

# EMICON

CLIMATE SOLUTIONS

## EMIBYTE

AIR CONDENSERS WITH AXIAL FANS

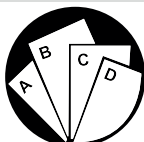
### RCE - RCE-S



#### USE AND MAINTENANCE TECHNICAL MANUAL

The instructions unit manual is composed by the following:

- Conformity declaration
- Technical Manual



Instructions:  
Referring to the specify



Read and understand all the  
present Manual before any  
intervention.

PRESERVE THE PRESENT FOR FUTURE

The copy, transmission or memorization of the present Manual is forbidden in any form without the written authorisation from the Manufacturer.

The Manufacturer could be contacted to receive any information about his products.

The Manufacturer works in a constant policy of products development and reserves the right to modify his products, the specifics and the instructions about use and maintenance without any prior notice.

## **Conformity declaration**

We declare under our responsibility that the supplied units comply in every part with the directives of the CE marking and the current EN standards. The Conformity declaration is attached to the onboard documentation. Be informed that the unit contains fluorinated greenhouses gases.

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## 1. INTRODUCTION

### 1.1 Preliminary information

The copy, transmission or memorisation of the present Manual is forbidden in any form without the written authorisation from the Manufacturer.

The unit which the present Manual refers is designed only for the uses presented in the following pages, comply with their performances and characteristics. Any contractual or extra-contractual liability of the Manufacturer for damages caused to people, animals, things or environment made by installation, regulation, maintenance errors or improper uses are excluded

All the uses not mentioned in the present Manual are not allowed.

The present documentation is an informative support and has not to be considered as a contract with third parts.

The Manufacturer works in a constant policy of products development and reserves the right to modify his products, the specifics, the instructions and also the documentation in any moment without any prior notice

### 1.2 Instructions content and purpose

The present instructions purpose to give all information concerning the selection, installation, use and maintenance of the units.

The instructions are written in conformity with legislative disposition of UE and to the technical available norms.

The instructions including the indication to avoid reasonably foreseeable improper uses of the units.

### 1.3 Instruction conservation

The instruction must be posed in a proper place, away from dust, humidity and where every person in charge to use and operate with the unit could find them easily

The instruction has to be always on board and during all the life cycle of the unit, therefore has to be transferred to every subsequent user

### 1.4 Instruction updating

Is suggested to verify that all the instructions are updated to the last release available.

Any updates sended to the user must be kept attached to the present Manual.

The Manufacturer is available to provide any information about use of his products.

### 1.5 Instruction use



The present instructions are integral part of the unit which are referred.

The users and operators have to consults mandatory the instructions before any intervention on the units and in every occasion of doubt about the transport, the handling, the installation, the maintenance, the use and the disposal of the unit.



In the following are mentioned all the graphic symbols which indicate all the operation has to be safety done

### 1.6 Residual risks

The units are deigned to reduce at minimum the risk for the people who will use them.

Anyway is impossible to eliminate completely the risk, so is strictly necessary refers to the following prescription in order to avoid them at the maximum.

ELEMENTS CONSIDERED (if presents)	RESIDUAL RISK	MODE	PRECAUTIONS
Exchanger coils	Small cutting wounds	Contact	Avoid the contact, use protective gloves.
Fans and grid fans.	Injury	Insertion of tools through the fans grid during the fans operation	Do not insert any tools throught the fans grid during their operation
Inside unit: compresors and discharge gas pipes	Burns	Contact	Avoid the contact, use protective gloves
Inside unit: metallic components and electrical cables.	Electrocution, several burns	Power supply cables insulation defect, electrical tension on metallic components.	Adequate supply line electrical protection; utmost care making the metallic parts ground connection.
Outside unit: Area around the unit	Intoxicaions, several burns	Fire due to short-circuit or overheating of the power supply line upstream of the unit's electrical panel	Section of the cables and protection system of the power supply line complying with the standard in force
High pressure safety valve (if present)	Intoxications, several burns, hearing loss	High pressure valve intervention with the cooling circuit panel open	Avoid opening the refrigeration circuit compartment as much as possible; carefully check the value of intervention of the condensation pressure valve; use all the high pressure personal protection safety devices required by law. Use all the personal protection devices required by law. PPE must also protect against gas leakage from the safety valve. The discharge of these valve is director to prevent damage to people or things.
Unit	Burst, injuries, burns, poisoning due to external incense.	Fire due to natural disaster or combustion of elemets adjacent to the unit.	Prepare the necessary fire-fighting equipment and / or adequate signals indicating that the uniti s under pressure
Unit	Burst, injuries, poisoning, electrocution due to natural disasters, earthquake	Breaks, sagging for natural disasters or earthquake	Prepare the necessary precautions, both electrical (adequate thermal magnetic circuit breaker and electrical protection of the power supply lines; treatment for maximum calamity when connecting the metal parts to earth, and mechanical (for example special antisismic anchors or anti-vibration dampers to avoid cause accidentals breakages or falls).

## 1.7 Safety symbols generality

ISO 3864-2 complied safety symbols :



### PROHIBITION

Black symbol inside a red circle with red diagonal indicates a forbidden action.



### ADVISE

A black graphic symbol inside a yellow triangle with black edges indicates a danger.



### MANDATORY ACTION

A white symbol inside in a blue circle indicates a mandatory action to avoid a risk.

ISO 3864-2 complied Combined safety symbols:



The advise graphic symbol is completed with additional safety information (text or many symbols).

## 1.8 Safety symbols



### GENERIC DANGER

Follow strictly all the advises near the symbol.  
Failure to follow the indications could generate user health risks.



### ELECTRICAL DANGER

Follow strictly all the advises near the symbol.  
The symbol indicates unit components or, in the present Manual actions could generate electrical risks.



### MOVING COMPONENTS

The symbols indicates unit's moving components could generate risk situations.



### HOT SURFACES

The symbols indicates unit's components could be very hot and that could cause several burns.



### SHARP SURFACES

The symbol indicates unit components could cause cutting wounds by contact.



### GROUND CONNECTION

The symbol indicates the unit's ground connection point.



### READ AND UNDERSTAND TEH INSTRUCTIONS

Read and understand the instruction before any intervention on the unit



### RECOVERABLE OR RECYCLABLE MATERIAL

## 1.9 Unit limit and not allowed uses

Units are designed and produced exclusively for the uses described in the paragraph "Use limits" of technical Manual. Any other use is forbidden because could generate user health risks.



The unit is not suitable to operate in environments:

- Excessively dusty or potentially explosive;
- Where are present vibrations;
- Where are present electromagnetic fields;
- Where are present aggressive ambients.



### 1.10 Unit identification

Every unit has a plate which contains its main information. The plate data could be different from the technical Manual because in the Manual are mentioned the standard unit data without any accessory.

On the Serial number plate is also mentioned the refrigerant charge.

For the non mentioned electrical information refers to the Wiring diagram attached to the present Manual.

Following a FAC-SIMILE of the plate.

<b>EMICON</b> CLIMATE SOLUTIONS		<input checked="" type="checkbox"/> NB 0948					
TEL.+39 0543495611 FAX+39 0543 495612							
Via A.Volta 49 Meldola FC ITALY							
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		2018					
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		A					
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		<table border="1"> <tr> <td>C1</td> <td>C2</td> <td rowspan="2">Kg. Ton</td> </tr> <tr> <td>C1</td> <td>C2</td> </tr> </table>	C1	C2	Kg. Ton	C1	C2
C1	C2	Kg. Ton					
C1	C2						
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		kW					
PESO OPERATIVO OPERATING WEIGHT POIDS OPERATION ARBEITSGEWICHT	Kg.	CORRENTE CORTOCIRCUITO SHORT CIRCUIT CURRENT COURANT COURT-CIRCUIT STROM KURZSCHLUSS					
		10 kA					
LATO BASSA PRESSIONE / LOW PRESSURE SIDE CIRCUIT BASSE PRESSION / NIEDERDRUCKSEITE		LATO ALTA PRESSIONE / HIGH PRESSURE SIDE CIRCUIT HAUTE PRESSION / HOCHDRUCKSEITE					
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		- 10 °C					
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		+120 GAS °C + 65 LIQU					
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- "apparecchiatura che contiene gas fluorurati ad disciplinati dal protocollo di Kyoto"		effetto serra					
- "equipment that contains fluorinated greenhouse covered by the Kyoto protocol"		gases					
- "équipement qui contient des gaz fluorés à effet couverts per le protocole de Kyoto"		de serre					
- "Maschine die enthalt fluorierte Treibhausgase en durch das Kyoto-protokoll fallen"		thalt					



THE PLATE HAS NOT TO BE MOVED FROM THE ORIGINALLY POSITION

## 2. SAFETY

### 2.1 Advise about toxic substances potentially dangerous

#### 2.1.1 Used fluid identification: R410A

- Difluoromethan (HFC-32) 50% weight CAS No.: 000075-10-5
- Pentafluoroethan (HFC-125) 50% weight CAS No.: 000354-33-6

#### 2.1.2 Used oil identification:

The oil used into the unit cooling circuit is polyester type. Anyway refers always to the compressor's plate.



For any information about refrigerant or oil characteristics please refers to Safety Schede which is possible to find to their Producers.

Main ecological information about cooling fluids used.



**ENVIRONMENT DEFENCE:** Read carefully the following ecological information and instructions.

#### 2.1.3 Persistence and degradation

The cooling fluids used decompose at the inferior atmosphere (troposphere) relatively quickly; decomposed they are highly dispersible so the concentration will be really low. They don't influence the photochemical smog and are not included in volatile organic compounds VOC (UNECE agreement).

Used refrigerants don't damage the ozone layer, there are regulated by the Montreal protocol (1992 release) and the CE 2037/200 of 29/06/2000 regulation.

#### 2.1.4 Effects on effluents treatment

The release into the atmosphere of these products do not cause lon-term water contamination

#### 2.1.5 Individual exposing and protection control

Is suggested to use clothes and protective gloves; is reccomended to always protect face and eyes.

#### 2.1.6 Professional limit esposing

##### R410A

HFC-32	TWA 1000 ppm
HFC-125	TWA 1000 ppm

## 2.2 First AID and injuries prevention



The users and maintenance technicians has to be well informed about risks of toxic potentially fluids. Failure to observe the mentioned indications could cause damages to people or to unit.

### 2.2.1 High quantity steam inhalation

The atmospheric refrigerant concentration has to be minimum reduced (lower than overmentioned professional exposition limit). Be informed that the steam is heavier than air so high concentrations can stay near the ground, where the general ventilation is low, it is suggested to ensure an adequate ventilation in order to avoid it.

Avoid contact with free flames and hot surfaces because toxic and irritating decomposition products can be formed.

Avoid contact between the liquid and the skin or the eyes.

### 2.2.2 Accidental refrigerant leak procedures

During the cleaning operation be sure to have the adequate safety protection (using respiratory breathways protections)

If the conditions are sufficiently safe, isolate the leak source, if the leak is limited leave the evaporation refrigerant free ensuring a good ventilation.

Otherwise if the leak is large ensure a good ventilation, contain spilled material with sand, earth or other suitable absorbent material; prevent that the refrigerant enter into drains, sewers, basements or work holes in order to avoid suffocating vapors formation.

## 2.3 Toxic information about the refrigerant fluid used

### 2.3.1 Inhalation

A great atmospheric concentration can cause anesthetic effects combined with loss of consciousness. Long expositions can cause abnormal heart rhythm and even sudden death.

More elevated concentrations can cause asphyxia for reduced oxygen content in the air.

### 2.3.2 Skin contact

Splashes of sprayed refrigerant can cause frost burns. It is unlikely to be dangerous due to skin absorption; Prolonged and repeated contact may cause removal of skin fat, dryness and dermatitis.

### 2.3.3 Eyes contact

Splashes of sprayed refrigerant can cause frost burns.

### 2.3.4 Ingestion

Highly unlikely but can cause frost burns.

## 2.4 First AID measures



Follow strictly the following advises and the first AID procedures.

### 2.4.1 Inhalation

Remove injured person from the source of exposure, keep him warm and at rest. If necessary administer some oxygen; practice artificial respiration if breathing has stopped or any signs of stopping occurs.

If there is cardiac arrest perform cardiac massage; request medical assistance

### 2.4.2 Skin contact

In case of skin contact wash immediately with warm water; if necessary thaw the epidermal tissue with water. Remove contaminated clothing which can stick to skin in case of frost burns. If there is irritation or blistering, request medical assistance.

### 2.4.3 Eyes contact

Wash immediately with eye washing solution or with clean water, keep eyelids open for at least two minutes; request medical assistance.

### 2.4.4 Ingestion

Do not induce vomiting, if the injured person is conscious rinse mouth with water and allow 200-300 ml of water to be drunk; request medical assistance.

### 2.4.5 Further medical treatment

Symptomatic treatment and supportive therapy as indicated; do not administer adrenaline and sympathomimetic drugs as a result of exposure, due to the risk of cardiac arrhythmia.

### 3. TECHNICAL CHARACTERISTICS

#### 3.1 Unit description

Remote condensers with low rpm axial fans for external installation, completely assembled and tested at the factory. The condensers can be installed either in vertical position (horizontal air flow) or in horizontal position (vertical air flow) by using the appropriate feet, an optional on demand. The unit is equipped with the condensing pressure control on each circuit. On 2-circuit units, the modulating fan speed regulator with phase control is standard: in this case, priority is given to the circuit where pressure is higher.

On request, the remote condensers can be provided with a condensing pressure control (option RG), by means of an actuated pressure fan speed controller, providing speed variation with a reduced full load current and allowing their operation down to -10°C ambient temperature. For lower temperatures down to -40°C, it is necessary to select option BW.

#### 3.1.1 Frame

The condensers CR /CRS / CRU are realised in pre-painted aluminium sheet (RAL 9003 colour).

#### 3.1.2 Fans

Of axial type, statically and dynamically balanced on two levels, with blades having an innovative design and realised in cast aluminium. The electrical motor is of external rotor type, IP54 class “F”, particularly suitable for speed regulation with phase control systems. The fan protection grid is in conformity with the security standards in force.

#### 3.1.3 Condensing coil

With a wide frontal surface and placed upstream to the fans for a better air distribution. It is built using copper pipes mechanically expanded on aluminium fins.

#### 3.1.4 Cooling connections

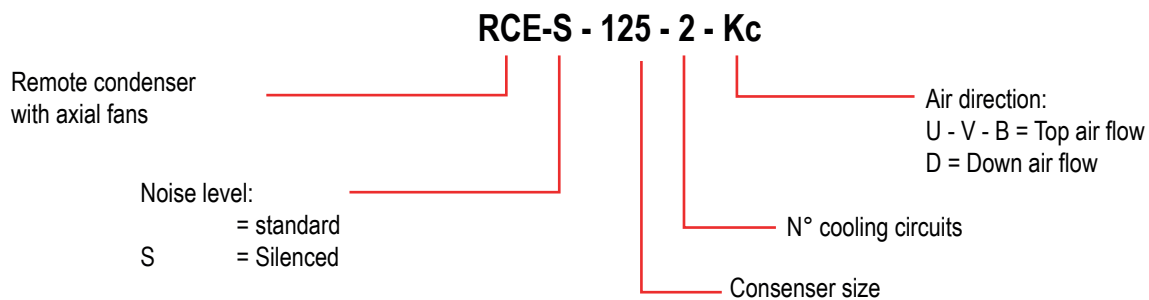
The fittings are of butt-welding type and are placed on one unit side.

#### 3.1.5 Wiring circuit

Main switch with protection rating IP44 for 1-circuit units and IP65 for the 2-circuit units placed on the fan side of the unit, pre-wired pressure control and (on 2-circuit units) protected by an appropriate housing.

#### 3.1.6 Remote condensers description

The following scheme shows the meaning of the elements composing the unit acronym.



### 3.2 Other version

- BW** **Low temperature operation down to -40°C:** In order to allow operation down to such external air temperature, we provide a kit of components to be installed close to the remote condenser that include: liquid receiver, condensing control valve, non-return valves, safety valve, self-regulating heating coil and insulating material.
- IM** **Seawood packing:** Fumigated seawood case and protection bag with hygroscopic salts, suitable for long sea transports.
- RG** **Fans speed regulation:** For operation down to -10°C external air, on the indoor unit we install a voltage fan speed controller (protection class IP54) already factory set.
- RM** **Condensing coil with pre-painted fins:** Superficial treatment of the condensing coils realized in epoxy pre-painted aluminium material.
- RR** **Copper/copper condensing coils:** Special execution of the condensing coils with copper pipe and fins.
- EC** **Axial fans with electronic commutated motor:** with external rotor directly coupled to a three-phase electronically commutated motor (EC) they have the possibility of a continuous regulation of the speed by means of a 0-10V signal completely managed by the microprocessor. Aluminum blades with wings profile are suitably designed to avoid any turbulence in the air detachment zone, granting in this way the max efficiency with the minimum noise level. The fan is equipped with galvanized steel protection grid painted after the construction. Thanks to a more accurate adjustment of air flow, they allow operation of the unit with external temperature down to -20°C.

