Operating and installation instructions

REMKO LWM series

Monobloc heat pumps
Air/water system for heating and cooling

LWM 80, LWM 110, LWM 150, LWM 110 Duo, LWM 150 Duo

Instructions for Technicians

0205-2023-01 Edition 2, en_GB

Read the instructions prior to performing any task!

CE

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

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

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

Translation of the original

Table of contents

1 Safety and usage instructions

1.1 General safety notes

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

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

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

Warning of inflammable substances!

1.2 Identification of notes

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

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

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

DANGER!

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

DANGER!

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

WARNING!

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

CAUTION!

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

NOTICE!

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

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

1.3 Personnel qualifications

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

1.4 Dangers of failure to observe the safety notes

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

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

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

1.5 Safety-conscious working

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

1.6 Safety notes for the operator

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

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

1.7 Safety notes for installation, maintenance and inspection

- Appropriate hazard prevention measures must be taken to prevent risks to people when performing installation, repair, maintenance or cleaning work on the units.
- The setup, connection and operation of the units and its components must be undertaken in accordance with the usage and operating conditions stipulated in this manual and comply with all applicable regional regulations.
- Regional regulations and laws as well as the Water Ecology Act (WHG) must be observed.
- Only install and store the units in rooms larger than 4 m^2. With a failure to comply, leaks may result in the room filling with a flammable mixture! The minimum room size of 4 m^2 required for installation and storage pertains to the basic fill quantity of the unit. This varies according to the installation type and total fill quantity of the system. The calculation must take place in accordance with valid DIN standards. Make sure that the installation site is suitable for safe unit operation.
- The electrical 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 an increased 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 may not be modified or bypassed.

1.8 Unauthorised modification and changes

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

1.9 Intended use

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

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

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

1.10 Warranty

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

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

1.11 Transport and packaging

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

⚠ WARNING!

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

Why:

- Leave packaging material are not around.

- Packaging material may not be accessible to children!

1.12 Environmental protection and recycling

Disposal of packaging

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

Disposal of equipment and components

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

2 Technical data

2.1 Unit data

Series		LWM 80	LWM 110	LWM 150
Function		Heating or Cooling		
System		Air/water		
Heat pump manager		Smart Control Touch		
Drinking water tank enamelled		optional		
Auxiliary heater installed/rated output	kW	optional 7.5		
Domestic hot-water heating (change-over valve)		optional		
Connection oil/gas boiler changeover valve		optional		
Heating capacity min./max.	kW	0.6-8.0	2.0-10.7	3.0-14.5
Heating capacity/COP [1)]				
with A12/W35	kW/COP	7.5/5.65	9.18/5.57	11.0/5.58
with A7/W35	kW/COP	6.25/5.10	8.04/5.02	10.28/5.03
with A2/W35	kW/COP	4.33/4.09	6.35/4.04	8.33/4.11
with A-7/W35	kW/COP	3.82/3.55	5.57/3.42	7.85/3.57
with A-15/W35	kW/COP	2.6/2.95	4.47/2.82	6.5/2.97
with A7/W45	kW/COP	6.05/3.96	7.87/3.88	10.09/3.89
with A-7/W45	kW/COP	3.73/2.96	5.51/2.83	7.76/2.98
with A7/W55	kW/COP	5.68/3.20	7.50/3.12	9.72/3.13
with A-7/W55	kW/COP	3.64/2.49	5.42/2.36	7.67/2.51
with A10/W35	kW/COP	6.80/5.43	8.55/5.31	10.60/5.32
Cooling capacity min./max.	kW	1.1-8.9	3.3-11.9	5.5-14.0
Cooling capacity/EER [2)]				
with A35/W7	kW/EER	4.90/2.81	7.63/2.73	12.20/2.65
with A35/W18	kW/EER	5.70/3.61	8.24/3.71	12.77/3.81
with A27/W18	kW/EER	5.80/3.92	10.71/4.00	18.20/4.11
Usable limits, heating	°C	-23 to +37		
Service limits, cooling	°C	+15 to +45		
Inlet temperature, heating water, max.	°C	65		
Min. inlet temperature for cooling	°C	7		
Heat pump power supply	V/Ph/Hz	230/1~/50	400/3~/50	
Electrical heating element power supply (Smart Serv)	V/Ph/Hz	400/3~/50		
Control board power supply	V/Ph/Hz	230/1~/50		

REMKO LWM series

Series		LWM 80	LWM 110	LWM 150
Heater for anti-freeze protection power supply (optional)	V/Ph/Hz	230/1~/50		
Max. current consumption per phase	A	5.8	4.7	6.6
Rated current consumption for A7/W35	A	5.30	2.57	3.27
Rated power consumption for A7/W35	kW	1.22	1.60	2.04
Rated power consumption for A2/W35	kW	1.06	1.57	2.03
Max. power consumption	kW	1.6	2.0	2.5
Power factor at A7/W35 (cosφ)	--	0.9		
Customer-provided electrical protection	A slow-acting	16	3 x 16	
Refrigerant		R454B [3]		
Refrigerant, basic capacity/CO_2 equivalent	kg/t	1.3/0.61	1.4/0.65	1.8/0.84
Medium flow rate water(according to EN 14511, at Δt 5 K)	m^3/h	1.1	1.4	1.6
Pressure loss (heating system), outdoor	kPa	80	70	60
Max. airflow volume	m^3/h	3000	3500	4000
Max. operating pressure, water	bar	3		
Hydraulic connection, inlet/return flow (flat-sealing)	Inches (DN)	1 1/4 (32)		
Recommended diameter for copper piping to be used by the customer	mm	28		
Max. sound power level in acc. with DIN EN 12102:2008-09 and ISO 9614-2	dB(A)	54	56	58
Sound pressure level, LpA [4]	dB(A)	32	34	36
Tonality	dB(A)	0		
Sound power level/sound pressure levelnight operations/lowering mode	dB(A)	47/25	49/27	51/29
Dimensions (height/width/depth)	mm	1600 x 1000 x 850		
Enclosure class	--	IP X4		
Weight	kg	180	200	220

[1] COP = coefficient of performance in accordance with EN 14511, VDE tested, rated compressor frequency 60 Hz

[2] EER = energy efficiency ratio in accordance with EN 14511, rated compressor frequency 60 Hz

[3] Contains greenhouse gas according to Kyoto protocol, GWP 466

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

Information provided without guarantee! We reserve the right to make technical changes within the framework of technical advancement.

Series		LWM 110 Duo	LWM 150 Duo
Function		Heating or Cooling	
System		Air/water	
Heat pump manager		Smart Control Touch	
Drinking water tank enamelled		optional	
Auxiliary heater/rated output per heat pump	kW	7.5	
Domestic hot-water heating (changeover valve)		optional	
Connection oil/gas boiler		optional	
Heating capacity min./max.	kW	2.0-21.4	3.0-29.0
Heating capacity/COP [1)]			
with A12/W35	kW/COP	18.36/5.57	22.00/5.58
with A7/W35	kW/COP	16.08/5.02	20.56/5.03
with A2/W35	kW/COP	12.70/4.04	16.66/4.11
with A-7/W35	kW/COP	11.14/3.42	15.70/3.57
with A-15/W35	kW/COP	8.94/2.82	13.00/2.97
with A7/W45	kW/COP	15.74/3.88	20.18/3.89
with A-7/W45	kW/COP	11.02/2.83	15.52/2.98
with A7/W55	kW/COP	15.00/3.12	19.44/3.13
with A-7/W55	kW/COP	10.84/2.36	15.34/2.51
with A10/W35	kW/COP	17.10/5.31	21.20/5.32
Cooling capacity min./max.	kW	3.3-23.8	5.5-28.0
Cooling capacity/EER [2)]			
with A35/W7	kW/EER	15.26/2.73	24.40/2.65
with A35/W18	kW/EER	16.48/3.71	25.54/3.81
with A27/W18	kW/EER	21.42/4.00	36.08/4.11
Usable limits, heating	°C	-23 to +37	
Service limits, cooling	°C	+15 to +45	
Inlet temperature, heating water, max.	°C	65	
Min. inlet temperature for cooling	°C	7	
Power supply per heat pump	V/Ph/Hz	400/3~/50	
Power supply per electrical heating element (Smart Serv)	V/Ph/Hz	400/3~/50	
Power supply per control board	V/Ph/Hz	230/1~/50	
Power supply per heater for anti-freeze protection (optional)	V/Ph/Hz	230/1~/50	
Max. current consumption per phase and heat pump	A	4.7	6.6
Rated current consumption for A7/W35 per heat pump	A	2.57	3.27

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Series		LWM 110 Duo	LWM 150 Duo
Rated power consumption for A7/W35	kW	1.60	2.04
Rated power consumption for A2/W35 per heat pump	kW	1.57	2.03
Max. power consumption per heat pump	kW	3.2	4.5
Power factor at A7/W35 (cosφ) per heat pump	--	0.9	
Fuse protection provided by the customer per heat pump	A slow-acting	3 x 16	
Refrigerant		R454B [3]	
Refrigerant, basic capacity/CO_2 equivalent	kg/t	2 x 1.4/0.65	2 x 1.8/0.84
Medium flow rate water(according to EN 14511, at Δt 5 K) per heat pump	m^3/h	1.4	1.6
Outdoor pressure loss (heating system) per heat pump	kPa	70	60
Max. airflow volume per heat pump	m^3/h	2x3500	2x4000
Max. water operating pressure per heat pump	bar	3	
Hydraulic connection inlet/return flow, flat-sealing per heat pump	Inches (DN)	1 1/4 (32)	
Copper collector line diameter to be used by the customer per heat pump	mm	42	
Max. sound power level in acc. with DIN EN 12102:2008-09 and ISO 9614-2per heat pump	dB(A)	56	58
Sound pressure level LpA [4]per heat pump	dB(A)	34	36
Tonality	dB(A)	0	
Sound power level/sound pressure levelnight operations/lowering mode per heat pump	dB(A)	49/27	51/29
Dimensions per heat pump (height/width/depth)	mm	1600 x 1000 x 850	
Enclosure class	--	IP X4	
Weight per heat pump	kg	200	220

[1] COP = coefficient of performance in accordance with EN 14511, VDE tested, rated compressor frequency 60 Hz

[2] EER = energy efficiency ratio in accordance with EN 14511, rated compressor frequency 60 Hz

[3] Contains greenhouse gas according to Kyoto protocol, GWP 466

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

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2.2 Product data

Average condition [1)]

Series		LWM 80	LWM 110	LWM 150
Energy efficiency ratio, heating 35°C/55°C		A++/A++		
Nominal heating power P rated	kW	5	7	10
Room heating energy efficiency ηs 35°C/55°C	%	161/136	161/142	164/138
Contribution to the seasonal room heating energy efficiency of the REMKO Smart-Control	%	4		
Yearly energy consumption Q_{HE} 35°C/ 55°C [4)]		2629/3173	3395/3797	4588/5780
Sound power level L_{WA}	dB(A)	56	58	60

Warmer condition [2)]

Series		LWM 80	LWM 110	LWM 150
Energy efficiency ratio, heating 35°C/55°C		A++/A++		
Nominal heating power P rated	kW	4	6	8
Room heating energy efficiency ηs 35°C/55°C	%	182/160	187/167	169/164
Yearly energy consumption Q_{HE} 35°C/ 55°C [4)]		1326/1379	1668/1638	2550/2537

Colder condition [3)]

Series		LWM 80	LWM 110	LWM 150
Energy efficiency ratio, heating 35°C/55°C		A++/A++		
Nominal heating power P rated	kW	7	9	13
Room heating energy efficiency ηs 35°C/55°C	%	147/114	145/122	148/120
Yearly energy consumption Q_{HE} 35°C/ 55°C [4)]		4158/6135	5485/7278	7319/10700

[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

REMKO LWM series

Average condition [1)]

Series		LWM 110 Duo	LWM 150 Duo
Energy efficiency ratio, heating 35°C/55°C		A++/A++	
Nominal heating power P rated	kW	14	20
Room heating energy efficiency ηs 35°C/55°C	%	161/142	164/138
Contribution to the seasonal room heating energy efficiency of the REMKO Smart-Control	%	4	
Yearly energy consumption Q_{HE} 35°C/ 55°C [4)]		6790/7594	9176/11560
Sound power level L_{WA} per heat pump	dB(A)	58	60

Warmer condition [2)]

Series		LWM 110 Duo	LWM 150 Duo
Energy efficiency ratio, heating 35°C/55°C		A++/A++	
Nominal heating power P rated	kW	12	16
Room heating energy efficiency ηs 35°C/55°C	%	187/167	169/164
Yearly energy consumption Q_{HE} 35°C/ 55°C [4)]		3336/3276	5100/5074

Colder condition [3)]

Series		LWM 110 Duo	LWM 150 Duo
Energy efficiency ratio, heating 35°C/55°C		A++/A++	
Nominal heating power P rated	kW	18	26
Room heating energy efficiency ηs 35°C/55°C	%	145/122	148/120
Yearly energy consumption Q_{HE} 35°C/ 55°C [4)]		10970/14556	14638/21400

[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 indoor units

Unit dimensions

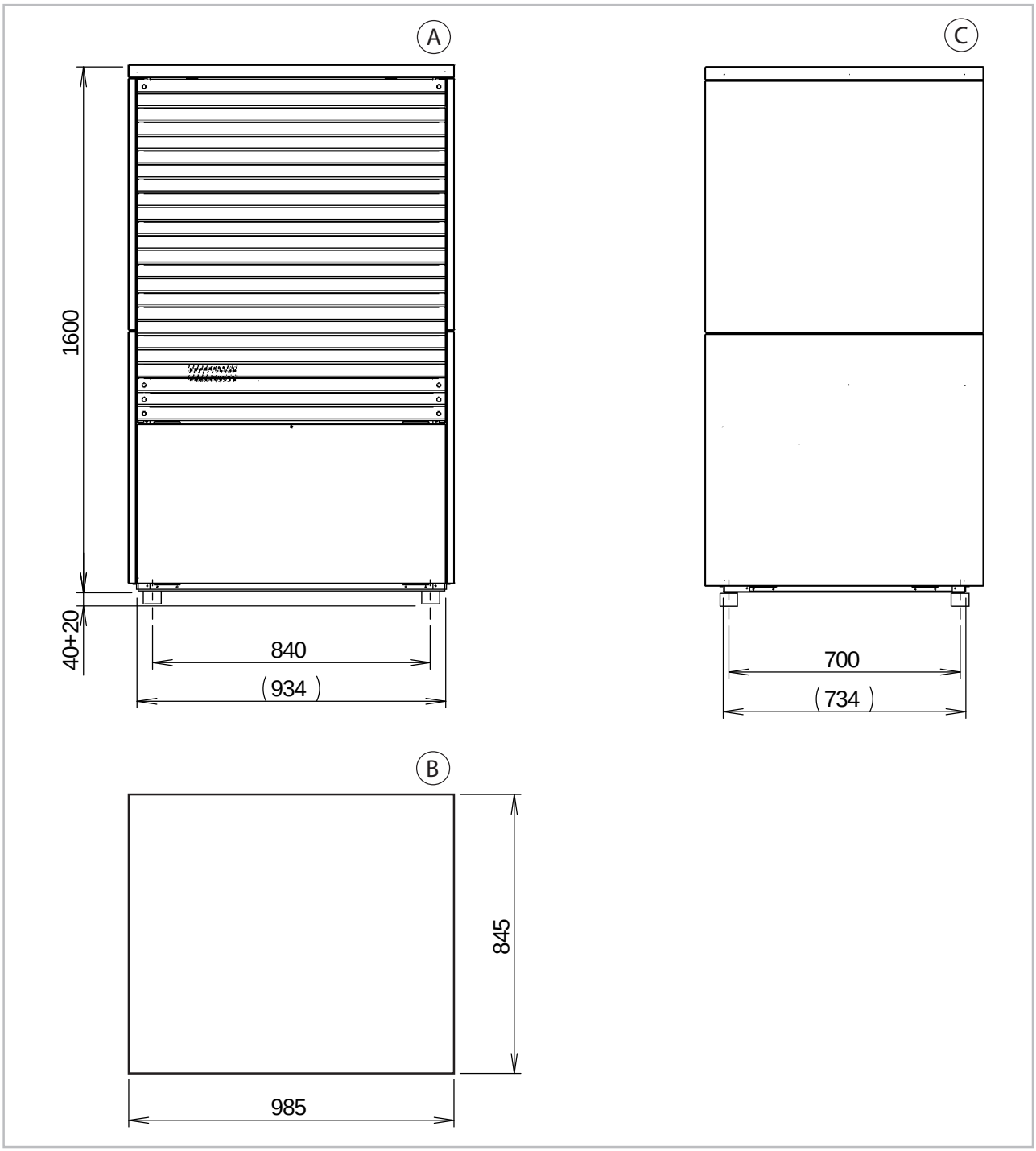


Fig. 1: Unit dimensions (all dimensions in mm)

A: Front view
B: Bird´s eye view
C: Side view

Designations of the pipe connections

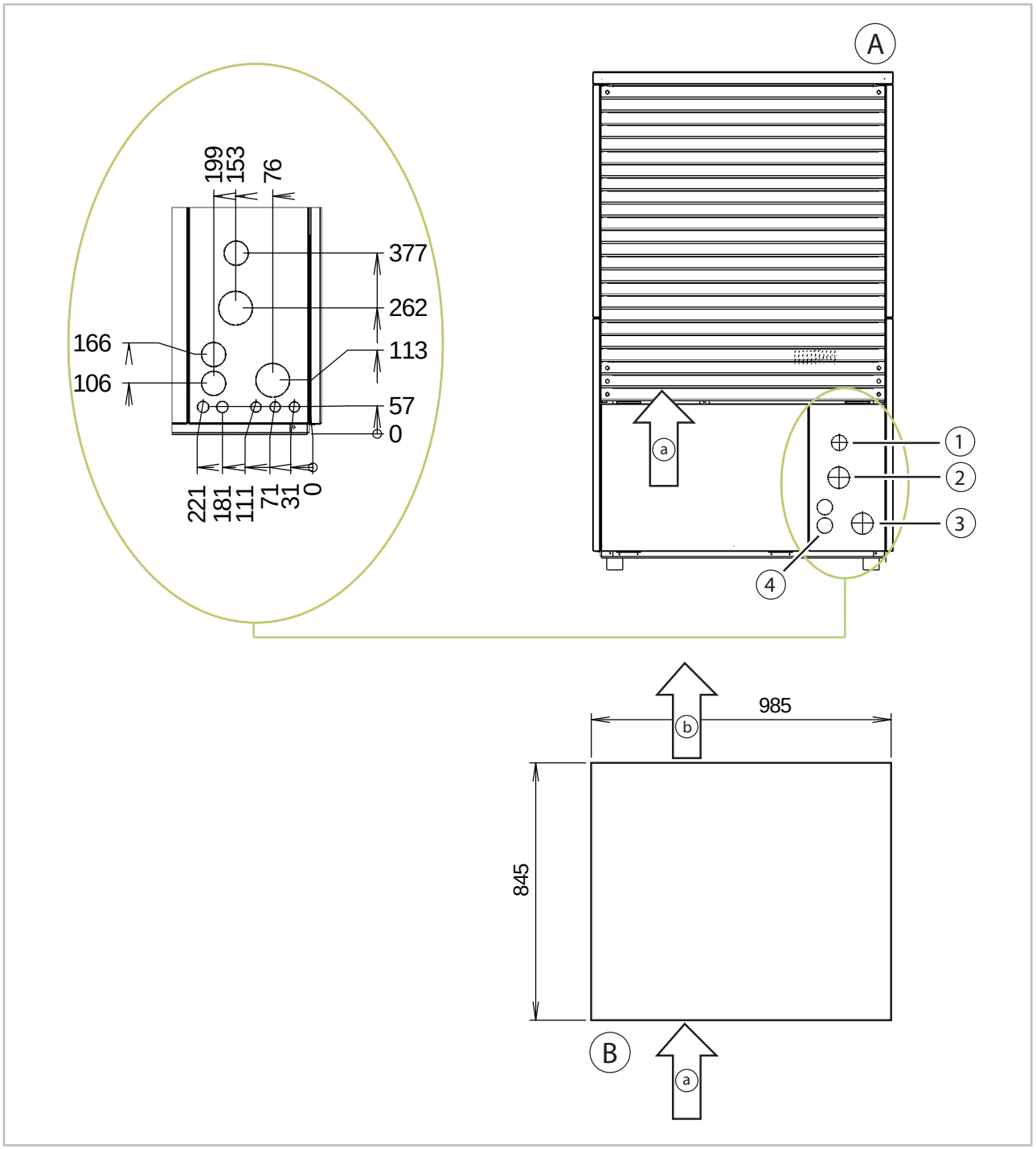


Fig. 2: Designations of the pipe connections

A: Rear view
B: Bird´s eye view
1: Condensate drain
2: Inlet heat pump 1 1/4"
3: Return flow heat pump 1 1/4"
4: Cable inlets
a: Air inlet
b: Air outlet

