



IT Cooling Solutions

# Mini-Space DX

Precision Air Conditioning Units  
380-415/3/50

Index G20  
Issue 1.2017

Original instructions





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Subject to technical modifications.

# 1. Safety

## 1.1 Marking



Danger - threatening danger, grievous bodily harm and death



Attention - dangerous situation, light bodily injury and material damage



Information - important information and application notice



ESD note - risk of damaging electronical components

## 1.2 Safety instructions

### General

These operating instructions contain basic information which is to be complied with for installation, operation and maintenance. They must therefore be read and complied with by the fitter and the responsible trained staff/operators before assembly and commissioning. They must be permanently available at the place where the system is used.



**This cooling unit contains fluorinated greenhouse gas covered by the Kyoto protocol.**

In STULZ units the refrigerant R407C (R410A in units with EC compressor) is used as standard. Refrigerants are volatile, or highly volatile fluorinated hydrocarbons which are liquefied under pressure. They are incombustible and not hazardous to health when used as intended.



- Works have to be carried out by competent staff only
- Observance of the regulations for accident prevention
- Stay out of danger when lifting and setting off the unit
- Secure the unit to avoid the risk of overturning
- Safety devices may not be bypassed.
- Respect the corresponding VDE-, EN- and IEC standards for the electrical connection of the unit and observe the conditions of the power supply companies
- Switch off the voltage from the unit when working on it.



- Observe the national regulations of the country where the unit will be installed
- The refrigerant circuit contains refrigerant and refrigerating plant oil, observe professional disposal for maintenance and when setting the unit out of service.
- Cooling water additives have an acidic effect on skin and eyes, wear safety glasses and safety gloves
- Observe personal protective equipment when working on the refrigerant circuit.
- The unit may only be used to cool air according to the Stulz specification.



- Respect material compatibility in the whole hydraulic circuit.
- The male triangular wrench is to be placed in a visible location in the immediate vicinity of the unit.

## 1.3 Handling refrigerants

According to EN 378, refrigerants are divided in groups in respect of health and safety: R407C and R134a belong to Group L1.

- Adherence to the regulations by law and guide-lines
- Execution only by competent staff

- Responsibility for correct disposal of refrigerant and system parts is incumbent on the operator.
- Refrigerants have a narcotic effect when inhaled in high concentrations.
- The room is to be evacuated immediately if high concentrations of refrigerant suddenly occur. The room may only be entered again after adequate ventilation.
- If unavoidable work is required in the presence of a high concentration of refrigerant, breathing apparatus must be worn. This does not mean simple filter masks. Comply with breathing protection data sheet.
- Safety glasses and safety gloves are to be worn.
- Do not eat, drink or smoke at work.
- Liquid refrigerant must not get onto the skin (risk of burns).
- Only use in well ventilated areas.
- Do not inhale refrigerant vapours.
- Warn against intentional misuse.
- It is absolutely essential to comply with the first aid measures if accidents occur.
- Refrigerants containing FCs contribute to the global warming and with this to climate changes. The FCs must therefore be disposed of in accordance with the regulations, i.e. only by companies specially qualified and licensed as recognised disposal companies for refrigerants.

## 1.4 Safety and environmental requirements

The following requirements relate to the operation of refrigerating plants within the European Community.

- The used components must correspond to the pressure equipment guide-line EC/97/23 and EN 378 part 1-4.
- Independent of the design, the equipment and inspection before the delivery, also the operator of such plants has duties according to EN 378 and national regulations.

This concerns the installation, the operation and the repeated inspection:

- Installation: according to EN 378
- Operation:
  - Determination of emergency measures (accidents, malfunctions)
  - Creation of an abbreviated instruction and notification (template page)
    - a. A unit protocol must be kept.
    - b. To be stored in the proximity of the unit
    - c. Access for competent staff in case of repairs and repeated inspection must be ensured.
- Repeated inspection: according to EN 378  
The operator is responsible for the execution.

The operator must ensure that all maintenance, inspection and assembly work is carried out by authorised and qualified specialist staff who have made an in-depth study of the operating instructions.

It is absolutely essential to comply with the procedure for shutting down the system described in the operating instructions. Before maintenance work, the unit must be switched off at the main switch and a warning sign displayed to prevent unintentional switching-on.

## Independent conversion and manufacture of replacement parts

The system may only be converted or modified after consultation with STULZ. Original replacement parts and replacement parts/accessories authorised by STULZ are an aid to safety.

## Unacceptable operating methods

The operating safety of the system is only guaranteed when it is used as intended. The limit values stipulated in the technical data must not be exceeded under any circumstances.



## 2. Residual risks

### Transport, Installation

Area	Cause	Danger	Safety note
Under the unit	Defective lifting device	Bruising	Keep away from under the unit
Beside the unit	Uneven or insufficient foundation or raised floor stand	Bruising by tipping over of the unit	Make sure, the foundation is even and stable and that the raised floor stand is correctly mounted. Wear protective equipment (helmet, gloves, safety shoes).
In the lower part of the unit	Heat by soldering flame, sharp edges, built-in parts	Burns, cuts, concussion damage	Wear safety glasses and gloves, don't put your head into the unit.
Electrical box	Connection cable under voltage, sharp edges of the openings for the cable introduction	Electric shock, cable damage at positioning	Check and make sure the unit is de-energized. Stand on isolated ground. Take care that sharp edges are always protected by rubber grommets

### Start-up

Area	Cause	Danger	Safety note
In the lower part of the unit, refrigerant piping	Defective filling line for refrigerant, leaks in the refrigerant piping, closed stop valves, defective safety valve	Discharge of refrigerant under high pressure, burns in case of contact to the skin, formation of acid vapours with open flames	Open stop valves. Wear safety glasses and gloves, don't put your head into the unit.
In the lower part of the unit, water piping	Leaks in the water lines, closed stop valves	Discharge of water under high pressure, contact with the skin of ethylen glycol, irritation of eyes and respiratory system by glycol vapours, increased risk of electric shock in combination with electricity, risk of slipping	Open stop valves. Wear rubber gloves, ethylen glycol is absorbed by the skin. Avoid swallowing water with glycol additives.
Fan outlet of up-flow units	Small parts fallen into the fan	Small parts can be thrown out of the fan when the unit starts.	Keep away from above the fan outlet.
Electrical box	Short circuit	Electric arc, acid vapours	Retighten terminal connections, Wear protective gloves

### Operation

Area	Cause	Danger	Safety note
In the lower part of the unit, refrigerant piping	Leaks in the refrigerant piping, defective safety valve/high pressure switch, fire	Discharge of refrigerant under high pressure, explosion of pipe sections, formation of acid vapours with open flames	In case of fire wear protective mask.
Unit bottom, eventually raised floor	Accumulation of condensate and water discharge by too small or clogged drain pipe	Corrosion and development of mould by moistness. Humidity in combination with electric connections.	De-energize water discharge area.
Electrical alimentation	Falsely dimensioned cables or protection devices	Short-circuit, fire, acid vapours	Correctly design alimentation cables and protection elements. Wear protective mask.

### Maintenance

Area	Cause	Danger	Safety note
In the lower part of the unit, refrigerant piping	Leaks in the refrigerant piping, defective safety valve/high pressure switch.	Discharge of refrigerant under high pressure, burns in case of contact to the skin, formation of acid vapours with open flames	Wear safety glasses and gloves, don't put your head into the unit.
Pressure lines, compressor, reheat behind heat exchanger	Heat	Burns in case of contact to the skin	Wear safety gloves. Avoid contact to hot unit parts.
Heat exchanger	Sharp edges, fins	Injuries by cutting	Wear safety gloves.
Steam humidifier	Discharge of steam	Burns	Avoid area around the steam lance.
Electrical box	Live components, supposed to be voltage-free.	Electric shock	Secure master switch against being switched on again.

### Dismantling

Area	Cause	Danger	Safety note
In the lower part of the unit, refrigerant piping	Soldering off or cutting the refrigerant pipes still under pressure.	Discharge of refrigerant under high pressure, burns in case of contact to the skin.	Depressurize pipes before disconnecting them. Wear safety glasses and gloves, don't put your head into the unit.
In the lower part of the unit, water piping	Unscrewing the water pipes still under pressure.	Discharge of water under high pressure, contact with the skin of ethylen glycol, increased risk of electric shock in combination with electricity, risk of slipping	Drain of cooling water by drain valve. Wear rubber gloves.
Electrical box	Live electrical alimentation cable	Electric shock	Check de-energized state of the alimentation before dismantling, Wear safety gloves.



## 3. Transport / Storage

### 3.1 Delivery of units

Stulz A/C units are mounted on pallets and packed several times in plastic film. They must always be transported upright on the pallets.



**Unit version A: The refrigerant circuit is filled with nitrogen up to 2.5 - 5.0 bar.**  
**Unit version G: The refrigerant circuit is filled with refrigerant ready for use.**

Construction of protective covering  
(from inside to outside)

1. Neoprene cushioning
2. Shrink film
3. Additional board in container shipments

The following information can be found on the packing.

- 1) Stulz logo
- 2) Stulz order number
- 3) Type of unit
- 4) Packing piece - contents
- 5) Warning symbols

also upon request

- 6) Gross weight
- 7) Net weight
- 8) Dimensions
- 9) Customer order number
- 10) Additional customer requirements



**When delivery is accepted, the unit is to be checked against the delivery note for completeness and checked for external damage which is to be recorded on the consignment note in the presence of the freight forwarder.**

- The delivery note can be found on the A/C unit when delivered.
- The shipment is made ex works, in case of shipment damages, please assert your claim towards the carrier.
- Hidden damage is to be reported in writing **within 6 days** of delivery.

### 3.2 Transport

The Stulz A/C units can be moved by lifting devices with ropes, for this the ropes have to be fixed at the pallet, and the upper unit edges have to be protected by wooden laths or metal brackets in such a way that they could not be caved in.

You can move the unit still packaged on the pallet with a fork lift, if you take care that the centre of gravity is within the fork surface. Take care that the unit is in an upright position at the transport.



**Never move the unit on rollers and never transport it without pallet on a fork lift, for the risk of distorting the frame.**

### 3.3 Storage

If you put the unit into intermediate storage before the installation, the following measures have to be carried out to protect the unit from damage and corrosion:

- Make sure that the water connections are provided with protective hoods. If the intermediate storage exceeds 2 months, we recommend filling the pipes with nitrogen.
- the temperature at the storage point should not be higher than 42°C, and the site should not be exposed to direct sunlight.
- the unit should be stored packaged to avoid the risk of corrosion especially of the heat exchanger fins.

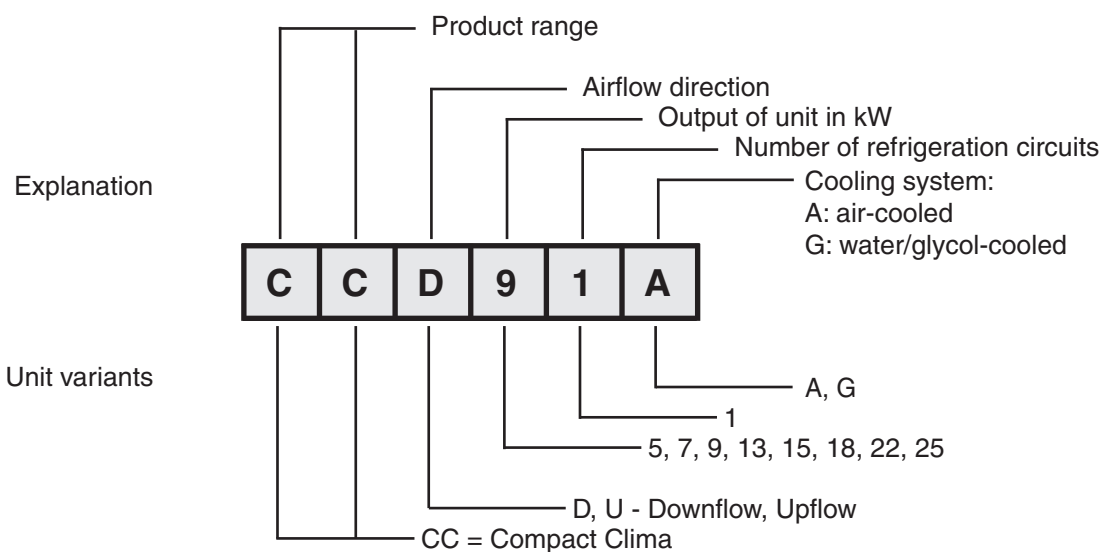
## 4. Description

### 4.1 Type code

The type code represents the unit variant of your A/C unit and can be found on the rating plate.

The rating plate is located in the door in front of the electrical compartment.

	Typenschild / type plate plaque d'appareil		CE
	<b>STULZ</b> Lieferant manufacturer vendeur <b>STULZ GmbH Hamburg</b> Holsteiner Chaussee 283, D-22457 Hamburg		
Unit type	Typ type type <b>CCD 91 A</b>	Versorgungsspannung supply voltage tension de service <b>400 V ± 10%</b> <b>50 Hz ± 1%</b>	
internal part no.	Artikel-Nr. Item-no. numéro d'article <b>B72040</b>	Kältemittel refrigerant refrigerant <b>R407c</b>	
Order number + alternative	Kommission/Alt commission/alt commission/alt <b>0530111234/01</b>	Max. Betriebsdruck max. operation pressure pression de fonction max. <b>28 bar</b>	
Serial no.	Baujahr model modele <b>2011</b>  S.Nr. s.-no. no. serie <b>1234567890</b>	Max. Füllgewicht max. filling charge charge max. de rempliss. <b>--- kg</b>	
			<b>Made in Germany</b>



### Page code

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Page code:  
 DE - German  
 EN - English  
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 IT - Italian  
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Date of issue  
month/year

Index  
number

Manufacturing base:  
 G - Germany  
 C - China  
 I - Italy

### Manufacturer address:

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**Klimatechnik**  
**Holsteiner Chaussee 283**  
**22457 Hamburg**  
**Tel: +49 40 55 85-0**  
**Fax: +49 40 55 85-404**



## 4.2 Intended use

This A/C unit is used to control room temperature and air humidity. The A/C unit is designed for indoor installation. Any use beyond this is not deemed to be use as intended.

## 4.3 Function of the A/C unit

The A/C unit is exclusively operated by the controller in the front panel and the main switch in the electric box. In the air inlet a temperature/humidity sensor is located which provides the measured values for the temperature/humidity control. The cooling is achieved by compressor operation in the refrigerant circuit.

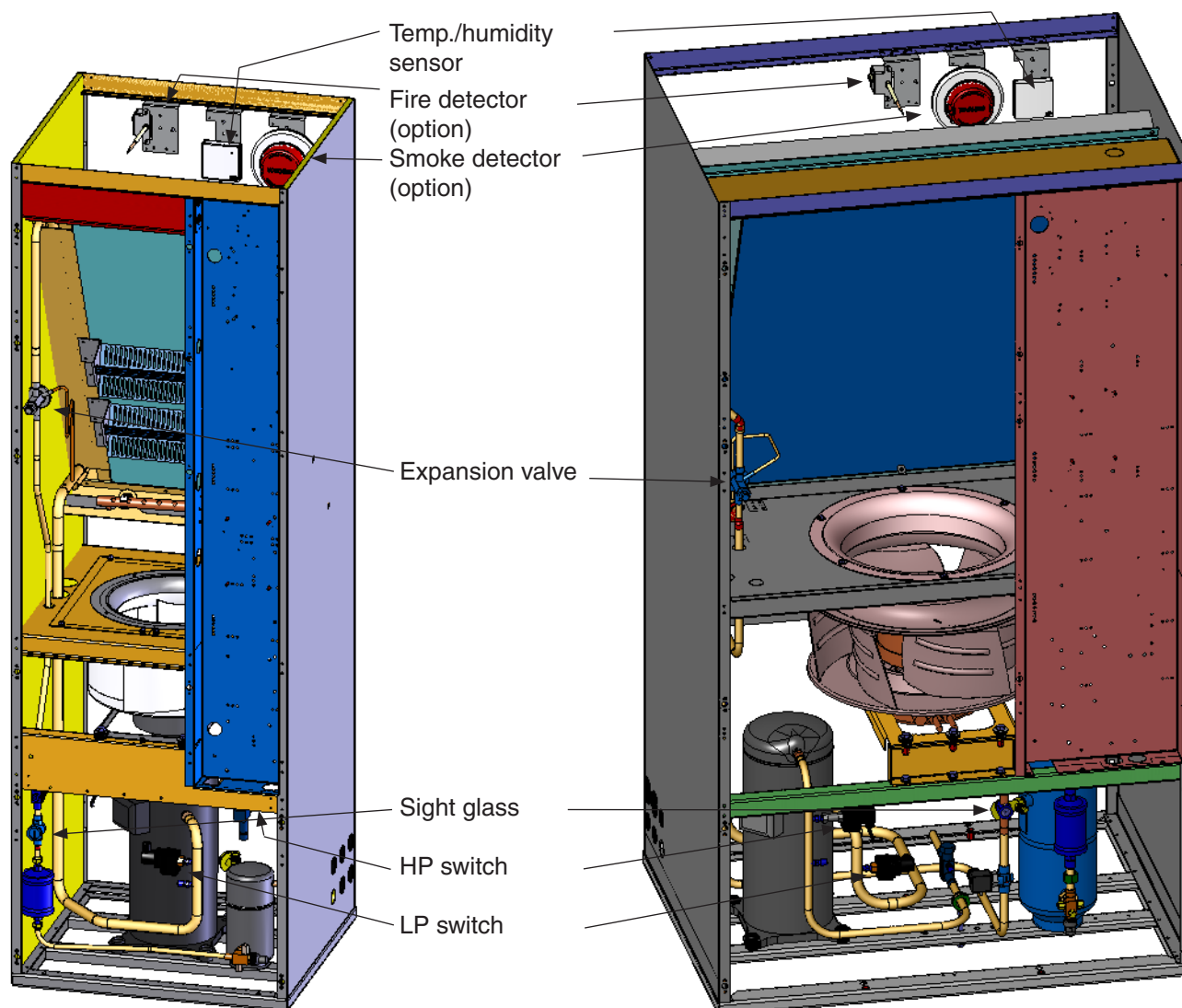
The A/C unit control is effected by the on board I/O controller. The operational conception is designed such as to allow to control up to 19 units from one unit. These units can be installed separately with a maximum control line length of 1000 m.

### Dehumidification

A dehumidification is achieved by a reduction of the air flow. With a constant cooling capacity, the temperature of the air which flows through the heat exchanger coil, passes below the dew point. The moisture contained in the air condenses on the heat exchanger gathers in the condensate pan and is carried away by the drain.

CCD 51/71/91/131/151 A

CCD 181/221/251 A



## 5. Technical data

### 5.1 Application limits

- Admissible return air conditions:  
 Temperature:  
   Lower limit: 18°C  
   Upper limit: 35°C  
 Humidity:  
   Lower limit: 5,5°C dew point  
   Upper limit: 60% r.h. and 15°C dew point
- Outdoor ambient conditions:  
   lower limit: -10°C, depending on selected option  
               down to -45°C  
   upper limit: depending on selected condenser
- Storage conditions:  
   Temperature [°C]: -20 - +42  
   Humidity [% rel. h.]: 5 - 95  
   Atmosphere pressure [kPa]: 70 - 110
- Cooling water pipes:  
   max. water head pressure: 16 bar
- Required min thermal load: 20% of nom. cooling cap.
- Hot water conditions for optional heating coil:  
   max. inlet water temperature: 110°C  
   max. water head pressure: 16 bar
- Max. length of piping between A/C unit and air-cooled condenser: 30 m equivalent.
- Max. level difference between condenser and A/C unit: 5 m (when condenser is below the A/C unit).

- Voltage: 380 - 415V / 3ph / 50Hz; N; PE
- Voltage tolerance: +/- 10%  
   (not for permanent operation)
- Frequency tolerance: +/- 1%

The following voltages are also available for this A/C unit series:

200V/3Ph/50Hz; PE (only for 41, 61, 81, 121, 171, 201)  
 208V/3Ph/60Hz; PE  
 230V/3Ph/60Hz; PE  
 380V/3Ph/60Hz; N; PE  
 460V/3Ph/60Hz; PE  
 Other voltages on request.

Voltage/frequency tolerances as for 400V/3Ph/50Hz.

The cooling capacity, air flow, water flow, pressure loss, sound pressure level and valve sizes change with a voltage different from the standard voltage (400V/3Ph/50 Hz). In this case, see the technical data by the help of the "Stulz Select" planning tool.

The unit design, the external dimensions, the weight, the position and size of the supply connections are independent of the supply voltage and can be found in this manual.

#### Requirements for UPS systems:

(in case of permanent operation of the EC fans with a UPS system)

- the output voltage of the UPS system must be grounded neutral (wye).
- the voltage distortions must be within the limits stated below and no inadmissibly high DC voltage portions may exist.
- all-pole sinus filters must be provided at the UPS system output.

transient peak over-voltage phase to ground:  
 max. 4 kV (1,2/50µs wave form; Z=12 Ohms in acc. to ANSI)

transient peak over-voltage phase to phase:  
 max. 2 kV (1,2/50µs wave form; Z=2 Ohms in acc. to ANSI)

ripple voltage phase to ground:  $dV/dt < 1V/\mu s$  ( $\approx 1000V/ms$ )  
 voltage harmonics: THD(V) < 8%

The warranty is invalidated for any possible damage or malfunction that may occur during or in consequence of operation outside the application ranges.



## Design conditions for technical data:

Electrical connection:	400V / 3ph / 50Hz
external static pressure for Downflow units:	20 Pa
external static pressure for Upflow units:	50 Pa
Return air conditions for evaporator capacity:	24°C, 50% rel. humidity
Cooling fluid (G):	Water, 30% ethylen glycol
Fluid inlet temperature:	30°C
Fluid outlet temperature:	40°C
Condensation temperature:	45°C

The sound pressure levels are valid at a height of 1 m and distance of 1 m in front of the unit under free field conditions and with nominal data. The values take into account the effects of all installation and design parts contained in the standard unit. The values for upflow units assume an installed discharge duct.

## Adjustment of the pressure switches:

### LP switch:

releases at:

automatic reset at:

### HP switch:

releases at:

manual reset possible at:

### Safety valve:

	R407C	R134a
bar	1,0	1,0
bar	3,0	3,0
bar	24,5	18,0
bar	18,0	14,0
bar	28	28

## 5.2 Technical Data

### CCD/U ... A/G

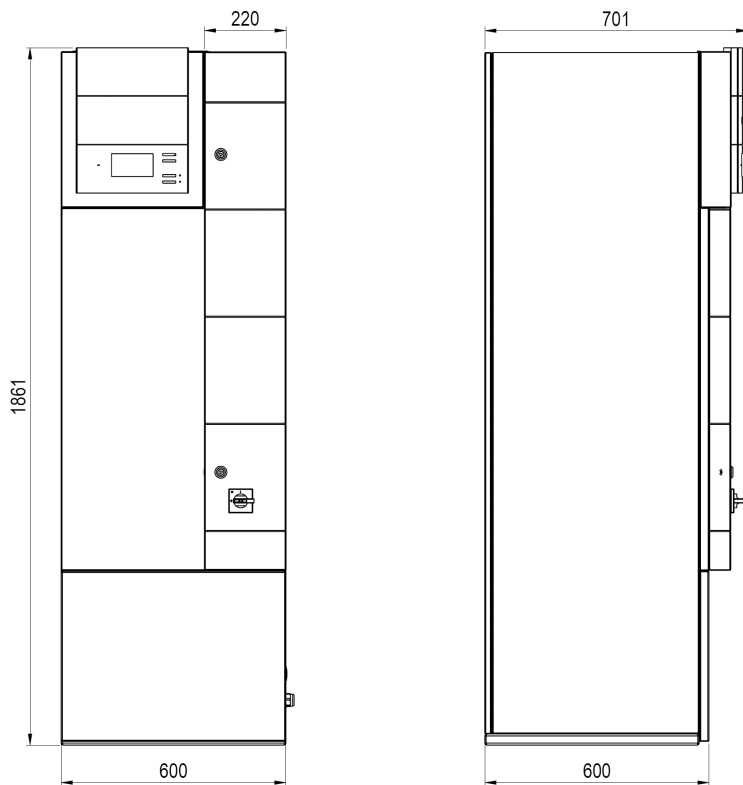
Type		51	71	91	131	151	181	221	251
DX-cooling cap. R407C 24°C/50% r.h.	total	6,4	7,5	9,6	12,1	13,8	18,1	21,9	26,0
	sensible	6,4	7,5	8,3	11,1	11,9	18,1	21,9	24,1
Nominal refrigerant charge, G		2,4	2,4	2,4	2,6	3,0	3,2	3,4	3,6
Water flow G		m³/h	0,8	1,0	1,2	1,5	1,8	2,2	3,2
Pressure loss, condenser G		kPa	< 1	1	1	2	2	19	28
Valve size (3-way) (option)		inch	1/2	1/2	1/2	3/4	3/4	1	1
Pressure loss, valve		kPa	9	12	19	8	11	6	10
Airflow		m³/h	2500	2500	2500	3500	3600	7000	8000
Return air filter class			G4	G4	G4	G4	G4	G4	G4
<b>Downflow</b>									
Sound pressure level (1m free field)		dBA	49,3	49,3	49,3	57,1	57,7	57,7	60,2
Weight - A		kg	136	138	141	141	151	276	282
Weight - G		kg	145	147	150	150	160	283	289
<b>Upflow</b>									
Sound pressure level (1m free field)		dBA	52,0	52,0	52,0	59,5	60,1	59,4	62,5
Weight - A		kg	147	149	152	152	163	297	303
Weight - G		kg	156	158	161	161	172	304	310
Cabinet size <sup>3</sup>			1				2		

\* For electrical data, (compressor and fan power consumption) see e-data sheet.