### 3.3 Accessories description

The units are available in different configurations according to the number of circuits, the noise level and the thermal capacity.

The available air condensing units are:

- RCE Kc – Standard remote condensers suitable for R410A – 1 and 2 circuits;
- RCE-S Kc – Silenced remote condensers suitable for R410A – 1 and 2 circuits.

### 3.4 What is the E.V.I. technology (enhanced vapour injection)

#### 3.4.1 Single circuit remote condenser technical data - Standard version

RCE		091 Kc	111 Kc	211 Kc	311 Kc	421 Kc	571 Kc	671 Kc	991 Kc	1101 Kc	1501 Kc
Heating capacity <sup>(1)</sup>	kW	9,3	11,1	19,2	29,4	44,2	60,5	66,5	97,4	100,2	150,6
Axial fans											
Quantity	n°	1	1	2	1	4	2	2	3	4	6
Rotation speed	g/min	1450	1450	1450	1300	1400	1300	1300	1300	1300	1300
Air flow	m <sup>3</sup> /h	2600	2400	5200	6620	9600	13250	12500	18760	29440	37530
Total input power	kW	0,14	0,14	0,29	0,68	0,58	1,36	1,36	2,04	2,72	4,08
Total nominal current	A	0,68	0,68	1,36	3,00	2,72	6,00	6,00	9,00	12,00	18,00
Diameter	mm	350	350	350	500	350	500	500	500	500	500
Sound pressure level <sup>(2)</sup>	dB(A)	40	40	43	48	46	51	51	52	53	54
Sound power level <sup>(3)</sup>	dB(A)	71	71	74	79	77	82	82	83	85	86
Dimensions <sup>(4)</sup>											
Length - horizontal air flow	mm	882	882	1582	1203	2980	2203	2203	3203	4373	2705
Depth - horizontal air flow	mm	480	480	480	570	480	570	570	570	705	600
Height - horizontal air flow	mm	510	510	510	830	510	830	830	830	1110	1645
Length - vertical air flow	mm	882	882	1582	1219	2980	2219	2219	3219	4393	2705
Depth - vertical air flow	mm	550	550	550	895	550	895	895	895	1110	1717
Height - vertical air flow	mm	811	811	811	1099	811	1099	1099	1099	1230	1070
Weight	kg	25	27	44	67	88	112	120	170	282	250
Battery capacity	dm <sup>3</sup>	0,9	1,2	1,5	3,0	4,5	5,9	7,2	11,1	17,7	28,2
Input/output connections	mm/mm	16/16	16/16	16/16	22/22	28/28	28/28	28/28	42/35	42/35	54/42
Power supply	V/ph/Hz	230/1/50+T									

#### 3.4.2 Single circuit remote condenser technical data - Low noise version

RCE-S		151 Kc	261 Kc	351 Kc	501 Kc	571 Kc	651 Kc	1001 Kc	1101 Kc	1301 Kc	
Heating capacity <sup>(1)</sup>	kW	15,8	22,8	30,9	46,2	57,1	66	78,4	108,7	140,1	
Axial fans											
Quantity	n°	1	1	2	2	3	3	4	6	6	
Rotation speed	g/min	665	865	665	865	865	865	865	665	865	
Air flow	m <sup>3</sup> /h	3590	4040	7180	8080	14100	12970	19930	20370	28200	
Total input power	kW	0,13	0,22	0,26	0,44	0,66	0,66	0,88	0,78	1,32	
Total nominal current	A	0,59	0,97	1,18	1,94	2,91	2,91	3,88	3,54	5,82	
Diameter	mm	500	500	500	500	500	500	500	500	500	
Sound pressure level <sup>(2)</sup>	dB(A)	30	37	33	40	41	41	42	37	44	
Sound power level <sup>(3)</sup>	dB(A)	61	68	64	71	72	72	74	69	76	
Dimensions <sup>(4)</sup>											
Length - horizontal air flow	mm	1203	1203	2203	2203	3203	3203	4373	3393	3393	
Depth - horizontal air flow	mm	570	570	570	570	570	570	705	990	990	
Height - horizontal air flow	mm	830	830	830	830	830	830	1110	2110	2110	
Length - vertical air flow	mm	1219	1219	2219	2219	3219	3219	4393	3393	3393	
Depth - vertical air flow	mm	895	895	895	895	895	895	1110	2110	2110	
Height - vertical air flow	mm	1099	1099	1099	1099	1099	1099	1230	1230	1230	
Weight	kg	62	71	104	120	146	157	282	425	425	
Battery capacity	dm <sup>3</sup>	1,9	4,2	3,7	7,2	5,6	8,2	17,7	41,8	41,8	
Input/output connections	mm/mm	16/16	28/28	28/28	28/28	28/28	35/28	42/35	54/42	54/42	
Power supply	V/ph/Hz	230/1/50+T									

(1) Performances are referred to the following conditions: Ambient temperature 35°C, Condensing temperature 50°C.

(2) Sound pressure level measured at 10 mt from the unit in free field conditions according to ISO 3744.

(3) Sound power level according to ISO 3744.

(4) Including support brackets.

### 3.4.3 Double circuit remote condenser technical data - Standard version

RCE		302 Kc	482 Kc	602 Kc	752 Kc	862 Kc	1052 Kc	1152 Kc	1252 Kc	1602 Kc	1702 Kc
Heating capacity <sup>(1)</sup>	kW	29,4	44,2	60,5	66,5	87,8	97,4	100,2	124,4	150,6	170,2
Axial fans											
Quantity	n°	1	4	2	2	3	3	4	4	6	6
Rotation speed	g/min	1300	1400	1300	1300	1300	1300	1300	1300	1300	1300
Air flow	m³/h	6620	9600	13240	12510	19870	18770	29440	27970	37540	35330
Total input power	kW	0,68	0,58	1,36	1,36	2,04	2,04	2,72	2,72	4,08	4,08
Total nominal current	A	3	2,72	6	6	9	9	12	12	18	18
Diameter	mm	500	350	500	500	500	500	500	500	500	500
Sound pressure level <sup>(2)</sup>	dB(A)	48	46	51	51	52	52	53	53	54	54
Sound power level <sup>(3)</sup>	dB(A)	79	77	82	82	83	83	85	85	86	86
Dimensions <sup>(4)</sup>											
Length - horizontal air flow	mm	1203	2980	2203	2203	3203	3203	4373	4373	2705	2705
Depth - horizontal air flow	mm	570	480	570	570	570	570	705	705	600	600
Height - horizontal air flow	mm	830	510	830	830	830	830	1110	1110	1645	1645
Length - vertical air flow	mm	1219	2980	2219	2219	3219	3219	4393	4393	2705	2705
Depth - vertical air flow	mm	895	550	895	895	895	895	1110	1110	1717	1717
Height - vertical air flow	mm	1099	811	1099	1099	1099	1099	1230	1230	1070	1070
Weight	kg	67	88	112	120	157	170	282	312	250	274
Battery capacity	dm³	3,0	4,5	5,9	7,2	8,2	11,1	17,7	26,6	28,2	35,9
Input/output connections	mm/mm	22/22	28/28	28/28	28/28	35/28	42/35	42/35	54/42	54/42	54/42
Power supply	V/ph/Hz	230/1/50+T									

### 3.4.4 Double circuit remote condenser technical data - Low noise version

RCE-S		382 Kc	482 Kc	602 Kc	752 Kc	862 Kc	1252 Kc	1602 Kc	1702 Kc
Heating capacity <sup>(1)</sup>	kW	37,1	46,2	57,1	68,4	93,3	114,3	116,6	157,8
Axial fans									
Quantity	n°	2	2	3	3	4	6	5	8
Rotation speed	g/min	865	865	865	865	865	865	865	865
Air flow	m³/h	9400	8084	14100	12120	18800	24810	23500	39850
Total input power	kW	0,44	0,44	0,66	0,66	0,88	1,32	1,1	1,76
Total nominal current	A	1,94	1,94	2,91	2,91	3,88	5,82	4,85	7,76
Diameter	mm	500	500	500	500	500	500	500	500
Sound pressure level <sup>(2)</sup>	dB(A)	40	40	41	41	42	44	43	45
Sound power level <sup>(3)</sup>	dB(A)	71	71	72	72	74	76	75	77
Dimensions <sup>(4)</sup>									
Length - horizontal air flow	mm	2203	2203	3203	3203	4373	2705	5373	4393
Depth - horizontal air flow	mm	570	570	570	570	705	600	705	2110
Height - horizontal air flow	mm	830	830	830	830	1110	1645	1100	990
Length - vertical air flow	mm	2219	2219	3219	3219	4393	2705	5393	4393
Depth - vertical air flow	mm	895	895	895	895	1110	1717	1110	2110
Height - vertical air flow	mm	1099	1099	1099	1099	1230	1070	1230	1230
Weight	kg	104	120	146	170	312	250	370	490
Battery capacity	dm³	4,0	7,2	5,6	11,1	26,6	28,2	32,4	37,6
Input/output connections	mm/mm	28/28	28/28	28/28	42/35	54/42	54/42	54/42	54/42
Power supply	V/ph/Hz	230/1/50+T							

(1) Performances are referred to the following conditions: Ambient temperature 35°C, Condensing temperature 50°C.

(2) Sound pressure level measured at 10 mt from the unit in free field conditions according to ISO 3744.

(3) Sound power level according to ISO 3744.

(4) Including support brackets.

### 3.5 Matching between indoor unit and remote condenser

#### 3.5.1 DX.A - Standard remote condenser

	Single circuit	Double circuit	Oversize - Single circuit	Oversize - Double circuit
DX.A 61	RCE 091 Kc	--	RCE 091 Kc	--
DX.A 71	RCE 091 Kc	--	RCE 111 Kc	--
DX.A 91	RCE 111 Kc	--	RCE 211 Kc	--
DX.A 111	RCE 111 Kc	--	RCE 211 Kc	--
DX.A 151	RCE 211 Kc	--	RCE 311 Kc	--
DX.A 181	RCE 211 Kc	--	RCE 311 Kc	--
DX.A 201	RCE 211 Kc	--	RCE 311 Kc	--
DX.A 221	RCE 311 Kc	--	RCE 421 Kc	--
DX.A 251	RCE 311 Kc	--	RCE 421 Kc	--
DX.A 232	2 x RCE 111 Kc	RCE 302 Kc	2 x RCE 211 Kc	RCE 482 Kc
DX.A 301	RCE 311 Kc	--	RCE 421 Kc	--
DX.A 321	RCE 421 Kc	--	RCE 421 Kc	--
DX.A 322	2 x RCE 211 Kc	RCE 302 Kc	2 x RCE 311 Kc	RCE 482 Kc
DX.A 391	RCE 421 Kc	--	RCE 571 Kc	--
DX.A 392	2 x RCE 211 Kc	RCE 482 Kc	2 x RCE 311 Kc	RCE 602 Kc
DX.A 431	RCE 421 Kc	--	RCE 571 Kc	--
DX.A 442	2 x RCE 311 Kc	RCE 482 Kc	2 x RCE 421 Kc	RCE 602 Kc
DX.A 451	RCE 421 Kc	--	RCE 571 Kc	--
DX.A 472	2 x RCE 311 Kc	RCE 482 Kc	2 x RCE 421 Kc	RCE 752 Kc
DX.A 511	RCE 571 Kc	--	RCE 671 Kc	--
DX.A 512	2 x RCE 311 Kc	RCE 602 Kc	2 x RCE 421 Kc	RCE 752 Kc
DX.A 531	RCE 571 Kc	--	RCE 991 Kc	--
DX.A 602	2 x RCE 311 Kc	RCE 602 Kc	2 x RCE 421 Kc	RCE 862 Kc
DX.A 672	2 x RCE 421 Kc	RCE 602 Kc	2 x RCE 571 Kc	RCE 862 Kc
DX.A 742	2 x RCE 421 Kc	RCE 752 Kc	2 x RCE 571 Kc	RCE 1052 Kc
DX.A 761	RCE 671 Kc	--	RCE 991 Kc	--
DX.A 762	2 x RCE 421 Kc	RCE 862 Kc	2 x RCE 571 Kc	RCE 1052 Kc
DX.A 772	2 x RCE 421 Kc	RCE 862 Kc	2 x RCE 571 Kc	RCE 1152 Kc
DX.A 841	RCE 991 Kc	--	RCE 1101 Kc	--
DX.A 862	2 x RCE 421 Kc	RCE 862 Kc	2 x RCE 571 Kc	RCE 1252 Kc
DX.A 982	2 x RCE 421 Kc	RCE 1052 Kc	2 x RCE 671 Kc	RCE 1602 Kc
DX.A 1002	2 x RCE 421 Kc	RCE 1052 Kc	2 x RCE 671 Kc	RCE 1602 Kc
DX.A 1102	2 x RCE 571 Kc	RCE 1252 Kc	2 x RCE 991 Kc	RCE 1602 Kc
DX.A 1252	2 x RCE 571 Kc	RCE 1252 Kc	2 x RCE 991 Kc	RCE 1702 Kc



## 3.5.2 DX.A - Remote condenser low noise version

	Single circuit	Double circuit	Overize - Single circuit	Overize - Double circuit
DX.A 61	RCE-S 151 Kc	--	RCE-S 151 Kc	--
DX.A 71	RCE-S 151 Kc	--	RCE-S 151 Kc	--
DX.A 91	RCE-S 151 Kc	--	RCE-S 151 Kc	--
DX.A 111	RCE-S 151 Kc	--	RCE-S 151 Kc	--
DX.A 151	RCE-S 151 Kc	--	RCE-S 261 Kc	--
DX.A 181	RCE-S 261 Kc	--	RCE-S 351 Kc	--
DX.A 201	RCE-S 261 Kc	--	RCE-S 351 Kc	--
DX.A 221	RCE-S 261 Kc	--	RCE-S 501 Kc	--
DX.A 251	RCE-S 261 Kc	--	RCE-S 501 Kc	--
DX.A 232	2 x RCE-S 151 Kc	RCE-S 382 Kc	2 x RCE-S 151 Kc	RCE-S 482 Kc
DX.A 301	RCE-S 351 Kc	--	RCE-S 501 Kc	--
DX.A 321	RCE-S 351 Kc	--	RCE-S 501 Kc	--
DX.A 322	2 x RCE-S 151 Kc	RCE-S 382 Kc	2 x RCE-S 261 Kc	RCE-S 482 Kc
DX.A 391	RCE-S 501 Kc	--	RCE-S 571 Kc	--
DX.A 392	2 x RCE-S 261 Kc	RCE-S 382 Kc	2 x RCE-S 351 Kc	RCE-S 602 Kc
DX.A 431	RCE-S 501 Kc	--	RCE-S 501 Kc	--
DX.A 442	2 x RCE-S 261 Kc	RCE-S 482 Kc	2 x RCE-S 351 Kc	RCE-S 752 Kc
DX.A 451	RCE-S 501 Kc	--	RCE-S 651 Kc	--
DX.A 472	2 x RCE-S 261 Kc	RCE-S 482 Kc	2 x RCE-S 501 Kc	RCE-S 752 Kc
DX.A 511	RCE-S 501 Kc	--	RCE-S 651 Kc	--
DX.A 512	2 x RCE-S 261 Kc	RCE-S 482 Kc	2 x RCE-S 501 Kc	RCE-S 752 Kc
DX.A 531	RCE-S 571 Kc	--	RCE-S 1001 Kc	--
DX.A 602	2 x RCE-S 351 Kc	RCE-S 602 Kc	2 x RCE-S 501 Kc	RCE-S 862 Kc
DX.A 672	2 x RCE-S 351 Kc	RCE-S 752 Kc	2 x RCE-S 501 Kc	RCE-S 862 Kc
DX.A 742	2 x RCE-S 501 Kc	RCE-S 752 Kc	2 x RCE-S 571 Kc	RCE-S 1252 Kc
DX.A 761	RCE-S 1001 Kc	--	RCE-S 1001 Kc	--
DX.A 762	2 x RCE-S 501 Kc	RCE-S 752 Kc	2 x RCE-S 571 Kc	RCE-S 1252 Kc
DX.A 772	2 x RCE-S 501 Kc	RCE-S 862 Kc	2 x RCE-S 571 Kc	RCE-S 1252 Kc
DX.A 841	RCE-S 1001 Kc	--	RCE-S 1001 Kc	--
DX.A 862	2 x RCE-S 501 Kc	RCE-S 1052 Kc	2 x RCE-S 651 Kc	RCE-S 1252 Kc
DX.A 982	2 x RCE-S 501 Kc	RCE-S 1052 Kc	2 x RCE-S 651 Kc	RCE-S 1602 Kc
DX.A 1002	2 x RCE-S 501 Kc	RCE-S 1052 Kc	2 x RCE-S 651 Kc	RCE-S 1602 Kc
DX.A 1102	2 x RCE-S 571 Kc	RCE-S 1252 Kc	2 x RCE-S 1001 Kc	RCE-S 1702 Kc
DX.A 1252	2 x RCE-S 571 Kc	RCE-S 1252 Kc	2 x RCE-S 1101 Kc	RCE-S 1702 Kc

