

ASSEMBLY INSTRUCTIONS

CONDENSING UNITS

UK



1. General Information

1.1 General details

The present assembly instructions represent an integral part of the CONDENSING UNITS (identified, in the Present Document, with the name of PARTLY COMPLETED MACHINERY) constructed by Rivacold s.r.l.; for this reason, they must be part of the technical file of the end-machine in which the present PARTLY COMPLETED MACHINERY will be incorporated.

These instructions are issued with the purpose of supplying the technicians with the information and instructions essential to correctly operate the PARTLY COMPLETED MACHINERY in safe conditions.



ATTENTION: since they must be easily and readily available for consultation, the present instructions must be stored in a known and accessible place.



NOTE: The Purchaser can request an additional copy of the present document (for example, in case the original document gets damaged) in writing to the Technical Department of the Producer (in this respect, please see Chapter 1.6.1 – Request of Assistance Intervention of the Present Chapter), undertaking commitment, in any case, to return the damaged copy to the Producer.

1.2 Property of the information

These assembly instructions contain information of reserved property.

All rights are reserved.

These instructions may not be reproduced or photocopied, in whole or in part, without prior written consent by the Producer. The use of this documentation is allowed only to the client to whom the instructions have been supplied together with the semi-machine to which the instructions refer.

The Producer declares that the information contained in these instructions is congruent to the technical and safety specifications of the PARTLY COMPLETED MACHINERY to which the instructions refer. The drawings, the diagrams, and the technical data reported are updated to the date of publication of this document and are valid only for the PARTLY COMPLETED MACHINERY to which they have been attached.

The Producer reserves itself the right to make changes or improvements to the documentation without having to provide fore-notice.

The Producer does not take responsibility for direct or indirect damages to persons, things, or domestic animals which ensue to the use of this documentation or of the PARTLY COMPLETED MACHINERY in conditions that differ from those provisioned and intended.

1.3 Contents of the assembly instructions

The present assembly instructions are intended for the technicians so that they may be knowledgeable of and be able to correctly install the PARTLY COMPLETED MACHINERY .

In fact, these instructions contain within them, in addition to a description of the PARTLY COMPLETED MACHINERY , the instructions and indications in order to:

- transport and correctly install the PARTLY COMPLETED MACHINERY ;
- perform the correct cleaning, regulation, and maintenance interventions on the PARTLY COMPLETED MACHINERY ;
- pay the necessary attention to the most basic safety and anti-injury rules.

It is necessary to carefully read all the chapters to fully understand the indications supplied in these instructions, and to operate the PARTLY COMPLETED MACHINERY ; for a further and more easy research of the contents, please refer to , which contains a description of the topics discussed in the chapters.

Chart 1 – Structure of the Assembly instructions.

CHAPTER	CONTENTS
Chapter 1 General Information	<ul style="list-style-type: none"> ➤ Description of the present assembly instructions, of their structure, and of the conventions used; ➤ definition of the terms used; ➤ definition of the relationship between the Producer and Purchaser/User (in terms of the warranty and assistance conditions).
Chapter 2 Description of the semi-machine	<ul style="list-style-type: none"> ➤ Description of the PARTLY COMPLETED MACHINERY .
Chapter 3 Safety and technical data	<ul style="list-style-type: none"> ➤ Presentation of the general indications on the PARTLY COMPLETED MACHINERY , the solutions adopted for the protection of the operating personnel, the general precautions to apply to correctly operate the PARTLY COMPLETED MACHINERY and the present residual risks; ➤ presentation of the main technical data concerning the PARTLY COMPLETED MACHINERY .
Chapter 4 Transportation and Installation	<ul style="list-style-type: none"> ➤ Description of the lifting and transportation modes of the PARTLY COMPLETED MACHINERY ; ➤ description of the installation modes of the PARTLY COMPLETED MACHINERY ; ➤ description of the storage modes of the PARTLY COMPLETED MACHINERY .
Chapter 5 Maintenance and Demolition	<ul style="list-style-type: none"> ➤ Description of the procedures to inspect and control the parts and the components of the PARTLY COMPLETED MACHINERY (especially those parts most subject to wear-out); ➤ description of the procedures that enable the personnel appointed to perform the cleaning of the PARTLY COMPLETED MACHINERY ; ➤ presentation of the indications to perform the dismantling, the demolition and the disposal of the PARTLY COMPLETED MACHINERY .
Chapter 6 Optional features	<ul style="list-style-type: none"> ➤ Description of the available optional features that can be installed on the PARTLY COMPLETED MACHINERY .

CHAPTER	CONTENTS
Chapter 7 Search for Breakdowns	► List of the possible malfunctions that can occur on the PARTLY COMPLETED MACHINERY and their respective solutions.
Chapter 8 Attachments	► Indications for the retrieval of the: refrigerant diagram, wiring diagrams of the available models of the PARTLY COMPLETED MACHINERY , documentation of the components present on the PARTLY COMPLETED MACHINERY.

1.4 Conventions and Definitions

1.4.1 General details

The assembly instructions of the PARTLY COMPLETED MACHINERY are divided into chapters which allow, for each phase of the life-cycle of the PARTLY COMPLETED MACHINERY (transportation, installation, maintenance, and phase-out), to simplify the retrieval of the relative information necessary to the User of the PARTLY COMPLETED MACHINERY.

The entire documentation relative to the PARTLY COMPLETED MACHINERY has been prepared developing on the themes indicated by the Machines Directive (2006/42/CE), the PED Directive (97/23/CE), and the safety Norms in force.

Configuration of the organs and devices described and depicted in the documents may differ from the configuration supplied on the PARTLY COMPLETED MACHINERY in the specific set-up arranged in accordance to particular requirements or safety norms; in such case, some description, references, or procedures recommended can be of general type, though maintain their efficiency. The quoted drawings and photographs are supplied to serve as examples to which refer for an easier comprehension of the text.

1.4.2. Conventions applied to the terminology

PARTLY COMPLETED MACHINERY : the term used in the present assembly instructions to identify the CONDENSING UNITS.

IPD: acronym which stands for the Individual Protection Device(s).

1.4.3 Definitions

DANGEROUS AREA

Any AREA in proximity of the PARTLY COMPLETED MACHINERY in which the presence of an exposed person represents a risk to that person's safety and health.

USER

Any PERSON (professional/company) who adequately uses the machine on which the PARTLY COMPLETED MACHINERY is installed, or who assigns its use or operations connected to its use to qualified persons.

EXPOSED PERSON

Any PERSON who stations entirely or partially in a dangerous area or in proximity of those areas.

MECHANICAL MAINTENANCE WORKER

QUALIFIED TECHNICIAN who can intervene on any mechanical organ to perform the necessary regulation, repair works, or maintenance interventions.

The mechanical maintenance worker is not usually qualified to perform interventions on the electrical systems in the presence of voltage.

ELECTRICAL MAINTENANCE WORKER

QUALIFIED TECHNICIAN who is responsible for all the interventions of electrical type (regulation, maintenance, and repair works) and who, when necessary, operates in the presence of voltage inside the electrical cabinets and the shint boxes.

PERSONNEL APPOINTED TO DISPLACEMENT

QUALIFIED PERSONNEL which performs displacement tasks with the SEMI-MACHINE, or with the equipment used in the case that the tasks require the use of lifting devices.

TECHNICIAN OF THE PRODUCER

QUALIFIED TECHNICIAN made available by the Producer of the SEMI-MACHINE to perform complex operations in special circumstances or, in any case, whenever agreed with the user.

1.4.4. Personal means of protection and behavioral norms

For each one of the operations described in the present instructions, the means of protection that the appointed personnel is responsible for using, and the behavioral norms which allow to protect the safety of the operators are indicated.



NOTE:

the Paragraph 3.6 – General Warnings and Behavioral norms of Chapter 3 – Safety and Technical data reports, in particular, a series of general recommendations to comply with in order to avoid conditions of risk for the persons or damages to the partly completed machinery .

1.4.5. Print-out conventions

The graphic layout of the present assembly instructions is such to allow that *the contents may be easily and readily identified*; with this objective in mind, for example, the instructions are linked to lists, as indicated below:

- this symbol identifies a generic bulleted list or a bulleted list formed by simple actions (the order in which the actions are presented is not mandatory, but highly recommended);
- 1. this is the way in which numbered lists are identified that are meant to explain a complex procedure (the order in which the actions are presented is not mandatory to correctly and safely perform the intervention being examined).

The *italics* are used, in particular, for:

- cross references; the cross references used in these instructions are expressed in the following manner: "Paragraph/Figure/Chart" with the number and, usually, the specification of "the Chapter" with the relative number and title (when not specified, it is implied that the paragraph, chart, or figure belong to the current Chapter);
- the specialized and technical terms, the first time they appear in the text;
- the terms in a foreign language which is not commonly/widely used (these too, only the first time they appear in the text).

The **bold text** is used to highlight words, sentences, or parts of a procedure.

Furthermore, to ensure a more in-depth knowledge of the PARTLY COMPLETED MACHINERY, the text of the present assembly instructions are associated with added indications that complete them, and which supply supplementary information, essential precautions, or especially significant dangers to be considered; the following notation is used in this concern:



NOTE: indicates the notes, precautions, suggestions, and other points to which the attention of the reader wants to be drawn, or which completes the explanation with added information.



ATTENTION: indicates situations or operations in which the possibility of causing damage to the semi-machine, the equipment connected to it, or the environment subsists.



DANGER: indicates situations or operations in which the possibility of causing damage to the semi-machine, the equipment connected to it, or the environment subsists.

GRAPHIC SYMBOLS USED TO INDICATE THE NECESSITY TO WEAR INDIVIDUAL PROTECTION DEVICES

The graphic symbols used in the present instructions to indicate the need to wear specific IPDs are illustrated in this paragraph.



Indicates the necessity to use protection gear for the head suitable to perform the operation described.



Indicates the necessity to use protection gloves suitable to perform the operation described (if need be, dielectric to execute interventions on the electrical system).