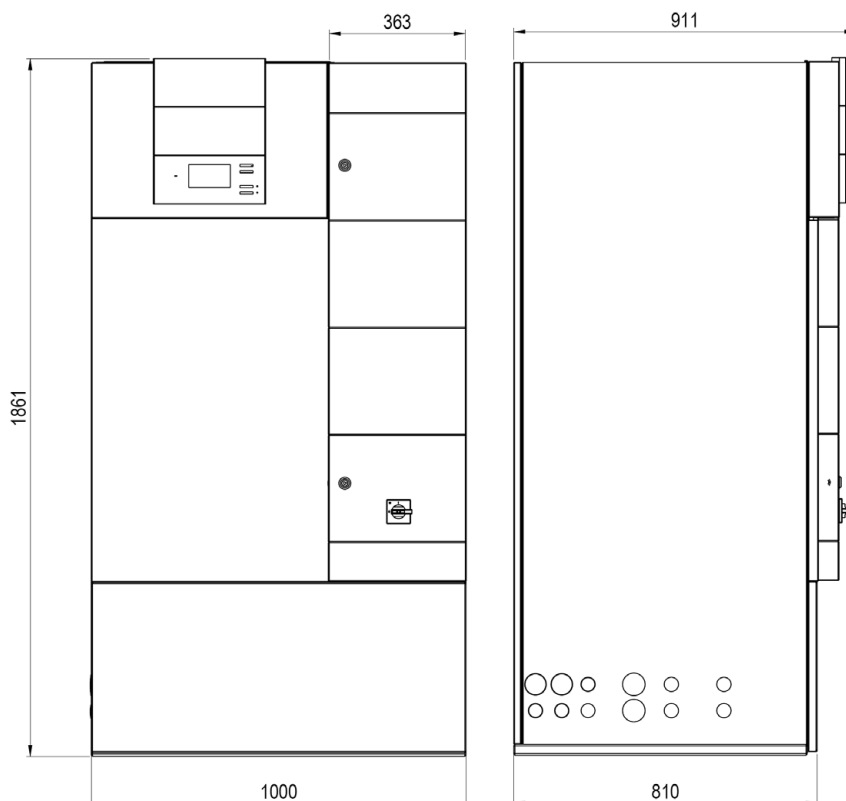


## 5.3 Dimensional drawings

### Cabinet size 1



### Cabinet size 2



## 6. Installation

### 6.1 Positioning

Check that the installation site is appropriated for the unit weight, which you can read in the technical data.

The A/C unit is designed for the inside installation on a level base. The solid base frame contributes significantly to an even weight distribution. When selecting the installation site take into account the necessary clearances for the maintenance and the air flow.

Children, unauthorized persons and animals may not have access to the installation site of the A/C unit.

Vibrations emanate from the A/C unit due to compressor operation. To avoid such vibrations, install the unit on a vibration absorbing base, as it is realized in case of a positioning on a raised floor socket e.g. by Mafund strips.

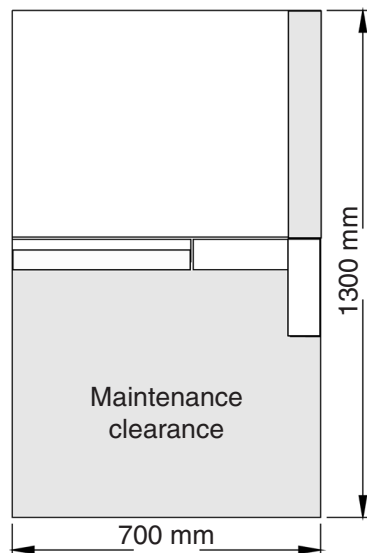
Use a vibration absorbing base for upflow units also.

Do not operate the A/C unit in office rooms or other rooms sensitive to noise.

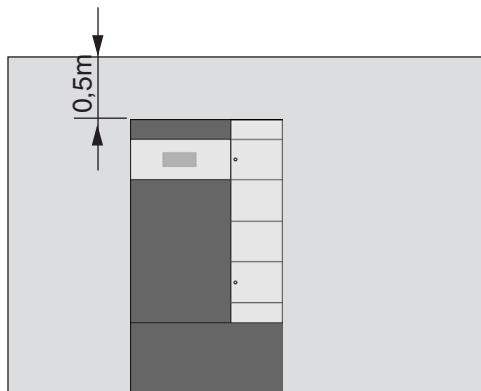
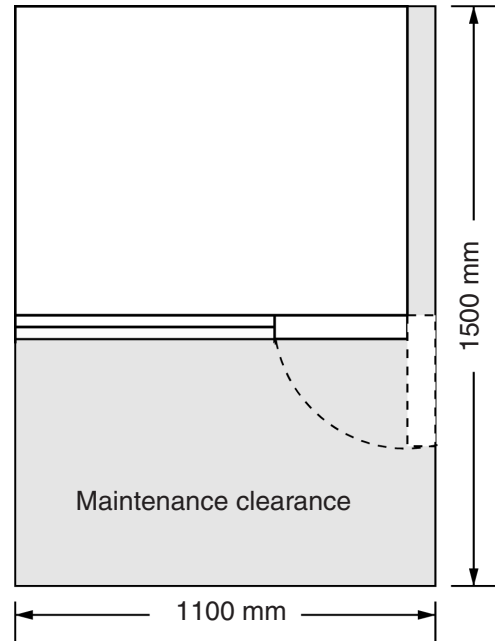


**The unit may not be operated in an explosive atmosphere!**

**Size 1**

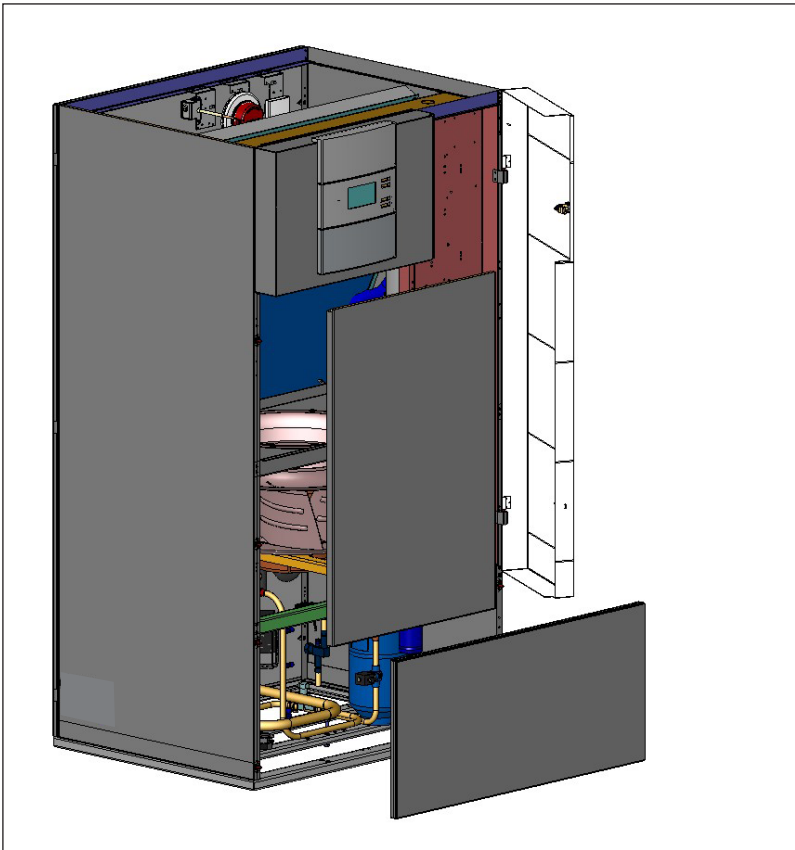


**Size 2**



Air intake area for Downflow units and air outlet area for Upflow units without duct connection

## 6.2 Opening the A/C unit



The A/C unit is opened by opening the electrical compartment door and by removing two front panels

The panel in front of the low temperature section is secured by ball pins and can be removed without auxiliary equipment. To remove the front panel in front of the air section, first open the electrical compartment door using the male triangular wrench provided.

All maintenance measures can be performed from the open front of the A/C unit.

## 6.3 Connection of the piping

### 6.3.1 Refrigerant piping (A units)

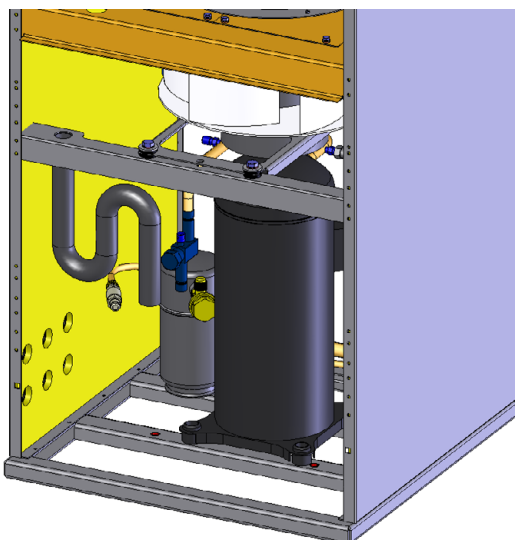
#### 6.3.1.1 Design

To design the piping between the A/C unit and the condenser follow the instructions in chapter "2. Refrigerant piping" of document "General-DX". This document is available in the e-Stulz area.

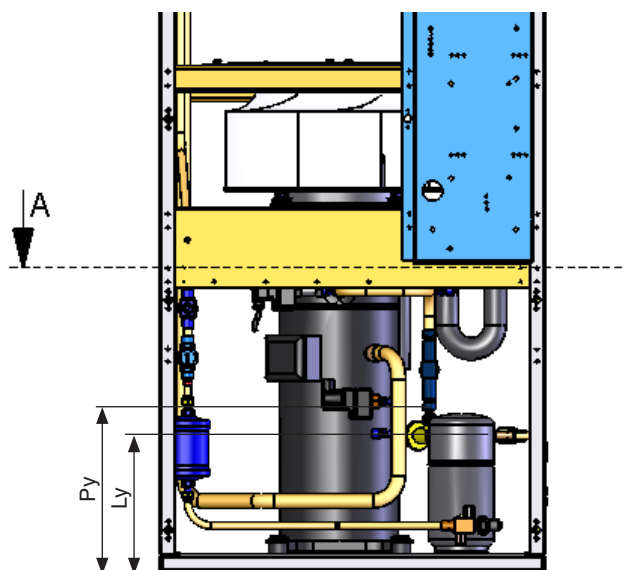
### 6.3.1.2 Position of the refrigerant connections

#### Downflow - CCD 51/71/91/131/151 A

Rear view:



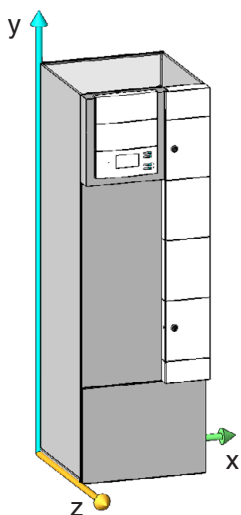
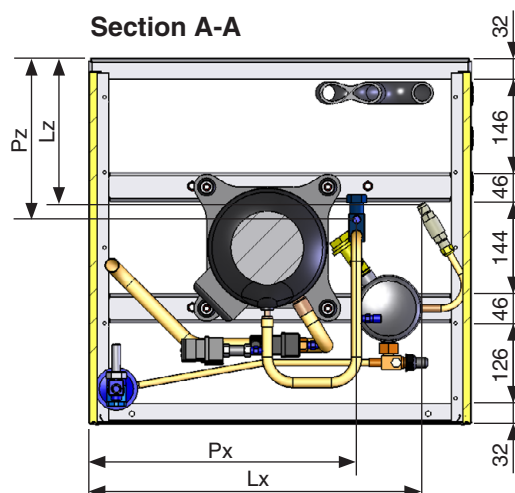
Front view:



#### Refrigerant line connection

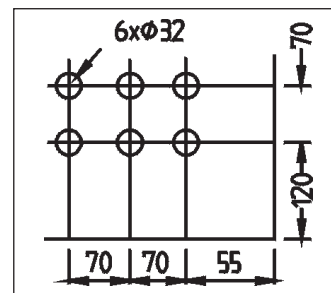
Unit		51	71	91	131	151
Pressure line	mm	12	12	12	16	16
Liquid line	mm	10	10	10	10	10

Unit		51	71	91	131	151
Pressure line	Px	419	419	419	414	401
	Py	224	214	252	266	263
	Pz	247	247	247	248	236
Liquid line	Lx	520	520	520	514	514
	Ly	214	214	214	215	215
	Lz	224	224	224	222	222



The refrigerant connections are located near the compressor and are labelled by the inscriptions "pressure pipe" and "liquid pipe". The lines to be connected have to be soldered.

In general the pipes of downflow units are routed through the raised floor out of the unit. However you can route them through openings in the right side panel. See the position and dimension of the openings in the right drawing. The point of reference is the right, rear corner below.

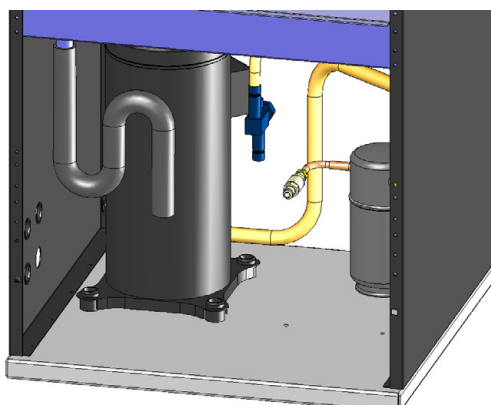


All dimensions in mm.

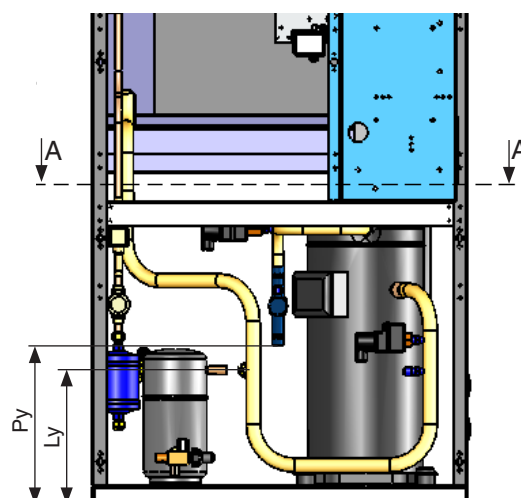


## Upflow - CCU 51/71/91/131/151 A

Rear view:



Front view:

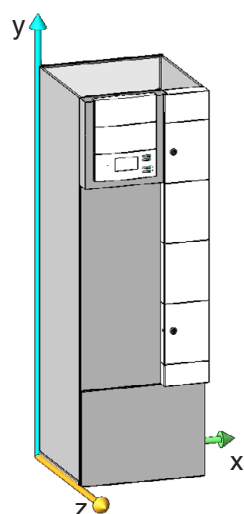
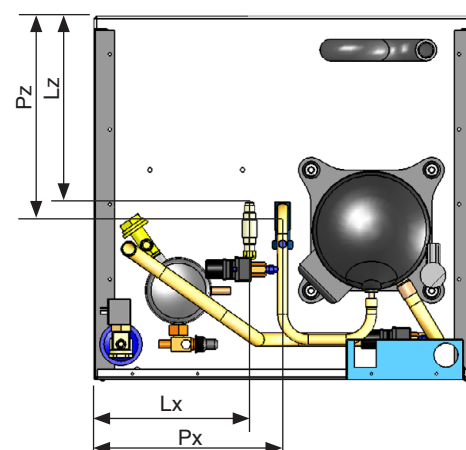


Refrigerant line connection

Unit		51	71	91	131	151
Pressure line	mm	12	12	12	16	16
Liquid line	mm	10	10	10	10	10

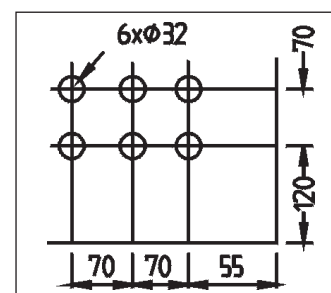
Unit		51	71	91	131	151
Pressure line	Px	296	296	296	293	297
	Py	198	208	235	255	281
	Pz	304	304	304	321	325
Liquid line	Lx	244	244	244	241	245
	Ly	214	214	214	215	215
	Lz	288	288	288	288	288

Section A-A



The refrigerant connections are located near the compressor and are labelled by the inscriptions "pressure pipe" and "liquid pipe". The lines to be connected have to be soldered.

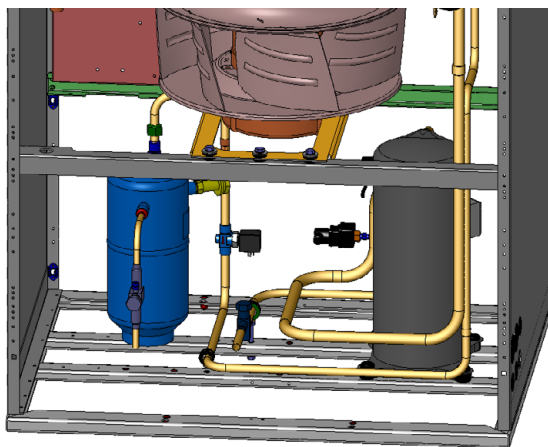
The pipes of upflow units are routed through openings in the right side panel. See the position and dimension of the openings in the right drawing. The point of reference is the right, rear corner below.



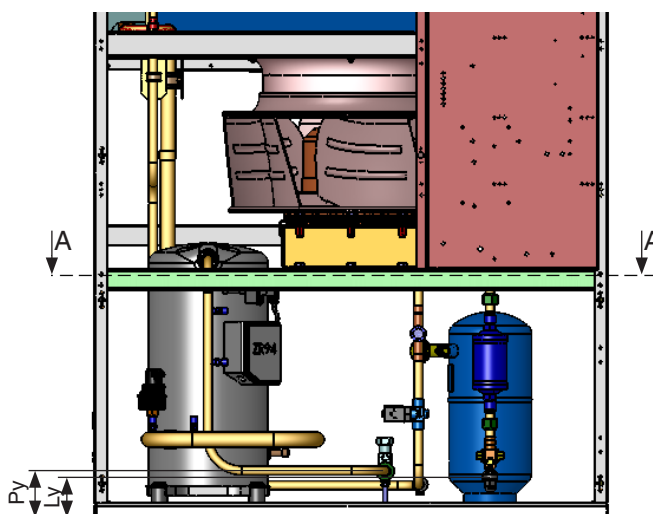
All dimensions in mm.

## Downflow - CCD 181/221/251 A

Rear view:



Front view:

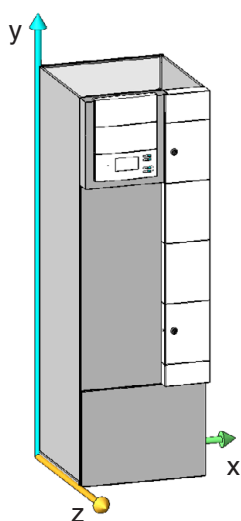
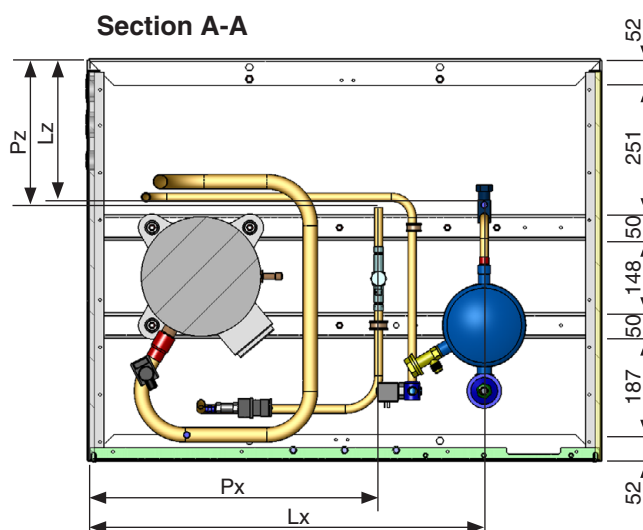


### Refrigerant line connection

Unit		181	221	251
Pressure line	mm	16	16	16
Liquid line	mm	16	16	16

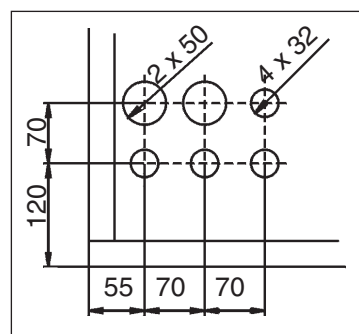
Unit		181 / 221	251
Pressure line	Px	561	566
	Py	115	110
	Pz	222	288
Liquid line	Lx	766	771
	Ly	88	87
	Lz	278	286

Section A-A



The refrigerant connections are located near the compressor and are labelled by the inscriptions "pressure pipe" and "liquid pipe". The lines to be connected have to be soldered.

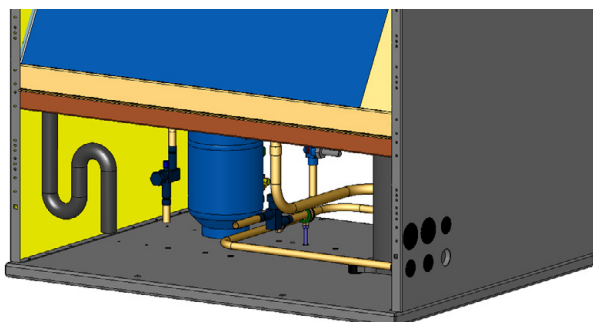
In general the pipes of downflow units are routed through the raised floor out of the unit. However you can route them through openings in the left side panel. See the position and dimension of the openings in the right drawing. The point of reference is the left, rear corner below.



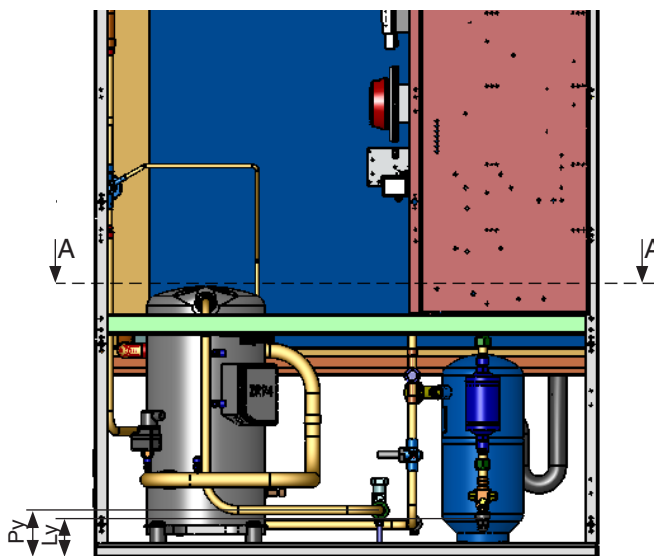
All dimensions in mm.

## Upflow - CCU 181/221/251 A

Rear view:



Front view:

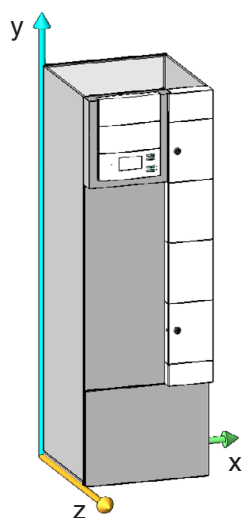
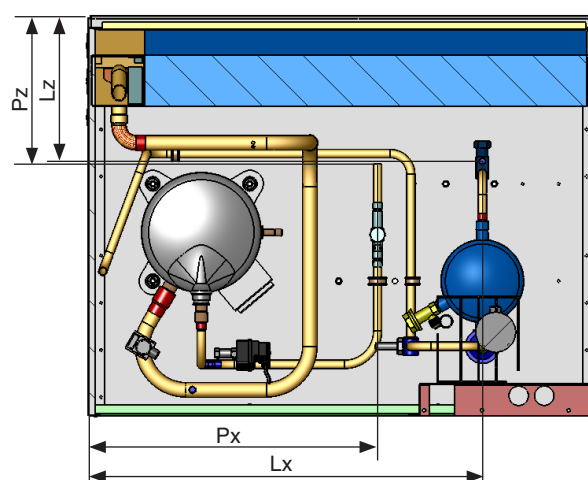


Refrigerant line connection

Unit		181	221	251
Pressure line	mm	16	16	16
Liquid line	mm	16	16	16

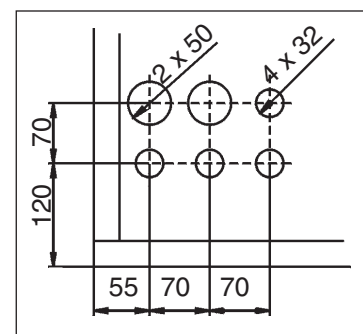
Unit		181 / 221	251
Pressure line	Px	560	560
	Py	119	119
	Pz	235	282
Liquid line	Lx	765	765
	Ly	96	96
	Lz	279	279

Section A-A



The refrigerant connections are located near the compressor and are labelled by the inscriptions "pressure pipe" and "liquid pipe". The lines to be connected have to be soldered.

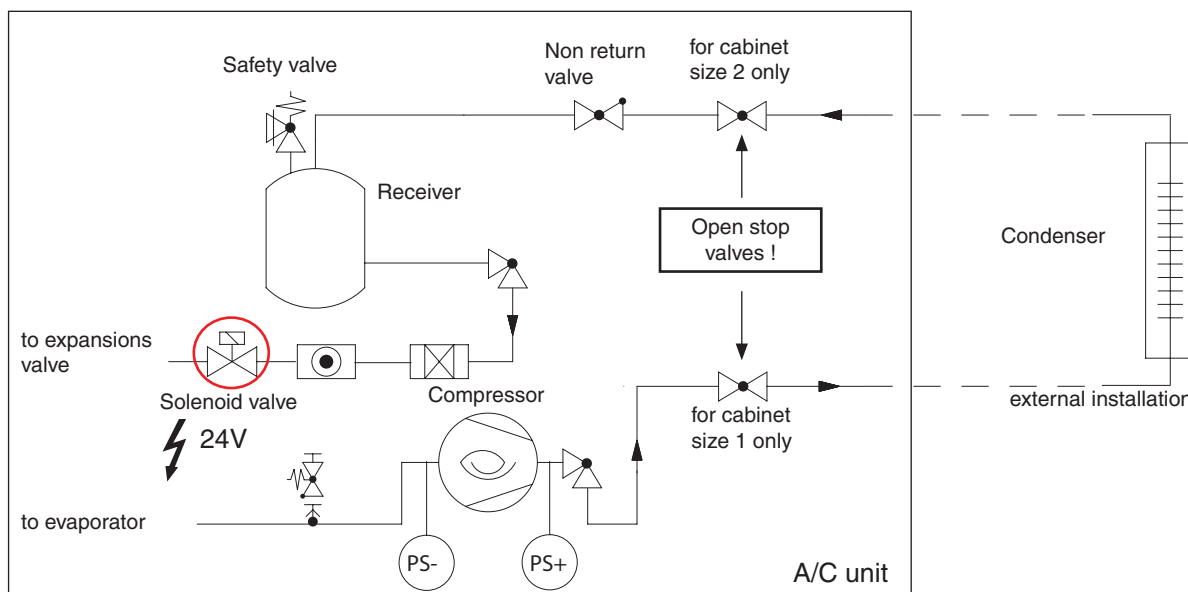
The pipes of upflow units are routed through openings in the left side panel. See the position and dimension of the openings in the right drawing. The point of reference is the left, rear corner below.