## 3.5.3 DXi.A - Standard remote condenser

	Single circuit	Double circuit	Oversize - Single circuit	Oversize - Double circuit
<b>DXi.A 61</b>	RCE 091 Kc	--	RCE 111 Kc	--
<b>DXi.A 111</b>	RCE 111 Kc	--	RCE 211 Kc	--
<b>DXi.A 121</b>	RCE 111 Kc	--	RCE 211 Kc	--
<b>DXi.A 151</b>	RCE 211 Kc	--	RCE 311 Kc	--
<b>DXi.A 181</b>	RCE 211 Kc	--	RCE 311 Kc	--
<b>DXi.A 201</b>	RCE 211 Kc	--	RCE 311 Kc	--
<b>DXi.A 251</b>	RCE 311 Kc	--	RCE 421 Kc	--
<b>DXi.A 321</b>	RCE 421 Kc	--	RCE 571 Kc	--
<b>DXi.A 381</b>	RCE 421 Kc	--	RCE 571 Kc	--
<b>DXi.A 392</b>	2 x RCE 211 Kc	RCE 482 Kc	2 x RCE 311 Kc	RCE 602 Kc
<b>DXi.A 472</b>	2 x RCE 311 Kc	RCE 482 Kc	2 x RCE 421 Kc	RCE 752 Kc
<b>DXi.A 491</b>	RCE 571 Kc	--	RCE 991 Kc	--
<b>DXi.A 531</b>	RCE 571 Kc	--	RCE 991 Kc	--
<b>DXi.A 532</b>	2 x RCE 311 Kc	RCE 602 Kc	2 x RCE 421 Kc	RCE 862 Kc
<b>DXi.A 631</b>	RCE 571 Kc	--	RCE 991 Kc	--
<b>DXi.A 652</b>	2 x RCE 421 Kc	RCE 702 Kc	2 x RCE 571 Kc	RCE 1052 Kc
<b>DXi.A 691</b>	RCE 671 Kc	--	RCE 991 Kc	--
<b>DXi.A 742</b>	2 x RCE 421 Kc	RCE 862 Kc	2 x RCE 571 Kc	RCE 1052 Kc
<b>DXi.A 761</b>	RCE 991 Kc	--	RCE 1101 Kc	--
<b>DXi.A 861</b>	RCE 991 Kc	--	RCE 1501 Kc	--
<b>DXi.A 931</b>	RCE 991 Kc	--	RCE 1501 Kc	--
<b>DXi.A 952</b>	2 x RCE 421 Kc	RCE 1052 Kc	2 x RCE 671 Kc	RCE 1602 Kc
<b>DXi.A 1021</b>	RCE 991 Kc	--	RCE 1501 Kc	--
<b>DXi.A 1142</b>	2 x RCE 571 Kc	RCE 1252 Kc	2 x RCE 991 Kc	RCE 1602 Kc

## 3.5.4 DXi.A - Remote condenser low noise version

	Single circuit	Double circuit	Oversize - Single circuit	Oversize - Double circuit
<b>DXi.A 61</b>	RCE-S 151 Kc	--	RCE-S 151 Kc	--
<b>DXi.A 111</b>	RCE-S 151 Kc	--	RCE-S 151 Kc	--
<b>DXi.A 121</b>	RCE-S 151 Kc	--	RCE-S 261 Kc	--
<b>DXi.A 151</b>	RCE-S 261 Kc	--	RCE-S 261 Kc	--
<b>DXi.A 181</b>	RCE-S 261 Kc	--	RCE-S 351 Kc	--
<b>DXi.A 201</b>	RCE-S 261 Kc	--	RCE-S 351 Kc	--
<b>DXi.A 251</b>	RCE-S 261 Kc	--	RCE-S 501 Kc	--
<b>DXi.A 321</b>	RCE-S 501 Kc	--	RCE-S 571 Kc	--
<b>DXi.A 381</b>	RCE-S 501 Kc	--	RCE-S 571 Kc	--
<b>DXi.A 392</b>	2 x RCE-S 261 Kc	RCE-S 382 Kc	2 x RCE-S 351 Kc	RCE-S 602 Kc
<b>DXi.A 472</b>	2 x RCE-S 261 Kc	RCE-S 482 Kc	2 x RCE-S 501 Kc	RCE-S 752 Kc
<b>DXi.A 491</b>	RCE-S 571 Kc	--	RCE-S 1001 Kc	--
<b>DXi.A 531</b>	RCE-S 571 Kc	--	RCE-S 1001 Kc	--
<b>DXi.A 532</b>	2 x RCE-S 351 Kc	RCE-S 602 Kc	2 x RCE-S 501 Kc	RCE-S 752 Kc
<b>DXi.A 631</b>	RCE-S 651 Kc	--	RCE-S 1101 Kc	--
<b>DXi.A 652</b>	2 x RCE-S 501 Kc	RCE-S 752 Kc	2 x RCE-S 571 Kc	RCE-S 1252 Kc
<b>DXi.A 691</b>	RCE-S 651 Kc	--	RCE-S 1101 Kc	--
<b>DXi.A 742</b>	2 x RCE-S 501 Kc	RCE-S 862 Kc	2 x RCE-S 571 Kc	RCE-S 1252 Kc
<b>DXi.A 761</b>	RCE-S 1001 Kc	--	RCE-S 1101 Kc	--
<b>DXi.A 861</b>	RCE-S 1001 Kc	--	RCE-S 1301 Kc	--
<b>DXi.A 931</b>	RCE-S 1101 Kc	--	RCE-S 1301 Kc	--
<b>DXi.A 952</b>	2 x RCE-S 501 Kc	RCE-S 1052 Kc	2 x RCE-S 651 Kc	RCE-S 1602 Kc
<b>DXi.A 1021</b>	RCE-S 1101 Kc	--	RCE-S 1301 Kc	--
<b>DXi.A 1142</b>	2 x RCE-S 571 Kc	RCE-S 1252 Kc	2 x RCE-S 1001 Kc	RCE-S 1702 Kc

## 4. INSTALLATION

### 4.1 General advices and symbols use



Before to operate any intervention the technicians has to know perfectly the unit functioning and all its components, also for having read the present Manual.



The maintenance operations has to be performed by well trained technicians in compliance with national legislation in the country of destination.



The unit installation and maintenance has to be performed following the regulation and norms in force.



Do not approach or insert any object into moving parts.

### 4.2. Workers health and safety



The operator's workplace must be kept clean, tidy and free of objects that mas restrict free movement; the workplace must be adequately lit for the intended operations. Inadequate or excessive lighting can pose risks.



Ensure that excellent ventilation of the work rooms is always guaranteed and that the extraction systems are always functional, in excellent condition and in compliance with the provisions of the law.

### 4.3 Individual protection devices



The technicians in charge for unit installation and maintenance has to wear mandatory, following the laws in force, the below mentioned protection devices.



Protection shoes.



Eyes's protections.



Protection gloves.



Respiratory protection.



Ears protections.

#### 4.4 Receipt and inspection

During the installation or any intervention it is mandatory to follow strictly any norms reported on the present Manual, to follow the onboard indications and apply every precaution in order to avoid any dangerous situation. At the unit receipt it is necessary to make a visual inspection; the unit left the Manufacturer in perfect conditions, damages occurs during transport has to be immediately disputed with the carrier noticing on the delivery sheet before signing in. The Manufacturer has to be informed about the damages within days from receiving of the unit. The unit owner must to complete a written report in the event of significant damage.

Before to accept the delivery check carefully:

- The unit has not be damaged during the transport;;
- The delivered unit corresponds to the ones indicated on the transport document.

#### If any damage or fault occurs:

- Note immediately the damage on delivery document;
- Inform Manufacturer or supplier, within 8 days from receipt, about the damage type; reports after 8 days from receipt are not valid;
- In case of significant damage, complete a written report.

#### 4.5 Storage and transport

If it was necessary to storage the unit, ensure to leave it in a closed and dry place; if the unit is already unpacked please follow the hereafter indications to avoid a possible corrosion, damage or deterioration:

- Be sure about every opening is well plugged or sealed;
- Do not use steam or aggressive detergents to clean the unit;
- Take out the control cabinet keys (if presents) and entrust them to the site manager.



The unit can be stocked to temperature between  $-10^{\circ}$  to  $+65^{\circ}\text{C}$ ; during the stops it is recommended to be sure about those temperatures in order to avoid refrigerant's leak from the safety valves.

The transport has to be done by authorized carriers and the truck characteristics must be such by to not damage the units during the load and during the transport. If the road are bumpy, the truck must have suspension suitable to protect the unit from any damage.

#### 4.6 Unpacking



The packaging could create risks for the operators

It is suggested to leave the packaged unit during the handling and remove it just before the installation. Be careful to remove the packaging in order to avoid unit damages and operators dangers.

The materials which compose the packaging could be from different nature (wood, nylon, cardboard, etc.)



The packaging materials has to be separately preserved and delivered for disposal or eventually for recycle to the responsible companies in order to reduce the environmental impact.  
Keep out the material of reach of childrens.

## 4.7 Lifting and handling

When unloading the unit, it is strongly recommended that sudden movements are avoided in order to protect internal components; unit can be lifted by using a forklift or, in alternative using belts. Take care that the method of lifting does not damage the side panels or the cover.



The weight of some models could be unbalanced, before to start the handling verify the unit stability in order to avoid problems during the operations.

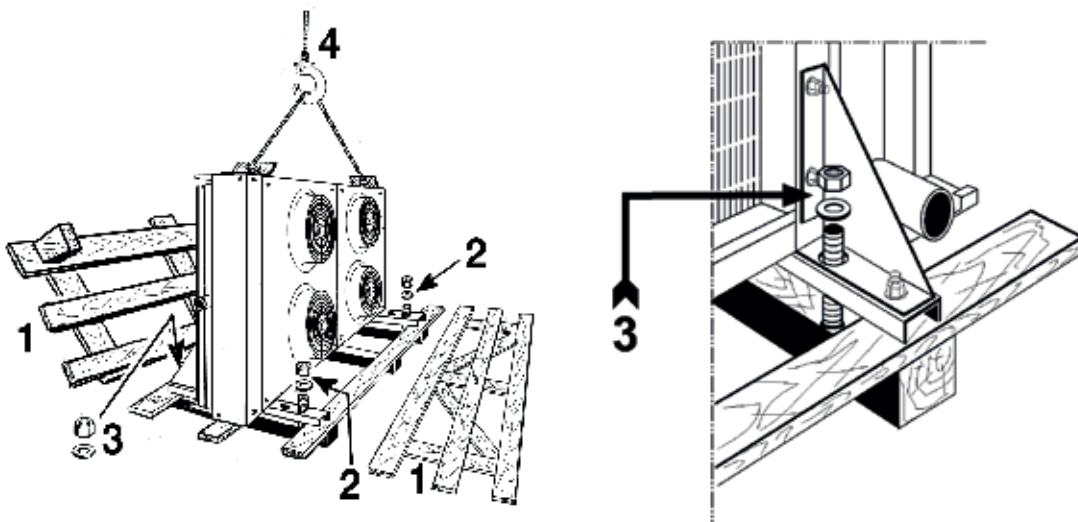


IS forbidden to put one unit over other also if are packed. If the unit is stored after receipt, must be away from the elemets even if packed.

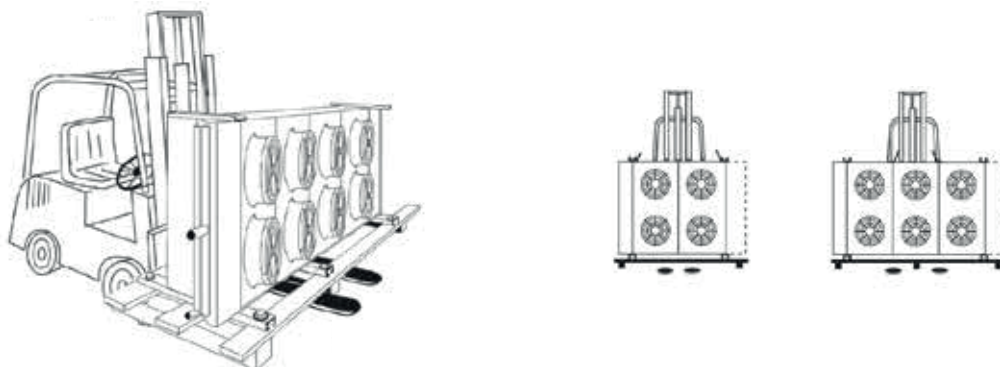


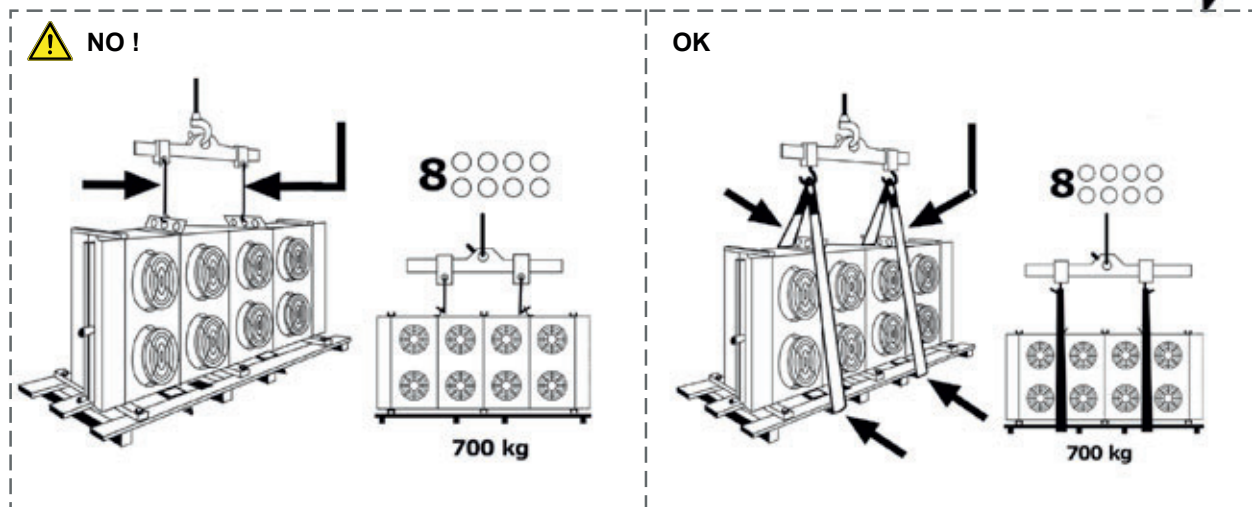
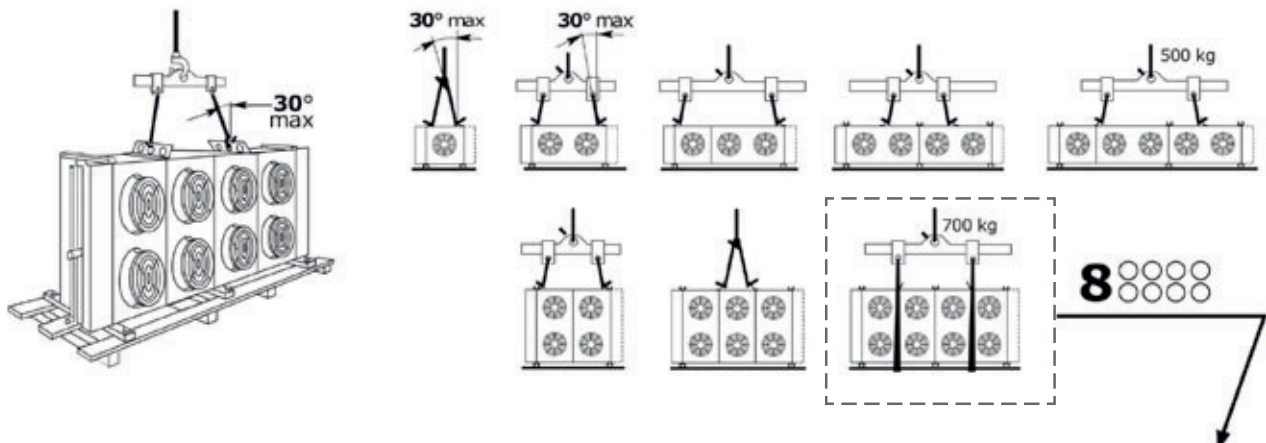
The handling devices, cables, belts has to be in compliance with laws and local norms.

