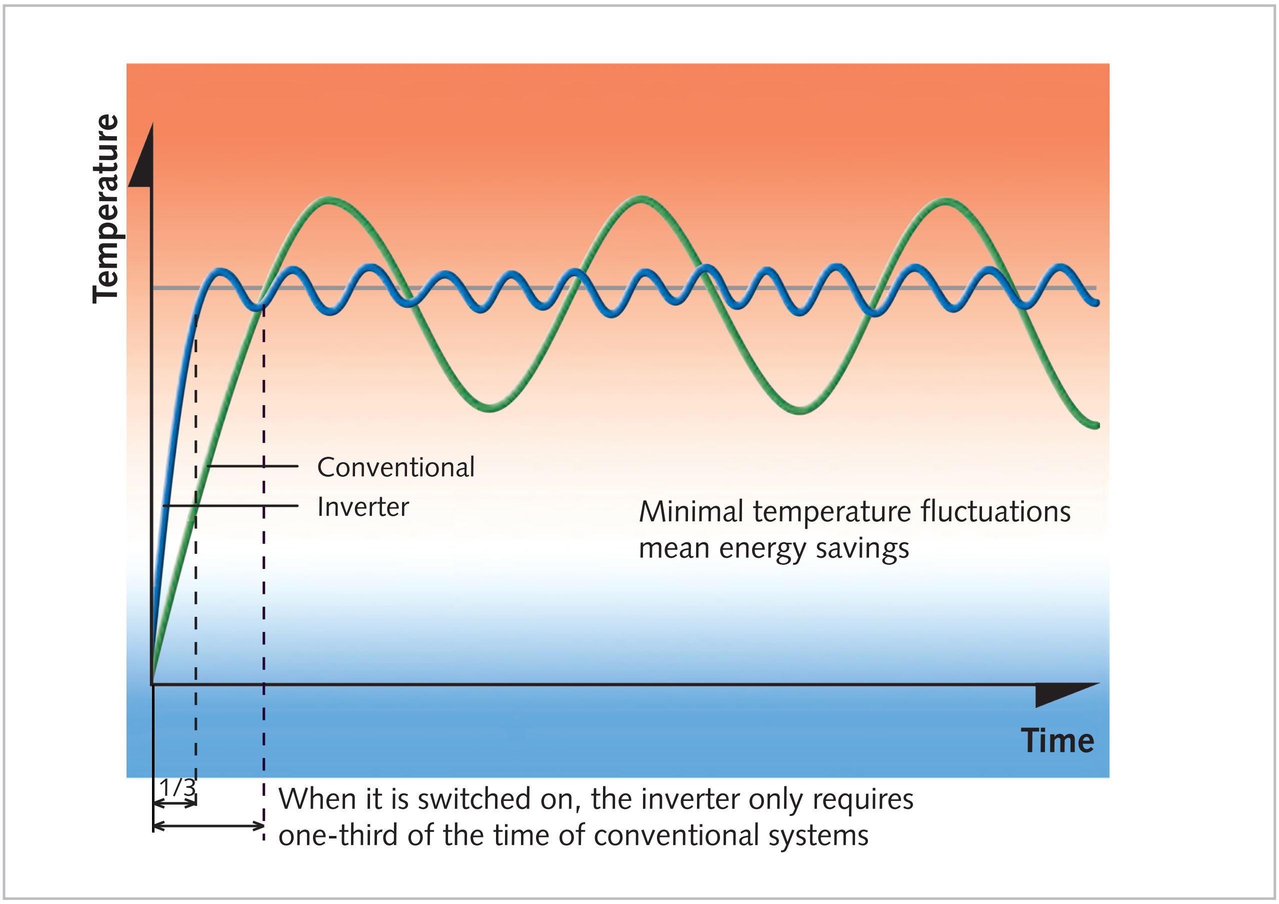


Fig. 9: Modern inverter technology

Function of the heat pump

A heat pump is a unit which makes use of a working medium to absorb heat under low temperatures and transports this heat to a place where it can be of use for heating purposes. Heat pumps work according to the same principles as a refrigerator. The difference is that heat, the by-product of the refrigerator, is the goal of the heat pump.

The main components of the cooling cycle consist of an evaporator, a compressor, a condenser and an expansion valve. In a finned evaporator, the refrigerant evaporates both because of lower pressure and because of lower heat-source temperatures through absorption of energy from the environment. In the compressor, the refrigerant is brought to a higher pressure and temperature by the application of electrical energy. Next, the hot refrigerant gas reaches the condenser, a plate heat exchanger. Here the heat gas condenses, transferring heat to the heating system. The liquefied refrigerant then expands and cools in a flow regulator, the expansion valve. Then the refrigerant flows into the evaporator once more and the cycle is complete.

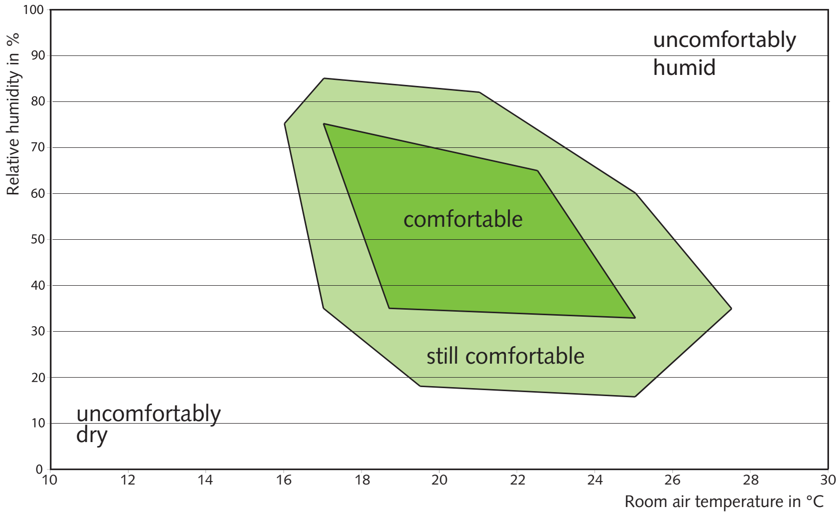


Fig. 10: Comfort zone

REMKO GmbH & Co. KG herewith confirms that the supplied product corresponds to the UBA (German Environment Agency) positive list.

The German Drinking Water Ordinance in conjunction with REMKO heat pumps

Under certain prerequisites, drinking water systems fall under the German Drinking Water Ordinance. It follows that regular sampling must take place and be documented at regular intervals. The installation of the system and the temperatures are also prescribed. The German Technical and Scientific Association for Gas and Water (DVGW) Code of Practice W 551 comments on this accordingly. The volume of the DHW heater (storage tank) and the water volume of the DHW pipe system (3L rule) are decisive for whether the DHW system falls under the DHW Drinking Water Ordinance

Overview of small and large systems and the assigned characteristics 1 and 2

	Planning				Construction
	(Consideration of storage and pipe volume)				
Type of building	**Storage tank volume**	**Pipe volume (DHW heater to tapping point)**	**Requirements for assembly (resulting from columns 2 and 3)**	**Definition**	**Pipe volume [1])**
One and two-family house	any	any		Small system	
Other buildings	≤ 400 litres	≤ 3 litres		Small system	All pipelines ≤ 3 litres
Other buildings	> 400 litres	≤ 3 litres		Large system	All pipelines ≤ 3 litres
Other buildings	> 400 litres	> 3 litres	Installation of a circulation	Large system	All pipelines ≤ 3 litres
Other buildings	≤ 400 litres	> 3 litres	Installation of a circulation	Large system	All pipelines ≤ 3 litres

REMKO MWL series

Source: Gerhardy (DVGW, Bonn)

[1]) From the point of secure temperature containment to the point of extraction

Advantages of the system

1. No Drinking Water Ordinance as under 400 l and under 3 l pipe volume
2. No annual sample collection
3. Significantly lower installation costs as only two-wire system and one KW supply per residential unit
4. No circulation, no hot water line
5. Significantly lower inlet temperatures
6. Lower operating costs
7. Circulating water of the strands from the source buffer tank = 20 °C (corresponds to the room/ambient temperature) - Further use of existing (possibly poorly insulated) pipelines possible
8. Higher efficiency of the heat pump
9. Less load on the heat pump
10. Lower noise emission of the heat pump
11. Each tenant can set their desired temperature
12. Continuous hot water supply even when the heat pump is not in operation, e.g. power supply company shutdown, malfunction, etc.
13. The power supply of the MWL is connected in the electrical distribution of the residential unit
14. No billing problems with the tenants

Conclusion:

Since it is difficult to reconcile the requirements of the Drinking Water Ordinance and the possibilities of a heat pump system, specialist tradesmen/planners as well as manufacturers are forced to create systems that meet the technical requirements and at the same time keep the investment costs within reasonable limits.

When using this system, the central hot water preparation and the resulting short pipe routes to the taps mean that the Drinking Water Ordinance is fulfilled with regard to the 3L rule.

4 Assembly

4.1 General installation notes

- These instructions are to be observed when installing the heat pump.
- The unit should be delivered as near as possible to the site of installation in its original packaging in order to avoid transport damage.
- The unit is to be checked for visible signs of transport damage. Possible faults are to be reported immediately to the contractual partner and the haulage company.
- The indoor unit must be installed on a firm, level surface.
- The surface must possess sufficient load-bearing capacity for the weight of the unit.
- The height-adjustable feet can be used to level the unit precisely
- Suitable sites for installation are to be selected with regard to machinery noise and the set-up process.
- Establish all electrical wiring in accordance with the relevant DIN and VDE standards.
- The electrical power cables must always be fastened to the electrical terminals in the proper manner. Otherwise there is a risk of fire.
- Ensure that no pipes that carry water pass through living or sleeping areas.
- The unit is to be mounted in such a way that there is sufficient space **at the front** for purposes of installation and maintenance.
- It is recommended to use a door with higher sound insulation properties.
- A floor drain or drain pan in the lower area of the heat pump is recommended.

Fig. 11: Minimum distances

DANGER!

All electrical installation work must be done by an electrician.

WARNING!

All electric lines are in accordance VDE regulations to dimension and to lay.

WARNING!

Only fasteners suitable for the given application may be used.

4.2 Assembly and installation

Setting up the heat pump

After pre-piping and laying the cables, set up the frame at the desired location. Remove the cover panel. The rear recess on the roof panel allows convenient positioning under the pre-piping / wall connections.

Fig. 12

Align the unit at the location using a spirit level and by adjusting the adjustable feet (5 mm Allen key).

Fig. 13

Connect the electrical supply line and optional peripherals (external probe/remote control) on site to the corresponding terminal blocks. Please refer to the cable installation diagram.

Fig. 14

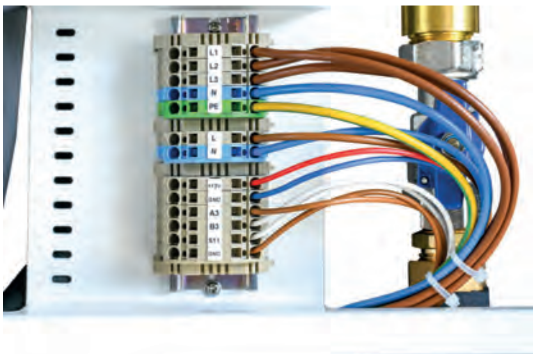


Fig. 15

If necessary, insert the water meter at the position of the placeholder in front of the safety valve.

Fig. 16

Connect the hydraulics, e.g. using armoured hoses, to the ball valve rail in the heat pump and the wall connections.

Use manual bleeders at the source (INt/RTN) and heating cycle (IN/RTN) connections

Fig. 17

Now insert the drinking water storage module into the frame.

Fig. 18

The MWL has now reached the status as shown in figure Fig. 19.

Fig. 19

Please ensure that the position of the storage tank allows for a problem-free screwed connection to the frame by exactly overlapping the steel eyelets and the rivet nut.

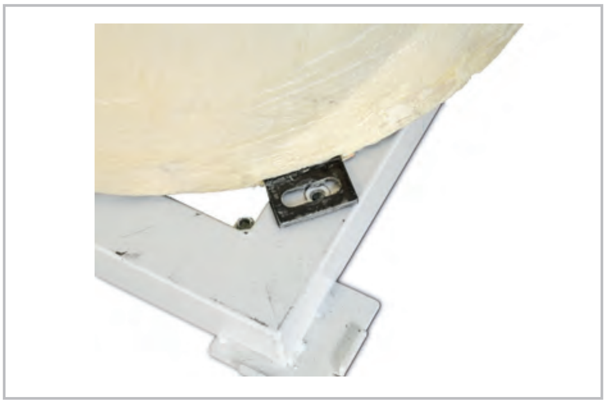


Fig. 20

Now connect the existing pipes to the drinking water storage tank module. Make sure that all flat sealed connections are made with the seals supplied.

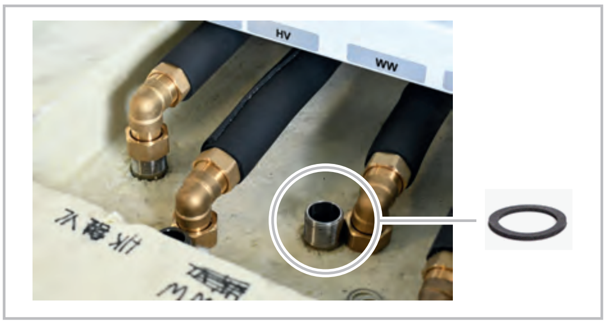


Fig. 21

A black connection pipe is located centrally under the condensate tray. Ensure on site that the liquid is led to a funnel siphon / sewer connection via the connection pipe. For reasons of hygiene, we recommend using our barrier fluid, which prevents the tub from drying out and thus prevents unpleasant odours.

Fig. 22

If necessary, move the lever above the compartment of the heat pump module completely upwards. Now insert the heat pump module into the compartment.

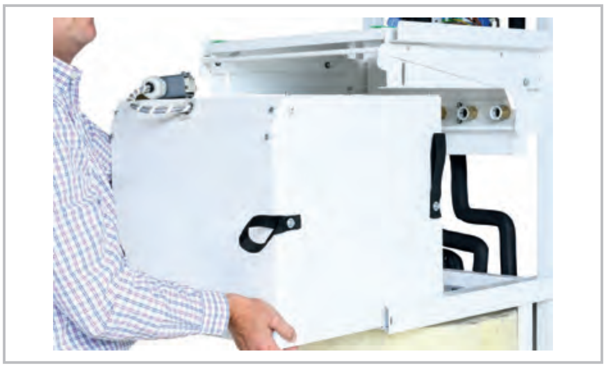


Fig. 23

Push the heat pump module into the frame with both hands as far as it will go. During the process, the rear couplers interlock. In addition, a lever mechanism is triggered which ensures that the lever, which was previously positioned upwards, is guided downwards again.

Fig. 24

The end position of the module is reached as soon as the lever engages downwards in its target position and completely encloses the lateral nipples. The lever thus combines three important functions: On the one hand, it secures the position of the cooling module for safety and prevents unintentional loosening of the hydraulic couplers due to existing hydraulic pressure during operation. In addition, the correct position of the module is displayed: The couplers covered by the module are now connected to each other ready for operation. The third function provides you with the option of conveniently disconnecting the module from the system again in the event of service/maintenance.

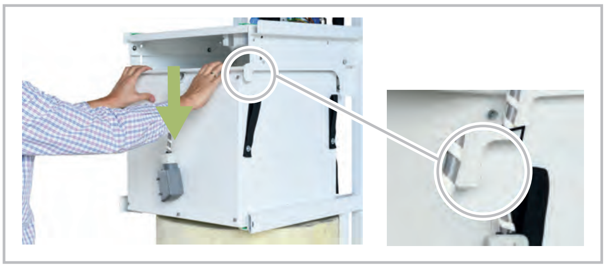


Fig. 25

The MWL has now reached the status as shown in figure Fig. 26.