All dimensions in mm.

### 6.3.1.3 Filling the refrigerant circuit

1. Solder the pipe ends of the external refrigerant piping coming from the aircooled condenser to the refrigerant pipe connections of the A/C unit.
2. Connect a 24 V AC voltage or a permanent magnet at the solenoid valve in the liquid line in order to open the valve. The closed solenoid valve would hamper an even dispersion of refrigerant during the filling.
3. Open the stop valve and in units of size 2 the Rotalock valve on the pressure side of the compressor.
4. The refrigerant circuit is filled with a nitrogen filling under a pressure of 2.5 to 5.0 bar. Evacuate the refrigerant circuit by the Schrader valves until approximately 0 bar.
5. Fill the refrigerant circuit by the Schrader valves with refrigerant.
6. Disconnect the voltage from the solenoid valve or remove the permanent magnet.



- Systems without refrigerant receiver or sight glass must always be filled according to weight.
- Systems with refrigerant receiver should be filled according to weight but can also be filled by checking the sight glass.



**If you use the refrigerant R407C, please note that R407C is a ternary blend. Take care that you add refrigerant in a liquid state, as the ratio of the refrigerant components changes if one of the three compounds passes over into the gaseous phase.**

- Before the system is filled with refrigerant, it must be clean and dry inside. (Refer to evacuation instructions). Then proceed as follows:

The standing refrigerant bottle is connected to the suction side via a pressure gauge station. The weight is noted shortly before filling. The specified amount of refrigerant is now added when the system is operating. During filling the pressure in the refrigerant bottle will adjust to that of the system. Filling is then no longer necessary.

This can be seen by the icing up of the bottle or by checking the pressure gauge. The bottle valve must then be closed until a pressure increase has taken place which is above the suction pressure of the system. This process can be accelerated if the bottle is wrapped in hot moist towels or it is placed in a water bath at a maximum temperature of 50°C.



**Never heat up the refrigerant bottle with a naked flame as there is a risk of explosion.**

To estimate the required refrigerant charge in advance, consider following volumes:

Components		CC.. 51 - 91 A	CC.. 131 - 151 A	CC.. 181 A	CC.. 221 - 251 A
Evaporator	dm <sup>3</sup>	3,48	4,28	8,42	8,62
Liquid receiver	dm <sup>3</sup>	1,5	1,5	5,3	5,3



## 6.3.2 Water piping

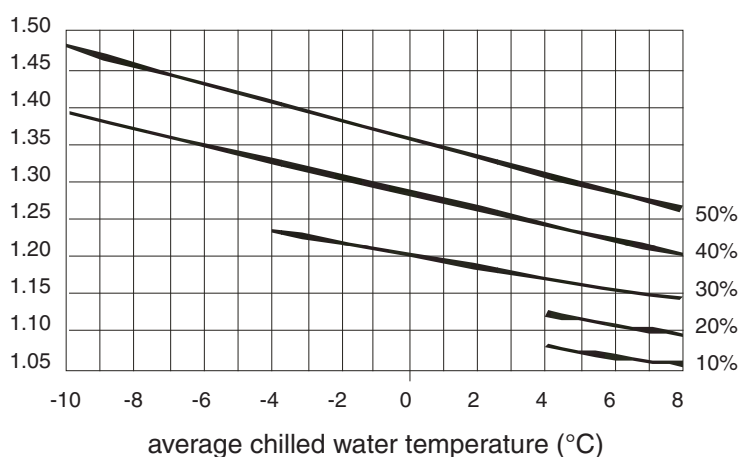
### External water circuit

To seal the water circuit you must connect the unit to a chilled water ring mains, which contains for the generation of cold water either a chiller or a dry cooler or cooling tower. Moreover the water circuit must be provided with a pump and an expansion tank with safety valve to convey the cooling water. If the water quality is insufficient, we recommend the additional installation of a fine mesh strainer.

For an efficient protection against corrosion, the anti-freezing agent is mostly sufficient, which should be used if the water temperature passes under 5°C or if the outside temperature is less than 0°C. We recommend to add the following quantities of ethylenglycol (indicated as percentage of weight of the water quantity) :

water or outside air temperature	ethylenglycol
from +5 to -5°C	10%
from -5 to -10°C	20%
from -10 to -15°C	28%
from -15 to -20°C	35%
from -20 to -25°C	40%

correction coefficient for the pressure drop in the water circuit when using ethylenglycol



### Recommendation for Condenser Water Systems

On new or renovated condenser water systems, ensure that the external pipework is thoroughly flushed, to remove construction debris and other particulate matter, before connecting to the new Stulz cooling units. A strainer should be fitted at the unit inlet, to protect the heat exchangers from fouling and possible blockage.

The strainer should have a mesh size of 0.5 mm. Be aware that any fouling or blockage of the heat exchanger result in a reduced water flow, loss of efficiency, possible damage to the heat exchanger and subsequent unit failure.

For connecting the unit to the external system remove the protective caps from the flanges of the water pipes.



**Water remaining from the test run may escape when the protective caps are removed.**

The water connections are executed in the shape of a screw connection with a soldering connection. Solder the part with the external thread of the connection to the external pipes and screw the lines of the external system to the lines of the unit respecting the designation at the unit.

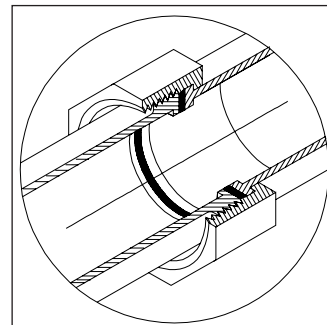


**If any seals are missing, these must only be replaced by glycol-resistant rubber seals.**

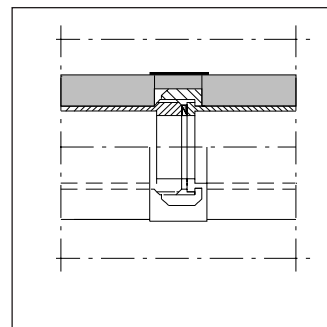
Insulate the water pipes with the insulating material supplied, to prevent the introduction of ambient air heat as well as possible.

Screw the water pipes of the A/C unit together with the local water pipes of the dry-cooler or the chiller.

Fill and bleed air from the cooling water circuit by means of the filling connections and the schrader valves for bleeding (see refrigerant diagram).



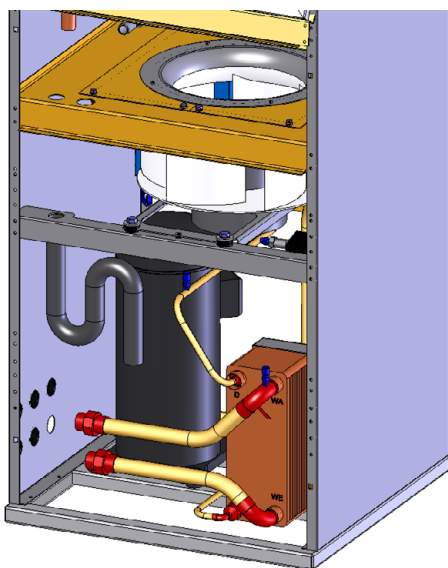
Union screwed connection



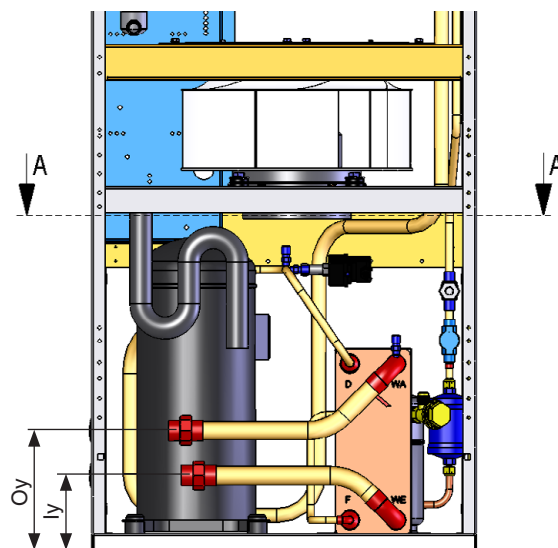
Water pipe insulation

## Downflow/Upflow - CCD/U 51/71/91/131/151 G

Rear view:



Rear view:

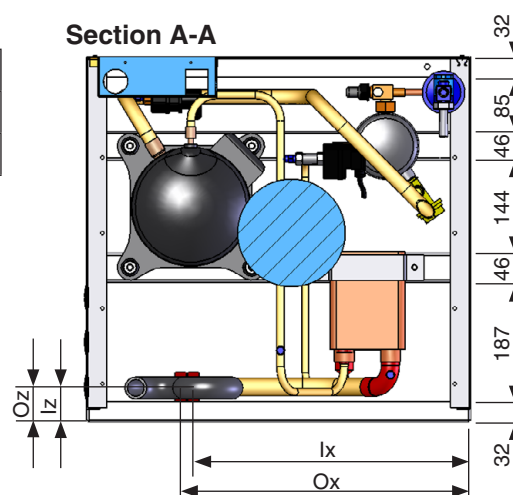


### Water pipe diameters

Unit		51	71	91	131	151
Inlet pipe	mm	28	28	28	28	28
Outlet pipe	mm	28	28	28	28	28

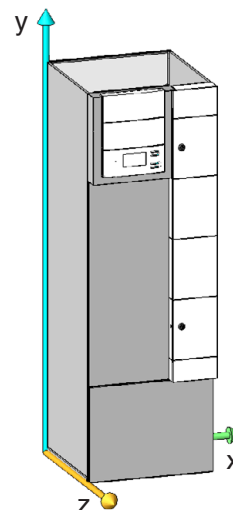
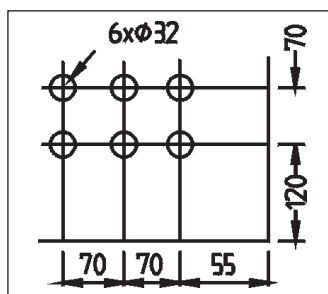
Unit		51	71	91	131	151
<b>Downflow</b>						
Cooling water inlet pipe	lx	441	441	441	456	456
	ly	118	118	118	120	120
	lz	76	76	76	51	76
Cooling water outlet pipe	Ox	461	461	461	476	476
	Oy	189	189	189	190	190
	Oz	76	76	76	51	76
<b>Upflow</b>						
Cooling water inlet pipe	lx	440	440	440	456	456
	ly	121	121	121	122	122
	lz	76	76	76	76	76
Cooling water outlet pipe	Ox	460	460	460	476	476
	Oy	191	191	191	192	192
	Oz	76	76	76	76	76

### Section A-A



All dimensions in mm.

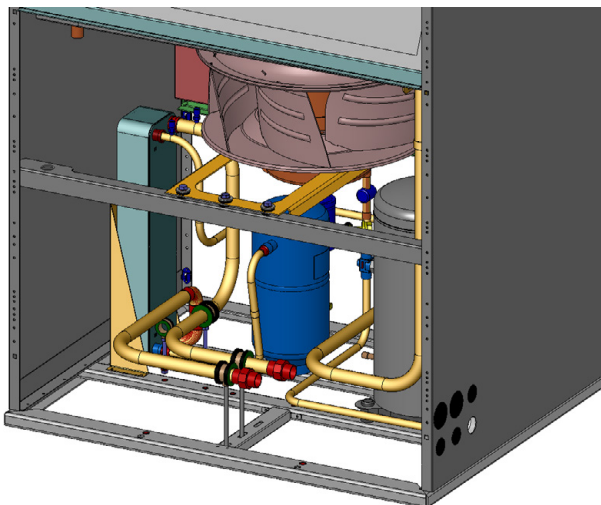
In general the pipes of downflow units are routed through the raised floor out of the unit. However you can route them through openings in the right side panel. See the position and dimension of the openings in the right drawing. The point of reference is the right, rear corner below.



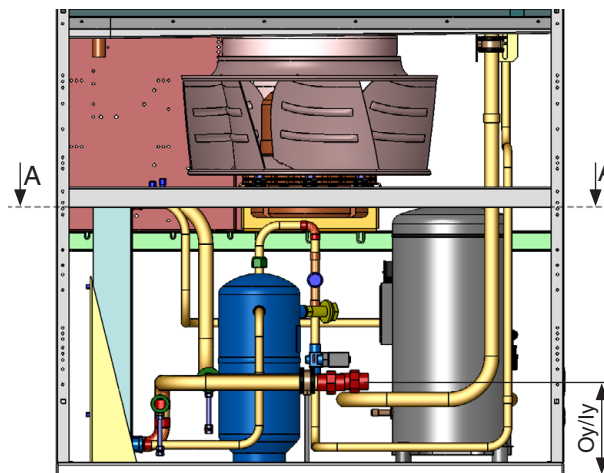
To connect the piping notice the labels on the pipe ends.

## Downflow/Upflow - CCD/U 181/221/251 G

Rear view:



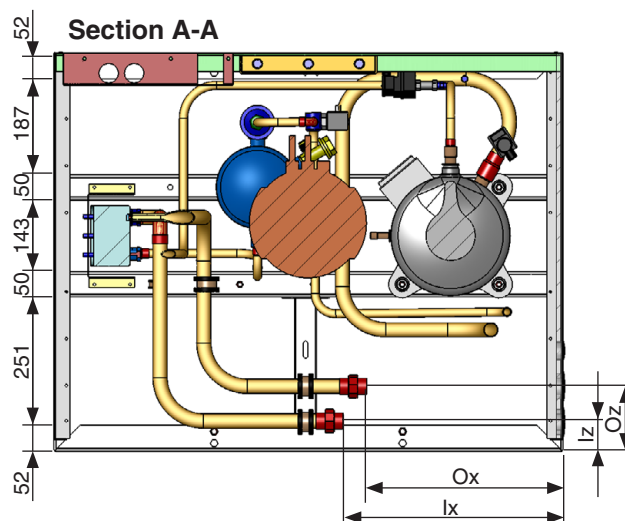
Rear view:



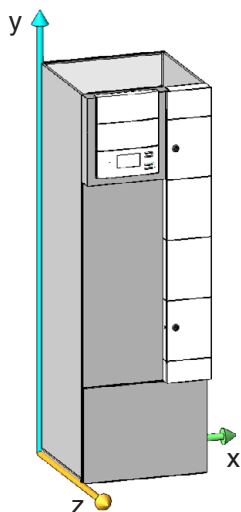
Water pipe diameters

Unit		181	221	251
Inlet pipe	mm	28	28	28
Outlet pipe	mm	28	28	28

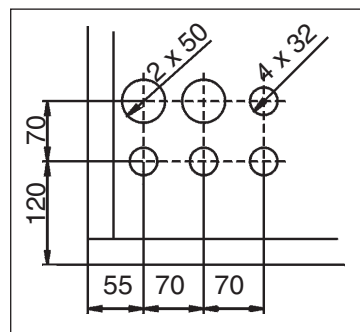
Unit		Downflow		Upflow	
		181/221	251	181/221	251
Cooling water inlet pipe	lx	428	428	416	430
	ly	186	186	190	190
	lz	57	57	53	53
Cooling water outlet pipe	Ox	382	382	370	383
	Oy	186	186	190	190
	Oz	125	125	121	121



All dimensions in mm.



In general the pipes of downflow units are routed through the raised floor out of the unit. However you can route them through openings in the left side panel. See the position and dimension of the openings in the right drawing. The point of reference is the left, rear corner below.



To connect the piping notice the labels on the pipe ends.



### 6.3.3 Condensate drain connection

#### Syphon installation

Ensure that there is a sufficient height difference between the fan pan and the upper bow of the syphon or the highest part of the drain tube, in order to avoid a water column in the drain syphon caused by the pressure in the suction area of the A/C unit, which prevents the draining of the condensate water

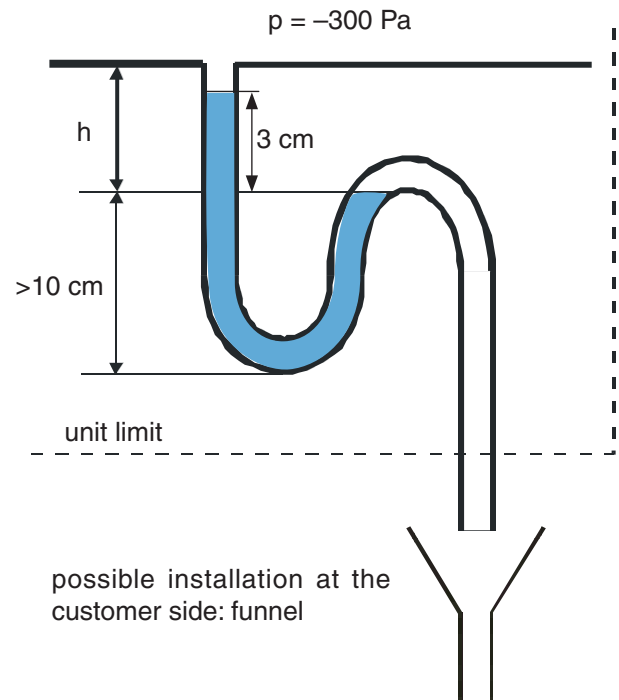
Example: Static pressure in the suction area:  
-300Pa

$$h = p / (\rho \cdot g)$$

$$h = -300\text{Pa} / (1000\text{kg/m}^3 \cdot 10\text{m/s}^2)$$

$$h = -3\text{ cm}$$

If the height  $h$  is smaller than 3 cm with a pressure of 300 Pa in the suction area, a water column rests in the drain, the water is not transported and fills the fan pan. This water can be drawn dropwise in the fan or can drop out of the unit if the pan is full.



Connect the condensate water drains to the local waste water system.

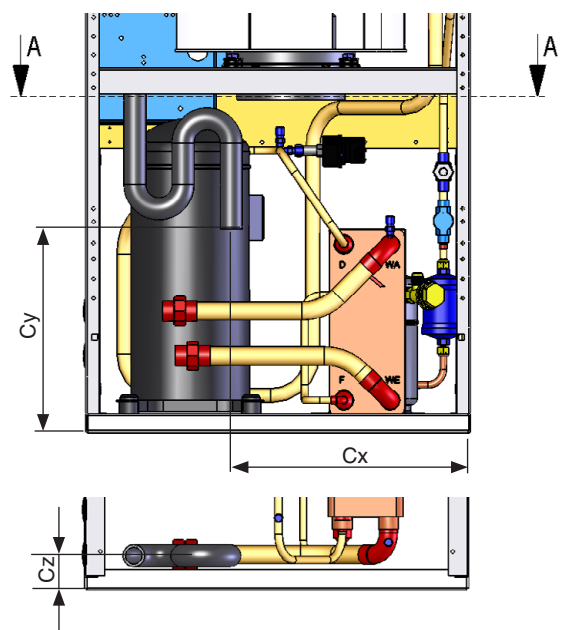


Comply with the regulations of the local water supply authority.

The condensate drain connection is located right backmost.

Unit	Cx	Cy	Cz
CCD 51/71/91/131/151 A/G	368	318	48
CCU 51/71/91/131/151 A/G	369	261	49
CCD 181/221/251 A/G	772	319	52
CCU 181/221/251 A/G	764	114	50

Rear view:



## 6.4 Electrical connection



Ensure that the electric cables are de-energized.

The electric cables are only to be connected by an authorised specialist.

The unit must dispose of an effective earthing.



Do not touch electronic components, without taking care of protective ESD measures.

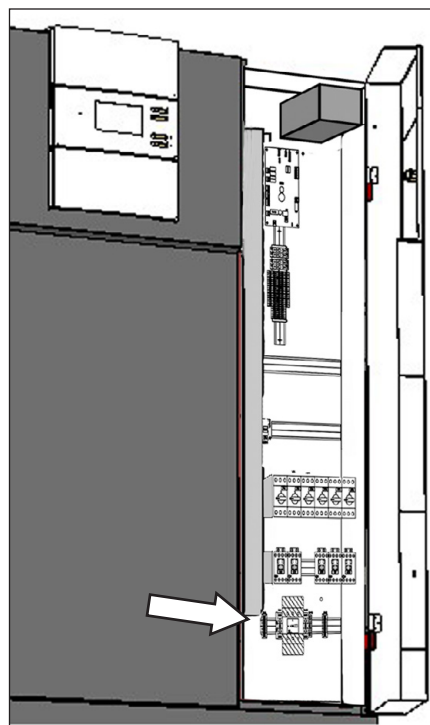
The power supply system on site and the pre-fuses must be designed for the total current of the unit (see technical data).

Route the electric cable into the electrics box from below and connect the three phases to the main switch, the PE conductor at the PE rail and the neutral conductor at the neutral terminal, in accordance with the wiring diagram (part of the unit documents) and secure these cables by the pull relief screw.



Make sure that the phase rotation is correct, the rotating field must turn right !

The scroll compressor is dependent on correct phase rotation. The sense of rotation will be checked at the factory before dispatch. On site, if the rotating field of the compressor is incorrect, it must be corrected by changing two phases of the power supply at the isolator. An inverse rotating field can be detected by a raised compressor noise level and results in overheating and destruction of the compressor after several hours of operation.



Connection of the power supply cable



For use of leakage-current (FI) circuit breakers, EN 50178 5.2.11.2 must be taken into account. Only type B pulse-current FI circuit breakers are permitted. FI circuit breakers do not provide protection against bodily harm during operation of the unit or frequency converters.

Make sure that the power supply corresponds to the indications on the rating plate and that the tolerances according to the "Application limits" are not exceeded.

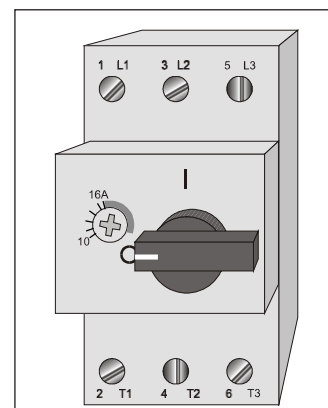
In addition to this, the **asymmetry of phase** between the conductors may amount to **2% maximally**. The asymmetry of phase is determined by measuring the voltage difference between the phase conductors. The average value of the voltage differences may not exceed 8 V.

## 7. Commissioning



The unit must be installed and connected in accordance with the chapter on "installation" before initial commissioning.

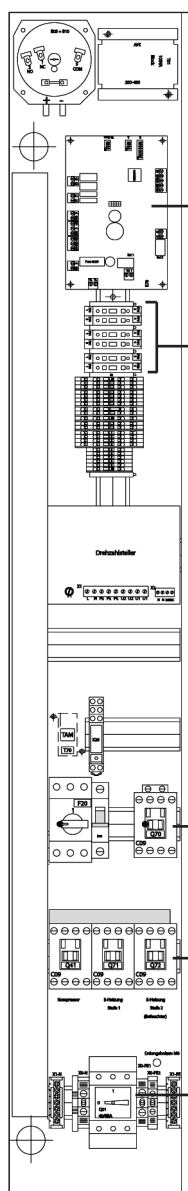
- Make sure that the master switch is off and the unit is de-energized.
- Open the electrical compartment door of the unit using the key provided.
- Check whether all power switches and control-circuit fuses in the electrical section of the unit are switched off.
- Retighten all screw connections in the electric cabinet.
- Verify the smooth function of the contactors.



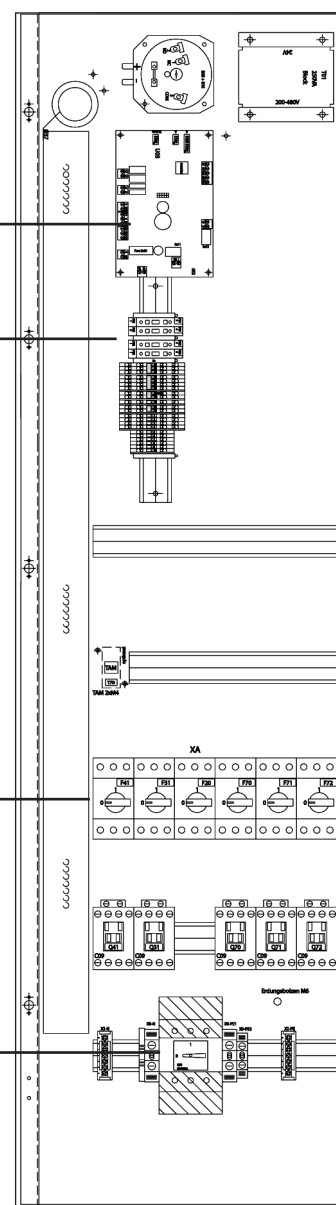
Power switch off

### Electrical compartment

Size 1



Size 2



Humidifier board (optional)

Control circuit fuses

Power switches

Master switch



**Do not turn the adjustment screw beyond the end of the calibrated scale range, as it may result in overheating and short-circuit at the consumer or in the destruction of the power switch.**

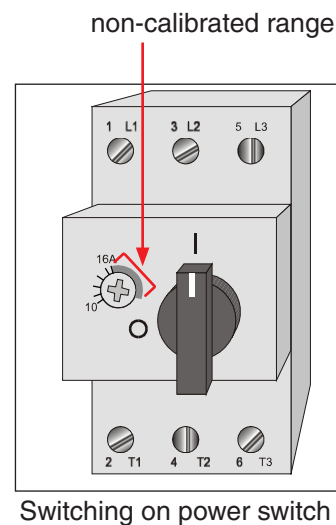
- Adjustment of the power switches according to electrical data sheet.
- Switch on the A/C unit at the master switch.
- Switch on the control-circuit fuses and the power switches of the fan and the compressor in sequence.
- Close the electrical compartment door.

The controller is now supplied with power, so you can use it for adjustments.

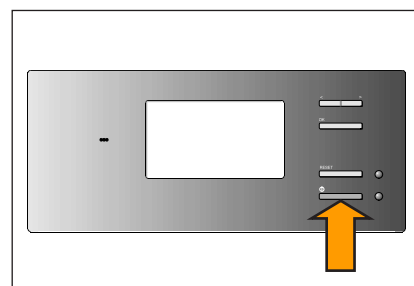
Make sure that the heat rejecting system is operating.