### 4.7.1 Lifting and handling RCE 091÷991 - RCE-S 151÷1001



### 4.7.2 Lifting and handling RCE 1101÷1702 - RCE-S 1101÷1702



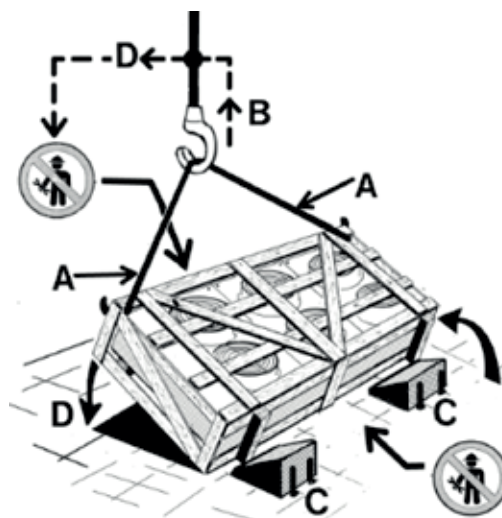


#### 4.8 Location and minimum technical clearances (RCE 091÷991 - RCE-S 151÷1001)

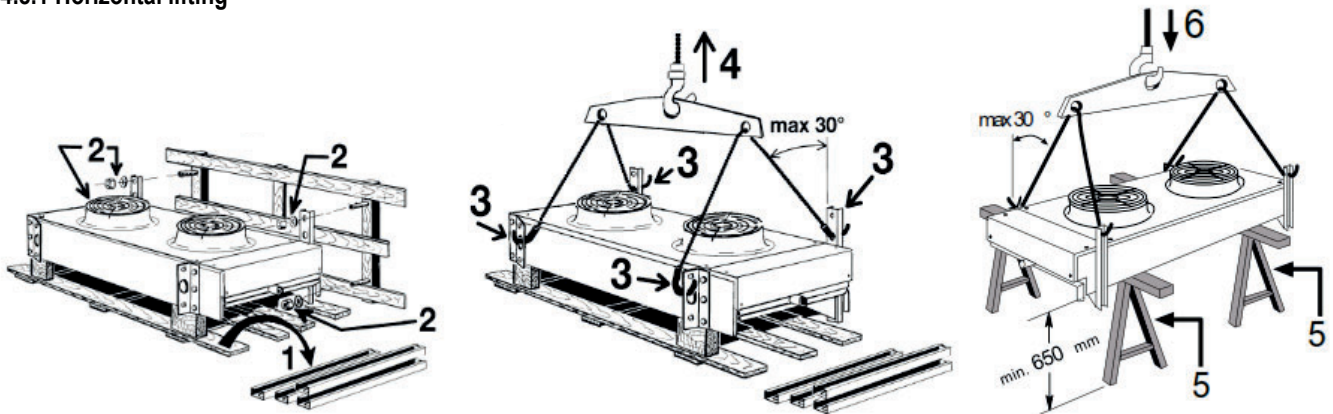
Before lifting the unit we recommend to check the structural integrity of the lifting devices and their secure position. During the overturning of the unit please check that:

- The lifting ropes are always vertical (A – B)
- The base of the unit is blocked by the necessary devices (C) to avoid sliding.

The operator must work next to the unit and not stand near the overturning areas (D)

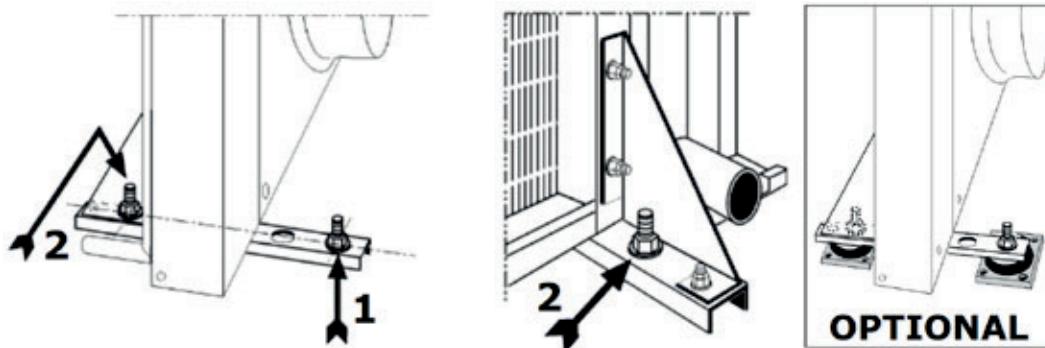


4.8.1 Horizontal lifting

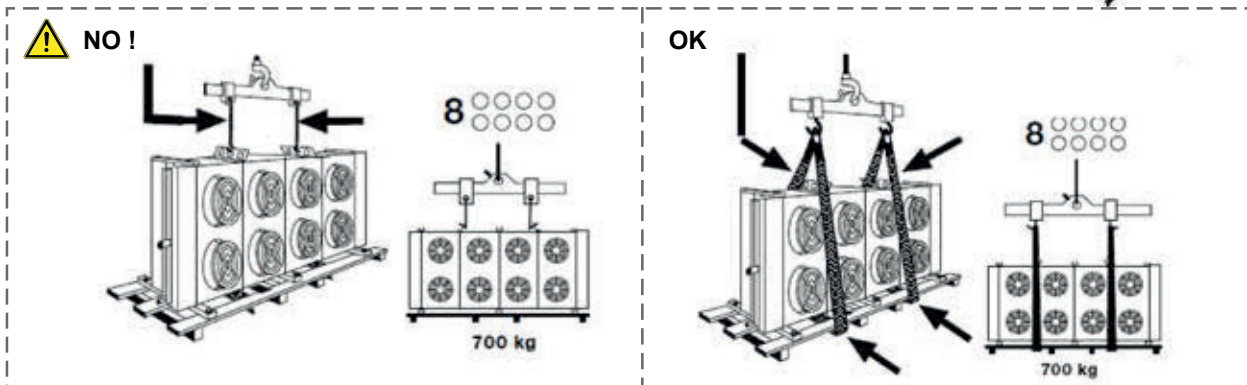
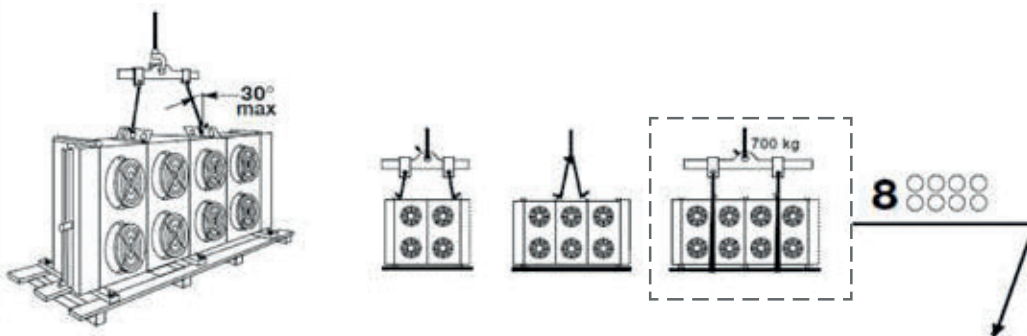


4.9 Vertical installation

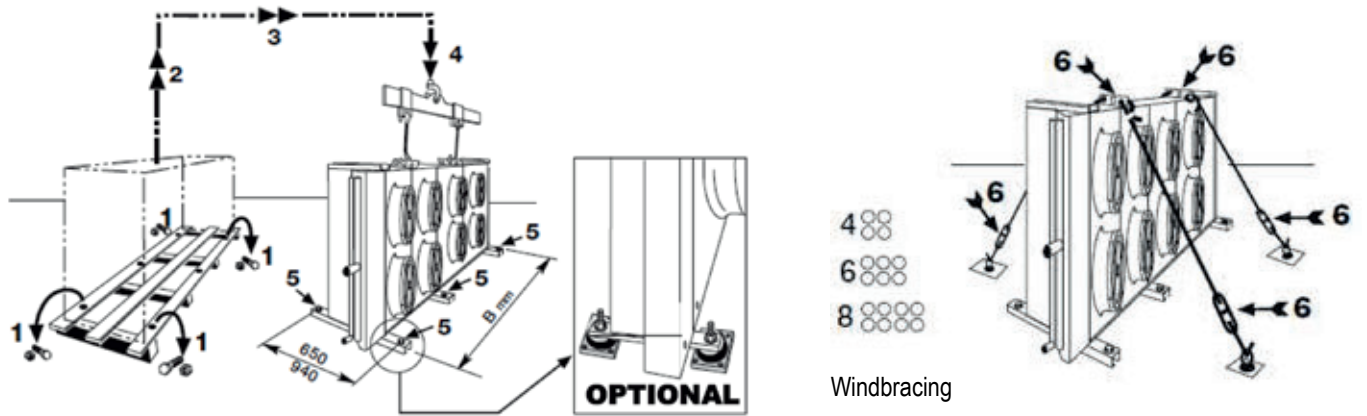
4.9.1 Vertical installation (RCE 091÷991 - RCE-S 151÷1001)



4.9.2 Vertical installation (RCE 1101÷1702 - RCE-S 1101÷1702)

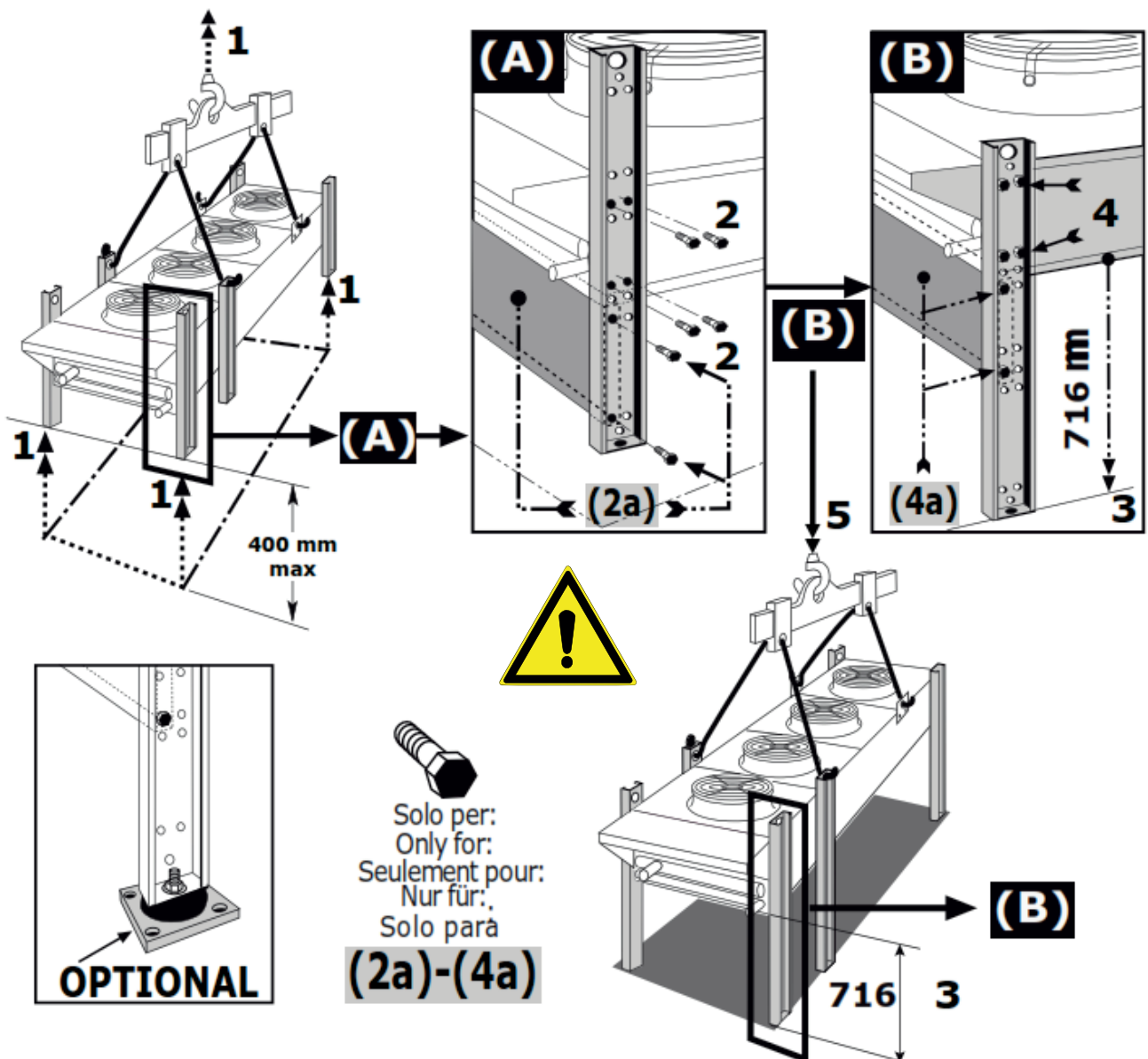






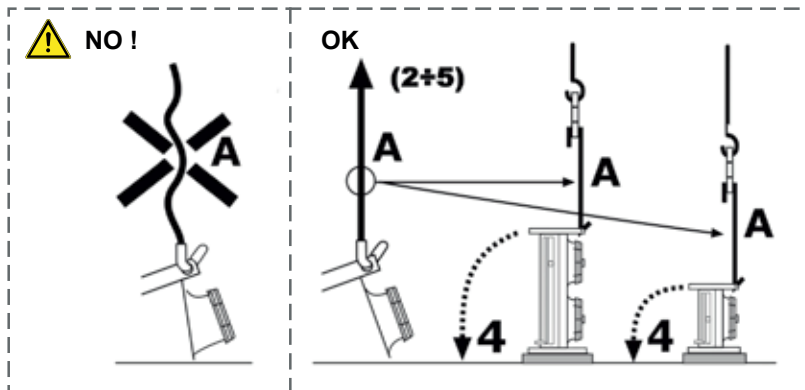
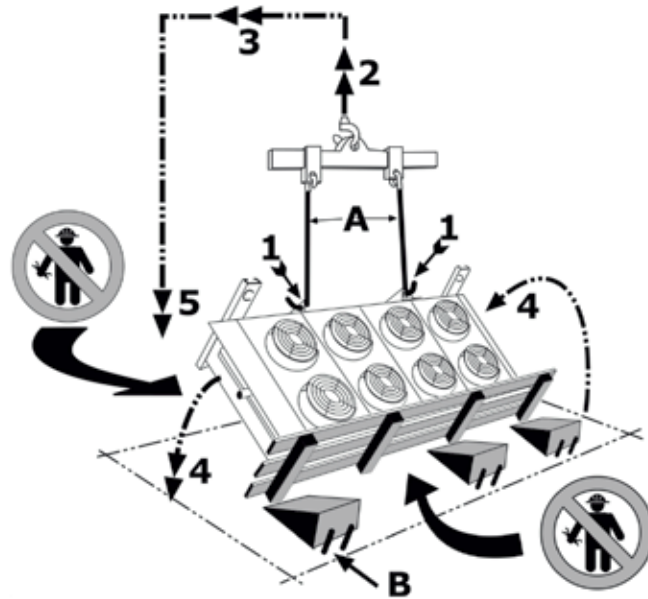
## 4.10 Horizontal installation

