

IT Cooling Solutions

# CyberRow

Precision Air Conditioning Units  
380-415 V / 3 Ph / 50 Hz

Index G35  
Issue 4.2016

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 this STULZ unit the R410A refrigerant is used. 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.

- 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.

### First aid measures

- If health problems occur during or after handling fluorinated hydrocarbons, a doctor is to be consulted immediately. The doctor is to be informed that the work involved the use of fluorinated hydrocarbons.
- In the case of acute effects, the casualty is to be brought into the fresh air as quickly as possible.
- Splashes of fluorinated hydrocarbons in the eyes can be blown out or fanned out by an assistant. Then rinse with water.

### 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.
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	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/AS: The refrigerant circuit is filled with nitrogene up to atmospheric pressure.**  
**Unit version GS/GES: The refrigerant circuit is filled with refrigerant ready for use.**

Construction of protective covering  
 (from inside to outside)

1. Neopolene 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.

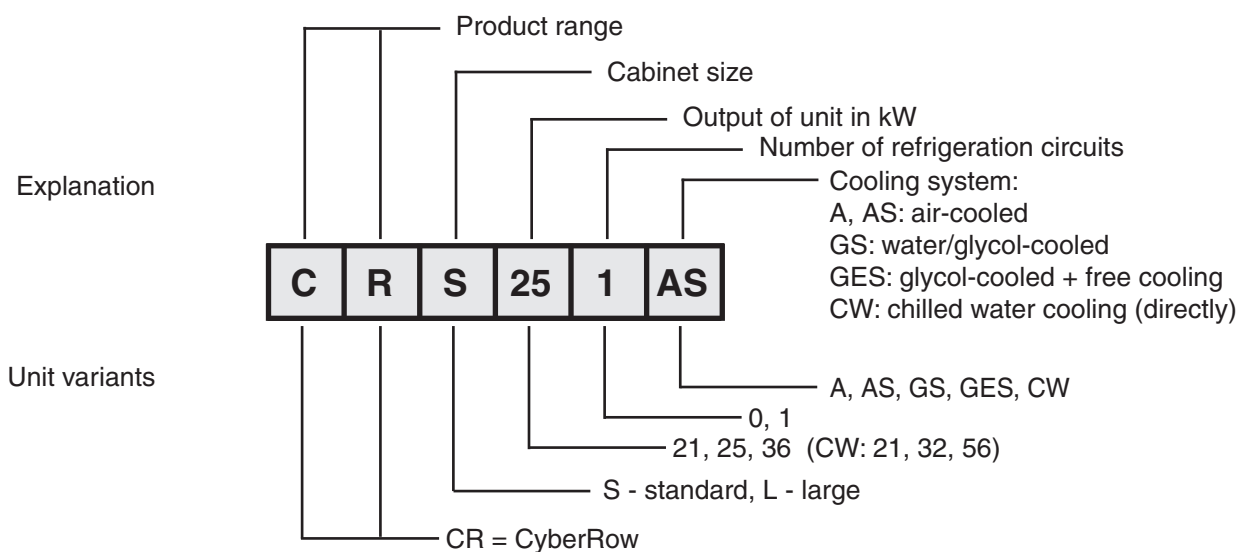
## 4. Description

### 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.

		<b>Typenschild / type plate</b> <b>plaque d'appareil</b>	
	Lieferant manufacturer vendeur	<b>STULZ GmbH Hamburg</b> Holsteiner Chaussee 283, D-22457 Hamburg	
Unit type	Typ type type	<b>CRS 251 AS</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>B72391</b>	Kältemittel refrigerant refrigerant
			<b>R410A</b>
Order number + alternative	Kommission/Alt commission/alt commission/alt	<b>0530111234/01</b>	Max. Betriebsdruck max. operation pressure pression de fonction max.
			<b>40 bar</b>
Serial no.	Baujahr model modele	<b>2012</b>	Max. Füllgewicht max. filling charge charge max. de rempliss.
	S.Nr. s.-no. no. serie	 <b>1234567890</b>	<b>---</b> kg
			<b>Made in Germany</b>



### Page information

Language:

EN - English

FR - French

ES - Spanish

PL - Polish

IT - Italian

HU - hungarian

RU - Russian

DE - German

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### Manufacturer address:

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**Fax: +49 40 55 85-404**



## 4.2 Intended and non-intended use

### Intended use

STULZ CyberRow conditioners are designed to cool rooms containing technological equipment, sheltered from weather. Use these conditioners to eliminate the problems caused by high temperatures, dirt and humidity in the room subject to climate control and in which the conditioners are to be installed.

As well, STULZ CyberRow conditioners cannot be used outside safety limits specified on the name-plate. Conditioners must not be transported or used in positions that differ from those for which they were designed.

CyberRow units are designed to be installed in rows of server racks with high computing density. Cooling system architecture is open loop, so the air conditioner takes air from a hot aisle and delivers treated air into a cold aisle. Main functions of air treatment are: filtration, cooling, dehumidification (as a secondary effect of cooling), humidification (with optional humidifier), and condensate pumping (with optional condensate pump). Due to the special configuration of air supply openings, treated air doesn't disperse in the entire cold aisle: it creates a layer on the frontal surface of server racks, immediately available at their intake openings.

Air discharge is at both front sides of the air conditioner. Therefore the recommended position is between server racks. If installed at the end of a row, the supply opening corresponding to the free side should be closed, to avoid a mixing between hot and cold air, with a consequent waste of energy.



**Only for CW size 2 units: by closing one lateral opening, the airflow supplied by the other opening causes an underpressure of nearly 70 Pa at the air intake of the server rack next to the unit. For the aspiration of cold air, the fans of this server rack must have an available static pressure of 70 Pa minimum.**

Allowed installation positions are shown in the paragraph dedicated to unit positioning.

STULZ is not responsible for any malfunctions caused by failure to comply with these instructions. The operator bears the entire risk.

### Non-intended use

The air conditioner cannot be installed on movable, vibrating, oscillating, tilted (non-levelled) parts.

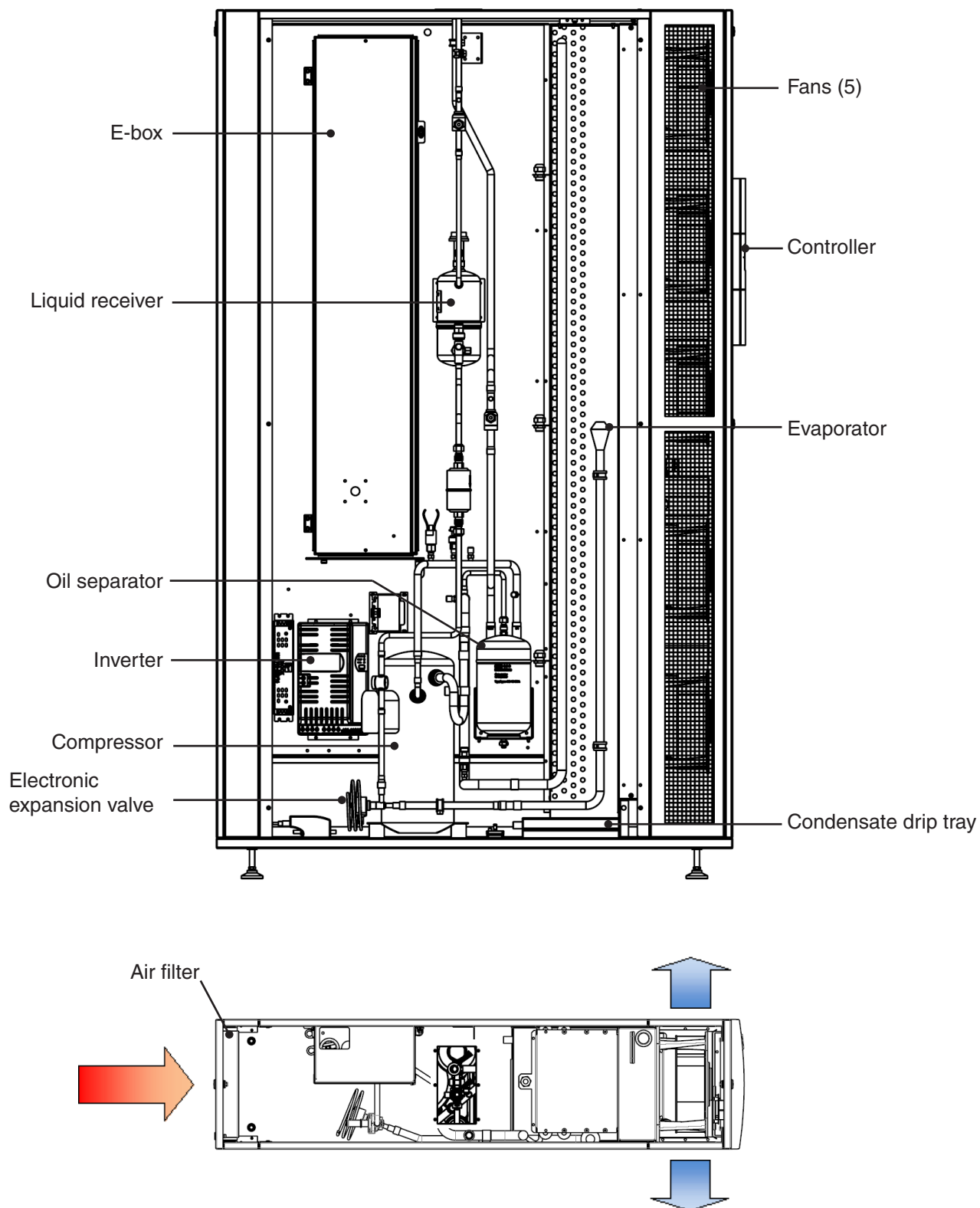
Generally, the air conditioner cannot be installed in the following areas:

- with strong heat radiation
- with strong magnetic fields
- with free flames
- with fire risk
- with inflammable products
- in explosive atmosphere
- in saline atmosphere
- in aggressive atmosphere

In case of doubt, please consult the manufacturer.

