



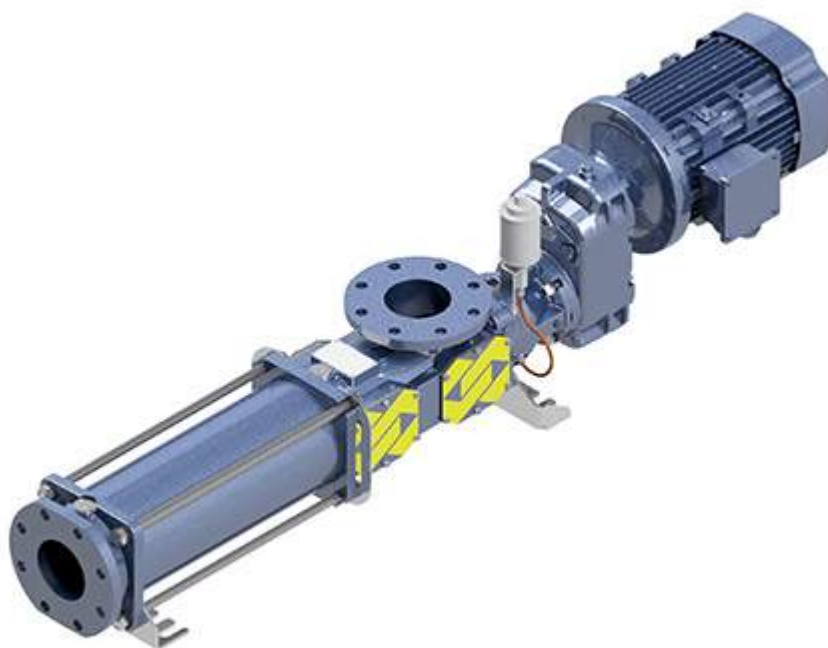
CHIOR®

PCP 60 - PCP 80 -
PCP 90 - PCP 100 -
PCP 110 - PCP 125

*ELECTRIC MOTOR-DRIVEN
PROGRESSING CAVITY PUMPS*

2

ASSEMBLY AND MAIN INSTRUCTIONS FOR USE AND MAINTENANCE

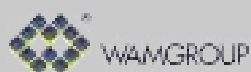


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ORIGINAL INSTRUCTIONS IN ENGLISH

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CHIOR



All the products described in this catalogue are manufactured according to **WAMGROUP S.p.A. Quality System procedures**. The Company's Quality System, certified in July 1994 according to International Standards **UNI EN ISO 9002** and extended to the latest release of **UNI EN ISO 9001**, ensures that the entire production process, starting from the processing of the order to the technical service after delivery, is carried out in a controlled manner that guarantees the quality standard of the product.

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1.1 Scope of the Manual

This Manual has been prepared by the Manufacturer to provide the operating technical information for installation, operation and maintenance of the equipment concerned.

The Manual, which is an integral part of the equipment concerned, must be preserved throughout the life of the equipment in a known easily accessible place, available for consultation whenever required.

If the Manual is lost, damaged or becomes illegible, contact the Manufacturer for a copy specifying the serial number of the equipment.

If the equipment concerned changes ownership, the Manual has to be handed over to the new owner as part of the equipment supply.

The Manual is meant for specialist technical personnel appointed and authorized by the Manufacturer, owner and installer to act on the equipment concerned for which specific technical skills in the sector concerned are necessary (electrical, mechanical, etc.).

The illustrations may differ from the actual structure of the equipment concerned but do not interfere with the explanation of the operations.

In case of doubt, contact the Manufacturer for explanations.

The Manufacturer reserves the right to make changes to the Manual without the obligation to provide prior notification. Exceptions to this are changes that affect safety.

The technical information included in this Instruction Manual is the property of the Manufacturer and therefore has to be considered as confidential.

It is forbidden to use the Manual for purposes other than those strictly linked to the operation and maintenance of the equipment concerned.

This information is provided by the Manufacturer in the original language (English) and can be translated into other languages to satisfy legislative and/or commercial requirements.

1.2 Symbols

To highlight certain parts of the text, for purposes of safety, or to indicate important information, certain symbols are used, the meaning of which is described below.

It is important to comply with and scrupulously follow the information highlighted by the symbols.



Danger - Warning

Indicates situations of serious danger which, if ignored, can be risky for the health and safety of persons.



Caution

Indicates that appropriate behaviour must be adopted to avoid posing risk for the health and safety of persons and avoid causing economic damage.



Important

Indicates particularly important technical information which must not be ignored.

List of safety and information symbols

Symbol representation	Symbol description
	Danger sign: indicates danger of electric shock caused by the presence of powered components inside the junction box or control panel.
	Obligation: read this Manual before carrying out any action on the equipment concerned.
	Forbidden: indicates that it is forbidden to lubricate or adjust moving parts.
	Danger: indicates danger of serious injury to limbs if the internal moving parts of the equipment are exposed. Before opening inspection or maintenance hatches or doors isolate the equipment concerned from the electrical energy sources.
	Information: indicates the direction of rotation of the electric motor.
	Obligation: indicates the hooking points for lifting each section of the equipment concerned.
	Forbidden: indicates it is forbidden to introduce hands into the equipment.

1.3 Glossary and terminology

Operator: Appropriately trained person authorised by the production manager to set up the relevant device (machine) and to carry out routine maintenance work.

Installer: Organisation with qualified staff and suitable equipment for risk-free installation and extraordinary maintenance.

Specialist technician: Person responsible, authorized by the manufacturer, owner or installer to work on the device (machine). This person must have the knowledge required for the relevant subject area (electrics, mechanics, etc.). The specialist technician, in addition to being familiar with the working of the equipment concerned, must be familiar with the working of the plant or equipment on which the equipment concerned is installed.

Routine maintenance: Includes all measures that are necessary to keep the respective device (machine) in good operating condition, to ensure a longer service life and to guarantee the safety requirements.

Extraordinary maintenance: All the actions meant to keep the equipment in perfect working order.

Taking safety measures: All precautionary measures that must be carried out by authorised persons before working on the relevant device (machine).

The precautions are listed below.

- Ensure that the equipment concerned is disconnected from all the mains and appropriate devices are used to prevent these from being reconnected accidentally.
- Ensure that all the moving parts of the equipment have come to a complete stop.
- Ensure the temperature of the equipment concerned is such that it does not burn.
- Provide appropriate lighting in the area around the operations.
- Wait for the material to be handled inside the equipment or machine concerned to settle down completely.

1.4 Manufacturer's data and identification of equipment



Important

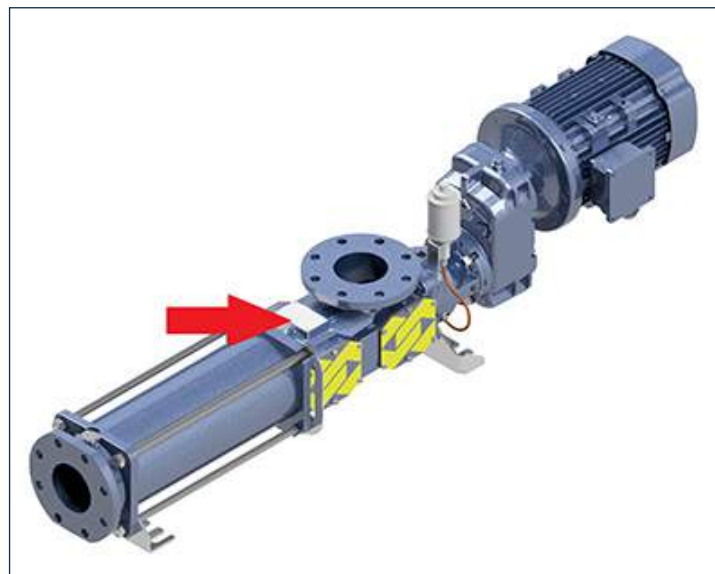
Do not change the data on the ID plate.

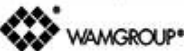
Keep ID plates clean, intact and legible.

If an ID plate is damaged or no longer legible (even if only one piece of information on it) contact the Manufacturer and ask for a new ID plate and replace it.

The ID plates shown identify the equipment concerned and its main components.

The identification plates show the necessary references for a safe operation.



 CHIOR		CE EAC	
Type	Batch No.		
Year	Kg.	IP 68	Ins.cl.: F
Q (m³/h)	H (m)	3 ~	cos φ
kW	V	Hz	A
Service S1	rpm		
		COD: 063002779	

Type:	Complete type designation of the electric motor-driven progressing cavity pump
Batch no:	Serial number
Year:	Year of manufacture
Kg:	Weight of the single electric pump
Hz:	Frequency
A:	Absorption
Cosφ:	Power Factor
Operation S1:	Continuous operation
V:	Electric motor wiring voltage
IP55:	Protection degree
Ins. Cl.: F:	Insulation class
3~:	Three phase AC
kW:	Installed power
rpm:	Gear motor rotation per minute
Q:	Flow rate
H:	Differential pressure

1.5 Request for assistance

For all technical assistance, contact the Manufacturer's service network.

