



KaClima 5-50kW

Compact air-chilled unit
for environmentally-friendly air conditioning

► Installation and operating instructions

Keep these instructions in a safe place for future use!



Kampmann.co.uk/installation_manuals

1513/04/15/1 GB SAP-Nr. 1226115

KAMPMANN
Genau mein Klima.

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

Key to symbols:



Caution! Danger!

Non-compliance with this information can lead to serious personal injuries or damage to property.



Danger of electric shock!

Non-compliance with this information can lead to serious personal injury or damage to property caused by electric current.

Carefully read these instructions in full prior to any assembly and installation work!

Anyone involved with the installation, commissioning and use of this product is obliged to pass these instructions on to tradespeople who are involved at the same time or subsequently, as well as to end users or operators. Retain these instructions until the final decommissioning!

Content or design-related changes may be made without any prior notice!

| | |
|--|----|
| 1. Correct and Proper Use | 3 |
| 2. Safety Information | 5 |
| 2.1 General safety regulations | 6 |
| 2.2 Measures in case of leaking refrigerant | 7 |
| 2.3 Working when the housing is open | 8 |
| 3. General | |
| 3.1 Liability and warranty | 9 |
| 3.2 Regulations | 9 |
| 4. Operating Data | |
| 4.1 KaClima AO operating data | 10 |
| 4.1 KaClima AO sound data | 11 |
| 4.1 KaClima AI operating data | 12 |
| 4.1 KaClima AI sound data | 13 |
| 5. Operating Limits | 14 |
| 6. Delivery, Transport, Storage | 15 |
| 7. Installation | 16 |
| 7.1 Installation site | 16 |
| 7.2 Installation of units with a heat pump function | 17 |
| 7.3 Bivalent heating mode | 18 |
| 8. Hydraulics | 19 |
| 8.1 General | 19 |
| 8.2 Hydraulic connection | 19 |
| 8.3 Design guide for hydraulics | 20 |
| 8.4 Minimum water content | 24 |
| 8.5 Use of glycol | 25 |
| 8.6 External water-side pressure | 27 |
| 8.7 Plate heat exchanger | 28 |
| 9. Electrical Connection | 29 |
| 10. Control | 31 |
| 10.3 Setting | 32 |
| 10.1 Display | 32 |
| 10.2 Keys | 32 |
| 10.4 Controller remote control (accessory) | 34 |
| 11. Commissioning | 35 |
| 11.1 Prior to commissioning | 35 |
| 11.2 Switching on the chiller | 36 |
| 11.3 Operational stoppages | 37 |
| 12. Maintenance and Service | 38 |
| 12.1 Maintenance and leak testing of refrigeration systems | 38 |
| 12.2 Maintenance outside the cooling circuit | 38 |
| 12.3 Service and fault diagnosis | 39 |
| Appendix | 40 |
| Technical Data KaClima AO | 40 |
| Technical Data KaClima AI | 43 |



Read the operating instructions carefully prior to installing the KaClima!

1. Correct and Proper Use

Kampmann KaClima units are fully assembled liquid chillers ready for connection. The liquid heated in the consumers enters the chiller and releases its heat to the cooling circuit. Refrigerant flows through the cooling circuit and absorbs the heat in the evaporator. This enters the compressor in gaseous form and is compressed to a higher pressure. The refrigerant in the air heat exchanger releases heat into the environment whilst it is condensing. Outside air is fed through the heat exchanger by means of fans. The refrigerant is then injected back into the plate heat exchanger (evaporator) via the expansion valve.

If the chiller is used as a heat pump, the direction of operation is reversed.

KaClima are built in line with the state of the art and recognised safety regulations. Nevertheless, their use can result in danger to people or damage to the units or other materials assets if they are not appropriately installed and operated or correctly and properly used.

KaClima are exclusively designed for cooling and for bivalent, alternative heating in buildings. Any use other than the use specified above is deemed not to be correct and proper. The user/operator of the unit alone will be liable for any damage resulting from this. Correct and proper use is also deemed to include observing the safety, operating, service and maintenance information described in these instructions.

The unit must only be installed, connected and commissioned in its entirety. It is not permitted, for example, to operate the unit without a filter dryer, motor protection switch or connected consumers as this may lead to serious personal injuries or property damage.

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

Applications

KaClima should only be used

- With a hydraulic connection that corresponds to the description
- For operation with a dirt trap, vibration damper and flow monitor
- For operation within the operating limits described

KaClima may not be used

- In an environment with aggressive substances/atmospheres
- In an atmosphere where there is a risk of explosion
- In an environment where the temperatures are above or below the operating limits
- Above electrical equipment (such as computers, audio equipment or any other electrical equipment or contacts that are not drip-proof as there is no guarantee that water will not drip out when maintenance is being carried out on the chiller unit.

Please refer to the current Kampmann KaClima catalogue!

Specialist knowledge

The installation of this product requires specialist knowledge of heating, cooling, ventilation, installation and electrical engineering. This knowledge, generally learned in vocational training in one of the fields mentioned above, is not described separately. Damage caused by improper installation is the responsibility of the operator.

The installer of these units should have adequate knowledge of the following gained from specialist vocational training

- Safety and accident prevention regulations
- Guidelines and recognised technical regulations, e.g. Association of German Electricians (VDE) regulations, DIN and EN standards.

The installation, operation and maintenance of this unit must comply with the applicable laws, standards, provisions and regulations in the respective country and the current state of the art.

Purpose and scope of these instructions

These instructions contain all the information on the turnkey installation of the KaClima. Ongoing tests and further developments may result in small variations between the unit supplied and the instructions.



2. Safety Information

Installation, assembly and maintenance work on electrical units should only be performed by a qualified electrician in compliance with the VDE guidelines. The connection should comply with the applicable VDE regulations and provisions laid down by the regional electricity providers. Non-compliance with the regulations and operating instructions can result in the units malfunctioning with consequential damage and danger to people. The units can be incorrectly wired by the wires being swapped – danger of fatal injury!

Caution! Disconnect all parts of the system from the mains power supply and prevent them from being reconnected before starting any connection and maintenance work!

Please read these instructions in full to ensure the correct and proper installation and operation of the KaClima. Anyone involved with the installation, commissioning and use of this product is obliged to pass these instructions on to tradespeople who are involved at the same time or subsequently, as well as to end users or operators.



Please note the following safety-relevant information!

- Disconnect all parts of the system that are being worked on. Ensure that the system cannot be accidentally re-connected!
- Before commencing with installation/maintenance work, wait until all rotating parts, such as fans, etc., have come to a complete standstill after the unit has been switched off!
- Caution! Pipes, casings and fittings can become very hot or very cold depending on the operating mode!
- Caution! Wear gloves, safety shoes and suitable protective clothing when transporting the unit! Sharp edges cannot be ruled out despite care during manufacture.
- Please note the accident prevention regulations (UVV).

Protect the products from moisture and temperature fluctuations during installation and any possible interim storage. Check the application with the manufacturer in case of doubt.

Modifications to the unit

Do not undertake any modifications, refurbishments or upgrades on the KaClima without discussing these with the manufacturer as these may impair the safety and operation of the unit. Modifications/changes may only be carried out with written approval. Do not carry out any measures on the unit not described in these instructions. Ensure that all on-site systems and cabling are suitable for connection to the intended system!

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

2.1 General safety regulations

Unauthorised persons are not permitted to go near the unit.

The information in the chapter on page 38 must be followed carefully before carrying out any maintenance on the unit.

It is only permitted for specialist personnel to open the housing when the unit has been taken out of operation.

It is prohibited to remove protective devices and exclude safety and emergency devices.

It is forbidden to stand on the unit.

- The unit must only be used for its intended purpose and within the system's limits.
- The manufacturer is not responsible for damage due to improper use of the unit or because of technical changes that have been performed on the unit.
- Check regularly that the safety devices are working correctly.
- When working on the unit, only use suitable tools and equipment that are in good condition.
- The occupational health and safety regulations must be observed. Personal protective equipment must be worn (gloves, helmet, goggles, etc.).
- Work on electrical equipment must only be carried out by a qualified electrician.
- Work on the cooling circuit must only be carried out by specialist personnel.

2.2 Measures in case of leaking refrigerant

Produkt: R410A

Caution! As the refrigerant gases displace the oxygen available for breathing, there is a risk of asphyxiation! Rapid evaporation of the liquid may cause frostbite.

First aid measures:

- Never give anything to an unconscious person!
- If inhaled: Move the persons affected into fresh air, give them oxygen or mouth-to-mouth resuscitation if necessary.
- Do not administer adrenaline or similar substances.
- In case of contact with eyes: Rinse the eyes thoroughly with plenty of water for at least 15 minutes and consult a doctor.
- In case of contact with the skin: Wash the affected areas immediately with plenty of water. Remove all contaminated clothing immediately.

Measures in case of leaking refrigerant:

Individual precautions:

- Move the personnel to a safe area.
- Provide good ventilation.
- Use personal protective equipment.
- Leave the areas where there is a risk of asphyxiation

Precautions for the environment:

- Clean up any leaking oil.
- Clean up any leaking antifreeze.

Cleaning methods:

- Dispose of leaking oil and antifreeze correctly.

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions



2.3 Working when the housing is open

It is necessary to remove the casing panels on the unit to gain access to inner parts to complete some of the work and/or checks described below.



Caution! Disconnect the power before removing the casing panels and ensure that it cannot be switched on again!



Caution! There may be hot (pipes, compressor, etc.) and cold surfaces (compressor inlet separator, etc.) and sharp-edged surfaces (fin exchanger) or rotating parts (fans) even when the unit is switched off!



Work on the unit must therefore only be carried out by specialist personnel wearing the appropriate protective clothing!

It may be necessary for functional checks to operate the unit (fully or partially) with a casing panel open. In this case, the panel must be removed when the unit is at a standstill.



Such checks are particularly dangerous and must therefore only be carried out by highly qualified personnel!

Proceed as follows:

- Disconnect the power at the main switch and ensure that it cannot be switched on again!
- Open the control cabinet and disable the elements that do not need to be working during the check by removing the respective safety devices.
- Close the control cabinet again.
- Remove the corresponding casing panel.
- Start the unit.
- Carry out the necessary checks with the utmost caution and whilst using personal protective equipment.
- Stop the unit after carrying out the checks and refit the casing panel that was previously removed.
- Disconnect the power and refit the safety devices that were previously removed.
- Close the control cabinet again.

Caution! When the casing is open, high pressure faults can occur due to changes in the condenser air flow.

3. General

3.1 Liability and warranty

- KaClima should only be used for the applications indicated in „Intended use“.
- Warranty claims for material and manufacturing defects are only valid if these have arisen within the warranty period.
- Modifications/changes may only be carried out with written approval.
- Any warranty becomes void if modifications are made to the unit, no dirt trap is used and/or faulty hydraulics are connected.
- Frost protection must be provided at temperatures below 3 °C.

3.2 Regulations

The accident prevention regulations (BGV A1 (old: VBG1), BGV A3 (old: VBG4), VBG7w, VBG9a and the generally recognised technical regulations, in particular DIN VDE 0100 and DIN VDE 0105) apply during transportation, assembly, installation and operation of the unit.

The installation, operation and maintenance of this unit must comply with the applicable laws, standards, provisions and regulations in the respective country and the current state of the art.

These instructions contain guidelines for the installation, operation and maintenance of the chiller and specify the associated risks and dangers. They were conceived and developed with the aim of making it easy and safe for the relevant personnel to operate the chiller. All information contained herein must be read carefully in full, particularly the information highlighted with the hazard symbols



as this can cause personal injuries, damage to the environment and/or the unit if it is not observed. The instructions must be kept in a safe place and made available to the personnel responsible for operating and carrying out maintenance on the chiller.



These installation and operating instructions must always be accessible to the relevant persons; the relevant persons are obliged to read these instructions before carrying out any work on the unit!