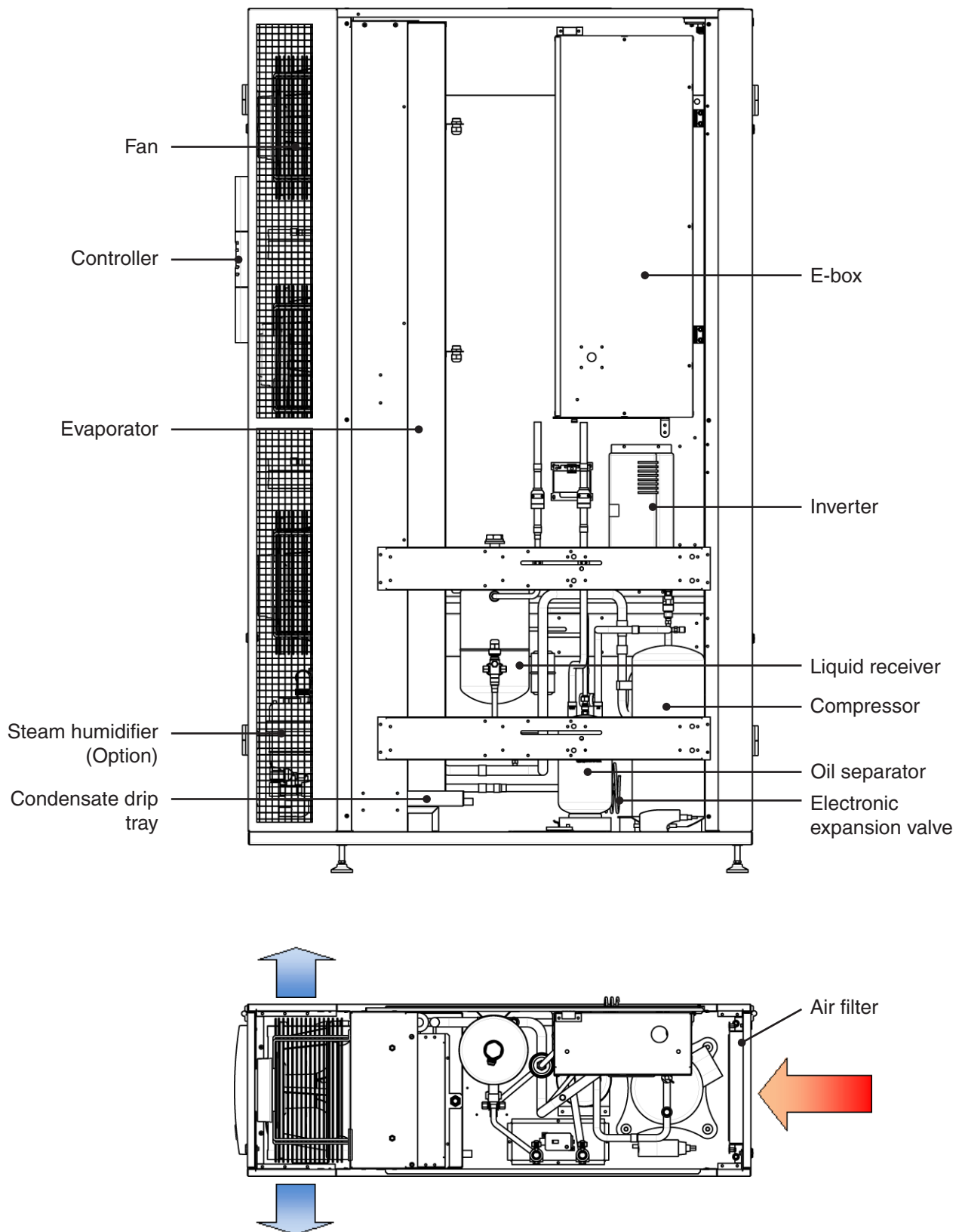
## 4.3 Component layout

### Internal layout of AS unit, size S

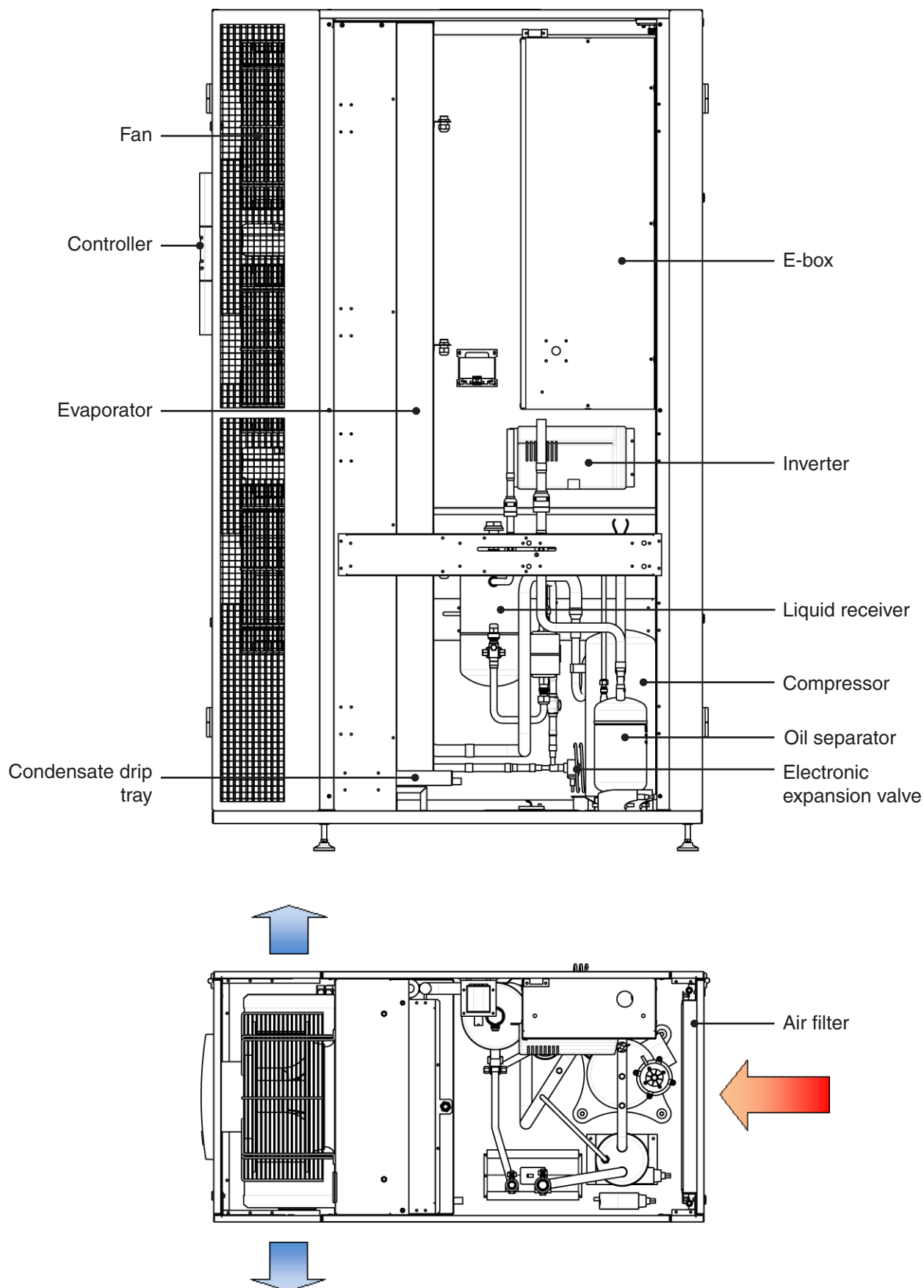




# Internal layout of AS unit, size 1

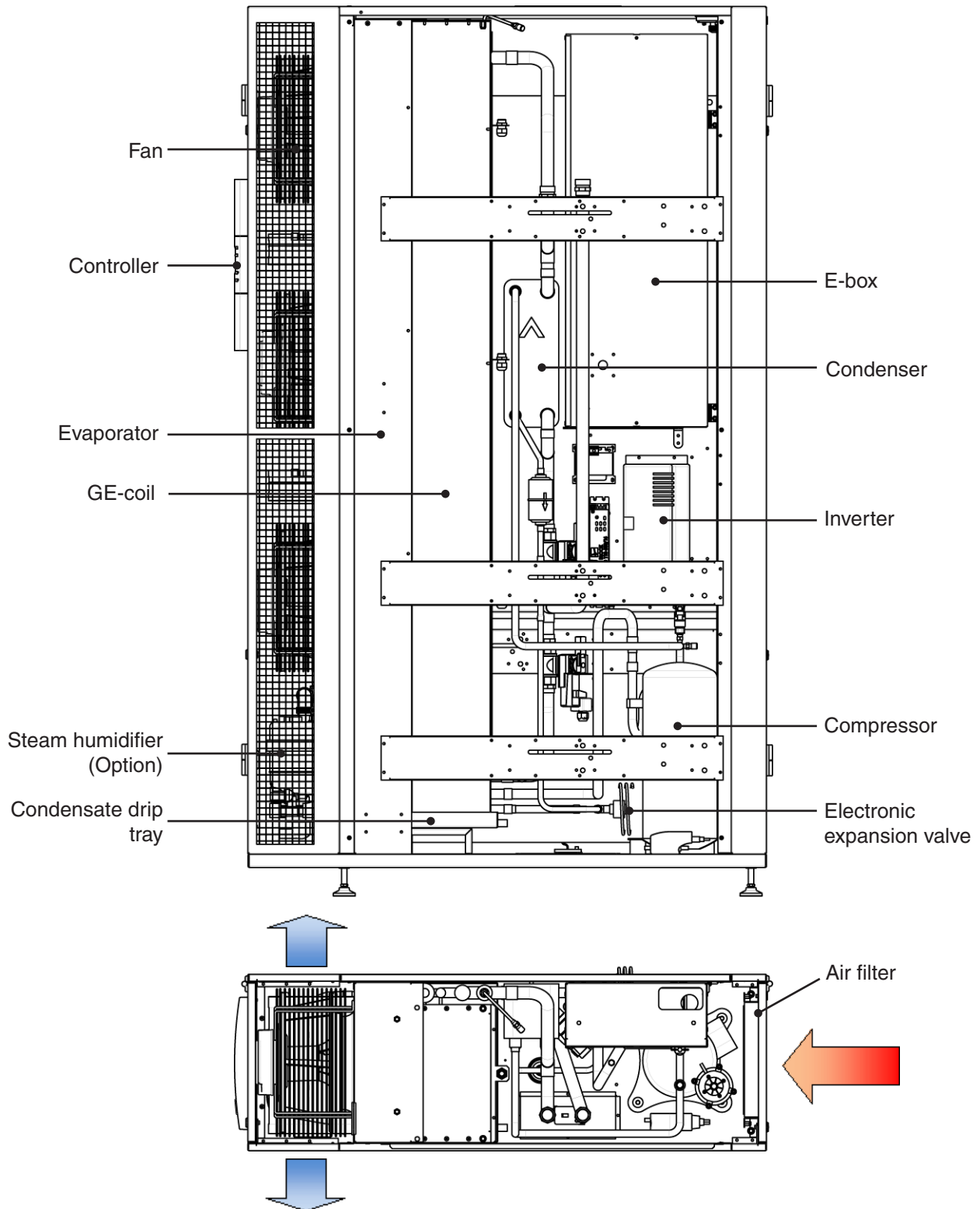


## Internal layout of AS unit, size 2

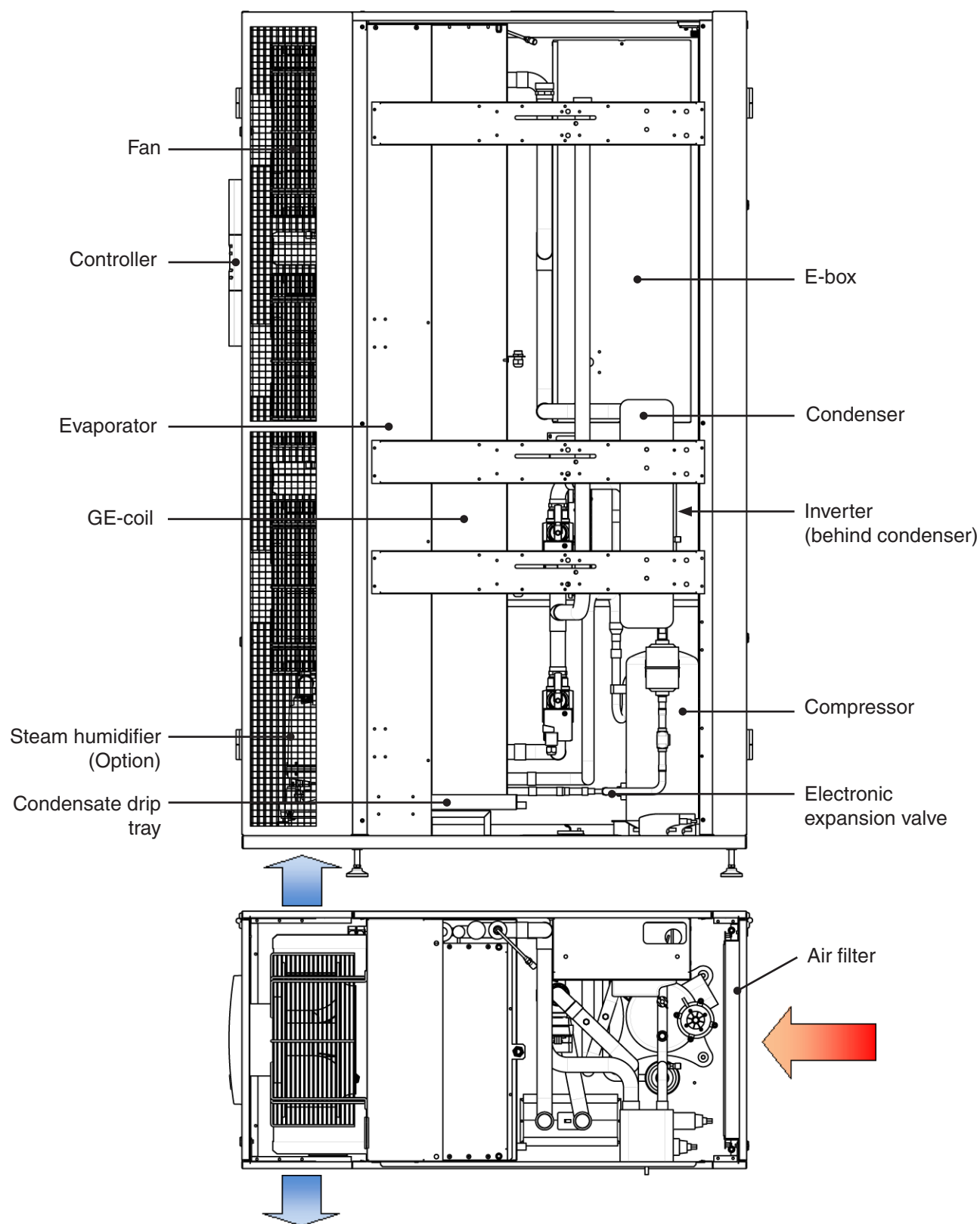




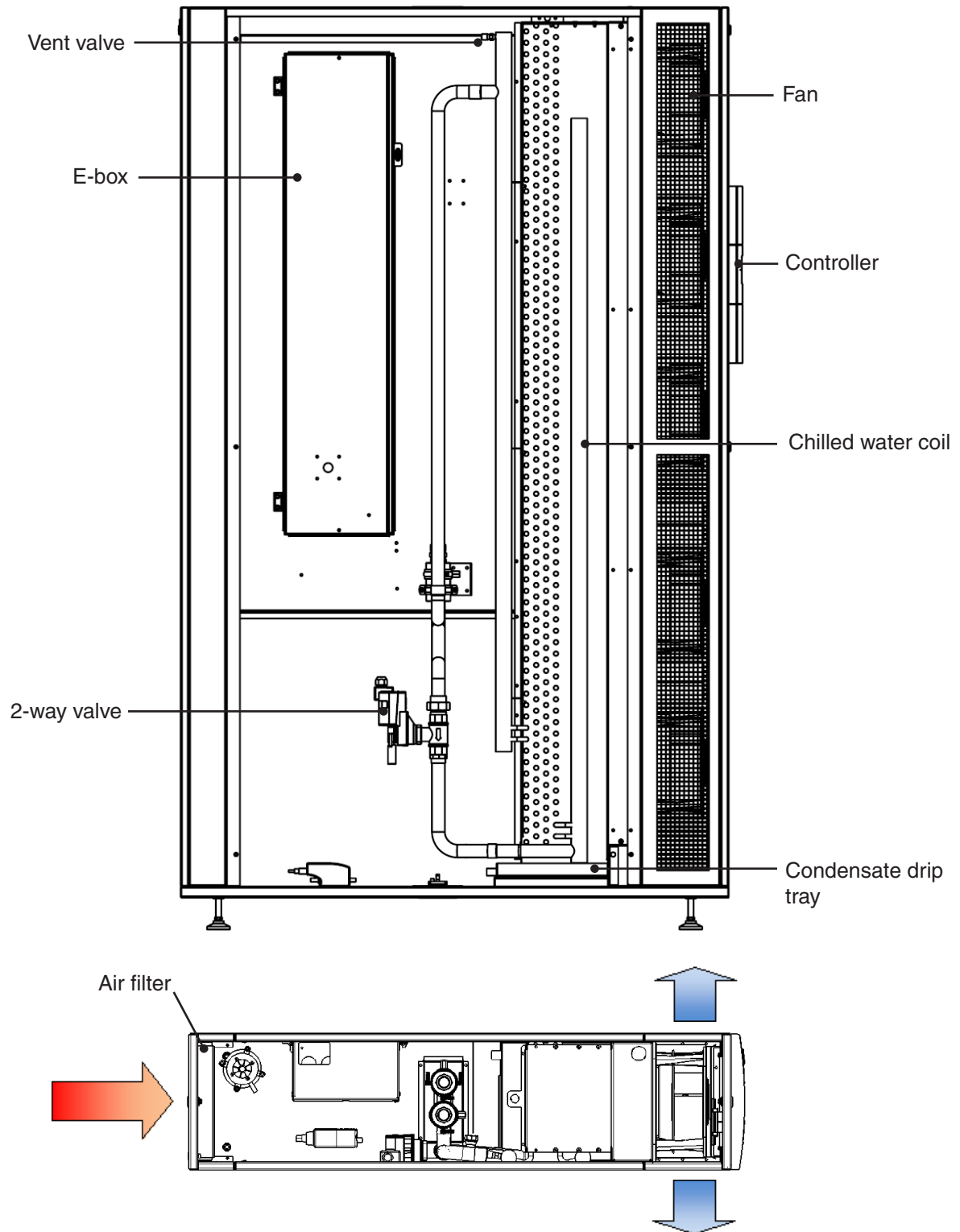
## Internal layout of GES unit, size 1



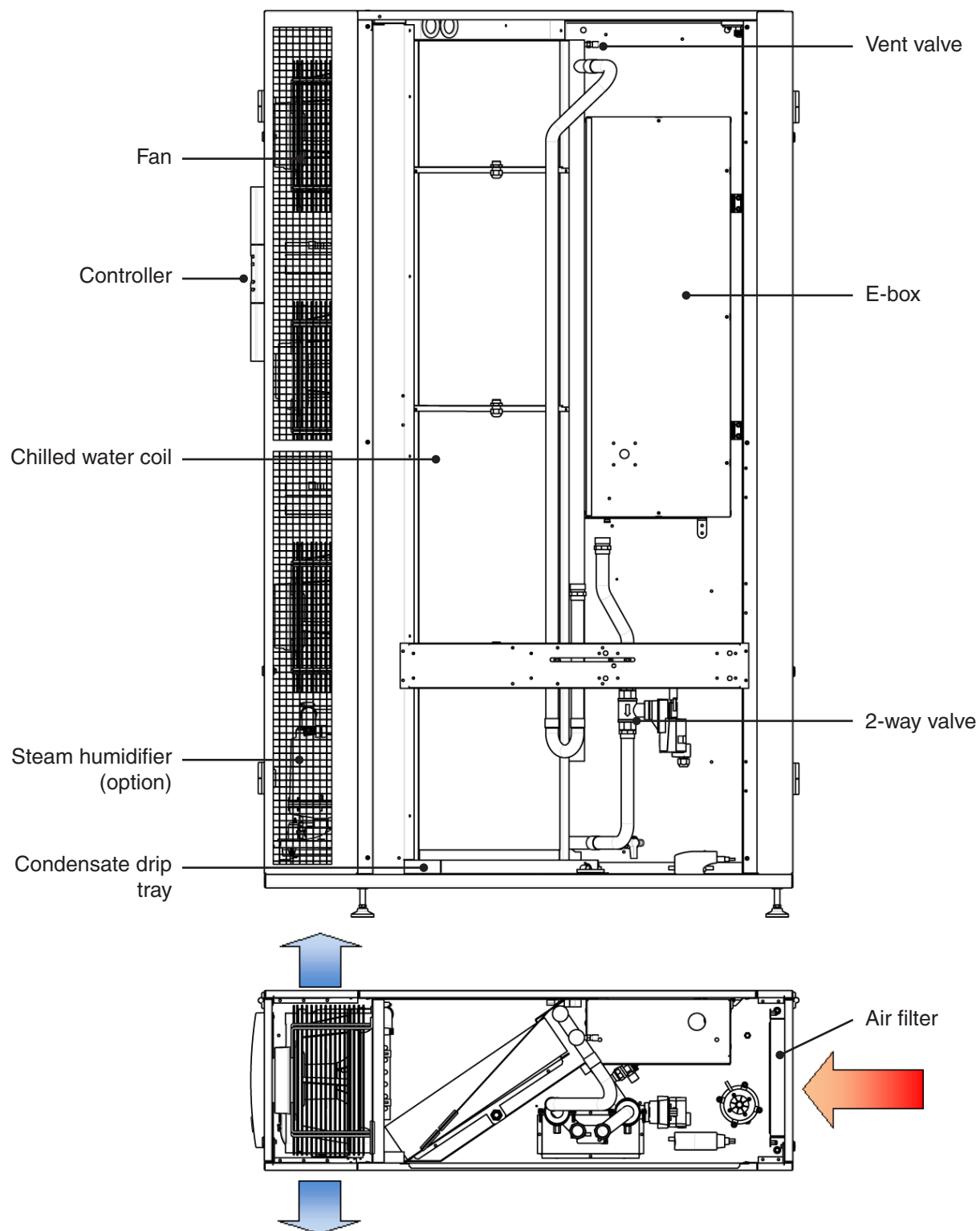
## Internal layout of GES unit, size 2



## Internal layout of CW unit, size S

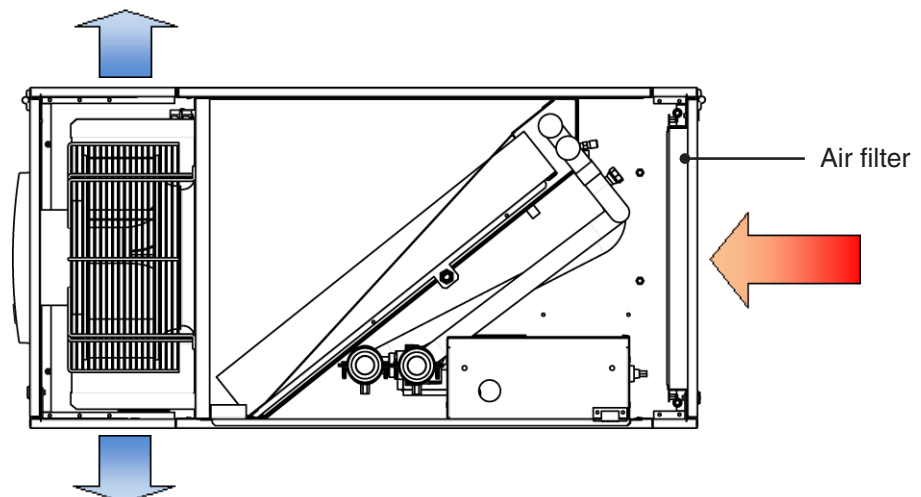
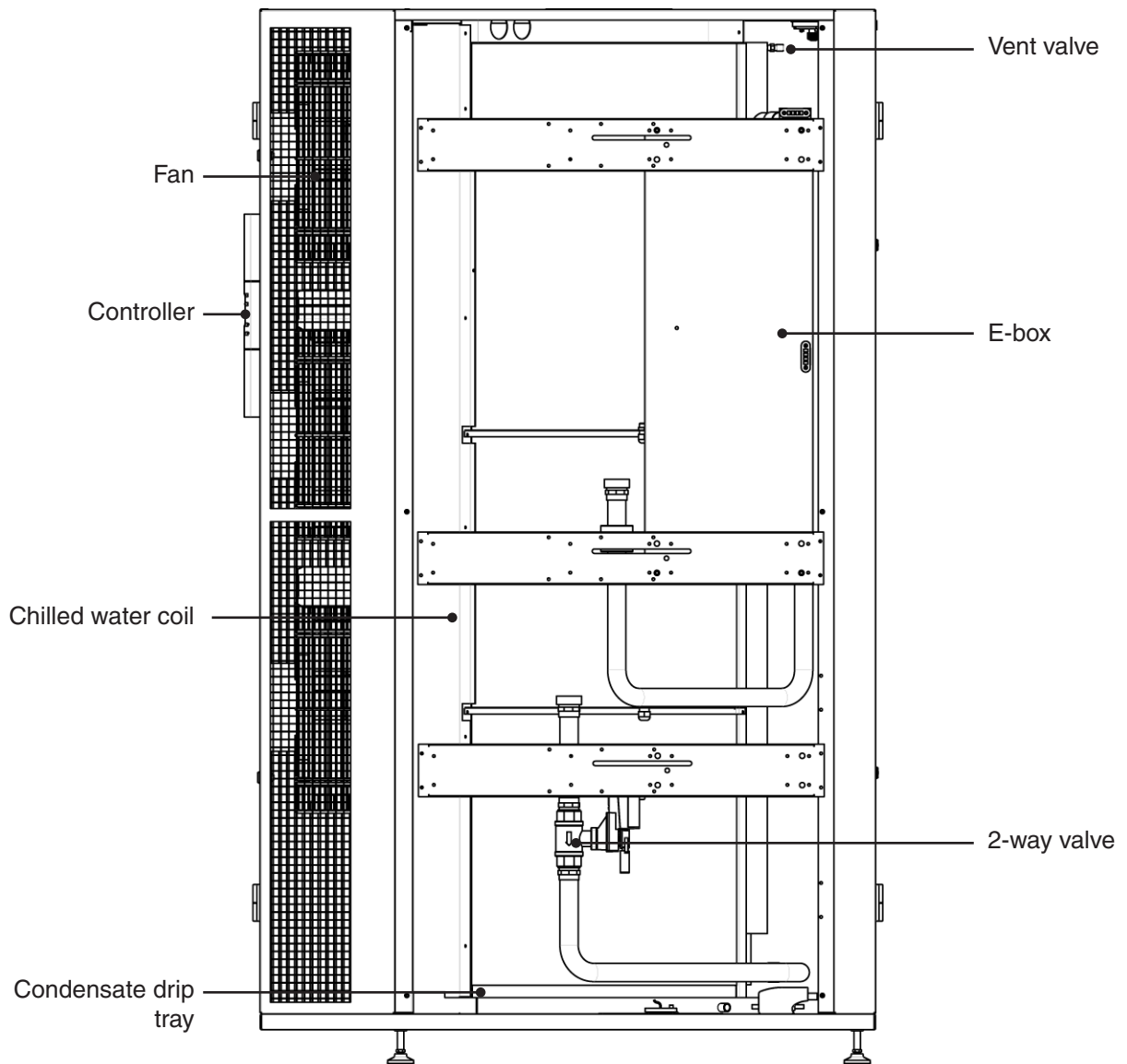


## Internal layout of CW unit, size 1





## Internal layout of CW unit, size 2



## 4.4 Working modes

### Cooling

Air is aspirated by the radial fans, it is filtered and then cooled passing through either the chilled water heat exchanger or the evaporator coil. After treatment, air is delivered through the front-lateral openings. The cooling capacity is modulated by C7000 in different ways:

- on A units acting on the fan speed, according to supply and return air temperatures;
- on AS and GS units acting on the compressor EC driver and the fan speed, according to supply and return air temperatures;
- on GES units acting on the compressor EC driver and the fan speed, according to supply and return air temperatures or by controlling the 2-way valve when free cooling operation is possible;
- on CW units acting on the 2-way valve and the fan speed, according to supply and return air temperatures.

### Humidification (option)

According to the signal of humidity inside the room, supplied by the humidity sensor, the C7000 controller switches on a steam humidifier (available as an option).

## 4.5 Mechanical components

### Structure

These units are made of self-supporting hot-dip galvanized sheet metal parts that offer good corrosion resistance (suitable only for non-corrosive and non-saline environments). External panels are powder coated with protective paint. This system is designed for an easy inspection of the unit.

The sides of the unit are internally lined with 10mm thick sound-absorbing material composed of polyurethane foam on an open-cell polyester base, tested for fire-resistance in accordance with FMVSS 302 motor vehicle safety standards. Inner components are accessible by opening their front and rear hinged doors.

### Air filter

An air filter is installed to filter air from the hot aisle before it enters the heat exchanger, preventing dirty particles from obstructing the coil. The zigzag filter belongs to efficiency class G4.

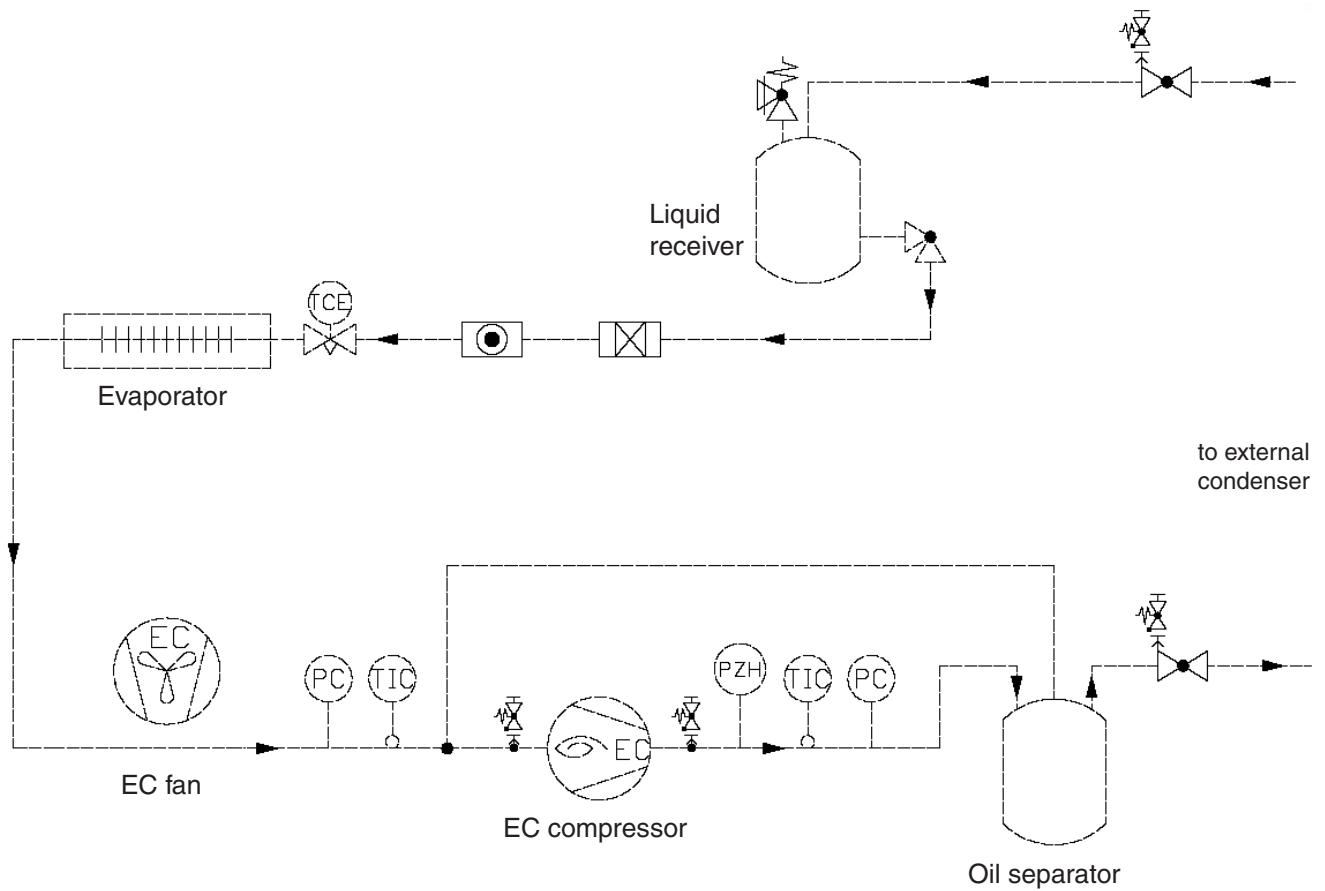
### Condensate water tray

Made of aluminium, it is placed below the heat exchanger to collect water condensing on its surface during cooling mode. It is provided with a connector with 16 mm outside diameter for water drain.















S-shaped plate for optimal air distribution

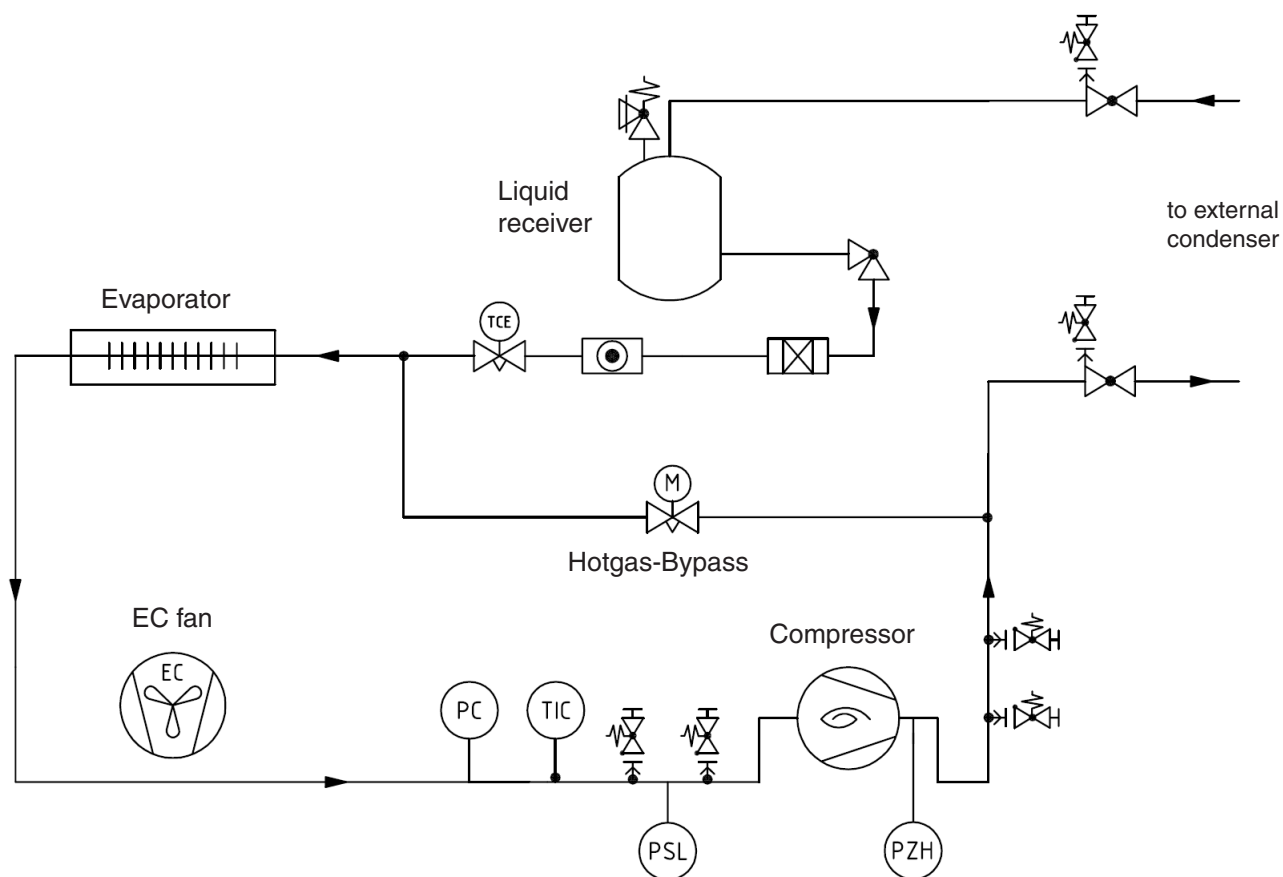
## Refrigerant scheme for AS units



### Legend

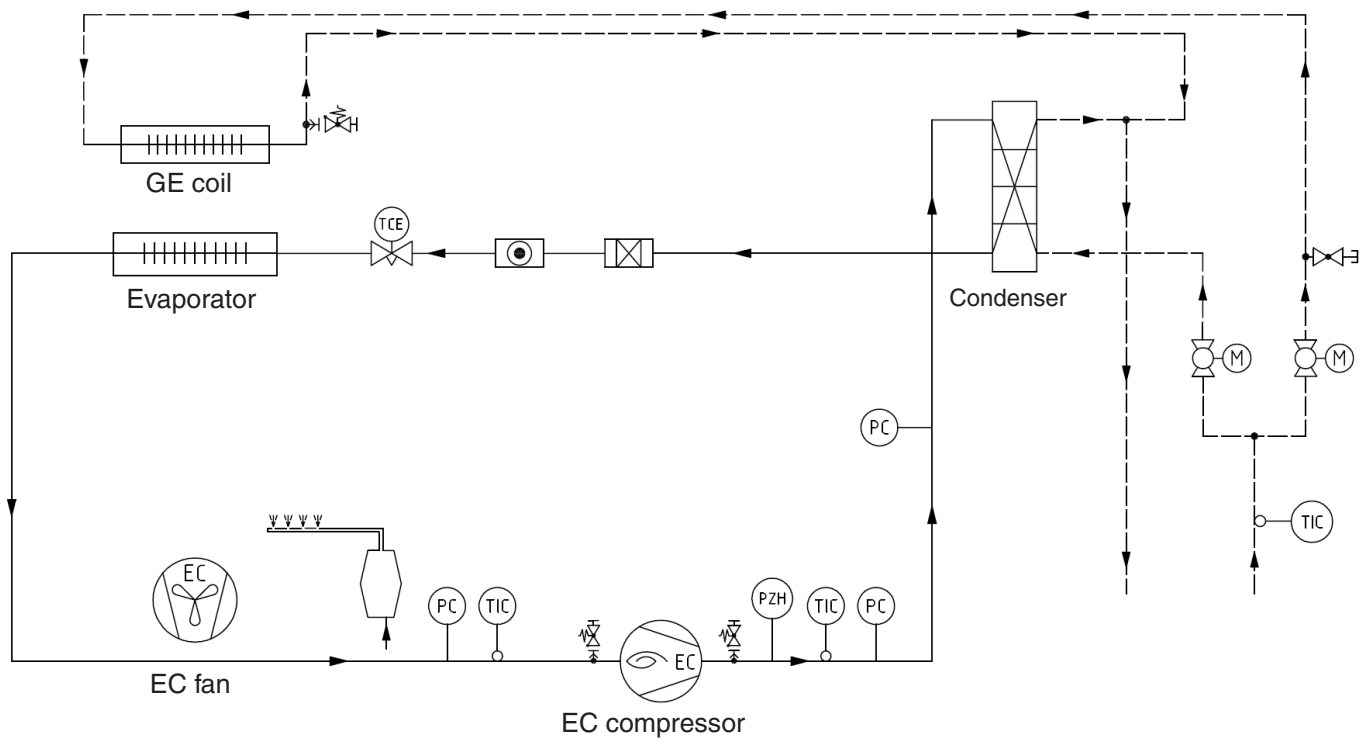
	Low pressure switch		Expansion valve
	High pressure switch		Filter drier
	Pressure transmitter		Sight glass
	Temperature sensor with indication		Angle valve
	Temperature sensor		Stop valve
			Pressure relief valve
			Schrader valve

