Operating and installation instructions

REMKO series WKF NEO-compact

Smart heat pumps
Air/water system for heating or cooling

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

Instructions for Technicians

0298-2023-06 Edition 1, en_GB

Read the instructions prior to performing any task!

CE

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

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

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

Translation of the original

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1 Safety and usage instructions

1.1 General safety notes

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

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

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

Warning of inflammable substances!

CAUTION!

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

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

1.2 Identification of notes

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

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

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

DANGER!

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

DANGER!

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

WARNING!

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

CAUTION!

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

NOTICE!

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

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

1.3 Personnel qualifications

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

1.4 Dangers of failure to observe the safety notes

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

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

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

1.5 Safety-conscious working

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

1.6 Safety notes for the operator

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

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

1.7 Safety notes for installation, maintenance and inspection

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

1.8 Unauthorised modification and changes

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

1.9 Intended use

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

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

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

1.10 Warranty

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

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

1.11 Transport and packaging

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

⚠ WARNING!

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

Why:

- Leave packaging material are not around.

- Packaging material may not be accessible to children!

1.12 Environmental protection and recycling

Disposal of packaging

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

Disposal of equipment and components

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

2 Technical data

2.1 Device data for WKF NEO-compact 80-170

Series		WKF NEO-compact 80	WKF NEO-compact 100	WKF NEO-compact 130	WKF NEO-compact 170
Function		Heating or Cooling			
System		Split air/water			
Heat pump manager		Smart Control			
Drinking water tank enamelled		Series 200 or 300 litre			
Auxiliary heater, rated output	kW	6.0			
Domestic hot-water heating (changeover valve)		Series			
Connection oil/gas boiler		optional			
Usable limits, heating	°C	-20 to +37			
Inlet temperature, heating water, max.	°C	+60			
Heating capacity (min./max.)	kW	6.0 (0.9-7.5)	8.0 (1.5-10.0)	9.0 (2.0-12.5)	11.0 (3.0-16.8)
Room heating energy efficiency Average 35/55	%	211/140	211/131	212/147	215/142
Energy efficiency class Average		A+++/A++	A+++/A++	A+++/A++	A+++/A++
Heating capacity / compressor frequency / COP for A12/W35	kW/Hz/COP	7.4 / 79 / 5.92	9.1 / 79 / 6.03	12.0 / 79 / 5.87	15.2 / 79 / 5.82
Heating capacity / compressor frequency / COP [1] for A7/W35	kW/Hz/COP	6.4 / 79 / 5.92	7.9 / 79 / 5.26	10.3 / 79 / 5.07	13.5 / 79 / 5.15
Heating capacity / compressor frequency / COP [1] for A2/W35	kW/Hz/COP	5.3 / 79 / 4.13	5.9 / 79 / 4.16	8.7 / 79 / 4.14	11.3 / 79 / 4.12
Heating capacity / compressor frequency / COP [1] for A-7/W35	kW/Hz/COP	4.2 / 79 / 3.50	5.2 / 79 / 3.56	6.9 / 79 / 3.47	8.8 / 79 / 3.45
Heating capacity / compressor frequency / COP [1] for A-15/W35	kW/Hz/COP	3.2 / 79 / 2.71	3.9 / 79 / 2.77	5.1 / 79 / 2.69	7.2 / 79 / 2.73
Heating capacity / compressor frequency / COP [1] for A7/W45	kW/Hz/COP	6.1 / 79 / 3.96	7.5 / 79 / 4.04	9.9 / 79 / 3.93	12.5 / 79 / 3.97
Heating capacity / compressor frequency / COP [1] for A7/W55	kW/Hz/COP	5.7 / 79 / 3.06	7.0 / 79 / 3.12	9.2 / 79 / 3.04	11.3 / 79 / 3.08
Heating capacity / compressor frequency / COP [1] for A-7/W55	kW/Hz/COP	3.5 / 79 / 2.07	4.3 / 79 / 2.11	5.7 / 79 / 2.05	7.5 / 79 / 2.08
Service limits, cooling	°C	+15 to +43			
Min. inlet temperature for cooling	°C	7			

Series		WKF NEO-compact 80	WKF NEO-compact 100	WKF NEO-compact 130	WKF NEO-compact 170
Cooling capacity min./max.	kW	4.0 (0.8-6.5)	6.0 (1.5-8.2)	8.0 (2.1-10.5)	12.0 (3.0-16.8)
Cooling capacity / compressor frequency / EER for A35/W7	kW/Hz/EER	4.5 / 2.7	7.2/2.8	6.5/2.7	12.4/3.17
Cooling capacity / compressor frequency / EER for A35/W18	kW/Hz/EER	7.45 / 4.05	9.5/4.23	9.8/3.9	14.2/4.31
Refrigerant / basic capacity AM	--/kg	R32 / 1.0	R32 / 1.6	R32 / 1.8	R32 / 2.55
Refrigerant / pre-charge quantity for more than 5 m length of ordinary pipe	g/m	30/R32			
Refrigerant connections	Inches (mm)	1/4 / 1/2	3/8 / 5/8		3/8 / 3/4
Refrigerant piping length, max.	m	20			
Refrigerant piping height, max.	m	10			
Power supply	V/Ph/Hz	230/1~/50			400/3~/50
Max. current consumption	A	13	14	16	15
Rated current consumption for A7/W35	A	5.40	6.55	8.85	12.96
Rated power consumption for A7/W35	kW	1.24	1.52	2.07	2.62
Rated power consumption for A2/W35	kW	1.28	1.56	2.10	2.74
Max. power consumption	kW	3.0	3.7	4.1	6.2
Power factor at A7/W35 (cosφ)	--	0.9			
Customer's fuse protection, recommended (outdoor unit)	A slow-acting	16	20		3 x 16
Medium flow rate water (according to EN 14511, at Δt 5 K)	m^3/h	1.1	1.4	1.8	2.3
Pressure loss on condenser at rated medium flow rate	bar	0.1	0.15	0.2	0.3
Pressure loss, outdoor	kPa	80		70	60
Max. airflow volume outdoor unit	m^3/h	2500	3150	3350	4480
Max. operating pressure, water	bar	3			
Hydraulic connection inlet/return flow (flat-sealing)	Inches (mm)	1 1/4 (31.8)			
Sound power level per DIN EN 12102:2008-09 and ISO 9614-2	dB(A)	54.4	56.7	58.3	60.6
Sound pressure level, LpA (Outside unit) [3)]	dB(A)	29.4	31.7	33.3	38.6
Sound power level min./max. per DIN EN 12102:2008-09 and ISO 9614-2	dB(A)	51/56	54/59	55/61	57/63
Sound pressure level LpA min./max. (Outdoor unit) [3)]	dB(A)	29/34	32/37	33/39	35/41

REMKO series WKF NEO-compact

Series		WKF NEO-compact 80	WKF NEO-compact 100	WKF NEO-compact 130	WKF NEO-compact 170
Tonality of each outdoor unit	dB(A)	-	-	-	-
Dimensions, indoor unit 200 l storage tank (height/width/depth)	mm	1350 x 555 x 850			
Dimensions, indoor unit 300 l storage tank (height/width/depth)	mm	1420 x 650 x 950			
Dimensions, outdoor unit (height/width/depth)	mm	700x1010 x370	845x1165 x370		1450x1085 x425
Enclosure class outdoor unit	--	IP X4			
Weight indoor unit	kg	50			55
Weight outdoor unit	kg	62	73	80	95

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

[2] Contains greenhouse gas according to Kyoto protocol, GWP 675

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

2.2 Technical data EWS 200E, EWS 301E

Series		EWS 200E	EWS 301E
Drinking water volume	l	168	264
Heat exchanger surface	m^2	2,0	3,4
Heat exchanger contents	l	---	19,4
Storage tank volume (gross)	l	200	300
Max. operating pressure	bar	10	10
Max. permissible operating temp.	°C	95	95
Max. drawing quantity when drawing continuously at 45 °C [1)]	l/min	---	37,0
Standby energy Consumption value [2)]	kWh/d	1,37	1,64
Standby losses 24h	kWh/24h	2,5	2,9
N_L count		8,0	7,0 [4)]
Energy efficiency ratio		B	B
Max. installation length for flange heater	mm	200	450
Height	mm	1340	1420
Tilt height	mm	1455	1562
Diameter	mm	550	650
Weight	kg	90	120

[1)] te=10, Tv=55 °C, Tm=45 °C, Q=3000 l/h

[2)] Energy consumption in standby according to DIN 44 532 with 50 °C storage tank temperature and 45 °C tap temperature.

[3)] N_L count according to EN 12897 and DIN 4708 at 50 °C storage tank temperature, 55 °C inlet temperature, Q = 3000 l/h and 45 °C tap temperature

[4)] N_L count according to EN 12897 and DIN 4708 at 65 °C storage tank temperature, 80 °C inlet temperature, Q = 3000 l/h and 45 °C tap temperature

We reserve the right to make technical changes for the purpose of technical advancement.

REMKO series WKF NEO-compact

Throughputs EWS 200E

Throughputs		EWS 200E Preparation for domestic water			
Inlet temperature	°C	55	55	55	55
Hot water temperature	°C	45	45	45	45
Cold water temperature	°C	10	10	10	10
Heating cycle flow rate	l/h	600	1200	1800	2400
Throughput	kW	14,6	23,1	28,0	31,0

Throughputs		EWS 200E Preparation for domestic water			
Inlet temperature	°C	60	60	60	60
Hot water temperature	°C	50	50	50	50
Cold water temperature	°C	10	10	10	10
Heating cycle flow rate	l/h	600	1200	1800	2400
Throughput	kW	16,6	25,9	31,5	35,0

Throughputs		EWS 200E Preparation for domestic water			
Inlet temperature	°C	65	65	65	65
Hot water temperature	°C	55	55	55	55
Cold water temperature	°C	10	10	10	10
Heating cycle flow rate	l/h	600	1200	1800	2400
Throughput	kW	18,4	28,7	34,7	38,6

We reserve the right to make technical changes for the purpose of technical advancement.

Throughputs EWS 301E

Throughputs		EWS 301E Preparation for domestic water			
Inlet temperature	°C	55	55	55	55
Hot water temperature	°C	45	45	45	45
Cold water temperature	°C	10	10	10	10
Heating cycle flow rate	l/h	600	1200	1800	2400
Throughput	kW	16,8	25,3	30,1	33,2

Throughputs		EWS 301E Preparation for domestic water			
Inlet temperature	°C	60	60	60	60
Hot water temperature	°C	50	50	50	50
Cold water temperature	°C	10	10	10	10
Heating cycle flow rate	l/h	600	1200	1800	2400
Throughput	kW	18,7	28,1	33,7	37,0

Throughputs		EWS 301E Preparation for domestic water			
Inlet temperature	°C	65	65	65	65
Hot water temperature	°C	55	55	55	55
Cold water temperature	°C	10	10	10	10
Heating cycle flow rate	l/h	600	1200	1800	2400
Throughput	kW	20,6	30,9	36,9	40,9

We reserve the right to make technical changes for the purpose of technical advancement.

2.3 Product data

Product data for WKF NEO-compact 80-170

Average condition (moderate temperature periods)

Series		WKF NEO-compact 80	WKF NEO-compact 100	WKF NEO-compact 130	WKF NEO-compact 170
Energy efficiency ratio, heating 35°C/55°C		A+++/A++			
Nominal heating power P rated	kW	5/4	6/5	8/7	11/9
Room heating energy efficiency ηs 35 °C/ 55 °C	%	211/140	211/131	212/147	215/142
Smart Control's contribution to seasonal room heating energy efficiency	%	4			
Yearly energy consumption Q_{HE} 35 °C/ 55 °C [1)]		1909/2809	2510/4011	3152/4725	4257/6845
Sound power level L_{WA} (outdoor unit)	dB(A)	54	57	58	61
Sound power level L_{WA} (indoor unit)	dB(A)	-	-	-	-

[1)] The specified value is based on results from standard testing.
The actual consumption depends on the use and location of the unit

2.4 Unit dimensions of outdoor units

WKF NEO-compact 80

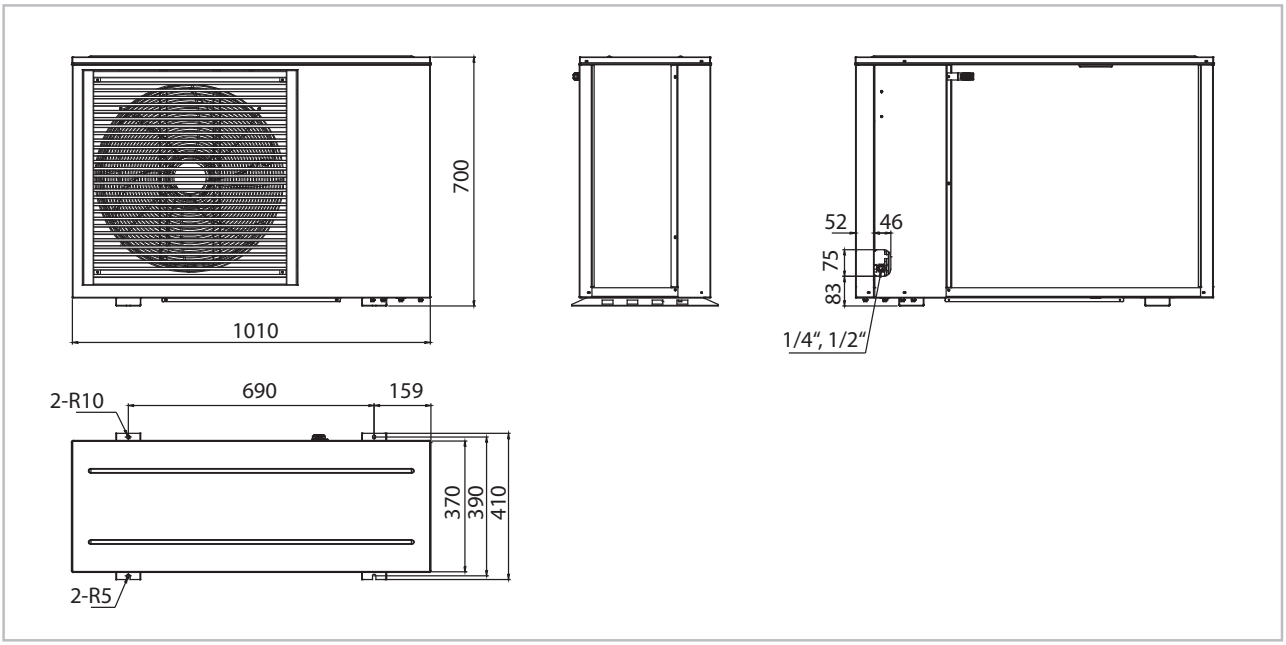

Fig. 1: Dimensions of outdoor units WKF NEO-compact 80

WKF NEO-compact 100/130

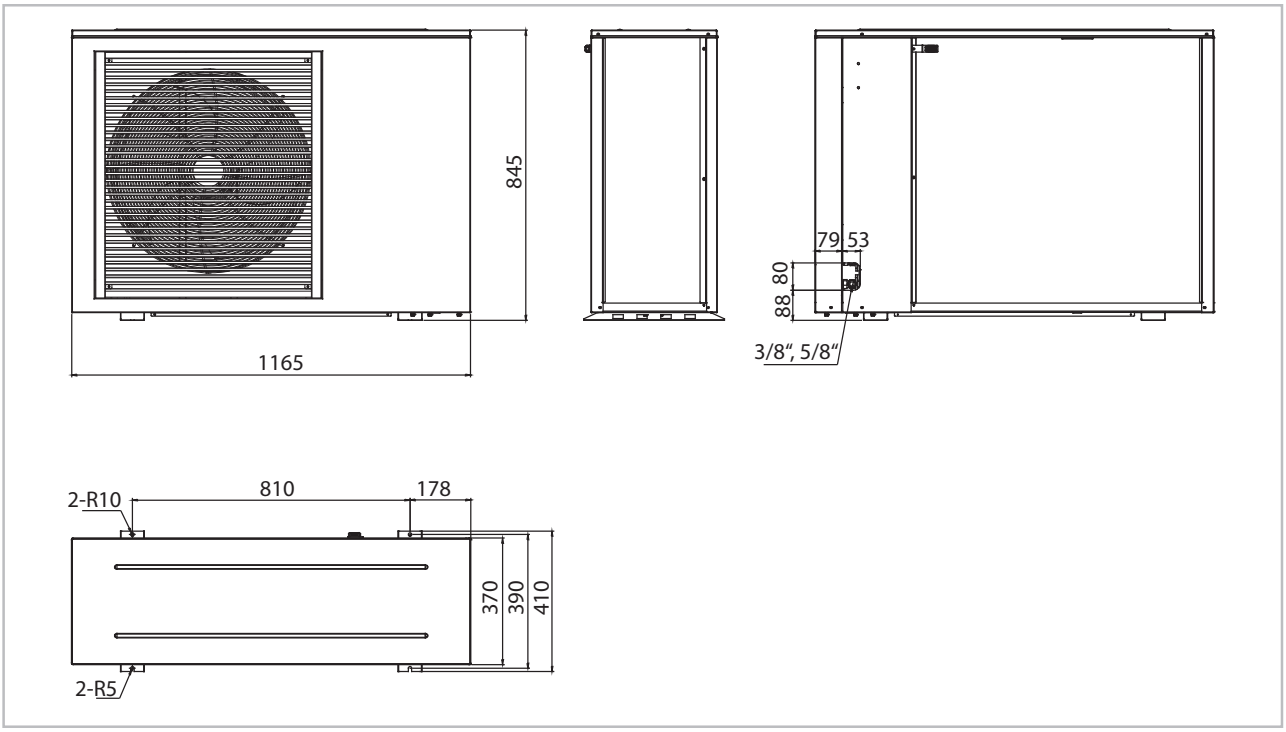

Fig. 2: Dimensions of outdoor units WKF NEO-compact 100/130

WKF NEO-compact 170

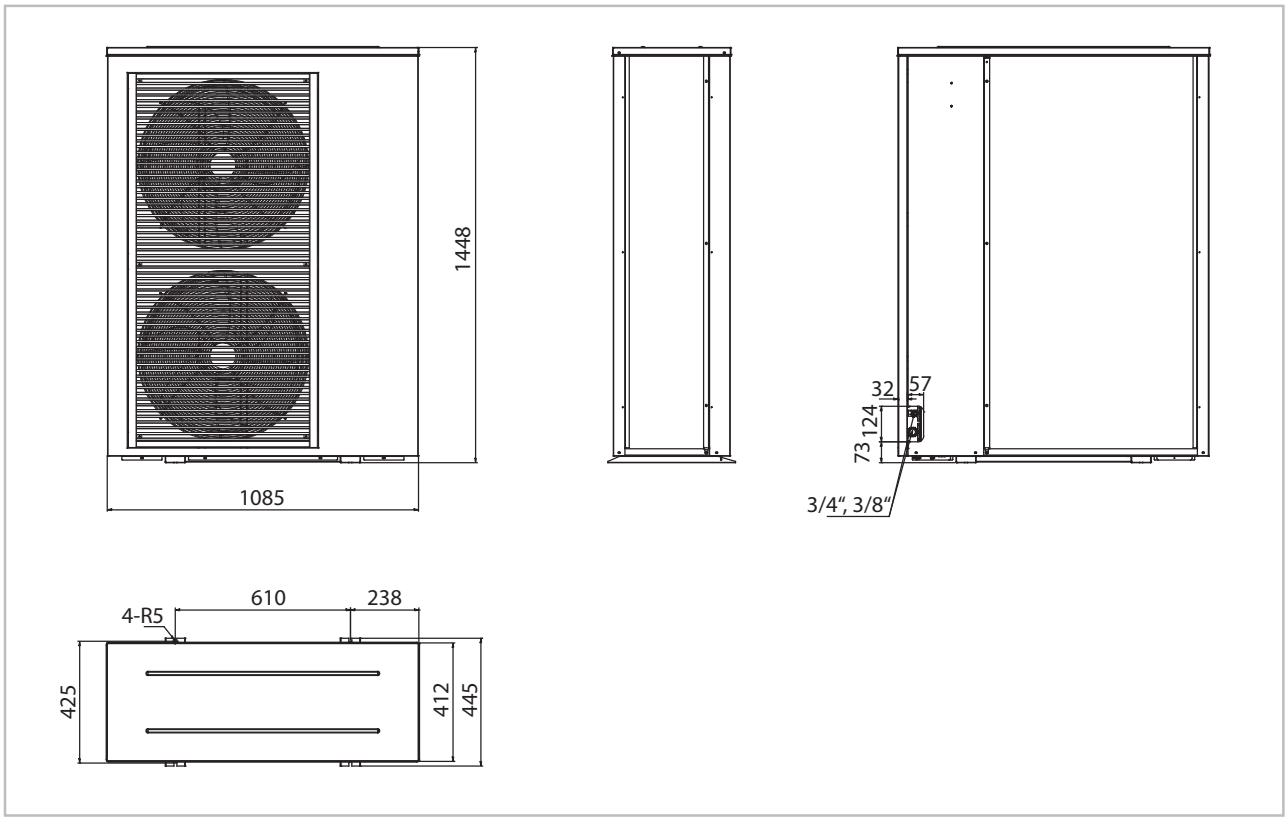

Fig. 3: Dimensions of outdoor units WKF NEO-compact 170

2.5 Unit dimensions of indoor units

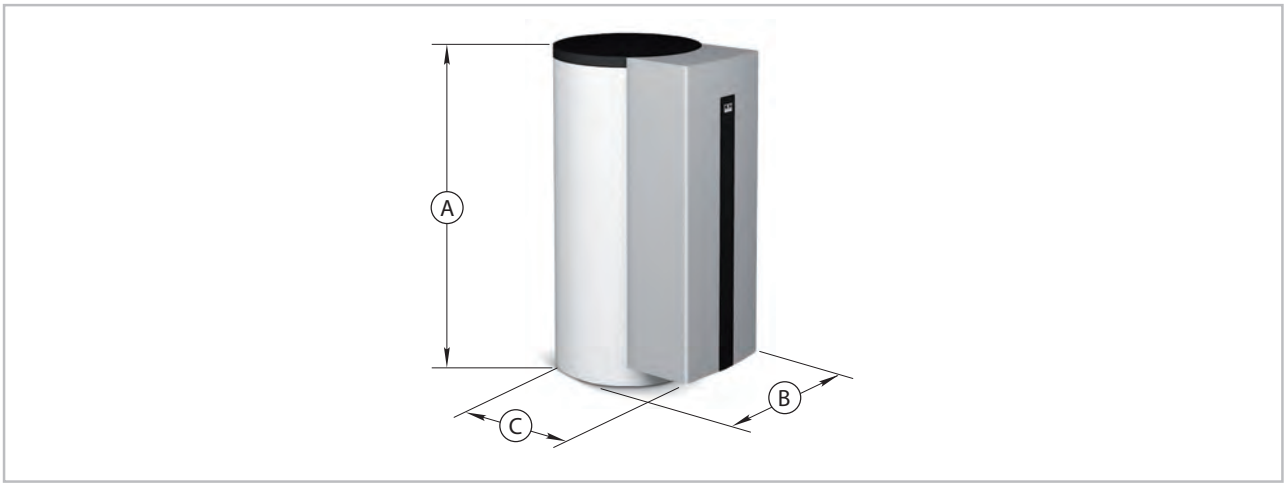

Fig. 4: Dimensions of indoor units WKF NEO-compact 80/100/130/170

Dimensions in mm	A	B	C
WKF NEO-compact 200 l	1350	555	850
WKF NEO-compact 300 l	1420	650	950

Pipe connection arrangement WKF NEO-compact 80/100/130/170 - 200 l - version

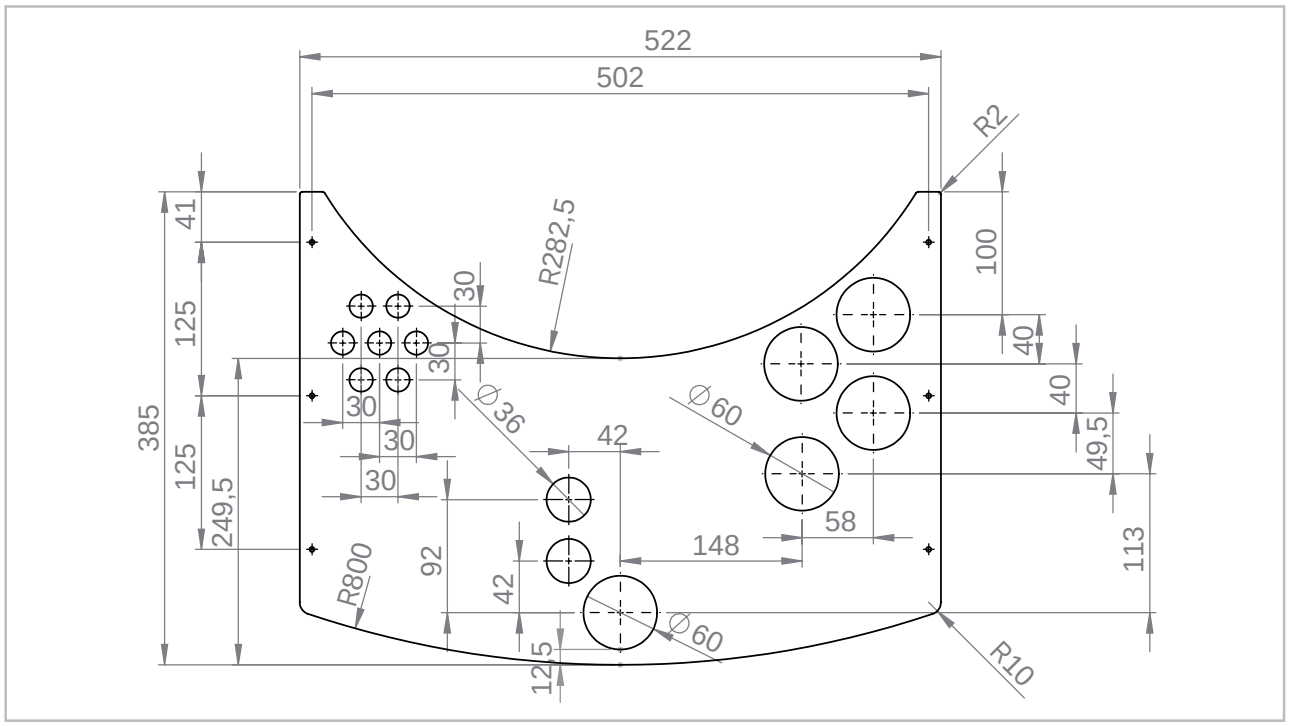

Fig. 5: Pipe connection arrangement WKF NEO-compact 80/100/130/170 - 200 l - version (all dimensions in mm)

Designations of pipe connections WKF NEO-compact 80/100/130/170 - 200 l - version

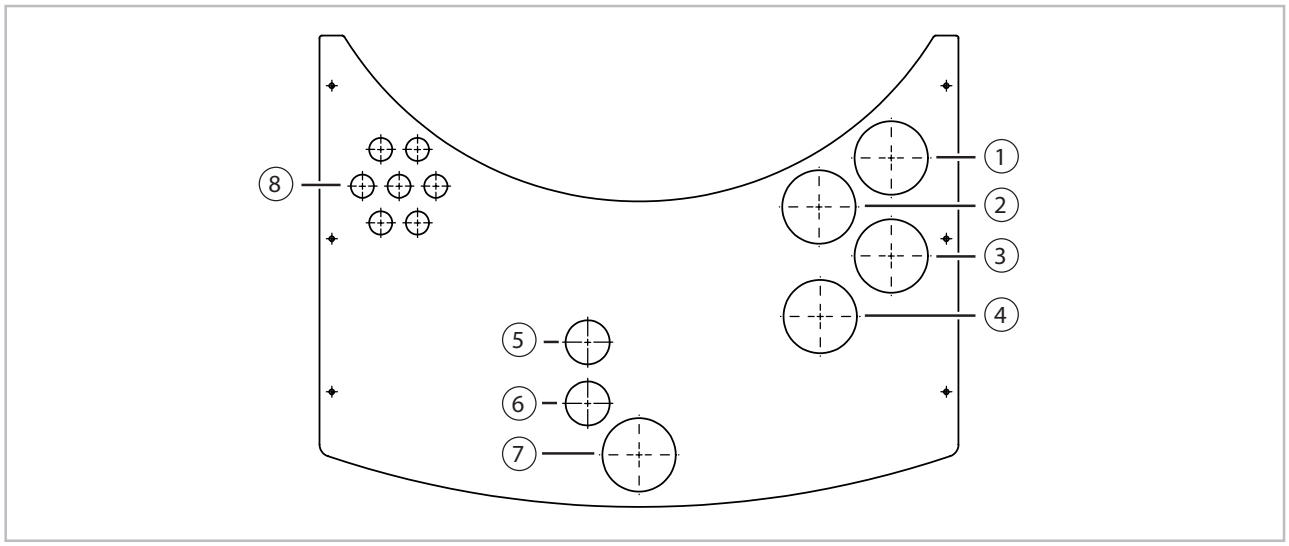

Fig. 6: Designations of pipe connections WKF NEO-compact 80/100/130/170 - 200 l - version

1: Hot water 1" union nut (flat-sealing)
2: Circulation
3: Cold water inlet 1" union nut (flat-sealing)
4: Heating return flow $1^1/_4$" AG
5: Refrigerant liquid pipe
6: Refrigerant heat gas pipe
7: Heating inlet flow $1^1/_4$" AG
8: Cable glands