Connection adapter with base panel

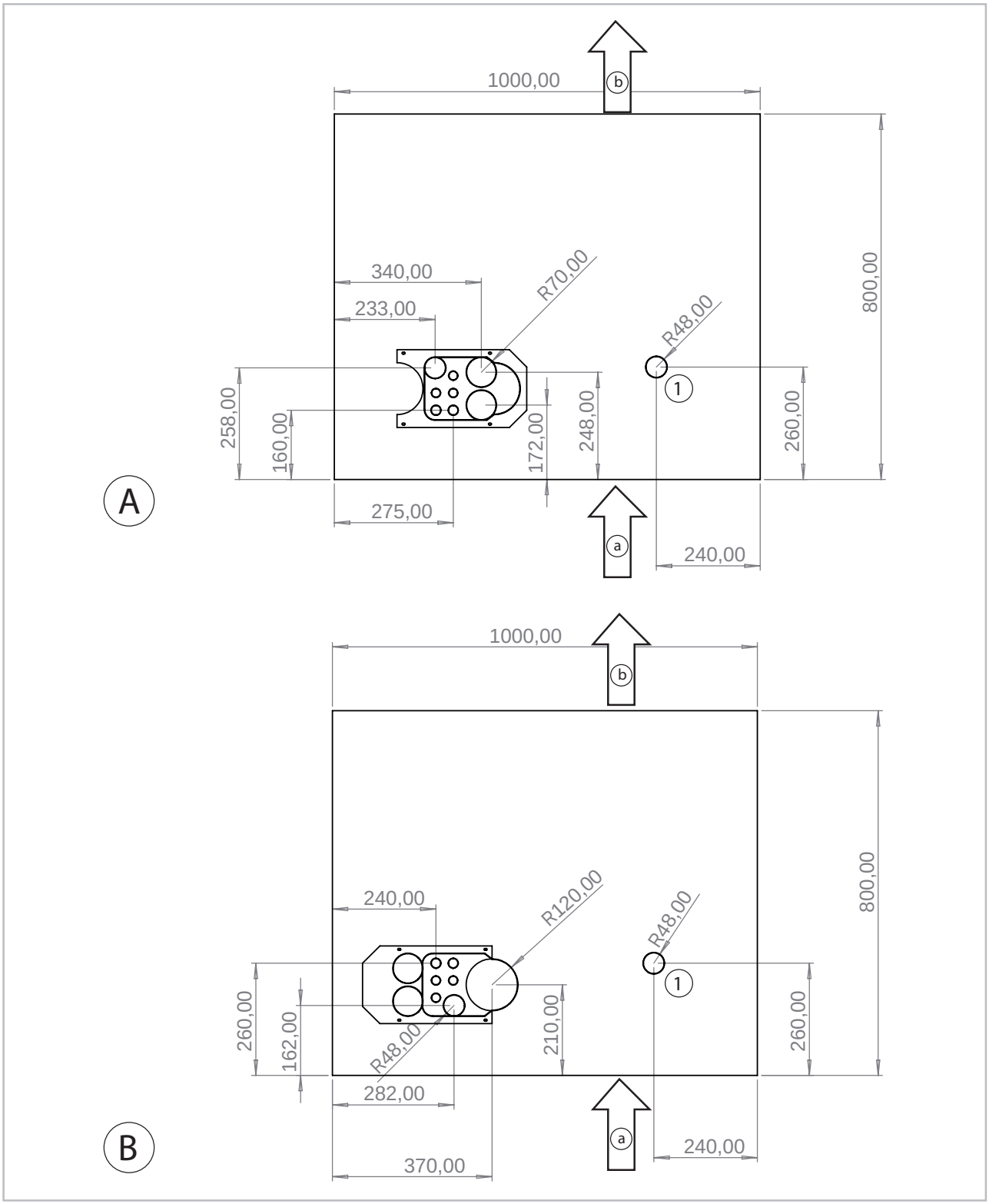


Fig. 3: Connection adapter with base panel

A: For pipelines
B: For district heating pipes
1: Condensate opening

a: Air inlet
b: Air outlet

2.4 Diagram, cooling cycle

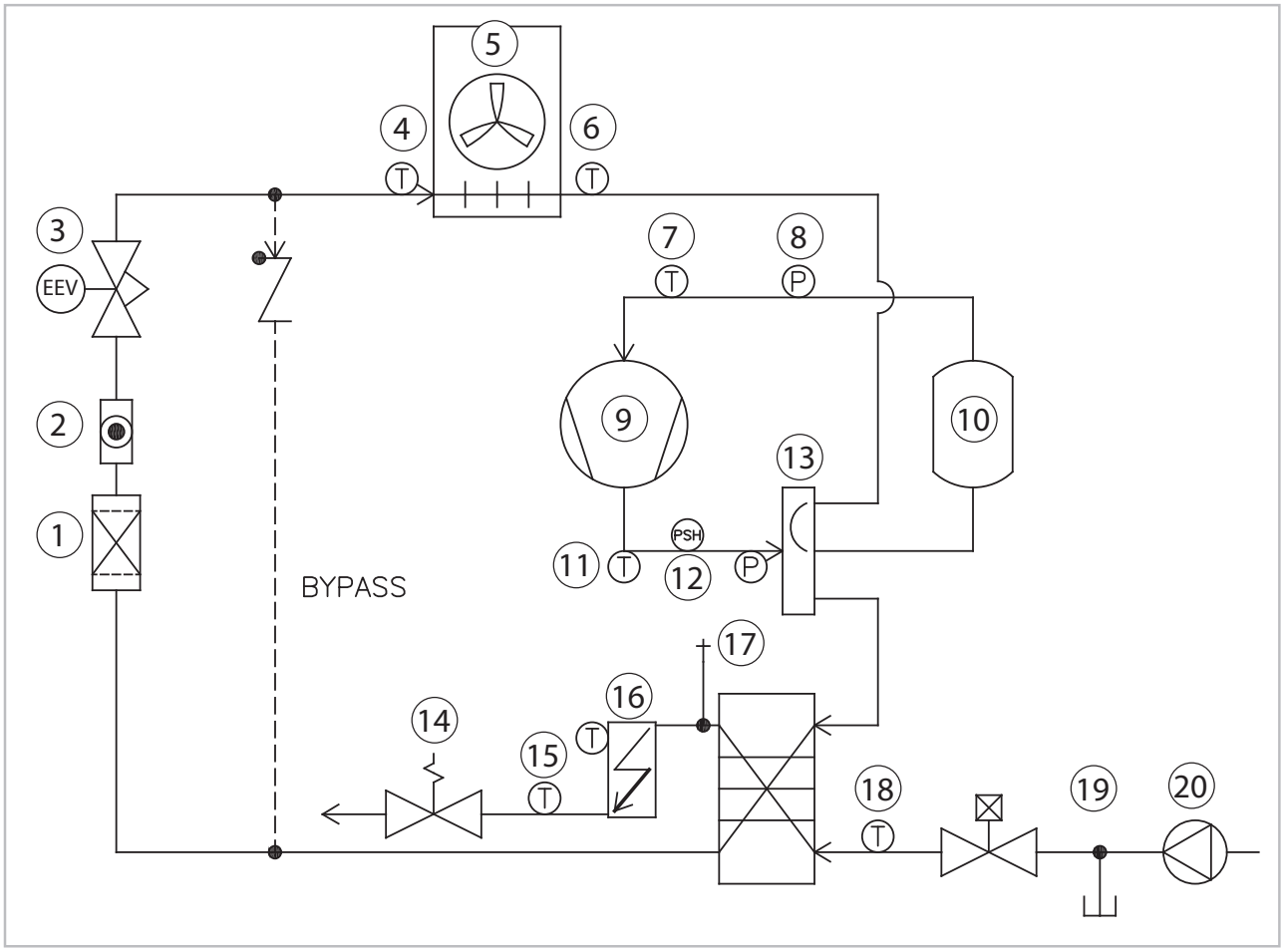


Fig. 4: Diagram, cooling cycle

1: Refrigerant dryer
2: Refrigerant inspection glass
3: Electr. expansion valve
4: Finned heat exchanger air suction probe
5: Finned heat exchanger fan
6: Finned heat exchanger air outlet probe
7: Refrigerant probe suction-side
8: Low pressure switch
9: Compressor
10: Refrigerant collector
11: Hot gas probe/Suction gas probe
12: High pressure switch 45 bar
13: 4-way changeover valve
14: Safety valve
15: Water outlet probe/Heat pump inlet
16: Smart Serv 7.5 kW
17: Manual bleeder valve
18: Water outlet probe/Heat pump return flow
19: Cap valve
20: Circulation pump

2.5 Heat pump usable limits in monovalent operation

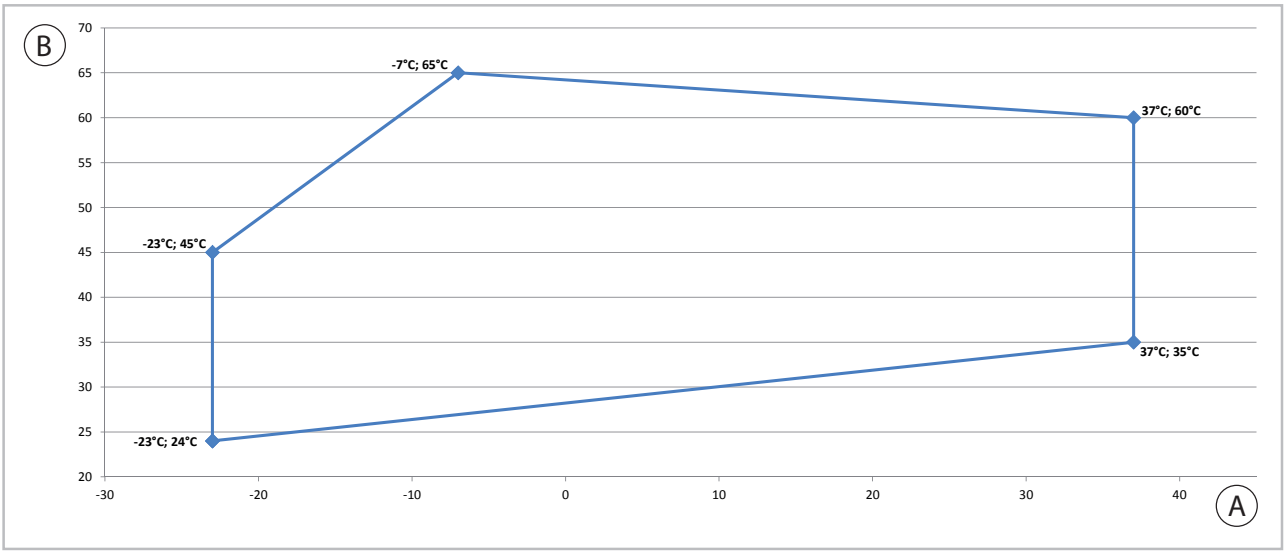


Fig. 5: Usable limits LWM

A: Outside temperature [°C]

B: Heating water inlet temperature [°C]

Outside temperature [°C]	-23	-23	-7	37	37
Inlet temperature [°C]	24	45	65	60	35

2.6 Pump characteristics and circulation pump pressure losses

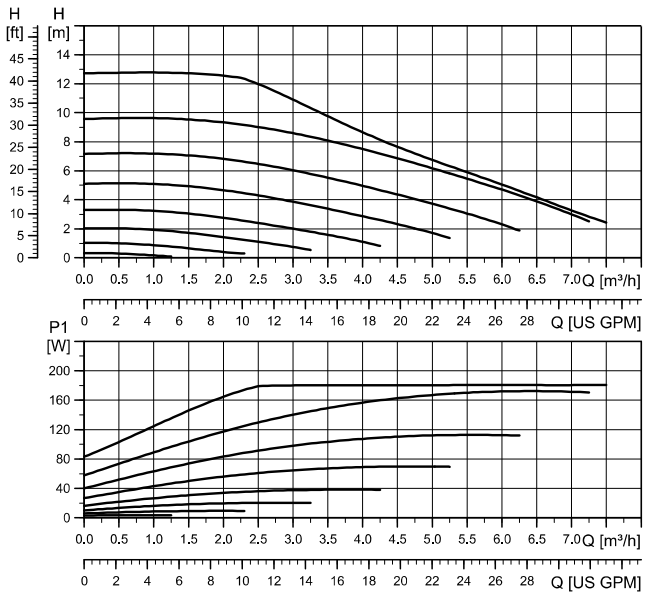


Fig. 6: Capacity range of the UPMXL 25-125

p: Power consumption [kPa]

H: Delivery height [m]

Q: Requirement [l/s or m^3/h]

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

REMKO LWM series

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

Technical data

Pump type			Grundfos UPMXL 25-125
Installation length		mm	180
Connecting threads		Inches	R 1 / G 1 1/2
Control signal	Internally controlled via PP/CP/CC		-
	Digital bidirectional low voltage PWM signal		●
Power supply voltage+ 10/- 15 % 50 Hz		V	1 x 230 V

The heating system must be dimensioned in such a way that at least the nominal heating water flow rate can be achieved with the residual head of the circulation pump.

Residual head LWM

Series		LWM 80	LWM 110	LWM 150
Nomin. [1] heating water throughput per heat pump	m^3/h	1.1	1.4	1.6
Residual head [2] per heat pump	kPa	80	70	60
3-way changeover valve pressure loss [3]	kPa	7	8	10
Spread	K	5	5	5

[1] Nominal volume flow rates according to DIN EN 14511, for efficient and safe operation do not fall below the nominal value.

[2] Residual head with pumps according to accessories (without pressure loss of the 3-way changeover valve)

[3] REMKO changeover valve DN 25

The pipe dimensions from the heat pump to the on-site hydraulic connection must be designed according to the design medium flow rate.

The minimum diameter is DN 25.

Heat pump pipe length to on-site hydraulic system	1-13 m	13-20 m	Duo collector line
Smooth pipe with inside diameter	DN 25	DN 32	DN 40 [*]

[*] The copper pipe of the Duo variant collector line must have an inside diameter of at least 42 mm.

In the case of metal composite pipes, the higher individual resistances of the fittings mean that a design with residual head must be carried out.

2.7 Total sound power level

LWM 80

Fig. 7: Total sound power level LP

A: Sound power level L_{WA}re 1pW [dB(A)]
B: Frequency [Hz]
1: Nominal/max. A7/W55
2: Night mode 60% A7/W55
3: A total [dB(A)]

Middle frequency [Hz]	100	125	160	200	250	315	400	500	630	800	1000
Nominal/max. A7/W55 [dBA]	30.6	39.6	40.6	42.4	41.3	38.9	39.2	39.2	40.4	45.5	45.4
Night mode 60% A7/W55 [dBA]	30.9	29.8	33.8	34.1	31.5	31.9	31.6	31.4	31.2	36.2	42.7

Middle frequency [Hz]	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	A total
Nominal/max. A7/W55 [dBA]	42.4	41.1	39.6	40.7	38.9	37.9	38.8	41.0	34.1	32.0	**53.9**
Night mode 60% A7/W55 [dBA]	30.6	33.4	31.6	31.9	32.1	30.2	31.8	33.4	28.0	26.3	**47.1**

The sound power conforms to accuracy class 2.

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

LWM 110/LWM 110 Duo

Fig. 8: Total sound power level LP

A: Sound power level L_{wA}re 1pW [dB(A)]
B: Frequency [Hz]
1: Nominal/max. A7/W55
2: Night mode 60% A7/W55
3: A total [dB(A)]

Middle frequency [Hz]	100	125	160	200	250	315	400	500	630	800	1000
Nominal/max. A7/W55 [dBA]	32.6	41.6	42.6	44.4	43.3	40.9	41.2	41.2	42.4	47.5	47.4
Night mode 60% A7/W55 [dBA]	32.9	31.8	35.8	36.1	33.5	33.9	33.6	33.4	33.2	38.2	44.7

Middle frequency [Hz]	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	A total
Nominal/max. A7/W55 [dBA]	44.4	43.1	41.5	42.7	40.9	39.6	40.8	43.0	36.1	34.0	**55.9**
Night mode 60% A7/W55 [dBA]	32.6	35.4	33.6	33.9	34.1	32.2	33.8	35.4	30.0	28.3	**49.1**

The sound power conforms to accuracy class 2.

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

LWM 150/LWM 150 Duo

Fig. 9: Total sound power level LP

A: Sound power level L_{WA}re 1pW [dB(A)]
B: Frequency [Hz]
1: Nominal/max. A7/W55
2: Night mode 60% A7/W55
3: A total [dB(A)]

Middle frequency [Hz]	100	125	160	200	250	315	400	500	630	800	1000
Nominal/max. A7/W55 [dBA]	34.6	43.6	44.6	46.4	45.2	42.9	43.2	43.2	44.4	49.5	49.4
Night mode 60% A7/W55 [dBA]	34.9	33.8	37.8	38.1	35.3	35.9	35.6	35.4	35.2	36.2	46.7

Middle frequency [Hz]	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	A total
Nominal/max. A7/W55 [dBA]	46.4	45.1	43.5	44.7	42.9	41.6	42.8	45.0	38.1	36.0	**57.9**
Night mode 60% A7/W55 [dBA]	34.6	37.4	35.6	35.9	36.1	34.2	35.8	37.4	32.0	30.8	51.1

The sound power conforms to accuracy class 2.

