

4 - INSTALLATION

4.1 Identification tag

The data for the product identification are permanent marked on the tag (Fig.4) attached to the packing and inside the unit near the electrical panel.

EMICON S.P.A.		HIGH TECH AIR CONDITIONING AND REFRIGERATION	
Via DRAGONI 59 FORLI ITALIA TEL. ++39 543 411450 FAX ++39 543 550790			
MODELLO MODEL MODELE MODELL	<input type="text"/>	GAS REFRIGERANTE TYPE OF REFRIGERANT REFRIGERANT KALTEMITTEL	<input type="text"/>
MATRICOLA SERIAL NUMBER NUMERO DE SERIE STAMM NR	<input type="text"/>	CARICA FREON CHARGE FREON CHARGE DE FREON VOREINFUELLUNG	kg <input type="text"/>
TENSIONE TENSION VOLTAGE SPANNUNG	V.Ph.Hz <input type="text"/>	PESO NETTO NET WEIGHT POIDS NET NETTOGEWICHT	kg <input type="text"/>
POTENZA MASSIMA ASSORBITA MAX POWER SUPPLY MAX PUISSANCE ABSORBEE LEISTUNGS-AUFNAHME	kW <input type="text"/>	ANNO DI COSTRUZIONE CONSTRUCTION DATE ANNEE DE CONSTRUCTION JAHR VON KONSTRUKTION	<input type="text"/>
POTENZA FRIGORIFERA NOMINALE NOMINAL COOLING CAPACITY PUISSANCE FRIGORIFIQUE NOMINAL NOMINALE KALTLEISTUNG	kW <input type="text"/>		
POTENZA RISCALDAMENTO NOMINAL HEATING CAPACITY PUISSANCE CHAUFFAGE NOMINAL NOMINALE HEIZUNG	kW <input type="text"/>		
		MADE IN EUROPE	CE

Fig. 4



The correct unit identification, by means of the serial number, is essential for the execution of any operations to carry out on the unit. The serial number must be always advised whenever submitting a request of technical service support.

4.2 Receiving and inspection


It is very important to inspect the packing integrity directly upon delivery. In case the packing is found damaged, it is necessary to carry out an accurate inspection of the machine, then describe the state of the received goods writing directly on the consignment note, which must be also countersigned by the driver. Any claims concerning the delivered goods must be sent by fax or registered letter within 8 days from receiving date. It is advisable to unpack the unit only when installation begins and possibly after the unit has been moved to the location where it must be installed.



It is forbidden to stack units, even if they are packed. In case the machine is stored after receiving, it must not be exposed to weather agents, even if packed.

4.3 Handling


The handling of the unit must be carried out by expert personnel equipped with proper equipment in relation to the weight and dimensions of the machine. During the handling operation the machine must be always kept upright.

 The weight of some models is unbalanced, check the unit stability before starting to handle it.

For any machine moving, what is shown below (Fig. 5) must be followed.

In case the fork lift is employed, the forks must be spaced out to the maximum allowed by the pallet size.

In case the machine is moved by means of a crane, possible damages caused by cables and belts must be prevented.

 Angle must not be greater than 30 °.

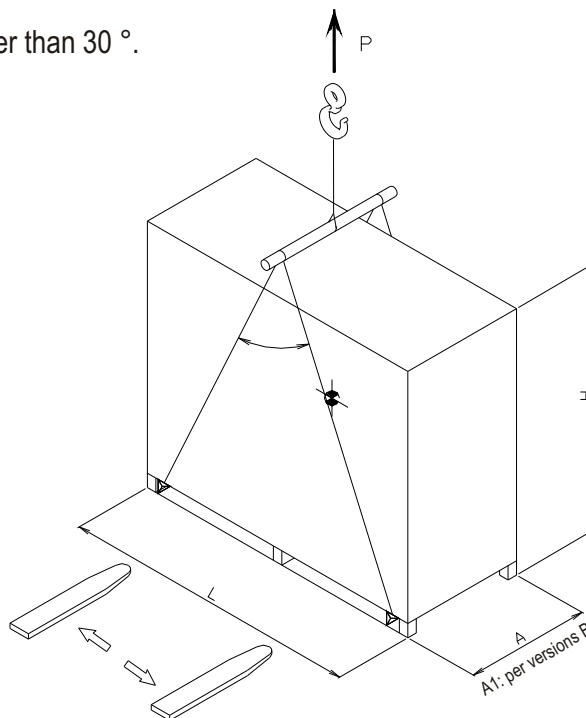


Fig. 5

Table 3 shows the overall dimensions of different models packaging included.

The overall dimensions of the units included packing are indicated in the table here below.

TABLE 3

Model	Steel frame size	H	L	A	A1
61-81-91	L1	1225	540	610	760
101-121-141	L2		690		
151-171-201 172-192	L3		990		
221-241-251-291-301-341 202-232-272-342	M1	2145	1290	710	860
321-361-451 302-362-442	M2		1600		
351-431-531 412-452-492	M3		1770	850	
471-521-601 482-532-572-602	M4	2030			
581-651-721-821 542-622-682-842	M5	2430			
762-892-1002-1102	M6	3000			


The lifting weight *P* of the unit is the result of the weight as indicated on the data sheet attached to the unit plus the packaging weight as shown in Table 4 here below.

TABLE 4

Steel frame size	L1	L2	L3	M1	M2	M3	M4	M5	M6
Packing weight (kg)	10	12	15	18	22	24	27	32	40

4.4 Arrangement and placing

The installation of the machine is under the responsibility of the installer, who must supervise the operations. The correct performance of the machine installation must be preceded by a plan drawn up by a qualified professional and the execution must be carried out by skilled and trained technicians. In the following paragraphs there are information and tips to keep in mind when planning the machine installation.

 The unit installation must comply with local existing laws

Before attempting to install the unit following details must be checked:

- ▶ All connections done. The machine needs refrigeration, hydraulic and electric connections and condensate drainage.
- ▶ Enough left room around the unit for allowing routine maintenance, as depicted on **Fig. 6** by the dashed area in front of the machine. It is also advisable to keep more room on the left and/or right side of the unit for all special maintenance operations, in case option PR is installed or if connections are made on the machine sides.
- ▶ If possible, leave lateral free room also for special maintenance operation like compressor replacement, heat exchanger replacement and fans replacement.
- ▶ The dimensions of these areas are shown in **Fig. 6** and in **Table 5** here below.
- ▶ The floor where the machine is positioned can bear the total weight of the unit under normal operation.