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

4.1 KaClima AO operating data

| Model | | 021 | 031 | 041 | 051 | 071 | 081 | 091 | 101 | 121 | 131 | 141 | 151 | 161 | 171 |
|---|----------|------|------|------|-------|-------|------|------|------|-------|-------|-------|-------|-------|-------|
| Cooling mode only | | | | | | | | | | | | | | | |
| Cooling output ¹⁾ | [kW] | 4.40 | 5.65 | 8.00 | 10.2 | 13.1 | 15.5 | 17.4 | 19.6 | 25.3 | 26.8 | 32.4 | 36.4 | 43.2 | 48.1 |
| Power consumption | [kW] | 1.58 | 2.04 | 2.91 | 3.78 | 5.12 | 5.18 | 6.26 | 7.83 | 8.69 | 8.56 | 10.2 | 12.2 | 14.4 | 16.4 |
| EER | | 2.79 | 2.77 | 2.75 | 2.69 | 2.55 | 2.99 | 2.78 | 2.50 | 2.91 | 3.13 | 3.18 | 2.99 | 3.00 | 2.93 |
| ESEER | | 4.42 | 4.09 | 4.43 | 4.28 | 4.76 | 5.18 | 5.13 | 4.90 | 5.71 | 4.18 | 4.27 | 3.88 | 3.80 | 3.75 |
| Heat output ^{2) 3)} | [kW] | | | | | | | | | | | | | | |
| COP ^{2) 3)} | | | | | | | | | | | | | | | |
| Number of compressors/ cooling circuits | | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 |
| Number of fans | | 1/AX | 1/AX | 1/AX | 2/ AX | 2/ AX | 1/EC | 1/EC | 1/EC | 1/EC | 1/EC | 1/EC | 1/EC | 1/EC | 1/EC |
| Air volume | [m³/h] | 2351 | 3701 | 3701 | 7492 | 7186 | 7999 | 8302 | 8798 | 10001 | 16898 | 16898 | 18500 | 20336 | 20999 |
| Max. operating current | [A] | 11.9 | 15.1 | 18.6 | 10.4 | 11.5 | 25.0 | 25.3 | 26.1 | 30.5 | 32.8 | 30.3 | 31.1 | 34.6 | 37.7 |
| Max. power consumption | [kW] | 2.7 | 3.4 | 4.2 | 5.7 | 6.6 | 7.3 | 8.3 | 9.9 | 12.4 | 14.7 | 19.2 | 19.4 | 21.0 | 23.3 |
| Voltage supply | [V] | 230 | 230 | 230 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Oil volume | [kg] | 0.35 | 0.35 | 0.87 | 1.70 | 1.70 | 1.90 | 1.90 | 1.90 | 1.90 | 1.90 | 3.30 | 3.30 | 3.60 | 3.60 |
| Refrigerant volume | [kg] | 2.1 | 2.1 | 2.1 | 3.3 | 4.4 | 4.7 | 4.7 | 4.7 | 6.8 | 6.8 | 6.8 | 10.0 | 10.0 | 10.0 |
| Water volume | [l/s] | 0.21 | 0.27 | 0.38 | 0.49 | 0.63 | 0.74 | 0.83 | 0.94 | 1.21 | 1.27 | 1.53 | 1.72 | 2.05 | 2.28 |
| External pressure of pump ¹⁾ | [kPa] | 57 | 53 | 44 | 49 | 54 | 52 | 50 | 47 | 72 | 129 | 146 | 136 | 117 | 102 |
| Water content in the chiller | [litres] | 0.56 | 0.64 | 0.64 | 1.14 | 1.80 | 2.37 | 2.37 | 2.37 | 3.13 | 3.13 | 3.13 | 3.13 | 4.27 | 4.27 |
| Min. water volume in the complete hydraulic system | [litres] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 70 | 70 | 70 | 100 | 100 | 120 | 140 |
| Heating and cooling mode | | | | | | | | | | | | | | | |
| Cooling output ¹⁾ | [kW] | 3.88 | 5.65 | 8.00 | 10.2 | 13.1 | 15.5 | 17.4 | 19.6 | 25.3 | 26.8 | 32.4 | 36.4 | 43.2 | 48.1 |
| Power consumption | [kW] | 1.50 | 2.22 | 3.07 | 3.97 | 3.97 | 5.56 | 6.28 | 8.24 | 9.88 | 9.78 | 12.13 | 13.68 | 16.06 | 18.64 |
| EER | | 2.58 | 2.55 | 2.61 | 2.57 | 2.57 | 2.79 | 2.77 | 2.38 | 2.56 | 2.74 | 2.67 | 2.66 | 2.69 | 2.58 |
| ESEER | | 4.41 | 4.07 | 3.86 | 4.17 | 4.81 | 5.01 | 5.14 | 4.70 | 5.13 | 4.14 | 4.00 | 3.69 | 3.66 | 3.55 |
| Heat output ^{2) 3)} | [kW] | 5.05 | 6.39 | 8.03 | 11.0 | 13.3 | 15.2 | 17.7 | 19.9 | 24.0 | 25.0 | 30.3 | 34.2 | 40.1 | 46.7 |
| COP ^{2) 3)} | | 2.60 | 2.61 | 2.54 | 2.53 | 2.52 | 2.46 | 2.44 | 2.31 | 2.35 | 2.39 | 2.55 | 2.51 | 2.49 | 2.52 |
| Number of compressors/ cooling circuits | | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 |
| Number of fans | | 1/AX | 1/AX | 1/AX | 2/ AX | 2/ AX | 1/EC | 1/EC | 1/EC | 1/EC | 1/EC | 1/EC | 1/EC | 1/EC | 1/EC |
| Air volume | [m³/h] | 2351 | 3701 | 3701 | 7402 | 7186 | 7999 | 8302 | 8798 | 10001 | 16898 | 16898 | 20333 | 24019 | 24700 |
| Max. operating current | [A] | 11.9 | 15.1 | 18.6 | 10.4 | 11.5 | 25.0 | 25.3 | 26.1 | 30.5 | 32.8 | 30.3 | 31.1 | 34.6 | 37.7 |
| Max. power consumption | [kW] | 2.7 | 3.4 | 4.2 | 5.7 | 6.6 | 7.3 | 8.3 | 9.9 | 12.4 | 14.7 | 19.2 | 19.4 | 21.0 | 23.3 |
| Voltage supply | [V] | 230 | 230 | 230 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Oil volume | [kg] | 0.35 | 0.35 | 0.87 | 1.70 | 1.70 | 1.90 | 1.90 | 1.90 | 1.90 | 1.90 | 3.30 | 3.30 | 3.60 | 3.60 |
| Refrigerant volume | [kg] | 2.0 | 2.1 | 2.0 | 3.4 | 4.6 | 6.0 | 6.0 | 6.0 | 8.7 | 8.7 | 8.7 | 11.0 | 11.0 | 11.0 |
| Water volume | [l/s] | 0.19 | 0.25 | 0.29 | 0.42 | 0.56 | 0.74 | 0.80 | 0.93 | 1.15 | 1.33 | 1.54 | 1.81 | 2.07 | 2.34 |
| External pressure of pump ¹⁾ | [kPa] | 58 | 54 | 51 | 53 | 56 | 53 | 51 | 48 | 74 | 125 | 146 | 131 | 116 | 98 |
| Water content in the chiller | [litres] | 0.56 | 0.64 | 0.64 | 1.14 | 1.80 | 2.37 | 2.37 | 2.37 | 3.13 | 3.13 | 3.13 | 3.13 | 4.27 | 4.27 |
| Min. water volume in the complete hydraulic system | [litres] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 70 | 70 | 70 | 100 | 100 | 120 | 140 |

*1 At CHW 7/12, outside temperature 35 °C

*2 In accordance with EN 14511:2013 incl. defrost function

*3 At LPHW 45/40, outside temperature 7 °C

4.2 KaClima AO sound data

| Sound power level [dB(A)] ⁴⁾ | | | | | | | | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Model | 021 | 031 | 041 | 051 | 071 | 081 | 091 | 101 | 121 | 131 | 141 | 151 | 161 | 171 |
| 63 Hz | 73 | 76 | 76 | 76 | 77 | 83 | 84 | 86 | 81 | 85 | 85 | 88 | 93 | 94 |
| 125 Hz | 73 | 70 | 71 | 71 | 71 | 77 | 79 | 81 | 73 | 83 | 83 | 86 | 91 | 84 |
| 250 Hz | 70 | 65 | 66 | 69 | 69 | 69 | 70 | 72 | 67 | 75 | 80 | 81 | 85 | 85 |
| 500 Hz | 65 | 60 | 61 | 66 | 67 | 61 | 62 | 62 | 61 | 70 | 79 | 80 | 85 | 85 |
| 1000 Hz | 63 | 58 | 59 | 63 | 63 | 63 | 64 | 65 | 63 | 78 | 83 | 84 | 87 | 87 |
| 2000 Hz | 59 | 53 | 54 | 58 | 59 | 67 | 67 | 67 | 67 | 69 | 75 | 75 | 78 | 78 |
| 4000 Hz | 51 | 46 | 47 | 50 | 50 | 60 | 60 | 60 | 61 | 63 | 72 | 72 | 75 | 75 |
| 8000 Hz | 36 | 48 | 49 | 39 | 40 | 61 | 61 | 61 | 61 | 64 | 61 | 61 | 65 | 65 |
| Total | 64 | 64 | 64 | 68 | 69 | 72 | 72 | 73 | 71 | 80 | 85 | 86 | 89 | 90 |
| Sound pressure level [dB(A)] | | | | | | | | | | | | | | |
| Total | 49 | 49 | 49 | 53 | 54 | 56 | 56 | 57 | 55 | 63 | 69 | 70 | 73 | 73 |

*4 Sound data under full load, nominal conditions, 1 m distance in free field, measurements in accordance with UNI EN ISO 9614-2

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

4.3 KaClima AI operating data

| Model | | 021 | 031 | 041 | 051 | 071 | 081 | 091 | 101 | 121 | 131 | 141 |
|--|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Cooling mode only | | | | | | | | | | | | |
| Cooling output ¹⁾ | [kW] | 4.40 | 5.65 | 8.00 | 10.2 | 13.1 | 15.5 | 17.4 | 19.6 | 25.3 | 27.8 | 30.6 |
| Power consumption | [kW] | 1.69 | 2.19 | 3.07 | 4.25 | 5.63 | 5.50 | 6.58 | 8.12 | 9.54 | 11.2 | 13.7 |
| EER | | 2.59 | 2.58 | 2.61 | 2.39 | 2.32 | 2.82 | 2.65 | 2.42 | 2.65 | 2.48 | 2.23 |
| ESEER | | 3.58 | 3.37 | 3.67 | 3.25 | 3.35 | 4.48 | 4.38 | 4.36 | 4.35 | 3.85 | 3.58 |
| Heat output ^{2) 3)} | [kW] | | | | | | | | | | | |
| COP ^{2) 3)} | | | | | | | | | | | | |
| Number of compressors/ cooling circuits | | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 |
| Number of fans | | 1/ AX | 1/ AX | 1/ AX | 2/ AX | 2/ AX | 1/ EC | 1/ EC | 1/ EC | 1/ EC | 1/ EC | 1/ EC |
| Air volume | [m³/h] | 2351 | 3701 | 3701 | 7492 | 7186 | 7801 | 8600 | 8798 | 11999 | 14000 | 15001 |
| External pressure of fan | [PA] | 100 | 100 | 100 | 100 | 100 | 120 | 120 | 120 | 120 | 120 | 120 |
| Max. operating current | [A] | 13.3 | 16.3 | 20.2 | 15.7 | 17.2 | 27.8 | 28.1 | 28.9 | 31.5 | 33.5 | 34.5 |
| Max. power consumption | [kW] | 3.6 | 4.3 | 5.2 | 8.1 | 9.2 | 9.7 | 10.7 | 12.3 | 14.4 | 16.7 | 17.7 |
| Voltage supply | [V] | 230 | 230 | 230 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Oil volume | [kg] | 0.35 | 0.35 | 0.87 | 1.70 | 1.70 | 1.90 | 1.90 | 1.90 | 1.90 | 1.90 | 3.30 |
| Refrigerant volume | [kg] | 2.1 | 2.1 | 2.1 | 3.3 | 4.4 | 4.7 | 4.7 | 4.7 | 6.8 | 6.8 | 6.8 |
| Water volume | [l/s] | 0.21 | 0.27 | 0.38 | 0.48 | 0.63 | 0.74 | 0.84 | 0.94 | 1.21 | 1.33 | 1.46 |
| External pressure of pump ¹⁾ | [kPa] | 52 | 46 | 48 | 44 | 44 | 70 | 65 | 60 | 55 | 48 | 38 |
| Water content in the chiller | [litres] | 0.56 | 0.64 | 0.64 | 1.14 | 1.80 | 2.37 | 2.37 | 2.37 | 3.13 | 3.13 | 3.13 |
| Min. water volume in the complete hydraulic system | [litres] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 70 | 70 | 70 | 100 |
| Heating and cooling mode | | | | | | | | | | | | |
| Cooling output ¹⁾ | [kW] | 3.88 | 5.65 | 6.11 | 8.84 | 11.7 | 15.5 | 16.8 | 19.5 | 24.0 | 26.6 | 29.1 |
| Power consumption | [kW] | 1.57 | 2.22 | 2.40 | 3.72 | 4.86 | 5.85 | 6.38 | 8.47 | 10.2 | 11.9 | 14.1 |
| EER | | 2.48 | 2.55 | 2.54 | 2.37 | 2.41 | 2.65 | 2.64 | 2.30 | 2.35 | 2.24 | 2.06 |
| ESEER | | 3.41 | 4.07 | 3.36 | 3.04 | 3.30 | 4.27 | 4.33 | 4.12 | 3.92 | 3.58 | 3.43 |
| Heat output ^{2) 3)} | [kW] | 5.19 | 6.39 | 8.25 | 11.5 | 13.8 | 16.2 | 18.5 | 20.4 | 25.8 | 28.2 | 31.5 |
| COP ^{2) 3)} | | 3.06 | 2.61 | 3.03 | 2.55 | 2.60 | 3.02 | 2.97 | 2.81 | 2.92 | 2.75 | 2.59 |
| Number of compressors/ cooling circuits | | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 |
| Number of fans | | 1/ RA | 1/AX | 1/ RA | 2/ RA | 2/ RA | 1/ RA | 1/ RA | 1/ RA | 1/ RA | 1/ RA | 1/ RA |
| Air volume | [m³/h] | 2351 | 3701 | 3701 | 7402 | 7186 | 7999 | 8302 | 8798 | 10001 | 11002 | 11419 |
| External pressure of fan | [PA] | 100 | 15.1 | 100 | 100 | 100 | 120 | 120 | 120 | 120 | 120 | 120 |
| Max. operating current | [A] | 13.3 | 15.1 | 20.2 | 15.7 | 17.2 | 27.8 | 28.1 | 28.9 | 31.5 | 33.5 | 34.5 |
| Max. power consumption | [kW] | 3.6 | 3.4 | 5.2 | 8.1 | 9.2 | 9.7 | 10.7 | 12.3 | 14.4 | 16.7 | 17.7 |
| Voltage supply | [V] | 230 | 230 | 230 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Oil volume | [kg] | 0.35 | 0.35 | 0.87 | 1.70 | 1.70 | 1.90 | 1.90 | 1.90 | 1.90 | 1.90 | 3.30 |
| Refrigerant volume | [kg] | 2.0 | 2.1 | 2.0 | 3.4 | 4.6 | 6.0 | 6.0 | 6.0 | 8.7 | 8.7 | 8.7 |
| Water volume | [l/s] | 0.21 | 0.25 | 0.38 | 0.48 | 0.63 | 0.74 | 0.84 | 0.94 | 1.21 | 1.33 | 1.46 |
| External pressure of pump ¹⁾ | [kPa] | 54 | 54 | 59 | 51 | 57 | 70 | 67 | 60 | 59 | 51 | 43 |
| Water content in the chiller | [litres] | 0.56 | 0.64 | 0.64 | 1.14 | 1.80 | 2.37 | 2.37 | 2.37 | 3.13 | 3.13 | 3.13 |
| Min. water volume in the complete hydraulic system | [litres] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 70 | 70 | 70 | 100 |

*1 At CHW 7/12, outside temperature 35 °C

*2 In accordance with EN 14511:2013 incl. defrost function

*3 At LPHW 45/40, outside temperature 7 °C

4.4 KaClima AI sound data

| Sound power level [dB(A)] ⁴⁾ | | | | | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Model | 021 | 031 | 041 | 051 | 071 | 081 | 091 | 101 | 121 | 131 | 141 |
| 63 Hz | 88 | 95 | 97 | 104 | 106 | 104 | 84 | 107 | 106 | 107 | 108 |
| 125 Hz | 77 | 87 | 89 | 95 | 97 | 94 | 79 | 96 | 100 | 103 | 104 |
| 250 Hz | 69 | 76 | 77 | 84 | 86 | 78 | 70 | 81 | 86 | 89 | 88 |
| 500 Hz | 65 | 71 | 72 | 88 | 90 | 73 | 62 | 74 | 81 | 85 | 86 |
| 1000 Hz | 64 | 69 | 70 | 83 | 85 | 71 | 64 | 72 | 78 | 82 | 83 |
| 2000 Hz | 66 | 66 | 68 | 72 | 74 | 70 | 67 | 70 | 77 | 81 | 82 |
| 4000 Hz | 60 | 62 | 64 | 65 | 67 | 69 | 60 | 69 | 70 | 75 | 77 |
| 8000 Hz | 41 | 48 | 49 | 58 | 60 | 56 | 61 | 60 | 65 | 69 | 69 |
| Total | 71 | 76 | 78 | 88 | 90 | 82 | 72 | 84 | 87 | 91 | 92 |
| Sound pressure level [dB(A)] | | | | | | | | | | | |
| Total | 63 | 67 | 69 | 79 | 81 | 72 | 73 | 74 | 77 | 81 | 82 |

*4 Sound data under full load, nominal conditions, 1 m distance in free field, measurements in accordance with UNI EN ISO 9614-2

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

5. Operating limits

It is not permitted to exceed or drop below the following operating limits when operating the chiller.