For all requests, provide the equipment identification data, the type of problem encountered and all other information which could be useful for identifying the problem.

1.6 Warranty

The conditions for validity and applicability of the warranty are specified in the sales contract.

1.7 Exclusion of responsibility

The equipment is delivered according to the specifications indicated by the Buyer in the order and the conditions valid at the time of purchase.

The Manufacturer shall not accept responsibility for safety of persons or objects and operation failure of the equipment if the loading/unloading operations from trucks, transport, positioning at the site, use, repairs, maintenance etc. have not been carried out in compliance with the warnings described in this Manual, and in accordance with the national legislation in force.

Likewise, the Manufacturer shall not accept any responsibility if the equipment concerned is used:

- improperly;
- by unauthorized persons and/or persons not sufficiently trained for installation, operation and maintenance;
- with modifications made to the original configuration without the Manufacturer's permission;
- with spare parts that are not original or are not specific for the model;
- without maintenance;
- non-pursuant to the regulatory standards and national or local legislation on the matter of occupational safety;
- non-pursuant to the recommendations in this Manual or on the warning and danger plates applied on the equipment.

2.1 General safety prescriptions

Read the Instruction Manual carefully and strictly follow the instructions it includes, especially those regarding safety.

Most accidents at the workplace are caused by negligence, failure to follow the most elementary safety regulations and incorrect or improper use of tools and equipment.

Accidents can be prevented and avoided by taking due care, using suitable equipment and adopting adequate preventive measures.

Apply and comply with the standards in force regarding workplace hygiene and safety.

The personnel trained for and authorized for the operations has to have the psychological/physical requisites, experience in the sector concerned and the necessary technical skills for carrying out the operations assigned to them.

All workers involved in any kind of operation must be prepared, trained and informed as regards the risks and the behaviour to be adopted.

Pay attention to the meaning of the notices applied on the equipment, keep these legible and respect the information indicated.

Use instruments, equipment and tools that have been approved and are intrinsically safe, and cannot alter the safety level of the operations or damage the equipment during installation, use and maintenance.

Modifications to the equipment components should not be made for any reason whatsoever, without the Manufacturer's permission.

2.2 Safety prescriptions for transport and handling

Carry out all the handling and transport operations in accordance with the procedures and instructions shown on the packaging and in the Manual supplied.

All the operations must be performed by qualified authorized personnel.

Those authorized to carry out the handling operations must have the capabilities and experience required to adopt all the necessary measures to guarantee one's safety and the safety of persons directly involved in the operations.

The chosen features of the lifting and handling means (crane, bridge crane, forklift truck etc.) must take into account the weight to be handled, the dimensions and the gripping points.

During lifting use only accessories such as eyebolts, hooks, shackles, spring hooks, belts, slings, chains, ropes etc., that have been certified and are suitable for the weight to be lifted.

During handling respect the prescriptions applicable for handling loads.

Keep the position of the equipment concerned or the sections and the loose components horizontal, keep the load low and make all the necessary movements gently.

Avoid sudden manoeuvres, dangerous oscillations and rotations, accompanying the movements manually and place the load gently on the ground.

2.3 Safety prescriptions for installation

Before starting with installation, a “Safety Plan” must be implemented to safeguard the personnel directly involved and those who carry out operations in the surrounding area.

All the laws must be strictly applied, especially those concerning workplace safety.

Before proceeding with installation operations, mark off the work area to prevent access by unauthorized persons.

The electrical connections must be made in compliance with the standards and laws in force.

The person in charge of making the electrical connections has to ensure that the required standards and laws are respected before testing.

2.4 Safety prescriptions for use and operation

Do not tamper with the equipment concerned by using any kind of device to obtain performances different from those designed.

All unauthorized changes can affect the health of people and the integrity of the equipment.

The operators have to exclusively wear protective clothing and have to be equipped with appropriate individual protection devices for carrying out the operations and as required by the safety and work accident prevention standards.

Before use, ensure that all the safety devices are installed and that they are working properly.

During operations, prevent access to the work area by unauthorized persons.

Remove all obstacles or sources of danger from the work area.

It is strictly forbidden to walk or placing any improper load on the equipment.

2.5 Safety prescriptions for maintenance and replacement of components



Danger - Warning

Before carrying out any operation on the equipment concerned, ensure it is switched off and disconnected from all mains and use suitable devices to prevent the possibility of the power sources being activated accidentally.

Maintain the equipment concerned in the conditions of utmost efficiency compliant with the maintenance plan provided by the Manufacturer.

Good maintenance apart from preserving the functional features and essential safety features over time, will also allow extending the working life of the equipment concerned and achieving the best possible performance.

Strictly follow the procedures indicated in the Manual, especially those concerning safety.

Ensure that all the safety devices are active and working properly.

Mark off the work area in such a manner as to prevent the access of unauthorized persons.

Replace the worn and damaged components exclusively with original spare parts, whose safety, reliability and interchangeability have been undoubtedly established.

Apart from invalidation of the warranty, the Manufacturer declines all responsibility for damage to objects and harm to persons deriving from the use of non-original spare parts or due to modifications made during repairs without express written authorization.

Use the oil and lubricants recommended by the Manufacturer.

Do not dump polluting material (oil, grease, paint, plastic etc.) in the environment, but carry out waste separation disposal depending on the chemical composition of the various products in compliance with the legislation in force.

On completion of maintenance or replacement operations, before resuming production, check that no foreign bodies (rags, tools etc.) have been left inside the equipment concerned.

2.6 Safety recommendations on biological risks



Danger - Warning

Depending on the product processed with the equipment, it is recommended to wear appropriate personal protective equipment against the biological risk that could not be eliminated (residual risk) in case of contact with the equipment or its components.

2.7 Safety recommendations on chemical risks



Danger - Warning

When handling hazardous liquids (e.g. hot, flammable, explosive, toxic, hazardous to health), observe the safety regulations for handling hazardous substances:

- Consider the safety data sheet of the product!
- Wear personal protective equipment!
- Ensure adequate ventilation in the room!

Pumps that deliver hazardous liquids must be decontaminated before repair, maintenance or disposal! Lubricants, cleaning agents and leaks of dangerous liquids must be drained in such a way that there is no risk to people or the environment. Legal regulations must be observed.

The corrosion resistance of the materials that come into contact with the product against the pumped liquid must be checked before commissioning.

When mixing different liquids, make absolutely sure that no dangerous gas concentrations result from possible chemical reactions (e.g. acid-base). In particular, hydrogen sulphide can be released in the biogas fermenter when acidic liquid is added and ammonia can be released when alkaline liquid is added.

3.1 General description of the equipment

The progressing cavity pump is designed for installation in the pipe or hose line in the agricultural or industrial sector.

The progressing cavity pumps are rotating displacement pumps and therefore have low pulsation.

These devices are designed and manufactured to pump or dose thin to highly viscous, pasty, neutral or aggressive, pure or abrasive, gaseous liquids. They are also suitable for liquids that tend to foam, including those containing fibers and solids.

The progressing cavity pump is self-priming and its conveying elements are formed by the rotating progressing screw (rotor) and the fixed stator. Due to the special profile of both parts, sealed chambers are formed, the contents of which are shifted axially and continuously from the suction to the pressure side when the rotor rotates.

It can even operate in a dry medium. However, dry running should be avoided because of the high friction between rotor and stator and the resulting risk of overheating. Sensor systems signal a lack of liquid in the suction tank, suction line or in the suction chamber of the pump, thus signalling a potential risk of dry running. Progressing cavity pumps must also be protected against overpressure. If the permissible limit values are reached, either an alarm or a pump shutdown is triggered.

The flow rate is proportional to the speed and can be easily adjusted by changing the speed, so that the pump can also handle dosing tasks.

Due to its function, the progressing cavity pump has an increased starting torque, which must be taken into account when designing the actuator (motor, frequency converter, soft starter, etc.) or cardan shaft on the tractor.

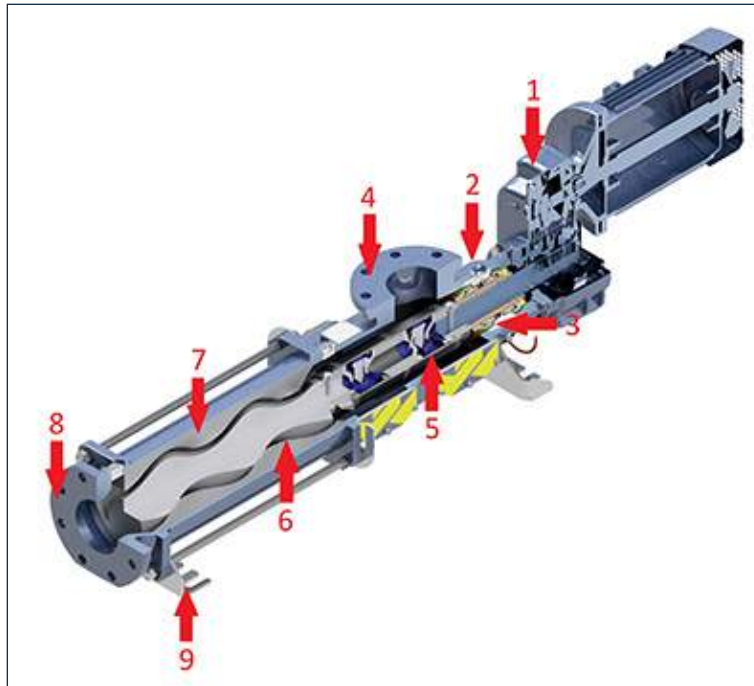
In particular, the electric motor-driven progressing cavity pumps consist of the following components:

- IP55 three-phase gear motor;
- Reducer flange;
- Mechanical face seal or mechanical seal;
- Pump housing and discharge nozzle;
- Universal joint;
- Rotor and stator;
- Fastening bracket for attachment to a flat surface;

The line connections to the pump housing (suction side) and to the discharge nozzle (pressure side) must be made by the Customer.

