

 COILS MANUFACTURER - BATTERIE RADIANTI	MANUALE USO E MANUTENZIONE USE AND MAINTENANCE MANUAL	Documento Document	MT-00
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<small>Loc. Cavaterre 2, 37020 Rivalta di Brentino Belluno (VR) Tel 045/6284081- Fax 045/6284086 - info@comaspa.com</small>			

Heat Exchanger

Use and Maintenance Manual



Località Cavaterre 2 - 37020
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1. Preliminary Warnings

Keep this manual in an easily accessible place protected from external agents, which could make it unusable.

Before starting any operation on the heat exchanger, carefully read the instructions and indications given below.

Any operation carried out on the exchanger during "its life" starting from receipt, handling, installation, commissioning, maintenance up to decommissioning must be performed by suitably trained personnel. The manufacturer rejects any responsibility for damage to people or property caused by failure to comply with the standards or instructions contained in this manual.

2. Exchanger Description

- The heat exchanger (or coil for short) consists mainly of 4 parts:
 - Assembly of pipes connected together by pipe bends.
 - Finned surface, normally consisting of a finned pack. The assembly of the pipes is integral with the finned pack following the mechanical expansion of the tubes. Air goes through the finned surface during the use of the exchanger.
 - Containment frame of the finned pack + tubes assembly.
 - Two elements (usually cylindrical manifolds) into which the pipes converge. They perform the function of supply and relief of the internal fluid in the tubes.
- The heat exchanger has the purpose of allowing the exchange of energy between the two fluids, the one flowing inside the tubes and the one flowing outside the tubes.
- The main information on the exchanger can be found as follows:
 - Materials: Through label and graphic symbols the materials for tubes and fins are quickly defined, the construction drawing provides a complete description of the materials of the entire exchanger.
 - Weight: Information present both on the label and on the construction drawing.
 - Dimensions: Refer to the construction drawing.
 - Fluids: Information present both on the label and on the construction drawing.
 - Use limits: Information present both on the label and on the construction drawing.

NOTE: It is recommended to read the following Chapter 3 which provides instructions for reading the label.


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3. Label Reading

-On each exchanger there is a label with which the user quickly obtains technical information about the use of the exchanger or information you might find useful for document traceability from CO.MA.

The label is usually placed on the manifold or on the frame, the placement is easy to spot.

Below a description of the details on the label.



The label contains the following information:

- CO.MA logo and contact info:** info@comaspa.com - www.comaspa.com - tel +39 0456284081
- Serial number:** 9999/0001/2020
- Customer:** 000001
- Order:** (blank)
- Coil code:** 61AA/10T/4R/1000L/2P/10N/V1
- Weight ~ [kg]:** 29
- Customer ref:** (blank)
- Customer cod:** (blank)
- Inside tubes:** Fluid Water / Water sol.; Fluid type 2; TS [°C] +0/+95; PS [barG] 8; PT [barG] 12; DN ///; Vol [l] 10
- Outside tubes:** Fluid Air; Fluid type 2; TS [°C] -10/+140; PS [barG] 0; PT [barG] ///; DN ///; Vol [l] ///
- PED 2014/68/UE:** Art 4.3

Arrows point from the following text to the corresponding fields on the label:

- serial number
- exchanger code
- heat exchanger working fluids inside the tubes and outside the tubes
- CO.MA. phone number
- details for customer order
- exchanger weight
- further customer's details
- PED category


Additional information below the label:

- use limits and test limits with details about connections and volumes:
- TS: maximum allowable temperature
- PS: maximum allowable pression
- PT: test pression
- DN: nominal diameter of connections
- V: volume

The CO.MA. heat exchange coils are produced in compliance with the PED Directive (2014/68/EU), when required they are therefore labelled with the EC mark and the Certificate of Conformity.

For exchangers operating in high temperature environments or for exchangers that fall into the PED categories cat I and cat II, a metal plate is placed next to the plastic label or replaces it.

The plate is engraved in order to present essential information on the exchanger such as serial number, exchanger code, working fluids, use limits and PED category.

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4. General Specifications

4.1 Working Fluids

-The exchanger is suitable for use with the fluids indicated on the plate.

