MASTER® CLIMATE SOLUTIONS

EN

# AC 24

Installation manual

Rev. 1.0



EN

Dantherm®
CONTROL YOUR CLIMATE

CE

# Declaration of Conformity

Dehumidification

---

Dantherm S.p.A
Marienlystvej 65
DK - 7800 Skive

Tel.: +45 96 14 37 00
Fax: +45 96 14 38 00

## Declaration of following product:

Product name: **AC 24**

Product no.: 323043

The product is in conformity with the following directives:

| | |
|---|---|
| 2006/42/EC | Machinery Directive |
| 2014/35/EU | Low Voltage Directive |
| 2014/30/EU | EMC Directive |
| 2014/68/EU | Pressure Equipment Directive |
| 2011/65/EU | RoHS Directive |
| 1907/2006/EC | REACH Regulation |

- and is manufactured in conformity with the following harmonised standards:

| | |
|---|---|
| DS/EN ISO 12100-1:2011 | Safety of machinery - General principles for design |
| EN 60204-1 | Safety of machinery - Electrical equipment of machines - Part 1 |
| EN 60 335-1:2012 | Household and similar electrical appliances - Safety - Part 1: |
| EN 60 335-2-40:2003 | Household and similar electrical appliances - Safety - Part 2-40 |
| DS/EN 61000-6-2:2005 | Electromagnetic compatibility (EMC) - Part 6 |
| DS/EN 61000-6-3:2007 | Electromagnetic compatibility (EMC) - Part 6 |

Skive, 20/08-2018

Product manager

Lars Brodersen
VP Sales

# Overview

**Introduction**

This is the service manual for the Master AC-24 unit.
The below table of contents gives an overview of the main sections.

This manual is for the unit AC 24

| Dantherm Number | Code | NSN |
|---|---|---|
| 323043 | AC-24-B-305-R9010 * | 4120-22-631-1514 |

**) The code is specified on the data plate, which is placed on the control panel.*
*See the explanation of the syntax code on page 8*

**WARNING**



It is the responsibility of the operator to read and understand this service manual and other information provided and to use the correct operating procedures.
Air conditioners should only be operated by qualified (trained) personnel and the repair of the cooling circuit and electrical system is to be done only by skilled service people. Failure to do so can result in personal injury or equipment damage.
Read the entire manual before the initial start-up of the air conditioner. It is important to know the correct operating procedures for the air conditioner and all safety precautions to prevent the possibility of property damage and/or personal injury.

**Table of main topics**

This service manual covers the following main topics:


| Topic | See page: |
|---|---|
| General information | 4 |
| Table of content | 5 |
| Product description | 6 |
| User's guide | 20 |
| Service guide | 29 |
| Technical information | 45 |

## General information

| | |
|---|---|
| **Introduction** | This section gives the general information about this service manual and about the unit. |
| **Target group** | • Users of the unit<br>• Technicians who install and maintain the unit |
| **Part number** | Part number of this service manual is 097881 |
| **Copyright** | Copying of this service manual, or part of it, is forbidden without prior written permission from Master. |
| **Reservations** | Master reserves the right to make changes and improvements to the product and the service manual at any time without prior notice or obligation. |
| **Recycling** | The unit is designed to last for many years. When the time comes for the unit to be recycled, the unit should be recycled according to national regulation to protect the environment. |
| **Quality Management System** | Dantherm S.p.A has implemented a Quality Management System according to EN/ISO9001. The system is supplemented with an Environmental Management System according to EN/ISO14001. Both systems are approved by third party and certified, by Bureau Veritas Certification. During 2005 & 2006 the Management Systems were supplemented with business routines with regards to safety. These routines meet the requirements stated in the international standard for Safety Management Systems OHSAS18001. |

# Table of contents

## Table of content


| Product description | See page |
|---|---|
| General description | 8 |
| Transport of the unit | 8 |
| Description of parts | 8 |
| Syntax | 9 |
| Description of the cooling system | 10 |
| Description of the control board | 15 |
| Description of room thermostat | 17 |
| Description of the high and low pressure switch function | 18 |
| Functional Description | 19 |
| **User´s guide** | |
| Preparations | 21 |
| Setup | 22 |
| Recommended camp configuration | 23 |
| Transport of the unit | 26 |
| Starting up and shutting down the air conditioner | 27 |
| Reset of thermo relay and control circuit fuse | 28 |
| **Service guide** | |
| Preventive maintenance | 30 |
| Spare parts | 33 |
| Fault finding guide | 41 |
| Service agreement | 43 |
| **Technical information** | |
| Technical data | 45 |
| Dimensions | 46 |
| Wiring diagram, AC 24 | 47 |
| Wiring diagram reference | 49 |

# Product description

**Introduction**

This section will give you a description of the AC 24 and its functionality.

**Content**

The section covers the following topics:


| Topic | See page |
|---|---|
| General description | 8 |
| Transport of the unit | 8 |
| Description of parts | 8 |
| Syntax | 9 |
| Description of the cooling system | 10 |
| Description of the control board | 15 |
| Description of room thermostat | 17 |
| Description of the high and low pressure switch function | 18 |
| Functional Description | 19 |

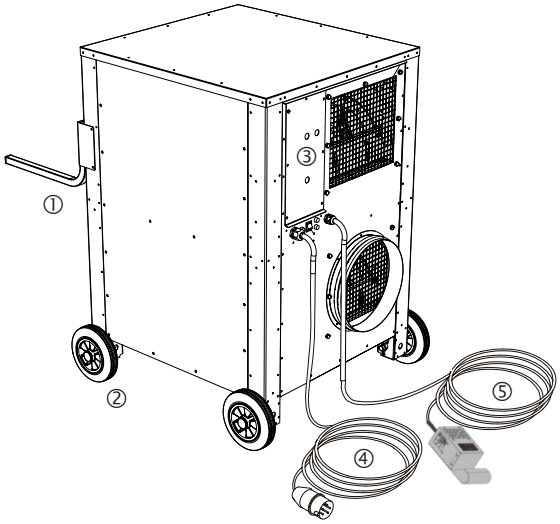
# General description

| | |
|---|---|
| **Introduction** | This section describes the unit as a whole.<br>The following sections describe the different parts of the unit.. |
| **General** | The AC 24 is a portable air conditioner that is made of high quality materials and the production process is subject to constant quality checking. The instructions in this service manual have been prepared to ensure that, when followed, this air condi-tioner will provide long and efficient service. |
| **Typical applications** | The AC 24 is designed primarily to supply cooled air to tents and other types of temporary portable shelters. |
| **Functionality** | The function of the unit is based on a cooling circuit and two powerful centrifugal fans. The lower section contains the evaporator and the evaporator fan which draws warm ambient or recirculated air through the cold evaporator coil and blows out the cooled air through the discharge.<br>The upper section of the unit houses the condenser fan and the condenser coil which returns the heat taken from the cooled air to the surrounding atmosphere. |
| **WARNING** | Do not cover, block or obstruct the air openings. This may cause malfunction!<br>Do not operate the product outside the specified temperature range.<br>See section "Technical data". |

## General description, *continued*

**Illustration**

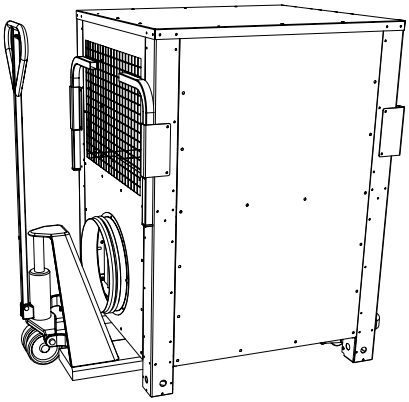
This illustration gives an overview of the unit.




**Parts**

| Item | Description |
|---|---|
| 1 | Handlebars for transport ( Accessories) |
| 2 | Wheels for easy field mobility of the unit (Accessories) |
| 3 | Control panel with function switch and lamps |
| 4 | Mains cable |
| 5 | Room thermostat |

**Transport of the unit.**





## Syntax

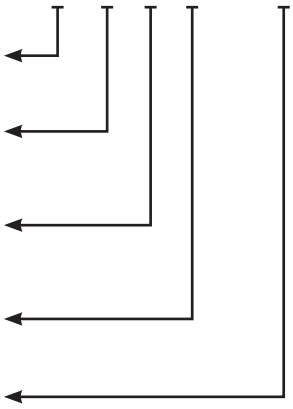
**Introduction**

All products are named according to a syntax giving information about the specific unit configuration.

**Example**

This example is not necessarily related to the specific unit this manual describes:

AC_24_B_305_R9010



| | | |
|---|---|---|
| AC | Air conditioner | |
| 24 | Nominal performance | 24.000BTU/h |
| B | 1ph; 230VAC; 50Hz | |
| C | 1ph; 230VAC; 60Hz | |
| 305 | Duct connection size - mm | |
| R | RAL Color code | |

# Description of parts

**Introduction**

This section gives a description of the following parts of the AC 24:

- Cabinet
- Air filters
- Heating coil
- Fans
- Mains cable
- Air openings

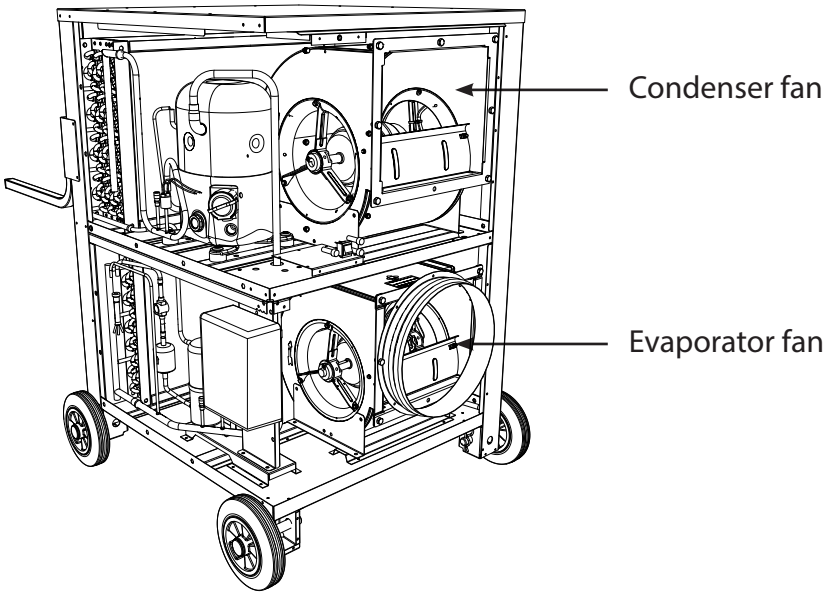
The following sections in this chapter give separate detailed descriptions of the cooling circuit, the control board and operation.
For illustration of the single components – please see section "General description"

**Cabinet**

The unit is made of strong construction in sheet metal plates which are galvanized to protect against corrosion.
The outside paint finish is standard white, RAL 9010.
In the middle plate there is a drain outlet for condensate.
On each side of the unit a plate can be removed to make inspection and service possible.
Inside the unit there is a horizontal partition dividing it into an upper and a lower section.