Indicates the necessity to use protection clothing suitable to perform the operation described.



Indicates the necessity to use anti-injury boots suitable to perform the operation described.



Indicates the necessity to use protective eyewear suitable to perform the operation described.



1.5 Warranty

1.5.1. General Conditions

The Producer, company Rivacold s.r.l., guarantees that the PARTLY COMPLETED MACHINERY and the equipment produced by the Producer are void of material and processing flaws, for a period which is agreed on the date in which the sale contract of the PARTLY COMPLETED MACHINERY is stipulated.

1.5.2. Parts excluded from warranty

The parts subject to wear-out and all the tools and consumption material which may be supplied by the Producer together with the PARTLY COMPLETED MACHINERY are excluded from the warranty.

1.5.3. Operations which entail the cancellation of the warranty

Any attempt to dismantle, change, or tamper with a component of the PARTLY COMPLETED MACHINERY on the part of the User or unauthorized personnel entails the cancellation of the warranty and absolves the Producer of any responsibility for any potential damages both to persons and things deriving from said attempts.

The Producer deems itself likewise absolved of any responsibility and will cancel the warranty relative to the PARTLY COMPLETED MACHINERY in the following cases:

- use of the PARTLY COMPLETED MACHINERY for which it is not expressly intended (in this respect, please see *Paragraph 3.5 – Proper and improper use of the PARTLY COMPLETED MACHINERY of Chapter 3 – Safety and Technical data*);
- use contrary to what required by the norms in force in the country where the semi-machine is installed;
- installation of the PARTLY COMPLETED MACHINERY in conditions different from those specified in *Chapter 4 – Transportation and Installation*;
- installation not compliant to the specifications reported in *Chapter 4 – Transportation and Installation*;
- total or partial failure to observe the instructions reported in the present instructions;
- failure to perform or incorrect maintenance;
- use of non-original spare parts or spare parts not specified by the Producer.

1.6 Assistance

As far as the maximum exploitation of the performances supplied by the PARTLY COMPLETED MACHINERY and the extraordinary maintenance operations are concerned, these instructions in no case replace the experience of the installers, the users, and the trained and qualified maintenance workers.

In this respect, the Technical Assistance Service of the company RIVACOLD S.R.L. supplies:

- support by telephone concerning the most basic characteristics and the interventions that can be performed on the PARTLY COMPLETED MACHINERY;
- transmission of documentation;



ATTENTION:

in case of doubts on the correct interpretation of the instructions reported in the present assembly instructions, contact the Technical Assistance Service (as indicated below) to obtain the NECESSARY clarifications.

1.6.1. Requests for assistance interventions

To speak with the Technical Assistance Service, contact:

Technical Office of Rivacold s.r.l.
Via Sicilia, 7
Fraz. Montecchio 61022 VALLEFOGLIA (PU)
Italy
Telephone: (+39) 0721 919911
Fax: (+39) 0721 490015
E mail: ufficiotecnico@rivacold.com

During the requests for assistance interventions, always specify the name, model, and serial number of the PARTLY COMPLETED MACHINERY.

2. Description of the partly completed machinery

The PARTLY COMPLETED MACHINERY which is the subject of the present document has been engineered to be incorporated in refrigerator counters (bar counters, confectioneries, fridge cells, etc.) and is intended for the refrigeration of the compartments of the latter. It is not supplied with an enclosure.

The PARTLY COMPLETED MACHINERY is represented exclusively of a condensing unit (which can be an air or water type, depending on the model). The refrigerant fluid follows the modes of the compressed refrigerant cycle. Power supply to the unit takes place by way of an electrical connection for which the installer is responsible. A separate electrical panel can be supplied with the PARTLY COMPLETED MACHINERY MACHINE on request. Depending on the individual order specifications, a software which allows to manage the PARTLY COMPLETED MACHINERY may or may not be supplied.

The unit is supplied without an evaporator (but is only arranged for its connection to an evaporator supplied by the client and integrated in the end-machine); this is the reason why it represents a semi-machine, in accordance to the definition provided by the Machines Directive 2006/42/CE, because it is not capable of performing a well-determined application (without an evaporator it is not capable of developing the refrigerant cycle provisioned). It can freely circulate on the market because it is accompanied by the correspondent declaration of incorporation of the producer, and by the correspondent assembly manual that allows for its simple integration on the end-machine (which will then have to be marked CE, pursuant to the directives applicable to it, by the subject performing the integration).



Electrical panel

The PARTLY COMPLETED MACHINERY can be supplied with an electrical panel on which a disconnecting switch is present only on request.



3. Safety and Technical Data

3.1 General safety details

3.1.1. Engineering Criteria

In the engineering phase of the PARTLY COMPLETED MACHINERY, the principles and concepts introduced in the pertinent paragraphs of the harmonized norms indicated in Chart 2 below have been applied.

Chart 2 – Main harmonized norms used in the engineering phase of the PARTLY COMPLETED MACHINERY.

NORM	TITLE
UNI EN ISO 12100-1: 2009	Safety of the machinery – Fundamental concepts, general principles of engineering - Part 1: Basic terminology, methodology
UNI EN ISO 12100-2: 2009	Safety of the machinery – Fundamental concepts, general principles of engineering - Part 2: Technical principles
UNI EN ISO 14121-1: 2007	Safety of the machinery – Risk evaluation – Part 1: principles
UNI EN ISO 13857: 2008	Safety of the machinery – Safety distances to prevent access to the dangerous areas by the upper and lower limbs
UNI EN 953: 2009	Safety of the machinery – General requisites for the engineering and construction of the guards (fixed, mobile)
UNI EN 378-1: 2008	Refrigeration systems and heat pumps – Safety and environmental requisites – Part 1: basic requisites, definitions, classification, and selection criteria
UNI EN 378-2: 2008	Refrigeration systems and heat pumps – Safety and environmental requisites – Part 2: engineering, construction, tests, marking, and documentation
CEI EN 60335-1: 2008	Safety of the electrical appliances for domestic use and similar appliances – Part 1: General norms
CEI EN 60204-1: 2006	Safety of the machinery – Electrical equipment of the machines - Part 1: General rules

The adherence to the paragraphs pertinent to the aforementioned harmonized norms allows for the elimination or reduction of risks in the best possible manner, both during normal functionality, and during maintenance operations.

The components used have been chosen accurately among those available on the market, and the materials which make up the PARTLY COMPLETED MACHINERY are void of risks to the health and integrity of the persons. All the parts supplied by third parties are marked CE (where required) and are compliant to the relative directives of reference. All the parts/details have been diligently inspected in compliance to the quality standards established by the norms in force.

Furthermore, precautionary and protection measure necessary to confront residual risks have been applied on the PARTLY COMPLETED MACHINERY (in this respect, please see Paragraph 3.3 – Warnings concerning residual risks).

3.2. Devices and solutions for protection

3.2.1. Passive Safety Devices

The following passive devices and constructional solutions have been adopted on the PARTLY COMPLETED MACHINERY:

- steel sheet fixed guards with protection grid in correspondence of the mobile parts.
- Safety signals in correspondence of the fixed guards.

3.2.2. Active Safety Devices

The following active safety devices have been adopted on the PARTLY COMPLETED MACHINERY:

- safety pressure meter (where required)
- safety valve (where required)

3.3. Warnings concerning residual risks

In order to avoid any condition of danger to persons or of damages to the PARTLY COMPLETED MACHINERY caused by residual risks, that is, those risks that persist in spite of all the measures adopted, or potential risks that aren't apparent, the Producer advises the maintenance workers and all personnel appointed to operate the PARTLY COMPLETED MACHINERY to scrupulously follow the warnings indicated in the following pages.



ATTENTION: *always follow the signs and indications on the labels applied on the PARTLY COMPLETED MACHINERY and exclusively operate based on the instructions supplied in the present instructions (such as those reported, for example in Paragraph 3.6 – General Warnings and Behavioral Norms).*

3.3.1. Lifting and Transportation

3.3.1.1. Residual Risks present during the lifting and Transportation Phases

During the lifting and transportation phases, risks are presented tied to:

- operations on the PARTLY COMPLETED MACHINERY by unqualified, untrained, uninformed, or incorrectly equipped personnel;
- incorrect choice or incorrect use of the means to transport and displace the PARTLY COMPLETED MACHINERY (for example, tackle, hoists) ;
- crushing of the operators appointed to displacement operations;
- loss of stability of the load during performance of the operations being examined;
- projection of mobile parts of the PARTLY COMPLETED MACHINERY that cannot be removed or cannot be appropriately fastened;
- collision of parts or components of the PARTLY COMPLETED MACHINERY against persons or things due to unexpected movements of the PARTLY COMPLETED MACHINERY , or due to incorrect behavior on the part of the personnel appointed to the operation;
- collision or drop of components of the PARTLY COMPLETED MACHINERY , which damage the PARTLY COMPLETED MACHINERY and the relative protections;
- unhealthy positions or excessive strain of the operators appointed to transportation and displacement of the components of the PARTLY COMPLETED MACHINERY.

3.3.1.2. Necessary Individual Protection Devices



3.3.1.3. Warnings to follow during the Lifting and Transportation Phases

During the lifting and transportation phases, it is necessary to follow the warnings described in the present paragraph.

- For these operations, only designate specialized personnel trained concerning the procedures for the displacement of machineries, and capable of choosing and safely using the lifting and transportation means most suitable to the circumstance (for example, tackle, hoists).
- Inspect and, if necessary, make sure that all the parts that are capable of moving are correctly fastened (or else, if required, removed and reassembled once the operation is completed).
- Do not lift, for any reason, the various parts of the PARTLY COMPLETED MACHINERY by grabbing it by non-structural elements (for example, cables or sheaths).
- Make sure that there are no persons in proximity of the area where the lifting, displacement, and unloading operations are being performed, and always keep at a safety distance.
- Always provide fore-notice that maneuvers are about to start.
- Do not transit beneath hanging loads.
- Do not let yourself be transported together with the loads.