Operating limits in cooling mode

- Min. outside temperature: -10°C
- Max. outside temperature: $+45^{\circ}\text{C}$
- Min. water outlet temperature: $+5^{\circ}\text{C}$
- Max. water outlet temperature: $+18^{\circ}\text{C}$

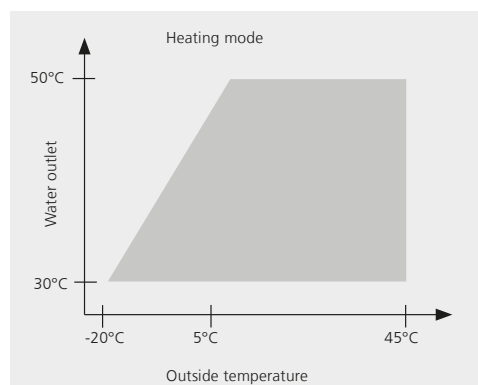
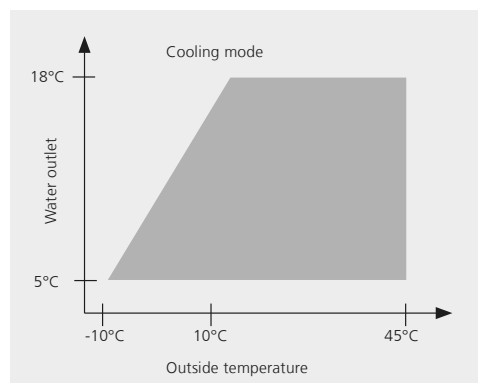
Operating limits in heating mode

- Min. outside temperature: -20°C
- Max. outside temperature: $+45^{\circ}\text{C}$
- Min. water outlet temperature: $+30^{\circ}\text{C}$
- Max. water outlet temperature: $+50^{\circ}\text{C}$

Water-side:

- Min. water supply for complete system: see technical data
- Min. glycol concentration: 20%
- Max. glycol concentration: 50%

Operating limits of water / outside temperature



6. Delivery, Transport, Storage

Delivery

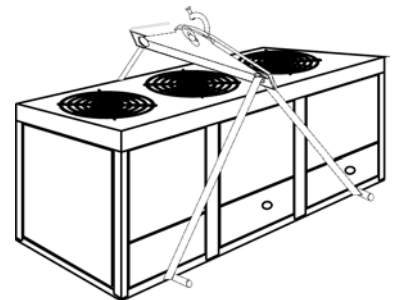
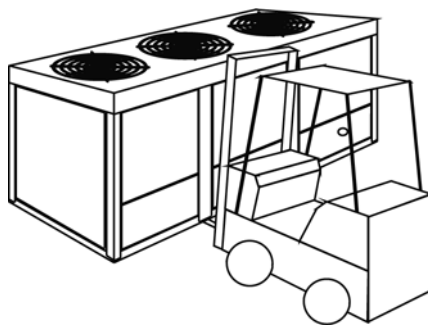
- Check the unit immediately upon receipt for any damage!

As it is inspected thoroughly before leaving the factory, any damage will be attributable to the carrier. It is therefore essential that this is noted on the delivery note before it is signed. Notify the manufacturer or its representative immediately about the extent of the damage.

Lifting and transport

- Do not make any sudden, jerky and/or violent movements when unloading and installing the unit.
- Do not hold onto the pipes or other components to lift the unit!
- The unit must only be moved as specified on the plate.
- The lifting points are clearly indicated on the label.

Caution! Make sure that the unit is firmly anchored for all lifting work to prevent it falling or tipping over.



3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

7. Installation

7.1 Installation site

The following points must be taken into consideration when choosing the installation site:

- Level, load-bearing surface
- Adequate air supply
- Free access for installation and maintenance work as well as for replacing parts during repairs
- Avoid sound amplification through the reflection of sound waves emanating from the unit
- The condenser must be protected against damage.

Oil and glycol trays: An oil or glycol collection tray may be required depending on the installation site. Please observe the country-specific legislation!

Protection from the weather: Wind can alter the operating conditions. The unit should be installed in a draught-free area if possible to minimise the impact. Wind protection may be required. The unit must be secured to prevent it tipping and falling over! The condenser should be installed in the shade; direct sunlight should be avoided.

Assembly of units for outdoor installation

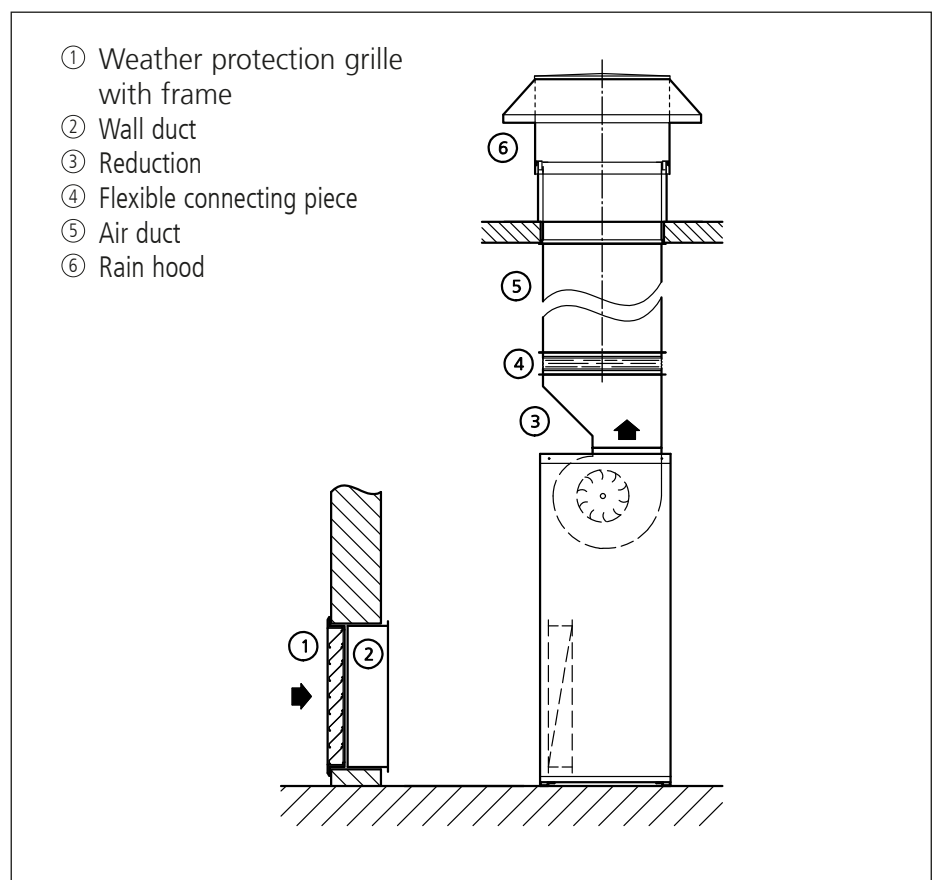
If you intend to install the product on a roof or terrace, it is imperative that you first check that it has sufficient load-bearing strength (taking into consideration additional weight, as could be provided by any accessories fitted, and possibly lay a reinforced foundation). The foundations or supporting structure must be horizontal. An unlimited air supply is essential for the proper operation of the chiller. Minimum clearances from obstacles must be observed for this reason. These can be found on the dimensional drawings.

Rubber or vibration dampers can be used as a base for the KaClima. Sound damping measures must be selected on the basis of the weight and other basic conditions. With flat roof installations, the support structure must be checked separately (by a specialist consultancy if necessary) to ensure that it can accommodate the chiller, particularly with regard to static and acoustic requirements.

Assembly of units for indoor installation

The same basic conditions apply to units for indoor installation. The air flow of the units must also be considered at the planning stage. The extract air side is connected via a duct network provided on-site. The duct system should be sized in accordance with the available external pressure of the respective unit used. Short circuits between the air intake and air outlet should be avoided at all costs as they inevitably lead to operational problems. The unit cannot be operated without a duct network. The air outlet must be protected against the infiltration of objects! **It is necessary to ensure a minimum pressure loss of 50 Pa.**

The units are not suitable for outdoor installation. The available external pressure can be found in the KaClima AI technical data.



Schematic diagram

7.2 Installation of units with a heat pump function

KaClima units with a heating option should be raised at least 20 cm to prevent them being blocked by ice and snow. KaClima units with a heat pump function should be placed on a tray provided on-site with a condensate drain and suitable frost protection heater.

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

7.3 Bivalent heating mode

Operating mode (cooling/heating)

The operating mode of KaClima units with a heating/cooling function can be changed over and they can be used for heating. They are factory-fitted with additional components for this purpose. This allows the cooling circuit to be reversed in the heating function and the chiller becomes a heat pump. The heat energy is taken from the ambient air of the chiller and thus cooled. A few points must be taken into account in this operating mode:

Reduction of the heat output with a lower outside temperature:

the lower the outside temperature, the lower the remaining heat output of the KaClima. The KaClima must be sized accordingly or an alternative heat source must be provided.

Bivalence point

The heat output and efficiency of the KaClima decreases in heating mode with a falling outside temperature. Operation of the unit as a heat pump below an outside temperature of approx. -5°C is economically worse compared with a conventional heat generator; this point is referred to as the bivalence point. It makes economic sense to change over to a conventional boiler if the temperature drops below the bivalence point.

The chillers should alternatively be operated bivalently. This means that a second heat generator (e.g. gas heating) assumes the heating function above a defined temperature and the on-site chiller is switched off.

Defrost mode

Frosting and icing may occur on the heat exchanger depending on the outside temperature and humidity.

This ice is defrosted at specific intervals by reversing the cooling circuit. The KaClima is in cooling mode again within this defrost interval. No heat energy is produced for the building during this period.

8. Hydraulics

8.1 General

The flow and return connectors are routed out of the housing as threaded spigots. The system should be connected up to the cold water mains in accordance with the applicable standards and technical regulations. Please observe the following, amongst other things:

- Provide safety equipment consisting of an expansion vessel and safety valve.
- Provide adequate ventilation for all connected consumers and at the highest point of the system.
- A coarse particle filter with a mesh width of < 1 mm should be provided upstream of the chiller to protect the evaporator (disclaimer of warranty 3.1).
- Pressure gauge on the flow and return side of the chiller.
- Make sure that the flow and return connections are correct. In the event that the wires are swapped, there is a risk of the evaporator icing over (and possibly even irreparable damage to the KaClima)
- Flexible design of the flow and return connections to avoid the transmission of expansions and vibrations.
- The connecting cables should be up to at least 1 m away from the unit and have the same nominal width as the connection diameter on the unit.
- A floor drain to remove any accumulating condensate should be provided especially with units for indoor installation and with a heat pump function.
- Chillers require a minimum mass flow of water in operation at any time. An overflow valve, volume flow controller, system separator or hydraulic compensator should be provided for this if necessary.



8.2 Hydraulic connection



The hydraulic connection of the KaClima to the pipe network is dependent on both the respective system and the size of the system. It is important to **ensure a constant mass flow of water or cooling brine in any operating situation**. There is a risk of the refrigerant evaporator freezing if the flow rate is too low, which will lead to faults and thus to the failure of the system.

In the event of a constantly changing chilled water requirement from the most diverse factors, such as duration of use, simultaneity factors, cooling load, etc., provide for 3-way control valves, bypass sections or relief valves at the planning stage to ensure adequate flow in the chiller. Please refer to the general technical data for the respective unit on pages 10 and 11 for the nominal flows needed. You will find information about the system configuration on the next page.

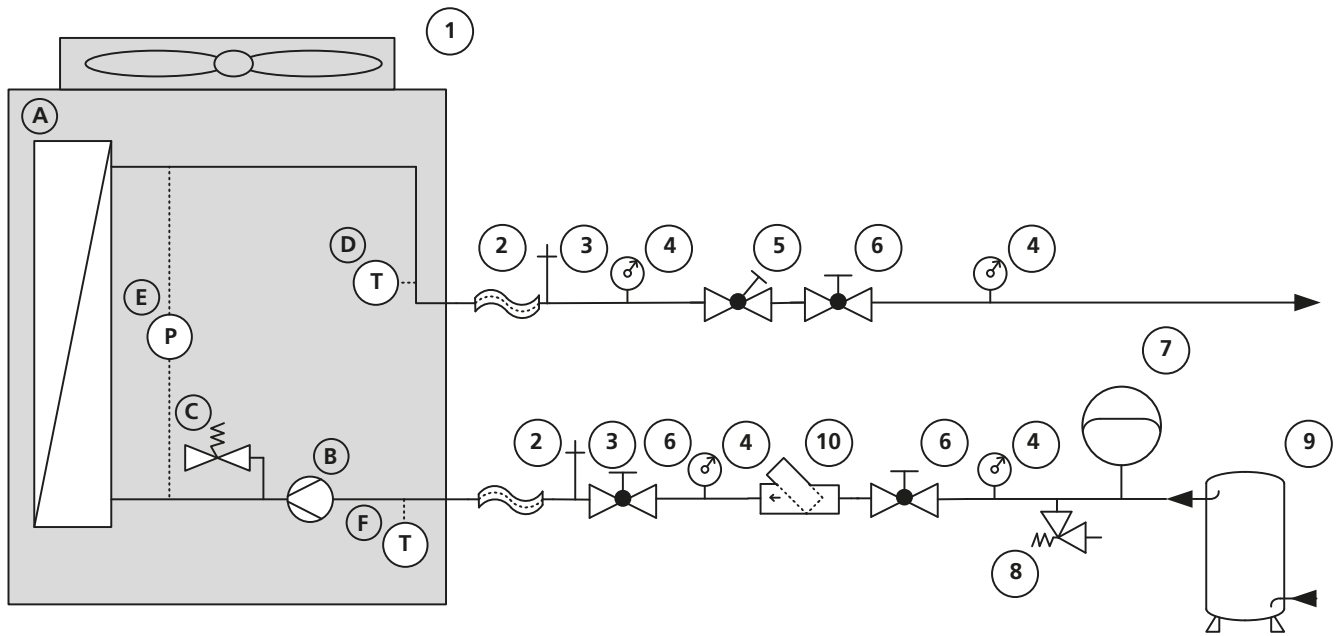
3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

8.3 Design guide for hydraulics

Air-chilled KaClima for outdoor or indoor installation
Model 021-171



- Ⓐ Water/ refrigerant exchanger
- Ⓑ Primary pump
- Ⓒ Safety valve (6 bar)
- Ⓓ Water outlet spigot Sensor
- Ⓔ Flow monitoring
- Ⓕ Water inlet spigot Sensor

- ① KaClima
- ② Flexible connection
- ③ Vent valve
- ④ Pressure gauge
- ⑤ Volume flow controller

- ⑥ Shut-off valve
- ⑦ Expansion vessel *¹⁾
- ⑧ Safety valve (6 bar) *²⁾
- ⑨ Increase of ext. water volume/storage tank *³⁾
- ⑩ Dirt trap *⁴⁾

Description

Frost protection:

The primary circuit should be filled with antifreeze to protect the KaClima units from frost damage in winter. Please refer to the data sheets supplied by the glycol manufacturers for information on the concentration, properties and safety measures (e.g. collection trays) that occur through the use of glycol.

