

Operating and installation instructions

REMKO series WKF NEO-compact

Smart heat pumps

Air/water system for heating or cooling

WKF NEO-compact 70, WKF NEO-compact 120, WKF NEO-compact 180



Instructions for Technicians



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

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

1.2 Identification of notes

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

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

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

DANGER!

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

DANGER!

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

WARNING!

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

CAUTION!

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

NOTICE!

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



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

1.3 Personnel qualifications

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

1.4 Dangers of failure to observe the safety notes

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

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

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

1.5 Safety-conscious working

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

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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 manufacturer 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.



REMKO series WKF NEO-compact

2 Technical data

2.1 Unit data

Series		WKF NEO 70	WKF NEO 120	WKF NEO 180
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 - +35	-20 - +45	
Inlet temperature, heating water, max.	°C	55		
Heating capacity min./max.	kW	1.2 - 6.0	2.5 - 12.5	3.1 - 17.7
Heating capacity/compressor frequency/COP ¹⁾				
with A12/W35	kW/Hz/COP	6.00/56/5.10	10.96/61/4.82	16.02/56/5.33
with A7/W35	kW/Hz/COP	5.46/54/4.62	9.86/61/4.44	14.02/56/4.53
with A2/W35	kW/Hz/COP	4.61/65/3.50	6.95/60/3.64	9.32/56/3.53
with A-7/W35	kW/Hz/COP	4.50/81/2.80	6.14/61/2.89	8.20/56/2.87
with A-15/W35	kW/Hz/COP	4.70/88/2.50	4.82/61/2.39	6.36/56/2.40
with A7/W45	kW/Hz/COP	5.00/56/3.60	10.15/58/3.67	12.27/58/3.46
with A-7/W45	kW/Hz/COP	4.40/81/2.60	---	---
with A7/W55	kW/Hz/COP	5.00/56/2.80	8.99/61/2.78	12.85/56/2.92
with A-7/W55	kW/Hz/COP	4.70/81/1.70	4.63/61/1.79	6.99/56/1.94
with A10/W35	kW/Hz/COP	5.80/54/4.92	11.2/61/4.74	15.9/56/4.83
Service limits, cooling	°C	+10 - +46	+15 - +45	
Min. inlet temperature for cooling	°C	7		
Cooling capacity min./max.	kW	1.33 - 5.30	3.3 - 9.1	2.8 - 15.0
Cooling capacity / compressor frequency / EER				
with A35/W7	kW/Hz/EER	4.90/49/2.80	6.79/66/2.33	12.2/72/2.60
with A35/W18	kW/Hz/EER	6.70/49/3.60	5.3/38/3.66	12.7/38/3.81
with A27/W18	kW/Hz/EER	6.80/49/3.90	9.46/66/3.61	18.20/66/4.08
Refrigerant		R410A ²⁾		
Basic filling quantity, outdoor unit	kg	1.20	2.00	2.85
Refrigerant / pre-charge quantity for more than 5 m length of ordinary pipe	g / m	50	---	---

Series		WKF NEO 70	WKF NEO 120	WKF NEO 180
Refrigerant / pre-charge quantity for more than 10 m length of ordinary pipe	g / m	---	50	
Refrigerant connections	Inches (mm)	3/8" (9.52) / 5/8" (15.9)		
Refrigerant piping length, max.	m	30	50	75
Refrigerant piping height, max.	m	20	30	
Power supply	V/Hz	220-240 / 50		380-415/ 3~/50
Max. current consumption	A	15.0	16.8	7.2 p. phase
Rated current consumption for A7/W35	A	5.19	10.44	5.02 p. phase
Rated power consumption for A7/W35	kW	1.18	2.22	3.09
Rated power consumption for A2/W35	kW	1.32	1.91	2.64
Max. power consumption	kW	3.50	4.0	4.5
Power factor at A7/W35 (cosφ)	--	0.99	0.97	0.95
Customer's fuse protection (outdoor unit)	A slow- acting	16	20	3 x 16 A
Medium flow rate water(according to EN 14511, at Δt 5 K)	m³/h	0.95	1.70	2.40
Pressure loss on condenser at rated medium flow rate	bar	0.095	0.1	
Pressure loss, outdoor	kPa	80		
Max. airflow volume outdoor unit	m³/h	2650	4450	6200
Max. operating pressure, water	bar	3		
Hydraulic connection inlet/return flow (flat-sealing)	Inches (mm)	1 1/4" (31.8)		
Sound power level in acc. with DIN EN 12102:2008-09 and ISO 9614-2	dB(A)	63.2	67.9	68.3
Sound pressure level LpA (outdoor unit) ³⁾	dB(A)	41.2	42.2	42.4
Tonality of each outdoor unit	dB(A)	3		
Dimensions indoor unit 200 l (H/W/D)	mm	1350/555/850		
Dimensions indoor unit 300 l (H/W/D)	mm	14200/650/950		
Dimensions outdoor unit (H/W/D)	mm	640/880/310	998/940/330	1420/940/330
Enclosure class outdoor unit	--	IP X4	IP 24	
Weight indoor unit 200 l	kg	131	133	135
Weight indoor unit 300 l	kg	154	156	158
Weight outdoor unit	kg	50	74	100

¹⁾ COP = coefficient of performance in accordance with EN 14511, VDE tested

²⁾ Contains greenhouse gas according to Kyoto protocol, GWP 1975

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

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2.2 Product data

Average condition ¹⁾

Series		WKF NEO 70	WKF NEO 120	WKF NEO 180
Energy efficiency ratio, heating 35°C/55°C		A++ / A++	A+ / A+	A+ / A+
Energy efficiency ratio, hot water XL		A	A	A
Nominal heating power P rated	kW	5.0 / 6.0	10.0	14.0
Room heating energy efficiency η_s 35°C/55°C	%	150 / 129	147/118	146/122
Contribution to seasonal room heating energy efficiency of the REMKO Smart Control	%	4	4	4
Yearly energy consumption Q_{HE} 35°C/ 55°C ⁴⁾		2808 / 3705	5514/6610	7860/9098
Hot water preparation energy efficiency η_{WH}	%	103	102	107
Sound power level L_{WA} (outdoor unit)	dB(A)	63.2	67.9	68.3
Sound power level L_{WA} (indoor unit)	dB(A)	-	-	-

Warmer condition ²⁾

Series		WKF NEO 70	WKF NEO 120	WKF NEO 180
Energy efficiency ratio, heating 35°C/55°C		A++ / A++	A++ / A+	A+++ / A+ +
Energy efficiency ratio, hot water XL		A	A	A
Nominal heating power P rated	kW	5.0 / 6.0	9.0	12.0
Room heating energy efficiency η_s 35°C/55°C	%	174 / 157	165/123	180/143
Yearly energy consumption Q_{HE} 35°C/ 55°C ⁴⁾		1389 / 1610	2968/3354	3803/5349

Colder condition ³⁾

Series		WKF NEO 70	WKF NEO 120	WKF NEO 180
Energy efficiency ratio, heating 35°C/55°C		A+ / A+	A+ / A+	A+ / A+
Energy efficiency ratio, hot water XL		A	A	A
Nominal heating power P rated	kW	6.0 / 8.0	12.0	18.0
Room heating energy efficiency η_s 35°C/55°C	%	132 / 108	136/104	134/105
Yearly energy consumption Q_{HE} 35°C/ 55°C ⁴⁾		4525 / 6889	8481/1228 2	13300/174 07

¹⁾ Average condition = Moderate temperature periods / ²⁾ Warmer condition = Warm temperature periods

³⁾ Colder condition = Cold temperature periods

⁴⁾ The specified value is based on results from standard testing.
The actual consumption depends on the use and location of the unit

2.3 Unit dimensions of outdoor units

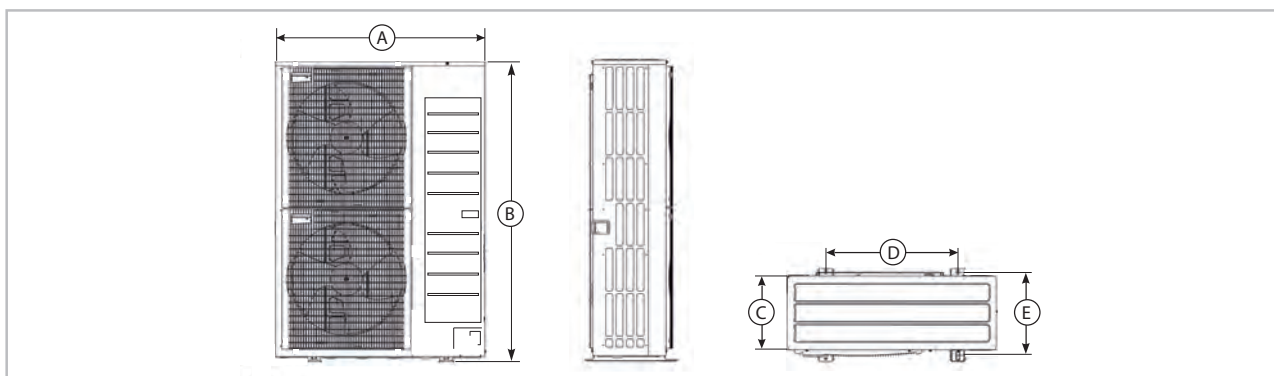


Fig. 1: Dimensions of outdoor units WKF NEO compact 70/120/180

Dimensions in mm	A	B	C	D	E
WKF NEO 70	880	640	364	660	340
WKF NEO 120	940	1010	330	620	360
WKF NEO 180	940	1430	330	620	350

2.4 Unit dimensions of indoor units

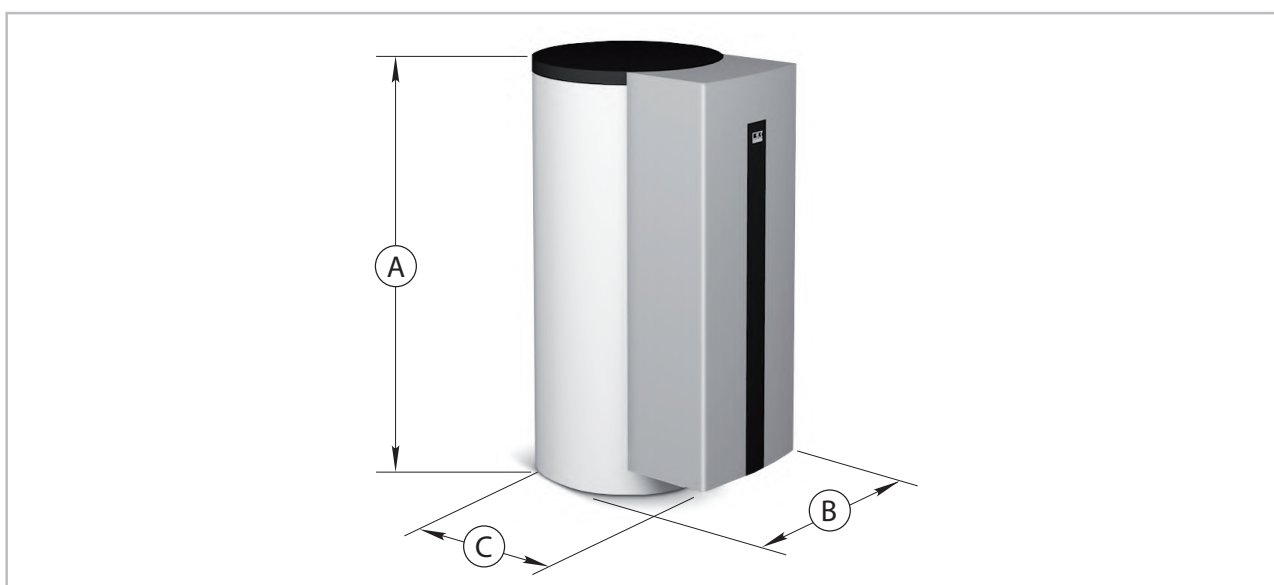


Fig. 2: Dimensions of indoor units WKF NEO compact 70/120/180

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

REMKO series WKF NEO-compact

Pipe connection arrangement WKF NEO compact 70/120/180 - 200 I - version

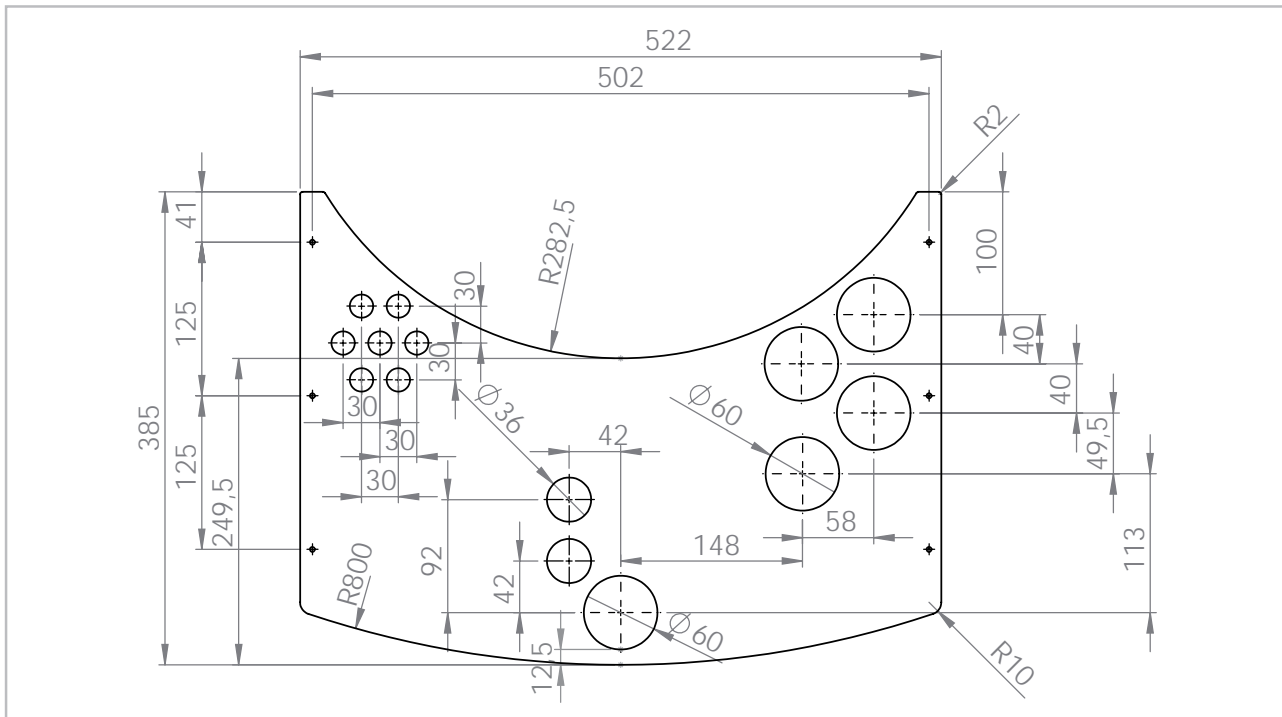


Fig. 3: Pipe connection arrangement WKF NEO compact 70/120/180 - 200 I - version (all dimensions in mm)

Designations of pipe connections WKF NEO compact 70/120/180 - 200 I - version

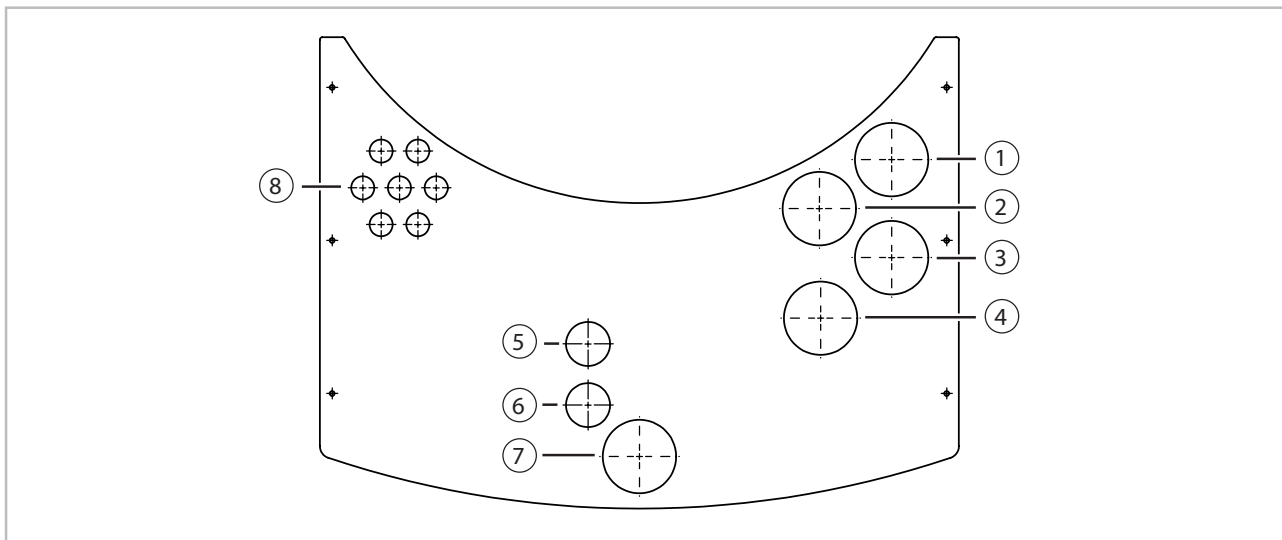


Fig. 4: Designations of pipe connections WKF NEO compact 70/120/180 - 200 I - version

- | | |
|---|---|
| 1: Hot water 1" union nut (flat-sealing) | 6: Refrigerant hot gas pipe $\frac{5}{8}$ " |
| 2: Circulation 1" union nut (flat-sealing) | 7: Heating inlet flow $1\frac{1}{4}$ " AG |
| 3: Cold water inlet 1" union nut (flat-sealing) | 8: Cable glands |
| 4: Heating return flow $1\frac{1}{4}$ " AG | |
| 5: Refrigerant liquid pipe $\frac{3}{8}$ " | |

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2.5 Heat pump usable limits in monovalent operation

NOTE:

The lower temperature value in the diagrams refers to the outdoor air temperature and the value on the left to the hot water inlet temperature.

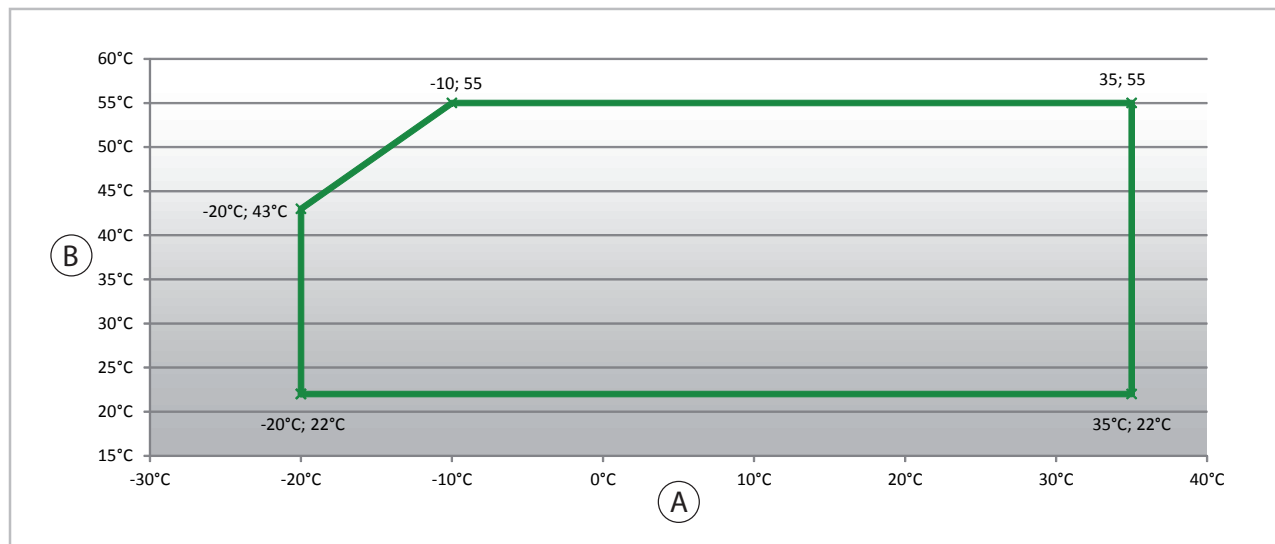


Fig. 7: Usable limits and measuring points WKF NEO 70

A: Outside temperature [°C] / B: Inlet temperat. [°C]

Outside temperature [°C]	-20	-20	-10	20	35	35
Inlet temperature [°C]	22	43	55	55	55	22

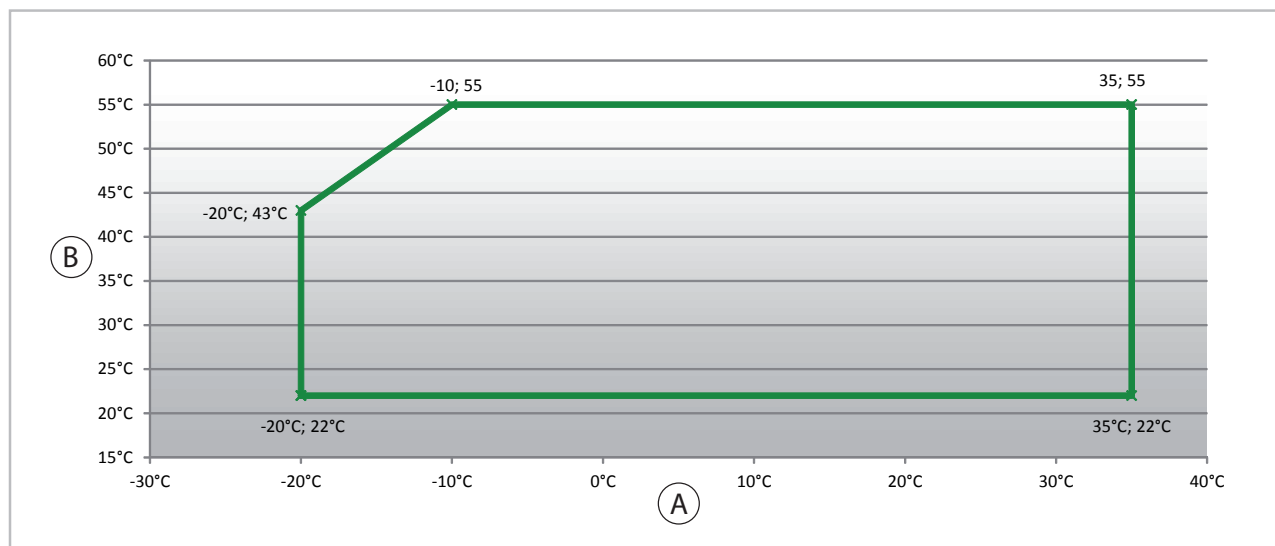


Fig. 8: Usable limits and measuring points WKF NEO 120

A: Outside temperature [°C] / B: Inlet temperat. [°C]

Outside temperature [°C]	-20	-20	-10	20	35	35
Inlet temperature [°C]	22	43	55	55	55	22