3.3.2. Installation and Connection

3.3.2.1. Residual risks present during the Installation and Connection Phases

During the installation and connection phases, risks are present tied to:

- operations on the PARTLY COMPLETED MACHINERY performed by unqualified, untrained, uninformed, or incorrectly equipped personnel;
- contact with elements under voltage;
- collision or crushing by components of the PARTLY COMPLETED MACHINERY which are being displaced/moved;
- tripping or falling in correspondence of the electrical power supply;
- damage of the PARTLY COMPLETED MACHINERY during the installation and connection phases.

3.3.2.2. Necessary Individual Protection Devices



3.3.2.3. Signs Present

The PARTLY COMPLETED MACHINERY is supplied with specific danger and prohibition signs; in this respect, please see Paragraph 3.4 – Signs concerning Safety.

3.3.2.4. Warnings to follow during the Installation and Connection Phases

During the installation and connection phases, it is necessary to follow the warnings described in the present paragraph.

- Follow the indications relative to safety reported in Paragraph 3.3.1 – *Lifting and Transportation* during the necessary operations of displacement of the components of the PARTLY COMPLETED MACHINERY .
- Use the auxiliary equipment and, in any case, any other machinery or tool (electrical or pneumatic) only once you've fully understood the indications reported in the Use and Maintenance Manual, or after having undergone specific and formal training.
- Protect the piping for the connections to the sources of energy with rigid sheaths or adequate conduits for cable passage.
- Perform the required interventions using work instruments up to norm (ladders, various tools) and paying maximum attention to elements that could lead to tripping accidents or cause bruises or cuts.

3.3.3. Maintenance and demolition

3.3.3.1. Residual risks present during Maintenance and demolition Phases

During the maintenance and demolition phases, risks are present tied to:

- operations on the PARTLY COMPLETED MACHINERY performed by unqualified, untrained, uninformed, or incorrectly equipped personnel;
- collision or crushing due to components of the PARTLY COMPLETED MACHINERY that are being displaced/moved;
- contact with heated elements of the PARTLY COMPLETED MACHINERY or of the relative equipment;
- contact with refrigerant fluid.

3.3.3.2. Necessary Individual Protection Devices



3.3.3.3. Signs Present

The PARTLY COMPLETED MACHINERY is supplied with specific danger and prohibition signs; in this respect, please see Paragraph 3. 4 – *Signs concerning Safety*.

3.3.3.4. Warnings to follow during the maintenance and demolition phases

During the maintenance and demolition phases, it is necessary to follow the warnings described in the present paragraph.







- Perform the required interventions using work instruments up to norm (ladders, various tools) and always wearing the necessary IPDs.
- The maintenance and demolition interventions must only be performed by qualified and specifically trained personnel.
- Check that the power supplies have been duly disconnected and that no one can re-activate them before the required interventions are completed (it is necessary to physically disconnect the plug from the electrical socket); check, furthermore, that any residual energy has been discharged before performing the interventions.
- Operate, as much as is possible on the PARTLY COMPLETED MACHINERY and on the piping only once they have been emptied and, before proceeding to re-start the machine, ensure an accurate cleaning of the system.
- Obtain the work permits necessary and check that all procedures to set up the PARTLY COMPLETED MACHINERY for the maintenance operations have been correctly followed.
- Use the auxiliary equipment and, in any case, any other machinery or tool (electrical or pneumatic) only after you've fully understood the indications reported in the relative Use and Maintenance Manuals, or after having undergone specific and formal training.
- Do not use, for any whatsoever reason, gasoline, solvents, or flammable fluids to clean the details/parts, but use commercial and certified detergents instead that are not flammable or toxic.
- Do not perform changes, transformations, or applications on the PARTLY COMPLETED MACHINERY which could compromise safety, without first having obtained written authorization by the Producer.

3.4. Signs concerning safety

The sign labels indicated in Chart 3 below are present on the PARTLY COMPLETED MACHINERY .

Chart 3 – Description of the sign labels present on the PARTLY COMPLETED MACHINERY

	LABEL	DESCRIPTION
A		Indicates that it is prohibited to remove the safety devices and protections installed; it is usually also accompanied by an explanatory writing: DO NOT REMOVE THE PROTECTIONS.

B		<p>Indicates that it is prohibited to perform any whatsoever intervention (including lubrication and cleaning) in proximity of the parts in movement; it is usually accompanied by an explanatory writing: DO NOT REPAIR OR ADJUST WHILE IN MOVEMENT.</p>
C		<p>Warns about the danger due to the presence of mobile parts in correspondence of the area of the machine where it is positioned.</p>
D		<p>Warns about the danger due to the presence of hot surfaces in correspondence of the area of the machine where it is positioned.</p>
E		<p>Warns about the danger due to the presence of elements under voltage in correspondence of the area of the machine where it is positioned.</p>
F		<p>Warns about the obligation to read the manual / assembly instructions</p>
G		<p>Be careful for sharp parts and when cleaning the condenser</p>

3.5 Proper and improper use of the partly completed machinery

The PARTLY COMPLETED MACHINERY has been engineered and constructed **exclusively** for the sole industrial and commercial refrigeration in stable premises.

Every PARTLY COMPLETED MACHINERY is capable of using the refrigerant gas specifically required and indicated on the label applied on it.

The PARTLY COMPLETED MACHINERY has been engineered and constructed to operate in environments in which **an explosive atmosphere is not present**.

The SEMI-MACHINE must adequately protected against atmospheric agents.

It is a sound precautionary norm to place powder fire extinguishers close to the PARTLY COMPLETED MACHINERY. In order to prevent the occurrence of a fire outbreak, it is necessary to keep the PARTLY COMPLETED MACHINERY clean of pieces of plastic, oils, solvents, paper, and rags.

The use of the PARTLY COMPLETED MACHINERY for different operations or the use of a refrigerant gas different from the one indicated above could cause damages to persons or to the SEMI-MACHINE and are therefore considered **improper uses** for the which the Producer does not deem itself responsible.



WARNING: *in case a different use is intended, it is essential to first consult the Technical Department of the Producer.*

3.6. General warnings and behavioural norms

In order to avoid any condition of risk to persons or of damages to the PARTLY COMPLETED MACHINERY, we recommend that you scrupulously follow the general warnings and behavioral norms reported herein.

**DANGER:**

the Producer rejects any responsibility for potential damages to things and/or persons deriving from improper interventions performed by unqualified, untrained, or unauthorized personnel.

- The operators appointed to manage the PARTLY COMPLETED MACHINERY must be appropriately instructed to make the best use of it and without risks, and must operate in comfortable environment which can guarantee the best conditions of safety and hygiene possible.

**DANGER:**

prevent that the PARTLY COMPLETED MACHINERY be used by unauthorized personnel or by uninstructed personnel without due surveillance: in fact, before starting to work, each operator must be perfectly knowledgeable of the characteristics of the PARTLY COMPLETED MACHINERY ; and must, furthermore, have FULLY read the present instructions.

- Before starting to use the PARTLY COMPLETED MACHINERY, make sure that any condition dangerous to safety has been duly eliminated and that no operators are present in the dangerous areas in proximity of the partly completed machinery.
- Before starting to use the PARTLY COMPLETED MACHINERY , make sure that all the guards or other protections are in their proper place and that all the safety devices are present and efficient.
- After having removed the packaging, make sure the machine is intact and undamaged in all its parts; if it isn't, contact the retailer.
- Carefully read the labels on the PARTLY COMPLETED MACHINERY, do not cover them for any reason, and replace them immediately in the case they get damaged.
- Do not lay liquid containers on the PARTLY COMPLETED MACHINERY.
- Consult the present instructions concerning the safety prescriptions in force and the specific IPDs to wear for personal safety; in particular, in any case, the personnel appointed to operate the PARTLY COMPLETED MACHINERY must wear suitable clothing, avoiding or paying the necessary attention to:
 - loose, flapping clothing,
 - large sleeves,
 - draping ties or scarves,
 - necklaces, bracelets, and rings.
- The personnel appointed to the maintenance of the PARTLY COMPLETED MACHINERY must be knowledgeable of all the procedures reported in *Chapter 5 – Maintenance and Demolition* and have the adequate technical preparation to be able to correctly interpret the instructions and the diagrams attached to the present instructions, and to be able to intervene on the PARTLY COMPLETED MACHINERY .
- The area where the maintenance operations are performed must always be kept clean, dry, and with the suitable equipment available and efficient.
- In case it were necessary to perform interventions in proximity of electrical components, always operate with dry hands and use dielectric gloves (operating on the electrical components with wet hands can lead to an almost certain danger of electrical shock).

**DANGER:**

it is necessary to make sure that, before starting any type of intervention on the PARTLY COMPLETED MACHINERY or in correspondence of its components or accessory equipment, the power supply is disconnected; if this isn't possible, it is necessary to adopt measures which allow, in any case, to safely operate in correspondence of the PARTLY COMPLETED MACHINERY .

**DANGER:**

tampering or the unauthorized replacement of one or more parts of the PARTLY COMPLETED MACHINERY and the use of accessories, tools, and consumption materials different from those indicated by the Producer can cause danger of injury.

**DANGER:**


Refrigerating gas leaks caused by pressure relief valve intervention may cause damages to things and / or people

**ATTENTION:**

all the materials with an environmental impact which must be eliminated after interventions or processing operations on the PARTLY COMPLETED MACHINERY must be disposed of in accordance to the norms in force. If necessary, entrust their disposal to specialized companies.