Pipe connection arrangement WKF NEO-compact 80/100/130/170 - 300 l - version

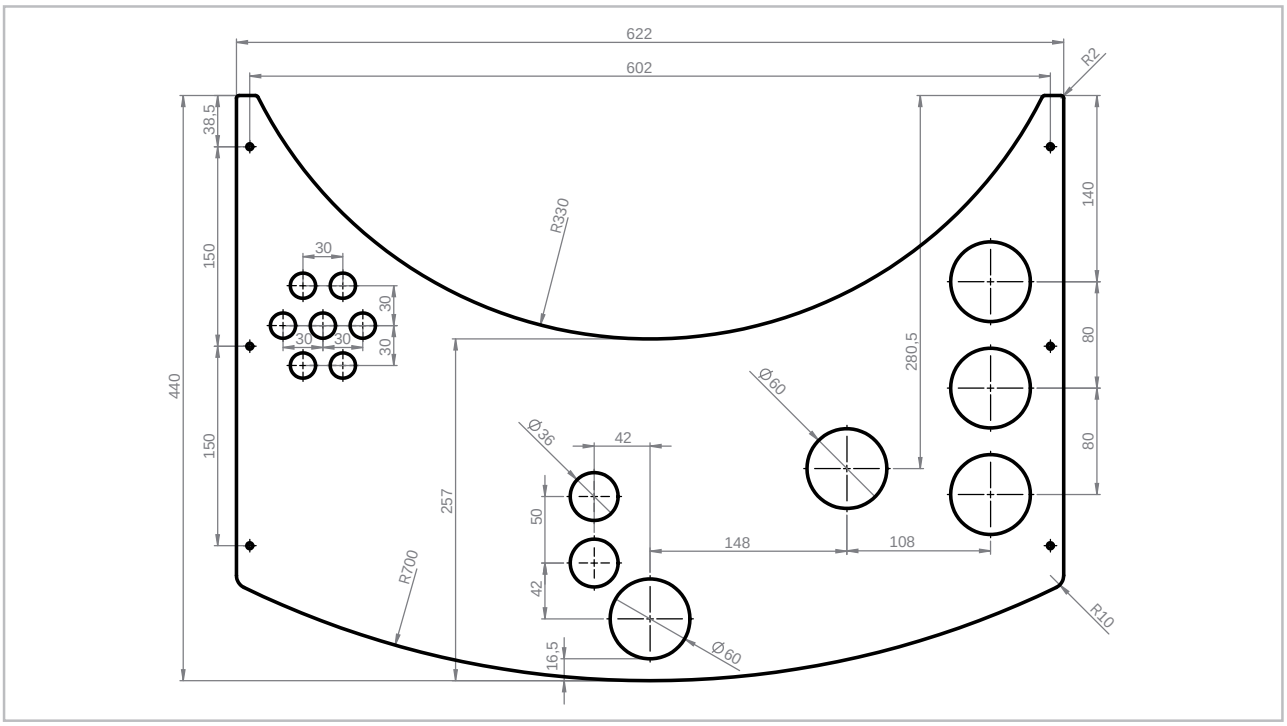

Fig. 7: Pipe connection arrangement WKF NEO-compact 80/100/130/170 - 300 l - version (all dimensions in mm)

Designations of pipe connections WKF NEO-compact 80/100/130/170 - 300 l - version

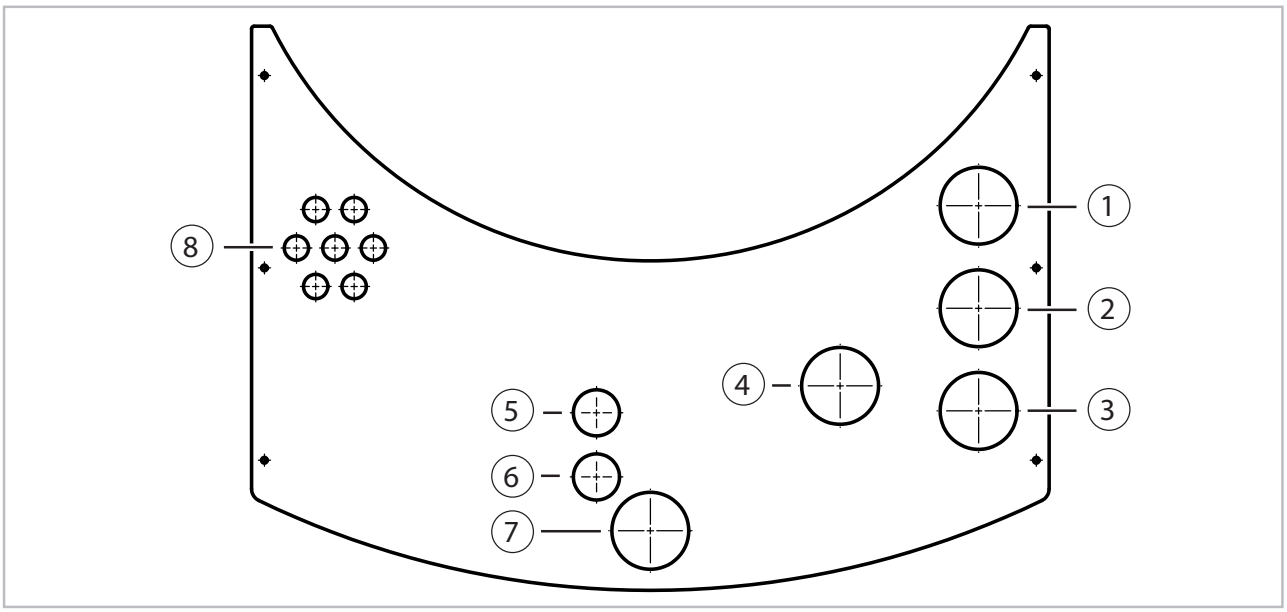

Fig. 8: Designations of pipe connections WKF NEO-compact 80/100/130/170 - 300 l - version

1: Circulation
2: Hot water 1" union nut (flat-sealing)
3: Cold water inlet 1" union nut (flat-sealing)
4: Heating return flow $1^1/_4$" AG
5: Refrigerant liquid pipe
6: Refrigerant heat gas pipe
7: Heating inlet flow $1^1/_4$" AG
8: Cable glands

2.6 Unit dimensions EWS 200E, EWS 301E

EWS 200E

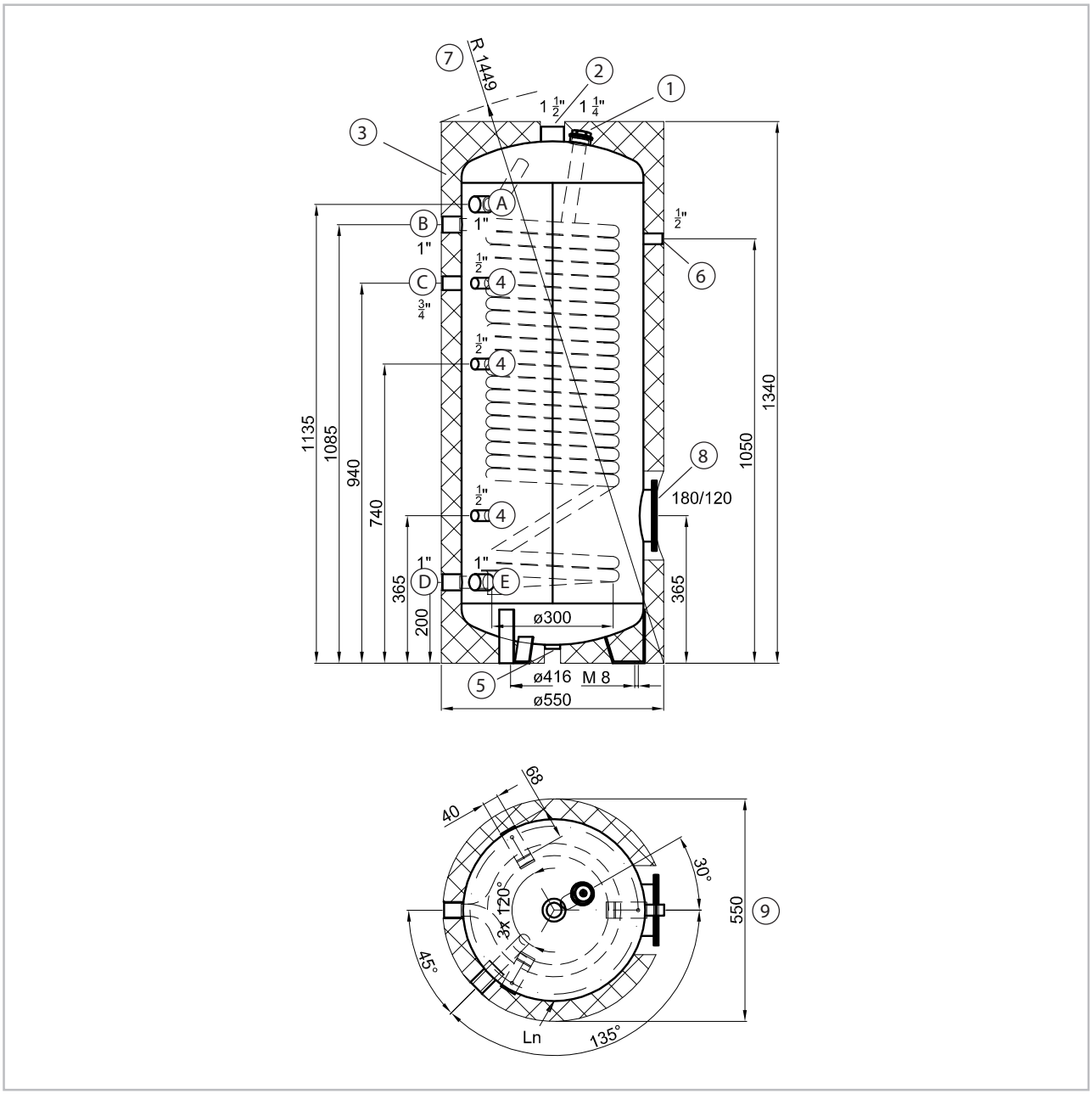

Fig. 9: Unit dimensions (all measurements in mm)

1: Magnesium anode
2: Venting
3: PU insulation
4: Probe sleeve
5: Sealing plug
6: Thermometer
7: Tilt height
8: Cleaning opening
9: Insertion dimension
A: Hot water
B: Inlet
C: Circulation
D: Return flow
E: Cold water

We reserve the right to make technical changes for the purpose of technical advancement.

REMKO series WKF NEO-compact

EWS 301E

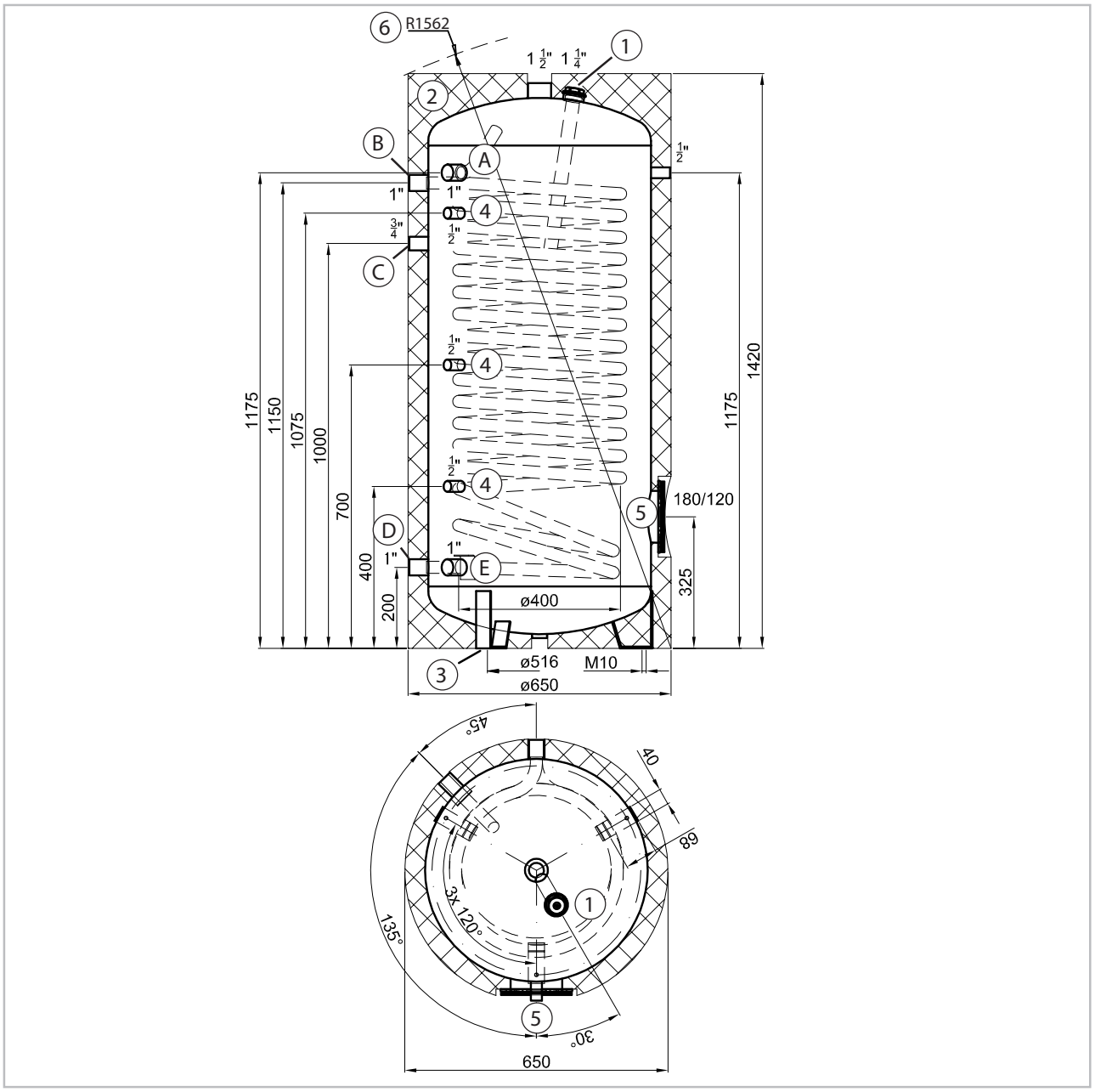

Fig. 10: Unit dimensions (all measurements in mm)

1: Magnesium anode
2: PU insulation
3: Adjustable feet
4: Probe connection 1/2”
5: Flange
6: Tilt height

A: Hot water
B: Inlet
C: Circulation
D: Return flow
E: Cold water

Dimensions without the adjustable feet supplied as standard!

We reserve the right to make technical changes for the purpose of technical advancement.

2.7 Heat pump usable limits in monovalent operation

WKF NEO-compact 80/100/130/170

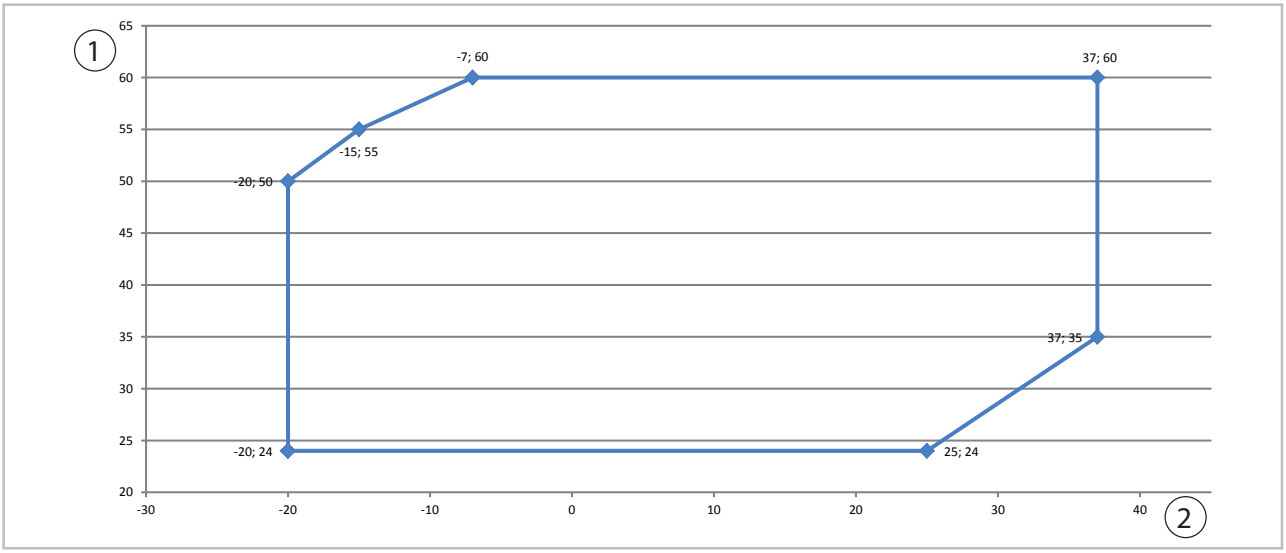

Fig. 11: Usable limits

1: Heating water inlet temperature [°C]
2: Outside air temperature [°C]

Outside temperature [°C]	-20	-20	-15	-7	37	37	25	-20
Inlet temperature [°C]	24	50	55	60	60	35	24	24

2.8 Pump-characteristic curves, indoor unit circulation pump

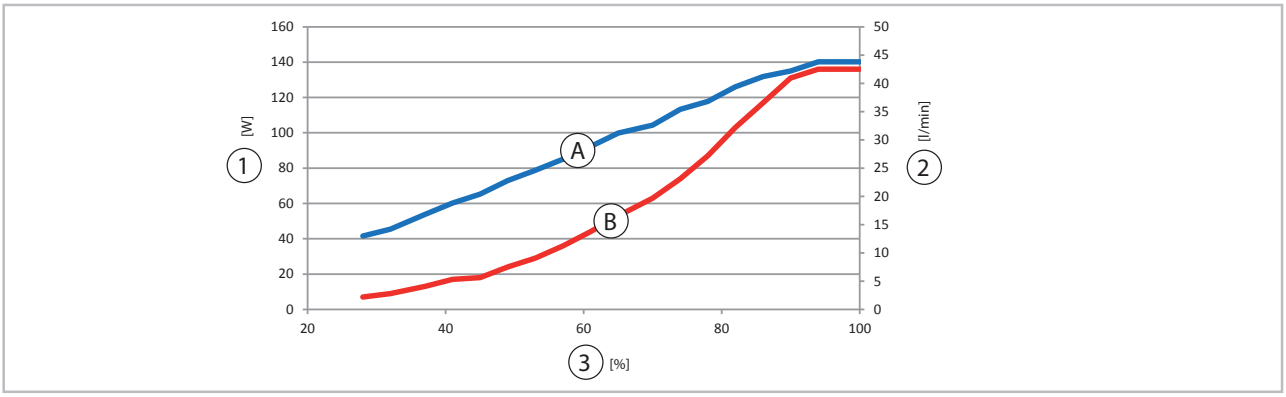

Fig. 12: Circulation pump Grundfoss UPML 25-105 180 PWM - capacity range

1: Power consumption [W]
2: Medium flow rate [l/min]
3: Request [%]

A: Characteristics curve for medium flow rate [l/min]
B: Characteristics curve for power consumption [W]

External control via analogue-In PWM signal. The tolerances of each curve are in acc. with EN 1151-1:2006

Stage	Effective power consumption[W]	Current consumption [A]	Motor protection
min.	7	0.07	blocking current resistant
max.	136	1.03	blocking current resistant

2.9 Total sound-power level outdoor units

Outdoor unit WKF NEO-compact 80

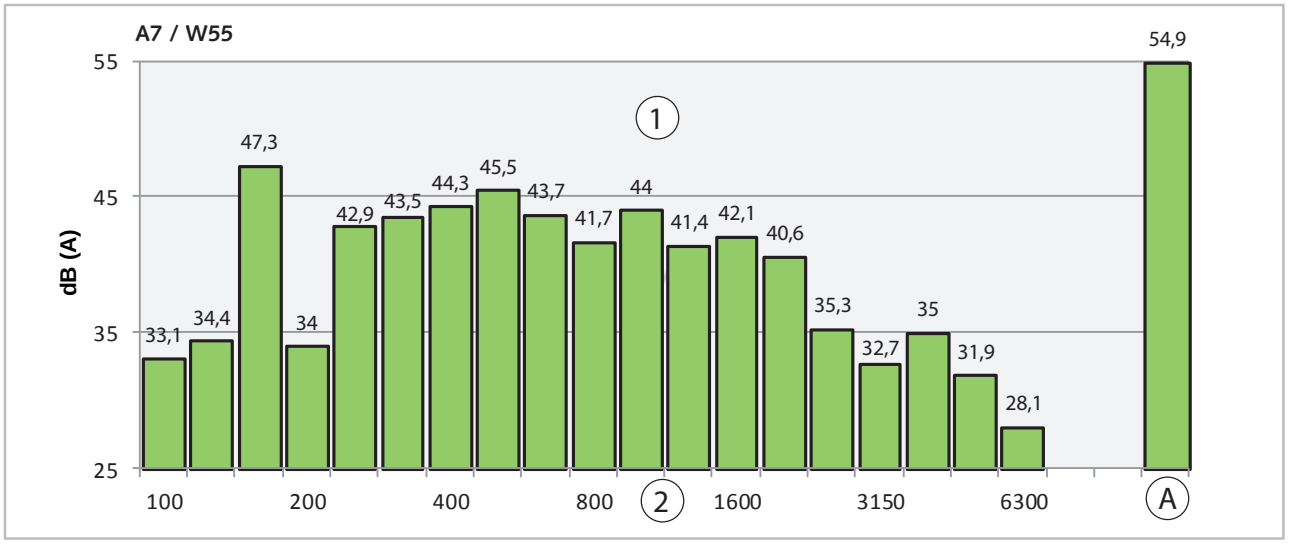

Fig. 13: Overall sound-power level L_P of a REMKO outdoor module type: WKF NEO-compact 80

A: A total [dB(A)]
1: Sound power L_{wA}re 1pW [dB(A)]
2: Frequency [Hz]

Middle frequency [Hz]	100	125	160	200	250	315	400	500	630	800
LWo [dB(A)]	33.1	34.4	47.3	34	42.9	43.5	44.3	45.5	43.7	41.7

Middle frequency [Hz]	1000	1250	1600	2000	2500	3150	4000	5000	6300	A
LWo [dB(A)]	44	41.4	42.1	40.6	35.3	32.7	35	31.9	28.1	54.9

The sound power conforms to accuracy class 2. The standard deviation of the aforementioned A-valued sound power levels amounts to 1.5 dB.

LWo: Sound power level radiated by the outdoor unit

Outdoor unit WKF NEO-compact 100

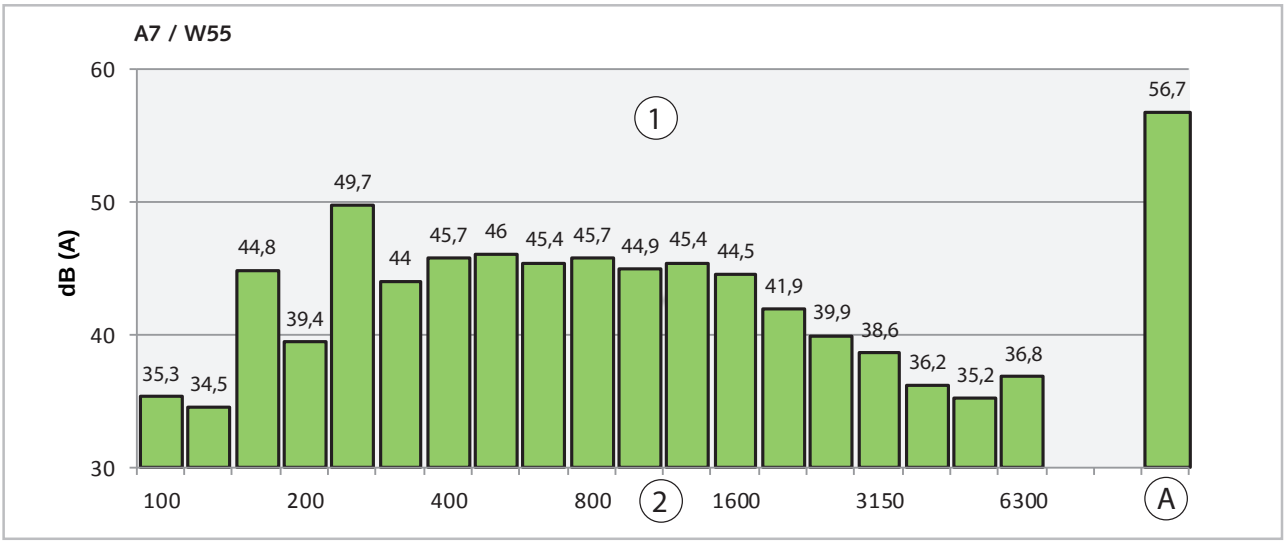

Fig. 14: Overall sound-power level L_P of a REMKO outdoor module type: WKF NEO-compact 100

A: A total [dB(A)]
1: Sound power L_{wA}re 1pW [dB(A)]
2: Frequency [Hz]

Middle frequency [Hz]	100	125	160	200	250	315	400	500	630	800
LWo [dB(A)]	35.3	34.5	44.8	39.4	49.7	44	45.7	46	45.4	45.7

Middle frequency [Hz]	1000	1250	1600	2000	2500	3150	4000	5000	6300	A
LWo [dB(A)]	44.9	45.4	44.5	41.9	39.9	38.6	36.2	35.2	36.8	56.7

The sound power conforms to accuracy class 2. The standard deviation of the aforementioned A-valued sound power levels amounts to 1.5 dB.

LWo: Sound power level radiated by the outdoor unit

REMKO series WKF NEO-compact

Outdoor unit WKF NEO-compact 130

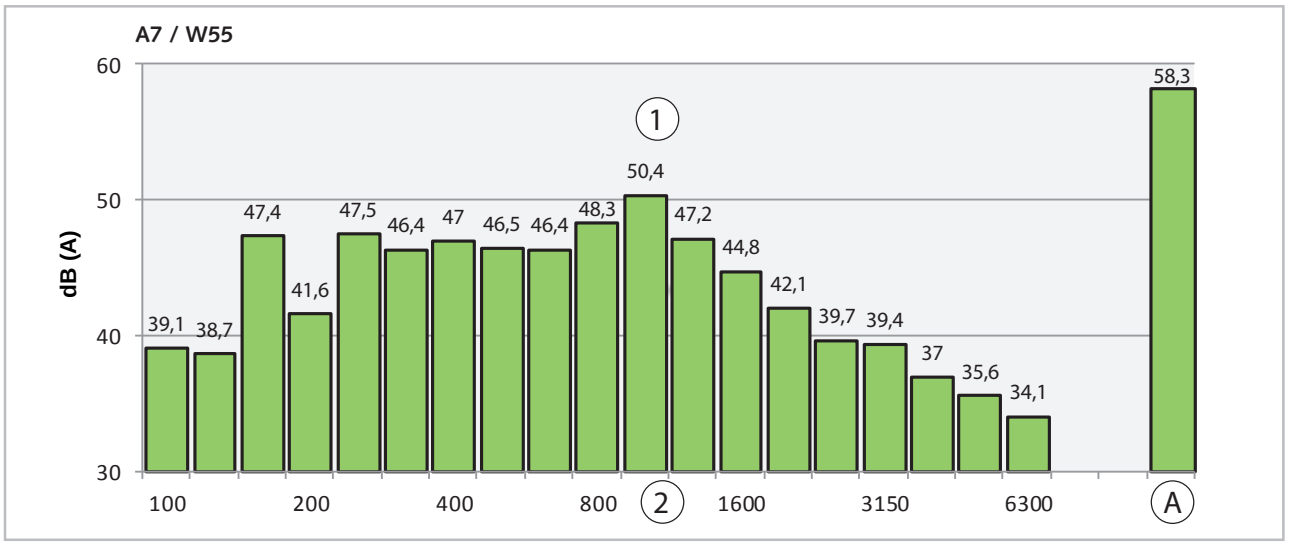

Fig. 15: Overall sound-power level L_P of a REMKO outdoor module type: WKF NEO-compact 130

A: A total [dB(A)]
1: Sound power L_{wA}re 1pW [dB(A)]
2: Frequency [Hz]

Middle frequency [Hz]	100	125	160	200	250	315	400	500	630	800
LWo [dB(A)]	39.1	38.7	47.4	41.6	47.5	46.5	47	46.5	46.4	48.3

Middle frequency [Hz]	1000	1250	1600	2000	2500	3150	4000	5000	6300	A
LWo [dB(A)]	50.4	47.2	44.8	42.1	39.7	39.4	37	35.6	34.1	58.3

The sound power conforms to accuracy class 2. The standard deviation of the aforementioned A-valued sound power levels amounts to 1.5 dB.