Fig. 26

Release the lift panel from its latch and pull it completely out of the unit until it is in the lower end position. Make sure that the lift panel has been fully lowered before placing the ventilation module. This way it avoids possible damage to the ventilation module and the roof connections.

Fig. 27

Now place the ventilation module on the fully lowered lift panel and push it into the unit as far as it will go over the slide rails.

Fig. 28

Now push the unit to its target position by pressing the lift panel back into its original position with both thumbs (exclusively). The ventilation module is thus guided into the ventilation connections by the upward movement. Attention: The amount of force required can be slightly increased by the leverage and the rubber seals on the roof connection.

(We recommend filling the drinking water storage tank beforehand and thus optimally shifting the centre of gravity of the MWL so that the position of the MWL is not accidentally changed when installing the modules. As soon as the target position is reached, the lift panel noticeably engages.

Fig. 29

The MWL has now reached the status as shown in figure Fig. 30.

Fig. 30

Now insert the electric module into the compartment between the heat pump module and the ventilation module.

Fig. 31

Push the electric module evenly into the unit as far as it will go. Attention: We recommend carrying out this procedure slowly and carefully so that the plug connector on the back (which floats slightly) can connect to the electrical module more easily and without interference.

Fig. 32

Connect the plugs to the connections on the electrical module according to the labelling.

Fig. 33

Attention: We recommend that you check the plug connectors carefully to ensure that they are in the correct position.

Fig. 34

Fig. 35

The MWL has now reached the status as shown in figure Fig. 36.

Fig. 36

Place the side walls in the L-profiles / lugs provided at the bottom of the frame.

Fig. 37

Attach the side walls to the frame as shown in the figure using the screws supplied.

Fig. 38

The MWL has now reached the status in accordance with the figure (photo).

Fig. 39

Place the front panel at the bottom in the adjusting lugs on the frame.

Fig. 40

Finally, fasten the side walls to the roof panel of the MWL with two additional screws.

Fig. 41

The unit assembly of the MWL is finished.

Fig. 42

5 Hydraulic connection

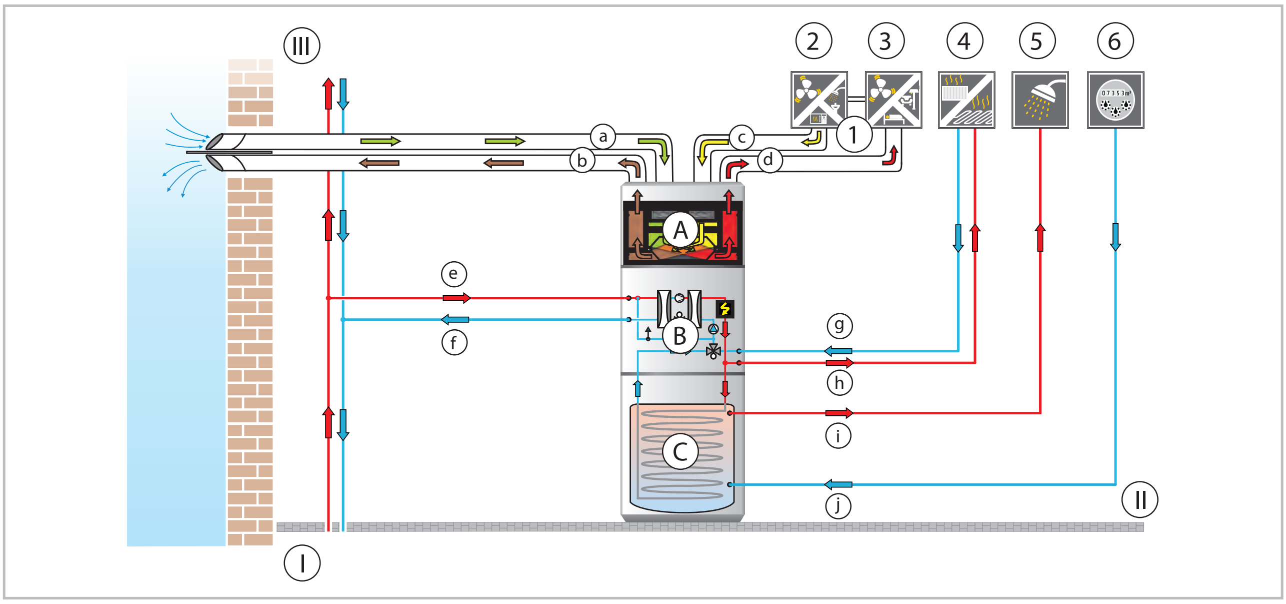


Fig. 43: Hydraulic circuit diagram

I: Source/heating room
II: 1. Residential unit
III: Further residential units (congruent)
A: Ventilation unit module
B: Heat pump module
C: Drinking water storage module
1: Overflow air vents
2: Kitchen / Bathroom
3: Bedrooms and living rooms
4: Floor heating
5: Hot water
6: Cold water
a: Outside air
b: Outgoing air
c: Exhaust air
d: Supply air
e: Source inlet
f: Source return flow
g: Heating cycle return flow
h: Heating cycle inlet
i: Hot water off
j: Cold water on

- Protect underfloor heating systems mechanically against excessively high inlet temperatures.
- The pipe cross-section of the inlet and return connection of the heat pump must not be reduced up to the floor distributor
- Plan for air bleed valves and drain-off taps at appropriate places
- Flush the system's entire pipe network before connecting the heat pump.
- Due to a hydraulic bypass line, it is possible to work with an external expansion vessel.
- One or, where necessary, several expansion vessels must be designed for the entire hydraulic system.
- The system pressure of the entire pipe network is to be matched to the hydraulic system and must be checked when the heat pump is turned off. Also update the static-pressure form supplied with the heat pump.
- A dirt trap must be fitted outside the heat pump in the return flow. Ensure that the dirt trap remains accessible for inspection and that it can be locked.
- The dirt trap must be checked during every maintenance of the system.
- Additionally, an automatic bleeder is installed in the unit for additional bleeding of the heat pump.
- All exposed metallic surfaces must be additionally insulated.
- All outgoing heating cycles are to be secured against the ingress of circulating water by means of check valves.
- Before being placed in service, the system must be thoroughly flushed.
- To prevent structure-borne transmission, we advise you to install additional compensators in the inlet line and return flow.

NOTICE!

Heat pump systems and components from REMKO must be filled and operated with deionised water (completely desalinated). We also recommend the use of the complete heating protection unit available from us. Full protection with glycol should be used in cooling systems. The system water should be tested each time the plant is serviced, but at least once a year. Damage that results from non-compliance is not covered by the guarantee. Below you will find a suitable form for documenting the filling of the system.

Also refer to the “Corrosion protection” chapter.

Pipework of the MWL frame

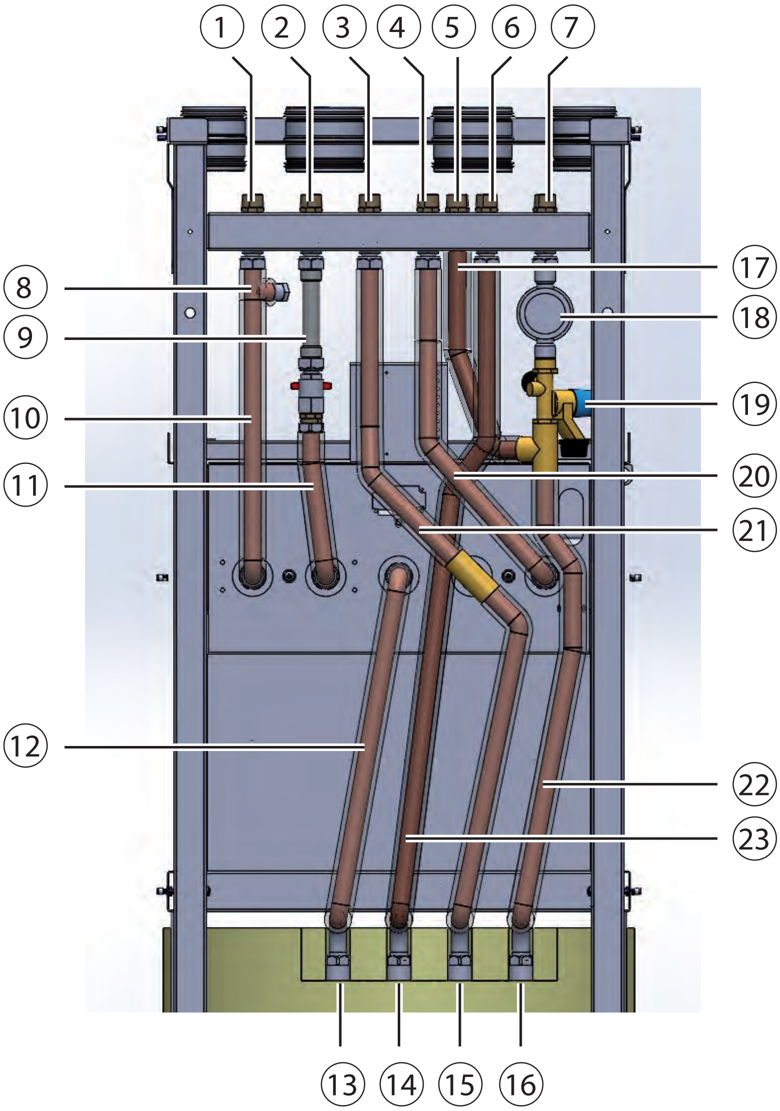


Fig. 44: Pipework of the MWL frame

1: Ball valve rail connection incoming from source
2: Ball valve rail connection going to source
3: Ball valve rail connection heating IN
4: Ball valve rail connection heating RTN
5: Ball valve rail connection cold water drain
6: Ball valve rail connection hot water drain
7: Ball valve rail connection cold water inlet
8: Immersion sleeve for heat meter probe - source IN
9: Heat meter probe placeholder - source RTN
10: Copper pipe incl. insulation - source IN
11: Copper pipe incl. insulation - source RTN
12: Copper pipe incl. insulation - heating RTN (DHW storage tank ➜ WP module)
13: TWS module connection ➜ heating RTN
14: TWS module connection ➜ hot water DRAIN
15: TWS module connection ➜ heating IN
16: TWS module connection ➜ cold water ON
17: Copper pipe incl. insulation - CW DRAIN
18: Water pipe ➜ placeholder - CW ON
19: Safety valve / SI group (10 bar), shut-off device - KW AN
20: Copper pipe incl. insulation - HC RTN
21: Copper pipe incl. insulation - HC IN
22: Copper pipe (safety valve ➜ drinking water storage tank) incl. insulation and T-piece - CW ON
23: Copper pipe incl. insulation - HW DRAIN

6 Ventilation connection

Ventilation connection template

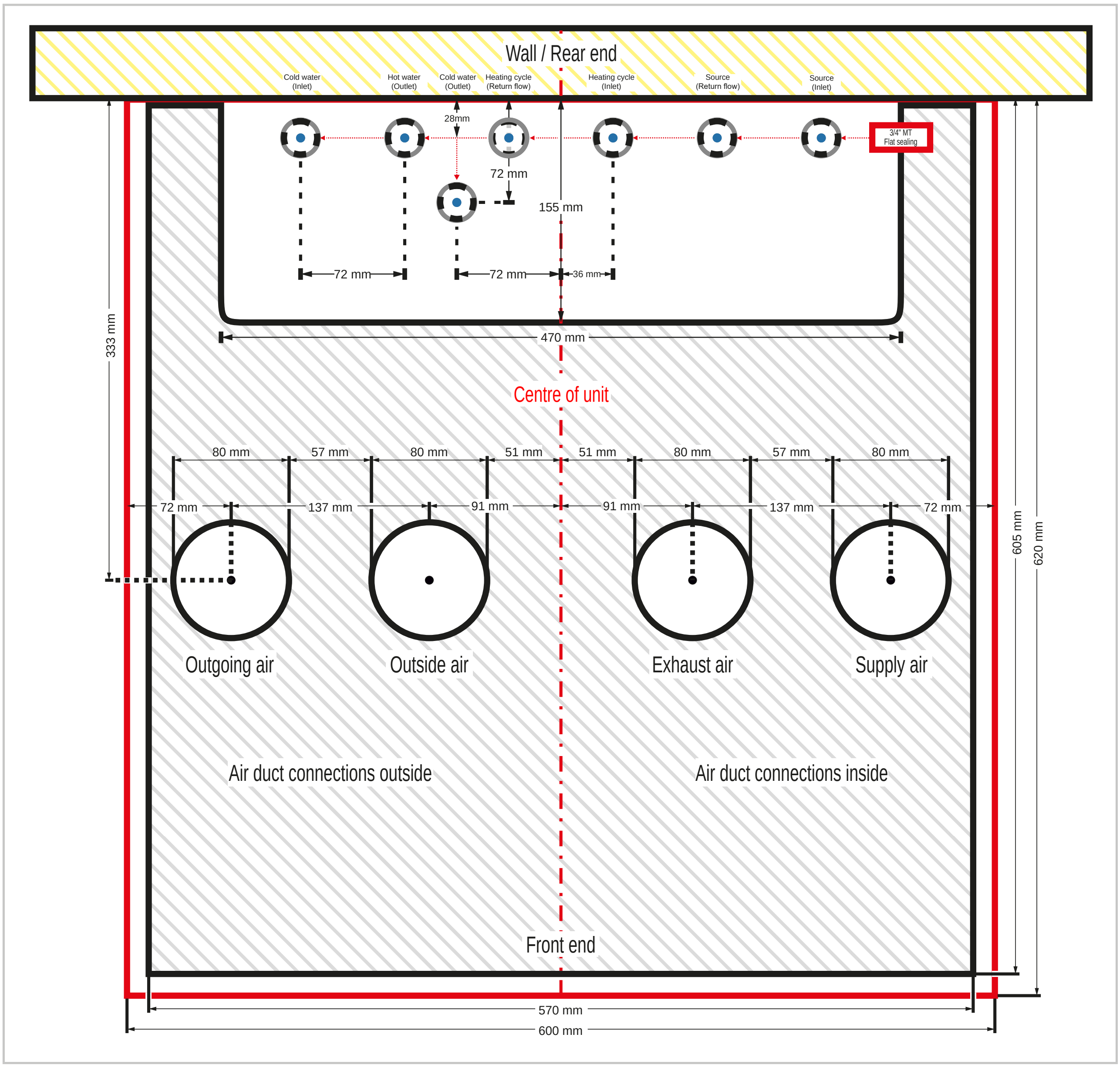


Fig. 45: Ventilation connection template

7 Corrosion protection

Oxygen always plays a role if metal materials in a heating system corrode. The pH value and the salt content also play a major role. A licensed plumber who would like to be able to guarantee his customers a hot water heating system not at risk of corrosion from oxygen - without the use of chemicals - must pay attention to the following:

- Correct system design by the heating builder/ planner and
- depending on the materials installed: filling the heating system with demineralised soft water or fully deionised water, checking the pH value after 8 to 12 weeks.

VDI 2035 applies for the system types listed below. If the guide values for filling, replenishment and circulation water are exceeded, the water must be pre-conditioned.

Scope of application of VDI 2035:

- Domestic hot-water heating systems as per DIN 4753 (sheet 1 only)
- Water heating systems as per DIN EN 12828 inside the building up to an inlet temperature of 100°C
- Systems that serve building complexes and with a replenishment water volume during their service life that is a maximum of twice the filling water volume.

See the following table for the requirements in accordance with VDI 2035 Part 1 with regard to total hardness.