3.7. Technical data and characteristics of the partly completed machinery

3.7.1. Identification Plate

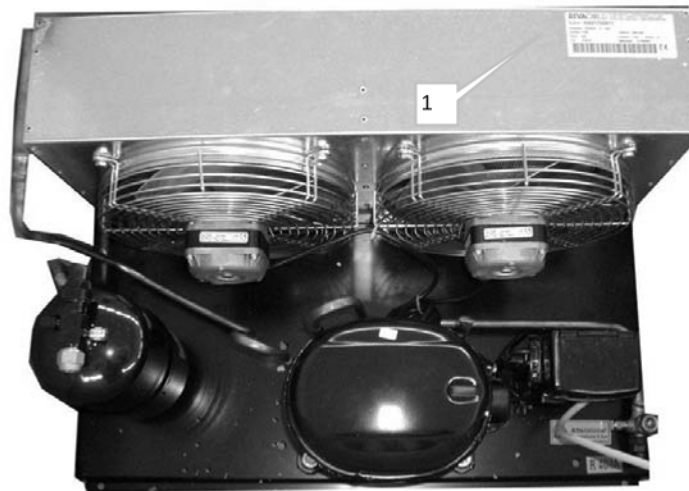
To identify the PARTLY COMPLETED MACHINERY , a specific CE identification plate has been applied on it (for example,  in figure 1); the identification data reported on this plate must be signaled to the offices of the Producer whenever requesting an intervention or whenever ordering spare parts. More specifically, the following data is reported on the identification plate:

- code,
- serial number
- ampere absorption (A),
- Watt absorption (W),
- refrigerant type,
- power supply voltage (Volt/Ph/Hz),
- maximum operating pressure PS HP (high pressure side) – PS LP (low pressure side),
- maximum operating temperature TS HP (high pressure side) – TS LP (low pressure side),
- overall category in accordance to directive 97/23CE (PED).

Registration Identification

- figure 1 and 2 = last two digits of the year of construction,
- figure 3 and 4 = week of year in which the semi- machine has been produced,
- figures 5, 6 , 7 and 8 = sequential number

Figure 1 – Identification Plate.



3.8 Technical Data and Overall Dimensions

The technical characteristics of the PARTLY COMPLETED MACHINERY can be retrieved in *Chapter 8 – Attachments* of the present instructions.

4. Transportation and Installation

4.1. General details

The installation of the PARTLY COMPLETED MACHINERY is performed directly by **qualified personnel**. Before proceeding to incorporate the PARTLY COMPLETED MACHINERY onto the end-machine, it is necessary, however, to arrange the power supplies and utilities necessary for the system to function correctly, following the indications reported in the Present Chapter and, if necessary, preemptively consulting the Technical Department of the Producer.



ATTENTION: *This product as sold complies with the 97/23CE (PED) standard and is marked with the relevant category. After purchase it is the responsibility of the owner to ensure that this equipment is regularly maintained continue its compliance up to the stage when it is finally decommissioned according to the relevant national law.*



DANGER: *the Producer rejects any responsibility for potential damages to things and/or persons deriving from improper interventions performed by unqualified, untrained, or unauthorized personnel.*

4.1.1. Power supplies and Utilities

The power supplies and utilities (responsibility of the Purchaser) necessary for the PARTLY COMPLETED MACHINERY to function exclusively consist of the supply of electrical energy.

Except if indicated differently, the following are the **responsibility of the Purchaser**:

- the arrangement of the transportation means necessary to transport the PARTLY COMPLETED MACHINERY to the premises where it will be assembled and installed;
- the arrangement of the tools necessary for the assembly and installation;
- the arrangement of the auxiliary means and consumption materials (for example, non-flammables and non-corrosives, materials and instruments necessary for cleaning operations, and covering cloths).

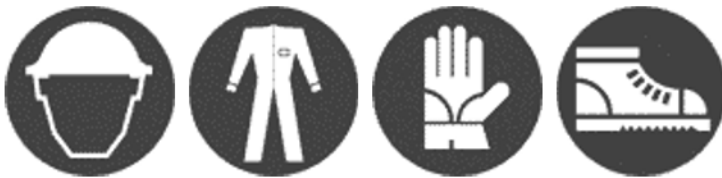
4.2. Transportation and displacement

The indications contained in this paragraph must be followed during the operations of transportation and displacement of the PARTLY COMPLETED MACHINERY , which can occur during the procedure of installation of the PARTLY COMPLETED MACHINERY onto the end-machine.



DANGER: *the Producer rejects any responsibility for potential damages to things and/or persons deriving from improper interventions performed by unqualified, untrained, or unauthorized personnel.*

To conduct the task in question, the following Individual Protection Devices are necessary:



During the transportation and displacement of the PARTLY COMPLETED MACHINERY, it is necessary to comply with the following warnings:

- check that the lifting equipment is suitable for the weight and dimensions of the PARTLY COMPLETED MACHINERY.
- Do not bump the structure or the protections of PARTLY COMPLETED MACHINERY with equipment or anything else.

4.2.1. Lifting



DANGER: *the lifting operation must be performed under the direct supervision of a qualified mechanical maintenance worker.*

The lifting operations for displacement and the following positioning of the PARTLY COMPLETED MACHINERY can be performed with the use of any adequate means which ensures its efficient and safe lifting (for example, a tackle with a system to harness the PARTLY COMPLETED MACHINERY)

To correctly perform the lifting operations, follow the warnings reported below.

- Never use two lifting means at the same time.
- Never station below hanging loads.
- If steel ropes are used, always apply the end eye to the lifting hook.
- If steel ropes are used, pay attention not to create acute folds, in other words, with a curvature radius inferior to the one of the eyelets of the rope ends.
- Use ropes with an adequate length, so that the angle between the ropes and the horizon is always greater than 45°.



ATTENTION: *during all these operations, follow the precautions necessary to avoid collisions or overturns, displacing the PARTLY COMPLETED MACHINERY in such way that the conditions of balance are not lost.*



DANGER: *make sure there is no unauthorized personnel in proximity of the area where the lifting, displacement, and unloading operations are taking place, and keep at a safety distance.*

4.3 Installation



DANGER: *the Producer rejects any responsibility for potential damages to things and/or persons deriving from improper interventions performed by unqualified, untrained, or unauthorized personnel.*

To perform the task being examined, the following Individual Protection Devices are necessary:



MASTERING COLD

4.3.1. Installation of an air condenser

Before proceeding with the installation, it is necessary to elaborate a project to lodge the refrigerant system, which must define: all the components of the refrigerant system (e.g., condensing unit, evaporator, thermostatic valve of the electrical panel, dimensions of the piping, any potential safety components, etc.);

positioning of the system;

pathway of the piping.

The condensing unit must be appropriately fastened onto the resting plane. For this purpose, the specific fastening holes are used (for example, **1** in Figure 2)

Figure 2



For a correct installation, please consider the following precautions:

- ▶ the machine must not be installed in sealed environments where a proper recycling of air is not ensured.
- ▶ Leave sufficient space around the machine to perform the maintenance operations in safe conditions.

For the compressors that are installed with spring anti-vibrants, it is necessary to loosen the screws and remove the washer (please see Figure 3).

Figure 3

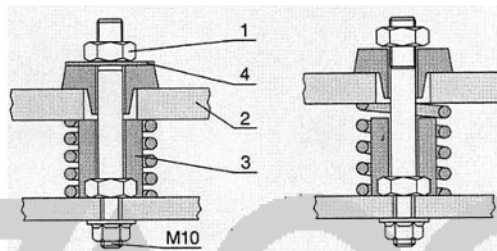
PROCEDURE FOR COMPRESSORS UNBLOCKING

TRANSPORT SAFETY DEVICES FOR UNIT CONDENSER

Type 2

During transport

During operation



Before transportation: tighten the self-blocking nut 1 to transport the unit, until the base 2 of the compressor rests on the guide spacer 3.

After assembly: loosen the nut 1 until it is possible to remove the washer with slit 4. Next, remove the washer with slit 4.

4.3.2. Installation of the air condenser

Before proceeding with the installation, it is necessary to elaborate a project to lodge the refrigerant system, which must define:

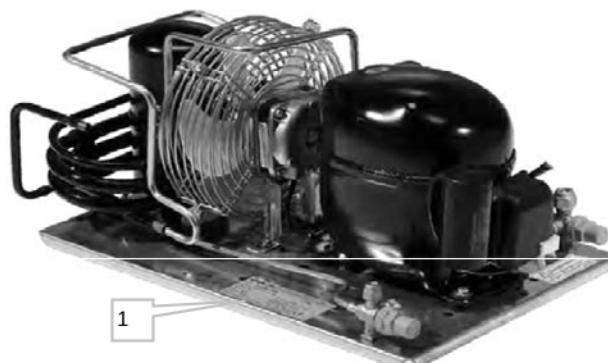
- ▶ all the components of the refrigerant system (e.g., condensing unit, evaporator, thermostatic valve of the electrical panel, dimensions of the piping, any potential safety components, etc.);
- ▶ positioning of the system;
- ▶ pathway of the piping.



ATTENTION: the PARTLY COMPLETED MACHINERY is not arranged to function with seawater.

The condensing unit must be appropriately fastened onto the resting plane. For this purpose, the specific fastening holes are used (for example,  in Figura 4)

Figure 4



To perform a correct installation, please consider the following precautions:

- it is preferable that upstream of the condenser on the water side, a valve be installed to regulate the condensation pressure.
- Connect the condenser outlet to piping for the discharge of water.
- Leave sufficient space around the machine to perform the maintenance operations in safe conditions.

4.3.3. Electrical connection

The electrical power supply (also in terms of voltage and frequency) provided by the Purchaser must be sufficient to correctly supply power to the machine. More specifically, it is necessary to implement the following indications:

- the supply cable must be properly stretched out (avoid roll ups or overlaps), in a position not exposed to potential collisions or tampering by minors, must not be placed in proximity of liquids, water, or sources of heat, and must not be damaged (if it were to get damaged, have it replaced by qualified personnel).
- Arrange a differential magneto-thermal switch between the supply line and the machine, adequately sized for the application and in compliance to the laws in force in the country where the semi-machine is installed, and make sure that the line voltage corresponds to the voltage indicated on the label (see label applied on the machine); allowed tolerance $\pm 10\%$ of the nominal voltage.