3.2 Main components

The figure below shows a progressing cavity pump with the main components, as supplied with all versions.



Main components of the progressing cavity pump

Item	MAIN COMPONENTS OF THE PROGRESSING CAVITY PUMP
1	Geared motor
2	Reducer flange
3	Shaft seal
4	Pump housing with intake flange
5	Universal joint
6	Rotor
7	Stator
8	Discharge nozzle
9	Mounting and fastening brackets



Important

The support systems are supplied as an integral part of the electric pump.

3.3 Operating principle of the progressing cavity pump

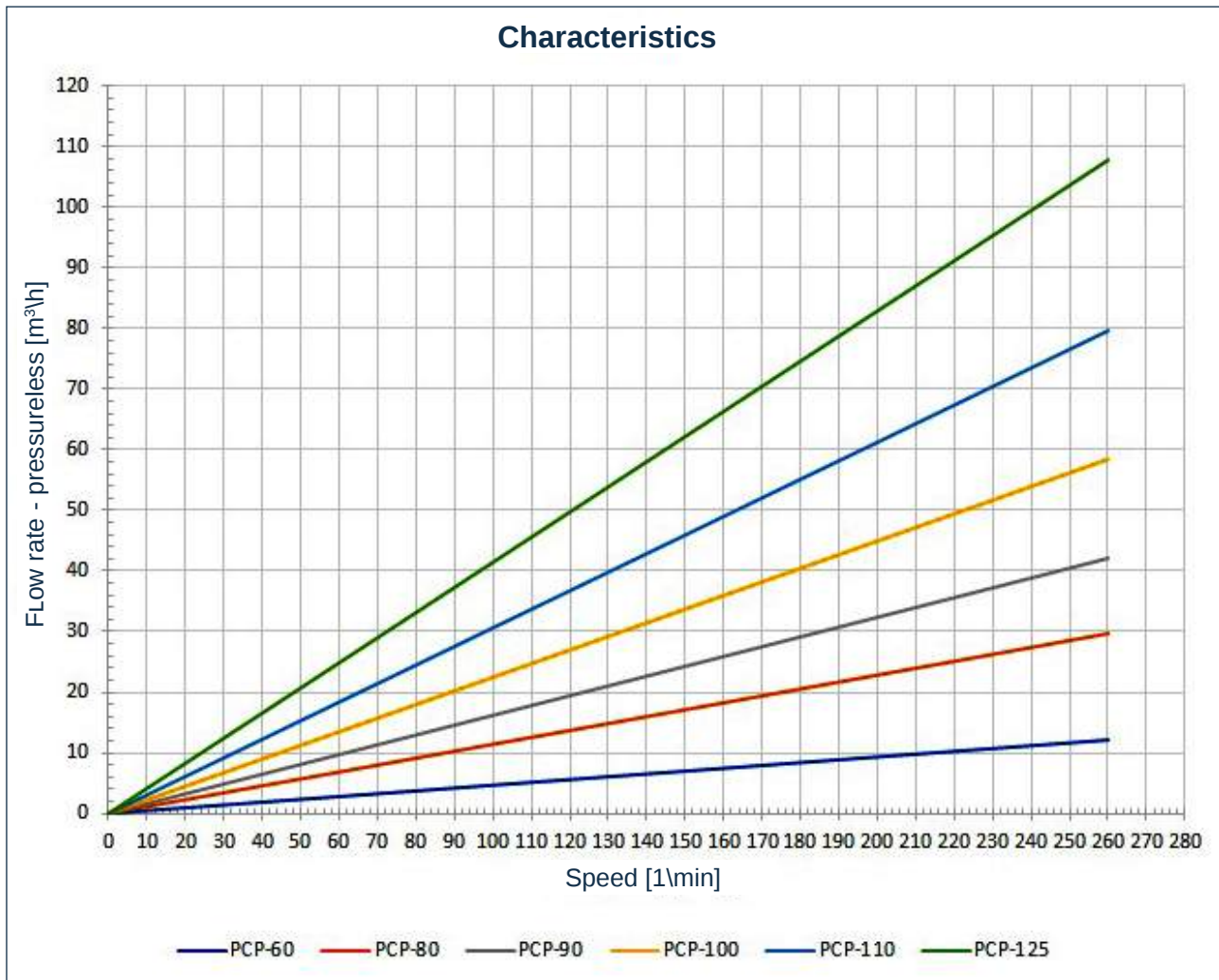
A rotating rotor and a fixed stator as the main parts of the progressing cavity pump serve as the conveying elements. The rotor is a single-threaded, elongated round-thread screw that is driven by the drive unit via a joint. The stator has two threads and twice the pitch length of the rotor. This leaves pumping chambers between the stator and the rotating and also radially moving rotor, which move continuously from the inlet side to the outlet side. The size of the pumping chambers and thus the theoretical flow rate depends on the respective pump size. One revolution of the rotor with a free outlet gives the volumetric flow rate per revolution. The flow rate of the pump can thus be changed via the speed and the actual flow rate is determined by the counter-pressure that occurs. The greater the level number, the greater the number of chambers and the ability to build pressure.

The liquid is sucked in through the pump housing, pushed through the pump set, and conveyed through the discharge nozzle into the pressure line.

3.4 Technical data

Motor data						
Data	50 (60) Hz					
	PCP 60	PCP 80	PCP 90	PCP 100	PCP 110	PCP 125
Power [kW]	2.2 (2.53)	4.0 (4.6)	5.5 (6.3)	7.5 (8.6)	11 (12.7)	15 (17.25)
Voltage (V)	230/400 (440-480)	230/400 (440-480)	230/400 (440-480)	230/400 (440-480)	400/690 (440-480)	400/690 (440-480)
Frequency (Hz)	50 (60)	50 (60)	50 (60)	50 (60)	50 (60)	50 (60)
Nominal current [A]	4.65 (4)	8.13 (9)	11.0 (9.4)	14.7 (12.5)	21.0 (17.7)	28.1 (24)
CONNECTIONS	Y	Y	Y	Y	D	D
Cosφ	0.81 (0.82)	0.82 (0.84)	0.82 (0.84)	0.83 (0.86)	0.84 (0.87)	0.85 (0.85)
no. of poles	4	4	4	4	4	4
IP protection degree	55	55	55	55	55	55
rpm	1430 (1730)	1425 (1740)	1425 (1740)	1430 (1740)	1460 (1750)	1455 (1750)

Pump data						
Data	50 (60) Hz					
	PCP 60	PCP 80	PCP 90	PCP 100	PCP 110	PCP 125
Nominal rotation speed [rpm]	204	204	204	204	204	204
Nominal flow rate [m³/h]	9	22	31	43	58	82
Nominal differential pressure [m]	30					
Maximum differential pressure [m]	60					
Maximum pressure in the pump housing [m]	10					
Maximum ball passage [mm]	47	63	71	79	86	92
Maximum solids size (hard particles) [mm]	12	16	18	20	22	24
Maximum operating temperature with standard pump set [°C]	55					
Maximum ambient temperature [°C]	40					
Maximum relative humidity [%]	80					
Minimum ambient and operating temperature	frost-free					



3.5 Permitted use

The CHIOR progressing cavity pump was designed for the following operating conditions:

- The conveying or dosing of thin to highly viscous, pasty, pure or abrasive, gaseous liquids that tend to foam, also with fiber and solid content;
- pH value of the pumped liquid between 6 and 9;

The pump is powered by a three-phase electric motor with alternating current 400V / 50Hz or 440V / 60Hz. When starting the pump, an increased starting torque is needed, so that the electric motor requires an increased starting current for a short time. If the pump is operated on-site with a soft starter or a frequency converter, this must be designed with a higher power level. The pump output values depend on speed and pressure, and must not exceed the nominal output by more than 5%;

- The pump has a low NPSH value between 1 and 2. The nominal pressure specified on the identification plate is therefore to be understood as the differential pressure between the suction and pressure connections. It is to be operated with a certain discharge head of -80% to +30% of the nominal pressure;
- Permissible pressure in the pump housing:
 - 0.8 to +1.0 bar (mechanical face seal variant)
 - 0.5 to +3.0 bar (mechanical seal variant)

- Permissible pressure in the discharge nozzle: 3 bar (briefly max. 6 bar)
- It is not recommended to carry out more than 5 start-ups (equally distributed) during an hour time.