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

2.8 Characteristic curves

Heating capacity LWM 80 at inlet temperature of 35°C

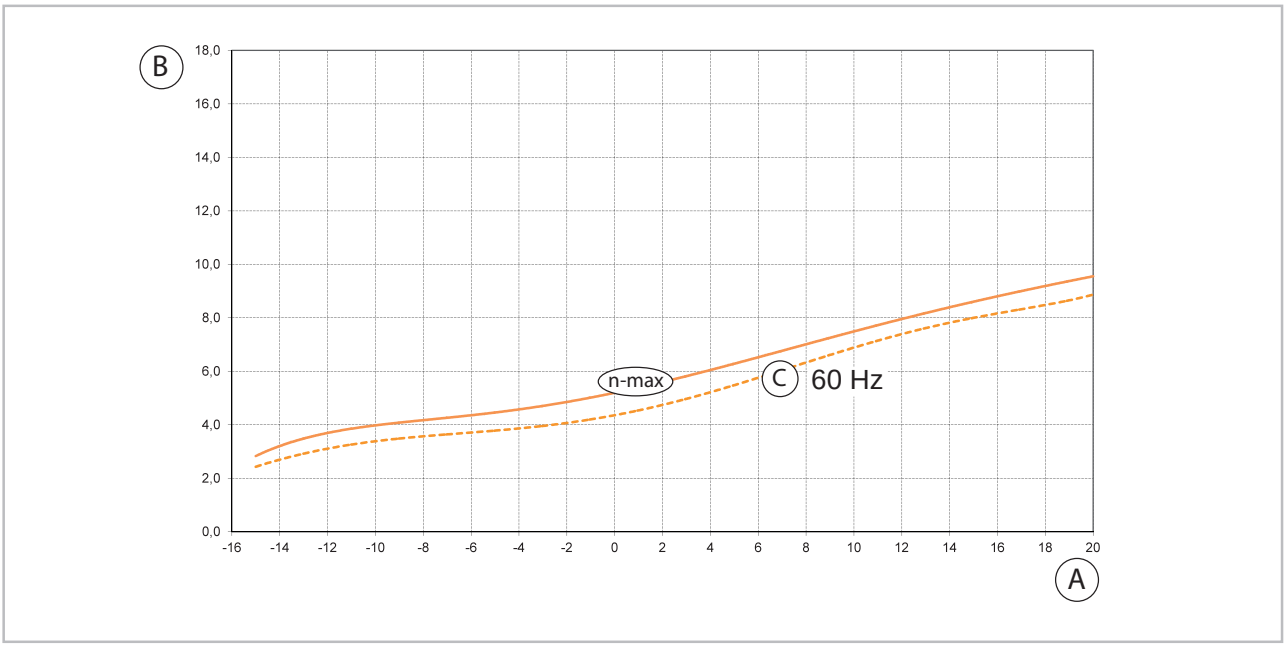


Fig. 10: Heating capacity at inlet temperature of 35 °C

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

Heating capacity LWM 80 at inlet temperature of 45 °C

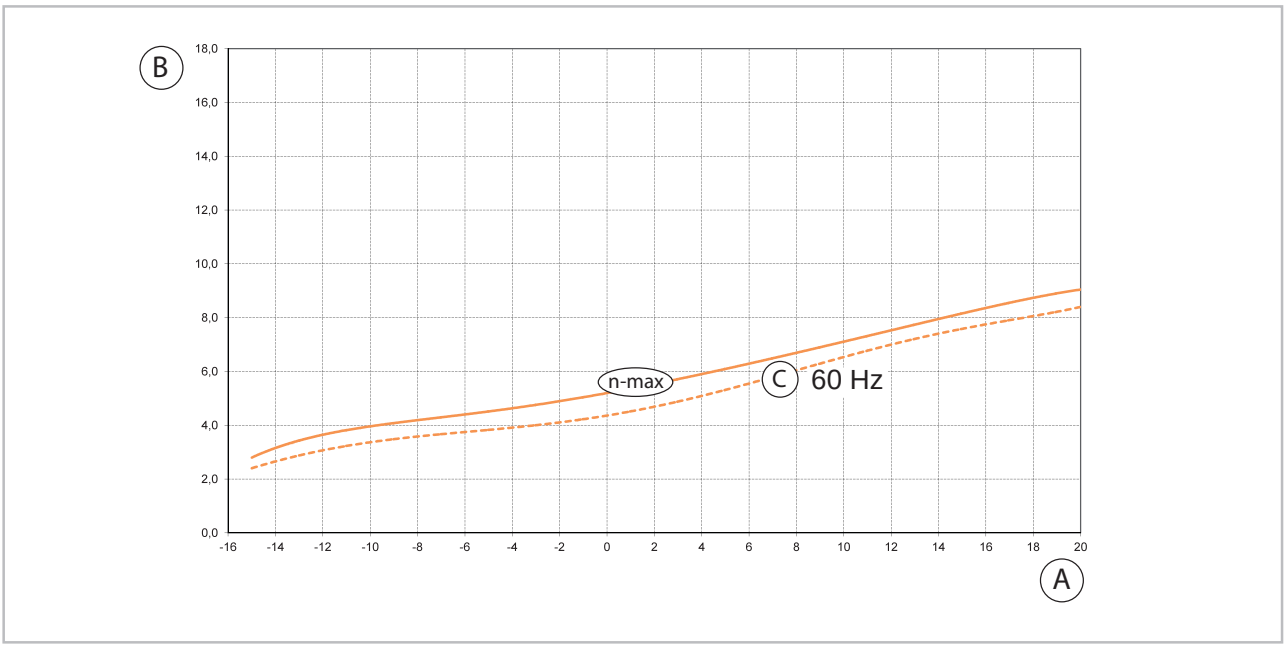


Fig. 11: Heating capacity at inlet temperature of 45 °C

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

Heating capacity LWM 80 at inlet temperature of 55 °C

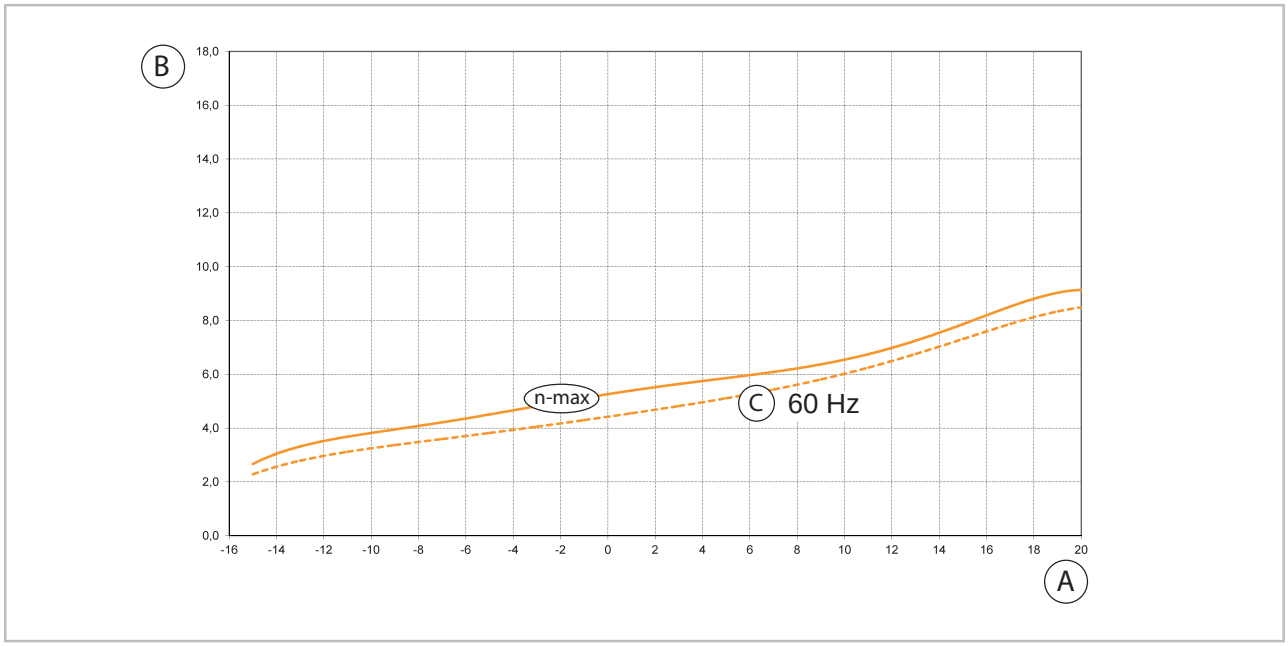


Fig. 12: Heating capacity at inlet temperature of 55 °C

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

COP LWM 80 at inlet temperature 35 °C, 45 °C and 55 °C

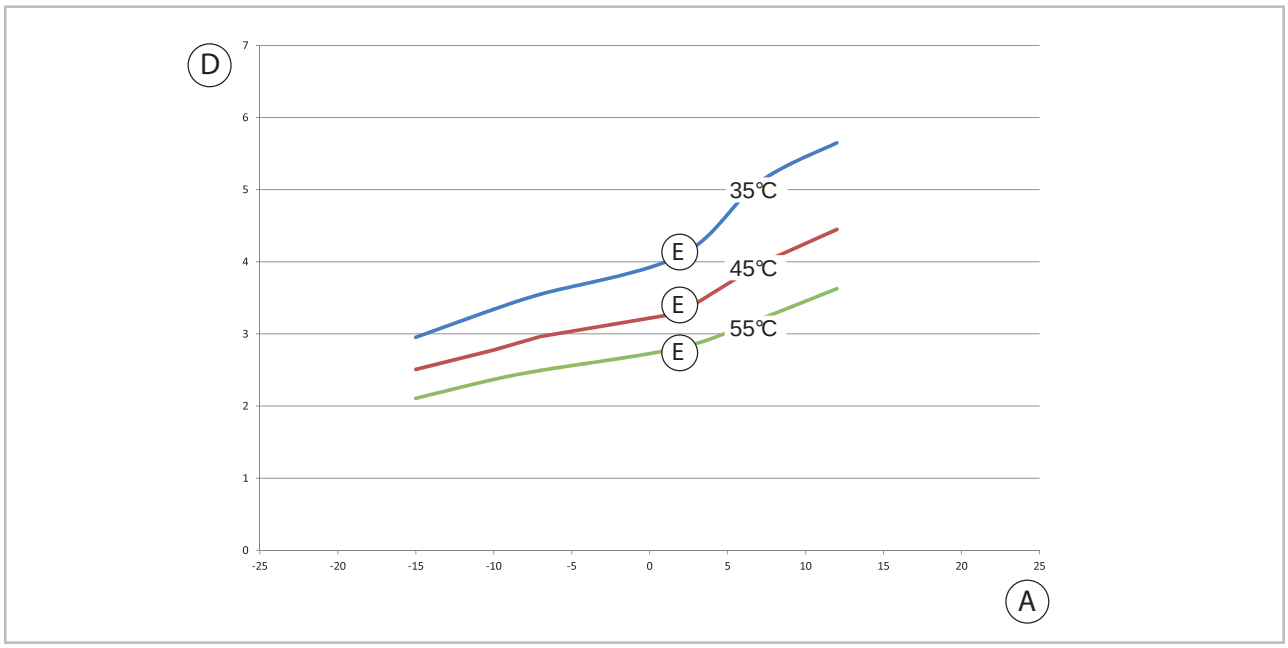


Fig. 13: COP at inlet temperature 35°C, 45°C and 55°C

A: Outside temperature [°C]
D: COP [-]
E: Inlet temperature [°C]

