

ETN EVO

TRANSLATION OF ORIGINAL INSTRUCTIONS
CAREFULLY READ THIS MANUAL BEFORE USING OR REPAIRING THIS PRODUCT

Magnetic drive lined centrifugal pump

Installation, Operating and Maintenance Manual



Pumps UK Ltd | Making the right choice

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Check receipt of goods

Upon receipt of the pump, please open the package and inspect the contents to check:

- the model and specifications listed on the data plate
- any accessories ordered
- the presence of accidental damages

For any inconsistencies between the delivered and ordered product please contact C.D.R Pompe S.r.l. or your authorized dealer.



For any future spare parts enquiry, assistance, or information about the pump delivered, it is important that you state the relevant **SERIAL NUMBER** (shown on the data plate fixed on the pump lantern).

This manual provides the users of the pump-motor unit of C.D.R. Pompe S.r.l. with the information required for correct installation, operation and maintenance under safety conditions as established by EC standards.

Please read this manual carefully before installation and make it available at any time to anyone using the machine.

The user is liable for damage resulting from not observing the operation conditions agreed at Order confirmation.

The Purchaser has the responsibility to:

- Check that the pump-motor unit and any accessory are suitable for the working environment.
- Provide suitable personal protective equipment to the operators.
- Inform users of the allowed use.

C.D.R. Pompe S.r.l. may update or edit this manual at any time and without previous notice to correct typos, inaccurate information or updated products.

These changes must be added to new editions of the manual.

C.D.R. Pompe S.r.l. has no obligation to install any modification of design or improvement of the products to previously delivered units.

This manual contains technical information and drawing owned by C.D.R. Pompe S.r.l. and cannot be reproduced in full or in part in any case without prior written authorization by C.D.R. Pompe S.r.l.

Any use other than the operation described in the manual is considered improper use and therefore C.D.R. Pompe S.r.l. will not be held responsible in this case.

C.D.R. Pompe S.r.l. is a leader in designing, manufacturing, selling and servicing centrifugal pumps for the treatment of dangerous and corrosive liquids in the chemical and pharmaceutical industries and in other industrial processes.

C.D.R. Pompe S.r.l.

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1. Warranty

1.1 Warranty conditions

C.D.R. Pompe S.r.l. warrants that its products (pumps and spare parts) are free from flaws and/or defects in manufacturing and assembling for a period of 12 (twelve) months from the date of delivery (indicated on the delivery note).

The purchaser's warranty is limited to the free replacement of parts recognized as defective, excluding the buyer's right to request termination of the contract or price reduction, or other damages.

C.D.R. Pompe S.r.l. warrants that the product sold is of good quality, material, and workmanship and agrees to, during the warranty period specified herein, repair or replace at its own expense in the shortest amount of time possible, those parts which due to poor quality of material or defect in workmanship or faulty assembly prove to be defective.

The warranty is understood ex warehouse from where the supply was carried out, including the return of defective parts.

The warranty validity period is:

12 months

from the date of delivery/shipment listed on the delivery note.

1.2 Warranty terms

For the warranty to remain fully valid throughout the period indicated in the warranty conditions it is necessary that:

- construction and/or material flaws are reported in writing within 8 days of receipt of the goods;
- all contractual obligations of the buyer have been fulfilled. Alleged or confirmed product defects do not justify non-fulfilment of contractual obligations;
- all installation operations, connection of the Product to energy networks (electric, water), use and maintenance are carried out in strict compliance with the instructions included in the Instruction Booklet or documentation provided with the product;
- all repairs are performed by personnel authorized by C.D.R. Pompe S.r.l. and that all spare parts used must be original spare parts.

The warranty does not cover:

- damages occurring during shipping and handling carried out by the buyer;
- pumping fluids that due to the nature or content are not compatible with the construction materials and/or application limits prescribed in the order;
- incorrect selection caused by incorrect information provided by the buyer;
- incorrect or lack of maintenance;
- tampering, failed or improper execution of the prescribed requirements for putting into service;
- normal wear and tear related to the service conditions.

1.3 Exclusion Clause

- Repairs or replacements pursuant to this warranty shall not renew or extend the original warranty period
- The product shall not be considered defective in materials, design, or workmanship if they need to be adapted, changed, or adjusted to conform to local technical or safety standards in force in any Country other than that for which the product was originally designed and manufactured.
- This warranty will not reimburse for such modifications or attempted modifications, whether properly performed or not, nor any damage resulting from them.

- This warranty will not reimburse for any attempted modifications made to adapt the product for purposes other than those defined in the contractual phase without prior consent in writing by C.D.R. Pompe S.r.l.
- C.D.R. Pompe S.r.l. shall not be held liable in any way for indirect, incidental, or consequential damages suffered by customers or third parties, including loss of profits, resulting from any infringement of the contents of this document, or suffered by customers or third parties due to the impossibility to use the product.
- The terms of this warranty shall be considered void if the User uses the pump differently than as specified in the order or does not follow the instructions contained in this manual.

1.4 Warranty Implementation

- The parts replaced must be sent to the closest C.D.R. Pompe S.r.l. office for review.
- WARRANTY ACCEPTANCE will not be granted unless the defective part is returned or appropriate photographs and a written report are provided.
- All defective parts replaced, as provided for in this document, become the property of C.D.R. Pompe S.r.l.
- The buyer shall not be required to deliver a defective part to C.D.R. Pompe S.r.l. if:
 - the part was destroyed as a result of its defect or of any defect covered by this warranty
 - C.D.R. Pompe S.r.l. is reasonably satisfied that the product was defective at the time of sale.
- If both of these conditions are met, C.D.R. Pompe S.r.l. shall replace the part as established herein, as if the Buyer had delivered the defective part to C.D.R. Pompe S.r.l.
- Pumps containing process fluid or installations outside of the pumping unit shall not be taken into consideration.
- The buyer agrees to provide C.D.R. Pompe S.r.l. with the time and availability to perform repairs and/or replacements, as C.D.R. Pompe S.r.l. deems necessary.
- Interventions on the plant. If the product supplied cannot be removed from the related plant, C.D.R. Pompe S.r.l. shall be responsible only for the explicit repair costs. Any other costs shall be the sole responsibility of the customer, based on A.N.I.M.A. (Italian Association of Mechanical and Engineering Industries) rates, including any civil works and/or defective designs.

Without prejudice to the foregoing, C.D.R. Pompe S.r.l. liability to customers or third parties from any claim shall be limited to the total amount paid by the customer for the product that caused the damage.

This warranty shall be governed by the Italian law. The Court of Milan shall have sole jurisdiction over any dispute.

2. Safety

2.1 Introduction

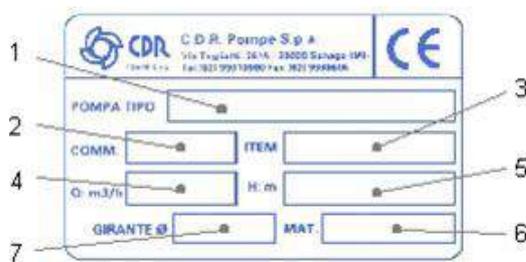
This manual contains all the information needed for the correct installation, use, and maintenance of the pump. It should be read and understood by all the personnel involved in the installation, operation, and maintenance of the pump before it is put into service.

Failure to comply with these safety instructions can be a source of danger for people, the environment and the machine, and voids any right to make claims against C.D.R. Pompe S.r.l. The liability of the supplier is ensured only if the pump is used in accordance with the contents of this manual. The limit values indicated in this manual or in any other documentation concerning the pump must never be exceeded. Personnel involved in the installation, operation, and maintenance of our pumps must be properly qualified to perform the operations described in this manual.

C.D.R. Pompe S.r.l. shall not be held liable for the training level of personnel and for the fact that they are not fully aware of the contents of this manual.

2.2 Symbols

Each pump is provided with the following plates:



- 1_Pump model
- 2_Serial no. / year of manufacture
- 3_Item (when necessary)
- 4_Flow rate
- 5_Head
- 6_Material in contact with liquid
- 7_Impeller diameter

Fig. 1 PUMP DATA PLATE



ARROW INDICATING THE PUMP'S DIRECTION OF ROTATION



GROUNDING



MAGNETIC FIELD HAZARD (only for magnetic drive pumps)

The following symbols are used in this manual:



WARNING: indicates that the pump and its operation may be at risk.



ELECTRICAL HAZARD: indicates a hazard caused by electronic equipment.



MAGNETIC FIELD HAZARD: indicates the presence of a hazard caused by magnetic fields.



GENERAL HAZARD: indicates the presence of a hazard for persons working on the pump unit.



PROHIBITED: persons with pacemakers must not go near strong magnetic fields (magnetic drive pumps).



EU SYMBOL: explosion protected devices intended for use in explosive atmospheres must be marked with this symbol.

2.3 Safety instructions and precautions

2.3.1 Personal Protective Equipment (PPE)



Fig. 2 Suitable gloves to prevent contact with hazardous substances.



Fig. 3 Mask to avoid breathing toxic or harmful substances.



Fig. 4 Goggles for eye protection.



Fig. 5 Accident prevention shoes to protect feet from any accidental falls.



Fig. 6 Protective clothing for the body.

Prior to carrying out any work on the pump make sure to use adequate protective equipment.

Pumps must be drained and flushed before servicing!



The corrosive and hazardous liquids contained in the pump may pose serious health and environmental hazards.

Avoid pumping, even at different times, liquids that may cause chemical reactions, without first draining and flushing the pump.

After servicing, start the pump again following all the safety instructions described in chapter "Starting and stopping".

Do not run the pump dry.



Start the pump only when it is completely filled and the delivery valve is almost completely closed, limiting this condition to the time that is strictly necessary to start the pump.

In the event dirty liquids are to be pumped, if this was not indicated at the time of ordering, please contact C.D.R. Pompe S.r.l.'s technical service beforehand.

2.3.2 Electricity

Do not perform any operation on the pump when it is running or before disconnecting it from the electrical system.



Any hazard caused by electricity must be avoided (refer to applicable regulations for further details).

Do not perform running tests before filling the pump with liquid. Check that the electrical data shown on the motor plate match the electrical specification of the system to which the pump will be connected.

2.3.3 Magnetic fields

Persons with pacemakers must stay at least 50 cm away from magnetic parts/components.



The strong magnetic fields present may cause heart rhythm disturbances, affect magnetic media and all metal instruments in general. See recommendations during disassembly/assembly in the corresponding chapters.

2.3.4 Hot surfaces



Hot and cold parts of the pump unit must be protected to prevent accidental contact. Do not subject the pumps to sudden changes in temperature.

Please remember that the maximum surface temperature mainly depends on the operating conditions of the fluid processed by the user (UNI EN 13463-1 art. 6.1.3).

2.3.5 Moving parts



Do not tamper with the guards of rotating parts. Do not touch or go near rotating parts when in motion.

2.4 Expected use

Safety of operation of the supplied product can be ensured only if the instructions of this manual or of the contractual documentation are strictly followed; if further clarifications are needed, please contact C.D.R. Pompe S.r.l.

The pump (or pump unit) and any configuration variation must be run according to the limits listed and/or described in the relevant contractual documentation provided with the pump.

Contact C.D.R. Pompe S.r.l. if the pump must be used in ways or for purposes other than those shown in the data sheet and/or contractual documentation.

The pump must **NEVER** operate beyond the values of the data sheet, such as pumped fluid (type, density, viscosity, etc.), temperature, flow rate, speed, head and shaft power.