You can also find information on page 25.

1) Expansion vessel:

The expansion vessel must be sized for the filling capacity of the system and the temperature differences that may occur. The filling capacity of the expansion vessel is included in the minimum water content of the system.

2) Safety valve:

The KaClima is equipped with a safety valve that is set at 6 bar. An additional valve is only required if a lower setting should be selected for the max. system pressure (e.g. 3 bar).

3) Increase of ext. water volume/ storage tank

A minimum volume of water is needed in the system to ensure smooth operation and maximum energy efficiency. The amount differs according to the model and is indicated in the technical data.

4) Dirt trap

The dirt trap is included with the KaClima and must be installed upstream of the KaClima.

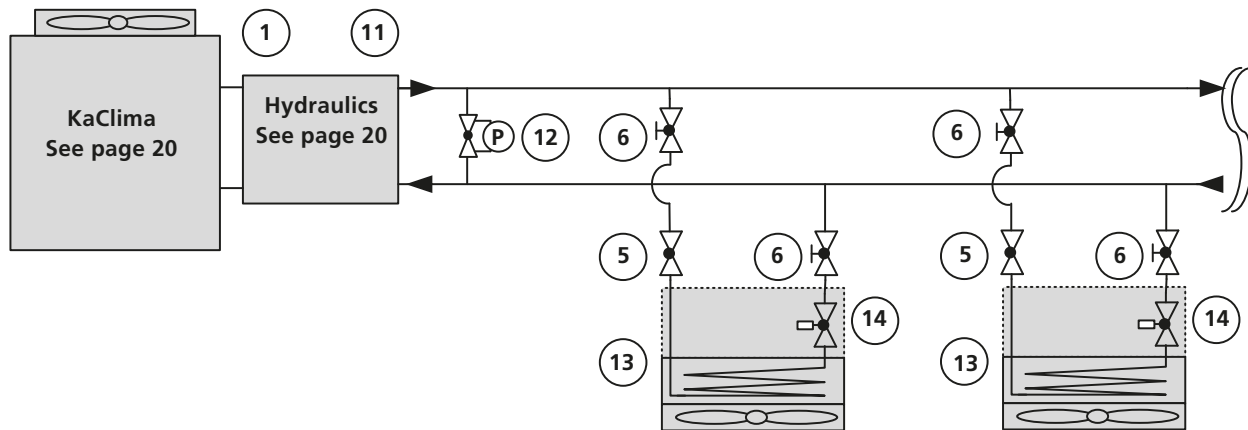
3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

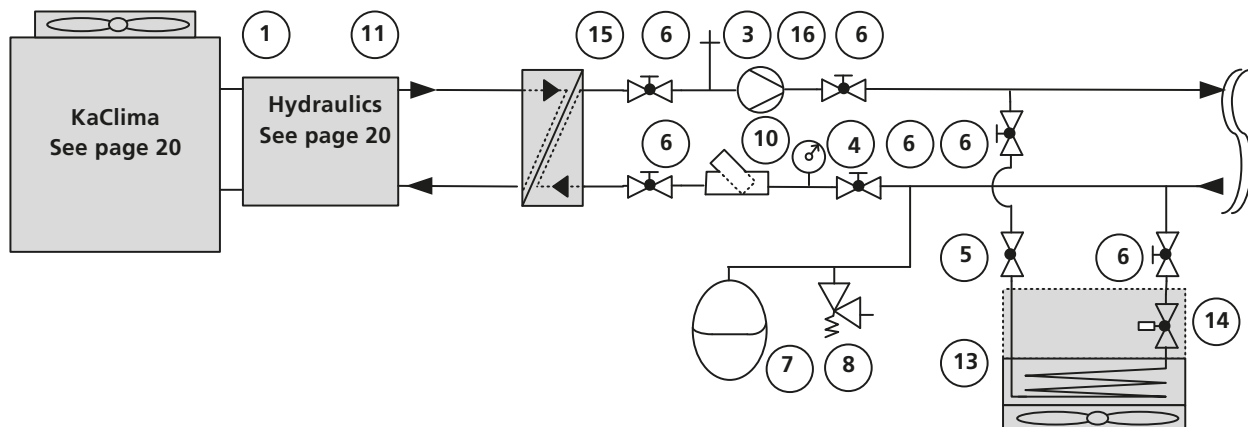
Installation and operating instructions

Suggested system designs

2-pipe system with primary/ secondary separation



2-pipe system with primary/ secondary separation



- | | | |
|--------------------------|---|--|
| ① KaClima | ⑧ Safety valve | ⑫ Overflow valve ¹⁾ |
| ③ Vent valve | ⑨ Increase of ext. water volume/ storage tank | ⑬ Consumer (e.g. fan coil, Katherm) |
| ④ Pressure gauge | ⑩ Dirt trap | ⑭ 2-way or 3-way valve ²⁾ |
| ⑤ Volume flow controller | ⑪ Basic hydraulics for primary circuit (from page 20) | ⑮ Plate heat exchanger/ system separator |
| ⑥ Shut-off valve | | ⑯ Secondary pump ³⁾ |
| ⑦ Expansion vessel | | |

This does not purport to be complete. The applicable regulations and standards must be observed. Additional information from the operating instructions should be taken into consideration.

1) Overflow valve:

KaClima units need a constant water flow. An overflow valve should be provided when using a variable flow rate in a secondary circuit, e.g. when using mixers or 2-way valves.

2) 2-way or 3-way valves

An overflow valve should be provided when using 2-way valves (see point 1). As there is no circulation in the main pipes with 2-way valves, this can lead to delayed cooling outputs on the consumers.

3) Secondary pump

When selecting the secondary pump, it is important to consider its suitability for cooling applications.

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

8.4 Minimum water content

The cold water system, consisting of the KaClima and the pipe network with the consumers, must have a minimum content of water and cooling brine.

If the water content is too low this may lead to high compressor clock frequencies and there may be high pressure levels leading to the malfunction of the KaClima. In addition, the water temperatures in the system will fluctuate significantly, resulting in poor performance of the consumers units and chiller.

For the above reasons it is imperative that the water content of the entire system is checked before the installation. If the calculated minimum water content in the entire system is not reached, a cold water storage tank needs to be installed to supplement the volume of water required.

Only components that carry medium are included in the minimum water volume. For example, expansion vessels cannot be added as the water does not flow through the expansion vessel and is therefore not relevant for the running time.

The water must not exceed a max. hardness of 14° and must not have an aggressive or corrosive effect on copper.

Please refer to the technical tables on pages 10 to 13 for the minimum water volumes.

External storage tanks in various sizes that are ready for connection are available on request.

8.5 Use of glycol

Use of glycol for frost protection

Chillers and heat pumps are often filled with a water/ glycol mixture to protect them from freezing. The following points must generally be observed to avoid operational problems and damage:

- The output of the chiller and/or consumers is reduced because of the thermodynamic properties of the antifreeze.
- Pressure losses (in valves, pipes, heat exchangers, etc.) increase considerably because of the increased kinematic viscosity (resistance).
- Pump flow rates and heights as well as valve flow rates must be corrected and checked.
- The water/ glycol mixture may be classified as hazardous to water. Appropriate safety measures to protect the environment and the groundwater must therefore be provided.
- Pipes that are galvanised on the inside must not be used! The inner zinc coating is dissolved by the mixture and forms compounds that can block components.
- Corrosion may occur if pure water is used to pressure test the system. It is therefore advisable at this stage to use the volume of glycol/water mixture that is needed later for this purpose.

Correction factors

| Glycol concentration | 15% | 20% | 25% | 30% | 35% | 40% | 45% | 50% |
|--|-------|-------|-------|-------|-------|-------|-------|-------|
| Frost protection temperature [°C] | -7 | -9 | -12 | -16 | -19 | -24 | -27 | -30 |
| Safety temperature [°C] | -2 | -7 | -10 | -11 | -14 | -19 | -22 | -25 |
| Power output correction factor [°C] | 0.985 | 0.981 | 0.977 | 0.974 | 0.971 | 0.968 | 0.965 | 0.962 |
| Input power correction factor [°C] | 0.990 | 0.988 | 0.986 | 0.984 | 0.982 | 0.981 | 0.979 | 0.976 |
| External pressure correction factor [°C] | 0.990 | 0.980 | 0.970 | 0.960 | 0.950 | 0.940 | 0.93 | 0.92 |

Usual antifreeze

| Antifreeze | Ethylene glycol | Propylene glycol |
|---------------------|---|---|
| Applications | Suitable for frost protection in cooling and heat pump systems outside of the food and catering sectors | Suitable for frost protection in cooling and heat pump systems in the food and catering sectors |
| Product description | Pale yellow in colour | Light blue in colour |
| Water hazard class | 1 | 1 |
| Potential product | Antifrogen N | Antifrogen L |

3.50 KaClima

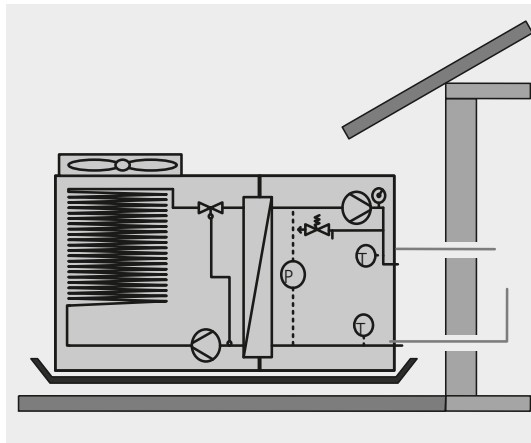
Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

Collection tray/ glycol protector

When using glycols, it may be necessary to make sure that the glycol is selectively removed in the case of an accident depending on the local and statutory conditions. Collection trays, for example, under the KaClima units can be provided for this purpose. They also offer the advantage that condensate occurring in heating mode can be selectively removed.

A collection tray is essential in this case, especially with indoor installations. It may be necessary to heat the trays depending on the design and installation.



Possible sources of supply for collection trays/ glycol protectors:

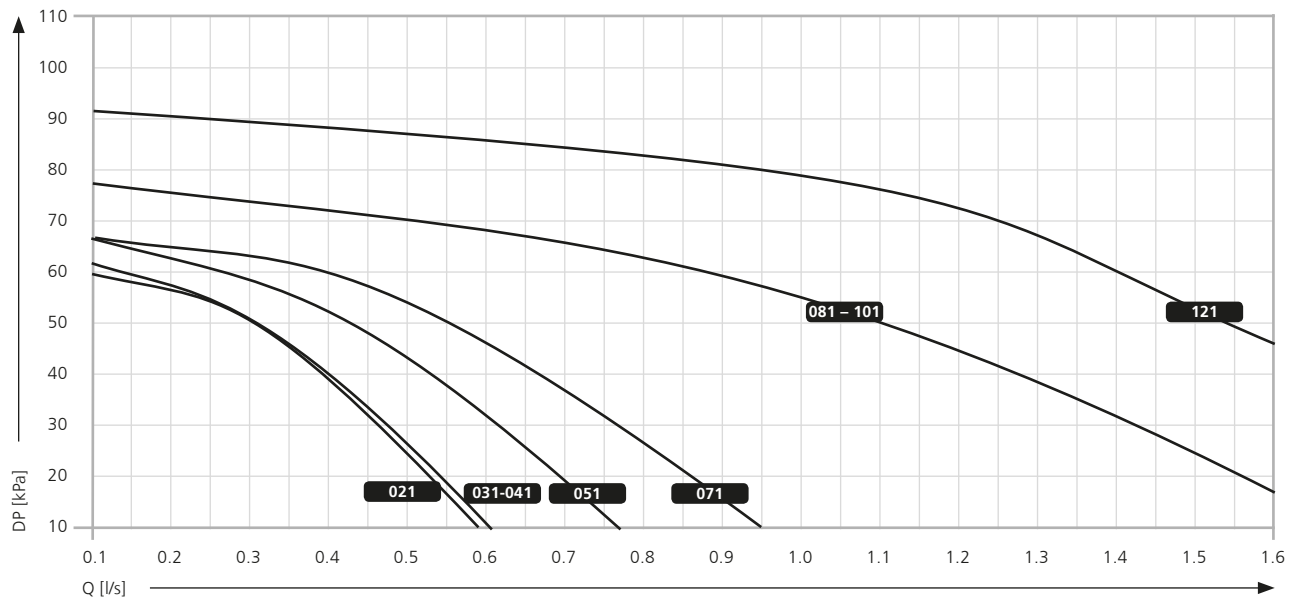
GUS – Gewässer-Umwelt-Schutz GmbH,
Lise-Meitner-Str. 14 · 48529 Nordhorn
Telephone: +49 (0)5921-713470

AuRü | GS Gesellschaft für Umweltschutz mbH
Otto-Hahn-Strasse 52 · 48529 Nordhorn
Telephone: +49 (0)5921-304370-304370

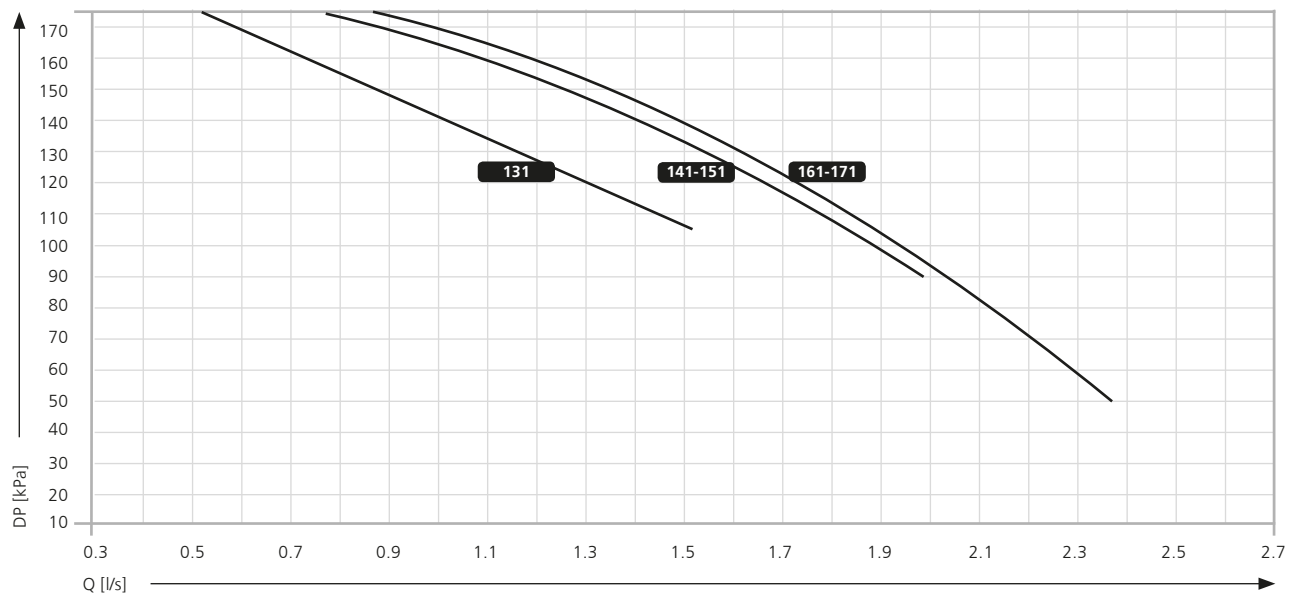
8.6 External water-side pressure

Internal pressure losses and accessories, such as the dirt trap, have already been deducted from the pump curve!