### 4.10.1 Horizontal installation (RCE 091÷991 - RCE-S 151÷1001)

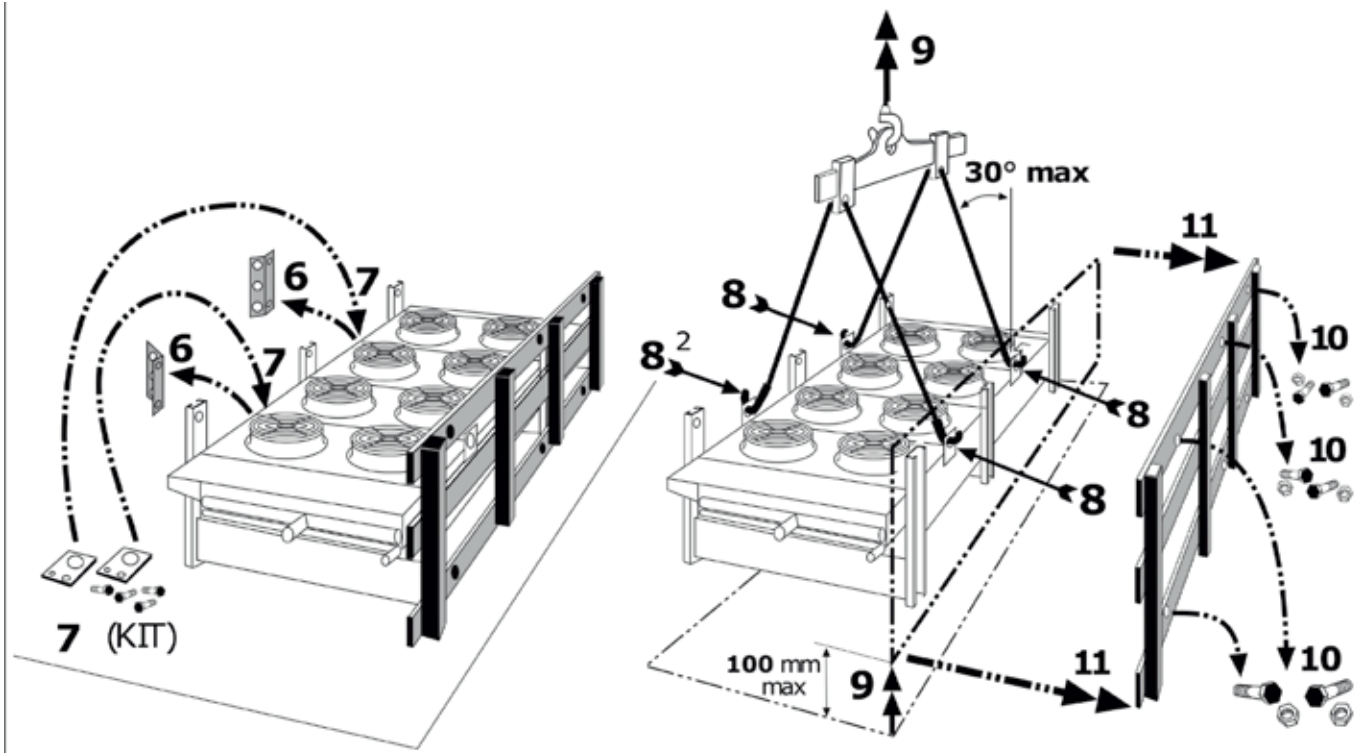


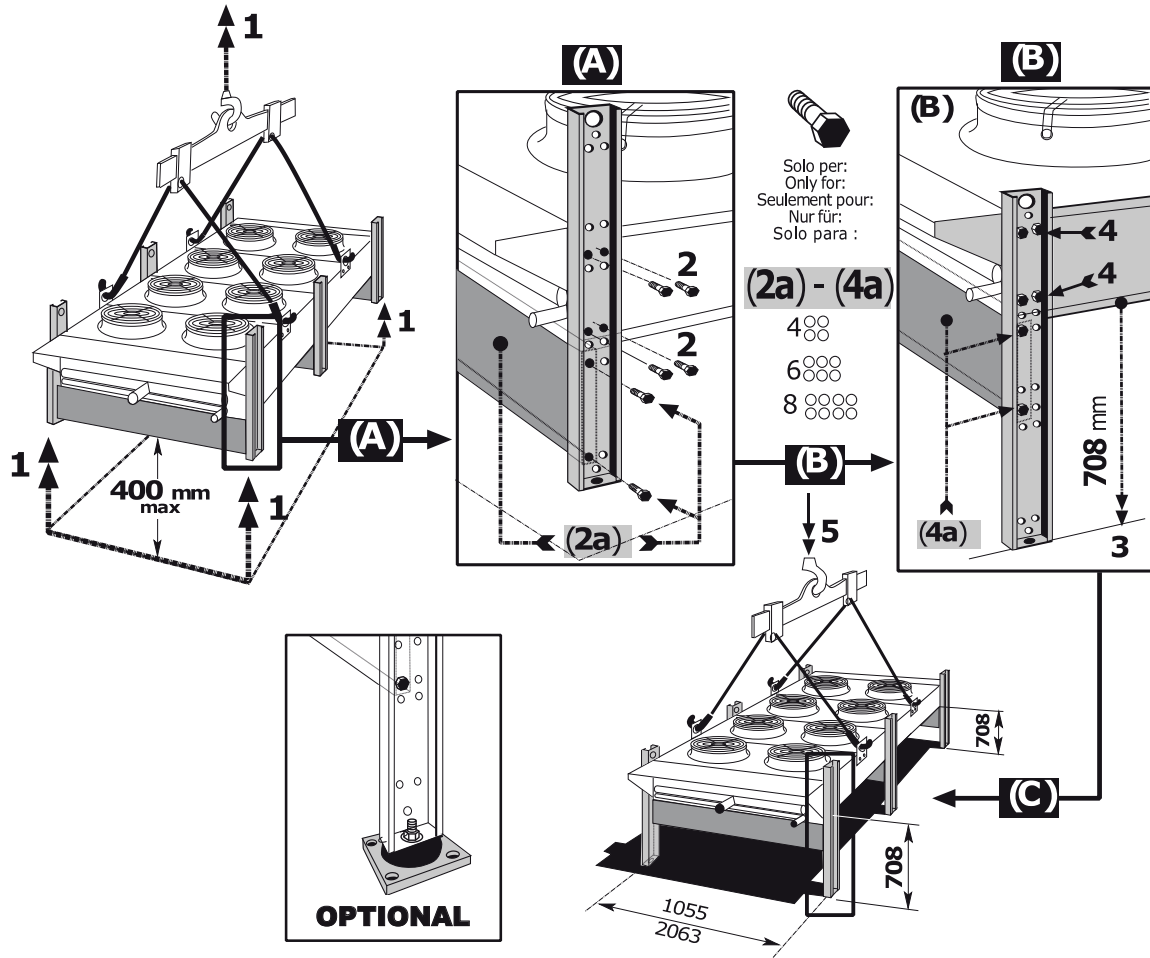
4.10.2 Horizontal installation (RCE 1101÷1702 - RCE-S 1101÷1702)

Overturning



Installation





### 4.11 Location and minimum technical clearances

All models are designed for internal installation; Unit vibration level is very low. It is vital to avoid recirculation from discharge and suction in order to avoid poor performances or even the normal operation stops. For these reason it is necessary to observe the following clearance. The unit doesn't need a special fundations, as it can simply be placed on the installation site to work.

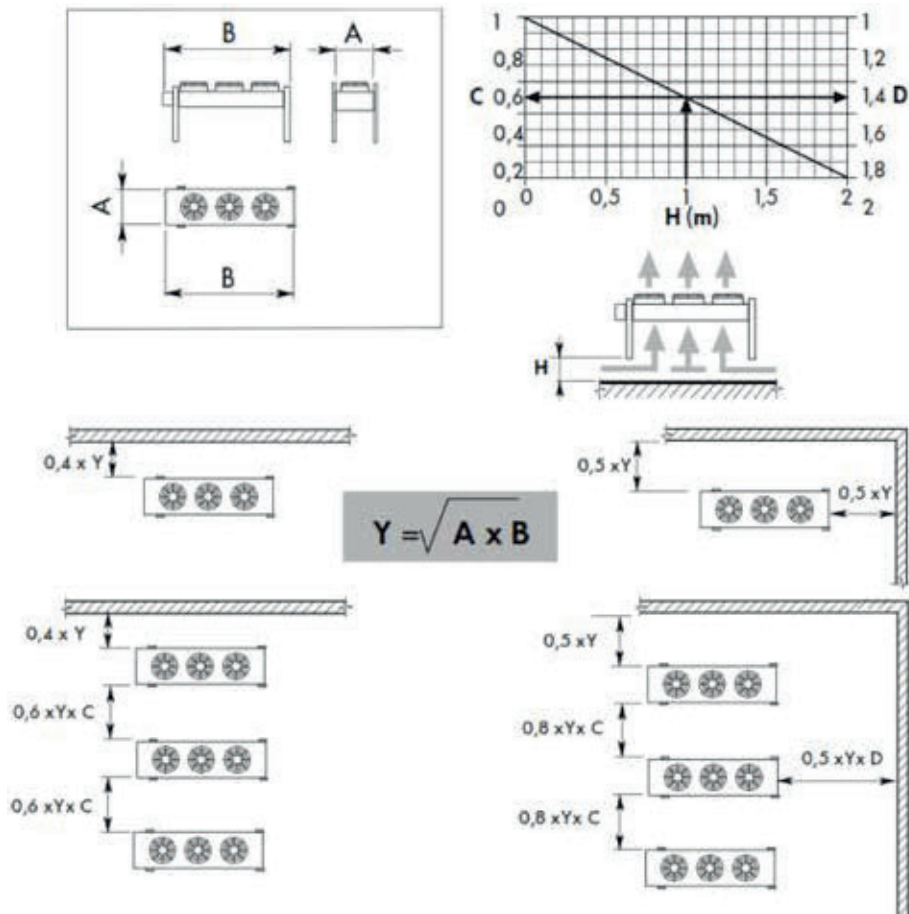


Pay attention to respect the clearances in order to allow ordinary and extraordinary maintenance. The guarantee does not costs related to platforms or handling equipment necessary for any repairs.

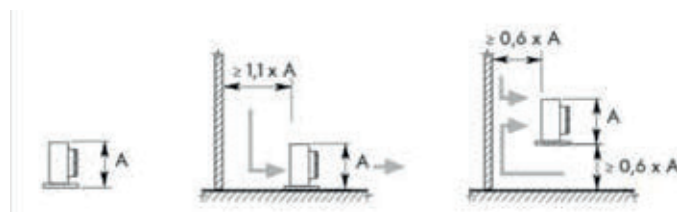


The installation site should be chosen in accordance with EN 378-1 and 378-3 standards; when choosing the installation site, all risks caused by accidental refrigerant leakage should be taken into consideration.

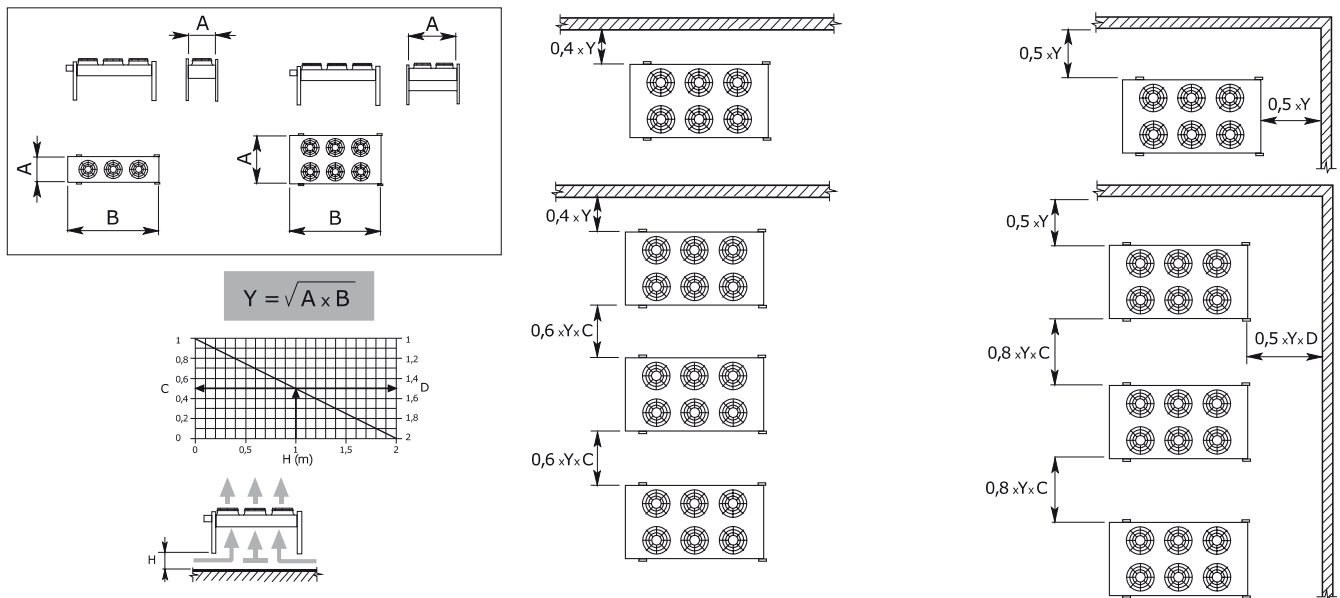
#### 4.11.1 RCE 091÷1152 - RCE-S 151÷752 -Horizontal installation



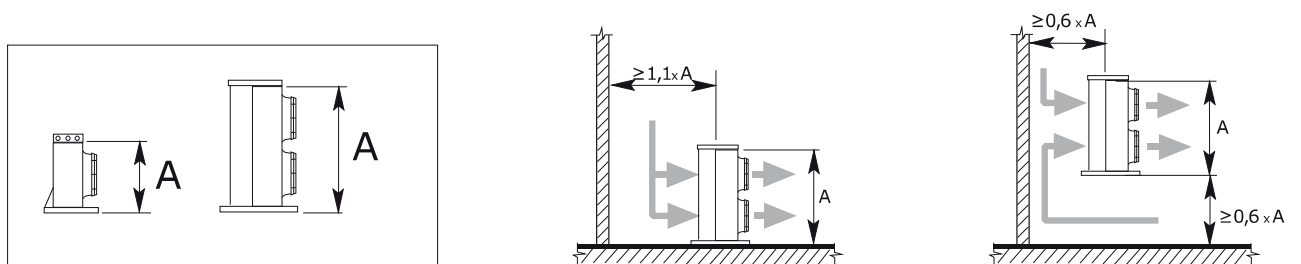
#### 4.11.2 RCE 091÷1152 - RCE-S 151÷752 - Vertical installation



**4.11.3 RCE 1101÷1702 - RCE-S 1101÷1702 - Horizontal installation**



**4.11.4 RCE 1101÷1702 - RCE-S 1101÷1702 -Vertical installation**



## 4.12 Hydraulic connections

The units are provided dry-air charged (10bar on freon side); Pay attention during the discharge and make it just before connection of the cooling circuits. The units are designed to operate with air cooling, so the internal unit must be connected to the outside condenser unit through copper pipes.

The pipes installation has to be carried by an expert technician.



The fluid to be cooled has not to contain aggressive substances, or not compatibles with copper, carbon steel, aluminium and every material which unit is composed. For any doubt will be necessary send to Manufacturer a chemical analysis about the fluid in order to find the necessary solutions.

The cooling circuit has to be made by an expert designer and realized by a qualified technicians on behalf of the unit owner following the norms and regulations in force.

Hereafter are mentioned some indications for the cooling circuit realization:

- The pipes path has to be as short as possible in order to prevent the pressure drop on the circuit;
- The gas line must have an inclination of 1% ÷ 3% in the direction of remote condenser
- The pipelines has to be adequately bracketed and posed in order to allow the inspection and maintenance;
- The nominal pressure of the material used for the system has to be at least 45 bar;
- During the circuit realization be careful in order to avoid the dirty and dust entrance in the pipes;
- Along the circuit has to be positioned syphons for the oil entrainment must be installed and must have at least two diameters as radius of curvature..
- Once the connection is made is necessary to wash the circuit using a suitable substances in order to avoid that dirty and dust remain inside which can cause malfunctions, anomalies and damages during operation.
- The minimum distance between gas and liquid line must be 20 mm. Pipes must be also insulated as well indicated in the following table.
- For height difference great than 10 MT, a double pipe ascent is mandatory.

### 4.12.1 Thermal insulation of pipes

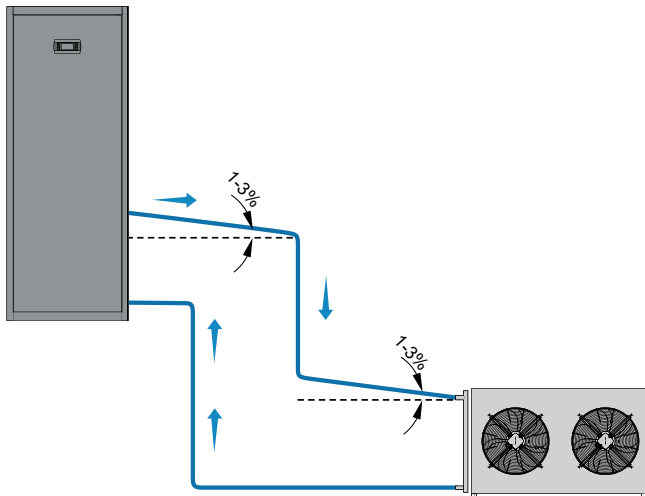
Pipeline type	Pipeline position	Thermal insulation
Gas	Inner	Mandatory
	Outer	For aesthetic or safety reasons only
Liquid	Inner	Not required
	Outer	Mandatory



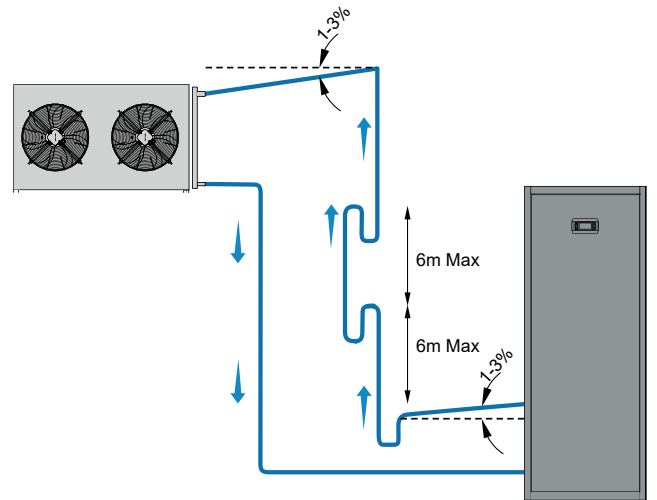
Although the refrigerant is not classified as toxic, during the charging operation it is necessary to pay attention and operate safely in compliance with Legislative Decree 81/08; for this reason is mandatory to wear individual protective devices necessary to avoid contact, inhalation and ingestion of the fluid. If one of the aforementioned cases occurs it is advisable to consult the gas safety data sheet for first AID and the emergency management operations; it is also advisable to bring them with the injured if a doctor intervention is needed.