The CHIOR progressing cavity pump is designed for typical liquids and sludges in the field of sewage treatment plants, biogas and agriculture, e.g. sewage, liquid manure, organic sludge, etc.

When the pump is at a standstill, a slide valve in the pressure line must be closed on-site so that the pump does not rotate backwards and the liquid does not flow back into the pump housing. An additional slide valve on the suction side is required to depressurize the pump for maintenance.

The pump can be permanently fastened to concrete or steel beams, but can also be mobile when installed on a chassis.

External forces (e.g. via flanges) must not act on the pump.

In case there are changes in the operating conditions (direction of rotation, pumped liquid, flow rate, pressure level, viscosity, temperature, humidity, corrosive atmosphere, installation altitude above sea level, external forces and vibrations, pipe changes, etc.), it is necessary to check the suitability of the pump for the changed operating conditions based on the operating limits, and the manufacturer is also to be consulted.

3.6 Improper use not permitted

Any other use, not specifically indicated in this manual, has to be considered improper, therefore forbidden.

IT IS FORBIDDEN:

- Pumping food, pharmaceutical and cosmetic substances;
- Using the pump for conveying bulk materials or for crushing dry matter; It must be ensured that there is liquid in the pump before dry substances are fed in; The mixing ratio must be adjusted so that the mixture is pumpable;
- Operating the pump when the medium is contaminated by foreign bodies (e.g. metal parts, stones, etc.); These can damage the pump and cause it to become blocked; Take suitable measures to ensure that no foreign bodies that could cause damage get into the pump (stone trap, metal separator, etc.);
- Turning on and off the pump for more than 5 times within an hour;
- Operating the pump continuously under alternating loads (i.e. motor/generator operation or clockwise/counterclockwise rotation), since the service life of the pump and the gear is reduced by heavy loads on the rotating parts and on the seal;
- Running the pump outside its flow range;
- Using the electric pump for pumping liquids having features that differ from those specified;
- Lifting the pump by the power cable or discharge pipe;
- Powering the electric motor with a voltage other than the one envisaged or which exceeds the threshold range of $\pm 5\%$;
- Using the pump for uses which have not been intended for;

- Using the pump before having read the instructions for use and with scars attention;
- Reaching into or touching moving parts;
- Reaching into or touching hot parts (motor);
- Using the pump as a shut-off device when it is idle; One-sided pressurisation can cause the drive train to rotate despite the drive being shut down; This can result in damage to the pump;
- Allowing the pump to run empty, as there is a risk of dry running and the pump set could be destroyed; If there is a risk, provide protection against dry running;
- Inserting the hands and / or fingers inside of the intake and discharge piping;
- Operating the pump when the pressure line is not fully open (e.g. due to a blockage or the accidental closing of a valve, the pressure generated by the pump can reach many times the permissible pressure of the system; This can lead to e.g. the bursting of the pipes, which must be avoided at all costs, especially with dangerous liquids; Therefore, appropriate safety devices must be installed in the system - e.g. pressure switches or bursting discs with feedback lines);
- Tampering with the safety devices of the electric pump;
- Using the pump as a support and / or working surface;
- Climbing on the electric pump or lean on the top of objects;
- Touching the exposed electrical parts exposed with the hands wet;
- Storing the pump in a careless manner;
- Cleaning or carrying out maintenance operations without having disconnected first the mains;
- Cleaning or carrying out maintenance operations without having waited for the motor o cool;
- Allowing untrained, unauthorized personnel, carry out maintenance operations without following specific procedures indicated in this manual;
- Carrying out interim repairs or makeshift repairs that do not comply with instructions;
- Using spare parts that are not original or not recommended by the Manufacturer;
- Carrying out maintenance operation in poorly illuminated environments;
- Carrying out maintenance operation without using the proper P.P.D.;
- Tampering the electrical system.

**Danger - Warning**

It is **STRICLTY** forbidden using the pump with explosive materials. The liquid to be pumped must not be a flammable liquid. Flammable liquids are classified according to regulation 1272/2008/EC (CLP regulation).

It is strictly forbidden using the pump in areas classified for explosion risks.

3.7 Environmental operating limits

Unless otherwise specified, the equipment concerned may be used only within the limits indicated.

- Altitude: less than 1,000 m at sea level.



Important

It is forbidden to use the equipment for materials with a temperature above +55 °C. In case of outdoor temperatures below 0 °C, the equipment has to be provided with the necessary protections. In case of thermal conditions beyond the recommendations, contact the Manufacturer.

3.8 Noise level

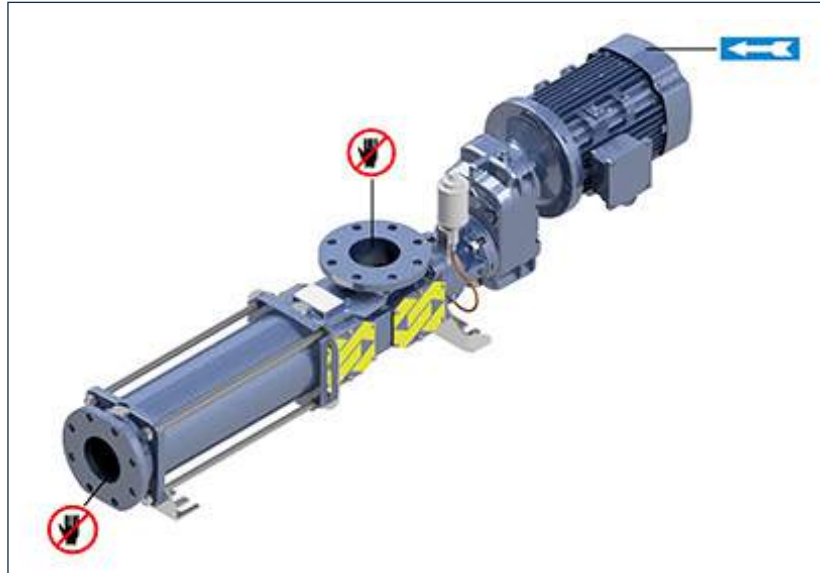
The noise level depends on several factors such as dimensions, the nature of the material to be conveyed and the filling rate.

The noise level of the electric pump, under normal operating conditions, is less than 80 dB (A). Values measured from 1 m distance on the most unfavorable position.

The vibrations of the machine doesn't represent a hazard for the personnel that operates it. An excessive vibration could be caused by a fault that has to be immediately signalled and repaired to avoid decreasing the reliability level of the equipment.

3.9 Overall dimensions and technical features

For an exact identification of the equipment concerned, see the ID plate.

3.10 Safety and information signs

NB: See the page 2, 1.2 Symbols

**Danger - Warning**

Danger of shearing and dragging: Do not reach into the progressing cavity pump!

**Important**

Check the correct direction of rotation of the electric motor.

3.11 Safety devices

The CHIOR progressing cavity pumps are optionally equipped with safety devices and systems to ensure safety when using the electric pump.

The main protections are listed below:

- Pt100 temperature sensor with analysis unit
- Pressure sensors on the suction and pressure side

These devices are maintenance-free; in case of malfunction of the electric motor, contact the CHIOR Customer Service.



Caution

Before starting any maintenance operation on the pump, the operators must wear personal protective equipment (PPE), namely:

- **Gas mask with suitable filters for sewage;**
- **Narrow sleeves overalls, well fastened;**
- **Protective gloves;**
- **Rubber boots.**

The personal protection equipment:

- have to comply the safety standards in force;
- they have to be the of right size so that they do not bother the operator during the movements and they cannot get caught in the mechanism;
- they have to be properly worn and fastened, to avoid unwanted movements; in case they get worn, they have to be replaced with new ones.

4.1 Type of packaging

The list shows the description and symbols envisaged on the packing.

A) Fragile: Indicates that the package must be handled and lifted carefully to avoid damage.



B) Centre of gravity: Indicates the position of the gravity centre of the package.



C) Harness: Indicates the correct harness position for lifting the package.



D) Stacking limit: Indicates the maximum stacking load of the packages.



E) Weight: Indicates the maximum weight of the package.