External pressure of KaClima BG 21 to 121



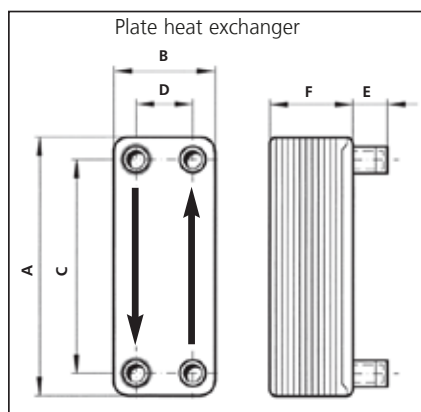
External pressure of KaClima BG 131 to 171



3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions



8.7 Plate heat exchanger

Plate heat exchangers are used for system separation of liquid media. The primary (chiller side) can be hydraulically decoupled from the secondary (consumer side) by installing a plate heat exchanger. This type of connection provides benefits when operating with water/ glycol mixtures. With system separation, the secondary side of the system can be operated without antifreeze and the primary circuit can be filled with a water/glycol mixture for frost protection.

The separation is particularly useful with systems for heating and cooling in a 2-pipe system as this avoids the heating water mixing with the water/ glycol mixture.

Protection against possible frost damage must be provided on-site, such as with an additional frost protection thermostat. This must actuate the chiller's emergency stop contact.

Plate heat exchangers should be connected using the reverse flow principle; otherwise there will be a drop in performance. Diffusion-tight insulation must be provided on-site; the insulation is not included in the delivery.

Technical Data Plate Heat Exchangers

Performance data with
Primary 6/12 °C glycol 35 %
Secondary 8/14 °C glycol 0 %

| Type | Transmission performance | Pressure loss Primary | Pressure loss Secondary | Connection diameter | Dimensions in mm | | | | | | Water content | Weight |
|--------------|--------------------------|-----------------------|-------------------------|---------------------|------------------|-----|-----|----|------|-------|---------------|--------|
| 3505010000*6 | [kW] | [kPa] | [kPa] | | A | B | C | D | E | F | [l] | [kg] |
| 1 | 6.0 | 9.3 | 4.5 | 1" Ag | 526 | 119 | 479 | 72 | 20.1 | 54.8 | 1.0 | 5.7 |
| 2 | 8.5 | 8.6 | 4.4 | 1" Ag | 526 | 119 | 479 | 72 | 20.1 | 77.2 | 1.5 | 7.47 |
| 3 | 11.5 | 9.1 | 4.9 | 1" Ag | 526 | 119 | 479 | 72 | 20.1 | 99.6 | 2.1 | 9.25 |
| 4 | 21 | 12.3 | 7.1 | 1" Ag | 526 | 119 | 479 | 72 | 20.1 | 122.0 | 2.6 | 11.0 |
| 5 | 21 | 12.2 | 7.3 | 1" Ag | 526 | 119 | 479 | 72 | 20.1 | 166.8 | 3.8 | 14.6 |
| 6 | 28.5 | 12.1 | 7.4 | 1" Ag | 526 | 119 | 479 | 72 | 20.1 | 211.6 | 5.0 | 18.1 |
| 7 | 32 | 13.7 | 8.5 | 1" Ag | 526 | 119 | 479 | 72 | 20.1 | 234.0 | 5.5 | 19.9 |
| 8 | 38 | 8.2 | 5.5 | 1 1/4" Ag | 526 | 119 | 470 | 63 | 27.1 | 269.8 | 6.4 | 21.3 |
| 9 | 51 | 11.2 | 7.5 | 1 1/4" Ag | 526 | 119 | 470 | 63 | 27.1 | 292.2 | 7.0 | 22.9 |



9. Electrical wiring

This work must only be carried out by specialist personnel!

- **Check in the control cabinet that the system has been completely disconnected from the power supply before starting any work (observe the safety regulations!).**
- Check that the available voltage corresponds with the machine data indicated on the type plate (voltage, number of phases, frequency).

A suitable cable with a protective conductor should be used for the wiring. The electrical wiring must be connected in accordance with the enclosed wiring diagram. It is a legal requirement to connect a protective conductor. The protective conductor must therefore be wired to the protective conductor bridge in the control cabinet with the designation PE. The control voltage for the unit is generated by a control transformer installed in the unit.

The cable cross-section and protective conductor must correspond to the values indicated (see operating data 4.1.4.3).

The wiring diagram is supplied with the unit.

- Always maintain a clockwise direction of rotation otherwise the unit may not work and damage may occur.

The voltage tolerance of the power supply must be between $\pm 5\%$. The voltage difference between the phases must not exceed 2%.

- **The fuse must have a „slow blow“ rating. The max. operating current must be taken into consideration when selecting the fuse.**

The system must be operated within the values listed above; otherwise any form of warranty will be invalidated.

3.50 KaClima

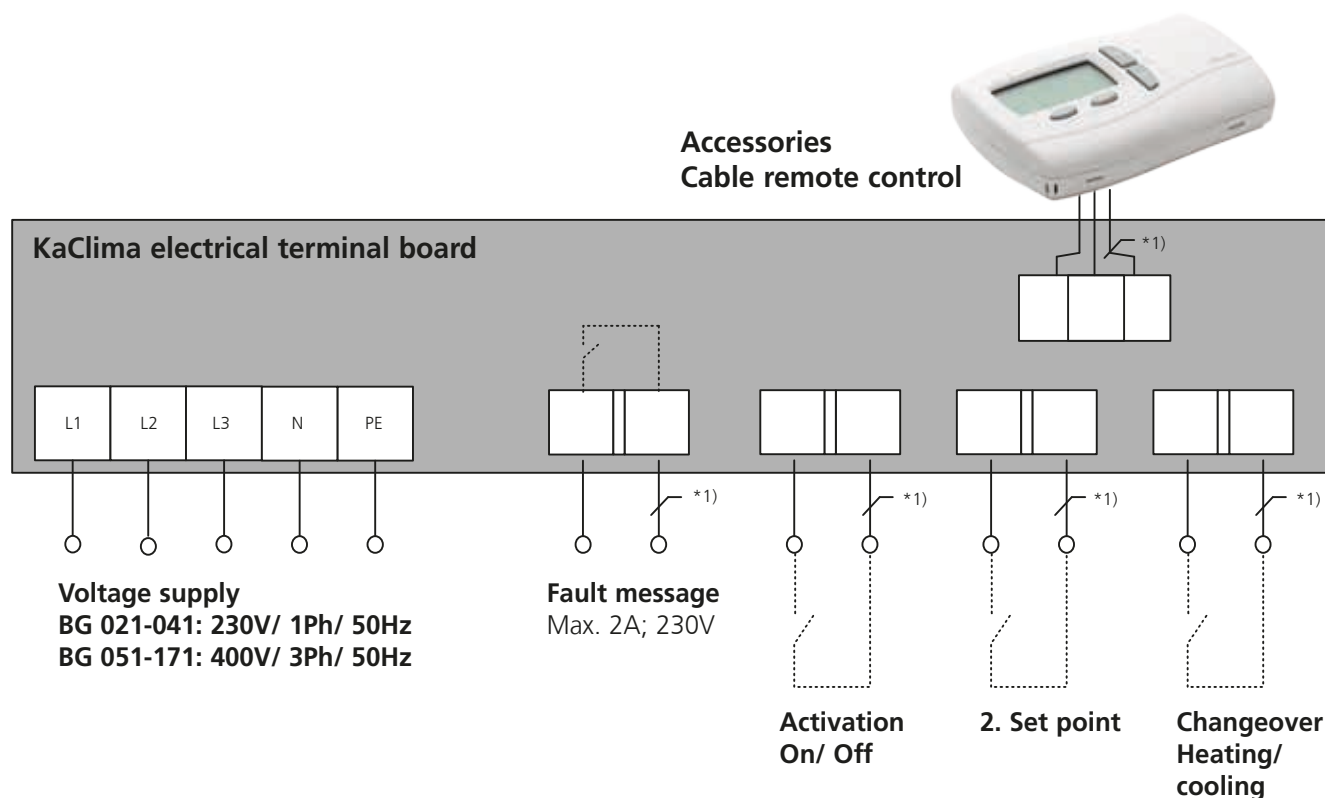
Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

Electrical wiring

External activation and fault messages

- The system must be wired in accordance with the enclosed wiring diagram if the aim is to switch the system on and off externally.



The fuse must be provided in accordance with the currently applicable standards and legislation!
Provide a fuse with a slow blow rating!
Provide a universal AC/DC sensitive residual current circuit breaker!

¹⁾ Lay shielded cables (e.g. JY(ST)Y, 0.8 mm), separately from high-voltage cables; max. cable length 50 metres

10. Control



The operating parameters are set via a fully automatic controller. The parameters may need to be adjusted depending on the desired operation. The chiller has a water outlet temperature control. The controller therefore determines the setpoint of the water outlet. The settings for the basic parameters can be found on page 22. It is necessary to enter a password to change parameters that may cause damage to the chiller. Please contact Kampmann customer service team for changes in these areas (e.g. frost protection parameters).

The controller also provides monitoring of the KaClima functions. The display shows various fault messages that may help with locating the cause of faults.

KaClima units can be operated externally. An external operating unit can be connected as an accessory. This allows the use of the chiller's full parameterisation and readout options at the installation site of the external operating unit. The operating unit can be purchased as an accessory from Kampmann.

KaClima units can also be connected to on-site controllers. External control options include: system activation, heating/cooling changeover. A collective fault message can be issued. Please use the wiring diagrams enclosed with the KaClima unit for the electrical wiring.

An incorrectly connected potential or error with the wiring may destroy the control unit!

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

10 Setting



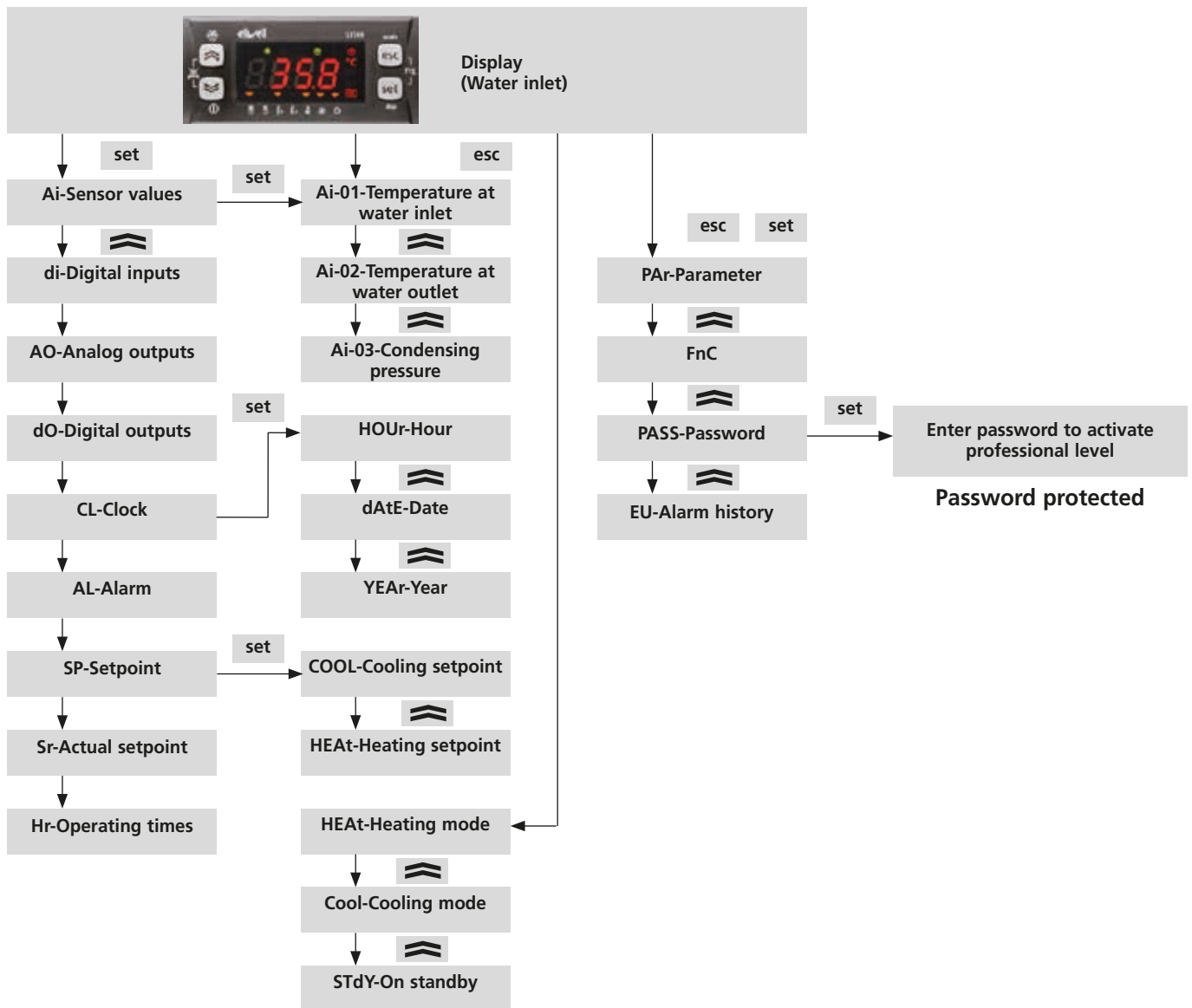
10.1 Display

| Symbol | Continuously lit | Flashing | Symbol | |
|--------|---------------------------|--|-----------|--|
| | Alarm triggered | Alarm muted | | Compressor |
| | Heating mode | | | Ventilation |
| | Cooling mode | Cooling mode remotely connected | LAMP TEST | An automatic test of the control card is carried out when the system is switched on: All LEDs will flash for a few seconds |
| | Standby via control panel | Standby remotely connected | | Water pump in the primary circuit |
| | Not used | | | Remote control display shows the time (Symbol provides no indication of scheduling) |
| | Clock scheduling enabled | Clock settings Programming scheduling | | |
| | Not used | | | |

10.2 Keys

| Symbol | Name | Action | | Function (3 sec.) |
|--------|------|---|------|---|
| | Up | Increase value Next entry | | Mute alarm |
| | Down | Decrease value Previous entry | | ON / OFF* |
| | Esc | Exit, WITHOUT SAVING CHANGES Previous level | mode | Cool / standby |
| | Set | Confirm exit, WITH SAVING CHANGES Go to the next level STATUS menu | | Inputs / clock (active alarms) |
| | | Enable/disable time intervals | | |
| | | Call up PROGRAMMING menu | | Parameters / functions / passwords / alarms |

* The frost protection function is not enabled if the unit is OFF.