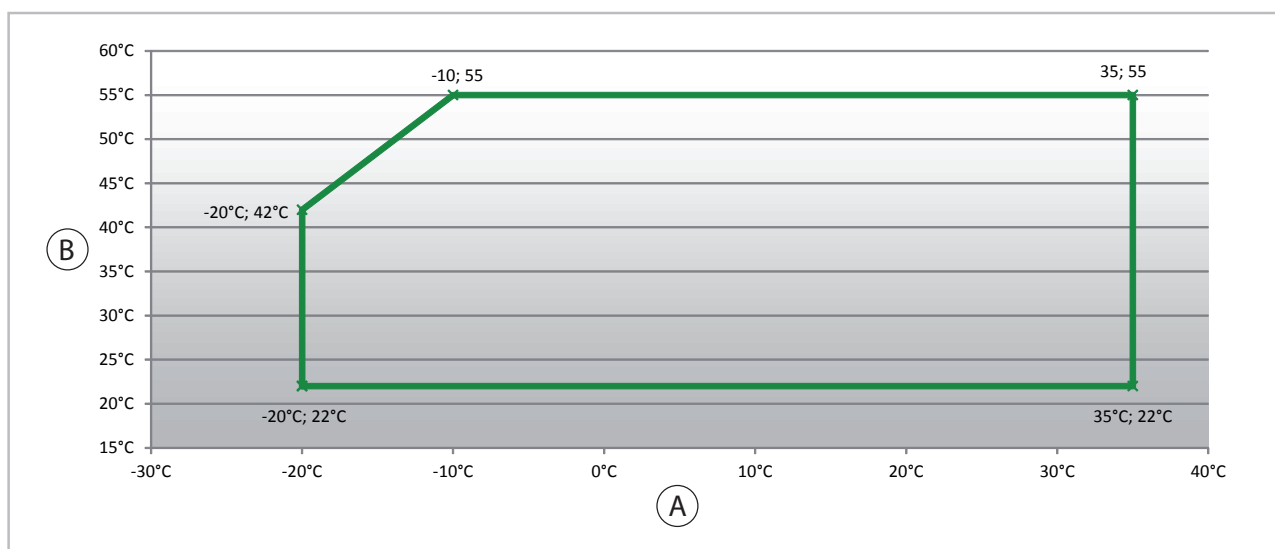


Fig. 9: Usable limits and measuring points WKF NEO 180

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

Outside temperature [°C]	-20	-20	-10	20	35	35
Inlet temperature [°C]	22	42	55	55	55	22

2.6 Pump-characteristic curves, indoor unit circulation pump

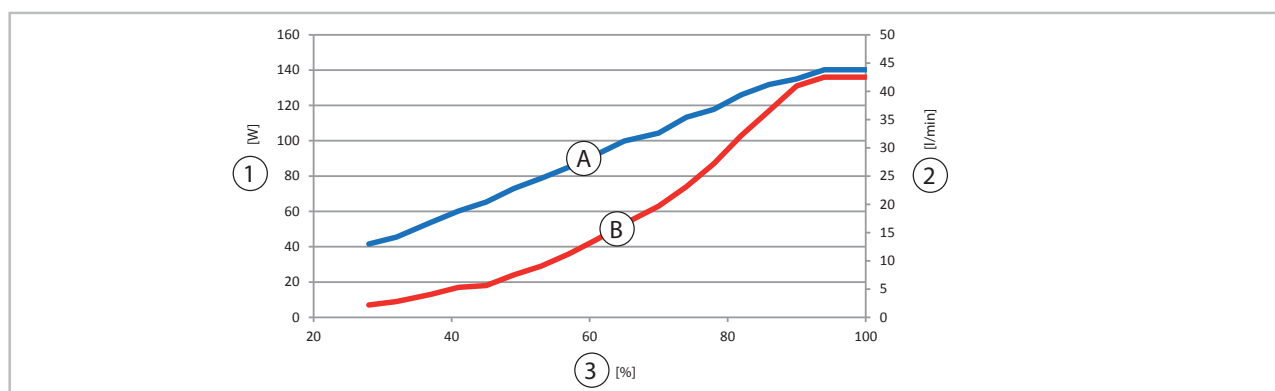


Fig. 10: Circulation pump Grundfoss UPML 25-105 180 PWM - capacity range

- 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

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2.7 Total sound-power level outdoor units

Outdoor unit WKF NEO 70

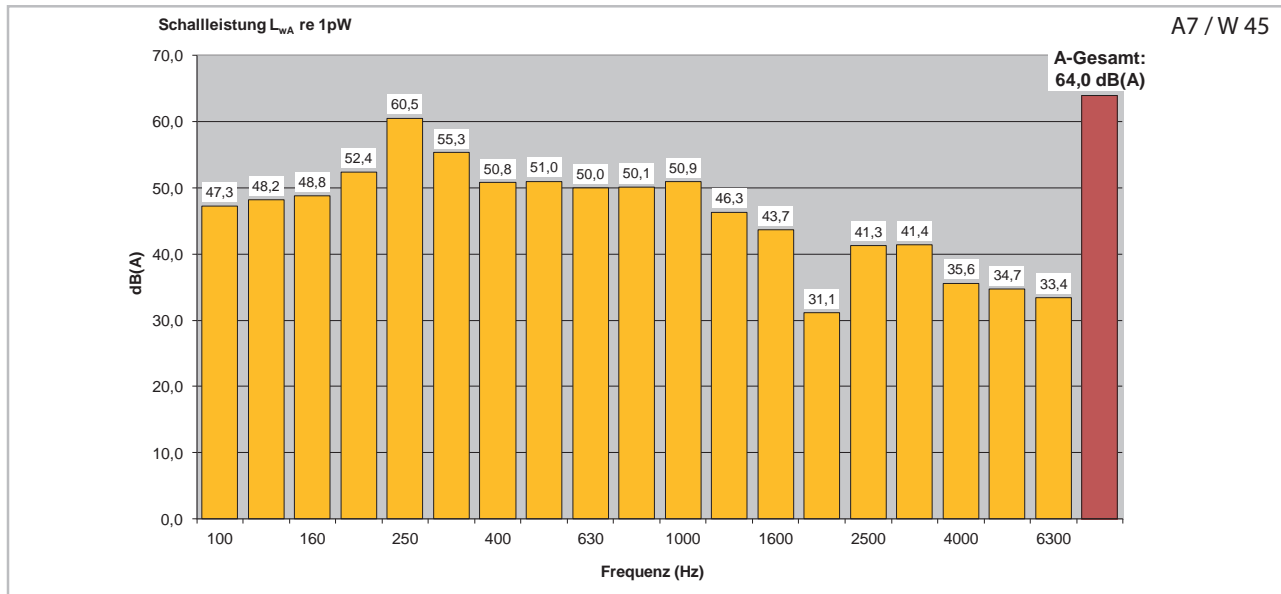


Fig. 11: Overall sound-power level L_P of a REMKO outdoor module type: WKF NEO 70

Middle frequency [Hz]	25	31.50	40	50	63	80	100	125	160
LI [dBA]	(25.6)	(38.3)	(30.8)	(37.7)	(35.1)	(31.3)	38.2	39.1	39.7
LWo [dBA]	(34.7)	(47.4)	(39.9)	(46.9)	(44.3)	(40.4)	47.3	48.2	48.8
FPI [dB]	-(14.7)	-(8.2)	-(8.8)	-(5.2)	-(3.5)	1(1.3)	0.6	2.0	4.7

Middle frequency [Hz]	200	250	315	400	500	630	800	1000	1250
LI [dBA]	43.3	54.3	46.1	41.6	41.9	40.8	41.0	41.8	37.2
LWo [dBA]	52.4	60.5	55.3	50.8	51.0	50.0	50.1	50.9	46.3
FPI [dB]	6.3	4.0	7.4	10.0	10.9	12.8	12.0	11.1	13.0

Middle frequency [Hz]	1600	2000	2500	3150	4000	5000	6300	8000	10000
LI [dBA]	34.6	21.9	32.1	32.3	26.5	25.6	24.3	(21.3)	(24.1)
LWo [dBA]	43.7	31.1	41.3	41.4	35.6	34.7	33.4	(30.4)	(33.2)
FPI [dB]	14.7	27.2	13.9	11.7	13.0	10.6	9.2	(7.7)	(4.5)

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

FPI: Correction value with regard to the environment

LI: Sound intensity

Outdoor unit WKF NEO 120

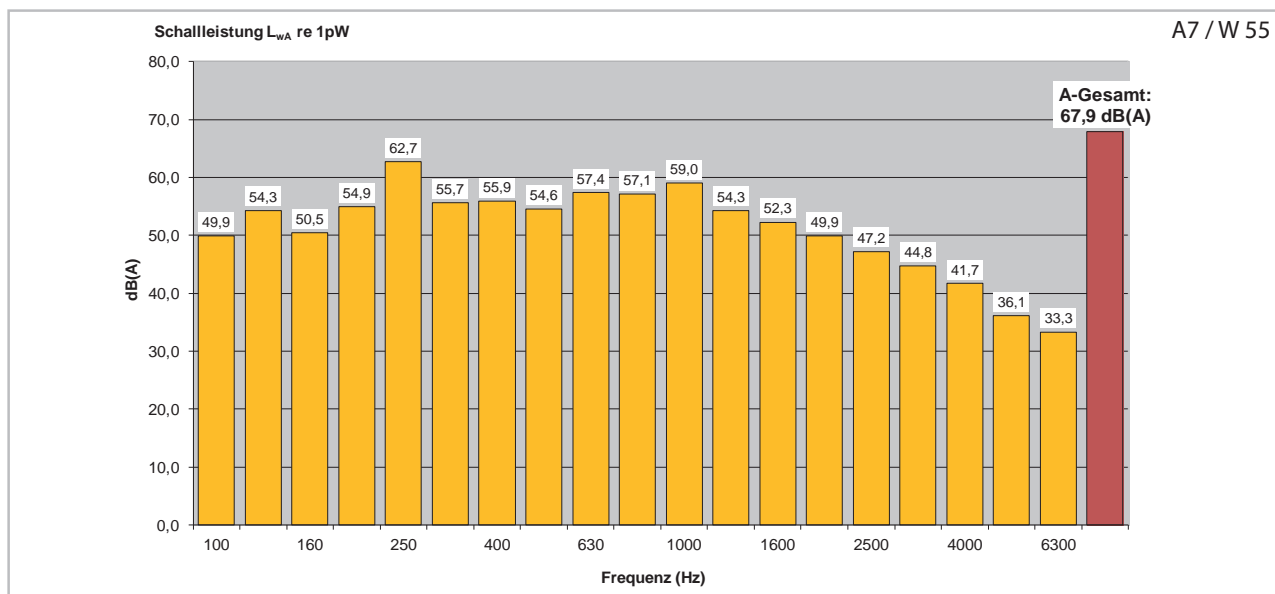


Fig. 12: Overall sound-power level L_p of a REMKO outdoor module type: WKF NEO 120

Middle frequency [Hz]	25	31.50	40	50	63	80	100	125	160
LI [dBA]	(27.6)	(40.9)	(38.3)	(31.4)	(45.3)	(33.5)	40.0	44.4	40.6
LWo [dBA]	(37.5)	(50.8)	(48.2)	(41.3)	(55.2)	(43.4)	49.9	54.3	50.5
FPI [dB]	-(14.3)	-(8.3)	-(8.5)	-(6.6)	-(3.6)	-(2.0)	-0.2	0.7	2.6

Middle frequency [Hz]	200	250	315	400	500	630	800	1000	1250
LI [dBA]	45.0	52.8	45.8	46.0	44.7	47.5	47.2	49.1	44.4
LWo [dBA]	54.9	62.7	55.7	55.9	54.6	57.4	57.1	59.0	54.3
FPI [dB]	4.3	4.3	5.6	6.7	7.1	7.1	11.2	6.0	6.0

Middle frequency [Hz]	1600	2000	2500	3150	4000	5000	6300	8000	10000
LI [dBA]	42.4	40.0	37.3	34.9	31.8	26.2	23.4	(21.6)	(16.2)
LWo [dBA]	52.3	49.9	47.2	44.8	41.7	36.1	33.3	(31.5)	(26.1)
FPI [dB]	5.7	5.5	5.5	5.4	5.1	6.0	6.3	(5.5)	(5.3)

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

FPI: Correction value with regard to the environment

LI: Sound intensity

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Outdoor unit WKF NEO 180

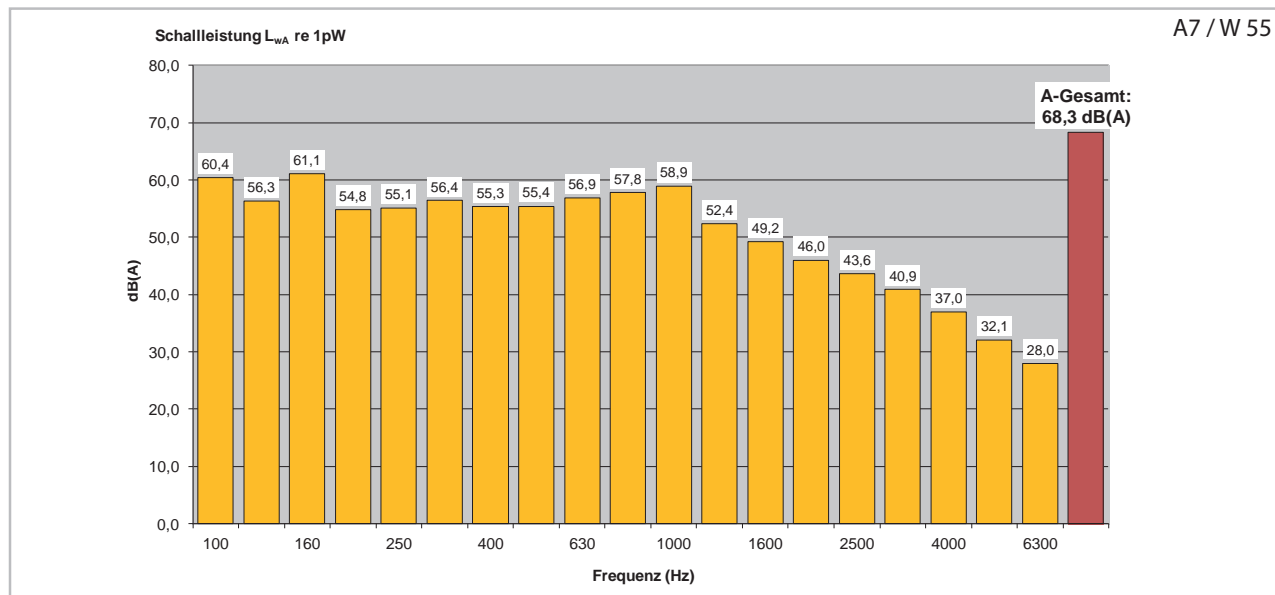


Fig. 13: Overall sound-power level L_P of a REMKO outdoor module type: WKF NEO 180

Middle frequency [Hz]	25	31.50	40	50	63	80	100	125	160
LI [dBA]	(31.4)	(41.6)	(32.8)	(40.8)	(37.3)	(37.4)	49.8	45.8	50.5
LWo [dBA]	(41.9)	(52.1)	(43.4)	(51.3)	(47.9)	(47.9)	60.4	56.3	61.1
FPI [dB]	-(11.6)	-(9.2)	-(7.7)	-(5.4)	-(3.2)	-(2.0)	0.0	1.1	2.1

Middle frequency [Hz]	200	250	315	400	500	630	800	1000	1250
LI [dBA]	44.3	44.6	45.8	44.8	44.9	46.4	47.2	48.4	41.9
LWo [dBA]	54.8	55.1	56.4	55.3	55.4	56.9	57.8	58.9	52.4
FPI [dB]	6.1	6.4	8.7	9.4	9.6	9.2	11.6	8.4	10.0

Middle frequency [Hz]	1600	2000	2500	3150	4000	5000	6300	8000	10000
LI [dBA]	38.7	35.5	33.1	30.4	26.5	21.6	17.5	(18.1)	(8.8)
LWo [dBA]	49.2	46.0	43.6	40.9	37.0	32.1	28.0	(28.6)	(19.3)
FPI [dB]	11.4	13.9	13.2	13.0	13.5	14.7	15.2	(11.1)	(14.8)

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

FPI: Correction value with regard to the environment

LI: Sound intensity

2.8 Characteristic curves

Heating capacity WKF NEO 70 at inlet temperature of 35°C

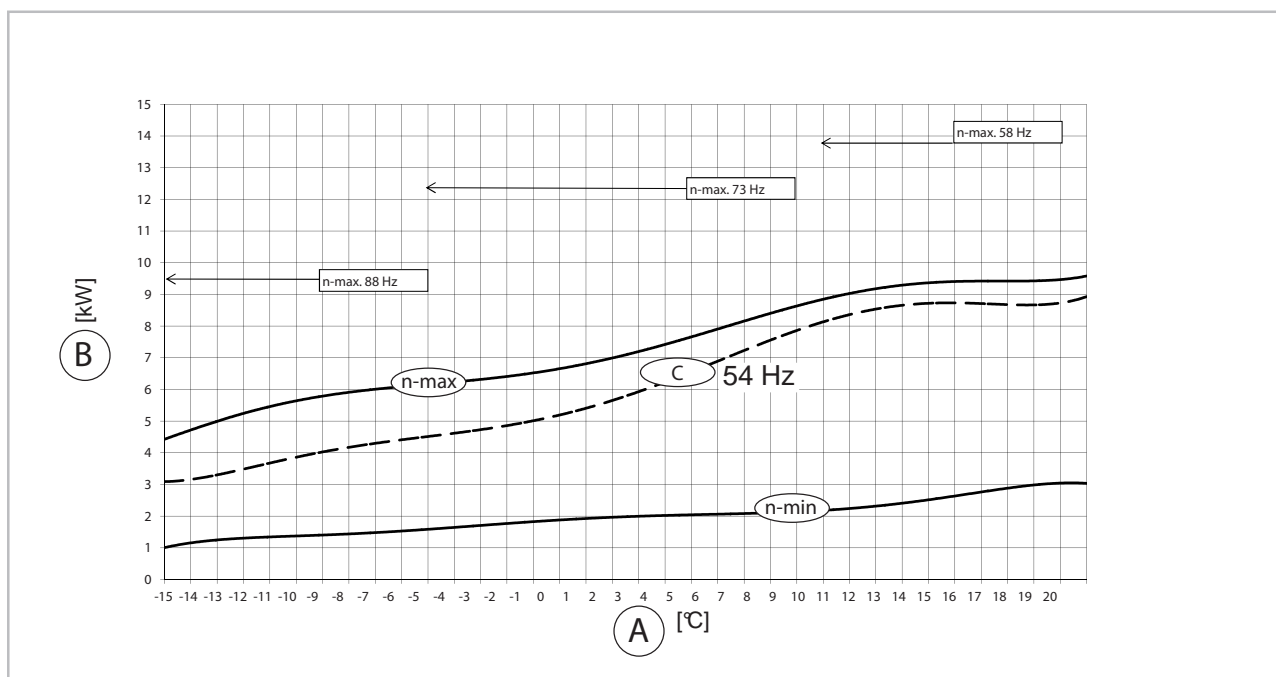


Fig. 14: Heating capacity WKF NEO 70 at inlet temperature of 35°C

- A: Outside temperature
- B: Heating capacity
- C: Rated frequency

Heating capacity WKF NEO 70 at inlet temperature of 45 °C

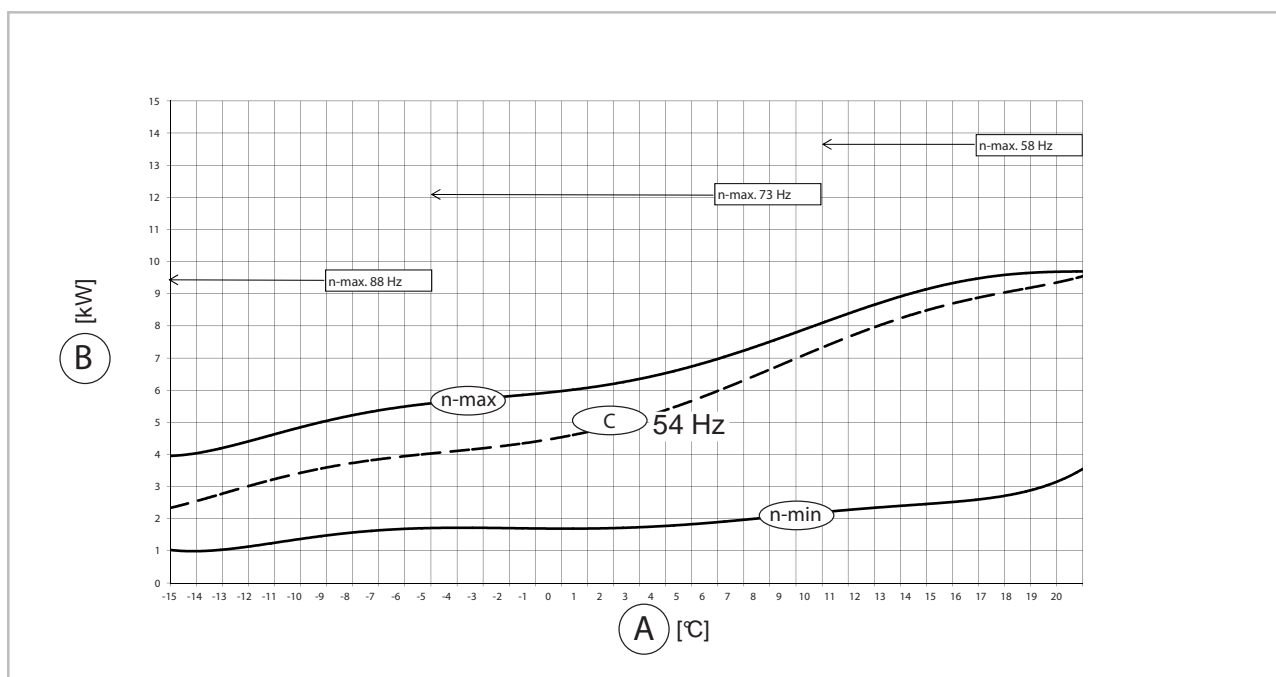


Fig. 15: Heating capacity WKF NEO 70 at inlet temperature of 45 °C

- A: Outside temperature
- B: Heating capacity
- C: Rated frequency

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Heating capacity WKF NEO 70 at inlet temperature of 55 °C