ATTENTION: *the differential magneto-thermal switch must be placed in the immediate vicinity of the machine, so that it is easily visible and accessible by the technician in case of maintenance.*

- It is necessary that the diameter of the supply cable be adequate to the power absorbed by the machine.



ATTENTION: *It is obligatory, in terms of law, to connect the machine to an efficient grounding system. The Producer rejects any responsibility for the failure to comply with this provision; and further rejects any responsibility were the electrical system to which the machine is connected to be proven not to be built in accordance to the norms in force.*

4.3.4. Refrigerant Connection

To perform the refrigerant connection, provide the piping for the liquid and suction lines, in accordance to the diameters of the attachments present on the machine.

The diameters recommended are valid for lengths of up to 10m maximum. For greater lengths, size the diameters so that the correct speed of the gas is ensured, or contact the Technical Assistance of the Producer.

The piping must be fastened to the wall close to the curves, the welding, and every 1,5 – 2m in linear segments.

Insulation of the suction line

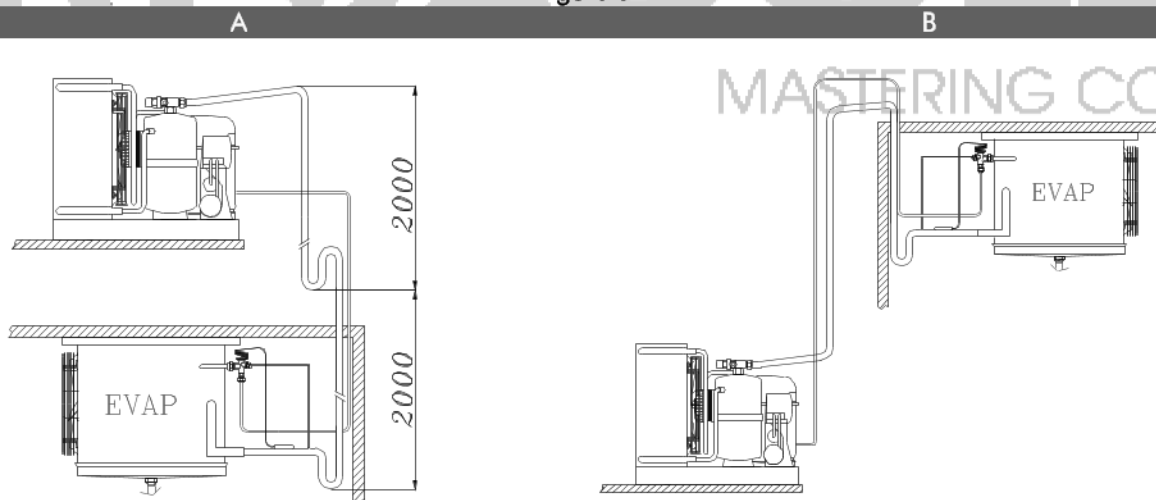
Insulate the suction pipe with an anti-condensation pipe. If the temperature of evaporation is lower than -10°C , the suction lines must be insulated with an anti-condensation pipe having a thickness of at least 13 mm, in order to limit overheating.

Oil return

All the systems must be engineered to ensure, in any case, the oil return to the compressor.

If the condensing unit is positioned above the evaporator (Figure 5 a), it is important to provide syphons on the suction line every 2 m of height difference, to ensure oil return to the compressor. In any case, when there are horizontal segments, it is important that the suction piping have a slope of at least 3% toward the compressor.

Figure 5



Adding oil

With the majority of installations in which the ducts do not exceed 10 meters, it is not necessary to add oil. In cases in which the ducts are over-sized with respect to standard conditions or in case they exceed 10 meters, a small quantity of oil must be added.

Vacuum

The correct performance of the vacuum is of vital importance to the proper functionality of the refrigerating machine and the endurance of the compressor, which must ensure that the content of air and especially humidity remain below the allowed values. The introduction of new gases has required the use of new oils of polyester type, having characteristics of high hygroscopicity, which require greater attention during the performance of the vacuum; it is advisable to perform the vacuum on both sides of the circuit. In any case, the goal to be reached is the obtainment of a pressure not greater than 5 Pa.



ATTENTION: *to avoid irreparable damages to the compressor, do not start it up in empty conditions or without the gas load. During the empty and loading phases, remember to supply voltage to the coil of the solenoid valve of the liquid line.*

Loading the refrigerant

After the vacuum operation has been performed, the system must be loaded with the type of refrigerant indicated on the label or alternatively other allowed types. To perform the loading operation correctly, we recommend that, after the vacuum has been performed, you pump part of the refrigerant into the compressor to “break the vacuum;” next, start up the compressor in order to aspirate the remaining part of the load.

In order to correctly quantify the load of gas, use manometers connected to the pressure intakes already arranged; the pressures must be compatible with the working conditions of the machine.



WARNING: *If the PARTLY COMPLETED MACHINERY is not equipped with a safety valve, the load of refrigerant gas must be lower than 10 kg.*



WARNING: *the mixtures of refrigerant gas must be loaded in the system in their liquid state.*



DANGER: *For the maneuvers to load, recover, and control the refrigerant, use protection gloves against low temperatures.*

Checking for refrigerant losses

A system can function regularly through time for the entire life-cycle of the compressor, only if all the prescriptions relative to the correct installation are followed, among which the absence of refrigerant losses. It has been estimated that losses of refrigerant equal to 10% of the total load of the system, over 15 years of functioning of the compressor, still ensure the proper functionality of the refrigerant system. With the new gas types (R134a; R404A and mixtures), the possibility of refrigerant losses through the welding and connections not performed correctly increase the reduced molecular dimension of the gas; for this reason, it is important that check-ups be performed for losses through the welding with methods and equipment suitable for the type of gas used.

Resistance of the housing

In case the compressor functions in environments with a temperature lower than + 5°C, it is obligatory to use a resistance of the housing (optional feature) to avoid the accumulation of liquid in the lower area of the compressor during stoppage periods; it is furthermore necessary to reduce the condenser, for example, by reducing the air capacity (e.g., through a speed adjuster – optional feature).

Work cycles

The systems must be sized so as not to exceed 5 on /off cycles per hour.

The intervention of the Thermal/Ammetric protection turns off the compressor, which will be reactivated after the time necessary to restore the contacts of the protector has elapsed.

Functioning times

The systems are sized for maximum 80% of the time of standard functioning.

100% functionality of the compressor can only occur in stressful conditions of load and temperature of the environment, outside the functioning limits allowed.

Pressure meters

In machines of **category 0** no safety pressure meter is assembled.

Machines of **category ≥ 1** are equipped with an HBP safety pressure meter. If the latter pressure meter is adjustable and the semi-machine does not have a safety valve, the pressure meter will have to be calibrated to a value of ≤ 90% Ps.

The LBP pressure meters are calibrated in accordance with the gas used and the application of the compressor. We recommend that you use the values reported in the following chart:

	Gas	°C = bar	Set	Differential
LBP Application TN	R404A / R507A	-25°C = 1.5 bar	3 bar	1.5 bar
	R407C	-25°C = 0.7 bar	2.2 bar	1.5 bar
	R134a	-25°C = 0 bar	1.5 bar	1.5 bar
Pump Down Application TN	R404A / R507A	-20°C = 2 bar	3.5 bar	1.5 bar
	R407C	-20°C = 1.1 bar	2.6 bar	1.5 bar
	R134a	-20°C = 0.3 bar	1.8 bar	1.5 bar
LBP Application BT	R404A / R507A	-45 °C = 0 bar	3 bar	3 bar
Pump Down Application BT	R404A / R507A	-35°C = 0.6 bar	2.1 bar	1.5 bar

Pump-down Pressure Meter: adjustment must be performed bearing in mind that the compressor must not be activated at close intervals (at least 5 minutes). In the cases, we recommend the use of a timer to delay start-up of the compressor.

The risk category of every machine is reported on the identification plate.

Safety valves on the liquid receiver

The machines of **category 0**, are not equipped with a venting device.

The machines of **category ≥ 1**, are equipped with a safety valve. If the gas load is lower than 10 kg and the category is lower than 4, the safety valve can be omitted.

The risk category of every machine is reported on the identification plate.

4.4. Storage

In case it is necessary to store the PARTLY COMPLETED MACHINERY for a certain period, we recommend to protect it adequately and to store it in a suitable environment, having the following characteristics:

- external surfaces resistant to atmospheric agents;
- protected against access by unauthorized persons;
- with the following environmental conditions:
 - good ventilation;
 - temperature of the environment included in the range between -20 °C and +50 °C;
 - relative humidity of the compressed air between 30% and 80%;
 - if possible, in a dry and not dusty atmosphere.



ATTENTION: *do not remove the packaging possibly present for some components of the SEMI-MACHINE, or adopt the appropriate precautions to protect the parts exposed.*

4.5. Uninstallation

In case it is necessary to uninstall the PARTLY COMPLETED MACHINERY, proceed by following the inverse order of the installation sequence reported in Paragraph 4.3 - Installation.



DANGER: *the Producer rejects any responsibility for potential damages to things and/or persons deriving from improper interventions performed by unqualified, untrained, or unauthorized personnel.*

To perform the task being examined, the following Individual Protection Devices are necessary:



5. Maintenance and Demolition

5.1. General Details concerning Maintenance

To ensure the maximum reliability of the PARTLY COMPLETED MACHINERY and to avoid conditions of danger, scrupulously adhere to the instructions and warnings reported in the following pages.



DANGER: *due to safety reasons, all the maintenance operations reported in the present chapter must be performed by qualified and specifically trained technicians only. The appointed technicians must, furthermore, have all the instruments and IPDs necessary to operate safely.*



ATTENTION: *in order to always ensure the full efficiency and safety of the PARTLY COMPLETED MACHINERY to the operators, and to prevent problems tied to the wear-out of the safety measures or to machine stoppages which may prove costly, it is necessary to implement an efficient preemptive maintenance, planning interventions at programmed intervals, with the goal of renovating or replacing the parts subject to standard wear-out, and to check the general conditions of the mechanical and electrical components which make up the PARTLY COMPLETED MACHINERY (and its auxiliary equipment), thus supplying the indications on any extraordinary operations which may be necessary.*

Before performing any maintenance or cleaning intervention reported in the present paragraph, it is necessary to disconnect the PARTLY COMPLETED MACHINERY from its electrical power supply.