**A** - air-cooled condenser

**G** - dry cooler



- Adjust the desired return air temperature at the controller.
- Start the A/C unit by pressing the Start/Stop-key on the controller.
- Check after 20 minutes operation, whether bubbles are visible in the sight glass of the liquid line. If this is the case, refrigerant might have escaped by a leak. Check the circuit on leaks, eliminate these and top up the circuit with R407C in regard of the chapter "Maintenance".
- Check the oil level at the compressor in respect of the right level.  
The oil level should be between the lower quarter and the middle of the sight glass.
- Check the current consumption of the compressors and the fans comparing it with the values of the technical data.
- Instruct the operational staff of the controller manipulation (refer to the controller manual).



## 8. Maintenance

### 8.1 Safety instructions

All maintenance work is to be carried out under strict compliance with the country-specific accident prevention regulations. In particular we refer to the accident prevention regulations for electrical installations, refrigerating machines and equipment. Non-compliance with the safety instructions can endanger people and the environment. Maintenance work is only to be carried out on the units by authorized and qualified specialist staff.

#### Procedure instructions



Work on the system must always only be carried out when it is shut down. To do this, the unit must be switched off at the controller and at the master switch. A „DO NOT SWITCH ON“ warning sign must be displayed.

Live electrical components are to be switched to de-energized and checked to ensure that they are in the de-energized state.

Some verifications must be effected with the unit in operation (measuring the current, pressures, temperatures). In such a case the unit must only be switched on at the master switch after all mechanical connections have been carried out. The unit must be switched off immediately after the measuring procedure.

#### Warning notes!

**When the master switch is switched on and the controller is stopped the power contactors are live, even if the components are not operating.**

**At the fan contactor, dangerous voltages occur. Do not open the unit within the first 5 minutes after disconnection of all phases. Be sure that the unit is being isolated.**

**The electronics housing can get hot.**

**The fans have an operation delay after the unit is stopped ! (Risk of injury)**

### 8.2 Maintenance intervals

Component	Maintenance interval		
	quarterly	half-yearly	yearly
<b>Refrigerant circuit</b>			
Refrigerant charge		x	
HP/LP switch			x
Sight glass		x	
Compressor			x
Expansion valve		x	
<b>Air circuit</b>			
Heat exchanger			x
Fan			x
Air filter	x		
<b>Water circuit</b>			
Tightness		x	
Condenser			x
<b>Unit in general</b>			
Electrics			x
Mechanics			x



## 8.3 Refrigerant circuit

### Refrigerant charge - Quantity and Purity

**Quantity** - Check the **sight glass** and the **LP switch**.

An insufficient charge causes the formation of bubbles in the sight glass or in extreme cases the triggering of the LP-switch. An operation with an insufficient refrigerant quantity over a longer period leads to a reduction of cooling capacity and to high superheating temperatures, which have a disadvantageous effect on the compressor lifetime.

If a leak is detected:

- let out the refrigerant in a collecting device down to a pressure of 1 bar<sub>absolut</sub>
- connect a vacuum pump via a pressure gauge station on the high and low pressure side
- extract the refrigerant by the vacuum pump (not by the compressor !) to approx. 0 bar<sub>absolut</sub>
- dispose the refrigerant according to the national regulations
- fill the circuit with nitrogen to 1 bar<sub>absolut</sub>
- repair the leak
- the circuit has to be run dry by several (at least 3x) fillings and extractings of nitrogen, eventually change the filter drier.
- fill with R407C according to weight (see technical data)



**R407C must be charged in a liquid state, in order that the composition of the refrigerant does not change.**

**Quantity** - Check the **HP switch**

An overfilling of the circuit makes the condensation pressure rise and by that the power consumption of the compressor. In the extreme the HP-switch triggers.

**Purity** - Check the **sight glass** and the **filter drier**.

Bubbles in the sight glass indicate that the charge is insufficient or that the filter drier is clogged.

A pollution of the filter drier, whose origin task is to clear the refrigerant from impurities and humidity, can be detected by a temperature difference upstream and downstream the filter drier.

Compare the colour indicator in the centre of the sight glass with the outer ring scale.

purple to blue ---> ok.

rose to red ---> humidity critical.

With too much humidity in the circuit, the expansion valve can freeze. In addition to this the ester oil in the compressor, which comes in touch with the refrigerant, takes up humidity and loses its ability to lubricate.

In this case the refrigerant must be completely evacuated and recharged according to the above described evacuation instruction.



Sight glass

## Compressor

In the compressor there is an ester oil charge, which does not have to be renewed under normal operation conditions and holds out for the unit's lifetime. However, it is possible that the ester oil, as it reacts hygroscopically, has taken up humidity of the air after repeated recharging of the refrigerant circuit due to repair works. The interaction between ester oil and water results in the formation of acid. Owing to a hyperacidity, corrosive processes take place inside the compressor. In this case the ester oil should be exchanged.

The oil level can be checked by looking at the sight glass of the compressor.

## Expansion valve

The refrigerant circuit is equipped with a expansion valve, which controls the superheating in the evaporator. The superheating is adjusted to 7 K at the factory and may not be modified. The expansion valve can freeze, if the humidity in the system is excessive.



**Do not thaw by soldering flame, danger of explosion ! Thaw with moist warm cloth. Check the sight glass.**

## 8.4 Air circuit

### Heat exchanger (Evaporator)

The heat exchanger consists of copper tubes with aluminium fins. If refrigerant leaks occur, they should be searched for at the heat exchanger. Beyond that, the heat exchanger is exposed to the air pollution, the particles of which settle at the fins and reduce the heat transmission the same as raise the air resistance. The latter shows when the fan current increases.

The heat exchanger can be cleaned by pressurized air which has to be blown opposite to the normal air flow direction along the fins.



**Do not distort the fins while cleaning, this also increases the air resistance !**

### Fan

The bearings of the fans are lifetime lubricated and do not need maintenance. Check the operation current. An increased operation current indicates a winding short circuit in the fan motor.

### Air filter

A filter monitor controls the state of the filter. As soon as the pressure loss exceeds an adjustable value, a filter alarm via the controller is released. The controller can be configured such as to compensate the pressure loss by a higher fan speed, however you should not wait too long for exchanging the filter. In upflow units the filters can be accessed by the front doors. In downflow units the filter lie on the evaporator and can be accessed from the top.

The clogged filter elements can not be cleaned with pressurized air, as the filter structure would be destroyed otherwise. When you re-install the filter elements after the exchange, take care that the side with the coloured mark (dirt side) is turned away from the heat exchanger.

## 8.5 Water circuit

### Tightness

Check the water circuit visually for tightness. Beyond that a level indication at the storage tank, if existent, can give information about changes of the water quantity. A lack of water in the circuit is replaced by air, which reduces the heat capacity of the chilled water circuit and is detrimental to the pump.

### Condenser (only at G)

Check the water side pollution of the plate condenser by comparing the cooling water inlet temperature to the outlet temperature. If the difference is less than 3 K, it indicates a limited heat transmission and thus pollution.

Another possibility to verify this consists in the comparison of the outlet temperature with the medium condensation temperature (by measuring the condensation pressure at the high pressure side of the compressor). If this difference exceeds 7 K, the condenser is probably polluted.

In this case the condenser has to be cleaned chemically.

## 8.6 Unit in general

### Electrics

Check the connection terminals for tight fixation when the unit is installed and once again after an operation time of 30 days.

### Mechanics

Clean the unit's inside with a vacuum cleaner. Clean pipes simplify the search for leaks. Check the pipes, the compressor and the condenser for a tight seat. Vibrations of pipes and circuit components can result in leaks. Check also the insulation of the water piping. Condensing air humidity on cold water pipes means a loss of cooling capacity.

## 8.7 Competences

Repairs on the refrigerant circuit (tightness, filter drier exchange)	Trained refrigeration technician
Repairs on the main components of the refrigerant circuit (compressor, expansion valve, condenser, evaporator)	Stulz service technician
Repairs on the water circuit (tightness)	Trained service technician
Repairs on the electrics	Trained electrician

## 9. Malfunction

Alarm message	Cause for alarm	Cause	Elimination
C7000: Compressor # error	High pressure switch has triggered or	1. outside temperature too high 2. cooling water temperature too high 3. condenser fan defective. 4. condenser pressure switch adjusted too high. 5. condenser coil soiled. 6. overcharge of refrigerant circuit 7. electric connection of high pressure switch loose. Cable defective. 8. trigger point adjusted too low.	Install bigger condenser. Check drycooler.  Check function. Modify setting.  Clean condenser. Discharge and dispose refrigerant. Check connection and cable.  Check setting of high pressure switch. Press blue release button at HP switch after elimination of error.
	Compressor power interruptor has triggered.	1. compressor motor defective.  2. feeding voltage too low.	Check compressor motor on voltage continuity and current consumption. Check alimentation under load.
C7000: Low pressure # error	Low pressure switch has triggered.	1. condenser pressure switch adjusted too low. 2. Insufficient refrigerant charge 3. electric connection of low pressure switch loose. Cable defective. 4. trigger point adjusted too high.  5. Expansion valve defective. 6. Solenoid valve in liquid line defective.	Modify setting.  Refill refrigerant. Check connection and cable.  Check setting of low pressure switch. Exchange expansion valve. Check electric alimentation with voltage meter.
C7000: Airflow failure	Differential pressure for airflow switch has triggered.	1. Fan motor defective. Fan speed too low.  2. Air filter extremely clogged. 3. Hoses to the airflow monitor dirty or kinked.	Check fan motor on voltage continuity and current consumption. Check if fan is mechanically blocked. Check air filter. Clean hoses and check whether they are kinked.
C7000: Sensor # error	The tolerance to the average value adjustable in the controller has been exceeded.	1. Big difference of measured values in selected zone. 2. sensor defective.	Check room on Hotspots or chilled air zones, moist zones. Check measured value with an external measuring instrument.
C7000: Sensor # defective	The measured voltage/current is outside the range defined in the controller.	1. electrical connection defective. 2. sensor cable defective. 3. sensor defective.	Check connections. Check cable on continuity. Check measured value with external thermometer, hygrometer, pressure gauge.

Depending on the option configured in the controller further alarm messages exist.  
 # stands for a number in case of several components of the same kind.

## 10. Dismantling and disposal

The A/C unit can only be dismantled by qualified specialists.

Switch off the A/C unit at the controller and at the master switch. Switch off power conducting cables to the unit and secure them against being switched on again. Disconnect the A/C unit from the de-energized network.

Dispose of the refrigerant in the unit in accordance with the disposal and safety regulations applicable on site



**The refrigerant may not be discharged into the atmosphere, but must be returned to the manufacturer, if it is not reused.**

**The ester oil in the compressor must also be disposed. As it contains dissolved refrigerant, it can not be disposed like usual oils, but must be returned to the oil manufacturer.**

Disconnect the depressurized refrigerant pipes from the external system (version A).



**If glycol or similar additives had been used, this liquid also has to be collected and disposed in an appropriate manner and may under no circumstances be introduced in the local waste water system.**

Disconnect the unit from the external water circuit by closing the shut-off valves and drain the water circuit of the unit (version G).

Disconnect the depressurized cooling water pipes of the unit from the external system.

Move the unit, as described in the chapter "transport", with a lifting device of sufficient load-carrying capacity.

Dispose of the A/C unit in accordance with the disposal and safety regulations applicable on site. We recommend a recycling company for this. The unit basically contains the raw materials aluminium (heat exchanger), copper (pipelines, wiring), and iron (condenser, panelling, mounting panel).

# 11. Contents of the CE Declaration of Conformity

The undersigned

**STULZ GmbH  
Klimatechnik  
Holsteiner Chaussee 283  
22457 Hamburg**

2016



hereby confirms that the units listed below, in the version marketed by us, fulfil the requirements of the harmonised EC directives and EC safety standards listed below.

In the case of a modification of the equipment not co-ordinated with us this declaration loses its validity.

## Air conditioning unit

### MiniSpace ... A / G

CCD 51 ...	/	CCU 51 ...
CCD 71 ...	/	CCU 71 ...
CCD 91 ...	/	CCU 91 ...
CCD 131 ...	/	CCU 131 ...
CCD 151 ...	/	CCU 151 ...
CCD 181 ...	/	CCU 181 ...
CCD 221 ...	/	CCU 221 ...
CCD 251 ...	/	CCU 251 ...

### EC-Directives

EC machinery directive 2006/42/EC  
EC directive for low voltage 2014/35/EU  
EC EMC directive 2014/30/EU  
RoHS-directive 2011/65/EU  
EC pressure equipment directive 97/23/EC

### Harmonised EN

EN 378 -1, -2, -3, -4  
EN ISO 12100  
EN ISO 13857  
EN 60204 -1  
EN 61000-6-2  
EN 61000-6-4

### National regulation

BGR 500 chapter 2.35  
BGV A3



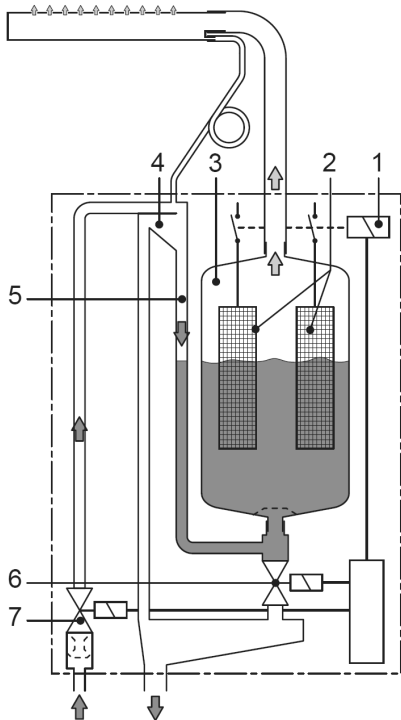


## 12.1 Steam humidifier

The steam humidifier is an optional extra for your A/C unit. It is installed complete and integrated within the function and method of operation of the A/C unit. Details concerning the connection assignment for the power supply can be found in the electrical diagrams in the appendix.

### 12.1.1 Description

The steam humidifier OEM2 is a pressureless steam generator that utilizes an electrode heating and is designed for air humidification via a steam distributor (steam distribution pipe, steam nozzle).



#### Steam generation

Any time steam is requested, the electrodes (2) are supplied with voltage via main contactor (1). Simultaneously, the inlet valve (7) opens and water enters the steam cylinder (3) from the bottom via water cup (4) and supply line (5). As soon as the electrodes come in contact with the water, current begins to flow between the electrodes, eventually heating and evaporating the water. The more the electrode surface is exposed to water, the higher is the current consumption and thus the steam capacity.

Upon reaching the requested steam capacity, the inlet valve closes. If the steam generation decreases below a certain percentage of the required capacity, due to lowering of the water level (e.g. because of the evaporation process or drainage), the inlet valve opens until the required capacity is available again.

If the required steam capacity is lower than the actual output, the inlet valve is closed until the desired capacity is achieved by lowering of the water level (evaporation process).

#### Level monitoring

A sensor provided in the steam cylinder cover detects when the water level gets too high. The moment the sensor comes in contact with water, the inlet valve closes.

#### Drainage

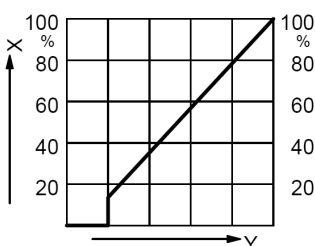
As a result of the evaporation process, the conductivity of the water increases due to an escalating mineral concentration. Eventually, an inadmissibly high current consumption would take place if this concentration process were permitted to continue. To prevent this concentration from reaching a value, unsuitably high for the operation, a certain amount of water is periodically drained from the cylinder and replaced by fresh water.

During the drainage process, the drain valve (6) is opened. Following a pre-determined time of drainage, the drain valve is closed again.

#### On/Off control



#### Proportional control



X = steam capacity in %  
Y = Output signal controller

#### Control

With the ECCM/S control unit either On/Off control or proportional control can be employed for steam production.

Below a minimum controllable steam output, proportional control will work in two-point operation (on/off control).

## Danger that may arise from the unit



### **DANGER! Danger of electric hazard!**

The steam humidifier OEM2 is operated with mains voltage. One may get in touch with live parts when the unit is open. Touching live parts may cause severe injury or danger to life.

**Prevention:** Before carrying out any work set the steam humidifier OEM2 out of operation as described in chapter 12.1.3.5 (switch off the unit, disconnect it from the mains and stop the water supply) and secure the unit against inadvertent power-up.



### **WARNING! Danger of burning!**

The steam humidifier OEM2 produces steam. When producing steam, the steam cylinder inside the humidifier gets very hot (up to 100 °C). If the unit is opened immediately after having produced steam there is danger of burning when touching the steam cylinder.

**Prevention:** Before carrying out any work set the steam humidifier OEM2 out of operation as described in chapter 12.1.3.5, then wait until the steam cylinder has cooled down sufficiently thus preventing danger of burning.

## 12.1.1.1 Technical data

Steam capacity [kg/h]	Nominal power [kW]	Nominal current [A]	Max. current [A]
200 ... 230V / 1N~ / 50 ... 60Hz			
2,0	1,5	7,5 ... 6,5	9,4 ... 8,2
4,0	3,0	15,0 ... 13,0	18,8 ... 16,3
200 ... 230V / 3~ / 50 ... 60Hz			
4,0	3,0	8,7 ... 7,5	10,8 ... 9,4

380 ... 460V / 3~ / 50 ... 60Hz			
4,0	3,0	4,6 ... 3,8	5,7 ... 4,7

Operating conditions	
Admissible water pressure	1 ... 10 bar
Water quality	Drinking water with a conductivity of 125 - 1250µS/cm
Admissible water temperature	1 ... 40 °C
Admissible ambient temperature	1 ... 50 °C (control unit 1 ... 40 °C)
Admissible ambient humidity	max. 75% rh, non-condensing
Adm. back pressure at steam connection	- 0,5 kPa ... 1,0 kPa
Type of protection	IP00
Conformity	produced according VDE regulations 0700 and 0700 part 98
Maximum discharge water flow	0,5 l/min (1,2 l/min for the model with 15 kg/h)



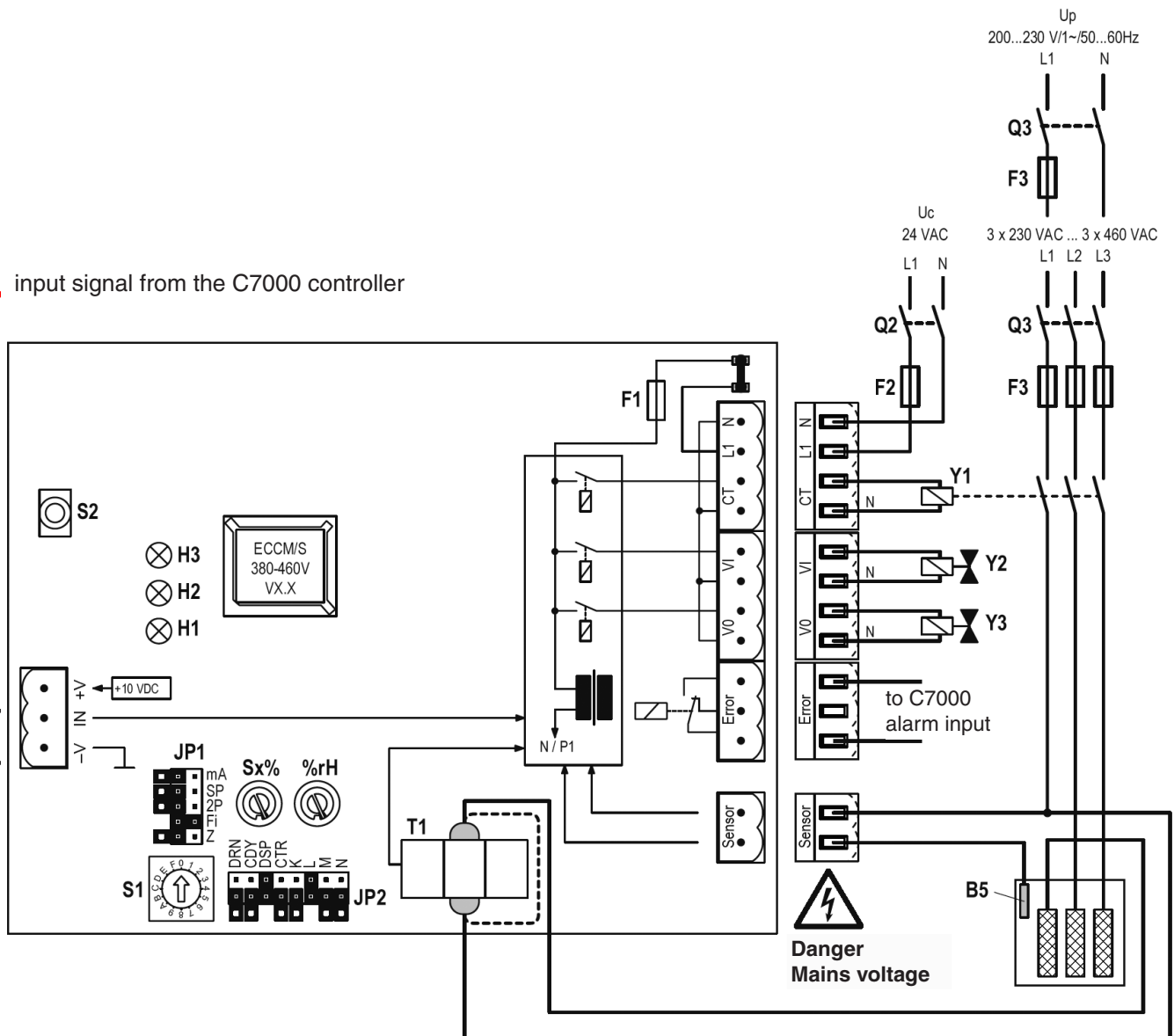
### **Do not treat the water with softeners !**

**This results in corrosion of the electrodes and in the formation of foam with insufficient filling of the steam cylinder.**

A reverse osmosis plant (ROP) can be used to soften water. The water from the ROP has a low conductivity and must be mixed with raw water for evaporation.

### 12.1.1.2 Wiring diagram of the control unit ECCM/S

input signal from the C7000 controller



- B5 Level sensor steam cylinder
- F1 Fuse control board (2 A, time-lag)
- F2/Q2 Automatic fuse control voltage
- F3/Q3 MCB humidifier
- H1 Red LED: Error
- H2 Yellow LED: Service, Warning
- H3 Green LED: Steam production
- JP1 Jumper block 1
- JP2 Jumper block 2

- S1 Rotary switch unit type
- S2 Drain/Info key
- Sx% Potentiometer power limitation
- %rH Potentiometer humidity value
- Y1 Main contactor heating voltage
- Y2 Inlet valve
- Y3 Drain valve
- T1 Current sensor

### 12.1.1.3 Configuration of the control unit ECCM/S

#### Setting the capacity limitation "Sx%"

Use the potentiometer "Sx%" to set the capacity limitation in % of the maximum capacity (setting range: 25...100%, factory setting: 100%).

#### Setting the control signal

With the jumpers on jumper block "JP1" you can set the control signal. The control signal is adjusted on 0-10V, none of the jumpers "mA", "SP", "2P" on jumper block "JP1" may be set for this.

#### General unit settings

With the jumpers on the jumper blocks "JP1" and "JP2" you can set different unit parameters.

Pos.	with jumper	without jumper
<b>Fi</b>	Connection to a mains supply with ground fault circuit interrupter **	Connection to a mains supply without ground fault circuit interrupter
<b>DRN</b>	Increased drain operation factor	Regular drain operation factor **
<b>CDY</b>	Low water conductivity (<125 µS/cm)	Normal water conductivity (≥125 µS/cm) **
<b>DSP</b>	Exchangeable steam cylinder **	Cleanable steam cylinder
<b>K</b>	Fault No. 4 "steam cylinder maintenance due": the unit triggers a warning only (the error switch on the control unit ECCM/S is not activated).	Fault No. 4 "steam cylinder maintenance due": 72 hours after the warning an error is triggered and the unit is switched off (red LED lights). However, the error switch on the control unit ECCM/S is activated already in warning status. **
<b>L</b>	Fault No. 3 "Fill time": a warning is triggered after 20 minutes filling time exceeding. After 220 minutes filling time exceeding an error is triggered and the unit is switched off (red LED lights and the error switch on the control unit ECCM/S is activated). **	Fault No. 3 "Fill time": the unit directly triggers an error after 20 minutes filling time exceeding (red LED lights and the error switch on the control unit ECCM/S is activated). However, the unit is switched off after 220 minutes filling time exceeding.
<b>Z, M, N</b>	no function (spare)	

\*\* Factory settings

#### Setting the rotary switch S1

Power supply	Steam capacity [kg/h]				
	2,0	4,0	8,0	10,0	15,0
200V 1N~	0	0			
208V 1N~	1	1			
220V 1N~	2	2			
230V 1N~	3	3			
200V 3~		4	8	C	
208V 3~		5	9	D	
220V 3~		6	A	E	
230V 3~		7	B	F	
380V 3~		0	4		8
400V 3~		1	5		9
415V 3~		2	6		A
460V 3~		3	7		B

## 12.1.2 Supply connections

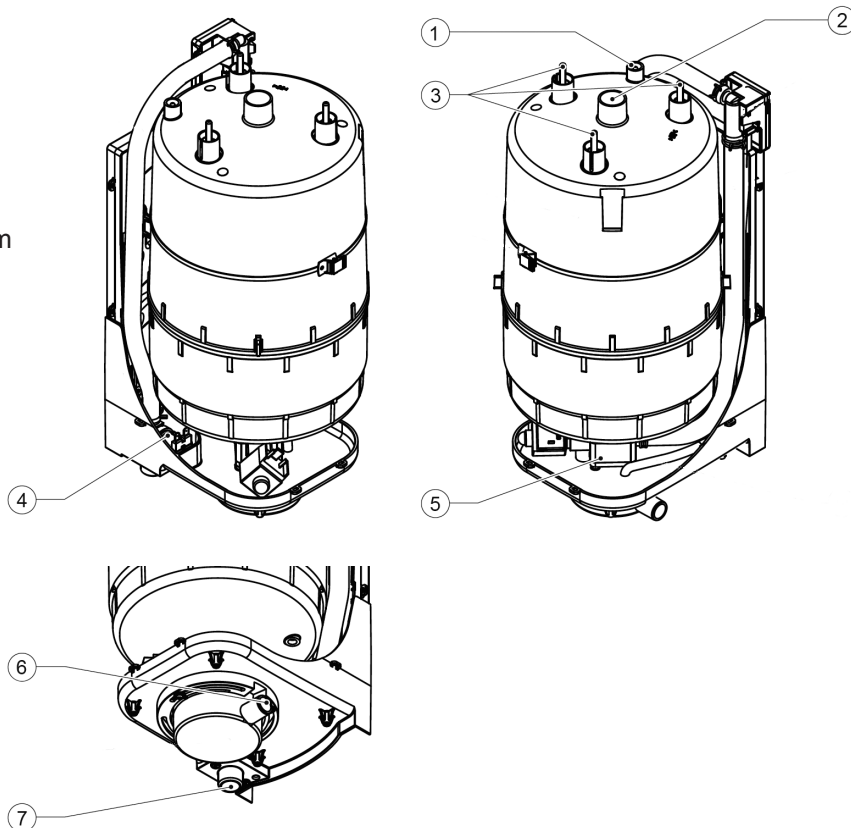
The steam humidifier is installed and electrically connected in the A/C unit. The local regulations of the water supply company are to be complied with when making the hydraulic connection.