Heating capacity LWM 110 at inlet temperature of 35 °C

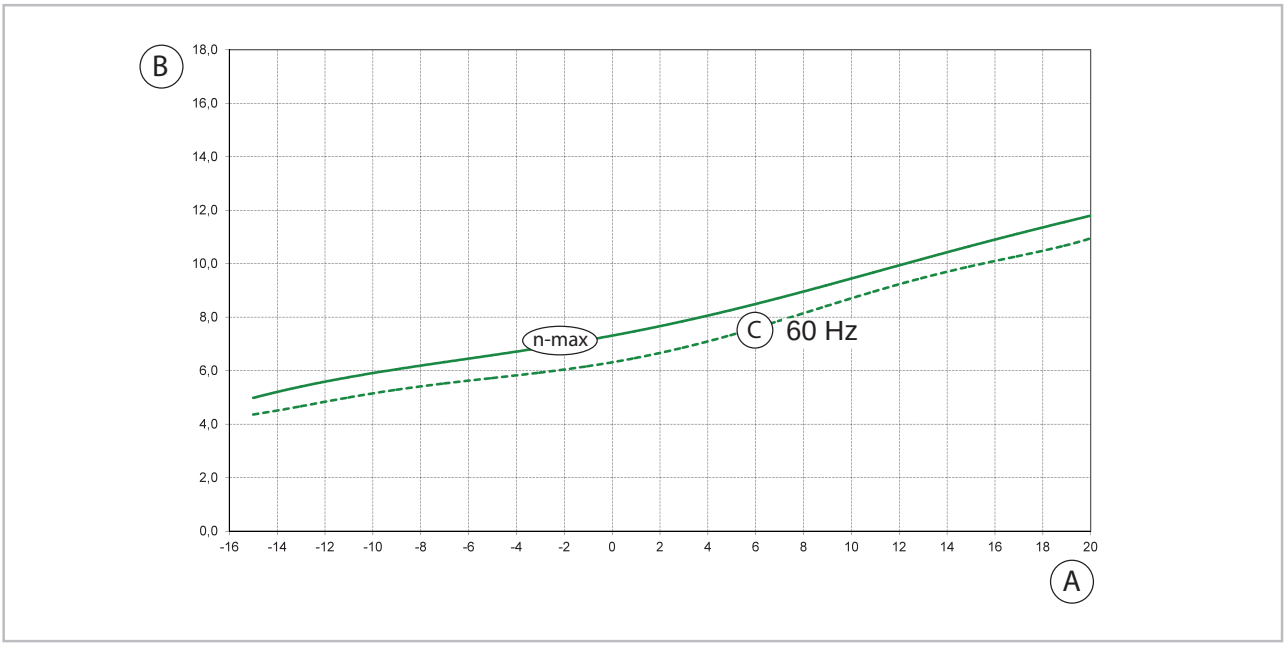


Fig. 14: Heating capacity at inlet temperature of 35 °C

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

Heating capacity LWM 110 at inlet temperature of 45 °C

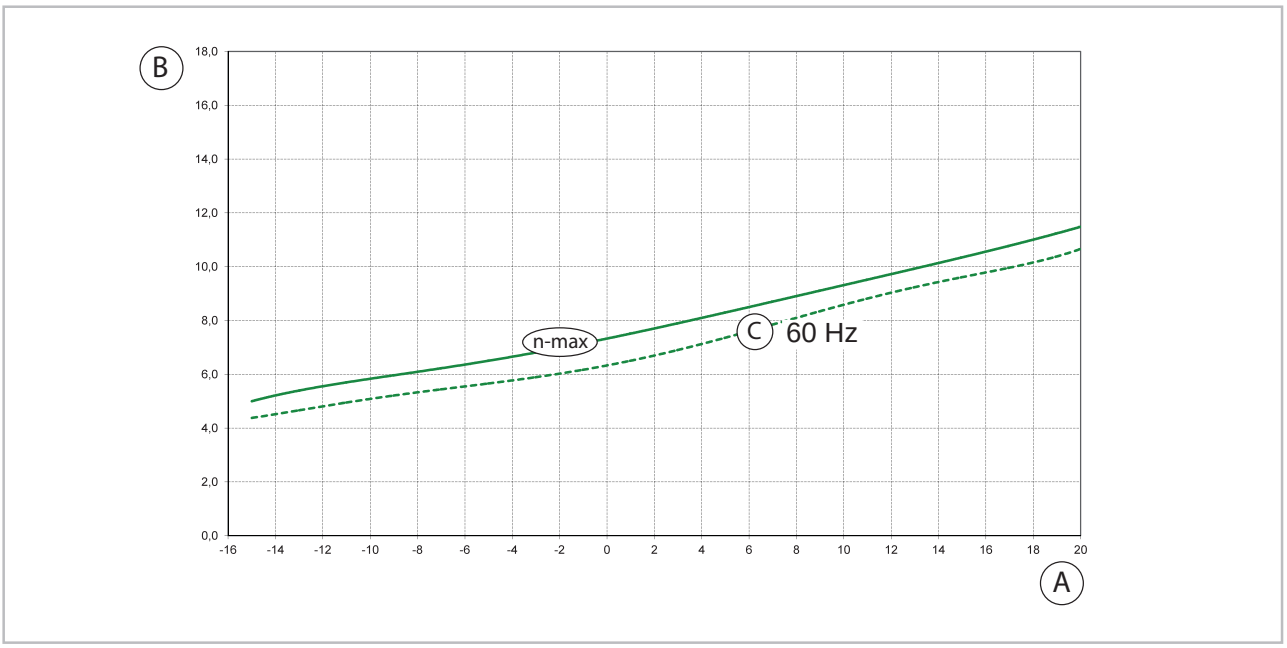


Fig. 15: Heating capacity at inlet temperature of 45 °C

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

Heating capacity LWM 110 at inlet temperature of 55 °C

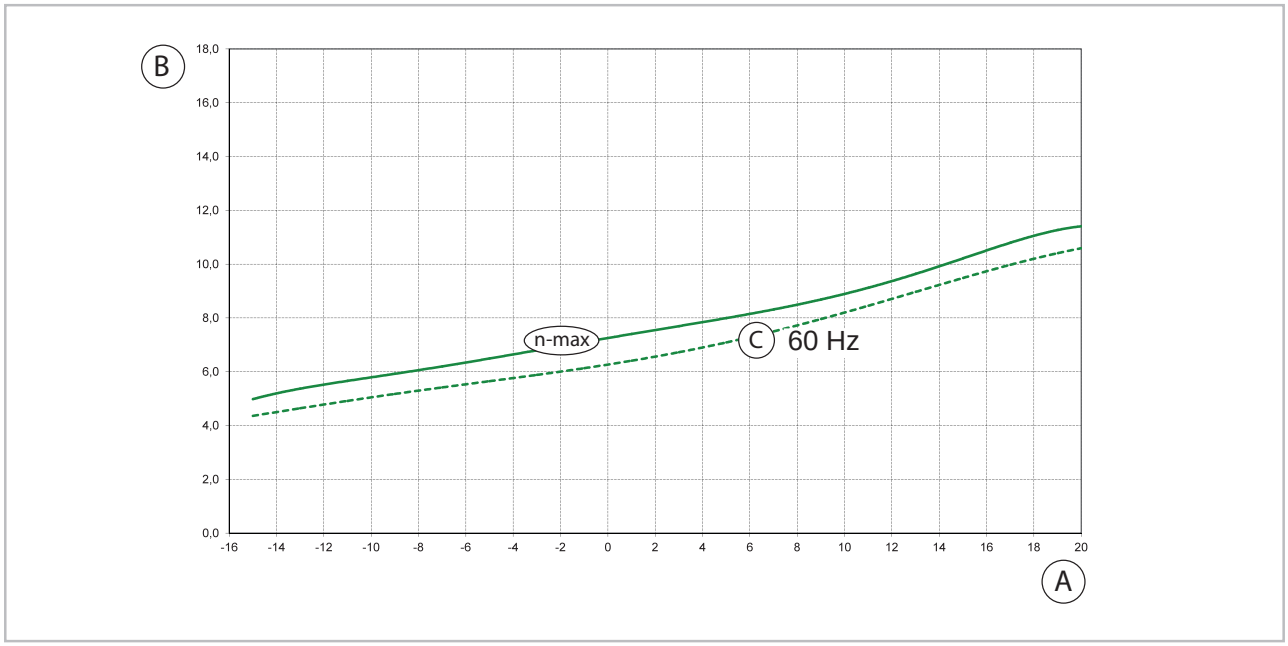


Fig. 16: Heating capacity at inlet temperature of 55 °C

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

COP LWM 110 at inlet temperature 35 °C, 45 °C and 55 °C

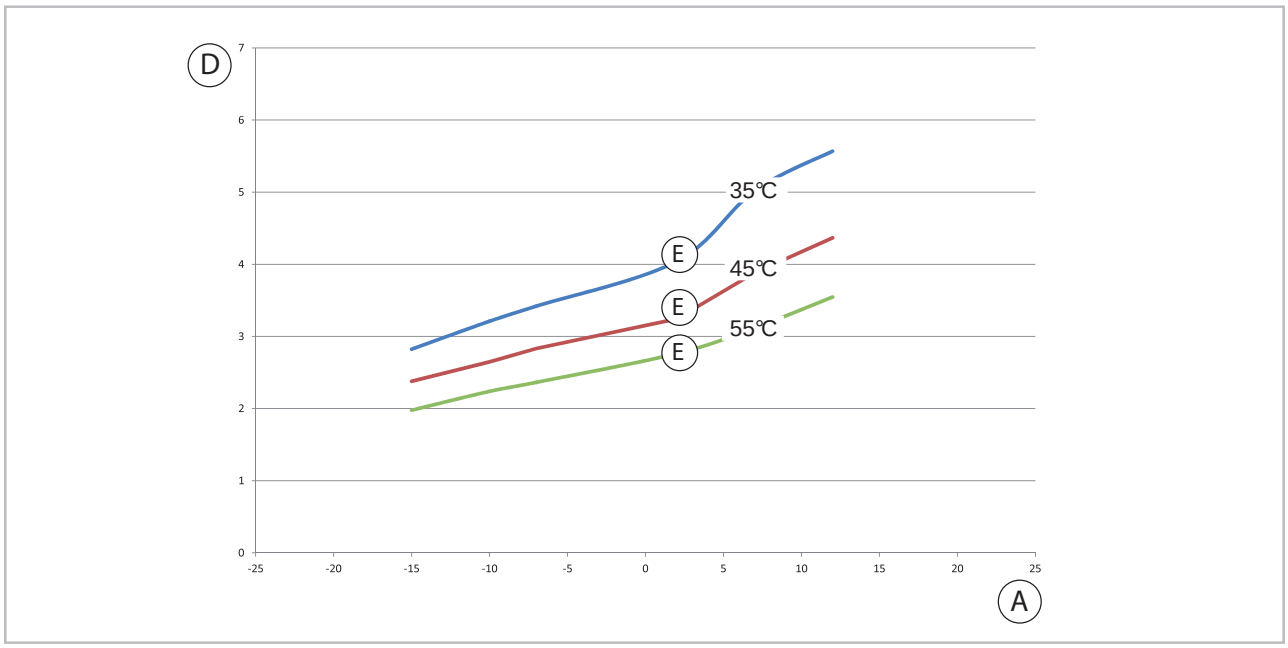


Fig. 17: COP at inlet temperature 35°C, 45°C and 55°C

A: Outside temperature [°C]
D: COP [-]
E: Inlet temperature [°C]

Heating capacity LWM 150 at inlet temperature of 35 °C

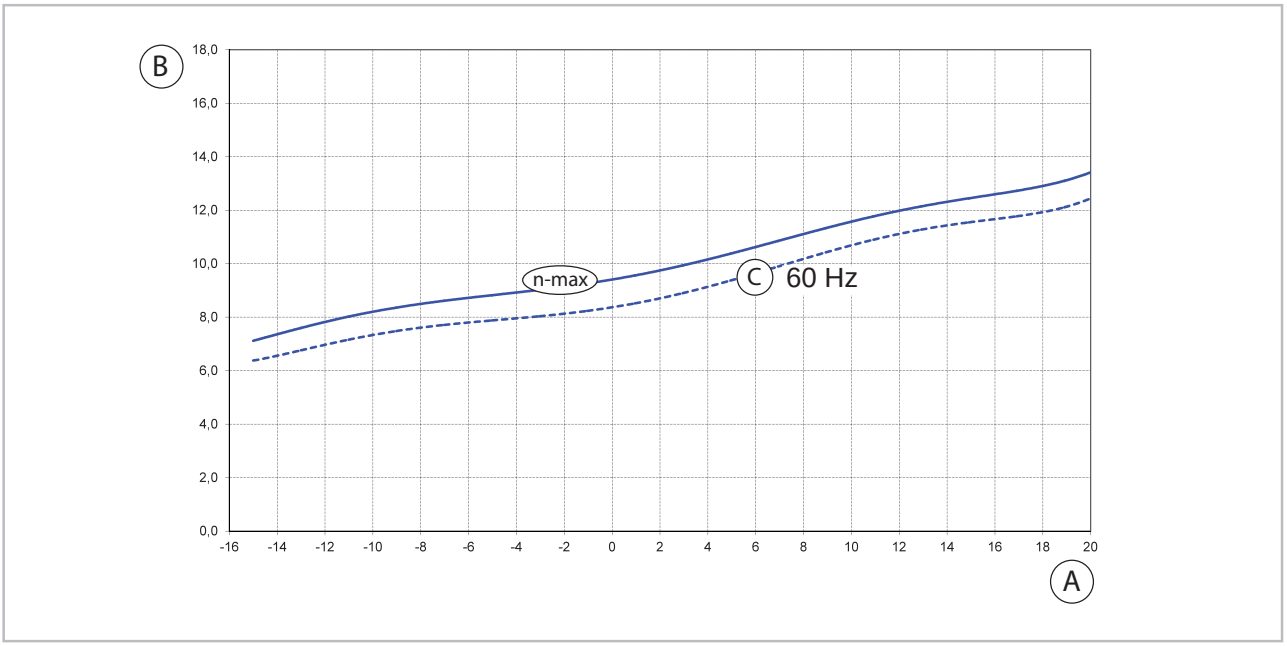


Fig. 18: Heating capacity at inlet temperature of 35 °C

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

Heating capacity LWM 150 at inlet temperature of 45 °C

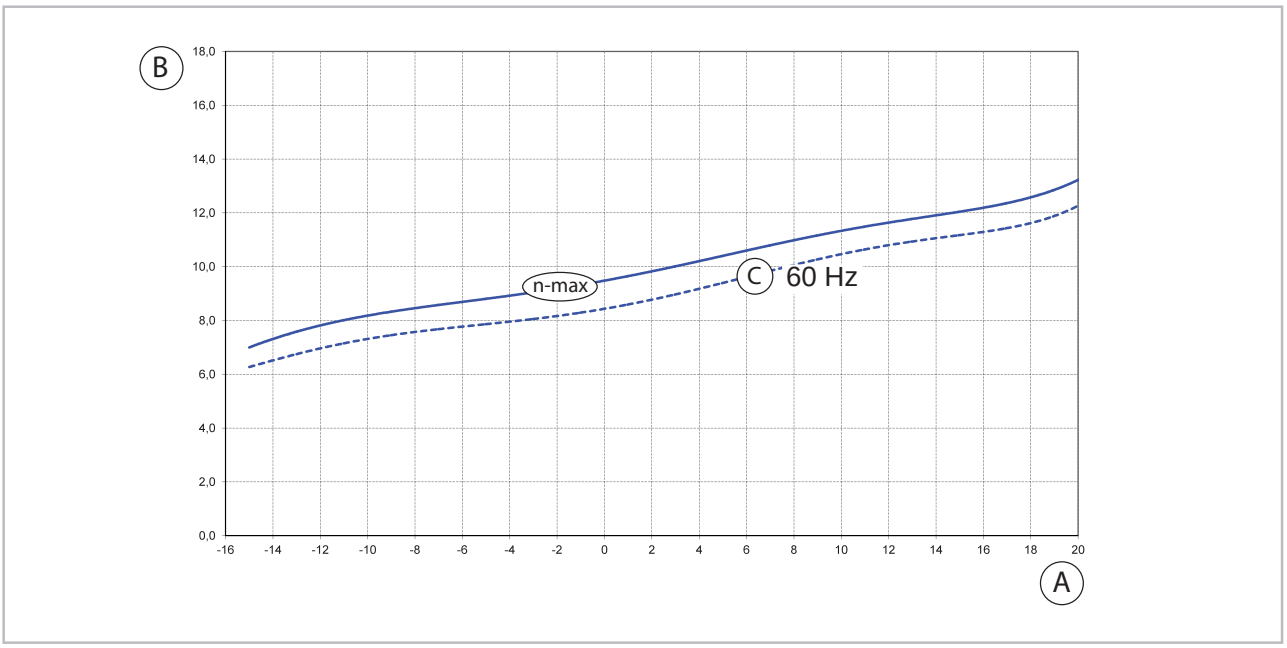


Fig. 19: Heating capacity at inlet temperature of 45 °C

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

Heating capacity LWM 150 at inlet temperature of 55 °C

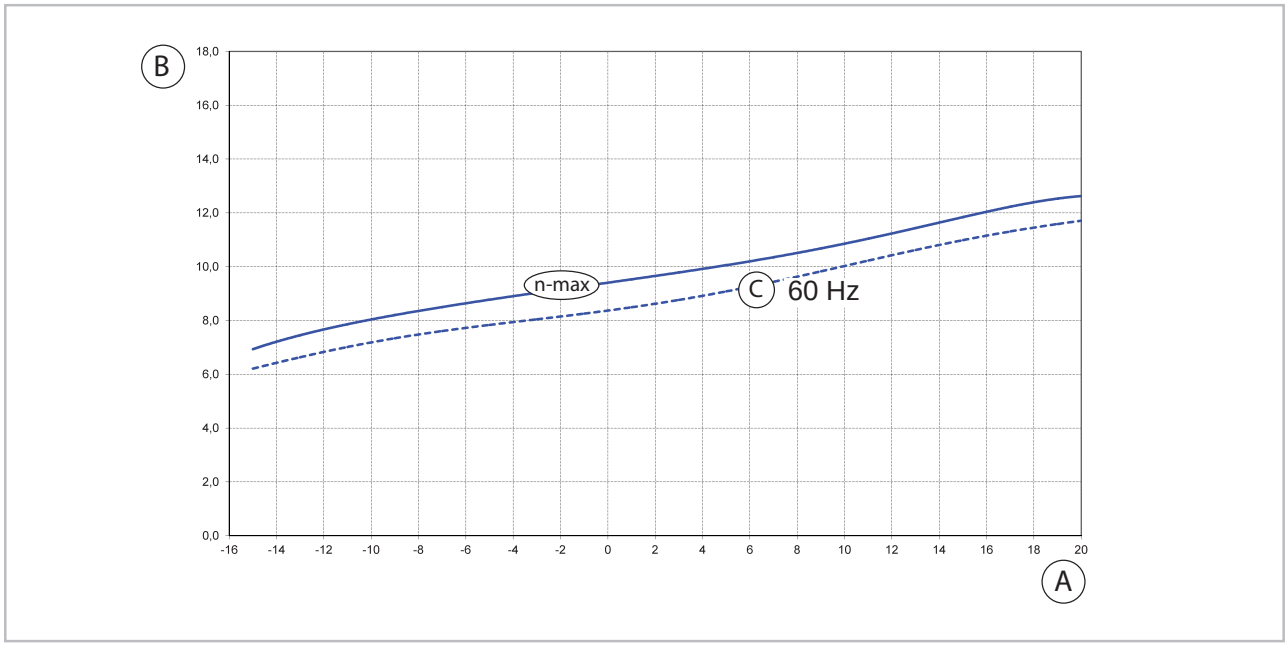


Fig. 20: Heating capacity at inlet temperature of 55 °C

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

COP LWM 150 at inlet temperature 35 °C, 45 °C and 55 °C

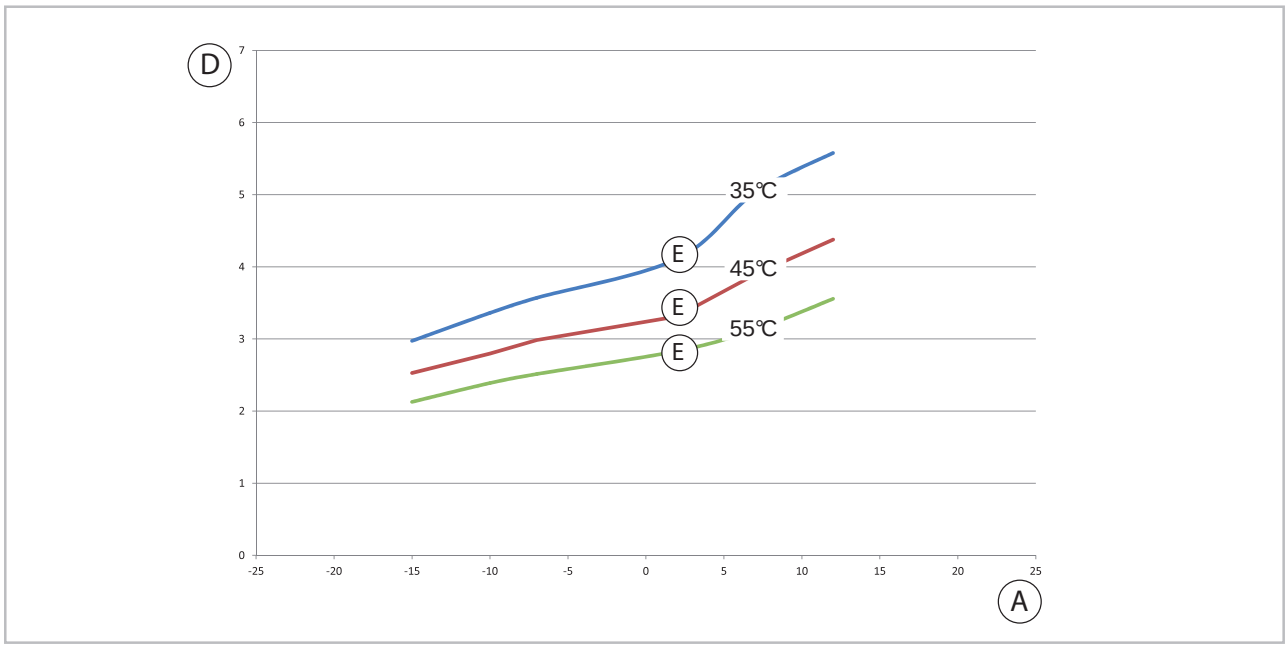


Fig. 21: COP at inlet temperature 35°C, 45°C and 55°C

A: Outside temperature [°C]
D: COP [-]
E: Inlet temperature [°C]