LWo: Sound power level radiated by the outdoor unit

Outdoor unit WKF NEO-compact 170

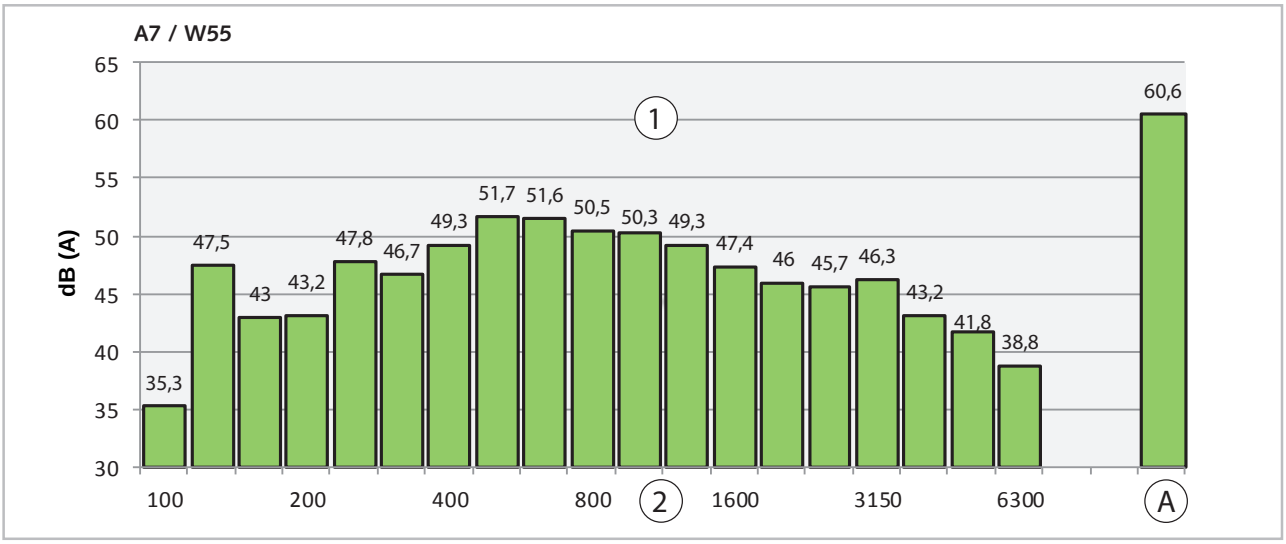

Fig. 16: Overall sound-power level L_P of a REMKO outdoor module type: WKF NEO-compact 170

A: A total [dB(A)]
1: Sound power L_{wA}re 1pW [dB(A)]
2: Frequency [Hz]

Middle frequency [Hz]	100	125	160	200	250	315	400	500	630	800
LWo [dB(A)]	40.8	39.9	50.6	48.5	52	49.3	51.8	51.3	50.2	48.8

Middle frequency [Hz]	1000	1250	1600	2000	2500	3150	4000	5000	6300	A
LWo [dB(A)]	52.6	48.5	44.8	43.6	40.9	39.4	38.9	37.8	36.5	60.6

The sound power conforms to accuracy class 2. The standard deviation of the aforementioned A-valued sound power levels amounts to 1.5 dB.

LWo: Sound power level radiated by the outdoor unit

2.10 Reduction of sound power level

The sound power level can be considerably reduced by using the **REMKO ARTdesign sound insulation hoods**.

Further information regarding REMKO sound insulation hoods can be found in the separate operating instructions “REMKO sound insulation hoods for REMKO heat pumps - SWK 4-7”.

Outdoor unit WKF NEO-compact 80 - Reduction of the sound power level using SWK 4

	Output restriction [%]							
↓ All information in dB(A) ↓	100	90	80	70	60	50	40	30
Sound power level AM max.	56	55.5	54.9	52.5	51	48.5	43	41
Reducer sound hood	-6.5							
Sound power level with SWK 4 sound hood	49.5	49	48.4	46	44.5	42	36.5	34.5

Outdoor unit WKF NEO-compact 100 - Reduction of the sound power level using SWK 5

	Output restriction [%]							
↓ All information in dB(A) ↓	100	90	80	70	60	50	40	30
Sound power level AM max.	59	58	56.5	55	54	52	49	46
Reducer sound hood	-7.0							
Sound power level with SWK 5 sound hood	52	51	49.7	48	47	45	42	39

Outdoor unit WKF NEO-compact 130 - Reduction of the sound power level using SWK 5

	Output restriction [%]							
↓ All information in dB(A) ↓	100	90	80	70	60	50	40	30
Sound power level AM max.	61	59	58.3	56	55	54	52	50
Reducer sound hood	-6.0							
Sound power level with SWK 5 sound hood	55	53	52.3	50	49	48	46	44

Outdoor unit WKF NEO-compact 170 - Reduction of the sound power level using SWK 7

	Output restriction [%]							
↓ All information in dB(A) ↓	100	90	80	70	60	50	40	30
Sound power level AM max.	63	62	61.2	59	57	56	55	54
Reducer sound hood	-5.0							
Sound power level with SWK 7 sound hood	58	57	56.2	44	52	51	50	49

During the final calculation of the sound pressure level using the BWP sound calculator, it must be ensured that the tonal accuracy entered there can also be deducted.

2.11 Characteristic curves

Heating capacity WKF NEO-compact 80 at inlet temperature of 35°C

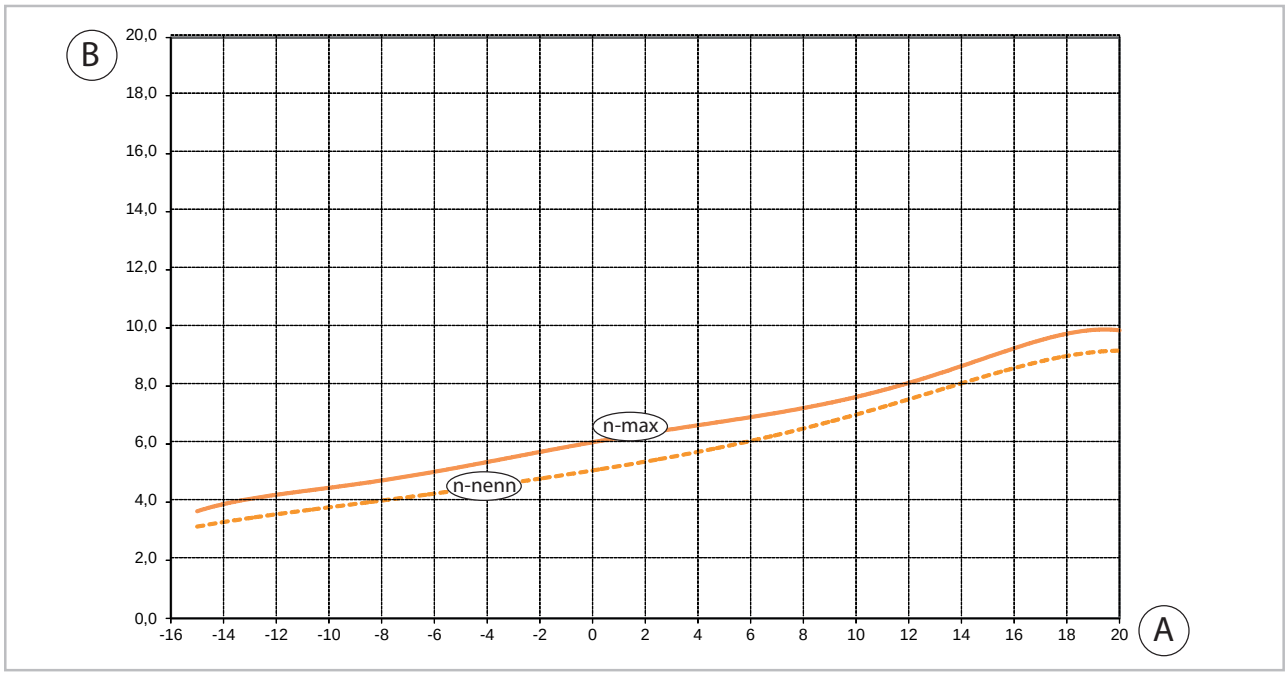

Fig. 17: Heating capacity WKF NEO-compact 80 at inlet temperature of 35°C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

Heating capacity WKF NEO-compact 80 at inlet temperature of 45 °C

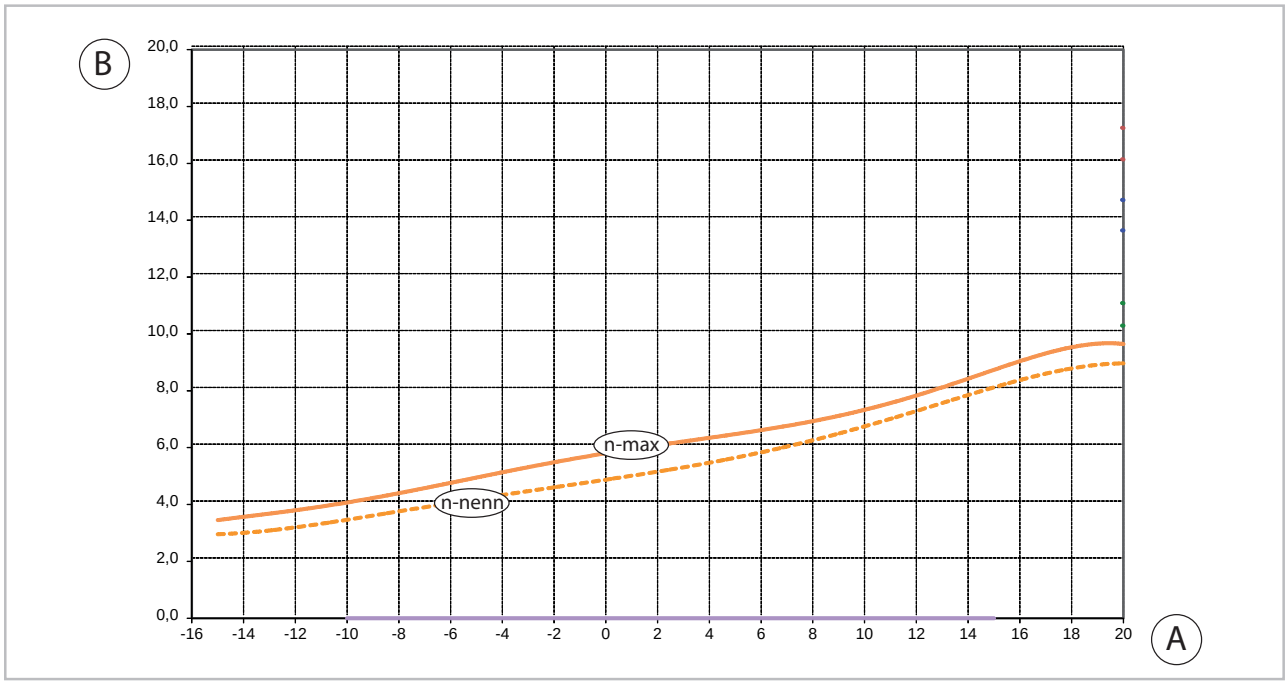

Fig. 18: Heating capacity WKF NEO-compact 80 at inlet temperature of 45 °C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

Heating capacity WKF NEO-compact 80 at inlet temperature of 55 °C

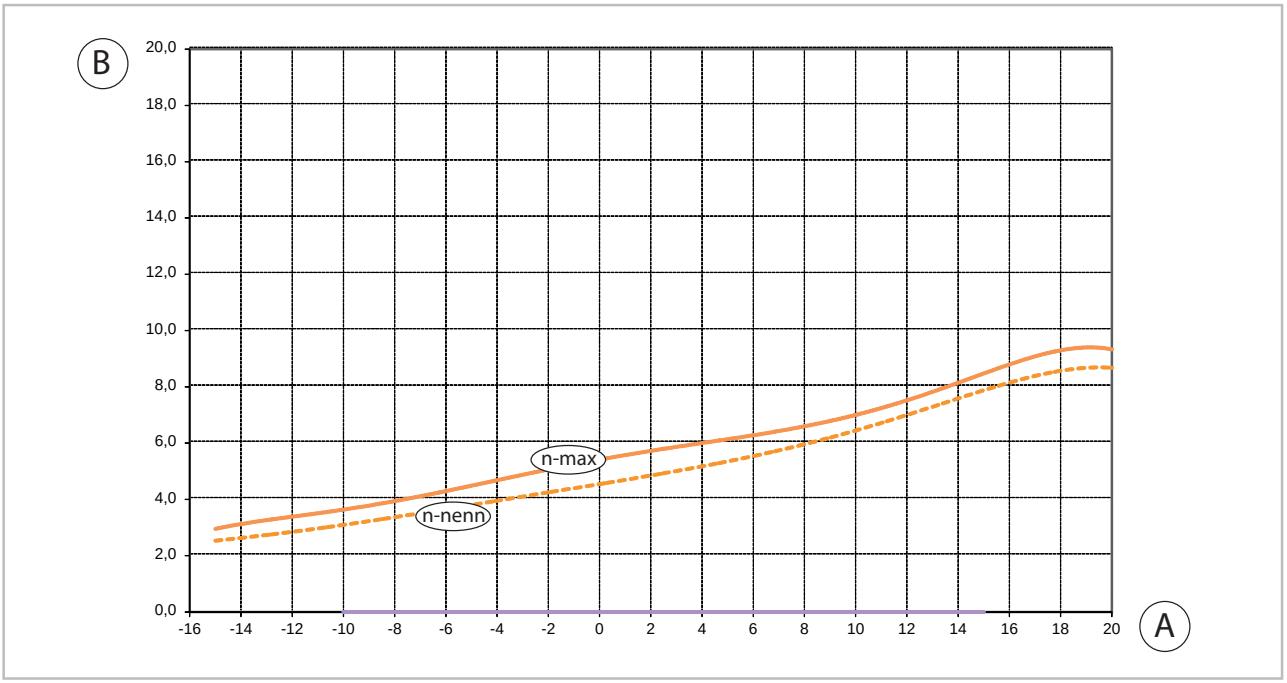

Fig. 19: Heating capacity WKF NEO-compact 80 at inlet temperature of 55 °C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

COP WKF NEO-compact 80 at inlet temperature 35 °C, 45 °C and 55 °C

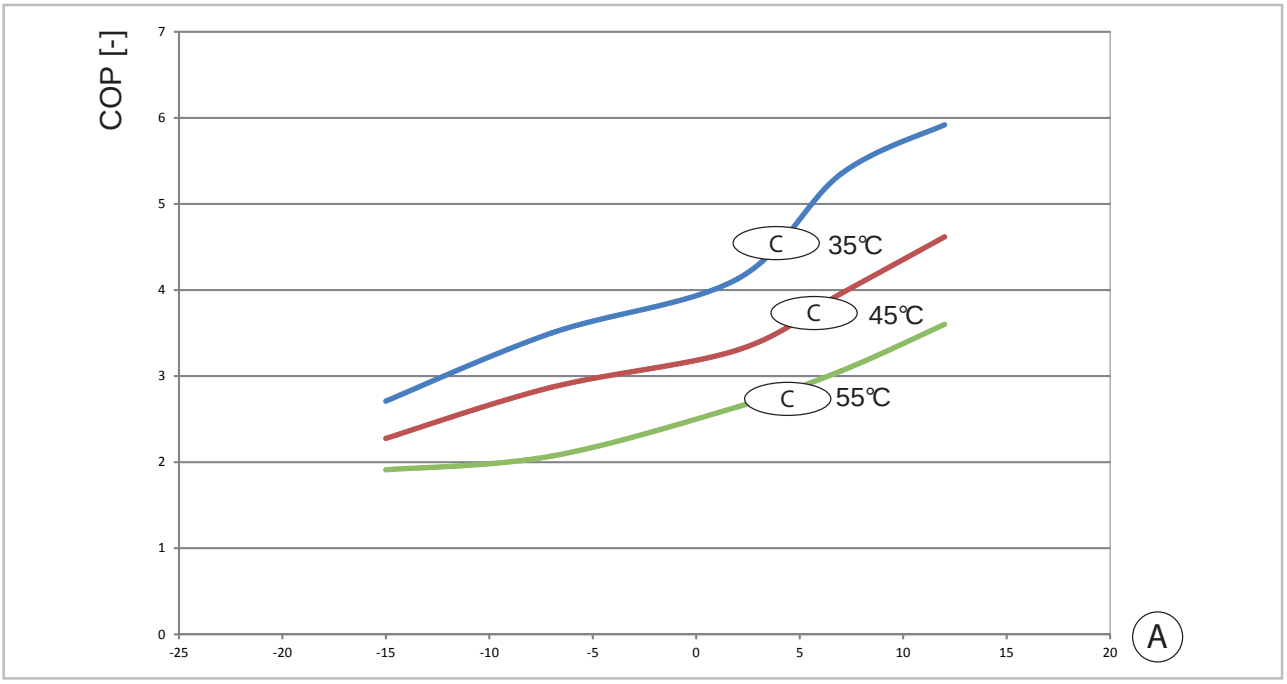

Fig. 20: COP WKF NEO-compact 80 at inlet temperature 35 °C, 45 °C and 55 °C

A: Outside temperature [°C] C: Inlet temperature [°C]

Heating capacity WKF NEO-compact 100 at inlet temperature of 35°C

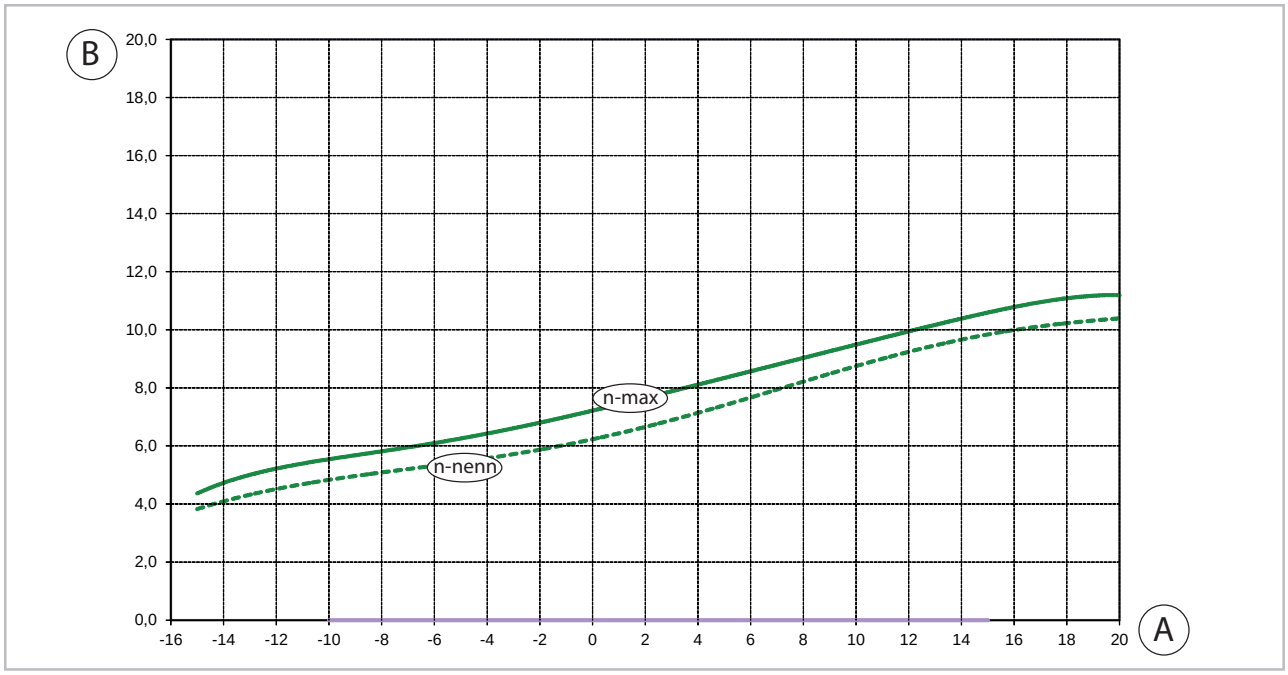

Fig. 21: Heating capacity WKF NEO-compact 100/ at inlet temperature of 35 °C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

Heating capacity WKF NEO-compact 100 at inlet temperature of 45 °C

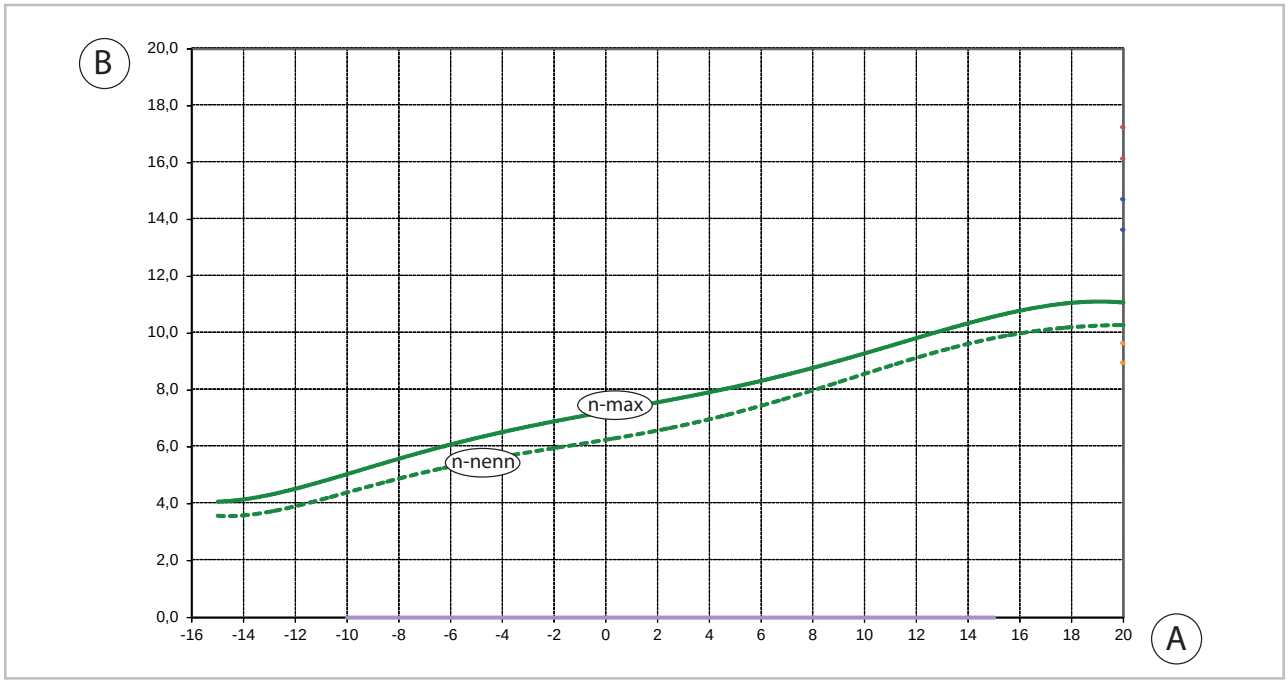

Fig. 22: Heating capacity WKF NEO-compact 100 at inlet temperature of 45 °C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

Heating capacity WKF NEO-compact 100 at inlet temperature of 55 °C

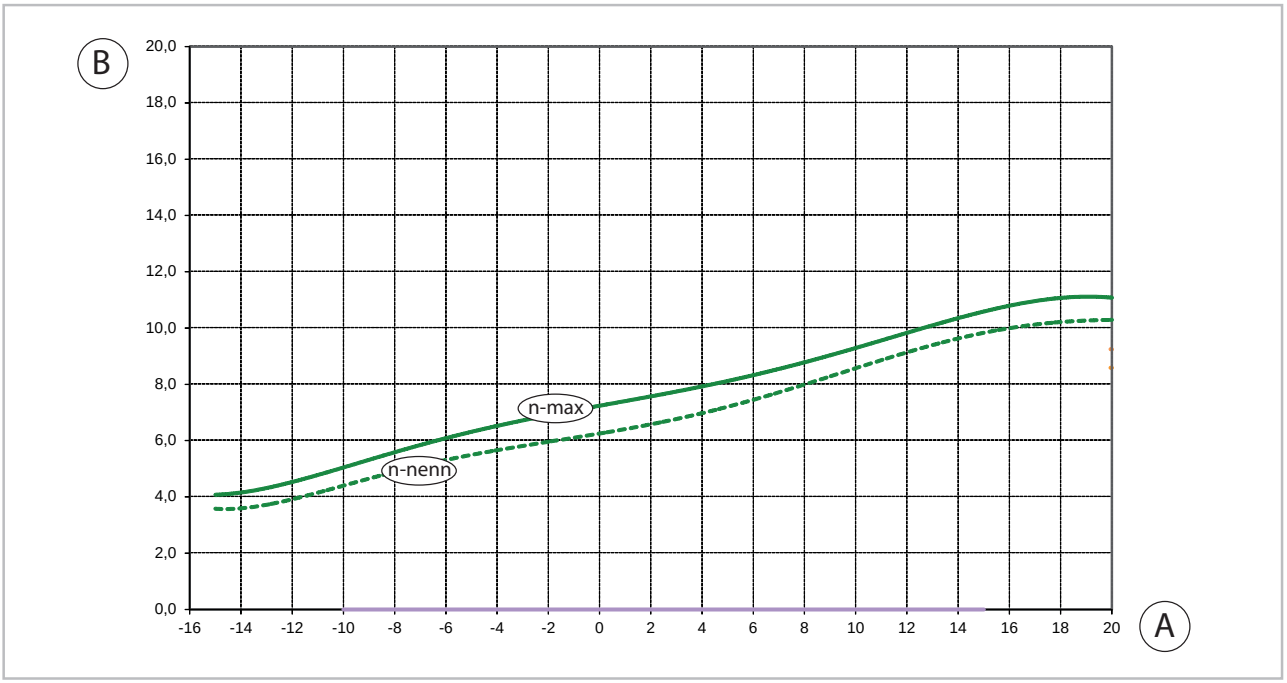

Fig. 23: Heating capacity WKF NEO-compact 100 at inlet temperature of 55 °C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

COP WKF NEO-compact 100 at inlet temperature 35 °C, 45 °C and 55 °C

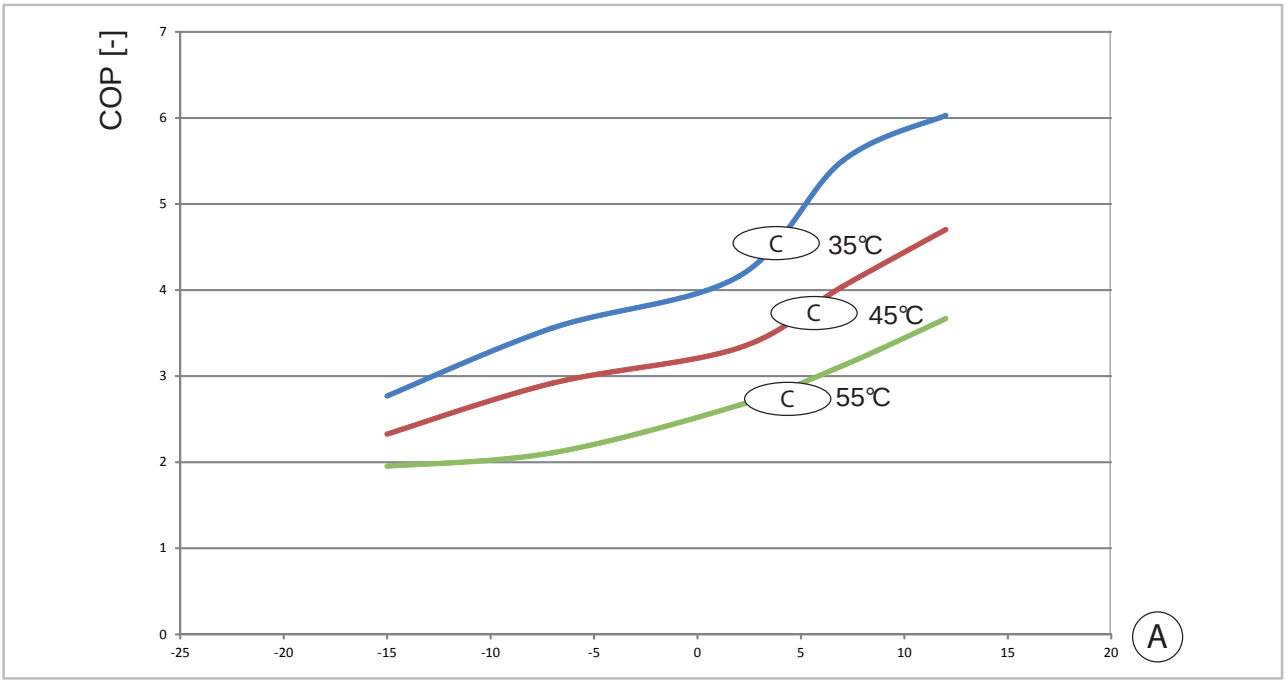

Fig. 24: COP WKF NEO-compact 100 at inlet temperature 35 °C, 45 °C and 55 °C

A: Outside temperature [°C] C: Inlet temperature [°C]

Heating capacity WKF NEO-compact 130 at inlet temperature of 35°C

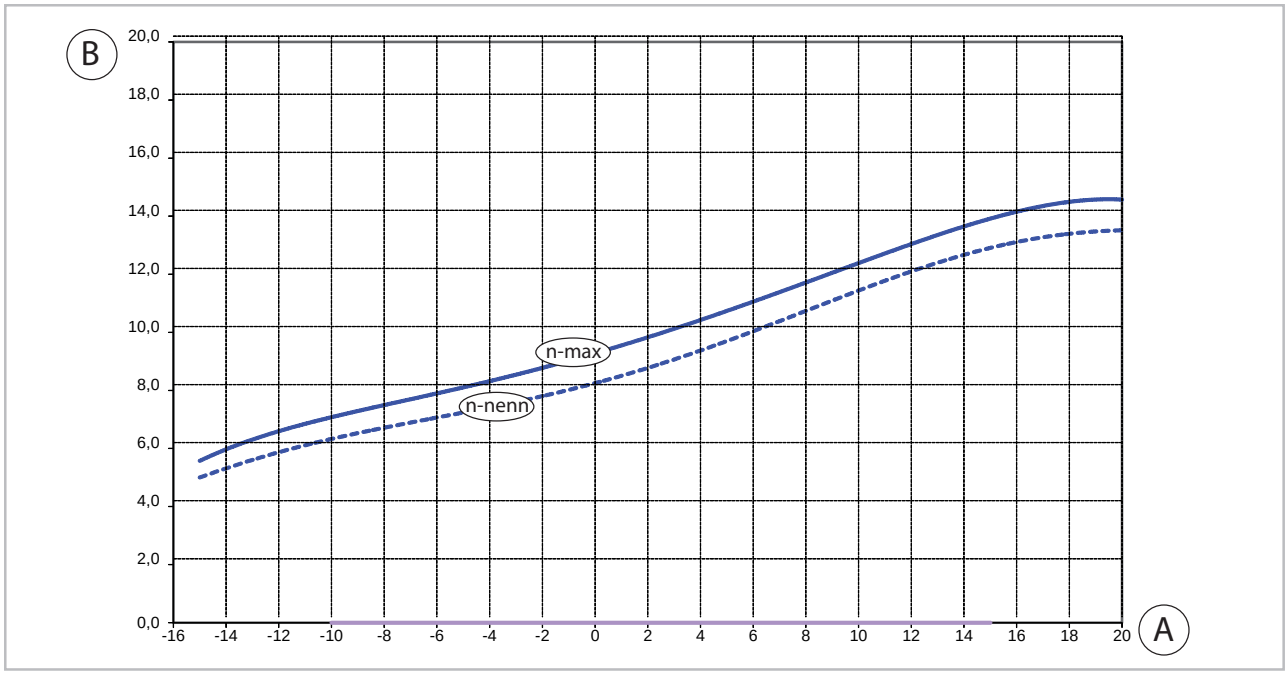

Fig. 25: Heating capacity WKF NEO-compact 130 at inlet temperature of 35°C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