## Refrigerant scheme for A units

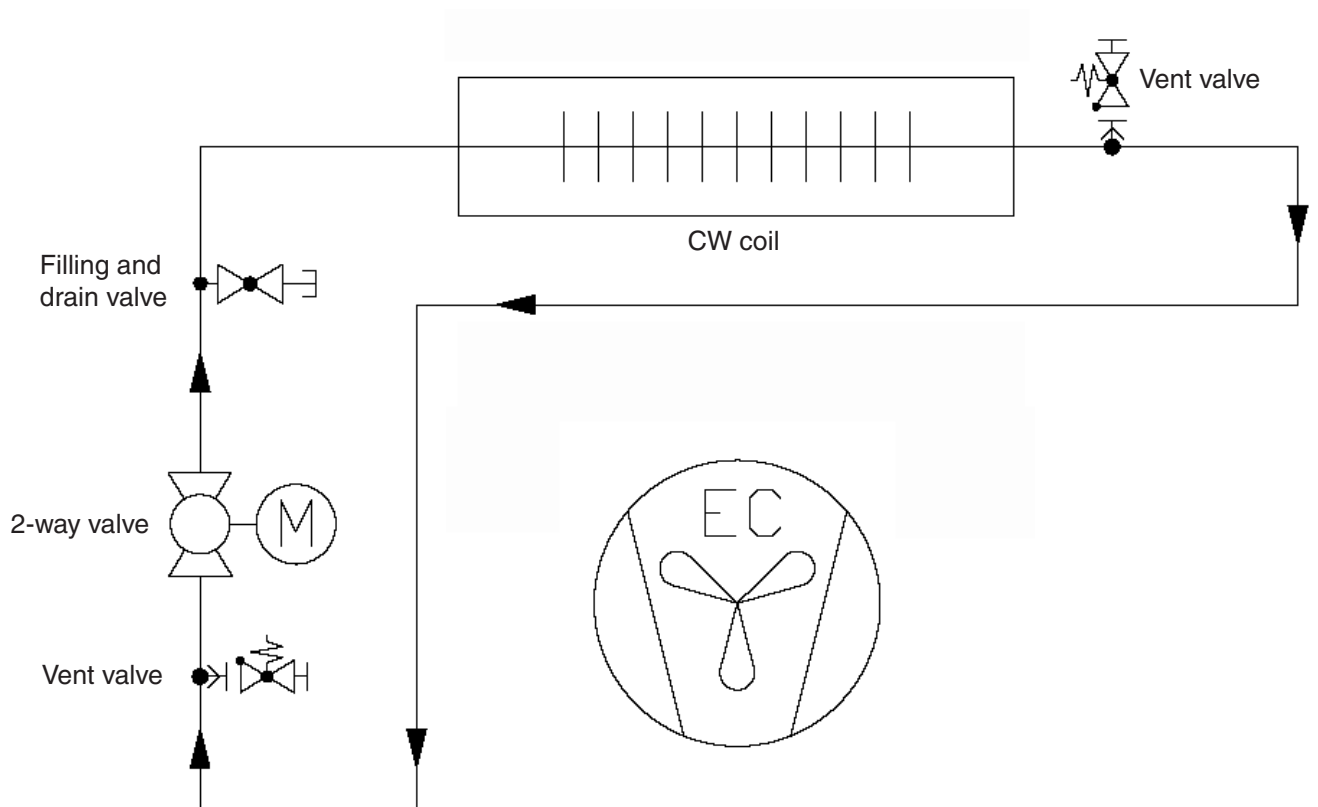




## Refrigerant scheme for GES units



## Refrigerant scheme for CW units



## 4.6 Motors

### Fans

Fans are radial, EC (electronic commutation) type, with backward curved blades made of galvanised sheet steel. Rotor is also made of galvanised sheet steel, mounted on ball bearings and dynamically balanced according to DIN ISO1940, quality level G6.3. Protection degree IP54. Insulation class B.

### 2-way modulating valve servomotor (CW units)

Power supply 24 V AC 50/60 Hz. Absorbed power 1 W at nominal torque. Control signal 0÷10 V. Running time = 90 s for an angle of 90°. Protection class III, IP54 protection degree.

## 4.7 Control, monitoring and safety components

All unit components are factory adjusted and generally do not require further adjustment. If, for special reasons, it becomes necessary to change the settings of the automatic devices these changes must only be performed by experts and only after informing the STULZ engineering division department.

**STULZ conditioners are equipped with a set of devices designed to ensure proper operation. Tripping by any one of these automatic safety devices is a sign of a malfunction and it is absolutely necessary to eliminate the cause.**



**It is forbidden to electrically by-pass the safety devices. Doing so, in addition to being dangerous, also immediately invalidates guarantee coverage for the product.**

**Isolate the system from electric mains before performing any repair or maintenance work.**

**Work on the units must only be done by qualified and authorized experts.**

### High pressure switch (A, AS, GS, GES units)

This stops compressor operation whenever pressure inside the refrigerant circuit exceeds 36 bar. When pressure returns below 29 bar, alarm signal from high pressure switch is disabled.

### Temperature sensors

Three PTC and three NTC temperature sensors are connected to analogue inputs of electronic controller, in order to measure following parameters:

- 3 return air sensors (TRA, TRB, TRC), placed behind air intake opening - higher, middle and lower part. They are NTC type connected to C7000 controller
- 3 supply air sensors (TIA, TIB, TIC), placed on frontal panel - higher, middle and lower part. They are PTC type connected to C7000 controller

On AS, GS and GES units: two additional NTC temperature sensors are placed on the suction and discharge side of compressor and connected to the driver of the compressor and the electronic expansion valve. The sensor on the suction side transmits a signal to the  $\mu$ PC controller for the management of the expansion valve. The sensor on the discharge side is used to check whether the compressor works within the envelope.

On GS units: one additional PTC sensor, connected to C7000, measures the temperature of water supplied to the condenser. This signal is used by C7000 to check anomalies in cooling circuit of the condenser.

### Pressure transducers (AS, GS, GES units)

Two pressure transducers are installed on the suction and discharge side of the compressor to check whether the compressor works within the envelope.

### µPC electronic board

It is installed on all AS, GS, GES units. This electronic board is connected to the C7000 via RS485 line to exchange data. The µPC controls the compressor speed acting on the EC driver. It receives also signals from pressure transducers and NTC temperature probes to check whether compressor works within the admitted range and to control the electronic expansion valve according to the superheating temperature.

On all units, this controller is also an expansion board of C7000 to provide the system with additional I/O contacts.

### Compressor EC driver (AS, GS, GES units)

According to a signal from the µPC controller, it modulates the rotation speed of compressor, in order to adjust cooling capacity to the actual thermal load.

### Main switch

An all-phase main switch is placed on the cover of e-box and disconnects the main power supply of all unit electric circuits downstream. The main switch knob is interlocked with the cover of e-box so as to prevent contact with electric live components inside the e-box. According to the instructions in chapter 6, an additional disconnecting switch must always be installed on main power supply lines upstream the unit, in order to cut off the power supply before performing maintenance.



**Double power supply line is available as an option, with the possibility of connecting also a second emergency power supply. In this case, the main switch installed on the unit interrupts both power supply lines.**



## 5. Technical data

### 5.1 Application limits

- Admissible return air conditions:
  - Temperature:
    - Lower limit: 18°C (DX) 20°C (CW)
    - Upper limit: 40°C (DX) 45°C (CW)
  - Humidity:
    - Lower limit: 5°C (DX), 5,5°C (CW) dew point
    - Upper limit: 60% r.h. and 16°C (DX) dew point  
resp. 17°C (CW) dew point
- Outdoor ambient conditions:
  - lower limit: -20°C
  - upper limit: depending on selected condenser
- Water circuit (CW-units):
  - max. total pressure: 16 bar
  - min. water temperature: 5°C
  - max. glycol content: 50%
- Required minimum thermal load: 30% of nom. cooling capacity
- Storage conditions:
  - Temperature [°C]: -20 – +45 (A/AS/GS/GES-units)  
-20 – +60 (CW-units)
  - Humidity [% rel. h.]: max. 90
- 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 with on/off compressors (CRS/L ... A):

208V/3Ph/60Hz; PE (also for CRS/L 320 CW)  
 230V/3Ph/60Hz; PE (also for CRS/L 320 CW)  
 380V/3Ph/60Hz; N; PE  
 460V/3Ph/60Hz; N; PE

460V/3Ph/60Hz; PE for the models CRS/L 361 AS  
 CRS/L 361 GS  
 CRS/L 361 GES  
 CRS/L 560 CW

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.



## Nominal conditions

Model		CR... - A/AS	CR... - GS	CR... - GES	CR... - CW
Return air temperature	°C	35			
Return air humidity	% r. h.	25			
Condensation temperature	°C	45			–
Water inlet temperature	°C	–	30	30 (10)*	10
Water outlet temperature	°C	–	40	40 (16)*	15
Refrigerant		R410A		R410A (100% water)	100% water

\* values for free cooling/winter operation in parentheses

The sound pressure levels are valid at a height of 1 m and distance of 2 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.

## Adjustment of the pressure switches:

### LP switch:

releases at:

automatic reset at:

### HP switch:

releases at:

manual reset possible at:

### Safety valve:

	R134a	R410A
bar	0,5	3,0
bar	1,5	6,0
bar	24,5	36,0
bar	18,0	29,0
bar	28	40

## 5.2 Technical Data - Construction size S

Model – CRS/CRL			211 AS	210 CW
Cooling capacity*	total	kW	22,2	22,7
35°C/25% r.h.	sensible		22,2	22,7
EER*			3,04	32,43
Water volume flow*		m <sup>3</sup> /h	–	3,9
Total pressure loss*		kPa	–	47
Diameter of 2 way CW valve		inch	–	1
Water content of CW coil		dm <sup>3</sup>	–	8,1
Air volume flow*		m <sup>3</sup> /h	4600	5000
Number of fans			5	5
Supply air temperature*		°C	21	21
Return air filter class			G4	G4
Filter number			2	
Filter dimensions		mm	900 x 260 x 47	
Sound pressure level - 2 m free field*		dB(A)	64,3	62,1
Unit dimensions H x W x D	CRS	mm	1950 x 300 x 1200	
Net weight (without water)		kg	220	170
Unit dimensions H x W x D	CRL	mm	1950 x 300 x 1375	
Net weight (without water)		kg	230	180

### Electrical Data

Model – CRS/CRL		211 AS	210 CW
<b>Compressor</b>			
Power consumption*	kW	6,4	–
maximum current consumption	A	16	–
<b>Fan</b>			
Power consumption*	kW	0,9	0,7
maximum current consumption	A	2,8 - 1,4 - 2,8	2,8 - 1,4 - 2,8
Total power consumption*	kW	7,4	0,7

\* values at nominal conditions

## 5.3 Technical Data - Construction size 1

Model – CRS/CRL			251 AS	251 GS	251 GES	320 CW
Cooling capacity*	total	kW	25,3	25,3	25,3 (21,2)	33,3
35°C/25% r.h.	sensible		25,3	25,3	25,3 (21,2)	33,3
EER*			3,56	3,56	3,37 (19,27)	27,75
Nominal refrigerant charge GS, GES <sup>1</sup>	kg		–	2,2	2,2	–
Water volume flow*	m³/h		–	2,8	2,9 (2,9)	5,7
Total pressure loss*	kPa		–	23	25 (35)	97
Diameter of 2 way GE/CW valve	inch		–	–	1	1
Diameter of 2 way cooling water control valve	inch		–	–	1	–
Water content of GE resp. CW coil	dm³		–	–	8,9	11,2
Air volume flow*	m³/h		5400	5400	5400	6400
Number of fans			3	3	3	3
Supply air temperature*	°C		21	21	21 (23)	21
Return air filter class			G4			
Filter number			2			
Filter dimensions	mm		900 x 260 x 47			
Sound pressure level - 2 m free field*	dBA		65,9	65,9	68,5	74,6
Unit dimensions H x W x D	mm	CRS	1950 x 400 x 1175			
Net weight (without water)	kg		250	270	290	197
Unit dimensions H x W x D	mm	CRL	1950 x 400 x 1375			
Net weight (without water)	kg		261	281	301	208

<sup>1</sup> Units of version AS contain a protective gas filling under atmospheric pressure.

Values for free cooling in parentheses

### Electrical Data

Model – CRS/CRL		251 AS	251 GS	251 GES	320 CW
<b>Compressor</b>					
Power consumption*	kW	6,4	6,4	6,4	–
maximum current consumption	A	16	16	16	–
<b>Fan</b>					
Power consumption*	kW	0,7	0,7	1,1	1,2
maximum current consumption	A	3,1	3,1	3,1	3,1
Total power consumption*	kW	7,5	7,5	7,9	1,2

\* values at nominal conditions

## 5.4 Technical Data - Construction size 2

Model – CRS/CRL			361 AS	361 GS	361 GES	560 CW
Cooling capacity*	total sensible	kW	37,5 37,5	37,5 37,5	37,5 (30,9) 37,5 (30,9)	58,2 58,2
EER*			3,35	3,35	3,32 (22,07)	–
Nominal refrigerant charge GS, GES <sup>1</sup>		kg	–	2,9	2,9	–
Water volume flow*		m³/h	–	4,2	4,2 (4,2)	10,0
Total pressure loss*		kPa	–	50	43 (42)	77
Diameter of 2 way GE/CW valve		inch	–	–	1	1 ¼
Diameter of 2 way cooling water control valve		inch	–	–	1	–
Water content of GE resp. CW coil		dm³	–	–	11,5	17,5
Air volume flow*		m³/h	8000	8000	8000	11200
Number of fans			3	3	3	3
Supply air temperature*		°C	21	21	21 (24)	20
Return air filter class			G4			
Filter number			2			
Filter dimensions		mm	900 x 460 x 47			
Sound pressure level - 2 m free field*		dBA	66,3	66,3	66,8	71,7
Unit dimensions H x W x D	CRS	mm	1950 x 600 x 1175			
Net weight (without water)		kg	300	330	360	254
Unit dimensions H x W x D	CRL	mm	1950 x 600 x 1375			
Net weight (without water)		kg	312	342	372	266

<sup>1</sup> Units of version AS contain a protective gas filling under atmospheric pressure.  
Values for free cooling in parentheses

### Electrical Data

Model – CRS/CRL			361 AS	361 GS	361 GES	560 CW
<b>Compressor</b>						
Power consumption*	kW		9,9	9,9	9,9	–
maximum current consumption	A		22	22	22	–
<b>Fan</b>						
Power consumption*	kW		1,3	1,3	1,4	2,8
maximum current consumption	A		5,3	5,3	5,3	5,3
Total power consumption*	kW		11,6	11,6	11,7	2,8

\* values at nominal conditions

## 5.5 Technical Data - Units with on/off compressor

Model – CRS/CRL			211 A	251 A	361 A
Cooling capacity R410A* 35°C/25% r.h.	total sensible	kW	20,3 20,3	24,8 24,8	35,9 35,9
EER R410A*			3,76	4,20	4,08
Supply air temperature R410A*		°C	22	21	22
Cooling capacity R134a* 35°C/25% r.h.	total sensible	kW	17,0 17,0	22,2 22,2	32,1 32,1
EER R134a*			4,05	4,44	4,17
Supply air temperature R134a*		°C	24	23	23
Air volume flow*		m³/h	4600	5400	8000
Number of fans			5	3	3
Return air filter class			G4		
Filter number			2		
Filter dimensions		mm	900 x 260 x 47		900x460x47
Sound pressure level - 2 m free field*		dBA	64,3	65,9	66,3
Unit dimensions H x W		mm	1950 x 300	1950 x 400	1950 x 600
Unit dimensions - depth	CRS	mm	1200	1175	
Net weight		kg	220	250	300
Unit dimensions - depth	CRL	mm	1375		
Net weight		kg	230	261	312

<sup>1</sup> Units of version A contain a protective gas filling under atmospheric pressure.



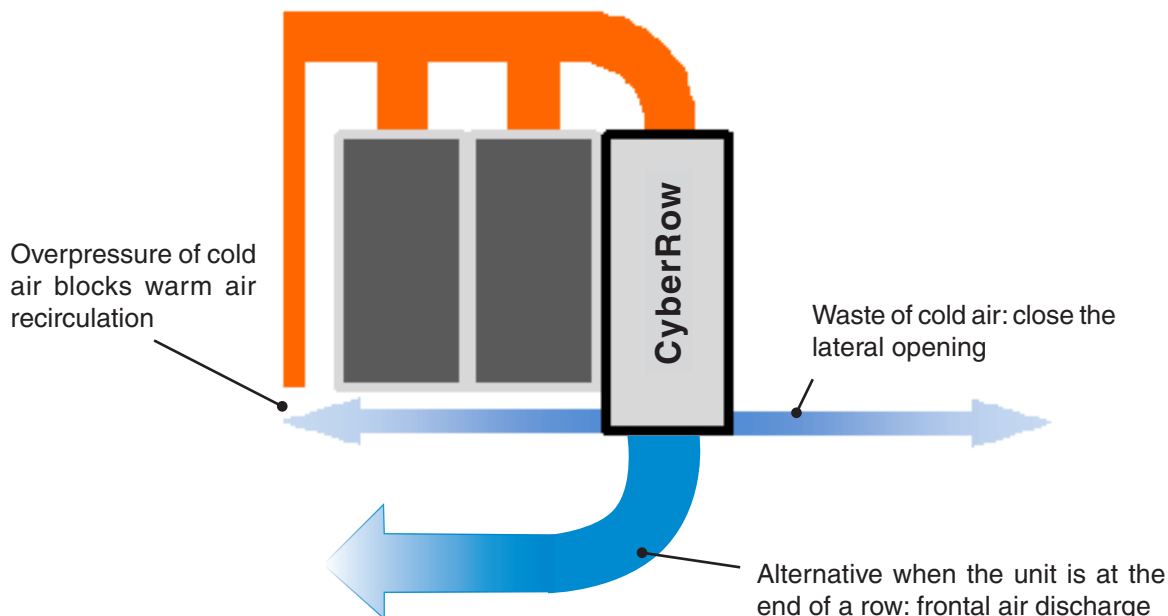
## 6. Installation

### 6.1 Positioning the unit

CyberRow units work in open loop architecture, between a hot and a cold aisle. For a higher energy efficiency of open loop applications, please consider the following recommendations:

- Minimize mixing of hot and cold air between the aisles at the end of the server rows and on their top. The air discharge from CyberRow units is already designed to reduce this mixing. However, where necessary, air deflectors in critical positions give some additional help.
- For the same purpose, provide blanking plates to close free spaces inside server racks.
- CyberRow units have air discharge at both lateral sides. Therefore they should be installed between racks. Installation at the end of a row cause a waste of cold air on the side without racks. Should this application be necessary, it is recommended to close the air discharge opening to that side. Closing plates are available as accessories. As an alternative to close the row of units, a unit with frontal air delivery is available as option.
- Install air conditioning units near the racks with the highest load.

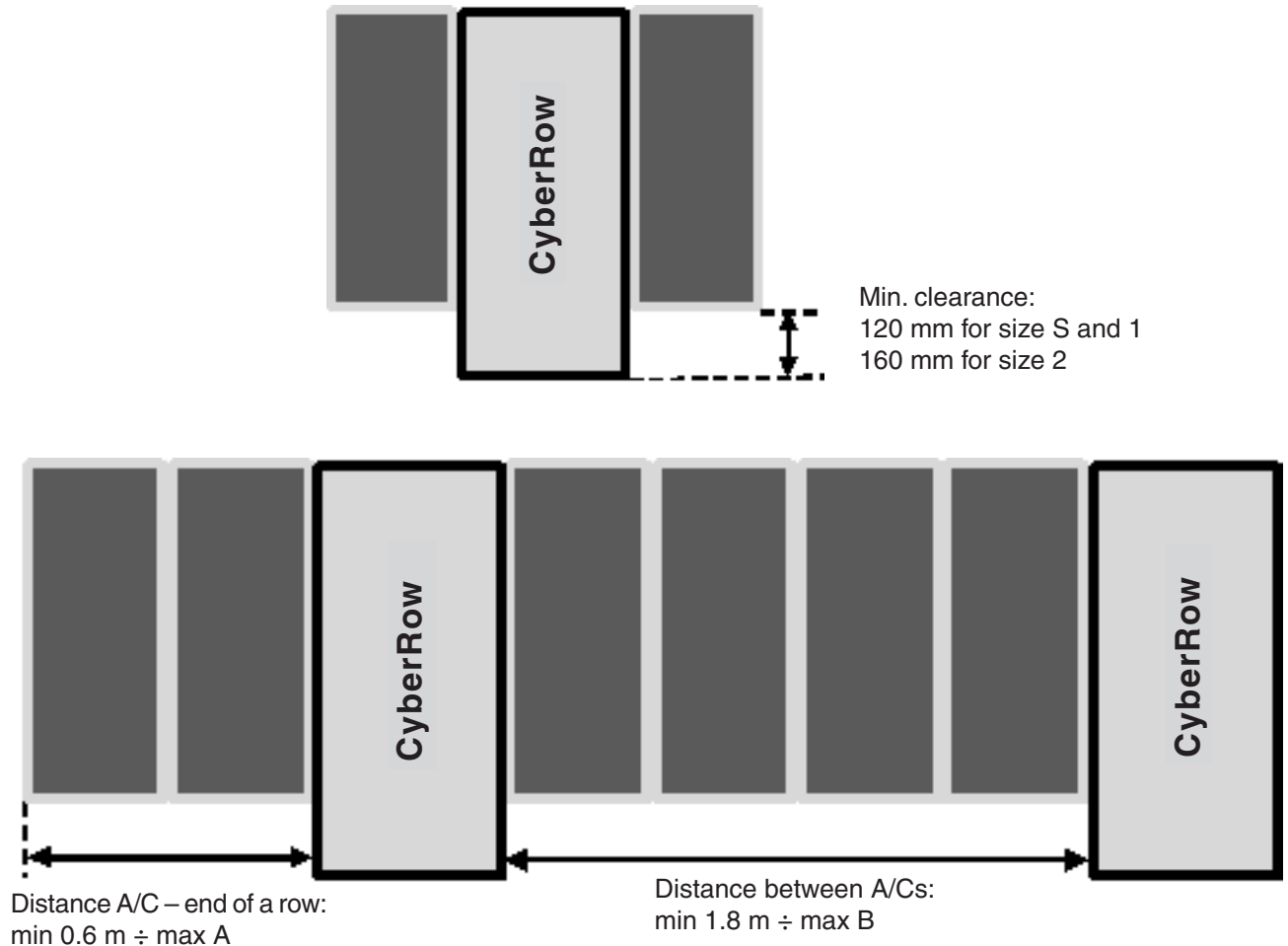
#### Top view



Only for CW size 2 units: by closing one lateral opening, the airflow supplied by the other opening causes an underpressure of nearly 70 Pa at the air intake of the server rack next to the unit. For the aspiration of cold air, the fans of this server rack must have an available static pressure of 70 Pa minimum.