	Total hardness [°dH] subject to the specific system volume		
Total rated output in kW	< 20 l/kW	≥ 20 l/kW and <50 l/kW	≥ 50 l/kW
to 50 kW	≤ 16.8 °dH	≤ 11.2 °dH	≤ 0.11 °dH

The following table provides the allowed oxygen content in connection with the salt content.

Reference values for the hot water in accordance with VDI 2035 Part 2			
		low-salt	saline
Electrical conductivity at 25°C	µS/cm	< 100	100-1500
Oxygen content	mg/l	< 0.1	< 0.02
pH value at 25°C		8.2 - 10.0 *)	

*) For aluminium and aluminium alloys, the pH range is restricted: pH value at 25 °C is 8.2-8.5 (max. 9.0 for aluminium alloys)

Water treatment with chemicals

Adding chemicals to treat water should only be done as an exception. VDI 2035 Part 2 requires explicitly under Point 8.4.1 that all water treatment be explained and documented in the system log book. There is a reason for this, because unprofessional use of chemicals leads:

- frequently to the failure of elastomer materials
- to blocking and sedimentation due to the sludge that forms
- to defective anti-friction seals on pumps
- to the formation of biofilms that cause microbially influenced corrosion and/or that can substantially impair thermal transfer.

In low-salt water and the correct pH for a short time even to oxygen concentrations up 0.5 mg / l are tolerated.

! NOTICE!

Heat pump systems and components from REMKO must be filled and operated with deionised water (completely desalinated). We also recommend the use of the complete heating protection unit available from us. Full protection with glycol should be used in cooling systems. The system water should be tested each time the plant is serviced, but at least once a year. Damage that results from non-compliance is not covered by the guarantee. Below you will find a suitable form for documenting the filling of the system.

Filling of heating system with completely deionised water

REMKO

	Initial filling	Year 2	Year 3	Year 4
Filled on				
System volume [litres]				
°dH value				
pH value				
Conductivity [µS/cm]				
Conditioning agent (name and quantity)				
Molybdenum content [mg/l]				
Signature				

Your heating contractor:

VDI directive 2035

Perform annual control measurement!

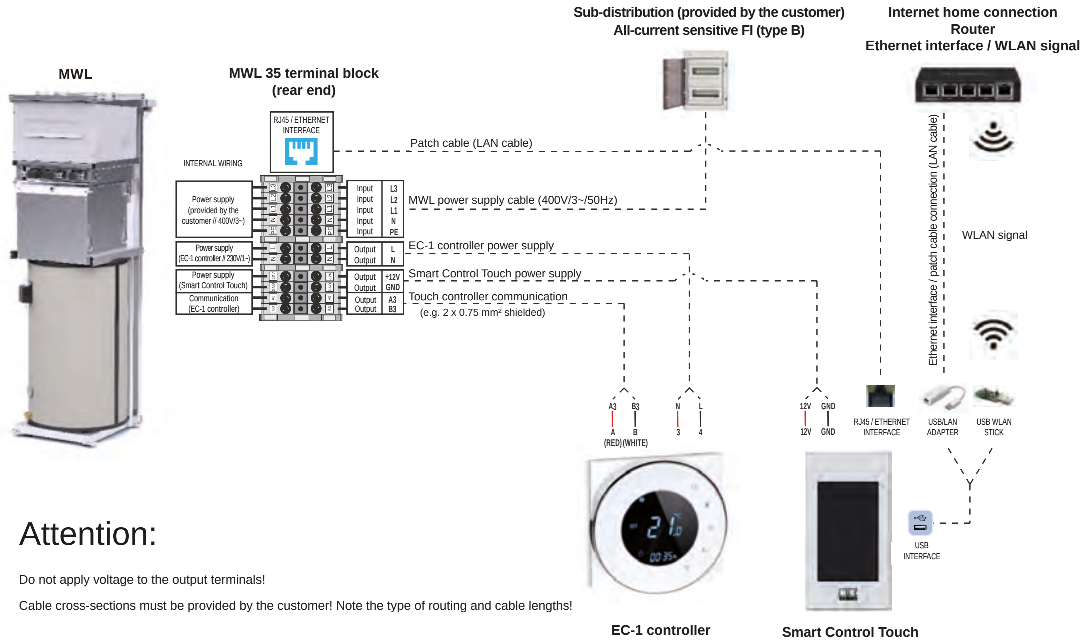
Fig. 46: Form for logging filling with completely deionised water

8 Electrical wiring

8.1 Cable installation diagram and connection of EC-1 controller

Cable installation diagram

Terminal diagram MWL 35 Control panel via Smart-Control Touch

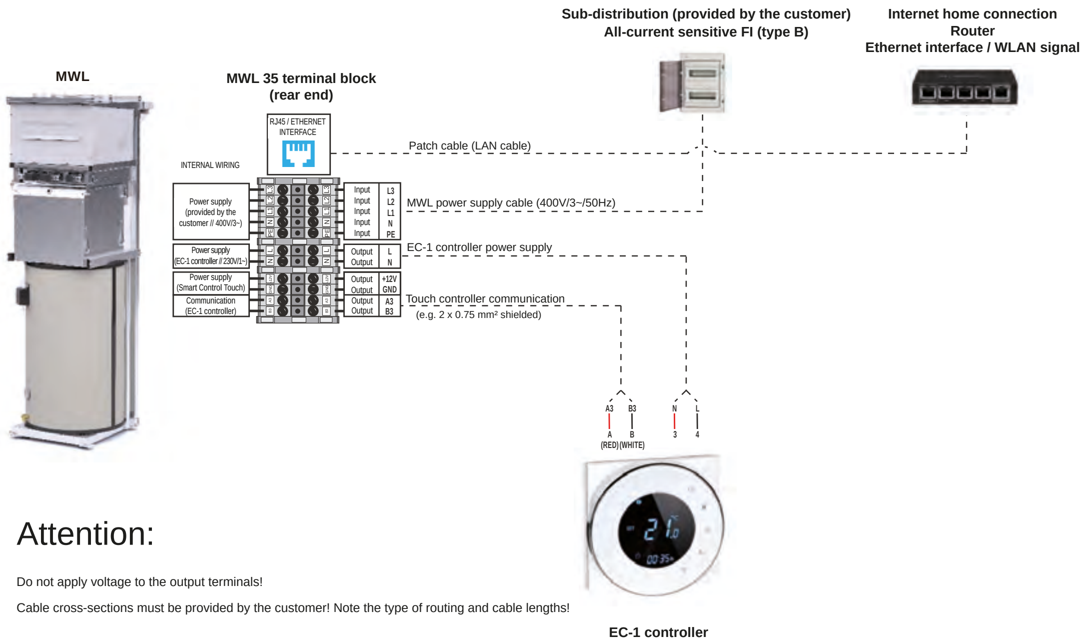


Attention:

Do not apply voltage to the output terminals!

Cable cross-sections must be provided by the customer! Note the type of routing and cable lengths!

Terminal diagram MWL 35 Operation via REMKO SmartWeb portal



Attention:

Do not apply voltage to the output terminals!

Cable cross-sections must be provided by the customer! Note the type of routing and cable lengths!

Installation EC-1 controller, touch controller and external probe

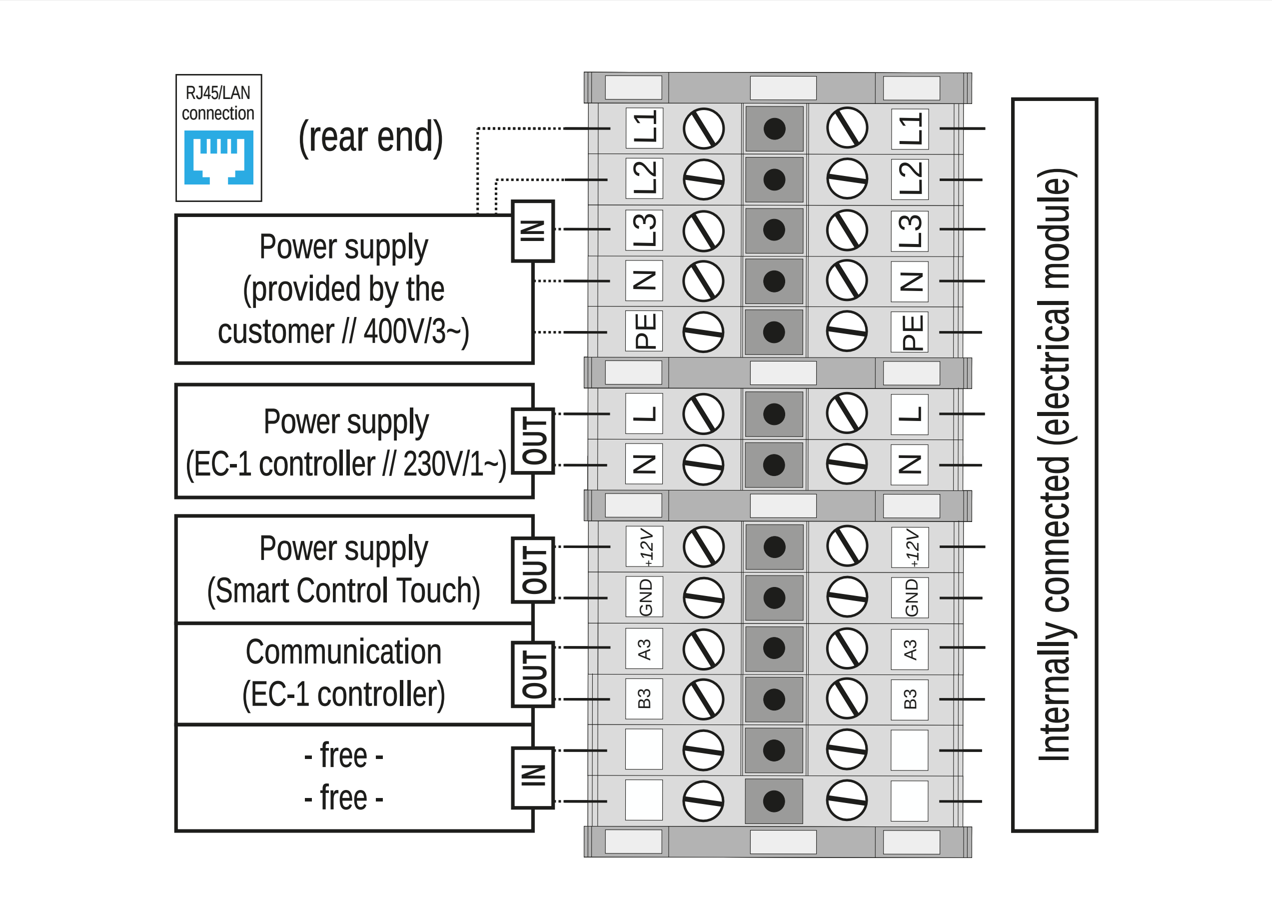
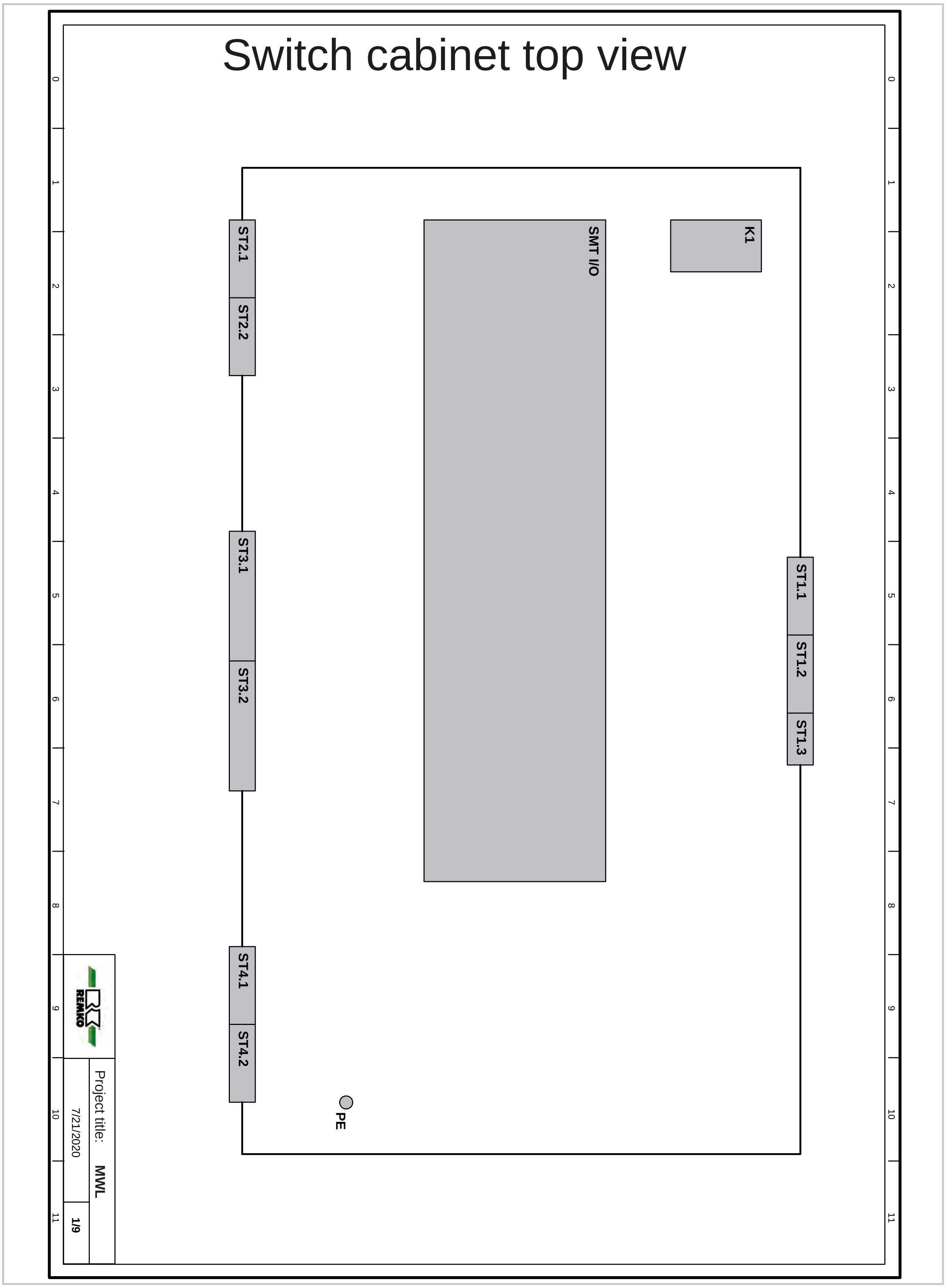
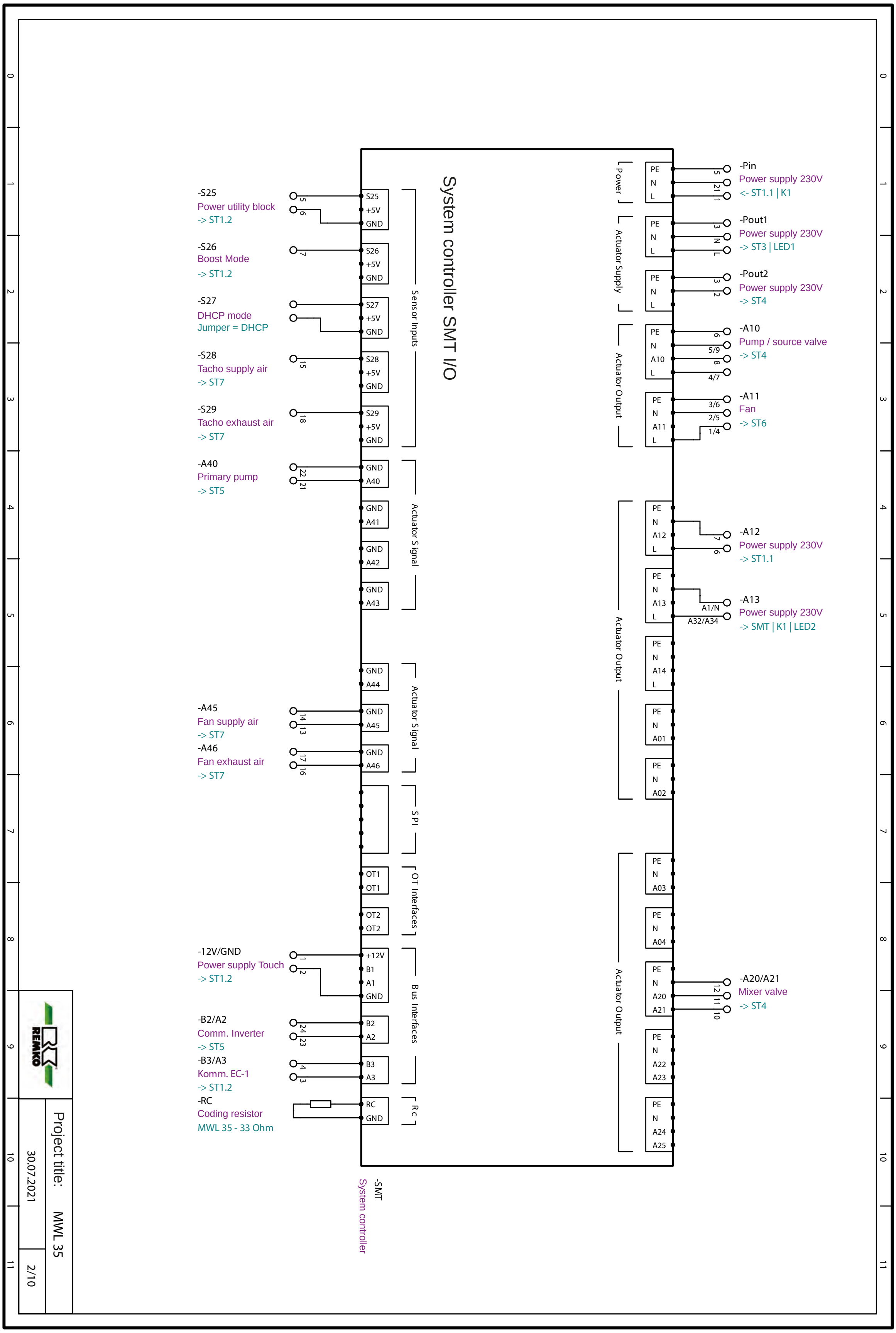