Heating capacity WKF NEO-compact 130 at inlet temperature of 45 °C

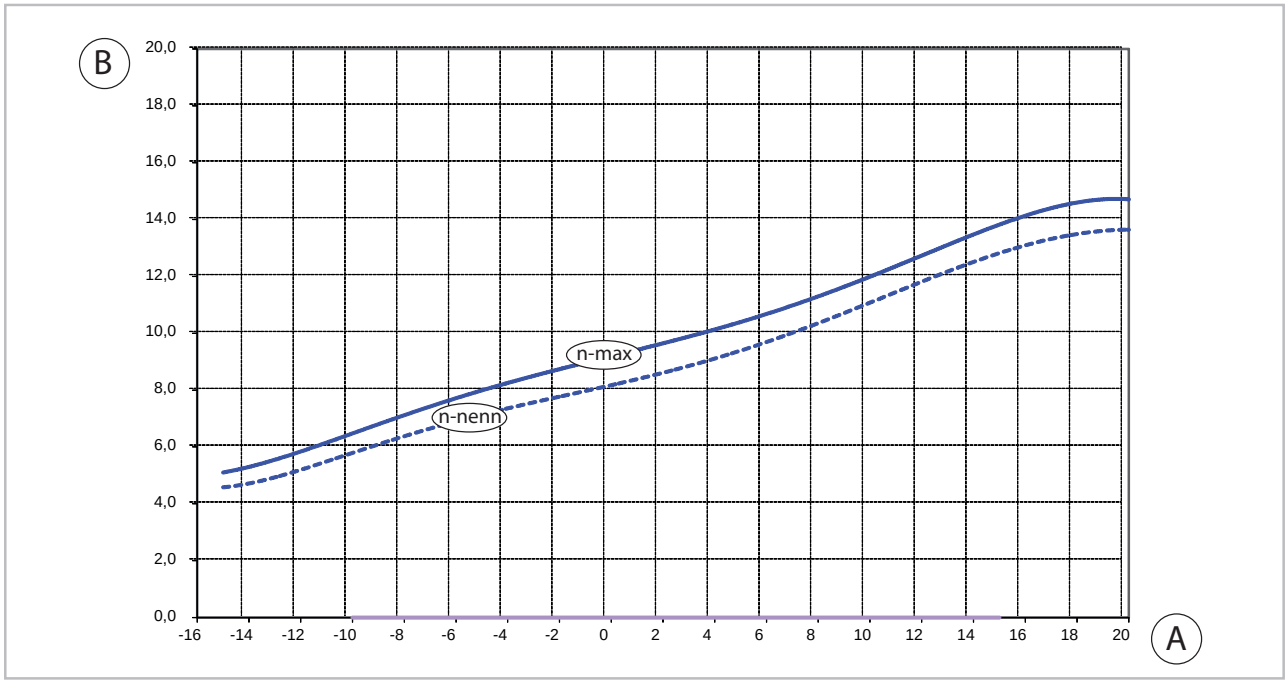

Fig. 26: Heating capacity WKF NEO-compact 130 at inlet temperature of 45 °C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

Heating capacity WKF NEO-compact 130 at inlet temperature of 55 °C

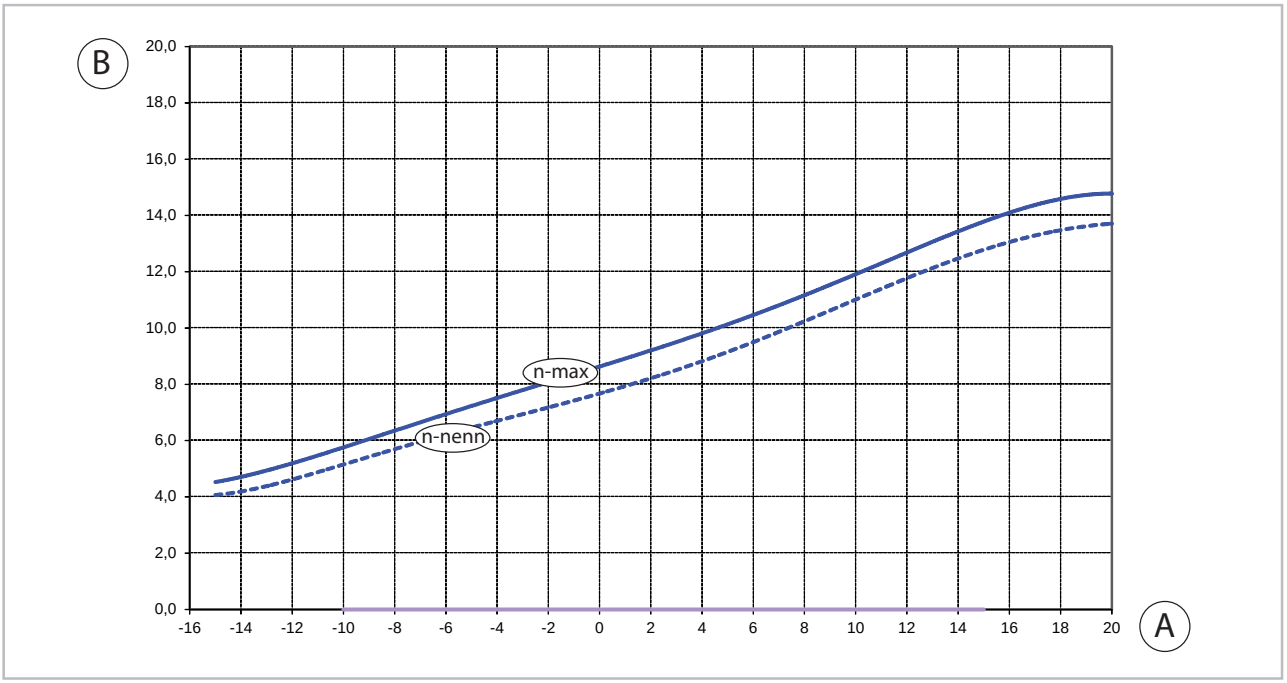

Fig. 27: Heating capacity WKF NEO-compact 130 at inlet temperature of 55 °C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

COP WKF NEO-compact 130 at inlet temperature 35 °C, 45 °C and 55 °C

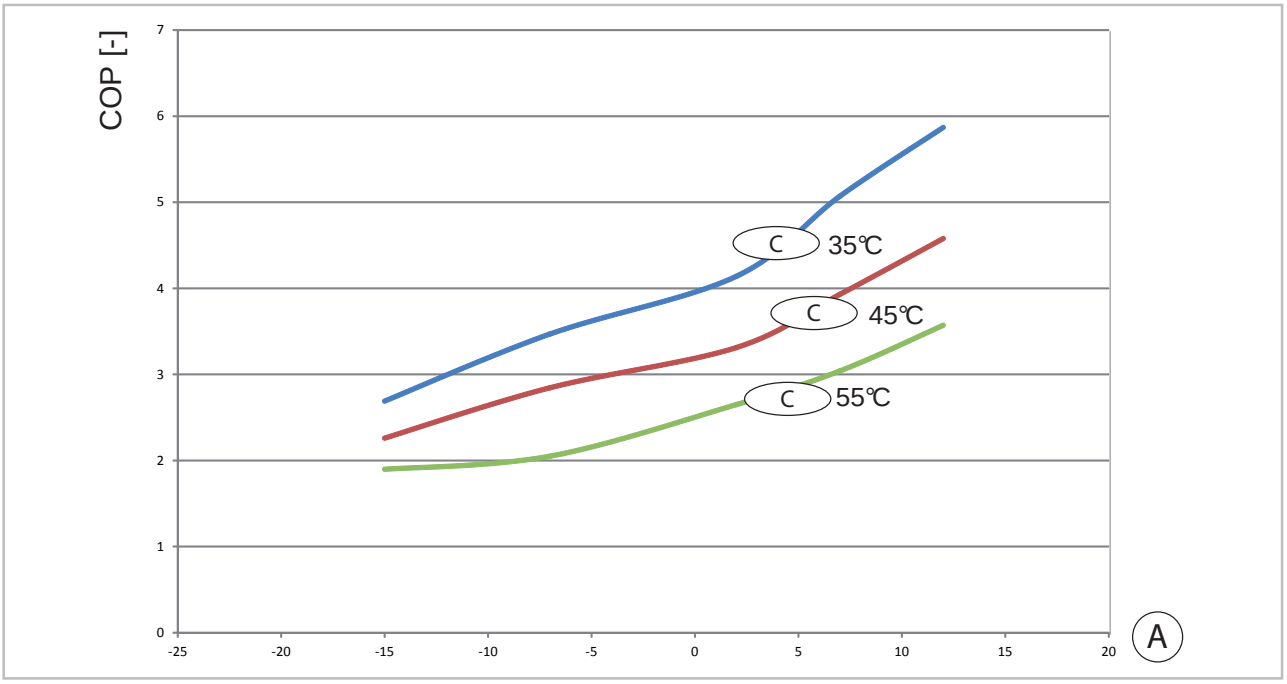

Fig. 28: COP WKF NEO-compact 130 at inlet temperature 35 °C, 45 °C and 55 °C

A: Outside temperature [°C] C: Inlet temperature [°C]

Heating capacity WKF NEO-compact 170 at inlet temperature of 35°C

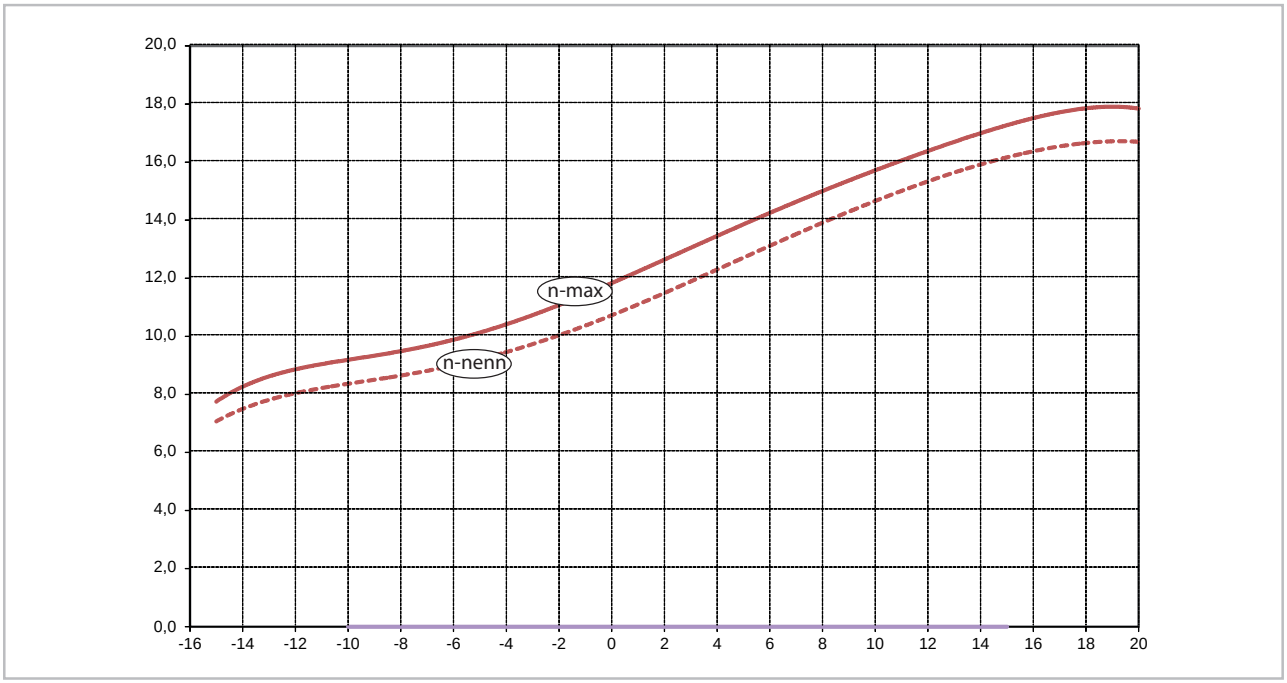

Fig. 29: Heating capacity WKF NEO-compact 170 at inlet temperature of 35°C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

Heating capacity WKF NEO-compact 170 at inlet temperature of 45 °C

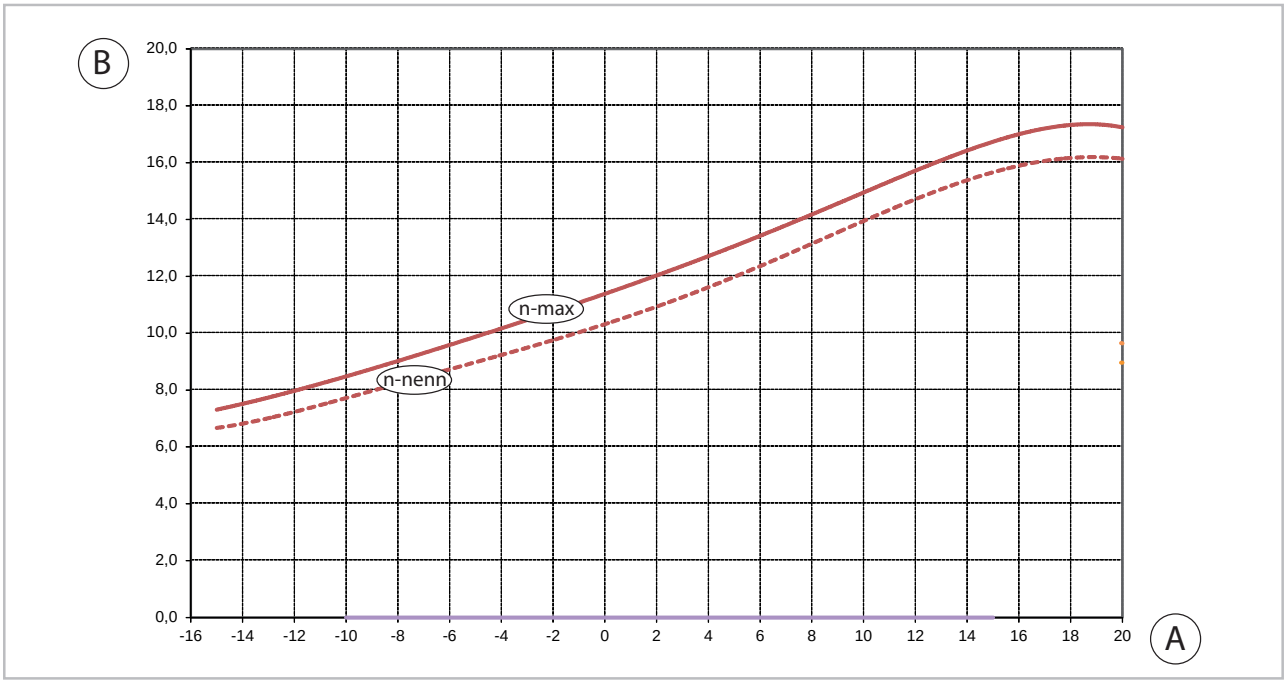

Fig. 30: Heating capacity WKF NEO-compact 170 at inlet temperature of 45 °C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

Heating capacity WKF NEO-compact 170 at inlet temperature of 55 °C

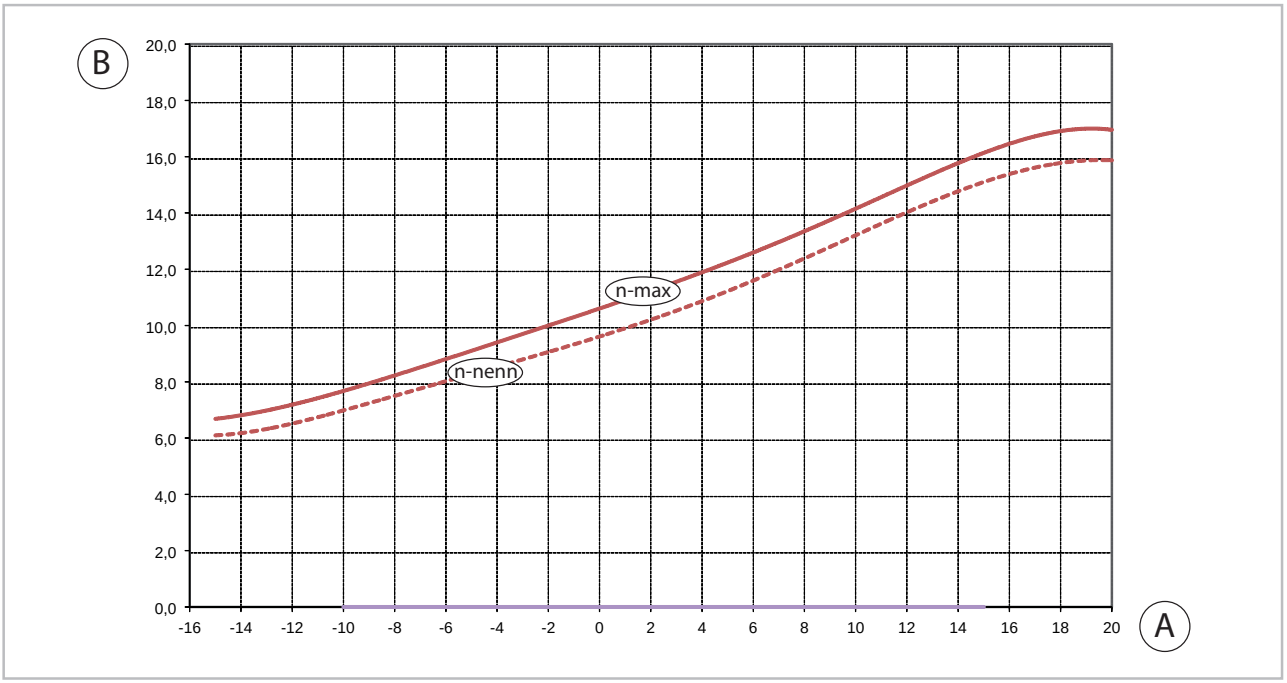

Fig. 31: Heating capacity WKF NEO-compact 170 at inlet temperature of 55 °C

A: Outside temperature [°C] B: Heating capacity/total thermal load [kW]

COP WKF NEO-compact 170 at inlet temperature 35 °C, 45 °C and 55 °C

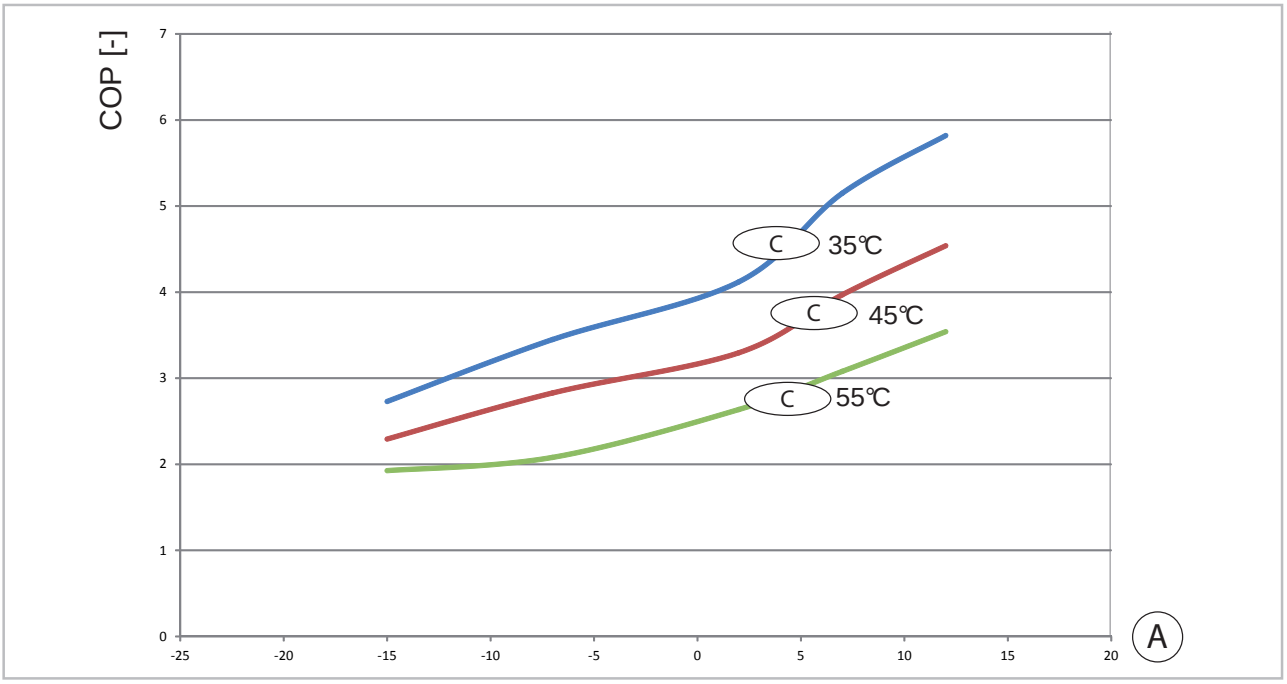

Fig. 32: COP WKF NEO-compact 170 at inlet temperature 35 °C, 45 °C and 55 °C

A: Outside temperature [°C] C: Inlet temperature [°C]

3 Design and function

3.1 The heat pump in general

Arguments for REMKO inverter heat pumps

- Lower heating costs in comparison to oil and gas.
- Heat pumps make a contribution to environmental protection.
- Lower CO_2 emissions in comparison to oil and gas heating.
- All models are able to cool as well as heat.
- Low noise-level of the outdoor units.
- Flexible installation due to split system design.
- Negligible maintenance costs.

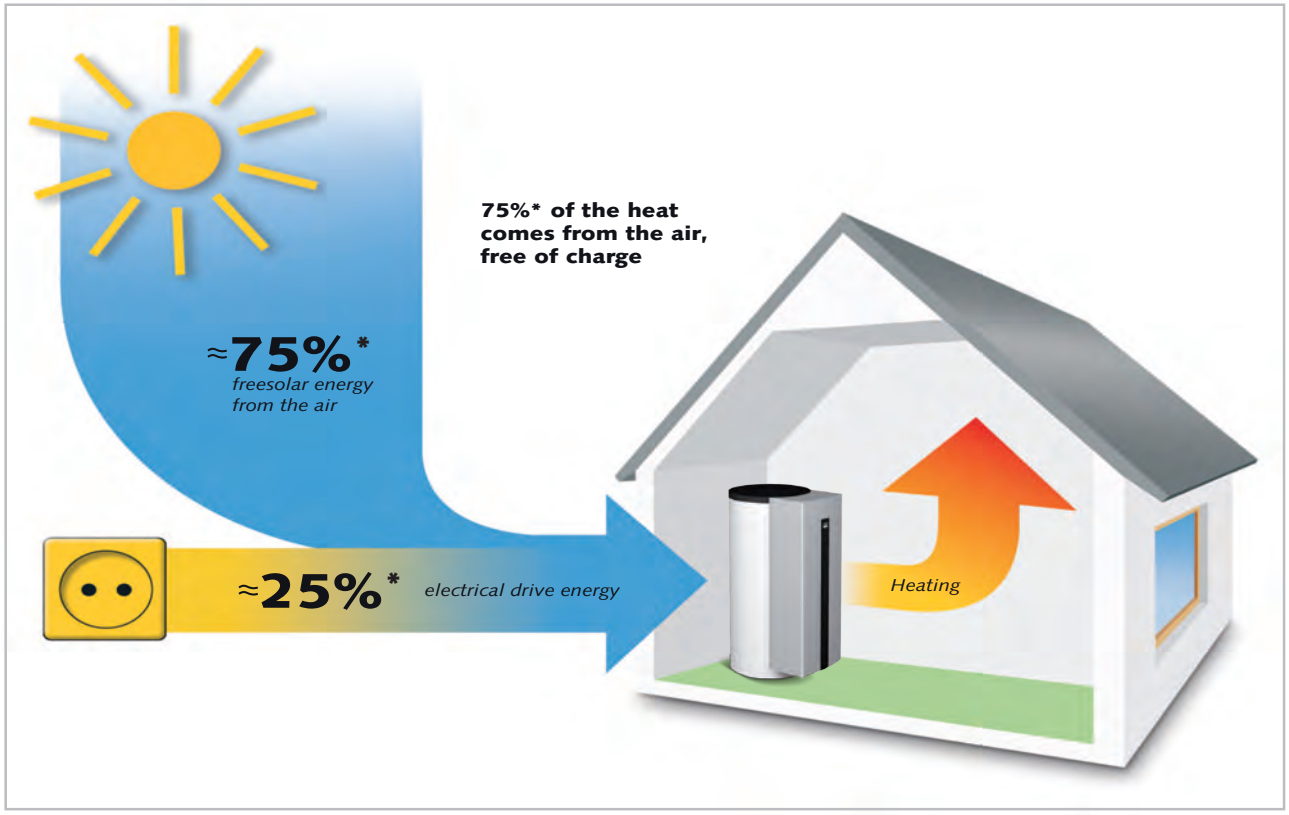

Fig. 33: Free heat

* The relationship can vary depending on outside temperature and operating conditions.

Economical and environmentally conscious heating

The burning of fossil-based energy sources in order to generate power creates severe consequences for the environment. A high percentage of fossil fuels is also problematic due to the limited resources of oil and gas and the price increases resulting from this. For this reason, many people today are thinking both economically and environmentally-consciously in terms of heating. The application of heat pump technology enables both of these concepts to be combined. It makes use of the energy which is permanently available in the air, water and soil and converts it into usable heating energy by means of inputting electrical energy. Yet in order to generate heat equivalent to 4 kWh, only about 1 kWh of electricity is required. The rest is made available free-of-charge by the environment.

Heat source

There are essentially three heat sources from which heat pumps can derive energy: air, soil and groundwater. Air heat pumps have the advantage that air as a source heat is available everywhere in **unlimited** quantities that can be used **free of charge**. A disadvantage is that the outside air is at its coldest when the heat requirement is greatest.

Brine heat pumps extract energy from the soil. This is achieved through serpentine pipe networks which are laid approx. 1m deep or placed by means of drilling. The disadvantage is the **large space requirements** for the serpentine pipe networks or the **high cost of drilling**. Long-term cooling of the soil is also a possibility.

Water heat pumps require **two wells** in order to obtain heat from the groundwater, one supply well and one dry well. The development of this source is not possible everywhere. It is expensive and requires planning permission.

Function of the heat pump

A heat pump is a unit which makes use of a working medium to absorb ambient 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 circuit 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.

The Smart Control is supplied for regulation, and it assures the independent operation of all safety devices. The water circuit in the indoor unit includes an integrated dirt trap, an integrated 3-way changeover valve and an enamelled service water storage tank, optionally with a content of 200/300L.

Wall and floor consoles, condensate trays condensate-tray heating, a 3-way changeover valve, an overflow protection valve and other probes are available as accessories.

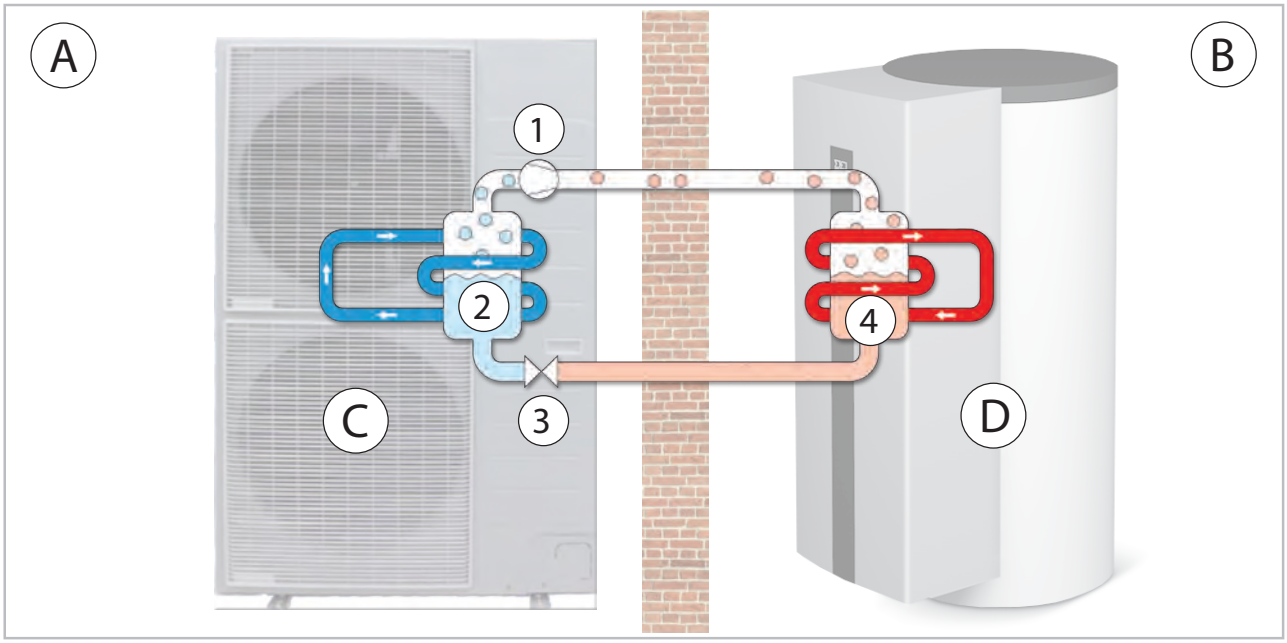

Fig. 34: Function diagram for heating the inverter heat pump

A: Outdoor area
B: Indoor area
C: Heat pump outdoor unit
D: Heat pump indoor unit

1: Condensing
2: Evaporation
3: Decompression
4: Liquefying

Heat pump operating mode

Heat pumps can work in various operating modes.