Due to the lateral position of air discharge openings, CyberRow units must be installed protruding in the cold aisle from the front of the rack line: 120 mm for sizes S and 1 / 160 mm for size 2.

#### Top view



Size	A	B
S	1,8 m	2,4 m
1	2,4 m	2,4 m
2	3,0 m	3,6 m



**When CyberRow works at reduced capacity, also the supply air speed decreases, therefore the most distant racks from the CyberRow unit are provided with less cold air. These should be the racks with the minimum heat load.**

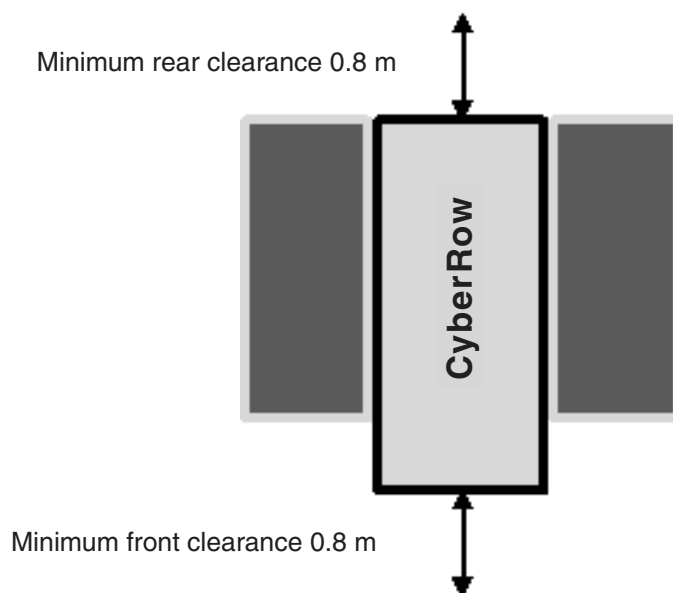
**To control temperature at the intake of most distant rack from the unit, remote probes to measure supply air temperature are available as accessory.**

There are no limits for the maximum width of aisles, because cold air is not dispersed in the entire cold aisle, but is supplied in a thin layer near the surface of the racks. Minimum width of aisles is determined by the space necessary for maintenance in the front and rear sides of the unit, as well as by applicable safety standards.

The number of racks served by one CyberRow unit, as well as the distribution of the units in the rows, must be decided from time to time according to the heat load per rack and the desired redundancy in case of failure. Contact STULZ for any assistance regarding the design of the site.

Furthermore, check that:

- There's room enough for an easy installation and maintenance of the unit: please check dimensional drawings, with particular attention to the accessibility of water / refrigerant connections and wiring. There must be a clearance of 0.8 m from both front and back sides of the unit for installation and maintenance.



- Air circulates correctly, avoiding any short circuit, re-circulation or by-pass.
- Avoid any obstacle in the air flow.
- Unit base is perfectly horizontal so that the unit will operate correctly and that condensate will drain properly. Units have adjustable supports for this purpose.

## 6.2 Preliminary operations

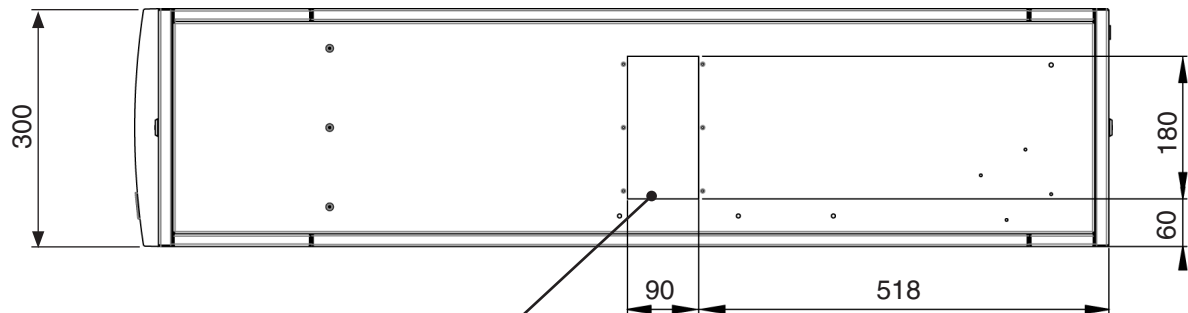
- Open the front panel with a male triangular wrench to check unit data plate. Then close it again.
- Open the rear panel with a male triangular wrench. You will find unit documentation. Read it carefully and prepare for connection of cooling circuit.
- Once the unit is placed for good, adjust its supports to have the base in a perfectly horizontal position. Supports are adjustable to a maximum height of 80 mm.
- Locate passage positions of refrigerant / chilled water pipes, as well as of condensate discharge, electric cables, humidifier connections (when present).

## CRS 211 A/AS, 210 CW

Size S

## Top view

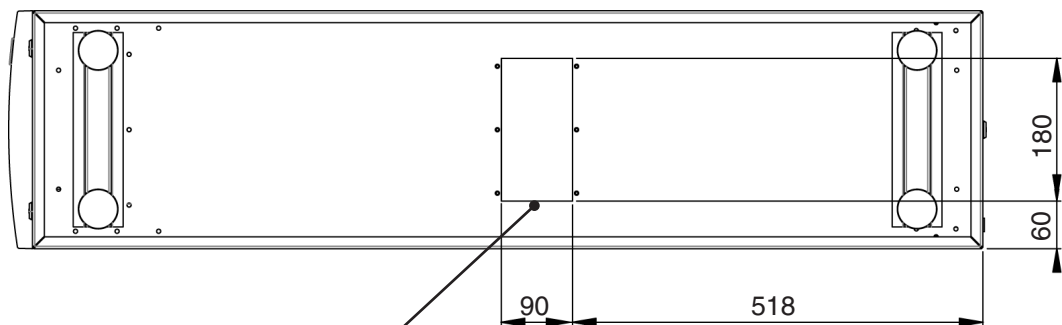
## Standard: connection from top



IN/OUT refrigerant/water pipes,  
condensate discharge (condensate  
pump is required), electric cables

## Bottom view

## Option: connection from bottom



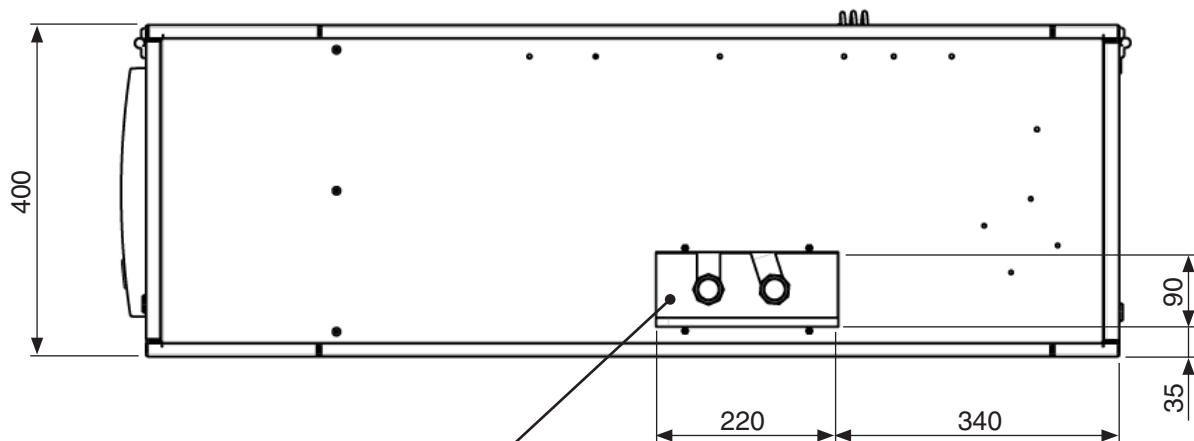
IN/OUT refrigerant/water pipes, con-  
densate discharge, electric cables

## CRS 251 A/AS/GS/GES, 320 CW

Size 1

Top view

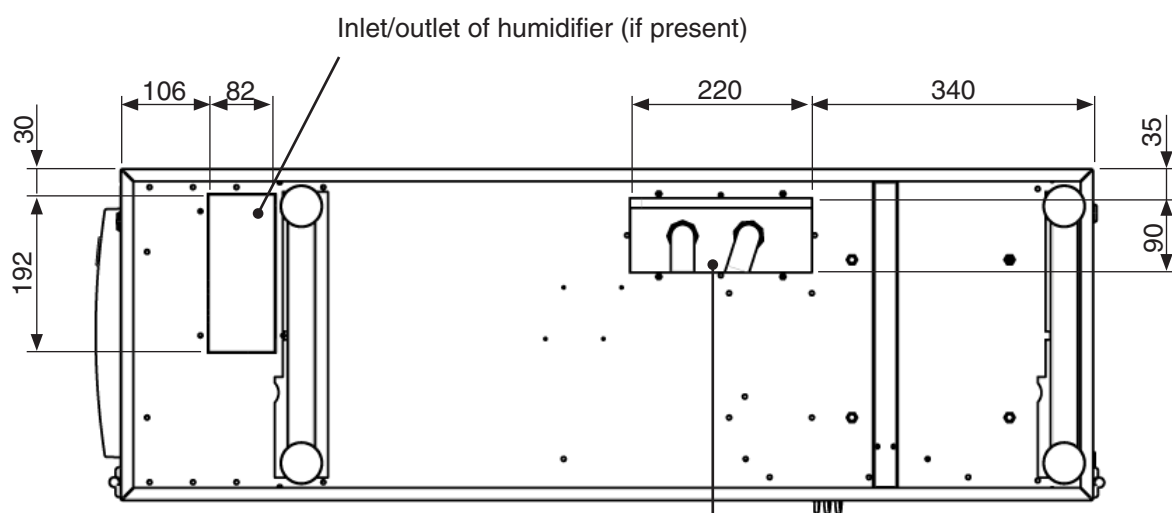
Standard: connection from top



IN/OUT refrigerant/water pipes,  
condensate discharge (condensate  
pump is required), electric cables

Bottom view

Option: connection from bottom



IN/OUT refrigerant/water pipes, con-  
densate discharge, electric cables





Each CyberRow unit is available in two different depths and, when in use with racks of different depths, it can ensure to be flush with the racks on the warm aisle side.

CyberRow Large units have a uniform depth of 1375 mm.

The unit views are displayed on the following pages sorted by construction sizes.

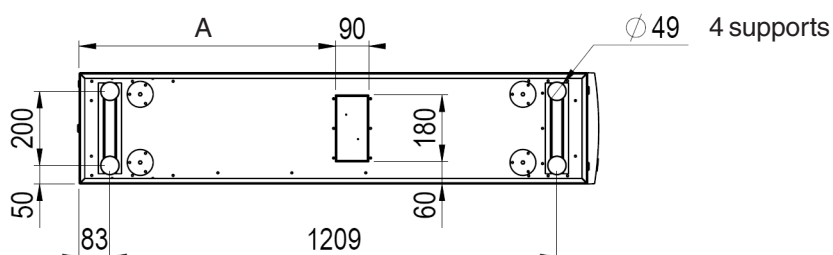
## CRL 211 A/AS, 210 CW

**Size S**

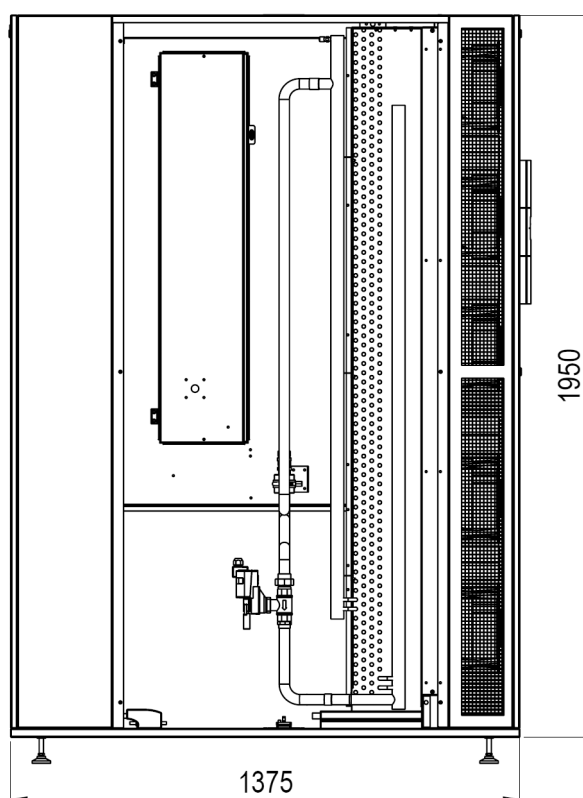
CyberRow model	CRL 211 A/AS	CRL 210 CW
A	778	693

[A] = mm

bottom view

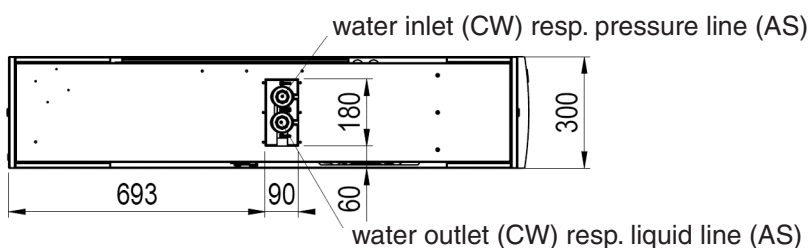


side view



This illustration shows the side view of a CW unit. The dimensions of the AS unit are identical.

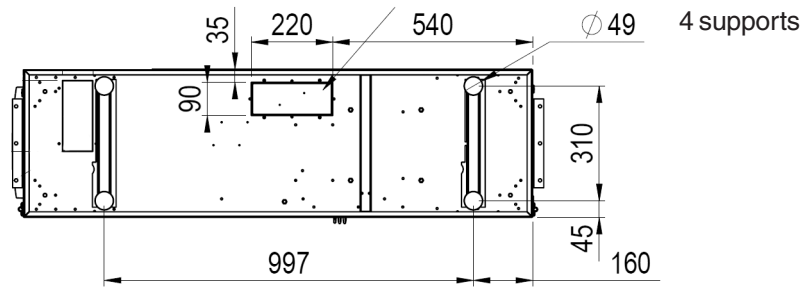
top view



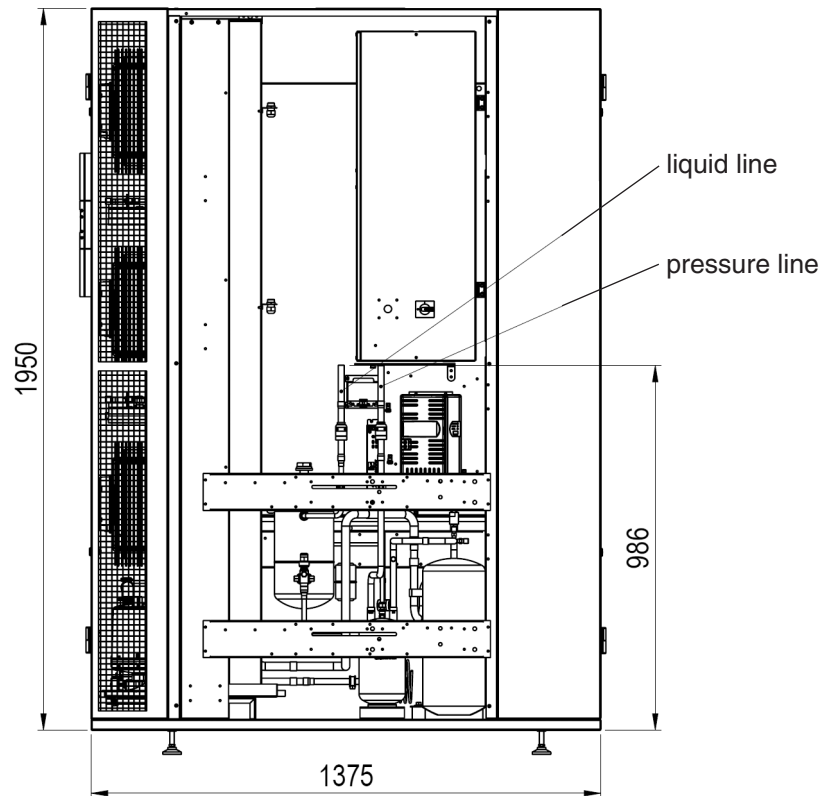
CRL 251 A/AS

Size 1

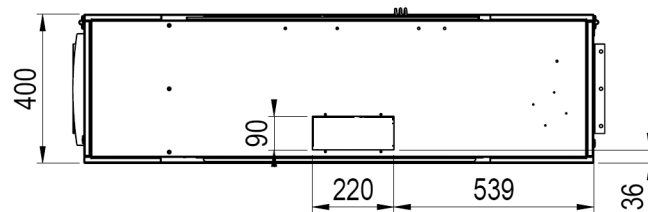
bottom view



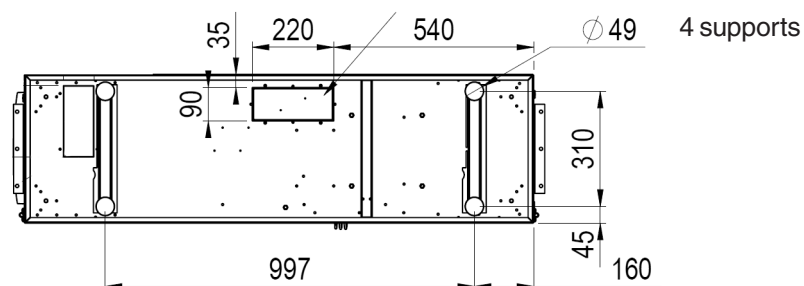
side view



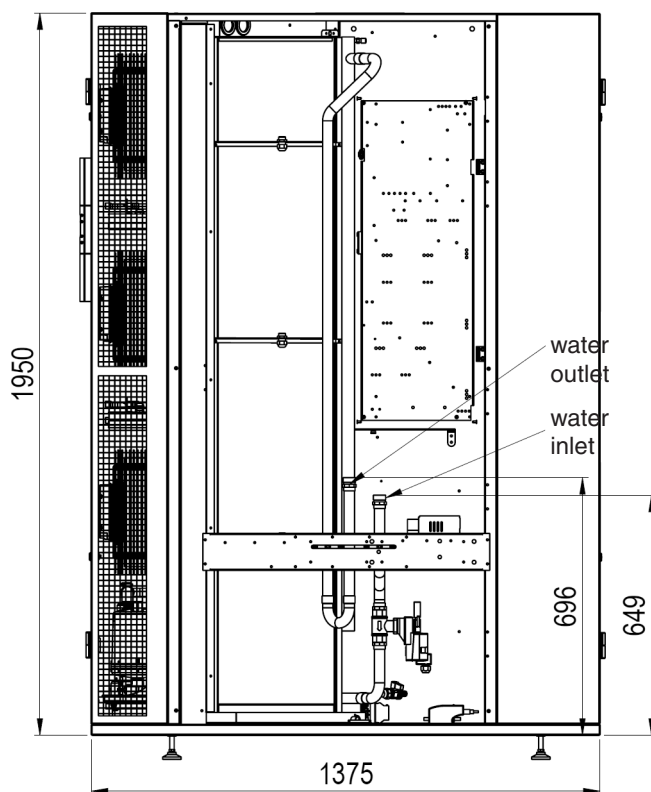
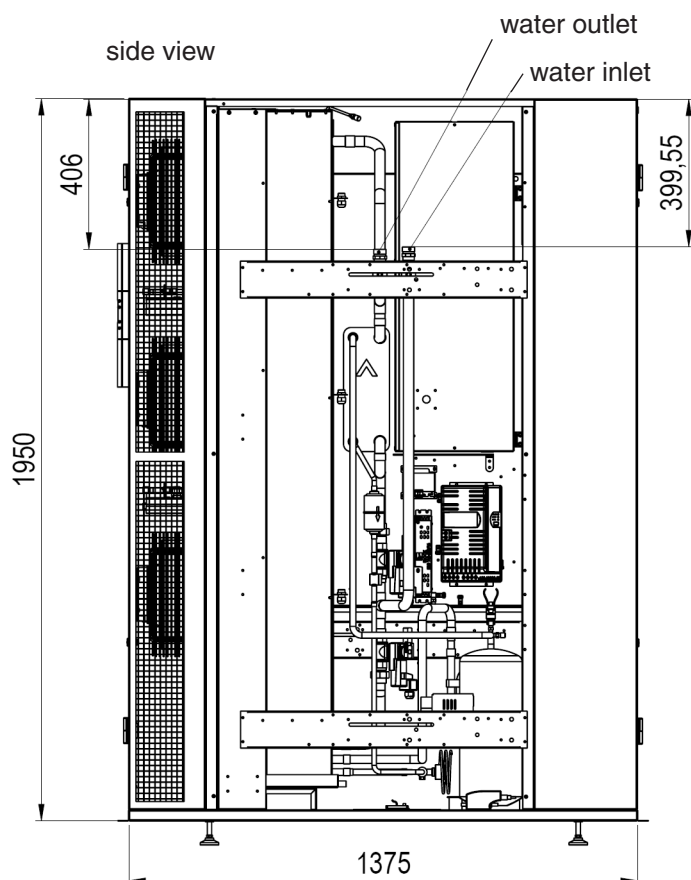
top view