**We recommend the installation of an Aqua-stop valve in the water supply of the humidifier. In addition to this, the room, in which the A/C unit with the humidifier is installed, should be equipped with a water detection system.**

### Legend:

- 1 Level sensor
- 2 Steam outlet connector  $\varnothing 22.5 - 30$  mm
- 3 Heating electrodes
- 4 Inlet valve
- 5 Outlet valve
- 6 Drain connector  $\varnothing 30$  mm
- 7 Water supply connector G 3/4"



### Water supply

The water connection at the cold water mains must be equipped with a shut-off valve and must be carried out according to the EU directive 98/83/EC and EN1717. It is recommended to install a filter to retain solid particles of pollution. The humidifier can be connected directly to the mains by a threaded tenon of 3/4" when the water pressure is between 1 and 10 bar. The pipe should have a diameter of at least 6 mm.

If the line pressure is more than 10 bar, the connection must be made via a pressure reducing valve (set to 4-6 bar). In each case it is to be ensured that the manufactured water pipe upstream of the connection to the humidifier is flushed properly. We recommend only using copper pipes. The water supply temperature must not exceed 40°C.

### Water drain

The drain connection has an outside diameter of 30 mm. A plastic hose can be connected to the drain connection which can be routed out of the unit by means of the openings in the unit provided for this purpose.

When creating the drain, attention is to be paid to provision for cleaning.

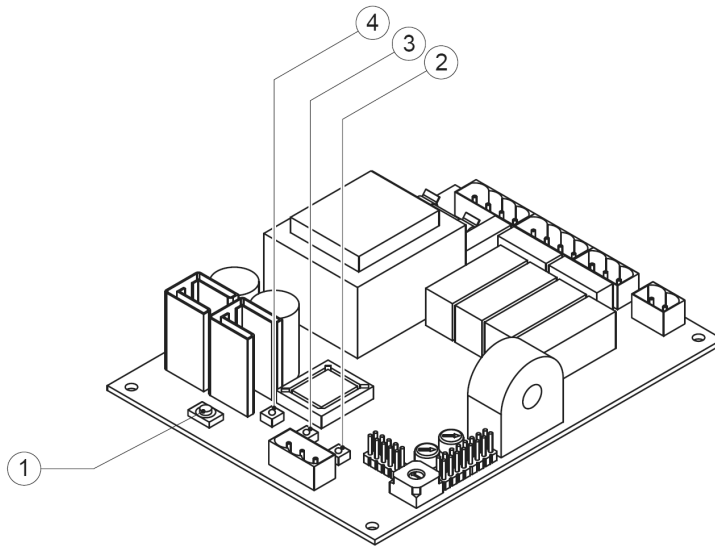
As the water drain is depressurized, we recommend routing the drain hose first into an open collector funnel and then passing through a syphon to the drainage system to ensure free discharge.

The drainage pipe should be routed to the sewerage system with sufficient gradient (at least 5%) and should be located approx. 30 cm below the humidifier. Attention is to be paid to temperature resistance when plastic pipes are used. If copper pipe is used, it must be earthed. For the drainage pipe an inside diameter of at least 30 mm is required.



## 12.1.3 Operation

### 12.1.3.1 Function of the display and operating elements on the control unit ECCM/S



#### 1 Drain/Info key

- press key shortly: opens and closes the drain valve (manual draining).  
**Note:** the drain valve is automatically closed after 10 minutes.
- press key for a extended period of time: activating the info mode

#### 2 Error indication (red LED)

- in normal operating mode  
 The LED lights in case of a malfunction of the unit. Further operation is no longer possible, the heating voltage is interrupted. An alarm signal is sent to the C7000 controller. At the C7000AT the alarm "HUMIDIFIER 1 FAILURE" is displayed.
- in info mode  
 LED blinks in intervals if a malfunction is present. The number of "blinks" per interval indicates the number of the error (see chapter 12.1.4.4).

#### 3 Warning and info indication (yellow LED)

- in normal operating mode
- The LED blinks, if manual draining is in progress.
- The LED lights if the cylinder maintenance is due or the maintenance indication is not reset after the maintenance.
- in info mode  
 LED blinks in intervals if a malfunction with status warning is present. The number of "blinks" per interval indicates the number of the error (see chapter 12.1.4.4).

#### 4 Steam production (green LED)

- in normal operating mode  
 The LED lights if the unit produces steam.
- in info mode  
 LED blinks in intervals. The number of "blinks" per interval multiplied by 10 indicates the current steam output in % (see chapter 12.1.3.3).

### 12.1.3.2 Commissioning

Proceed as follows when putting the unit into operation:

1. Examine the steam humidifier and installation for possible damage.
2. Open the shut-off valve (if existant) in the water supply line.
3. Switch on control fuse and humidifier power switch in electric box. Switch on main switch.
4. Adjust the humidity set value at the C7000 controller. To force humidifer operation for a functional test you can either increase the set value or start the humidifier by the manual operation function of the C7000.

After switching on the control unit ECCM/S carries out a system test, during which all the LEDs on the control unit light up in sequence.

If, after the system test (or during operation) the yellow or red LED lights up, an error has occurred (see information in chapter 12.1.4 "Fault elimination").

After switching on the steam humidifier is ready for operation. As soon as the C7000 controller requires humidity, power is switched on and the green LED lights on the control unit ECCM/S. The inlet valve opens after approx. 60 seconds and the steam cylinder fills with water. The submerged electrodes heat the water up and after a few minutes (approx. 5–10 minutes, depending on the conductivity of the water) steam is produced.

**Note:** If the water has low conductivity, it is possible in the first few hours of operation that the maximum steam output is not achieved. This is normal. As soon as the water reaches adequate conductivity through the vaporization process, the steam humidifier will work at maximum output.

### 12.1.3.3 Function of the LEDs in info mode

The info mode is activated by pressing the drain/info key for an extended period of time (> 3 seconds). In info mode the LED's on the control unit indicate the current operating status of the steam humidifier.

**Note:** The info mode is automatically reset after 15 minutes, or manually by pressing the drain/info key again.

- the green LED blinks. The number of blinks indicates the current steam output in % of the maximum steam capacity:

green LED blinks...	1x	2x	3x	4x	5x	6x	7x	8x	9x	10x
Steam capacity in %	10	20	30	40	50	60	70	80	90	100

### 12.1.3.4 Manual draining

1. Briefly press the drain/info key. The heating voltage is interrupted and the drain valve opens. The yellow LED blinks.

Note: the drain valve closes after 10 minutes automatically

2. To stop the drain cycle briefly press the drain/info key again.

### 12.1.3.5 Taking the unit out of operation

1. If the unit has to be switched off because of a malfunction, please activate the info mode (see chapter 4.4.1) and note the number (number of blinks of the red LED) of the actual error.
2. Close the shut-off valve in the water supply line.
3. Start manual draining and wait until the steam cylinder is empty (approx. 5-10 minutes).
4. Disconnect the steam humidifier from the mains: Switch off the humidifier power switch in the electric box.

### 12.1.4 Fault elimination

**Important!** Most operational malfunctions are not caused by faulty equipment but rather by improper installation or disregarding of planning guidelines. Therefore, a complete fault diagnosis always involves a thorough examination of the entire system. Often, the steam hose connection has not been properly executed, or the fault lies with the humidity control system.

#### 12.1.4.1 Fault indication

LED on control unit ECCM/S		Description
yellow	red	
blinks permanently	—	Drain/info key has been pressed shortly (manual draining in progress)
lights	—	Steam cylinder maintenance due or maintenance indication not reset.
lights	lights	Steam cylinder maintenance not executed or maintenance indication not reset.
—	lights	Fatal malfunction.

If the yellow or red LED lights, press drain/info key (at least 3 seconds) until yellow (“Warning”) or red (“Error”) LED starts blinking intermittently (info mode). The amount of “blinks” per interval indicates the type of malfunction.

– Yellow LED “Warning” blinks intermittently

A malfunction is present. The control unit checks whether there is a temporary problem (e.g. water supply interrupted for a short time) or whether it can resolve the problem by taking necessary measures.

– Red LED “Error” blinks intermittently

The control unit, after several attempts, fails to solve the problem (number of attempts depends on the type of malfunction) or the problem obstructs further operation. In this case the heating voltage is interrupted via the main contactor.

#### 12.1.4.2 Resetting the maintenance indication

After completing maintenance work, the maintenance indication (yellow LED) must be reset as follows:

- De-energize the humidifier board.
- Press drain key and keep pressed.
- Switch on humidifier board.
- Keep drain key pressed until the system test is completed (approx. 10 seconds).

#### 12.1.4.3 Notes on fault elimination



**DANGER! Danger of electric hazard!**

For the elimination of faults set the steam humidifier out of operation as described in chapter 12.1.3.5, separate the unit from the mains (test with voltage tester) and secure it against inadvertent power-up.



**Do not touch electronical components, without taking care of protective ESD measures.**

### 12.1.4.4 Malfunction lists

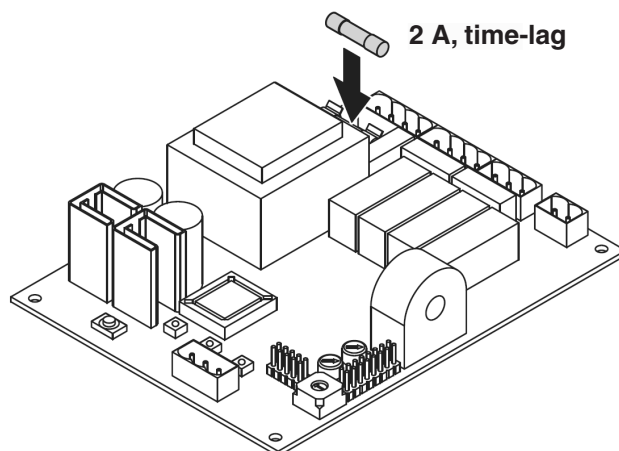
“Warning” yellow LED blinks	“Error” red LED blinks	Cause	Remedy
1x Control board defective	---	Control board defective	Please contact your unit supplier.
2x Max. filling level of steam cylinder reached	---	Water conductivity too low (after initial operation). Water conductivity too low for type of steam cylinder. Phase failure heating voltage.	Wait.  Select correct steam cylinder type. Check mains fuse(s) and replace if applicable.
3x Permissible filling time exceeded for more than 20 minutes (first automatic cleaning cycle)	3x Permissible filling time exceeded for more than 220 minutes.	Phase failure heating voltage.  Water supply obstructed, water pressure too low, inlet valve defective.  Excessive steam back pressure, causing water loss via filling cup. Drain valve is leaking.	Check mains fuse(s) and replace if applicable. Open shut-off valve in the water supply pipe, clean water inlet filter, check water pressure, inspect/replace inlet valve. Inspect steam installation.  Clean/replace drain valve.
<b>Note:</b> if the Jumper “L” is removed from the ECCM/S control unit, the unit automatically triggers an error without prior warning if the admissible filling time has been exceeded for more than 20 minutes (red LED lights and the error switch on the control unit ECCM/S is activated). However the unit switches off after 220 minutes of filling time exceeding (see chapter 12.1.1.3).			
4x Steam cylinder needs servicing	4x Interval for steam cylinder service exceeded for more than 72 hours	Interval for steam cylinder service exceeded. Mineral deposits and/or electrodes spent.	Replace steam cylinder type A, clean steam cylinder type D (see chapter 5, humidifier service manual). <b>Important!</b> Refer to chapter 12.1.4.2 for resetting the maintenance indicator.
<b>Note:</b> if the Jumper “K” is installed on the ECCM/S control unit, the unit remains in warning status even if the interval time has been exceeded for more than 72 hours. No error is triggered (red LED does not light) and the error switch on the control unit ECCM/S is not activated (see chapter 12.1.1.3).			
6x Electrode current too high	6x Electrode current too high	Steam cylinder (electrodes) defective. Faulty auto-drain function. Faulty drain valve/coil. Steam cylinder outlet obstructed. Water conductivity too high for type of steam cylinder.	Replace steam cylinder or electrodes. Inspect installation/control system. Replace drain valve/coil. Clean/replace steam cylinder. Select correct steam cylinder type.
7x Foam detection in the steam cylinder	7x Foam control impossible	Formation of foam in steam cylinder.	Empty/flush steam cylinder. Set jumper on “DRN” (see chapter 12.1.1.3).
---	8x Main contactor jammed	Main contactor jammed in activated position.	Check/replace main contactor.
9x Drain valve blocked	9x Drain valve blocked	Drain valve blocked or defective. Steam cylinder outlet blocked.	Clean/replace drain valve. Clean steam cylinder outlet.
---	10x Rotary switch in wrong position	Rotary switch on control unit ECCM/S is set to an invalid position.	Set rotary switch on control unit ECCM/S to the position for the corresponding steam cylinder type (see chapter 12.1.1.3).

### 12.1.4.5 Replacement of fine-wire fuse on the control unit ECCM/S

If the fine-wire fuse on the control unit ECCM/S blows this is usually due to a faulty coil of the inlet or drain valve or the main contactor. Therefore you should test these components before replacing the fuse.

To replace the fine-wire fuse proceed as follows:

1. Set the steam humidifier OEM2 out of operation as described in chapter 12.1.3.5, separate the unit from the mains and secure it against unintentional switching on. Take care that the electricity supply to the control unit ECCM/S is disconnected (check with voltage tester).
2. Replace fine-wire fuse (see figure below) with a fuse of the given type with the specified nominal current rating.



**CAUTION!**

It is not permitted to use repaired fuses or to short-circuit the fuse holder.

### 12.1.4.6 Resetting fault indication (red LED lights in normal operating mode)

To reset the error indication:

Disconnect the steam air humidifier from the mains. Wait approx. 5 seconds, then reconnect the unit to the mains.

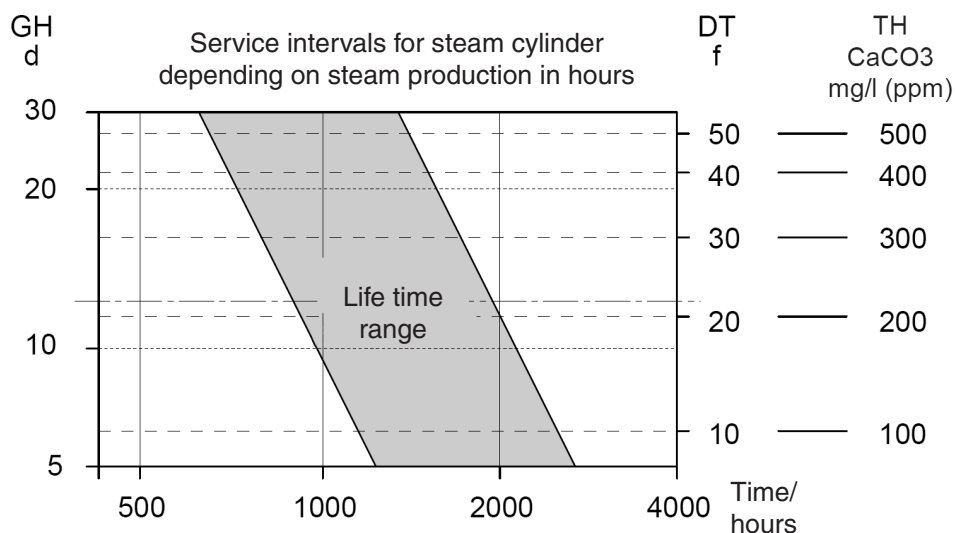
**Note:** If the fault has not been eliminated, the error indication reappears after a short while.

## 12.1.5 Maintenance

You find a detailed description of the maintenance procedures in chapter 5 of the humidifier service manual. This manual is available on the website [www.stulz.com](http://www.stulz.com) in the e-Stulz area under „Downloads/Precision A/C“ as a pdf document.

Here you can only see a diagram, which shows the average life cycle of a steam cylinder in dependence of the runtime and the total hardness.

The humidifier runtime can be read in the Info menu of the C7000AT or by the command "humi h" in the C7000.



GH: Gesamthärte  
DT: Dureté totale  
TH: Total hardness

## 12.2 Reheat

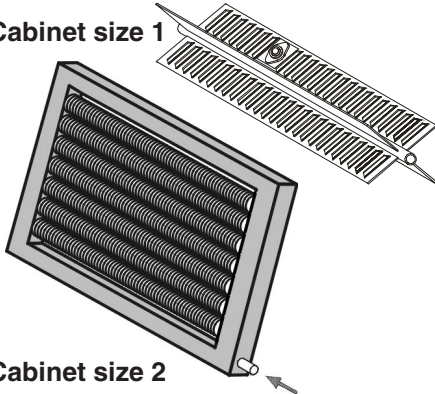
The reheat is an optional extra for your A/C unit. It is installed complete and integrated in the function and method of operation of the A/C unit. It is used to heat up the air. The following versions of the heater are available:

- Electrical reheat
- Hot water reheat (HW)
- Hotgas reheat (HG)

### Description

#### Electrical reheat

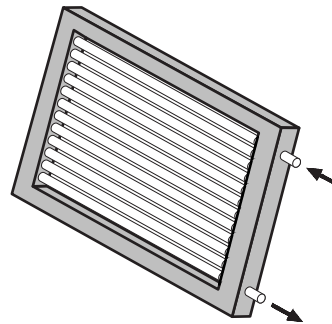
##### Cabinet size 1



##### Cabinet size 2

The reheat is connected in accordance with the electric diagram. It is controlled and monitored by the controller. The values for switching on and off are adjusted in the "operate/components/heating" menu on the controller. Refer to the operating instructions C7000. C1002: menu item 12-14 (E, F, H) C6000: Control/module functions/Heating/E-heating

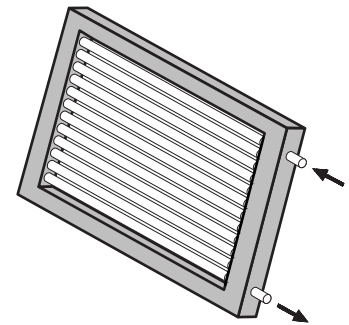
#### HW reheat



The HW reheat is to be connected to an external hot water circuit. The water supply is controlled via an electrically actuated HW valve. The HW valve is controlled via the controller. The control parameters are adjusted in the "operate/components/heating/HWR valve" menu on the controller. Refer to the operating instructions C7000.

C1002: menu item 12-14 (E, F, H)  
C6000: Control/module functions/Heating/HWR-valve

#### HG reheat



The hotgas reheat is integrated in the refrigerant circuit in accordance with the refrigerant diagram in the appendix. The refrigerant supply is controlled via an electrically-actuated 3-way solenoid valve. The solenoid valve is controlled via the controller. The control parameters are adjusted in the "operate/components/heating" menu on the controller. Refer to the operating instructions C7000.

C1002: menu item 12-14 (E, F, H)

### Operation

The reheat is controlled and monitored by the controller. No further measures are required for operation.

### Maintenance

Clean the reheat annually from contaminations and check it for damage.



## Installation

The reheats are installed and connected in the A/C unit. The HW reheat is to be connected on site to the external hot water circuit. The pipelines are to be routed out of the A/C unit. The diameters for the connection piping of the HW reheat are listed in the following table.

### Temperatures:

Water inlet: 60°C

Water outlet: 40°C

Air inlet: 13°C

Glycol: 0%

Cabinet size		1	2
Pipe - Ø	mm	22	22

## Commissioning

The reheats are controlled and monitored by the controller of your A/C unit. No further measures are required for commissioning.

## Malfunction causes

### Alarm: Reheat defect

All reheat alarms are received by the controller and can be requested according to the equipment.

C7000-control system: no display (display only externally)

C7000 advanced terminal: indication on the display

C1002: display: HEA

## 12.3 Air Circuit Options

### EU5 filter (only for size 2)

The EU5 filter is used instead of the standard EU4 filter and cuts down on air contamination to a greater extent.

### Condensate pump

The condensate pump is delivered loose.

The type of pump depends on the A/C unit equipment.

without steam humidifier: condensate pump type AB-1 F/M, March

with steam humidifier: condensate pump type A2-SA, Milton Roy Hartell

The condensate pump extracts the condensate water occurring in the condensate water tray and pumps it into the local sewage system. The condensate water tray is located beneath the filter elements in the A/C unit. The pump is provided with an integral float switch. The float switch switches the pump on and off automatically.

Connect the 6 m long drain hose (6 mm diameter) to the local sewage system.

Connect the pump in accordance with the terminal diagram.



**When routing the drain line, ensure that it is not kinked.**

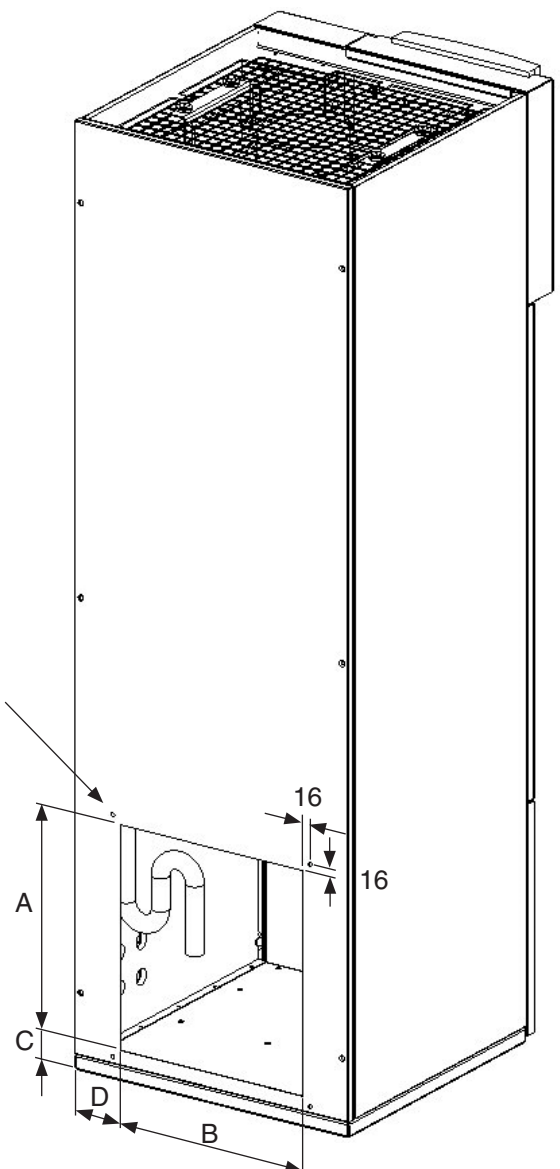
### Return air suction from behind - Upflow

#### Dimensions

CCU	A	B	C	D
Construct. size 1	440	400	80	100
Construct. size 2	300	900	77	50

At the return air suction from behind the air duct has to be fixed at the back with M8 screws. In this case the standard filter can not be used. A special filter has to be installed in the air duct, instead.

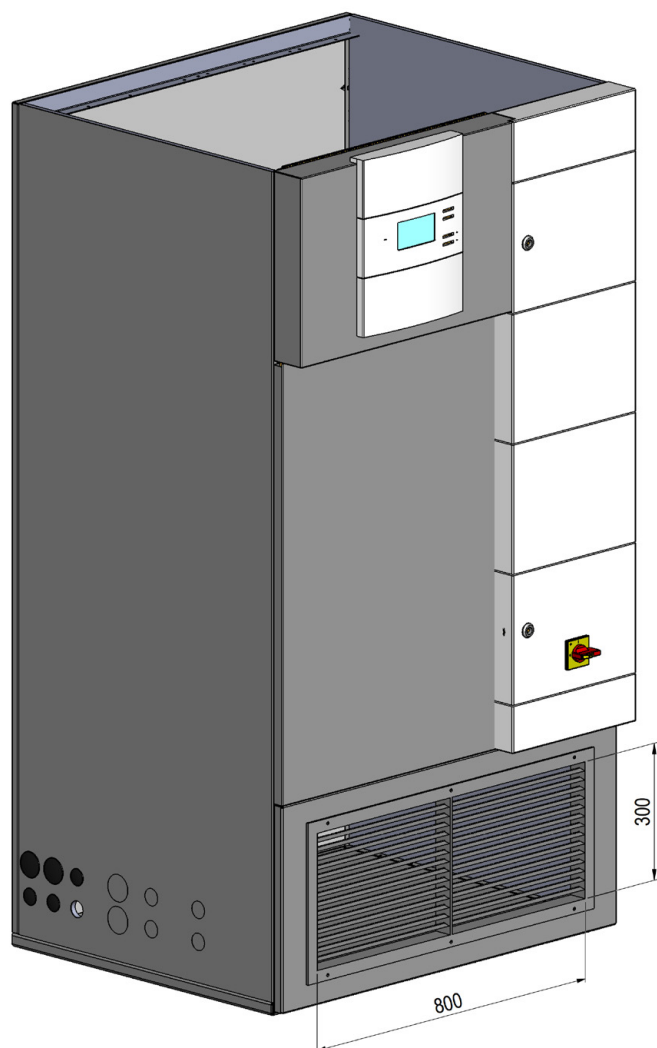
4xM8-nut set up from outside



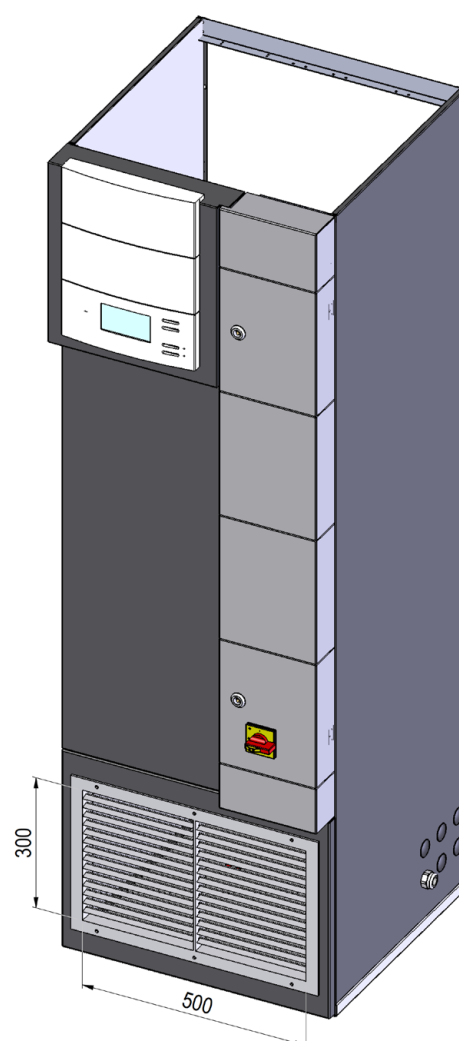
## Air discharge to the front - Downflow

The A/C unit features a closed unit bottom and a grille with horizontal fins in the lower section of the front. The fins can be manually adjusted so that the discharge angle of the supply air can be influenced.