DANGER: *the Producer rejects any responsibility for potential damages to things and/or persons deriving from improper interventions performed by unqualified, untrained, improperly equipped, or unauthorized personnel.*

5.2. Indications concerning Safety

To correctly perform the maintenance and cleaning interventions, it is essential to bear in mind the indications reported below.

- During all interventions, it is necessary to provide notice of their performance on the PARTLY COMPLETED MACHINERY by way of suitable signs (these signs must be positioned so as to prevent any undesired intervention on the PARTLY COMPLETED MACHINERY).
- During the interventions, only authorized personnel can access the work area.



ATTENTION: *the maintenance and cleaning interventions must be performed by expert personnel which has read and fully understood all the indication reported in the present assembly instructions.*



DANGER: *only dismantle the parts of the PARTLY COMPLETED MACHINERY actually necessary to perform the specific maintenance operation.*

- All the materials with an environmental impact which must be eliminated after a maintenance intervention must be disposed of in accordance to the norms in force.



ATTENTION: *for the disposal of materials with a high environmental impact, if necessary, contact specialized companies.*

In any case, to perform all the maintenance and cleaning interventions reported below in correspondence of the PARTLY COMPLETED MACHINERY, the following Individual Protection Devices are necessary:



5.3. Checking the availability of Materials

At least **60 days** in advance on the date scheduled for the maintenance intervention, perform a detailed examination of the materials necessary:

1. check if the material is available in stock,
2. if need be, request the missing materials to the Technical Department of the Producer, at least **30 days** in advance.

5.4. Maintenance and cleaning



DANGER: *the Producer rejects any responsibility for potential damages to things and/or persons deriving from an incorrect or incomplete maintenance.*



DANGER: *before performing all the necessary ordinary maintenance interventions, make sure the PARTLY COMPLETED MACHINERY has been disconnected from its electrical power supply; furthermore, wait for the hot surfaces to cool down.*



ATTENTION: *in case of replacement of components of the SEMI-MACHINE, the latter must be replaced with identical and original components.*



ATTENTION: *any braze welding interventions on products of risk category PED ≥ 1 must be performed by qualified personnel.*

5.4.1. Interventions and their relative frequency

The most significant and important operations relative to ordinary maintenance can be thus summarized:

- Periodically clean (**once a month**) the condenser, removing any dust or grease. If the environment in which the unit is installed is very dusty, it may be necessary to clean it more often.
- Clean, **every four months**, the contacts, fixed and mobile, of all the contactors, replacing them if they display signs of wear-out.
- Check, **every four months**, all the electrical terminals, both inside the panels and in the terminals of every electrical utility; carefully check that fuse elements are fastened.
- Visually check, **every four months**, the entire refrigerating circuit, also internally, to search for refrigerant losses, which is also hinted by traces of lubricant oil. Timely intervene and further inspect in depth in case of doubts (if need be, contact the Technical Assistance of the Producer).
- Checking for leakages of refrigerant gas:
 - for systems with **3 kg \leq refrigerant load $<$ 30 kg** the inspection must be performed **annually**;
 - for systems with **30 kg \leq refrigerant load $<$ 300 kg** the inspection must be performed **semestrally**;
 - for systems with a **refrigerant load \geq 300 kg**, the inspection must be performed **quarterly**;
 if a loss is detected, it is necessary to intervene immediately and to perform an inspection within 30 days to make sure the repair work is efficient.
- Check, **every four months**, also the regulator of the flow of refrigerant on the LED present on the liquid line.
- Check, **every four months**, the oil level on the specific LED (where present) placed on the housing of the compressor. Replace the lubricant oil after approximately 100 hours of operations from the time in which the compressor was first started up, in order to remove the impurities that have remained in the system and collected in the housing by the flow of the refrigerant and lubricant. Replace the lubricant load **every 10000 hours** of operations to ensure the original viscosity characteristics.
- Carefully examine, **every four months**, through the glass of the LED that indicates the passage of the liquid line, the color of the element sensitive to humidity. The green color indicates dry conditions, the yellow color indicates humidity. In case humidity is indicated, proceed to immediately stop the machine and to replace the filter on the liquid; substitute the load of refrigerant and oil. Repeat the inspection after 3 days of operations.
- Check, **every four months**, the noise level of the compressor. This operation must be performed with caution because it must be performed while the system is on; check for the presence of ticking sounds or vibrations, which can be a symptom of breakage or excessive mechanical play between parts in movement.



ATTENTION: at the end of every maintenance and cleaning intervention, reposition all the fixed guards.

5.4.2. Interventions on the safety valve (where supplied)

We recommend that you replace the safety valve in case it has intervened; in fact, during the unloading, the accumulation on the gasket of the valve of residues of processing operations of the components and the piping can make the seal defective when it is closed again.



DANGER: before replacing the valve, check that the system, in the area in which operations are being performed, is not under pressure or with a high temperature.



DANGER: do not dismantle the safety valve without having first recovered the gas present inside the liquid receiver.



ATTENTION: no maintenance is required on the safety valves. The removal of the cap or tampering with the seal are considered unauthorized changes of the calibration; the latter entail the cancellation of the warranty provided by the constructor. Inspection of the safety valves is reserved to the competent institutions and is governed by the specific norms of law in force in the country where the PARTLY COMPLETED MACHINERY is installed.

We recommend that you perform an inspection of the safety valve **every three years**.

5.4.3. Cleaning in the case of water condensers

In the case of water condensers, cleaning can only be performed on condensers with a pipe bundle that can be inspected. In case the efficiency of a condenser that cannot be inspected is reduced, the condenser must be replaced.

Tower water must be treated. Well water, network water, or river water does not usually require treatment; in this case we always recommend the installation of a filter upstream of the condenser.

It is the responsibility of the user to establish the quality of the water used and to make sure that the latter is compatible with the materials used in the condenser. The quality of the water, for the reasons indicated above, can considerably affect the service and the endurance of the exchanger. A first step in the water treatment program is the chemical analysis of the liquid, operation which must be performed by qualified personnel belonging to specialized companies. Some of the parameters which must be detected are:

- The hardness of the water, to determine the necessity of a water softening treatment.
- A pH analysis, to determine if a chemical inspection is necessary where excessively acidic or excessively basic conditions are present: the pH value must be included in the range between 7.5 – 9.
- An analysis of the sediments, to determine if filters are necessary, for the purpose of preventing the formation and the accumulation of residues and the erosion of the pipe. We recommend that you always install a filter upstream of the condenser with a mesh of maximum 1.5 mm.

The methods used to clean the pipes inside can be of the following types:

- Mechanical, performed by way of the internal swabbing of the pipes: this procedure can be performed only on units with traditional, smooth type pipes.
- Chemical, performed by making commercial solutions re-circulate inside the pipes, solutions which must be chosen based on the type of organic or inorganic dirt. This method can be applied on all the types of pipes, both smooth and internally striped, and must be performed by qualified personnel only.

The corrosive action primarily concerns the carbon steel, while it is less widespread (minor effects) on copper-based materials and its alloys. These evaluations must always be performed by personnel of companies specialized in water treatment. For cleaning operations, mechanical or chemical method types can be used, with commercial products that have a double action, both the removal of the scaling sliver and the prevention of corrosive phenomena. With tower water, as reported above, the tendency to incrustation is higher: to reduce this phenomenon, several types of water softening treatments are available. As far as waters with a high organic content are concerned (algae, bacteria), only chemical method types can be practiced.

5.4.4 Oil for the compressors

In Chrt 4 a summary of the oils that can be used for the compressors is provided.

Chart 4 – Oil for compressors.

PRODUCER	REFRIGERANT	MODEL	VISCOSITY AT 40 °C (CST)	LUBRICANT OIL (2 ALTERNATIVES)
FRASCOLD	R134a-R507A-R22-R404A-R407C	A/B/C/D/F/Q/S	32	ICI EMKARATE RL32-H Mobile EAL Arctic 32
		V/Z/W	68	ICI EMKARATE RL68-H Mobile EAL Arctic 68
DORIN	HFC	H5/H6/H7 version CC	46	Mobile EAL Arctic 46 ICI Emkarate RL 46 H

PRODUCER	REFRIGERANT	MODEL	VISCOSITY AT 40 °C (cSt)	LUBRICANT OIL (2 ALTERNATIVES)
	HFC	H1/H2/H32/H34/H4 all H5/H6/H7 version CS	32	Mobile EAL Arctic 32 ICI Emkarate RL 32 H
COPELAND	R134a-R507-R22- R404A-R407A- R407C-R410A	ZF/ZS/ZB/ZR/ZP/2D/3D/4D/6D/8D/4S/6S/8S	32	Mobil EAL Arctic 22 CC Emkarate RL 32-3MAF
BITZER	R134a-R507-R22- R404A-R407A- R407B-R407C	Piston Compressors	32	BSE 32 Uniquema RL 32H
	R134a – R22 – R410A	For special applications (high condensation temperature)	55	BSE 55 Uniquema RL 68S
DANFOSS	R134a	SC/FR	22	Emkarate RL32HB
	R404A	SC/FR	32	Emkarate RL32H
EMBRACO	R134a – R404A – R407C – R290	All	22	Emkarate RL22HB POE
U.H.	R134a – R404A – R407C	All (except LBP R404A)	32	8685030 POE
	R404A	LBP	32	8685015 POE
MANEUROP	R404A-R507- R407C-R134a	MTZ	32	160PZ
	R404A-R507	LTZ/NTZ	32	160Z
	R404A	MPZ	32	160MPZ

5.5 Dismantling and Demolition

To perform the dismantling and demolition operations, the following Individual Protection Devices are necessary:



5.5.1 Dismantling

In case it becomes necessary to dismantle the PARTLY COMPLETED MACHINERY, follow the procedure indicated below.