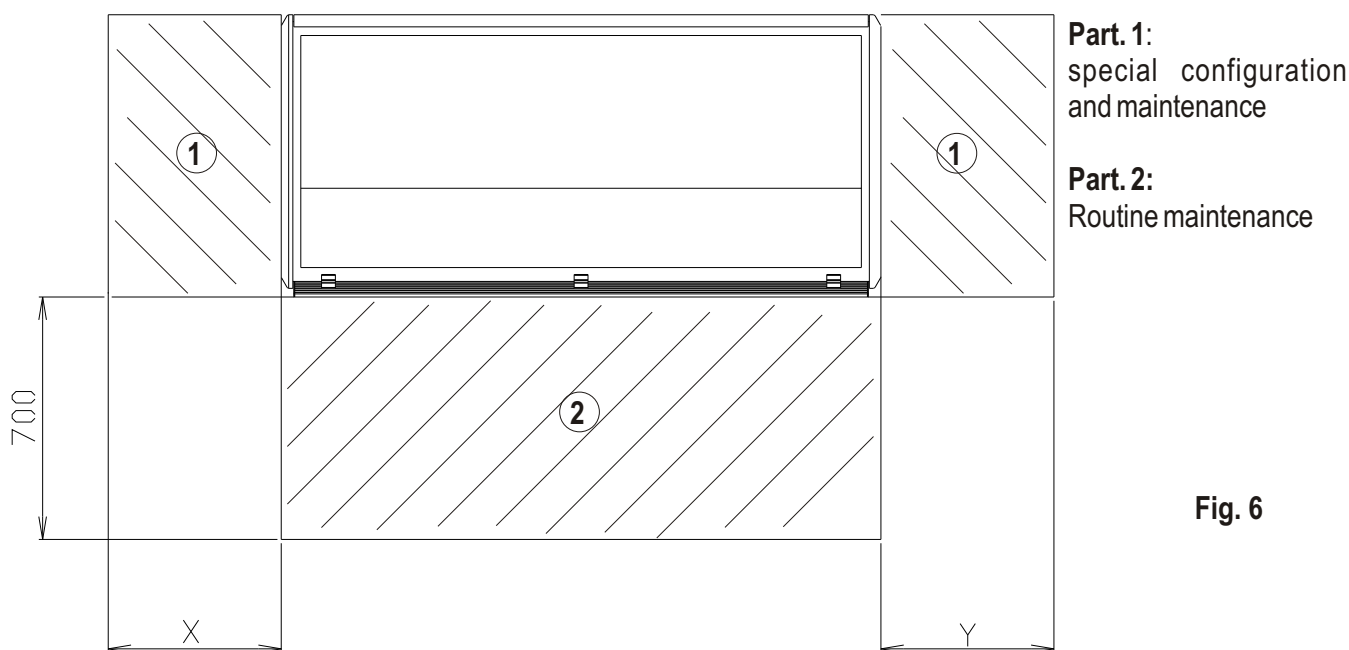


Fig. 6

Table 5

	500 mm	1000 mm
X	-Left hand connections -Left hand PR option	- Fans replacement M5-M6 U/V/B/D
Y	- Right hand connections - Right hand PR option - B version (filter rescue)	-Compressors replacement M1 - M4 D M5- M6 U/V/B/D -Fans replacement L1-M4 U/V/B/D

Before starting to move the unit for final positioning, it is necessary to identify the best way to the place, considering dimensions and weight of the machine, the lifting equipment available and any optional accessory dimensions. All units described in this manual do not need any special foundation, since they can be simply laid on the chosen surface or arranged on a base frame (option) just placing a rubber gasket of about 5 mm. thickness underneath.

Make sure the features of the unit, as shown in the data sheet, match those required for the undertaken project .

In case of machine provided with bottom air outlet, the height of the floating floor must be kept into account because it can greatly influence the unit performance.

Check carefully the value of the load drops on the air distribution system, they shall not be higher than the static delivery of the unit in its standard configuration. In case of special requirement, different grades of static delivery head, besides the standard one, are available as optional. The number and the features of the suction and air distribution grills must be controlled in order to check if they fit the unit flow capacity.

As for the installation of accessories supplied apart from the unit, strictly follow the assembling instruction attached to each of them.

4.5 Cooling connections (for ED.A, ED. M)

These units are supplied with pressurized anhydrous nitrate (20 bar). Discharge pressure carefully only before performing the cooling connections.

Since the machines work with air cooling system, copper tubes must be employed for the connections to their ventilated condenser units which are installed outdoor.

The tubing scheme is shown on **Fig. 7 (ED.A)** and **Fig. 8 (ED.M)**.