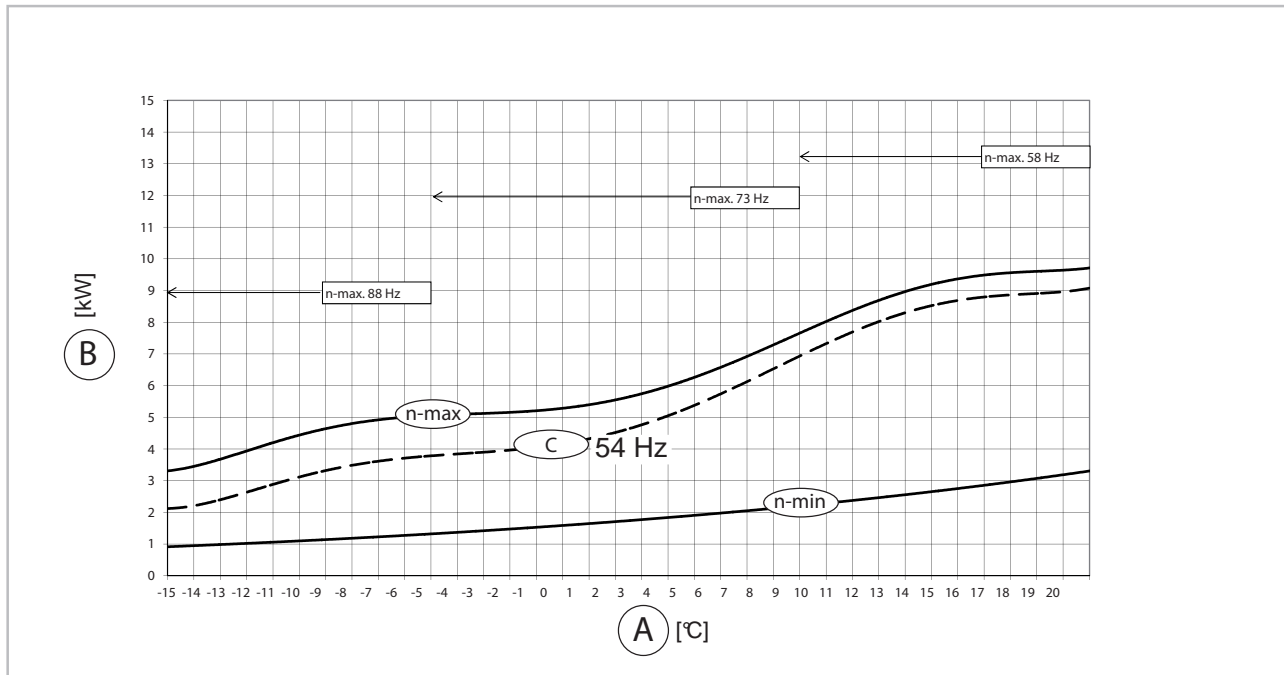


Fig. 16: Heating capacity WKF NEO 70 at inlet temperature of 55 °C

- A: Outside temperature
- B: Heating capacity
- C: Rated frequency

COP WKF NEO 70 at inlet temperature 35 °C, 45 °C and 55 °C

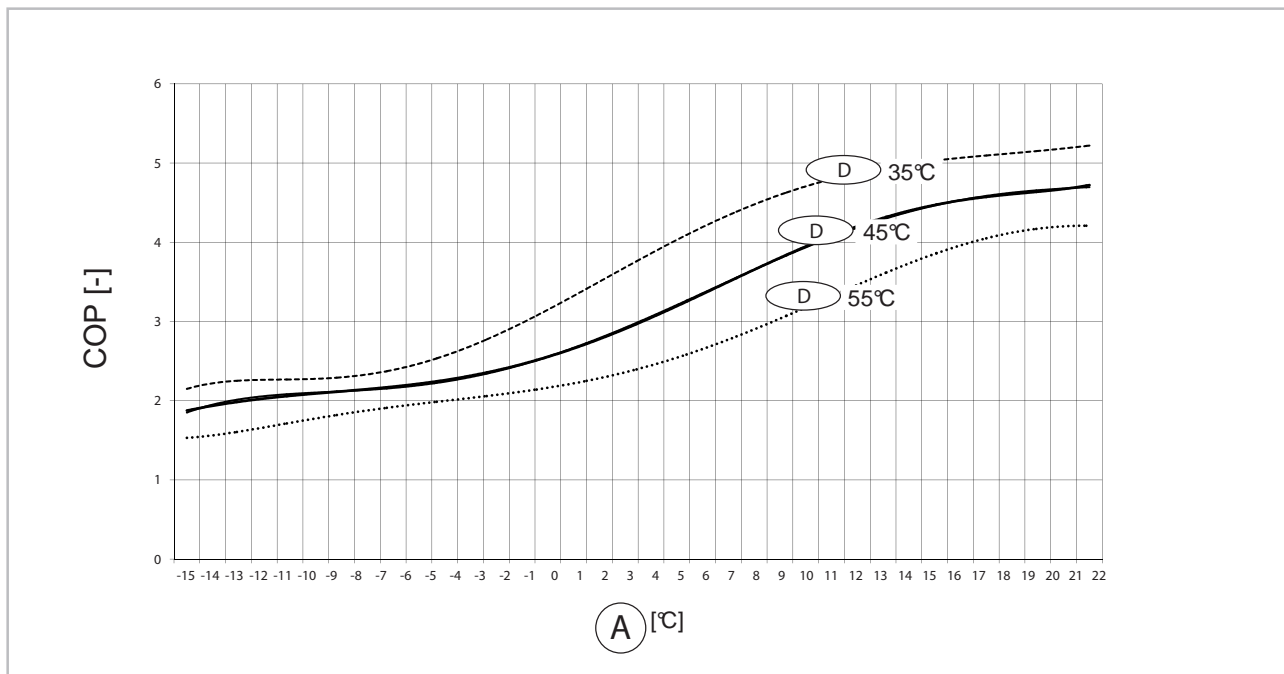


Fig. 17: COP WKF NEO 70 at inlet temperature 35 °C, 45 °C and 55 °C

- A: Outside temperature
- D: Inlet temperature

Heating capacity WKF NEO 120 at inlet temperature of 35 °C

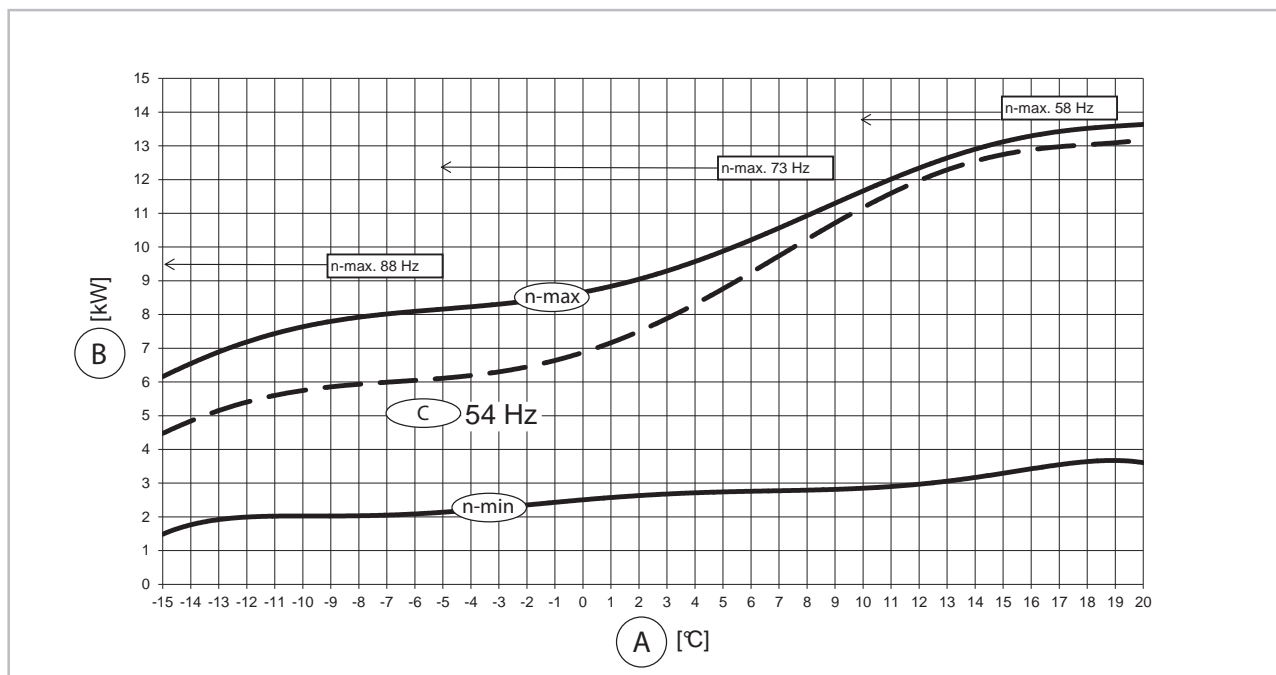


Fig. 18: Heating capacity WKF NEO 120 at inlet temperature of 35 °C

- A: Outside temperature
- B: Heating capacity
- C: Rated frequency

Heating capacity WKF NEO 120 at inlet temperature of 45 °C

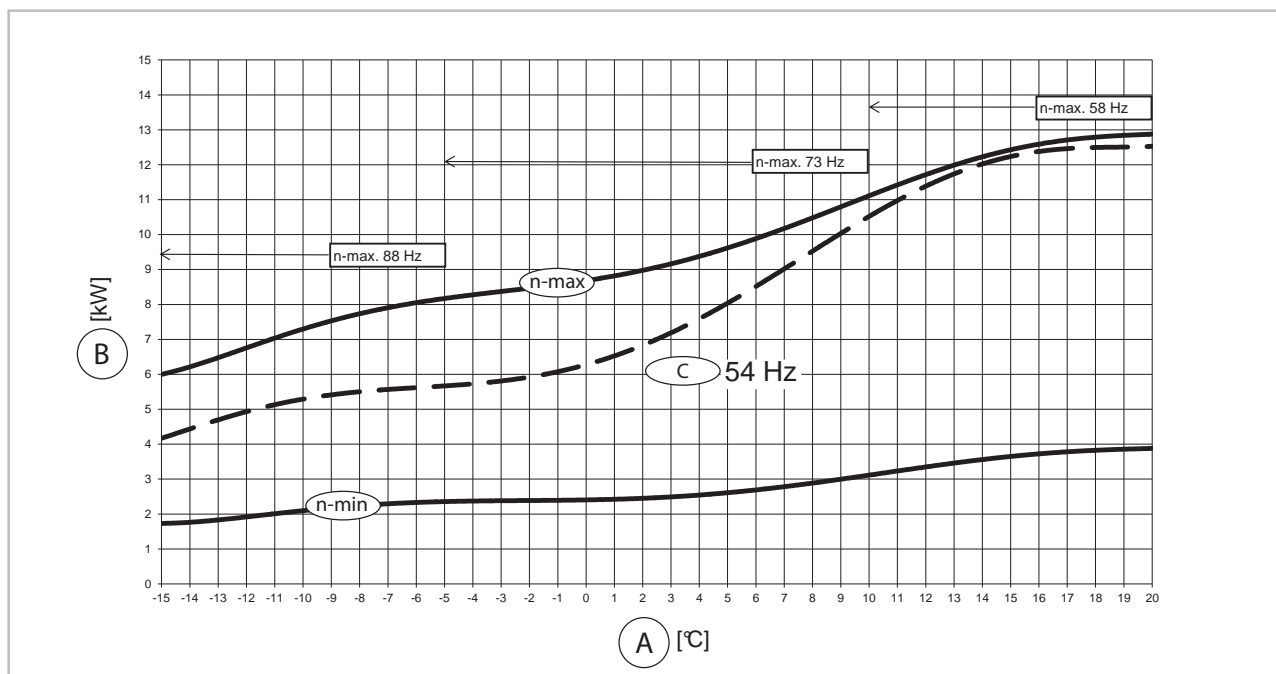


Fig. 19: Heating capacity WKF NEO 120 at inlet temperature of 45 °C

- A: Outside temperature
- B: Heating capacity
- C: Rated frequency

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Heating capacity WKF NEO 120 at inlet temperature of 55 °C

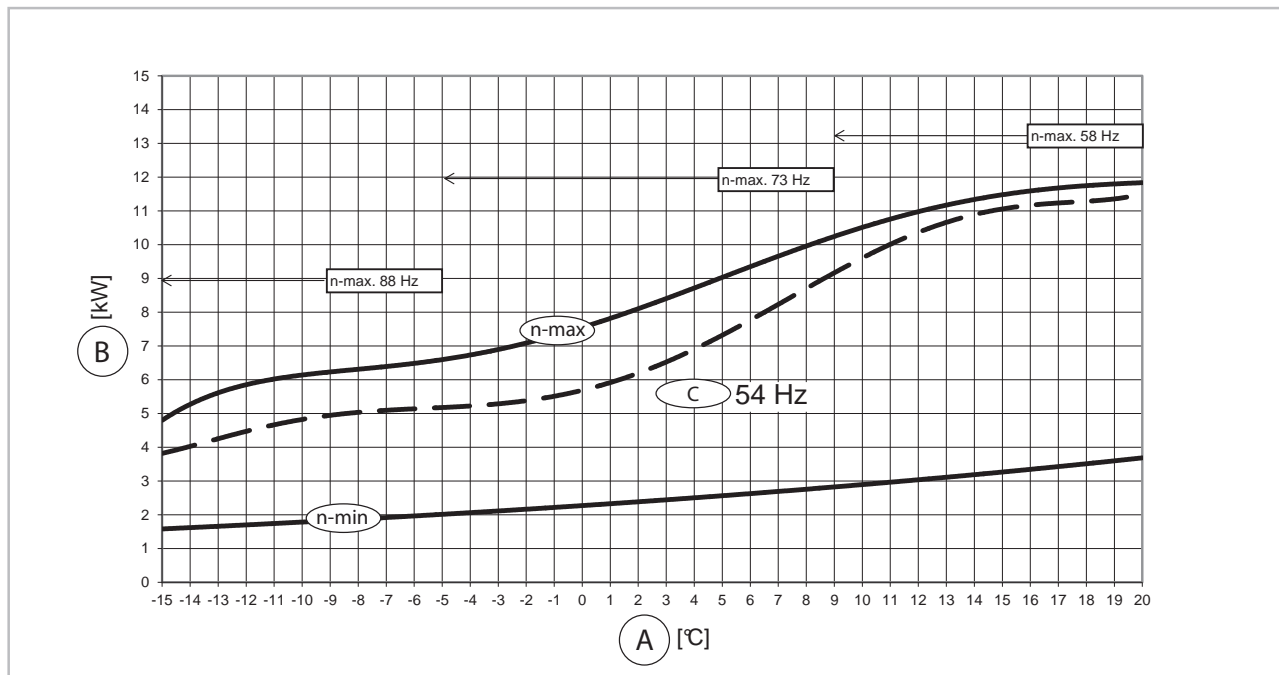


Fig. 20: Heating capacity WKF NEO 120 at inlet temperature of 55 °C

A: Outside temperature

B: Heating capacity

C: Rated frequency

COP WKF NEO 120 at inlet temperature 35 °C, 45 °C and 55 °C

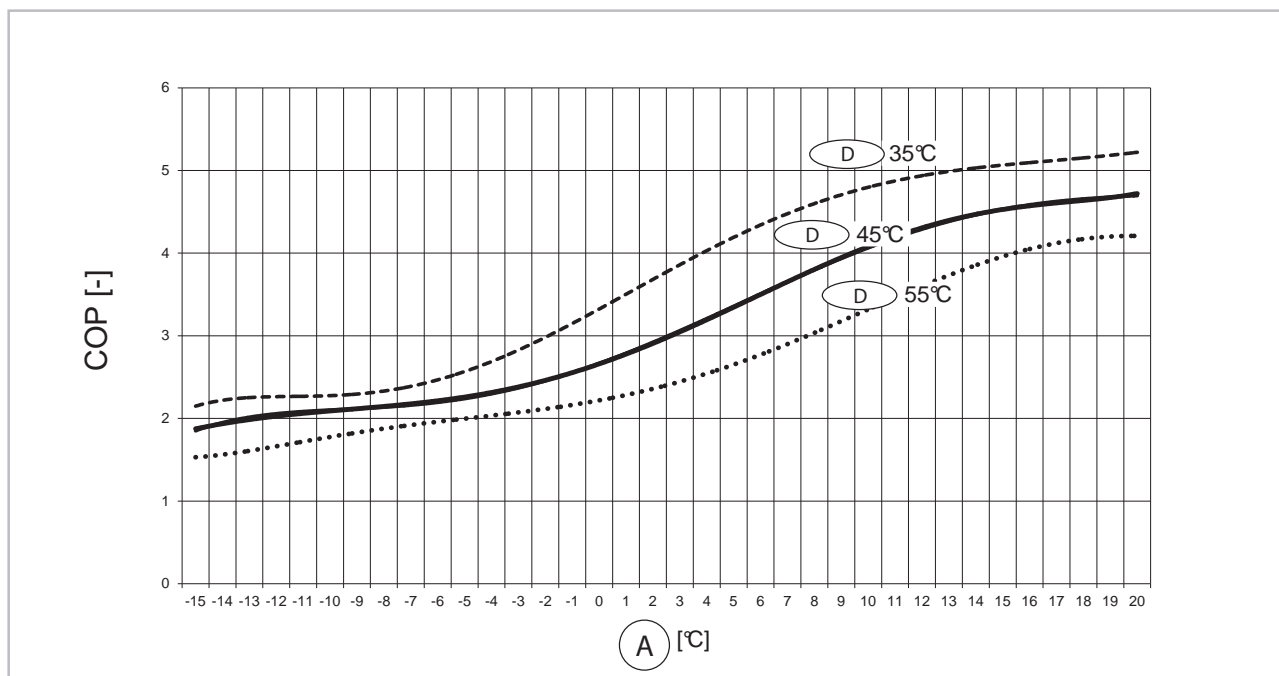


Fig. 21: COP WKF NEO 120 at inlet temperature 35 °C, 45 °C and 55 °C

A: Outside temperature

D: Inlet temperature

Heating capacity WKF NEO 180 at inlet temperature of 35 °C

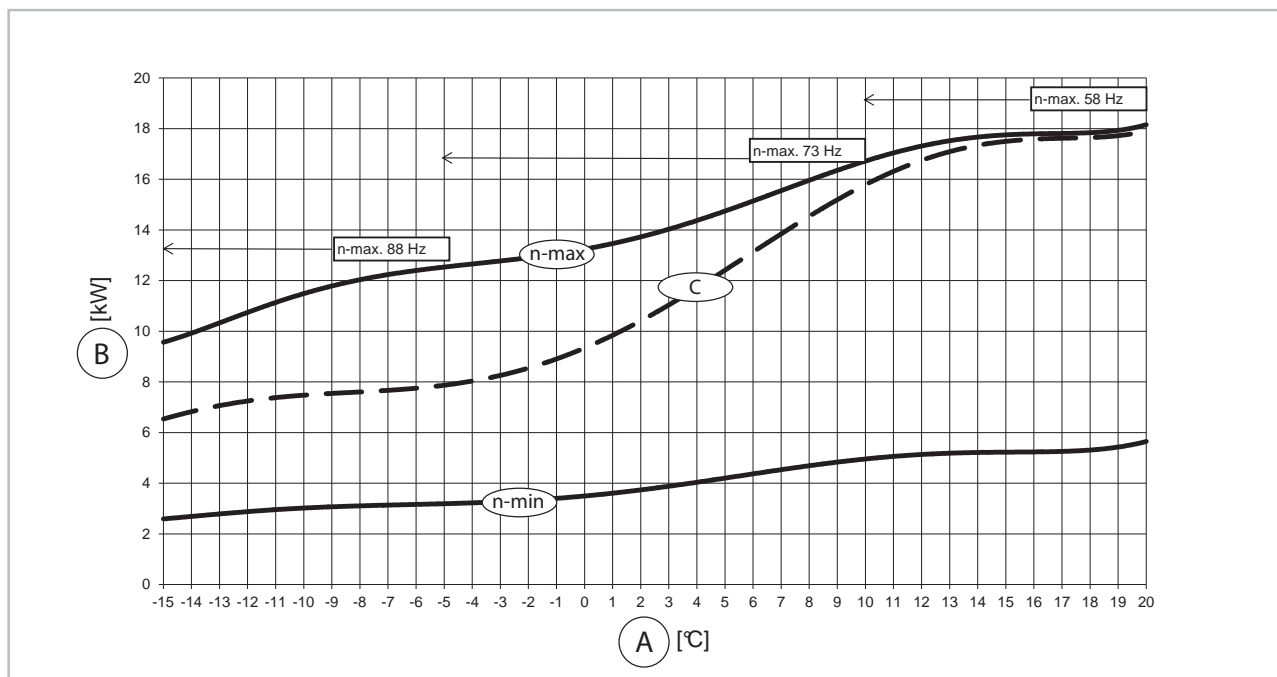


Fig. 22: Heating capacity WKF NEO 180 at inlet temperature of 35 °C

- A: Outside temperature
- B: Heating capacity
- C: Rated frequency

Heating capacity WKF NEO 180 at inlet temperature of 45 °C

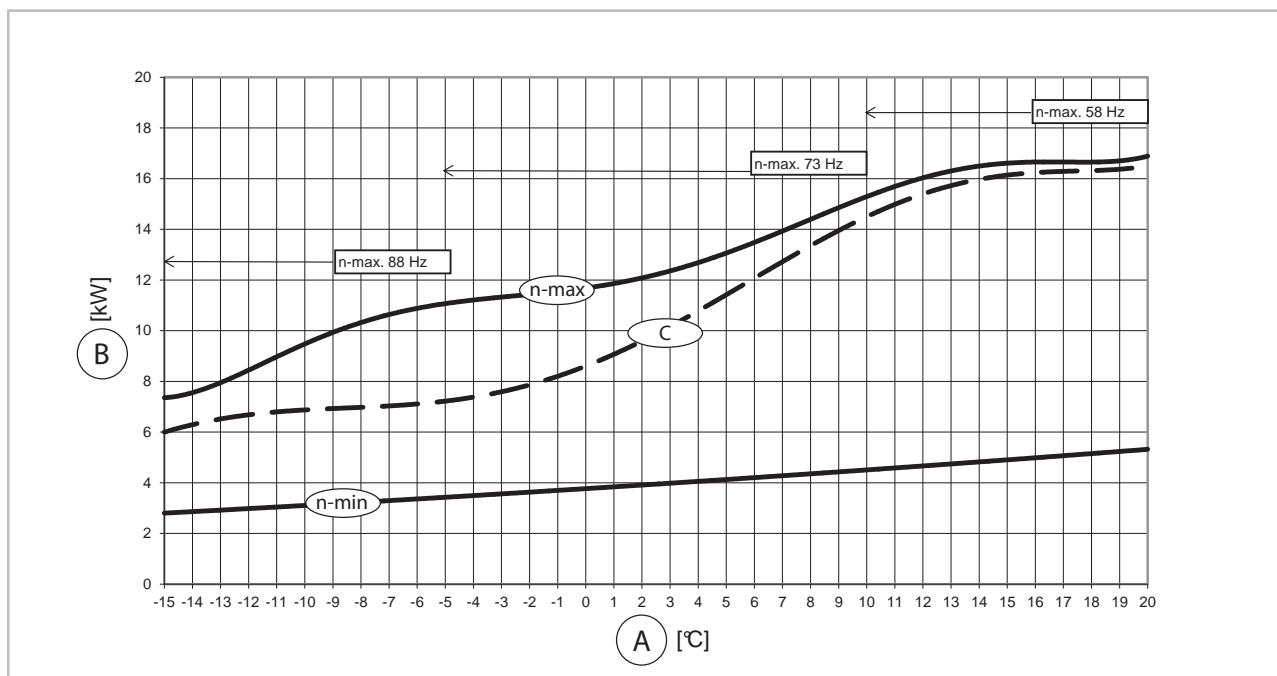


Fig. 23: Heating capacity WKF NEO 180 at inlet temperature of 45 °C

- A: Outside temperature
- B: Heating capacity
- C: Rated frequency

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Heating capacity WKF NEO 180 at inlet temperature of 55 °C