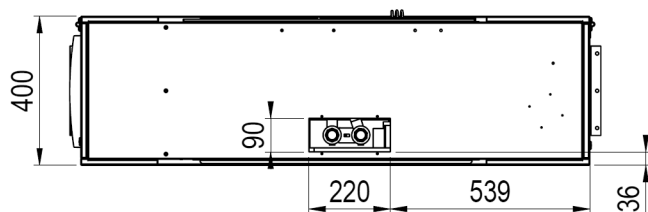
bottom view



side view



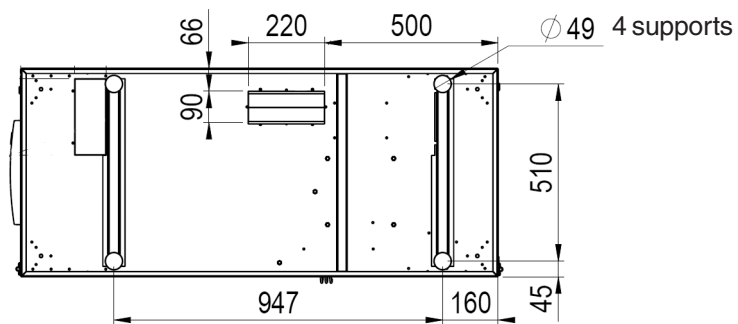
top view



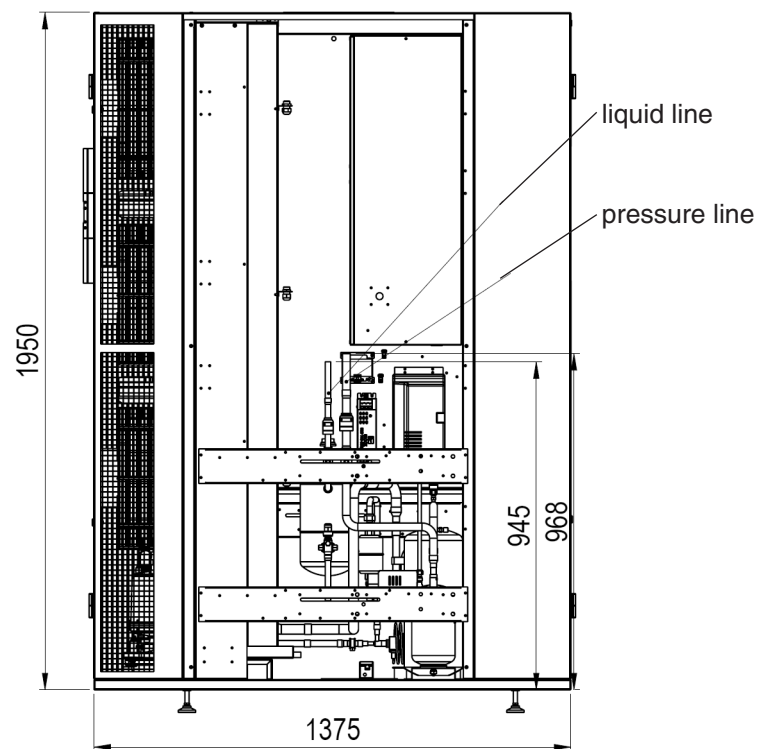
## CRL 361 A/AS

Size 2

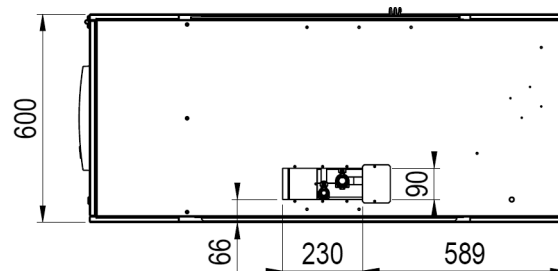
bottom view



side view



top view

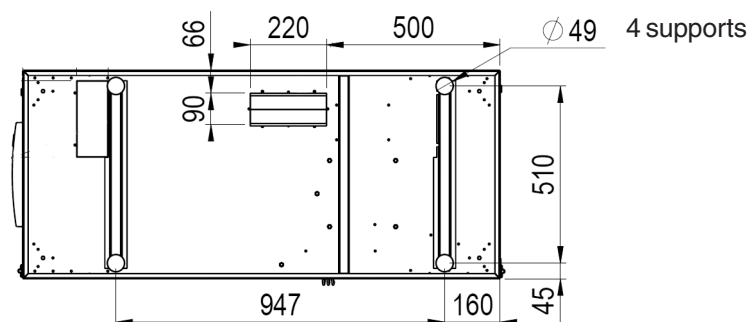


## CRL 361 GES

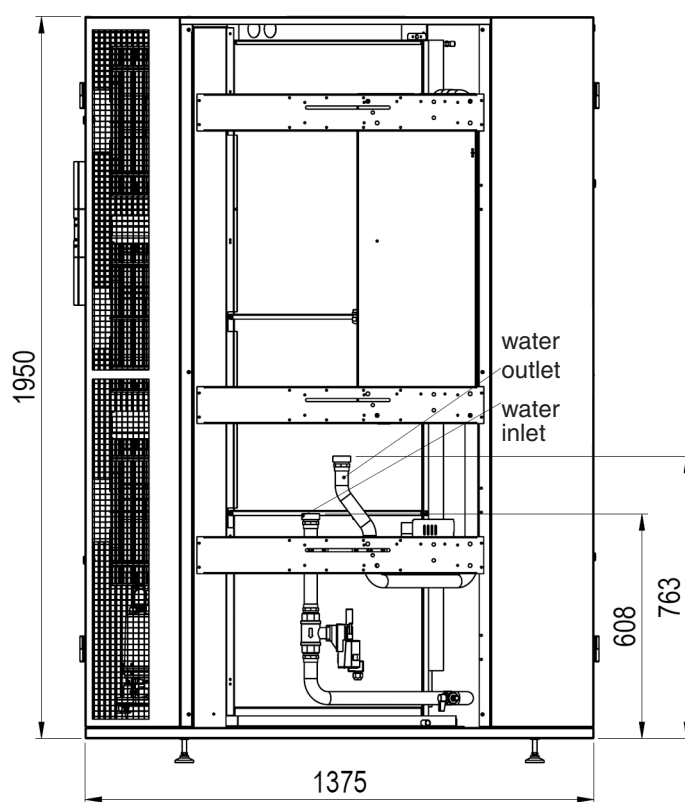
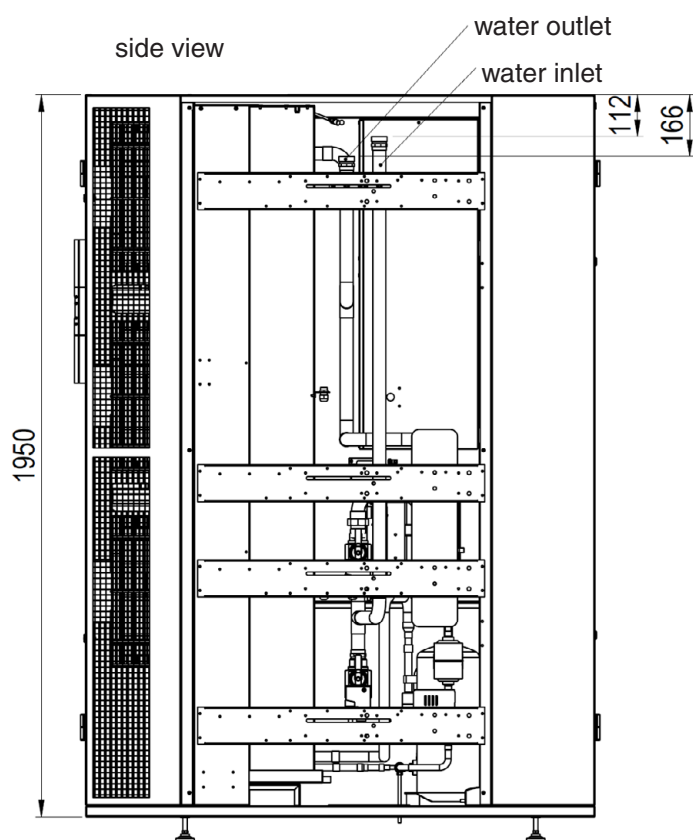
## CRL 560 CW

## Size 2

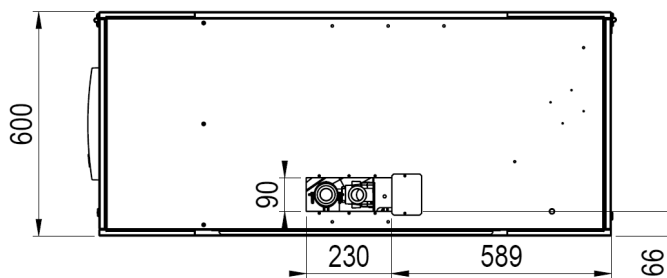
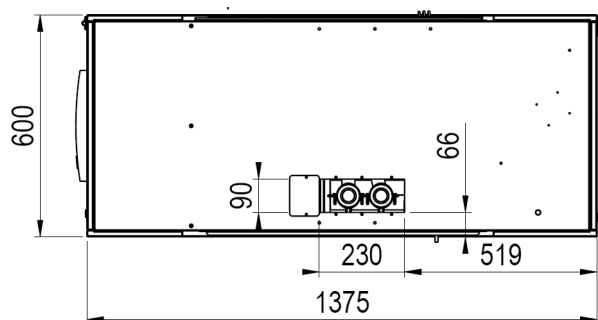
bottom view



side view



top view



## 6.3 Refrigerant circuit connection (A and AS units)

CyberRow A and AS units must be connected to a remote condenser. This condenser is not supplied together with the unit.

Establishing the refrigerant connection consists of the following steps:

1. Selecting and laying the pipes.
2. Closing the circuit and testing the tightness with the conditioner and condenser stop valves closed.
3. Opening the valves and creating a vacuum.
4. Filling with refrigerant.

### 6.3.1 Selecting and laying the pipes

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.



## A/C units with speed controlled compressor (AS version)

The units contain an oil separator which is installed at the hot gas side of the compressor and serves to recuperate oil in all operating states. The separated oil is injected on the suction side of the compressor.

For the hot gas line and the liquid line each a non return valve is supplied loose with the A/C unit. For the liquid line we recommend to install the non return valve near the condenser, this avoids the return flow of refrigerant in to the condenser and a possible low pressure error at the unit start.

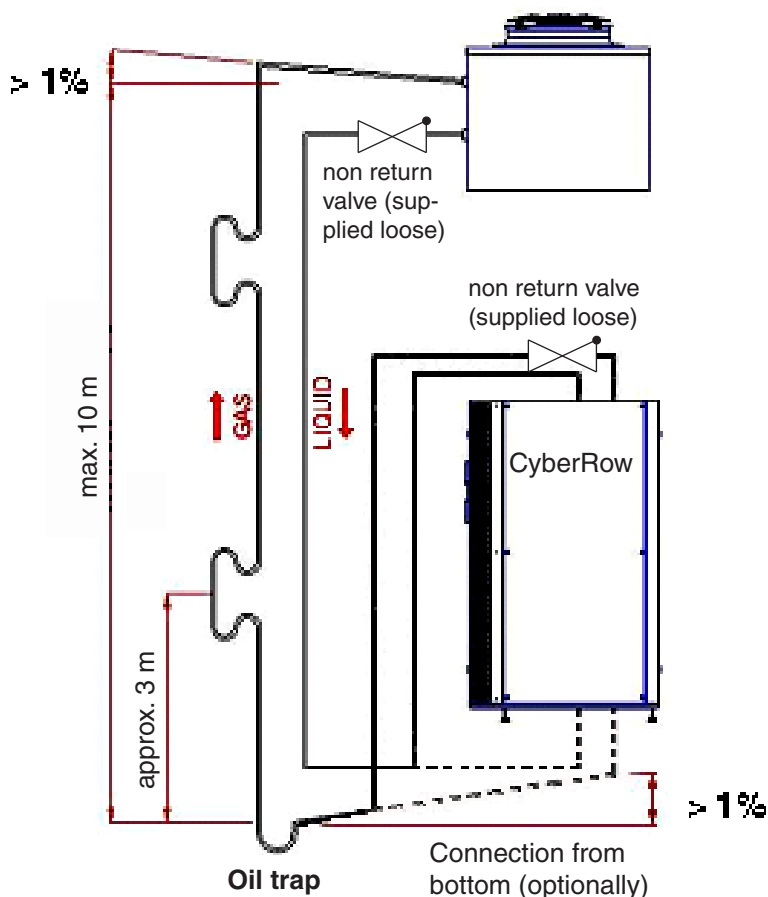
For the hot gas line we recommend to install the non return valve as close as possible to the A/C unit. The non return valve avoids the return flow of liquid refrigerant from the condenser when the A/C unit is not in operation.

### Measures to take with hot gas pipes if the condenser is positioned higher than the A/C unit

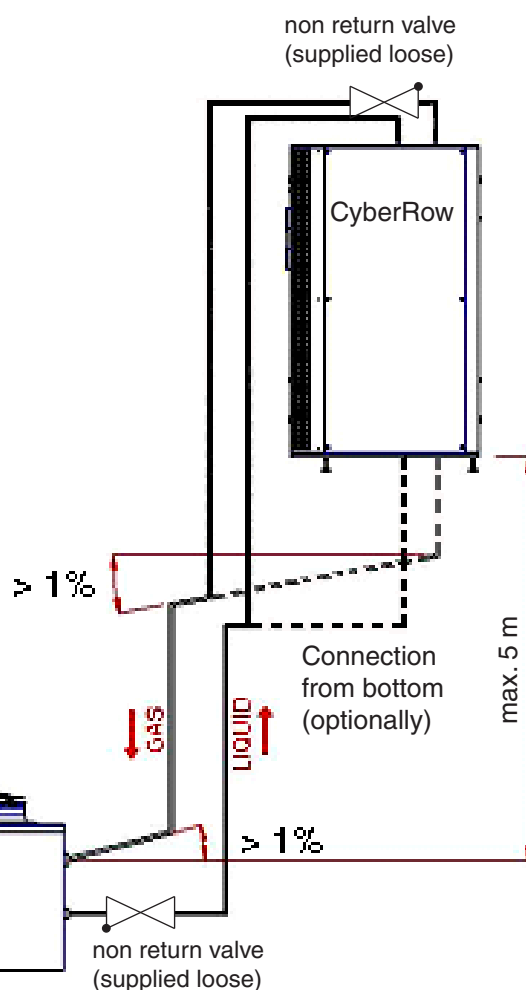
- Ascending pipes must have oil traps every 3 m (see drawing).
- Install an oil trap at the end of horizontal gas pipes whenever the following pipe is an ascending pipe (see drawing).



**Install a remote condensing unit designed for R410A refrigerant. For correct operation of the whole refrigerant circuit, the remote condenser must be provided with variable speed fan, to adapt condensing pressure to variable outdoor conditions.**



Laying pipes when the condenser is located higher up than the conditioner.



If condensing unit is located more than 5 m lower than the air conditioner, the air conditioning system must be adjusted so that an additional subcooling is guaranteed (contact STULZ).

### 6.3.2 Closing the circuit



**CyberRow unit is precharged with nitrogen at the end of manufacturing process. Check that the stop valves of the air conditioner are closed when connecting refrigerant pipes.**

1. Connect the pipes to the condenser. If the connections are pipes with brazed ends then cut the pipes, enlarge them and braise them to the pipe. If the connections are threaded then flange the pipes and connect. Check which is hot gas line and which is the liquid line.
2. Blow out the lines as follows:
  - Plug the free ends of the pipes
  - Connect a cylinder of dry nitrogen equipped with a pressure reducer (maximum pressure 10 bar) to the Schrader fittings on the condenser.
  - Pressurize the pipes with dry nitrogen
  - Instantly unplug the pipes
  - Repeat this process several times
3. Weld the pipes to the fittings on the air conditioner. For pipe passage, use the openings either on the base or on the top of the unit.



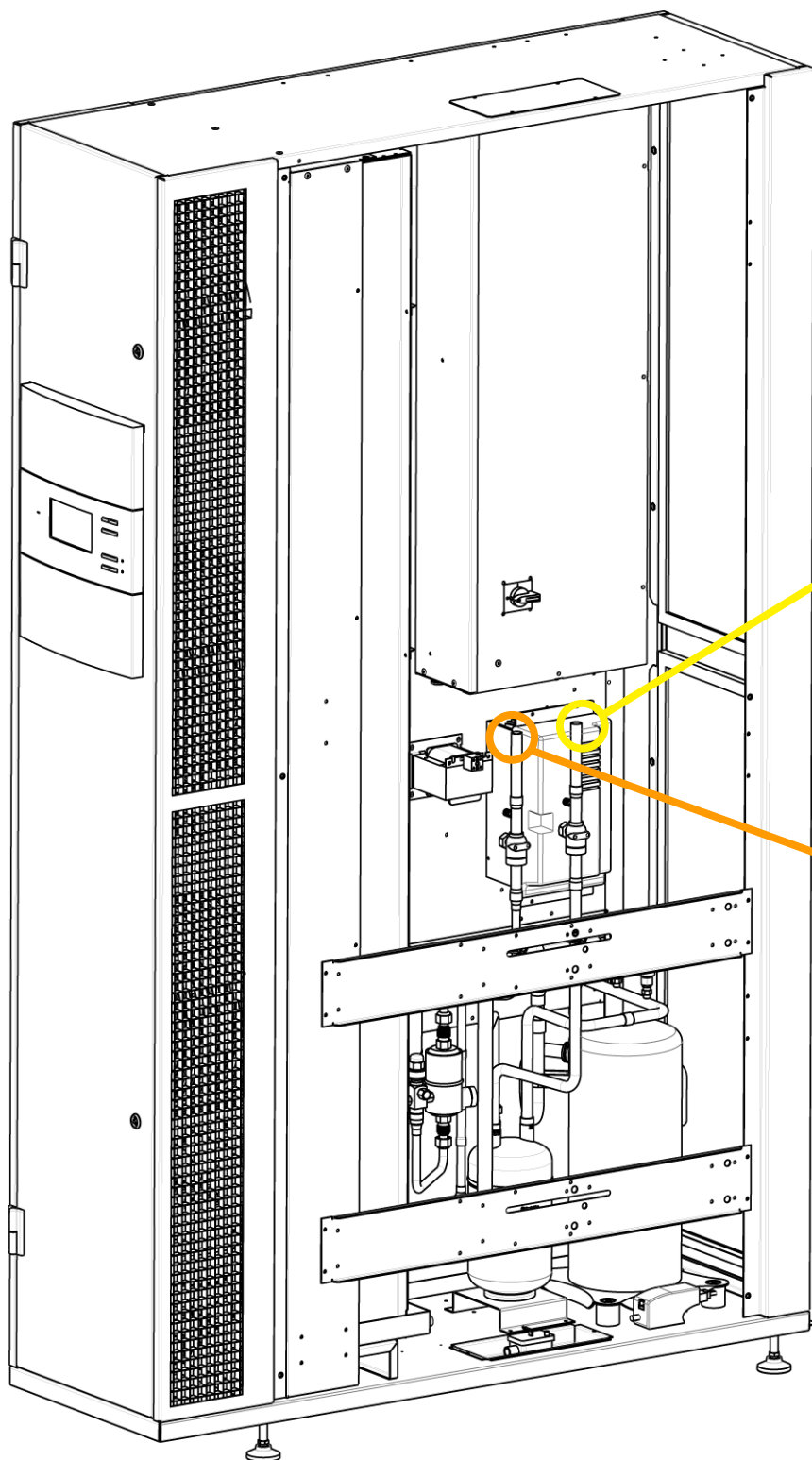
**Only for CyberRow size 1: electric box of the unit can rotate on its side for a better accessibility during maintenance. Lay out pipes inside the unit so that they do not impede its free movement.**



**Refrigerant at high pressure and temperature might go out from the discharge point of safety valve. Danger in the proximity of the discharge point.**

- In case of any leakage, after finding and repairing the leak, repeat the check.

After checking the pipe seal open the conditioner and condenser cocks and proceed with the next installation phase (creation of a vacuum and filling the circuit).



### Refrigerant line connection

#### Hot gas pipe

CR... 211 A/AS:  $\varnothing$  16 mm

CR... 251 A/AS:  $\varnothing$  16 mm

CR... 361 A/AS:  $\varnothing$  22 mm

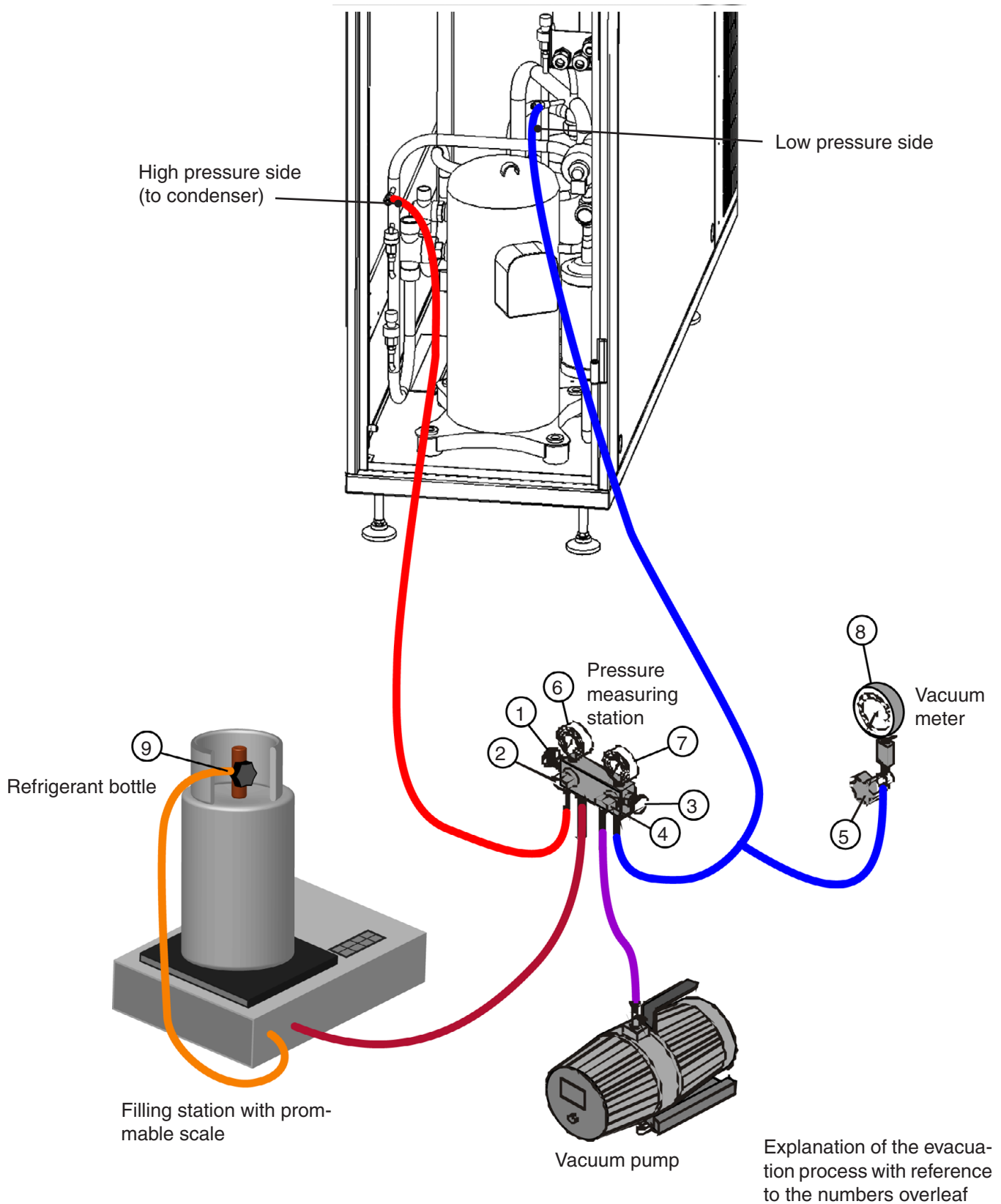
#### Liquid pipe

CR... 211 A/AS:  $\varnothing$  12 mm

CR... 251 A/AS:  $\varnothing$  16 mm

CR... 361 A/AS:  $\varnothing$  16 mm

### 6.3.3 Creating a vacuum



Process	Values	Operation
1. Preparation	———	Open the valves (1) to (5). Close the valve (9).
2. Evacuation	70 mbar	Operate the vacuum pump until the value of 70 mbar is displayed on the pressure gauge. Stop the vacuum pump after evacuation.
3. Breaking vacuum	0,98 bar	Close the valves (3), (4) and (5). Open the valve (9) and fill refrigerant whilst the high pressure gauge (6) and the low pressure gauge (7) are observed. When the value of 0,98 bar is reached, close valve (9).
4. Waiting time	5 minutes	———
5. Disposal	———	Disposal of refrigerant in accordance with the valid country-specific regulations. (e.g. using disposal station for FC)
6. Repeat 2. - 5.	1 x	as the above items
7. Last evacuation	1-2 mbar	as item 2
8. Completion	———	Close the suction side valves (3), (4) and (5). Stop the vacuum pump.
9. Filling refrigerant	As required by system	Open the valve (9). Pre-fill the liquid receiver with refrigerant. The correct amount to be filled must be determined during the operation of the compressor. Close all valves after completing the filling process.

For reference see the illustration on the previous page.

### How to determine correct refrigerant charge

- Start up the unit according to the instructions in the chapter: Start-up. Manually force the unit to start cooling.
- Set the supply air set point and the differential set point at the lowest admitted level, so that the unit works at maximum cooling capacity.
- Check that the condensation temperature is approximately 45°C. If it is lower then reduce the efficiency of the condensing coil by partially shutting it down or by reducing the speed of the condenser fan.
- Measure the subcooling. Fill the system with refrigerant until a subcooling from 5 to 8 °C is reached.



**In general, electronic expansion valve doesn't require adjustments on site. This operation can be done only by specialized refrigeration technicians only after informing the STULZ engineering division department**

To estimate refrigerant charge in advance, please consider following volumes:

Components	Refrigerant circuit volume (dm <sup>3</sup> )		
	CR... 211 AS	CR... 251 AS	CR... 361 AS
Evaporator	4,6	5,9	9,3
Liquid receiver	1,5	4,6	4,6
Internal pipes - Liquid side*	0,16	0,83	0,86
Internal pipes - Gas side**	0,35	0,47	0,99

\* Including solenoid valve, sight glass, filter dryer

\*\* Intake and discharge pipes of compressor

### Oil charge



**The A/C unit is prefilled with 0.6 l oil. Further addition of oil damages the compressor and may invalidate guarantee coverage for the product.**

### 6.3.4 Filling the refrigerant circuit

- Before the system is filled with refrigerant, it must be clean and dry inside.
- Connect the unit electrically as described on top of page 51.
- Turn the main switch to the ON position (the C7000 controller should now be in the Stop mode).
- Switch on the control-circuit fuses.
- Do not switch on neither power switches nor the controller.