**4.12.2 Indoor unit and remote condenser layout**

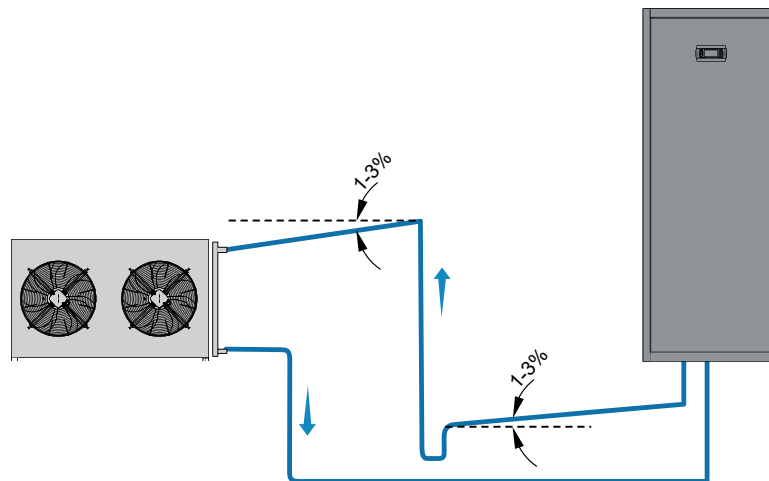
Indoor unit at a higher level than the remote condenser



Indoor unit at a lower level than the remote condenser



Indoor unit and remote condenser at the same height



- A check valve must be installed at the condenser outlet. Follow the valve manufacturer's instructions for orientation and position.
- On vertical ascent sections, there must be syphons, at least every 6 metres, to allow the oil to return to the compressor.
- On horizontal sections of the discharge line provide for a 1÷3% gradient to facilitate the return of the oil to the compressor.

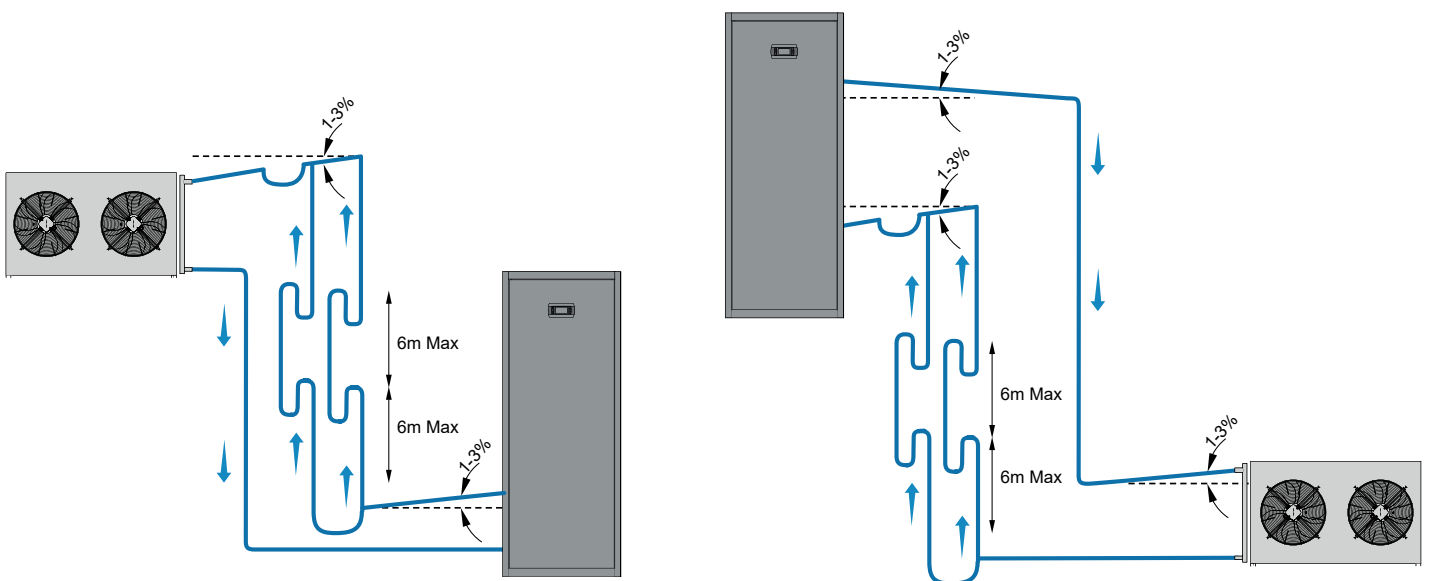
**4.9.2 Relative position between indoor unit and remote condenser**

Maximum distance between indoor unit and remote condenser	Up to 40 equivalent meters			From 40 to 100 equivalent meters
	from 20m to -3m	from -8m to -15m	from 30m to -8m	from 30m to -8m
Max. geodetic height difference between indoor unit and remote condenser <sup>(1)</sup>	from 20m to -3m	from -8m to -15m	from 30m to -8m	from 30m to -8m
Syphons for oil on the vertical ascent sections of the line	Every 6 m	Every 6 m	Every 6 m	Every 6 m
Remote condenser fan speed control installation	Mandatory	Mandatory	Mandatory	Mandatory
Remote condenser	Standard	Improved by 20% and with built-in liquid receiver	Improved by 20% and with built-in liquid receiver	Improved by 20% and with built-in liquid receiver
Hot gas coil	Allowed	Not Allowed	Not Allowed	Not Allowed
Solenoid valve on the liquid line	Not mandatory up to 20 equivalent meters. Mandatory over 20 metres equivalent.	Mandatory	Mandatory	Mandatory
Pipes *	Double ascent obligatory for height differences > 10 meters	Double ascent obligatory for height differences > 10 meters	Double ascent obligatory for height differences > 10 meters	Double ascent obligatory for height differences > 10 meters (**)
External liquid pipe insulation	Allowed	Mandatory	Mandatory	Mandatory
Horizontal section gas line	Inclination 1÷3% to the remote condenser	Inclination 1÷3% to the remote condenser	Inclination 1÷3% to the remote condenser	Inclination 1÷3% to the remote condenser

(1) Positive values indicate that the remote condenser is higher than the indoor unit; negative levels indicate that the remote condenser is lower than the indoor unit.

(\*) Only for DX.A 761-841-772-862-982-1002-1102-1252 e DXi.A 631-691-761-861-931-1021-1142






(\*\*) THE USE OF AN OIL SEPARATOR ON DISCHARGE



(\*) Example of double gas pipe ascent.



### 4.12.3 Equivalent length of curves, shut-off valves and non-return valve

Nominal diameter (mm)					
12	0,50	0,25	0,75	2,10	1,90
14	0,53	0,26	0,80	2,20	2,00
16	0,55	0,27	0,85	2,40	2,10
18	0,60	0,30	0,95	2,70	2,40
22	0,70	0,35	1,10	3,20	2,80
28	0,80	0,45	1,30	4,00	3,30

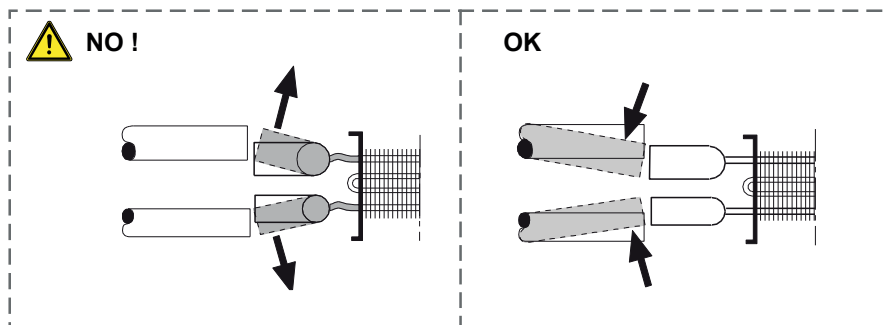
### 4.13 Connections



Do not adapt the position of the collectors to the line.



Before connecting the collectors/distributors, you must ensure that the supply circuit is closed (lack of pressure)

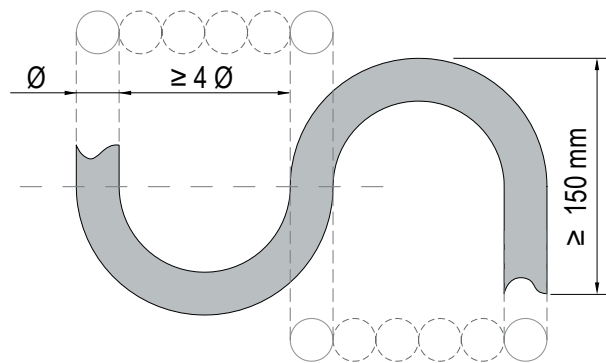


#### 4.13.1 Additional oil charge

The quantity of oil here mentioned in the table, should be added for any syphon and meter of liquid line.

Liquid line diameter [mm]	Additional charge per line meter (g/m)	Additional charge per syphon (g)
35	45	160
28	27	100
22	16	60
18	11	40
16	9	30
12	5	15
10	3	10

The syphon must respect the following dimensions



#### 4.14 Tightness test, vacuum and charge



The units are supplied without refrigerant charge and must be subjected to the operations described below.

For a right and reliable operation of the system, once the connection lines between the indoor and the outdoor units are carried out, it is extremely important to clear the circuit of any air, humidity, non-condensable gas and, in general, of any polluting substance before carrying on the refrigerant charge.

The presence of solid particles, such as metal dust, welding debris and very small dirty (hardly to be detected by the mechanical filters), can cause serious damages to the surfaces in motion also involving a reduction of the compressor efficiency and lifetime.



Do not drill the cooling circuit, if the total removal of metal particles produced cannot be granted

The presence of too much humidity inside the cooling circuit can lead to negative consequences. Humidity can freeze inside the thermostatic valve and can even clog it up, stopping the unit for low pressure alarm. A significant amount of humidity can very quickly saturate the drier filters which should be replaced (with consequent system stop).

Humidity chemically interacts with refrigerants and polyester lubricant oils (normally used with refrigerant type R407C, R134a, R404A, R410A, etc.). This interaction creates acid substances that, if present in remarkable amount, can damage the compressor electric motor insulation causing motor burns and oxidizing copper pipes, so generating solid impurities.



Reduce as far as possible the exposure of the circuit and its parts to the atmosphere, especially if used compressors are charged with polyester oil.

If non-condensable gases are not accurately eliminated from the circuit, they can be collected inside the condenser and the liquid receiver. In the first case, they can cause a reduction of the useful thermal exchange surface, therefore a condensing temperature increase with a resulting reduction of the system energy efficiency and reliability. In the worst cases, the unit can be stopped by the high pressure switch activation.

The thermostatic valve, for the presence of high concentration of non-condensable gases in the liquid receiver, could not be suitably fed by just liquid refrigerant, as required, but also by a mixture of refrigerant and non-condensable vapours. This causes a remarkable reduction of the evaporating temperature (up to the activation of the low pressure switch, in worst cases) , that means a reduction of the unit cooling capacity and of the system efficiency and lifetime.

The operations to be carried out are:

- a. Tightness test
- b. Vacuum and dehydration
- c. Refrigerant charge

#### 4.14.1. Leak test

In order to detect any possible leak in the cooling circuit, follow the here below steps:

- a. Charge the cooling circuit with refrigerant gas up to a pressure of 1 bar.
- b. Add dry nitrogen by means of bottles with reducer up to a pressure of 15 bar.
- c. Locate the eventual leaks by means of a leak detector having a calibration (5 gr/year or better) suitable for the employed refrigerant. In particular, check the joints involved in the repairs.
- d. In case a leak is detected, discharge the cooling circuit, repair it and repeat again the leak test.

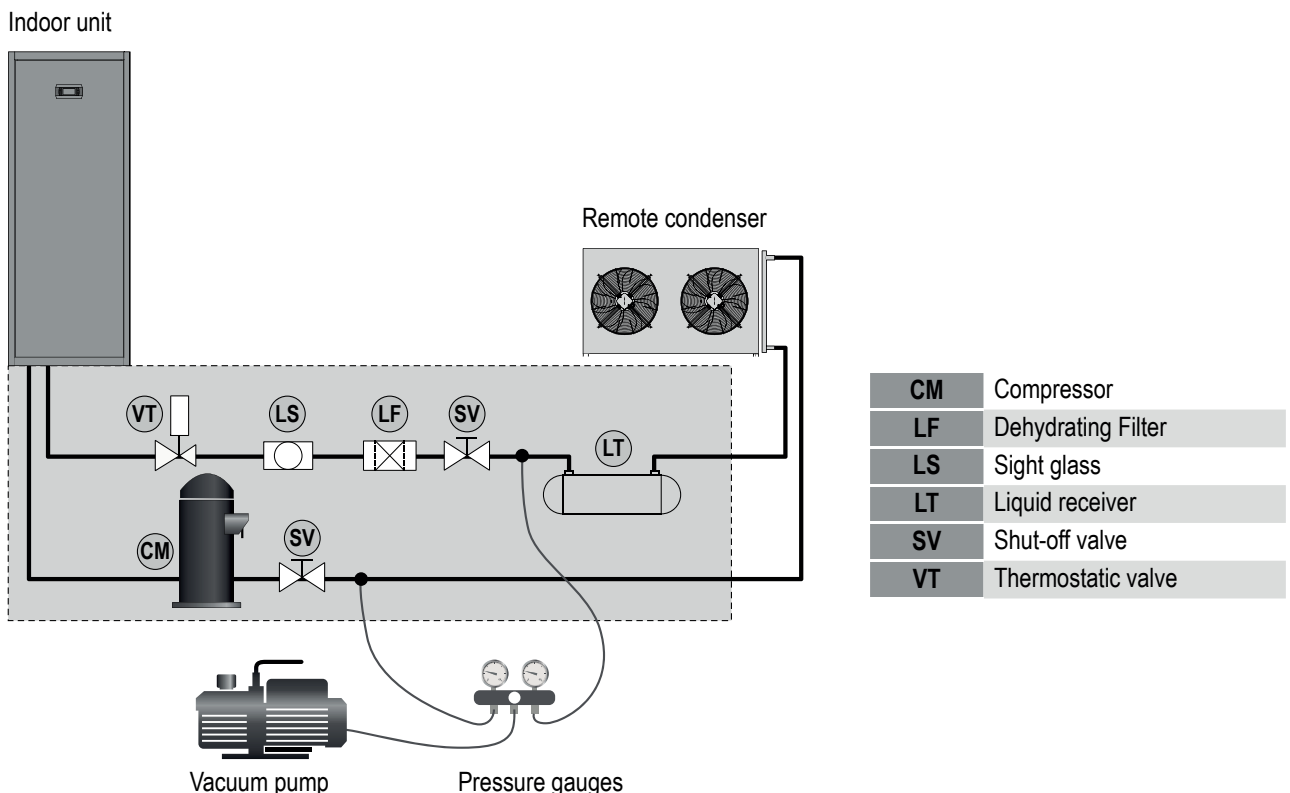


Do not use oxygen, hydrogen or any other reactive and inflammable gases to pressurise the cooling circuit: use dry nitrogen only.



It is forbidden to charge the circuit and, in particular, the low pressure side, at a pressure higher than 16 bar.

#### 4.14.2 Vacuum execution





Do not use compressor for cooling circuit vacuum execution.



Check that all the valves are open in order to do not have insulated circuit sections.

To obtain a suitable vacuum, use a two-stage pump with suitable features.

It is normally considered suitable, a vacuum degree able to grant a humidity content in the refrigerant lower than 100 ppm, at unit start; in this way, during the operation, the drier filter can keep this value below 20 ppm.

Once the cooling lines are completed and no leaks detected, realize the system vacuum as here below described:

- a. Connect a vacuum pump with a suitable water flow capacity (a two-stage pump able to keep a pressure of 0,02 mbar) to the system, by using the charge connections on discharge side and liquid receiver (if the latter is not present, the charge connection is placed on the suction pipe). The charge/discharge positions are clearly marked by stickers, see figure.
- b. Let the vacuum pump work until the pressure shown on the appropriate vacuum meter will be 0,04 mbar at least.



Vacuum degree must be always checked by vacuum manometers on the circuit and not by the instruments on the pump.

c. Isolate the pump from the circuit by means of the special cut-off valves and wait 30 min.

d. If pressure increases during all the pump stop period, or if it is impossible to reach the desired pressure value, it means that there is a leak in the circuit. Detect and repair the leak, then repeat the procedure starting from step b).

e. If pressure increases till a balance value, it means the circuit contains a big amount of humidity. In this case, introduce Anhydrous nitrogen in the circuit (up to about 2 bar) and repeat steps b), c) and e) for at least twice; then proceed with step f).

f. If pressure stabilises after a short increase, it means the circuit is leak proof and reasonably dried. Open the pump shut-off valves once more and, after pressure has returned lower than 10 mbar, let it operate for 2-4 hours according to the circuit size.