Heating capacity LWM 110 Duo at inlet temperature of 35 °C

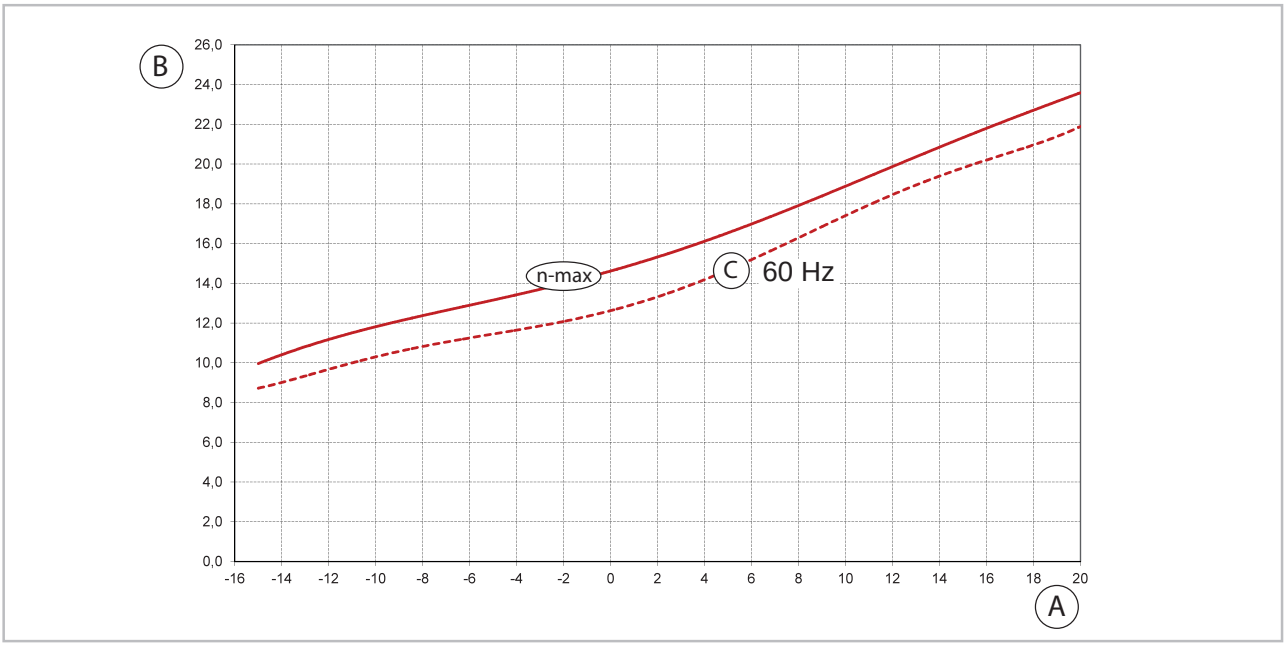


Fig. 22: Heating capacity at inlet temperature of 35 °C

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

Heating capacity LWM 110 Duo at inlet temperature of 45 °C

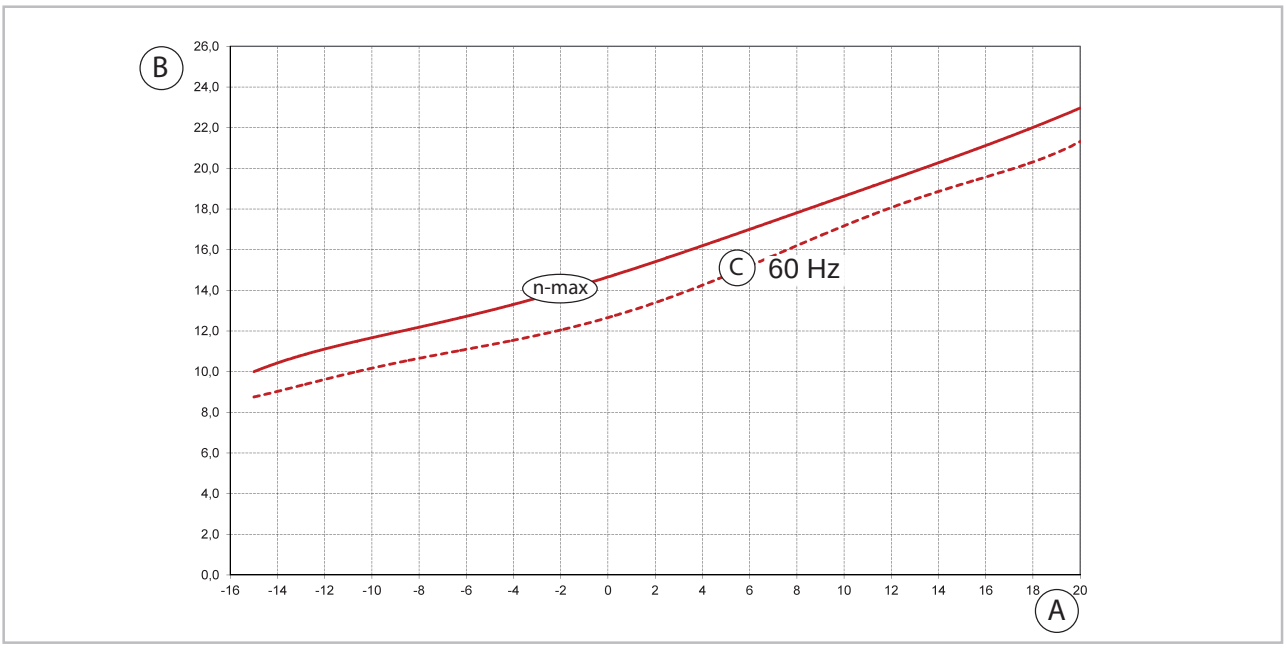


Fig. 23: Heating capacity at inlet temperature of 45 °C

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

Heating capacity LWM 110 Duo at inlet temperature of 55 °C

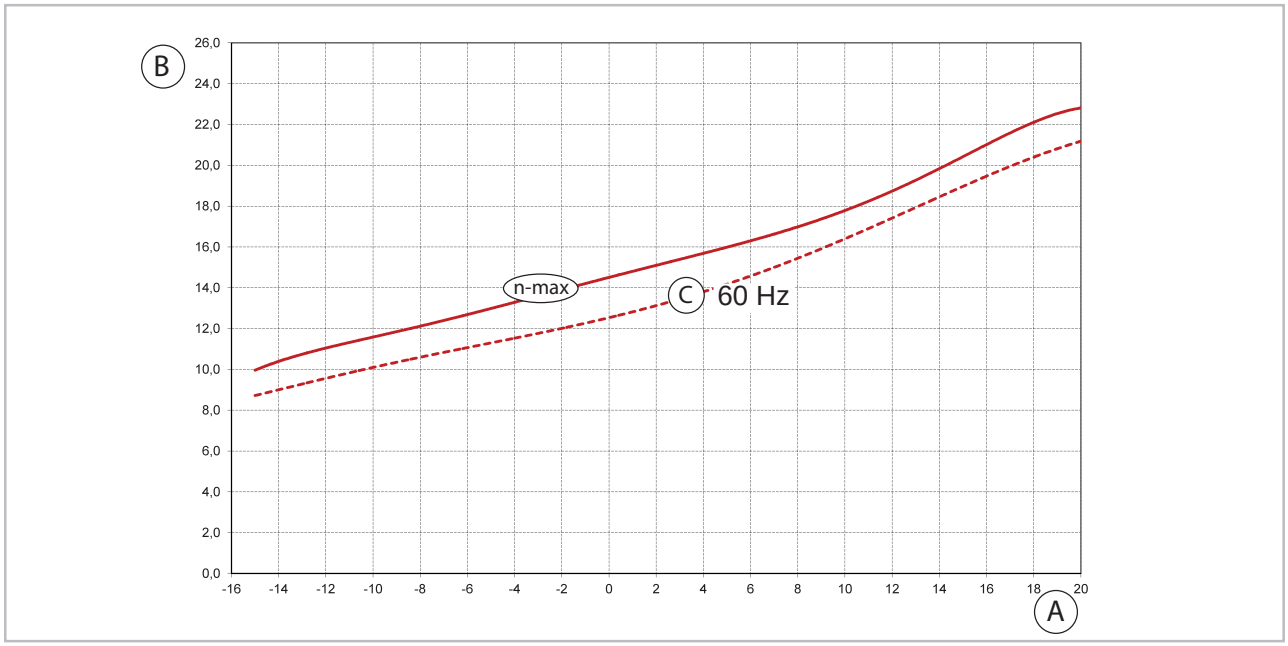


Fig. 24: Heating capacity at inlet temperature of 55 °C

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

COP LWM 110 Duo at inlet temperature 35 °C, 45 °C and 55 °C

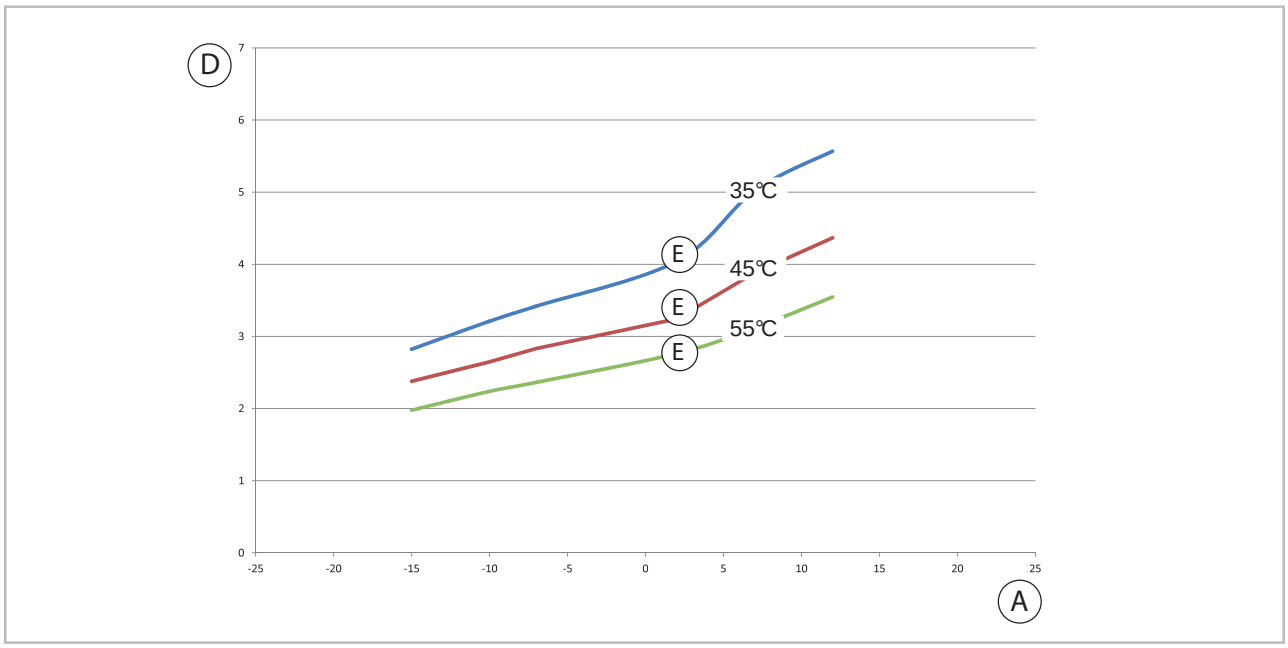


Fig. 25: COP at inlet temperature 35°C, 45°C and 55°C

A: Outside temperature [°C]
D: COP [-]
E: Inlet temperature [°C]

Heating capacity LWM 150 Duo at inlet temperature of 35 °C

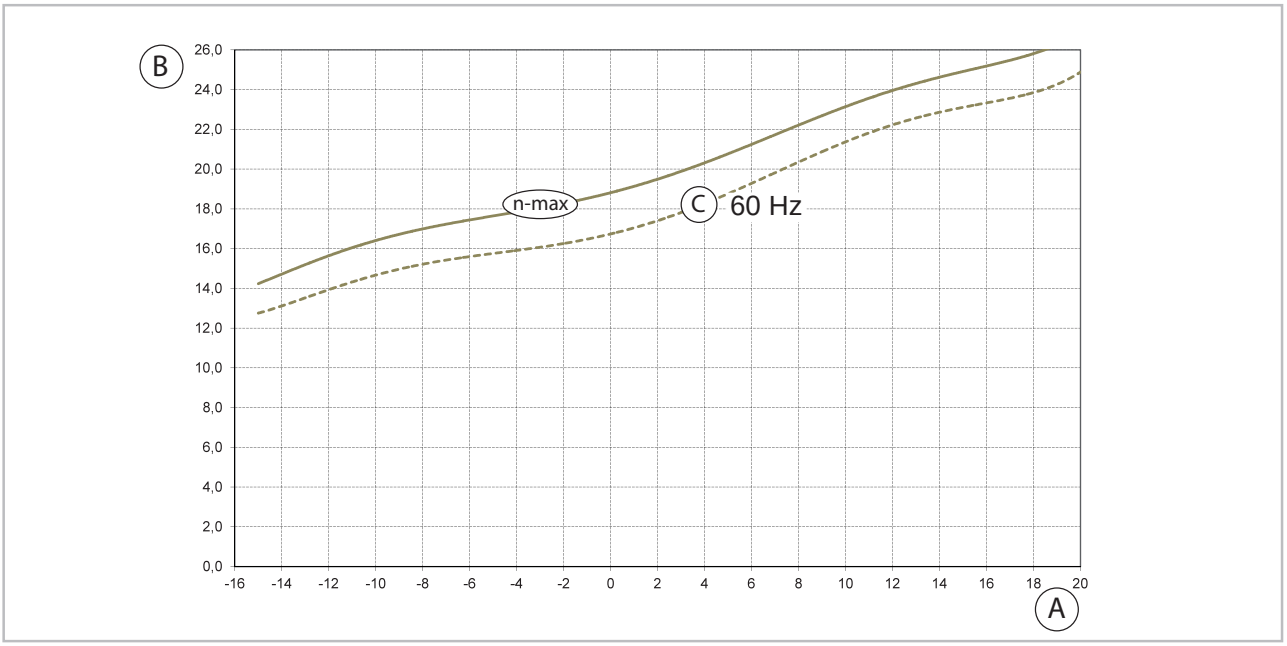


Fig. 26: Heating capacity at inlet temperature of 35 °C

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

Heating capacity LWM 150 Duo at inlet temperature of 45 °C

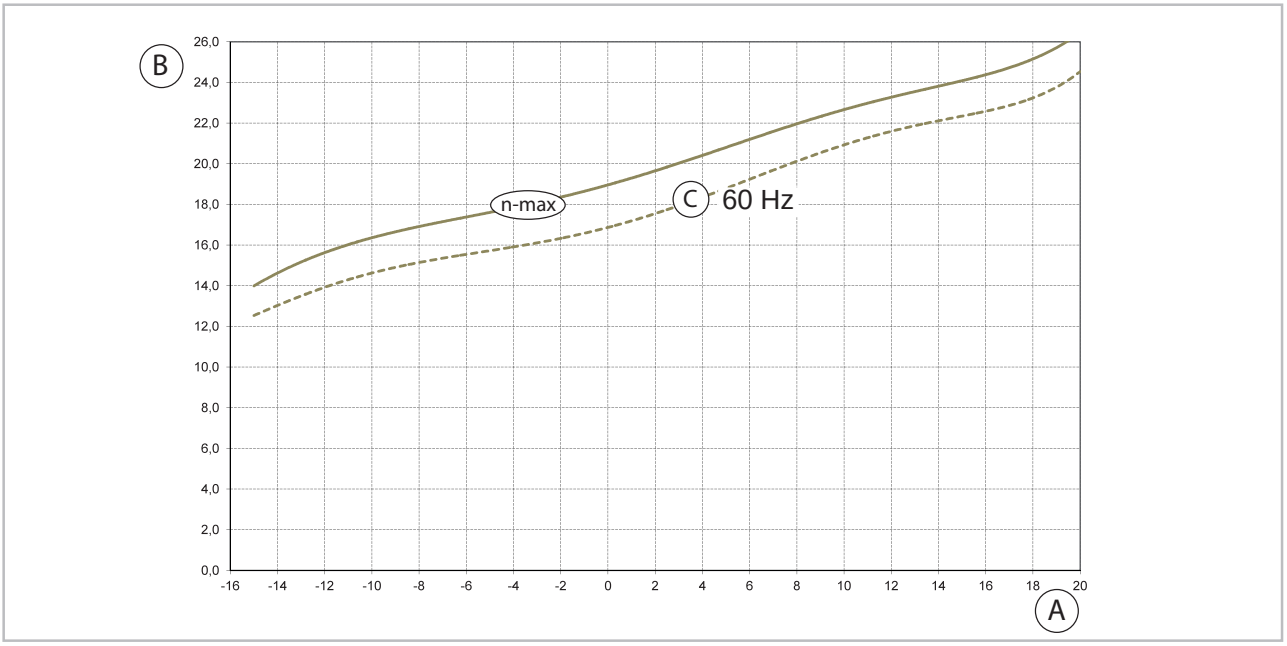


Fig. 27: Heating capacity at inlet temperature of 45 °C

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

Heating capacity LWM 150 Duo at inlet temperature of 55 °C

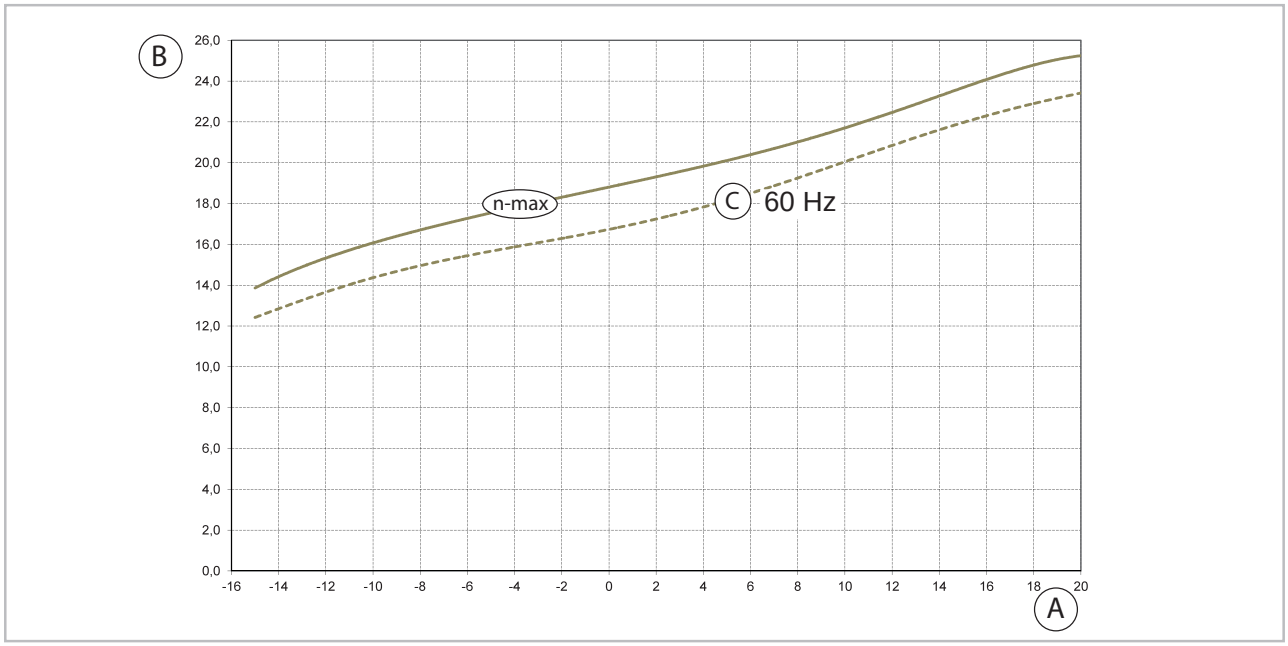


Fig. 28: Heating capacity at inlet temperature of 55 °C

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

COP LWM 150 Duo at inlet temperature 35 °C, 45 °C and 55 °C

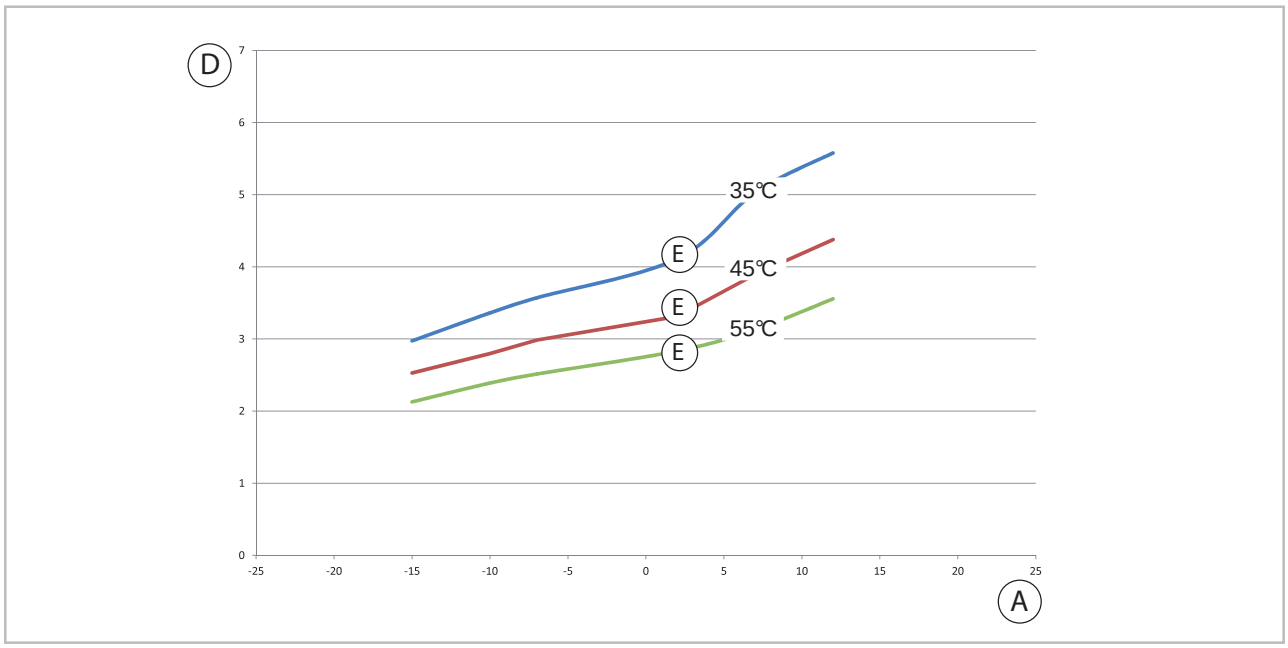


Fig. 29: COP at inlet temperature 35°C, 45°C and 55°C

A: Outside temperature [°C]
D: COP [-]
E: Inlet temperature [°C]

3 Unit description

Description

The LWM series is a monobloc heat pump in which refrigeration components are installed in a hermetically sealed refrigeration circuit. In addition, a highly efficient speed-controlled circulation pump and an electric volume flow monitor are integrated.

Furthermore, an optional electric Smart-Serv auxiliary heater can be installed to realise monoenergetic operation. The Smart-Serv can also be used for screed drying, hygiene functions or emergency heat-operation.