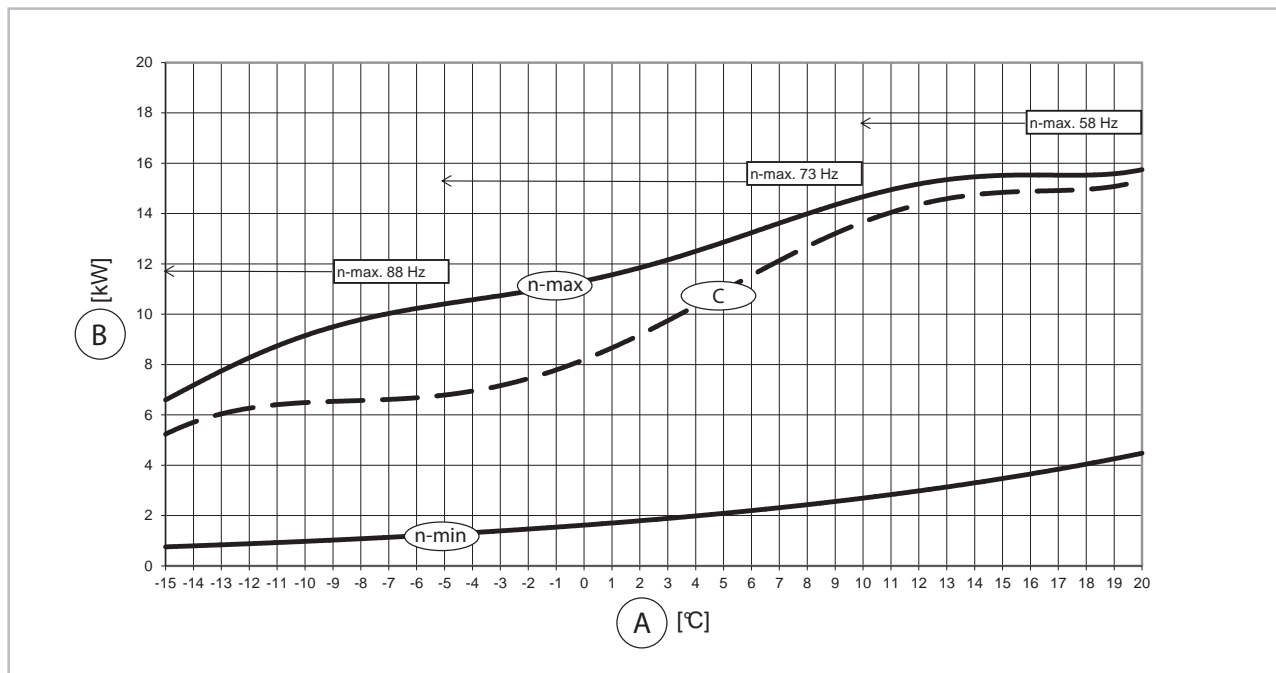


Fig. 24: Heating capacity WKF NEO 180 at inlet temperature of 55 °C

A: Outside temperature

B: Heating capacity

C: Rated frequency

COP WKF NEO 180 at inlet temperature 35 °C, 45 °C and 55 °C

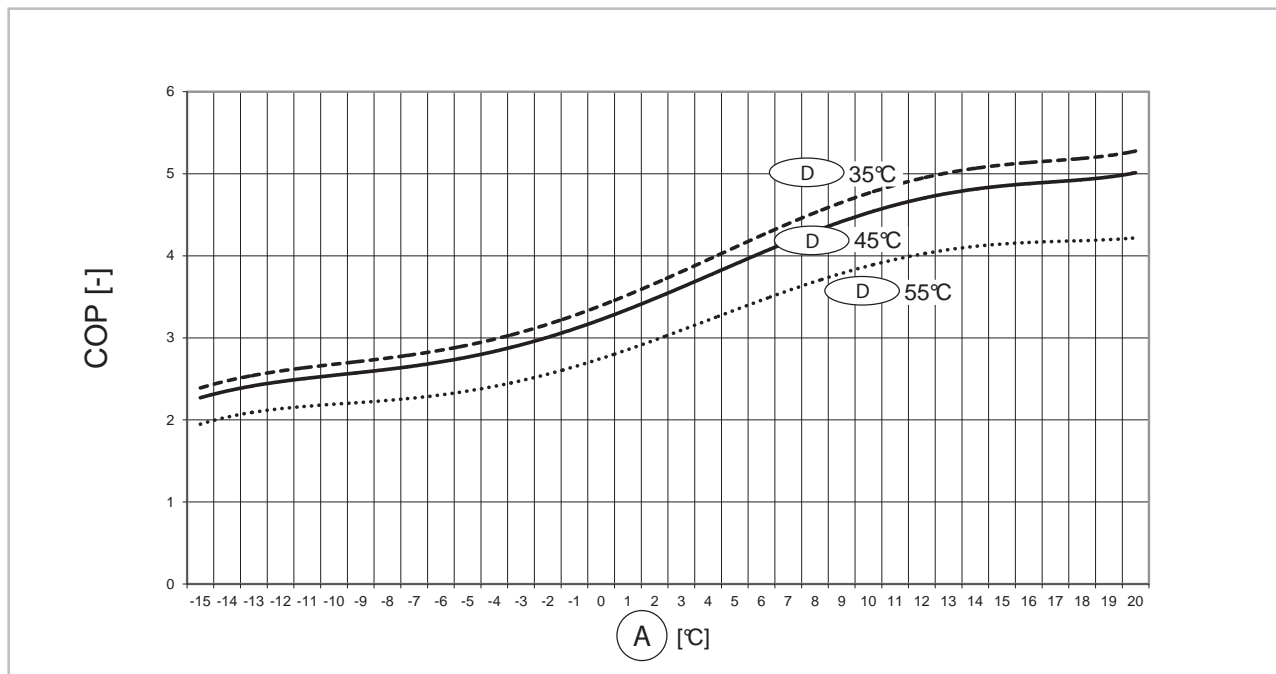


Fig. 25: COP WKF NEO 180 at inlet temperature 35 °C, 45 °C and 55 °C

A: Outside temperature

D: Inlet temperature

Loss in heating and cooling output

Depending on the length of the refrigerant piping and the difference in elevation between the indoor and outdoor units, there may be a loss in heating or cooling output. These can be calculated using the following diagrams.

Heat output losses at WKF NEO 70

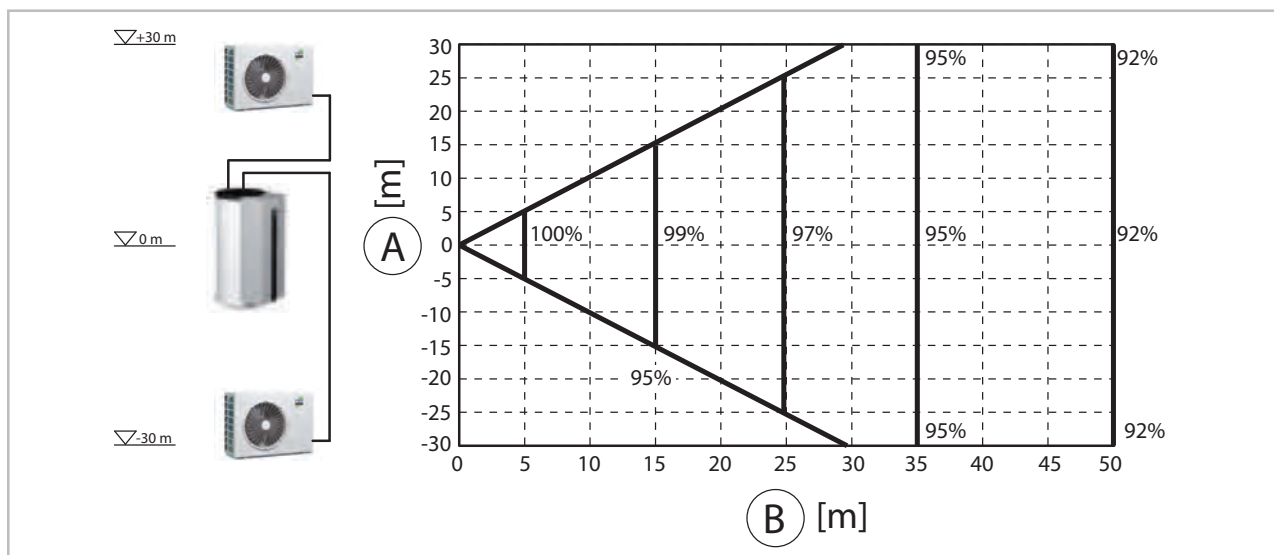


Fig. 26: Heat output losses at WKF NEO 70

A: Difference in elevation
B: Length of refrigerant piping

Cooling output losses at WKF NEO 70

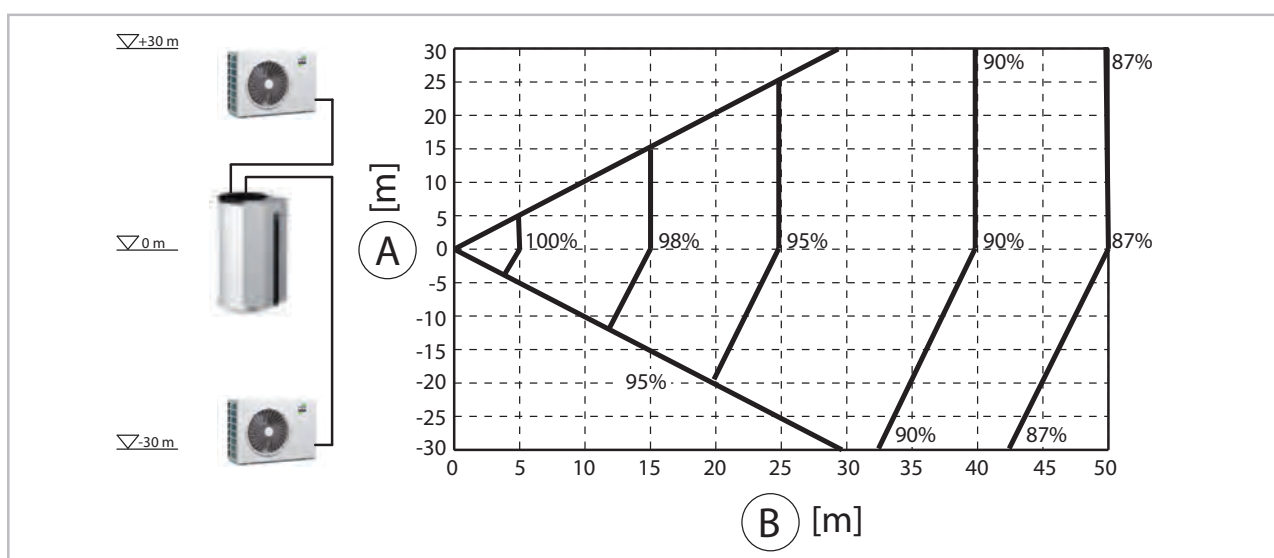


Fig. 27: Cooling output losses at WKF NEO 70

A: Difference in elevation
B: Length of refrigerant piping

REMKO series WKF NEO-compact

Heat output losses at WKF NEO 120

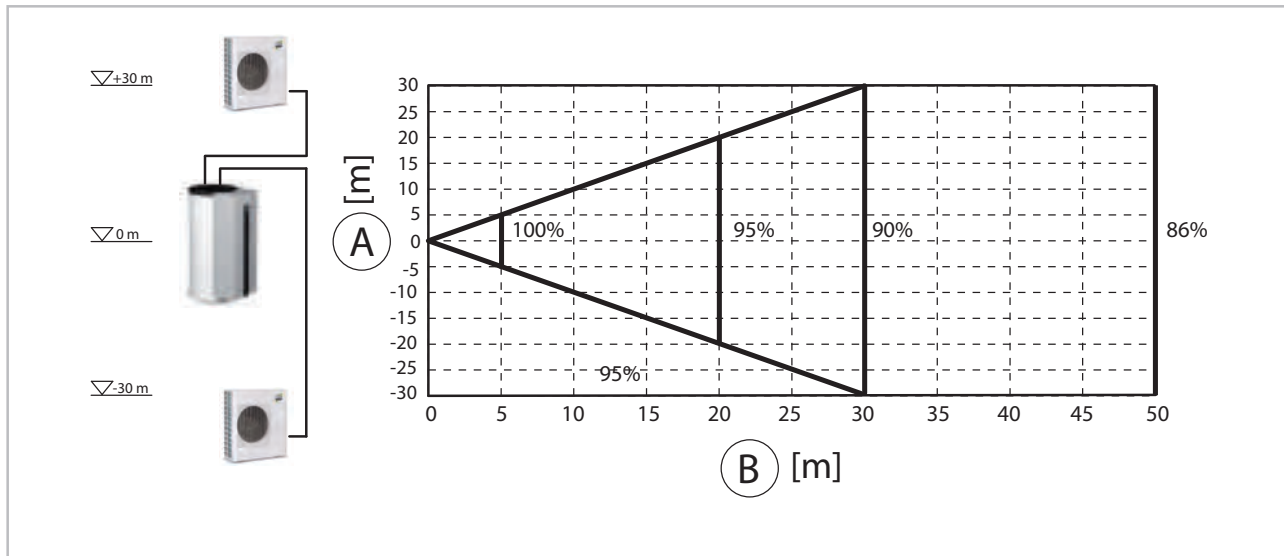


Fig. 28: Heat output losses at WKF NEO 120

A: Difference in elevation
B: Length of refrigerant piping

Cooling output losses at WKF NEO 120

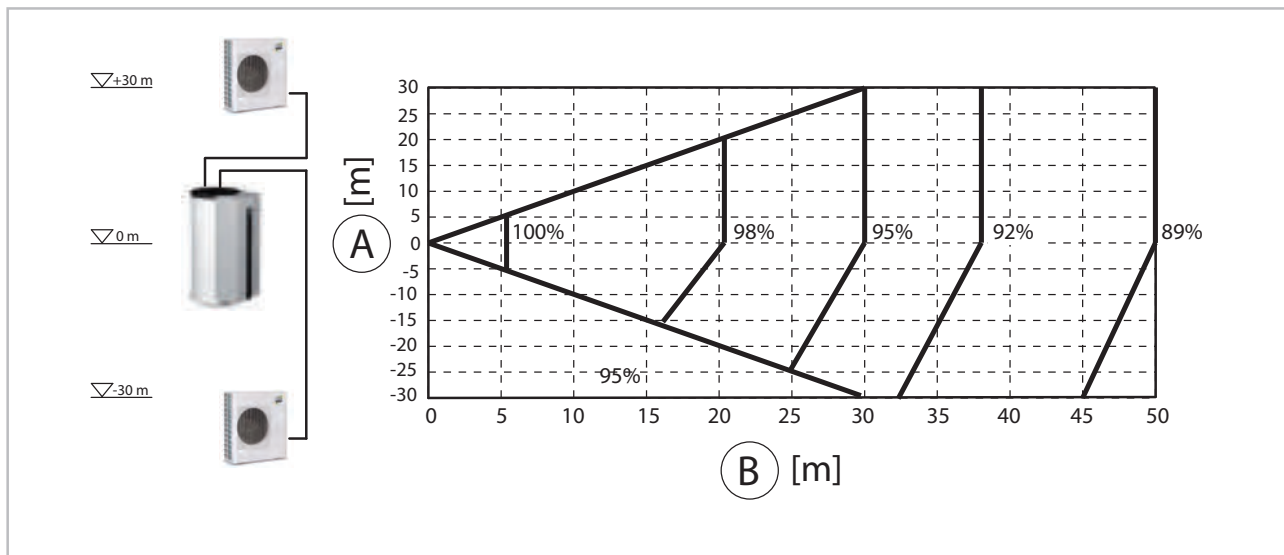


Fig. 29: Cooling output losses at WKF NEO 120

A: Difference in elevation
B: Length of refrigerant piping

Heat output losses at WKF NEO 180

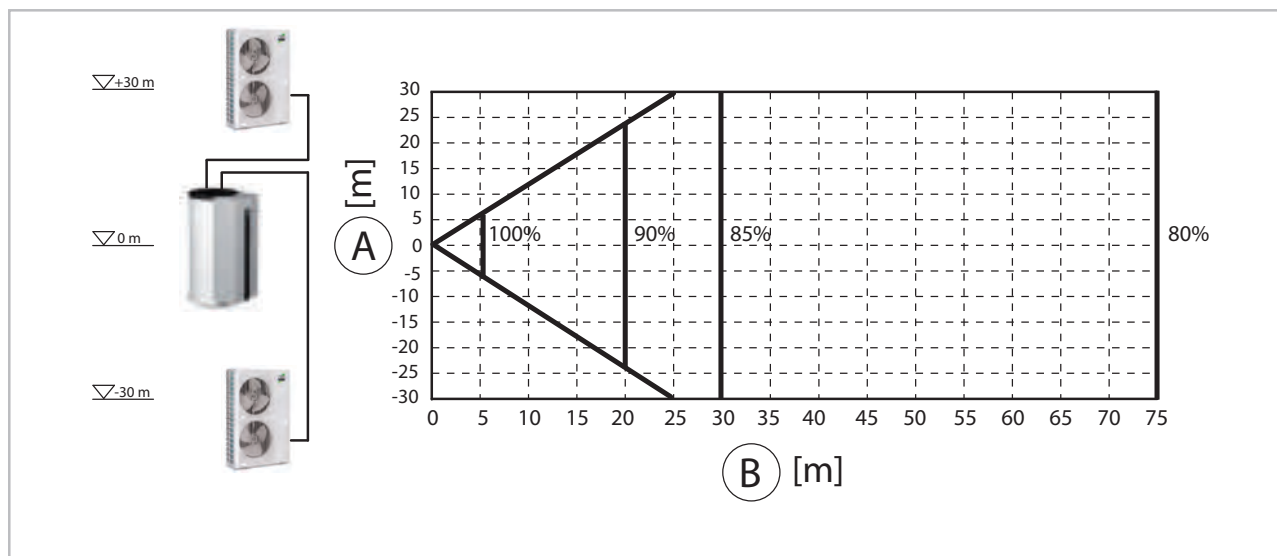


Fig. 30: Heat output losses at WKF NEO 180

A: Difference in elevation
B: Length of refrigerant piping

Cooling output losses at WKF NEO 180

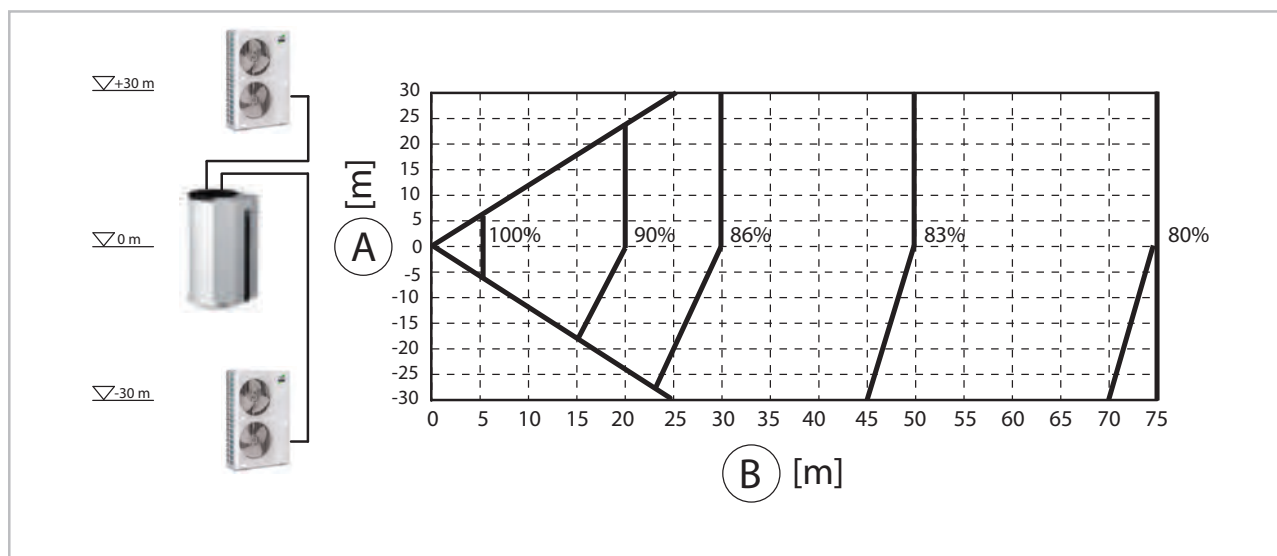


Fig. 31: Cooling output losses at WKF NEO 180

A: Difference in elevation
B: Length of refrigerant piping

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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 CO₂ 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.

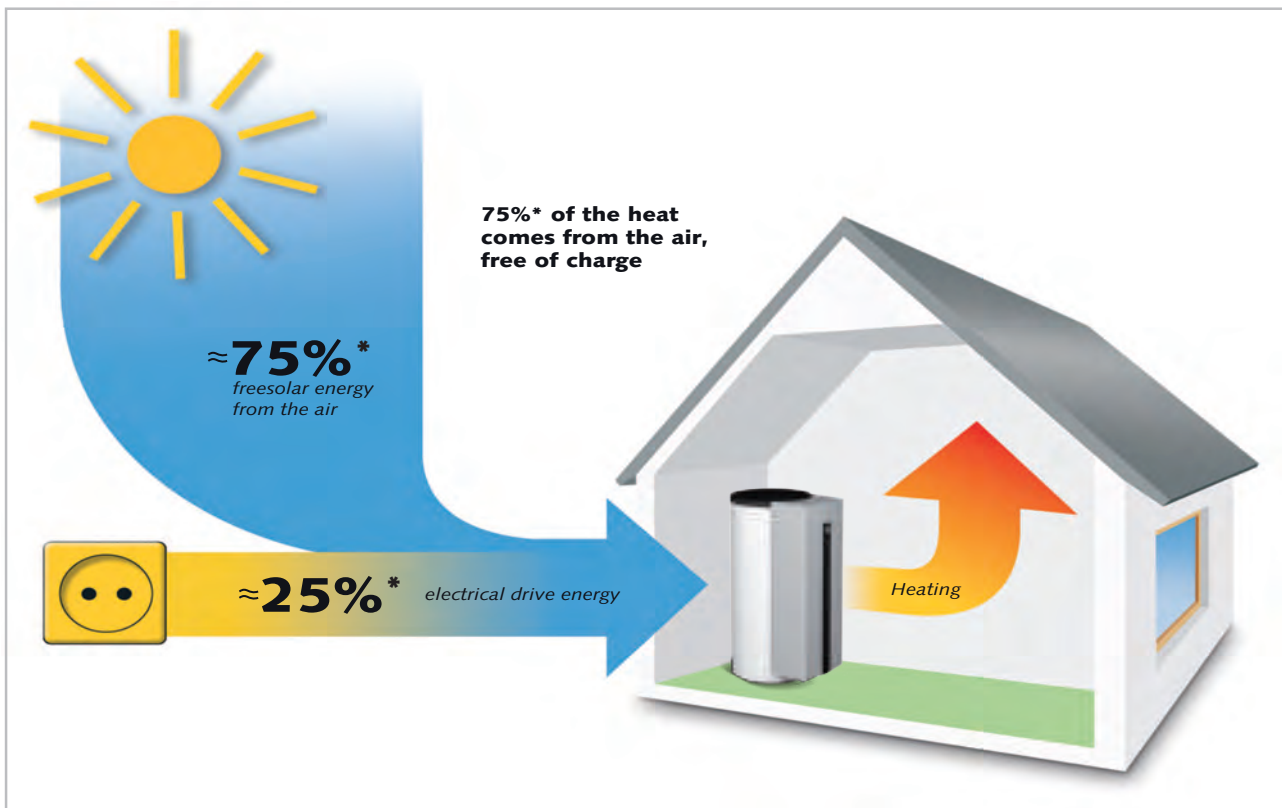


Fig. 32: Free heat

* 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.