Fig. 47: Terminal block (at the rear at the height of the electric module)

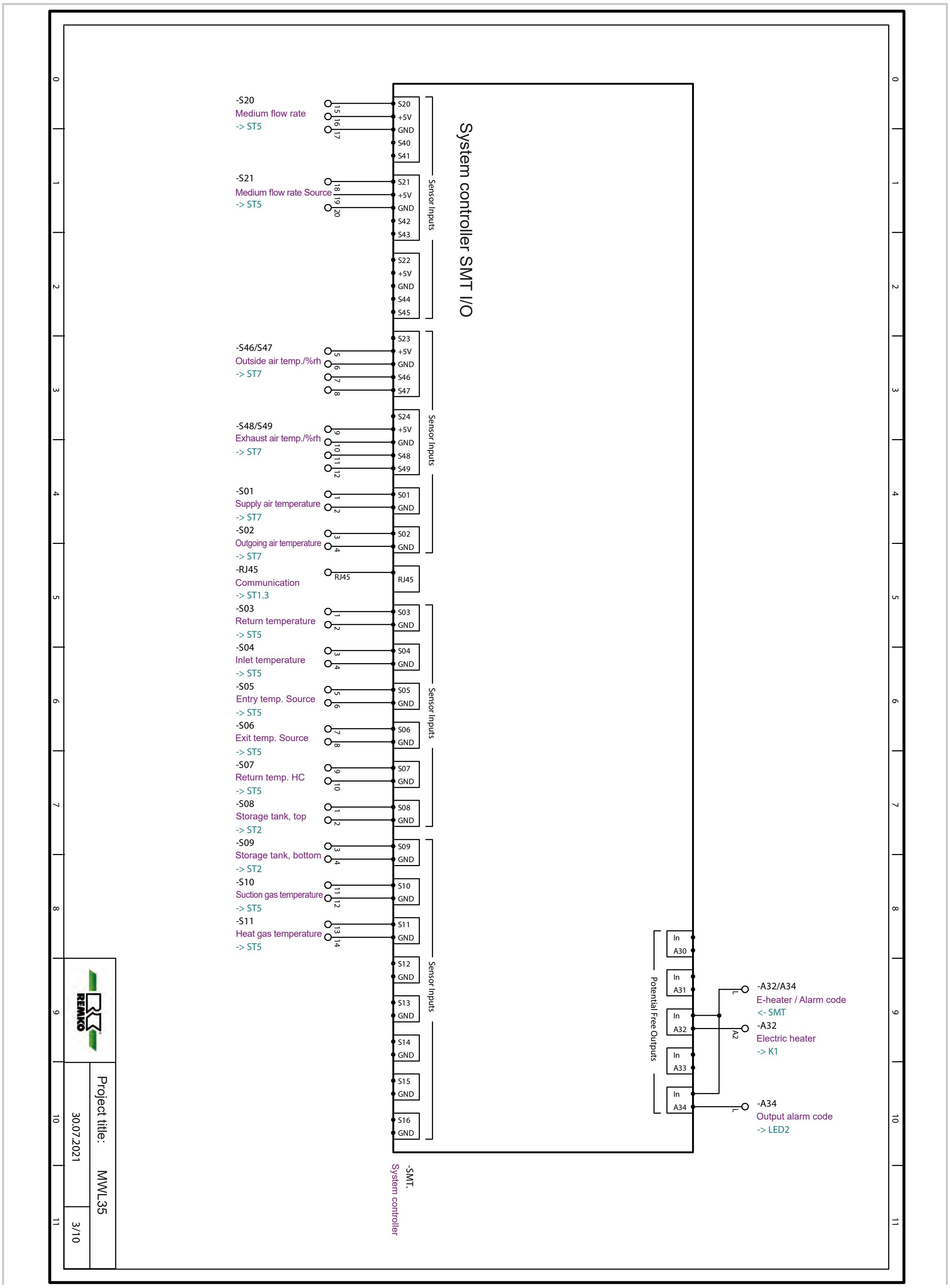
- Please note that for the communication of the touch controller, the Ethernet cable must also be connected
- The Ethernet connection is located on the rear