The pump must be in perfect technical conditions before operation.



The pump must never run dry and/or with a percentage of gas over 2% in volume!
Always check that the pump is filled with liquid during operation.



Applying and observing the technical and operational limits of the pump is necessary to ensure correct and safe pump operation, particularly when installed in environments with possible generation of explosive atmosphere. In this case, applying and respecting the technical and operational limits as well as application limits of the pump decreases the risk of generating ignition sources (see chapter "Safety in an explosive environment").



Always refer to the Directive 99/92/EC containing minimum regulations to improve health and safety of workers who may be exposed to explosive atmosphere hazards.



Always check the limits of **minimum flow rate** as shown in the contractual documentation. This is necessary to prevent damage due to overheating, excessive axial thrust, damage of the bearings, high wear of rotating parts, etc. (see the section "Minimum and maximum flow" of chapter "Technical characteristics").



Always check the limits of **maximum flow rate** as shown in the contractual documentation. This is necessary to prevent damage due to vibrations, cavitation, damage of the bearings, overheating, etc. (see the section "Minimum and maximum flow" of chapter "Technical characteristics").

To adjust flow rate or head never operate by closing the suction valve but always operate on the delivery valve.

Improper use (not consistent with the instructions in this manual or with best practices in the operation of centrifugal pumps), even if for very short periods, may cause serious and extensive damage to the unit (pump or pump unit).



With regards to centrifugal pumps with mechanical seal, always refer to the specific manual of the mechanical seal manufacturer for its correct operation.



In particular, check and compare accurately the operational temperature limits of the mechanical seal with those of the pumped liquid (also see the section "Temperature limits" of chapter "Factors to be taken into account for ATEX environment installations").

2.5 Safety information for the customer/operator



The operator must always use Personal Protective Equipment (PPE) as required by the current safety regulations for work environments, with regards to the time and location of the work.

Please **ALWAYS**:

- strictly observe the instructions of this manual and of the contractual documentation;
- respect current safety prevention regulations;
- respect safety measures and regulations of the system and/or customer;
- never disable safety and protections devices when the pump is operating;
- protect hot and/or cold parts of the machine so that it is not possible to touch them;
- the personnel must always wear suitable Personal Protective Equipment when working on hot, cold and/o moving parts, as well as checking that the devices are active and are operating correctly;
- in the event of treatment of dangerous liquids (e.g. explosive, toxic, harmful, hot liquids), stop, limit and remove any leaks in order to avoid risks to people and the environment. Take care to always follow regulations!
- avoid any electrical hazard. Please refer to applicable national safety regulations and/or regulations issued by local power companies.



Take particular care when the unit is installed in potentially explosive areas. Avoid any incorrect or improper operation!

2.6 Safety information for maintenance, inspection and installation

The instructions of this manual or of the contractual documentation must be strictly followed; if further clarifications are needed, please contact C.D.R. Pompe S.r.l.

Always purge the pump when used to pump harmful liquids (see section "Return to supplier" in the chapter "Handling and storage").

Perform maintenance only when the pump is:

- stopped and in safety conditions (see the "Stop sequence" section in the chapter "Starting and stopping")
- cooled to room temperature
- not under pressure

The pump maintenance, inspection and installation personnel must be specialised and qualified, as well as informed of the content of this manual.

Any modification to the pump is allowed only after prior authorisation by C.D.R. Pompe S.r.l.

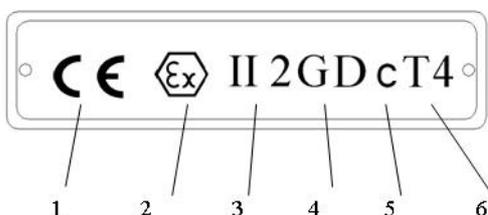
Use only genuine spare parts or spare parts authorised by C.D.R. Pompe S.r.l. Any damage due to using non genuine spare parts voids any liability by C.D.R. Pompe S.r.l.

Immediately after maintenance all safety and protection devices must be reassembled and activated (see the sections "Pre-start checklist" and "Start sequence" in the chapter "Starting and stopping").

2.7 Safety in an explosive environment

2.7.1 ATEX EC marking example (valid only for pumps compliant with the ATEX regulation)

The pump is compliant with the **ATEX Directive 94/9/EC** and next **2014/34/EU** group II category 2 GD.



An additional data plate is applied to pumps installed in an explosive environment, with the following information:

- 1_ EC symbol
- 2_ Explosive protection symbol
- 3_ Machine group and category
- 4_ Type of explosive atmosphere G = Gas, Vapour, Mist D = Dust-air
- 5_ "c" UNI EN 13463-5 construction safety
- 6_ "T4" temperature class

Fig. 7 ATEX data plate.

The data plate shows the pump marking (see "ATEX declaration" attached to this manual).

2.7.2 Protection in an explosive environment

If the pump is installed in potentially explosive environments, always follow the instructions in this section (in particular, see the chapters "**Intended use**", "**Safety information for the customer/operator**", "**Safety information for maintenance, inspection and installation**").

Only pumps (or pump units) identified and compliant with the ATEX Directive 94/9/EC and next 2014/34/EU can be installed in environments with a risk of explosion.

Always refer and see the specific sections highlighted by the "Ex ATEX" symbols in this manual.



Safety of operation of the supplied product can be ensured only if the instructions of this manual or of the contractual documentation are strictly followed; if further clarifications are needed, please contact C.D.R. Pompe S.r.l. (see the "Intended use" chapter).

The pump must **NEVER** operate beyond the values of the data sheet, such as pumped fluid (type, density, viscosity, etc.), temperature, flow rate, speed, head and shaft power.



Avoid any incorrect or improper operation!

2.7.3 Classification

If included in the supply, the specific conformity certificate of the motor must always be available

The following is an example of pump classification:

CE Ex II2G from T1 to T4

This means that the pump can be used in environments where the ignition temperature is higher, e.g. T4 > 135 °C.

In any case, the temperature class must always be assessed according to the highest ignition temperature of each individual element comprising the unit: pump, motor, etc.

Example:

Pump T4 > 135 °C

Motor T3 > 200 °C

The pump can be installed in environments classified as T3 > 200 °C.



The maximum temperature of the liquid to be pumped, according to the aforementioned data, is listed in the table under paragraph "d" below.

2.7.4 Factors to take into consideration for installations in ATEX environments.

a. Electrostatic charges



The user is responsible for the electrical connection and grounding of the machine.

The pump is provided with a threaded hole on the adaptor, or fastening screws on the pump feet (see section "Electrical connections" in chapter "Installation").]

The surfaces of coupled metallic parts are clean and degreased thus ensuring connection between the pump frame, motor frame, and support frame. The outer parts of the machine are made of conducting materials.

b. Dry running

Dry running will cause:

- an abrupt increase in temperature of the rotating parts
- pump failure
- danger for persons and the environment depending on the liquid being pumped.

c. Temperature limits

During normal pump operation the highest temperature can be found:

- on the surface of the volute casing
- on the surface of the isolation shell



Under critical operating conditions: dry run, low flow rate and/or room temperature > 40 °C the temperature on the surface of the volute casing may exceed 130 °C.

During pump operation ensure the external surface is free from dust in order to prevent the pump surface from exceeding the allowed temperature.

The customer must ensure that the maximum temperature during pump operation is strictly complied with and, if in doubt, properly monitored (see chapter "Monitoring devices").

Temperature class pursuant to EN 13463-1	Motor flange	Motor shaft
T6 (85 °C)	70 °C	70 °C
T5 (100 °C)	70 °C	80°C
T4 (135 °C)	75°C	85°C
T3 (200 °C)	80°C	100°C
T2 (300 °C)	80°C	100°C
T1 (450 °C)	80°C	100°C

Room temperature must be between -20 °C and +40 °C, otherwise please contact C.D.R. Pompe S.r.l.

The maximum allowed temperature of the pumped liquid is strictly connected to the type of pump lining.

d. Allowed temperature for gas atmosphere (G)

The following table indicates the limit (theoretical) temperature value of the liquid, pursuant to EN 13463-1.

Temperature class pursuant to EN 13463-1	Process liquid temperature limit - Volute casing material = PP	Process liquid temperature limit - Volute casing material = ETFE
T6 (85 °C)	60°C	75°C
T5 (100 °C)	60°C	90°C
T4 (135 °C)	60°C	90°C
T3 (200 °C)	60°C	90°C
T2 (300 °C)	60°C	90°C
T1 (450 °C)	60°C	90°C

Room temperature must be between -20 °C/+40 °C, otherwise please contact C.D.R. Pompe S.r.l. **Warning!** The values above are applicable only in proper operation, lubrication and maintenance conditions.

e. Allowed temperature for dust atmosphere (D)

Tmax is determined as the minimum temperature deriving from the following equations:

- Tmax = temperature limit of the selected pump (see the temperature class table in the previous section)
- Tmax = T5mm-75 °C (where T5mm is the ignition temperature of a layer of dust 5 mm thick)
- Tmax = 2/3 x Tcl (where Tcl is the ignition temperature of a dust cloud)

T5mm and Tcl must be determined by the client/user in case of dust protection (D). Room temperature must be between -20 °C/+40 °C.



Warning! Keep the outer surface of the pump free from dust by means of antistatic clothes.

2.8 Noise

The noise levels shown in the following chart refer to pump (A) operation in normal working conditions coupled with an electric motor (B) at a speed of 2900 rpm.

The values of the graph, as per ISO 3744 and EN 12639, are valid for operating range $Q/Q_{opt} = 0.8-1.1$ without cavitation. Add an allowance of 3 dB to allow for the tolerance of measuring tools.

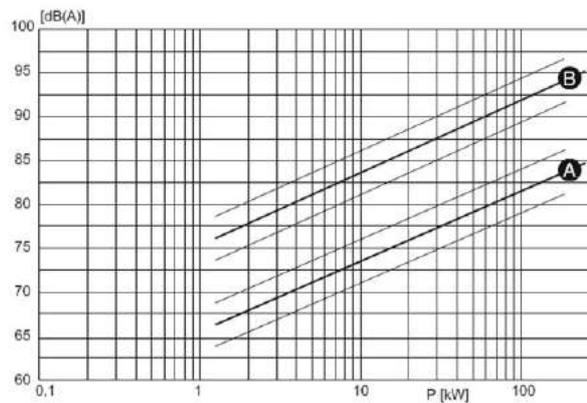


Fig. 8 Noise chart in logarithmic scale.

The major sources of noise are not connected with the pump.

We would like to remind you that the most frequent sources include:

- liquid turbulence in the plant
- cavitation (not dependant on the manufacturer)



The user must provide adequate protective equipment if the sources of noise generate a noise level harmful for operators and for the environment (in accordance with current regulations).

2.9 Monitoring devices

The motor-pump unit must be operated only within the limits specified in the data sheet and on the plate. If the running system cannot ensure these limits are respected, continuous monitoring devices must be used.

Check if monitoring devices are required in order to ensure the pump-motor unit works correctly.

The following accessories can be supplied by C.D.R. Pompe S.r.l. upon request:

- temperature probes
- pressure sensors
- flow sensors
- vibration sensors
- electrical protection equipment

All electrically actuated accessories must be in conformity with applicable safety requirements and regulations on explosion protection systems.