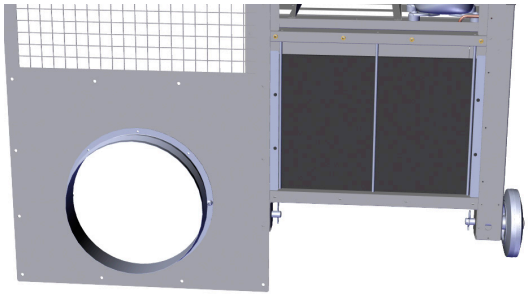
**Fans**

In both upper and lower sections there is a centrifugal fan with a direct-coupled motor.




**Air filters**

The internal airflow enters through a standard washable, easily removable air filter, PPI 15.
The filter is situated behind the return air inlet



The rods keeping the filter in place are accessible through the fan opening without having to remove the cover.

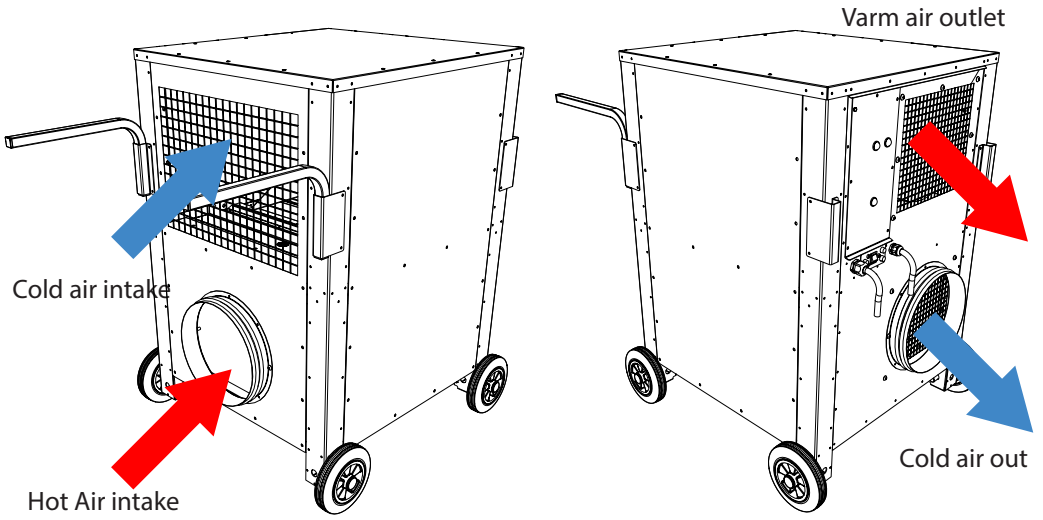
The airflow will be influenced by the resistance in filters, hoses and coils, which must be kept clean to minimize the pressure drop.

## Description of parts, *continued*

**Mains cable**

The unit requires an external electric power source.
The mains cable is 10 m long and normally has a 16 A CEE connector at its end.

**Air openings**



## Description of parts, *continued*

**Air openings, continued**

| inlets/outlets | Purpose |
|---|---|
| Supply air outlet,<br>1 × 315 mm | Air is supplied to the tent/shelter through these openings.<br>Flexible air hose(s) will be connected here |
| Return air inlet,<br>1 × 315 mm | Air is drawn into the unit through this/these opening(s). With connected air hose(s) the unit is supplied with recirculated return air from the tent/shelter<br>Flexible air hose(s) will be connected here |
| Ambient air inlet | Ambient air is ducted in through the condenser after entering the external removable filter |
| Exhaust air outlet | Condenser exhaust air leaves the air conditioner<br>through these openings |

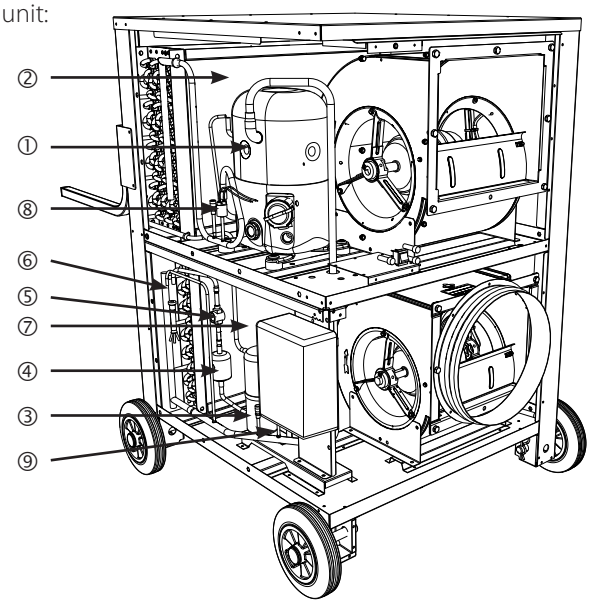
**WARNING**

Do not cover or obstruct air openings!

# Description of the cooling system

**Illustration**

This drawing illustrates the different parts of the cooling circuit and where they are situated in the AC 24 unit:




**Parts and their function**

This table gives an overview and short description of each part shown above and on the next page:

| | | |
|---|---|---|
| ① | Compressor | Circulates the fluid in the cooling system |
| ② | Condenser | Emits the heat generated in the tent/room to the outside air |
| ③ | Receiver | Accumulates surplus coolant in connection with the cooling process |
| ④ | Dry filter | Absorbs moisture and impurities in the cooling circuit |
| ⑤ | Sight glass | Enables a visual check of the coolant |
| ⑥ | Expansion valve | Supplies the correct quantity of coolant into the evaporator. It also reduces the pressure |
| ⑦ | Evaporator | Absorbs heat from the shelter by cooling down the circulated air |
| ⑧ | HP pressure switch | Ensures that the compressor does not operate at too high pressure |
| ⑨ | LP Pressure switch | Ensures that the compressor does not operate at too low pressure |

**Refrigerant**

The cooling circuit is hermetically sealed and filled with refrigerant (R134a).

**Liquid flow**

From the receiver ③ liquid refrigerant will flow under high pressure through the liquid line dryer and the sight glass to the thermostatic expansion valve which releases the pressure. Here the refrigerant is led into the evaporator ⑦ where it evaporates under low pressure and low temperatures.
The evaporated refrigerant is drawn back to the hermetic compressor and compressed. From the compressor the refrigerant vapour goes to the condenser, where it is cooled to below the dew point and condensed to liquid refrigerant.

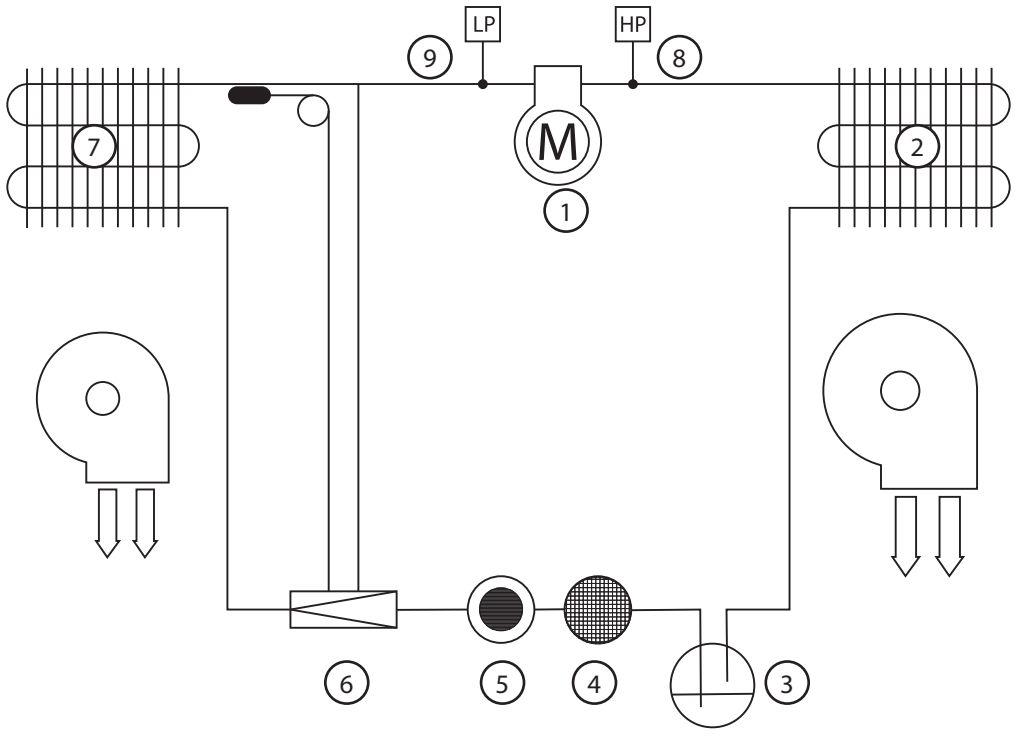
## Description of the cooling system, *continued*

**Description**

Both evaporator and condenser are heat exchangers with copper tubes and aluminium coated fins. By the cooling of the evaporator air stream heat is adapted to the cooling circuit and released in the condenser together with the electric energy consumption of the compressor.
At room temperatures below 20 °C, where cooling is not normally required, the humidity in the airflow will form ice on the evaporator. To prevent this, the LP pressure switch cuts out at low pressure in the circuit. If the room temperature is too low, the LP activation will cause the compressor to start and stop frequently. This may damage the compressor and must be avoided at any time by not operating the product outside the specified temperature range. See section "Technical data", page 54. At high ambient temperatures (above 55 °C) the cooling of the condenser airflow will be too poor, and the high pressure results in cut out of the HP pressure switch.
The yellow lamp on the front panel will illuminate if the HP/LP pressure switch cuts out. The HP/LP pressure switch automatically resets after a few minutes and the lamp will switch off again. If the lamp continues to illuminate, please refer to the "Fault finding guide", page 50.