3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

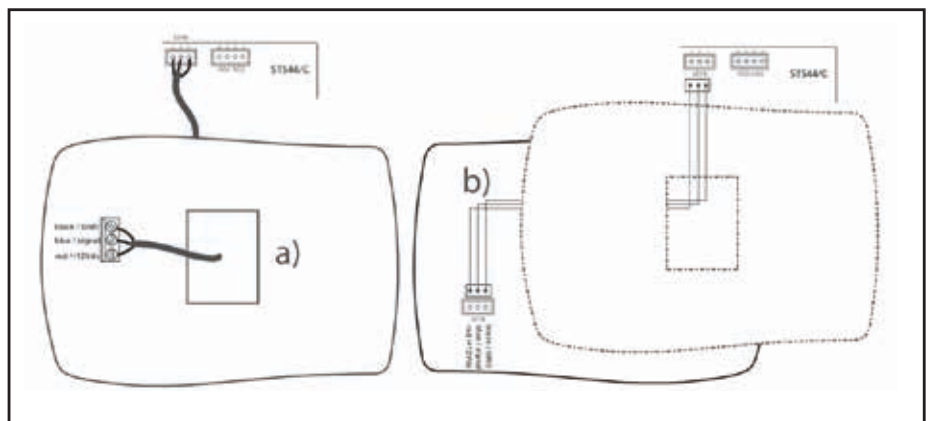
10.3 Controller remote control (accessory)

Remote control accessory 350401000011:

The remote control accessory supplements the built-in controller in the KaClima unit. The functions of the controller can be operated from the remote control position using the remote control.

Installation:

A three-wire cable is included in the delivery. This is plugged into the chiller controller as shown in the illustration. The cable can be extended on-site to the remote control using shielded cable and connected to the terminals.

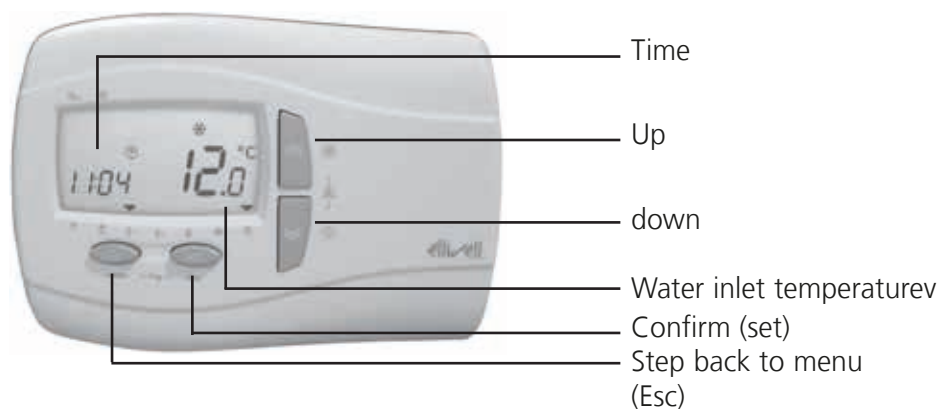


| Terminal ST500 | Terminal SKW10 | Description |
|----------------|----------------|-----------------------------------|
| 1 | GND / black | Ground / black |
| 2 | Signal / blue | Signal / blue |
| 3 | +12Vdc / red | 12~ supply of ST500 |
| KEYB | - | remote keyboard (remote terminal) |

Operation:

It is operated in a similar way to the controller, as described above.

Press and hold the Set and Esc key for 3 seconds to change to the parameter assignment menu.



11. Commissioning

11.1 Prior to commissioning

- Check all external electrical connections and terminal connections that must be tightened firmly and tighten if necessary.
- Use a voltmeter to check whether the voltage on terminals L1, L2, L3 corresponds to the information on the rating plate (permissible tolerance $\pm 5\%$). Check that there is a clockwise direction of rotation.
- The units are shipped with open vent valves and drains. The position of these devices should be closed at the point that the water circuit is filled during the installation.
- Check whether the fans can rotate freely.
- Check that the water connections are correct. These connections must be made in accordance with the information on the rating plate (flow and return).
- Make sure that the water circuit has previously been cleaned: bypass the chiller to do this. Rinse the system until no more dirt is detected. (Then clean the on-site dirt trap).
- Check whether the system is vented. Gradually drain any air through the vent valves.
- Open the water taps (provided that a pressure test has been previously been carried out).
- If the frost protection concept provides for the system to be filled with glycol, check the concentration and adjust this if necessary.
- Check whether the transport safety devices have been removed.
- Is there a large enough expansion vessel available and is it set to the system pressure?

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

11.2 Switching on the chiller

Make sure that the oil sump heater has been running for a minimum of 8 hours without interruption prior to commissioning. The KaClima can then be put into operation as follows:

- Switch on the KaClima.
- Use the controller to switch the chiller to „Standby“. Press the On/Off key on the controller for 3 seconds.
- If no errors are displayed on the operating unit and the setpoint has not been reached, the fans should start up after a short time. Visually check the function of the fans.
- The compressor should start up after a short time. Now check the water inlet/ outlet temperature. These should differ.
- You can assess the flow rate after about 10 minutes using the temperature difference between the flow and return temperature. It should not be below 4K or above 8K. Adjust the flow accordingly.
- Measure the voltage and power consumption again whilst the unit is in operation (fan and compressor running) and compare these with the technical data.
- Check the evaporating and condensing temperature as well as the overheating and undercooling.
- Check audibly and visually whether there are strong vibrations.
- Set the setpoints as desired.
- Set the time and date.
- The frost protection parameters must be adjusted if the unit is filled with glycol; please consult the Kampmann customer service team about this.

The following checks are needed once the unit has been running for around 2 hours:

- Visually check the cooling circuit for leaks.
- Use the operating unit to check the refrigerant pressures via the analog inputs.
- Vent the water-side hydraulics again. (Repeat the process until there is no air left in the circuit).
- Measure and check the voltage and power consumption again.

If you are using external inputs and outputs, check that there are working.

Certain legal documents must be drawn up and retained for the operation of refrigeration products. More information on this can be found on page 38.

11.3 Operational stoppages

The power supply should only be interrupted during longer operational stoppages e.g. in winter.

The required 12 hour warm-up period using the crankcase heater should be observed when restarting the system.



- The crankcase heater is only in operation when the power supply is turned on and the main switch is actuated!



- The trace heating is not in operation when the power supply is interrupted and there is no frost protection of the internal components!



The system must be protected against frost during operational stoppages (winter time)! Please fill the system with glycol or drain the system!

3.50 KaClima

Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

12. Maintenance and Service

12.1 Maintenance and leak testing of refrigeration systems

Knowledge of refrigeration systems and personnel and company certification in accordance with EC Regulation 303/2008 is needed for a full maintenance and statutory leak testing. Failure to comply with the regulation may result in severe penalties against the operator. The operator is responsible for the necessary checks. In addition, a system logbook must be kept in accordance with EC Regulation 842/2006 and the Chemicals Climate Protection Ordinance. The logbook must contain the following data:

- Quantity and type of the fluorinated greenhouse gas used.
- The topped up volume of refrigerant.
- The volume of refrigerant recovered during the maintenance, servicing or final disposal.
- Relevant information to identify the company or technical personnel who performed the servicing or maintenance.
- Dates and results of the leak testing.

The logbook must be kept for at least 5 years and handed over at the request of the relevant authorities.

The inspection intervals for the leak testing are as follows:

- Every 12 months for a filling capacity over 3 kg.
- Every 6 months for a filling capacity over 30 kg.

12.2 Maintenance outside the cooling circuit

Some work must be carried out outside the cooling circuit to ensure efficient and smooth operation of the system. The following list can be used as an aid.

The intervals may vary depending on the system and may need to be adapted to the local conditions. A period of 6 months is recommended for the initial maintenance.

- Check the function of the control and safety devices.
- Check on the sight glass to make sure that sufficient refrigerant has been added.
- Check whether there are any leaks on the compressor.
- Test the function of the flow monitoring.
- Check the fill level of the water circuit (fill and vent if necessary).
- Clean the dirt trap in the cold water mains.
- Check the terminal blocks to make sure that the wires are tight and there is no corrosion.
- Check the function of the crankcase heater.
- Clean leaves, dust, etc. off the condenser.
- Check the frost protection concept (top up the glycol if necessary).
- Check and clean the condensate drains.
- Check the spread in cooling mode.
- Clean the dirt trap in the water circuit.

12.3 Service and fault diagnosis

The following table is intended to help with fault diagnosis. The controller may display a fault message as a code depending on the error. The fault code can be translated using the table below; this makes the diagnosis much easier.

General faults:

| Fault | Possible cause | to check | Remedial action |
|---------------------------------|--|---|-------------------------|
| No function | No power supply | Is power connected to the chiller? | Replace fuse |
| | | | Switch on repair switch |
| Cooling function does not start | Setpoint too high | Is the water inlet temperature below the setpoint? | Adjust setpoint |
| Too high a spread | Water flow rate too low | Water flow or pressure drop in the system Check whether the water filter is dirty. | Increase flow rate |
| | | | Clean water filter |
| | | | Check frost protection |
| Too low a spread | Water flow rate too high | Pressure drop in the system | Increase pressure drop |
| System synchronises | Check if the water volume within the system is too low | Calculate or measure the water volume in the system | Use buffer tank |

Faults displayed on the controller:

| Code | Definition | Checks: |
|------|-------------------------------|---|
| Er01 | High pressure fault | Dirty condenser? |
| | | Can the air be supplied and extracted without resistance? |
| | | Is the high pressure switch OK? |
| Er02 | Low pressure fault | Is there sufficient refrigerant? |
| | | Is the low pressure switch OK? |
| Er10 | Overcurrent in the compressor | Check compressor power consumption? |
| | | Is the overcurrent trip setting OK? |
| | | Is the overcurrent trip OK? |
| Er20 | Flow fault | Check water flow |
| | | Check cold water pump |
| | | Check pressure drop in the system |
| | | Check frost protection concept |
| Er30 | Frost protection fault | Check frost protection concept |
| | | Check heaters |
| | | Check frost protection settings |
| | | Check the spread |

3.50 KaClima

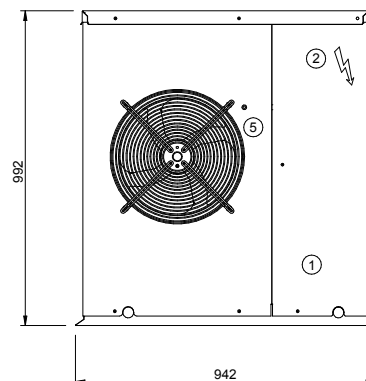
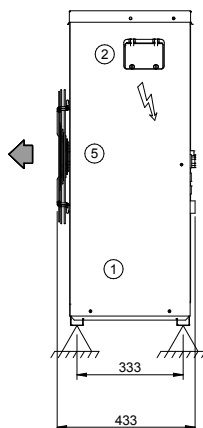
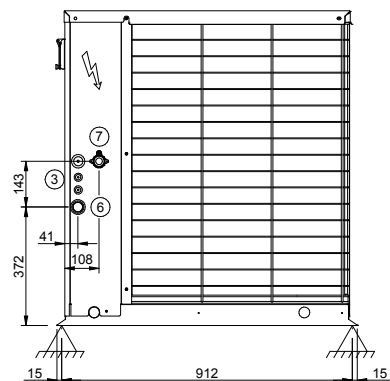
Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

Technical Data KaClima AO

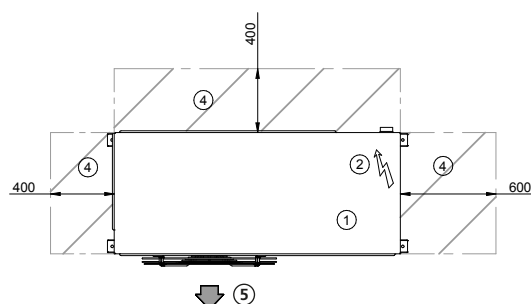
Model 021–041

Technical drawings (all dimensions in mm)



- ① Cooling generation
- ② Electrical control box
- ③ Cable entry
- ④ Air inlet / service opening
- ⑤ Air outlet
- ⑥ 1" water inlet
- ⑦ 1" water outlet

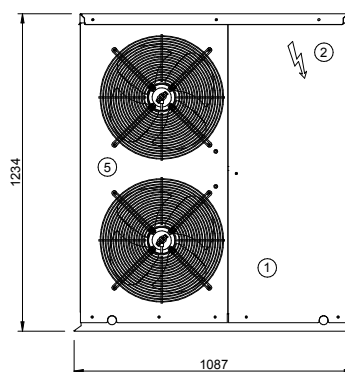
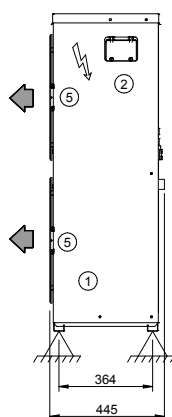
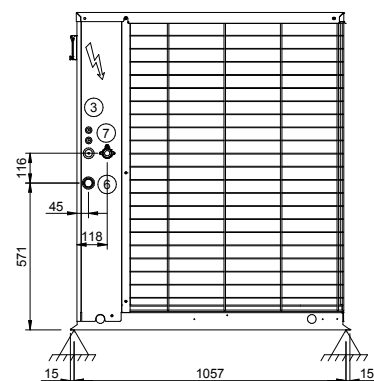
| Model | 21 | 31 | 41 |
|--------------------------------|------|------|------|
| | [kg] | [kg] | [kg] |
| Operating weight ¹⁾ | 112 | 116 | 124 |
| Shipping weight ¹⁾ | 114 | 118 | 126 |



Keep air outlet free

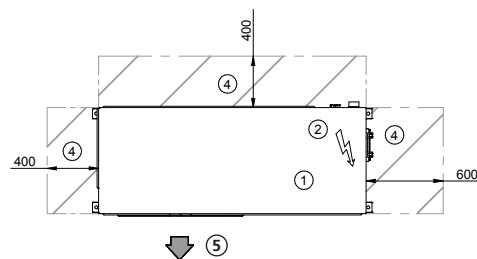
Technical Data KaClima AO

Model 051–071



- ① Cooling generation
- ② Electrical control box
- ③ Cable entry
- ④ Air inlet / service opening
- ⑤ Air outlet
- ⑥ 1" water inlet
- ⑦ 1" water outlet

| Model | 51 | 71 |
|--------------------------------|------|------|
| | [kg] | [kg] |
| Operating weight ¹⁾ | 170 | 175 |
| Shipping weight ¹⁾ | 172 | 177 |