Take into consideration the following risks when choosing suitable monitoring equipment:

2.9.1 Interruption of the cooling flushing



In the standard version the inner magnet is cooled by the process fluid through flushing holes located on the bushings support. Due to some characteristics of the transported liquid, e.g. the high viscosity, flushing could be interrupted, causing a dangerous increase in temperature.

2.9.2 Loss of synchrony between inner and outer magnet.



Overloading, overheating or non compliance with design data can cause a lack of synchronisation of the inner and outer magnets. The thermal energy generated inside the isolation shell or outer magnet can also cause a dangerous increase in temperature.

2.9.3 Liquid leaks



Liquid leaks (dangerous, toxic, harmful liquids) can also pose a danger to the personnel and the environment. Therefore monitor any leak continuously and equip the pump with containment systems if necessary.



Presence of magnetic fields near the magnets.

The minimum safety distance from components containing permanent magnets or from permanent magnets not assembled on the pump must be at least 35 cm, for the following reasons:

- Danger of death for people having a pacemaker!
- Interference with electronic devices!
- Magnets generate strong attraction that interacts with objects, part and components that are sensitive to magnetic forces!

When the pump is completely assembled the intensity of the magnetic field generated by permanent magnets contained in the cores is completely shielded, therefore there is no danger due to the magnetic fields, whether the pump is running or not.

In any case we discourage any people wearing a pacemaker from coming close to the area near the external magnet, marked by the relevant symbol, in particular for pumps equipped with very powerful magnets (where the coupled electric motor is very powerful).

2.10 Operating range

The pump (or pump unit) operating ranges for pressure, temperature, flow rate, speed and power are listed in the Data Sheets and/or in the contractual documentation and must be strictly observed.

These values always refer to liquids similar to water; if fluids with chemical and physical characteristics different from water are pumped, the above limits may vary and this variation must be taken into account. If in doubt, contact C.D.R. Pompe S.r.l.



The aforementioned caution is extremely important, in particular for those fluids having a specific heat that could considerably increase the process temperature, which in turn can increase the temperature of the pump surface.

3. Handling and storage

3.1 Packaging

C.D.R. Pompe S.r.l. pumps or pumping units are normally packed in either cartons or secured on pallets. In case of pumps ordered without an electric motor, they are packed with the external magnetic core loose, which is kept in the package, yet separate from the pump, and protected against possible impacts due to handling the package.



The strong magnetic fields present (only for mag drive pumps) may cause heart rhythm disturbances, affect magnetic media and all metal instruments in general.



Persons with pacemakers must not, under no circumstances whatsoever, go near magnetic parts and components. The strong magnetic fields can cause heart rhythm disturbances.

3.2 Handling

To move crates, cages, cartons, or pallets weighing more than 20Kg, use proper equipment suitable for the weight indicated on the shipping document. When lifting freely suspended loads, harness the crate as illustrated below.

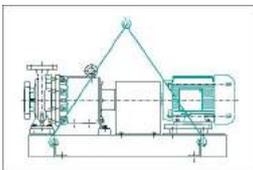


Fig. 9 End-suction execution.

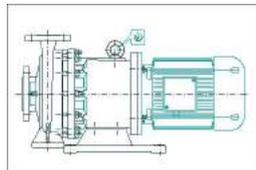


Fig. 10 Close coupled execution.



Fig. 11 Handling.

To ensure correct handling and lifting of crates, cages, cartons, or pallets, refer to the specific symbols shown on the packaging.



Fig. 12 Symbols on the packaging.

3.3 Shipping

The goods we deliver are subject to a verification procedure and approved prior to being released. At any rate, you should follow these instructions. The contents of each package are described in the packing list or delivery note. They must be carefully checked upon receipt. Upon receipt, and with the driver present if possible, check that the material and packaging are not damaged. Any claim must be reported immediately to the shipping company, with the claim signed by the driver. Furthermore, check that the goods delivered match the purchase order (quantity and type of material).

3.4 Receiving

See instructions for inspection at the reception given at the beginning of the manual.

3.5 Storage

In case of storage, the pump must be stored in a covered and dry location, and kept in its original packaging.

The protection caps and lids of the flanges must remain on the pump until it is time for installation. If the pump will be stored for a long period of time, or stored in particularly severe weather and environmental conditions, the use of hygroscopic substances (silica gel) or sealing of the package is recommended.

3.6 Return to supplier

Before returning pumps to C.D.R. Pompe S.r.l., you must ensure the following:

- pump not pressurized,
- pump completely empty,
- electrical connections isolated and motor secured against switch-on,
- pump cooled down,
- auxiliary systems shut down, not pressurized and emptied,
- manometer lines, manometer and fixtures dismantled.



Pumps that have been used for handling toxic or corrosive fluids must be flushed and cleaned before being returned to the manufacturer.

Always complete and enclose a truthful and full certificate of decontamination when returning to C.D.R. Pompe S.r.l. the pump-motor unit or individual parts (see form at the end of manual).

Always indicate any purging and safety measure observed.

Order a safety certificate from C.D.R. Pompe S.r.l. if necessary.

Take necessary measures, depending on the required repair work, as listed in the table below when returning the pump to the C.D.R. Pompe S.r.l.:

Repair carried out	Measure for return
...at the customer's premises	Return the defective component to the manufacturer.
...at the manufacturer's premises	Flush the pump and decontaminate it if it was used to pump hazardous media. Return the complete pump (not disassembled) to the manufacturer.
...at the manufacturer's premises for warranty repairs	Only in the event of hazardous pumped media: flush and decontaminate the pump. Return the complete pump (not disassembled) to the manufacturer.

4. Installation

4.1 General instructions

C.D.R. Pompe S.r.l. shall not be held liable for any damage to property or injury to persons caused by incorrect assembly or assembly performed by unauthorized persons and/or any person who has not received specific training on the above operations.

4.2 Foundations



Do not start the pump until it has been secured to the ground.

The pump-motor unit must be set on and secured to a structure strong enough to support the entire perimeter of the base of the unit. The support surface of the foundation must be flat and level. Concrete foundations on a firm ground are the most satisfactory type. Comply with the requirements of standard DIN 1045 on handling concrete. Provide for foundation bolts as shown in the illustration:

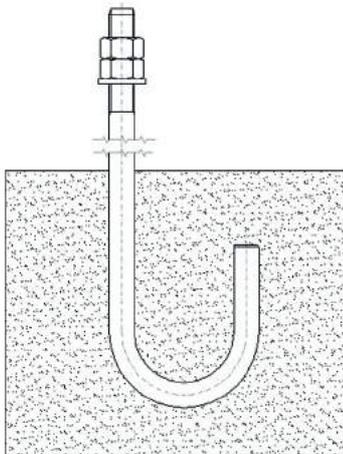


Fig. 13 Foundations for fixing of pump-motor unit.

Once the pump-motor unit is in position, level it using metal shims placed between the feet and the surface on which it stands.

The shims must be placed right next to the foundation bolts and they must be sufficiently wide to cover the largest possible surface.

Check that each foot of the pump-motor unit stands steady on each of these.

Under no circumstances should this position be obtained by excessive tightening of the foundation bolt nuts.

For bases that have windows, fill them with mortar that doesn't shrink.

If the unit is installed on a steel structure, make sure that it is supported so that the feet do not warp.

In any case, we recommend that you place appropriate rubber vibration dampers between the pump and civil works.

4.3 Correct installation

The pump should be installed in a location where, if possible, it is easy to perform maintenance tasks. Therefore enough space must be provided around the pump in order to facilitate:

- maintenance operations
- ventilation for the electric motor



The pumps or pumping units running in potentially explosive areas must be in compliance with standards on explosion protection (see section "Safety in explosive environments" in chapter "Safety").

For pumping flammable fluids provide for, in any event, especially in ATEX environments, proper grounding of the pump as static currents may cause sparks and explosions (see section "Electrical connections").

Whenever there is a danger of explosion, you must comply with the regulations concerning ATEX protection and those of the test certificate, kept where the machine is used.

4.4 Pump installation diagram

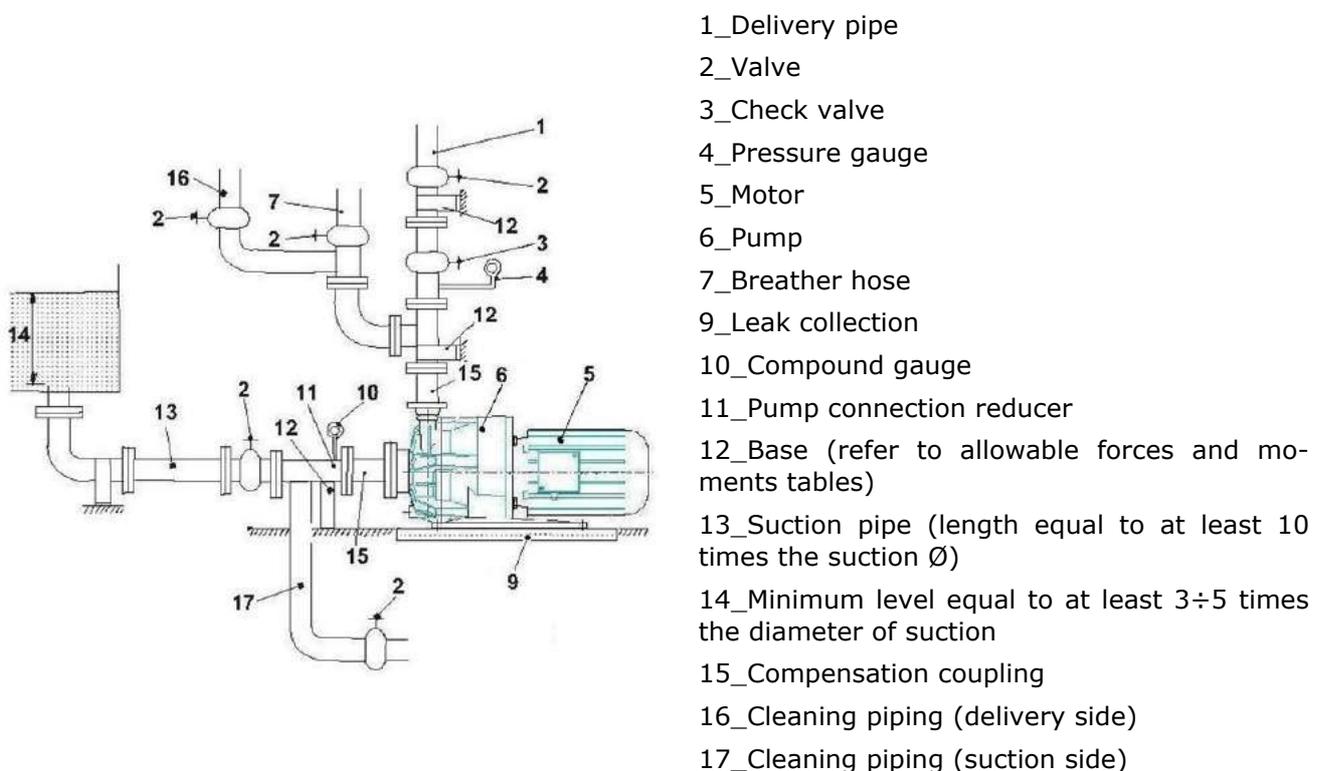


Fig. 14 Pump installation diagram

The check valve protects the pump from possible water hammering.

The shut-off/regulation valve excludes the pump from the line and also adjusts the flow.