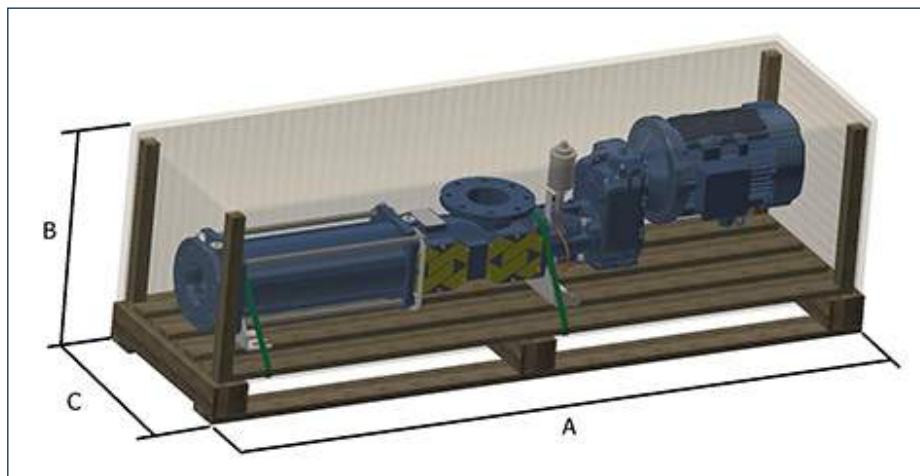


The packaging material has to be disposed of or recycled in compliance with the standards in force. Due to the risk of injury, no steel straps are used. If, in exceptional cases, steel straps have been used, wear gloves and stand to the side when removing.



Important

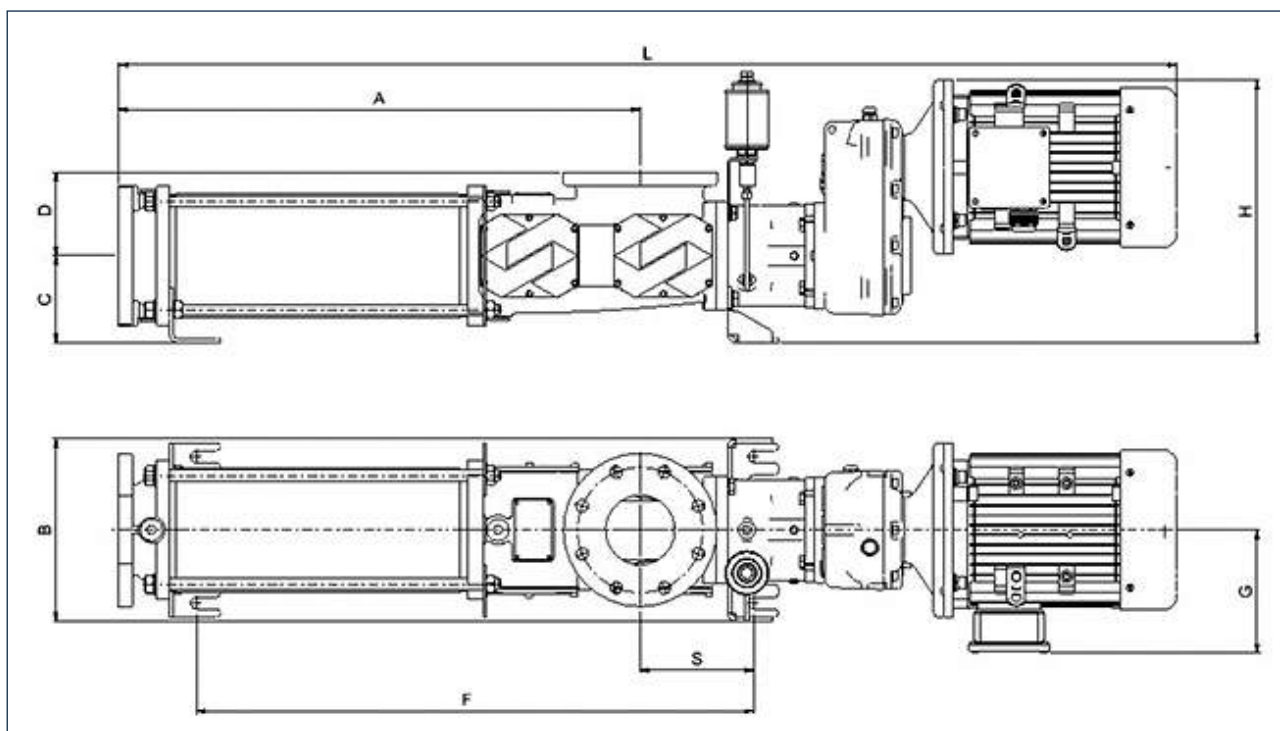
The Manufacturer shall not be held liable for potential damages caused by a failure to observe the information provided for shipment and handling or due to the use of improper equipment to handle the equipment.

**4.0 INFORMATION REGARDING HANDLING
AND TRANSPORT**

PACKAGING WITH PALLET

Model	Connection flange	Drive power [kW]	Weight of packaging [kg]	Weight of the electric pump [kg]	Weight of the electric pump + packaging [kg]	Dimensions (mm)		
						A	B	C
PCP 60	DN65/PN16	2.2	17	135	152	1690	543	500
PCP 80	DN100/PN16	4	17	163	180	1690	543	500
PCP 90	DN150/PN16	5.5	20	233	253	1990	603	500
PCP 100	DN150/PN16	7.5	20	260	280	1990	603	500
PCP 110	DN150/PN16	11	25	398	423	2590	743	500
PCP 125	DN150/PN16	15	25	463	488	2590	743	500

4.2 Overall dimensions

PCP 60 - 125



Model	Connection flange	Drive power [kW]	DIMENSIONS (mm)								
			A	B	C	D	F	G	H	L	S
PCP 60	DN65/PN16	2.2	650	262	125	110	701	180	377	1455	163
PCP 80	DN100/PN16	4	748	262	125	120	799	190	377	1593	163
PCP 90	DN150/PN16	5.5	891	302	150	140	967	210	438	1796	192
PCP 100	DN150/PN16	7.5	951	302	150	140	1027	210	438	1896	192
PCP 110	DN150/PN16	11	1070	372	160	165	1164	255	509	2230	225
PCP 125	DN150/PN16	15	1231	372	160	165	1325	255	553	2475	225

4.3 Reception of goods

On receiving the goods, ensure that the type and quantity correspond to the data present on the acknowledgment of order.

Possible damage has to be immediately communicated in writing in the space provided to this purpose in the waybill.

The carrier is obliged to accept the complaint and leave the Customer a copy of the waybill.

If the supply is "free destination" a copy of the waybill and of the complaint shall be sent to the Manufacturer or to the forwarder.

If the damages are not claimed immediately on receipt of the goods, your request for compensation may not be accepted.

4.4 Lifting and unloading methods



Danger - Warning

Carry out the lifting and handling operations according to the information indicated on the equipment and in the Manufacturer's Operation Manual.

The person authorized for unloading operations has to make sure all the necessary measures are adopted to ensure his or her safety and the safety of other persons directly involved.

Use means and accessories (ropes, hooks, shackles etc.) suitable for the load to be lifted.

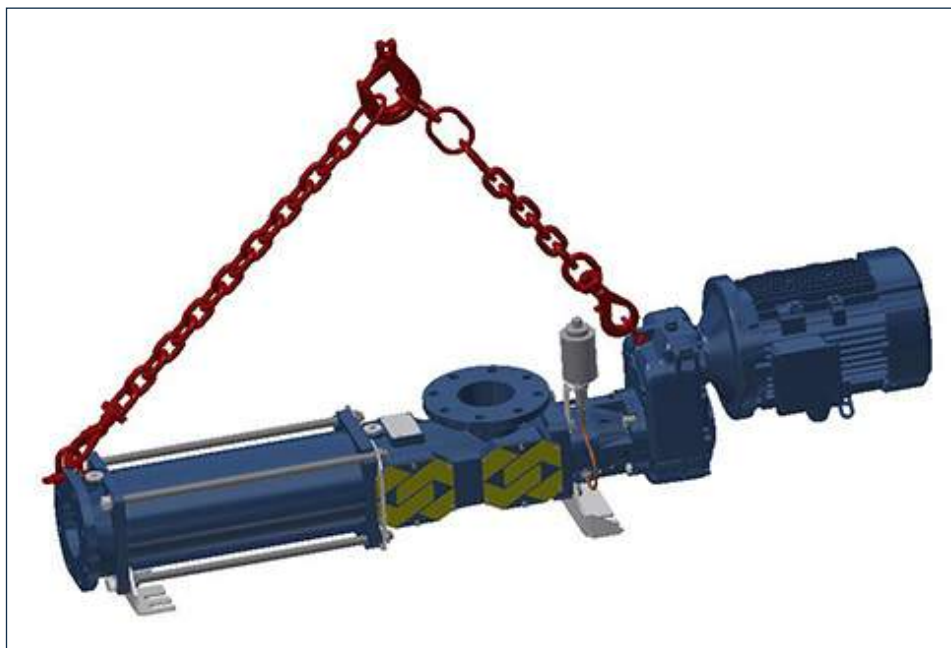
Pay attention in the lifting phase to balance the load to avoid uncontrolled movements which could cause work injuries to persons.

Do not stack the packages as they are not sized for that purpose.

Do not drag or push the entire or sections of the equipment as it will damage them.

Before lifting and handling the load, read the relevant information indicated in the "Information regarding safety" Chapter.

Given their weight, the CHIOR progressing cavity pumps should only be lifted using lifting equipment and accessories of sufficient lifting capacity.


Important

The lifting means have to match the weight and dimensions of the component as well as the movements to be carried out.