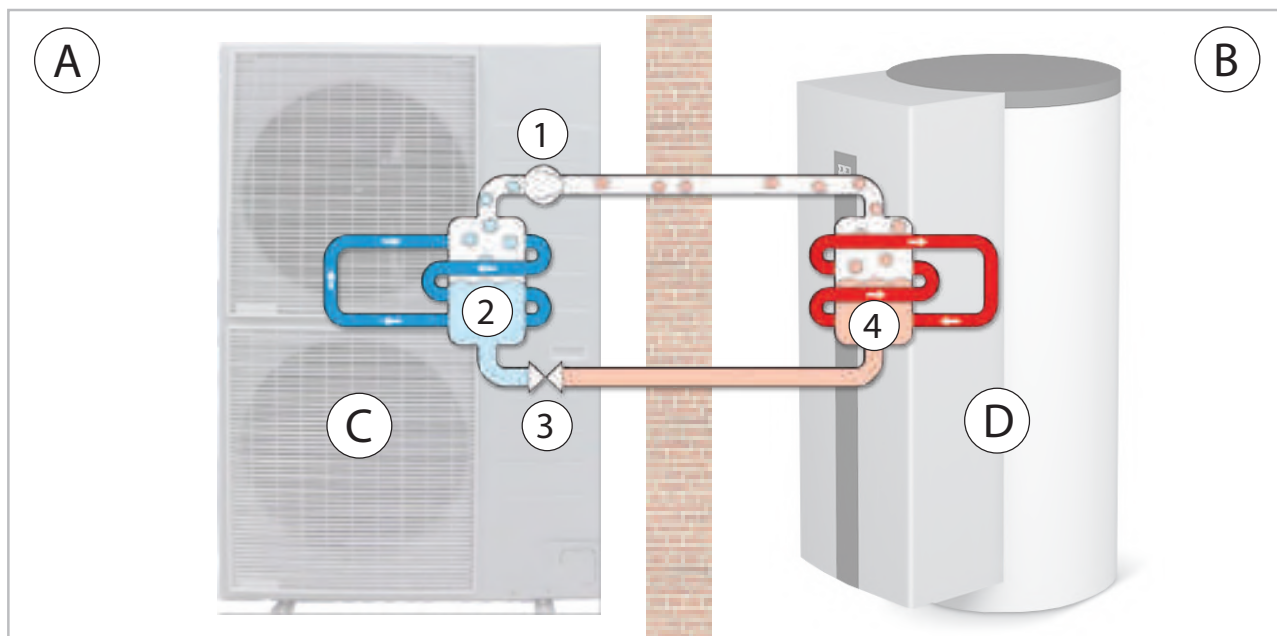


Fig. 33: Function diagram for heating the inverter heat pump

A: Outdoor area

B: Indoor area

C: Heat pump outdoor unit

D: Heat pump indoor unit

1: Condensing

2: Evaporation

3: Decompression

4: Liquefying

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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 31 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 dif-

ferent 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: $Q=V \times n \times c \times (t_R-t_A)$ 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 m² and a heating requirement of approx. 80 W/m² 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. 34) 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).

Building type	Specific heating capacity in W/m ²
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

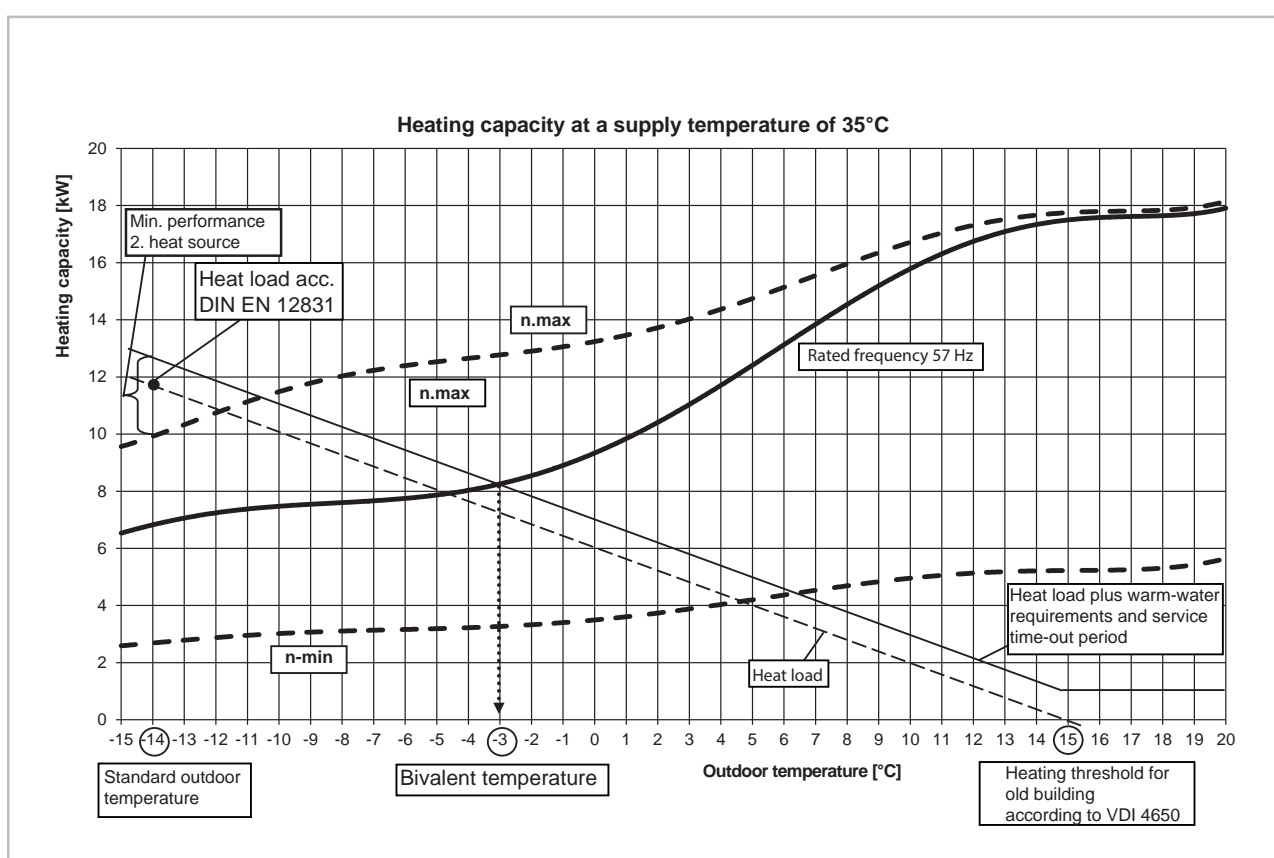


Fig. 34: Heating performance diagram of the heat pump WKF NEO 180

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.

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- 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 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.

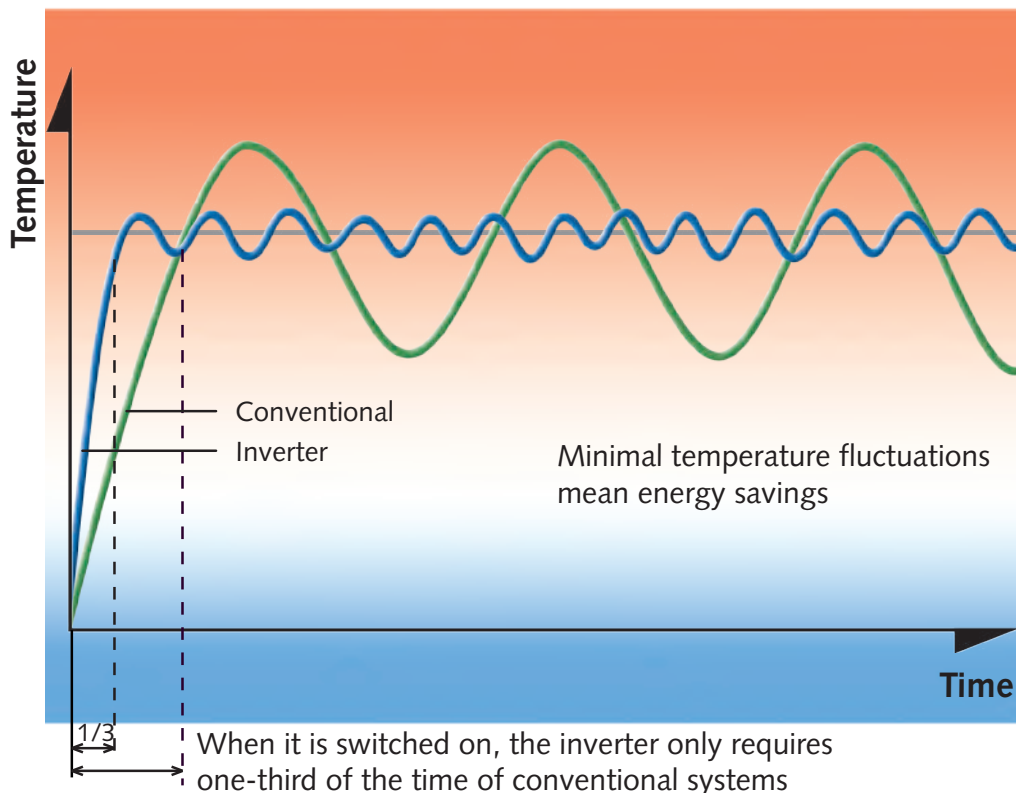


Fig. 35: Modern inverter technology



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.

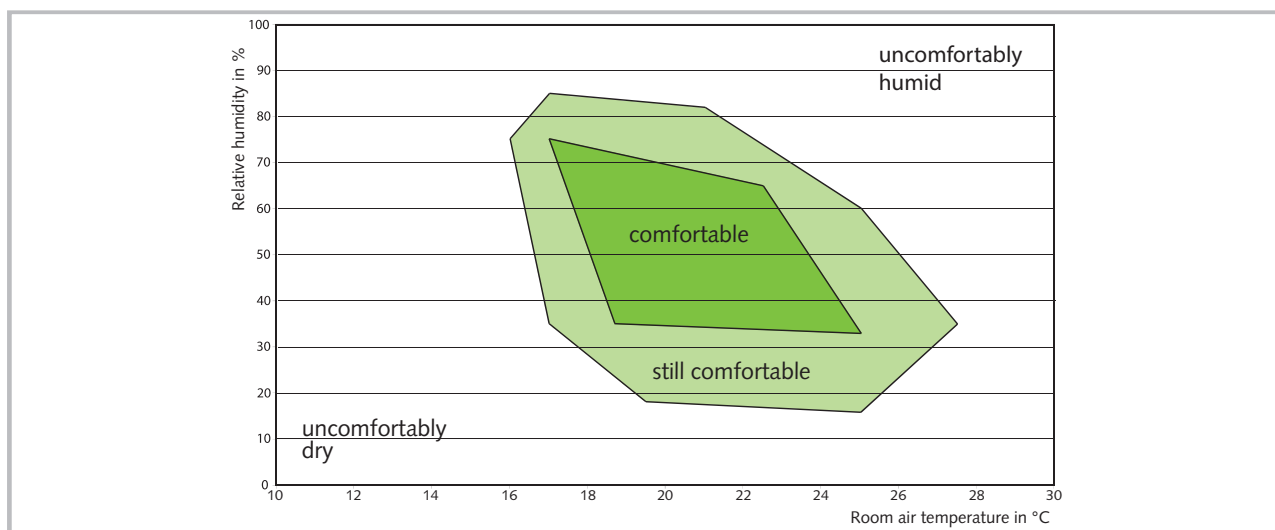


Fig. 36: Comfort zone

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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 source (single energy-source operation).

Single energy-source operation through REMKO Smart-Serv or bivalent operation through REMKO Smart-BVT is likewise to be realised. All connections are to be established on the top of the unit.



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

4 Assembly

4.1 System layout WKF NEO 70

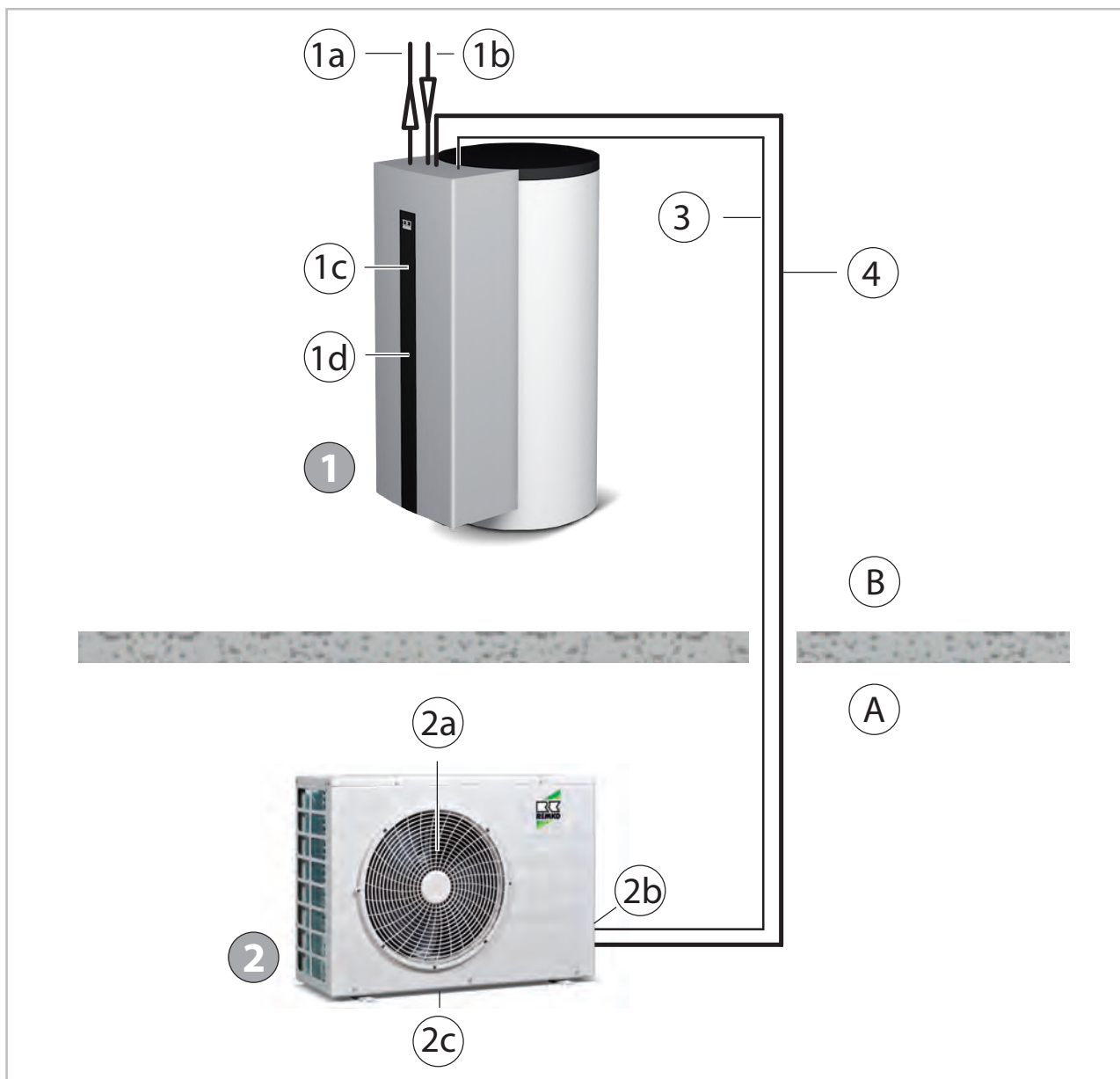


Fig. 37: System layout WKF NEO 70

- | | |
|---|---|
| A: Outdoor area | 2: Outdoor unit |
| B: Indoor area | 2a: Fan |
| 1: Indoor unit | 2b: Power supply, outdoor unit
= 230V/1~/50Hz, 16A (e.g. 3 x 2.5 mm ²) |
| 1a: Heating inlet flow (1 ¹ / ₄ " AG) | 2c: Condensate tray, outdoor unit
(drain must be designed to be frost proof!) |
| 1b: Heating return flow (1 ¹ / ₄ " AG) | 3: Control line, sheathed (e.g. 2 x 1 mm ²) |
| 1c: Power supply, indoor unit
= 230V/1~/50Hz, 10A (e.g. 3 x 1.5 mm ²) | 4: Refrigerant lines ³ / ₈ " and ⁵ / ₈ " |
| 1d: Mains supply line, electrical auxiliary heater
(e.g. 5 x 1.5 mm ²) | |

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4.2 System layout WKF NEO 120

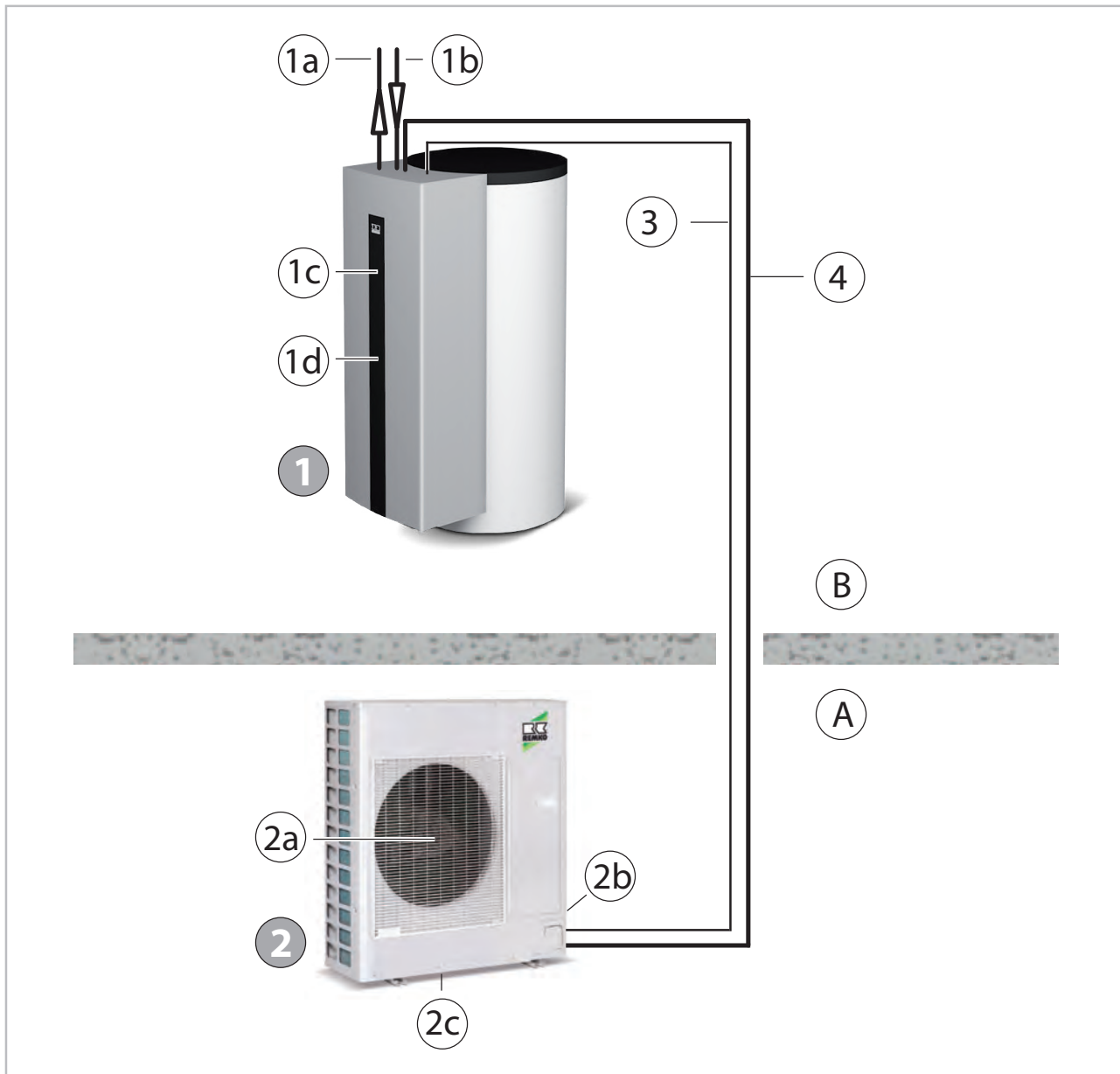


Fig. 38: System layout WKF NEO 120

- | | |
|---|--|
| A: Outdoor area | 2: Outdoor unit |
| B: Indoor area | 2a: Fan |
| 1: Indoor unit | 2b: Power supply, outdoor unit
= 230V/1~50Hz, 20A (e.g. 3 x 2.5 mm ²) |
| 1a: Heating inlet flow (1 ¹ / ₄ " AG) | 2c: Condensate tray, outdoor unit
(drain must be designed to be frost proof!) |
| 1b: Heating return flow (1 ¹ / ₄ " AG) | 3: Control line, sheathed (e.g. 2 x 1 mm ²) |
| 1c: Power supply, indoor unit
= 230V/1~50Hz, 10A (e.g. 3 x 1.5 mm ²) | 4: Refrigerant lines ³ / ₈ " and ⁵ / ₈ " |
| 1d: Mains supply line, electrical auxiliary heater
(e.g. 5 x 1.5 mm ²) | |

4.3 System layout WKF NEO 180

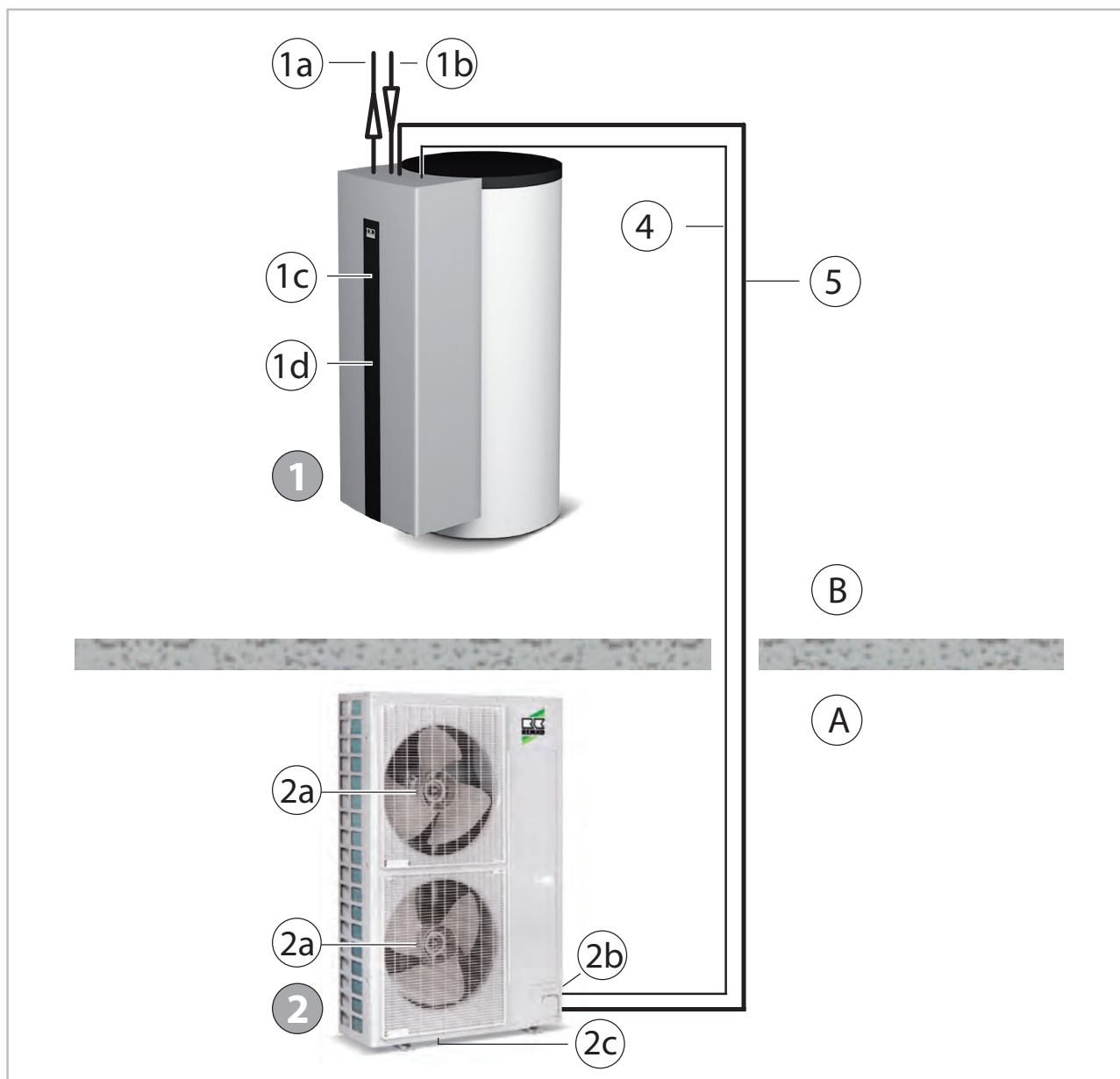


Fig. 39: System layout WKF NEO 180

A: Outdoor area

B: Indoor area

1: Indoor unit

1a: Heating inlet flow (1 $\frac{1}{4}$ " AG)

1b: Heating return flow (1 $\frac{1}{4}$ " 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 $\frac{3}{8}$ " and $\frac{5}{8}$ "

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The indoor and outdoor units have to be connected with refrigerant lines of dimensions (outer diameter) $\frac{3}{8}$ " (=9.52 mm) and $\frac{5}{8}$ " (=15.88 mm). At least a two-wire control line has to be laid between the two modules. Both the indoor and outdoor units require a separate power supply.