If there is a foot valve do not install a delivery check valve because the closing of the foot valve before the check valve would cause water hammer which harms pump performance.

4.4.1 General information



Before connection, remove the pump suction and delivery port protection caps.

A pump is generally part of a piping system that can include a number of components such as valves, fittings, filters, expansion joints, instruments, etc. The piping layout and the position of these components have an important influence on the operation and service life of a pump.



The pump must never be used as a support for the components connected to it.

The thermal expansion of pipes must be compensated for using appropriate expansion compensators.

The pump-piping connection flanges must be centred and aligned before tightening the related bolts. Do not, under any circumstances, attempt to pull or straighten the pipes by tightening the bolts of the flanges or threaded fittings.

The suction and delivery lines and the installed valves or filters must be supported and anchored next to but not on the pump so that no strain is transmitted to the body of the pump.



The forces and moments transmitted to the pump by the piping system must not exceed the allowable forces and moments (see relevant section in the chapter "Technical Data").

The piping must remain clean and free of debris (welding slag, small chips, etc.).

Remove the temporary filters specially provided after commissioning/testing the plant.

The liquid flow should be as straight as possible.

To the extent possible, elbows, tight bends, or radical reductions in diameters should be avoided as they may cause head losses in the plant.

If you need to reduce the diameter you should use appropriate eccentric reducers on the suction flange (and concentric reducers on the delivery flange) at size changes, placed at a minimum distance from pump ports equal to ten (10) times the diameter of the pipe.

4.4.2 Suction piping

Suction piping plays a critical role in the correct operation of the pump-motor unit.

Suction piping must be:

- as short and direct as possible (length equal to at least 10 times the suction \emptyset)
- created according to best practices to prevent the possible formation of air pockets
- free from air inlets (critical points are the seals between the flanges and the seals of the valve stems)
- with the inside diameter equal to that of the suction side of the pump

- with the inside diameter one size greater than that on the suction side of the pump in case of longer pipes



The plant must have a N_{pshd} (available) > N_{pshr} (required)

The NPSHd value of the system must always be at least 0.5 m above the NPSHr of the pump (value referring to water at 20 °C).

RECOMMENDED:

to eliminate air, set up the pipe as shown in the following diagram

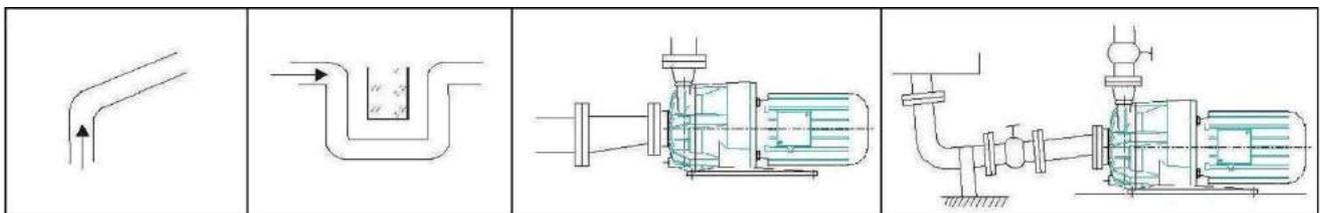


Fig. 15 Recommended installation of suction piping.

AVOID:

piping that can entrap or obstruct the evacuation of air as shown in the following diagram

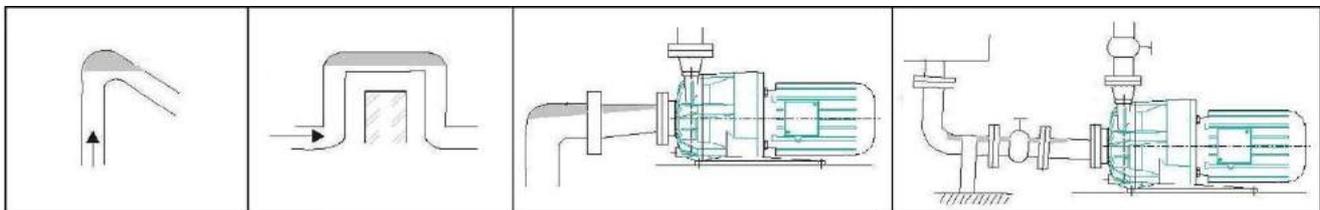


Fig. 16 Not recommended installation of suction piping.

Single-stage centrifugal pumps **not self-priming** always require that a suitable foot valve (check-valve) is installed in all cases where pumps are positioned above the level of the liquid.



Do not, under any circumstances, adjust the flow-rate using the valve on the suction pipe.

4.4.3 Delivery piping

The check valve protects the pump from possible water hammering.

The shut-off/regulation valve excludes the pump from the line and also adjusts the flow.

4.5 Instruments

In order to ensure reasonable control of the performance and conditions of the pump installed it is advisable to use the following instruments:

- a compound gauge on the suction line
- a pressure gauge on the delivery line

The pressure fittings must be installed on straight segments of pipe at least five diameters from the pump ports.

The pressure gauge on delivery must always be placed between the pump and the shut-off/regulation valve.

Flow rates can be deduced by reading the pressures, converted into meters and then compared with the characteristic curves. These optional instruments can signal different pump malfunctions, including: accidental valve closing, no liquid, overloads, etc. (for further information please contact C.D.R. Pompe S.r.l.'s technical service).



If the temperature of the pumped liquid is a critical element you should install a thermometer (preferably on suction).

The instruments must be in conformity with applicable safety requirements and regulations on explosion protection systems.

4.6 Pump-motor unit alignment

4.6.1 General information



Correct alignment between the pump and motor is essential both for proper operation and for a satisfactory service life.

Close coupled execution

In the event the pump is supplied without a motor, carefully follow the instructions included in the chapter "Pump assembly" in order to assemble the motor correctly.

End-suction execution

The joints provided are generally a flexible type to compensate for minor misalignments due to assembly, or due to possible thermal expansion. The flexible joint is protected by a special non-sparking coupling guard, to prevent accidental contacts while the pump is running.



You should not rely on the flexibility of the joints to compensate for misalignments exceeding the limits specified below.



General information is reported below concerning the joints and coupling between the pump and motor; for further details please refer to the joint manufacturer's manual.

4.6.2 Checking alignment

- 1) You must check the alignment before commissioning (i.e. after tightening the nuts of the foundation bolts and the tightening of the port flanges), or after performing maintenance, or when pumps supplied on a base are delivered.
- 2) Warning: checking, and if necessary, correcting the alignment must always be performed with the motor stopped and in safety.
- 3) The tools needed to align these joints are a cutting ruler, a wedge type feeler gauge or a series of thickness probes.
- 4) It is advisable to leave the pump in its position and only move the motor.
 - 4.1) For motors fixed directly to the base, loosen the bolts of the motor feet.
 - 4.2) For motors fixed on an adjustable plate, loosen the bolts securing the motor plate to the respective threaded columns.
 - 4.3) Height adjustments can be made by inserting or removing thin metal sheets under the feet of the motor or by adjusting the threaded screws, while horizontal adjustments can be made with lateral movements. Once the alignment is satisfactory, the motor must be blocked by once again tightening the bolts that secure it to the base.
- 5) The pump-motor unit must be aligned in all directions

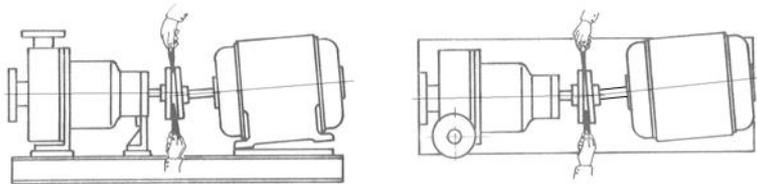


Fig. 17 Angular: the maximum misalignment allowed is 0.8 mm (for a joint that has a 96 millimetre diameter).

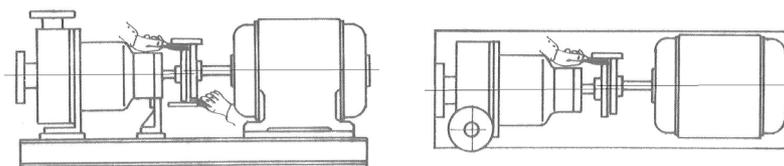


Fig. 18 Lateral: a slight parallel misalignment, no greater than 0.2 mm, can be tolerated with this type of joint.

4.7 Electrical connections



WARNING! Electrical installations in hazardous areas (ATEX classified) must comply with the requirements of IEC 60079-14.

4.7.1 Grounding



Make sure that the motor has suitable grounding and that it has been connected properly. The user is responsible for grounding the machine.



Use the threaded hole on the lantern, or the fastening screw on the foot of the pump marked with the following symbol. See section "Correct Installation".

4.7.2 Wire connections

Please keep in mind that:

- you must comply with the regulations of the local electricity distribution company
- do not, under any circumstances, connect the electrical motors directly to the mains, but install a suitable electrical panel equipped with a disconnector and suitable safety devices
- motors must be protected against overloads using adequate safety devices
- before turning the motor on, check that the motor cooling fan rotates freely
- to facilitate maintenance operations on the pump use flexible cables, allowing the lantern/motor unit to "slide" (see figure below)

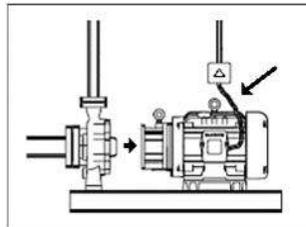


Fig. 19 Lantern/motor unit "sliding".

- the type of connection is specified on the motor data plate, which may be Y (star) or Δ (Delta), based on the power supply of the motor (see figure below).

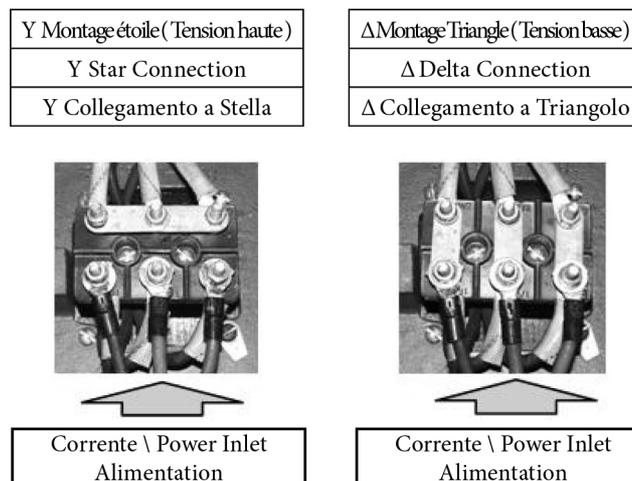


Fig. 20 Electrical connections of the motor.



WARNING!

Always have the electrical connections installed by a trained electrician.



Compare the available mains voltage with the data plate on the motor and then select an appropriate connection.



Do not start the pump! Check the direction of rotation! To check the motor's direction of rotation you must first FILL THE PUMP and follow the safety rules contained in the section "Safety".