Danger - Warning

The electric pump, given its considerable weight, must be moved using the provided gripping points and suitable lifting equipment, which can easily support its weight. When lifting, transporting and lowering the device, no one should be under the load.

Never leave the load unattended while it is being lifted. When lifting and lowering, do not reach under the device.


Caution

In order to move the electric pump, the lifting equipment must not be attached to the electric cables, as this could damage them and thus impair the operation of the electric pump and, at the same time, create the risk of the pump falling.

4.5 Shipping and packaging

For **road transport**, use vans or trucks with a housing that suits the size of the progressing cavity pump and provides the necessary space for easier loading and unloading operations.

After placing the device on the means of transport, make sure it cannot fall or move; it may damage the vehicle or fall off, which may endanger the safety of others.

To avoid such situations, fasten the device firmly to the means of transport and secure it with harnesses in every possible direction of movement.



Caution

SHIPPING RECOMMENDATIONS

For transport, special packaging has been provided to safely handle the electric pump.

For transport operations, make sure you have firmly secured the packaging on the means of transport to avoid the rolling or falling of the electric pump, which can cause damage to property, people or to the electric pump itself.



Caution

STORAGE RECOMMENDATIONS

Proper storage increases the service life of the progressing cavity pump. Proper storage means keeping away from negative influences, such as heat, dust, moisture and chemicals. The pump must not be stored outside of enclosed spaces.

If the pump was already in operation, it must be completely cleaned and decontaminated prior to storage.

In the case of long-term storage (storage period > 3 months), the following storage instructions must be observed:

- Storage location: cool but frost-free, dry, dust-free and moderately ventilated;
- Storage temperature up to 40°C; protect the pump from direct sunlight;
- Relative humidity not above 70%; Avoid condensation!

If the rotor is not used for more than 3 months, it can permanently deform the stator on the contact surfaces. This requires an increased starting torque when restarting.

If the pump is to be put into operation again, silicone oil or pure soft soap must be applied between the rotor and stator via the discharge nozzle and cleaning openings on the pump housing in order to loosen any adhesions in the pump set. Otherwise the drive train could be overloaded.

To avoid the deformation of the stator, we recommend storing the stator separately from the pump in the event of a longer standstill. The rules of DIN 7716 apply.

5.1 Safety prescriptions for installation



Danger - Warning

The replacement operations must be carried out by a specialist authorized technician with specific skills.

Provide appropriate safety measures and use suitable equipment to prevent risk of work accident to persons involved in the operations and to those nearby.

Harness and handle the sections of the equipment concerned as described and shown in the “Unloading and lifting method” paragraph.

It is forbidden to pull, stress or bend the power cables (the minimum bending radius must be at least 5 fold the cable diameter).

The free ends of the cables have to be suitably protected against possible water or moist infiltration, especially during installation.



Danger - Warning

FIRE AND EXPLOSION

- Do not use the progressing cavity pump in the vicinity of paint, solvents, fuel or other highly flammable material storage areas!
- It must be ensured that the installation site of the progressing cavity pump is outside the potentially explosive area and that the pump does not convey any flammable liquids.

ELECTRIC SHOCK

- Make sure the free ends of the powered cables never enters into contact with water!
- The power cable must be perfectly intact, since even small abrasions, can cause infiltration of liquid inside the engine housing!
- The pump is to be disconnected from any external power supply, even if the location is changed slightly.

PREPARING THE ASSEMBLY PLACE (RESPONSIBILITY OF THE CONTRACTOR)

The Contractor must perform the following preliminary steps in order to provide for a proper installation of the equipment:

- verify the suitability of the support surface and supporting structure on which the equipment will be installed.

In particular, the installation substructure (concrete quality, concrete thickness, steel frame) must be able to absorb the static and dynamic forces of the progressing cavity pump and it must be level.

- the suitability of the manoeuvring space so that the pump may be reached easily and safely at any time, as well as operated and maintained from a safe standpoint;
- check the suitability of the pathways, corridors, walkways and escape routes in the vicinity of the installation site;

The determination of the space requirement is carried out taking into account the following factors in particular:

- Dimensions and weight of the progressing cavity pump;
- Necessary transport and lifting equipment;
- Possible pipeline route;
- Manoeuvring space to operate the progressing cavity pump, the speed adjustment, to read the speed, temperature and pressure displays, to change the lubricant in the shaft seal and to change the oil in the gear motor;
- Space required to handle the assembly tools during disassembly (e.g. sufficient wall clearance for stator disassembly = at least one stator length wall clearance);
- Before making openings and drillings, be sure to pay attention to laid pipes, power lines or similar;
- Avoid material damage caused by excessive forces and torques of the pipeline on the pump; Do not exceed permissible values (see nozzle load according to DIN EN ISO 14847); If necessary, install expansion joints between the pump and the pipeline.

The installation site must be designed in such a way that no damage occurs if the pump leaks:

- Installation site with leakage drain;
- Installation of leakage sensor;
- The pipeline is to be laid in such a way that leaks at pipeline connections do not cause damage and that leaks can be quickly identified and remedied.

The progressing cavity pump is installed by the operator or on its behalf. The following must be observed:

- Never work alone;
- Have a first aid kit at hand;
- Keep retreat routes clear;
- Make sure the work area is clean;
- Danger due to rotating parts (when the device is open);
- Never turn on the progressing cavity pump unless it is fully connected to the piping;

**Danger - Warning**

The installer is responsible for properly connecting the components in accordance with the safety regulations applicable to the installation site.

Installation and subsequent testing of the suitability and proper functioning of the electrical system:

- The power supply line, output power, the distribution circuit, circuit breakers for the cutting of the short circuit current, section, power, cable length and earthing in accordance with regulations.
- If the overcurrent protection circuit breaker is of the thermal magnetic type with differential release, the "In" threshold level must not be less than 0.5 A.

When installing the electric pump, it is necessary to observe the following recommendations, in order to avoid damaging it.

- In the case of outgassing liquids, the suction line can fill with a gas bubble while the pump is at a standstill, provided that it is designed to rise, so that there is a risk of dry running.
- In the case of outgassing liquids, inadmissibly high pressures can occur in the pump if the slide valve is closed on the suction and pressure sides. Close both slide valves only for maintenance, if the pump needs to be opened.
- As a rule, when the pump stops, only close the pressure-side slide valve so that the pump does not rotate backwards due to the pressure in the pipeline and the liquid does not flow back again.
- The correct dimensioning of the pipeline is crucial in order to be able to pump the liquid reliably.
- The pipeline is to be executed on the suction and pressure side in such a way that it does not run empty when it is at a standstill. This prevents the pump from running dry when it is started up.
- Clean the pipeline before assembly and connect it to the pump.
- The suction line is to be made as short and direct as possible, with a low suction height and the largest possible pipe bend radius.
- Make sure that the flow resistance in the pipeline is as low as possible and take into account all possible operating conditions:
 - cold/warm
 - pressureless/pressurised
 - homogeneous liquid / easily segregated liquid
- In general, to facilitate maintenance, a flat slide valve must be installed in the pipeline on the suction and pressure sides. A pipe section with at least the same length as the stator is to be provided in the pressure line to facilitate the dismantling of the stator.
- Depending on the nature of the liquid to be pumped, valves, filters or severe pipe constrictions that tend to clog are to be avoided.
- The maximum permissible pressure in the pump housing is 1 bar, unless otherwise agreed.
- The permissible pressure in the discharge nozzle is the maximum operating pressure specified in the order. Please note that the pressure resistance of the flange (e.g. PN16) is not the decisive factor for the maximum permissible pressure.

**Danger - Warning**

Operations at high altitude (height > 2 m) must be performed by qualified personnel and trained for the purpose, equipped with:

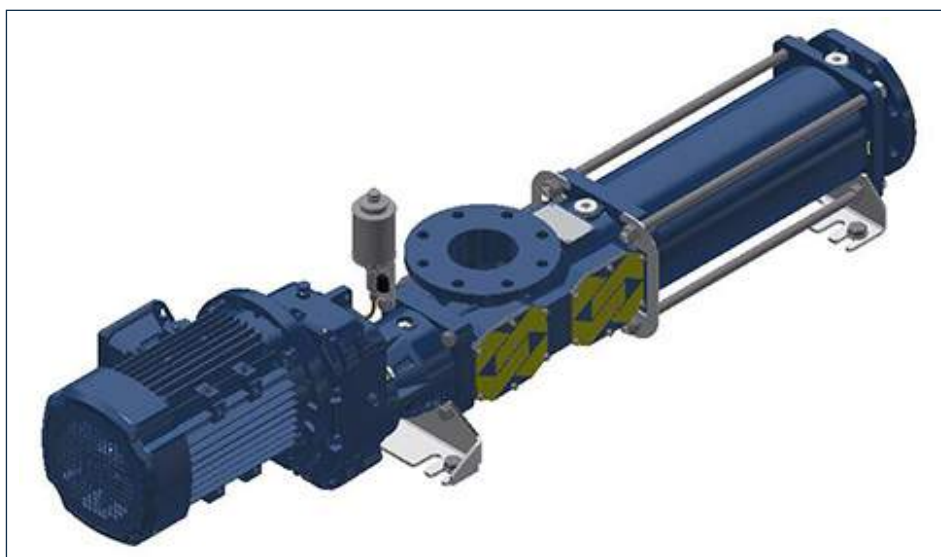
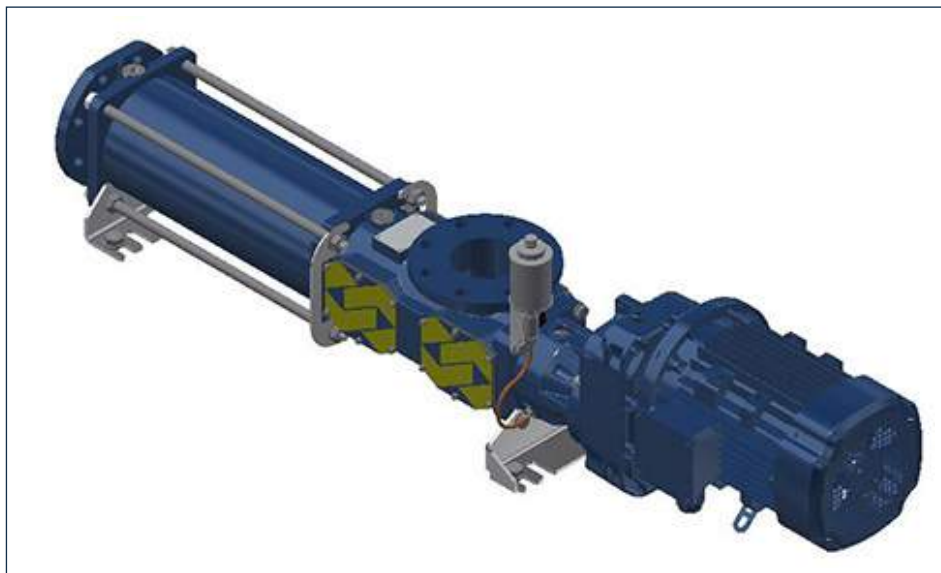
- **Appropriate personal protective equipment (PPE = shoes, helmet, gloves, safety belts);**
- **Work equipment (forklift and scaffolding) compliant to the following parameters:**
 - **type of workplace, environmental characteristics, soil type;**
 - **height of the workplace, and available space;**
 - **Dimensions and weight of the parts to be installed;**


Important

The assembly operations for the components of the equipment must be carried out in accordance with the instructions contained in this manual. Above all, it must be ensured that:

- The instruction manual refers to the correct type of equipment to be installed;
- The equipment's features comply to the use intended;
- The equipment, cranes and lifting devices used are suitable for the load to be handled;

In order to avoid damage to the equipment and the contamination of the pumped liquid, it should be noted that the rotor and stator are fitted with silicone oil as standard ex works. If the silicone oil is not compatible with the medium or system, the pump must be cleaned before assembly.

5.2 Installation of the progressing cavity pump


The progressing cavity pump is fastened to the discharge nozzle and pump housing using the fastening brackets. Unless otherwise agreed, fasten the pump using on-site machine screws or anchor plugs. If necessary, unevenness should be leveled out by placing spacer plates under the fastening brackets.

Corrosion can cause parts to lose their strength and no longer perform their intended function. For this reason, only use corrosion-resistant fastening components (shear connectors, screws, nuts, etc.) that are designed for the forces that occur.

If the progressing cavity pump is equipped with a mounting frame, it must be aligned and unevenness compensated for by placing spacer plates under the frame or pump.

It is recommended to use the 4 outer mounting options (see figure) because of the increased stability and the easier assembly. Alternatively, it is possible to choose the 4 inner mounting options if it seems more affordable on site.

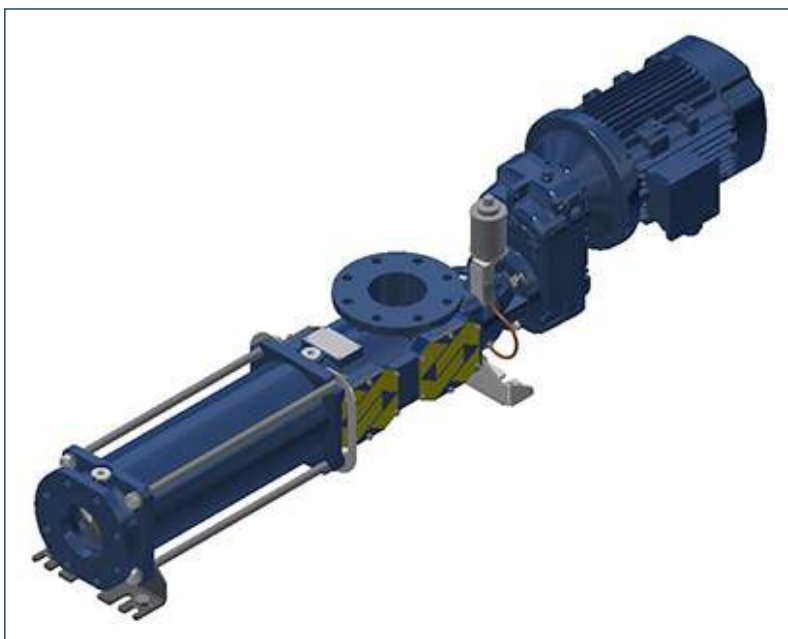
Drill anchor holes and anchor the pump or mounting frame including the pump with shear connectors (mortar cartridge and threaded rod) to the concrete according to the anchor manufacturer's specifications or set anchor plugs.

Fasten the progressing cavity pump with a washer and hexagon nut or, in the case of anchor plugs, with a hexagon screw.

5.3 Positioning of the fastening brackets

When delivered, the fastening brackets are positioned according to the figure in section 5.2.

When exchanging the pump with another make, it can be advantageous to fix the fastening bracket on the discharge nozzle in the opposite direction to the discharge nozzle, as shown in the following figure.



To do this, loosen the two lower tie rods and turn the fastening bracket.

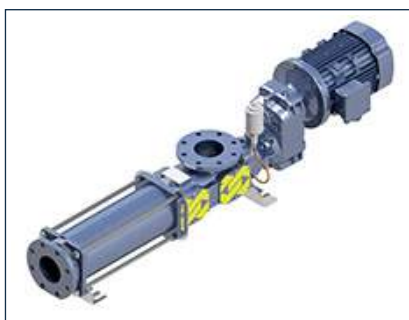
Reattach it by screwing the tie rods back into place.

Finally, tighten the lock nut for the fastening bracket again.

5.4 Installation position of the electric pump



Suction spout position on the right



Suction spout position at the top



Suction spout position on the left

Vertical positioning is not permitted.

5.5 Hydraulic connections

The piping for the electric pump is not included. The connection to the electric pump must be carried out by a specialized technician.

Connect the suction and pressure flanges of the pump with the flat gasket and counterflanges of the pipelines and screw together without tension (see figure).

To mechanically decouple the pump from the pipeline, it is advantageous to provide expansion joints between the connection pieces of the pump and the pipeline.

A maintenance slider is to be installed on the suction and pressure side of the progressing cavity pump for easy maintenance.

A pipe section with at least the same length as the stator or an expansion joint is to be provided in the pressure line to facilitate the dismantling of the stator.

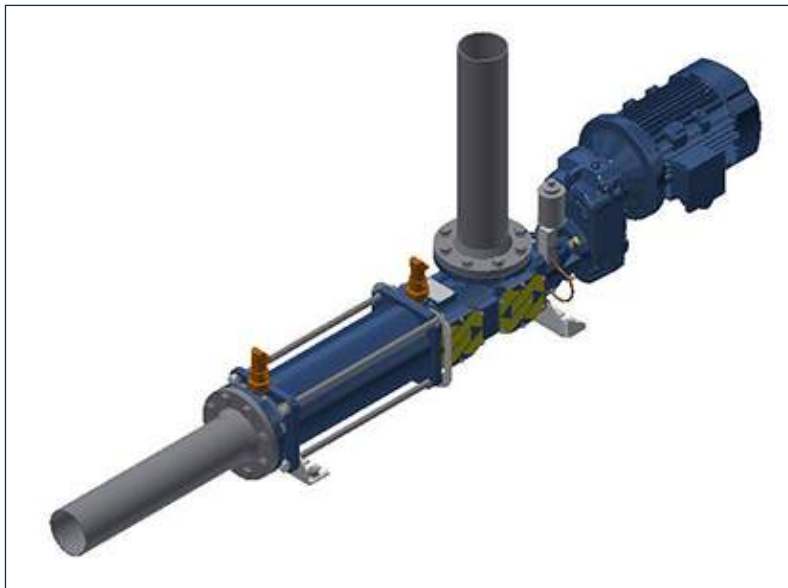
Attach safety devices and protective covers prior to start-up.

Check and tighten all screw connections with a torque wrench according to the table.