The choice of materials was in fact evaluated considering the compatibility with the fluids used and with the process for which the coil is intended. Any use of different fluids must be checked in advance with CO.MA., otherwise the warranty shall become void.

-If the working fluid is water, respect the following points:

Install adequate filters in the supply line upstream of the exchanger to prevent the passage of sediments, algae, sand that could cause the pipes to clog, and all chemical-physical water treatment systems in order to minimize corrosion and prevent deposits and encrustations.

-If the working fluid is steam, respect the following points:

In the phases of steam generation and its transport in the feed line upstream of the exchanger, provide chemical-physical water treatment systems in order to minimize corrosion and prevent deposits and encrustations.

Provide for each exchanger a valve to regulate the steam supply phase upstream of the exchanger and a steam trap downstream of the exchanger in order to avoid dangerous overpressure known as water hammer.

-If the working fluid is different from water and steam (for example diathermic oil) provide treatment/filtration systems to avoid presence and accumulation of impurities.

The use of unstable fluids that may involve decomposition phenomena is strictly excluded.

4.2 Use limits

-The exchanger use limits with regard to minimum/maximum allowable temperatures (TS) and maximum allowable pressures (PS) are marked on the plate.


-The exchanger guarantees the performances described in the selection/calculation printout submitted by CO.MA. if the project data are actually reproduced in the operating phase. Pay particular attention to the correct air distribution on the entire front of the exchanger. In the absence of data and therefore of sizing carried out by CO.MA. performances are not guaranteed.

In addition to the limits imposed by the plate, the following rules must necessarily be followed or else you risk damaging the exchanger:

-Correct operation of the exchanger is guaranteed if and only if both fluids flow in and out of the pipes.

-In the case of interruption of the flow of water or its mixtures inside the pipes, two very risky conditions can occur. If the air outside is at a temperature below the freezing point, ice will gradually form and then break (usually break the pipe bends); if air or gas flows outside at a temperature above the boiling point, evaporation will progressively occur. In the event of prolonged stoppage, the coil must be completely drained to avoid freezing. Then the coil must be stored empty, dry and sealed, adding hygroscopic and/or protective substances inside.

-If the working fluid in the heat exchanger is diathermic oil, a minimum flow must be guaranteed, avoiding any stoppage in order to prevent decomposition phenomena (cracking) and the subsequent formation of aggressive compounds.

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5. Safety Regulations

-Before starting any operation, wear personal protective equipment (gloves, goggles, helmet, etc.) suitable for the function to be performed.

-It is necessary to check the absence of elements in the clothing and in the worn objects which could become entangled in the exchanger or in parts connected to it.

Provide enough space to safely carry out all operations during the life of the exchanger, from handling/positioning to subsequent installation/connection, to accessing the exchanger for routine maintenance or for extraordinary interventions, up to replacement/decommissioning.

-Pay attention to edges and corners of the frame and the heat exchange fins because they are sharp.

-Do not stand and/or walk under the exchanger during handling operations.

Since the coil can be used at both high and low temperature, avoid touching the exchanger without adequate protection when it is in operation.

While using the exchanger, you must stay away from it and you must not leave any type of objects on the heat exchange surfaces or on the frame or the manifolds.

Before any maintenance operation, check that the exchanger is isolated from any source of thermal and/or electrical energy.

6 Handling

6.1 Phase: Goods Receipt

-Upon receipt of the goods make sure that the supply corresponds to the order details, checking delivery note, any attached documents and statements on the packaging.

-Check that the packaging is in good condition, and in case of damage, immediately notify CO.MA.

-Pay extreme attention to the choice and use of the vehicle (forklift, pallet truck) during unloading and storage of the goods.

-The exchanger can be delivered as a single element or more often together with other exchangers in a suitably sized packaging according to weight, dimensions and transport type.

6.2 Phase: Unpacking

The packaging type is extremely varied, pallets, wooden cages, metal structures for packaging, with the integration of various possible protection and fastening elements such as straps, plastic film, cardboard or styrofoam or plywood sheets.