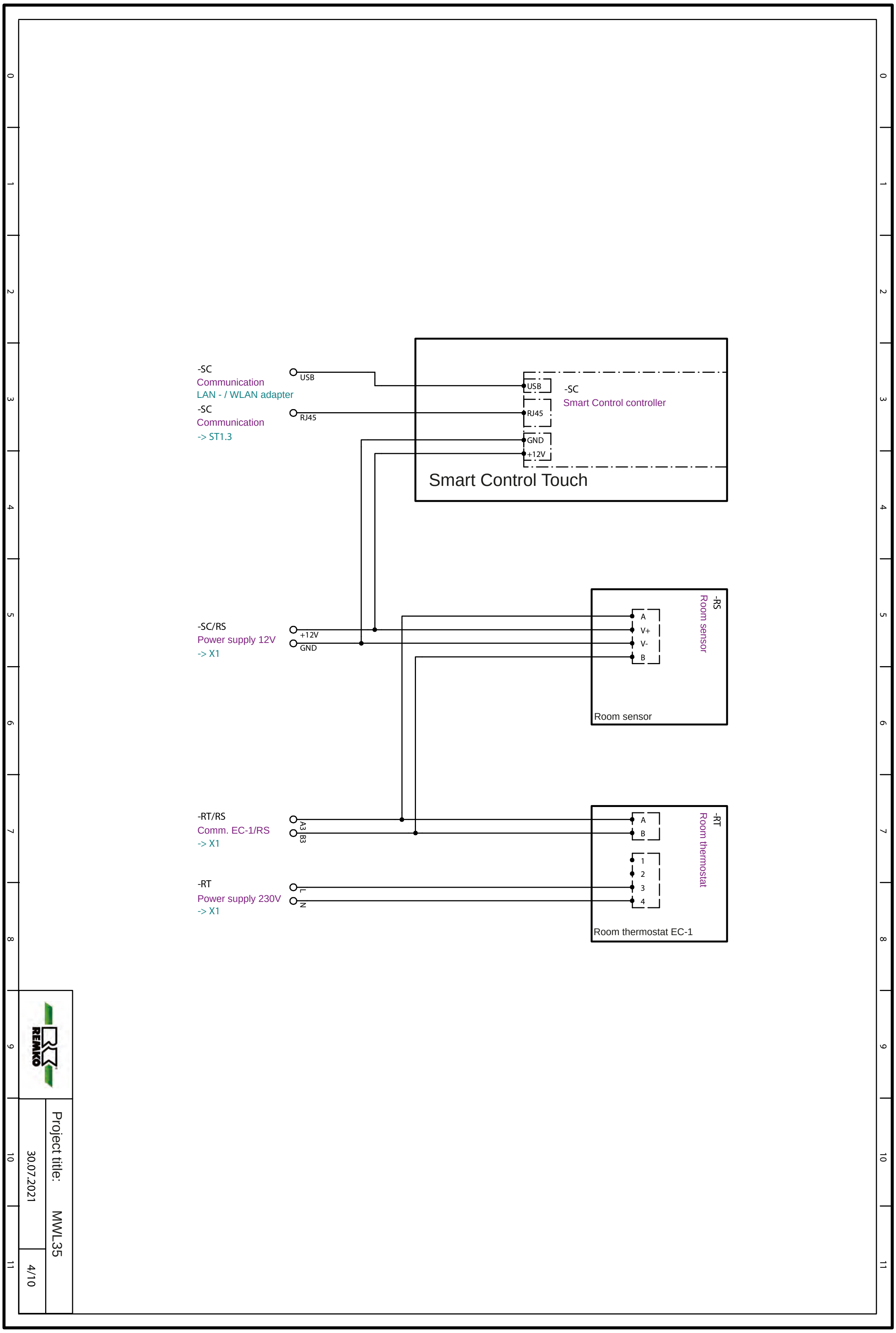
8.2 Circuit diagrams

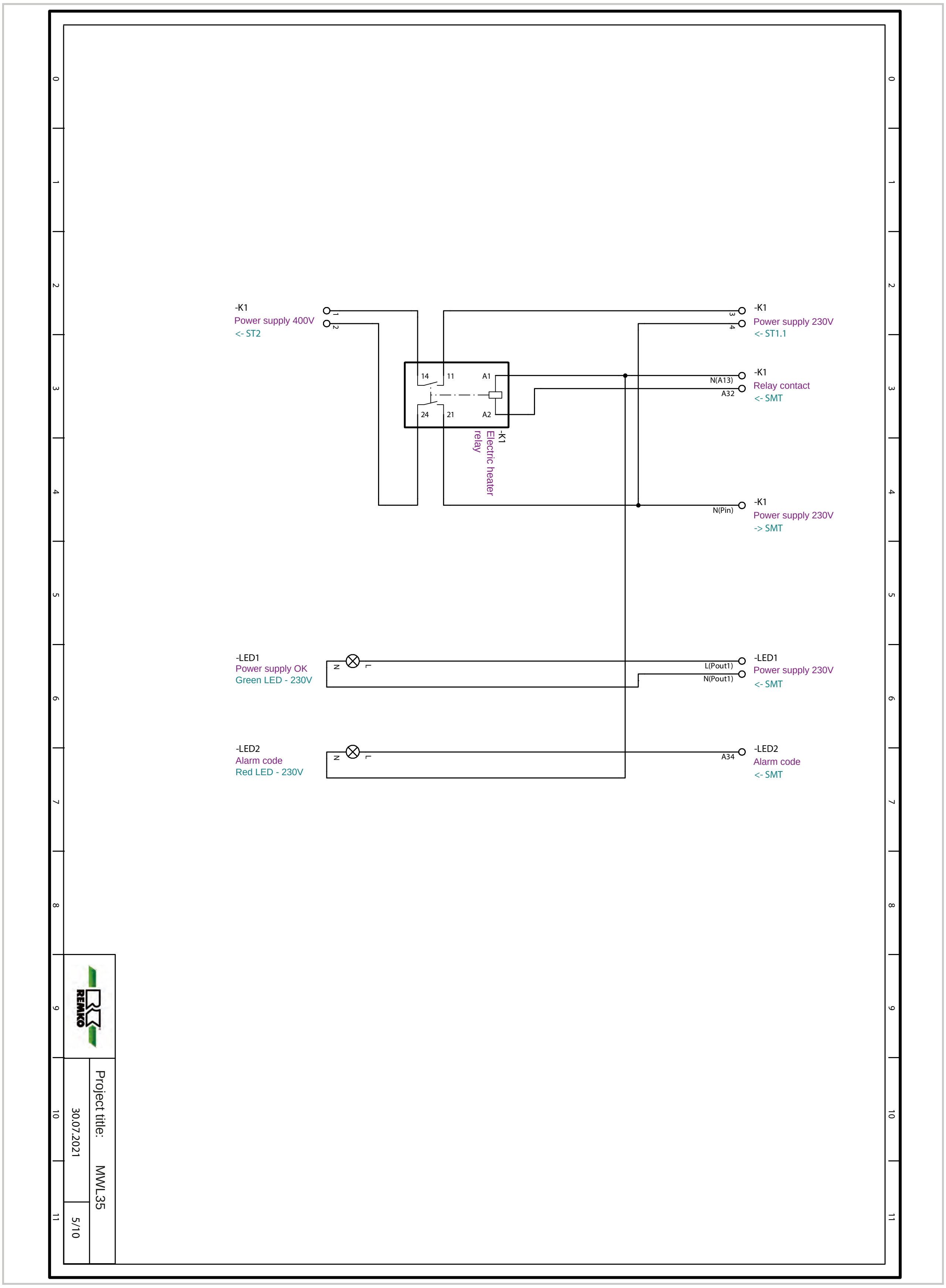


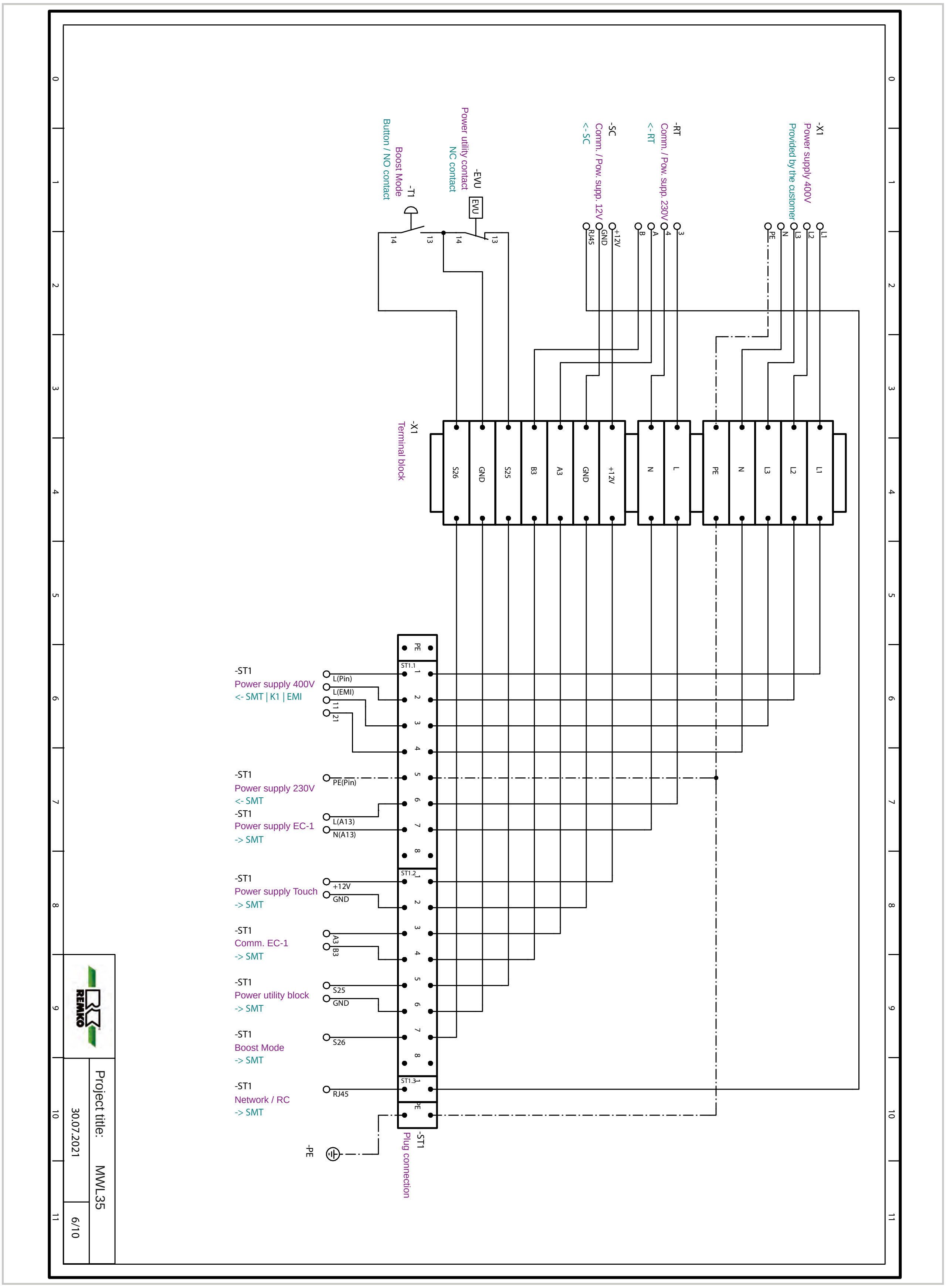

System controller SMT I/O
Sensor Inputs
Actuator Signal
SPI
OT Interfaces
Bus Interfaces
Rc
Power
Actuator Supply
Actuator Output
-S25
Power utility block
-> ST1.2
-S26
Boost Mode
-> ST1.2
-S27
DHCP mode
Jumper = DHCP
-S28
Tacho supply air
-> ST7
-S29
Tacho exhaust air
-> ST7
-A40
Primary pump
-> ST5
-A45
Fan supply air
-> ST7
-A46
Fan exhaust air
-> ST7
-12V/GND
Power supply Touch
-> ST1.2
-B2/A2
Comm. Inverter
-> ST5
-B3/A3
Komm. EC-1
-> ST1.2
-RC
Coding resistor
MWL 35 - 33 Ohm
-Pin
Power supply 230V
<- ST1.1 | K1
-Pout1
Power supply 230V
-> ST3 | LED1
-Pout2
Power supply 230V
-> ST4
-A10
Pump / source valve
-> ST4
-A11
Fan
-> ST6
-A12
Power supply 230V
-> ST1.1
-A13
Power supply 230V
-> SMT | K1 | LED2
-A20/A21
Mixer valve
-> ST4
-SMT
System controller
Project title: MWL 35
30.07.2021
2/10

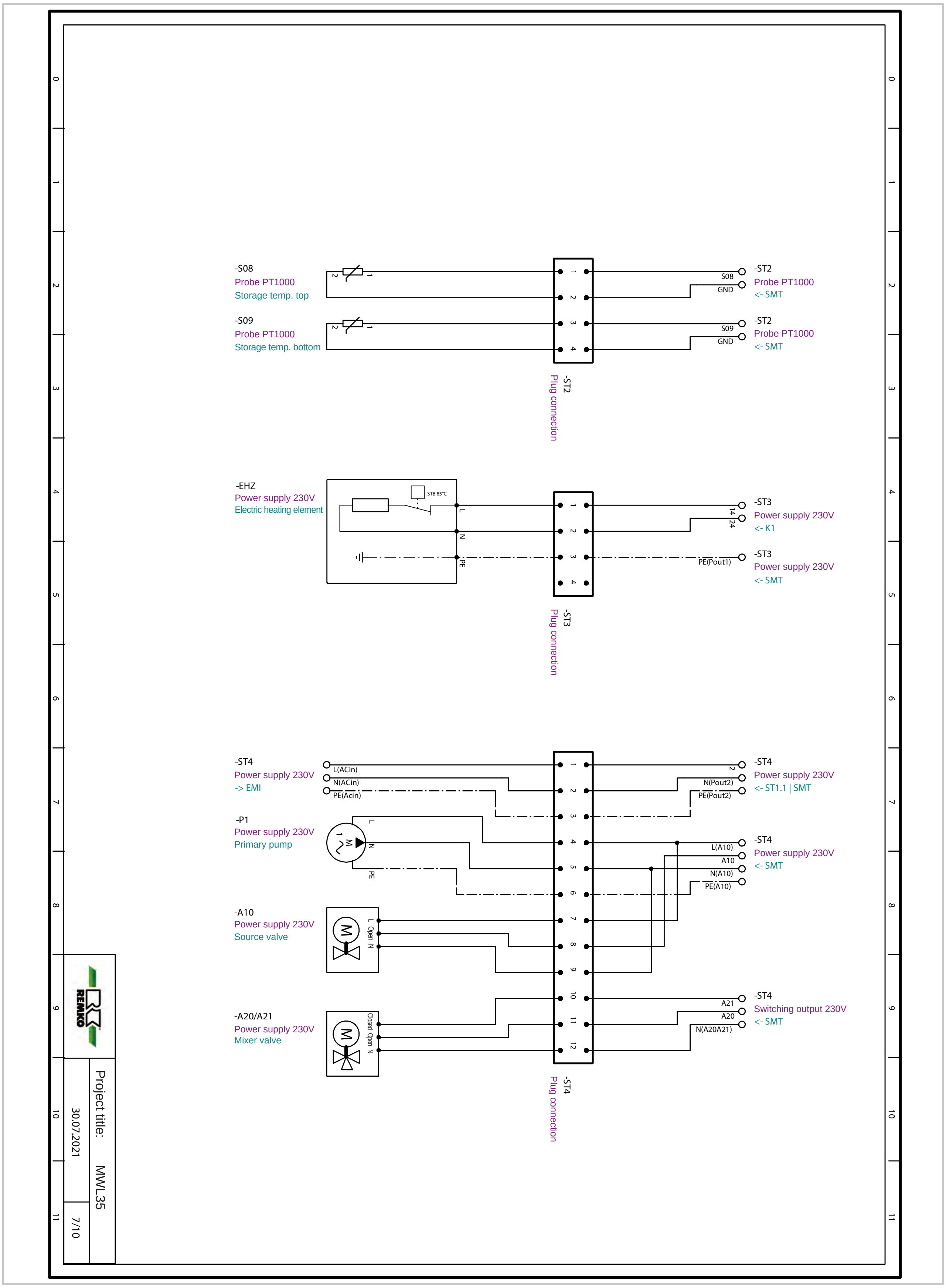
REMKO MWL series

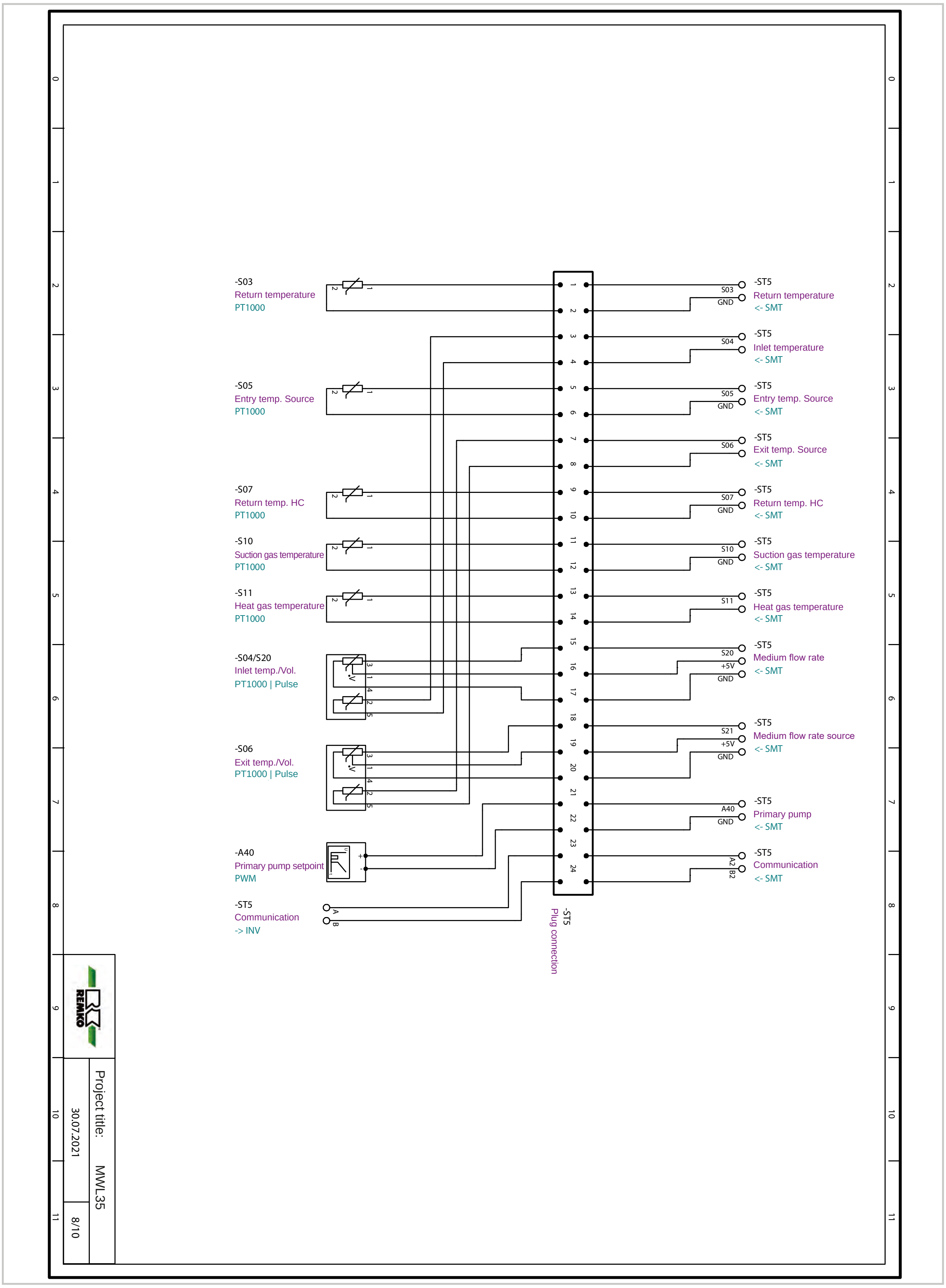



-SC
Communication
LAN - / WLAN adapter
-SC
Communication
-> ST1.3
USB
RJ45
-SC
Smart Control controller
GND
+12V
Smart Control Touch
-SC/RS
Power supply 12V
-> X1
+12V
GND
-RS
Room sensor
A
V+
V-
B
Room sensor
-RT/RS
Comm. EC-1/RS
-> X1
A3
B3
-RT
Power supply 230V
-> X1
L
N
-RT
Room thermostat
1
2
3
4
Room thermostat EC-1
Project title:
MWL35
30.07.2021
4/10

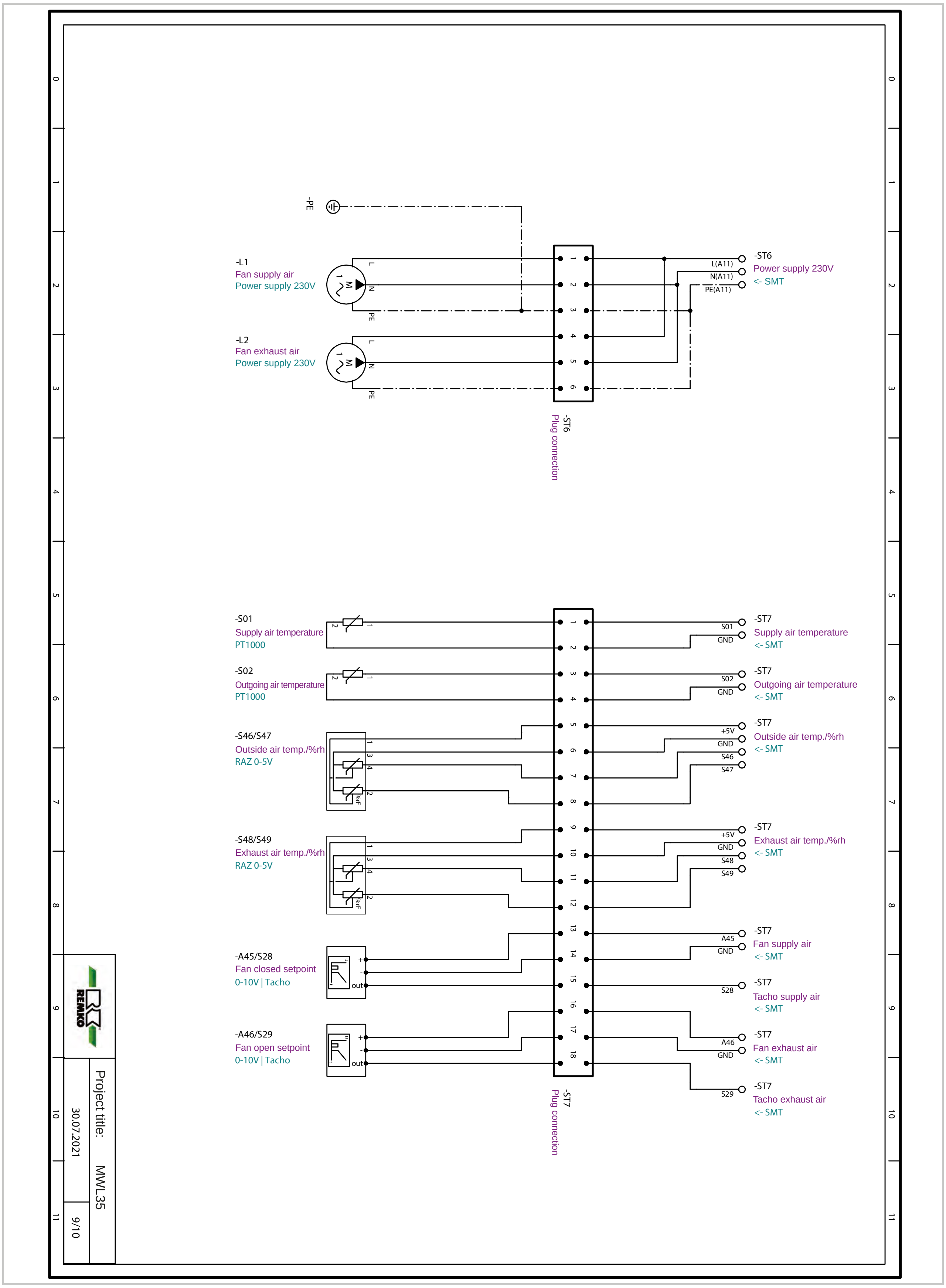

-K1
Power supply 400V
<- ST2
-K1
Power supply 230V
<- ST1.1
-K1
Relay contact
<- SMT
N(A13)
A32
14
11
A1
24
21
A2
-K1
Electric heater
relay
-K1
Power supply 230V
-> SMT
N(Pin)
-LED1
Power supply OK
Green LED - 230V
L(Pout1)
N(Pout1)
-LED1
Power supply 230V
<- SMT
-LED2
Alarm code
Red LED - 230V
A34
-LED2
Alarm code
<- SMT
REMKO
Project title:
MWL35
30.07.2021
5/10