**Schematic view**

This schematic drawing illustrates the different parts of the cooling circuit.




| | | | |
|---|---|---|---|
| ① | Compressor | ⑥ | Expansion valve |
| ② | Condenser | ⑦ | Evaporator |
| ③ | Receiver | ⑧ | HP pressure switch |
| ④ | Dry filter | ⑨ | LP pressure switch |
| ⑤ | Sight glass | | |

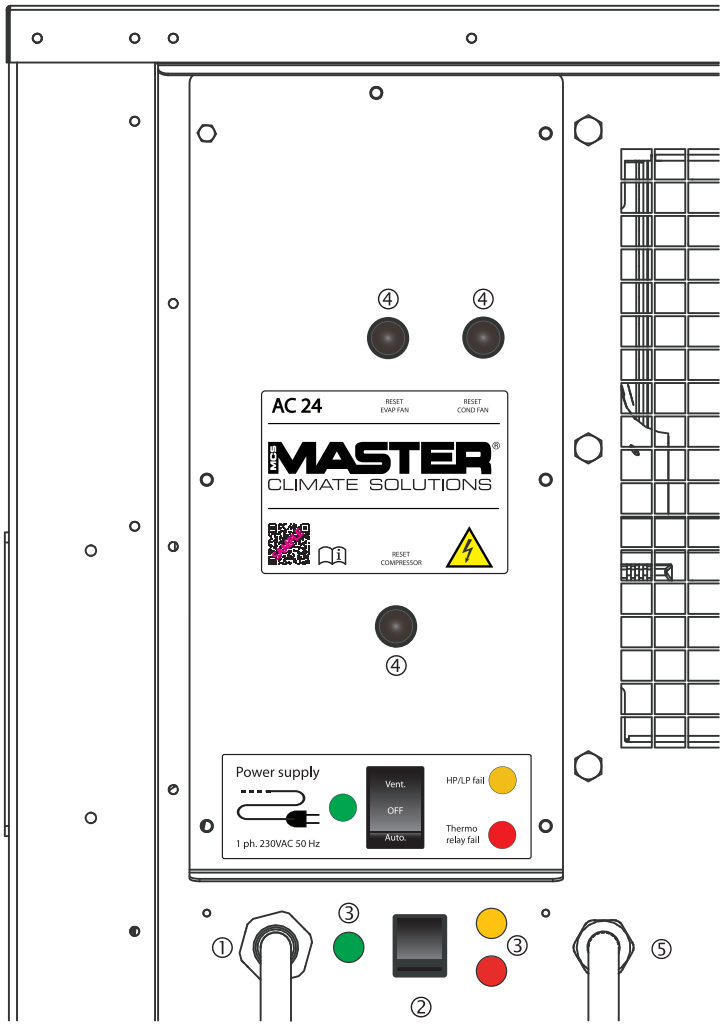
# Description of the control board

**Introduction**

This section gives a description of the control board.
A description of how to start up, for example, is found in the relevant sections.
The control panel on the front contains the controls required for normal operation.

**Illustration**

This drawing illustrates the control board of the AC 24:



## Description of the control board, *continued*

**Part/function**

This table gives an overview of each part of the control panel in fig. 6:

| No | Part | Function |
|---|---|---|
| ① | Electric connection | Mains cable with a 16 A CEE connector at the end |
| ② | Function switch | The function switch selects the operating mode and has three positions: VENT, OFF and AUTO |
| ③ | Indicator lamps | On the operator panel there are three control lamps, indicating the following: |
| ④ | Reset button<br>•Compressor<br>•Evaporator fan<br>•Condenser fan | If the failure indicator (Thermo relay ③) illuminates, the thermo relay will have to be reset on one of the reset buttons.<br>If it is not clear which one of the thermo relays has disconnected, push the reset buttons one by one.<br>See also "Fault finding guide" |
| ⑤ | Thermostat connection | Cable for the remote thermostat |

| Color | Unit | Description |
|---|---|---|
| Green | Power | Shows that power has been connected to the unit |
| Red | Thermo relay fail | Illuminates if the compressor, evaporator fan or condenser fan thermo relay has cut off because of a too high running current.<br>Please also refer to the "Fault finding guide" |
| Yellow | HP/LP | Illuminates when the built-in HP/LP pressure switch cuts out and stops the com-pressor because of too high pressure (HP) or low pressure (LP) in the cooling circuit. The HP/LP pressure switch automatically resets after a few minutes. Do not let the product operate with HP/LP switching ON and OFF.<br>If the lamp continues to illuminate, please refer to the "Fault finding guide" |

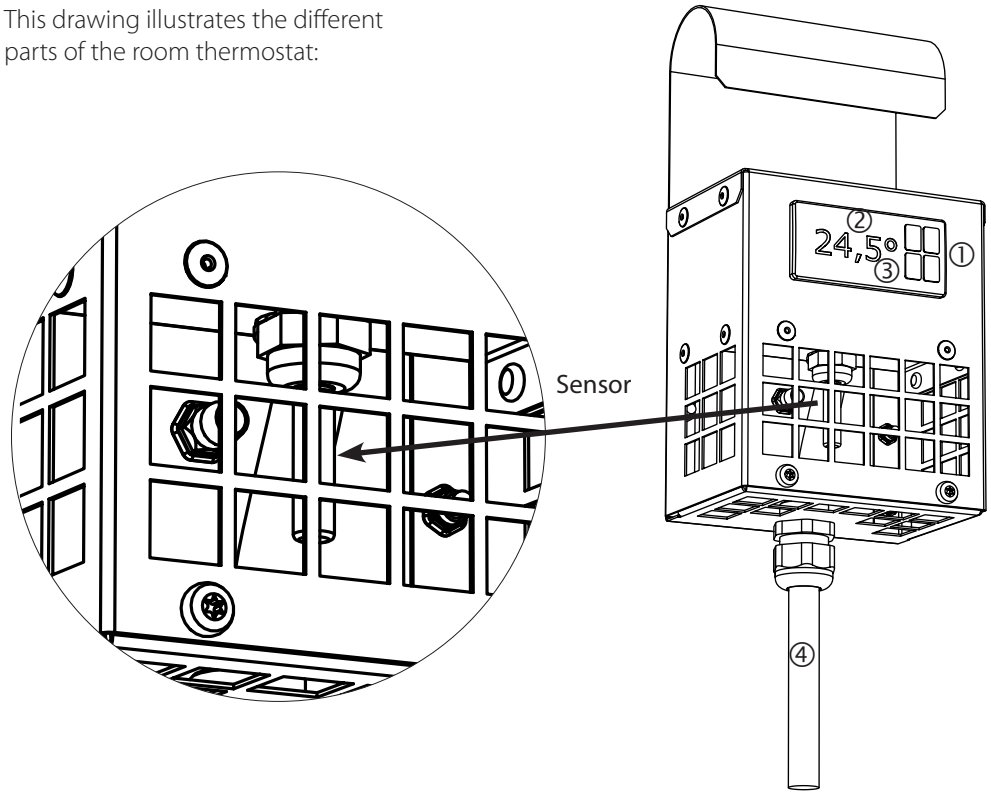
# Description of room thermostat

**Introduction**

This section gives a detailed description of the room thermostat.

**Illustration**

This drawing illustrates the different parts of the room thermostat:

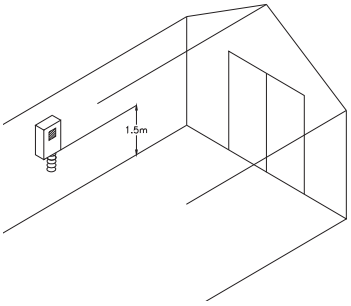



**Parts and their function**

| No | Part | Function |
|---|---|---|
| ① | Knob | Setting of the temperature |
| ② | Scale | Shows the temperature setting |
| ③ | Scale | Shows the differential temperature setting |
| ④ | 14 m cable | - |

**Location**

The thermostat must be placed inside the tent.
See more about the placement in section "Set-up"



# Description of the high and low pressure switch function

**Introduction**

This topic describes the HP/LP function.

**System protection**

The cooling system is protected by pressure switches. If the pressure falls outside of the normal operating range, the air conditioner compressor is automatically switched off. This is to prevent component damage. If the pressure is too high or too low, the unit is switched off. The malfunction must normally be identified by a trained technician and corrected.

**Reset**

The HP/LP pressure switch automatically resets after a few minutes.
If the lamp continues to illuminate, please refer to the "Fault finding guide".

**LP (low pressure)**

The cooling system is protected by a low-pressure switch (LP switch). The switch is set at 1 bar and will automatically reset at 2.5 bar. The safety function cuts off the com-pressor.

The LP function will be activated if:

- The cooling system loses refrigerant
- The internal temperature is so low that the low pressure gets below set point (1 bar).

Do not operate the product with frequent operating LP function.

- The evaporator is blocked or does get not sufficient air flow

**HP (high pressure)**

The cooling system is protected by a high-pressure switch (HP switch). The switch is set at 25 bar and will automatically reset at 18 bar. The safety function cuts off the compressor.

The HP function will be activated if:

- The outdoor temperature is too high
- The condenser is blocked or does not have sufficient airflow

## Functional description

| | |
|---|---|
| **VENT**<br>**Ventilation-only operation** | With the function switch in this position the evaporator fan will operate continuously and the cooling unit, heating coil (if installed) and condenser fan will be turned off.<br>This mode can be used to bring in fresh outdoor air or to recirculate the indoor air - even when cooling or heating (if installed) is not needed. |
| **AUT. or AUTO**<br>**Room thermostat operation, cooling/heating (if installed)** | With the function switch in this position, the unit will operate according to the room thermostat settings.<br>On the AC 24 with heating coils the room thermostat has a flip switch with the following positions:<br>• Cool<br>With the flip switch in the cool position, the unit will cool as long as the thermostat senses a temperature higher than the set point. When the temperature reaches the set point it cuts off the compressor and fans. |
| **OFF or 0** | OFF<br>With the function switch in this position all functions will stop immediately and only the illuminated green lamp will indicate that the power is still on if the main switch is on. |

# User's guide

**Introduction**

This section describes how to utilise the different functions.

**WARNING**

Do not try to restart the compressor several times within a short period.
This will make the compressor overheat and may damage it. The internal compressor thermostatic protection may also cut out.
Operating the product outside the temperature range specified in the technical data will cause the cooling system to start frequently.
Do not operate the product at temperatures outside the specifications.

**Warning**

If forklift (MHE) is to be used it is imperative that the tine is fully engaged, thereby supporting the entire unit. Rough and incorrect handling can cause damage and loss of function.

**Contents**

This User`s guide contains the following topics:


| Topic | See page |
|---|---|
| Preparations | 21 |
| Setup | 22 |
| Recommended camp configuration | 23 |
| Transport of the unit | 26 |
| Starting up and shutting down the air conditioner | 27 |
| Reset of thermo relay and control circuit fuse | 28 |

## Preparations

**Location**

Follow these conditions when siting the air conditioner:

| Conditions |
|---|
| Place in the shade as close as possible to the tent/shelter that needs to be ventilated |
| Place the air supply ducts in both ends of the tent/shelter |
| Allow sufficient space around the air conditioner for operating and servicing access |
| Avoid sharp bends or kinking when locating air supply ducts in order to avoid disrup-tion of the airflow (see "Recommended camp configuration", page 23) |
| Keep any source of engine exhaust fumes (vehicles/generators etc.) away from air in-takes |

**Air distributing channels**

It is imperative that the cooled air is distributed equally inside the tent/shelter. For that purpose the use of air distributing hoses are recommended (accessory).