Fig 7: Piping diagram ED.A

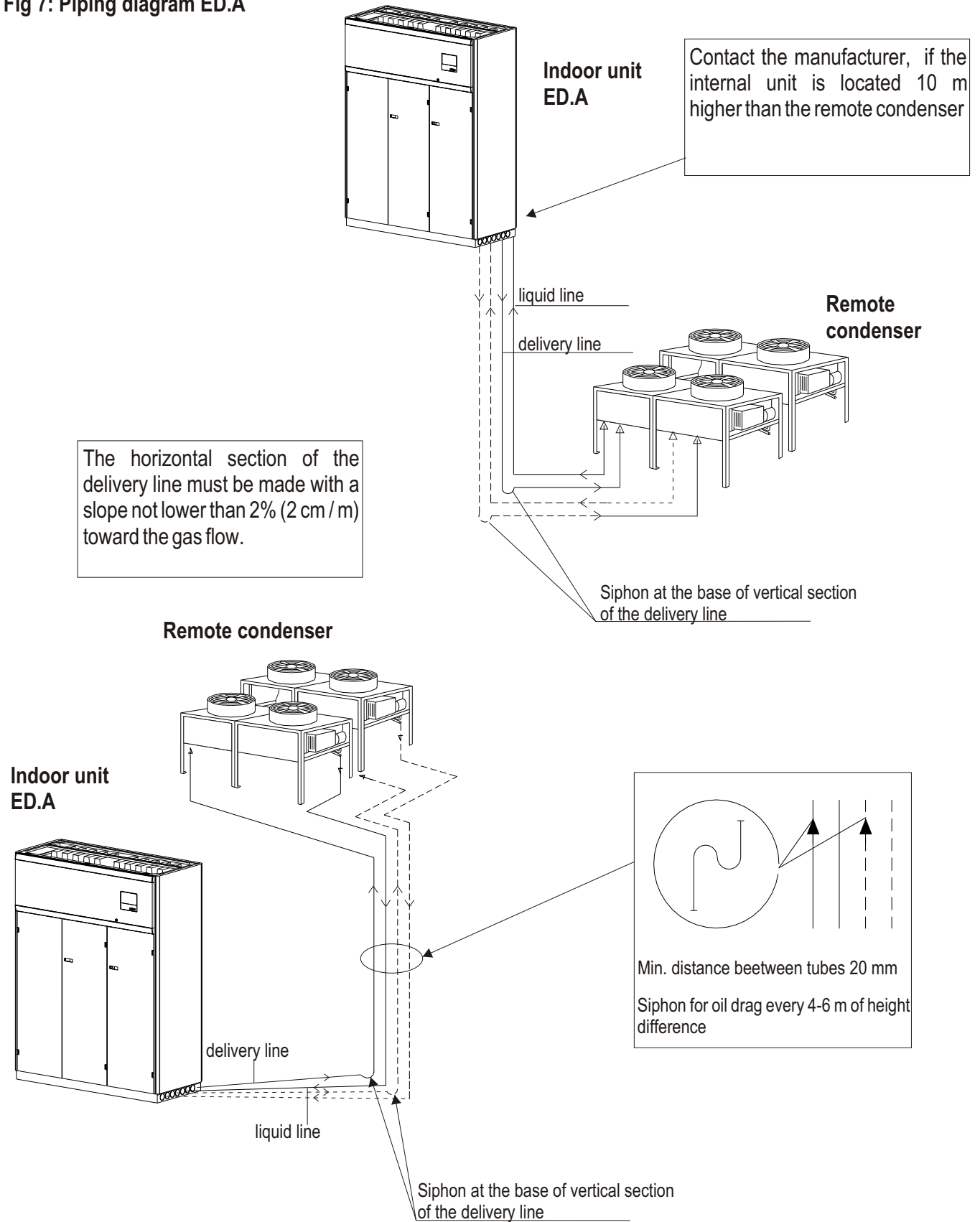
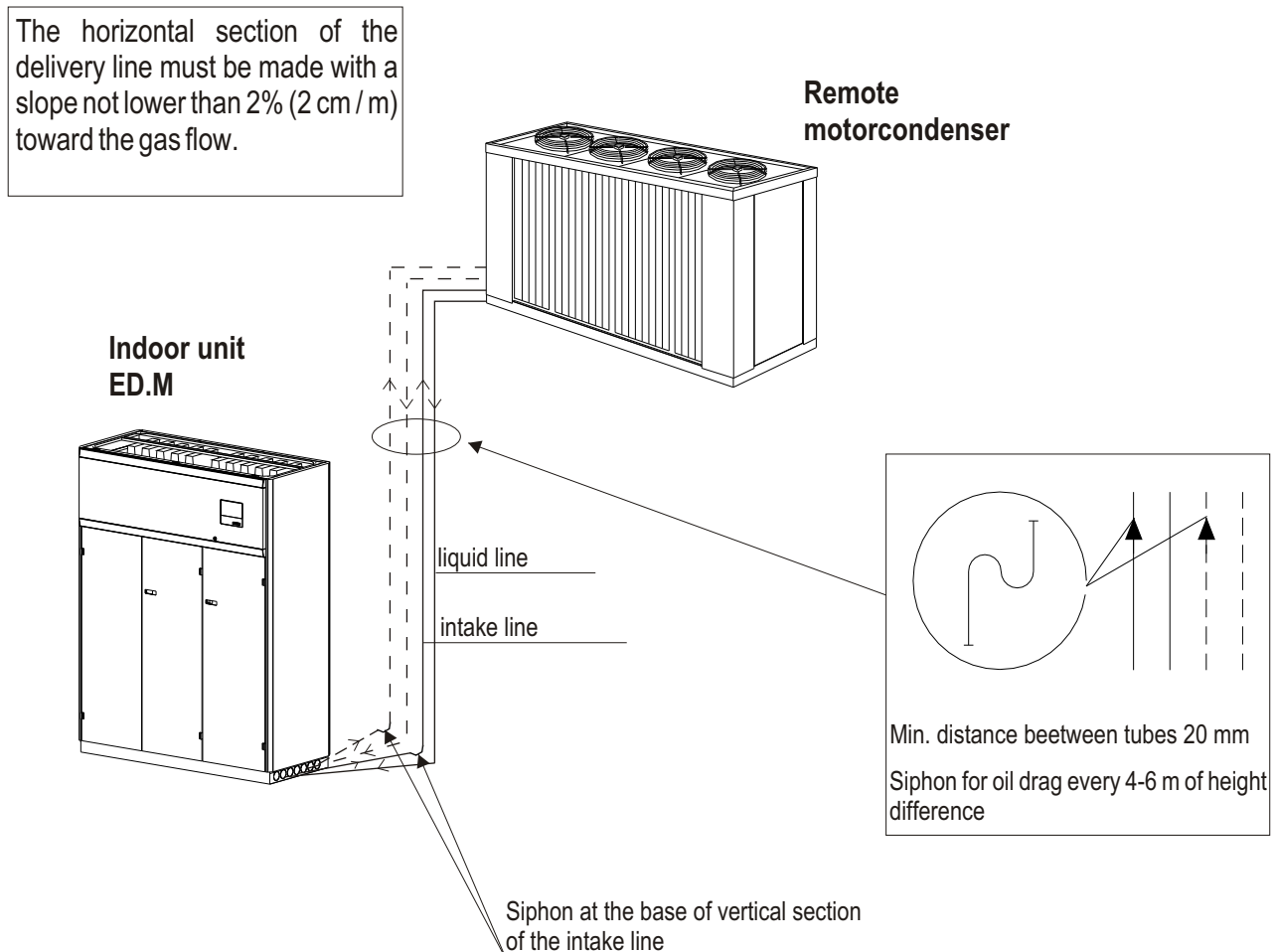
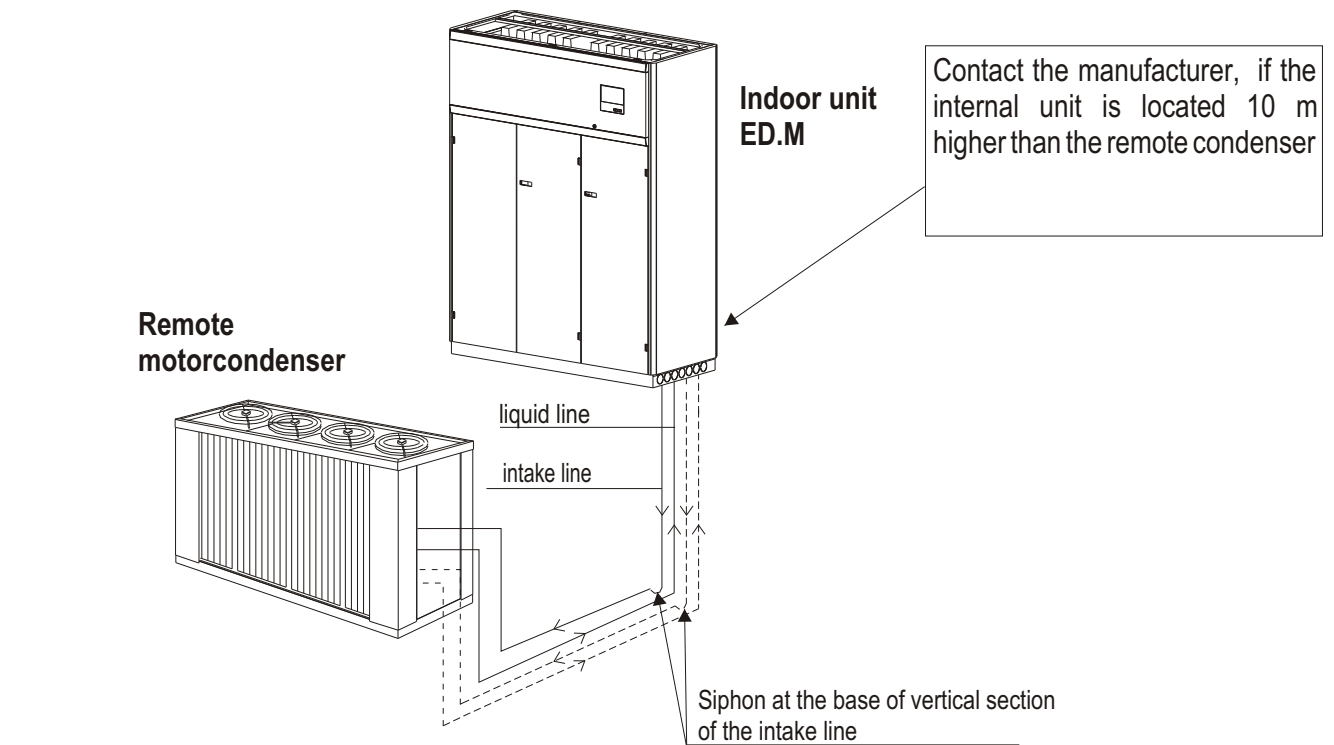