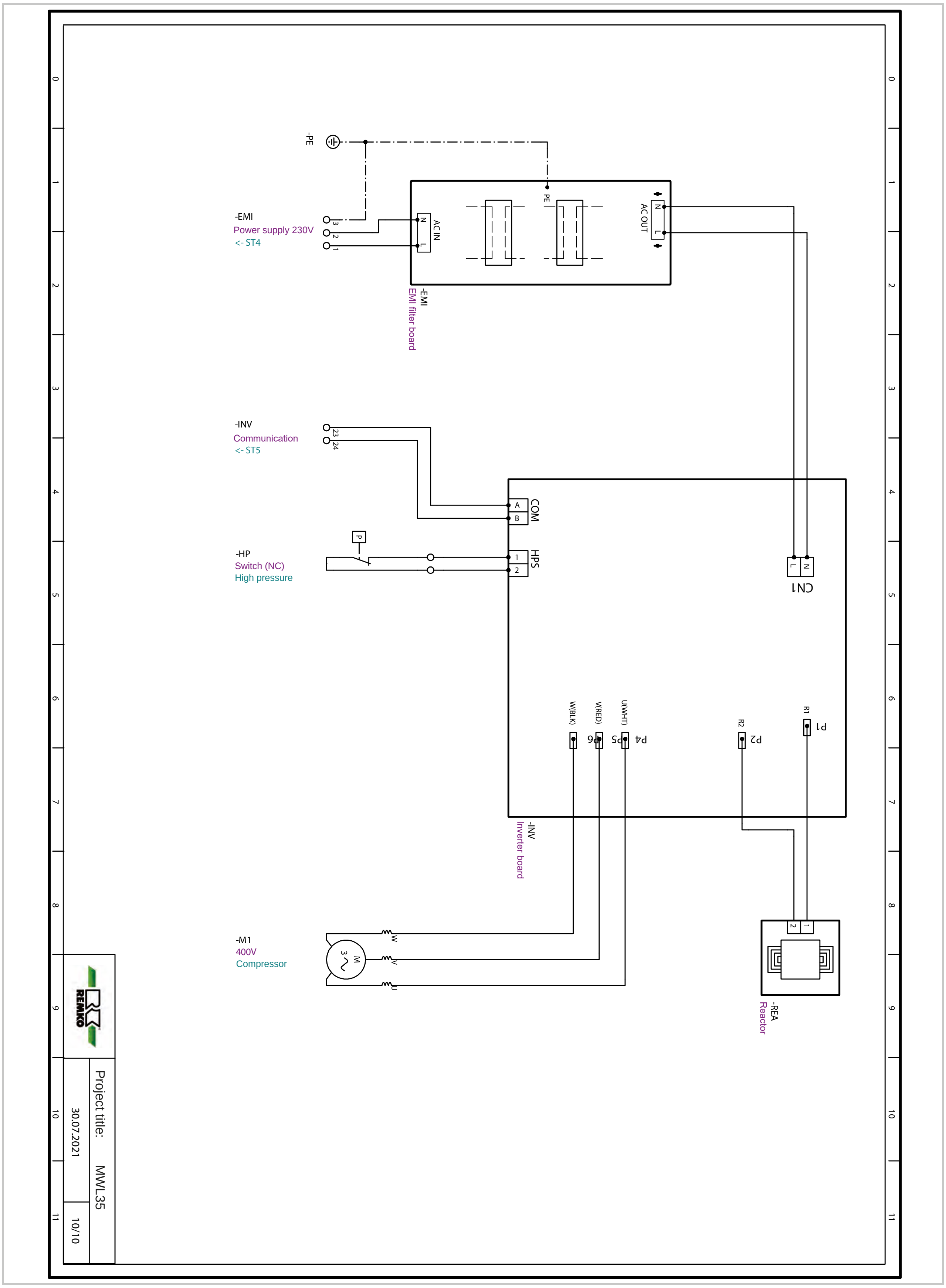

-X1
Power supply 400V
Provided by the customer
-RT
Comm. / Pow. supp. 230V
<- RT
-SC
Comm. / Pow. supp. 12V
<- SC
-EVU
Power utility contact
NC contact
-T1
Boost Mode
Button / NO contact
-X1
Terminal block
-ST1
Power supply 400V
<- SMT | K1 | EMI
-ST1
Power supply 230V
<- SMT
-ST1
Power supply EC-1
-> SMT
-ST1
Power supply Touch
-> SMT
-ST1
Comm. EC-1
-> SMT
-ST1
Power utility block
-> SMT
-ST1
Boost Mode
-> SMT
-ST1
Network / RC
-> SMT
-PE
-ST1
Plug connection
Project title: MWL35
30.07.2021
6/10


-S08
Probe PT1000
Storage temp. top
-S09
Probe PT1000
Storage temp. bottom
-ST2
Probe PT1000
<- SMT
-ST2
Probe PT1000
<- SMT
S08
GND
S09
GND
-ST2
Plug connection
-EHZ
Power supply 230V
Electric heating element
STB 85°C
-ST3
Power supply 230V
<- K1
-ST3
Power supply 230V
<- SMT
PE(Pout1)
-ST3
Plug connection
-ST4
Power supply 230V
-> EMI
L(ACin)
N(ACin)
PE(ACin)
-P1
Power supply 230V
Primary pump
-A10
Power supply 230V
Source valve
-A20/A21
Power supply 230V
Mixer valve
-ST4
Power supply 230V
<- ST1.1 | SMT
N(Pout2)
PE(Pout2)
-ST4
Power supply 230V
<- SMT
L(A10)
A10
N(A10)
PE(A10)
-ST4
Switching output 230V
<- SMT
A21
A20
N(A20A21)
-ST4
Plug connection
REMKO
Project title: MWL35
30.07.2021
7/10


-S03
Return temperature
PT1000
-S05
Entry temp. Source
PT1000
-S07
Return temp. HC
PT1000
-S10
Suction gas temperature
PT1000
-S11
Heat gas temperature
PT1000
-S04/S20
Inlet temp./Vol.
PT1000 | Pulse
-S06
Exit temp./Vol.
PT1000 | Pulse
-A40
Primary pump setpoint
PWM
-ST5
Communication
-> INV
-ST5
Plug connection
-ST5
Return temperature
<- SMT
-ST5
Inlet temperature
<- SMT
-ST5
Entry temp. Source
<- SMT
-ST5
Exit temp. Source
<- SMT
-ST5
Return temp. HC
<- SMT
-ST5
Suction gas temperature
<- SMT
-ST5
Heat gas temperature
<- SMT
-ST5
Medium flow rate
<- SMT
-ST5
Medium flow rate source
<- SMT
-ST5
Primary pump
<- SMT
-ST5
Communication
<- SMT
S03
GND
S04
S05
S06
S07
S10
S11
S20
+5V
S21
A40
A2
B2
A
B
Project title:
MWL35
30.07.2021
8/10

REMKO MWL series




-PE
-EMI
Power supply 230V
<- ST4
AC IN
PE
AC OUT
-EMI
EMI filter board
-INV
Communication
<- ST5
COM
A
B
-HP
Switch (NC)
High pressure
HPS
CN1
W(BLK)
V(RED)
U(WHT)
P6
P5
P4
R2
P2
R1
P1
-INV
Inverter board
-M1
400V
Compressor
-REA
Reactor
Project title:
MWL35
30.07.2021
10/10

Legend for the circuit diagrams

E-heater:	Electric heater
EHZ:	Electric heater
EVU:	Power utility
HC:	Heating cycle
Comm.:	Communication
NTC:	Temperature probe
Primary pump.:	Primary pump
PWM:	Pulse width modulation
Power supp.:	Power supply
T.:	Temperature
Temp.:	Temperature

9 Before commissioning

Observe the following points before commissioning:

- The heating system is filled with DI water in accordance with VDI 2035. We recommend the addition of REMKO full heating protection (see the chapter "Corrosion protection").

! NOTICE!

No commissioning can take place if the above named points are not observed. Damage resulting from this is not covered by the guarantee!

10 Commissioning

Internet version

EC-1 version

Touch display version

Touch display and information on commissioning

The Smart Control is used to operate and control the entire heating system. The Smart Control is operated via the touch display.

- The unit is pre-installed at the factory. After a reset of the Smart Control, the default parameters are loaded.
- An intensive visual inspection is to be carried out before the actual commissioning.
- Switch on the power supply.

> **! NOTICE!**
>
> Before commissioning the entire system, including hot water tank, must be filled!

11 Care and maintenance

Regular care and maintenance assure fault-free operation and long service life for the heat pump system.

- The unit must be kept free of dirt, growth and other deposits.
- The unit is to be cleaned with a damp cloth. In doing so, ensure that no caustic, abrasive or solvent-based cleaning products are used. Use of powerful water jets is to be avoided.
- The air filters of the ventilation module must be cleaned.
- Plan for air bleed valves and drain-off taps at appropriate places if necessary

12 Troubleshooting and customer service

The unit has been manufactured using state-of-the-art production methods and has been tested several times to ensure that it works properly. However, in the event that malfunctions should occur, the unit should be checked against the following list. Please inform your dealer if the unit is still not working correctly after all of the functional checks have been performed.

Malfunction	Possible causes	Remedial measures
The heat pump does not start or switches itself off	Power failure, under-voltage	Check the voltage and, if necessary, wait for it to come back on
	Defective mains fuse/main switch turned off	Exchange mains fuse, master switch on
	Damaged power supply	Repair by specialist firm
	Power company off-period	Wait until the power-company off-period is over and the heat pump starts up as required
	Operational temperature limits too low or too high	Observe temperature ranges

13 View of the unit

13.1 Unit representation of the overall unit

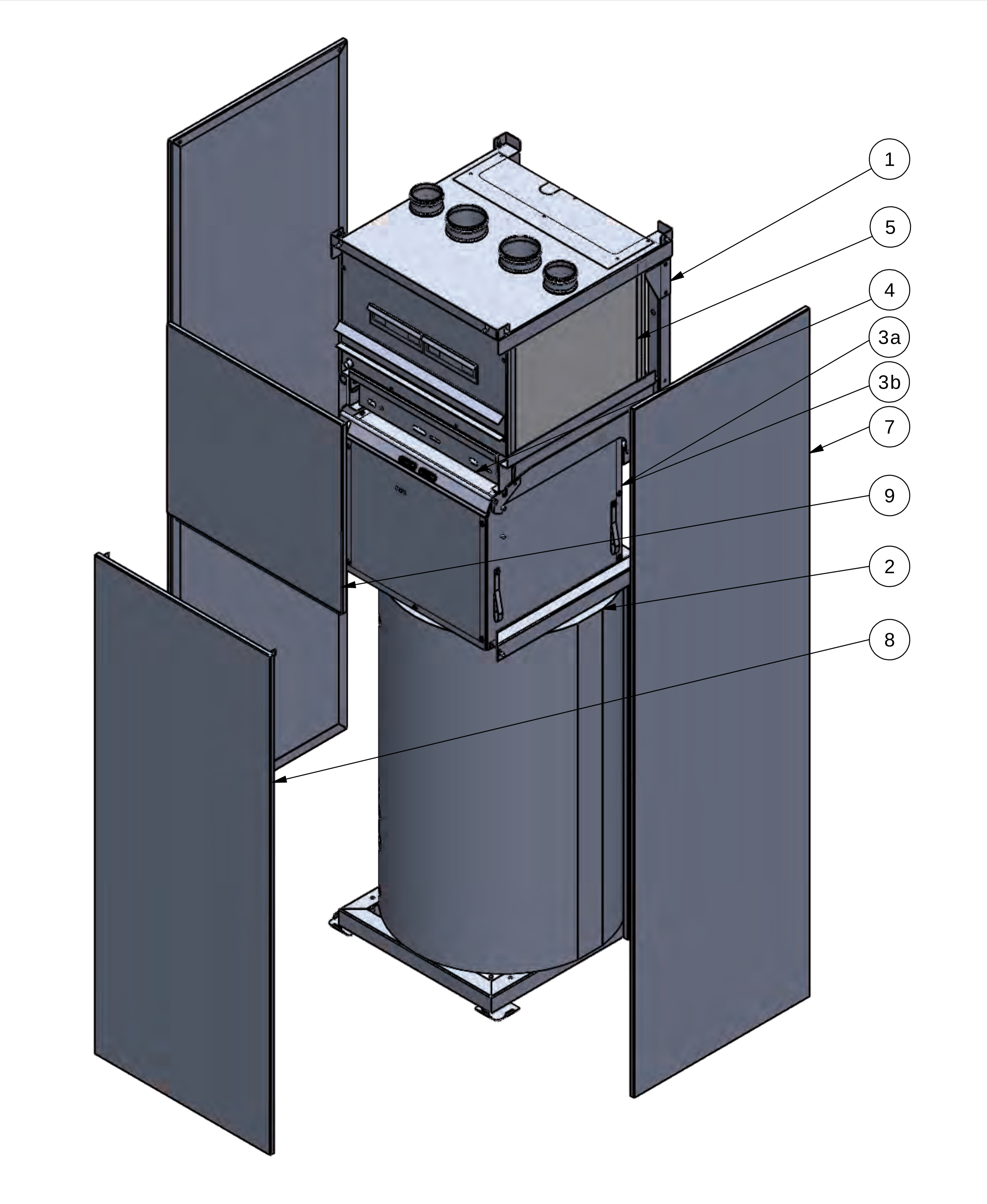


Fig. 48: Exploded view of the overall unit

13.2 Spare parts for the entire unit

No.	Designation	MWL 35
1	Frame	On request by providing the serial number
2	MTS 150 storage tank module	
3a	Heat pump module MWP 35 heating	
3b	Heat pump module MWP 35 heating and cooling	
4	MEL 35 electric module	
5	MLG 70 ventilation module	
6	Connection box	
7-9	Cladding panels, set	
	Spare parts not illustrated	
	MWL 35 with ventilation	On request by providing the serial number
	MWL 35 without ventilation	
	MLG coaxial heat exchanger	
	MWL 35 assembly template	
	MWL 35 module set 1	
	MWL 35 module set 2	
	Quick-release coupling sealing set	

When ordering spare parts, please always state the EDP number, unit number and unit type (see name plate)!