Monovalent

The heat pump the only heat generator for the building all year round. This mode is particularly suitable for heating plants with low supply-water temperatures and is primarily used in combination with brine/water and water/water heat pumps.

Monoenergetic

The heat pump has an electrical heater to handle peak loads. The heat pump covers the majority of the required heating capacity. Occasionally, when it is extremely cold outside, an electrical booster-heating system switches on as required in order to support the heat pump.

Bivalent alternative

The heat pump provides the entire heating energy down to a predetermined outside temperature. If the outside temperature drops below this value, a second heat generator switches on to support the heat pump, which shuts down at this point. There is a distinction to be made here between **alternative operation** with oil or gas heating and **regenerative operations** with solar energy or wood-fired heating. This operating mode is possible for all heating systems.

Layout

A precise calculation of the building's heating load according to EN 12831 is required for the design and dimensioning of a heating system. However, approximate requirements can be determined based on the year of construction and the type of building. This table ↬ *on page 38* provides an approximate specific heating load for a few types of building. The required heating system output can be calculated by multiplying the area to be heated with the given values.

For a precise calculation, various factors must be considered. The transmission-heat requirement, the infiltration heat-loss and an allowance for water heating comprise the total heating capacity which the heating system must provide.

The total area of the floor surfaces, exterior wall windows, doors and roofing is required in order to determine the transmission heat requirement. In addition, information about the materials used in the building is required, as well as about the different thermal transmission coefficients (known as the K value). Also required are the room temperature and the standard outside temperature, that is, the lowest outside temperature on average that will occur during the year. The equation for determining the thermal transmission requirement is $Q=A \times U \times (t_R-t_A)$ and must be calculated for all enclosed room floor areas.

The infiltration heat requirement takes into consideration how often the heated room air is exchanged for cold external air. The room volume (V), the air exchange frequency (n) and the specific heat capacity (c) of the air is also required in addition to the room temperature and average low temperature. The equation is: $Q=V \times n \times c (t_R-t_A)$ An approximate addition for the preparation of domestic water per person amounts in acc. with VDI 2067: 0.2 kW.

Design example

By way of a design example, a residential home with a living area of 150 m^2 and a heating requirement of approx. 80 W/m^2 was selected. A total of five persons live in the house. The heat load amount to 11.5 kW. Adding a drinking water allowance of 0.2 kW results in a required heating capacity of 12.5 kW. Depending on the power company, an additional charge must then be made in order to factor in any service time-out periods that may apply. The rating and determination of the heat pump's balance-point temperature derives graphically from the heat pump's inlet temperature specific heat-output diagram (in this example 35 °C for underfloor heating). Next, the heat load for the standard outdoor temperature (the lowest temperature of the year locally) and the heat threshold are marked on the graph. The outside-temperature-dependent heating requirement, (Fig. 35) simplified here as a straight-line relationship between heat-load and the start of the heating season, is recorded in the graph of heat-load curves. The intersection of the two straight lines with the rated heat-load curve is plotted on the X axis, where the balance-point temperature is read (in this example approx. -3 °C). The minimum performance of the 2nd heat source is the difference between heat load and the heat pump's maximum heating capacity on these days (in this example, the required power required to cover peak load requirements is approx. 3 kW).

REMKO series WKF NEO-compact

Building type	Specific heating capacity in W/m²
Passive energy house	10
Low-energy house built in 2002	40
According to energy conserv. order regarding heat insul. 1995	60
Modern building constructed around 1984	80
Partially renovated old building constructed pre-1977	100
Non-renovated old building constructed pre-1977	200

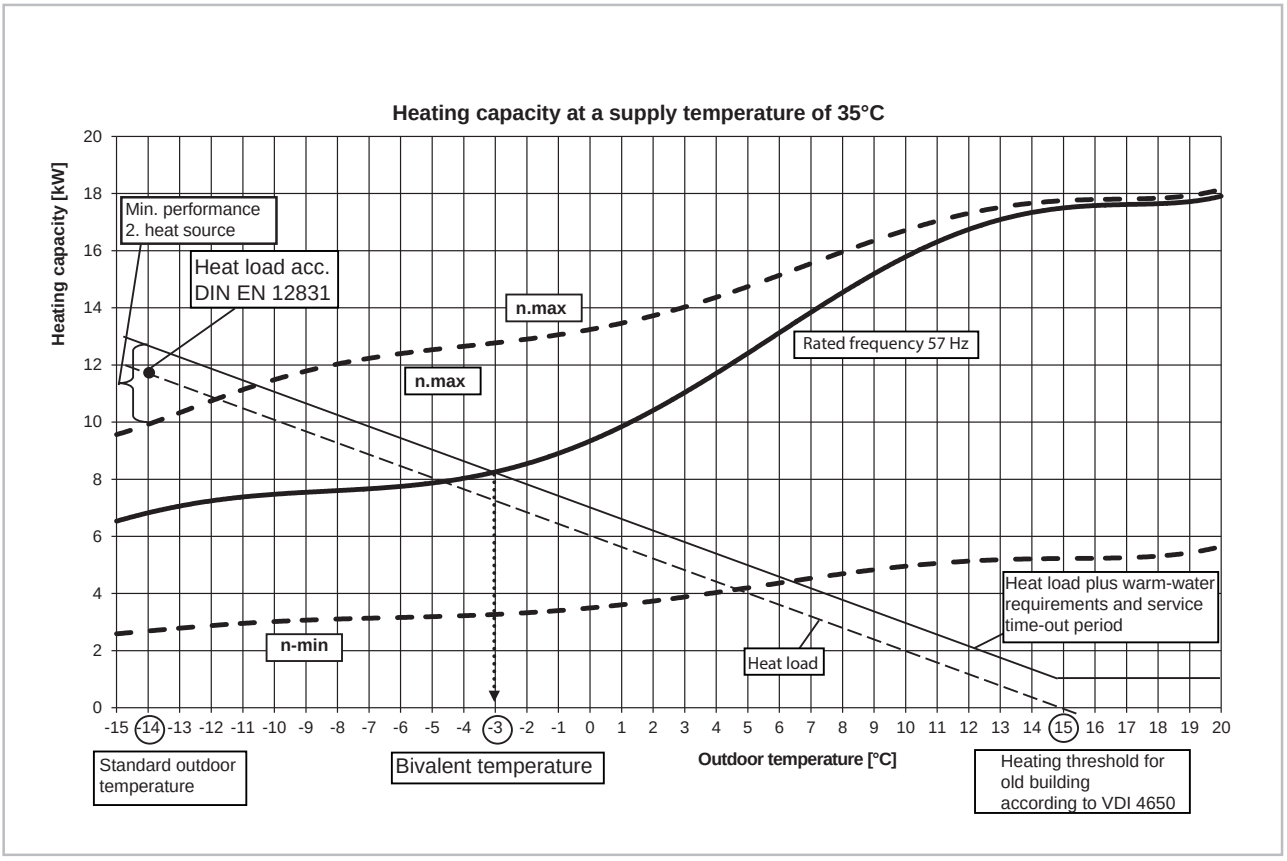

Fig. 35: Heating performance diagram of the heat pump WKF NEO-compact 170

Characteristics of REMKO inverter heat pumps

Outdoor air as a heat source

An air/water heat pump absorbs energy from the outdoor air as its heat source and transmits this to the heating system. They have the following advantages over brine/water and water/water heat pump systems:

- Can be used anywhere. Air is available everywhere in unlimited quantities. For example, no wells are required.
- No excavation is required. No large areas are required for soil collectors.
- Favourable. Expensive drilling is not required.
- Good price-performance ratio and easy to install.
- Particularly suitable for low-energy houses with low inlet temperatures.

- Ideal for bivalent operation, in order to save energy.
- Great operational readiness achieved with inverter technology.

Split AC unit

The REMKO inverter heat pump is what is known as a split device. This means that it consists of an outdoor unit and an indoor unit, both of which are connected via refrigerant-carrying copper pipes. Thus there are no water-carrying pipes laid from the indoors to outdoors which need to be made frost proof. The outdoor unit consists only of the compressor, the evaporator and the expansion valve. This means that the outdoor unit is considerably smaller. The indoor unit contains the system's condenser and the connections for the heating network.

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.

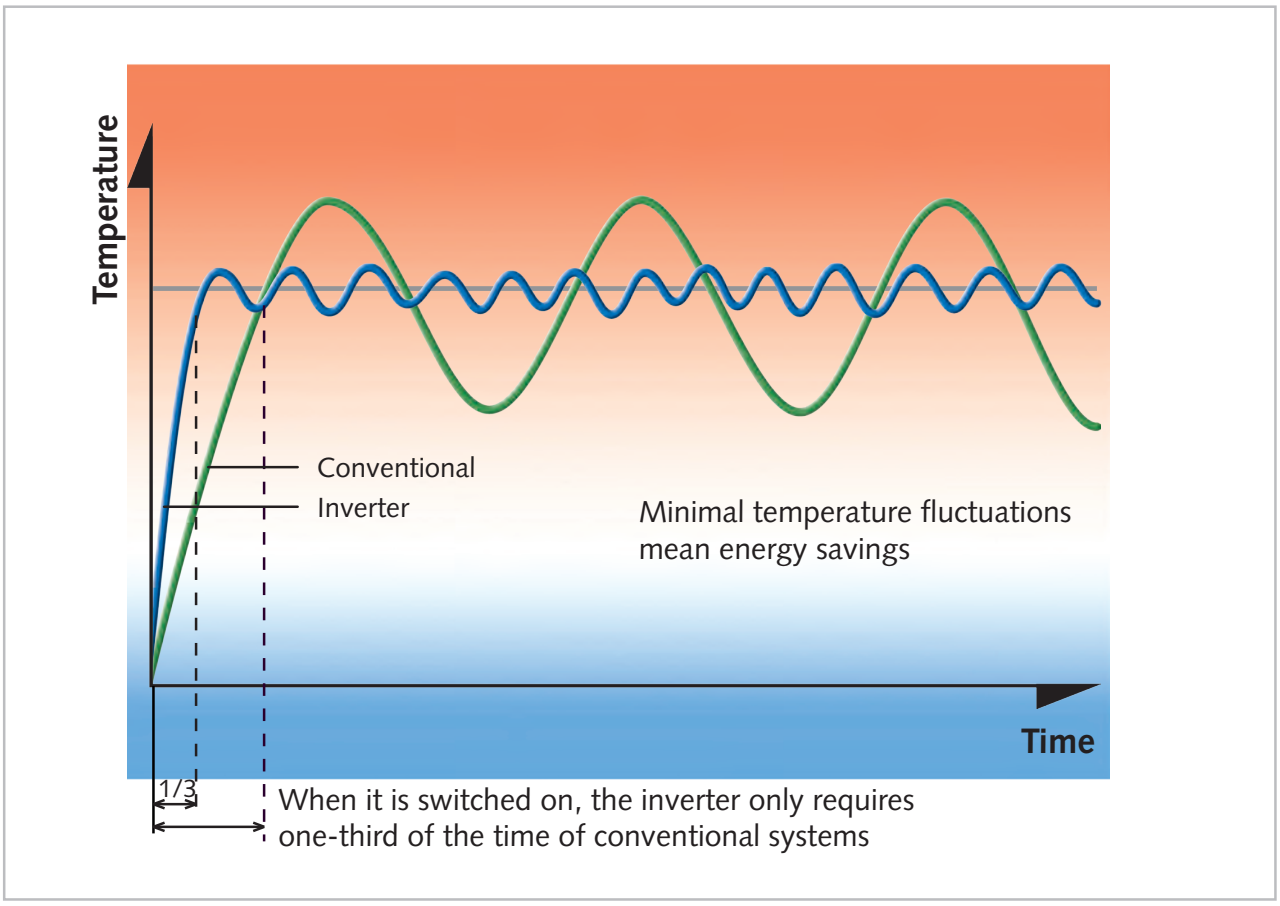

Fig. 36: Modern inverter technology

REMKO series WKF NEO-compact

Thanks to innovative inverter technology, this heat pump will almost always operate by adapting its heating capacity to the actual requirements of the heating season, and will in fact turn itself off when heat is no longer needed. The same applies in the opposite direction with cooling.

Defrost by circulation reversal

At temperatures below about +5°C, humidity freezes in the evaporator (outdoor unit) and an ice layer can form which reduces heat transfer from the air to the refrigerant and to the air stream. This layer of ice must be removed. A four-way valve serves to reverse the refrigerant circuit, so that the heat gas from the compressor flows through the original evaporator and the ice that has formed there can melt. The defrost process is not initiated after a predetermined time; rather it is carried out as required in order to save energy.

Cooling mode

Because of circuit reversal, cooling is also possible. In cooling mode, the components of the refrigeration circuit are used to produce cold water with which heat can be extracted from a building. This can be accomplished with dynamic cooling or passive cooling.

With **dynamic cooling** the refrigerating capacity is actively transferred to the indoor air. This is achieved by means of water-based fan convectors. In doing so, it is desirable that the inlet temperatures are under the dew point, in order to transfer a higher refrigerating capacity and to dehumidify the indoor air.

Passive cooling refers to the absorption of heat via cooled floors, walls or ceiling surfaces. In doing so, water-carrying pipes make the structural sections into thermally effective heat exchangers. In order to achieve this, the refrigerant temperature has to lie above the dew point, in order to avoid the formation of condensation. Dew-point monitoring is required for this purpose.

We recommend dynamic cooling with fan convectors, in order to achieve increased cooling capacity and in order to dehumidify the air on muggy summer days. You will find corresponding devices in the KWD, KWK and WLT-S series on our website: “www.remko.de”. The advantage here is that dew point monitoring is not required.

The comfort zone in the illustration below shows which values for temperature and humidity are considered comfortable for people. This range should ideally be met when heating or air-conditioning buildings.

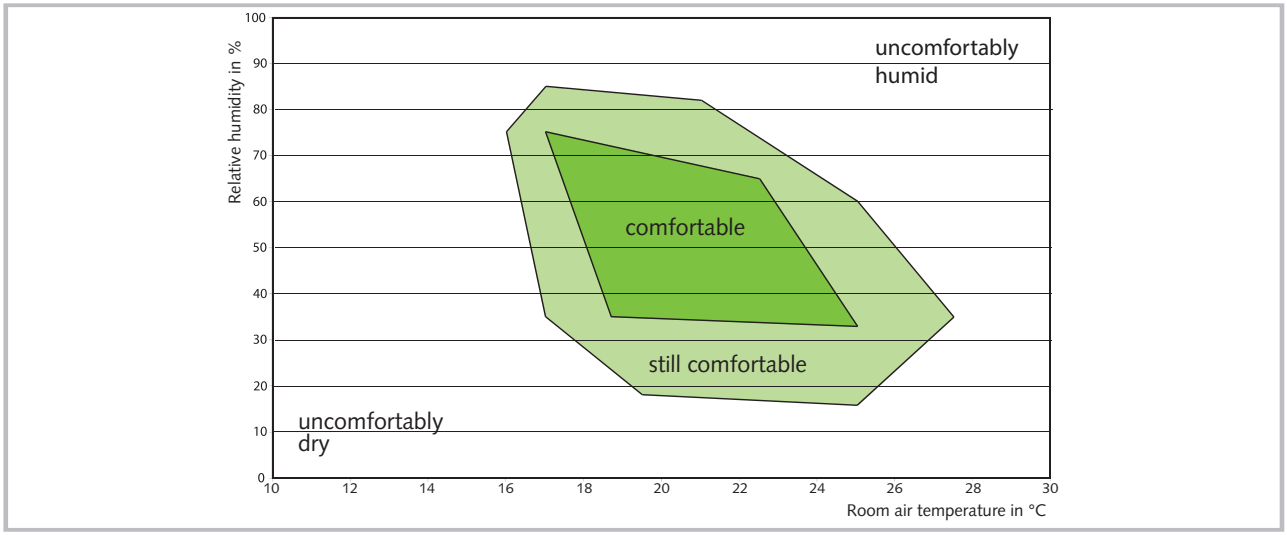

Fig. 37: Comfort zone

3.2 Peripherals

The indoor unit is additionally equipped with an enamelled 200 or 300 l drinking water storage tank. A 6 kW electric auxiliary heater is already installed. As a result, this series is the ideal unit when the heat pump is intended as the sole heat generator (monoenergetic operation).

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

4 Installation

4.1 System layout WKF NEO-compact 80

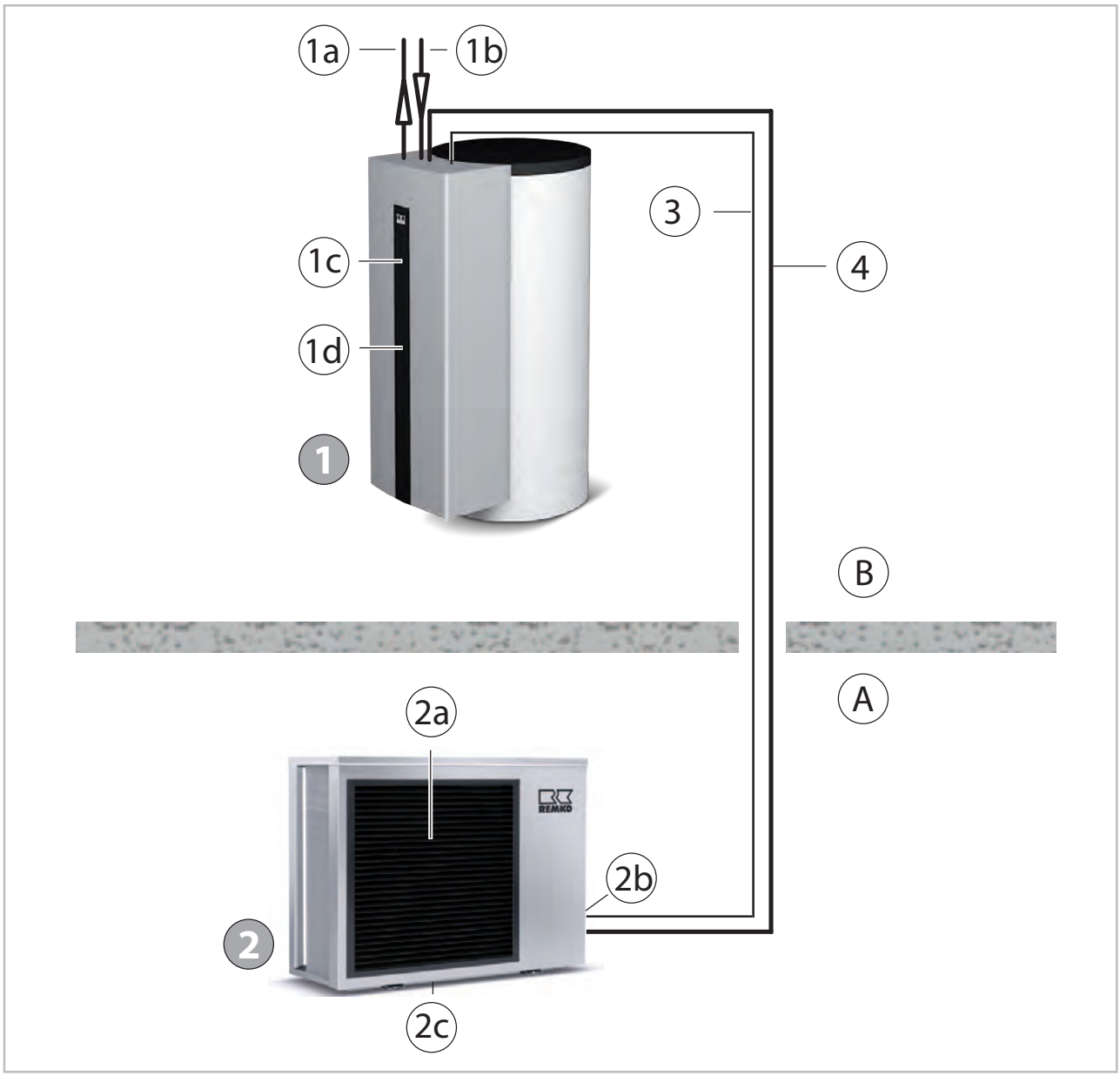

Fig. 38: System layout WKF NEO-compact 80

A: Outdoor area
B: Indoor area
1: Indoor unit
1a: Heating inlet flow ($1^1/_4$" AG)
1b: Heating return flow ($1^1/_4$" AG)
1c: Power supply, indoor unit
= 230V/1~/50Hz, 10A (e.g. 3 x 1.5 mm^2)
1d: Mains supply line, electrical auxiliary heater
(e.g. 5 x 1.5 mm^2)
2: Outdoor unit
2a: Fan
2b: Power supply, outdoor unit
= 230V/1~/50Hz, 16A (e.g. 3 x 2.5 mm^2)
2c: Condensate tray, outdoor unit
(drain must be designed to be frost proof!)
3: Control line, sheathed (e.g. 2 x 1 mm^2)
4: Refrigerant lines $^1/_4$" and $^1/_2$"

4.2 System layout WKF NEO-compact 100 /WKF NEO-compact 130

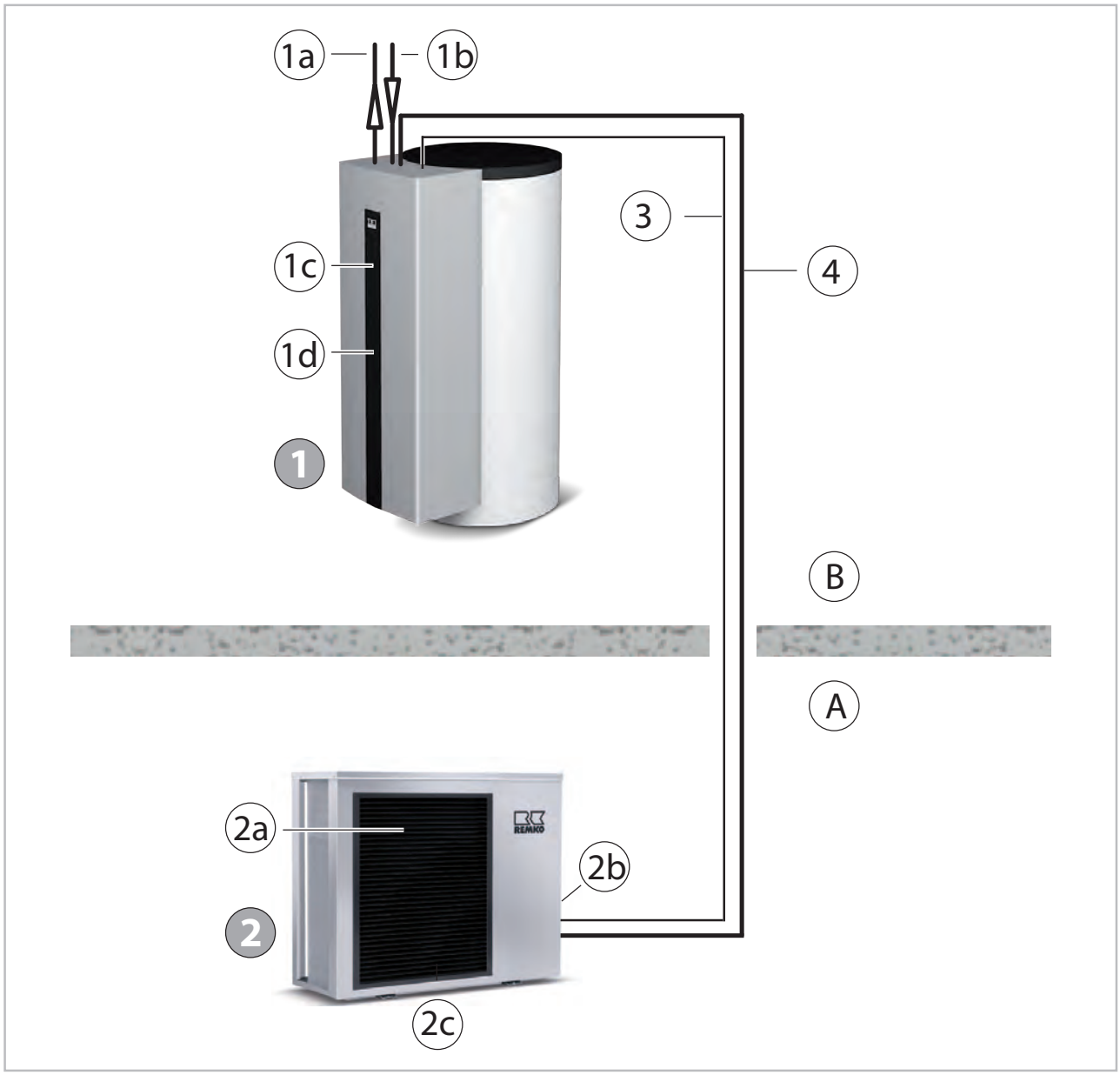

Fig. 39: System layout WKF NEO-compact 100 /WKF NEO-compact 130

A: Outdoor area
B: Indoor area
1: Indoor unit
1a: Heating inlet flow ($1^1/_4$" AG)
1b: Heating return flow ($1^1/_4$" AG)
1c: Power supply, indoor unit
= 230V/1~/50Hz, 10A (e.g. 3 x 1.5 mm²)
1d: Mains supply line, electrical auxiliary heater
(e.g. 5 x 1.5 mm²)
2: Outdoor unit
2a: Fan
2b: Power supply, outdoor unit
= 230V/1~/50Hz, 20A (e.g. 3 x 2.5 mm²)
2c: Condensate tray, outdoor unit
(drain must be designed to be frost proof!)
3: Control line, sheathed (e.g. 2 x 1 mm²)
4: Refrigerant lines $^3/_8$" and $^5/_8$“

4.3 System layout WKF NEO-compact 170

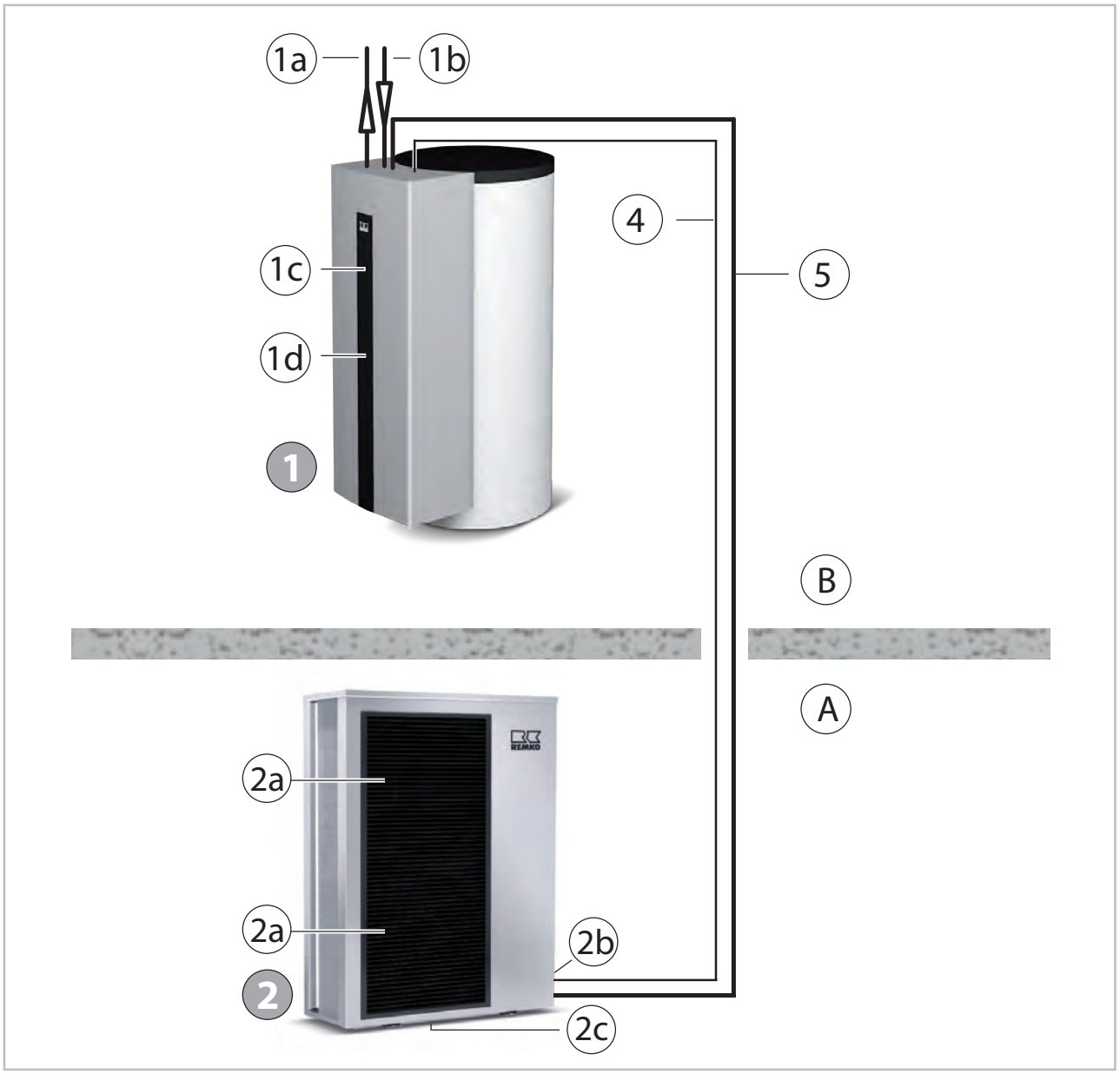

Fig. 40: System layout WKF NEO-compact 170

A: Outdoor area
B: Indoor area
1: Indoor unit
1a: Heating inlet flow ($1^1/_4$" AG)
1b: Heating return flow ($1^1/_4$" AG)
1c: Power supply, indoor unit
= 230V/1~/50Hz, 10A (e.g. 3 x 1.5 mm²)
1d: Mains supply line, electrical auxiliary heater
(e.g. 5 x 1.5 mm²)
2: Outdoor unit
2a: Fan
2b: Power supply, outdoor unit
= 400V/3~/50Hz, 3 x 16A (e.g. 5 x 1.5 mm²)
2c: Condensate tray, outdoor unit
(drain must be designed to be frost proof!)
3: Control line, sheathed (e.g. 2 x 1 mm²)
4: Refrigerant lines $^3/_8$" and $^3/_4$"

4.4 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.
- Suitable sites for installation are to be selected with regard to machinery noise and the set-up process.
- The stop valves for the refrigerant lines may only be opened immediately before commissioning of the system.
- The outdoor units are pre-filled for an ordinary length. For other lengths, refer in this regard to the tables in the section “Adding refrigerant” in the “Commissioning the refrigeration system” chapter.
- 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.
- See that neither refrigerant or pipes that carry water pass through living or sleeping areas.