1. Insulate the PARTLY COMPLETED MACHINERY from the electrical power supply.
2. Referring to Paragraph 4.5 - Uninstallation of Chapter 4 – Transportation and Installation, proceed to uninstall the PARTLY COMPLETED MACHINERY; furthermore, contact the Technical Department of the Producer to obtain the necessary assistance during the intervention.
3. To proceed to the displacement of the PARTLY COMPLETED MACHINERY, operate in accordance to the instructions reported in Paragraph 4.2 – Transportation and Displacement of Chapter 4 – Transportation and Installation.
4. Arrange the components appropriately in function of the fact that they must be transported to another site (please refer to Paragraph 4.2 – Transportation and Displacement of Chapter 4 – Transportation and Installation), that they must be stocked (please refer to Paragraph 4.4 - Storage of Chapter 4 – Transportation and Installation), or that they must be demolished (please refer to Paragraph 5.5.2 – Demolition and disposal).



DANGER:

the Producer rejects any responsibility for potential damages to things and/or persons deriving from improper interventions performed by unqualified, untrained, improperly equipped, or unauthorized personnel.

5.5.2 Demolition and Disposal

When the PARTLY COMPLETED MACHINERY has ended its life-cycle, before proceeding to its final disposal, it is necessary to perform a series of operations aimed at minimizing the environmental impact tied to the disposal of the components of the PARTLY COMPLETED MACHINERY, as required by the norms in force concerning the disposal of waste products.

The latter operations are:

1. Separate and stock the parts with an environmental impact, or rather:
 - a. separate the various parts that could cause pollution;
 - b. perform a selection of the materials with the purpose of favoring their recycling, assigning them to separate waste collection (in particular, select the plastic and rubber elements).
2. The gas contained inside the system **must not** be dispersed in the environment. The compressor oil is subjected to separate waste collection; for this reason, we recommend that you dispose of the unit only at specialized separate waste collection centers, and not treating it as standard iron scrap, and that you follow the normative provisions in force.
3. Dispose of the casings, that is, once the removal and storage of the pollutant elements has been completed, contact companies specialized in the disposal of such casings.

6. Optional features

On request of the client, it is possible to supply the following optional features on the PARTLY COMPLETED MACHINERY.

HIGH PRESSURE METER (OPTIONAL ONLY FOR CATEGORY 0)

It interrupts the functioning of the machine in case that the pressure of the system is too high. Once it has intervened, the pressure meter is reset manually by pressing the specific reset button. In the automatic pressure meter, once the pressure has again fallen below the maximum pressure level, minus the value of the pressure of the differential, the reset is automatic.

LOW PRESSURE METER

It intervenes by stopping the machine, when the pressure of the suction circuit falls below the value at which it is calibrated, minus the value of the pressure of the differential, This occurs as a consequence of the a breakdown. Reset occurs at the calibration pressure.

OIL DIFFERENTIAL PRESSURE METER (WHERE APPLICABLE)

This device is present only on the units which carry a compressor equipped with an oil pump. Its purpose is to interrupt operations of the machine when the difference between the oil pressure and the low pressure of the refrigerating system is no longer within the calibration value (normally preset by the constructor). The oil pressure meter, which is located, just as the other pressure meters, next to the compressor, requires manual re-insertion through the specific reset button.

OIL SEPARATOR

When the distance between the condensing unit and the evaporator exceeds 10 m, we recommend the use of an oil separator which, by intercepting the oil dragged by the compressed gas and regularly returning it to the housing of the machine, concurs to ensure the efficient lubrication of the parts in movement of the compressor. Furthermore, by eliminating or reducing the oil layer on the exchange surfaces of the condenser and the evaporator, it keeps the coefficient of thermal transmission of the latter equipment high.

LIQUID SEPARATOR

It is located on the suction piping in proximity of the compressor and its function is to prevent accidental suction of liquid fluid by the compressor. It is assembled in a vertical position. In case that the installer has a liquid separator installed, it must be remembered that the latter must be protected both in the event of a fire outbreak or of over-pressurization, in compliance to Directive 97/23 CE. Calculation of the diameter of the venting valve must be performed in accordance to EN 13136. For the choice of the opening pressure of the safety valve, check the data reported on the label of the machine.

VALVE TO ADJUST THE SUCTION PRESSURE (KVL)

It keeps the suction pressure of the compressor within acceptable values when, at the beginning of a freezing cycle, high temperatures are present in the cell. It is positioned on the suction pipe close to the compressor.

FILTER (LIQUID LINE)

It is located on the liquid line immediately after the receiver, or after the condenser in units that do not have a liquid receiver.

LIQUID INDICATOR (LIQUID LINE)

It is installed downstream of the filter of the liquid line. The indicator must always be checked when the machine is operating; if you notice a consistent passage of large bubbles, this can mean a lack of gas within the system. Vice-versa, if the indicator is clear or you notice isolated passage of bubbles, this means that the quantity of gas is correct.

SOLENOID VALVE (LIQUID LINE)

It is located right after the filter of the liquid line. It is assembled for the purpose of interrupting the flow of liquid when the machine must stop because it has reached a set temperature or to defrost.

SOLENOID VALVE (HOT GAS LINE)

It is installed on the derivation of the outlet, positioned between the compressor and the condenser. The outlet of the valve must be connected to the inlet of the evaporator, immediately after the lamination part. It is necessary to defrost the evaporator, by using the hot gas of the compressor.

7. Search for Breakdowns

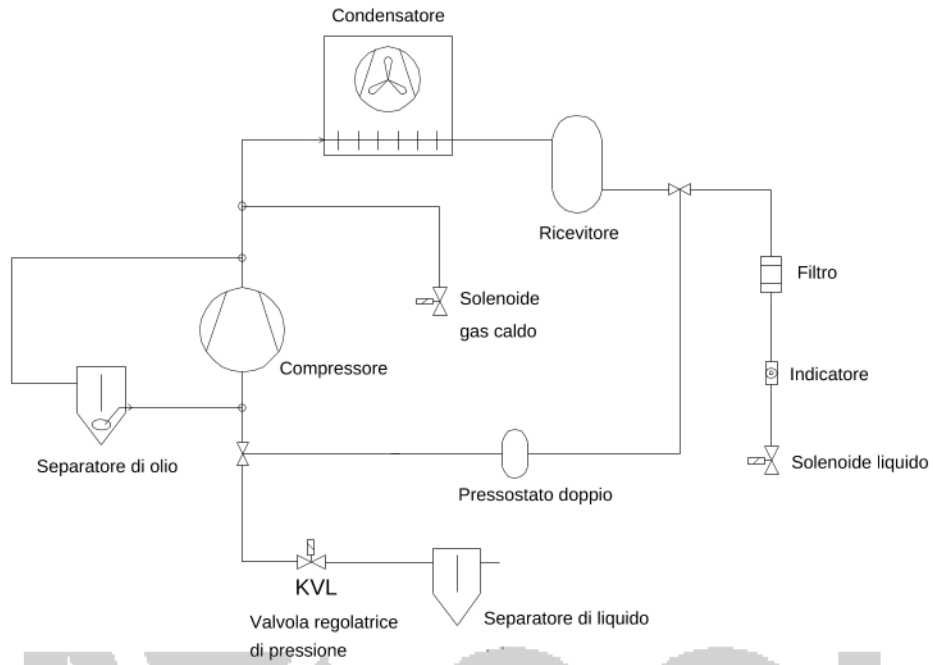
	POSSIBLE CAUSES	SOLUTIONS
A	<p><u>The compressor does not start and does not release a humming sound</u></p> <ol style="list-style-type: none"> Lack of voltage. Start-up relay with open contacts. Thermal cut-off intervenes. Loose electrical connections or incorrect electrical connections. 	<ol style="list-style-type: none"> Check the line or replace the relay. Re-check the electrical connections. Tighten or re-do the connections in accordance to the wiring diagram.
B	<p><u>The compressor does not start (releases humming sound) and the thermal cut-off intervenes</u></p> <ol style="list-style-type: none"> Incorrect electrical connections. Low voltage supply to the compressor. Defective start-up of the condenser. Relay does not close. Winding of the electrical motor interrupted or in short-circuit. 	<ol style="list-style-type: none"> Re-do the connections. Identify the cause and eliminate it . Identify the cause and replace the condenser. Identify the cause and replace the relay if necessary. Replace the compressor.
C	<p><u>The compressor starts but the relay does not open</u></p> <ol style="list-style-type: none"> Incorrect electrical connections. Low voltage supply to the compressor. Relay blocked in closed position. Excessive discharge pressure. Winding of the electrical motor interrupted or in short-circuit. 	<ol style="list-style-type: none"> Check the electrical circuit. Identify the cause and eliminate it. Identify the cause and eliminate it . Identify the cause and replace the relay if necessary. Replace the compressor.
D	<p><u>Intervention of the thermal cut-off</u></p> <ol style="list-style-type: none"> Low voltage supply to the compressor (imbalanced phases on tri-phase motors). 	<ol style="list-style-type: none"> Identify the cause and eliminate it.