5. Starting and stopping

5.1 Pre-start checklist

Before starting the pump, check the following:

- the shut-off valve on suction (if provided) must always be completely open
- the shut-off/regulation valve on the delivery must be set to the minimum flow rate for the pump. If you don't know the minimum flow rate close completely the discharge valve and slowly re-open it to 1/3.
- make sure that the fluid flows regularly to the pump
- the pump and suction piping are completely full of liquid
- for starting on new or modified plants you should use suitable temporary filter socks installed on the suction line



in case of negative suction head, fill the suction pipe and check that the foot valve works properly to prevent back flow of liquid thus emptying the suction pipe with consequent disconnection of the pump



check the direction of rotation:

the motor must turn in the same direction as the arrow shown on the pump. Since all the C.D.R. Pompe S.r.l. pumps turn clockwise, make sure that the motor fan turns clockwise too (view facing the motor fan).



check that the motor rotates freely by turning by hand:

- the motor cooling fan for close-coupled pumps
- the flexible joint for pumps with bearing bracket

- If the liquid must be kept at a certain temperature to prevent crystallization or solidification, heat piping in accordance with installation requirements
- make sure that any auxiliary connections are connected and working (see chapter 11 auxiliary connections, where provided):
 - heating jackets
 - inert gas flushing of the lantern: Please note: check that all threaded holes of the lantern are plugged, especially the lower one near the pump stand
 - if the pump is supplied sealed with external flushing, the flushing liquid pressure must be in compliance with the seal manual



check the level of oil:

- for pumps provided with oil lubricated bearing bracket, fill it before starting the pump (see details in section "Maintenance").

5.2 Frequency of starts



ATTENTION to the excessive surface temperature of the motor!
It may cause danger of explosion and damage to the motor!



In case of ATEX motor installation, observe the frequency of starts specified in the manufacturer's manual.

The frequency of starts is usually determined by the maximum temperature increase of the motor. This largely depends on the power reserves of the motor in steady-state operation and on the starting conditions. If the start-ups are evenly spaced over the period indicated, the following limits can be used for orientation for start-up with the delivery-side gate valve slightly open:

Motor (kW)	Maximum number of start-ups (Start-up/hour)
< 12	15
12 - 100	10
>100	5



Do not re-start the pump/motor unit before the motor has stopped!

5.3 Start-up sequence

- 1) The delivery regulation/shut-off valve must be set so that the pump runs at minimum flow.
- 2) Make sure that the air or gas pockets have been thoroughly bleed.

For mechanical seal pumps, only for the first start up or after long periods of downtime, rotate the pump manually 12 times through the motor fan (close-coupled pumps) or by the coupling (long coupled pumps). This in order to ensure the lubrication of the seal faces, avoiding the bonding and /or seizing up of the seal faces.

- 3) Start the electric motor.
- 4) Gradually open the delivery valve until reaching the desired output or at least one fourth of the total opening.
- 5) If the pressure shown on the delivery pressure gauge does not increase, turn the pump off immediately. Repeat the installation procedure.
- 6) The pump must not run more than two or three minutes with the delivery closed. Operating in these conditions for a longer period of time could cause serious damage to the pump.

Do not adjust the flow rate using the suction valve; see section "Intended Use" in the chapter "Safety".



Should dramatic changes in the flow rate, head, density, temperature, or viscosity of the liquid occur, stop the pump and contact C.D.R. Pompe S.r.l.'s technical service.

5.4 Starting after power failure

In case of accidental stopping, make sure that the check valve has prevented backflow and check that the motor cooling fan is stopped.

Then restart the pump following the instructions in previous section "Start-up sequence".



If the pump is installed over the machine in level, it can unprime during the stop. Therefore, before starting, check again that the pump and the suction piping are full of liquid.

To ensure correct operation of the pump avoid:

- dry running, which could cause the rotating parts to seize
- operating with the delivery closed, which will not allow the heat generated by the pump to be dissipated, resulting in a sudden increase in temperature until the pumped liquid boils and the plastic parts deteriorate
- cavitation, which causes damage to the impeller
- water hammer, which can cause the internal ports and isolation shell to break
- abnormal vibrations, which can cause the screws to loosen and affect the durability of bearings
- unstable working points, which cause undue stress on the mechanical parts.

A series of accessories are available in order to ensure that the pump runs smoothly:

- bushings for accidental dry running made of Graphite LF or Run Safe SiC
- temperature probes
- pressure sensors
- flow sensors
- vibration sensors
- electrical protection equipment

C.D.R. Pompe S.r.l. is at your service to help you select the most appropriate accessory.

5.5 Stop sequence

- A) gradually close the delivery regulation/shut-off valve until reaching the minimum flow rate
- B) stop the motor making sure that the motor deceleration is steady
- C) close all the other valves: if a suction shut-off valve is present, you should close it completely



The reverse sequence is not recommended, especially with larger pumps or with longer delivery piping, in order to prevent possible problems due to water hammer.

5.6 Measures to take for periods of long inactivity

The pump remains installed:

to prevent sediment from forming inside the pump, periodically start the pump for about five minutes (about once a month).

The pump is removed:

proceed as described in the previous section "Stop Sequence". Protect the ports (using the caps provided on delivery). When handling and storing the pump, follow the instructions in section "Storage".



If electrically charged liquids were used in the pump, fill it with inert gas when draining to prevent the formation of an explosive atmosphere.



To allow electrostatic charges to dissipate, wait at least one hour before removing the pump from the plant.

5.7 Running the pump after a long period of stop



It is always recommended to run the pump at least once a month or once every three months as a minimum, for approximately 5-10 mins.

This avoids the formation of sediments inside the pump, as well as preventing the elastomers from losing their elasticity and the mechanical seal from hardening (if the pump is equipped with it).

To restart the pump after a period of inactivity, see the entire section "Starting and stopping" and the section "Maintenance".

We recommend following these suggestions:

UP TO ONE YEAR:

- replace all elastomers;
- check the conditions of the bearing lubricant (1)
- check the mechanical seal (see the mechanical seal manual) (2)

BEYOND ONE YEAR (in addition to the above):

- replace the bearings (1)
- check the magnetic field of the inner and outer magnet (3)

(1) applicable only for pumps equipped with bearing bracket

(2) applicable only for pumps with mechanical seal

(3) applicable only for magnetic drive pumps

6. Pump characteristics

6.1 Description and operation of the pump

The **ETN EVO** series pumps are single-stage centrifugal pumps with magnetic drive, in a single block version.

The main feature of these pumps is the magnetic coupling drive.

These are sub-ISO pumps, suitable to pump fluids in small systems, where the reduced hydraulic needs allow for maximum efficiency and MTBPM (Mean Time Between Planned Maintenance).

The outer magnet is connected to the motor shaft and transfers the torque moment to the inner magnet and then to the impeller by means of a magnetic field.

The impeller is driven without physical contact between magnets.

The isolation shell is located between the magnets to seal the pumped liquid from atmosphere without a mechanical seal.

6.2 Reference regulations

Compliant with	2006/42/EC	94/9/EC and next 2014/34/EU
In accordance with	Sub-ISO 2858	
Flanges	UNI 1092-1 PN16RF or slotted holes ANSI 150RF (optional)	

6.3 Minimum and Maximum Flow

Unless specified otherwise in the characteristic curves or on the data sheets, the following applies:

$Q_{min} = 0.1 \times Q_{bep}$: SHORT OPERATION

$Q_{min} = 0.3 \times Q_{bep}$: CONTINUOUS OPERATION

$Q_{max} = 1.1 \times Q_{bep}$: 2-POLE OPERATION

$Q_{max} = 1.25 \times Q_{bep}$: 4-POLE OPERATION

Q_{min} = Minimum flow

Q_{max} = Maximum flow

Q_{bep} = Flow at the best efficiency point



The data refer to water or other liquids similar to water. However, if the physical properties of the treated liquids are different from those of water, it is necessary to determine whether the additional heat generated can lead to an increase in temperature, such as to impair the operation of the pump. If necessary, the minimum flow rate must be increased.

7. Technical data

7.1 Technical characteristics

SPECIFICATIONS	DESCRIPTION
Pump type	Single stage horizontal centrifugal pump with magnetic drive - Structure: single block
Performance 2900 rpm	Q max = 60 m ³ /h -> H max = 34 mcl
Drives	0.75 kW (size 80) -> 7.5 kW (size 132)
Operating temperature limits	PP: -10°C -> +60°C ETFE: -20°C -> +90°C
Viscosity limits	0.5 - 60 cSt max

7.2 Operating temperature/pressure limit chart

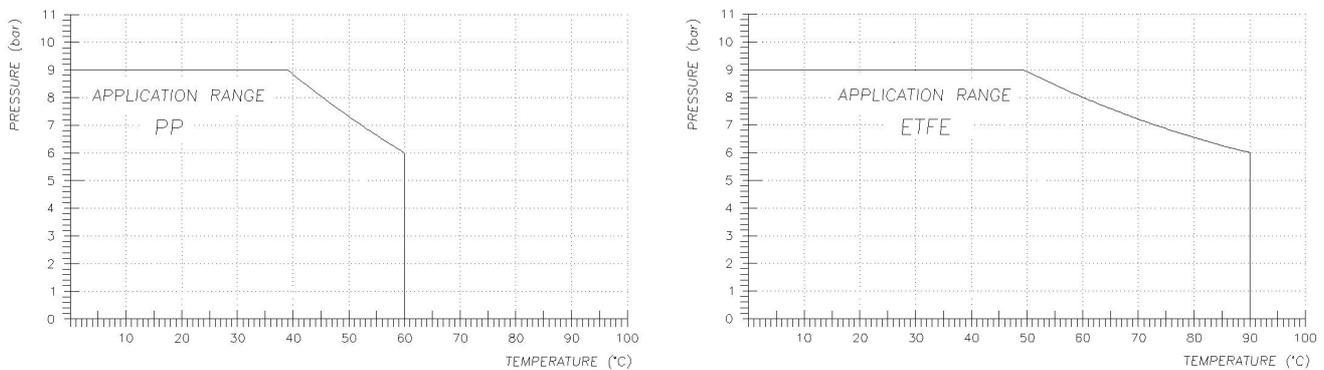


Fig. 21 Left: ETN EVO in PP. Right: ETN EVO in ETFE

Room temperature	0 ÷ 40 °C
Room humidity	35 ÷ 85% RH
Room pressure	0.8 ÷ 1.1 bar abs

In the event of high thermal excursion between the temperature of the pumped liquid and the room temperature, condensation may form inside the lantern.

When transferring high temperature liquids take into account the motor operating temperature limit.

When transferring low temperature liquids, condensation may form on the magnet and volute casing. In this case, de-humidify the area.

7.3 Materials constituting the pump

DIN code	COMPONENT	MATERIAL
102	Casing	(PP / ETFE) lined
106	Suction Casing	ETFE+CF
157	Isolation shell	ETFE+PC / PP-GF, Hastelloy C
211	Shaft	SiC / Al ₂ O ₃ / RSSiC
240	Impeller assembly	PP / ETFE
344	Lantern	GS400
412.1	Casing gasket	EPDM / FPM / FPM-FEP
510	Thrust bearings	SiC / Al ₂ O ₃ / RSSiC
529	Bearing sleeves	SiC / PTFE-Al ₂ O ₃ / Graphite / RSSiC
856	Outer magnet	GS400+Ryton

7.4 Allowed forces and moments

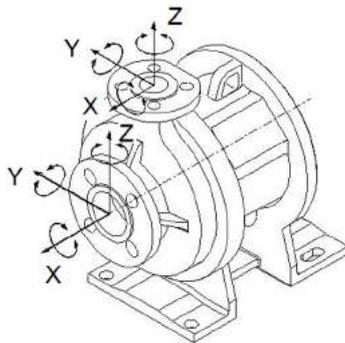


Fig. 22 Forces and moments. X-axis: suction, Z-axis: delivery.