-Pay extreme attention to the choice and use of the unpacking means, especially since some of the most delicate parts of the exchanger can be hidden from view by protection elements in the packaging.

6.3 Phase: Installation - Removal

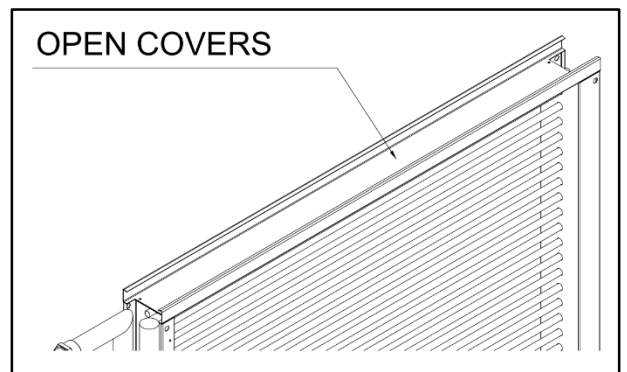
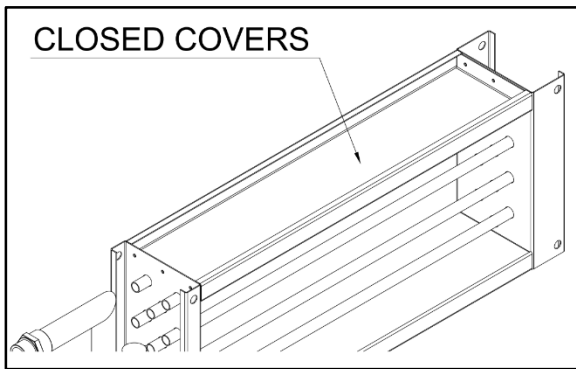
The following rules concern the handling of the single coil in the installation phase at the "beginning of life" or in the removal phase at the "end of life".

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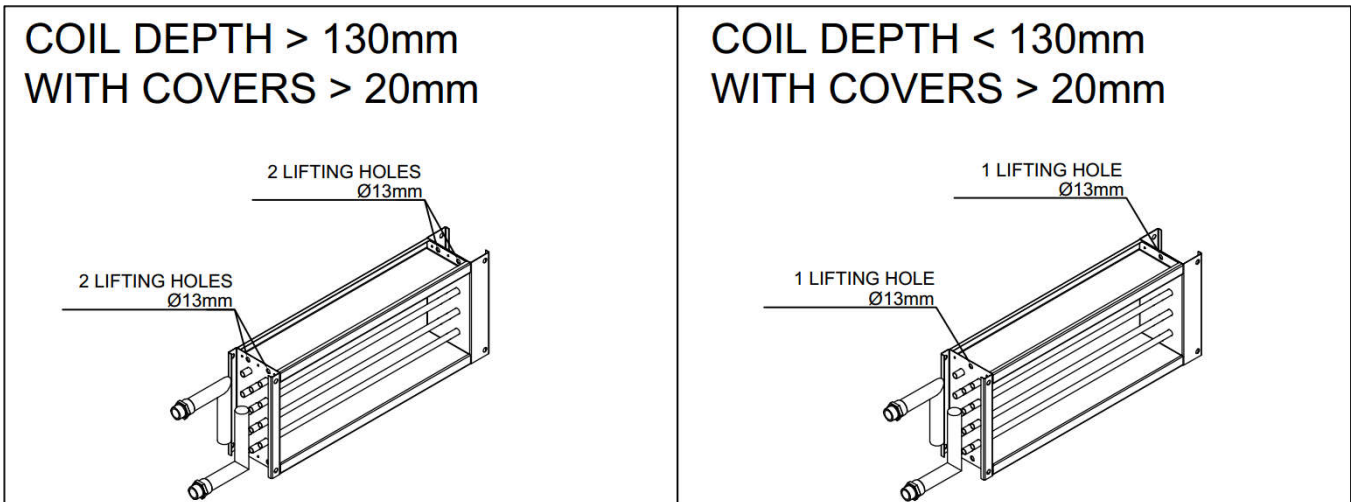
The handling of the exchanger to the place of connection to the system/plant takes place by lifting using auxiliary means. In this phase the exchanger must be hooked into its lifting points.