**Power**

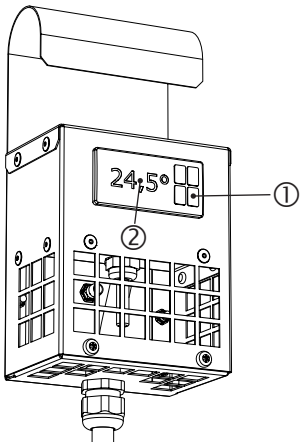
The air conditioner requires 1 x 230 V AC/50 Hz.
The mains cable is 10 m long and has a 16 A CEE connector at the end.

**Note**

The maximum combined length of flexible air hoses should not exceed 9-10 m.

# Setup

**Procedure**

| Step | Action |
|---|---|
| 1 | Find a suitable location for the air conditioner as described on previous page. |
| 2 | Supply ducts.<br>Connect the flexible insulated air hoses to the evaporator discharge openings and insert the opposite end of the hose to the tent. If there are any internal distribution hoses in the tent, these can be connected too |
| 3 | Return ducts.<br>A return air hose may be connected from the shelter to the evaporator air inlet. As long as the return air is colder than the ambient air this will save cooling capacity |
| 4 | Place the room thermostat inside the tent/shelter at the optimal location<br>• Avoid sunlight<br>• Avoid direct cold air from the air conditioner ducts<br>• 1.5 m above the floor<br>• Near the return air end of the tent/room |
| 5 | • Set the desired temperature ② in the shelter by pressing the buttons ①on the thermostat. In cooling mode – do not require less than 20ºC which would make the unit operate outside its´ specified limits.<br> |
| 6 | Check that the function switch is set at "0" or „OFF" |
| 7 | Check that the power switch is OFF |
| 8 | Connect the CEE plug to the external power source and switch on |

# Recommended camp configuration

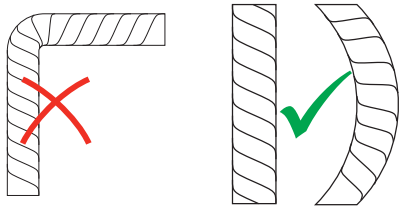
## Introduction

The configuration is an important factor for gaining the highest performance and reliability from the air conditioner including lowest power consumption. A camp can be set up in various ways and still work, but a few important hints will be given in this section.
This section describes the following:

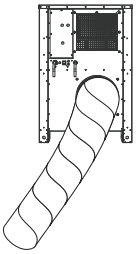
- Ducting
- Solar heat
- Air distribution
- Sand storms
- Air re-circulating
- Doors and openings
- Heat sources
- Surroundings
- Drains

## Ducting

The ducts will introduce a pressure loss every time they are bent. Slight bends are not as critical as tight bends > 45°.

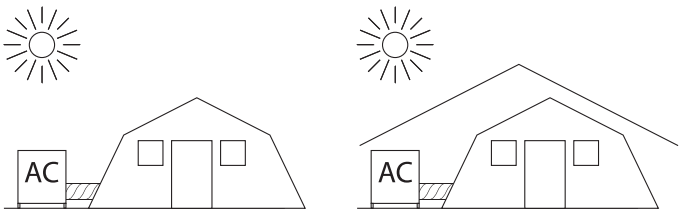


The shorter the ducts the higher performance frmo the air conditioner.
In some cases the tent does not allow for ducting as per the air conditioner design. Be aware that blocking one or two of the duct holes on the air conditioner will reduce the cooling performance significantly.
Use as few ducts as possible. As a rule of thumb expect that each 3 m insulated duct changes the temperature inside the duct by 3-5 °C (6-10 °F).



## Solar heat

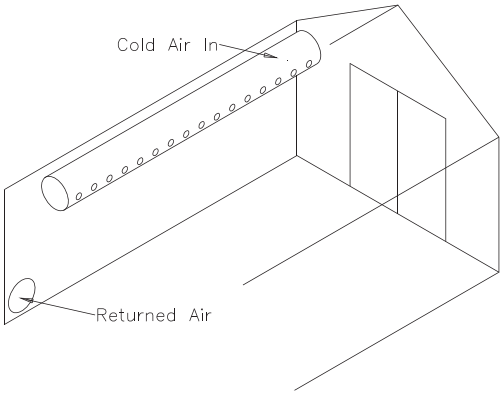
Solar heat gain to shelter surfaces and to duct-/air conditioner reduces the efficiency of the unit. If possible use a sun shield to cover the shelter, the air conditioner, and the associated air ducting. Additional efficiency is gained by using insulated panels/liners in the shelter.



## Recommended camp configuration, *continued*

**Air distribution**

In cases where air distribution plenums are used for distributing the internal cooled air, it can be an advantage if the plenum is located under the roof.
The cold air will slowly fall to ground and be sucked back into the air conditioner.




**Sand storm**

In case of sand storms it is important that the air conditioner is shielded against the sand.
Do not shield to the extent where the air flow will become obstructed.




**Air re-circulating**

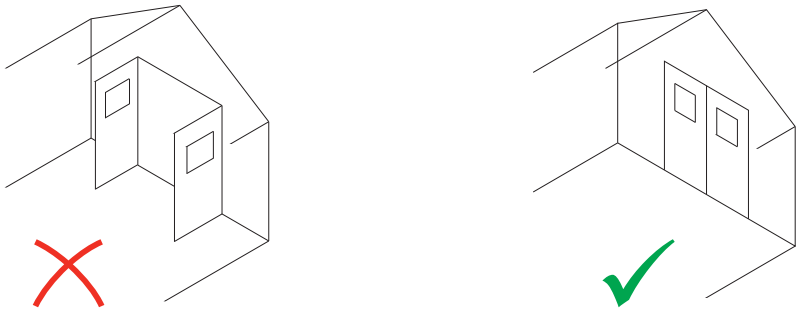
In order to cool down the air most efficiently, the air being introduced to the air conditioner must be as cold as possible. If the room temperature is lower than the am-bient temperature outside, it is most efficient to re-circulate the air from the room. To do so, connect insulated ducts between the tent and the air conditioner internal air in-take.
If the tent temperature is higher than the ambient temperature, it can be an advantage to operate without return ducts. Also be aware of the dust risk and generation of over pressure in the tent.



## Recommended camp configuration, *continued*

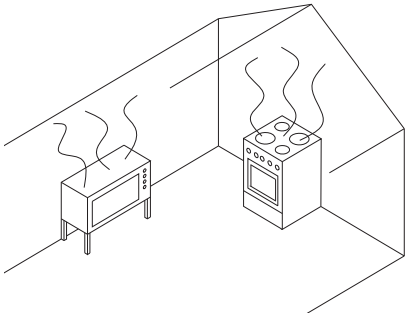
### Doors and openings

In order to achieve best performance it is imperative that doors and openings are kept closed.



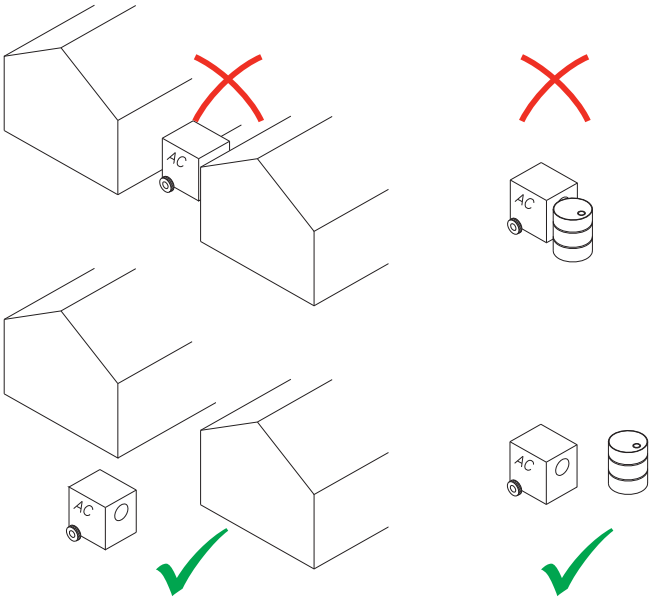
### Heat sources

Heat producing sources will degrade the efficiency of the air conditioner and thus non-essential heat sources should be turned off whenever possible.



### Surroundings

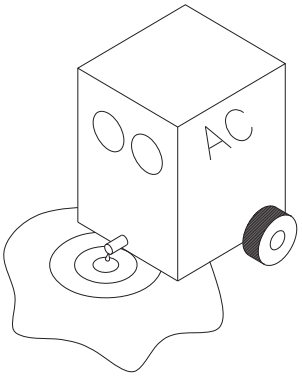
Do not cover, block or obstruct the air path. Make sure that the air conditioner is clear of obstruction on all sides allowing air to be drawn in and exhausted out freely.



## Recommended camp configuration, *continued*

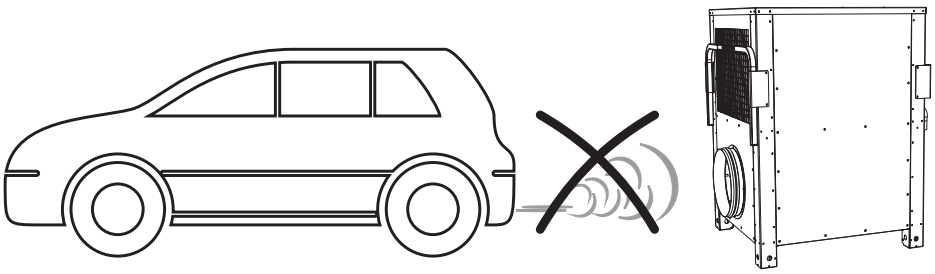
**Drain**

Water draining from the evaporator will saturate the area around the drain outlet. Pay attention to this potential problem and route away condensate if necessary. If possible raise the air conditioner above ground level by use of a pallet or other suitable means.




**WARNING**

Do not park vehicles where exhaust gases can be drawn into the air intake of the AC-24



## Starting up and shutting down the air conditioner

**Start up**

After preparation and set-up the air conditioner is ready for operation.

Turn the function switch to the desired mode (see "Description of the control board", page 14) and the unit will operate according to the "Functional description",

**Fault**

If the unit does not operate it might have been switched off by a safety device:

- HP pressostat: High ambient temperature stopped condenser fan or reduced airflow over the condenser
- LP pressostat: Low return air temperature stopped evaporator fan or reduced airflow over the evaporator
- Evaporator or condenser thermo relay: Running current for fan motor too high
- Compressor thermo relay: running current for compressor too high
- ETA relay: running current for control current too high

Refer to the "Fault finding guide", for possible solutions.

**WARNING**



Do not attempt to repeatedly restart the compressor.
This will cause the compressor to overheat and may damage it.
The internal compressor thermostatic protection may also cut out.

**Shutting down**

Follow this procedure to shut down the air conditioner from any mode of operation:

1. Turn the function switch to OFF/0
   Result: All operations will stop immediately
2. Disconnect the connector from the power source if any servicing has to be performed.
   If the air conditioner is not to be re-used for a long period, continue shutting down as follows:
3. Disconnect the air ducts and stow them in their compression sacks.