Fig 8: Piping diagram ED.M



The pipe installation must be performed by a skilled refrigeration technician.

The piping course must be the shortest possible in order to reduce the quantity of circulating Freon gas, oil and charge losses.

In case copper tubes have to cross electric wires, it is advisable to isolate the tubes, so avoiding the danger of inducted current. The piping can be made of pickled copper tubes, of an appropriate diameter, as shown on **Table 6 (ED.A)** and **Table 7 (ED.M)**.

It is here reminded that the total piping length is the result of its geometrical calculation plus the length of valves, bents and fittings present on the line itself. In case of difficulties in checking the components, the total length can be obtained multiplying the geometrical length of the line by 1.5 or 2.0.

The copper piping must be adequately supported by brackets in order to make it secure and fasten, nevertheless able to allow thermal expansion of the copper tubes.

In case the out let tubes go through rooms where people normally live, it is advisable to insert an anti-vibrator and a sound attenuator the closest possible to the compressor.

The piping insulation, except for special need, can be applied to the following parts only:

- ▶ Air intake pipes (ED.M);
- ▶ Outlet pipes (ED. A), where pipes are lapped by the outlet air from the unit (pipes on the suspended floor); where they can be at hand of persons or things, so that any damages or skin burns can be avoided.

During piping arrangement, the refrigeration tubes must be sealed with end caps in order to prevent humidity and dirt go inside.

The piping arrangement must consider easy access for operations like bracket insertion, tube welding and inspection.

At piping completion before performing the connections to the unit, the system must be leak tested by means of pressurized anhydrous nitrogen. It is recommended to mark the pressure test value on a pressure gauge.



Do not exceed 20 bar when pressing with nitrogen.

The nitrogen enables the circuit to dry up. In case the circuit pressure drops meaning the circuit is not sealed off, it is then necessary to let in a small quantity of refrigerant that, by means of appropriate detectors, can locate the leaks.

If a leak is detected, after the repair a new leak test must be carried out again.

At the end, the vacuum and the charge of the system can be performed according with the instructions described on par.4.1