If the on-site pressure loss does not exceed the maximum available, a heating buffer tank can be dispensed with. If necessary, only a drinking water storage tank and changeover valve should then be installed.

A district heating pipe is recommended as the water-bearing pipe from the heat pump into the house. This can be supplied as an option. The Smart-Control Touch controller is supplied in an attractively designed housing for wall mounting or as a built-in controller in an indoor unit with a storage tank. The touch display can optionally be installed in a double flush-mounted or double surface-mounted box. With the Smart-Control Touch, three heating cycles can be activated, two of which act as a mixing cycle. Further functions such as solar thermal, second heat generator as bivalent system, cooling, external heating cycle pumps can be controlled as standard. A combination with a PV system to increase its own power requirement is integrated as standard.

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.

Smart-Control Touch is used for regulation, and it assures the independent operation of all safety devices. The water circulation system consists of a circulation pump, plate heat exchangers, dirt traps, safety valve, a manometer, filling and drain valves, a flow switch and a service water storage tank.

A 3-way changeover valve, overflow protection valve, additional probes and storage systems are available as accessories.

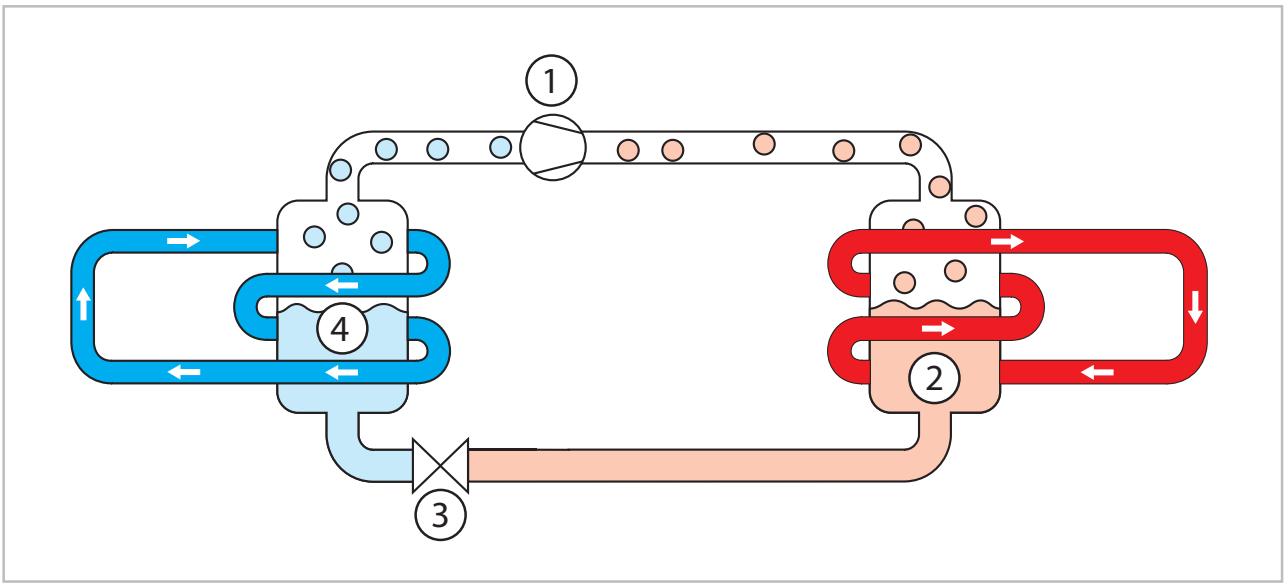


Fig. 30: Functional diagram heating

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

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 33* provides an approximate specific heating load for a few types of building. The required heating system output can be calculated by multiplying the area to be heated with the given values.

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

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

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

Design example

By way of a design example, a residential home with a living area of 150 m^2 and a heating requirement of approx. 40 W/m^2 was selected. A total of five persons live in the house. The heat load amount to 6.0 kW. Adding a drinking water allowance of 0.2 kW results in a required heating capacity of 7.0 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. 31) 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 conservation order regarding heat insulation 1995	60
Modern building constructed around 1984	80
Partially renovated old building constructed pre-1977	100
Non-renovated old building constructed pre-1977	200

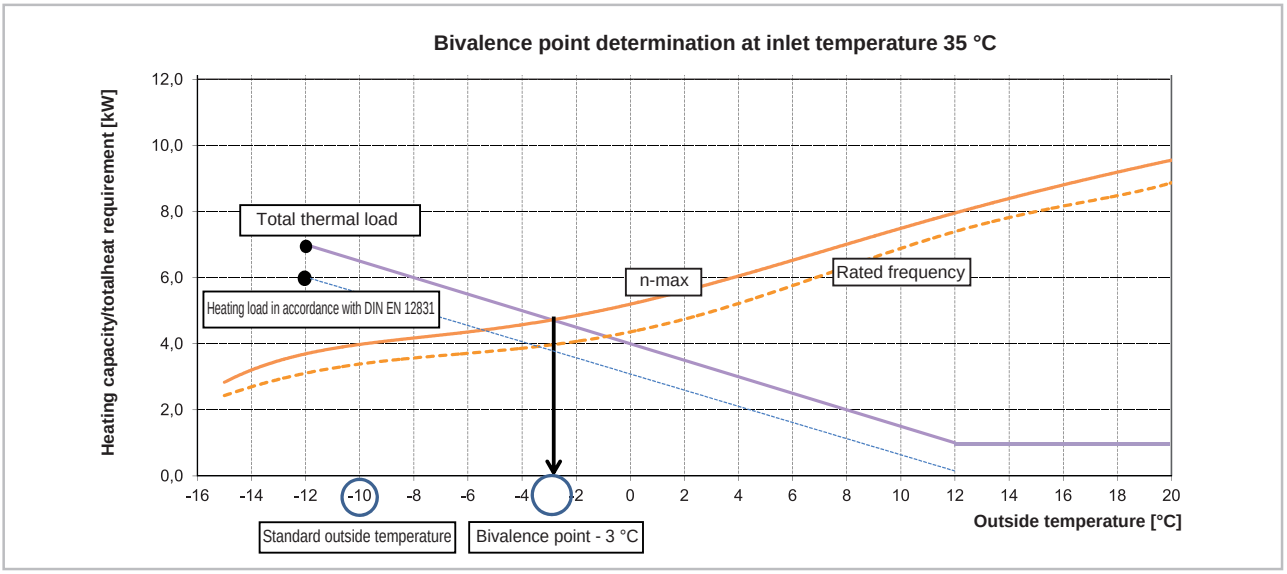


Fig. 31: Heating performance diagram of the heat pump LWM

Monobloc heat pump

The REMKO inverter heat pump is connected to the house via water-carrying pipes. The water-carrying pipes must be laid to be frost proof. If this is not possible from a structural point of view, other frost protection measures must be implemented, e.g. glycol, trace heating, etc.

REMKO inverter technology

The heat pump's compressor is equipped with are equipped with a speed control system, as needed. The power control on conventional heat pumps provides only two states, either “ON” (full output) or “OFF” (no output). The heat pump turns on below a specified temperature and turns off when this temperature is reached. Heat regulation in the REMKO monobloc 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.: Monobloc heat-pumps will run practically throughout the heating season. In all, the highest efficiency possible.

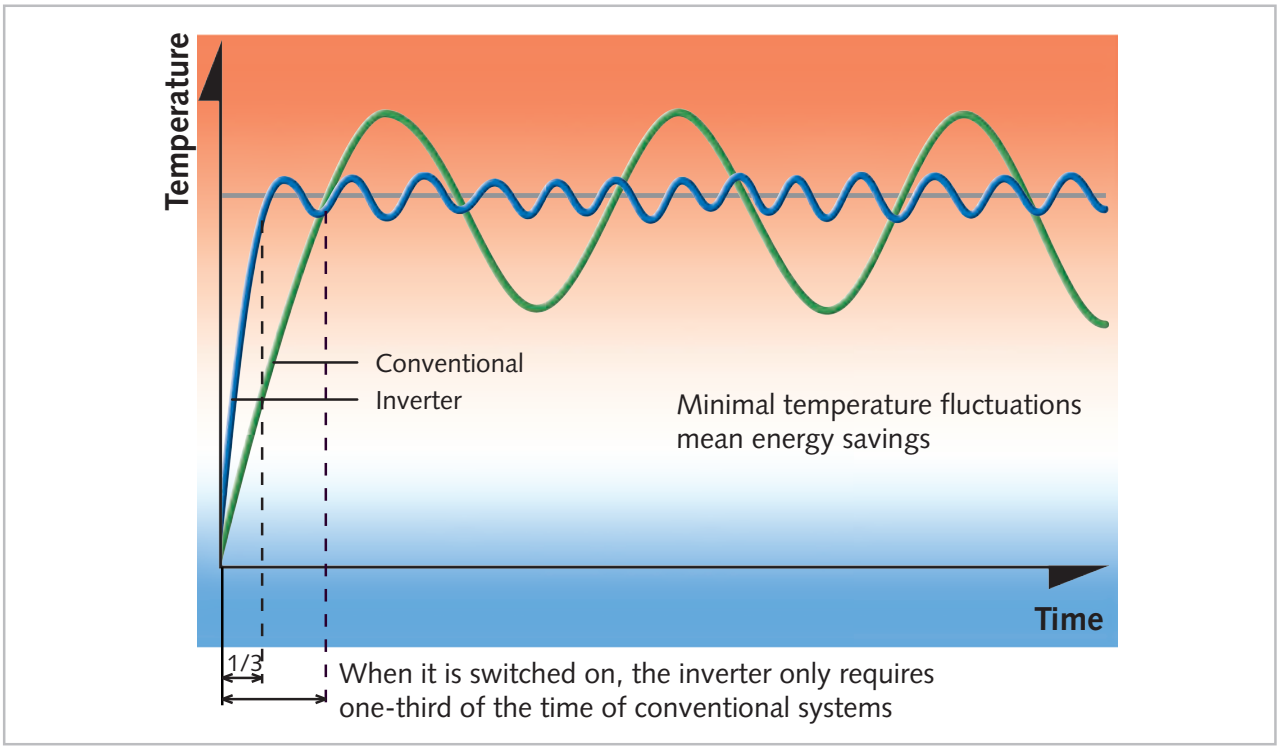


Fig. 32: Modern inverter technology

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.

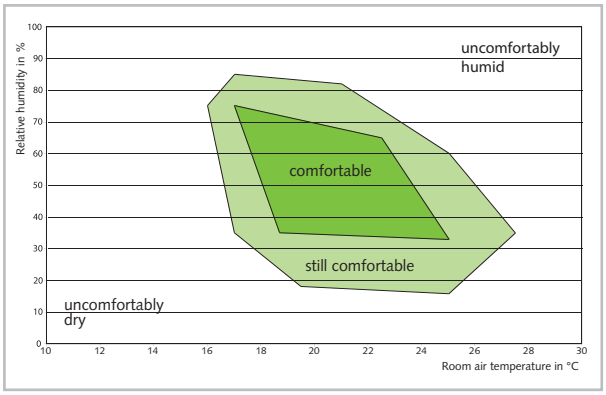
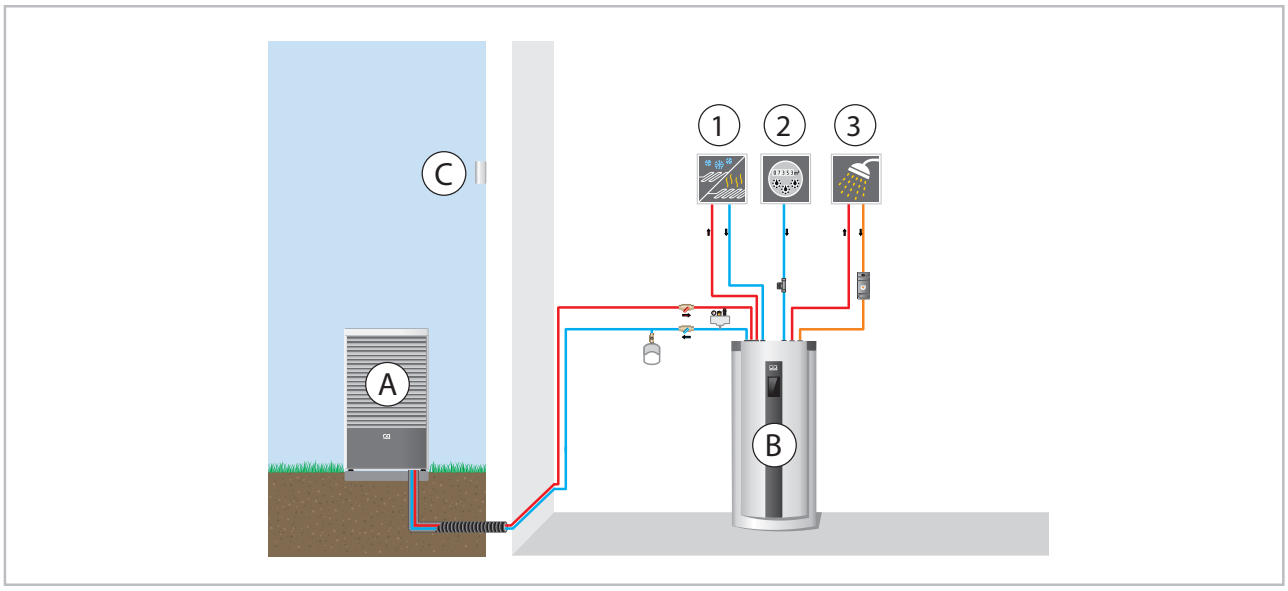


Fig. 33: Comfort zone

4 Assembly

4.1 System layout

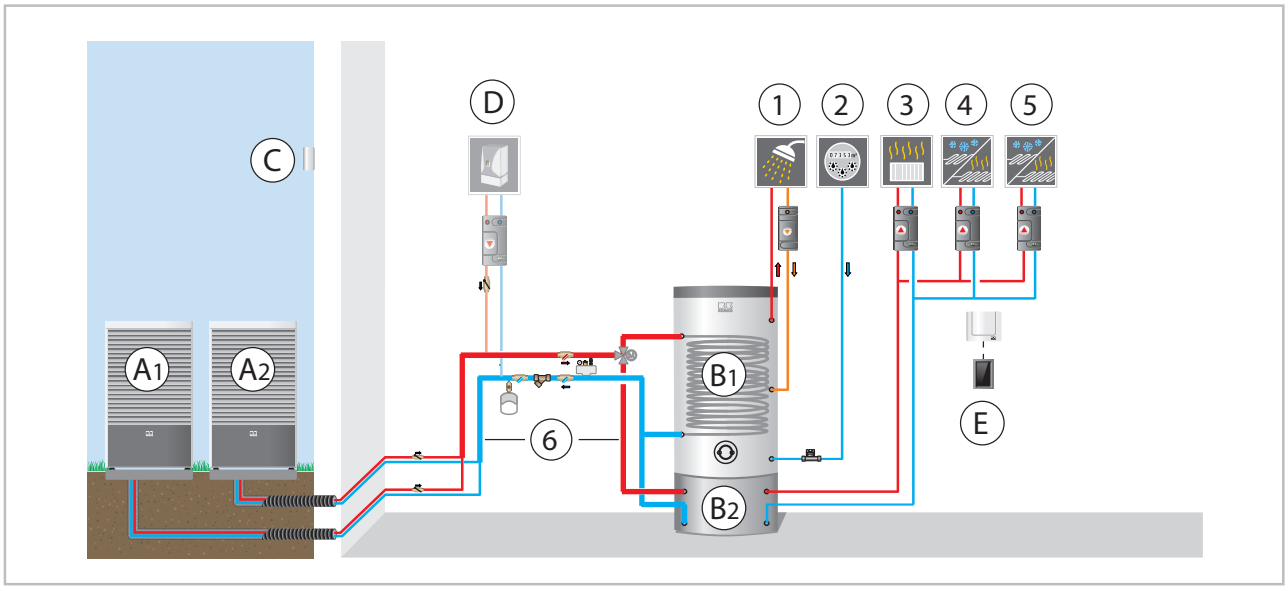
System layout for heat pump assembly LWM 300 IM Stuttgart



A: Outdoor unit
B: Indoor unit with storage tank
C: External probe

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

System layout for heat pump assembly LWM Duo Mannheim



A1/A2: Heat pump 1 and 2
B1: Hot water storage tank
B2: Buffer tank
C: External probe
D: Boiler/wall heating unit (optional)
E: Smart Control Touch

1: Hot water
2: Cold water
3: Unmixed cycle
4: Mixed cycle
5: Mixed cycle
6: Collector line (min. DN 40)

4.2 General installation notes

DANGER!

All electrical installation work must be done by an electrician.

WARNING!

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

DANGER!

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

- 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.
- It is recommended to place the heat pump as close as possible to the building to be heated, observing the minimum distances.
- 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 damage.
- Ensure that no water-carrying pipes pass through living or sleeping areas.

Wall opening

- A wall opening of approx. 200 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 provided by the customer, taking account of fire protection regulations and local conditions.
- District heating pipelines are recommended (see accessories).

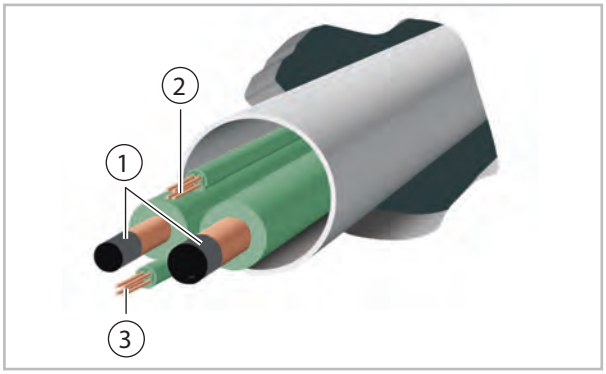


Fig. 34: Wall opening

1: Inlet/return flow, heat pump
2: Power supply, heat pump
3: Smart-Control control cable (shielded)

4.3 Set-up and assembly of the heat pump

Set-up site

- The unit may be attached only to a load-bearing structure or wall. Ensure that the 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 units into account. Additionally, there must be adequate space available for installation, maintenance and repair.
- If the unit is erected in an area of strong winds, then it must be protected against them and additional stabilisation is recommended. This can be realised for example with wire ropes or other constructions (Fig. 35). The snow line is to be observed during installation (Fig. 36).
- REMKO recommends always placing the unit on vibration dampers. Vibration dampers prevent the transmission of vibrations through the floor or walls.
- If there is insufficient space under the device for the lines, then the pre-cut recesses can be removed from the rear 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. 36).
- 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'.

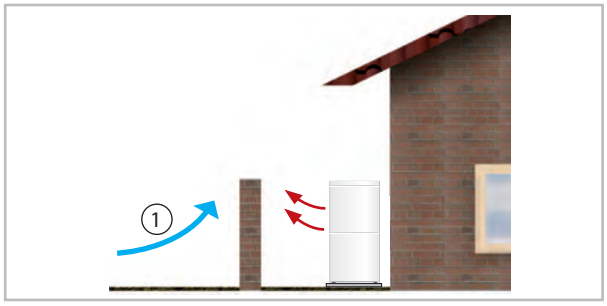


Fig. 35: Protection against wind

1: Wind

! NOTICE!