	POSSIBLE CAUSES	SOLUTIONS
	2 Defective thermal cut-off. 3 Defective running condenser. 4 Excessive discharge pressure. 5 Suction pressure too high. 6 Compressor overheated, hot return gas. 7 Winding of the compressor motor in short-circuit.	2 Check its characteristics and replace it if necessary. 3 Identify the cause and eliminate it . 4 Check the ventilation and any possible restrictions or obstructions in the system circuit. 5 Check the sizing of the system. Replace the condensing unit with a more powerful one, if necessary. 6 Check the refrigerant load; repair the potential loss and add gas if necessary. <i>If the semi-machine does not have a safety valve, the load of refrigerant gas must be lower than 10 kg.</i> 7 Replace the compressor.
E	The compressor starts and circulates, with short-spanded function cycles 1 Thermal cut-off. 2 Thermostat. 3 Intervention of the high pressure meter, due to the insufficient cooling of the condenser. 4 Intervention of the high pressure meter, due to the excessive load of refrigerant gas. 5 Intervention of the low pressure meter, due to the scarce load of refrigerant gas. 6 Intervention of the low pressure meter, due to the restriction or clogging of the expansion valve.	1 See previous point (thermal cut-off intervention). 2 Small differential; correct adjustment . 3 Check that the motorized ventilator functions correctly or clean the condenser. 4 Reduce the refrigerant load. 5 Repair the loss and add refrigerant gas. <i>If the PARTLY COMPLETED MACHINERY does not have a safety valve, the load of refrigerant gas must be lower than 10 kg.</i> 6 Replace the expansion valve.
F	The compressor functions uninterruptedly or for long periods 1 Poor load of refrigerant gas. 2 Thermostat contacts blocked in closed position. 3 System insufficiently sized in function of the load. 4 Excessive load to cool or insufficient insulation. 5 Evaporator covered with ice. 6 Restriction in the system circuit. 7 Condenser clogged.	1 Repair the loss and add refrigerant gas. <i>If the PARTLY COMPLETED MACHINERY does not have a safety valve, the load of refrigerant gas must be lower than 10 kg.</i> 2 Replace the thermostat. 3 Replace the system with a more powerful one. 4 Reduce the load and improve insulation, if possible. 5 Defrost. 6 Identify the resistance and eliminate it . 7 Clean the condenser.
G	Running condenser damaged, interrupted, or in short-circuit 1 Incorrect running condenser.	1 Replace the condenser with the correct type.
H	Start-up relay defective or burnt out 1 Incorrect relay. 2 Relay assembled incorrectly . 3 Incorrect running condenser.	1 Replace with the correct relay. 2 Reassemble the relay in the correct position. 3 Replace the condenser with the correct type.
I	Compartment temperature too high 1 Thermostat regulated too high. 2 Expansion valve under-sized. 3 Evaporator under-sized. 4 Insufficient air circulation.	1 Regulate correctly. 2 Replace the expansion valve with a suitable one. 3 Replace it increasing the surface of the evaporator. 4 Improve air circulation.
L	Suction piping frosted 1 Expansion valve with excessive flow of gas or over-sized. 2 Expansion valve blocked in open position. 3 Evaporator ventilator does not work. 4 High gas load.	1 Regulate the valve or replace it with one correctly sized. 2 Clean the valve of foreign substances or replace it if necessary. 3 Identify the cause and eliminate it. 4 Reduce the load.

Chapter 8

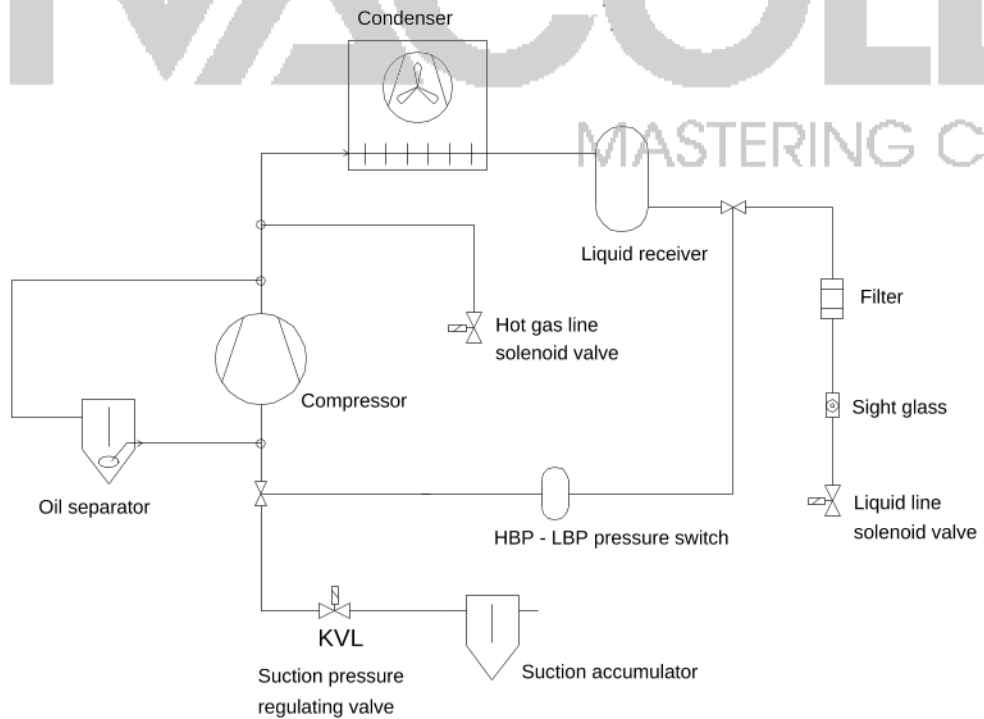
Alleged files

Refrigerator diagram



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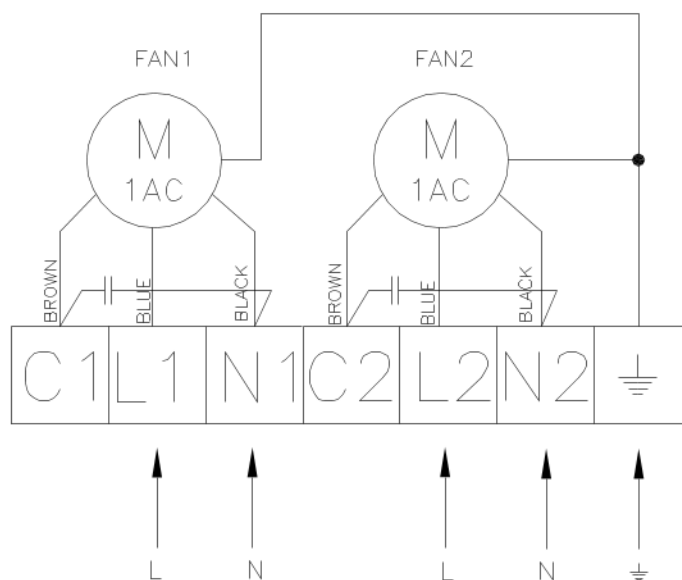
MASTERING COLD



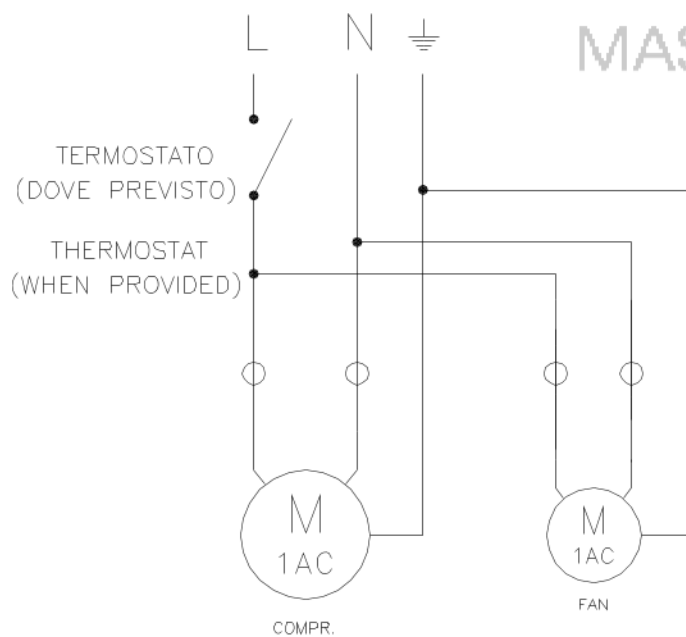
Electrical diagram

SCHEMA STANDARD VENTILATORI MONOFASE

SCHEME STANDARD SIGLE-PHASE FANS

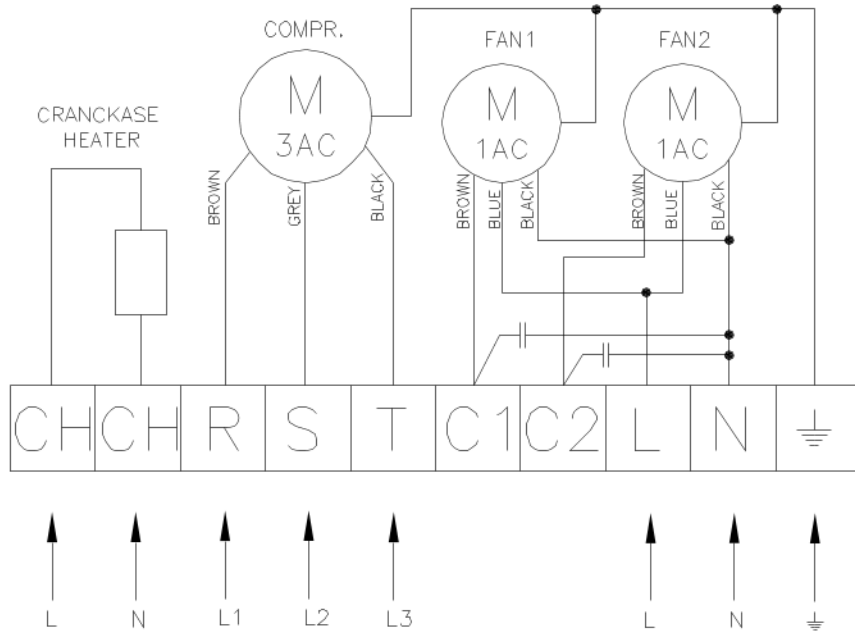


SCHEMA STANDARD U.C. MONOFASE
SCHEME STANDARD U.C. SINGLE-PHASE



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SCHEMA STANDARD U.C. TRIFASE
SCHEMA STANDARD U.C. TREE-FASE



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