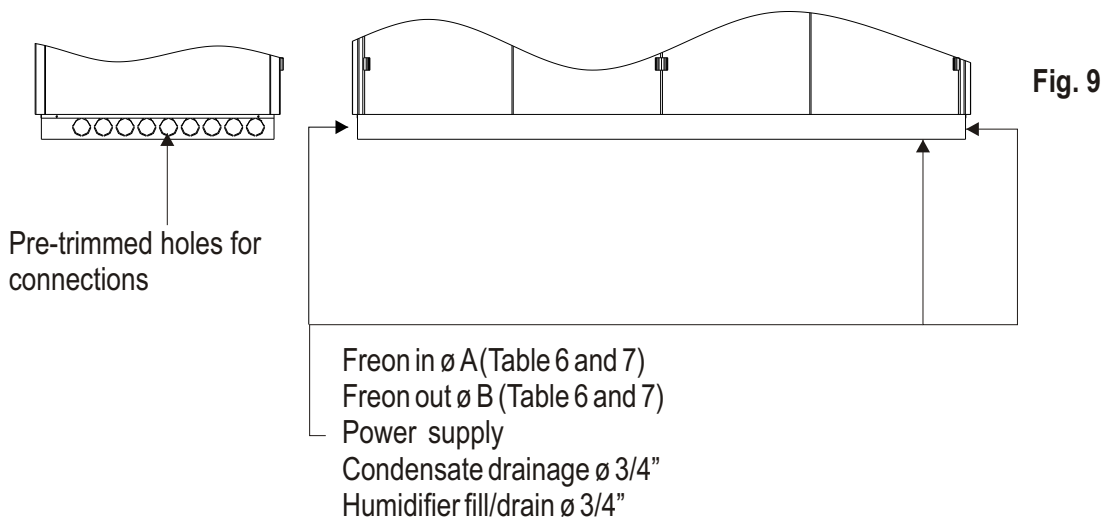


Table 6

ED. A		Leq						Fig. 9			
		10 m		20 m		40 m		ØA	ØB		
		M	L	M	L	M	L				
61		12	10	16	10	16	10	10	12		
81	172	16				18	12			18	12
91	192			22	16					28	18
101	202										
121	232		16	10	22	16					
141	272						18	12	35	22	
151	302		22	16	28	18					
171	342-362	18					12	22	16		
201			22	16	28	18					
221	412-442	16					10	22	16		
241	452-482		18	12	35	22					
251	492-532	22					16	28	18		
291	542-572		16	10	22	16					
301	602	18					12	35	22		
321	622		22	16	28	18					
341	682	16					10	22	16		
351			18	12	35	22					
361	762	22					16	28	18		
431	842		16	10	22	16					
451	892	18					12	35	22		
471	1002		22	16	28	18					
521	1102	16					10	22	16		
531			18	12	35	22					
581		22					16	28	18		
601			16	10	22	16					
651		18					12	35	22		
721			22	16	28	18					
821		22					22	42	22		

Table key:

- Leq:** Length of the piping (m)
- L:** Recommended diameter of the liquid piping (mm)
- M:** Recommended diameter of the delivery piping (mm)
- ØA:** Diameter for freon inlet connection
- ØB:** Diameter for Freon outlet connection

Contact the manufacturer for line length equal or longer than those reported in above table.

Table 7

ED. M		Leq						Fig. 9					
		10 m		20 m		40 m							
		S	L	S	L	S	L	ØA	ØB				
61		16	10	22	10	22	10	10	16				
81	172	22							12	28	12	16	18
91	192			28	16	35	16						22
101	202												35
121	232			42	18	54	22		35				
141	272	42	22					54		22	42		
151	302			42	22	54	22		42				
171	342-362	42	22					54		22	42		
201				42	22	54	22		42				
221	412-442	42	22					54		22	42		
241	452-482			42	22	54	22		42				
251	492-532	42	22					54		22	42		
291	542-572			42	22	54	22		42				
301	602	42	22					54		22	42		
321	622			42	22	54	22		42				
341	682	42	22					54		22	42		
351				42	22	54	22		42				
361	762	42	22					54		22	42		
431	842			42	22	54	22		42				
451	892	42	22					54		22	42		
471	1002			42	22	54	22		42				
521	1102	42	22					54		22	42		
531				42	22	54	22		42				
581		42	22					54		22	42		
601				42	22	54	22		42				
651		42	22					54		22	42		
721				42	22	54	22		42				
821		42	22					54		22	42		

Table key:

- Leq:** Length of the piping (m)
- S:** Recommended diameter of the intake piping (mm)
- L:** Recommended diameter of the liquid piping (mm)
- ØA:** Diameter for freon inlet connection
- ØB:** Diameter for Freon outlet connection

Contact the manufacturer for line length equal or longer than those reported in above table.

4.6 Hydraulic connection of condensers (ED.W)

The units are designed to work with tower water. It is necessary that the refill water for the evaporator tower is treated, in order to avoid corrosion problems, limestone deposit and algae or microorganisms proliferation.

It is also possible to employ water from water city systems or from a well. In these cases the water condenser can be provided with a pressure valve as optional: when calculating the circulation pump size it must be kept into account also the pressure drop of these components.

On demand, the condensers can be supplied capable to employ a mixture of water and ethylene glycol in a closed circuit cooled by a forced ventilation coil exchanger (dry-cooler), which dissipates the heat into the atmosphere. The use of water and glycol allow operation of the cooling circuit also at low outdoor temperature.

The mixture percentage of ethylene glycol and water are indicated in **Table 8**.

Table 8

Percentuale di glicole etilenico	5%	10%	15%	20%	25%	30%	35%	40%
Temperatura di congelamento	-2.1	-4.5	-7.0	-9.0	-12	-16	-20	-25

When employing anti-freeze mixture, the system must be endowed with an antifreeze fluid temperature control.

If the anti-freeze mixture contains an ethylene glycol percentage lower than those indicated there can be risks of freezing, while a larger quantity can reduce the unit performances. It is essential to check the correct concentration of anti-freeze in the system every winter. It is strongly recommended to employ only inhibited ethylene glycol in order to avoid rusting of the hydraulic circuit. Do not employ anti-freeze liquid with chemical agent unsuited to copper, stainless steel and to all other materials present in the system.

It is recommended the installation of a filter, with grid not greater than 1 mm., on the condenser water inlet.

It is also advisable to install shutoff ball valves on the condenser inlet and outlet in order to allow conditioning unit shut off in case of special maintenance operation: the installation of a three-piece joint between valves and conditioning unit will ease these operations. The water system pressure must range between 1.5 and 3.5 bar.

4.7 Condensate drainage connection

The conditioner is provided with a stainless steel tank collecting the condensate generated during the dehumidification phase. The tank must be connected, by means of a flexible pipe (supplied with the unit) having internal diameter of 27 mm., to the drainage collector. The pipe shall be placed with a gradient not lower than 1.5% (1.5 cm/m) toward the outlet direction.



In order to guarantee a right condensate drainage, set up a siphon on the flexible pipe 20 mm. far from the connection point.

4.8 Connection to the humidifier

On request, the unit can be supplied with an optional steam humidifier with immersed electrodes type (**Picture 10**) and appropriate capacity.

The unit is designed to be connected to a supply water line and to a drain water line, according to the criteria below.


The humidifier is provided with a \varnothing 3/4" Gas male coupling for the supply water. The supply water line must have following features:


- ▶ delivery head not lower than 0.6 l/min (1.2 l/min. for the 15 kg/h humidifier);
- ▶ internal diameter not smaller than 6 mm;
- ▶ shutoff valve and filter with grid not larger than 100 μ m.


The humidifier must be supplied possibly with water from water mains, with following features: -flow pressure included between 1 and 8 bar;

- ▶ temperature included between 1° and 40° C.;
- ▶ hardness included between 14 and 35° Fr;
- ▶ specific conductivity (at 20°C) included between 300 and 1250mS/cm.

On request, a unit is available with operating features of specific conductivity between 125 and 500 mS/cm. For further details about chemical characteristics of the supply water with regards to the specific conductivity refer to the Humidifier operating and maintenance manual.