WARNING!

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

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. Refer in this regard to the tables in the section "Adding refrigerant" in *Chapter 9.2 'Commissioning the refrigeration system' on page 52*
- 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).

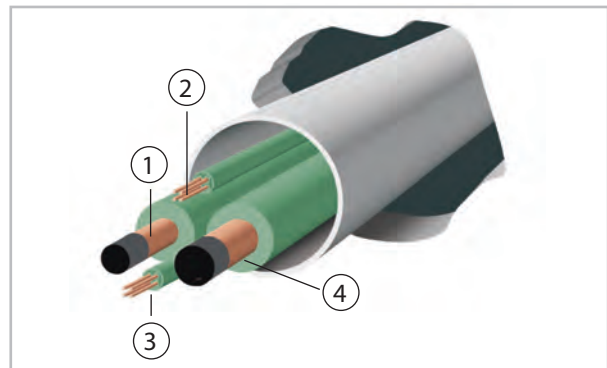


Fig. 40: Wall opening

- 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 Layout, assembly 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.



Fig. 41: Floor set-up



WARNING!

Only fasteners suitable for the given application may be used.

Minimum spacing for indoor units

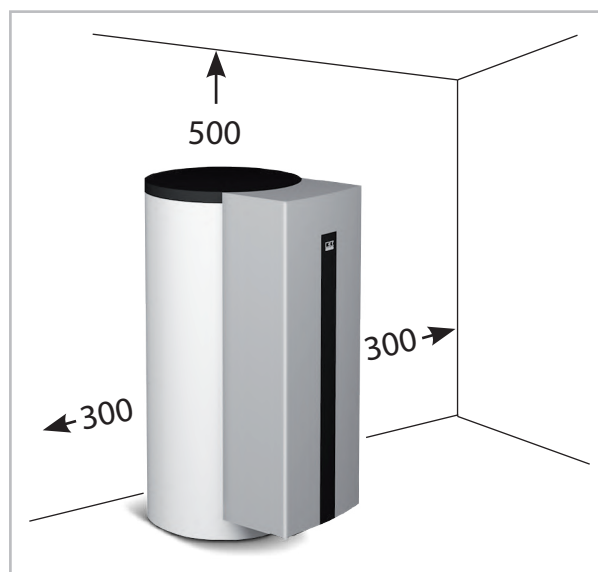


Fig. 42: Minimum spacing for indoor units

REMKO series WKF NEO-compact

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. 43). The snow line is to be observed during installation (Fig. 44).
- 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). The Water Ecology Act is to be observed.
- 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. 44).

- 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. 43: 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.

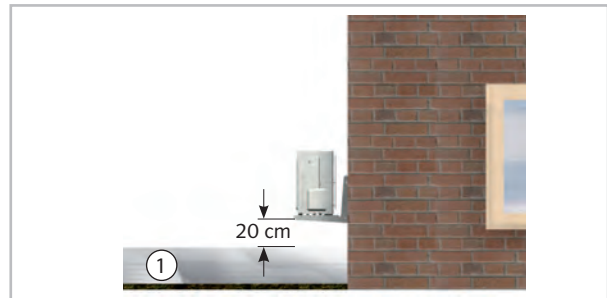


Fig. 44: Protection against snow

1: Snow

Point of emissions	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!

REMKO series WKF NEO-compact

Minimum distances of the outdoor units

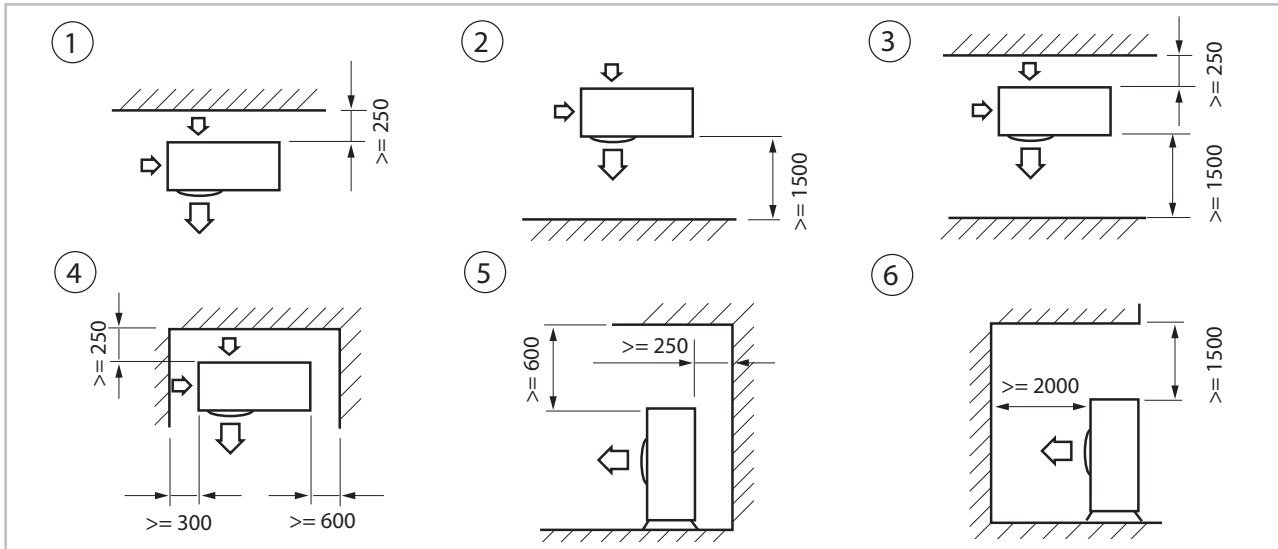


Fig. 45: Minimum distances during construction of an outdoor units in mm

- | | |
|---|---|
| 1: Next to a wall, air outlet open to the front, flow restriction behind | 5: Next to a covered wall, air outlet open to the front, flow restrictions behind and above |
| 2: Next to a wall, air outlet toward the wall, flow restriction to the front | 6: Next to a covered wall, air outlet open in the direction of the wall, flow restrictions behind and above |
| 3: Between two walls, air outlet toward the wall, open sides: flow restriction front and rear | a: WKF NEO 70 ≥ 150 mm |
| 4: In a niche, air outlet open to the front, flow restriction behind and on both sides | WKF NEO 120/WKF NEO 180 ≥ 200 mm |

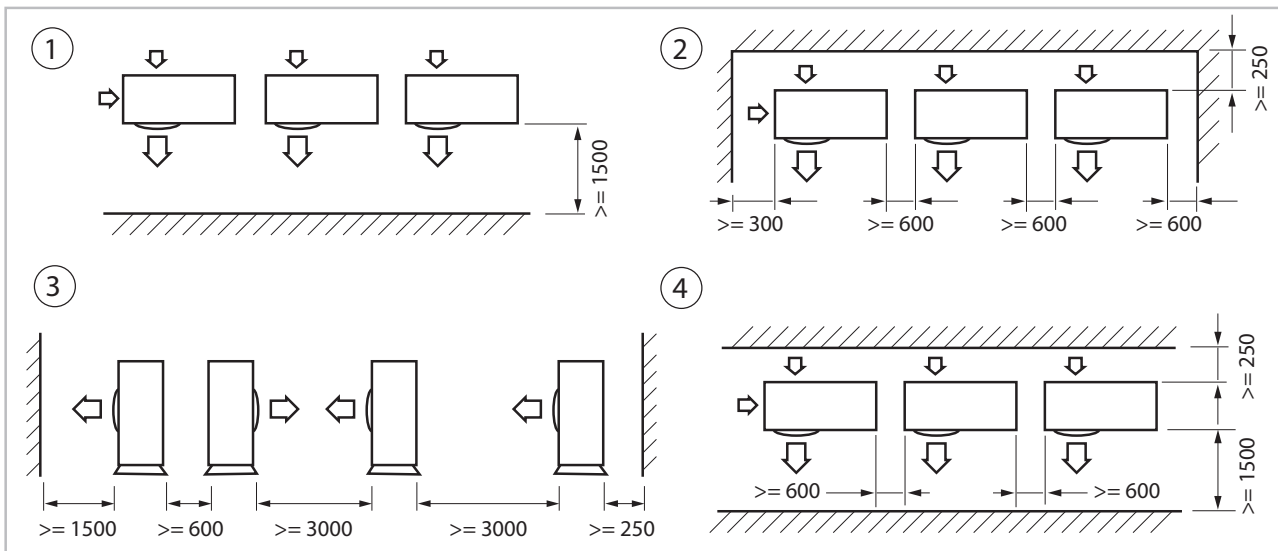


Fig. 46: Minimum distances during construction of multiple outdoor units in mm

- | | |
|---|--|
| 1: Next to a wall, air outlet toward the wall, flow restriction to the front | 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 |
| 2: In a niche, air outlet open to the front, flow restriction behind and on both sides | a: WKF NEO 70 ≥ 150 mm |
| 3: Between two walls, air outlet toward the wall and in the direction of other devices, open sides: flow restriction front and rear | WKF NEO 120/WKF NEO 180 ≥ 200 mm |

Condensate drainage connection and secure discharge

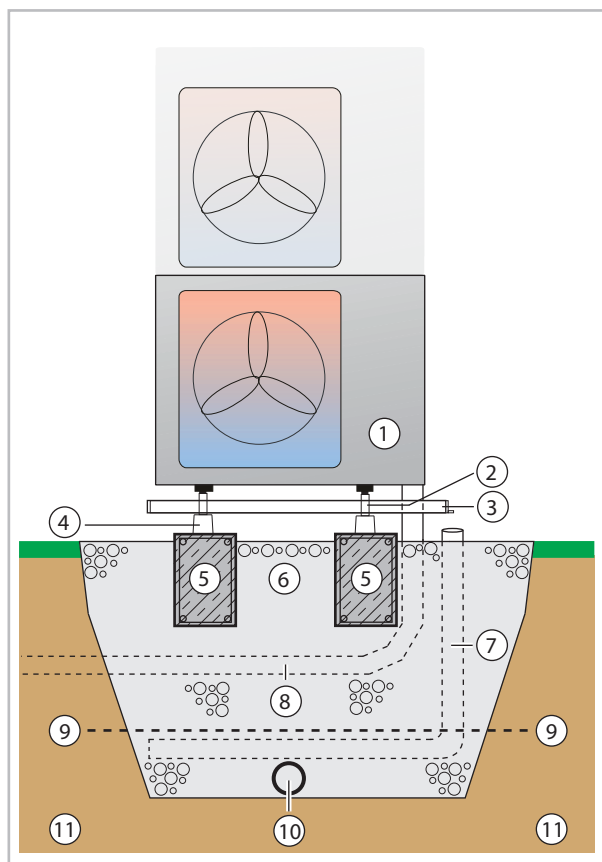


Fig. 47: Condensate drainage, seepage of condensate and strip foundation (cross-section)

- 1: Outdoor unit
- 2: Leg
- 3: Condensate catch pan including pan heater
- 4: BK 660/1000 floor console
- 5: Reinforced strip foundation
HxWxD = 300x200x800 mm
- 6: Gravel layer for seepage
- 7: Drainage channel
- 8: Conduit for refrigerant piping and electrical connecting line (temperature-resistant up to at least 80 °C)
- 9: Frost line
- 10: Drainage pipe
- 11: Soil

! NOTICE!

The refrigerant lines must enter the housing from the rear, side or front with the use of the REMKO OA 2 oil separator.
WKF NEO compact 70/120/180

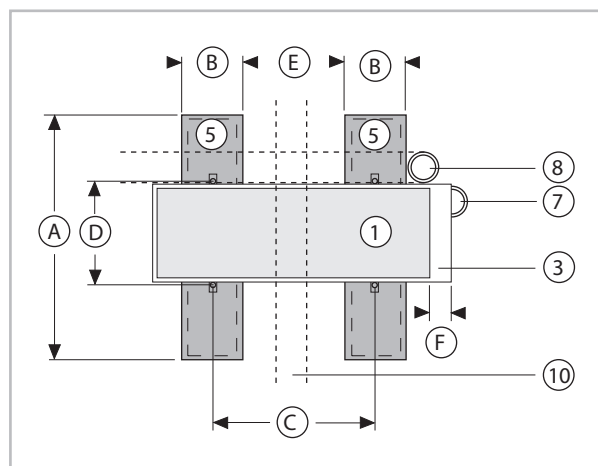


Fig. 48: Dimensions for the strip foundation (bird's eye view)

For the designations of 1,3,5,7,8 and 10, please refer to the legend for Fig. 47

Dimensioning the strip foundation (all dimensions in mm)

Dim.	WKF NEO 70	WKF NEO 120 WKF NEO 180
A	800/1000	800/1000
B	200	200
C	660	620
D	340	360 ¹⁾ 350 ²⁾
E	400	420
F	100	100

¹⁾ WKF NEO 120

²⁾ WKF NEO 180

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.

REMKO series WKF NEO-compact

- 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!

Local regulations or environmental laws, for example the German Water Resource Law (WHG), can require suitable precautions to protect against uncontrolled draining in case of leakage to provide for safe disposal of escaping refrigerator oil or hazardous media.

! 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.

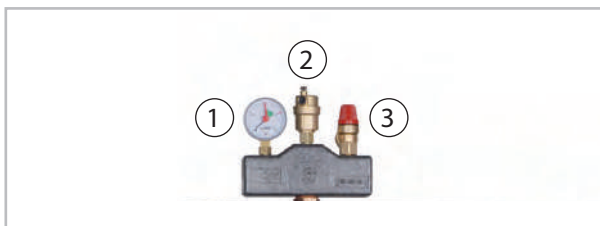


Fig. 49: Safety assembly

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

- 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 losing 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!

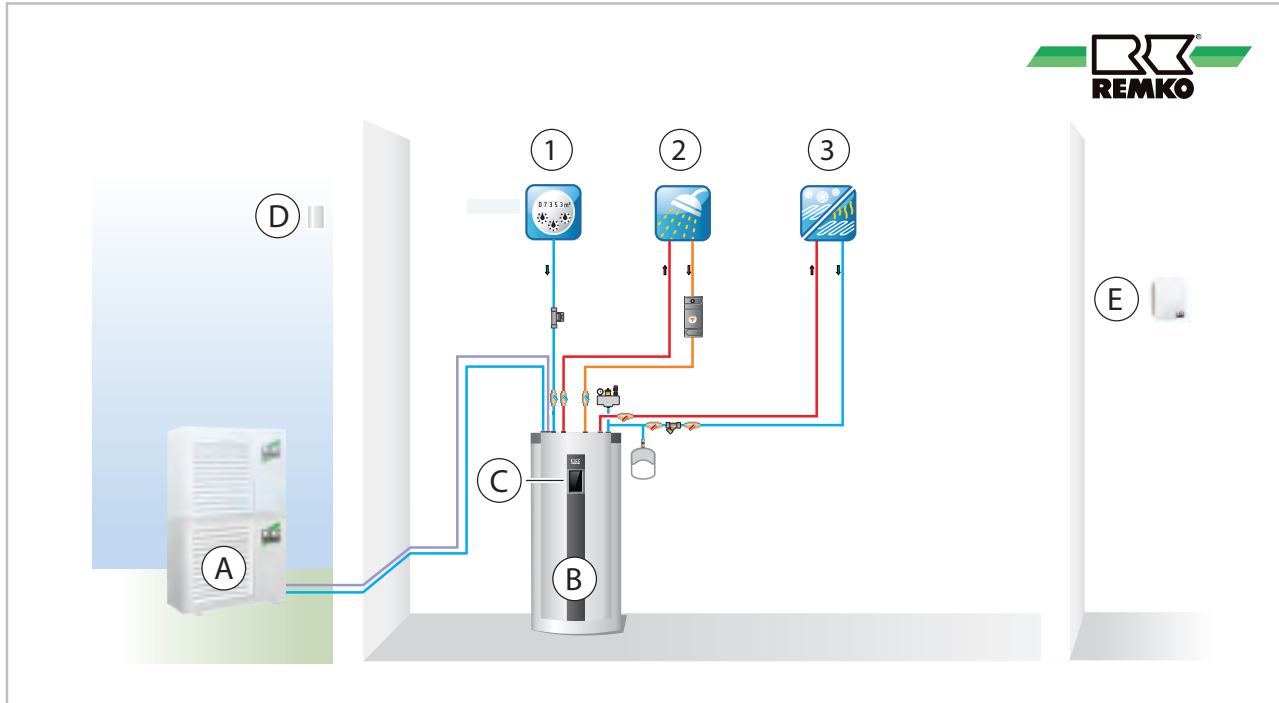


Fig. 50: Example hydraulic diagram

- | | |
|------------------------|--------------------------------------|
| A: Outdoor unit | E: Room temperature / humidity probe |
| B: Indoor unit | 1: Cold water |
| C: Smart Control Touch | 2: Hot water |
| D: External probe | 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/KW 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

Description of the cooling installation

Cooling via mixed heating cycle (surface heating cycle)

If the series WKF heat pump is to be used for cooling, then this must be possible via the mixed heating cycle. The hydraulic connection is identical to the connection for the heating cycle. If the circuit is used for heating or cooling, it will be connected as presented in the hydraulic circuit diagrams on pages and . The sensors S12 and S11 measure the inlet and return temperatures, when a heating-/cooling buffer is used.

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.

Dewpoint control via the Smart Control cable remote control

If the series WKF heat pump is to be used to implement a cooling function, the Smart Control cable remote control must be installed in the selected reference room (e.g. living room). It is recommended that it is mounted on the wall. It must thereby ensure that the room air can freely flow over the remote control. The remote control measures the room temperature and room humidity. From these it calculates the nominal dewpoint and correspondingly adjusts the cooling water temperature with a sufficient safety margin so that the temperature on the activated room surface as well as the exposed pipes does not fall below the dewpoint.



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.

It is also recommended to install a 230 V dewpoint monitor with the associated pipe temperature sensors to the feed pipes outside the heat pump. The location should be selected so that it does not favour the temperature falling below the dewpoint. The dewpoint monitor is wired so that it divides the connector in the feed line to the utility company switch to the controller (input S16) in order to switch of the heat pump.

Cooling without installed cable remote control in the room

If no additional remote control apart from the heat pump is to be installed in the room, the regulation of the minimum inlet temperature is via the outside temperature minus 6 K. It is then essential to mount an additional 230 V dewpoint monitor with associated pipe temperature sensors on the inlet pipes. The location should be selected so that it does not favour the temperature falling below the dewpoint. The dewpoint monitor is wired so that it divides the connector in the feed line to the utility company switch to the controller (input S16) in order to switch of the heat pump.

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.

Cooling via setpoint

If no additional remote control is installed in the room, the cooling system can be operate at a setpoint that is above the dewpoint.

Example: minimum inlet temperature not less than + 16 ° C

! 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.

REMKO series WKF NEO-compact

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				

Technical changes and errors reserved.

Your heating contractor:

VDI directive 2035
Perform annual control measurement!

Fig. 51: Form for logging filling with completely deionised water

REMKO series WKF NEO-compact

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 $\vartheta = 1 \text{ mm}^2/\text{s}$ (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 (copper tubes in refrigerator quality) with dimensions of $3/8" = 9.5 \text{ mm}$ and $5/8" = 15.88 \text{ mm}$ (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 pipes are to be flared to make the connections to the modules. In doing so, check that the flare has the correct shape and suitable union nuts (included in the scope of supply) (Fig. 52 to Fig. 54).