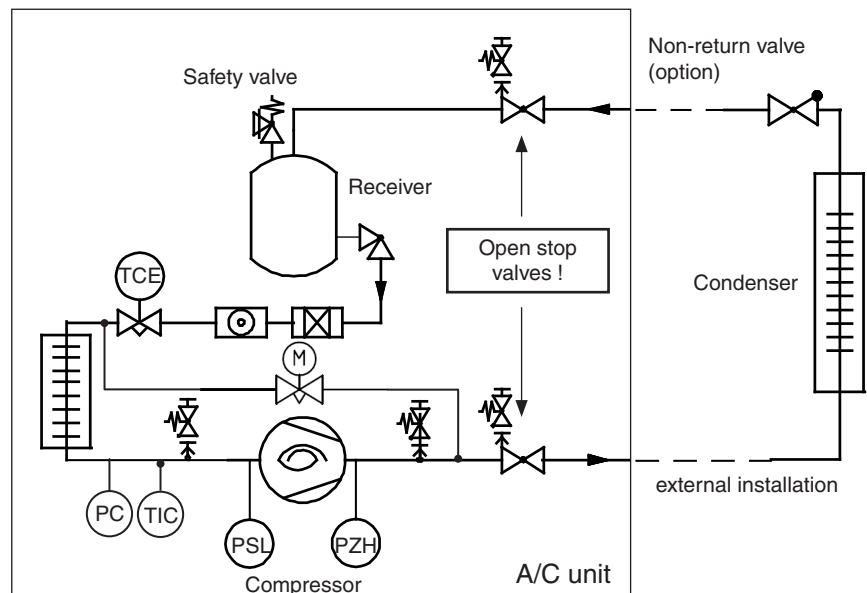
#### C7000AT:

- Select the Config menu.
- Enter the password.
- Go to menu "Components/Manual oper./Cooling/Valves.
- Change the parameter in the column "EN" line "EEV 1" from "0" to "1".
- Set the parameter in the column "Value" of the same line to 100%.

#### C7000IOC:

- Enter the command: "eev 1 hand 1" and "eev 1 handon 100".

#### A/C units with On/Off compressor



The expansion valve is now completely open.

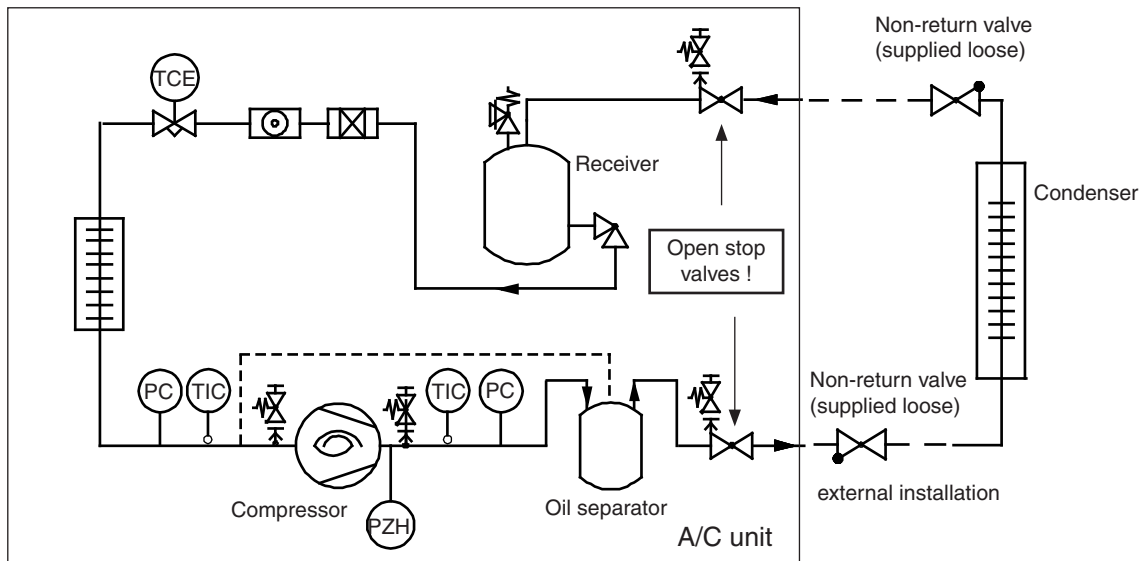
- Open the stop valves.
- The refrigerant circuit is filled with a nitrogen filling under atmospheric pressure. Evacuate the refrigerant circuit by the Schrader valves until approximately 0 bar.
- Fill the refrigerant circuit with refrigerant by the Schrader valves.
- Systems without refrigerant receiver 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 R410A, note that R410A is a binary blend. Take care that you add refrigerant in a liquid state, as the ratio of the refrigerant components changes if one of the two compounds passes over into the gaseous phase.**



### A/C units with speed controlled compressor



- Because R410A is a blend and scrolls have discharge check valves, systems should be liquid-charged on both the high and low sides simultaneously to ensure a positive refrigerant pressure is present in the compressor before it runs. The majority of the charge should be placed in the high side of the system to prevent bearing washout during first-time start.
- 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.**

## 6.4 Water connection (GS, GES, CW units)

CyberRow CW air conditioners must be connected to a circuit with chilled water, including either a chiller or a dry cooler or a cooling tower. For chilled water circulation, pumps have to be provided. These pumps must be selected according to total pressure losses in the hydraulic circuit.



**Internal pressure losses in water circuits of the air conditioners are shown in the technical data in chapter 5. Pressure losses refer to pure water. When monoethylene glycol is added, the correction factor for pressure losses which are shown in the following diagram must be taken into account.**

An important requirement for hydraulic circuit is quality of water. In case its purity is inadequate, a fine mesh filter in the circuit is recommended.



**Cooling fluid temperature must be  $> +5^{\circ}\text{C}$ .**

**The following table shows substances which must be added in particular working conditions to ensure correct functioning:**

WORKING CONDITIONS	ADDITIVE
Outside temperature $< 0^{\circ}\text{C}$	Antifreeze containing inhibited monoethylene glycol (*)
Hydraulic circuit made of multi-metallic systems as cast iron, steel, copper, brass, Aluminium	Passivating inhibitor of corrosion with neutral PH

(\*) Dose following the prescriptions of antifreeze supplier, according to minimum ambient and working temperatures.



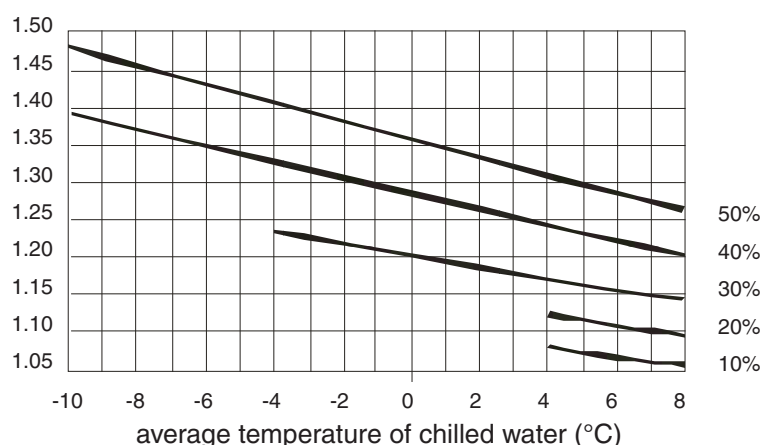
**An excess of additive reduces the performance of the cooling system. In case of doubt consult the manufacturer.**



**Maximum admitted quantity of glycol 50%**

**Maximum total (static + dynamic) pressure in water circuit = 10 bar for every standard CyberRow type GS, GES, CW.**

Coefficient of correction for pressure drop through the water circuit when using monoethylene glycol



Hydraulic connections in CyberRow units have an external thread, with the following diameters:

CR... 251 GS/GES	CR... 361 GS/GES
1"	1 1/4"

CR... 210 CW	CR... 320 CW	CR... 560 CW
1"	1"	1 1/2"

### Recommendation for GS and GES 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.



**Select hydraulic pipes with diameter suitable to their equivalent length (considering pressure losses by curves, unions, etc.), to the water flow, to the circulation pump head. The following minimum diameters are suggested:**

Water volume flow	dm <sup>3</sup> /h	< 2500	2500 - 3000	3000 - 4000	4000 - 5500
Pipe diameter	mm	28	42	54	64

For connecting the unit to the external system remove the protective caps or sealing disks of the screwed connections.

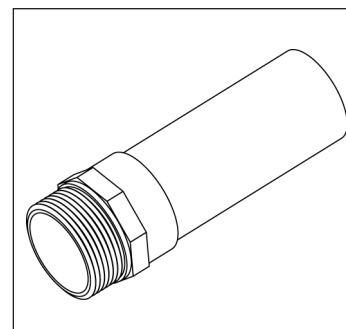


**Water remaining from the test run may escape when the protective caps are removed.**

The water connections end with an external thread. Screw the lines of the external system to the lines of the unit respecting the designation at the unit.

Insulate the water pipes with the diffusion tight insulating material, to prevent the introduction of ambient air heat and the formation of condensate at the pipes.

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



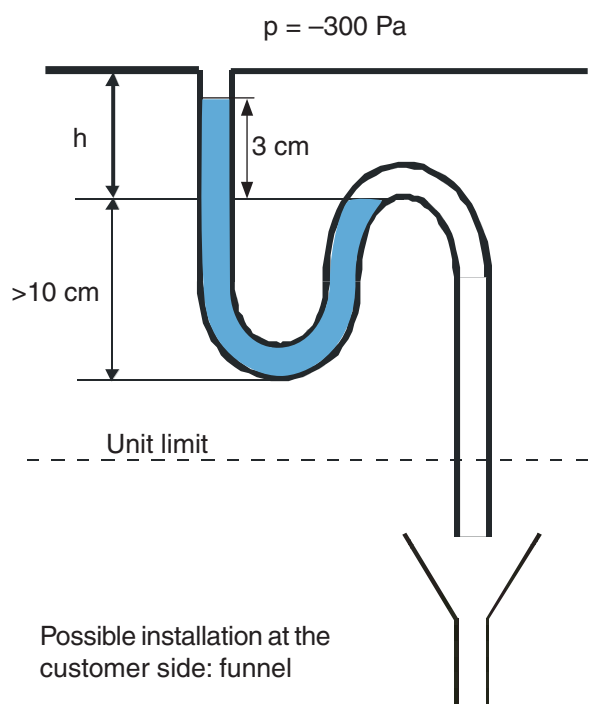
Connection with external thread

## 6.5 Condensate drain connection

Condensate drain connector is placed on the rear side of the drain pan, under the evaporator (or CW) coil. Connection diameter is 16 mm for all models. If condensate pump is not present, a PVC pipe with 2 m length is provided. This pipe has to be routed outside the unit through the opening on its base used also for pipes and electric cables. Make a siphon according to the following instruction:

### Siphon installation

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



Connect the condensate water drains to the local waste water system. Ensure a 2% gradient towards water drain



**Comply with the regulations of the local water supply authority.**

## 6.6 Electric connections

It is absolutely necessary, before making any connections, to check the supply voltage with a tester. The voltage that is measured must correspond with the voltage indicated on the unit label.

The installer must install, upstream from the unit, an isolating switch with fuse and capacity as specified on the label in order to permit maintenance on the machine with total absence of electricity.



The ON-OFF key on the C7000 is only used to switch off the control. It must not be considered to be a safety component permitting maintenance on the unit. Maintenance must only be carried out after having isolated the power supply to the unit (see previous note).

All electric connections and wiring must be done exclusively by authorized technical personnel. The system must be equipped with an effective ground connection.



Optionally, CyberRow units can be provided with an additional terminal to connect emergency power supply. Emergency line supplies the whole unit and it must have the same features as the main supply line.

The electric connection to the climate-control system must comply with the following regulations:

Machine safety directive (2006/42/CE)

Low voltage directive (2006/95/CE)

Electromagnetic compatibility directive (2004/108/CE)

National mechanical and electric systems regulations

- Cut off every power supply line before working on the unit;
- Section of power supply cables must be selected in accordance to their length, kind of power supply and the current absorbed by the unit, as prescribed by current regulations. These cables must comply with currently applicable standards. In any case we recommend using shielded cables unless the installer carries out, at his expense, tests that demonstrate that shielding is not necessary;
- Check that the power cables are installed at an adequate distance from alarm, communication and monitoring cables;
- On the main power supply line, install an all-phase circuit breaker with type C curve. The size of the circuit breaker must be determined according to the maximum current consumption of the components (standard + options). Do the same on emergency power supply line, if existent.
- The ground fault switches on the whole power supply lines to the unit must be industrial type B,  $I_n = 0.3 \text{ A}$
- Connect main power supply cables from the distribution panel of the site to the unit power terminals located inside its electric box. The cables can be routed through the same openings used for pipes placed both on top and bottom panels of the unit, as shown in the drawings in paragraph 6.2
- Repeat the same procedure to connect also emergency power supply, if available.



**Only for CyberRow size 1: electric box of the unit can rotate on its side for a better accessibility during maintenance. Lay out cables inside the unit so that they not impede its free movement.**

## 7. Start-up



**Before you first start up the system install and connect it as described in the “Installation” chapter.**

- Make sure the main switch is turned off and that the system is isolated from power mains.
- Check that all power switches in the electric system have been turned off.
- Check that the main electric supply cable and the terminals, including the PE terminals, are correctly connected.
- Check that contactors can move freely.
- Use the main switch (both on site power supply and on the unit) to switch on the control system.
- Activate the control fuses one by one and the power switches for the fan. On units type **AS GES** activate also the power switch of the compressor.
- Check the supply voltage on all phases.
- **Units type AS:** check the supply voltage on all phases for the remote condenser.
- **Units type CW, GES:** start either dry-cooler or water chiller. Verify water circulation and temperature.
- At this point the electronic board is powered and the single components of the system can be activated to check for proper operation.
- Set the desired supply air temperature and the desired differential set point (difference between return and supply air temperature) on the C7000 display.
- Start the climate control system by pressing the ON-OFF push-button on the display.
- **Units type AS GES:** after about 20 minutes of operation check the sightglass for air bubbles in the liquid pipe. If there are bubbles this may have been caused by a leak and loss of refrigerant. Check the circuit for leaks. Repair all leaks and refill the circuit with R410A refrigerant as described in the previous chapter.
- **Units type CW, GES:** check that there are no water leakages.
- Check the current that is absorbed by the compressor (**units type AS GES**), fans and other optional components, comparing these values with those indicated in technical data.
- **Units type AS:** check also electric consumption of the remote condenser.
- When the system is operating at normal capacity:
  - 1) check that there are no alarms;
  - 2) check that the fans work properly;
  - 3) check, with the unit operating, that the power supply remains within the values indicated on the rating plate for the unit;

### Shutdown

To shut the unit down, disconnect it from all its power supplies by the corresponding isolating switches.

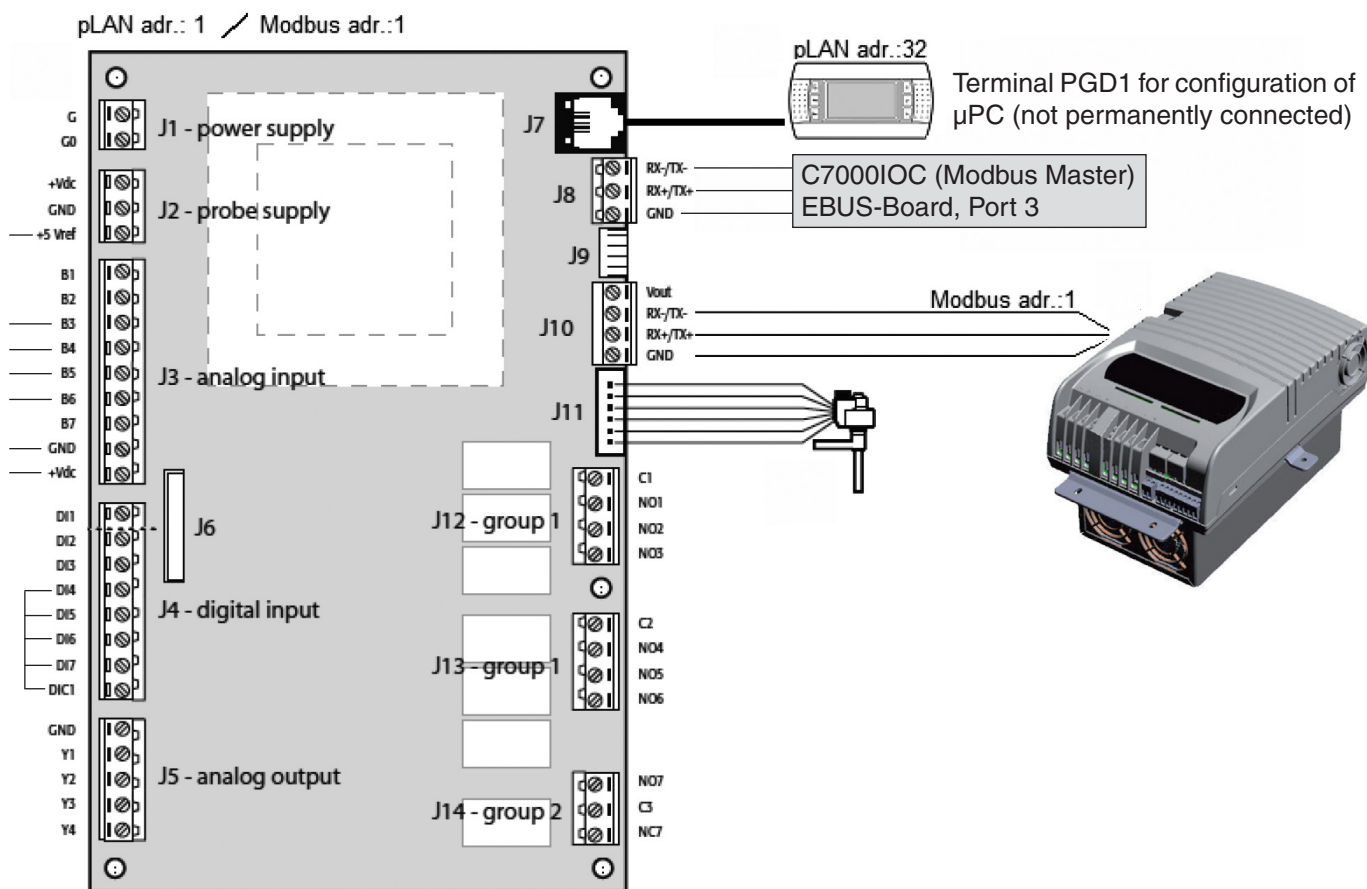


**The ON-OFF key on the C7000 controller is only used to put the unit in stand-by. It must not be mistaken as a safety component to turn the unit off prior to performing maintenance.**



## μPC electronic board

This electronic board is connected to the C7000 via RS485 line to exchange data. The μPC controls the compressor speed acting on the inverter. It receives also signals from pressure transducers and NTC temperature probes to check whether compressor works within the admitted range and to control the electronic expansion valve according to the superheating temperature.



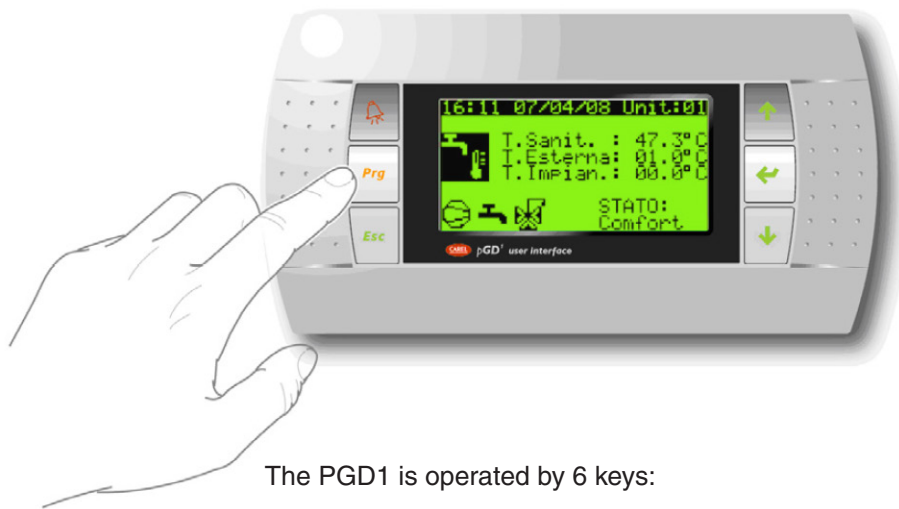
Digital input	Assignment of block J4
ID1	-
ID2	-
ID3	-
ID4	Compressor start/stop (with ramp)
ID5	Compressor start/stop (without ramp)
ID6	Alarm reset
ID7	Serial or pLAN/Modbus commutation

Dig output	Assignment of blocks J12, J13, J14
NO1	not used
NO2	not used
NO3	not used
NO4	not used
NO5	not used
NO6	not used
NO7	not used





Analog input	Assignment of block J3
B1 (NTC)	-
B2 (NTC)	-
B3 (NTC)	Suction gas temperature
B4 (NTC)	Hot gas temperature
B5 (4-20mA)	Condensation pressure
B6 (0-5V)	Evaporation pressure
B7 (0-5V)	not used

Ana output	Assignment of block J5
Y1 (0-10V)	"out of operation range" position signal (not used)
Y2 (0-10V)	Compressor speed (not used)
Y3 (0-10V)	Expansion valve opening (not used)

## Operation of the terminal PGD1



The PGD1 is operated by 6 keys:

-  displays the list of active alarms.
- Prg** with this key you enter the configuration menu (M01, M02 etc.)
- Esc** with this key you come to the precedent view
-  scroll up in a list or increase the value in the display.
-  scroll down in a list or reduce the value in the display.
-  ENTER key for access to the selected sub menu, to the modification mode or for confirmation of the adjusted value.

After the software update with the Smartkey (description available in the e-Stulz area) some settings must be adapted. For this the connection from the C7000IOC to the  $\mu$ PC must be removed.

- De-energize the  $\mu$ PC.
- Open terminal ID7, remove the 0V voltage.
- Pull the connector of the ModBus® connection from J8.
- Push the telephone connector of the PGD1 on to block J7.
- Switch on the  $\mu$ PC.

```
Initialization
DEFAULT INSTALLATION
Erase permanent memory
and install global
default value.
Please wait...
```

```
Warning
INITIALIZATION DONE
switch-off unit
to confirm data
```

After the  $\mu$ PC is powered, the PGD1 terminal executes an initialization which lasts approximately 30 seconds. After this the  $\mu$ PC must be switched off and on again to correctly complete the procedure.

```
WIZARD Wz01
Control mode via:
Modbus (serial 0/1)
```

After the restart, a program for quick configuration is started, which is called Wizard, displaying eight windows from Wz01 to Wz08. In Wz01 the control mode must be set. The  $\mu$ PC is controlled by a ModBus® connection to the C7000. First the setting "Analog input (B7)" appears. Press ENTER key, adjust "Modbus (serial 0/1)" with the arrow keys, confirm by the ENTER key. with "down arrow" key (press 2 times) to Wz03.



To navigate among the different windows by the arrow keys, the cursor must be in the left top corner.

```

WIZARD           Wz03
BMS Settings
Serial Address:   001
Baudrate:        9600
  
```

Here the BMS settings must be selected. The serial Modbus address of the  $\mu$ PC is set on 001 as standard and has not to be changed. In the C7000IOC however, the command "icc 1 id 1" must be entered to enable a communication.

The baudrate must be set on 9600.

```

WIZARD           Wz04
Power+ Config
Motor Type:
SIAM ANB52F-400V
Set defaults:     Yes
Poles numbers:    6
Type drive: PSD0*224**
  
```

Here the used compressor must be adjusted. The compressor type can be seen on the type plate of the compressor.

SIAM ANB33-400V or

SIAM ANB42-400V or

SIAM ANB52-400V

(Set default: Yes) By this setting the inverter suitable to the compressor is initialized suitable. It is compellingly required to select "Yes". Following the data is written in the inverter.

The program verifies the compatibility of Kcompressor and inverter, displays the result of the verification in Wz04a and requires the confirmation for writing the default setting.

```

WIZARD           Wz04a
Power+ Config
Power+ type: 400V 14A
Power+ set:  400V 14A
Write defaults: Yes
  
```

Write default: Yes

After the confirmation with the ENTER key, the display shows "Wait default install", then the value for "Write default" switches back to "No".

By ESC you get back to view Wz04.