# Reset of thermo relay and control circuit fuse

**Introduction**

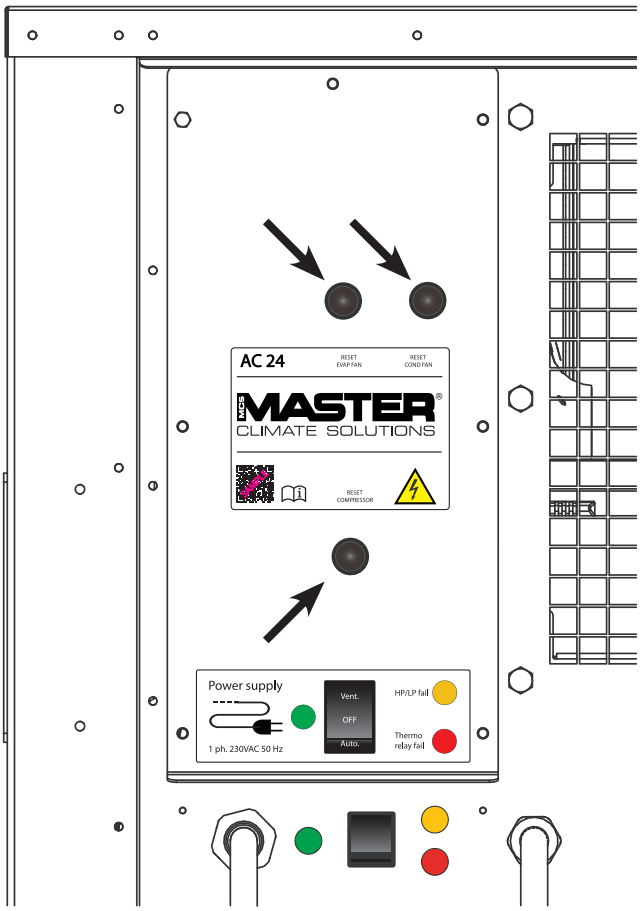
The procedures below describe how to reset the thermo and replace the control circuit fuse.

**Thermo relay**

If the running current for the compressor, condenser fan or evaporator fan exceeds the set value, the thermo relay will switch off the compressor or fan and will have to be reset.

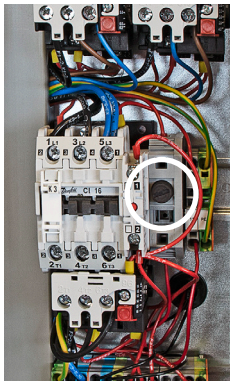
**Reset Thermo relay**

Push the buttons one by one in no particular order to reset the thermo relay.
See buttons marked with arrows below.




**Control circuit fuse**

If the running current for the control circuit is too high, the fuse will blow, and will have to be replaced. See location below.



# Service guide

**Contents**


| Topic | See page |
|---|---|
| Preventive maintenance | 30 |
| Spare parts | 32 |
| Fault finding guide | 40 |
| Service agreement | 42 |

## Preventive maintenance

**Introduction**

In order to achieve the best possible operation and long lifetime of the air conditioner it has to be maintained properly within defined guide lines.
This section contains the description of daily, monthly and annual maintenance.

**Tools**

For service and maintenance no special tools are required.
A 10 mm spanner and a flat headed screwdriver are sufficient for most maintenance tasks.

**CAUTION**

Before doing any maintenance, be sure that the air conditioner has been shut down and that the power cable is disconnected from the unit.
See section "Starting up and shutting down the air conditioner"

**Daily preventive maintenance**

Preventive maintenance to be carried out daily or every 8 hours of operation:
After shutdown each day or after every eight hours of operation perform the following preventive maintenance procedures:

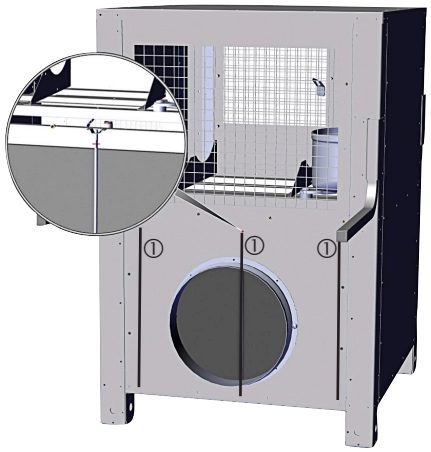
**Daily preventive maintenance**

Preventive maintenance to be carried out daily or every 8 hours of operation:
After shutdown each day or after every eight hours of operation perform the following preventive maintenance procedures:

| Step | Action |
|---|---|
| 1 | Inspect electrical cables for damage or loose connections |
| 2 | Inspect the air filter and remove any debris or foreign objects that may have accumulated on filters. |
| 3 | Inspect air hoses for damage or sharp bends |

## Preventive maintenance, *continued*

### Monthly preventive maintenance

| Step | Action |
|---|---|
| 1 | Perform daily maintenance as described on previous page. |
| 2 | Remove the air filter which have to be vacuum cleaned or washed in lukewarm soapy water.<br>The evaporator filter is easily removed. In order to remove the filter material, Remove the three flexible plastic rods holding the filter in place ①. Access the rods through the duct hole. Make sure that the filter is dry before it is returned to service and are subjected to dust.<br><br> |
| 3 | Remove the two side cover plates and inspect the evaporator and condenser coils.<br>If they are dirty vacuum clean or wash with warm soapy water and a brush |
| 4 | Check that the condensate drain is not blocked |
| 5 | Inspect and clean the radial wheels in the two fans if necessary |

### Annual preventive maintenance

| Step | Action |
|---|---|
| 1 | Perform daily and monthly maintenance as described |
| 2 | Have a refrigerant mechanic check the cooling circuit and all electrical functions<br>This control must follow the national rules for control of cooling equipment. |

# Spare parts

**Introduction**

This section contains the general information needed when ordering spare parts.
**For units in military services spares will normally be ordered through the military logistic system.**

**When ordering**

When ordering, kindly inform us about:

- Dantherm S.p.A. spare parts number/text
- NATO stock number of parts
- Dantherm S.p.A. field unit type
- Dantherm S.p.A. production and serial number from the data plate of the field unit (or approximate date of delivery).

**Information**

If it is part of a group naturally forming a whole or part of a purchased, complete component, ome items may not be available for individual delivery.
Dantherm S.p.A reserve the right to make this assessment.

**Reservations**

Dantherm S.p.A. reserve the right to make any necessary changes of construc-tion and choices of components without notice - but will, as far as possible, maintain a stock of the changed parts.

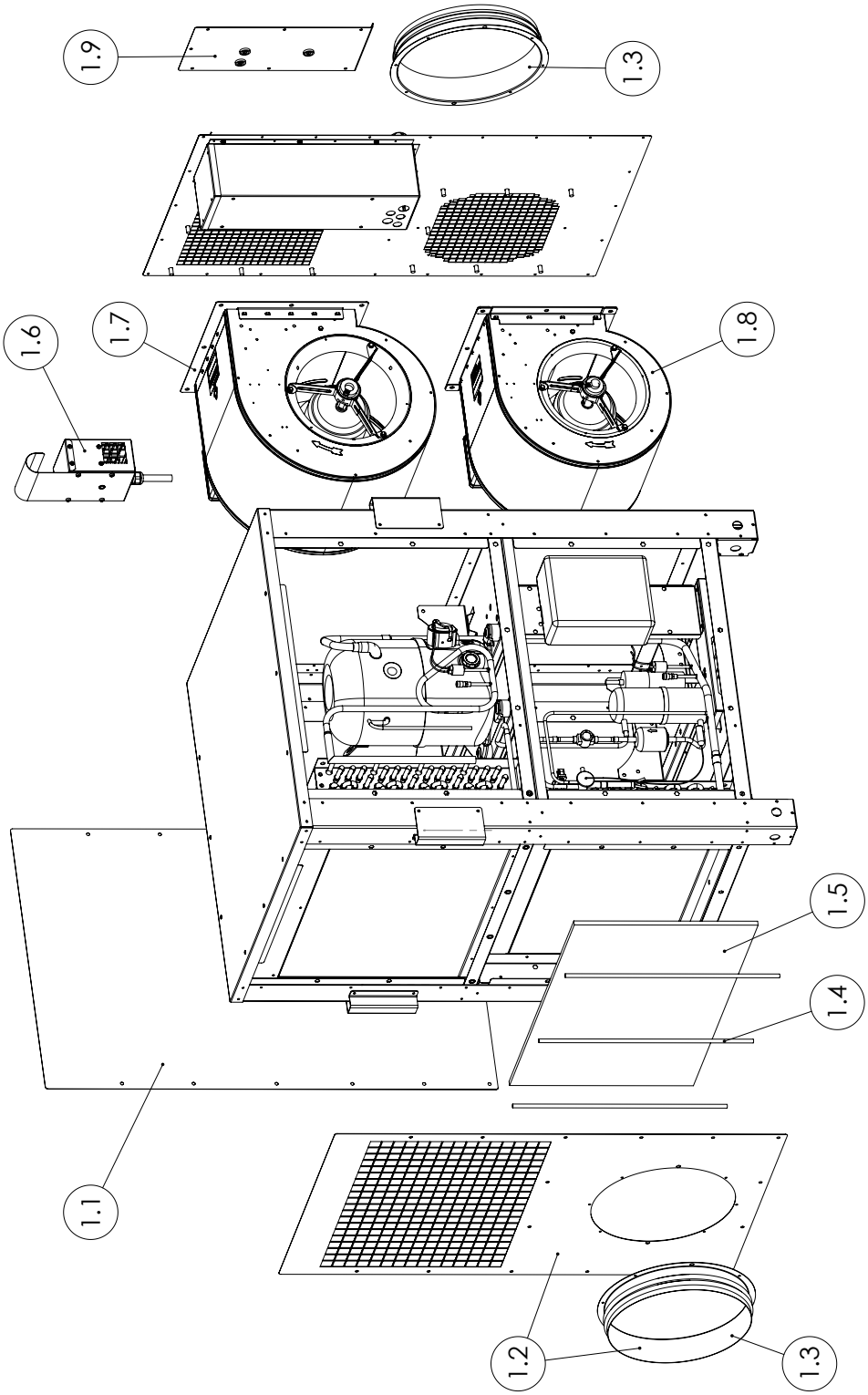
**Contents**


| Topic | Page |
|---|---|
| Spare parts for cabinet | 34 |
| Spare parts for cooling system | 36 |
| Spare parts for controller | 38 |
| Accessories | 40 |