During the vacuum, do not let the compressor work and do not carry out any kind of test.



If the cooling circuit has been kept open only for a little while, operations described in steps a), b) and c) are usually enough to obtain a suitable vacuum.

If the suitable equipment is not available or if the circuit has been kept open for long, it could be required to repeat steps b) and c), using the refrigerant instead of the nitrogen to break the vacuum.

## 4.15 Refrigerant charge execution



Do not use a refrigerant different from the one indicated in the Identification Tag



Avoid any refrigerant gas release in the environment during the charge operations.



If the refrigerant is a mixture of several components, such as R410A, introduce it in the circuit in a liquid state to avoid the components separation. On this purpose, bottles are provided with two different valves: one for vapour and one for liquid.

Once vacuum is completed, the circuit must be charged with the right refrigerant and if required antifreeze oil quantity.

- a. Connect the refrigerant bottle to a 1/4" SAE male (7/16" – 20 UNF) charge connection placed on the liquid refrigerant line.
- b. Let a small quantity of liquid go out in order to remove any air from the connection pipe.
- c. Open the bottle valve and let the refrigerant flow in the cooling circuit for pressure difference; replace the refrigerant bottle once empty.
- d. If pressure inside the circuit reaches a balance value at room temperature, the refrigerant cannot spontaneously flow out from the cylinder any more. Therefore, it should be required to connect the bottle to a charge connection, placed on the suction line.
- e. Let the air vent from the connection pipe as indicated at step b).
- f. Start the compressor and once the max load is reached, open the bottle valve and complete the charge. Replace the bottle when necessary.
- g. Charge small quantities of refrigerant one after the other, checking each time operating pressure and temperatures to avoid a system overload.
- h. The charge must be completed by comparing the quantity of refrigerant introduced with the value indicated on the data sheet.
- i. Check that the charge introduced in the circuit is the right one, by checking the sight glass and measuring the liquid sub-cooling and the suction superheating.

The connection pipes must be as shortest as possible and must be provided with valves in order to reduce the possibility of refrigerant leaks. To make the charge operation easy, the following tables shows, just as an indication, the required refrigerant charges for the different types of indoor units and the corresponding connecting pipes. For a correct calculation of the refrigerant quantity, also consider the volume of the outdoor units cooling circuit and of any other installed component (such as additional liquid receivers, oil separators, etc.).

Use only new refrigerant or recycled one whose composition is known and suitable for use in cooling circuits.

The recovered refrigerant in liquid state can be re-used in the same unit, if in the circuit there is no inert gas or any other pollutants.

Before charging the refrigerant from a tank, check quality and quantity of contained fluid.

The amount of refrigerant charged in the cooling circuit must be measured (by weight or by volume). It is good rule charging the refrigerant in liquid state.

If the refrigeration lines are particularly long or if oil separators are installed on the compressors' discharge, it will be necessary to add an appropriate amount of incongelable oil.



Check the compatibility of the used oil with the oil loaded in the compressor (detectable on the compressor's nameplate).

If oil separators are used, add the amount of lubricant recommended by the Manufacturer.

For refrigerant lines longer than 30 m, charge approx. 0.2 kg of oil every 10 m of additional pipework.

In any case, check the correct oil charge by verifying the oil level in the sight glass of the compressor about 30 minutes after running at full capacity.

It is suggested to charge 1 kg of oil for every 10 kg of refrigerant supplied in the system.



An overload oil charge can cause loss of efficiency of the system and compressor failure.

#### 4.15.1 Line refrigerant charge

External Ø	DISCHARGE Condensing temperature = 48°C Discharge temperature = 73°C	LIQUID Condensing temperature = 48°C SC = 5K
	R410A charge (kg/m)	R410A charge (kg/m)
6	0,0014	0,0133
10	0,0052	0,0508
12	0,0081	0,0786
16	0,0153	0,1481
18	0,0199	0,1935
22	0,0281	0,2729
28	0,0487	0,4724
35	0,0798	0,7740
42	0,1185	1,1496
54	0,1948	1,8896
64	0,2805	2,7211
76	0,4039	3,9183

#### 4.16 Electric connections: safety preliminary advices

The electrical cabinet is located inside on the front of the unit where are placed also the cooling circuit components. To access please remove the frontal panel.



The electric connection has to be performed following the electrical diagram attached to the unit following the local and international norms.



Ensure that the power supply line is sectioned upstream of it.  
Ensure that the sectioning device is locked and that on the drive handle is positioned the advice to not operate.



Verify the power supply corresponds to the unit nominal datas (tension, phases, frequency) provided on the wiring diagram and on the Identification Tag attached on the unit.



The power supply cables must be protected upstream against the effect of short circuits and overload by a suitable device complying with the regulations and norms in force.



Ensure that the power supply cable section are suitable to the capacity of the unit and safety devices taking into consideration all the factors can influence it (temperature, isolation type, length, etc.)



The electrical power supply has to respect the mentioned limits; otherwise the warranty will be immediately decay.



Make all the ground connections required by the legislation and norms in force.



Before to starts any operation ensure the power supply is disconnected.



The electrical line and unit external safety devices has to be dimensioned in order to guarantee the power supply tension to the maximum operation conditions provided to the wiring diagram.



In presence of IT power supply lines the Manufacturer has to release, after checking, the connection authorization.

#### 4.17 Electrical data



The condensing unit operates automatically and independently (in relation to the pressure of the refrigerant), powered by the main unit to which it is connected; for its power supply follow the wiring diagram attached to this Manual.



The supply voltage cannot suffer variations higher than  $\pm 10\%$  and the unbalance between phases less then 1% (EN 60204 norm). If those tolerances are not respected please contact the technical department of the Manufacturer. The unit use with voltage different that designed will make decay the warranty.

### 4.18 Regulation devices

The condenser is equipped with a condensing pressure regulator.

The regulation system depends on the fans total input current:

1. For a total input current  $\leq 3$  A;
2. For a total input current  $> 3$  A

Both devices are modulating speed regulators with phase control. The regulation device is pre-set at the factory.

Both devices are modulating speed regulators with phase control. The regulation device is pre-set at the factory.



To check the setting point, connect a full scale manometer of at least 45 bar to the pressure connection on the inlet collector of the condenser and check the fan operation according to the pressure. In case of setting point modification, carry out the following instructions and check again the setting point as above explained.



Before proceeding with any operation on the electrical parts, make sure that the unit is disconnected and that the main switch of both units (internal and external) is open (in "O" position) and locked.

#### 4.18.1 Regulator for input current $\leq 3$ A

The fan is powered by a TRIAC based voltage regulator sensitive to the condensing pressure.

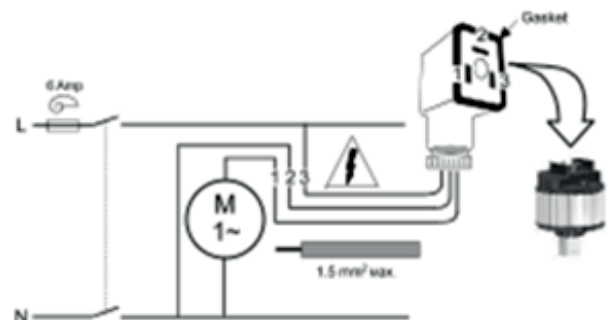
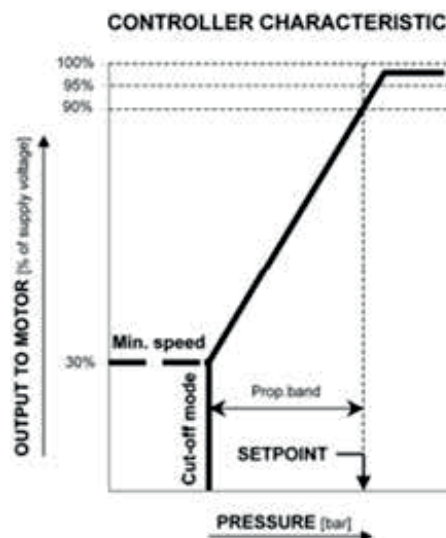
The speed controller operates on the condenser fans speed so as to maintain the condensing pressure close to the desired value.

The output voltage varies according to the control signal, using the phase control principle, and it increases/decreases when the controlled parameter increases.

The output voltage from the controller, and therefore the fan speed, using the phase control principle, can vary between a maximum of 95% and a minimum of 30% of the supply voltage depending on the condensing pressure in an interval of 5 bar.



This regulation system is suitable to be used with outdoor temperatures not inferior to  $-20^{\circ}\text{C}$  and in not corrosive places. The pressure set point, equivalent to the maximum output voltage, can be set on the sensor element by means of the adjusting screw indicated in the picture here below.





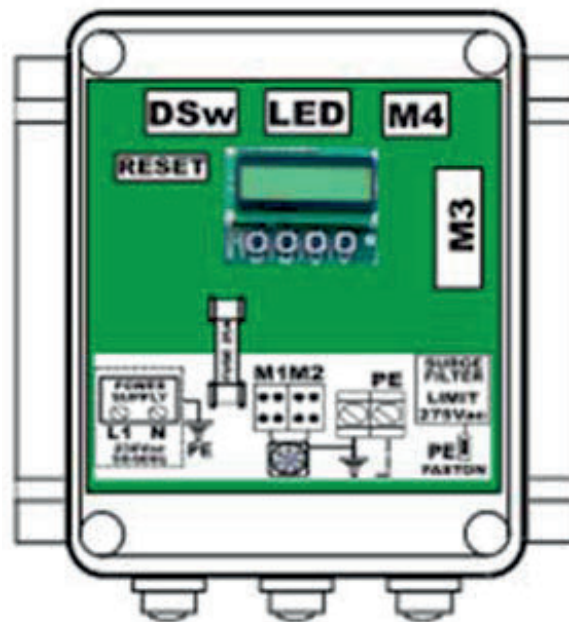
#### 4.18.2 Regulator for input current $\geq 3$ A

The speed controller operates on the condenser fans speed so as to maintain the condensing pressure close to the desired value; The output voltage varies according to the control signal, using the phase control principle, and it increases/decreases when the controlled parameter increases.

The speed regulator is composed of an electronic card, installed inside a box having a protection rate of IP55, with the control area on the upper part and the power area on the bottom part. Furthermore, it is provided with a main switch with padlock.

The regulator is cooled by free convection, therefore the air must be able to pass freely up and down the device. Keep, then, a free space of at least 150 mm above and under the regulator.

The picture here aside shows the position of the main components of the regulator control card. We describe here below their meaning:

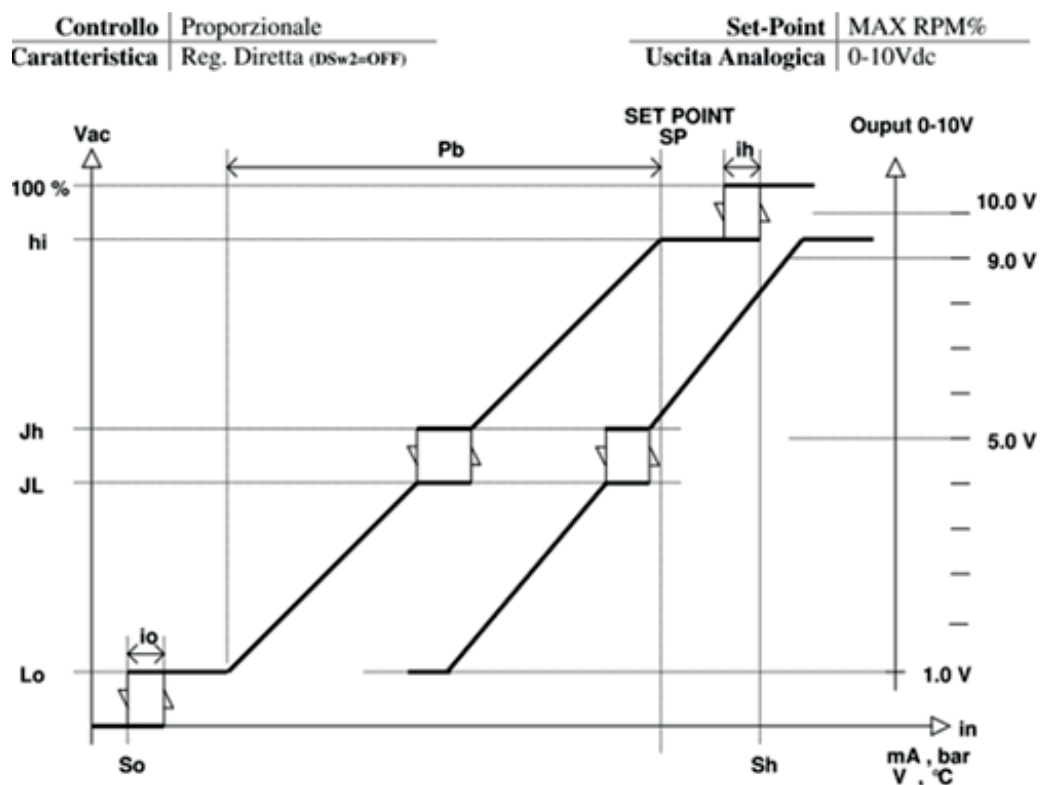


<b>DS w</b>	Switch to enable the modification of the operating parameters
<b>LED</b>	Led showing the regulation status
<b>M3</b>	Connection of sensors and regulation signals
<b>M4</b>	Connection of alarm relay RL1
<b>Display</b>	Display showing the operating parameters set by the program keyboard
<b>SB1</b>	RESE T button
<b>L1 – N</b>	power terminal board
<b>PE</b>	grounding connection
<b>M1 – M2</b>	load connection terminal board

When the regulator starts, the display shows the information related to the hardware and the software version, the manufacturer name, the type of configuration, the operational status, etc.

The status/operational messages are the following:

<b>STAND-BY</b>	Ready to operate, no power supply;
<b>PWR-OUT</b>	Power supply ongoing;
<b>ALARM</b>	Presence of one or more alarms;
<b>STOP</b>	Regulation stopped by the external STOP control



<b>SP</b>	Value of the Set-Point in place (mA-Vdc-°-C-bar)
<b>In</b>	Value of the signal at the selected input IN (mA-Vdc-°-C-bar)
<b>Jh</b>	Upper limit of the extra dB zone to skip
<b>JL</b>	Lower limit of the extra dB zone to skip
<b>Sh</b>	Value of the input signal (mA-Vdc-°-C) for the By-pass of the MAX limit
<b>ih</b>	Hysteresis on the Sh value (mA-Vdc-°-C)
<b>So</b>	Value of the input signal (mA-Vdc-°-C) for the By-pass of the MIN limit (Cut-Off point)
<b>Io</b>	Hysteresis on the So value (mA-Vdc-°-C)
<b>Hi</b>	MAX VAC limit at charge (RPM%)
<b>Lo</b>	MIN VAC limit at charge (RPM%)
<b>Pb</b>	Value of the proportional band in use (mA-Vdc-°-C-bar)

## 4.19 Functioning of optional BW



If the condenser is installed at an altitude of less than 3 mts compared to the evaporating unit please contact the Manufacturer

### 4.19.1 Operation

When the external air temperature drops, the condensing pressure decreases, approaching the set value of the valve 4), modulating 3 way valve responding to the receiver pressure. When the receiver pressure falls below the set value of the valve, this allows the discharge gas to bypass the condenser.