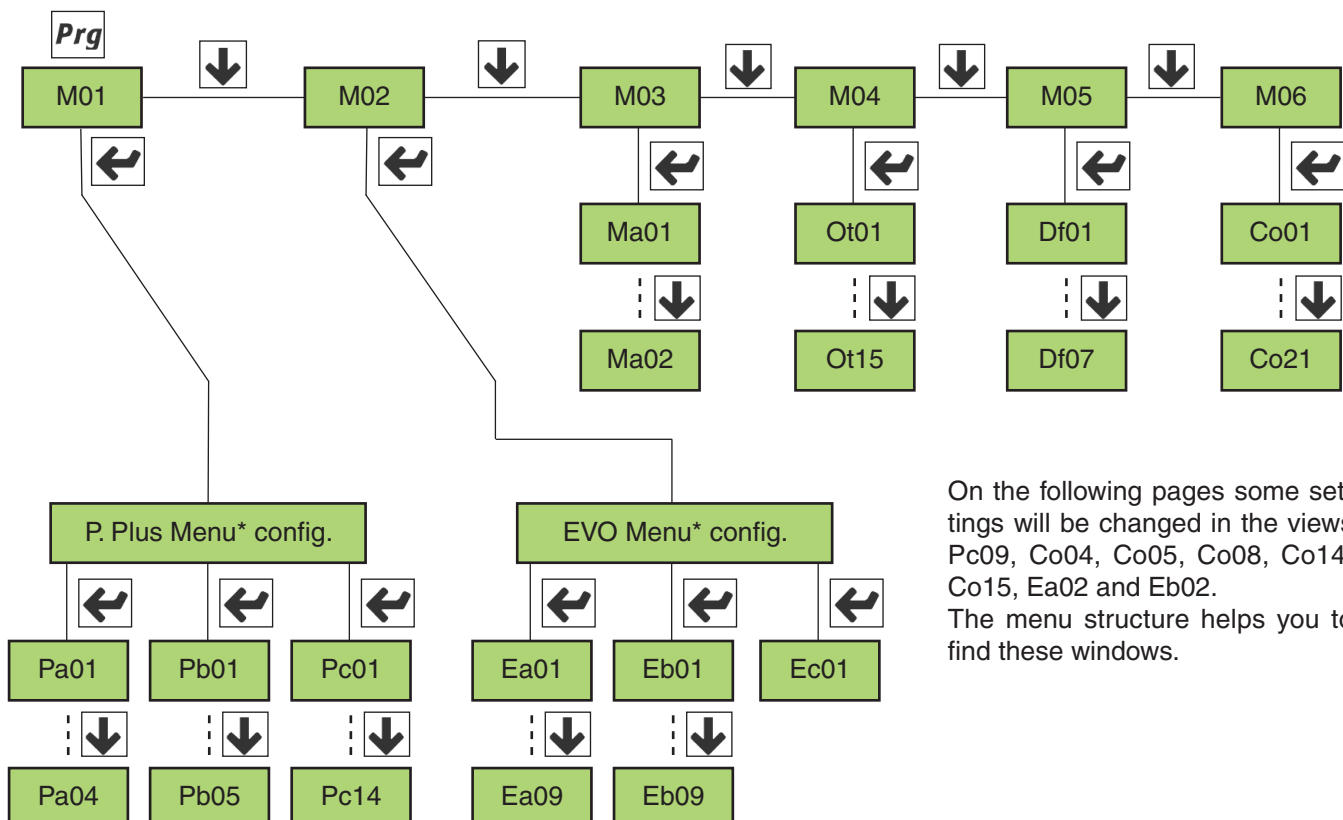
```

WIZARD           Wz08
Initial config. done
Please confirm: No
  
```

Scroll to view Wz08 with the "down arrow" key.

Confirm the configuration with "Yes".

## Menu structure



On the following pages some settings will be changed in the views Pc09, Co04, Co05, Co08, Co14, Co15, Ea02 and Eb02.

The menu structure helps you to find these windows.

```

Configuration      M01
Power+ n°1

Press ENTER to
configure
Power+ Inverter

```

By the PRG-key you come to view M01, the first window in the main menu branch. With the Enter key you proceed to the next menu.

```

P.Plus Menu' config
Power+ n°1

c Custom
a Configuration
b Regulation

```

The selection **a. Configuration** gives you again the possibility to set the compressor type, (as in Wz04) and it leads you to further three menus in which special settings can be made.

Select now **c. Custom**.

```

Power+ Custom      Pc01
Power+ n°1

Motor control mode:
[000]
PM MOTOR

```

Pc01 appears. Scroll down to Pc09.

```

Power+ Custom      Pc09
Power+ n°1
Magnetizing time:
[051] 00000msec
Starting current:
[057] 000.0%
Freq. for start curr.:
[058] 000.0%

```

Adjust the starting current depending on the installed compressor.

SIAM ANB33-400V	55,0%
SIAM ANB42-400V	55,0%
SIAM ANB52-400V	75,0%

Go back to M01, using ESC or faster with Prg.

```

EVO Menu' config.

c.Manual Cmd
a.Configuration
b.Regulation

```

Now you must modify two settings for the expansion valve. By the windows **M02, EVO Menu' config.** and selecting the menu item "**a. Configuration**" you first get to **Ea01** and then to view **Ea02**.

```

EVO config.      Ea02
Main Regulation
AC/CHILLER WITH BLDC
SCROLL COMP
Auxiliary Regulation
---

```

Here the main regulation must be set on "AC/CHILLER WITH BLDC SCROLL COMP".

By the menu **EVO Menu' config.** and selecting the menu item "**b. Regulation**" you first get to **Eb01** and then to view **Eb02** (no picture). In **Eb02** set the valve opening at start-up on 75%.

```

Compressor Reg.    M06

Press ENTER to
configure
BLDC COMPRESSOR

```

Now select M06.

BLDC means "Brushless direct current"

```
Compressor reg. Co04
Pressure Limits
Max Discharge
  Pressure: 43.5bar
Min. Suction
  Pressure: 0.2bar
Min. Suction Compr
  Start Delay 000s
```

**View Co04**

Set the limit value for minimum suction pressure on 3,0 bar.

Set the delay for low pressure alarm  
(Min. Suction Compr Start Delay on 180s.

```
Compressor reg. Co05
Start-up Pressure
differential control
Max Pressure differ.
admitted: 009.0bar
```

**View Co05**

Here you adjust the admitted maximum pressure difference between hot gas and suction gas to allow the compressor start. A higher pressure difference would overcharge the inverter with reference to the current and leads to an alarm message.

Set 7,0 bar.

```
Compressor reg. Co08
Start-up failure
control
Pressure difference
min.variation: 0.3bar
Control period: 10s
```

**View Co08**

Set the control period on 30 seconds. This means the following: If 30 seconds after the compressor start, the hot gas pressure is less than the adjusted 0,3 bar higher than the value before the start, the compressor will be stopped and the alarm message „Start failure alarm“ will appear.

The alarm will be automatically reset 5 times and the compressor will be restarted 30 seconds after the stop. After the fifth failed attempt the alarm „Compressor start failure - Check motor wiring“ is displayed and there is no other start attempt.

```
Compressor reg. Co14
Envelope control
in zone 1c
Evaporat.limits: 12.0°C
Maximum admitted
speed: 090rpm
```

In the **view C014** the operation range of the compressor (Zone 1c) can be extended.

Set the maximum admitted speed on 120 rpm.

```
Compressor reg. Co15
Envelope control
Low ratio management
by EEV closing: No
by compr. speed up: No
```

In **view Co15** you can adjust, how the control with a low pressure ratio shall function.

1. by closing the expansion valve.
2. by increasing the compressor speed.

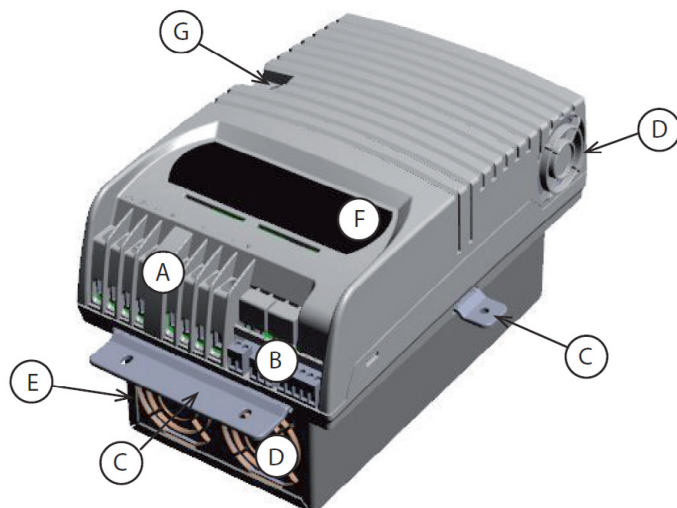
Set both parameters to "Yes".

The configuration is now finished.

- De-energize the  $\mu$ PC.
- Pull the telephone connector of the PGD1 from block J7.
- Re-establish the 0V connection to terminal ID7.
- Put the connector of the ModBus® connection onto J8.
- Switch on again the  $\mu$ PC.

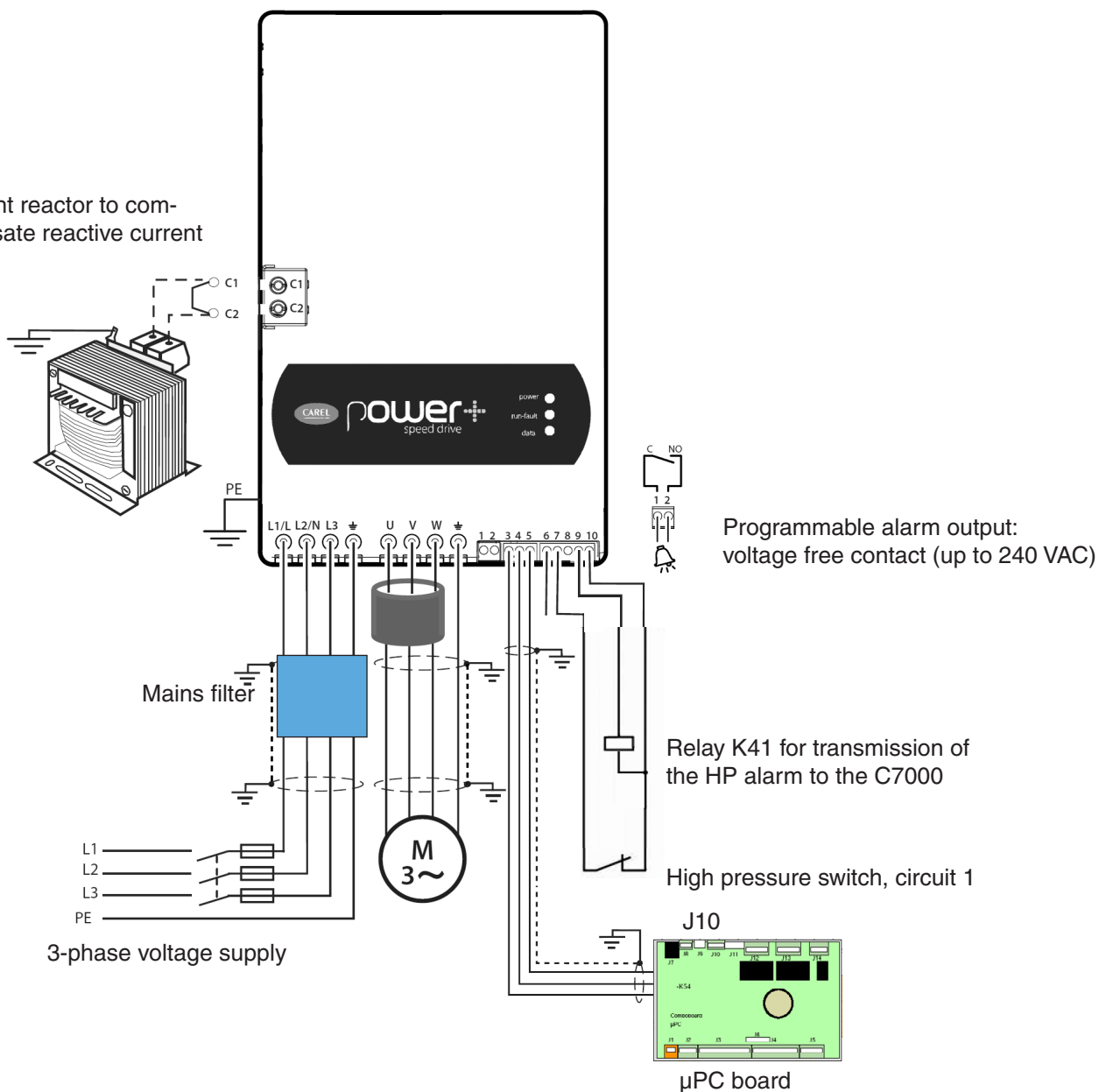
## Inverter (EC compressor driver)

According to a signal from the  $\mu$ PC controller, the inverter modulates the rotation speed of compressor, in order to adjust cooling capacity to the actual thermal load.



Reference	Description
A	Terminal block for power lines
B	Terminal block for control lines
C	Fastening bracket
D	Cooling fan
E	PE connection
F	Operating status LEDs
G	Terminals for connecting a shunt reactor

## Inverter connections



Terminal	Assignment	Use
3	0V	RS485/ModBus® connection
4	RX+/TX+	
5	RX-/TX-	
6	PTC input	not used
7	24VDC	auxiliary voltage
8	0V	
9	STOa	input for HP alarm
10	STOb	
1, 2	Relay output	not used



## 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 established. 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.**

**In units with 2 or 3 fans dangerous charges of >50µC can occur between AC line terminals and PE after disconnection.**

**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 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.

An insufficient charge causes the formation of bubbles in the sight glass. 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 R410A according to weight (see technical data)



**R410A 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.

green ---> ok.

yellow ---> 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.

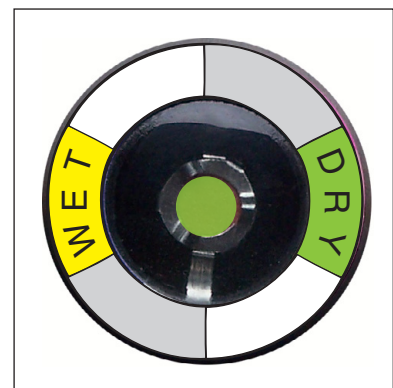
In this case the refrigerant must be completely evacuated and recharged according to the above described evacuation instruction.

#### High pressure switch

High pressure switch is a safety device, therefore its correct intervention must be verified regularly. To do this, simulate a pressure increase. If the high pressure switch intervenes at a higher pressure than 41.6 bar (original intervention value + 10%), it must be immediately replaced by a new switch with the same intervention point.

#### Safety valve

Safety valve (when installed on liquid receiver) must be replaced every 4 years from unit commissioning. The new safety valve must have the same features and it must be provided with PED certification.



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.



**It is not allowed to recharge oil in case of refilling a refrigeration circuit after a leakage. In such cases the compressor has to be exchanged.**

## Expansion valve

The refrigerant circuit is equipped with a electronic 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 / CW/GE-coil)

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 either a higher air resistance by a clogged pre-filter or a winding short circuit in the fan motor.

The fans are speed controlled in dependance of the required cooling capacity. You can manually modify the speed at the controller for test purposes, so as to compare the measured current with the values on the pages with the technical data or with those of the planning tool.

## 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. To pull it out, proceed as follows:

- Open rear panel: the filter is installed inside the frame of the rear panel
- Rotate retaining tongues of filters.
- Remove the filter.



**Spare filters must have a filter medium with the same thickness and density as the original. A set of spare filters can be ordered at your local STULZ service partner.**

## 8.5 Water circuit

### Tightness

Check the water circuit visually for tightness. Beyond that a level indication at the storage tank, if existant, 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 GS, GES)

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.

## 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 coil soiled. 5. overcharge of refrigerant circuit 6. electric connection of high pressure switch loose. Cable defective. 7. trigger point adjusted too low.	Install bigger condenser. Check drycooler.  Check function. Clean condenser. Discharge and dispose refrigerant. Check connection and cable.
	Compressor power interruptor has triggered.	1. compressor motor defective.  2. feeding voltage too low.	Check setting of high pressure switch. Press blue release button at HP switch after elimination of error.  Check compressor motor on voltage continuity and current consumption. Check alimentation under load.
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. Fan 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, hygostat, 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 AS).



**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 GS, GES, CW).

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 CyberRow ... A/AS/GS/GES**

CRS 211 A	CRS 211 AS		
CRS 251 A	CRS 251 AS	CRS 251 GS	CRS 251 GES
CRS 361 A	CRS 361 AS	CRS 361 GS	CRS 361 GES
CRL 211 A	CRL 211 AS		
CRL 251 A	CRL 251 AS	CRL 251 GS	CRL 251 GES
CRL 361 A	CRL 361 AS	CRL 361 GS	CRL 361 GES

### **EC-Directives**

EC machinery directive 2006/42/EC  
EC directive for low voltage 2006/95/EC  
EC EMC directive 2004/108/EC  
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  
EN 61800 - 3 - C2

### **National regulation**

BGR 500 chapter 2.35  
BGV A3

## **CyberRow ... CW**

CRS 210 CW	CRL 210 CW
CRS 320 CW	CRL 320 CW
CRS 560 CW	CRL 560 CW

### **EC-Directives**

EC machinery directive 2006/42/EC  
EC directive for low voltage 2006/95/EC  
EC EMC directive 2004/108/EC  
EC pressure equipment directive 97/23/EC

### **Harmonised EN**

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

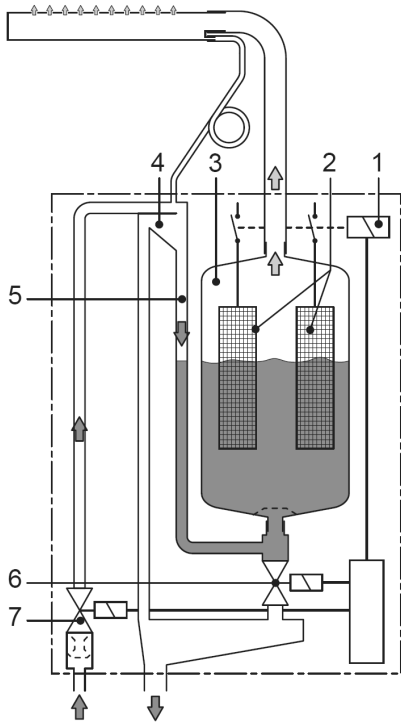


## 12.1 Steam humidifier

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

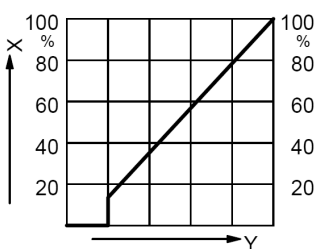
As a result of the evaporation process, the conductivity of the water increases due to an escalating mineral concentration. Eventually, an inadmissibly high current consumption would take place if this concentration process were permitted to continue. To prevent this concentration from reaching a value, 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

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)



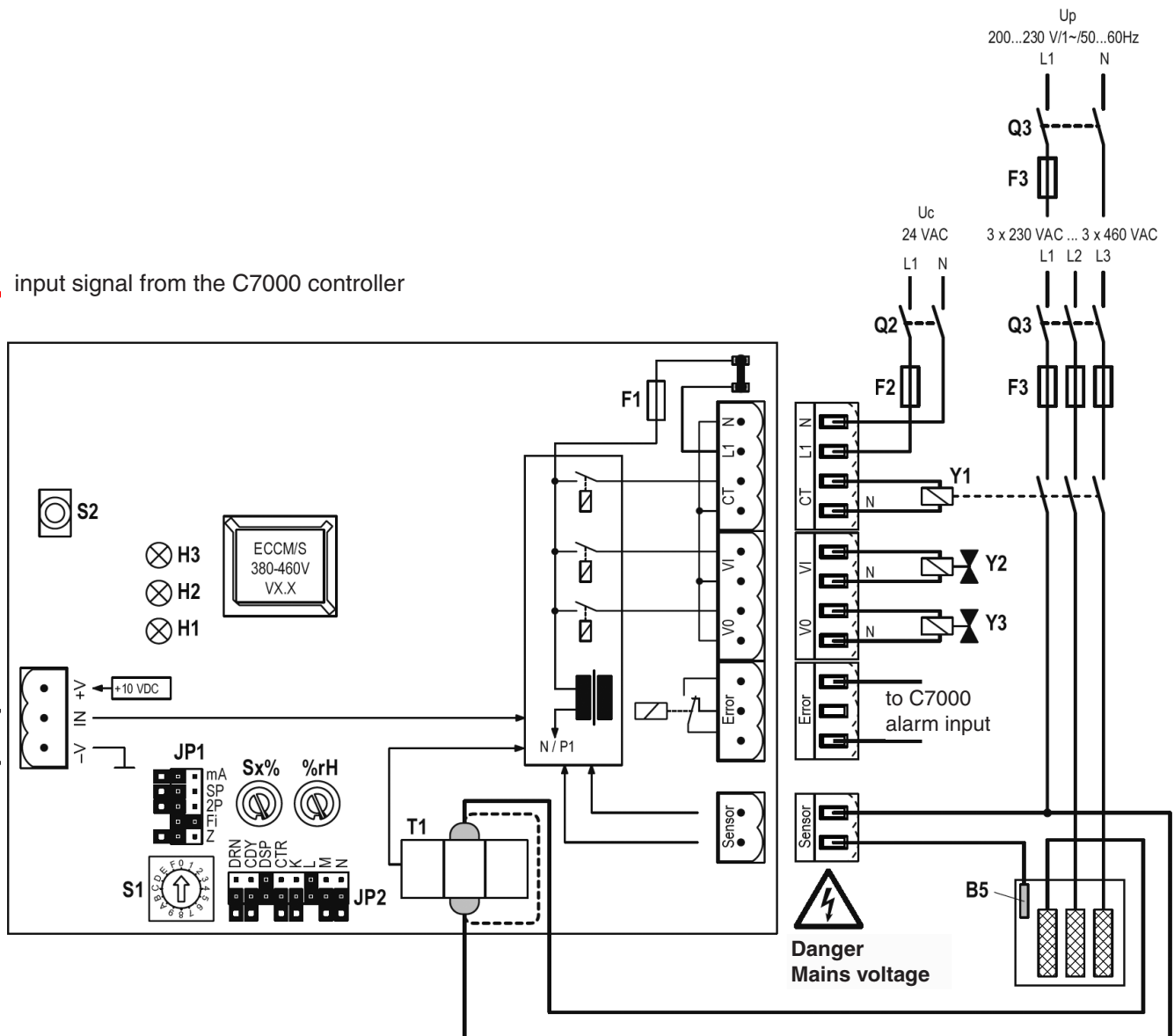
### **Do not treat the water with softeners !**

**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

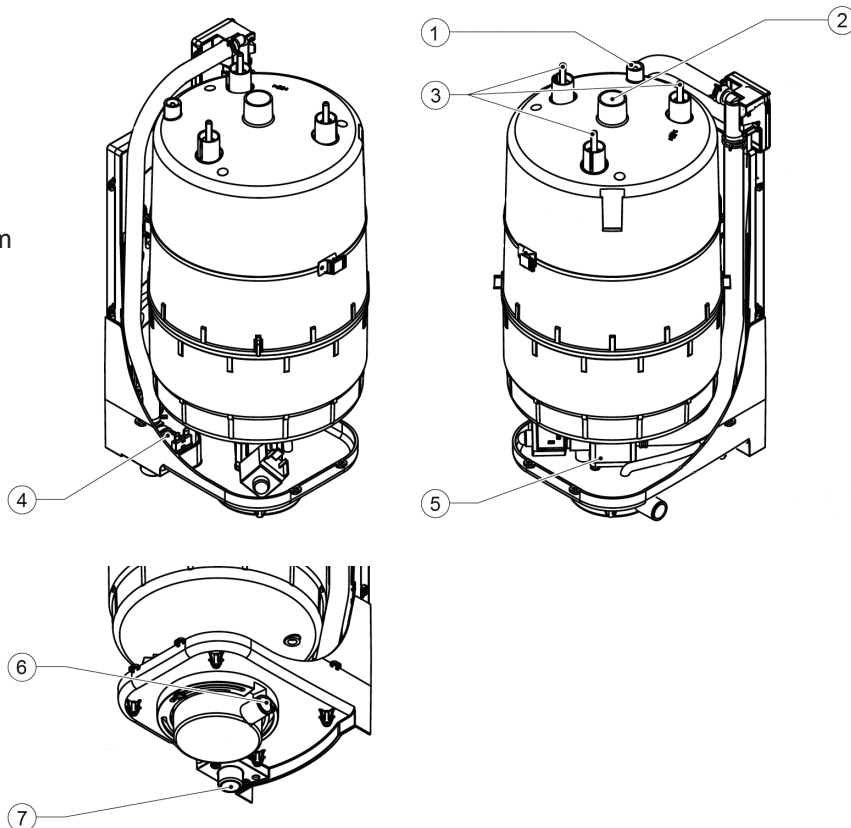
The steam humidifier is installed and electrically connected in the A/C unit. The local regulations of the water supply company are to be complied with when making the hydraulic connection.