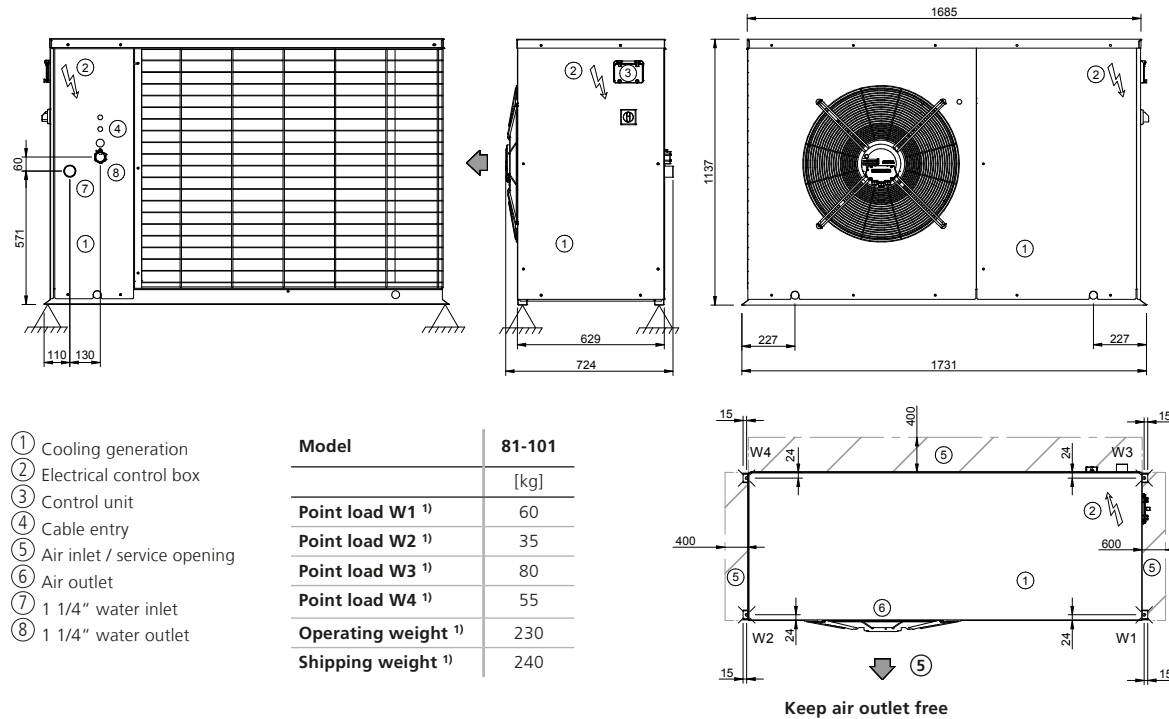
Keep air outlet free

¹⁾ Weight indications without optional accessories!

Technical Data KaClima AO

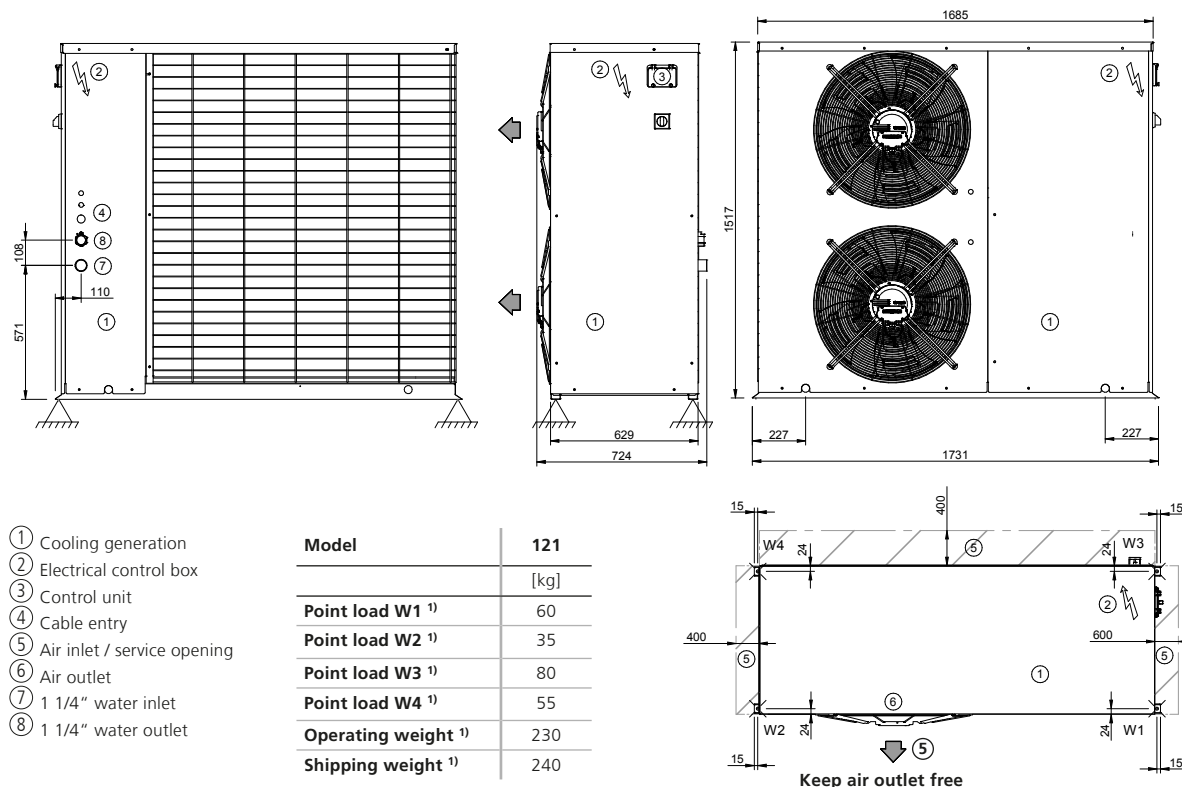
Model 081-101

Technical drawings (all dimensions in mm)



Technical Data KaClima AO

Model 121



¹⁾ Weight indications without optional accessories!

3.50 KaClima

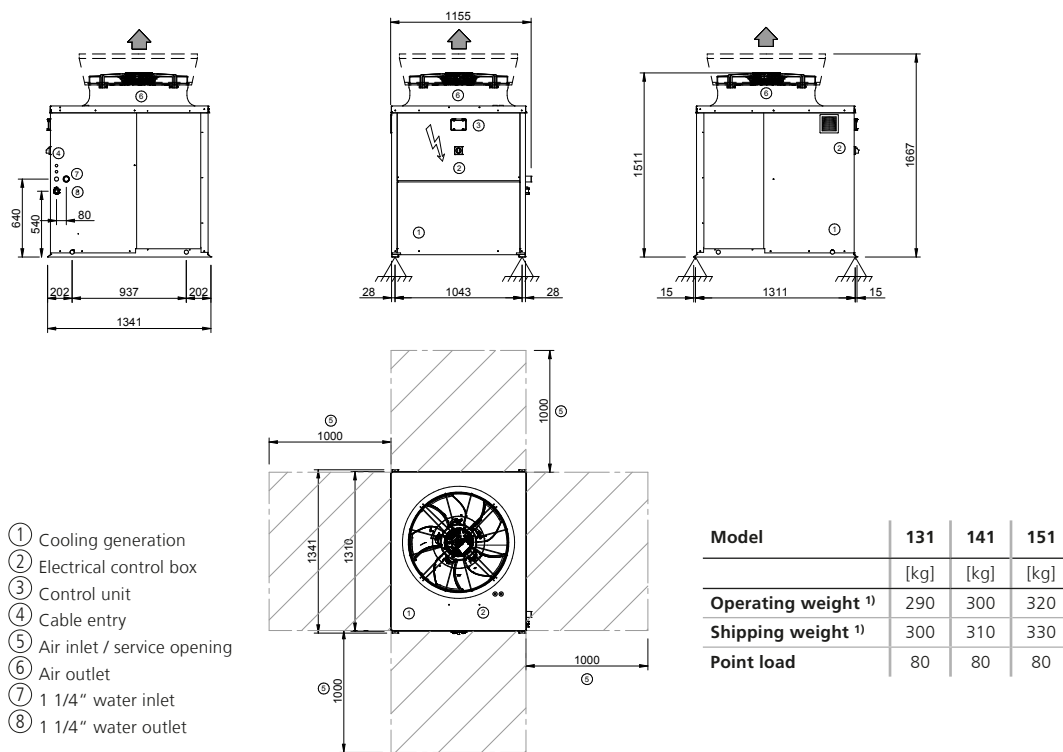
Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

Technical Data KaClima AO

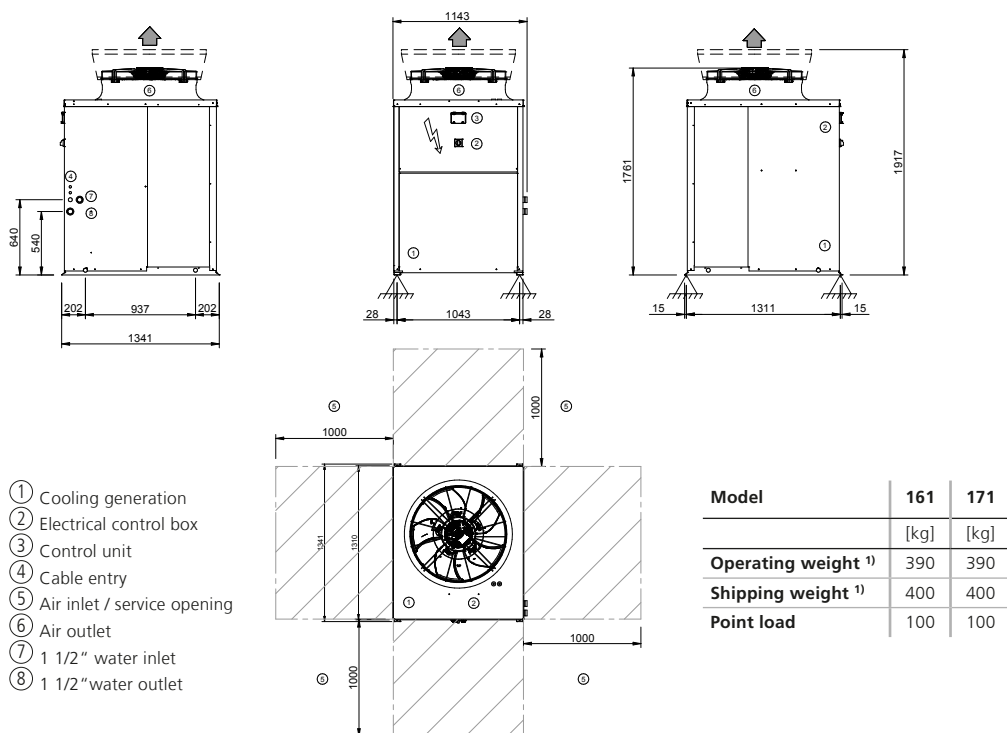
Model 131–151

Technical drawings (all dimensions in mm)



Technical Data KaClima AO

Model 161–171



¹⁾ Weight indications without optional accessories!

KaClima 3.50

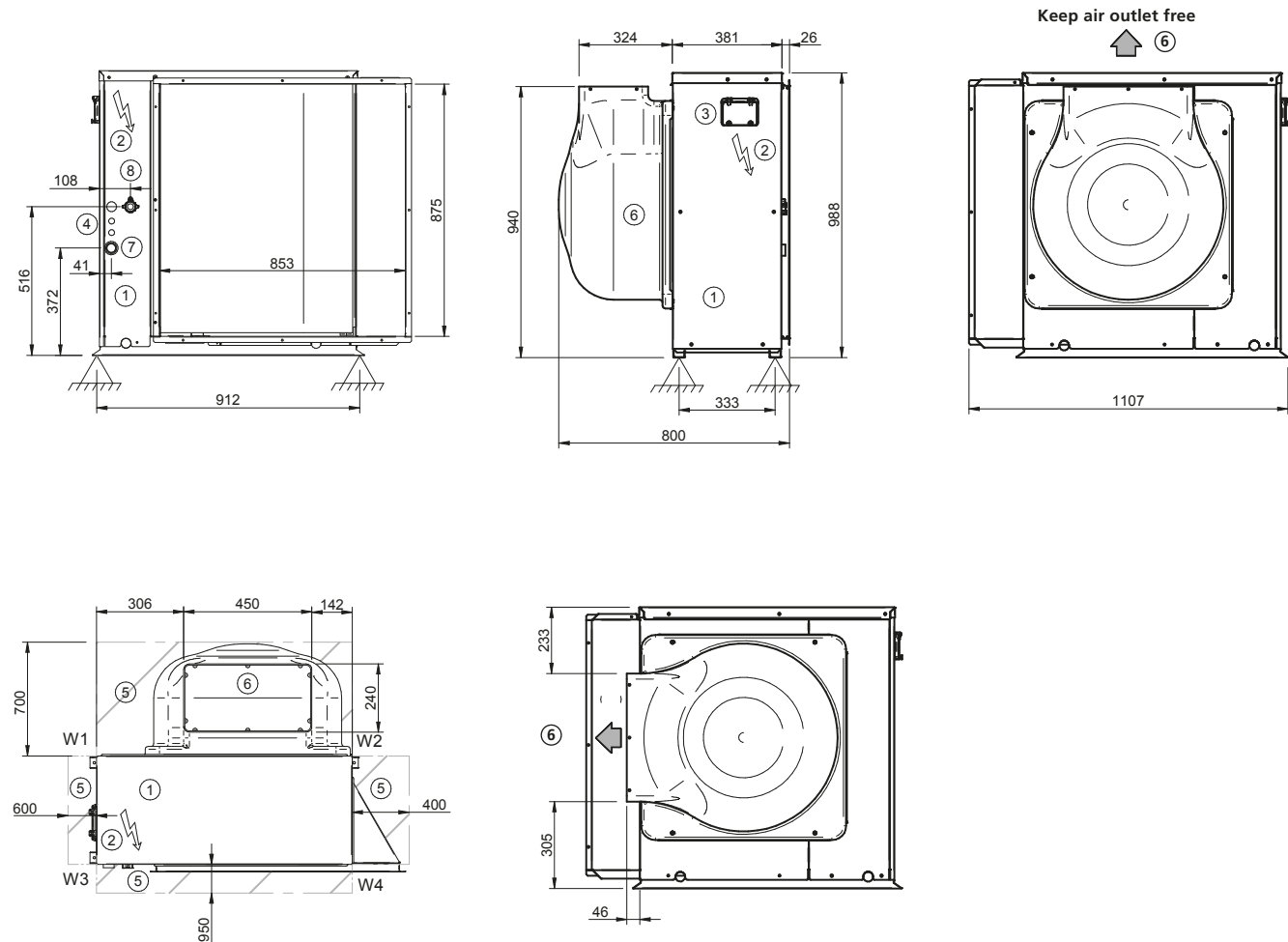
Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

Technical Data KaClima AI

Model 021-041

Technical drawings (all dimensions in mm)



- ① Cooling generation
- ② Electrical control box
- ③ Control unit
- ④ Cable entry
- ⑤ Air inlet / service opening
- ⑥ Air outlet
- ⑦ 1" water inlet
- ⑧ 1" water outlet

| Model | 21-24 |
|--------------------------------|-------|
| | [kg] |
| Point load W1 ¹⁾ | 24 |
| Point load W2 ¹⁾ | 38,2 |
| Point load W3 ¹⁾ | 39 |
| Point load W4 ¹⁾ | 23 |
| Operating weight ¹⁾ | 134,2 |
| Shipping weight ¹⁾ | 136,5 |

¹⁾ Weight indications without optional accessories!