 The supply water must not be treated with softeners because they can cause electrodes corrosion or can cause foam generation, which impedes the regular functioning of the unit.

 It is not advisable to employ well water, process water coming from the cooling circuits or that may contain polluted chemical or bacteria that could be spread in the ambient together with the produced steam.

 It is also inappropriate the use of supply water containing disinfectants or anticorrosion compounds because they are potentially hazardous.

The humidifier is provided with a 32 mm external diameter coupling for drain purpose of water, condense and possible overflows. A drainage line made up of a flexible pipe (supplied with the unit) having internal diameter of 27 mm. must be connected to this coupling. A siphon in the flexible pipe is needed immediately after the connection to the humidifier.

The drainage line must have following features:

- ▶ Instantaneous delivery not lower than 4 l/min;
- ▶ internal diameter not smaller than 25 mm;
- ▶ piping material must be able to bear at least 100°C. temperature;
- ▶ free from obstruction and without counter pressure;
- ▶ a slight slope not less than 1.5% (1.5 cm/m) toward the outlet.

The drain water contains the same substances as the supply water, but in higher concentration, because of the steam production.

This water can be therefore discharged to a collecting clear wastewater system.


 Once the installation is completed, wash the supply water piping letting flow water directly to the drainage line (without entering the humidifier) for few minutes; this will help eliminate any remains or installation debris which could provoke unit malfunctioning.



Fig. 10

4.9 Renewal air intake connection

The module Renewal air intake(optional) is installed on the left internal side of the conditioning machine, on demand, on the right side. The renewal air intake duct is connected to the nearest external intake through a coupling of 100 mm diameter, mounted on the left side panel of the unit (**Fig. 11a**). The module renewal air intake is equipped with a filter easy removable for cleaning purpose for steel frame size included between M1 and M6. (**Fig. 11b**), while for steel frame size L1 and L3 the filter of the renewal air intake is made up of a layer of washable synthetic material.



Fig. 11.a



Fig. 11.b

4.10 Electric connection

Before carrying out unit connection to power supply, it must be checked:

- ▶ power frequency and tension are the same as those stated on the unit identification tag (**Fig.4**);
- ▶ complete absence of humidity inside the electrical board and on each electronic component. In case humidity is found, detect and eliminate the cause of infiltration;
- ▶ the wiring and the components have not been damaged during transportation, handling and positioning. If any, proceed with needed repairs.
- ▶ electrical cable must be properly tightened, if some are loose proceed with adequate tightening.



Qualified and experienced personnel accurately trained must carry out any intervention on the electrical wiring.



Check the wiring diagram placed inside the key board



Strictly comply with existing local regulations when performing the electrical connections

4.10.1 Power supply connection (Fig. 12)

The standard power supply tension is 400V/3ph/50Hz, arrangement for special power supply tension can be supplied on request (check identification label and wiring diagram).

The unit is normally powered with a 5-pole cable (3pole+neutral+earth).

Connect the phases and the neutral to the terminals of the main breaker switch (L1, L2, L3 and N) and the earth wire to its corresponding terminal (PE). Use a power supply cable of adequate cross section and of moderate length to avoid voltage drops



Protect the power supply cable by means of an automatic differential switch of acceptable size and features. The cross section of the power supply cable and the size of the automatic switch can be found on Table 9, according to different unit models and configurations.

4.10.2 User's terminal connection

A user terminal (Fig. 13) is available with contacts designed for:

- ▶ - generic alarm state (1);
- ▶ - machine remote ON/OFF (2).



For the exact correspondence of the terminal numbers see the wire diagram.

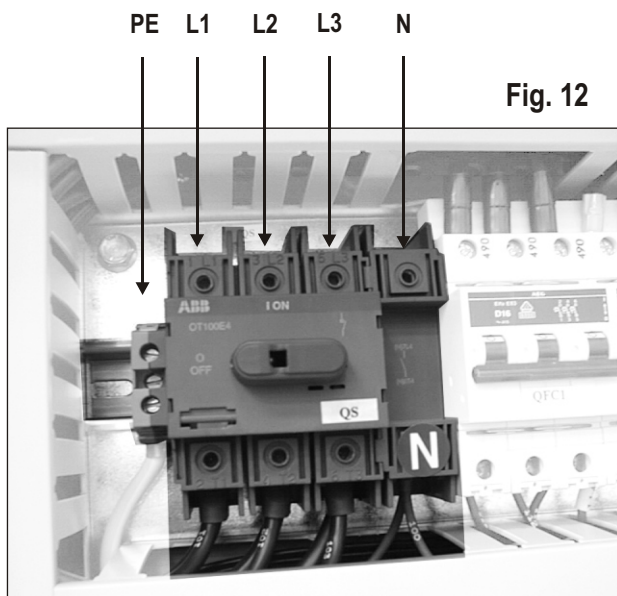


Fig. 12

Fig. 13




Table 9

Model	STD	H	RE
61-81-91	16A 4P	25A 4P	25A 4P
101-121-141	25A 4P	32A 4P	32A 4P
151-171-201	32A 4P	40A 4P	50A 4P
221-241-251-291	40A 4P	50A 4P	63A 4P
301-341	50A 4P	63A 4P	
321-361			
451-351			
451			80A 4P
531	63A 4P	80A 4P	100A 4P
471-521-601		100A 4P	
581			
651-721-821	80A 4P	40A 4P	50A 4P
172-192	40A 4P	50A 4P	63A 4P
202			
232-272-342	50A 4P	63A 4P	100A 4P
302-362			
442	80A 4P	100A	125A 4P
412-452-492			
482-532			
572	100A 4P	80A 4P	160A 4P
602			
542-622-682			
842			
762	125A 4P	100A	160A 4P
892-1002-1102			

Table key:

- STD: standard machine(without humidifier and heating elements)
- H: machine with humidifier(without heating elements)
- RE: machine with heating elements or with heating elements and humidifier

 The values shown in the above table refer to units with standard power supply 400 V/3f/50Hz.

4.10.3 Connections to condenser (ED.A) or to motor-condenser (ED.M)

The condenser units and the remote motor-condensers must be connected to the correct wire terminals in the indoor unit employing electric cable of acceptable diameter and features suitable for the environment.

4.11 System vacuum and charge execution(ED.A , ED.M)

4.11.1 General warnings

In order to get an efficient and reliable system function, it is extremely important to clear the circuit of any air, humidity, non-condensable gases and of any polluting substance presence, once the connecting lines between the internal and the external unit is completed. The presence of solid particles like metal dust, welding debris, and dirt of small dimensions not detectable by the filters can provoke serious damages to surfaces in relevant movement, reducing the efficiency and the life of the compressors.