DANGER!

The connection of refrigerant pipes and the handling of refrigerant may be only be carried out by qualified personnel (competence category I).

NOTICE!

Open refrigerant pipes must be protected against the introduction of moisture by means of suitable caps or adhesive strips Refrigerant pipes may not be kinked or compressed. Refrigerant pipes may only be cut to length with a suitable pipe cutter (use no hacksaws or the like).

DANGER!

All electrical installation work must be done by an electrician.

Wall opening

- A wall opening of at least 70 mm diameter and 10 mm incline from the inside to the outside must be created.
- To prevent damage, the interior of the wall opening should be padded or, for example, lined with PVC pipe (see figure).
- After installation has been completed, use a suitable sealing compound to close off the wall opening, taking account of fire protection regulations (provided by the customer).

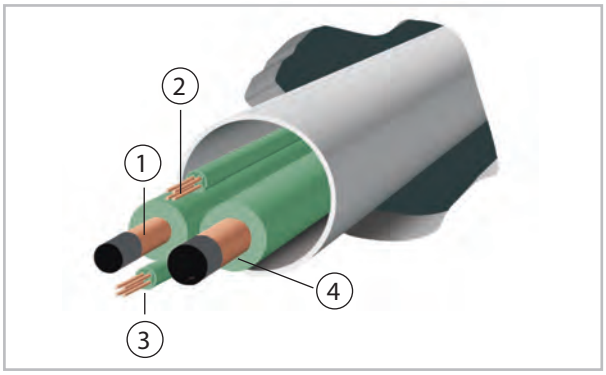

Fig. 41: Wall opening

1: Injection pipe / 2: Control line
3: Supply pipe / 4: Suction pipe

In order to create a watertight pipe/cable duct cutout and prevent damage, we recommend use of a REMKO pipe gland.

4.5 Set-up, assembly indoor unit

Minimum volume of set-up space

When environmentally friendly refrigerants are used, the installation rooms may have to have a minimum size or volume, depending on the total fill quantity. If the total fill quantity is greater than 1.84 kg, consideration must be made according to DIN EN 60335 T2-T40. The following table shows the minimum surface space based on the refrigerant fill quantity.

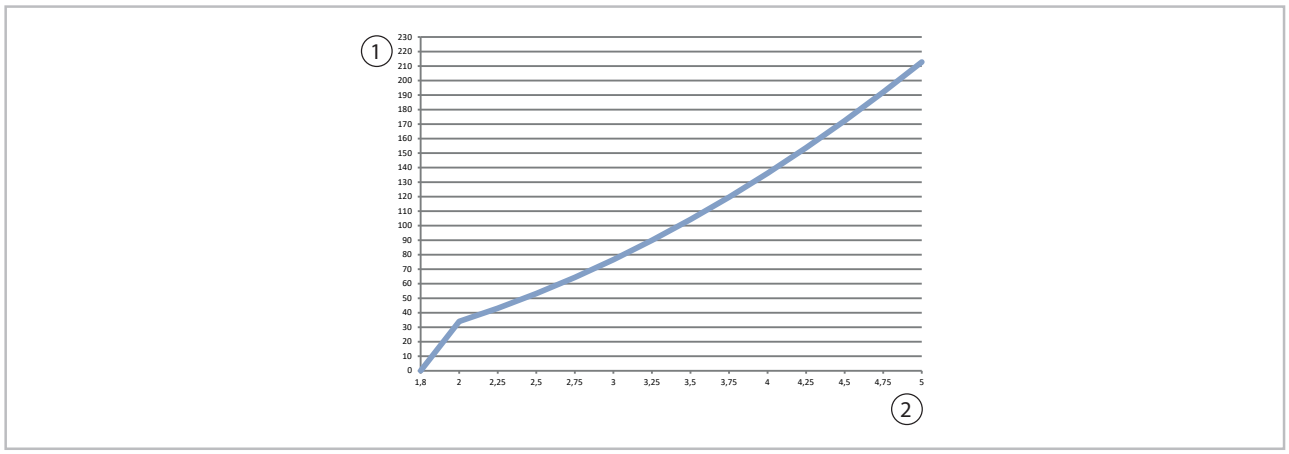

Fig. 42: Minimum space for unventilated installation rooms based on fill quantity with an installation height of 1.6 m

1: Area [m²] / 2: Refrigerant fill quantity [kg]

NOTICE!

If the minimum volumes cannot be reached, an exhaust air fan must be installed. This can run in continuous operation or is switched on using the R32 gas detector (from the accessory EDP no. 260829). Vacuuming must take place in the bottom area. The quantity of exhaust air of the fan is dependent on the total fill quantity of the heat pump. At the maximum possible fill level, the medium flow rate must be able to deliver 120 m³/h.

If the space requirements cannot be adhered to, the space must be joined to another one with air grilles or door slits. Moreover, mechanical ventilation can be installed for the installation room.

The necessary cross-sections of the connection openings can then be calculated according to DIN EN 60335 T2-T40.

Refrigerant fill quantity [kg] per basic pipe length [m] per circuit. Installation height of indoor unit 1.6 m

[m]	5	6	7	8	9	10	11	12
WKF NEO-compact 80	1.00 [1)]	1.03 [1)]	1.06 [1)]	1.09 [1)]	1.12 [1)]	1.15 [1)]	1.18 [1)]	1.21 [1)]
WKF NEO-compact 100	1.60 [1)]	1.63 [1)]	1.66 [1)]	1.69 [1)]	1.72 [1)]	1.75 [1)]	1.78 [1)]	1.81 [1)]
WKF NEO-compact 130	1.80 [2)]	1.83 [2)]	1.86 [2)]	1.89 [2)]	1.92 [2)]	1.95 [2)]	1.98 [2)]	2.01 [2)]
WKF NEO-compact 170	2.55 [2)]	2.58 [2)]	2.61 [2)]	2.64 [2)]	2.67 [2)]	2.70 [2)]	2.73 [2)]	2.76 [2)]

[1)] No specification for the installation room

[2)] The minimum size of the installation room must be considered

For more, see the next page

[m]	13	14	15	16	17	18	19	20
WKF NEO-compact 80	1.24 [1]	1.27 [1]	1.30 [1]	1.33 [1]	1.36 [1]	1.39 [1]	1.42 [1]	1.45 [1]
WKF NEO-compact 100	1.84 [1]	1.87 [2]	1.90 [2]	1.93 [2]	1.96 [2]	1.99 [2]	2.02 [2]	2.05 [2]
WKF NEO-compact 130	2.04 [2]	2.07 [2]	2.10 [2]	2.13 [2]	2.16 [2]	2.19 [2]	2.22 [2]	2.25 [2]
WKF NEO-compact 170	2.79 [2]	2.82 [2]	2.85 [2]	2.88 [2]	2.91 [2]	2.94 [2]	2.97 [2]	3.00 [2]

[1] No specification for the installation room

[2] The minimum size of the installation room must be considered

If the minimum volumes cannot be reached, an exhaust air fan must be installed. This can run in continuous operation or is switched on using the R32 gas detector (from the accessory EDP no. 260829). Vacuuming must take place in the bottom area. The quantity of exhaust air of the fan is dependent on the total fill quantity of the heat pump. At the maximum possible fill level, the medium flow rate must be able to deliver 120 m^3/h.

Setting up the indoor unit

- The indoor unit must be installed on a firm, level surface.
- The surface must possess sufficient load-bearing capacity for the weight of the indoor unit.
- The height-adjustable feet can be used to level the indoor unit precisely.
- The indoor unit is to be mounted in such a way that all of the sides have sufficient space for purposes of installation and maintenance. It is equally important that there is sufficient space above the module for installing the pipes and the safety assembly.
- All connections and pipe connections must be checked for leaks and fittings and stoppers tightened.

⚠ WARNING!

Only fasteners suitable for the given application may be used.

Fig. 43: Setting up the indoor unit

Minimum spacing for indoor units

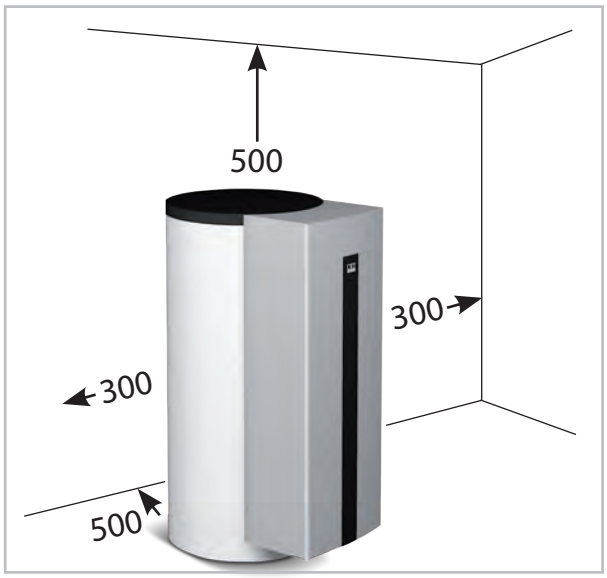

Fig. 44: Minimum spacing for indoor units

Safety assembly – Description

In rare cases, refrigerant may flow into the heating water. To prevent uncontrolled flow out into the installation room, we recommend guiding escaping gases outdoors through a blow-off line by a safety valve. Applicable regulations must be observed. Below are some instructions on installing the blow-off line of the safety valve to the outdoors.

Diaphragm safety valve

! NOTICE!

In order to avoid damage, the installation, commissioning and maintenance of the diaphragm safety valves must always be implemented as stipulated in the installation instructions.

The diaphragm safety valves were manufactured in accordance with the safety requirements of the pressure equipment directive 97/23/EC and are TÜV-certified (with enlarged outlet, type-tested per TRD 721 VdTÜV bulletin for safety valve SV100).

Safety assembly

The manifold is made from solid cast brass CB753S. The small air bubbles in heating water are automatically routed to the fast-bleeder, thanks to the special design.

The lower connection, for the heat pump connection line, has a 1" internal thread.

A pre-formed polystyrene shell per DIN 4102-A1 provides insulation.

The complete safety assembly comprises:

1. A heating manometer $^1/_4$", ø 63 mm, with green flag and red position indicator and metal housing. The automatic shut-off valve $^3/_8$" x $^1/_4$" enables trouble-free replacement without having to empty the system.
2. An automatic fast-bleeder with a shut-off valve, brass design, a float made from high quality plastic and functionally reliable valve. Connection = $^3/_8$" with an O-ring seal.
3. A diaphragm safety valve $^1/_2$" x $^3/_4$", type-tested, in compact brass design and a trigger pressure of 3 bar for power ratings up to 50 kW or 45 000 kcal/h.

The safety assembly can only be used for closed heating systems per EN 12828 for power ratings up to 50 KW.

Dimensions of the safety assembly

WARNING!

Water temperatures or water mix temperatures over 50 °C can result in burns.

Ensure that these high temperatures do not present any hazard to personnel during the installation of the safety valve.

CAUTION!

Do not damage the connection threads during installation. This will prevent damage to property and injury to personnel.

CAUTION!

All connections must be leak-tight.

The fittings and equipment (manometer, quick-bleeder and safety valve) are sealed into the manifold and checked for functionality and leak-tightness. Install the safety valve per EN 12828, above the level and in the immediate vicinity of the heat generator.

Route the connecting line (min. $^{3}/_{4}$" DN = 20 mm) with standard permissible materials keeping the route as short as possible. No shut-off valve may be installed.

Install the safety assembly such that the fittings are all vertical.

The diameter of the discharge line for the safety valve must comply with the diameter of the valve outlet.

The max. length must not exceed 2 m, more than 2 bends is not permitted. If these max. values are exceeded (2 bends and 2 m line), then the next largest dimension should be selected for the discharge line. Note that in this case, more than 3 bends and a 4 m line length is also not permitted.

! NOTICE!

Carry out the installation such that the safety assembly is located above the level of the heat generator.

Safety assembly – Installation schematic

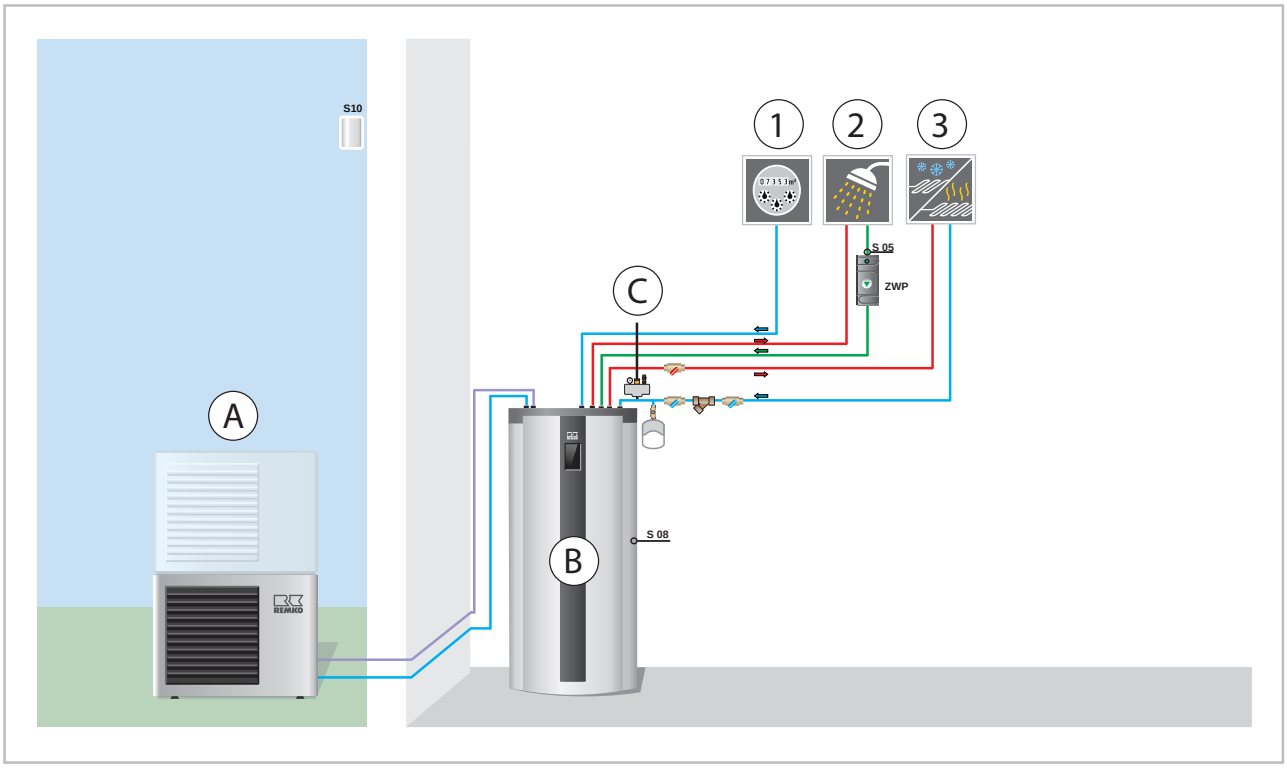

Fig. 45: Safety assembly – Installation schematic

A: Outdoor unit
B: Indoor unit
C: Safety assembly

1: Cold water
2: Hot water
3: Floor heating cycle

4.6 Layout, assembly of outdoor unit

Outdoor unit installation location

- The unit may be attached only to a load-bearing structure or wall. Ensure that the outdoor unit is installed only vertically. The installation site should be well ventilated.
- To minimise noise, install floor consoles with vibration dampers and a considerable distance from acoustically-reflective walls to minimise noise.
- The minimum clearances specified on the next page should be maintained when carrying out the installation. These minimum distances serve to ensure unrestricted air inlet and outlet. The air that has discharged may not be drawn in again. Take the performance data of the outdoor units into account. Additionally, there must be adequate space available for installation, maintenance and repair.
- If the outdoor unit is erected in an area of strong winds, then the unit must be protected against them and additional stabilisation is recommended. This can be realised for example with wire ropes or other constructions (Fig. 46). The snow line is to be observed during installation (Fig. 47).
- The outdoor unit must always be installed on vibration dampers. Vibration dampers prevent the transmission of vibrations through the floor or walls.
- A heated, condensate catch-pan ensures that condensation from the pan can drain off. Ensure that the condensate is prevented from freezing so that it can drain off (gravel, drainage).
- If there is insufficient space under the device for the refrigerant lines, then the pre-cut recesses can be removed from the side enclosure-panel and the pipes guided through these openings.
- During installation, add about 20 cm to the expected snow depth to guarantee unimpeded intake and exhaust of outdoor air year round (Fig. 47).
- The installation site of the outdoor unit should be agreed together with the operator primarily so that 'non-concerning levels of operating noise' are achieved, rather than in respect of 'short distances'. This is because: Thanks for splitter technology, there is a vast amount of different installation options with almost identical efficiency available.

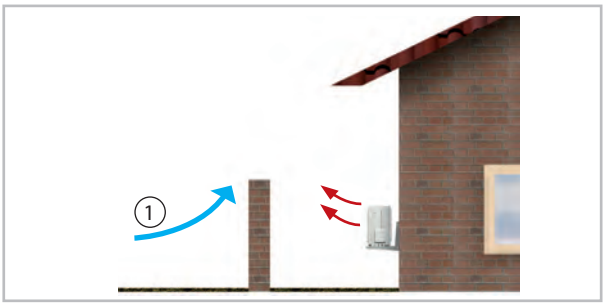

Fig. 46: Protection against wind

1: Wind

! NOTICE!

The site for the outdoor unit must be selected so that machinery noise that occurs disturbs neither the residents nor the facility operator. Observe the TA-noise specifications as well as the table containing the drawings relating to sound pressure levels.

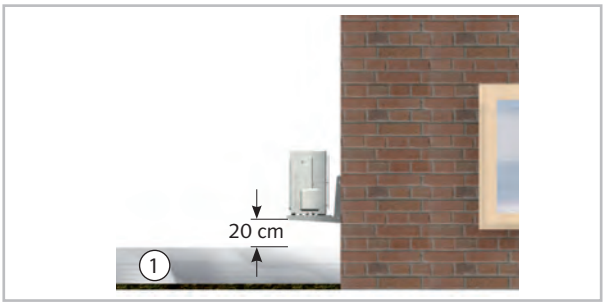

Fig. 47: Protection against snow

1: Snow

⚠ WARNING!

Refrigerant is heavier than air. If there are leaks, escaping refrigerant can get through open windows of the room under the installation location. If refrigerant escapes from the unit, the refrigerant sinks downward and displaces the air. There is danger of suffocation.

Set up the unit at an adequate distance from light shafts.

Immission location	Assessment level in accordance with TA noise	
	Daytime in dB(A)	Night-time in dB(A)
Industrial areas	70	70
Commercial areas	65	50
Core areas, village areas and mixed zones	60	45
General residential areas and small housing estates	55	40
Exclusively residential areas	50	35
Spa areas, hospitals and mental institutions	45	35

Isolated noise peaks of short duration may not exceed 30 dB(A) during the day and 20 dB(A) at night.

Definition of the Danger Area

⚠ WARNING!

Access to the unit is only permitted for authorised and trained persons. If unauthorised persons can approach the danger areas, these areas must be identified with corresponding signs, barriers, etc.

- The external danger area surrounds the unit up to a distance of 2 m, measured in all directions from the unit housing.
- The external danger area on-site can differ as a result of the setup. The specialist company performing the installation work bears the responsibility for this.
- The internal danger area is located inside the machine and can only be reached with the use of an appropriate tool. Access is prohibited for unauthorised persons!

Minimum distances of the outdoor units

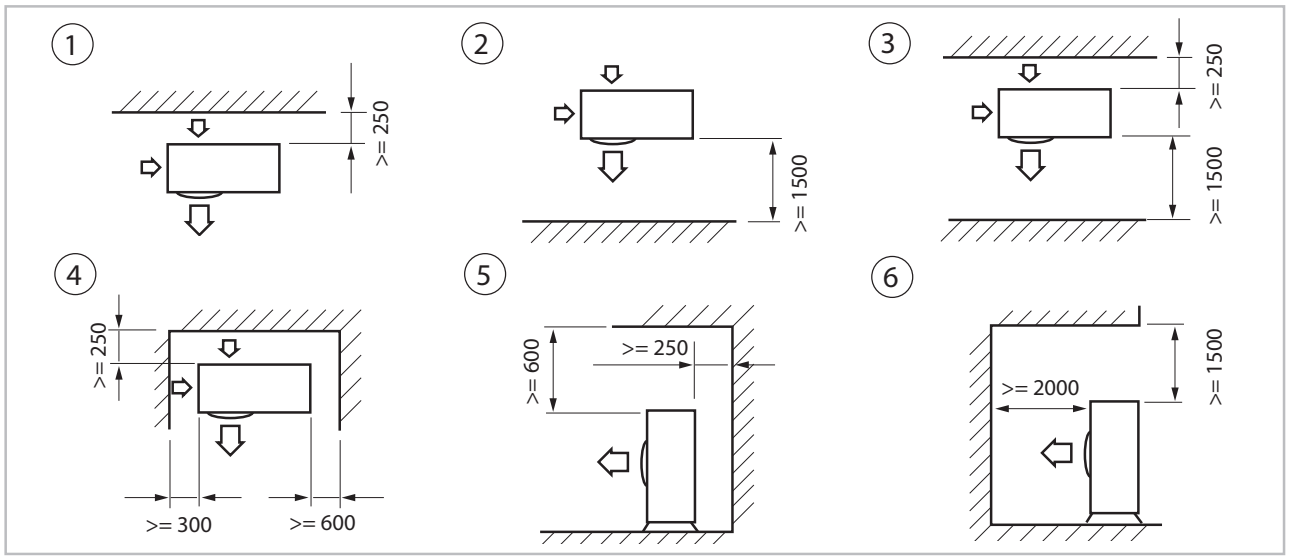

Fig. 48: Minimum distances during construction of an outdoor units in mm

1: Next to a wall, air outlet open to the front, flow restriction behind
2: Next to a wall, air outlet toward the wall, flow restriction to the front
3: Between two walls, air outlet toward the wall, open sides: flow restriction front and rear
4: In a niche, air outlet open to the front, flow restriction behind and on both sides
5: Next to a covered wall, air outlet open to the front, flow restrictions behind and above
6: Next to a covered wall, air outlet open in the direction of the wall, flow restrictions behind and above
a: WKF NEO-compact 80 >= 150 mm
WKF NEO-compact 100/130/170 >= 200 mm

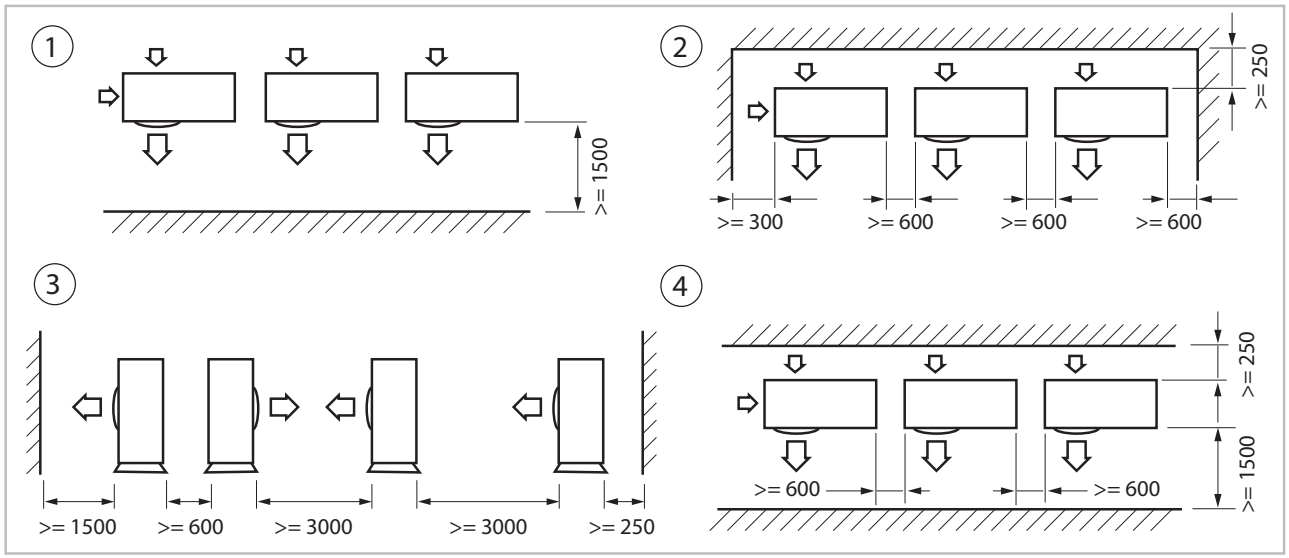

Fig. 49: Minimum distances during construction of multiple outdoor units in mm

1: Next to a wall, air outlet toward the wall, flow restriction to the front
2: In a niche, air outlet open to the front, flow restriction behind and on both sides
3: Between two walls, air outlet toward the wall and in the direction of other devices, open sides: flow restriction front and rear
4: Between two walls, air outlet toward the wall, sides of external devices open: flow restriction front, rear and for internal devices on the sides
a: WKF NEO-compact 80 >= 150 mm
WKF NEO-compact 100/130/170 >= 200 mm

Condensate drainage connection and safe drainage

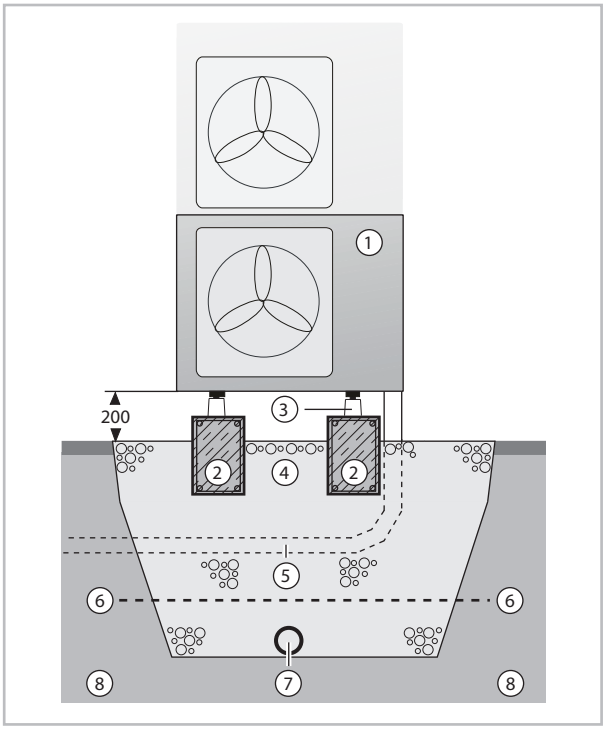

Fig. 50: Condensate drainage, seepage of condensate and strip foundation (cross-section)

1: Outdoor unit
2: Reinforced strip foundation
H x W x D = 300 x 200 x 800 mm
3: BK 660/1000 floor console
4: Gravel layer for seepage
5: Conduit for refrigerant piping and electrical connecting line (temperature-resistant up to at least 80 °C)
6: Frost line
7: Drainage pipe
8: Soil

! NOTICE!

The refrigerant lines must enter the housing from the rear with the use of the REMKO OA2 oil separator.

Strip foundation

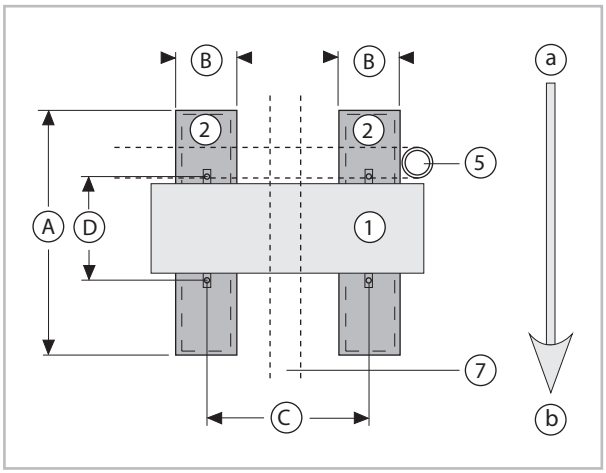

Fig. 51: Dimensions for the strip foundation (bird's eye view)

1: Outdoor unit
2: Reinforced strip foundation
H x W x D = 300 x 200 x 800 mm
5: Conduit for refrigerant piping and electrical connecting line (temperature-resistant up to at least 80 °C)
7: Drainage pipe
a: Suction side (rear)
b: Outlet side (front)

Dimensioning the strip foundation (all dimensions in mm)

Dimension	WKF NEO-compact 80	WKF NEO-compact 100/130/170
A	800	800
B	200	200
C	690	810 [1)] 610 [2)]
D	390	390 [1)] 425 [2)]

[1)] WKF NEO-compact 100/130

[2)] WKF NEO-compact 170

Condensate drainage connection

If the temperature falls below the dew point, condensation will form on the finned condenser during **heating mode.**

A condensate tray should be installed on the underside of the unit to drain any condensate.