13.3 Unit representation of the frame

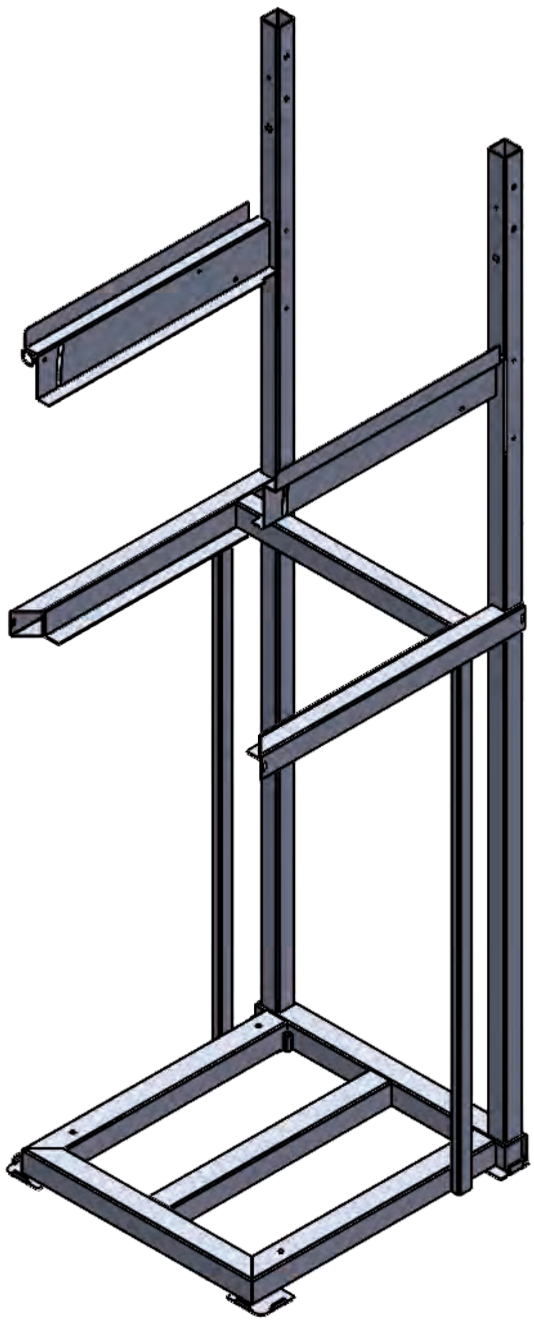


Fig. 49: Exploded view of the frame

13.4 Spare parts for the frame

No.	Designation	Frame
	Frame, complete	On request by providing the serial number

When ordering spare parts, please always state the EDP number,
unit number and unit type (see name plate)!

13.5 Unit representation of the frame with attachments

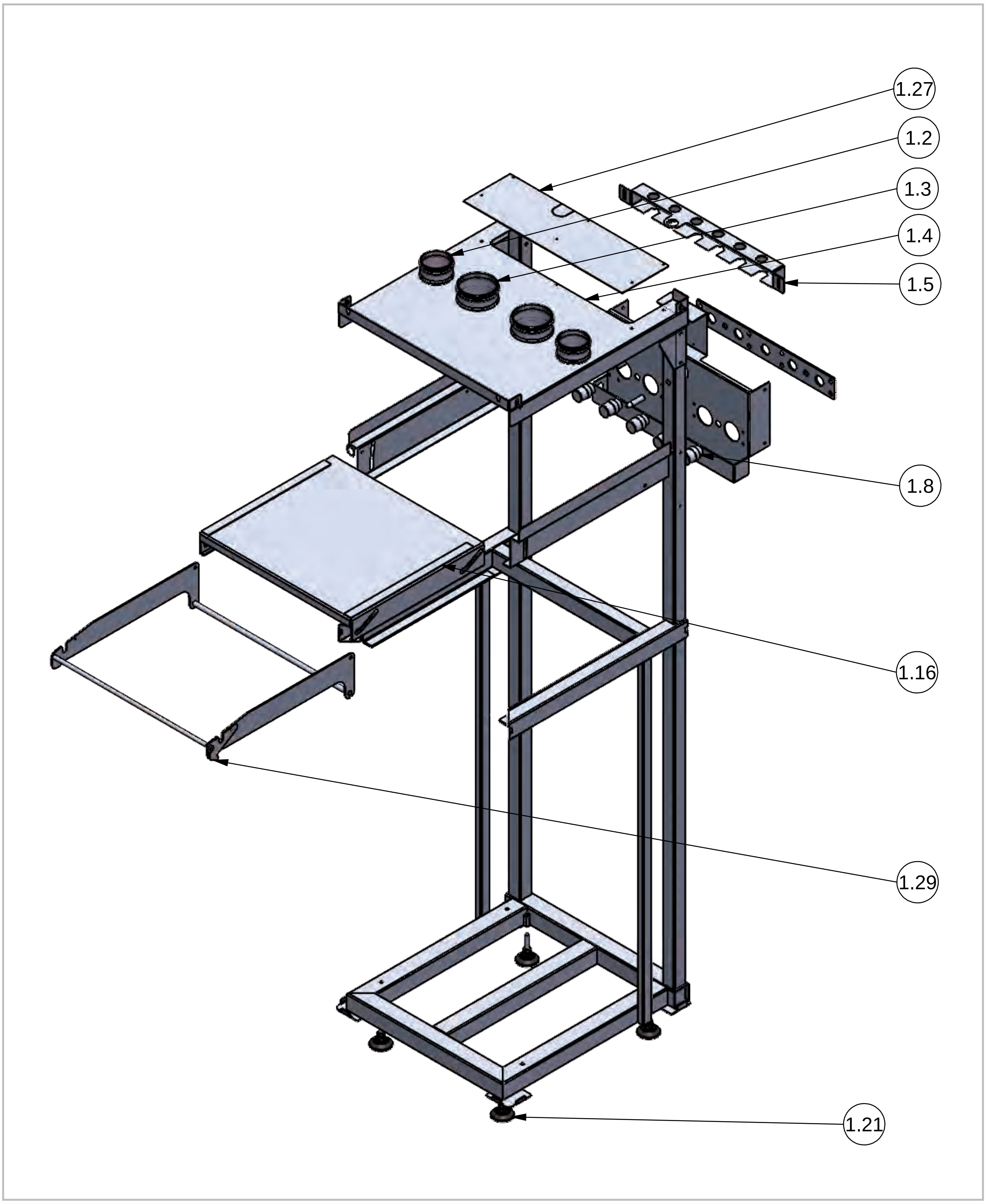


Fig. 50: Exploded view of the frame with attachments

13.6 Spare parts for the frame with attachments

No.	Designation	Frame with attachments
	Frame, complete	On request by providing the serial number
1.2	Inner connector DN 80	
1.3	Inner connector reducer DN 100/80	
1.4	Roof panel	
1.5	Ball valve retaining bar	
1.8	Coupler 3/4" MWP 35	
1.16	Plastic modular slide rail	
1.21	Adjustable foot M10	
1.27	Roof cover panel	
1.29	Locking lever	
	Spare parts not illustrated	
	Cladding panel, top front	On request by providing the serial number
	Cladding panel, bottom front	
	Cladding panel, side	
	Connector block	
	Hose nozzle	
	Condensate hose - Parts list = 1613052	
	Terminal block	
	Plastic plain bearing	
	Protection ring 22 mm	
	O-ring 22 mm	
	Coupler sealing set	

When ordering spare parts, please always state the EDP number, unit number and unit type (see name plate)!

13.7 Unit representation of MWP 35 heat pump module

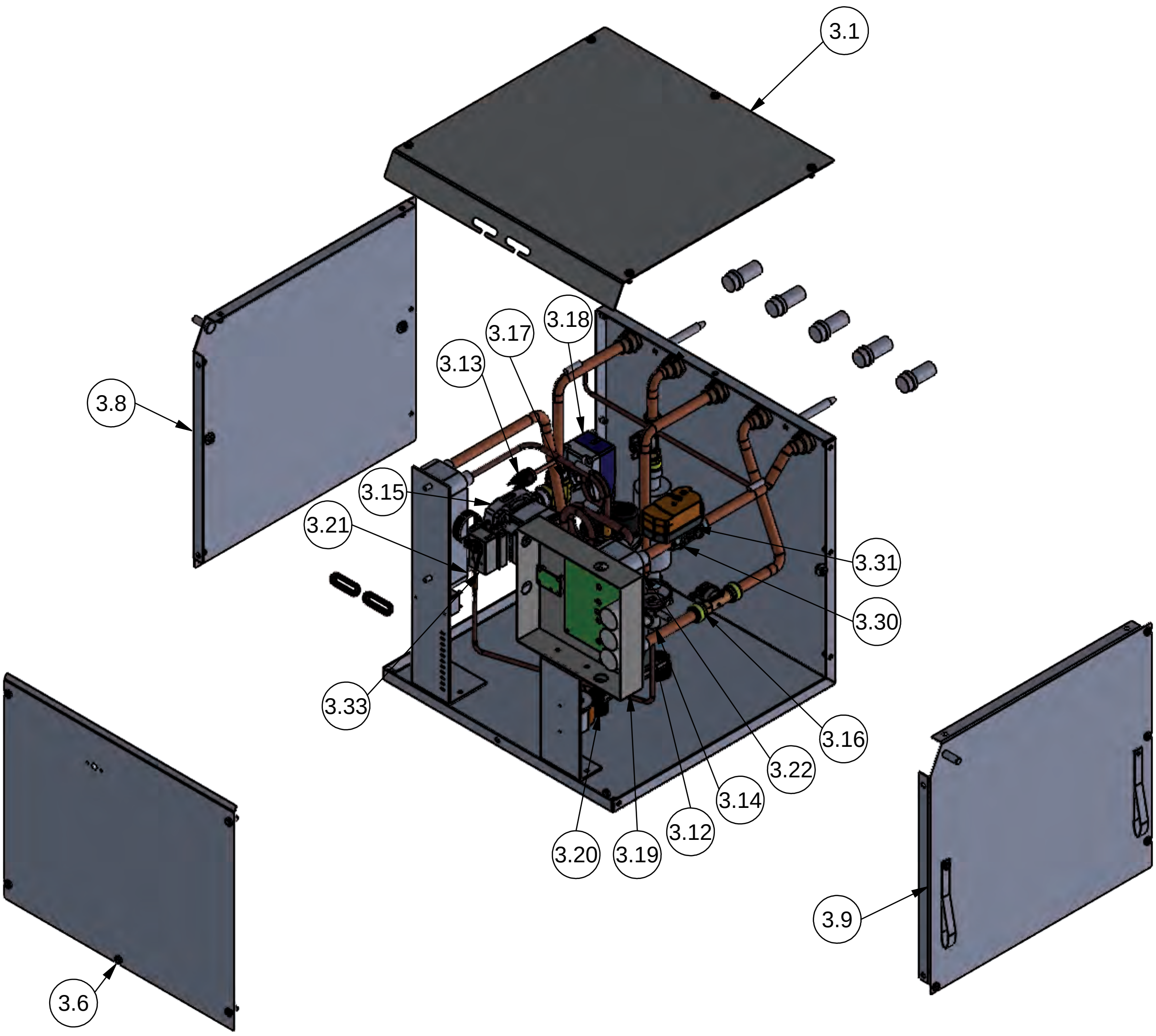


Fig. 51: Exploded view of MWP 35 heat pump module

13.8 Spare parts for MWP 35 heat pump module

No.	Designation	MWP 35
	Heat pump module, complete	On request by providing the serial number
3.1	Cover, top	
3.6	Cover (front panel)	
3.8	Housing side section, left	
3.9	Housing side section, right	
3.12	Compressor	
3.13	High pressure switch	
3.14	E-valve	
3.15	Circulation pump UPM 3S 15-40 130 mm	
3.16	Flow sensor	
3.17	Mixing valve body	
3.18	Mixing valve motor	
3.19	Inverter board + Box	
3.20	Vibration damper	
3.21	Condenser heat exchanger	
3.22	Evaporator heat exchanger	
3.30	2-way valve	
3.31	Motor 2-way valve	
3.33	STB, SmartServ	
	Spare parts not illustrated	
	Belt perforated horizontal	On request by providing the serial number
	Belt (perforated)	
	Electr. auxiliary heater 3 kW	
	Basic housing ground/rear wall	
	Slotted grommet	
	Insulation	
	Sealing tape	
	Coupler hydraulics M	
	Probe PT 1000	
	EMI board spacer	
	Molex plug	
	3-way valve $^{3}/_{4}$" cooling	

When ordering spare parts, please always state the EDP number, unit number and unit type (see name plate)!

13.9 Unit representation of MLG 70 ventilation module

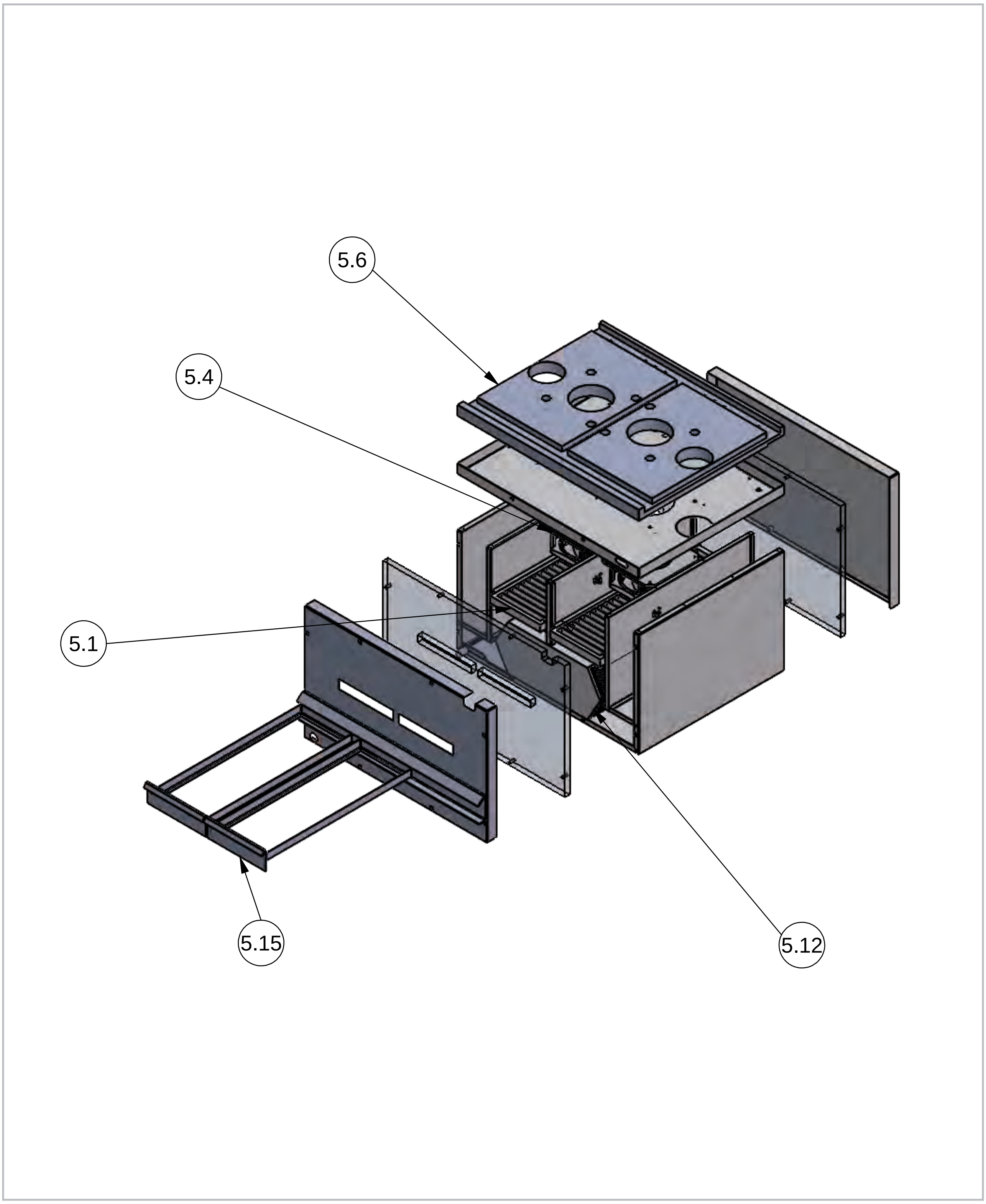


Fig. 52: Exploded view of MLG 70 ventilation module

13.10 Spare parts for MLG 70 ventilation module

No.	Designation	MLG 70
	Ventilation module, complete	On request by providing the serial number
5.1	MLG 70 air filter	
5.4	Supply/exhaust air fan	
5.6	EPP panel	
5.12	Cross-flow heat exchanger	
5.15	Filter cassette	
	Spare parts not illustrated	
	K-module fan	On request by providing the serial number
	PT 1000 temperature sensor	
	Temperature/humidity sensor	
	MLG 70 condensate hose	
	Rubber grommet (cable entry)	
	Carrying strap	
	Insulation set	
	K-module extension	

When ordering spare parts, please always state the EDP number,
unit number and unit type (see name plate)!