3.50 KaClima

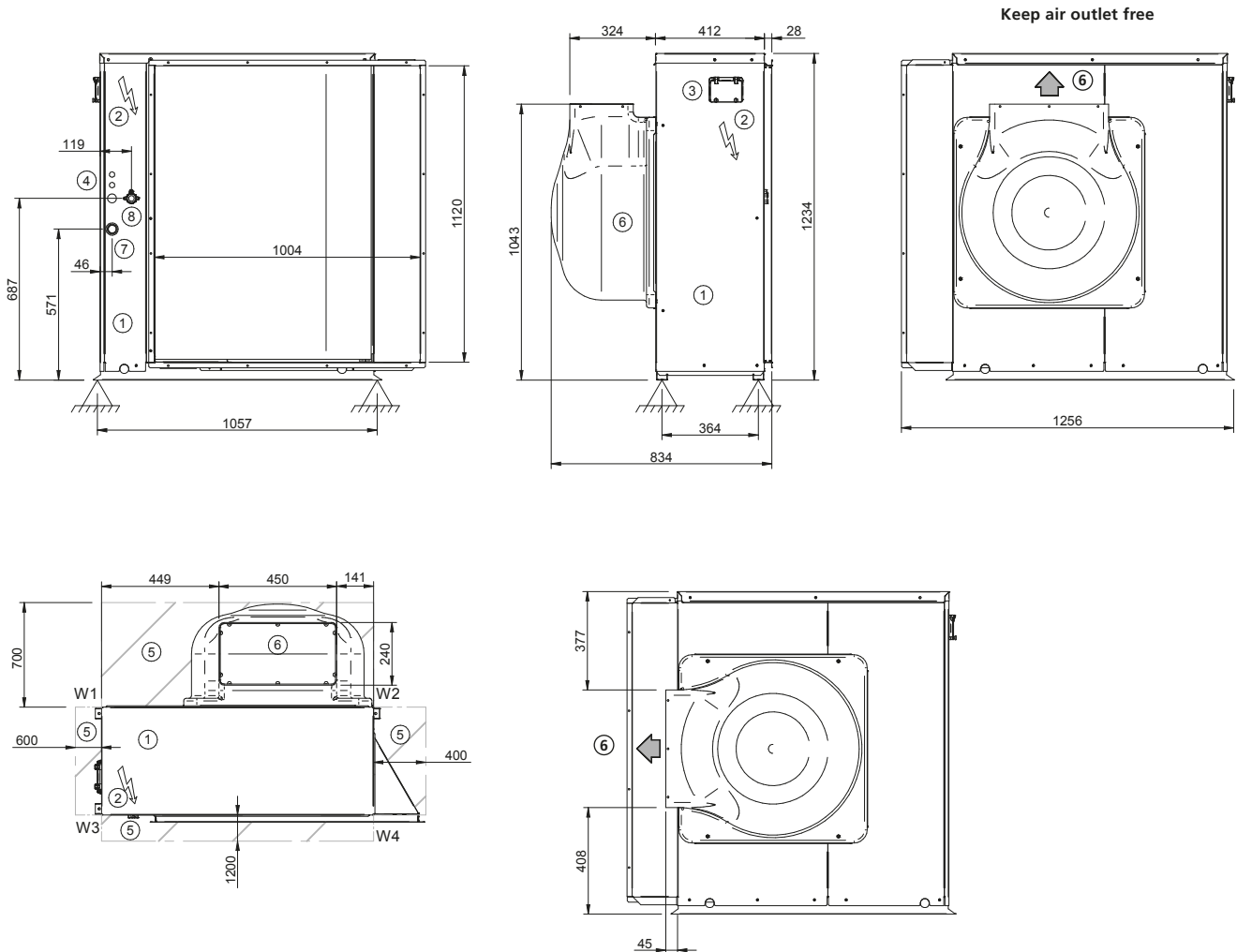
Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

Technical Data KaClima AI

Model 051–071

Technical drawings (all dimensions in mm)



- ① Cooling generation
- ② Electrical control box
- ③ Control unit
- ④ Cable entry
- ⑤ Air inlet / service opening
- ⑥ Air outlet
- ⑦ 1" water inlet
- ⑧ 1" water outlet

| Model | 51-71 |
|--------------------------------|-------|
| | [kg] |
| Point load W1 ¹⁾ | 51 |
| Point load W2 ¹⁾ | 45,4 |
| Point load W3 ¹⁾ | 54 |
| Point load W4 ¹⁾ | 29 |
| Operating weight ¹⁾ | 179,4 |
| Shipping weight ¹⁾ | 183 |

¹⁾ Weight indications without optional accessories!

KaClima 3.50

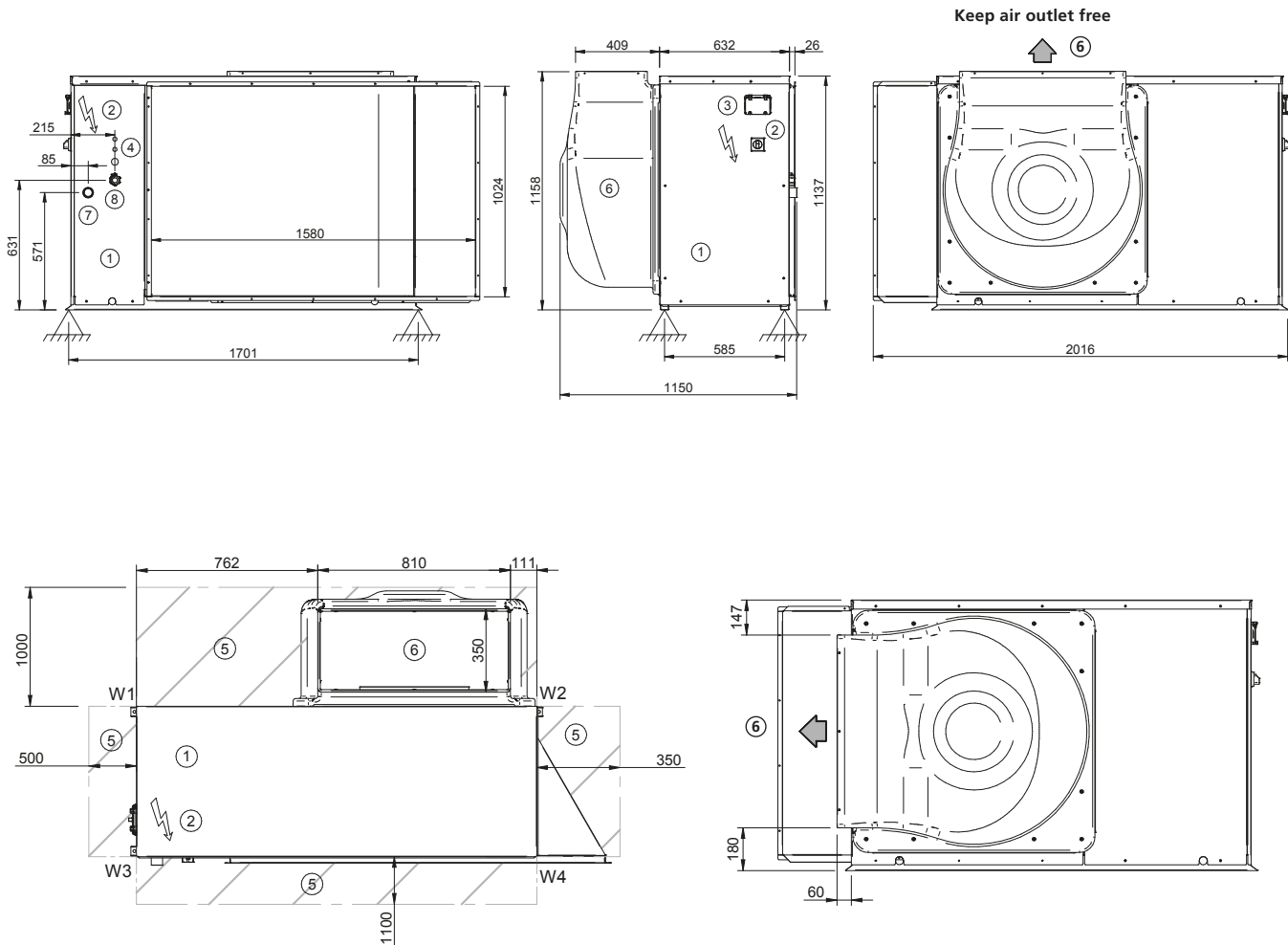
Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

Technical Data KaClima AI

Model 081 – 101

Technical drawings (all dimensions in mm)



- ① Cooling generation
- ② Electrical control box
- ③ Control unit
- ④ Cable entry
- ⑤ Air inlet / service opening
- ⑥ Air outlet
- ⑦ 1 1/4" water inlet
- ⑧ 1 1/4" water outlet

| Model | 81-101 |
|--------------------------------|--------|
| | [kg] |
| Point load W1 ¹⁾ | 75 |
| Point load W2 ¹⁾ | 66 |
| Point load W3 ¹⁾ | 67,5 |
| Point load W4 ¹⁾ | 37,5 |
| Operating weight ¹⁾ | 246 |
| Shipping weight ¹⁾ | 250 |

¹⁾ Weight indications without optional accessories!

3.50 KaClima

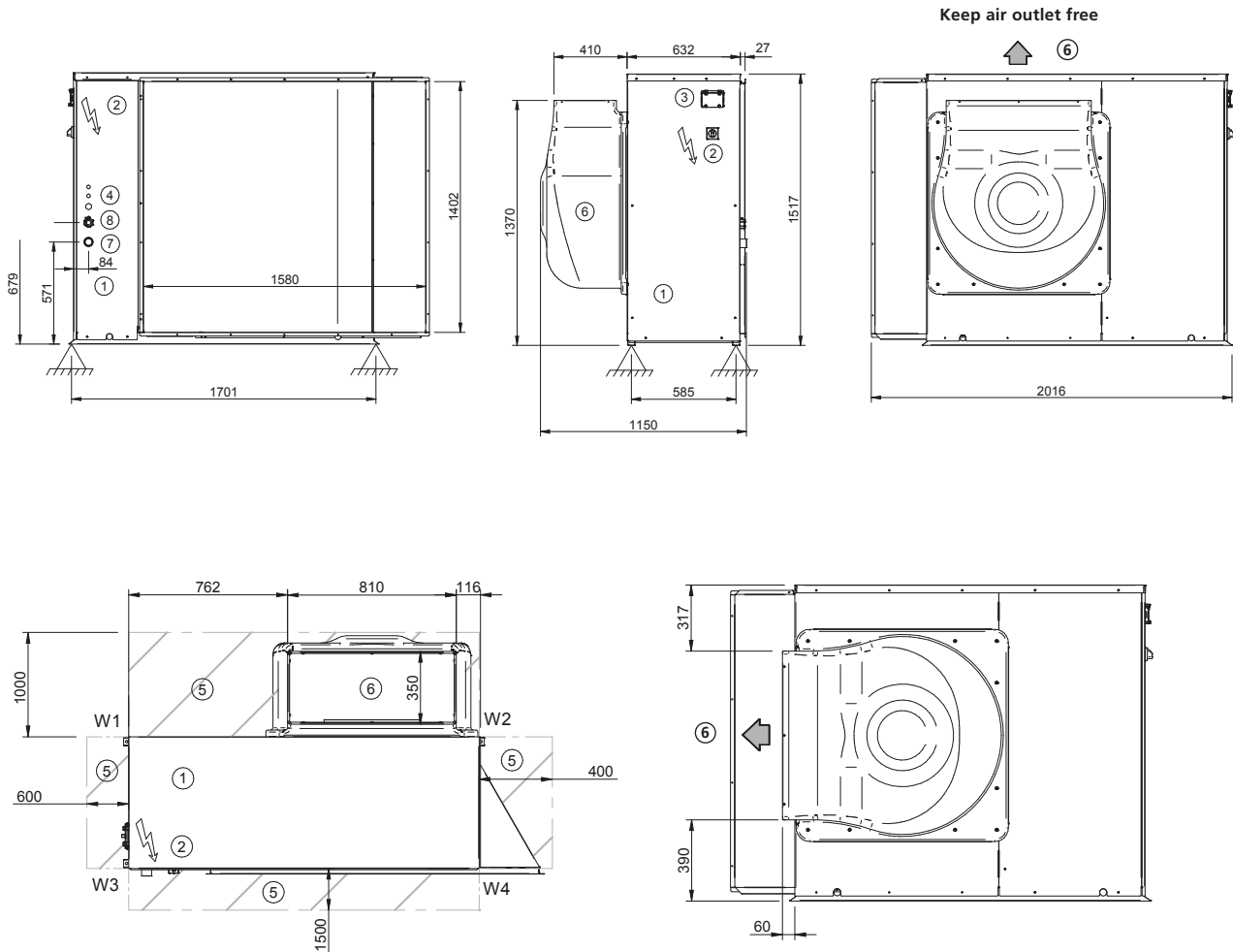
Compact air-chilled unit for environmentally-friendly air conditioning

Installation and operating instructions

Technical Data KaClima AI

Model 121 – 141

Technical drawings (all dimensions in mm)



- ① Cooling generation
- ② Electrical control box
- ③ Control unit
- ④ Cable entry
- ⑤ Air inlet / service opening
- ⑥ Air outlet
- ⑦ 1 1/4" water inlet
- ⑧ 1 1/4" water outlet

| Model | 121 |
|--------------------------------|------|
| | [kg] |
| Point load W1 ¹⁾ | 82 |
| Point load W2 ¹⁾ | 86 |
| Point load W3 ¹⁾ | 83 |
| Point load W4 ¹⁾ | 58 |
| Operating weight ¹⁾ | 309 |
| Shipping weight ¹⁾ | 312 |

¹⁾ Weight indications without optional accessories!

Kampmann.co.uk/kaclima

Kampmann GmbH

Friedrich-Ebert-Str. 128 - 130
49811 Lingen (Ems)
Germany

T +49 591 7108-0
F +49 591 7108-300
E info@kampmann.de
W Kampmann.de

Kampmann UK Ltd.

Dial House, Govett Avenue
Shepperton, Middlesex, TW17 8AG
Great Britain

T +44 (0)1932 228592
F +44 (0)1932 228949
E info@kampmann.co.uk
W Kampmann.co.uk