- The condensate drainage line must be provided by the customer and have an incline of at least 2 %. If necessary, fit vapour-diffusion-proof insulation.
- When operating the unit at outside temperatures below 4 °C, ensure the condensate drainage line is laid to protect it against frost. The lower part of the housing and condensate tray is also to be kept frost free in order to ensure permanent draining of the condensate. If necessary, fit a pipe heater.
- Following installation, check that the condensate run off is unobstructed and ensure that the line is durably leak tight.

Safe drainage in the event of leakages

The REMKO oil separator OA 2.2 fulfils the following list of requirements from regional regulations and laws.

! NOTICE!

With the connection of an external drain line to the oil separator, it must be kept frost-free.

5 Hydraulic connection

A separate interpretation of nominal flow rate must be made for every system (see technical data).

- We recommend installing a buffer tank as a hydraulic compensator for hydraulic isolation of the heating cycle. Hydraulic isolation is required when: - different inlet temperatures are to be realised, e.g. underfloor heating/radiators - the pressure drop of the heat distribution system is greater than 80 kPa - with the use of further heat generators, such as solid fuel boilers, solar or bivalent systems.
- Perform a pipe-network calculation before installing the heat pump. After installing the heat pump, it is necessary to perform a hydraulic balancing of the heating circuit.
- Protect underfloor heating systems against excessively high inlet temperatures.
- Do not reduce pipe diameters for the inlet and return flow connections to the heat pump before connecting a buffer tank.
- Plan for air bleed valves and drain-off taps at appropriate places.
- Flush the system’s entire pipe network before connecting the heat pump.
- 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.
- As delivered, the safety assembly consists of a pressure gauge, a bleeding valve and a safety valve. It is to be mounted to the pipe connection provided on the indoor unit.

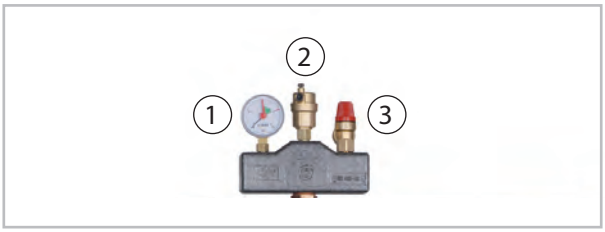

Fig. 52: Safety assembly

1: Pressure gauge
2: Automatic bleeding valve
3: Safety valve

- System separation is required if no oxygen diffusion-tight pipe has been used, and in systems in which contaminants are already present.
- Install the dirt trap delivered with the unit outside the heat pump in the return flow. Ensure that the dirt trap remains accessible for inspection.
- Be sure to position one gate valve upstream and another downstream of the dirt trap. This ensures that the dirt trap can be checked at any time without loosing water.
- The dirt trap must be checked during every maintenance of the system.
- Additionally, a hand-operated bleeder is installed on the heat pump for additional bleeding.
- All exposed metallic surfaces must be additionally insulated.
- Cooling mode via the heating circuit requires a completely vapour diffusion tight insulation along the entire length of the pipework.
- All outgoing heating cycles, including the connections for water heating, 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. Conduct a seal test and perform a thorough bleeding of both the indoor unit and the entire system - repeatedly, if necessary, in acc. with DIN standards.

Actual schemas for hydraulic integration can be found on the internet at www.remko.de

REMKO series WKF NEO-compact

Hydraulic circuit diagram

Functions: Heating and hot water incl. Smart-Serv emergency heating coil.

This hydraulic cycle diagram serves solely to assist in planning activities;
the customer-provided hydraulic system on site must be planned and installed by the installation contractor!

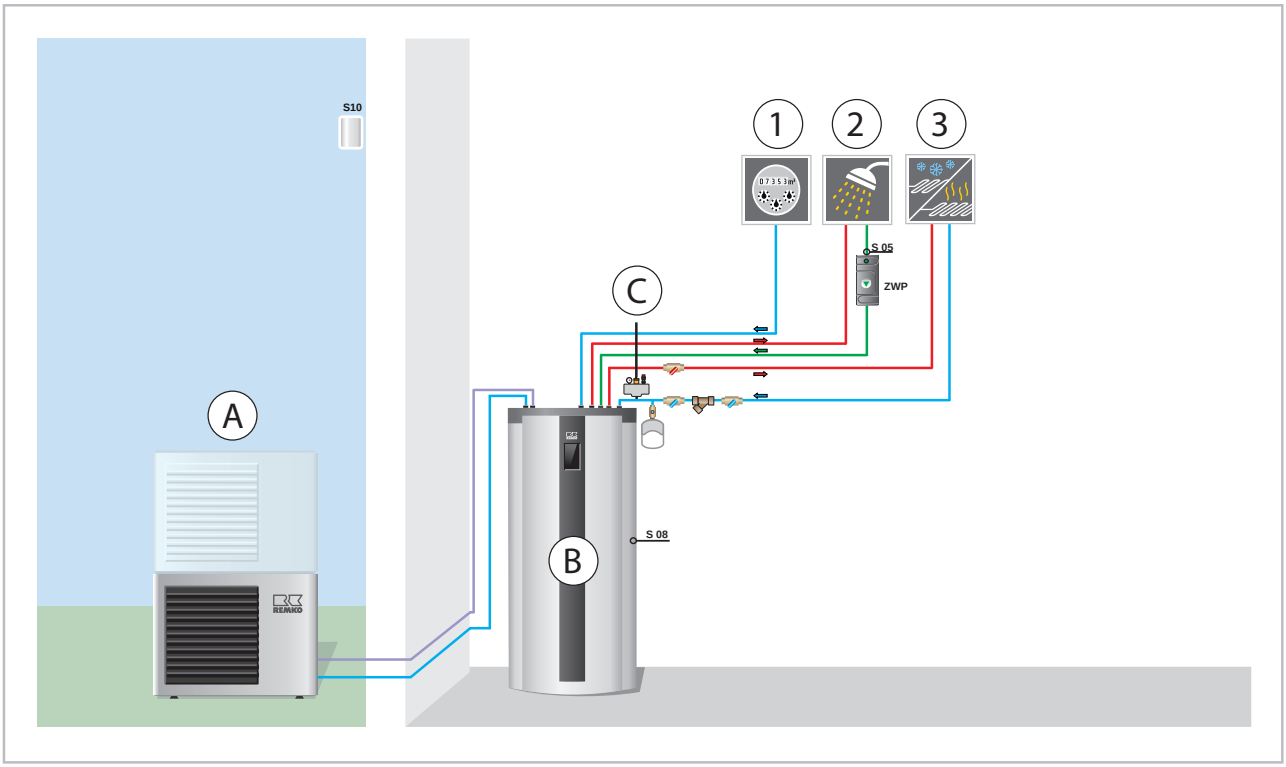

Fig. 53: Example hydraulic diagram

A: Outdoor unit
B: Indoor unit
C: Safety assembly

1: Cold water
2: Hot water
3: Unmixed heating cycle

The WKF NEO-compact heat pump is ideal for use in new construction, where the heat pump is the sole heat generator. In an emergency, an electr. auxiliary heater (mono-energetic variant) can be switched on by the Smart Control.

The REMKO drinking water storage tank is an enamelled drinking water storage tank. The 3-way change-over valve is switched over by the Smart-Control to provide HW, and is also part of the indoor unit.

The highly efficient primary pump can be used as a heating cycle pump and its speed is regulated according to requirements. A pressure loss of max. 80 kPa is made available by the customer. If the pressure losses on site exceed this, a separate storage tank, e.g. REMKO KPS 300, must be used as a hydraulic compensator. Then a REMKO heating cycle group unmixed, type HGU, and two mixed heating cycle groups, type HGM, are available. Moreover, the hot water connections, cold water supply, and circulation are all connected to the indoor unit on the top.

So that the heat pump can efficiently and smoothly supply the heating water system directly (without buffer tank), the following basic prerequisites must be fulfilled:

- The heating system must be able to be operated with an inlet temperature (e.g. only floor heating).
- The pressure drop of the heating system shall not exceed 80 kPa
- A minimum water flow volume of 20 l/min must be assured. If this is not possible, then a valve must be installed at a suitable location (last heating manifold).
- The pipe cross sections of the lines from the heat pump to the heating manifolds shall not be reduced
- The min. water volume with active cooling must be observed.

6 Cooling of the heat pump

Tempering/cooling via the floor heating

The floor heating is predominantly known for emitting heat during the heating period. When in heating mode, the heat emission capacity of floor heating stands at around 50 W/m^2. If temperature control is to take place via the floor heating, this can be activated and controlled depending on the temperature difference and air humidity between the floor heating and the rooms to be cooled. The cooling capacity then stands at between 20-30 W/m^2. This value is usually sufficient for cooling the living area.

Comfortable cooling with the heat pump

If the floor heating is to be used for cooling, it is necessary to observe the following points. Cooling should be activated promptly because this is a slow-acting system. Heating the building in advance should be prevented. The automatic function of REMKO Smart-Control regulation realises automatic switching from heating in the winter to cooling in the summer when the parameters are correspondingly set. Once the regulation has been changed to summer mode (hot water only), the outside temperature is monitored by the REMKO Smart-Control regulation. In order to ensure that the building does not heat when this is not desired, in “automatic” room climate mode the cooling function is enabled as necessary with the correspondingly activated parameters. The heat pump then operates from this time point in cooling mode to achieve heat dissipation. Hot water preparation always operates as a priority in cooling mode, as in heating mode.

Cooling via a separate cooling circuit

If a separate cooling circuit should be used with the system in addition to the heating cycles, then a changeover valve (A14) must be installed in the inlet pipe, which is activated with 230 V. This is attached to the controller on A14. In cooling mode, the valve is switched to the cooling circuit AB/A. If no cooling mode is operated, the valve is de-energised at AB/B heating cycle.

Cooling via a heating circle

Cooling via a surface system, for example via floor heating, is referred to as passive cooling. When cooling via a surface system, it is necessary to observe the inlet temperature in particular. The regulation of this cooling function is adjusted such that the floor heating is not cooled too greatly and undershoots the so-called dew point. If the dew point temperature is undershot, moisture forms on the water-bearing pipes or on the floor surface of the heating system, which must be avoided in all instances. Using REMKO Smart-Control regulation, cooling can be activated via a cooling curve of a connected heating/cooling circuit. This also requires a REMKO room temperature humidity probe. This probe is installed in a reference room, such as the living room for example. Using this probe the current air humidity and room temperature are determined and it is possible to react to changing air humidity or temperature fluctuations. Furthermore, a heating/cooling circuit mixing valve must also be installed. The water temperature in the heating/cooling system is always held above the dew point via the mixing valve function. Determination of the water temperature takes place via a supply and return probe, which is installed above the mixing valve and the heating cycle pumps, directly on the pipes. Using the supply and measured return temperature, REMKO Smart-Control regulation is able to regulate the water temperature with the aid of the heating cycle mixing valve such that the dew point is not undershot. This avoids moisture forming on the water-bearing pipes or floor and causing moisture damage as a result of the dew point being undershot. For comfortable cooling via the floor heating, we recommend installing a REMKO HGM pump assembly. In order to prevent moisture forming in the case of a technical defect or incorrect setting of the cooling function parameters, it is advisable to additionally install a dew point monitor.

To protect the complete system, it is always advisable to safeguard the floor heating with at least one external dew point monitor and one dew point probe. In general, one dew point probe should be installed per sub-distributor for the floor heating. The dew point probe reacts to any moisture and switches off the system (e.g. HGM heating cycle pump) if moisture arises. This ensures that the system is switched off if necessary in a serious situation, without it being possible for more major damage to occur.

Cooling via a parallel buffer tank as system boundary

If the system is to be operated with a parallel buffer tank, which acts as system boundary to the consumer circuit, then there is no need to mounted a remote control in the living room, if the regulation of the consuming cooling circuit is operated via an external controller.

! NOTICE!

Minimum water volume

If the system/water volume in the cooling circuit provided by the customer is less than 5L/kW cooling capacity, an additional buffer tank is recommended to increase the volume. This can be incorporated as a serial buffer in the return flow or as a hydraulic compensator. The KPS series buffer tank can be supplied by REMKO for this.

The water temperature in the pipes is maintained above the nominal dewpoint temperature by the controller, in order to prevent the formation of condensation on the exposed pipes as well as those concealed under the plaster.

7 Corrosion protection

Oxygen always plays a role if metal materials in a heating system corrode. pH values and the salt content also play a major role. The challenge: A licenced 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 contractor/planner and
- subject to the installed materials: filling the heating system with demineralised softwater 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		
Overall 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	salline
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 value range is limited: the 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. This has reasons:

- The improper use of chemicals often leads to the failure of elastomer materials
- To blockages and deposits because of sludge formation
- To defective floating seals in pumps
- To the formation of biofilm which can cause microbial influenced corrosion or significantly impair heat 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

	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. 54: Form for logging filling with completely deionised water

Media conveyed by the pumps

Grundfos pump

The pump is suitable for conveying the following media:

- Clean, thin, non-aggressive and non- explosive media without any solid or long-fibred components
- Cooling liquids that are free of mineral oil
- Soft water

The kinematic viscosity of water is ϑ = 1 mm2/s (1 cSt) at 20 °C. If the pump is used to convey liquids that have a different viscosity, the conveying capacity of the pump is reduced.

Example:

A water-glycol mixture with a 50 % glycol ratio has a viscosity of approx. 10 mm2/s (10 cSt) at 20 °C. This reduces the conveying capacity by approx. 15 %. Additives that could impair the functionality of the pump must not be added to the water. The viscosity of the conveyed medium must be taken into consideration when designing the pump.

Wilo pump

The pump can be used to convey water- glycol mixtures with a glycol ratio of up to 50 %. Example of a water-glycol mixture:

Maximum permissible viscosity: 10 to 50 cSt. This corresponds to a water-ethylene glycol mixture with a glycol ratio of approx. 50 % at -10 °C. The pump is controlled by a performance-limiting function that protects against overloading.

The conveyance of glycol mixtures has an impact on the MAX characteristic curve because the conveying performance is reduced in line with the glycol content and the temperature of the media. Temperatures above the nominal temperature specified for the medium in question should be avoided so that the effect of the glycol is not diminished.

As a general rule, operating times should be kept to a minimum if media temperatures are high. It is essential that the plant be cleaned and rinsed before adding the glycol mixture.

To prevent corrosion or precipitates, the glycol mixture must be checked regularly and replaced if necessary. If the glycol mixture needs to be thinned out, follow the instructions of the glycol manufacturer.

8 Emergency-heat operation

If the outdoor unit fails, you can start emergency-heat operation as follows:

1. Pressing the REMKO logo in the top right corner of the display takes you to the "Expert" level. Enter the password "0321" sequentially with the "+" and "-" key and then confirm your entry by touching the "OK" field in the bottom right corner.
2. Deactivate the heat pump in the "Settings ⇒ Basic settings ⇒ System configuration" menu point of the expert level. After the heat pump has been switched off, the auxiliary heating will be released.
3. It is not necessary to manually set the set-point on the electric heating element.
4. The Smart-Control takes full control of heat regulation and the activation of the heating element.

In order to deactivate emergency-heat operation again, the heat pump must be enabled once more in the Expert level.

9 Refrigeration connection

9.1 Connection of refrigerant piping

- The outdoor unit and the indoor unit are connected together by two copper lines (refrigerator-quality copper tubes) with the following dimensions:
  WKF NEO-compact 80: 1/4"-1/2"
  WKF NEO-compact 100/130: 3/8"-5/8"
  WKF NEO-compact 170: 3/8"-3/4"
  connected (REMKO accessories).
- When bending the refrigerant piping, pay attention to the bending radii to prevent bending of the tubes. Never bend a pipe twice in the same place. Doing so can make it brittle or cause cracks.
- Assure suitable fastening and insulation when laying the refrigerant pipes.
- The copper tubes are connected by hard soldering with an insoluble bond.
  The soldered joints must be made in a protective atmosphere to avoid the formation of scale inside.
  On the indoor unit, the copper tubes are soldered in a shielding gas atmosphere to create an insoluble bond.

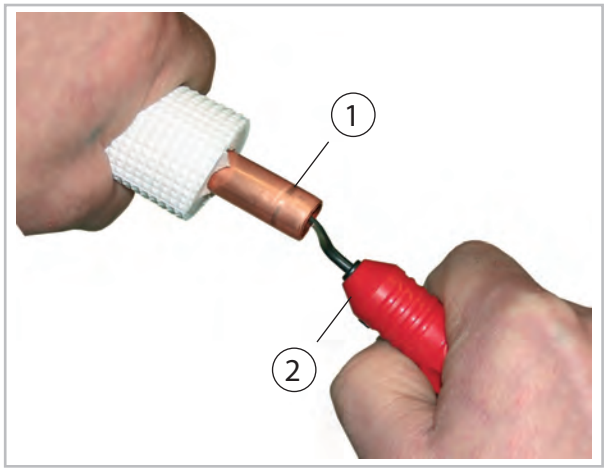

Fig. 55: Deburring the refrigerant piping

1: Refrigerant piping
2: Deburrer

Connection to the unit

- The cover of the outdoor unit must be dismantled. It may be necessary to remove the pre-cut bushings.
- Take off the factory-fitted protective caps.
- The transitions for the refrigerant piping included in the scope of delivery must be used for the connection.
- The connection of the refrigerant pipes to the device connections are initially to be made by hand, in order to ensure a good fit.
- All flammable materials in the immediate vicinity of the soldering points must be removed and protected against ignition.
- The installed refrigerant piping, including the soldering connections, must be provided with suitable insulation up to the shut-off valve.
- Special measures need not be taken for the return of the compressor oil.

! NOTICE!

Use only tools which are approved for use in an HVAC environment. (z. B.: bending pliers, pipe/tubing cutters, de-burrers and flaring tools). Do not cut refrigerant pipes with a saw.

! NOTICE!

All work must be carried out in a way that prevents dirt, particles, water etc. from entering, refrigerant lines!

! NOTICE!

The on-site power supply for the outdoor unit of the heat pump must be switched **on 24 hours before** the technical assistance commissioning!

9.2 Commissioning the refrigeration system

Leak testing

Once all the connections have been made, the pressure gauge station is attached to the Schrader valve as follows (if fitted):

blue = large valve = suction pressure

Once the connection has been made successfully, the leak test is carried out with dry nitrogen. Leak testing involves spraying a leak detection spray onto the connections. If bubbles are visible, the connections have not been made properly. In that case, tighten the connection or, if necessary, create a new flange.

Pumping down to vacuum

After completing a successful leak test, the excess pressure in the refrigerant piping is removed and a vacuum pump with an absolute final partial pressure of min. 10 mbar is used to remove all of the air and empty the pipes. Any moisture present in the pipes will also be removed.

> **NOTICE!**
>
> A vacuum of at least 10 mbar must be produced!

The time required to generate the vacuum is dependent on the final pressure pipe volume of the indoor unit and the length of the refrigerant piping. This always takes at least 60 minutes. Once any foreign gases and humidity have been completely extracted from the system, the valves on the pressure gauge station are closed and the valves on the outdoor unit are opened as described in the "Commissioning" section.

Commissioning

> **NOTICE!**
>
> Commissioning should only be performed and documented by specially trained personnel.
>
> Observe the operating manual for the indoor units and outdoor components when commissioning the entire system.

Once all the components have been connected and tested, the system can be put into operation. A functional check should be performed to verify its correct function and identify any unusual operating behaviour prior to handing it over to the operator. This check is dependent on the installed indoor units. The processes are specified in the operating manual for the indoor units being commissioned.

Functional checks and test run

Check the following points:

- Leak-tightness of the refrigerant piping.
- Compressor and fan running smoothly.
- Issue of warmer water in the indoor unit and issue of cold air to outdoor unit during heating operation.
- Function test of the indoor unit and all program sequences.
- Check of the surface temperature of the suction pipe and that the vaporiser is not overheating. To measure the temperature, hold the thermometer to the suction pipe and subtract the boiling point temperature reading on the pressure gauge from the measured temperature.
- Record the measured temperatures in the commissioning report.

Function test of heating operating mode

1. Remove the protective caps from the valves.
2. Start the commissioning procedure by briefly opening the shut-off valves on the outdoor unit until the pressure gauge indicates a pressure of approx. 2 bar.
3. Check all connections for leaks with leak detection spray and suitable leak detectors. If no leaks are found, fully open the shut-off valves by turning them anti-clockwise using a spanner. If leaks are found, draw off the refrigerant and rework the defective connection. It is imperative that the vacuum creation and drying steps are repeated!
4. Activate the main circuit breaker or fuse.
5. Program the Smart-Control.
6. Switch on heating mode

   > *Due to the turn on delay, the compressor will start up a few minutes later.*

7. Check all regulating, control and safety devices for function and correct adjustment during the test run.
8. Measure all cooling data and record the measured values in the commissioning report.
9. Remove the pressure gauge.

Final tasks

- Use the Smart-Control to set the target temperature to the required value.
- Mount all removed parts.
- Familiarise the operator with the system.

> **NOTICE!**
>
> Check that the shut-off valves and valve caps are tight after carrying out any work on the cooling cycle. Use appropriate sealant products as necessary.

Adding refrigerant

⚠ DANGER!

The connection of refrigerant pipes and the handling of refrigerant may be only be carried out by qualified personnel (competence category I).

⚠ DANGER!

Only refrigerant in a liquid state may be used to fill the cooling cycle!

⚠ CAUTION!

Danger of injury from refrigerant!

Refrigerant degreases the skin on contact and may cause cold burns.

Therefore:

- Wear chemical-resistant protective gloves when undertaking any work involving refrigerants.

-Safety glasses must be worn to protect the eyes.

! NOTICE!

Check the overheating to determine the refrigerant fill quantity.

- The outdoor unit is pre-filled with refrigerant sufficient for a max. pipe length (see following tables).
- If the length of any of the pipelines exceeds the max. pipe length, then an additional filling is required for each additional metre of pipe length (basic length) (see following tables).

Basic pipe length	Additional fill quantity
	All series
Up to and incl. 5 m	0 g/m
5 m to max. 30 m per circuit	30 g/m

Examples

Basic pipe length	Additional fill quantity
	All series
5 m	0 g
10 m	150 g
15 m	300 g
20 m	450 g

! NOTICE!

The escape of refrigerant contributes to climatic change. In the event of escape, refrigerant with a low greenhouse potential has a lesser impact on global warming than those with a high greenhouse potential. This device contains refrigerant with a greenhouse potential of 1975. That means the escape of 1 kg of this refrigerant has an effect on global warming that is 1975 times greater than 1 kg CO^2, based on 100 years. Do not conduct any work on the refrigerant circuit or dismantle the device - always enlist the help of qualified experts.

10 Electrical wiring

Important Information

You can find information on the electrical connections of the indoor and outdoor unit, on the terminal assignment of the I/0 module, as well as on the circuit diagrams in the separate "Electrical wiring" operating instructions

NOTICE!

For an existing block the heat pump by the utility (utility switching) must be used the control contact S 16 of the Smart-Control.

11 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 chapter "Corrosion protection").
- - A water or system temperature of min. 20 °C in the return flow must be ensured (e.g. with a heating element/emergency heating operation).
- The entire heating system is rinsed, cleaned and de-aerated (incl. hydraulic balancing).
- The refrigerant filling quantity must be expanded if necessary! At WKF >10 m by 50 g/m, (basic overall pipework quantity of both devices.
- The refrigerant piping is laid without kinks in the protective tube. The protective tube is professionally fitted with waterproof sealing to prevent any water penetration.
- **The heat pump is not released if an outside temperature under 10 °C is measured at the external probe and the water inlet temperature (return flow) is under 15 °C.**

NOTICE!

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

12 Commissioning

Touch display and notes about commissioning

The Smart Control is used to operate and control the entire heating system. The Smart-Control is operated from 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.
- Then the preinstalled data is loaded and the parameters can be set with the help of the commissioning wizard or in the system configuration. You can find information on this in the separate operating instructions of the Smart-Control.

! NOTICE!

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

Overview of the controls

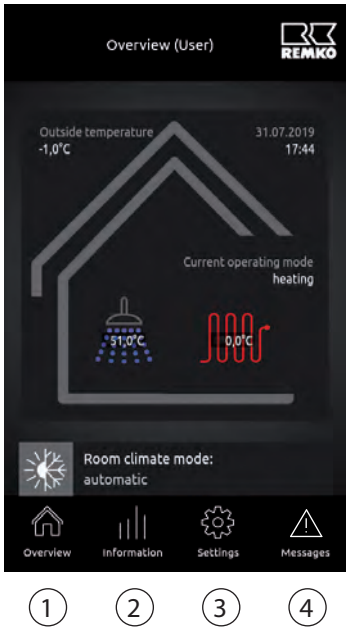

Fig. 56: Controls of the Smart-Control Touch

1: Overview (quick access)
2: Information (quick access)
3: Settings (quick access)
4: Messages (warnings, information notes and errors)

Function display

The REMKO Smart Control Touch regulation is an operating module with touch display. Unit operation is intuitive and self-explanatory via the plain text display on the user interface of the controller. No buttons are required to adjust and change parameters. Instead, this takes place by touching the surface of the controller at the appropriate points. The installation of further functions such as KNX or Smart-Web is possible through the installation of further supplementary software available as an accessory.

13 Care and maintenance

Regular care and maintenance serves to ensure trouble-free operation and long service-life of the heat pump system.

Care

- The indoor and outdoor units must be kept free of soiling, vegetation and other deposits.
- The device is to be cleaned with a damp cloth. In doing so, it is to be ensured that no caustic, abrasive or solvent-based cleaning products are used. Use of powerful water jets is to be avoided.
- Open the outdoor unit regularly and carry out maintenance. For this, the evaporator fins must be cleaned and impurities removed from the module if necessary. Special attention should be paid to the condensate drainage. Proper drainage of any condensate that accumulates must always be ensured.

! NOTICE!

It is not recommended to set up/mount the outdoor unit under trees or bushes!

Maintenance

- To perform the possibly statutory seal test, it is necessary to arrange an annual maintenance contract with an appropriate specialist firm.

! NOTICE!

If the CO_2 equivalent is greater than specified below, the refrigeration circuit must be checked for leaks.

> 5 t ➜ 1 x a year

> 50 t ➜ 2 x a year

> 500 t ➜ 4 x a year

A heat pump should always be serviced annually. Therefore, we recommend arranging for a service contract that includes the seal inspection.

14 Temporary shut-down

The system may not be switched off at the mains power supply even if the heating system is not used for heating purposes over an extended period (e.g. holidays)!

- During the temporary shut-down the plant for heating must be put in a "Standby" mode and for hot water over to the "Off".
- Heating phases can be programmed for the duration of the period of absence.
- The previous operating mode has to be switched back on when the shut-down phase is over.
- Instructions for changing the mode appear in the corresponding chapter of the Smart-Control manual.

! NOTICE!

In "Standby" , the heat pump is in standby mode. Of the entire system, only the frost-protection function s activated.

15 Troubleshooting and customer service

15.1 General Troubleshooting

The unit has been manufactured using state-of-the-art production methods and tested several times to ensure its correct function. However, in the event that malfunctions should occur, the device 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.