FORCES (F_x, F_y, F_z)

Z-axis - DN	F _y (N)	F _z (N)	F _x (N)	Σ F (N)
25	245	297,5	262,5	455
40	350	437,5	385	682,5
50	472,5	577,5	525	910

X-axis - DN	F _y (N)	F _z (N)	F _x (N)	Σ F (N)
40	385	350	437,5	682,5
65	647,5	595	735	1155
80	787,5	717,5	875	1382,5

MOMENTS (M_x, M_y, M_z)

Z-axis - DN	M _y (Nm)	M _z (Nm)	M _x (Nm)	Σ M (Nm)
25	210	245	315	455
40	315	367,5	455	665
50	350	402,5	490	717,5

X-axis - DN	M _y (Nm)	M _z (Nm)	M _x (Nm)	Σ M (Nm)
40	315	367,5	455	665
65	385	420	525	770
80	402,5	455	560	822,5

7.5 Component/material details and drawing

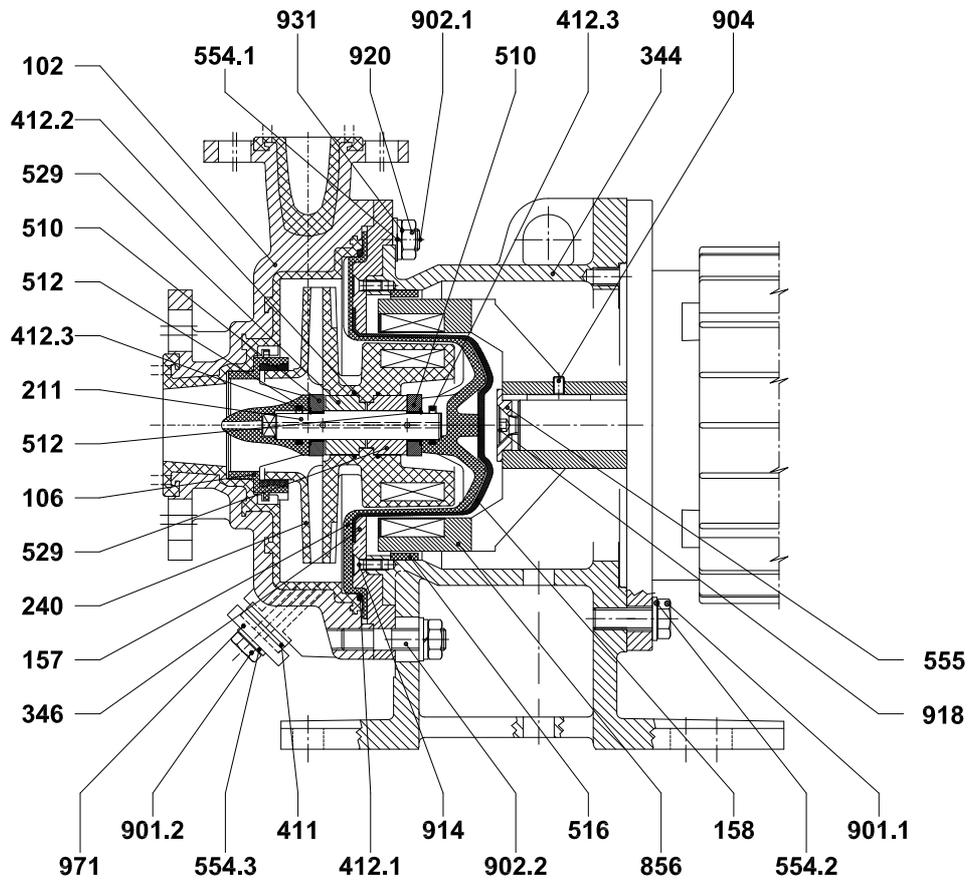


Fig. 23 General cross-section ETN EVO Motor size 100/112.

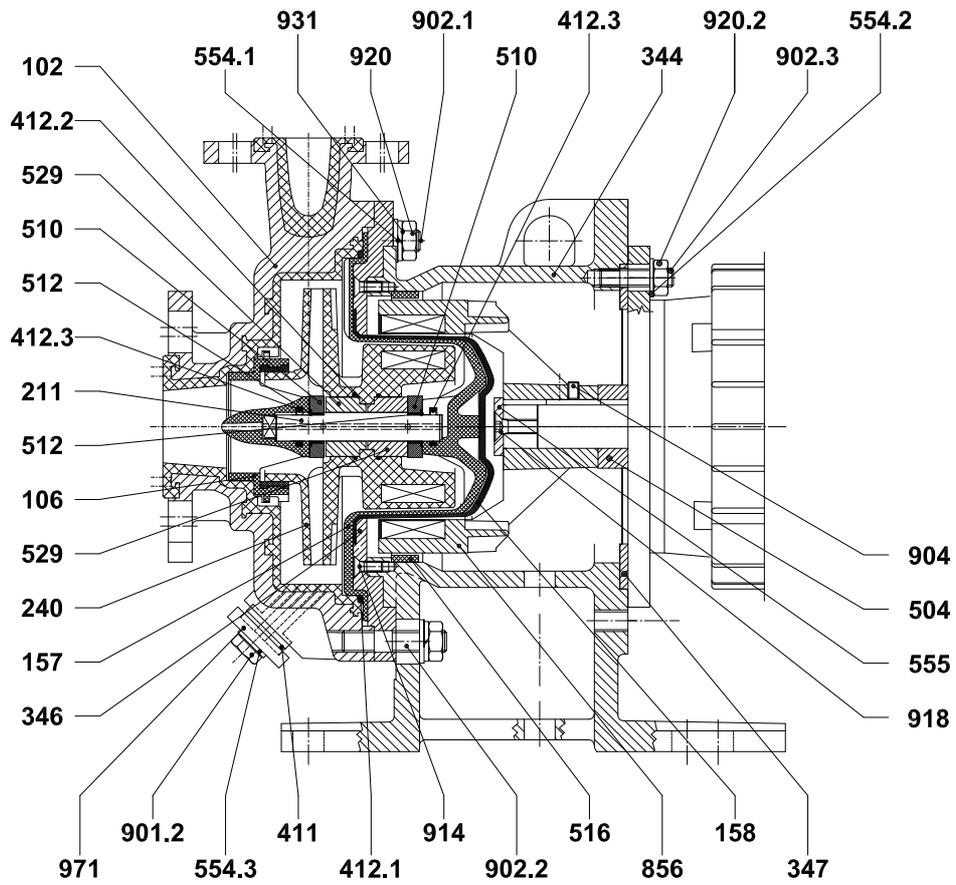


Fig. 24 General cross-section ETN EVO Motor size 80/90.

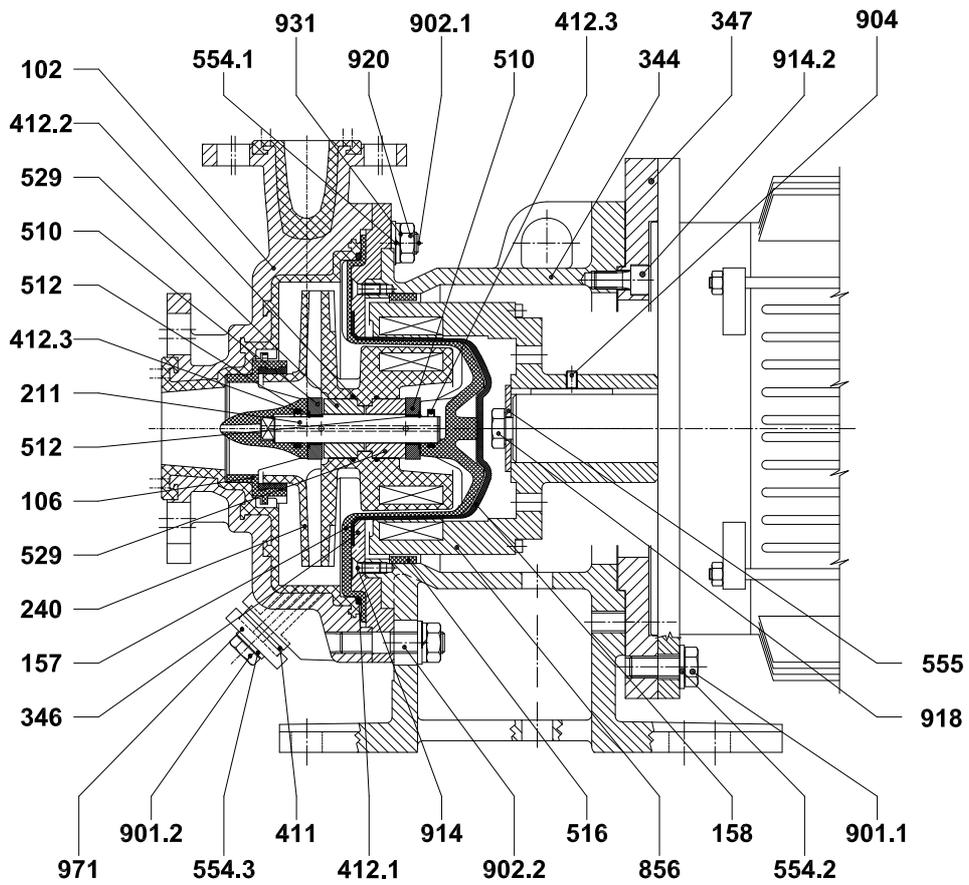


Fig. 25 General cross-section ETN EVO Motor size 132.

DIN code	Description
102	Volute casing
106	Suction Casing
157	Isolation shell
158	Isolation shell cover
211	Pump shaft
240	Impeller assembly
344	Lantern
347	Motor adapter
411	Joint Ring
412.1	O-Ring
412.2	O-Ring
412.3	O-Ring
504	Spacer Ring
510	Thrust bearing
512	Thrust bearing wear ring
516	Antispark ring
529	Bearing sleeve
554.x	Washer
555	Countersunk washer
856	Outer magnet
900	Screw
901.x	Hexagon head bolt
902.x	Stud
904	Grub screw
914	Socket Head cap screw
918.x	Countersunk hex head screw
920.x	Nut
931	Locking washer
971	Draining Plate

8. Disassembly

8.1 General information



During the warranty period no work must be performed by personnel not authorised by C.D.R. Pompe S.r.l. All stages described in this chapter must be performed by qualified personnel.

Prior to carrying out any work on the pump ensure the following recommendations are observed:



use proper Personal Protective Equipment.



clean the outer surface of the pump only with antistatic solutions and clothes.



disconnect all electrical contacts so that the machine cannot start inadvertently.



empty and purge the pump to service the parts in contact with the pumped liquid.



Warning! During assembly/disassembly, strong magnetic fields are present near the magnetic parts/components. Bring metal tools at a safe distance so that they are not pulled suddenly. Furthermore, we recommend to keep electrical data or magnetic strip supports and watches at least 15 cm away.



People with pacemakers must remain at least 50 cm away.



Ceramic and silicon carbide parts are very brittle, therefore they must be handled with care.

8.2 Disassembly of ETN EVO pump

For pumps ETN EVO with motor size 100/112 and shape B5, proceed as follows:



Fig. 26 Disassemble the volute casing (102) from the lantern (344) by unscrewing the relevant nuts.



Fig. 27 Pull out the suction casing (106) from the volute casing (102) turning the suction casing counterclockwise.



Fig. 28 Pull out the thrust bearing (510) from the shaft (211).