Do not perform any holes on the cooling circuit, the complete rescue of metal particles produced would be then prevented

If excessive humidity persists inside the cooling circuit, negative phenomena can arise. Humidity can freeze inside the thermostatic valve and can cause an obstruction resulting on operating unit stop due to low-pressure alarm. Humidity can saturate the filter drier in a very short time, causing their replacement (with necessary system stop).

Humidity chemically interacts with the refrigerants and especially with polyester lubricant oils (normally employed with refrigerant type R407C, R134a, R404A, but sometime also with R22). This interaction creates acid substances that, if present in fair amount, can damage the compressor electric motor insulation provoking motor burns and rusted copper tubing that later generate solid impurity.



Reduce to minimum atmosphere exposure the circuit and its components, especially if the compressors are charged with polyester oil.

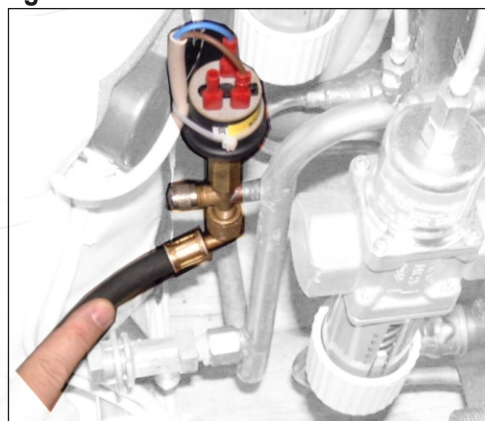
Non-condensable gases can gather inside the condenser and the liquid receiver, if not accurately eliminated from the circuit. If the gases are in the condenser, they cause a reduction of the useful thermal exchange surface meaning a condensation temperature rise and a further energy efficiency and system reliability reduction. In worst cases, the unit can be stopped by the activation of the high-pressure switch.

Big quantities of non-condensable gases gathered in the liquid receiver can cause the malfunctioning of the thermostatic valve, in case a mixture of refrigerant and non-condensable vapor replaces liquid refrigerant. If this happen, there will be a strong reduction of the evaporation temperature up to the activation of the low-pressure switch, in worst cases. This will lead to a reduction of the unit cooling capacity and to a reduction of the efficiency and lasting of the system.

Fig. 14



Fig. 15





4.11.2 Vacuum execution

Once the cooling lines are completed and connected between the indoor and outdoor units, checked no leaks are present, the vacuum can be made following this sequence:



The unit is normally tested by the manufacturer for leaks by cooling circuit pressurization.

 The unit is supplied with nitrogen pressure (20 bar).
During installation check the circuit holds its pressure, in case the pressure is low, look for leaks, detect and repair it before going on with the installation operations.

 Make sure all nitrogen present in the liquid receiver has been discharged before beginning the vacuum operation.

a) Let the vacuum pump work until the pressure shown on the appropriate vacuum meter (**Fig. 14**) does not go below 10 mbar.



Do not employ the compressor for carrying out the vacuum inside the cooling circuit.



Make sure all valves are open in order to avoid that some circuit parts result cut off.

b) Isolate the pump from the circuit by means of the cut-off valves and wait for 30 min.

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

d) If pressure increases during the pump stop period or if it is impossible to reach the desired pressure value, it means there is a leak in the circuit. The leak must be located and repaired, after that a new procedure starting from point a) must be performed.

e) If the pressure goes up until it reaches a climax value, it means the circuit contains a large amount of humidity. In this case, it is necessary to inlet some anhydrous nitrogen (up to about 2 bar) and then repeat steps a), c) and e) for at least twice, then proceed with step f).

f) If pressure stabilizes after a short increase, it means the circuit is leak proof and reasonably dried: Operate the pump only after cut-off valves are open and pressure has returned below 10 mbar for 2-4 hours, according to circuit size.



Do not operate the compressor nor employ a megahom meter while the circuit is vacuum.

4.11.3 Refrigerant charge

Once finished the vacuum operation, the circuit must be charged with the exact quantity of refrigerant and if needed, also with anti-freeze oil.



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



ED.W units are supplied with refrigerant charge and anti-freeze oil included, therefore these units must not undergo the following operations, unless some maintenance operations have been carried out:

a) Connect a full up refrigerant gas cylinder to the circuit employing the charge connections present on the liquid line. the liquid line.



Check carefully the refrigerant you are going to employ for the circuit charge match the same type as shown on the unit identification tag. In case of discrepancy contact the manufacturer.

b) Open the cylinder valve and charge the refrigerant until the circuit pressure reaches the same cylinder pressure (repeat the operation with two gas cylinders, if needed).



If the refrigerant is a mixture compounds, make sure to let enter the circuit in a liquid state in order to avoid compounds separation. This is why cylinders are provided with two different valves: one for the vapor and one for the liquid.

c) Close the cylinder valve, disconnect the cylinder from the liquid line and connect it to the intake line (possibly prior to the evaporator)

d) Operate the unit, open the cylinder liquid valve and complete the charge (with more cylinders if needed) until the sight glass (located immediately after the filter drier) becomes clear and does not present foam or gas bubbles during operation in nominal condition.

In order to facilitate the charge operations, the tables below show, as useful information, the refrigerant quantities needed to carry out the charge for the different type of internal units and their relevant connecting pipes. For a correct evaluation of the refrigerant quantity it must be counted also the volume of the cooling circuit of external units and that of other possible components installed (like additional liquid receivers, oil separators, etc.)

In case the cooling lines are rather long or in case oil separators are installed on the compressors delivery, a fair quantity of anti-freeze oil must be added..



Check the oil employed is compatible with the one charged in the compressor (refer to the compressor's identification tag).

In the event oil separators are employed, the lubricant quantity suggested by the manufacturer must be added. In presence of cooling lines of 30 m or longer, it must be charged about 0.2 kg of oil for every 10 m of piping (beyond 30 m). In any case, ensure the correct oil charge checking the oil level through the compressor sight glass after about 30 minutes of standard operation mode.



An overload oil charge can lead to a system efficiency drop and to compressor breaks.