# Spare parts for cabinet

**Illustration**

Available spare parts



# Spare parts for cabinet

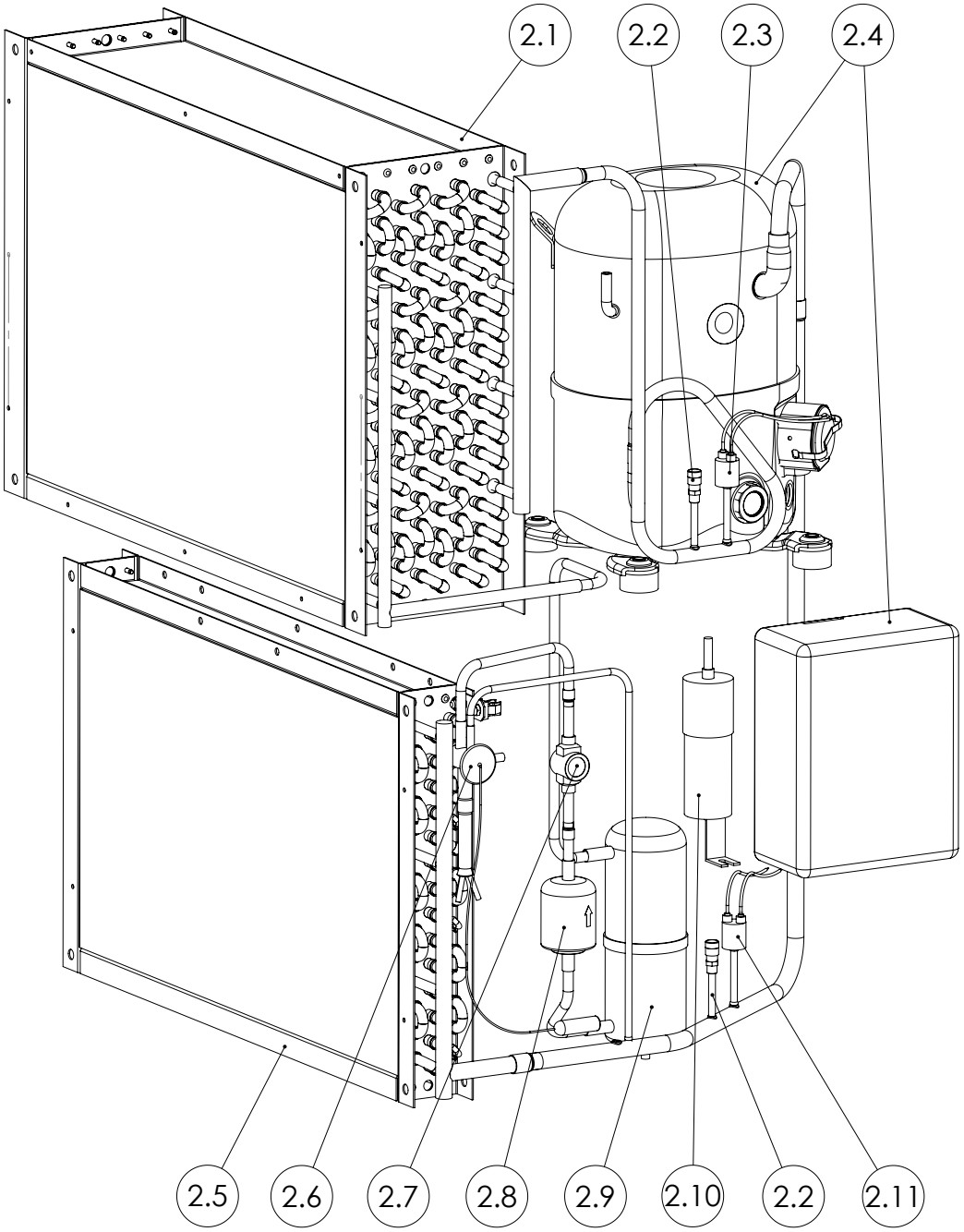
**Cabinet**

| Cabinet | Art.No. | Name | NSN |
|---|---|---|---|
| 1.1 | 098820 | Sideplate right/left | 4130-22-632-1603 |
| 1.2 | 098822 | Rear plate with hose connection | 4130-22-632-1606 |
| 1.3 | 098823 | Hose connection | 5999-22-632-1609 |
| 1.4 | 098824 | Filter mounting | 5340-22-632-1612 |
| 1.5 | 081579 | Filter | 4130-22-632-1614 |
| 1.6 | 093803 | Roomthermostat complete. | 5930-22-632-1619 |
| 1.7 | 081582 | Condenser fan | 4140-22-632-1622 |
| 1.8 | 075499 | Evaporator fan | 4130-22-632-1626 |
| 1.9 | 098830 | Front for controller | 4130-22-632-1664 |

# Spare parts for Cooling system

**Illustration**

Available spare parts for cooling system



## Spare parts for Cooling system

**Cabinet**

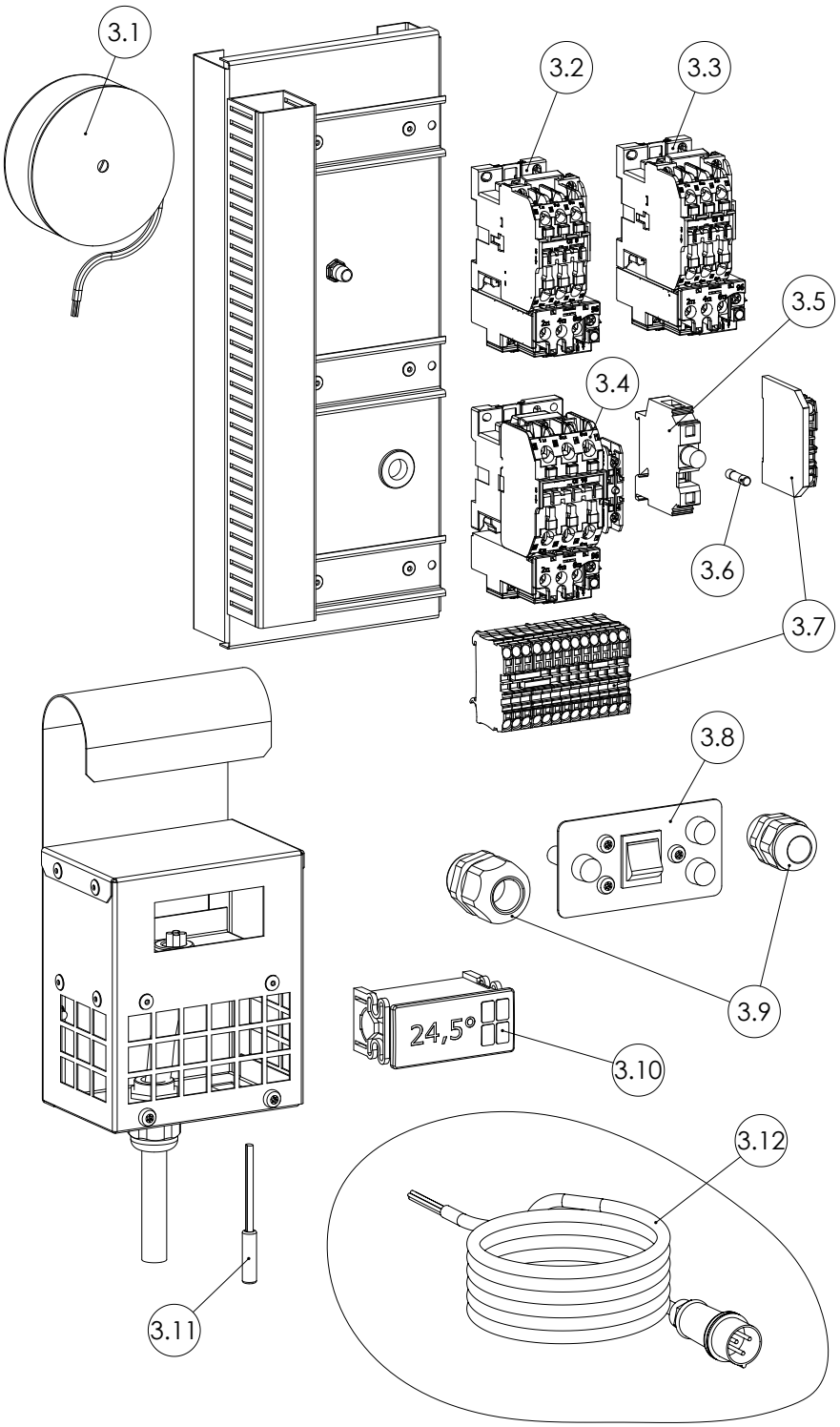
| Cabinet | Art.No. | Name | NSN |
|---|---|---|---|
| 2.1 | 081580 | Condenser coil | 4130-22-632-1665 |
| 2.2 | 063125 | Service valve | 4820-22-632-1667 |
| 2.3 | 298976 | Low Pressure switch (LP) | 5930-22-632-1668 |
| 2.4 | 098840 | Compressor cpl. | 4130-22-632-1670 |
| 2.5 | 091283 | Evaporator coil | 4130-22-632-1672 |
| 2.6 | 081631 | Thermostatic valve | 4820-22-632-1677 |
| 2.7 | 063123 | Sight glass | 6680-22-632-1679 |
| 2.8 | 298974 | Filter drier | 4130-22-616-3541 |
| 2.9 | 063128 | Reciver | 4130-22-632-1682 |
| 2.10 | 098868 | Capacitor for Compressor | 5910-22-632-1683 |
| 2.11 | 086414 | High Pressure switch (HP) | 5930-22-632-1684 |

Note: All spare parts for cooling system includes filter drier.

# Spare parts for Controller

**Illustration**

Available spare parts for controller



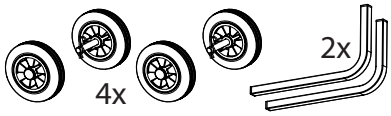
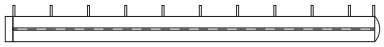
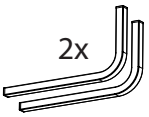
# Spare parts for Controller

**Cabinet**

| Cabinet | Art.No. | Name | NSN |
|---|---|---|---|
| 3.1 | 081686 | Transformer | 6120-22-632-1689 |
| 3.2 | 098858 | K1 - Contactor Cpl. | 6110-22-632-1709 |
| 3.3 | 098859 | K2 - Contactor Cpl. | 6110-22-632-1710 |
| 3.4 | 098860 | K3 - Contactor Cpl. | 5945-22-632-1712 |
| 3.5 | 098861 | Fuse Block | 5920-22-632-1713 |
| 3.6 | 098862 | Fuse 10 pcs. | 5925-22-632-1714 |
| 3.7 | 098863 | Terminal block cpl. | 5940-22-632-1726 |
| 3.8 | 098864 | Controller front | 1670-22-632-1727 |
| 3.9 | 064274 | Cable gland set | 5975-22-620-1668 |
| 3.10 | 091287 | Controller for Roomthermostat | 4130-22-632-1696 |
| 3.11 | 091288 | Sensor for Roomthermostat | 6685-22-632-1698 |
| 3.12 | 098865 | Power supply cable | 6150-22-632-1699 |

# Accessories

## Accessories

| Art. No. | Description | Illustration | Nato Stock Number |
|---|---|---|---|
| 096673 | Wheel set and handles |  | 4520-22-631-7709 |
| 097754 | Hose Ø320mm L. 3000mm |  | 4720-22-631-7710 |
| 097756 | Air distribution hose Ø320mm L. 5000mm |  | 4720-22-631-7163 |
| 098108 | Hose ties |  | 5340-22-631-7711 |
| 093894 | Handles |  | 5340-22-631-7708 |

# Fault finding guide

## Fault finding

Malfunctions that might occur in the operation of the air conditioner are listed in the table below. Reference to actions required to restore the air conditioner to normal op-erating condition are also indicated.