The lifting points on the exchanger consist of 13mm diameter holes on the frame. In the absence of a specific drawing, on standard exchangers, to identify the lifting points, follow the indications/instructions below.

Preliminary Note: Please consider that we distinguish two types of covers: so-called closed covers and so-called open covers. See the two drawings below as an example.

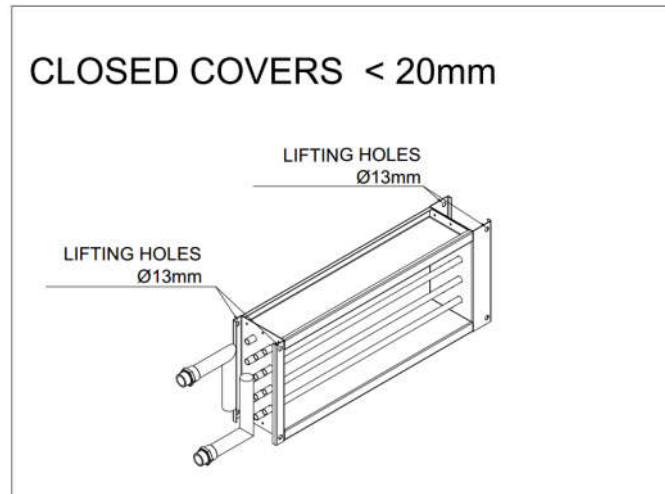


1) Exchanger with closed covers higher than 20mm:

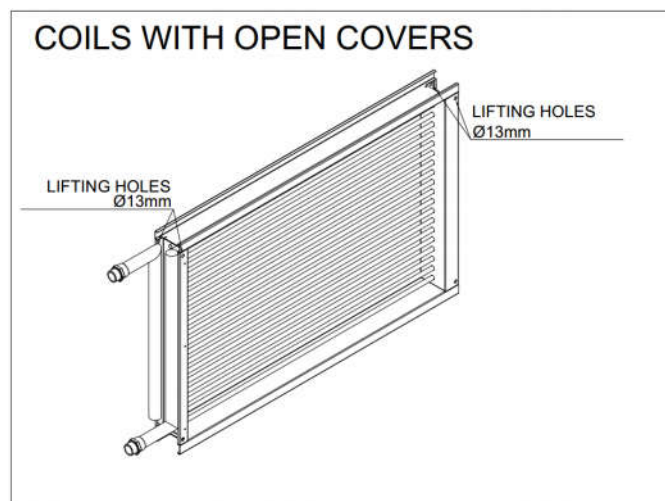


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2) Exchanger with closed covers less than 20mm high:



3) Exchanger with open covers:



For non-standard exchangers a construction drawing is always submitted/delivered, showing nature, number and placement of the lifting points.

The operator must hook into the lifting points using carabiner hooks and/or lifting lugs (on its own initiative).

For handling use the lifting points from the frame. Never hook onto pipe bends or manifolds.

During all the aforementioned phases of goods receipt, unpacking and handling (unloading, storage, installation) the operations must be carried out with the utmost care in order not to damage or crush the fins or other elements making up the coil, otherwise the exchanger will not function properly.

The exchanger must always be gently placed on the ground using, if necessary, pieces of wood or soft supports.

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7 Installation - Commissioning

Before starting any operation, wear personal protective equipment (gloves, goggles, helmet, etc.) suitable for the function to be performed.

NOTE: Before installation, check the existence of the seal that is affixed to all the coils to prove that the test has been carried out. If the seal is missing (it can accidentally be removed during transport) ask CO.MA. for the certificate attesting that the test has been carried out.

7.1 Position/Orientation


The exchanger has been designed under the binding assumption that it is then placed correctly.

A fundamental and necessary condition is the air flow perpendicular to the plane represented by the finned pack.

First check whether the exchanger must work in a so-called horizontal or vertical position.

Operation with horizontal coil is defined as that in which the air flow is vertical and the plane of the finned pack is horizontal; operation with vertical coil is defined as that in which the air flow is horizontal and the plane of the finned pack is vertical.