The site for the 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!

The sound pressure calculator of the "Bundesverbandes Wärmepumpe e.V." (German Federal Association of Heat Pumps) can be used for theoretical calculations (www.waerme-pumpe.de/schallrechner/).

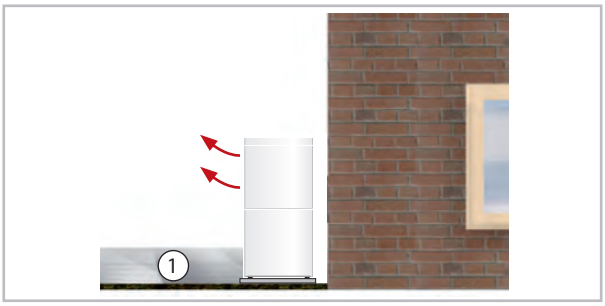


Fig. 36: Protection against snow

1: Snow

! NOTICE!

In areas with heavy snowfall, the foundation must be higher!

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!

Minimum distances during construction of a heat pump

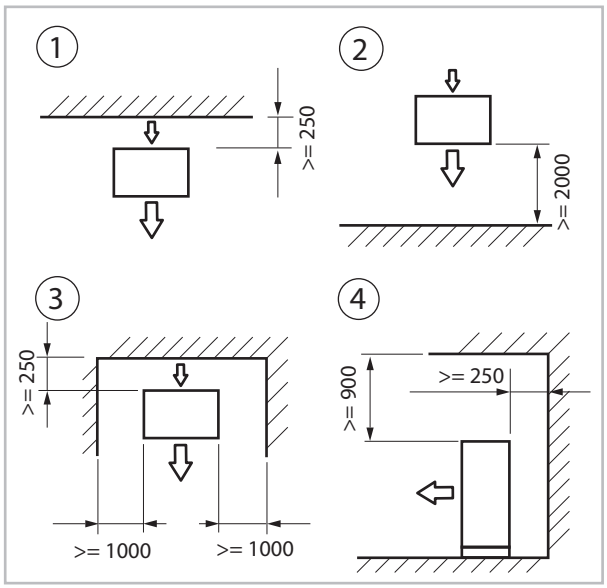


Fig. 37: Minimum distances during construction of a heat pump in mm

1: Next to a wall, air outlet open to the front, flow restriction behind
2: Next to a wall, air outlet toward the wall, flow restriction to the front
3: In a niche, air outlet open to the front, flow restriction behind and on both sides
4: Next to a covered wall, air outlet open to the front, flow restrictions behind and above

Minimum distances during construction of multiple heat pumps

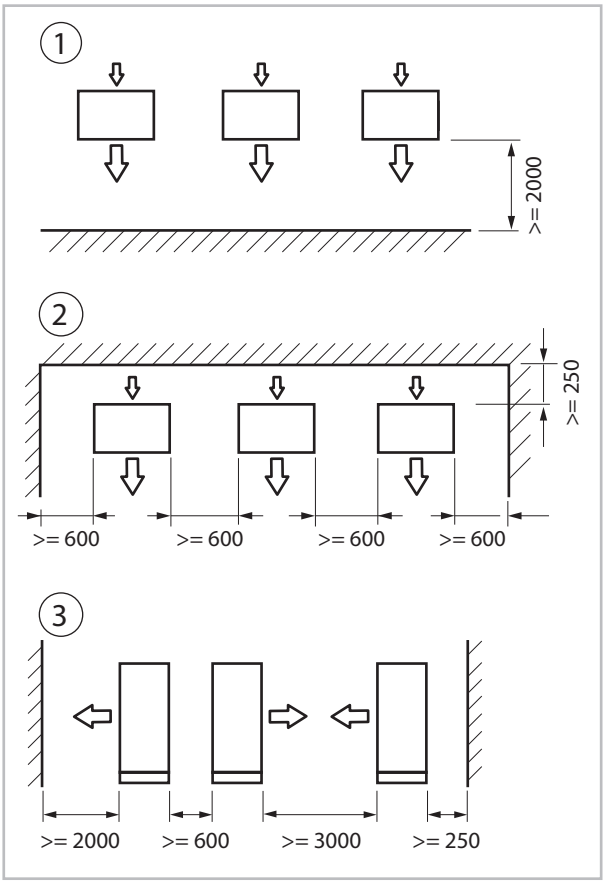


Fig. 38: Minimum distances during construction of multiple heat pumps in mm

1: Next to a wall, air outlet toward the wall, flow restriction to the front
2: In a niche, air outlet open to the front, flow restriction behind and on both sides
3: Between two walls, air outlet toward the wall and in the direction of other devices, open sides: flow restriction front and rear

Condensate drainage connection and safe drainage - strip foundation

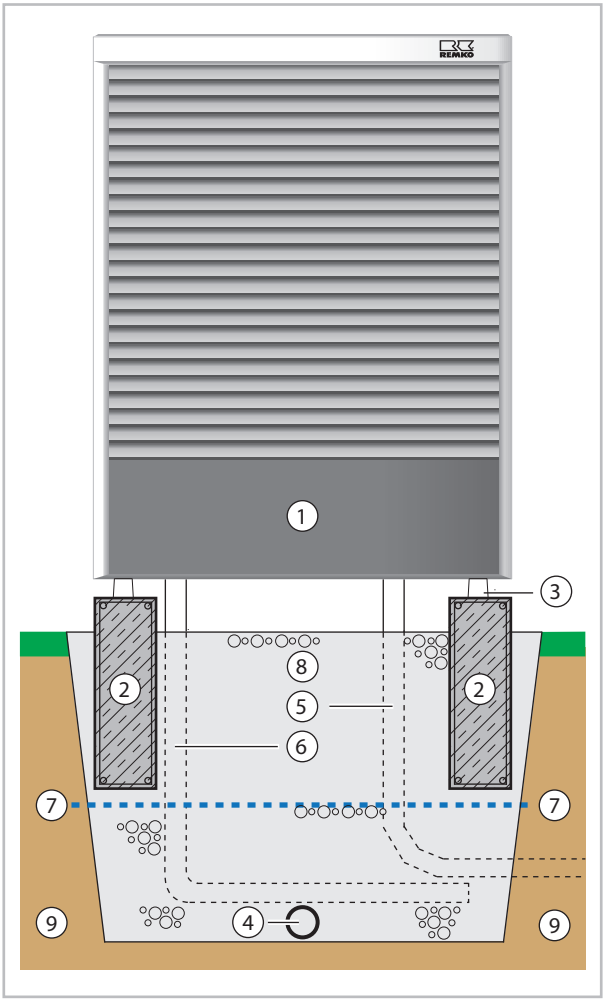


Fig. 39: Condensate drainage, seepage of condensate and strip foundation (cross-section)

1: Heat pump (air outlet)
2: Reinforced strip foundation, frost free
3: Vibration dampers
4: Drainage channel
5: Protective tube for lines and electrical connecting line (temperature resistant up to at least 80 °C)
6: Drainage pipe
7: Frost line
8: Gravel layer for seepage
9: Soil

! NOTICE!

When installing an LWM-Duo heat pump, the minimum distances must be observed and an air short circuit must be prevented.

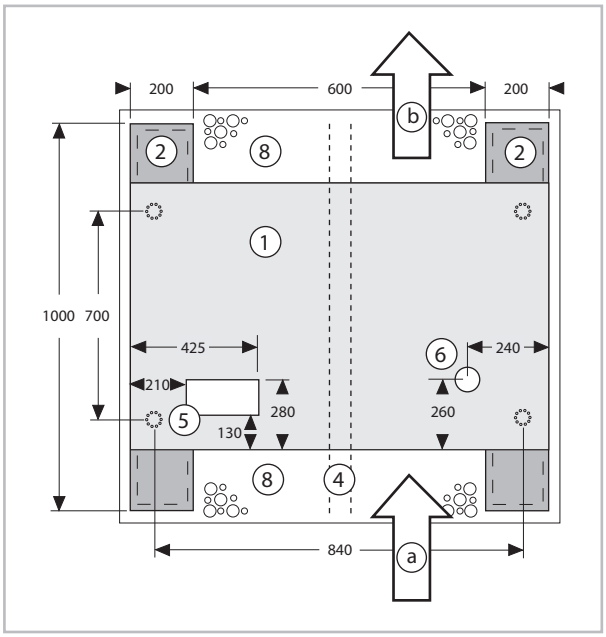


Fig. 40: Dimensions for the base panel (bird's eye view)

1: Heat pump
2: Reinforced strip foundation, frost free
4: Drainage pipe
5: Pipelines opening
6: Condensate opening
8: Gravel layer for seepage
a: Air inlet
b: Air outlet

! NOTICE!

Anti-freeze protection

In the case of heat pump systems, in which frost-free conditions are not assured, a drainage facility should be provided. If control and heating circulation pump are ready for operation, the anti-freeze protection function of the controller works. The system must be emptied when the heat pump is shut down or there is a power failure. For heat pump systems in which a power failure cannot be detected (e.g. holiday home), the heating circuit must be operated with a suitable anti-freeze protection.

Condensate drainage connection

If the temperature falls below the dewpoint on the finned evaporator, condensation occurs during the **heating operation**.

The condensate water must be drained off frost-free via a condensation pipe with a diameter of at least 50 mm.

- 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. If necessary, the lower part of the housing and condensate tray is to be kept frost free in order to ensure permanent draining of the condensate. If necessary, fit a pipe heater.
- If the substrate is permeable to water, it is sufficient to lead the pipe vertically at least 90 cm deep into the ground.
- In the case of condensate drainage in drains or into the sewer system, the installation must be frost-free and with an incline.
- The condensate may only be discharged into the sewer system via a funnel siphon, which must be accessible at all times.

  Regional laws must be observed.
- Following installation, check that the condensate run off is unobstructed and ensure that the line is durably leak tight.

Pipe heater

A pipe heater can be mounted on water-carrying pipes to ensure frost protection in the pipes.

Install a pipe heater if there is a risk of frost.

When installing on the mounting bracket or on a foundation, we recommend the installation of a pipe heater if the condensate drain or the inlet/ return flow heat pipes cannot be laid in a frost-free manner or if they are heavily exposed to weather conditions.

The pipe heater must be connected to a separate power supply (UPS).

Heater for anti-freeze protection

The heater for anti-freeze protection is used to control the temperature of the interior space of the hydraulic unit. This ensures that in the event of a fault, the last step in the freezing of the medium and thus defects due to frost can be prevented. A temperature of >+3 °C is established through recirculated air operation. It is essential that a separate UPS is used for the power supply.

Safe drainage in the event of leakages

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 need to be achieved, e.g. underfloor heating/radiators
  - the pressure drop in the heating distribution system is greater than stated in the technical data
  - the use of other heat generators, e.g. combustible burner for solid fuel, solar or bivalent (dual-fuel) 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. This must be installed by the customer in the hydraulic system.
- During installation Duo systems, the minimum cross-sections of the collector line must be 42 mm or larger.
- System separation is required if no oxygen diffusion-tight pipe has been used, and in systems in which contaminants are already present.

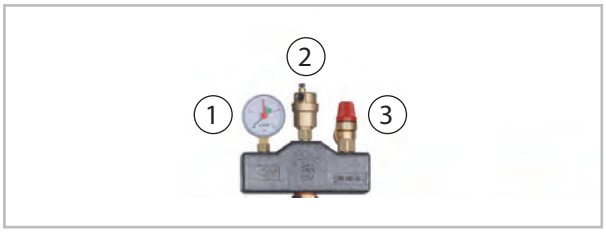


Fig. 41: Safety assembly

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

- All exposed metallic surfaces must be additionally insulated.
- Cooling mode via the heating circuit requires a complete vapour density 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 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 LWM series

Hydraulic diagram for heat pump assembly LWM Stuttgart

Functions: Heating/cooling and hot water, operating mode: monoenergetic

**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!**

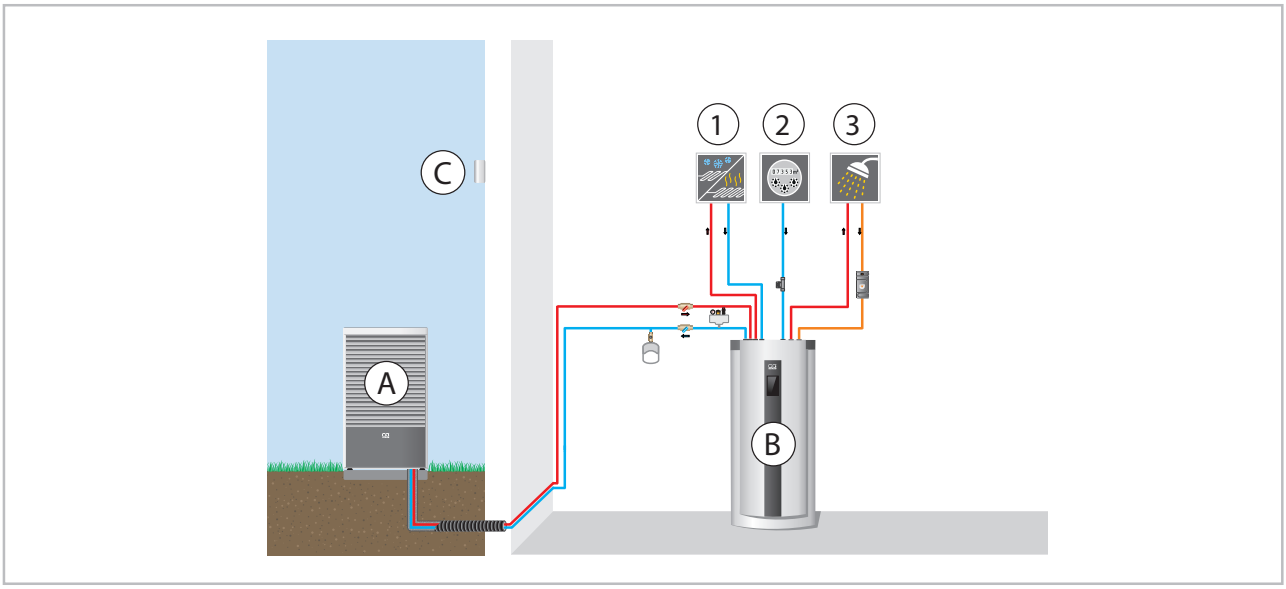


Fig. 42: Example hydraulic diagram

A: Heat pump
B: Indoor unit LWM 300 IM
C: External probe

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

LWM compact heat pump models are 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 indoor unit consists of an enamelled 300 l drinking water storage tank of the EWS series. In addition, a 3-way changeover valve and an electric bypass valve are installed.

The Smart-Control installed in the indoor unit switches all electrical components. Due to the pre-installed components, considerable assembly time is saved.

The highly efficient primary pump in the outdoor unit [A] can be used as a heating cycle pump and its speed is regulated according to requirements. There is a pressure drop present on site (see technical data). If the pressure losses on site exceed this, a separate storage tank, e.g. REMKO KPS, 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 and cold water supply connections are all connected to the indoor unit on the top.

A circulation line can optionally be connected to the storage tank.

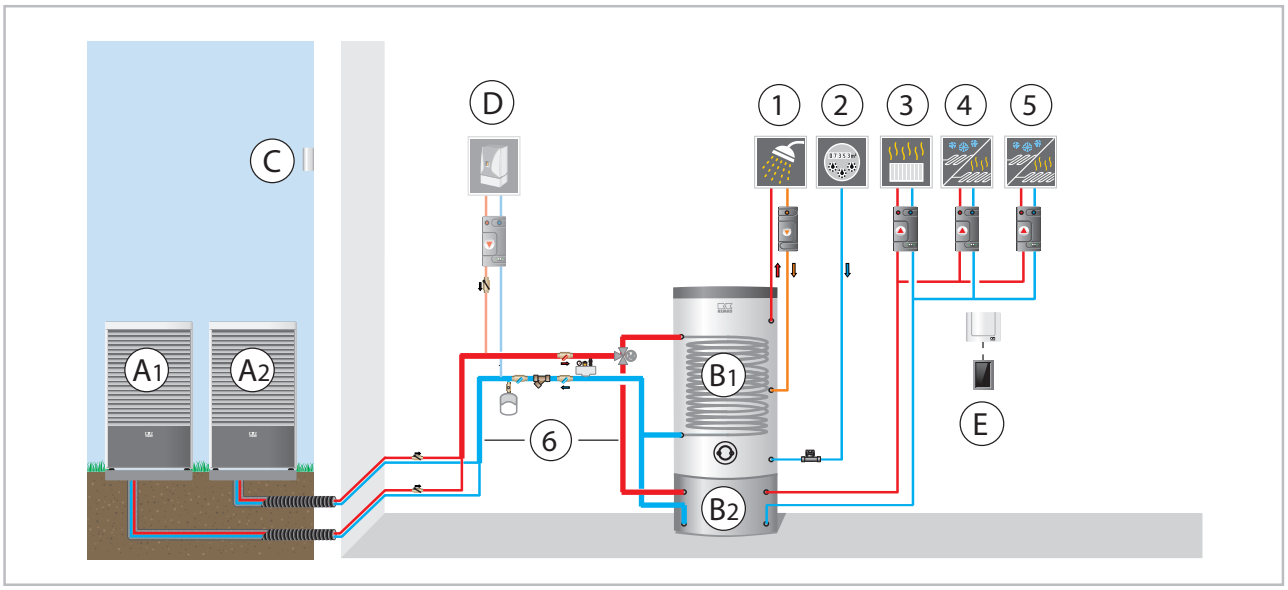
So that the heat pump can efficiently and smoothly supply the heating water system directly (without buffer tank), the following basic prerequisites must be fulfilled:

- The heating system must be able to be operated with an inlet temperature (e.g. only floor heating)
- The maximum pressure drop in the heating system must not be exceeded
- 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 of 5 l/kW cooling capacity with active cooling must be observed

Hydraulic diagram for heat pump assembly LWM Duo Mannheim

Functions: Heating/cooling and hot water, operating mode: monoenergetic

**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!**



A1: Heat pump 1
A2: Heat pump 2
B1: Hot water storage tank
B2: Buffer tank
C: External probe
D: Boiler/wall heating unit (optional)
E: Smart Control Touch

1: Hot water
2: Cold water
3: Unmixed cycle
4: Mixed cycle
5: Mixed cycle
6: Collector line (min. DN 40)

The LWM compact heat pump models are ideal for use in new or in existing buildings, where the heat pump is the sole heat generator. An additional heat generator can be installed to cover peak loads.

The Smart-Control regulation switches all electrical components.

The highly efficient primary pump inside the heat pump is used as the circulation pump. The combination buffer tank consists of an enamelled 300 l hot water tank [B1] and a 100 l vapour diffusion-tight buffer tank [B2] which is integrated into the system. The buffer tank is the hydraulic compensator if the pressure losses of the heating system are too high (see “Technical data”).