If the air conditioner should malfunction, find the problem in column 1. Columns 2 and 3 describe the possible causes and corrective actions. The list of problems, causes, and remedies will only give an indication of where a possible problem can be and what actions are needed to correct the problem.

| Problem ① | Cause ② | Action ③ |
|---|---|---|
| Air conditioner does not operate<br><br>Green indicator lamp on control panel is not ON | No power input | Check that the power cable is correctly connected to power source and unit. Check that power source is turned on and providing 1 x 230 V AC |
| | Controller fuse is blown. | Replace fuse.<br>Location shown on page 27 |
| Air conditioner (compressor) does not operate.<br><br>Green and yellow HP/LP indicator lamps are on, but they switch off again after a few minutes | High ambient temperature resulting in HP pressure switch cut-out | The HP pressure switch will automatically reset when the ambient temp. has fallen below 55 °C. |
| | Reduced condenser airflow perhaps combined with ambient temperature just below 55 °C | Hereafter the unit will restart |
| | Reduced evaporator airflow perhaps combined with low ambient temperature resulting in LP pressure switch cut-out | Clean evaporator coil and airflow filter Check that the grill at the air outlet are not blocked |
| | Faulty thermostatic valve | A refrigeration engineer has to replace the valve. |
| Air conditioner (compressor) does not operate.<br><br>Green and yellow HP/LP indicator lamps are on, and they do not switch off after a few minutes | Refrigerant leak on the cooling circuit | A refrigerant engineer has to check on the problem |
| Compressor does not operate Green and red THERMO RELAY indicator lamps are on | Compressor thermo relay has cut off | Press the reset button for compressor on the control panel (see section "Reset of thermo relay", page 27) |

## Fault finding guide, *continued*

**Fault finding, continued**

| Problem ① | Cause ② | Action ③ |
|---|---|---|
| Condenser or evaporator fan does not operate.<br><br>Green and red thermo relay indicator lamp are on | Fan thermo relay has cut off | Press the reset button for the evaporator or condenser fan on the control panel (see section "Reset of thermo", page 28) |

**WARNING**

Do not try to restart the compressor several times within a short period. This will overheat and may damage the compressor. The internal compressor thermostatic protection may also cut out.

**High ambient temperature**

If the surrounding temperature is higher than the max working temperature: 55 °C, the condenser will not be cooled enough, resulting in too high pressure in the cooling circuit and thereby operating the pressure switch (HP). Allow some time for cooling of the system.

**Low ambient temperature**

If the air conditioner is operating below 20 °C the humidity in the airflow can form ice in the evaporator coil. As the ice is insulating, the pressure in the cooling circuit will decrease until the pressure switch (LP) operates. In this case the mode selector should be turned to ventilation-only so that the evaporator coil can be defrosted by the airflow.

**Reduced airflow**

A reduced airflow can be caused by dirty filters or sharp kinks in the air hoses etc.
This can result in activation of the pressure switch (LP). Check the unit.

## Service agreement

**Introduction**

The unit includes mechanical and electrical parts and the unit is often placed in a rough environment where the components are exposed to different climate conditions. Therefore the unit will need preventative maintenance on a regular basis.

The After Sales Support Department of Dantherm S.p.A. is ready to help you in case of a problem.
To be able to offer quick and efficient help, please have the following information ready when contacting Dantherm S.p.A. :

- Name
- Company
- Country
- Phone no.
- Email
- Type (unit)
- Site/location (unit)
- Serial no/order no.
- Description of the problem

Contact Dantherm S.p.A. and ask for the After Sales Support department and help will be provided as soon as possible:

Phone: +45 96 14 37 00
Fax: +45 96 14 38 00
Email: service@dantherm.com

**Preventive maintenance**

Dantherm S.p.A. offers to do the preventive maintenance on the units so that they at all times will operate according to factory standards.

**Corrective and emergency repair**

In case of malfunctions of the product Dantherm S.p.A. offers to do emergency repair on the climate units. Agreements will be made with the customer on response time and price.

**Setup**

Dantherm S.p.A. has established a network of service partners to do the preventative maintenance. The partner is trained and certified on the actual climate units. The partner will also carry an adequate number of spare parts – so that any repairs can be made during the same visit.
The agreement will be made with Dantherm S.p.A. – and the overall responsibility for the agreement belongs to Dantherm S.p.A.

**Further information**

For further information about a service agreement in your country or region, please contact:

Claus Havboe Rasmussen
After Sales Manager
Dantherm S.p.A.
Phone: +45 9614 3725
Mobile: +45 6168 1233
Email: Claus.Rasmussen@dantherm.com

# Technical information

**Overview**

This section provides technical information about the AS 24 and covers the following topics:

**Contents**


| Topic | See page |
|---|---|
| Technical data | 45 |
| Dimensions | 46 |
| Wiring diagram, AC 24 | 47 |
| Wiring diagram reference | 49 |

# Technical data

**Introduction**

Technical data for the AC 24 units.
*Note: All data regarding heating is only relevant for models with heating coil installed.

**Performance characteristics**

The air conditioner has a maximum cooling capacity of 6.0 kW.
When the relative humidity of the air inlet is high, the air can be cooled below its dew point and thus condense some of the water vapour to free water. This requires a certain amount of latent cooling but provides a dehumidification process, which is an important factor in comfortable air supply conditions.
The operating range is between 20 and 55 °C approximately and is controlled by the HP/LP-pressure switch. In relatively dry locations the air temperature drop will depend on inlet conditions.

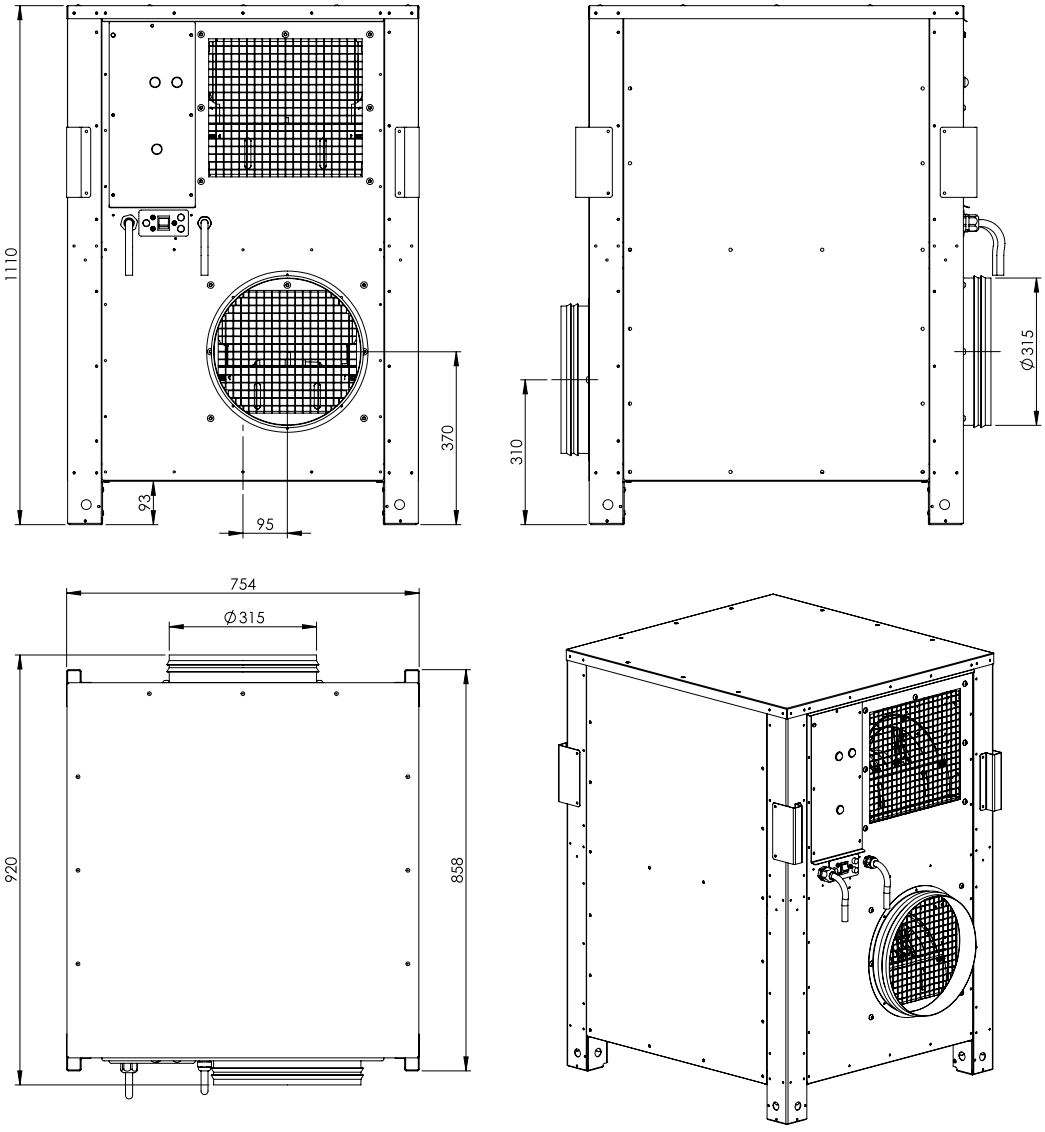
**Data**

Data and dimensions on the cabinet are shown in the following table:

| Specification | Designation | Value 6,0 kW |
|---|---|---|
| Dimensions | Height × width × depth - mm | 1110 x 754 x 920 mm |
| Weight | kg | 162 |
| Cabinet material | | 0.9 mm galvanized sheet metal plates |
| Packaging | - | Wooden pallet and cardboard |
| Voltage supply | V/PH/Hz | 230/1/50 |
| Max current | Amp | 16A |
| Airflow, evaporator, Standard setup[2]) | m³/h | 2,800 |
| Cooling capacity, max | W | 6.000 |
| Refrigerant/Load | Type/kg | R134a/2,3 |
| Max. refrigerant pressure | Bar | 25 |
| Operation temp. range | C° | 20-55 |
| Minimum room temperature setting | C° | 20 |
| GWP (Global Warming potential) | | 1430 |
| IP | | 55 |
| Locked rotor amperange (LRA) | A | 46 |