The information is contained in the last portion of the exchanger code.

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Serial number: 9999/0001/2020	Customer: Order: 000001
Coil code: 61AA/10T/4R/1000L/2P/10N/V1	Weight ~ [kg]: 29
Customer ref:	Customer cod:
Inside tubes Fluid Water / Water sol.: Fluid type 2;	PED 2014/68/UE: Art. 4.2

If you see V the operation is vertical

If you see H the operation is vertical

Complete indication for countercurrent operation

The second check to be made is to verify that when connecting the couplings countercurrent operation against the air direction must always be considered.

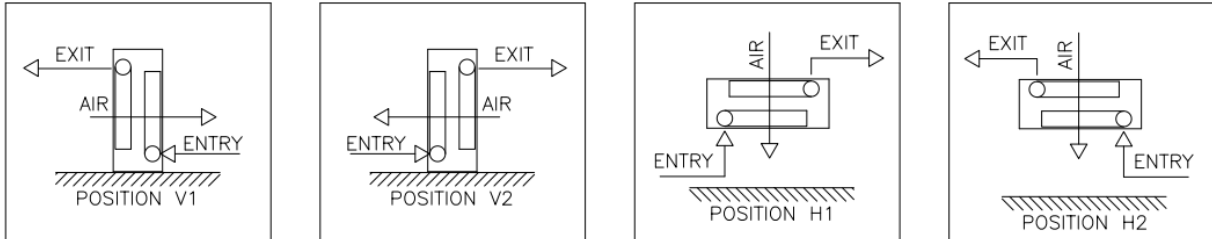
Countercurrent operation is what guarantees the best DTMLog and is the one on which calculations for the selection of exchangers are based.

This information is contained in the last portion of the exchanger code and must be considered together with the type of working fluid.

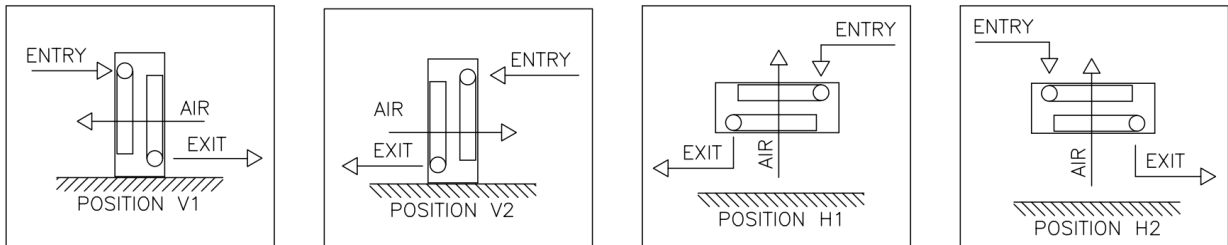
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The main codes (operating combinations) are as follows:

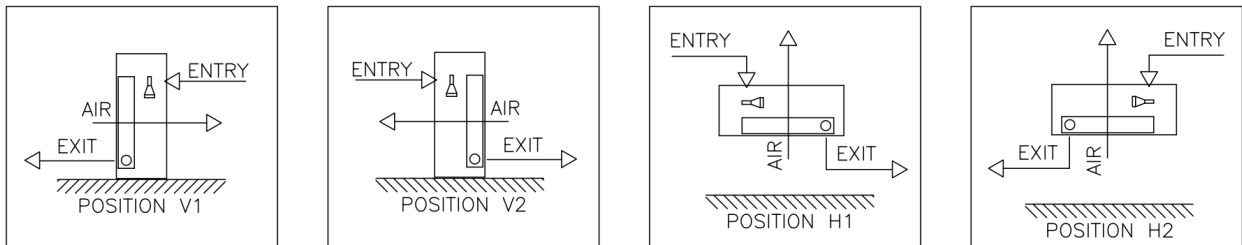
If the fluid is water, glycol water, superheated water, diathermic oil:



If the fluid is steam, coolant with condensation operation:



If the fluid is coolant with evaporation operation:



There are some codes (operating combinations) used more rarely, in that case refer to the construction drawing or contact the CO.MA technical office.