Fault	Possible causes	Remedial measures
The heat pump does not start or switches itself off	Power outage, under-voltage	Check the voltage and, if necessary, wait for it to come back on
	Defective mains fuse Master switch off	Exchange mains fuse, master switch on
	Damaged mains cable	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
	Set-point temperature exceeded Incorrect mode	The set-point temperature has to be higher than the heat-source temperature, check mode
		Disconnect the outdoor module, then establish the correct clamp order using the connection plan Re-establish voltage to the outdoor module. Also make sure that the protective earth is connected correctly.
Heat circuit pump fails to switch off	Incorrect pump switching	Arrange to have pump switching checked in "heating circuit" expert level
Heat circuit pumps fail to switch on	Incorrect mode set	Check mode
	Control PCB fuse in indoor module switching cabinet faulty	Exchange the fuse on the left side of the control PCB
	Incorrect heating program set	Check heating program We recommend the operating mode "heat" in the cold heating season
	Temperature overlapping, e.g. external temperature greater than room temperature	Observe temperature ranges
Red indicator lamp	Failure outdoor module	Contact customer service

15.2 Fault messages

Fault display – Malfunction codes

Error	ID	Description	Details
E03	ID7308	Transistor module malfunction	The protection function of the inverter's transistor module (IPM/IGBT) has triggered.
E10	ID7047	Power supply malfunction	Malfunction from over- or undervoltage
E17	ID7275	Air inlet temperature probe fault	Short circuit or open contact – probe ambient air temperature, outdoor unit
E18	ID7044	Register temperature probe fault	Short circuit or open contact – probe register temperature, outdoor unit
E19	ID7293	Hot gas temperature probe fault	Short circuit or open contact – probe for heating gas temperature, motherboard
E20	ID7043	Suction gas temperature probe fault	Short circuit or open contact – probe for suction gas temperature, outdoor unit
E21	ID7046	Low-pressure probe error	Low-pressure probe fault – Please check the low pressure probe on the outdoor unit and its connection.
E22	ID7045	High-pressure probe error	High-pressure probe fault – Please check the high-pressure probe on the outdoor unit and its connection.
E25	ID7313	Fan 1 malfunction	Malfunction at fan 1 of outdoor unit
E26	ID7314	Fan 2 malfunction	Malfunction at fan 2 of outdoor unit
E27	ID7037	Low pressure	Low pressure malfunction
E28	ID7038	High pressure	High pressure malfunction
E33	ID7290	Indoor/outdoor unit communication	Communication between the indoor and outdoor unit is interrupted. Check the communication line and the power supply to the outdoor version's circuit board.
E34	ID7310	Communication motherboard/ inverter	Communication fault between motherboard and inverter board
E35	ID7316	Compressor current malfunction	Check for cable break or short circuit on the compressor line.
E36	ID7041	Compressor overload malfunction	The compressor's maximum current consumption was exceeded.
E37	ID7042	Inverter error	Inverter fault – Check the winding resistances and the connection lines of the compressor **Winding resistances**: WKF 80 about 1.91 ohms at 20 °C WKF 100 about 0.72 ohms at 20 °C WKF 130 about 0.95 ohms at 20 °C WKF 170 about 0.88 ohms at 20 °C

Fault display – Malfunction codes (continued)

Error	ID	Description	Details
E38	ID7311	DC voltage fault	Fault in interim DC circuit of inverter
E39	ID7039	AC current fault	AC current consumption is not plausible
E40	ID7040	EEPROM error	The EEPROM settings for the motherboard (outdoor unit) are not plausible.
---	ID7109	Communication malfunction	Communication malfunction - 1st Heat pump
---	ID7170	Communication malfunction	Communication malfunction - 2nd Heat pump
---	ID7252	WP general alarm signal	Heat pump general alarm signal – 1. WP
---	ID7253	WP general alarm signal	Heat pump general alarm signal – 2. WP

16 View of the unit and spare parts

16.1 Device representation outdoor unit WKF NEO-compact 80

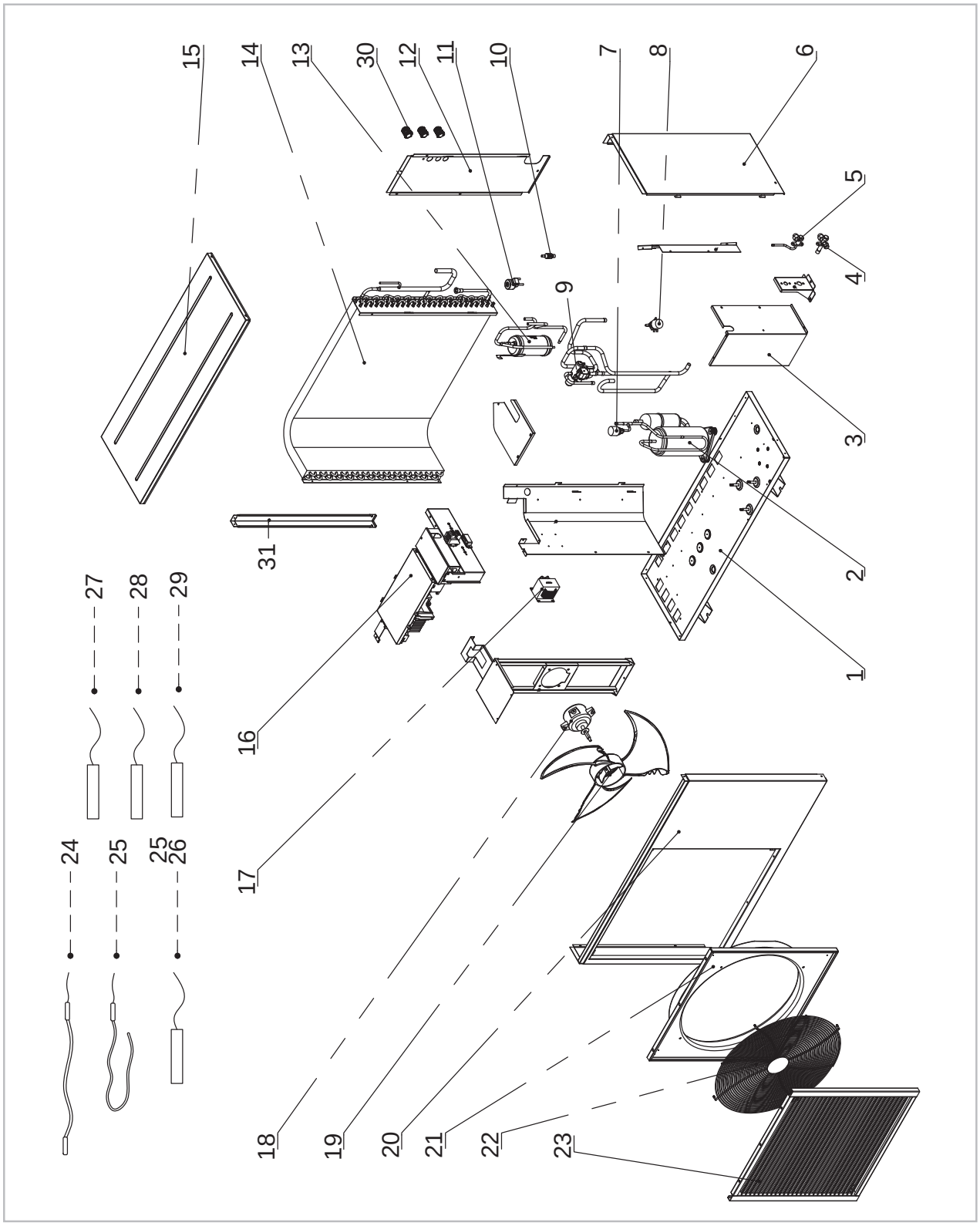

Fig. 57: Exploded view

16.2 Spare parts outdoor unit WKF NEO-compact 80

No.	Designation
1	Device base/condensate tray
2	Compressor
3	Compressor noise protection housing
4	Shut-off valve $^1/_2$”
5	Shut-off valve $^1/_4$”
6	Side panel, right
7	Low pressure sensor
8	High pressure transducer
9	Four-way changeover valve
	Coil 4-way changeover valve
10	Filter
11	Electronic expansion valve
	Coil, electronic expansion valve
12	Side panel, rear
13	Fluid collector (0.7 l)
14	Lamella heat exchanger
15	Cover panel
16	Motherboard
17	Choke
18	Fan motor
19	Fan blade
20	Front panel (RAL 9006)
21	Fan safety panel (RAL 7021)
22	Fan safety grid (RAL 7021)
23	Air baffle (RAL 7021)
24	Crankcase heating compressor
25	Condensate heating – Assembly
26	TP evaporator probe
27	TS suction pipe probe
28	Sensor, TA air suction
29	Sensor, TD heat gas
30	Cable entry
31	Housing brace rear left
Spare parts not illustrated	
	Protection grid, side
	Protective grid, air suction side

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

16.3 Device representation outdoor unit WKF NEO-compact 100

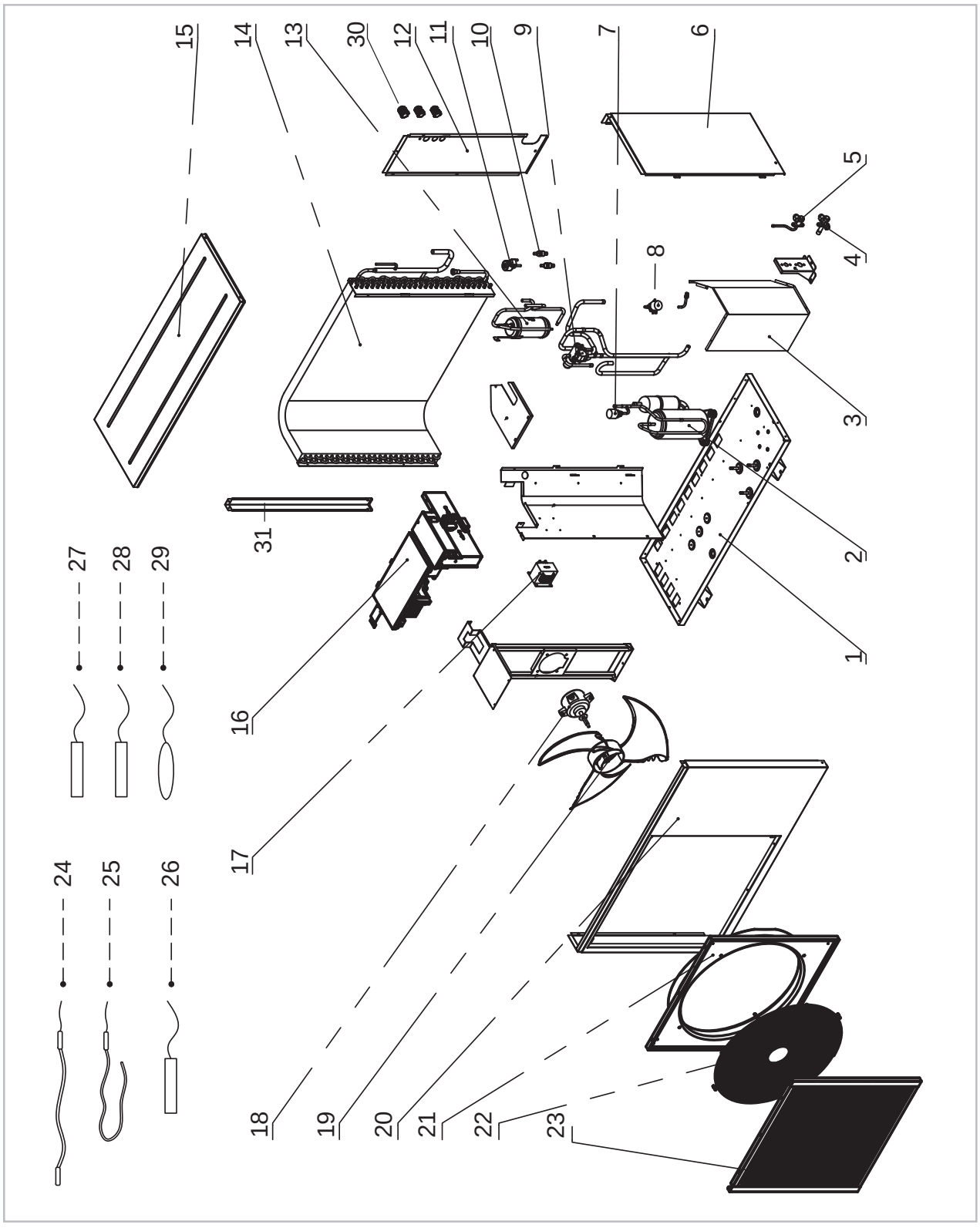

Fig. 58: Exploded view

16.4 Spare parts outdoor unit WKF NEO-compact 100

No.	Designation
1	Device base/condensate tray
2	Compressor
3	Compressor noise protection housing
4	Shut-off valve $^{5}/_{8}$”
5	Shut-off valve $^{3}/_{8}$”
6	Side panel, right
7	Low pressure sensor
8	High pressure transducer
9	Four-way changeover valve
	Coil 4-way changeover valve
10	Filter
11	Electronic expansion valve
	Coil, electronic expansion valve
12	Side panel, rear
13	Fluid collector (0.7 l)
14	Lamella heat exchanger
15	Cover panel
16	Motherboard
17	Choke
18	Fan motor
19	Fan blade
20	Front panel (RAL 9006)
21	Fan safety panel (RAL 7021)
22	Fan safety grid (RAL 7021)
23	Air baffle (RAL 7021)
24	Crankcase heating compressor
25	Condensate heating – Assembly
26	TP evaporator probe
27	TS suction pipe probe
28	Sensor, TD heat gas
29	Sensor, TA air suction
30	Cable entry
31	Housing brace rear left
Spare parts not illustrated	
	Protection grid, side
	Protective grid, air suction side

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

16.5 Device representation outdoor unit WKF NEO-compact 130

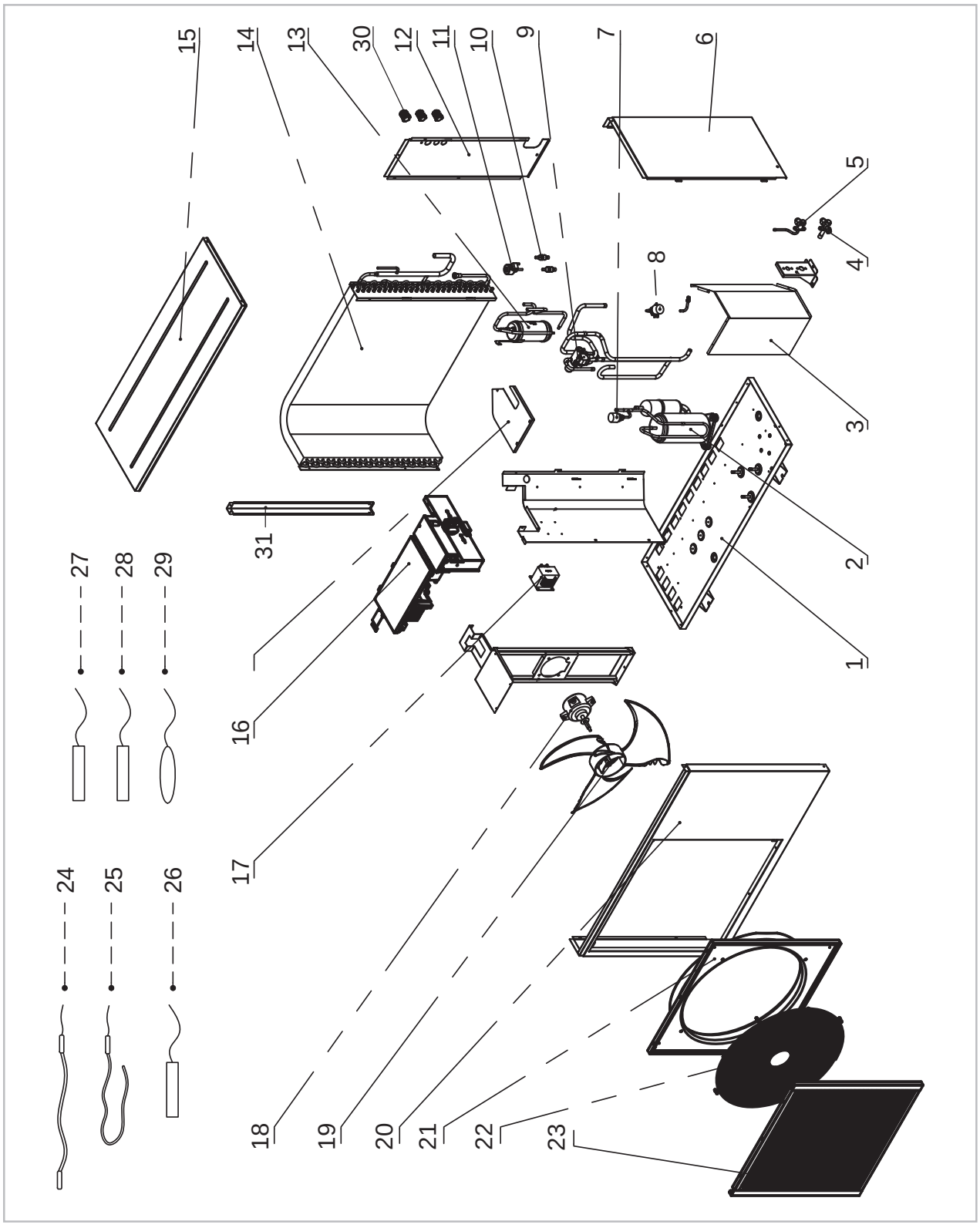

Fig. 59: Exploded view

16.6 Spare parts outdoor unit WKF NEO-compact 130

No.	Designation
1	Device base/condensate tray
2	Compressor
3	Compressor noise protection housing
4	Shut-off valve $^{5}/_{8}$”
5	Shut-off valve $^{3}/_{8}$”
6	Side panel, right
7	Low pressure sensor
8	High pressure transducer
9	Four-way changeover valve
	Coil 4-way changeover valve
10	Filter
11	Electronic expansion valve
	Coil, electronic expansion valve
12	Side panel, rear
13	Fluid collector (0.7 l)
14	Lamella heat exchanger
15	Cover panel
16	Motherboard
17	Choke
18	Fan motor
19	Fan blade
20	Front panel (RAL 9006)
21	Fan safety panel (RAL 7021)
22	Fan safety grid (RAL 7021)
23	Air baffle (RAL 7021)
24	Crankcase heating compressor
25	Condensate heating – Assembly
26	TP evaporator probe
27	TS suction pipe probe
28	Sensor, TD heat gas
29	Sensor, TA air suction
30	Cable entry
31	Housing brace rear left
Spare parts not illustrated	
	Protection grid, side
	Protective grid, air suction side

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

16.7 Device representation outdoor unit WKF NEO-compact 170

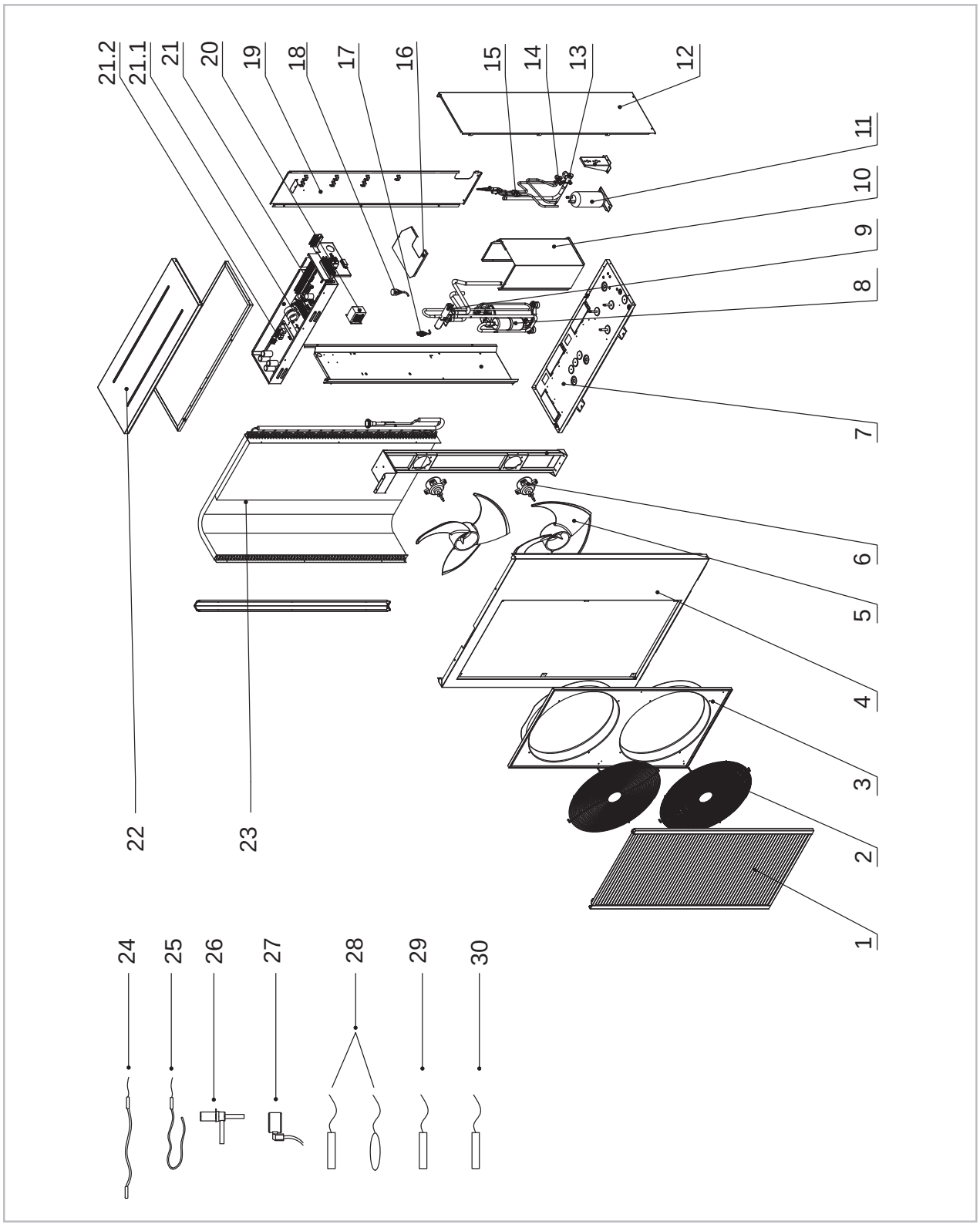

Fig. 60: Exploded view

16.8 Spare parts outdoor unit WKF NEO-compact 170

Nr.	Bezeichnung
1	Air baffle (RAL 7021)
2	Fan safety grid (RAL 7021)
3	Fan safety panel (RAL 7021)
4	Front panel (RAL 9006)
5	Fan blade
6	Fan motor
7	Device base/condensate tray
8	Compressor
9	Four-way changeover valve
	Coil four-way changeover valve
10	Compressor noise protection housing side part
11	Fluid collector
12	Side panel, right
13	Shut-off valve $^{3}/_{4}$”
14	Shut-off valve $^{3}/_{8}$”
15	Filter
16	Compressor noise protection housing
17	High pressure transducer
18	Low pressure transducer
19	Rear side panel (pipe inlet)
20	Choke
21	Motherboard
21.1	Power/filter board
21.2	Inverter board
22	Cover panel
23	Lamella heat exchanger evaporator
24	Crankcase heating compressor
25	Condensate heating – Connection terminal assembly
26	Electronic expansion valve
27	Coil, electronic expansion valve
28	Probe set for evaporator/suction pipe
29	Sensor, TD heat gas
30	Sensor, TA air suction
Spare parts not illustrated	
	Inverter board
	Power-/Filter board
	Protection grid, side
	Protective grid, air suction side

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

16.9 Exploded view of indoor units WKF NEO-compact 80/100/130/170

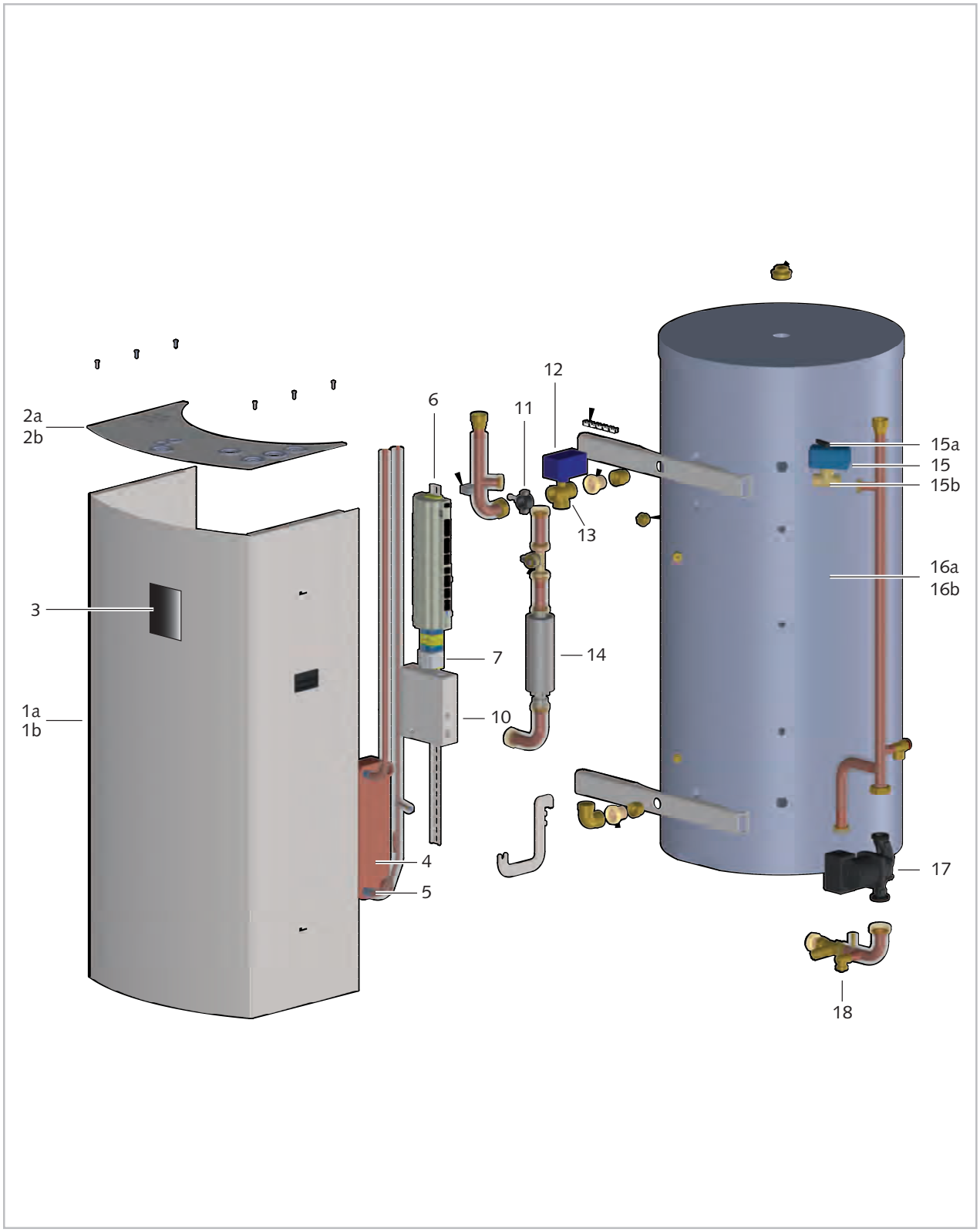

Fig. 61: Exploded view - Indoor units

We reserve the right to modify the dimensions and design as part of the ongoing technical development process.

16.10 Spare parts for indoor units WKF NEO-compact 80/100/130/170

No.	Designation	WKF NEO-compact 80/100/130/170
1a	Front panel / hood - 200 l variant	On request by providing the serial number
1b	Front panel / hood - 300 l variant	
2a	Cover - 200 l variant	
2b	Cover - 300 l variant	
3	Smart Control Touch, installed	
4	Plate heat exchanger	
5	Dirt trap 1"	
6	SMT I/O module	
7	Smart-Serv 6 kW relay	
10	STB auxiliary heater	
11	Flow probe	
12	Servo-motor, 3-way valve	
13	Valve body, 3-way valve	
14	Auxiliary heater 6 kW (Smart-Serv)	
15	Bypass valve, complete	
16a	Drinking water storage tank 200 l	
16b	Drinking water storage tank 300 l	
17	Grundfos UPML circulation pump	
	Alternatively Wilo	
	Alternatively REMKO	
18	Ball valve $^1/_2$"	

Spare parts not illustrated

Designation	WKF NEO-compact 80/100/130/170
LW line, stainless steel	On request by providing the serial number
WW line, stainless steel	
Complete electric assembly	
Safety valve $^{1}/_{2}$"	
Rod anode	
Chain anode	
SD card I/O module (current software without Smart-Count and without Smart-Web) *)	
SD card Smart-Control Touch (current software without Smart-Count and without Smart-Web) *)	
Coding resistor	
Probe Pt1000 (S08)	
Probe Pt1000 (S13)	
Probe Pt1000 (S15)	

*) When exchanging the SC card, always change both cards and order 2 cards accordingly.

Components of accessories set (without illustration)

Designation	WKF NEO-compact
Accessories set, complete	On request by providing the serial number
Immersion probe	
Ball valve 1“, red	
Ball valve 1“, blue	
Safety assembly	
External probe	

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

16.11 Spare parts list EWS 200E, EWS 301E

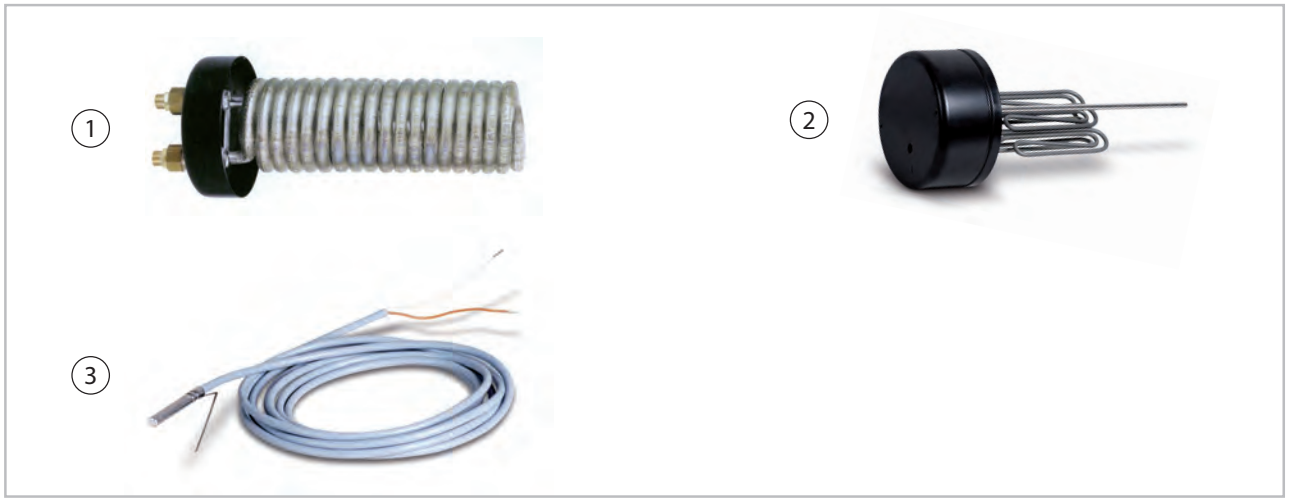

Fig. 62: Spare parts

We reserve the right to modify the dimensions and design as part of the ongoing technical development process

Spare parts list

No	Designation	EWS 200E	EWS 301E
		EDP no.	
1	Fine-tube heat exchanger	---	260200
2	Flange heating cartridge	---	260160
3	Immersion probe	1120930	1120930
	Spare parts not illustrated		
	Flange seal	1120236	1120236
	Magnesium anode	1110777	1110781
	Magnesium chain anode	1120121	1120121
	Flange cover/hood	1110780	1110780
	Flange	1110788	1110788
	Foil lining	1110778	1110786
	Cover	1110779	1110783
	Thermometer	---	1125600
	Adjustable feets	---	1125601

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

17 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.

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REMKO series WKF NEO-compact

REMKO QUALITY WITH SYSTEMS

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REMKO GmbH & Co. KG
Klima- und Wärmetechnik

Im Seelenkamp 12
32791 Lage

Telephone +49 (0) 5232 606-0
Telefax +49 (0) 5232 606-260

E-mail info@remko.de
URL www.remko.de

Hotline within Germany
+49 (0) 5232 606-0

Hotline International
+49 (0) 5232 606-130