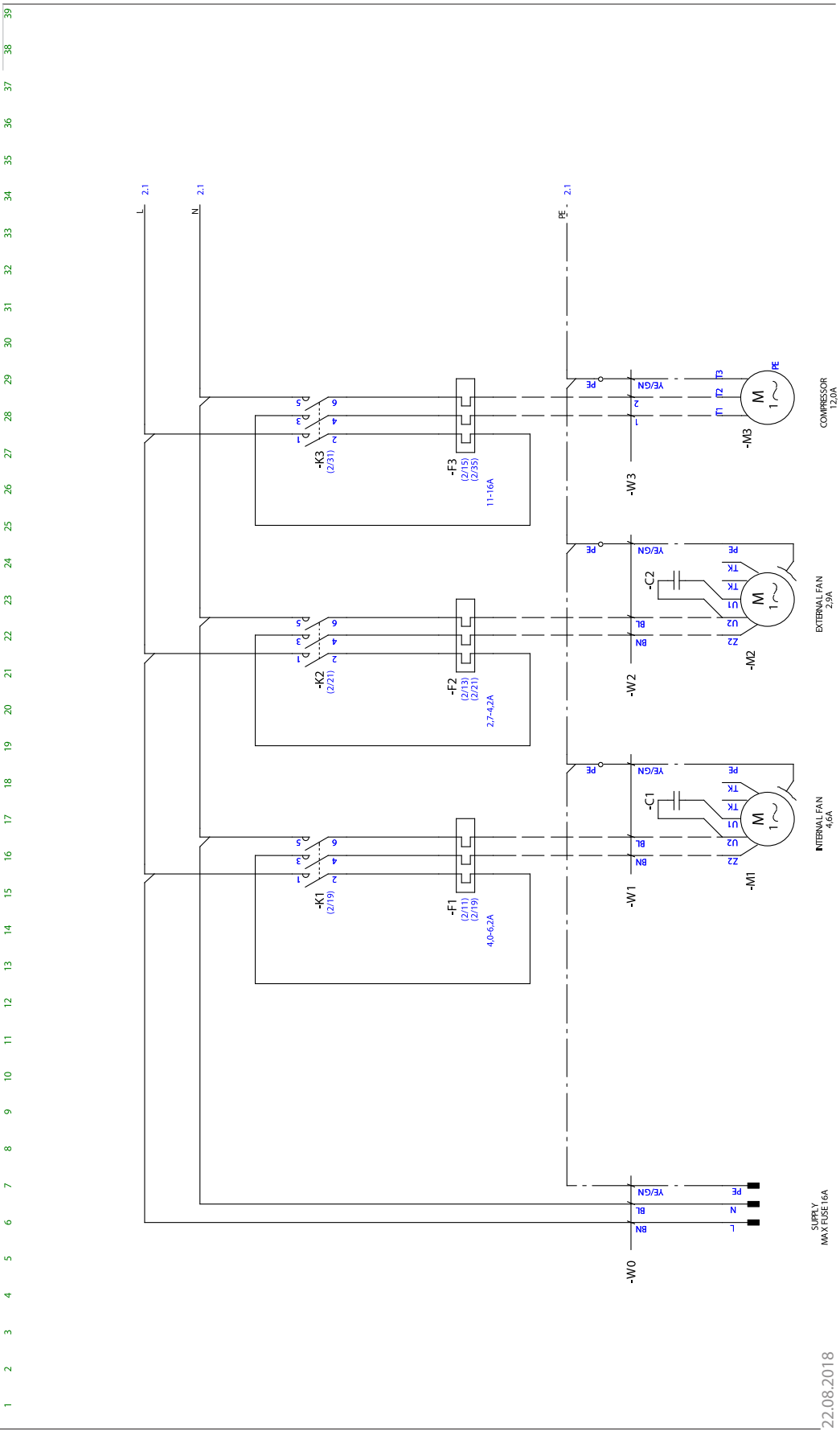
# Dimensions

## Dimensions



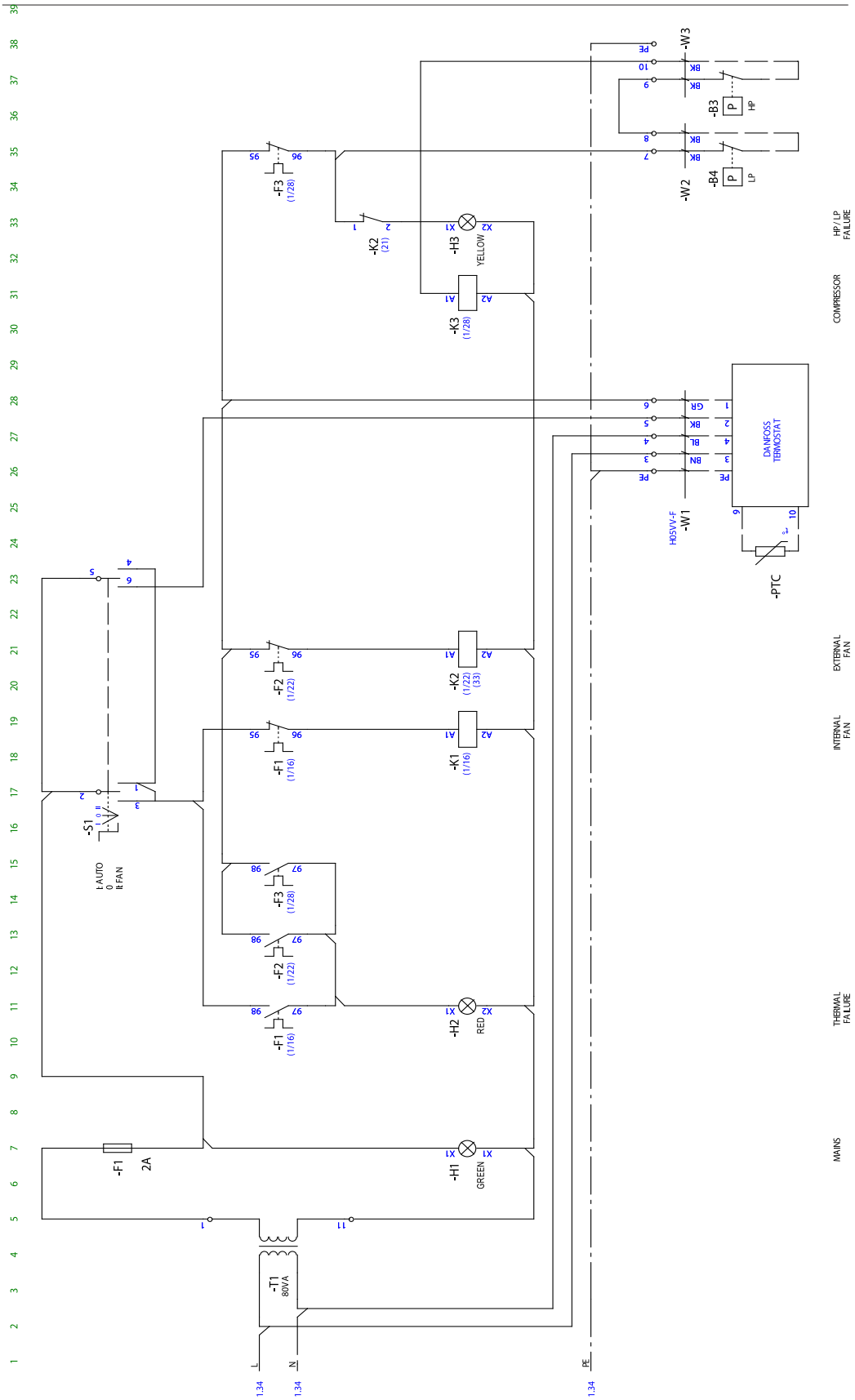
# Wiring diagram

## Wiring diagram



# Wiring diagram, *continued*

## Wiring diagram, Continued

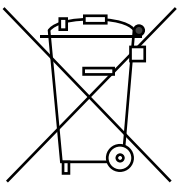


# References

**References**

The following references refer to the wiring diagrams on the previous pages:

| Reference | Description | Reference | Description |
|---|---|---|---|
| A | El. Heating coil | K1 | Contactor evaporator fan |
| B3 | HP pressure switch | K2 | Contactor condenser fan |
| B4 | LP pressure switch | K3 | Contactor compressor |
| B2 | OT thermostat el. heating coil | K4 | Contactor heating coil |
| B1 | Limit thermostat el. heating coil | K5 | Timer (After run) el. heating coil |
| C1 | Evaporator fan motor condenser | M1 | Evaporator fan motor |
| C2 | Condenser fan motor condenser | M2 | Condenser fan motor |
| F1 | Evaporator fan motor thermo relay | M3 | Compressor |
| F2 | Condenser fan motor thermo relay | RT | Room thermostat |
| F3 | Compressor thermo relay | S1 | Function switch |
| H1 | Green lamp "Mains" | T1 | Transformer |
| H2 | Red lamp "Thermo relay" | XRT | Thermostat plug |
| H3 | Yellow lamp "HP/LP" | XT | Control current breaker |



Master can accept no responsibility for possible errors and changes.

MCS MASTER®
CLIMATE SOLUTIONS


Dantherm S.p.A.
Via Gardesana 11
37010
Pastrengo, Italy
t. +39 045 6770533
info@mcsitaly.it

Dantherm Sp. z o.o.
ul. Magazynowa 5a
62-023 Gądki Poland
t. +48 61 65 44 000
office@mcs-ce.pl

Dantherm LLC
Transportnaya 22/2
142800, Stupino
Moscow, Russia
t. +7 (495) 642 444 8
info@mcsrus.ru

Dantherm SP S.A.
C/Calabozos,
6 (Poligono Industrial)
28108 Alcobendas
Madrid Spain
t. +34 91 661 45 00
euritecsa@euritecsa.es

MCS China
Unit 2B, No. 512 Yun-
chuan Road Baoshang,
Shanghai,
201906 China
t. +8621 61486668
office@mcs-china.cn

Dantherm Group S.p.A
Marienlystvej 65
7800 Skive
Denmark
t. +45 99 14 90 00

Dantherm S.p.A
Marienlystvej 65
7800 Skive
Denmark
t. +45 96 14 37 00

Dantherm Ltd.
Unit 2, Galliford Road
Maldon CM9 4XD
United Kingdom

Dantherm AS
Lokkeasveien 26
3138 Skallestad
Norway
t. +47 33 35 16 00

Dantherm AB
Fridhemsvagen 3
602 13 Norrkoping
Sweden
t. +46 (0)11 19 30 40

Dantherm GmbH
Oststrase 148
22844 Norderstedt
Germany
t. +49 40 526 8790

Dantherm AG
Im Vorderasp 4
8154 Oberglatt ZH
Switzerland
t. +41 44 851 51 51

Dantherm Dubai
Suite #1009
Prism Tower,
Business Bay Dubai
United Arab Emirates
t. +971 56 831 7466



Data, descriptions and pictures are for indication only and absolutely not binding.
The Company reserves the right to modify or improve them without prior notice.


Master is a part of
DANTHERMGROUP


097881