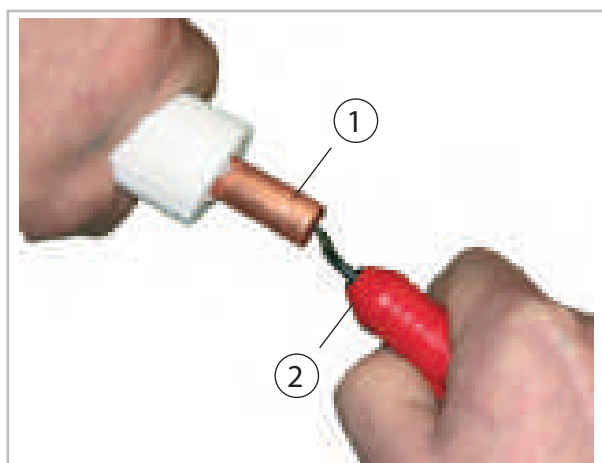


Fig. 52: Deburring the refrigerant piping

- 1: Refrigerant piping
2: Deburrer

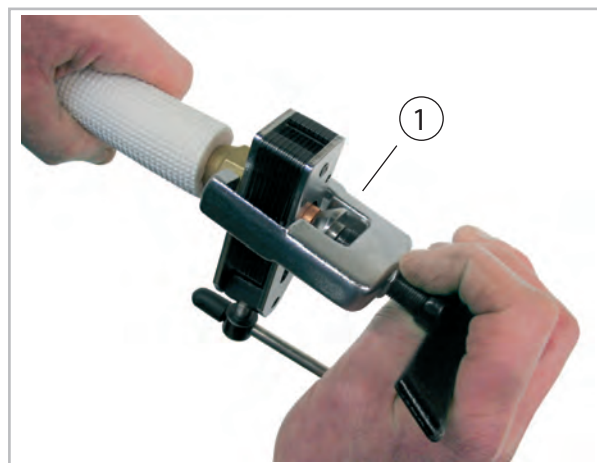


Fig. 53: Flanging the refrigerant piping

- 1: Flanging tool

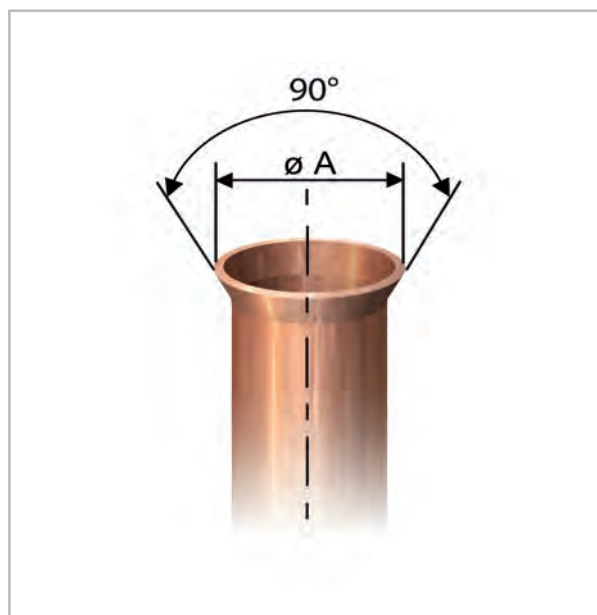


Fig. 54: Correct flange shape

Copper piping outer diameter	Widened diameter $\varnothing A$
$3/8" = 9.5 \text{ mm}$	12.4 - 12.8 mm
$5/8" = 15.88$	21.9 - 22.3 mm

REMKO series WKF NEO-compact

Connection to the unit

- The cover of the outdoor unit may also need to be dismantled. It may be necessary to remove the pre-cut bushings.
- Take off the factory-fitted protective caps. You can use the union nuts for additional mounting. Make sure to slide the union nuts onto the pipe before it is flared.
- The connection of the refrigerant pipes to the device connections are to initially be made by hand, in order to ensure a good fit. Subsequently the threaded assemblies are to be fastened with two appropriate open-ended spanners. One of the spanners is to be used to **counter the rotation** (Fig. 55).

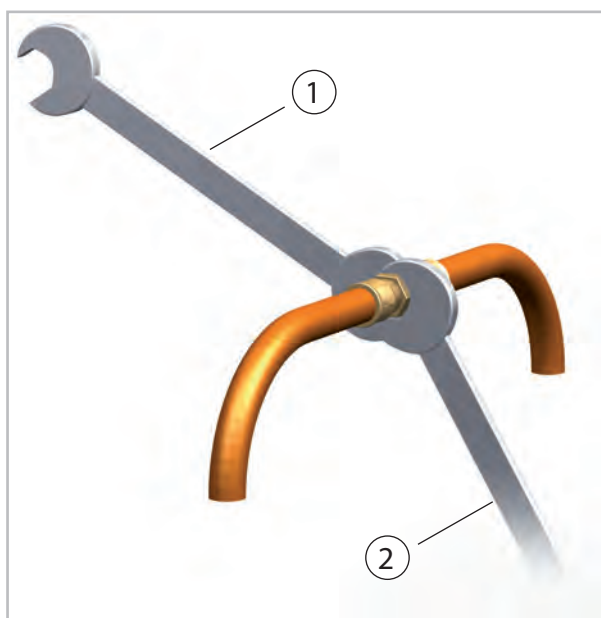


Fig. 55: Tightening the fitting

- 1: Tighten with the first open-ended spanner
- 2: Counter with the second open-ended spanner

Pipe dimension	Tightening torque
3/8" = 9.5 mm	32 - 40 Nm
5/8" = 15.88	65 - 75 Nm

- The installed refrigerant pipes, including the flare connections, must be provided with suitable insulation.
- 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!



Outdoor units may be delivered with nuts suitable for joining flanges.

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 outside 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 over-heating. 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.
- Install 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.

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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 decreases 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
	WKF NEO 70
Up to and incl. 5 m	0 g/m

Basic pipe length	Additional fill quantity
	WKF NEO 70
5 m to max. 30 m per circuit	50 g/m

Basic pipe length	Additional fill quantity	
	WKF NEO 120	WKF NEO 180
Up to and incl. 10 m	0 g/m	0 g/m
10 m to max. 50 m per circuit	50 g/m	---
10 m to max. 75 m per circuit	---	50 g/m

Examples

Basic pipe length	Additional fill quantity	
	WKF NEO 70	All other series
5 m	0 g	0 g
10 m	250 g	0 g
15 m	500 g	250 g
20 m	750 g	500 g
25 m	1000 g	750 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 CO₂, 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/O 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!

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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!

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.

Overview of the controls

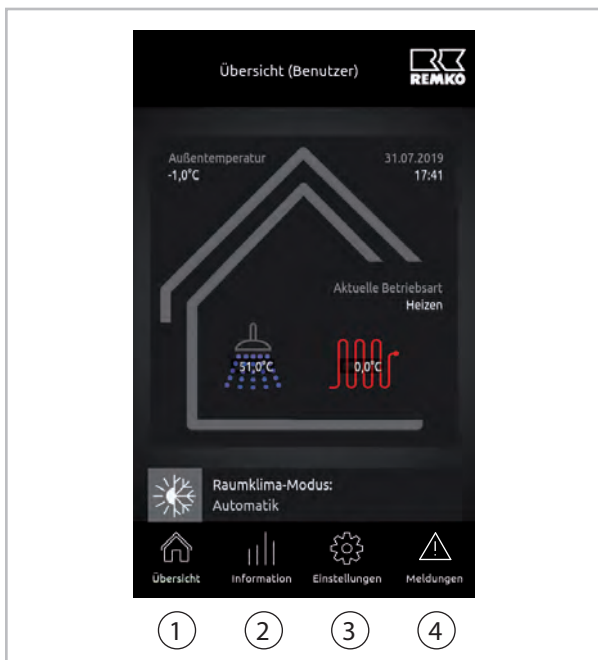


Fig. 56: Controls of the Smart Control Touch

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

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!

As the refrigerant capacity exceeds 3 kg, an annual seal inspection must be made of the refrigerant circuit by a firm specializing in this field. A heating system 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 is activated.

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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 Error messages on the outdoor unit

Error display for the outdoor unit

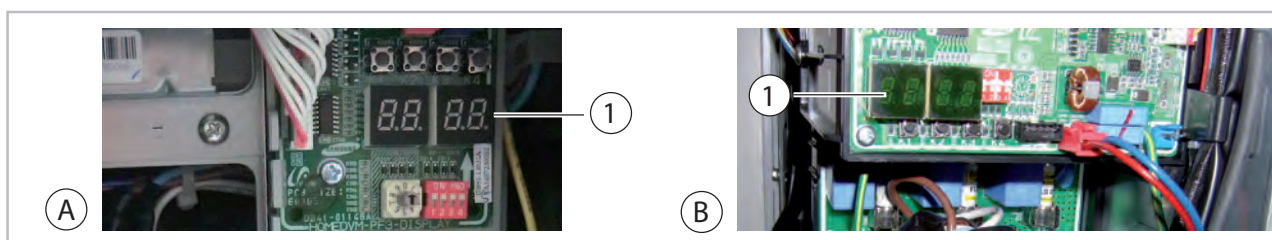


Fig. 57: Display on the outdoor units

1: Display

A: WKF NEO 70

B: WKF NEO 120 and WKF NEO 180

Disp.	LED display			Circuit board	Plug	Pin	Meaning
	red	green	yellow				
E101	-	-	-	IM	CN31		Communication error between the indoor unit and outdoor unit or incorrect board versions
E102	-	-	-	IM	CN31		Communication breakdown between IM and AM
E162	-	-	-	IM			EEPROM error
E177	●	(+)	○	AM			AM unit has received an emergency stop signal
E201	●	✱	○	AM	CN31		Communication error between the indoor unit and outdoor unit or incorrect board versions
E202	●	● or ○	○	AM	CN31		Communication breakdown between IM and AM
E203	●	●	✱	AM	CN39		Communication error between motherboard and inverter board
E221	●	✱	○	AM	CN43	1.2	Error in outdoor temperature probe
E231	●	✱	○	AM	CN43	3.4	Evaporator probe error
E237							
E251	●	✱	○	AM	CN43	3.4	Hot gas temperature probe error
E320	●	✱	○	AM	CN43	7.8	1. OLP probe error (overload protection)
E403	●	✱	○	AM			Ice protection compressor (only in cooling mode)
E404	●	✱	○	AM			Compressor overload protection (normal operation)
E407	●	✱	○	AM	CN34		Interrupt. due to press. control for high pressure
E416	●	✱	○	AM	CN43	5.6	Compress. overheating protect. (normal operation)
E419	●	✱	○	AM	CN81		Malfunction of electronic expansion valve
E425	●	✱	○	AM			Phase error malfunction. At least one phase conductor missing (only WKF NEO 180) or incorrect EEPROM on the motherboard (only WKF NEO 120)
E440	●	✱	○	AM	CN43	1.2	Heating mode not possible; outdoor temp. > 35 °C
E441	●	✱	○	AM	CN43	1.2	Cooling mode not possible; outdoor temp. < +10 °C

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Disp.	LED display			Circuit board	Plug	Pin	Meaning
	red	green	yellow				
E443	●	✱	○	AM	CN42		Gas leakage error (before operation), low pressure at HP probe
E458	○	○	●	AM			Compress. start error, overcurr. or BLDC fan error
E461	○	✱	○	AM			Current consumption of the compressor is not plausible (too low)
E462	●	✱	○	AM			Current consumption of the compressor is not plausible (too high)
E463	●	✱	○	AM	CN43	7.8	Compressor overheat protection (OLP) is triggered (over 115 °C)
E464	✱	○	○	AM			Inverter board current consumption IPM is too high or software version of the motherboard
E465	○	●	✱	AM			Compressor current consumption too high
E466	✱	●	○	AM			AC/DC power supply malfunction
E467	●	○	●	AM			Phase error malfunction. A phase conductor is missing on the compressor
E468	●	✱	✱	AM			Motherboard/inverter board current consumption probe malfunction
E469	●	✱	○	AM			DC voltage sensor malfunction (inverter board)
E470	●	✱	○	AM			EEPROM malfunction (read error)
E471	●	✱	○	AM			EEPROM version of the motherboard does not match inverter
E472				AM			Check AC input voltage
E473				AM			Compressor blocked
E474	✱	✱	○	AM			IPM (IGBT module) malfunction
E475	○	○	●	AM			BLDC fan 2 malfunction
E484	●	✱	●	AM			PFC overload malfunction (inverter board)
E485	●	✱	○	AM			Total power consumption malfunction
E500	✱	✱	○	AM			Inverter board overheating malfunction
E554	●	✱	○	AM			Refrigerant quantity malfunction
E556	○	○	✱	AM			EEPROM version of the motherboard and Com-Kit version do not match
E901	●	✱	○	IM	CN41	1.2	Return flow probe malfunction
E902	●	✱	○	IM	CN41	5.6	Inlet probe malfunction
E904							
E906	●	✱	○	IM	CN41	3.4	Liquid line probe malfunction
E912							
EA							

● = on / ✱ = flashing / ○ = off / IM = Indoor unit / AM = Outdoor unit

15.3 Error messages on the Smart Control

Operating messages, warnings and error display on the Smart-Control

Operating messages

ID	Description	Desig.	Details
ID6000	Storage tank 1: Max. temperature reached		The temperature on one of the probes in storage tank 1 is higher than the maximum permitted storage tank temp.
ID6001	HW request		There is an active requirement to charge the storage tank
ID6002	Heat pump compr. start		Heat pump compressor start
ID6003	Switching cycle disabled (I/O2)		The heat pump was disabled in order to reduce the compressor's switching cycles
ID6005	Internal pump lead time		The internal pump runs at reduced speed during the pump lead time
ID6006	Switching cycle disabled		The heat pump was disabled in order to reduce the compressor's switching cycles
ID6007	Min. holding time		The heat pump is disabled due to a min. holding time
ID6008	Disable signal	S16	The heat pump is disabled due to a disable signal
ID6009	Disable signal (I/O 2)		The heat pump is disabled due to a disable signal
ID6010	Heat pump compressor start (I/O 2)		Heat pump compressor start
ID6012	Defrosting HP (I/O 2)		Defrost heat pump
ID6020	Pump internal after-run time		The internal pump runs at a reduced speed during the pump after-run time
ID6022	Min. holding time (I/O2)		The heat pump is disabled due to a min. holding time
ID6103	Heat demand HP		Heat demand, heat pump
ID6104	Cooling demand HP		Cooling demand, heat pump
ID6105	Defrost heat pump		Defrost heat pump
ID6107	Standby mode enabled		Standby mode enabled
ID6108	Random delay after power failure		Random delay after power failure (up to 200 seconds after power returns) - the purpose of the random delay is to avoid a system overload due to many consumers being switched on at the same time
ID6109	Outdoor temp. Heat pump usable limit		Outdoor temp. Heat pump usable limit - the heat pump is disabled due to the usable limits being exceeded or not being reached
ID6111	Heat pump bivalence temperature		Heat pump bivalence temperature - the heat pump is disabled because the temperature has dropped below the bivalence temperature
ID6113	Solar heating		Solar heating - heat generators are disabled
ID6115	Low pressure difference		The pressure difference is too low to start the compressor
ID6116	Max. defrosting period		Maximum defrosting period

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Error

ID	Description	Desig.	Details
ID7050	Anti-freeze protection		The anti-freeze protection in the heat pump's heat exchanger was triggered due to an inlet temperature that is too low. After rectifying the cause of the error, reset the error in (Expert/Settings/Heat pump/Basic settings) and, if necessary, de-energise the outdoor unit.
ID7103	Incorrect phase sequence	μPC	Incorrect phase sequence (rotating field) - please check the phase sequence (the rotating field) of the power supply.
ID7108	Anti-freeze protection		The anti-freeze protection in the heat pump's heat exchanger was triggered due to a return temperature that is too low. After rectifying the cause of the error, reset the error in (Expert/Settings/Heat pump/Basic settings) and, if necessary, de-energise the outdoor unit.
ID7150	EEV motor fault	μPC	EEV motor fault. Please contact an authorised service technician
ID7200	Open contact - storage tank 1 bottom probe	S02	Open contact - storage tank 1 bottom probe
ID7201	Short circuit - storage tank 1 bottom probe	S02	Short circuit - storage tank 1 bottom probe
ID7202	Open contact - storage tank 1 middle probe	S09	Open contact - storage tank 1 middle probe
ID7203	Short circuit - storage tank 1 middle probe	S09	Short circuit - storage tank 1 middle probe
ID7204	Open contact - storage tank 1 top probe	S08	Open contact - storage tank 1 top probe
ID7205	Short circuit - storage tank 1 top probe	S08	Short circuit - storage tank 1 top probe
ID7206	Open contact - external probe	S10	Open contact - external probe
ID7207	Short circuit - external probe	S10	Short circuit - external probe
ID7208	Open contact - refrigerant probe	S07	Open contact - refrigerant probe
ID7209	Short circuit - refrigerant probe	S07	Short circuit - refrigerant probe
ID7210	Open contact - circulation temp. probe	S05	Open contact - drinking water circulation temperature probe
ID7211	Short circuit - circulation temp. probe	S05	Short circuit - drinking water circulation temperature probe
ID7212	Open contact - inlet temp. probe	S13	Open contact - inlet temp. probe
ID7213	Short circuit - inlet temp. probe	S13	Short circuit - inlet temp. probe
ID7214	Min. refrigerant temp.	S07	The minimum refrigerant temperature was not reached - anti-freeze protection in the heat exchanger.

ID	Description	Desig.	Details
ID7215	Min. refrigerant temp. (I/O2)	S07.2	The minimum refrigerant temperature (I/O2) was not reached - anti-freeze protection in the heat exchanger.
ID7218	Open contact - collector 1 probe	S01	Open contact - collector 1 probe
ID7219	Short circuit - collector 1 probe	S01	Short circuit - collector 1 probe
ID7228	Open contact - inlet temp. probe	S13.2	Open contact - inlet temp. probe
ID7229	Short circuit - inlet temp. probe	S13.2	Short circuit - inlet temp. probe
ID7231	Anti-freeze protection (I/O 2)		The anti-freeze protection in the heat pump's heat exchanger was triggered due to an inlet temperature of less than 5 °C. After eliminating the cause of the error, the controller must be restarted to reset the error
ID7236	Open contact - mix. heating cycle inlet temp. probe	S12	Open contact - mixed cycle inlet temperature probe
ID7237	Short circuit - mix. heating cycle inlet temp. probe	S12	Short circuit - mixed cycle inlet temperature probe
ID7238	Open contact - mix. heating cycle return temp. probe	S11	Open contact - mixed cycle return temperature probe
ID7239	Short circuit - mix. heating cycle return temp. probe	S11	Short circuit - mixed cycle return temperature probe
ID7240	Connection to the KNX interface	KNX	Connection to the KNX IP interface lost
ID7241	Negative temp. differential	μPC	The temperature difference when the heat generator is active is implausible.
ID7245	Tunnel occupied	KNX	The tunnel with the physical address (PA of the SMT) set on the controller is already taken by another KNXnet/IP unit (e.g.: ETS PC) or is not available on the interface.
ID7246	Low pressure	μPC	The compressor is locked due to a low pressure malfunction.
ID7247	Device offline	μPC	Device offline - please check the data connection between the controller board and the inverter.
ID7248	Interface is not supported	KNX	The KNXnet/IP tunnelling protocol is not supported by the detected KNX interface.
ID7249	Incorrect interface detected	KNX	The physical address of the detected KNXnet/IP interface is not consistent with the parameter settings of the SMT controller.
ID7250	Min. medium flow rate (I/O 2)		The medium flow rate fell below the heat pump's minimum medium flow rate due to defrosting or in cooling mode. After eliminating the cause of the error, the controller must be restarted to reset the error
ID7251	Min. medium flow rate		The medium flow rate fell below the heat pump's minimum medium flow rate due to defrosting or in cooling mode. After eliminating the cause of the error, the indoor and outdoor units must be restarted to reset the error

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ID	Description	Desig.	Details
ID7252	Heat pump malfunction code	S20	Heat pump malfunction code
ID7253	Heat pump 2 malfunction code	S20.2	Heat pump 2 malfunction code
ID7254	General inverter fault	μPC	General inverter fault - please contact an authorised service technician
ID7255	EEPROM error	μPC	EEPROM error. Please contact an authorised service technician
ID7256	Envelope fault	μPC	Envelope fault - the compressor operates outside the programmed curve. Please contact an authorised service technician
ID7257	Fan overload	μPC	The compressor is disabled due to a fan overload
ID7258	Maximum hot gas temperature	μPC	Maximum hot gas temperature - the compressor is blocked by having reached the maximum hot gas temperature
ID7259	High pressure malfunction	μPC	High pressure malfunction. If this fault occurs frequently, please contact an authorised service technician
ID7260	High pressure malfunction transducer	μPC	The compressor is disabled due to a high pressure malfunction
ID7262	Outside temperature probe error	μPC	Outside temperature probe error - please check the outside temperature sensor on the inverter board and its connection
ID7264	Inlet temperature probe error	μPC	Inlet temperature probe error - please check the inlet temperature probe on the inverter board and its connection
ID7267	Outlet temperature probe error	μPC	Outlet temperature probe error - please check the outlet temperature probe on the inverter board and its connection
ID7269	Hot gas temperature probe error	μPC	Hot gas temperature probe error - please check the hot gas temperature probe on the inverter board and its connection.
ID7270	Suction gas temperature probe error	μPC	Suction gas temperature probe error - please check the suction gas temperature probe on the inverter board and its connection.
ID7271	High pressure probe error	μPC	High pressure probe error - please check the high pressure probe on the inverter board and its connection.
ID7272	Low pressure probe error	μPC	Low pressure probe error - please check the low pressure probe on the inverter board and its connection.
ID7273	WKF fault code E101		Communication error between com. kit and outdoor unit. F1/F2 twisted or cable break
ID7274	WKF fault code E177		Compressor stopped due to an emergency stop signal. After eliminating the cause of the error, the indoor and outdoor units must be restarted to reset the error
ID7275	WKF fault code E221		Short circuit or open contact - probe ambient air temperature motherboard outdoor unit CN43 Pin 1&2
ID7276	Restart required		Due to the changed system (setting / coding resistor), the controller has to be restarted - disconnect it from the power supply for around 10 seconds
ID7278	Low overheating		The compressor is disabled due to overheating being too low.

ID	Description	Desig.	Details
ID7283	Open contact - internal return temp. probe	S15	Open contact - internal return temperature probe
ID7284	Short circuit - internal return temperature probe	S15	Short circuit - internal return temperature probe
ID7285	Low suction gas temperature	μPC	The compressor is disabled due to the suction gas temperature being too low
ID7286	Coding error	Rc	A unique unit identifier could not be assigned using the coding resistor at the Rc terminal
ID7287	Low evaporation temperature	μPC	The compressor is disabled due to the evaporation temperature being too low
ID7288	High evaporation temperature	μPC	The compressor is disabled due to the evaporation temperature being too high
ID7289	High condensation temperature	μPC	The compressor is disabled due to the condensation temperature being too high
ID7290	WKF fault code E102		Communication error between com. kit and outdoor unit. F1/F2 twisted or cable break
ID7291	WKF fault code E201		Communication error between com. kit and outdoor unit - communication could not be established or incorrect board version
ID7292	WKF fault code E231		Short circuit or open contact - evaporator temperature probe motherboard outdoor unit CN43 Pin 3&4
ID7293	WKF fault code E251		Short circuit or open contact - hot gas temperature probe motherboard outdoor unit CN43 Pin 5&6
ID7294	WKF fault code E320		Short circuit or open contact - overload switch probe (OLP) motherboard outdoor unit CN43 Pin 7&8
ID7295	WKF fault code E416		Compressor stopped by overheating protection
ID7296	Open contact - 2nd mixed heating cycle return flow temp.	S14	Open contact - 2nd mixed cycle return flow temp.
ID7297	Short circuit - 2nd mixed heating cycle return flow temp.	S14	Short circuit - 2nd mixed cycle return flow temp.
ID7298	Open contact - 3rd mixed heating cycle inlet temp.	S12.2	Open contact - 3rd mixed cycle inlet temp.
ID7299	Short circuit - 3rd mixed heating cycle inlet temp.	S12.2	Short circuit - 3rd mixed cycle inlet temp.
ID7300	Open contact - 3rd mixed heating cycle return flow temp.	S11.2	Open contact - 3rd mixed cycle return flow temp.
ID7301	Short circuit - 3rd mixed heating cycle return flow temp.	S11.2	Short circuit - 3. mixed cycle return flow temp.
ID7302	Open contact - 4th mixed heating cycle inlet temp.	S06.2	Open contact - 4th mixed cycle inlet temp.