**Size 2:**



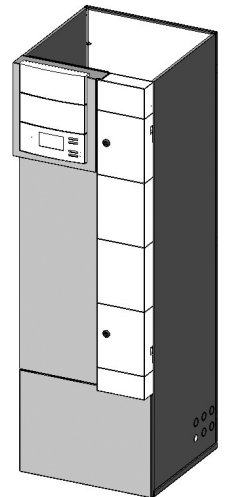
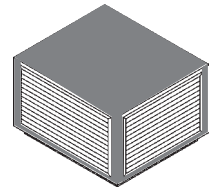
**Size 1:**



Air discharge zone, keep clear

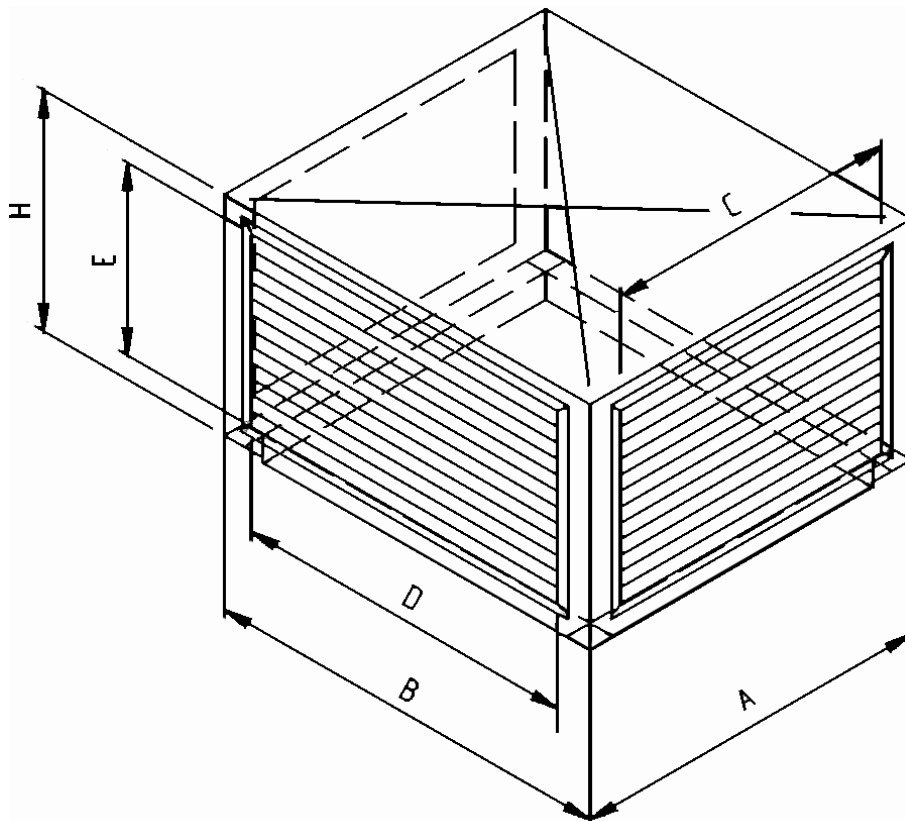
## Air discharge plenum - Upflow

The air discharge plenum is set on the A/C unit without being screwed.



### Dimensions

CCU	A	B	C	D	E	H
Construct. size 1	572	600	425	525	325	500
Construct. size 2	782	1000	625	825	425	500



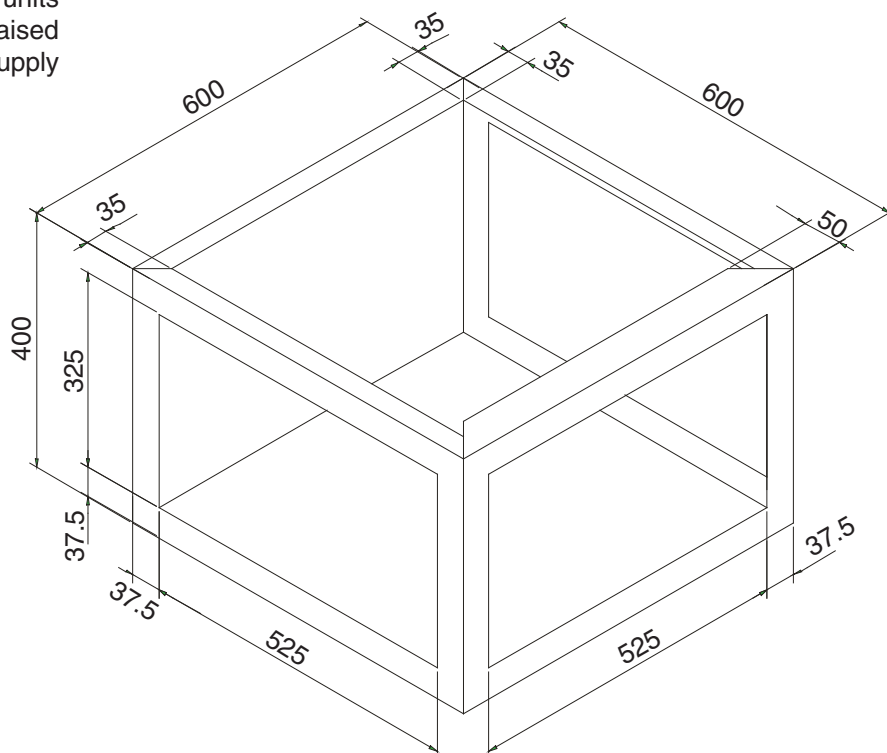
## Unit base for air discharge

The unit base is designed for downflow units which are installed in rooms without a raised floor and serves for the discharge of the supply air. With upflow units this unit base serves for the return air suction. The room air to be cooled is sucked in through the air grilles, which are not shown in the illustration.

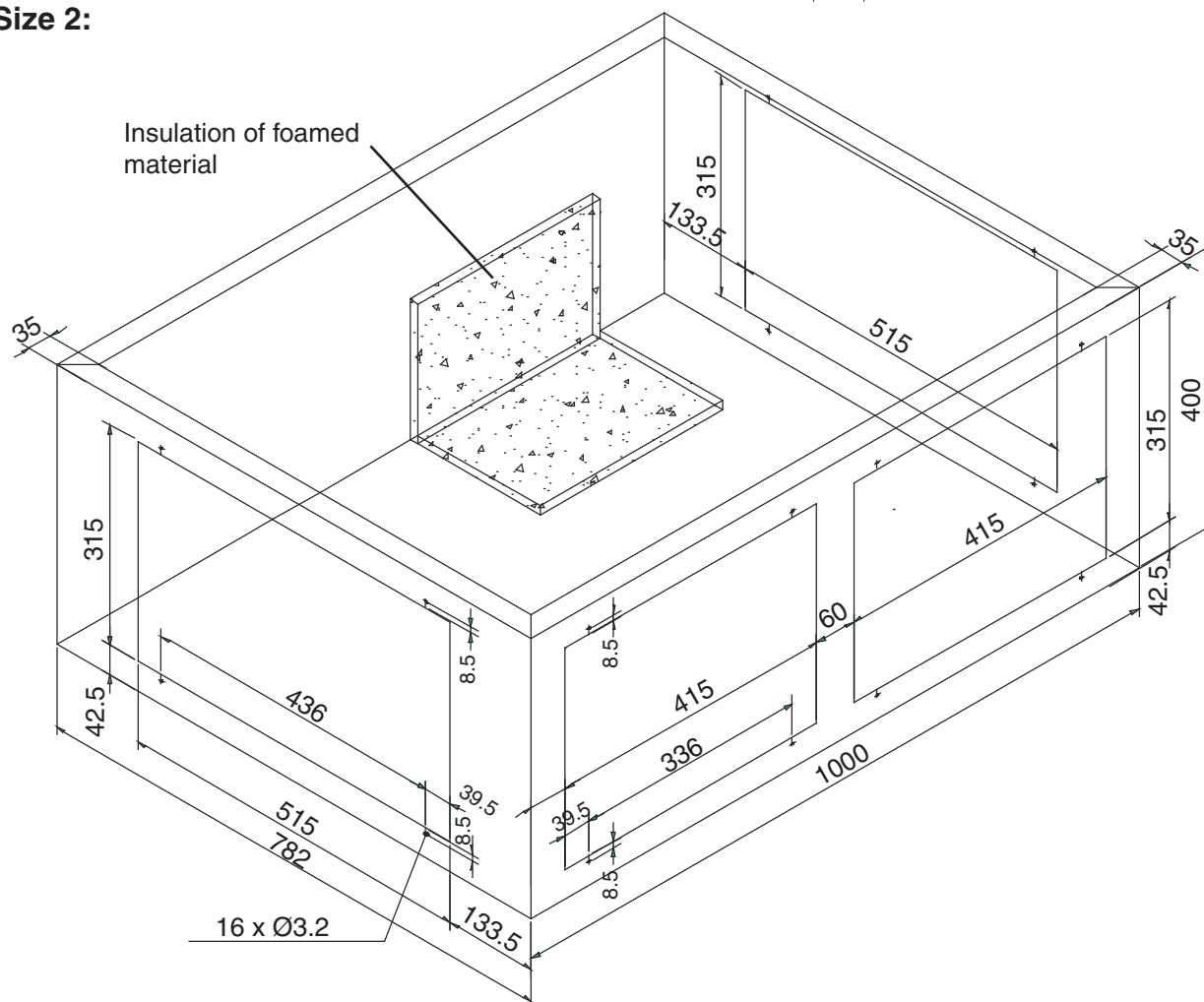
## Installation

Please note that the unit base has to be bolted to the unit.

**Size 1:**



**Size 2:**

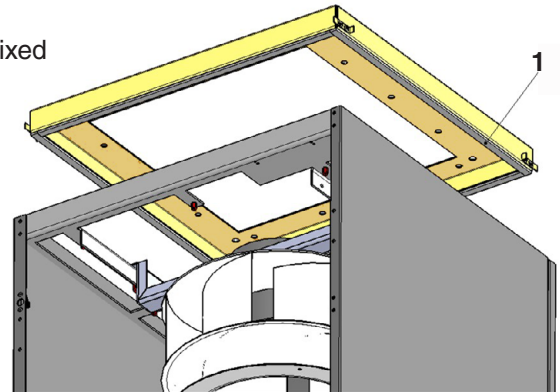
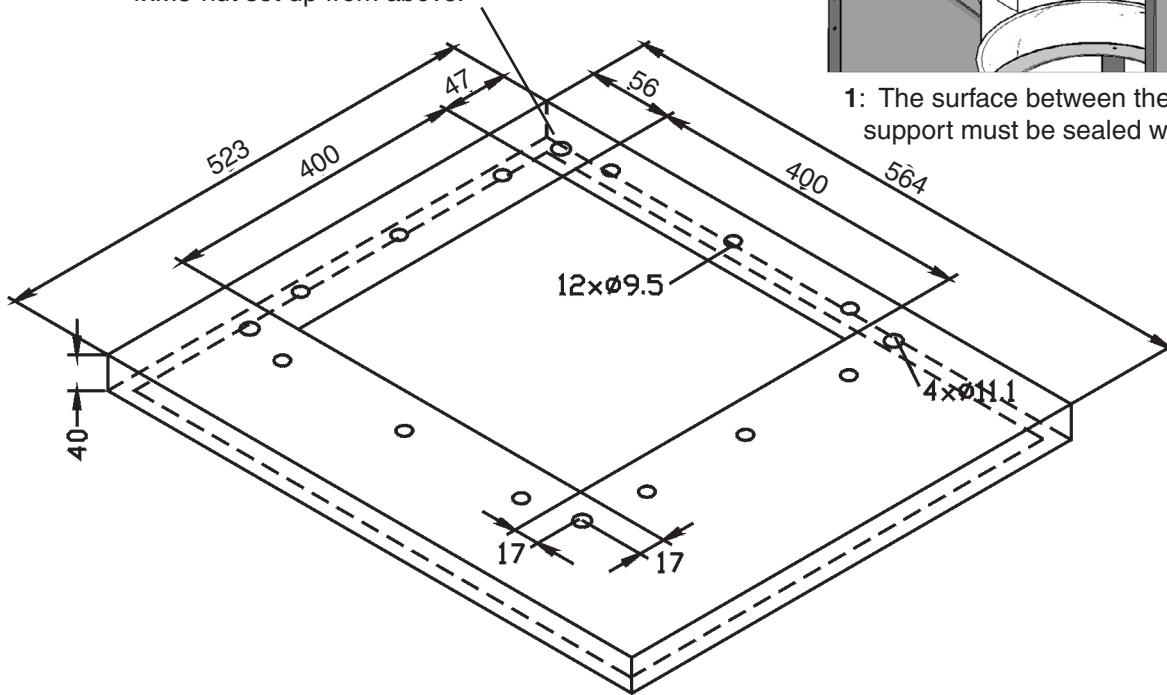


## Base for duct connection and air damper - Upflow

The base is set on the A/C unit without being screwed. The duct is fixed on the base with 4 M8 screws.

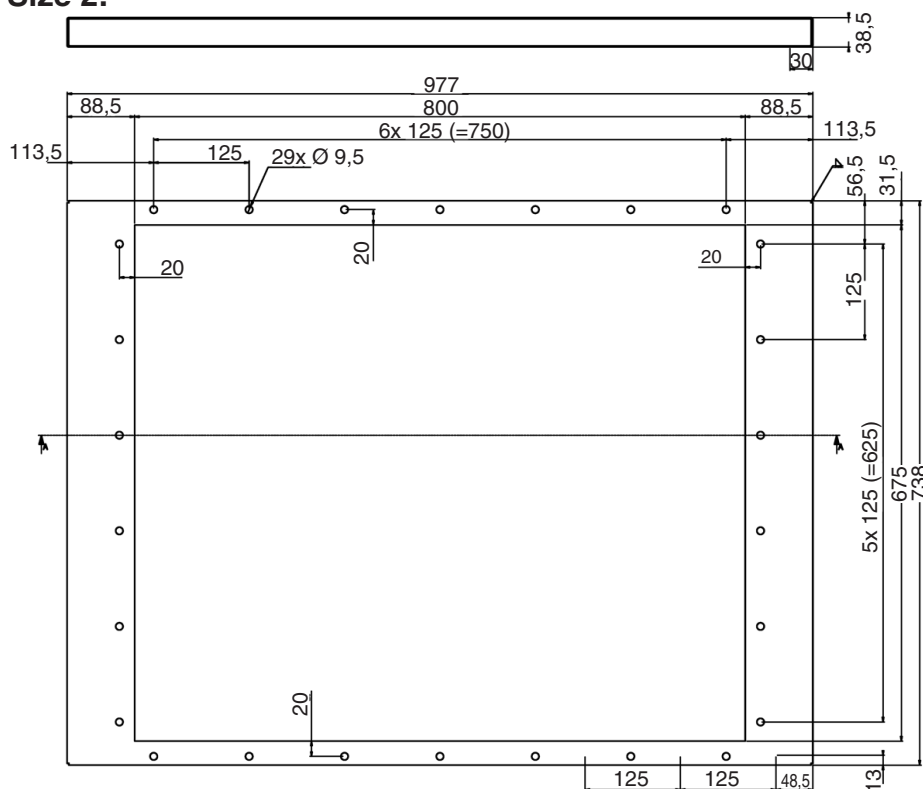
### Size 1:

4xM8-nut set up from above.



1: The surface between the base and the fan support must be sealed with an appropriate adhesive tape.

### Size 2:

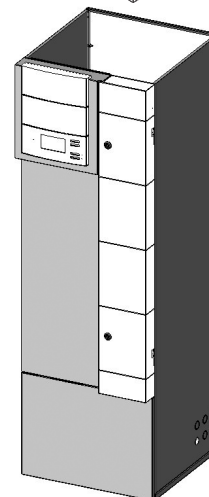
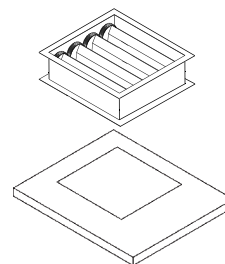
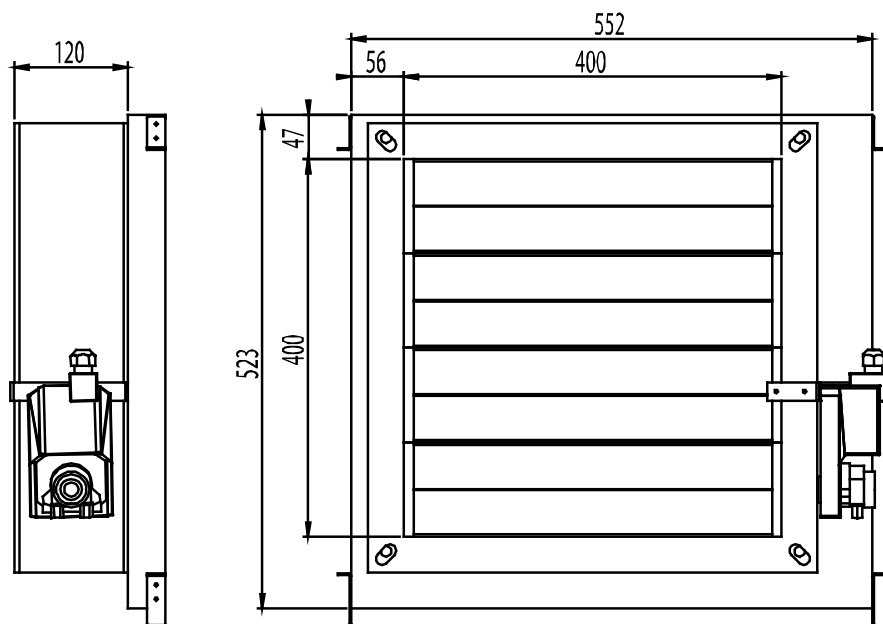




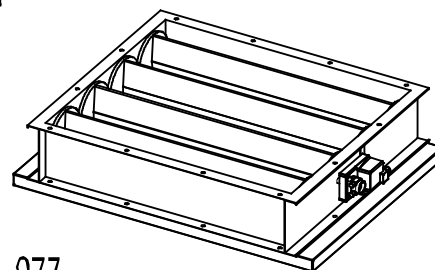
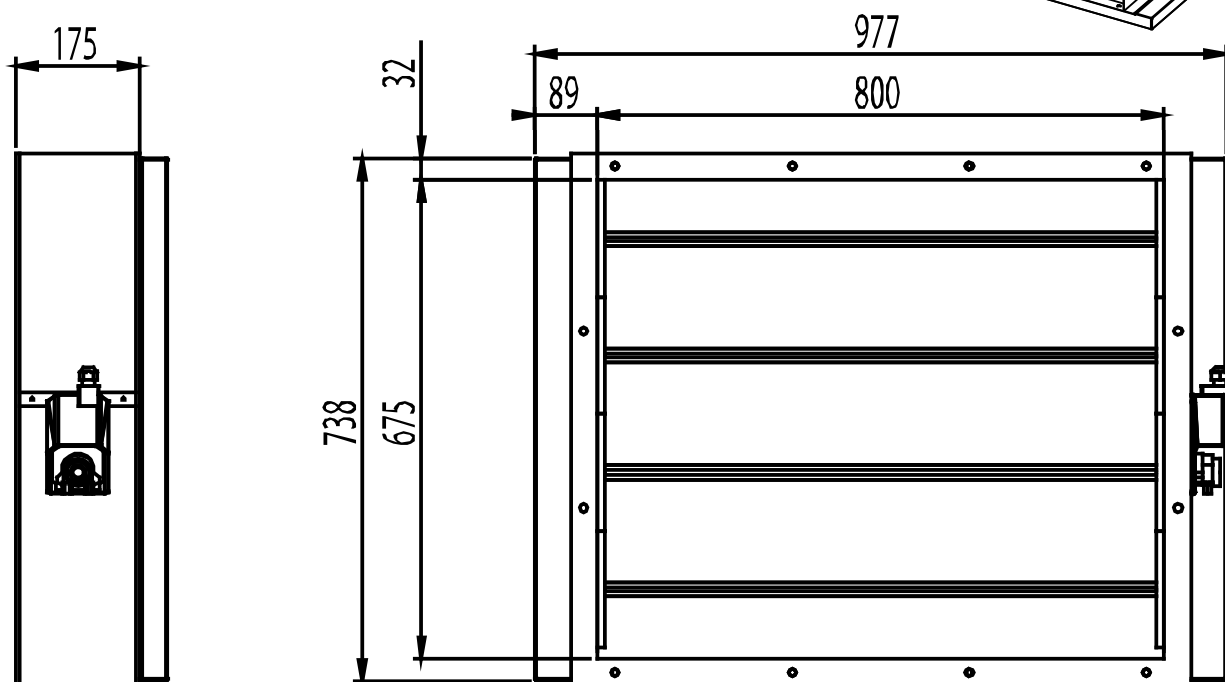
## Air damper - Upflow

An air damper can only be provided on the discharge side for downflow and upflow units. The most frequent use of the air damper is shown, on the discharge side of upflow units. For the installation of an air damper on the upflow unit a connection base (see page before) is necessary.

### Size 1:



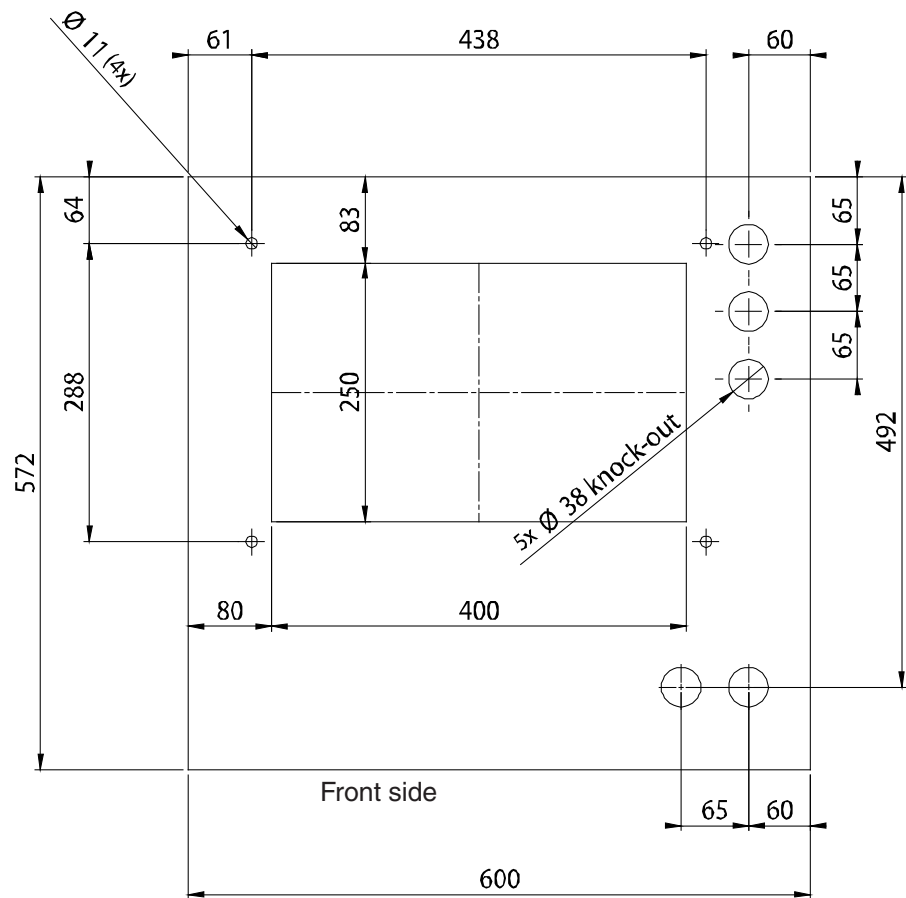
### Size 2:



## Adaptor plate for damper below the unit - Downflow

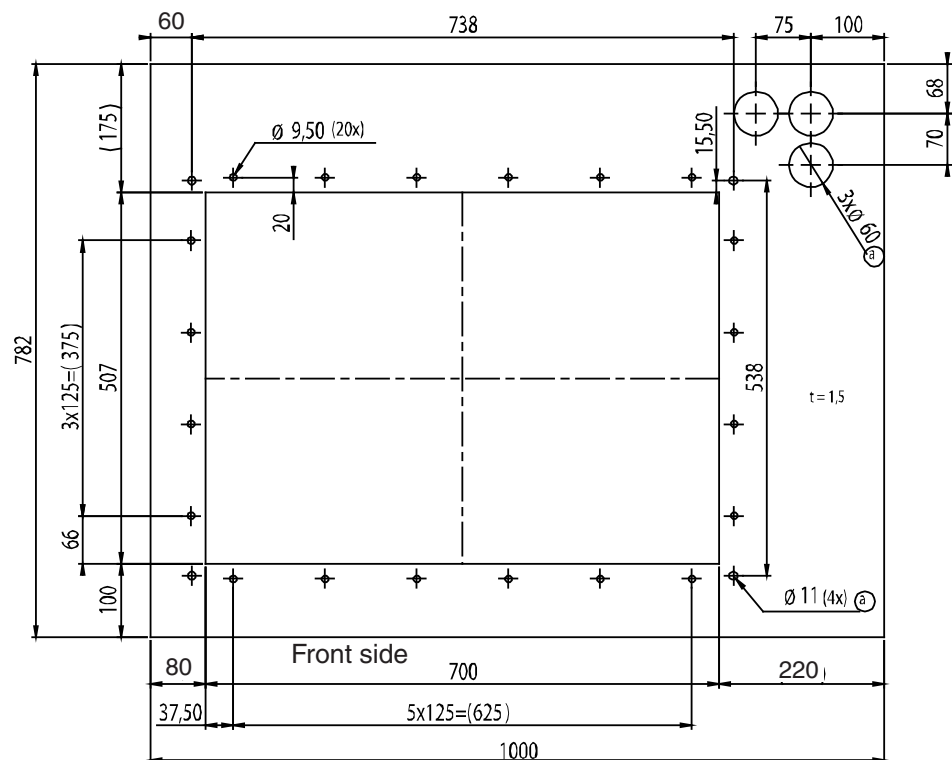
### Size 1:

Top view



### Size 2:

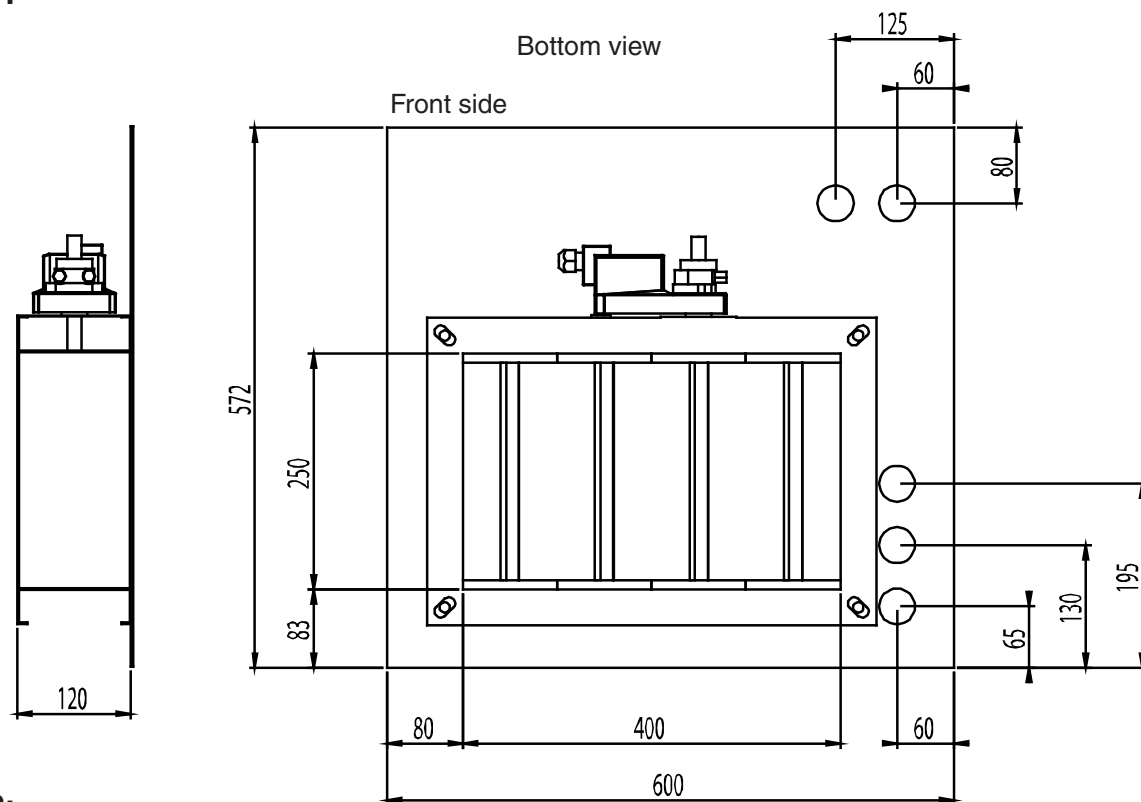
Top view



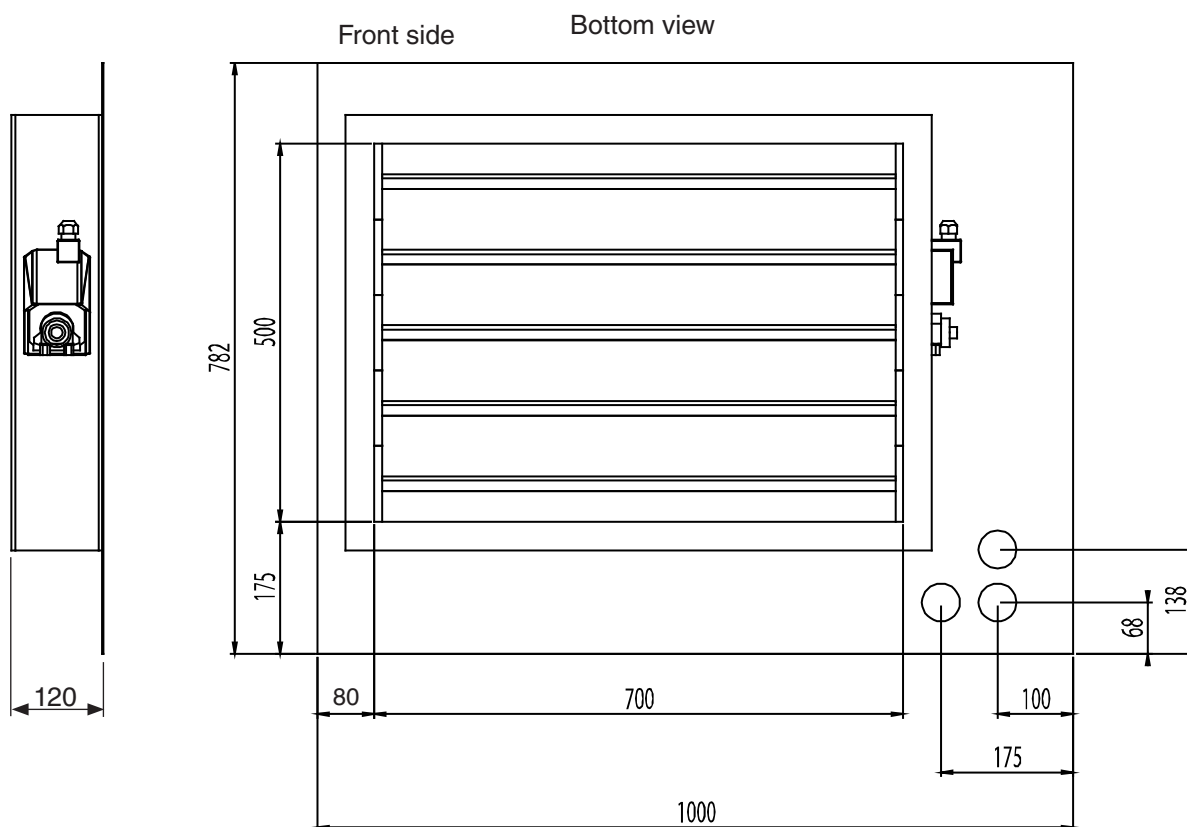
## Air damper - Downflow

Here the use of the air damper on the discharge side of downflow units is shown. For the installation of an air damper below the downflow unit an adaptor plate (see page before) is necessary.

### Size 1:



### Size 2:



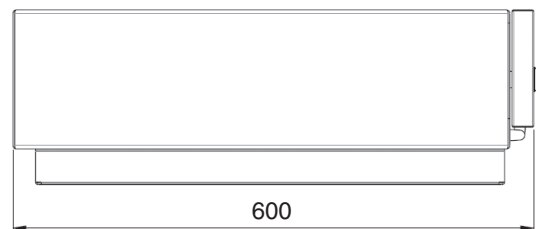
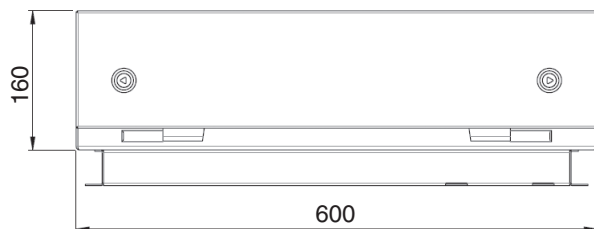
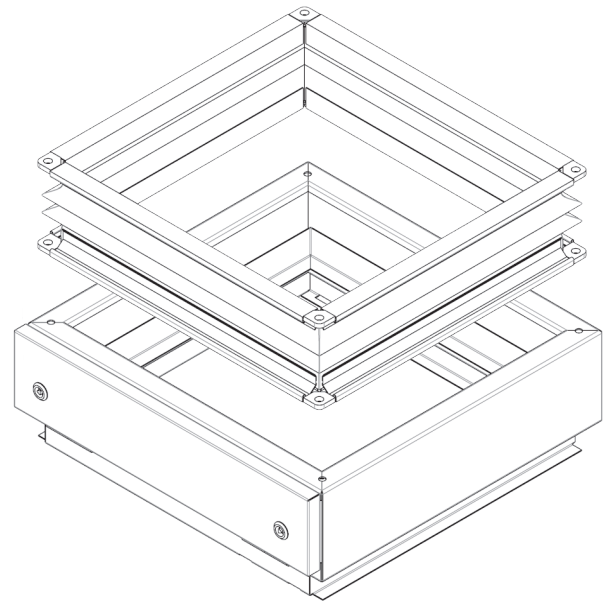
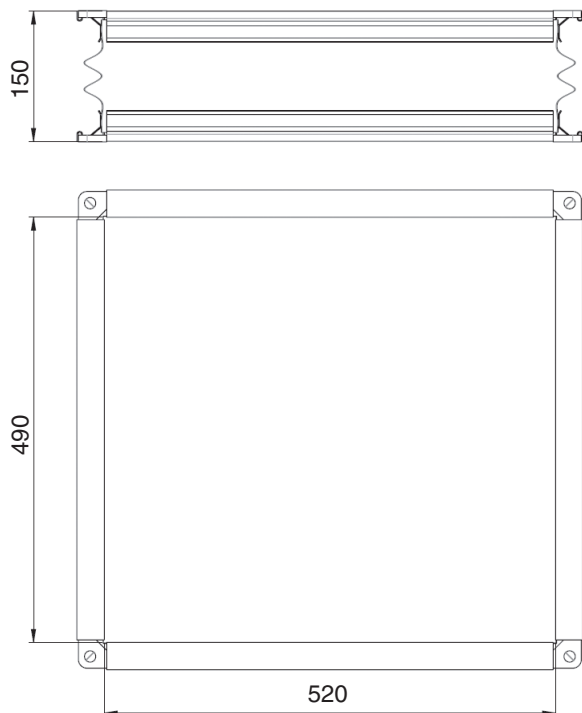
## Filter top with flexible duct

The filter top with flexible duct is determined for the suction side connection at downflow units.

### Installation

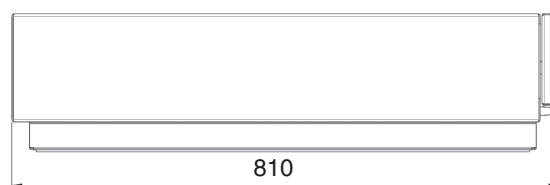
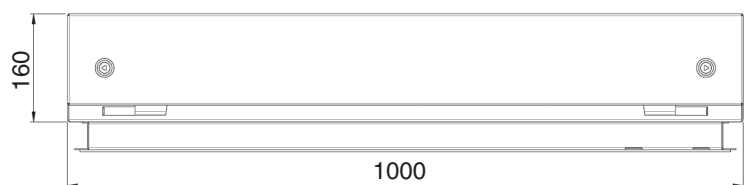
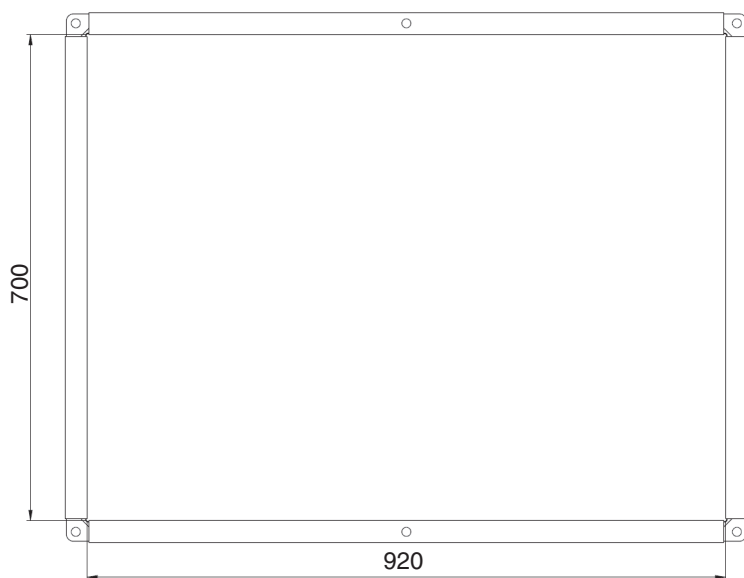
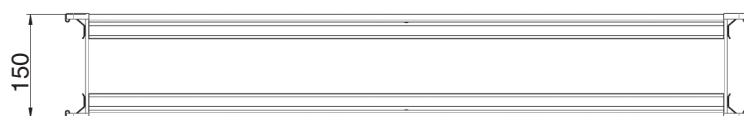
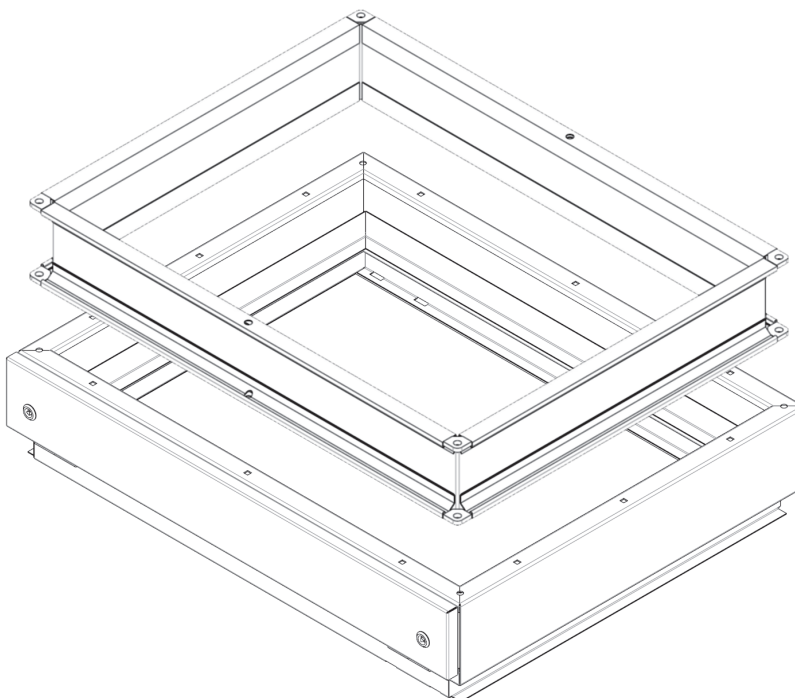
- Fix the flexible duct on the filter top by four M10 screw connections.
- Set the filter top with mounted flexible duct on the A/C unit without screwing it to the A/C unit.

### Size 1:



## Filter top with flexible duct

**Size 2:**



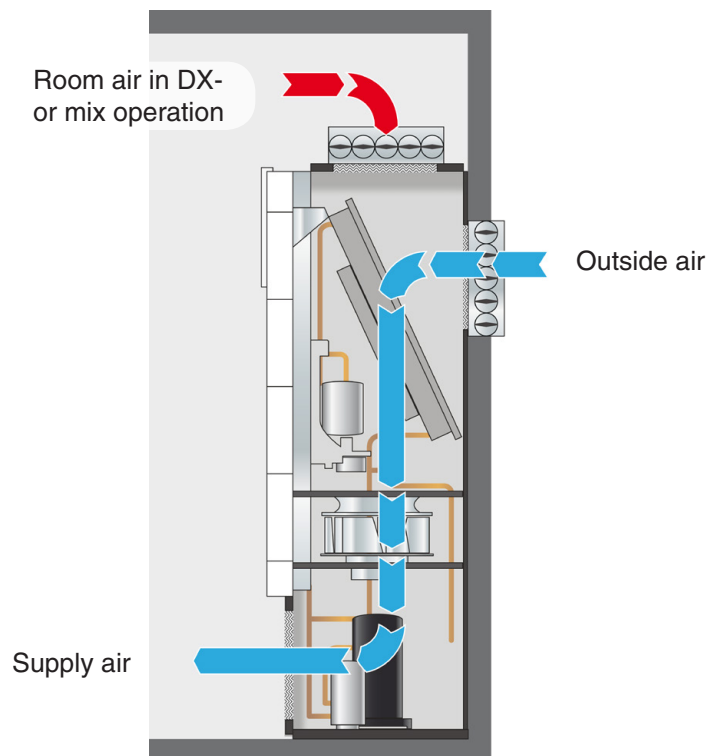
## Ecocool (only for downflow version)

With the Ecocool function outside air is used for cooling the room air and is mixed with the return air via louvers. Two louvers per unit are installed. At the downflow unit the louvers are situated on top and at the upper part of the rear side. The louver at the rear allows outside air to come into the unit. Room air flows into the unit through the louver on top of the downflow unit.

Exhaust air is conducted by another louver which must be provided by the customer to the outside to prevent a pressure increase in the room by the intake of fresh air.

For description of the control see C7000 manual, Ecocool function.

### Airflow in free cooling operation



## Actuators and end position switch

### Louver actuator NM 24 - SR for fresh or return air

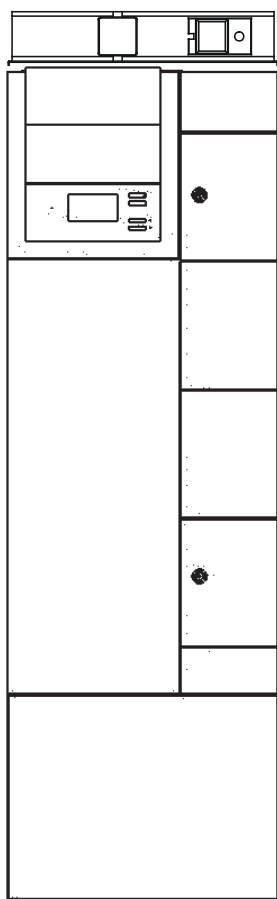
The louver actuator has no end position switch and is overload-proof. When the limit stop of the louver is attained, the actuator automatically stops.

After switching on the power supply or actuating the push button on the actuator a function test with calibration is automatically executed. The actuator scans the two end positions and adapts its electrical operating range of 2-10 V DC and the running time of 150 s to the actual mechanical louver swing angle. The actuator then adjusts itself on the position which is required by the control signal. The actuators are constantly supplied with 24 V AC. The control is realized with 0-10 V DC. The actuator NM24-SR is mounted on the fresh air louver.

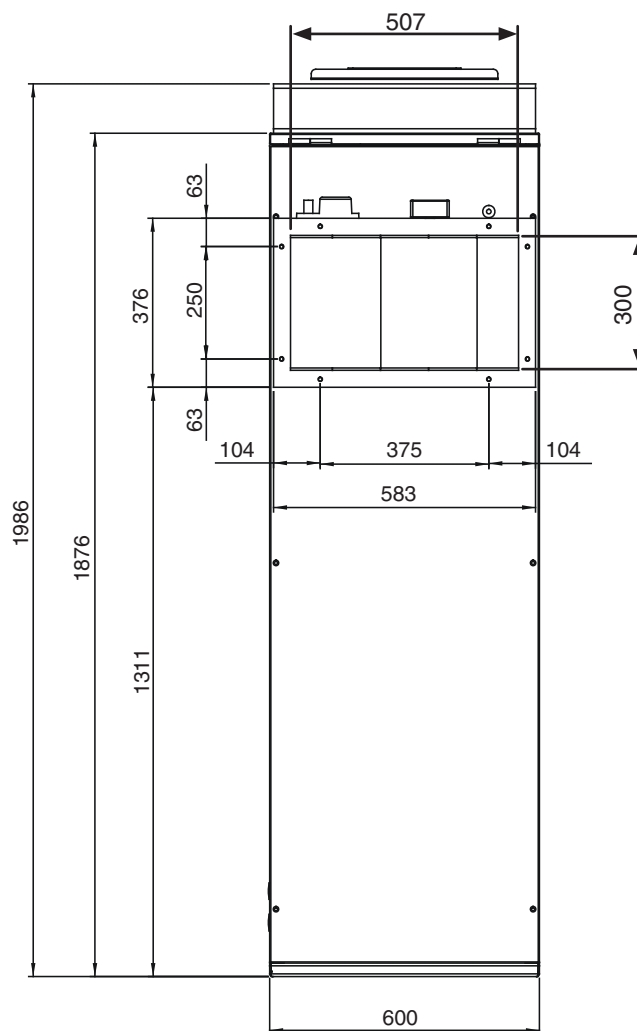
Function test: By pressing the button at the housing the gear shift is released, and the louver can be manually operated.

# Dimensions - Size 1 - Downflow with Ecocool louvers

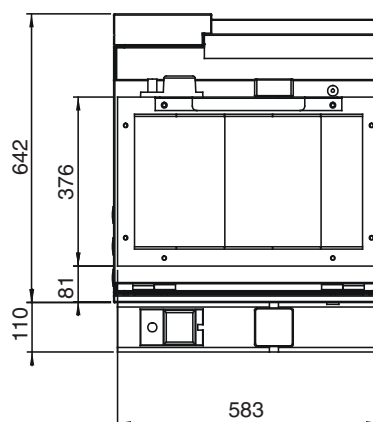
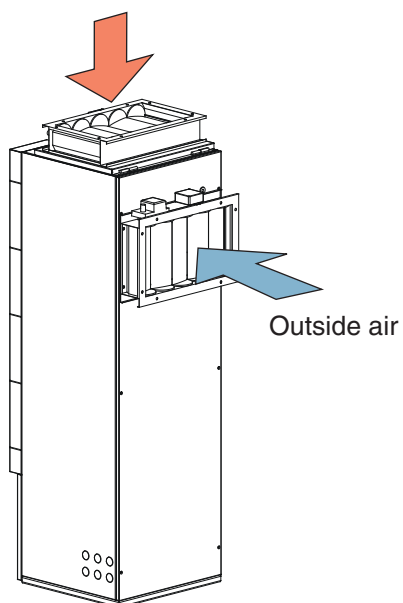
front side



rear side



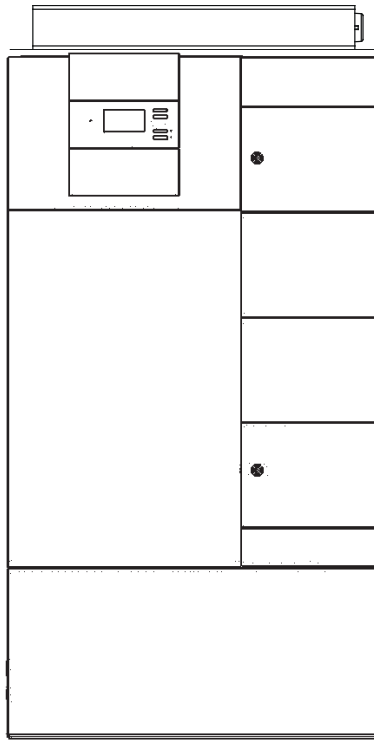
Return air



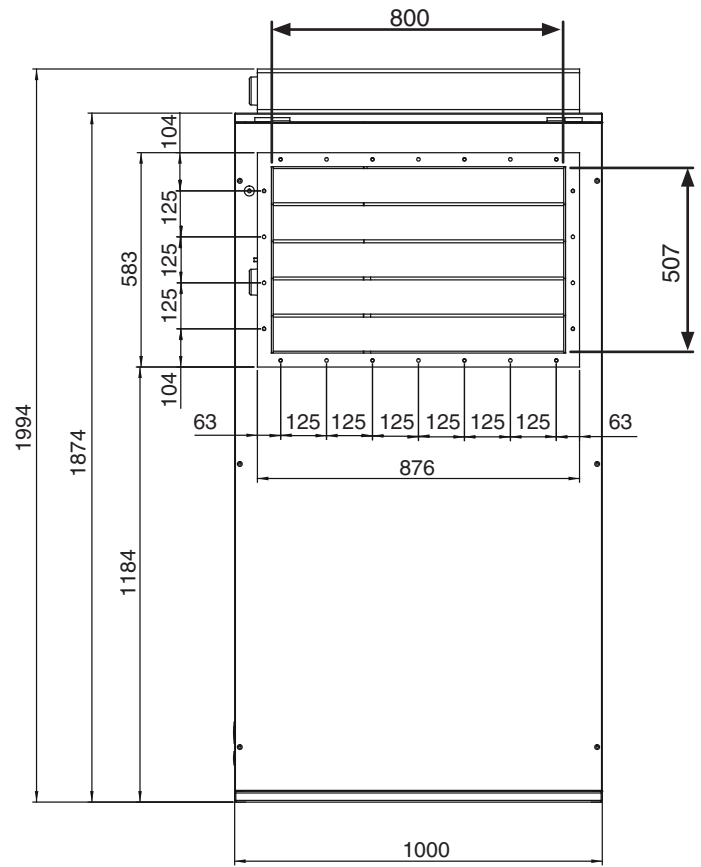


## Dimensions - Size 2 - Downflow with Ecocool louvers

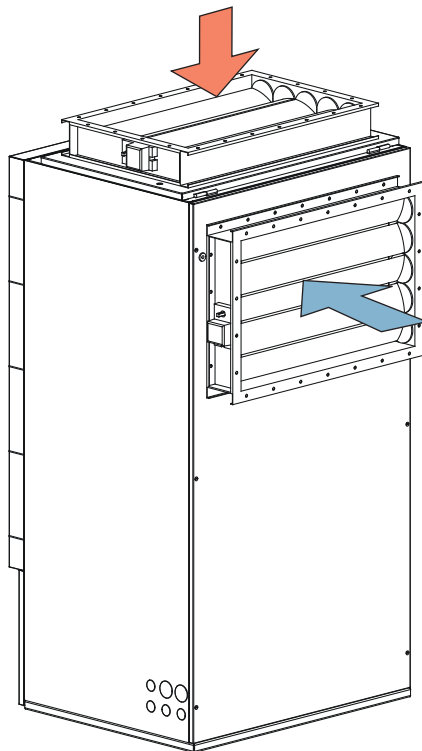
front side



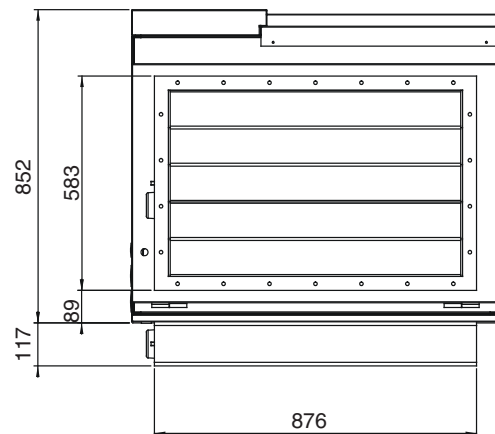
rear side



Return air



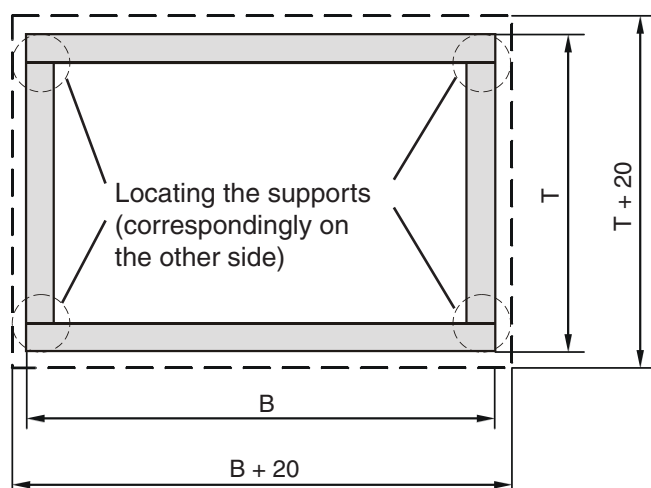
Outside air





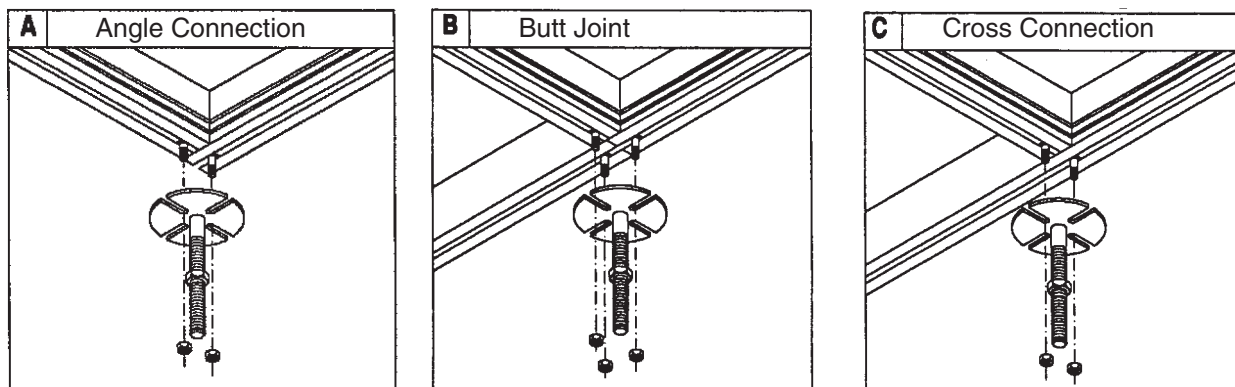
## 12.4 Raised floor stand

The floor stand is used to adjust the height of the A/C unit to the existing raised floor and consists of an encircling rectangular profile of galvanized steel with adjustable screw sockets. Anti vibration compound is recommended between concrete floor and base plate.