- An air short circuit of the external units must be prevented
- The pressure loss available on site from both heat pumps must not be exceeded.
- The collector line of the heat pumps must be at least DN 40
- The hydraulic connection of the individual heat pumps must be at least DN 25
- The pipe cross sections of the lines from the heat pump to the connection to the storage tank shall not be reduced
- The min. water volume with active cooling must be observed.
- The hydraulic connection of the LWM-Duo variant must always be made via a suitable buffer tank

REMKO LWM series

Hydraulic diagram for heat pump assembly LWM Mannheim

Functions: Heating/cooling and hot water, operating mode: monoenergetic

**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!**

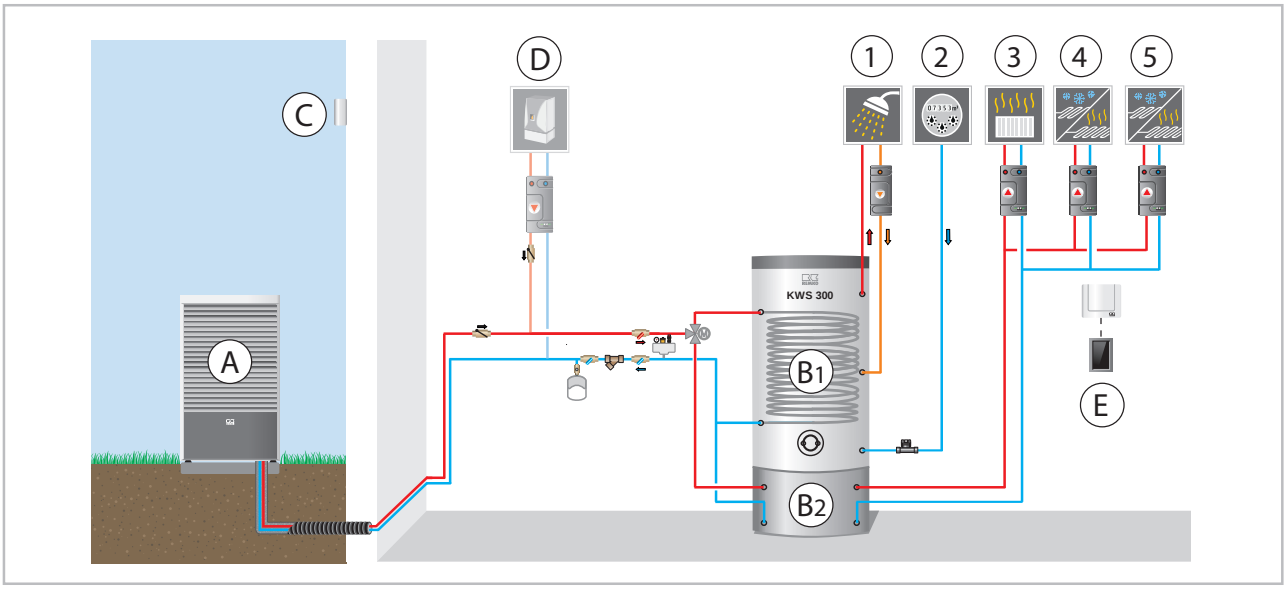


Fig. 43: Example hydraulic diagram

A: Heat pump
B1: Hot water storage tank
B2: Buffer tank
C: External probe
D: Boiler/wall heating unit (optional)
E: Smart Control Touch

1: Hot water
2: Cold water
3: Unmixed cycle
4: Mixed cycle
5: Mixed cycle

The LWM compact heat pump models are ideal for use in new or in existing buildings, where the heat pump is the sole heat generator. An additional heat generator can be installed to cover peak loads.

The Smart-Control regulation switches all electrical components.

The highly efficient primary pump inside the heat pump is used as the circulation pump. The combination buffer tank consists of an enamelled 300 l hot water tank [B1] and a 100 l vapour diffusion-tight buffer tank [B2] which is integrated into the system. The buffer tank is the hydraulic compensator if the pressure losses of the heating system are too high (see “Technical data”).

- The heating cycles connected must be hydraulically balanced.
- The pressure drop between heat pump and storage tank must not be exceeded.
- A minimum water flow volume of 20 l/KW must be assured.
- The pipe cross sections of the lines from the heat pump to the storage tank may not be reduced.
- The min. water volume of 5 l/kW cooling capacity with active cooling must be observed.

6 Emergency-heat operation

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

1. Activation of emergency-heat operation is only possible in the expert level of the Smart-Control regulation. To do this, select the "Expert" level on the basic display.
2. After activating the expert level by touching the REMKO logo, a password is required (the password is: "0321").
3. After confirmation, +/- symbols are displayed at the bottom. The password can be set by touching the +/- symbols. After the entry, confirm with "OK".

   The REMKO default password for the expert level is "0321". If this password has not already been changed, the expert level is enabled after entering this password.

   After the expert level has been enabled, various parameter levels are visible.
4. Select the "Settings" level by touching the "Settings" icon.
5. After selecting the "Settings" level, select the "Basic settings" parameter.
6. The "System configuration" parameter appears in the "Basic settings" level. Select this icon by touching it.
7. After selecting the "System configuration" level, select the "Heat pump" parameter.
8. Then deactivate the heat pump in the “Heat pump” level by touching the “activated” icon and changing the operating mode setting from “activated” to “deactivated”.

   The heat pump is now deactivated.

With deactivation of the heat pump, the second heat generator, e.g. the REMKO Smart-Serv auxiliary heater or a condensing unit installed in the system is active.

! NOTICE!

If the heat pump is switched off, e.g. by triggering the fuse, the water must be drained manually to prevent freezing.

7 Cooling with room temperature/humidity probe

Description of the Cooling Installation

Cooling via the mixed heating cycle (surface heating cycle)

If the heat pump is to be used for cooling, then this must be possible via the heating cycle. The hydraulic connection is identical to the connection for the heating cycle. If the mixed cycle is used for heating or cooling, it will be connected as shown in Fig. 43 and Fig. 42. The probes S12 and S11 measure the inlet and return flow temperatures, if a heating/cooling buffer is used. Dew-point monitoring is required for this.

Dew point regulation via room temperature/ humidity probe

If cooling via the surface heating is also required in summer, this can only be activated in conjunction with the Smart-Control Touch and the appropriate room temperature/humidity probe. Only with the use of the REMKO room temperature/humidity probe it is possible to use a cooling curve in order not to fall below the dew point. The remote control of the Smart-Control Touch regulation does not have its own humidity probe, therefore the room temperature/humidity probe must always be used if surface cooling is required.

As of software version 4.24, the mixing valves can mix at different inlet temperatures.

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 (inlet S16) or the external heating cycle pump in order to switch off the heat pump.

Cooling via a parallel buffer tank as a system limit

If the system is operated using a parallel buffer tank that acts as a system limit on the consumer circuit, no probe must be installed in the living room if the regulation of the consuming cooling circuit is operated via a third-party controller.

NOTICE!

Minimum water volume

If the system/water volume in the cooling circuit provided by the customer is less than the min. water volume, 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.

8 Water treatment

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

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

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

Scope of application of VDI 2035:

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

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

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

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

Reference values for the hot water in accordance with VDI 2035 Part 2			
		low-salt	saline
Electrical conductivity at 25°C	µS/cm	< 100	100-1,500
Oxygen content	mg/l	< 0.1	< 0.02
pH value at 25°C		8.2 - 10.0 *)	

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

Water treatment with chemicals

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

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

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

! NOTICE!

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

Filling of heating system with completely deionised water

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

Your heating contractor:

VDI directive 2035

Perform annual control measurement!

Fig. 44: Form for logging filling with completely deionised water

Media pumped by the Grundfos pump

The pump is suitable for circulation of the following media:

- Pure, low viscosity, non-aggressive and non-explosive media without solid or long-fibre components
- Mineral oil free coolants
- Softened water

The kinematic viscosity of water is ϑ= 1 mm^2/s (1 cSt) at 20 °C. If you use the pump to pump liquids with a different viscosity, the max. pump pressure will be reduced.

Example: A water-glycol mixture with 50% glycol content has a viscosity of approx. 10 mm^2/s (10 cSt) at 20 °C. Then the pumping capacity is reduced by approx. 15 %.

No additives must be added to the water which could impair the function of the pump.

The viscosity of the pumped medium must be taken into account when designing the pump.

9 Commissioning the refrigeration system

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.

! NOTICE!

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

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 cooling cycle
- Compressor and fan running smoothly.
- Issue of cold air in heating mode.
- Function test of all program sequences.
- Check of the surface temperature of the suction pipe and that the vaporiser is not overheating. To measure the temperature, hold the thermometer to the suction pipe and subtract the boiling point temperature reading on the pressure gauge from the measured temperature.
- Record the measured temperatures in the commissioning report.

Function test of heating operating mode

1. Open the on-site valves.
2. Check all connections for leaks with suitable leak detectors. If leaks are found, the faulty connection must be remedied.
3. Activate the main circuit breaker or fuse.
4. Program the Smart-Control Touch.
5. Switch on heating mode

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

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

Final tasks

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

NOTICE!

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

Adding refrigerant

DANGER!

Work on the cooling circuit may be undertaken only by trained specialist personnel! (technical specialist category I)

DANGER!

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

CAUTION!

Danger of injury from refrigerant!

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

Therefore:

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

-Safety glasses must be worn to protect the eyes.

NOTICE!

Check the overheating to determine the refrigerant fill quantity.

NOTICE!

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

10 Electrical wiring

Important Information

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

NOTICE!

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

11 Before commissioning

Observe the following points before commissioning:

- The heating system is filled with DI water in accordance with VDI 2035. We recommend the addition of REMKO full heating protection (see ↳ *Chapter 8 'Water treatment' on page 49*).
- - 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 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!

NOTICE!

All connections must be properly insulated in accordance with applicable standards.

12 Commissioning

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

- The unit is pre-installed at the factory. After a reset of the Smart-Control Touch, 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 pre-installed 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 Touch.

! NOTICE!

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

Overview of the controls

Fig. 45: Controls of the Smart Control Touch

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

Function display

Unit operation is intuitive and self-explanatory via the plain text display on the user interface on the touch display. 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.

You can access the expert level by touching the REMKO logo in the upper right corner of the display. After entering the password (0321) using the +/- combination and then touching the "Next" and "OK" displays, the expert level is enabled.

13 Care and maintenance

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

- To perform the statutory leak test where applicable, it is necessary to arrange a yearly maintenance contract with an appropriate specialist firm.
- The heat pump must be kept free of dirt, growth and other deposits.
- The unit is to be cleaned with a damp cloth. In doing so, ensure that no caustic, abrasive or solvent-based cleaning products are used. Use of powerful water jets is to be avoided.
- Open the unit regularly and carry out maintenance. For this, the evaporator fins must be cleaned and impurities removed from the unit if necessary. Special attention should be paid to the condensate drainage. Proper drainage of any condensate that accumulates must always be ensured.

! NOTICE!

The heat pump may only be opened by trained specialist personnel.

14 Temporary shutdown

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)!

- The system is to be switched to "Stand-by" mode for heating during temporary shutdowns and for hot water it should be switched to "Off" mode.
- 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 shutdown phase is over.
- Instructions for changing the mode appear in the corresponding chapter of the Smart-Control manual.

! NOTICE!

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

! NOTICE!

Please note that an unnoticed power failure can lead to frost damage!

15 Troubleshooting and customer service

General troubleshooting

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

Malfunction	Possible causes	Remedial measures
The heat pump does not start or switches itself off	Power failure, under-voltage	Check the voltage and, if necessary, wait for it to come back on
	Defective mains fuse/main switch turned off	Exchange mains fuse, master switch on
	Damaged power supply	Repair by specialist firm
	Power company off-period	Wait until the power-company off-period is over and the heat pump starts up as required
	Operational temperature limits too low or too high	Observe temperature ranges
	Nominal temperature exceeded, incorrect operating mode	The set-point temperature has to be higher than the heat generator temperature, check mode
		Disconnect the outdoor unit, then establish the correct terminal sequence using the connection plan. Re-establish voltage to the outdoor unit. Also make sure that the protective earth is connected correctly
Heating cycle pump does not switch off	Incorrect pump switching action	Have pump switching of the "heating cycle" checked out at specialist level
Heating cycle pumps fail to switch on	Incorrect operating mode set	Check mode
	Control board fuse in indoor units switching cabinet faulty	Exchange the fuse on the left side of the control board
	Incorrect heating program set	Check heating program. In the cold heating period, we recommend the ‘heating’ operating mode
	Temperature overlapping, e.g. outside temperature greater than room temperature	Check temperature ranges. Sample test!

Compressor windings resistance (in kOhm)

Windings	LWM 80 (230V/1~/50Hz)	LWM 110/110 Duo (400V/3~/50Hz)	LWM 150/150 Duo (400V/3~/50Hz)
T1 - T2	1,14	1,14	1,14
T2 - T3	0,84	0,84	0,84
T3 - T1	1,0	1,0	1,0

16 General view of unit and spare parts

16.1 Exploded view of the unit LWM 80-150

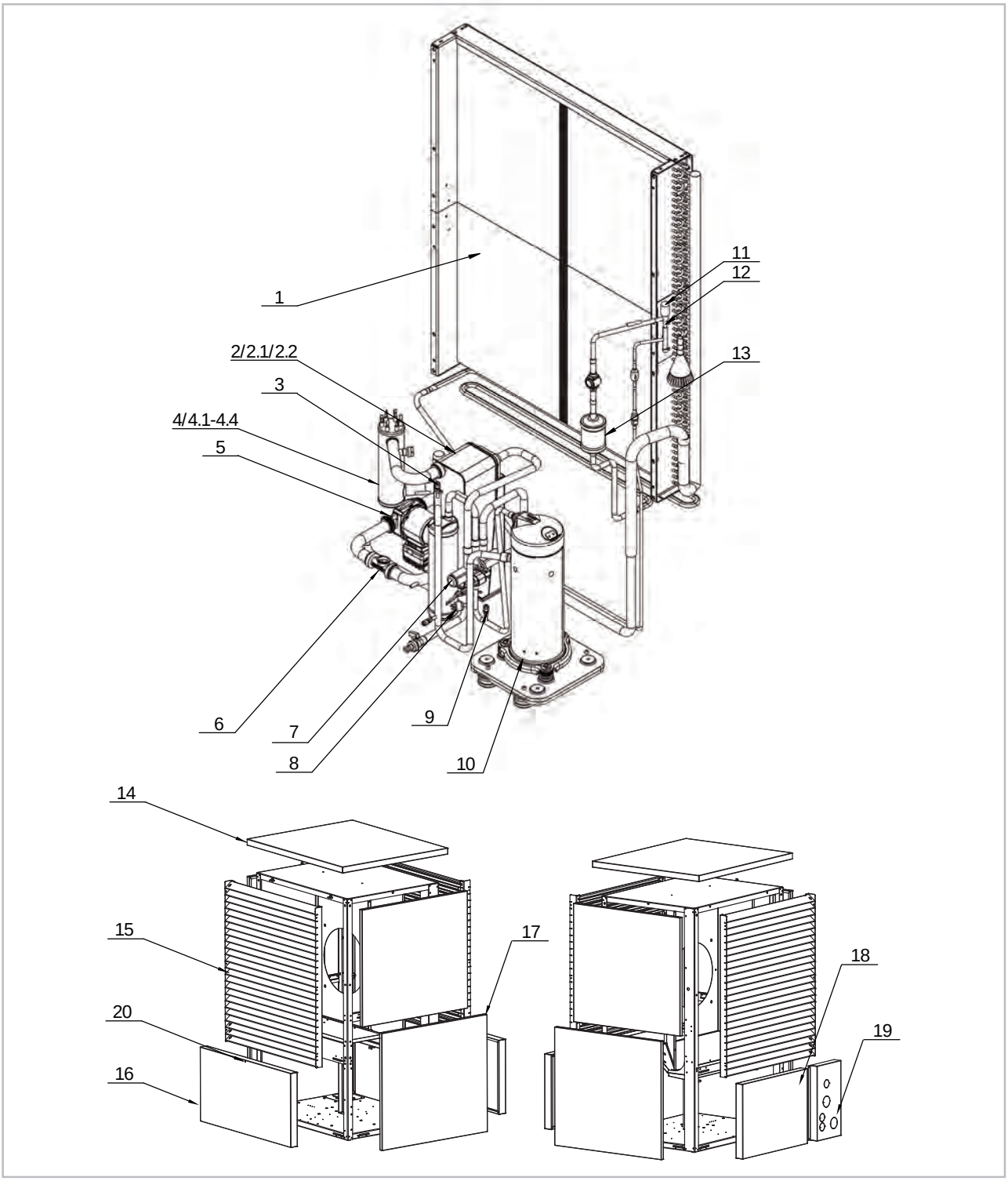


Fig. 46: Exploded view drawing

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

16.2 Spare parts LWM 80-150

No.	Designation	LWM 80-150
1	Fin vaporiser	On request by providing the serial number
2	Plate heat exchanger	
2.1	Sensor sleeve	
2.2	Sensor sleeve retaining clip	
3	Low pressure transducer	
4	Smart Serv heating element 7.5 kW	
4.1	Heating rod pipe group	
4.2	Bleeder	
5	Circulation pump	
6	Ultrasonic flow rate meter	
7	4-way changeover valve	
8	High pressure switch	
9	High pressure transducer	
10	Compressor	
11	EEV coil	
12	Electronic expansion valve	
13	Filter dryer	
14	Cover RAL 9006	
15	Aluminium finned grille	
	Graphite finned grille	
	Camura finned grille	
16	Air outlet bottom cover plate RAL 7021	
17	Side cover plate RAL 9006	
18	Rear/bottom cover plate	
19	Cover plate incl. pipe inlet	
20	Plastic sealing plug, cladding	

To ensure the correct delivery of spare parts, please always provide the unit type with its corresponding serial number (see name plate).

Spare parts not illustrated

Designation	LWM 80-150
Inverter (frequency converter)	On request by providing the serial number
Wave-trap	
Hot gas sensor probe (inverter)	
Cooling cycle control board	
Inverter-control board control cable	
Pressure transducer control cable	
Temperature sensor	
Control board plug set	
Axial fan with grille	
I/O module	
Smart-Control Touch display surface mounting	
Smart-Control Touch indoor unit display	
SD card	
Coding resistance	
Retaining clip cladding panel	
Terminal L1/L2/L3 (black)	
Terminal PE	
Terminal N	
Heating rod supply line terminal N	
Terminal block 230 V	
End terminal	
Sensor strip terminal block	
Safety temperature limiter (STB)	
Roof mounting retrofit kit	
Contactor	

To ensure the correct delivery of spare parts, please always provide the unit type with its corresponding serial number (see name plate).

17 General terms

All-in-one unit

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

Annual power input factor

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

Bivalent mode

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

Coefficient of performance

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

Compressor (condenser)

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

Condenser

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

Defrost

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

Energy supply company switching

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

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

Evaporator

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

Expansion valve

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

Heat carrier

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

Heat pump system

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

Heat source

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

Heating output

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

Inverter

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

Limit temperature / bivalence point

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

Monovalent mode

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

Noise

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

Refrigerant

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

Refrigerating capacity

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

Regulations and guidelines

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

Seal inspection

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

Seasonal performance factor

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

Single energy-source mode

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

Sound pressure level

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

Split AC unit

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

Storage tank

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

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REMKO QUALITY WITH SYSTEMS

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