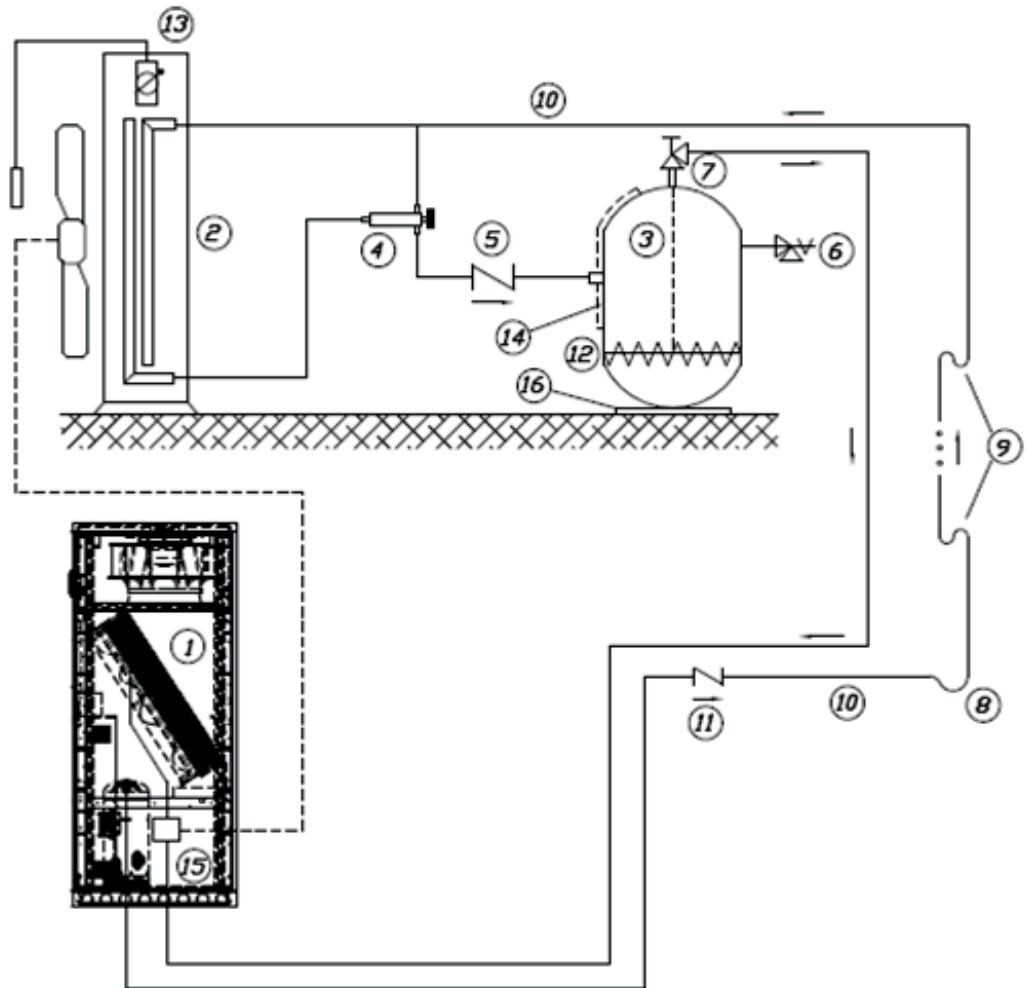
This discharge gas warms up the liquid in the receiver increasing its pressure up to the set value of the valve. While the discharge gas bypasses the condenser, the liquid flow from the condenser is limited. This allows to increase the quantity of liquid refrigerant inside the condenser. By flooding the condenser, the actual heat exchange surface is reduced causing an increase of the condensing pressure. In summer conditions, instead, there is a full liquid refrigerant flow from the condenser to the receiver.

The liquid receiver 3) must have a sufficient capacity to contain the necessary quantity of refrigerant to fill the condenser. An additional heating of the liquid receiver is recommended (it must be thermally insulated with specific material 14) and thanks to the heating cable 12) powered by the thermostatic valve 13), when the external temperature is below -10°C

### 4.19.2 Installation

Follow the steps here below for a correct installation;

- Fix the fixing plate with the appropriate screws 16) near the remote condenser and install the liquid receiver 3);
- Wrap the self-regulating heating cable 12) around the receiver; use the cloth tape provided to fix the heating cable 12) around the receiver 3);
- Thermally insulate the liquid receiver 3) with the thermal insulation 14);
- Fit on the liquid receiver 3) the pressure relief device 6) the shut-off valve 7) (with its seal) and the non-return valve as shown here below (F1100034), always protecting the thermal insulation during welding;
- Complete the circuitry by fixing the condensing pressure control valve 4) and the shut-off valve on discharge line 10) to finalise the cooling circuit as shown here below (F1100034);
- Place the thermostatic valve 13) inside the aluminium electric box; fix the box on the remote condenser installing the thermostatic bulb 13) in a position sensitive to external temperature ( for example on the incoming airflow to the condenser);
- Set the thermostatic valve 13) on ON=-10°C
- Electrically connect the thermostatic valve 13) and the heating cable 12);
- Wait 4 hours before the commissioning to allow the heating cable 12) to properly warm up the liquid receiver 3) (if the external temperature is below -10°C).



1	Evaporating unit	9	Siphon every 4-6 mt of height difference on the discharge line
2	Remote condenser	10	Slope in direction of the flow of 1 cm for each meter of the horizontal discharge line.
3	Liquid receiver	11	Non-return valve on the discharge line
4	Non-return valve on liquid line	12	Self-regulating heating cable
5	Non-return valve on liquid line	13	Thermostatic valve (ON= -10°C) and aluminium electric box
6	Pressure relief device	14	Thermal insulation of the liquid receiver
7	Shut-off valve (with its seal)	15	Fans speed regulation
8	Siphon on basis	16	Fixing plate of the receiver

## 5. START UP

### 5.1 Preliminary checks

Before to start up the unit has to be necessary perform some electric, hydraulic and cooling checks.



Commissioning operations has to be performed following the previous mentioned indications.



Do not switch off the unit (temporary stop) using the main switch; this device has to be used only to disconnect the unit when a current is absent, for example when the unit is in OFF. Moreover, when the power supply is off the crankcase heaters are not powered with consequent danger of compressor rupture when the unit will powered.

#### 5.1.1 Before to start up



Malfunctions or damage can derive also by lack of attention during shipping and installation; before installing or starting up the unit check about refrigerant leak presence caused by capillaries rupture or gauges connections, cooling circuit pipes, transport vibrations, manumission or mistreatments on site.

- Check the right unit installation in accordance with advices in the present Manual;
- Check the electric connection and the terminal screw connections;
- Check the phases voltage (R S T) and the compliance with the Identification Tag;
- Check the unit ground connection;
- Check the refrigerant leaks, eventually using an apposite device;
- Check the oil leaks near the compressors or along the cooling circuit;
- Check the pressure of the cooling circuit using the gauges installed (if presents) or service gauges;
- Check the closing of all service outlets;
- Check the correct supply of the crankcase heaters (if presents);
- Check that all the hydraulic connection are performed correctly and that all the indications on the plates are respected;
- Check that the system has been properly vented;
- Check the unit internal fluid temperature, they must respect the operation limits;
- Before to start up the unit check that every panel is in right position and well closed;
- Check the opening of all the circuit shut-off valve.



Do not modify any unit connection, otherwise the warranty immediately decay.



If present, the crankcase heaters must be switch on at least 12 hours before unit starts (preheating period) closing the main switch (the heaters are automatically supplied when the switch is closed). The heaters are working correctly if after few minutes the carte temperature will be 10/15°C higher than ambient temperature.



In case of crankcase heaters presence, during the preheating period is important to check if on the unit display is present the word OFF or if the unit is in stand-by mode. In case of accidental start (before of preheating time) the compressors could be seriously damaged and the warranty immediately decay.

## 5.2 First start up

The fan is activated automatically when the condensing pressure of the refrigerant delivered by the compressor reaches the pressure regulator set point (pre-set at the factory).



Therefore, the condenser operation can only be checked after having started the compressor of the cooling circuit it belongs to.

## 6. MAINTENANCE UNIT

### 6.1 General warnings



Starting from 01/01/2016 the new European Regulation 517\_2014 "Obligations concerning the containment, use, recovery and destruction of fluorinated greenhouse gases used in stationary refrigeration, air conditioning and heat pumps" became effective. This unit is subject to the following regulatory obligations, which have to be fulfilled by all operators:

- (a) Keeping the equipment records
- (b) Correct installation, maintenance and repair of equipment
- (c) Leakage control
- (d) Refrigerant recovery and disposal management
- (e) Presentation to the Ministry of the Environment of the annual declaration concerning the atmospheric emissions of fluorinated greenhouse gases.

Maintenance can:

- Keep the equipment operating efficiently
- Prevent failures
- Increase the equipment life



It is advisable to have a unit booklet with a purpose to sign any intervention performed helping the troubleshooting.



The maintenance operations must be performed in accordance with all the overmentioned prescriptions.



To perform any intervention pay attention to use any individual protection devices in accordance with local norms.



In case of winter stop, the water contained in the circuit can freeze harming the unit; is advisable to remove carefully all the water contained checking that all the circuit, all the internal/external siphons is empty.

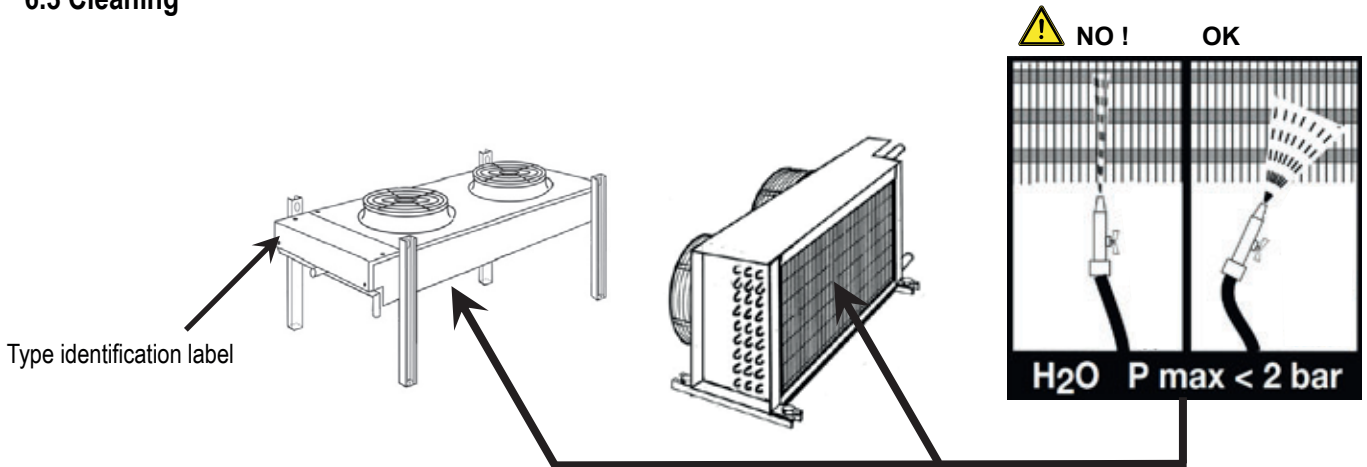


Before to perform any electrical intervention is necessary to switch off the power supply turning the main switch to OFF position.

### 6.2 Unit access

Once the unit is installed, the access is allowed only to trained and expert technicians; the unit owner is the company legal representative, entity or natural person owner of the plants where it is installed. He is responsible to enforce all the safety norms indicated on the present Manual and the local norms

### 6.3 Cleaning

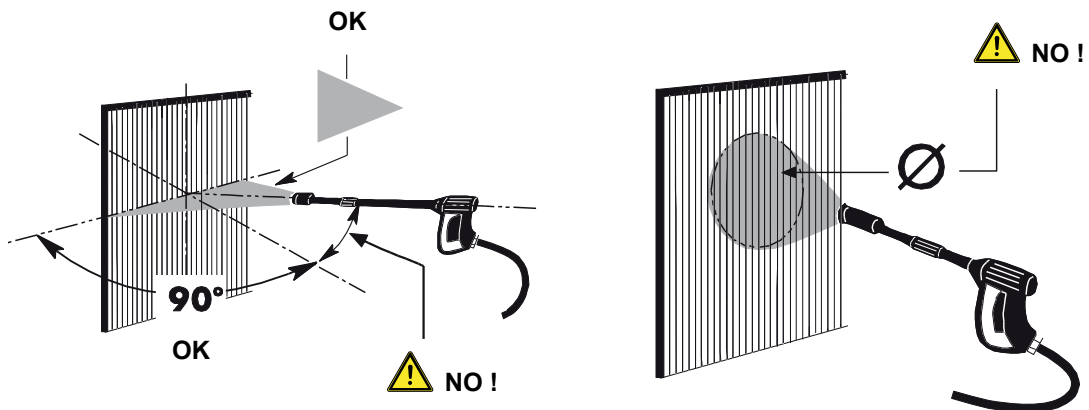
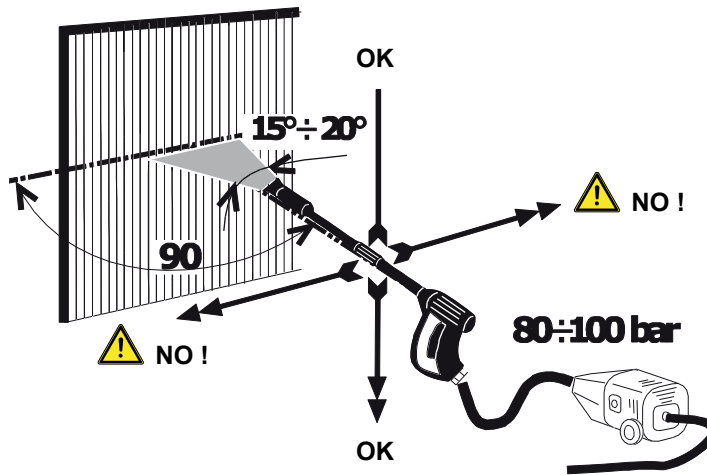


#### 6.3.1 Lavaggio con idropulitrice



**NOTES FOR CORRECT CLEANING:**

- Ø flat fan spray.
- water pressure 80÷100 bar.
- keep the water spray at right angles to the fin edge of the both vertically and horizontally.



## 6.4 Scheduled maintenance

The unit owner has to be sure to make an adequate maintenance following the instructions on the present Manual, based on type, size, age of the unit and in accordance with the regulations and local norms.



If are installed leak sensors devices, these must be inspected once a year in order to ensure they work properly.

During his lifetime the unit must be subjected to inspections following the local norms in force; particularly, more strictly specifics don't exists, it is necessary refer to the following table (EN378-4, all.D) paying attention to the situations described.



If a fault is detected could endangers the reliable unit operation, it's necessary to rectified it before restart the unit.

## 7. DECOMMISSIONING

### 7.1 Disconnect the unit



All the disposal operations must be performed by expert technicians following the national legislation (destination county).

- Do not dissipate the refrigerant in the environment.
- Before the unit disconnection recovery (if present):
- All the refrigerant gas;
- All the antifreeze solutions contained in the hydraulic circuit;
- Lubricant oil from the compressors.

Waiting the disposal unit could be storage also to outdoor if all the circuits (electrical, cooling and hydraulic) closed and undamaged.

### 7.2 Disposal, recovery and recycling

If the frame and devices are unusable must be demolish and divide them for the recycling; particularly attention on the copper and aluminium.

All the materials must be recovered and disposed in accordance with the regulations and norms in force.



Recovery, reusing, recycle, rigeneration and disposal of refrigerant must be performed by authorized personnel, expert and well equipped and informed, in accordance with the local regulations.



The refrigerant pressure in the cooling circuit can be high, discharge it with caution.





The refrigerant released in sudden way can cause freezing burns if it comes in contact with the skin.



The refrigerant filters used can contains a residual fluid parts which have to be eliminated before to proceed to disposal.



It is forbidden to release the refrigerant in teh environment.

### 7.3 RAEE Directive (UE members only)



The barred bin symbol, on the unit label, indicates the correspondence of the unit to electric and electronic device norm about the garbage.

The abandonment of the unit or the abusive disposal are punished by law.

All the unit this Manual refers complying with 2012/19/UE norm concerning the electric and electronic waste management (RAEE). The unit must not be recycling with home waste because is composed by different material suitable to disposal only to recycling centers. Ask to authorities where these centers are located in order to delivery all the different material a well recycling. The system is potentially dangerous for human and animal health and the environment, also if any dangerous substance is contained (as 2011/65/UE (RoHS) Directive) is abandoned could create a serious pollution risk. Read carefully the instructions before the first use of the system. Any use not clearly mentioned in the present Manual is forbidden, also for electrical shock risk for improper use.

## 8. DIAGNOSIS AND TROUBLESHOOTING

### 8.1 Fault finding

The identification of faults that might occur during operation is accomplished by a unit control microprocessor which, besides the alarm conditions, also shows the type of active problems on the display.

The following table describes the most common faults which might occur on the unit and for each of them the most possible causes and solutions are stated.

In case of alarm, before proceeding with any repair, it is recommended to verify that:

- The operating conditions correspond to those provided for and are in any case compliant with the functioning limits of the unit;
- All the electrical cables of the concerned components are steadily fixed in the specific clamps;
- The values set for the parameters involved are compliant with the operating conditions.



BE SURE TO RESET AN ALARM ONLY AFTER YOU HAVE REMOVED THE CAUSE OF THE FAULT; REPEATED RESET MAY RESULT IN IRREVOCABLE DAMAGE TO THE UNIT AND IMMEDIATELY VOID THE WARRANTY.

FAULT	POSSIBLE CAUSE	CORRECTIVE ACTION
1. High output pressure: the condenser HP switch is activated	a. The finned exchanger is dirty or clogged by foreign objects.	Clean the finned exchanger.
	b. Air to the condenser too hot.	Check the presence of any condensation air re-cycle. Make sure the condensation air temperature is not higher than the project value.
	c. Air to the condenser too hot.	Check that the condenser has been installed respecting the minimum distances.
	d. One or more fans are out of order.	Check if the internal protection of the defective fans is activated; if necessary, replace the fan.
	e. The regulation device is not properly set or defective.	Check the setting of the regulation device. If necessary, replace it.
2. Low output pressure	a. Refrigerant leak.	Check the setting of the regulation device. If necessary, replace it.
	b. Control unit out of order or defective	Eliminate the leak and re-establish the charge.





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