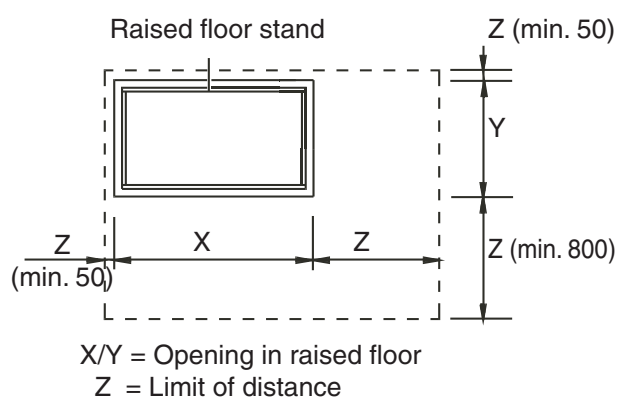
Cabinet size		1	2
B	mm	600	1000
T	mm	575	782
-	mm	-	-
Supports	n°	4	
Rectangular profiles 70 x 40	n°	4	
Mafund strips	n°	4	
Screws M8 x 30	n°	8	

## Connecting the bars (View from below)



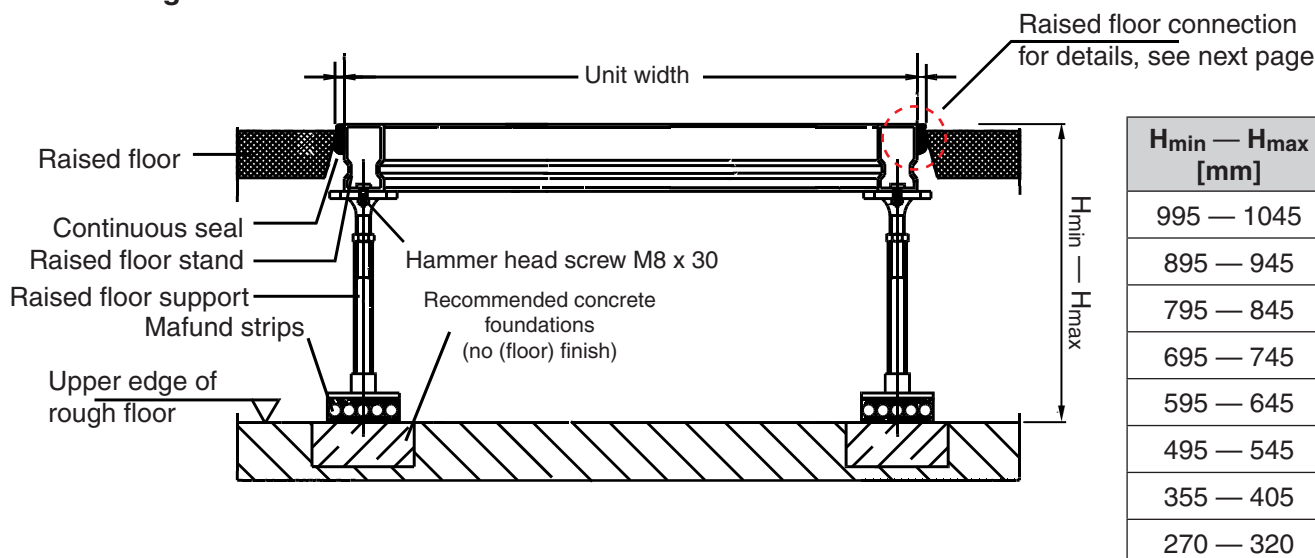
## Minimum distances and mounting instructions

- Please observe that the floor stand must be decoupled from the surrounding floor plates by damping insertions and that mafund plates are laid under the floor supports.
- The raised floor cutting (notch) should at least be 15° and must not have any contact to the raised floor stand, which could result in bone-conduction.
- If the floor stand is placed near a wall, a minimum distance of 50 mm should be respected. The gap between wall and floor stand should be closed by tin stripes.
- The dimensions of the openings in the raised floor (X and Y) are 10 mm longer than the raised floor stand. The joint must be closed by customers with a continuous seal.
- A concrete foundation is recommended in the area of the raised floor supports.

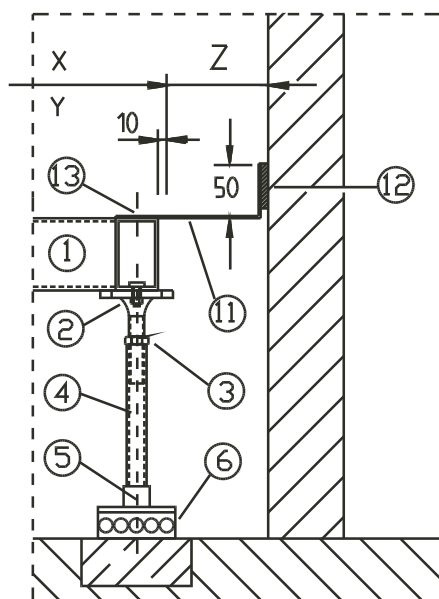


- The raised floor supports have to be installed on vibration dampening material (do not screw down the supports!).
- Prior to installation of the A/C unit, the raised floor must be installed 7 mm higher than the raised floor plates, as the mafund plates are compressed by the weight of the A/C unit.

## General design of the raised floor stand

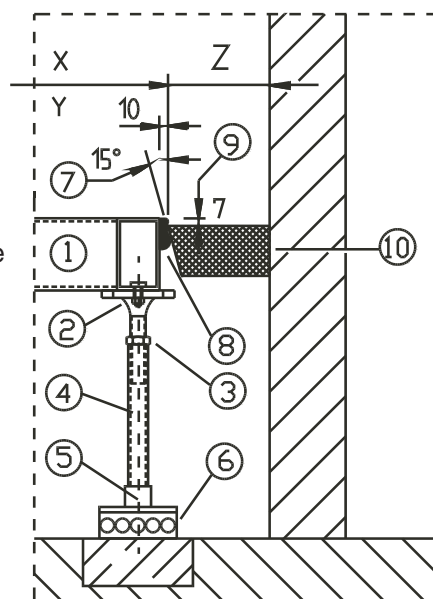


## Detail of raised floor connection



Sealing detail  
when distance  $Z < 100$  mm

- 1 Raised floor stand
- 2 Adjustable support plate
- 3 Adjusting nut
- 4 Support pipe
- 5 Support base
- 6 Mafund strips
- 7 Raised floor cut out angle
- 8 Continuous seal profile
- 9 Before unit installation
- 10 Raised floor plate
- 11 Angled bracket
- 12 Permanently elastic seal
- 13 Fixing



Sealing detail  
when distance  $Z \geq 100$  mm

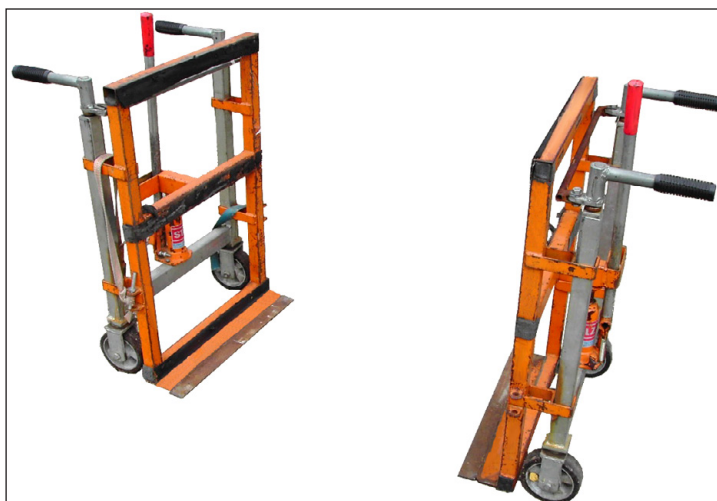
## Other mounting options (e.g. louvers)

If louvers shall be installed beneath the unit, these must be first mounted onto the adapter plate. If there are two or three louvers, the louver shafts are connected by a coupling piece. The louver actuator, which has to be installed on the shaft, will later be on the right unit side in the proximity of the electric cabinet.

## Positioning of the A/C unit on the floor stand

When positioning the A/C unit on the floor stand, it must be brought precisely into the correct position above the floor stand from the front (under no circumstances diagonally). Hereby use mounting aids to bring in the unit and secure these by fixing belts. We recommend further to lay in advance at least two securing instruments (e. g. square steel bars) on the stand to avoid a slip-off.

When the unit is in the right position the securing aids can be taken away and the unit can be set down. Now the mounting aids can be pulled away under the unit.



Mounting aid



## 12.5 Electrical Options

### Three Phase Control

The phase monitoring relay monitors a phase failure and a phase reversal. Excess voltage, undervoltage and the phase imbalance are monitored in relation to the set values.

In case of a phase failure the phase monitoring relay is de-energized without delay and triggers an alarm. If the monitoring relay detects a wrong phase sequence during the A/C unit start, it is not energized and prevents the unit start. You can adjust a triggering delay on the relay for the errors excess voltage, undervoltage and phase imbalance (excess of the adjusted limit values).

### Automatic restart

When the defective phase returns and if the voltage is within the limit values and the phase imbalance within the adjusted tolerance, the A/C unit is restarted automatically.

For this, the parameter "Phase restart" must be set to "1", either in the menu "Config/Values/Misc." of the C7000AT or by the command "phase start 1".

Error	Adjustment range	Factory setting
Excess voltage (upper limit value)	off, 106-173%	108%
Undervoltage (lower limit value)	off, 50-94%	92%
Phase imbalance	off, 4 - 20%	5%
Triggering delay	0,1 - 20s	3s

### Second Power Supply, incorporated in electric box (for size 2 only)

This option provides the connection of a second power supply. Both power supplies are switched on to the A/C unit. A contactor circuit ensures that the priority is set on power supply 1.

All three phases of both power supplies are checked constantly on excess voltage, undervoltage, phase failure, phase balance and correct rotation. In case of failure of supply 1 the unit is switched off. After a lapse of time which can be set at the time relay (preadjusted: 10 seconds) power supply 2 is switched onto the unit. The unit starts by the automatic restart which is integrated in the controller.

When the voltage of power supply returns, the unit is switched off again. On a second time relay a delay can be set (preadjusted: 10 seconds), after which power supply 1 is switched onto the unit. The unit starts by the automatic restart.



## Second Power Supply in separate box (for size 1 only)

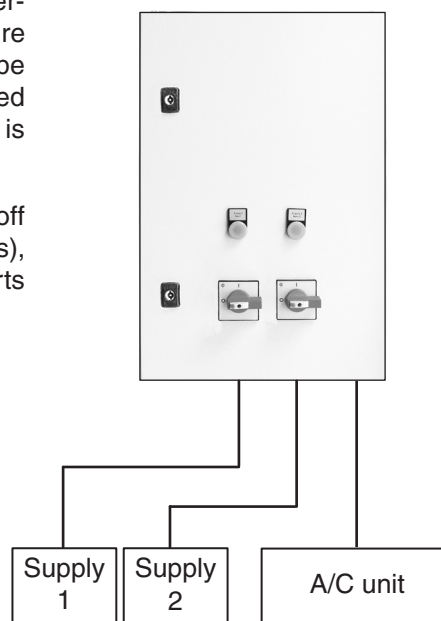
This option provides an automatic commutation between two power supply networks.

In case of failure of the main power supply the A/C unit has the possibility to restart operation by commutation to the second supply network. Both supply lines of the power supply networks are fixed by screw connections and are directly connected at the main switches. An internal circuit ensures that the priority is set on power supply 1.

All three phases of both power supplies are checked constantly on under-voltage, phase failure, phase balance and correct rotation. In case of failure of supply 1 the A/C unit is switched off. After a lapse of time which can be set at the time relay (preadjusted: 10 seconds) power supply 2 is switched onto the A/C unit. The A/C unit starts by the automatic restart which is integrated in the controller.

When the voltage of power supply 1 returns, the A/C unit is switched off again. On a second time relay a delay can be set (preadjusted: 10 seconds), after which power supply 1 is switched onto the A/C unit. The A/C unit starts by the automatic restart.

Two green LED indicators display the active power supply network.

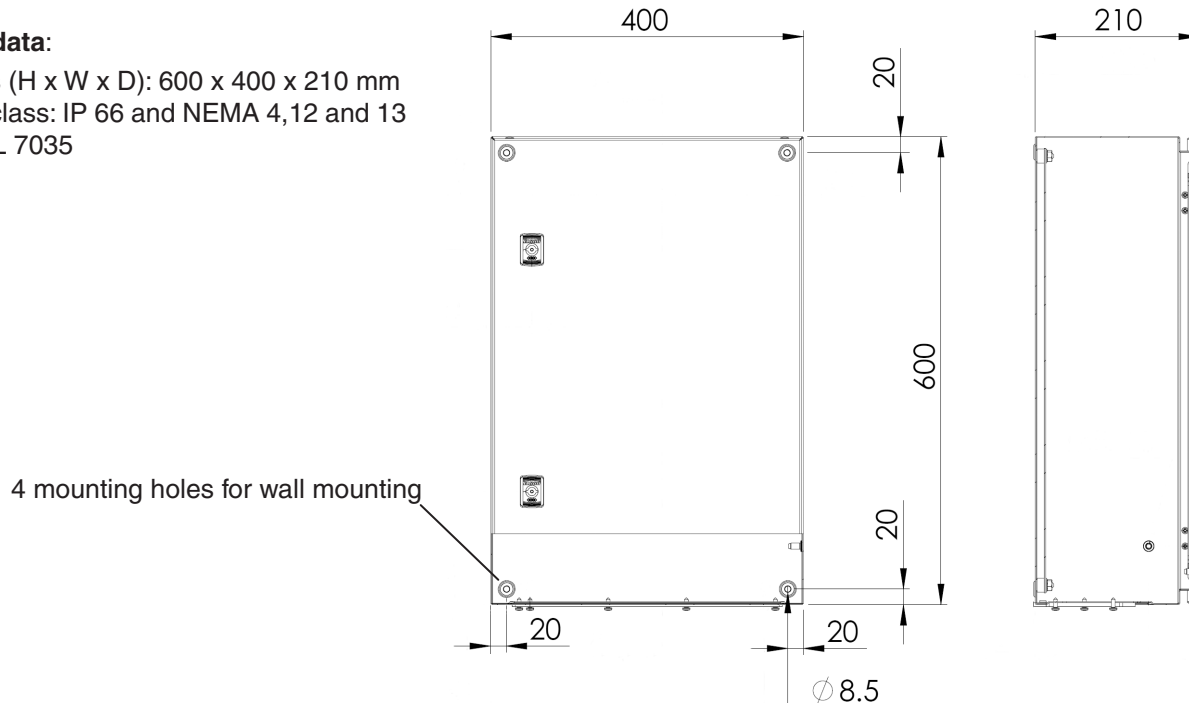


### Technical data:

Dimensions (H x W x D): 600 x 400 x 210 mm

Protection class: IP 66 and NEMA 4,12 and 13

Colour: RAL 7035

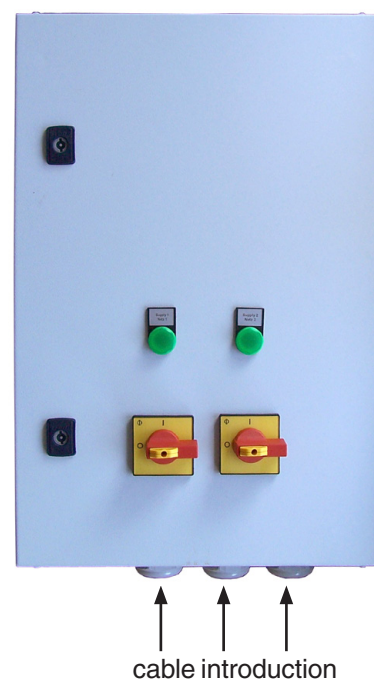


### Maximum cross-section of the supply lines

main switch	A	40	63	80
single-wire or multi-wire	mm <sup>2</sup>	16	16	50
finely stranded conductor	mm <sup>2</sup>	16	16	35

### Requirements:

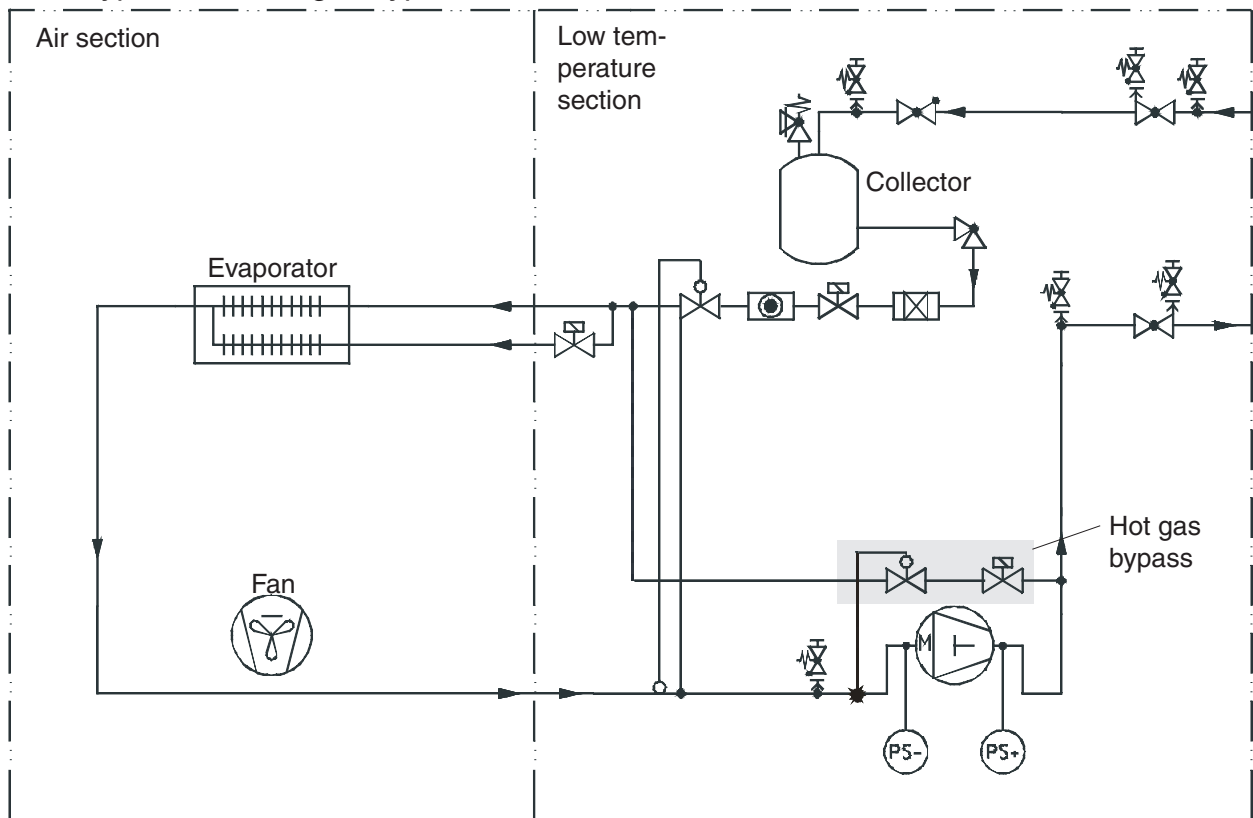
- Network configuration TN-S, TN-C-S (400V +/-10%, 3 phases, N, PE, 50/60 Hz)
- The housing is intended only for indoor installation.
- Use only copper conductors for 75°C.
- Install two back-up fuses in the supply lines. The size of the back-up fuses depends on the terminal equipment (A/C unit).
- Choose the cable cross-sections in accordance with local standards, the laying method and line lengths.





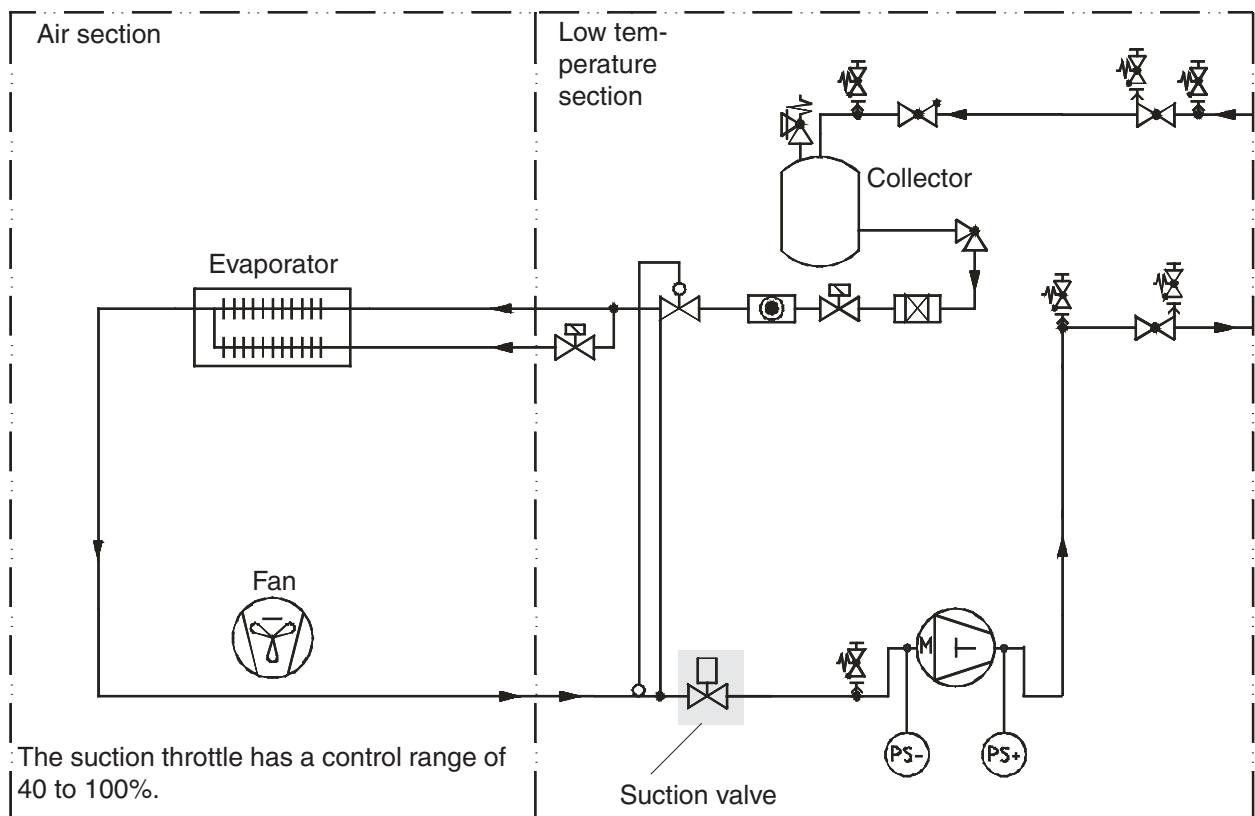
## 12.6 Refrigerant Circuit Options

### A/C unit type A with hot gas bypass extension



In order to reduce the switching rate and thus increase the life of the compressor, the refrigerant circuit can be enhanced by a hot gas bypass or with a suction throttle. The hot gas bypass has a control range of 50 to 100%.

### A/C unit type A with suction valve extension



## **Adjustable HP/LP switch**

The compressor is controlled and monitored by the controller of your A/C unit. Permanently set high-pressure and low-pressure switches are required as sensors for this. An adjustable version of these HP/LP switches is supplied in order to individually adapt the switching points for the high pressure and low pressure to the operating conditions.



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