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ID	Description	Desig.	Details
ID7303	Short circuit - 4th mixed heating cycle inlet temp.	S06.2	Short circuit - 4th mixed cycle inlet temp.
ID7304	Open contact - 4th mixed heating cycle return flow temp.	S14.2	Open contact - 4th mixed cycle return flow temp.
ID7305	Short circuit - 4th mixed heating cycle return flow temp.	S14.2	Short circuit - 4. mixed cycle return flow temp.
ID7306	Open contact - refrigerant probe (I/O 2)	S07.2	Open contact - refrigerant probe (I/O 2)
ID7307	Short circuit - refrigerant probe (I/O 2)	S07.2	Short circuit - refrigerant probe (I/O 2)
ID7308	WKF fault code E464		Overcurrent at the inverter module IPM (IGBT transistor module). Check software status for the motherboard
ID7309	WKF fault code E425		Phase fault malfunction. A phase conductor is missing at the frequency converter (can only occur with WKF NEO 180 - otherwise, check motherboard version)
ID7310	WKF fault code E203		Communication error between motherboard (7-segment display) and inverter board
ID7311	WKF fault code E466		Under-voltage or over-voltage in the intermediate DC circuit of the inverter.
ID7312	WKF fault code E469		Voltage probe fault in the intermediate DC circuit of the inverter. Replace inverter board if necessary
ID7313	WKF fault code E458		Implausibly high current at the current probe or fault at the BLDC motor for fan 1.
ID7314	WKF fault code E475		Fault at the BLDC motor for fan 2
ID7315	WKF fault code E461		Implausibly low current at the current probe or fault on the inverter board at compressor start (can occur with compressor damage)
ID7316	WKF fault code E467		Missing phase conductor on the compressor
ID7317	WKF fault code E462		Overcurrent fault (primary side) - check power supply / fuse for the EMI board
ID7318	WKF fault code E463		Compressor overtemperature (OLP). Probe value greater than 115 °C (below 12.7 kohm). Can be caused by a jammed expansion valve
ID7319	WKF fault code E554		Refrigerant quantity / refrigerant loss malfunction
ID7320	WKF fault code E556		Power ratings for the com. kit board (IM) and the motherboard (AM) differ - check board versions.
ID7328	Open contact - 2nd mixed heating cycle inlet temp.	S06	Open contact - 2nd mixed cycle inlet temp.
ID7329	Short circuit - 2. mixed heating cycle inlet temp.	S06	Short circuit - 2nd mixed cycle inlet temp.

ID	Description	Desig.	Details
ID7332	Anti-freeze protection	μPC	The anti-freeze protection in the heat pump's heat exchanger was triggered due to an inlet temperature that is too low. After eliminating the cause of the error, the controller must be restarted to reset the error.
ID7333	Negative temp. differential		The temperature difference when the heat generator is active is implausible
ID7334	Comm. signal		Communication between operating unit SMT 1 and power unit SMT 1 I/O was interrupted.

Warnings

ID	Description	Desig.	Details
ID8100	System temperature too low		The system temperature is too low to start the heat pump.
ID8102	Temperature discrepancy in solar cycle		The collector temperature is at least 60 K higher than the storage tank temperature
ID8103	Overnight collector temperature		A collector temperature of at least 45°C occurred overnight
ID8105	Target flow rate		The flow rate has dropped below the target flow rate
ID8107	Compressor status		The active operating mode is safety mode because the compressor is active without demand
ID8108	Compressor start error	μPC	Compressor start error
ID8109	EVD EVO probe fault	μPC	EVD EVO probe fault
ID8110	Driver offline	μPC	Driver offline
ID8132	Anti-freeze protection active		The anti-freeze protection function is currently active - check the room climate mode set
ID8138	HW storage tank set temp.		The hot water storage tank set temperature was reduced due to low outside temperatures
ID8139	Lower application area (heating)		The temperature has currently dropped below the guaranteed application area of the external unit in heating mode
ID8140	Upper application area (heating)		The guaranteed application area of the external unit in heating mode is currently exceeded
ID8141	Lower application area (cooling)		The temperature has currently dropped below the guaranteed application area of the external unit in cooling mode
ID8142	Upper application area (cooling)		The guaranteed application area of the external unit in cooling mode is currently exceeded
ID8144	Target flow rate (I/O 2)		The flow rate has dropped below the target flow rate
ID8223	SD card error (host)		SD card error (host): The SD card is either not inserted correctly or an error has occurred
ID8224	SD card error		SD card error (CP): The SD card is not inserted or an error has occurred
ID8225	Dewpoint monitoring	CP	Dew point monitoring was activated but no control panel (with integrated humidity and temperature probe) was assigned to the cooling cycle to calculate the dew point

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ID	Description	Desig.	Details
ID8226	Temp. dropped below min. inlet temp.		Temp. dropped below min. inlet temp. (or dew point) - cooling request is suppressed
ID8227	Hygiene function: Setpoint not reached		The hygiene function was cancelled due to the maximum runtime being reached before attaining the set temperature
ID8229	2. heat generator active		Due to the return temperature being too low during defrosting, the 2nd heat generator activated

16 General view of unit and spare parts

16.1 Exploded view of outdoor unit WKF NEO 70

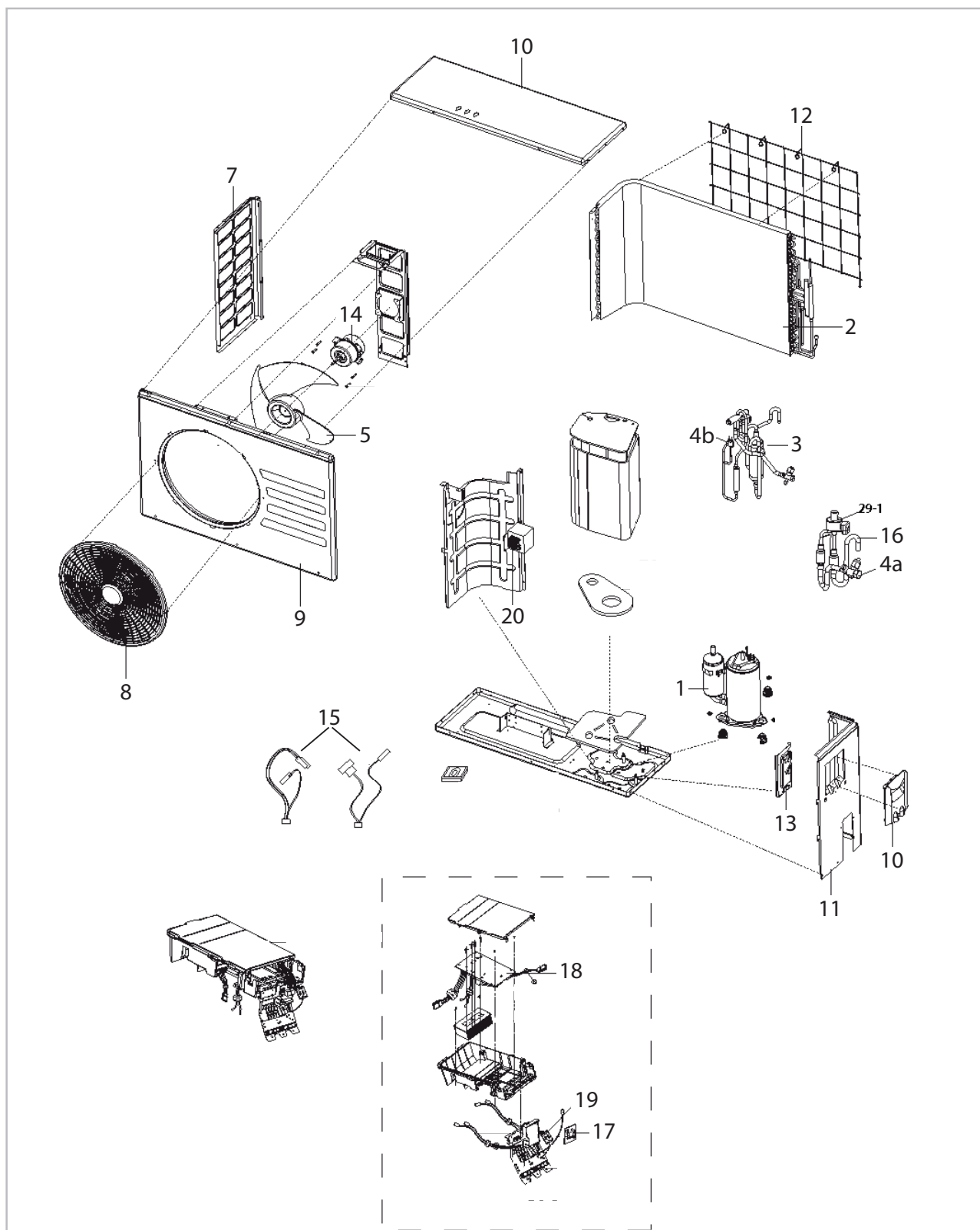


Fig. 58: Exploded view of outdoor unit WKF NEO 70

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16.2 Spare parts for outdoor unit WKF NEO 70

No.	Designation	WKF NEO 70
1	Compressor	On request by providing the serial number
2	Finned heat exchanger	
3	Four-way changeover valve	
4	Shut-off valves	
5	Fan blade	
6	Cover panel	
7	Side panel, left	
8	Fan protection grate	
9	Front panel	
10	Cover - display	
11	Side panel, right	
12	Grate, rear	
13	Valve mounting plate	
14	Fan motor	
15	Probe set evaporator/compressor heat gas/outside temperature	
16	Electronic expansion valve	
17	Motherboard with display	
18	Inverter board	
19	F1/F2 interference filter	
20	Inductor	

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

16.3 Exploded view of outdoor unit WKF NEO 120

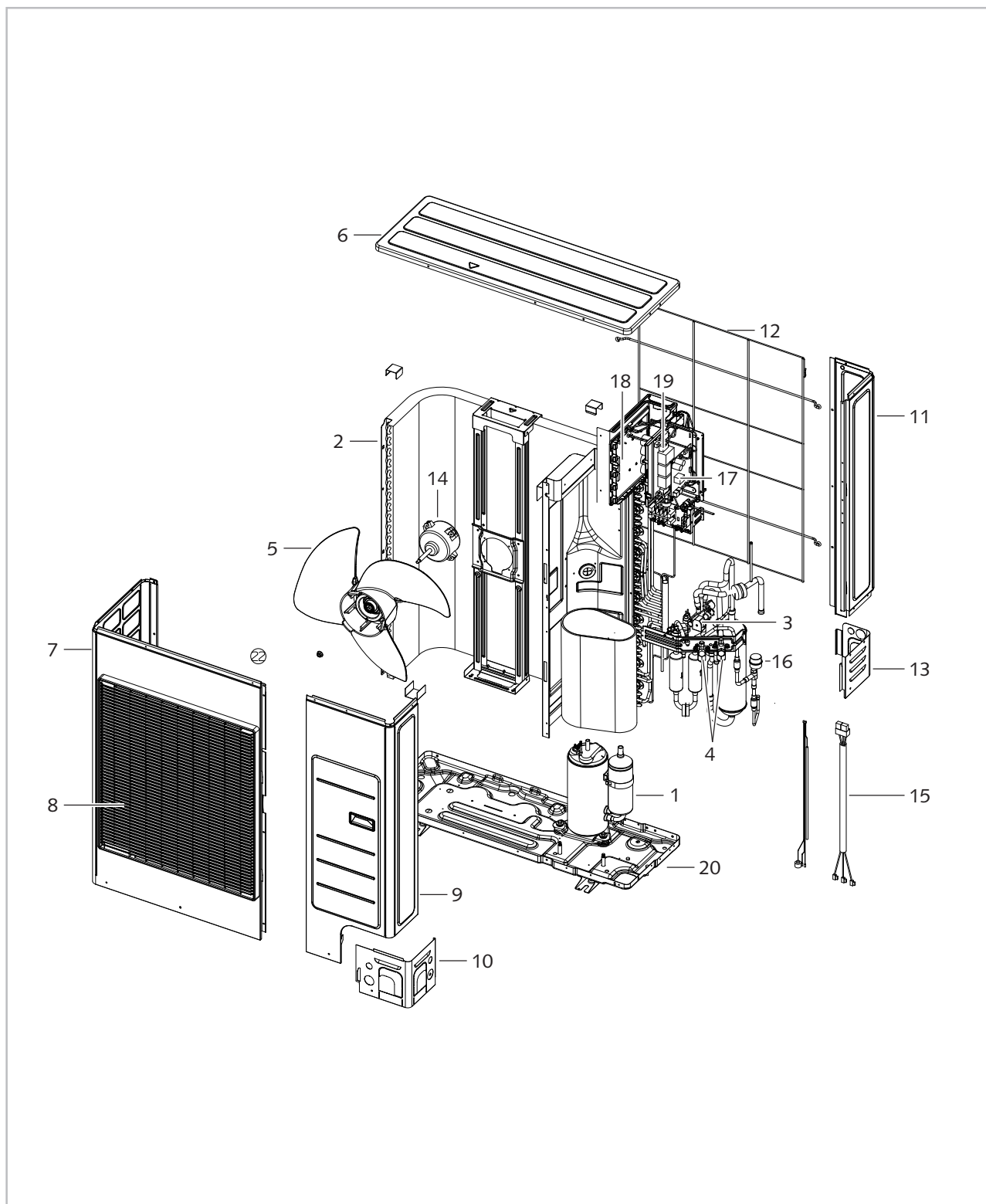


Fig. 59: Exploded view of outdoor unit WKF NEO 120

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

REMKO series WKF NEO-compact

16.4 Spare parts for outdoor unit WKF NEO 120

No.	Designation	WKF NEO 120
1	Compressor	On request by providing the serial number
2	Finned heat exchanger	
3	Four-way changeover valve	
4	Shut-off valves	
5	Fan blade	
6	Cover panel	
7	Side panel, left front	
8	Grate, front	
9	Side panel, right front	
10	Mounting corner, right front	
11	Side panel, right rear	
12	Grate, rear	
13	Mounting corner, right rear	
14	Fan motor	
15	Evaporator probe / compressor probe set	
15	Heat gas probe / outside temperature probe set	
16	Electronic expansion valve	
17	Motherboard with display	
18	Inverter board	
19	EMI board	
20	Device base/condensate tray	
Spare parts not illustrated		
	Inductor	On request by providing the serial number

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

16.5 Exploded view of outdoor unit WKF NEO 180

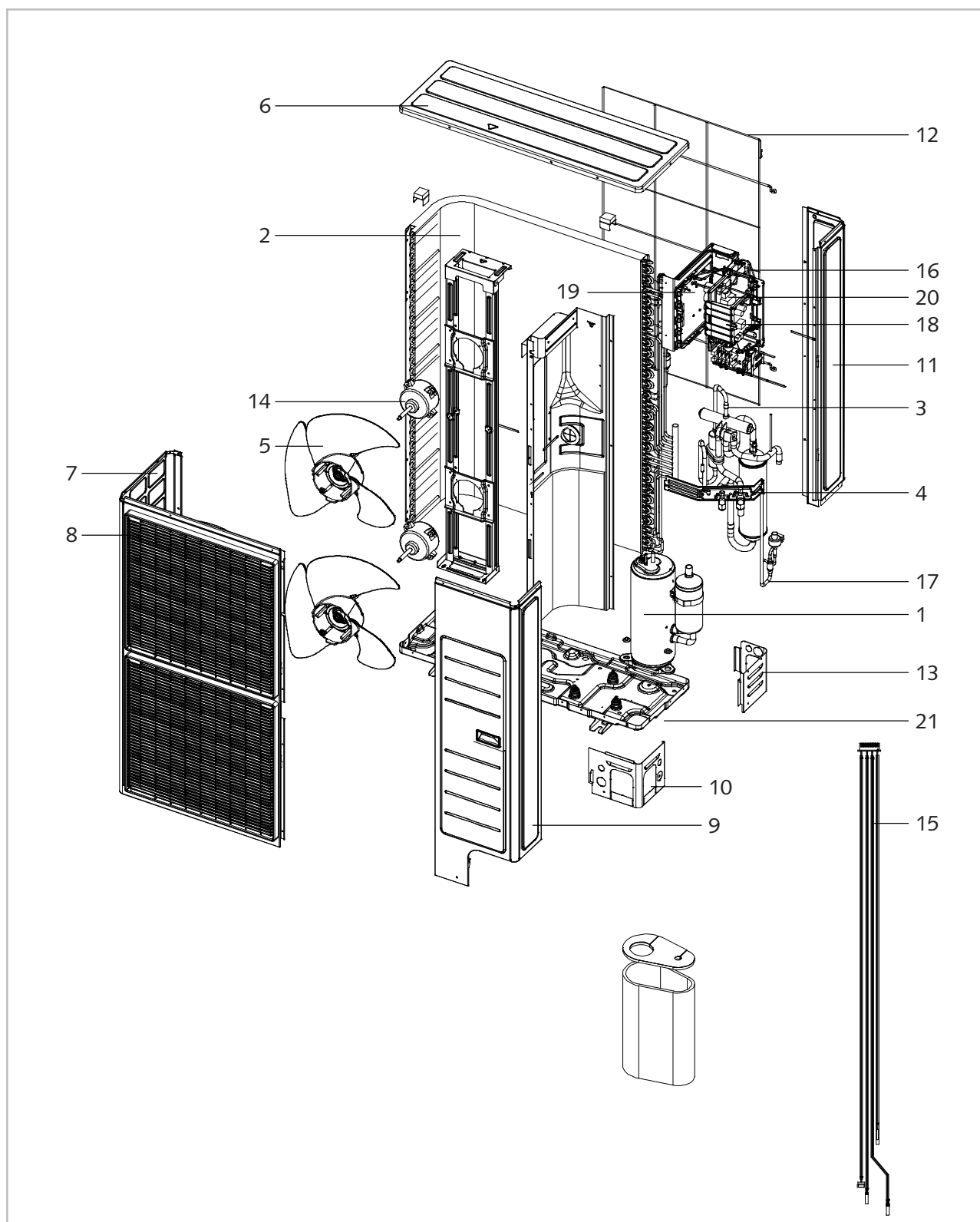


Fig. 60: Exploded view of outdoor unit WKF NEO 180

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

REMKO series WKF NEO-compact

16.6 Spare parts for outdoor unit WKF NEO 180

No.	Designation	WKF NEO 180
1	Compressor	On request by providing the serial number
2	Finned heat exchanger	
3	Four-way changeover valve	
4	Shut-off valves	
5	Fan blade	
6	Cover panel	
7	Side panel, left front	
8	Grate, front	
9	Side panel, right front	
10	Mounting corner, right front	
11	Side panel, right rear	
12	Grate, rear	
13	Mounting corner, right rear	
14	Fan motor	
15	Evaporator probe / compressor probe set	
15	Heat gas probe / outside temperature probe set	
16	Inductor	
17	Electronic expansion valve	
18	Motherboard with display	
19	Inverter board	
20	EMI board	
21	Device base/condensate tray	

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

16.7 Exploded view of indoor units WKF NEO compact

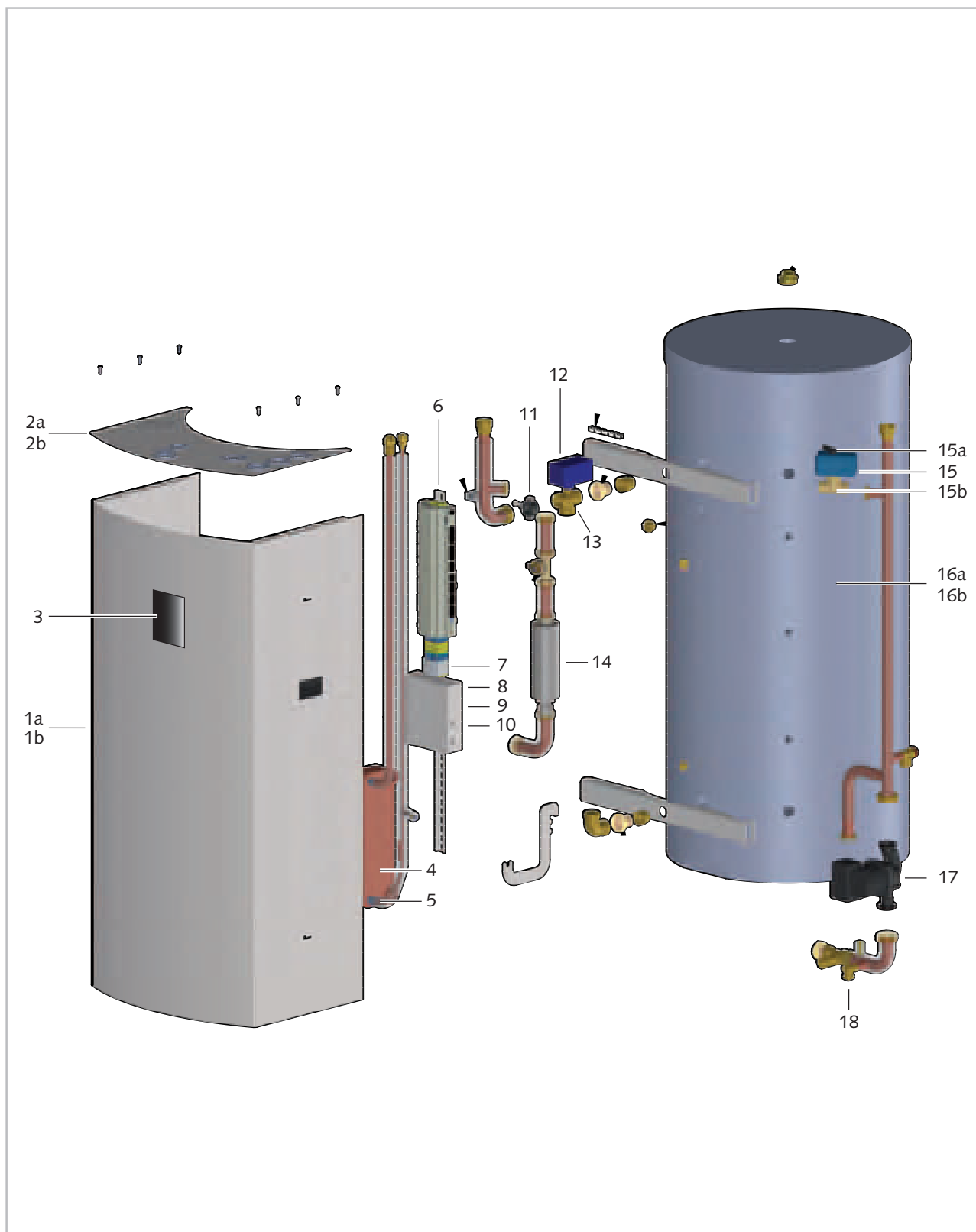


Fig. 61: Exploded view - Indoor unit WKF NEO compact

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

REMKO series WKF NEO-compact

16.8 Spare parts for indoor units WKF NEO compact 70/120/180

No.	Designation	WKF NEO compact 70/120/180
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	
8	Comkit board transformer	
9	Comkit control board	
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	
18	Ball valve 1/2"	

Spare parts not illustrated

Designation	WKF NEO compact 70/120/180
Cold water pipe stainless steel	On request by providing the serial number
Hot water pipe 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 resistance	
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)!

REMKO series WKF NEO-compact

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. $-3\text{ }^{\circ}\text{C}$). 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 $5\text{ }^{\circ}\text{C}$ 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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