Fig. 29 Pull out the magnet/impeller assembly (240), including the bearing sleeves (529) from the shaft (211).



Fig. 30 Remove the bearing sleeves (529) and the bushing locking O-ring (412.2) from the impeller assembly (240).



Fig. 31 Pull out the static shaft (211) and thrust bearing (510) from the isolation shell (157). Remove the O-ring (412.1) from the isolation shell (157)



Fig. 32 Pull out the isolation shell (157) and relevant coating (158) from the lantern (344).



Fig. 33 Pull out the outer magnet-motor assembly (856) from the lantern (344) by undoing the relevant screws.



Fig. 34 Undo the grub screw (904) of the outer magnet (856).



Fig. 35 Undo the screw (918) of the outer magnet (856).



Fig. 36 Pull out the outer magnet (856) from the motor.

If the pumps are mounting motor size 80/90 and shape B5, proceed as follows:

- 1) pull out the motor with motor adaptor flange (347) from the lantern
- 2) remove the outer magnet (856) from the motor as described in the disassembly sequence
- 3) pull out the spacer ring (504)

If the pumps are mounting motor size 132 and shape B5, proceed as follows:

- 1) pull out the motor from the lantern spacer (348)
- 2) remove the outer magnet (856) from the motor as described in the disassembly sequence.

9. Maintenance

9.1 Maintenance interval

To ensure reliable and safe operation the pump unit must undergo proper maintenance at regular intervals and must be kept in perfect technical conditions.

The inspection/maintenance intervals may vary according to the working point of the pump referred to the characteristic curve.

Furthermore, some circumstances, such as intermittent operation, characteristics of the pumped fluid and installation in a system, may impact the duration of wear parts.

9.2 Parts to be checked

1) OUTER MAGNET (Code 856)

DETAILS	ACTIONS
Does the internal diameter of the isolation shell show signs of chemical aggression?	Contact C.D.R. Pompe S.r.l. in case of faults.
Is the isolation shell visibly broken?	Stop the pump and replace the isolation shell.
Are there spots/stains on the outer surface of the isolation shell?	Clean the isolation shell thoroughly and check its seal.

2) ISOLATION SHELL (Code 157)

DETAILS	ACTIONS
Are there any abrasions on the magnet housings?	Contact C.D.R. Pompe S.r.l. in case of faults.
Is the magnet mounted properly? Are screws loose?	Check the coupling between motor and magnet and tighten the screws.
Is the internal diameter of the magnet turning concentrically to the drive shaft?	Check the magnet-motor coupling. Tighten or replace the fastening screws.
Is the magnet vibrating during operation?	Check balancing and magnet-motor coupling. Tighten or replace the screws.

3) IMPELLER UNIT (Code 240)

DETAILS	ACTIONS
Is there any breakage?	Contact C.D.R. Pompe S.r.l. if anything unusual is observed.
Is there any clogging in the space between the impeller vanes?	Eliminate any clogging and clean the impeller.
Does the capsule containing magnets show signs of chemical aggression?	Contact C.D.R. Pompe S.r.l.

4) VOLUTE CASING (Code 102)

DETAILS	ACTIONS
Is there any breakage?	If anything unusual is observed, replace the casing.
Is the gasket swollen/worn?	Replace the gasket.
Does the internal surface show signs of chemical aggression?	Contact C.D.R. Pompe S.r.l.

5) SHAFT (Code 211) / BUSHINGS (Code 529 - 510)

DETAILS	ACTIONS
Are the shaft and/or bushings worn out?	Check for wear according to the following table and replace worn components as necessary.

9.3 Replacing wear parts

The following components may impair the correct operation of the pump if not replaced regularly:

- the gasket of the isolation shell casing (412.1)
- the bushing locking O-rings (412.2) and shaft (412.3)
- the bearing locking rings (512)
- the bearing sleeves (529), the static shaft (211) and the thrust bearings (510) (Limit size values are shown in the following table)



To order spare parts please specify the DIN code of the component and the **SERIAL NUMBER** of the pump.

Description	DIN code	Ref.	Rated value (mm)	Limit value (mm)
Thrust bearings	510	A	8	< 7.6
Bearing sleeve	529	B	18.5	< 18.1
		C	Ø 16	< 16.2
Shaft	211	D	Ø 16	< 15.75

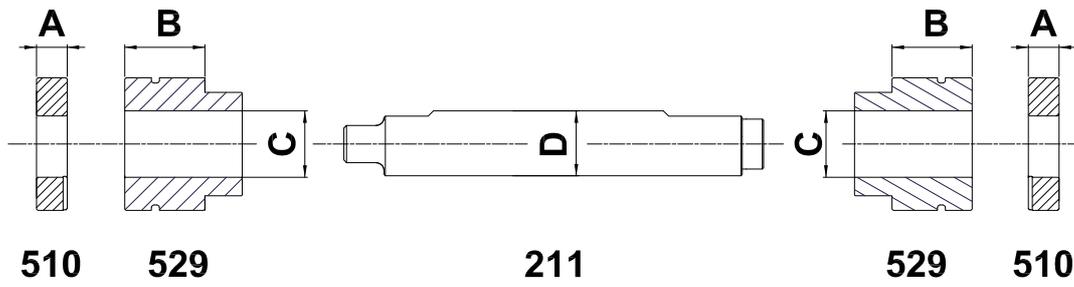


Fig. 37 Thrust bearings, bearing sleeve and shaft are wear parts.

10. Assembly

10.1 General information



Before any assembly operation see the recommendations in the "Disassembly" chapter.

10.2 Screw tightening torque

DIN code	Description	Thread	Tightening torque (Nm)
901.x	Hexagon head bolt	M8	12
		M10	20
		M12	30
914.x	Hex head screw	M10	20
918.x	Countersunk hex head screws	M6	5
		M8	12
		M10	20
		M12	30
920.x	Nut	M10	20
		M12	30

10.3 Assembly of ETN EVO pump

For pumps ETN EVO mounting motor size 100/112 and shape B5, proceed as follows:

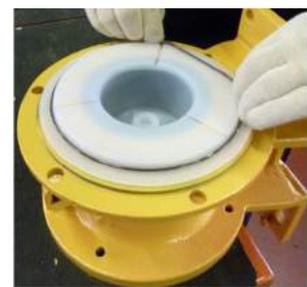


Fig. 38 Seat the antispark ring (516) in the relevant seat of the lantern (344). **Fig. 39** Insert the isolation shell (157) in the cover (158). **Fig. 40** Fit the O-ring (412.1) on the isolation shell (157).



Fig. 41 Seat the suction casing (106) in the relevant slot of the volute casing (102) turning the suction casing (106) clockwise.



Fig. 42 Tighten the studs (902.1÷902.2) for the two longer studs (902.2) to align with the holes which are diametrically opposed to the delivery opening.



Fig. 43 Insert the O-ring (412.3) into the slots found in the holes of the isolation shell (157) and of the suction casing (106).



Fig. 44 Check that the bearing locking ring in PFA (512) is inserted in the thrust bearing (510).



Fig. 45 Couple the static shaft (211) with the thrust bearing (510), which must have 3 grooves toward the innermost part of the shaft.



Fig. 46 Insert the assembly (shaft and bearing) into the suction casing (106) so that the 3 grooves on the bearing are visible.



Fig. 47 Seat the two bushing locking O-rings (412.2) into the impeller assembly (240).



Fig. 48 Insert the rotating bushings (529) into the impeller assembly (240).



Fig. 49 Fit the assembly on the static shaft (211).



Fig. 50 Insert the thrust bearing



Fig. 51 Insert the isolation shell in the casing.



Fig. 52 Insert the lantern (344) on the volute casing (102).



Fig. 53 Tighten the nuts on the studs.



Fig. 54 Insert the outer magnet (856) on the motor shaft.



Fig. 55 Tighten the screw (918) with the relevant washer (555). Secure the seal with a threadlocker, such as Loctite 243. Tighten the grub screw (904) on the outer magnet (856).



Fig. 56 Fit the previously assembled volute casing (102) and lantern (344) assembly on the outer magnet-motor assembly (856).



Fig. 57 Tighten the motor on the lantern (344) with the special screws, with washers in between them.

10.4 Assembly check

After assembly, check the following:

- the impeller rotates freely, operating on the motor fan or the impeller vanes from the intake or delivery opening;
- the pump is sealed by means of air or water pressure at 6 bar;
- the screws of the casing are tightened according to the table in the "Screw tightening torque" paragraph.



Do not start the pump!

To check the motor's direction of rotation you must first FILL THE PUMP and follow the instructions in "Starting and stopping".

11. Malfunctions and solutions



Prior to performing any operation on the pump disconnect the power.



Do not, in any case, operate on pumps or components that have not been fully purged. In compliance with regulation 626/94, our technical assistance service cannot operate on pumps or components which have not been fully purged. Therefore we will be forced to return to sender all pumps we receive that have not been purged.]

11.1 Malfunction table: possible causes and solutions

A	The pump delivers an insufficient flow rate						
B	Motor overloading/overheating						
C	Excessive increase of the bearing temperature (where present)						
D	Leaks from the pump, the mechanical seal (when present) or connections						
E	Vibrations during pump operation						
F	Excessive increase of the temperature inside the pump						
A	B	C	D	E	F	Possible cause	Solution
X						The pump is not primed correctly	Prime the pump and bleed any air in the pipes/volute casing.
X						High head loss.	Set the operation point in accordance with the pump characteristic curves. Check that the pumped liquid is free from impurities. Check the diameter of the impeller; it may be too small
X				X	X	Air in the pump or pumped liquid. The pump or piping are not fully bled/filled	Check the piping seal and the gaskets of the volute casing; replace them if necessary. Bleed and/or fill up
X						Intake manifold or impeller clogged and/or blocked	Remove any sediment from the pump or piping
X			X	X		Available NPSH too low (cavitation)	Check/increase the suction head. Open the suction cut-off valve. Check suction head loss. Check and clean any filter installed on suction
X						Wrong direction of rotation	Invert the two power supply phases of the motor (in case of three-phase power supply)
X						Speed is too low, wrong electrical connections (a phase is missing)	Check the electrical connections and correct them if necessary. Check and increase voltage/frequency within the allowed range if necessary
	X					Power voltage too low	Check electrical installation

A	B	C	D	E	F	Possible cause	Solution
X		X	X	X	X	Rotating parts worn (bearings/seal faces/wear rings)	Replace worn parts with new parts
	X			X		Backflush pressure of the pump lower than the value in the data sheet. No head on delivery	Adjust the working point again. In case of permanent overload, decrease the impeller diameter.
X	X			X		Density and viscosity of the pumped liquid too high compared with the values in the data sheet	Contact C.D.R. Pompe S.r.l.
X			X			Worn gaskets in the volute casing or flanges	Replace the gaskets of the volute casing or connections.
	X	X	X	X		Pipes cause mechanical stress on the pump, or vibrations in the pipes	Check the pump is installed correctly, so as not to be mechanically strained, and check the alignment. Support the pipes properly
	X	X	X	X		Misalignment of the pump/motor unit	Check the coupling and realign if necessary. Check the conditions of the seal for pumps with mechanical seal. Replace the coupling blocks if worn
		X		X		Poor lubrication (low oil level) or excessive lubrication (excessive oil in the bearing bracket) or wrong type of lubricant	Add, decrease or replace the lubricant
	X				X	Wrong tolerance of the bearing bracket housing/bearings	Contact C.D.R. Pompe S.r.l.
				X		The impeller is not properly balanced	Balance and/or clean the impeller
	X			X		Worn bearings	Replace bearings
			X			Loose connecting bolts and screws	Check the bolts and screws are tightened periodically
					X	Liquid temperature not compliant with data sheet or contractual documentation	Check the temperature of the pump/pumped liquid. Contact C.D.R. Pompe S.r.l.
			X			Use of unsuitable materials	Change the combination of materials. Contact C.D.R. Pompe S.r.l.
					X	No coolant or dirty flushing liquid	Increase flushing. Clean/purify the flushing liquid
			X			Disassemble the pump and find the source of leaks	Repair where necessary. Contact C.D.R. Pompe S.r.l.
X				X	X	Air in the pumped liquid due to a low level of liquid at suction	Increase the level of liquid at suction and keep it as constant as possible
X				X	X	Pump running without liquid (dry run)	Stop the pump and check the internal components are not damaged
	X			X		Foreign bodies in the pump	Check and clean the pump
	X	X	X	X		Pipes cause mechanical stress on the pump, or vibrations in the pipes.	Check the pump is installed correctly, so as not to be mechanically strained, and check the alignment. Support the pipes properly.