Table 10.a

Steel frame size	Model	Refrigerant charge (kg) (*)	
		ED.A	ED.M
L1	61-81	2,4	1,1
	91	2,7	1,4
L2	101-121	3,0	1,7
	141	3,4	2,1
L3	151-171	4,1	2,7
	201	4,7	3,4
M1	221-241	5,2	3,8
	251-291	6,4	5,1
	301	7,6	5,1
	341	8,9	6,4
M2	321-361	9,0	6,5
	451	11	8,1
M3	351-431	10	7,5
	531	12	9,3
M4	471-521	11	8,9
	601	14	11
M5	581-651	13	10
	821	15	13

Table 10.b

Steel frame size	Model	Refrigerant charge (kg)(*)	
		ED.A	ED.M
L3	172	2,7	1,4
	192	3,0	1,7
M1	202-232-272	3,2	1,9
	342	4,5	3,2
M2	302-362	4,6	3,2
	442	5,4	4,1
M3	412-452	5,1	3,7
	492	6,0	4,7
M4	482-532	5,8	4,5
	572	7,0	4,5
	602	8,1	5,6
M5	542	6,5	5,1
	622-682	7,7	5,1
	842	9,0	6,4
M6	762-892	9,5	7,0
	1022-1102	11	8,7

(*) for each cooling circuit

Table 10.c

Refrigerant weight for every 10 m of piping													
D _e (mm)	6	10	12	16	18	22	28	35	42	54	64	76	
M _{asp} (kg/10m)	0,0035	0,013	0,020	0,040	0,052	0,079	0,13	0,20	0,30	0,49	0,71	1,0	
M _{man} (kg/10m)	0,011	0,042	0,07	0,13	0,16	0,25	0,42	0,6	1,0	1,6	2,3	3,3	
M _{liq} (kg/10m)	0,15	0,55	0,86	1,7	2,2	3,3	5,6	8,4	13	21	30	43	

Table key

D_e = external pipe diameter

M_{asp} = refrigerant weight for the intake line

M_{man} = refrigerant weight for the delivery line

M_{liq} = refrigerant weight for the liquid line

5 - OPERATING

5.1 First startup

Before starting the unit, the following simple operations must be carried out:

5.1.1 Cooling circuit (ED.A, ED.M)

Once completed all operations, as described on paragraph 4.11, the unit is ready for the startup.

At first check the valves are open as follows:

- ▶ unplug the stylus protective cap (**Fig.16**);
- ▶ rotate the stylus anti-clockwise until the end (**Fig.17**);
- ▶ rotate the stylus clockwise for one turn (if the manometer plug1 is employed);
- ▶ plug well the cap tightening it, so to avoid any gas leakage.

Fig. 16



1

Fig. 17



5.1.2 Hydraulic circuit (ED.W)

Check the hydraulic circuit is completely air free and the condensation water capacity and temperature correspond to the right ones.

5.1.3 Startup

First perform all operations as described in paragraph 4.10 "Electric connections" then carry out following instructions :

Turn the disconnecting switch to ON position. Make sure the conditioner is OFF from keyboard.



Wait for three hours before starting the unit in order to allow the heating element pre-heat the oil.

Start the air conditioning unit pushing the ON/OFF button on the microprocessor keyboard.



Check if the fans rotation is right, in case the rotation is reversed and the compressors are 3-phase, two of the three phases must be inverted in the terminals of the main switch.

Once the unit is started, after a short period needed to the microprocessor for an auto-test, the electric fans of the air conditioning unit will start to rotate. At this point, all the system components will start working automatically according to selected and detected thermal and humidity parameters.

Push OFF button on the microprocessor keyboard to stop the air conditioning.



If the unit is stopped for more than 24 hours, turn also the main switch to OFF position.

5.1.4 Setup

The setup must be performed with the unit working and its status very close to the nominal one.

Check:

- ▶ the thermal load present is adequate;
- ▶ doors and windows are closed;
- ▶ the surrounding area is clean.

Check the suction gas heating, if adjustment is needed, the thermostatic valve setting must be changed as described below. With the conditioning unit working as close as possible to nominal condition, insert a manometer on low pressure side. Check, with a thermometer (Fig.18), the gas temperature on the compressor intake (Fig.19). The overheating intake value is the difference between the detected temperature and that of saturation (dew value for mixture) corresponding to the pressure shown on the manometer.

If the gas temperature is higher than 10°C., the thermostatic valve must be opened, to the contrary, if the gas temperature is lower than 5°C., the thermostatic valve must be closed. (Fig. 21 Cap removal & Fig. 22 Opening adjustment).

Valve adjusting operations must be carried out always with caution, turning the adjusting screw only half turn each time; then waiting a couple of minutes to allow the unit reach steady conditions.

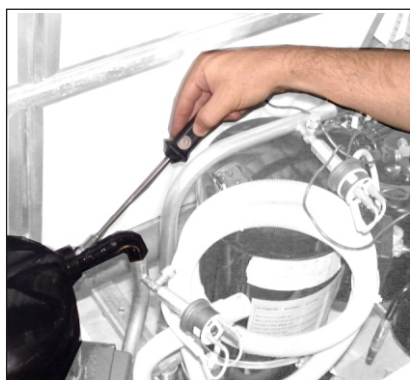


Fig. 18



Fig. 19

Gas: R407 C
 Intake temp.: 15°C
 Intake pressure: 5.5 bar at 10°C
 Overheating: 15 - 10 = 5°C

Fig. 20

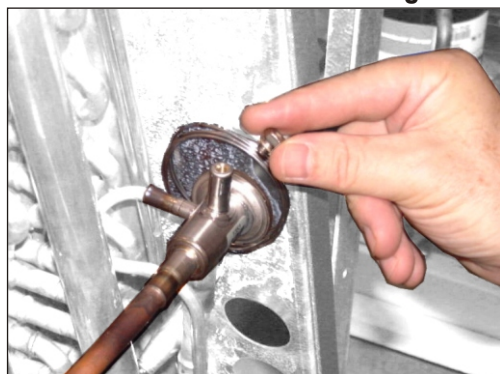
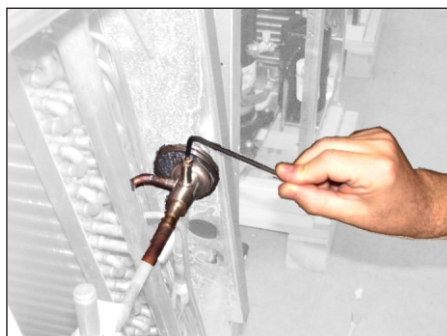


Fig. 21



The adjustment of the thermostatic valve is a very delicate operation, thus it must be carried out by a skilled technician.