13.11 Unit representation of MEL 35 electric module

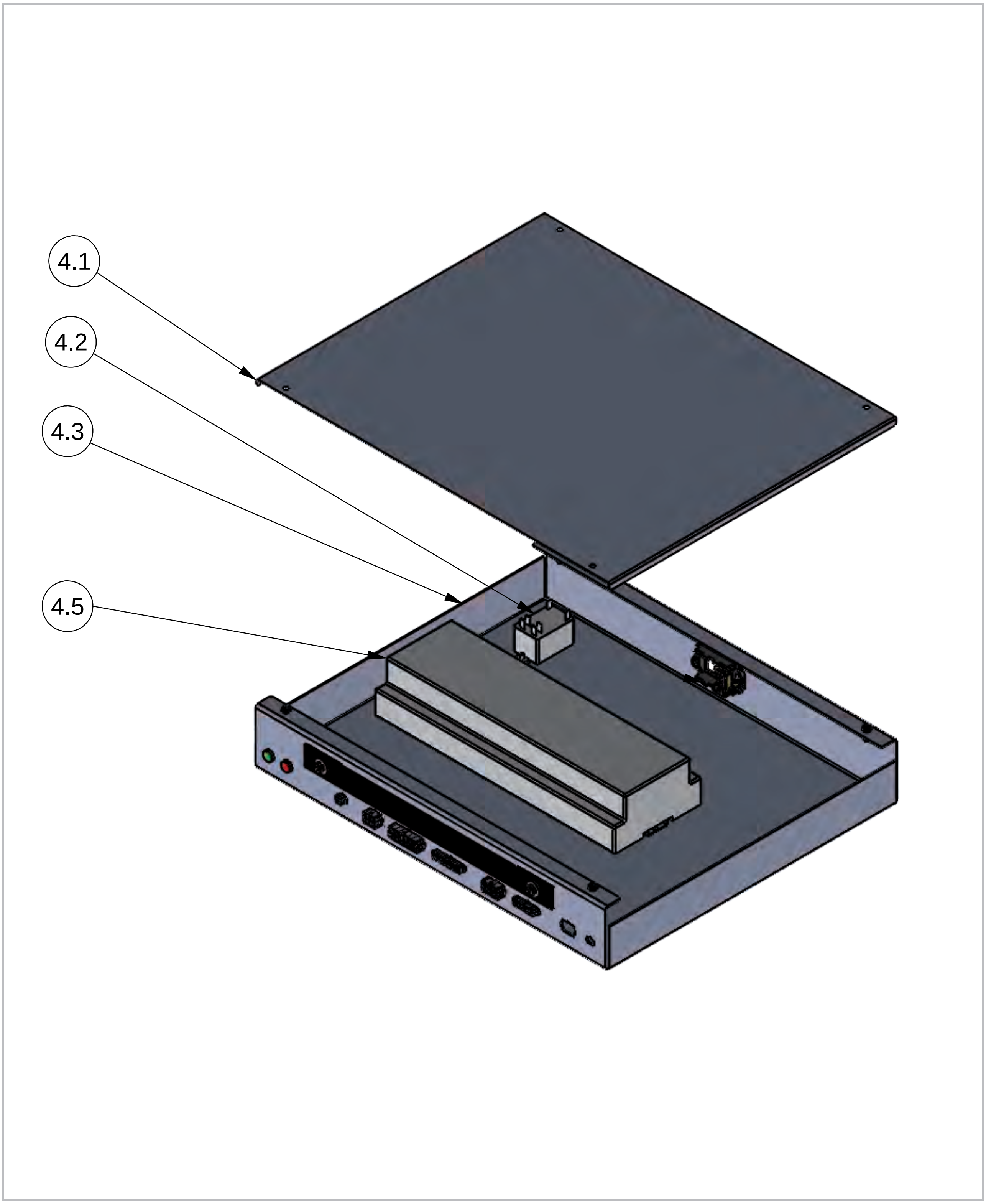


Fig. 53: Exploded view of MEL 35 electric module

13.12 Spare parts for MEL 35 electric module

No.	Designation	MEL 35
	Electric module, complete	On request by providing the serial number
4.1	E-box cover	
4.2	Relays	
4.3	E-box housing	
4.5	I/O module	
	Spare parts not illustrated	
	Carrying strap	On request by providing the serial number

When ordering spare parts, please always state the EDP number, unit number and unit type (see name plate)!

13.13 Unit representation of MTS 150 storage tank module

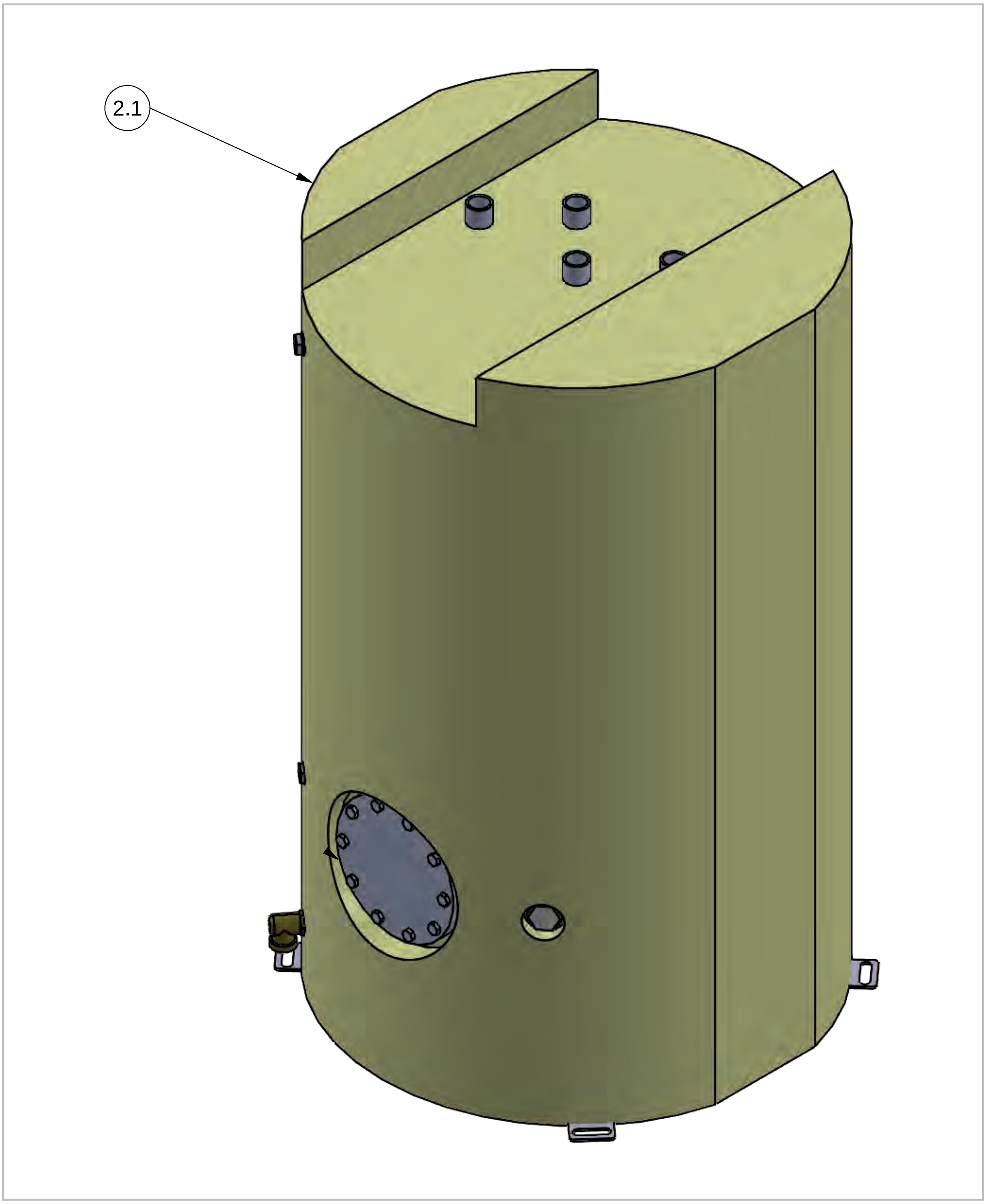


Fig. 54: Exploded view of MTS 150 storage tank module

13.14 Spare parts for MTS 150 storage tank module

No.	Designation	MTS 150
2.1	Storage tank module, complete	On request by providing the serial number
	Spare parts not illustrated	
	Immersion sleeve	On request by providing the serial number
	Ball valve for filling/drainage	
	False anode	
	PT 1000 temperature sensor	
	Pre-assembly plug	

When ordering spare parts, please always state the EDP number, unit number and unit type (see name plate)!

14 General terms

All-in-one unit

Design in which all refrigeration components are installed in one housing. No refrigeration work has to be carried out.

Annual power input factor

The annual power input factor indicates the power input (e.g. electrical energy) required in order to achieve a certain benefit (e.g. heating energy). The annual power input factor includes the energy required for auxiliary drives.

Bivalent mode

The heat pump provides the entire heating energy down to a predetermined outdoor temperature (e.g. -3 °C). If the temperature drops below this value, the heat pump switches off and the secondary heating appliance takes over the heating, e.g. a heating boiler.

Coefficient of performance

The current ratio of thermal output produced by the heat pump to the consumed electrical power is referred to as the coefficient of performance, as measured under standardised boundary conditions according to EN 255 / EN 14511. A coefficient of performance of 4 means that a usable thermal output amounting to 4-times the electrical power consumption is available.

Compressor (condenser)

Unit designed for the mechanical conveyance and compression of gasses. Compression serves to significantly increase the pressure and temperature of the medium.

Condenser

Heat exchanger on a refrigerant plant which liquefies a working medium in order to transmit heat to its environment (e.g. the heating system).

Defrost

At outdoor temperatures below 5 °C it is possible that ice may form on the evaporators of air/water heat pumps. The removal of this ice is referred to as defrosting and is undertaken by supplying heat, either regularly or as requirements dictate. Air/water heat pumps with circuit reversal are distinguished by their requirements-based, quick and energy-efficient defrosting system.

Energy supply company switching

Certain energy supply companies offer special tariffs for the operation of heat pumps.

When switching off the power supply companies only on the barrier is in contact only requirement of a heat source (heat pump) is blocked. Be switched off at monoenergetic operation, the power supply of the electric heating element with.

Evaporator

Heat exchanger on a refrigerant plant which uses the evaporation of a working medium in order to extract heat from its environment at low temperatures (e.g. the outdoor air).

Expansion valve

Heat pump component for lowering the condensing pressure on the vapour tension. In addition, the expansion valve regulates the quantity of injected refrigerant in relation to the evaporator load.

Heat carrier

Liquid or gas medium (e.g. water, brine or air), in which heat is transported.

Heat pump system

A heat pump system consists of a heat pump and a heat source system. For brine and water/water heat pumps, the heat source system must be made available separately.

Heat source

Medium from which the heat pump derives heat, in other words, soil, air and water.

Heating output

Flow of heat emitted from the liquefier to the environment. The heating output is the sum of the electrical power consumed by the condenser and the heat flux obtained from the environment.

Inverter

Power regulator which serves to match the speed of the compressor motor and the speed of the evaporator fans to the heating requirement.

Limit temperature / bivalence point

Outdoor temperature where the secondary heating appliance cuts in under bivalent operation.

Monovalent mode

In this mode, the heat pump is the sole heating appliance in the building all year round. Monovalent mode is primarily used in combination with brine/water and water/water heat pumps.

Noise

Noise is transmitted in media such as air or water. Essentially there are two types of noise, airborne sound and solid-borne sound. Airborne sound is transmitted entirely via the air. Solid-borne sound is transmitted in solid materials or liquids and is only partially radiated as airborne sound. The audible range of sound lies between 20 and 20,000 Hz.

Refrigerant

The working medium used in a refrigerant plant, e.g. heat pump, is referred to as the refrigerant. The refrigerant is a liquid which is used for thermal transfer in a refrigeration plant and which is able to absorb heat by changing its state at low temperatures and low pressures. A further change of state at higher temperatures and higher pressure serves to dissipate this heat.

Refrigerating capacity

Heat flux extracted from the environment by the evaporator (air, water or soil).

Regulations and guidelines

The erection, installation and commissioning of heat pumps has to be undertaken by qualified specialist engineers. In doing so, various standards and directives are to be observed.

Seal inspection

System operators are obliged to ensure the prevention of refrigerant leakage in accordance with the directive on substances that deplete the ozone layer (EC 2037/2000) and the Regulation on Certain Fluorinated Greenhouse Gases (EC 842/2006). In addition, a minimum of one annual service and inspection must be carried out, as well as a sealing test for refrigerating plants with a refrigerant filling weight over 3 kg.

Seasonal performance factor

The seasonal performance factor relates to the ratio of heat content delivered by the heat pump system to the supplied electrical energy in one year. It may not be compared to the performance number. The seasonal performance factor expresses the reciprocal of the annual power input factor.

Single energy-source mode

The heat pump covers a large proportion of the required thermal output. On a few days per year an electrical heating coil supplements the heat pump under extremely low outdoor temperatures. Dimensioning of the heat pump for air/water heat pumps is generally based on a limit temperature (also known as balance point) of approx. -5 °C.

Sound pressure level

The sound pressure level is a comparable characteristic quantity for the radiated acoustic output of a machine, for example, a heat pump. The noise emission level at certain distances and acoustic environments can be measured. The standard is based on a sound pressure level given as a nominal noise level.

Split AC unit

Design where one part of the device is positioned outdoors and the other inside the building. Both units are connected to each other by a refrigerant pipe.

Storage tank

The installation of a hot-water storage tank is generally recommended in order to extend the running time of the heat pump under low heat requirements. A storage tank is required for air/water heat pumps in order to bridge off-periods.

15 Index

C

Cable installation diagram 38
Circuit diagrams 40
COP 10

D

Disposal of equipment 7

E

Electrical wiring 39
Environmental protection 7

H

Heat pump
  Function of the heat pump 22
Heating coefficient 10

I

Intended use 6

O

Ordering spare parts . . . 53, 54, 56, 58, 60, 62, 64

P

Propellant in accordance with Kyoto Protocol . . 10

S

Safety
  Dangers of failure to observe the safety notes 5
  General 5
  Identification of notes 5
  Notes for inspection 6
  Notes for installation 6
  Notes for maintenance 6
  Personnel qualifications 5
  Safety notes for the operator 6
  Safety-conscious working 5
  Unauthorised modification 6
  Unauthorised replacement part manufacture . 6
Spare parts
  Frame 54
  Frame with attachments 56
  MEL 35 electric module 62
  MLG 70 ventilation module 60
  MTS 150 storage tank module 64
  MWP 35 heat pump module 58
  Overall unit 53

T

Troubleshooting
  General troubleshooting 51

V

Ventilation connection 35
View of the unit
  Frame 54
  Frame with attachments 55
  MEL 35 electric module 61
  MLG 70 ventilation module 59
  MTS 150 storage tank module 63
  MWP 35 heat pump module 57
  Overall unit 52

W

Warranty 6

REMKO QUALITY WITH SYSTEMS

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