A	B	C	D	E	F	Possible cause	Solution
X				X		Foreign bodies in the pump.	Check and clean the pump.
X			X			Worn gaskets in the volute casing or flanges	Replace the gaskets of the volute casing or fittings.

11.2 Disposal



Parts of the pump may be contaminated by liquid that is harmful for people or the environment.

- 1) Wear protective clothing when operating on the pump.
- 2) Before disposing of the pump:
 - Collect any leaked fluids and dispose of them in compliance with current regulations.
 - Purge any residual fluids
- 3) Separate the materials of the pump (plastic, metal, etc.), disposing of them in compliance with current regulations.

12. Weight and size

Bareshaft pump weight (without motor):

PUMP VERSION	WEIGHT (kg)
ETN EVO 50	32
ETN EVO 60	32
ETN EVO 70	37

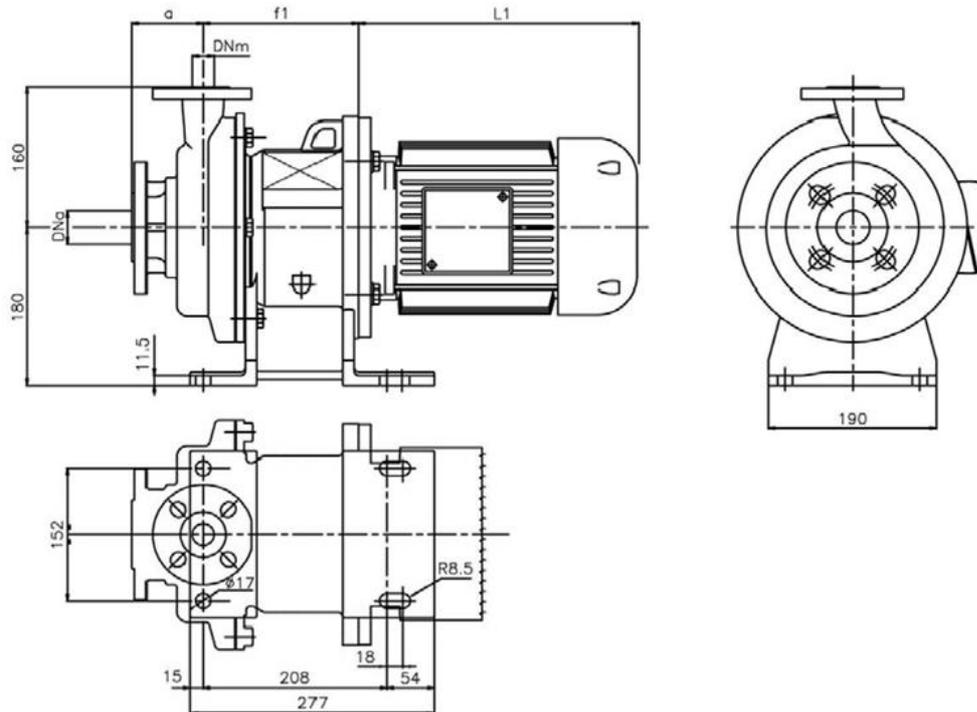


Fig. 58 Size drawing (measurements in mm).

PUMP VERSION	DNa	DNm	a	MOTOR SIZE SHAPE B5	f1
ETN EVO 50	40	25	80	80	175.5
	40	25	80	90	175.5
ETN EVO 60	65	40	80	90	175.5
	65	40	80	100	175.5
	65	40	80	112	175.5
ETN EVO 70	80	50	100	112	175.5
	80	50	100	132	193.5

The size of flanges (DNa, DNm) follows the sub-ISO 2858 standard.

The size of motor L1 changes according to the brand of installed motor.

13. Annexes: CE / ATEX Declarations / Contamination Safety

The pages below list the following annexes:

- CE Declaration of conformity
- CE / ATEX Declaration of conformity
- Safety information / Declaration of contamination



Dichiarazione di Conformità secondo EN ISO/IEC 17050
Declaration of Conformity according to EN ISO/IEC 17050

Prodotto <i>Product</i>	Pompe centrifughe a trascinamento magnetico per liquidi chimici come unità <i>Magnetic Drive Chemical Centrifugal Pump as unit</i>		
Serie <i>Serie</i>	STN, ETN, ETN EVO, UTN-L, UTN-BL		
Direttiva UE <i>EU-Directive</i>	2006/42/CE – Direttiva Macchine <i>2006/42/EC- Machinery Directive</i>		
Modulo <i>Modul</i>	Assicurazione della Qualità <i>Quality Assurance</i>		
Norme armonizzate applicate <i>Applied harmonised Standards</i>	EN ISO 12100 EN 60204-1	EN 809	
Marcatura <i>Marking</i>	2006/42/CE	2006/42/EC	CE

C.D.R. Pompe S.r.l., con la presente, conferma che le serie di pompe sopra citate soddisfano i requisiti essenziali delle direttive e norme indicate.

C.D.R. Pompe S.r.l. hereby certifies that the above mentioned pump series meet the essential requirements of the directives and standards listed.

Persona autorizzata alla compilazione dei fascicoli tecnici in accordo alla 2006/42/CE
Authorised person compiled the technical files according to 2006/42/EC

A. Cerizza
Resp. Area Tecnica
Tech. Dept. Resp.

Senago, 14.03.2017



M. Abordi
Amministratore Delegato
Chief Executive Officer

Compilato/Compiled:	A. Cerizza	il/on:	14.03.2017	Pagina/Page:	1
Approvato/Approved:	M. Abordi	il/on:	14.03.2017	di/of:	1



Dichiarazione di Conformità secondo EN ISO/IEC 17050
Declaration of Conformity according to EN ISO/IEC 17050

Prodotto	Pompe centrifughe a trascinamento magnetico per liquidi chimici		
Product	Asse nudo, monoblocco o come unit ¹⁾ Magnetic Drive Chemical Centrifugal Pump Bare shaft, block version or as unit ¹⁾		
Serie	STN, ETN, ETN EVO, UTN-L, UTN-BL		
Numero di serie	dal	15.04.2016	
Serial number	from	15.04.2016	
Direttiva UE	2006/42/CE – Direttiva Macchine 94/9/CE – Direttiva per atmosfere potenzialmente esplosive (fino al 19 Aprile 2016) e successiva 2014/34/UE – Direttiva per atmosfere potenzialmente esplosive (dal 20 Aprile 2016)		
EU-Directive	2006/42/EC – Machinery Directive 94/9/EC – ATEX Equipment explosive atmosphere (until April 19 th , 2016) and next 2014/34/EU – ATEX Equipment explosive atmosphere (from April 20 th , 2016)		
Modulo	Assicurazione della Qualità		
Modul	Quality Assurance		
Norme armonizzate applicate	EN ISO 12100	EN 809	
Applied harmonised Standards	EN 60204-1	EN 13463	
Marcatura	2006/42/CE	2006/42/EC	CE
Marking	94/9/CE e successiva 2014/34/UE	94/9/EC and next 2014/34/EU	II 2 GD c TX X ¹⁾

Il fascicolo tecnico è stato depositato presso il sottostante ente notificato secondo la Direttiva 94/9/CE e successiva 2014/34/UE.
The technical documentation is filed by below mentioned notified body according to Directive 94/9/EC and next 2014/34/EU.
 BUREAU VERITAS ITALIA S.p.A. Viale Monza 261, 20126 Milano (Italia)

Serie Series	N. Registrato Registered #
STN, ETN, ETN EVO, UTN-L, UTN-BL	BVI/ATEX/ITA/17/020

C.D.R. Pompe S.r.l., con la presente, conferma che le serie di pompe sopra citate soddisfano i requisiti essenziali delle direttive e norme indicate.

C.D.R. Pompe S.r.l. hereby certifies that the above mentioned pump series meet the essential requirements of the directives and standards listed.

Persona autorizzata alla compilazione dei fascicoli tecnici in accordo alla 2006/42/CE
 Authorised person compiled the technical files according to 2006/42/EC

A. Cerizza
 Resp. Area Tecnica
 Tech. Dept. Resp.

1) Non applicabile all'unità in ottemperanza alla 94/9/CE e successiva 2014/34/UE (Linee Guida ATEX, Nov. 2012, Paragrafo 3.7.5.2a)
 1) Not valid for the unit according to 94/9/EC and next 2014/34/EU (ATEX Guideline, Nov 2012, Paragraph 3.7.5.2a)

Senago, 14.03.2017



M. Abordi
 Amministratore Delegato
 Chief Executive Officer

Compilato/Compiled: A. Cerizza il/on: 14.03.2017 Pagina/Page: 1
 Approvato/Approved: M. Abordi il/on: 14.03.2017 di/of: 1

Safety information / Contamination declaration
on CDR pumps and components

Dear Customer,

all industrial and commercial companies have a duty to protect their workers and the environment from harmful influences arising from the use and handling of hazardous materials in compliance with applicable legal regulations.

For the reasons detailed above, an inspection/repair of C.D.R. Pompe S.r.l. products or parts occurs only if they have been thoroughly cleaned up.

Before arranging for shipment of pumps or components, the operator must fill in the declaration on the next page and enclose it with the shipping documents.

Always observe the following requirements:

- ◇ Drain process fluids
- ◇ Wash parts in contact with process fluid
- ◇ Hermetically seal all openings
- ◇ Package properly
- ◇ Send in a container / packaging suitable for transport
- ◇ Affix a copy of the contamination declaration on the outside of packaging

Devices which have come into contact with radioactive substances are not accepted for any reason.

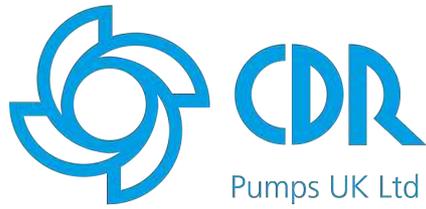
If, despite a thorough emptying and cleaning of equipment, additional security measures are necessary, these must be communicated to us.

Annex: The “Contamination declaration” is an integral part of the repair order.

This shall not however prejudice our right to refuse to accept the order for other reasons.

Sincerely,
C.D.R. Pompe S.r.l.

Senago, 23.03.2015



Pumps UK Ltd | Making the right choice...

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