**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.

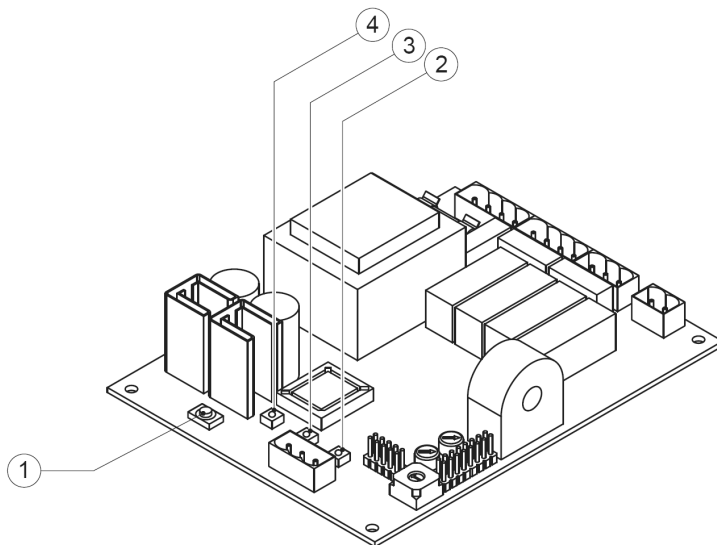
When creating the drain, attention is to be paid to provision for cleaning.

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).

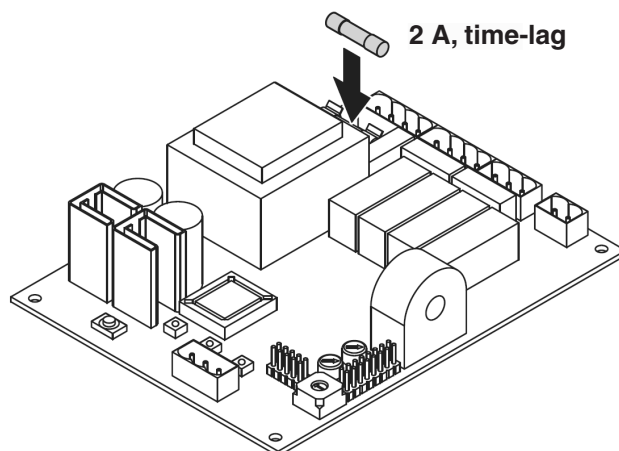


### 12.1.4.5 Replacement of fine-wire fuse on the control unit ECCM/S

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.

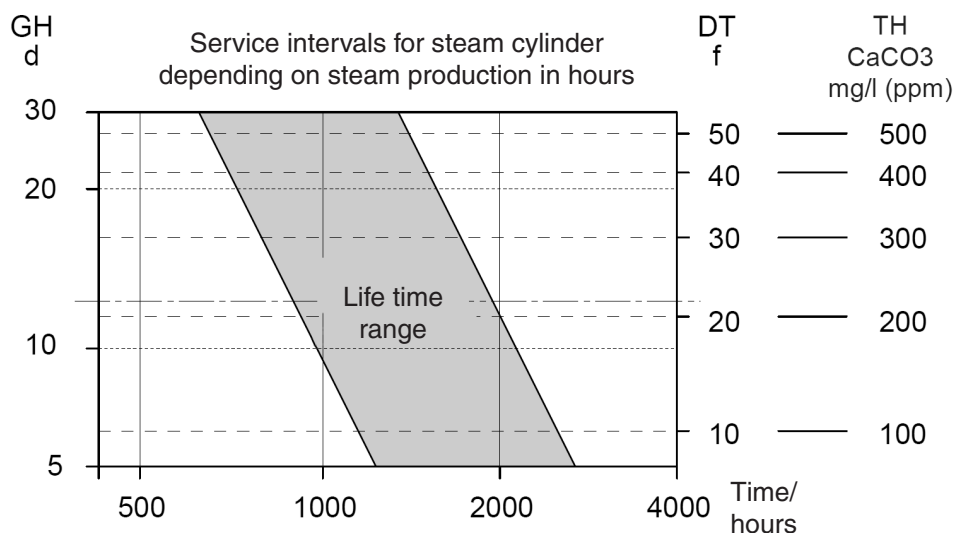
**Note:** If the fault has not been eliminated, the error indication reappears after a short while.

## 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 Air Circuit Options

### Return air filters with F5 efficiency

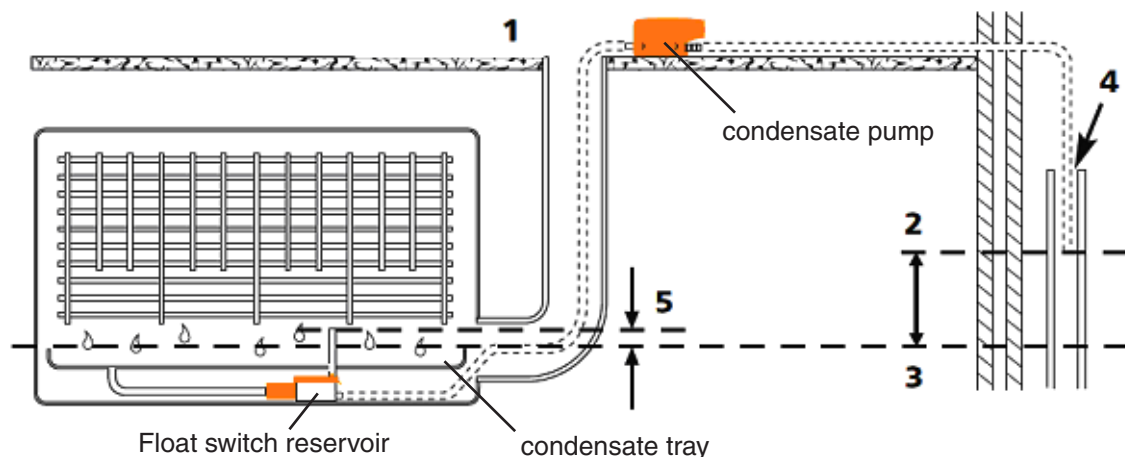
With this option, standard G4 air filters on return air will be replaced by high efficiency F5 filters with same dimensions. These filters require a different setting of dirty filter differential switch. More efficient filters get clogged more frequently, requiring shorter maintenance intervals.

### Condensate pump installed inside the unit

This option is necessary when condensate evacuation by gravity is not possible. With piping connections to the top (standard) the pump is installed in the A/C unit. With piping connections to the bottom (optional) the pump is delivered loose.

The pump receives power supply from the e-box and sends a water level digital signal to C7000 controller.

- Use the pump within the following operating limits: maximum pumping head 10 m. With 10 m pumping head, and no suction lift water flow is 4.5 l/h.
- Carry out the discharge pipe in PVC with 6x9 mm diameter provided with the pump from one of the openings used for water and refrigerant pipes. Channel discharge tube to an appropriate drain, avoiding restrictions.
- Always ensure the box with the float switch is placed in an even and horizontal position.
- Test pump operation by pouring water into evaporator tray. **CHECK FOR LEAKS.**
- Preventing siphoning: cut discharge tube (2) above water level (3) of evaporator tray and direct end into large pipe (4), allowing air break.



### Maintenance

- This pump, like all mechanical equipment, requires maintenance.
- Every six months the float switch box should be removed, taking care to clean the filter, float switch and the reservoir thoroughly prior to reassembly. We recommend this to be done in spring and autumn, using an anti-bacterial wash.
- Take great care to replace the float switch with the magnet facing upwards.
- Additional inline filters are available if required.

### Troubleshooting

#### Fault: Pump runs all the time

1. Is the float switch positioned with the magnet to the top?
2. Is the reservoir lid (sensor) located firmly onto the reservoir, with the float switch located inside the reservoir, around the sensor column?
3. Is there sludge inside the reservoir, preventing float switch from resting on the bottom? (This may occur if pump has been in operation for some time without cleaning. Clean using an anti-bacterial wash.)

Please note:

- After installation and during operation, if you notice air in the pipe between the reservoir and the pump, you have a siphoning problem. Follow advice in 'Preventing Siphoning'.
- The pump will only switch off when the float switch is at the bottom of the reservoir.

**Fault: Pump stops and starts and makes a loud noise.**

1. The water is siphoning back through the pump. Follow advice in 'Preventing Siphoning'.

**Fault: Pump runs but does not pump any water.**

1. Are there any air-leaks in the pipe running to the pump?
2. Check that reservoir, filter and inlet tube are free of sludge and debris.

**Fault: Pump isn't operating at all.**

1. Is the pump supplied by electric power? Is it correctly wired? Is the voltage correct?
2. Is the pump very hot? A thermal cut-out may have been activated to protect pump. This will automatically be reset when the pump has cooled down.

## Frontal air discharge (not available for size S)

With this option the air is discharged through the front panel. The unit sides are designed as closed panels. This optional configuration of air flow can be used in the following cases:

- When there's not enough space to install the units protruding beyond the rack front line. then lateral air delivery is not possible.
- When it is necessary to put the unit at the end of a row. In some cases, the lateral air delivery towards the end of the row cannot be closed, because air speed from the other opening would be too high. This creates a high depression at the intake of the rack next to the air delivery. If this depression is higher than the available ESP of rack fans, cold air cannot enter the rack.



**Inside non-compartmented server rooms, units with frontal air delivery should be installed at the end of a rack row. The air flow should be directed towards the side with racks. A minimum distance of 0,8 m between the end of a row and the wall is recommended to avoid that the cold air layer adheres to the wall.**

## Lateral air discharge to the left

The right air discharge (seen from the user standing in front of the unit) of the CyberRow unit is closed with a plate to avoid a waste of cold air when the air conditioning unit is placed at the end of a row.

## Lateral air discharge to the right

The left air discharge (seen from the user standing in front of the unit) of the CyberRow unit is closed with a plate to avoid a waste of cold air when the air conditioning unit is placed at the end of a row.



**Only for CRS 560 CW units: by closing one lateral opening, the airflow supplied by the other opening causes an underpressure of nearly 70 Pa at the air intake of the server rack next to the unit. For the aspiration of cold air, the fans of this server rack must have an available static pressure of 70 Pa minimum.**

### Three remote air sensors with 8 m cable

This accessory is a kit of three remote air sensors to replace the supply air sensors installed inside the unit. Cable of remote air sensors has a length of 8 m and is screened. Sensor cable ends with a quick connector so that disconnecting standard sensors and connecting the remote ones is easy.

Remote sensors have to be placed at the intake of the most critical rack, usually the most distant rack from the air conditioner, in order to monitor supply air temperatures. Fan speed of CyberRow unit is then determined by the difference of temperature between return air and supply air of the critical rack. When this last temperature is high, the difference is smaller. Thus, fans speed up to reach the set point ensuring a higher ventilation of the rack.

### Humidity sensor

The humidity sensor measures internal humidity giving a proportional signal to the C7000 in order to realize the following functions:

- display of internal humidity value;
- control of humidification function (when humidification is needed an optional humidifier must be ordered).

Range of measurement is RH between 15% and 90%.

When supplied, the sensor is installed in the unit.

## 12.3 Option chilled water piping

**Only for CyberRow type CW**

### 3-way valve

The 3-way valve replaces the standard 2-way valve when the CW unit has to be connected to a chilled water distribution system with fixed flow. The kvs value of the 3-way valve is the same as for the 2-way valve, so pressure losses are the same as the ones indicated in technical data. Operating limits are the same as for the 2-way valve.

## 12.4 Electrical Options

### Water detector with sensor

It consists of a relay installed inside the e-box and a sensor electrode placed in the area where water risks to collect. If water is detected the signal is transmitted to a digital input of C7000 to activate the alarm.

- Operating voltage 24V AC
- Sensibility adjustable between 5kOhm and 450kOhm

Restrictions:

- admissible cable impedance: 100nF/km
- maximum cable length: 200m

### Second Power Supply in separate box

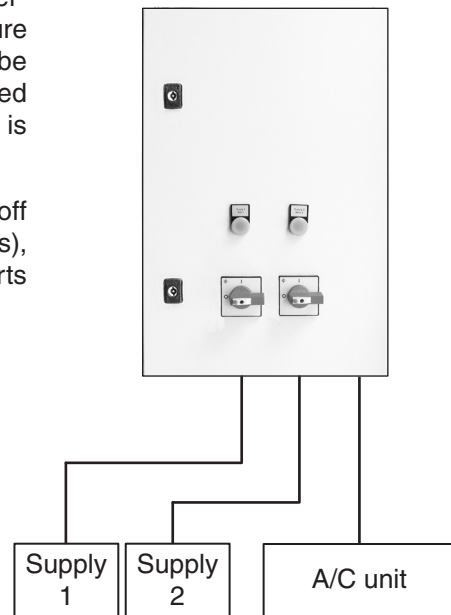
This option provides an automatic commutation between two power supply networks.

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.

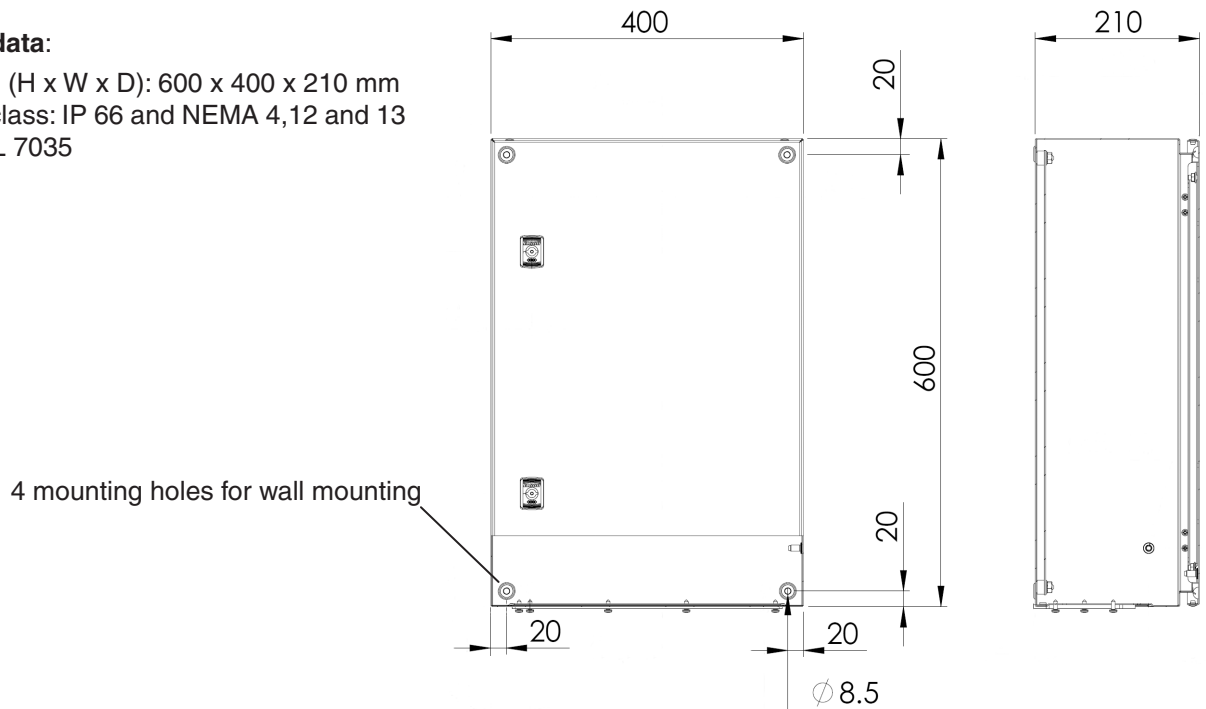
When the voltage of power supply 1 returns, the A/C unit is switched off again. On a second time relay a delay can be set (preadjusted: 10 seconds), after which power supply 1 is switched onto the A/C unit. The A/C unit starts by the automatic restart.

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.



## 12.5 Electrical reheat

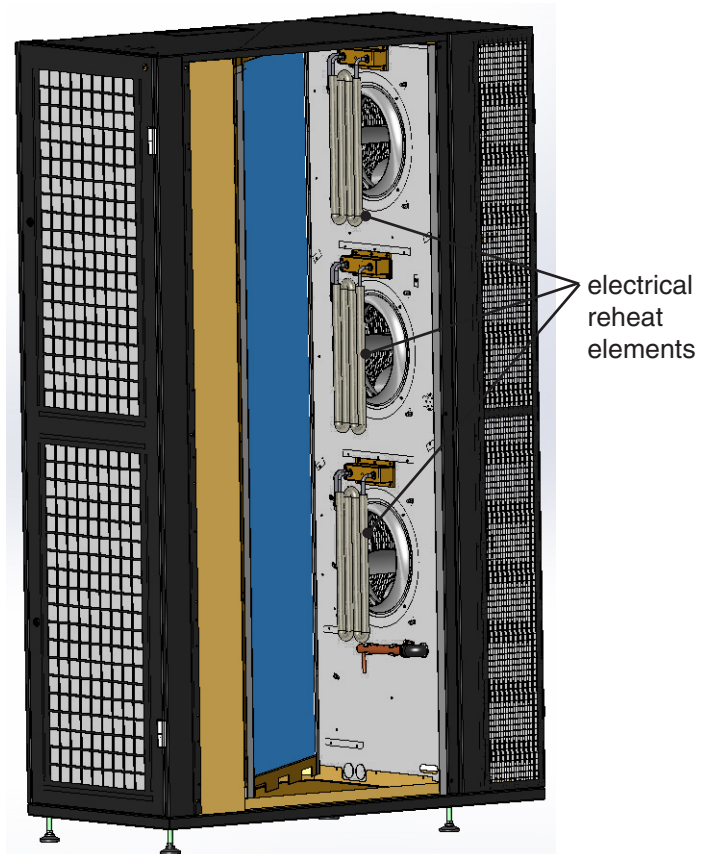
The electrical reheat is an optional extra for the A/C unit. It is completely installed and integrated in the function and method of operation of the A/C unit. It is used to heat up the air. The following versions of the electrical reheat which is single-stage are available:

- 3 x 0,7 kW for construction size 1
- 3 x 2,0 kW for construction 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.

### Maintenance

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



Example: CRS 320 CW

### Malfunction causes

**Alarm: E-HEAT 1 FAILURE (display by C7000 controller)**

#### Cause:

The temperature switch at the reheat element or the reheat power switch has triggered.

#### Effect:

The electrical reheat is switched off by the C7000 controller.



## 12.6 Levelling castor

This option will be delivered loose and includes the following parts:

4x levelling castors  
4x washers  
4x screws M8x16

### Installation

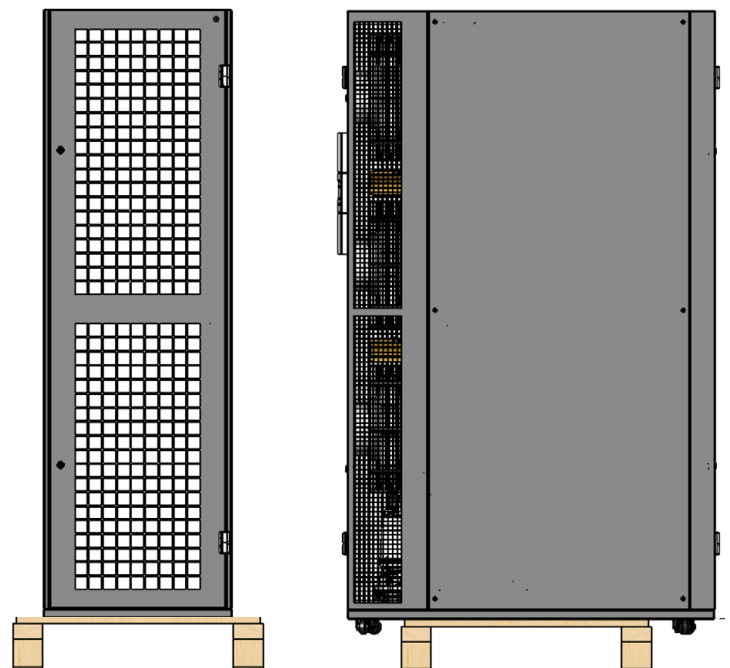
We recommend to mount the castors while the A/C unit is on the pallet. For this purpose, the device must be rotated by 90°.

Open the unit front door, insert an M8 screw through the washer into the opening provided in the bottom of the unit, hold the castor against it and tighten the screw in the threaded hole of the levelling castor. Install both castors at the front side and the two castors at the rear of the unit by opening the rear door. Tighten the four castors initially as firmly as possible. Now you lift the unit from the pallet on the floor. By the unit's weight it is now possible to tighten the screw to the specified torque of 16 Nm

### Locking and adjusting the height

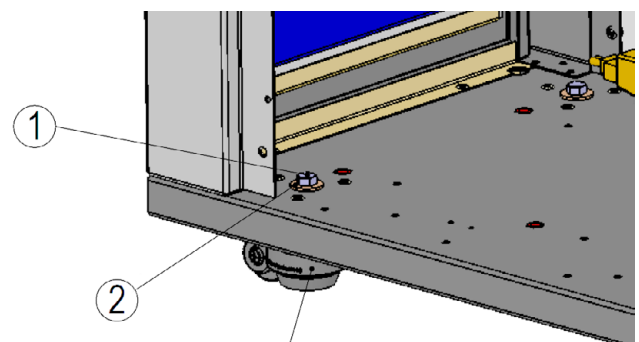
After you have rolled the A/C unit to the site and positioned correctly, you can fix the position by lowering the integrated truck lock. First, you turn the orange gear wheel counterclockwise until the truck lock touches the ground. For a further lowering of the lock and raising the A/C unit you need a wrench with a width of 13mm, which you apply below the gear wheel.

Minor ground unevenness can be compensated by lowering the truck lock up to 8 mm beyond the castor height.

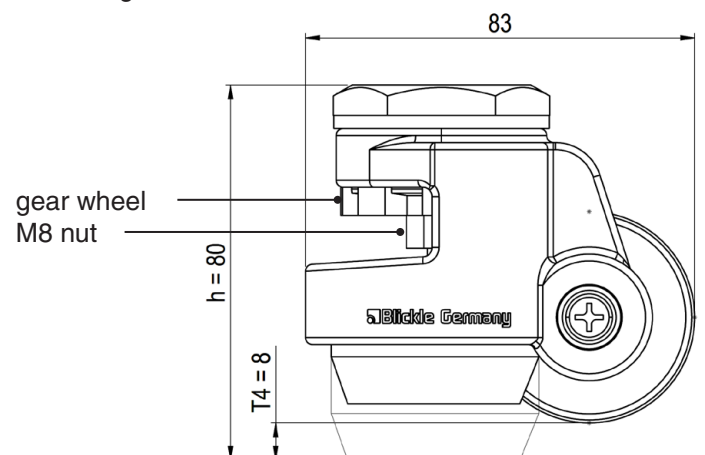
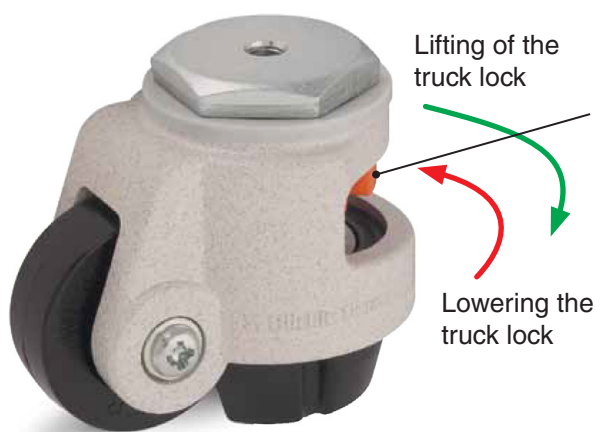


Position at delivery

Unit rotated by 90°



1. screw (M8)
2. washer
3. levelling castor



Position of the maximally lowered truck lock



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