7.2 Connection - Start

The connection of the exchanger to the system must be carried out by qualified personnel, using suitable equipment. One of the interface points between the exchanger and the system is made up of two manifolds, they must be connected to the system by flexible couplings to compensate for thermal expansion.

In addition to flexible couplings, the use of anti-vibration mounts is recommended to reduce the effect of possible vibrations induced by the fluid supply systems inside the pipes.

The loads on the nozzles/connections must be zero; it will be the installer's responsibility to provide suitable support systems for the connection pipes.

For correct installation, the installer must mount drain, vent and bypass valves in the appropriate points for the relief and depressurization of the fluid contained in the heat exchanger.

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To allow the coil to function properly and to avoid risky conditions, do not exceed the operating conditions indicated on the label accompanying the exchanger (fluid, temperature and pressure).

The equipment does not have protective devices. The user must guarantee protection against exceeding the allowable limits (PS, TS) by applying safety devices and accessories suitable for the system in which the coil is installed.

Fill and start up the system gradually to avoid water hammer phenomena.

The exchanger is not designed/sized to work in cyclic mode, it is recommended to always pay extreme attention to the start and stop phases in order to avoid conditions (temperature and pressure) outside the acceptable limits set.

The exchanger is not designed/sized to withstand mechanical and thermal loads unrelated to the treatment object of the heat exchange; in addition to the aforementioned loads on the nozzles to be avoided, any seismic loads or thermal loads due to fire are not foreseen in the design.

The heat exchanger materials are chosen according to the nature of the fluids and their working temperature, in the design phase no corrosion excess thicknesses are considered.

The use of unstable fluids which may involve decomposition phenomena is strictly excluded. COMA cannot verify moment by moment the nature of the fluids used by the customer, for this reason it cannot give guarantees regarding corrosion resistance of the materials.

During the working life of the exchanger, in case of accidental breakage, sudden leaks of fluids (liquids or gases), or detachment of solid fragments may occur.

To prevent the events described above from causing damage to people or things, install the exchanger in a place that is as protected as possible, also using indications of possible danger.

8 Maintenance

It is recommended to view the exchanger condition on a regular basis, in order to detect any problems that may reduce the exchanger performance and plan routine maintenance.

Before starting any operation, wear personal protective equipment (gloves, goggles, helmet, etc.) suitable for the function to be performed.

The main cause of reduction in exchange efficiency is due to fouling of the finned surface; to clean the coil, use the most convenient and suitable means (compressed air, pressure washer, etc.) taking care not to damage the fins.

It is recommended to always keep the air/water jet perpendicular to the finned front in order to avoid bending/damage to the finned pack.

To avoid damaging the aluminum or copper finned coil DO NOT use mechanical means for cleaning (e.g. brushes or other means).


To allow the coil to function properly when, for any reason, the fins are crushed in, run a rake with the right size through the pack.

These rakes are usually on the market, but you can also ask CO.MA. for them.

After analyzing the condition of the finned surface, pay attention to the condition of the assembly pipes + pipe bends + manifolds (here briefly called pipes).

The inspection of the outside and inside of the pipes is useful in order to assess the cleanliness, detect the presence of any elements obstructing the proper flow and the possible occurrence of corrosion or erosion phenomena.

To check the internal condition of the pipes pay extreme attention to the fluid emptying phase.

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The fluid contained in the exchanger can be dangerous because it is toxic or flammable, in any case it must be emptied after having depressurized the fluid up to ambient pressure and brought it to room temperature; it is necessary to provide for the direct transfer of the fluid from the exchanger into a suitable storage tank.

The operator must be properly protected with suitable gloves, overall and an air purification system in case of toxic vapors he/she might breathe in.

In the event that the exchanger contains toxic fluids, you will need collection in suitable containers and storage in the sites prepared by the competent authorities in order to dispose of them.

Do not clean inside with water (liquid water or vapor) coils used to function as evaporators or condensers.

9 Decommissioning

At the end of the exchanger working life, when you want to dispose of it, contact the competent authority for disposal.

Never throw away the exchanger or release any parts into the environment.

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10 CO.MA. S.p.a. Contacts

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