Important

The pipes used for this must be able to withstand the pressure in the pressure and suction lines. Since progressing cavity pumps can generate very high pressures, the pump must be protected against impermissible operating parameters. It is recommended to replace the 3/4" screw plugs on the top of the discharge nozzle and pump housing with pressure sensors (see figure), which switch off the pump when impermissible pressures are reached.



Sudden changes in fluid velocity can cause high pressure blows (water hammer) in the electric pump and in the pipes. If possible, avoid high flow rates, sudden shut-offs and pump stops with low-viscosity liquids.

The suction line must be as short as possible and shaped in such a way that no air or gas pockets can form. If this is not possible, ventilation must be provided at the highest point.

Seal each pipe connection: Air infiltrations in the suction line impair the operation of the electric pump, so that the liquid can be sucked up poorly or not at all. The pump draws air, so there is a risk of dry running.

5.6 Electrical connection



Danger - Warning

The machine is supplied without electrical system. Connection to the mains has to be carried out by an electrician.

The power supply of the equipment in question must be carried out in accordance with the legislation in force. In addition, safety measures required for the installation environment and the intended operating conditions must be taken into account.

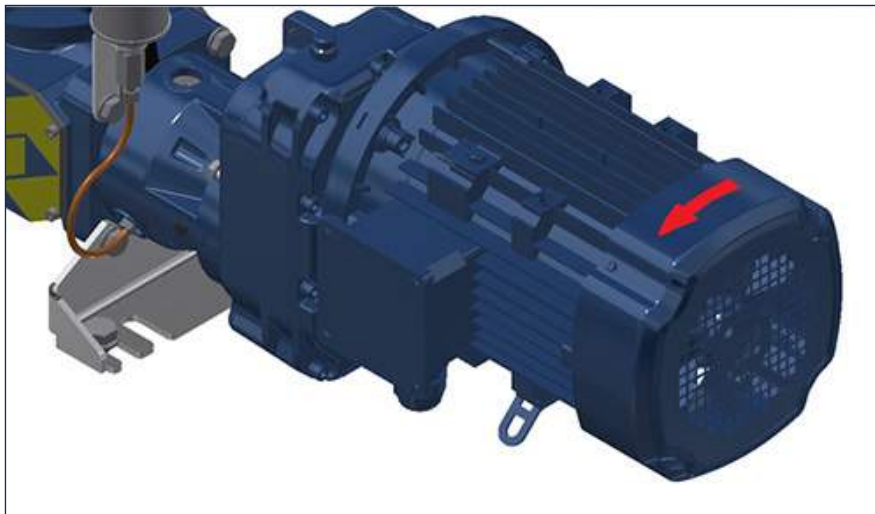
Before connecting, make sure that the type of current, mains voltage and frequency match the information on the identification plate of the electric motor. Make sure that the terminal box is in perfect condition and that the cable gland is installed correctly! Disconnect from the mains before carrying out any work and use suitable devices so that there cannot be an accidental reconnection.



Important

If the cables are disconnected and reconnected, check the direction of rotation; if the rotation is reversed, the pump will deliver in the opposite direction, which can lead to seal damage and leakage at the pump housing.

Reverse phases to change the direction of rotation.



The equipment must be secured on site by a qualified electrician with an appropriate back-up fuse (according to the rated power of the motor). The pump requires an increased starting torque. The starting current is up to 8 times the nominal current.

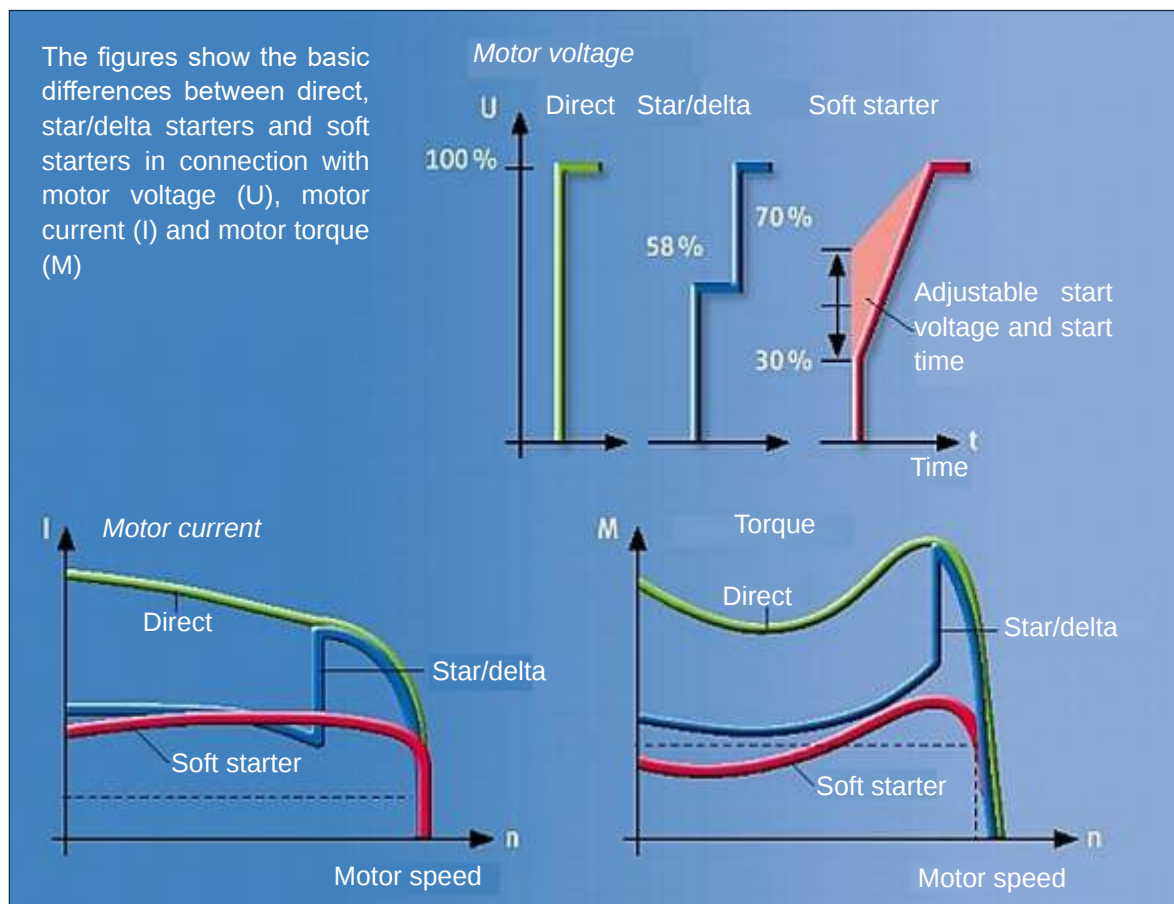
Grounding, zeroing, residual current protection circuits, etc. must comply with the regulations of the local energy supply company (EVU) and must function properly according to the electrician's test. An earth-leakage circuit breaker with a maximum permissible rated residual current of 30 mA must be provided for personal protection.

A lockable main switch and a 2-channel emergency stop switch, which are easily visible and accessible, must also be installed on site by a qualified electrician and connected to the control of the entire equipment.


Important

Undersized or substandard electrical equipment can be subject to rapid deterioration, resulting in incorrect power supply to the motor and damage the equipment.

To ensure safe operation, install good quality electrical equipment.



In the figure, three starting methods are compared with each other.

- The **direct start-up** is the safest starting method because the power grid provides full torque with a high current flow. However, the electricity supplier has an interest in using electricity as evenly as possible so as not to overload the power grid. For this reason, an electronic device for reducing the starting current is often specified for a starting current > 60A:
 - Star/delta start-up
 - Soft start (soft starter)
 - Frequency converter

These devices must be designed in such a way that the starting torque of the progressing cavity pump can be achieved.

- The **star/delta start-up** is only possible for 400/690V windings, since motors with 230/400V windings can only be operated in a star connection. The star/delta start-up is not suitable for heavy starting due to the reduced torque.
- **The soft start** (soft starter) should usually be selected one power level higher than the motor due to the reduced starting torque. If a motor protection function is integrated, it cannot be used.

SETTINGS

Pre-configured parameter sets such as “pump” are not suitable; rather select parameter sets such as “conveyor belt” or “elevator”.

Nominal motor current: set so high that the starting current is seven or eight times the actual nominal motor current. This can mean that a higher “nominal motor current” must be set on the soft starter than is read on the drive’s identification plate.

Maximum starting current: set to maximum;

Voltage drop at low speeds: No or minimal ramp time or start time: Minimal, less than 2 seconds;

The parameters related to the stop are usually not critical and can be adjusted according to the needs of the equipment and the viscosity of the liquid, in order to avoid the risk of high pressure surges.

- **Frequency converters** are best suited because they are able to provide an increased starting torque. The following must be observed for a proper operation:

Dimensioning of the frequency converter after a high overload:

- constant torque curve
- increased starting torques expected
- 200% overload for 3 seconds plus 150% overload for 57 seconds within a cycle time of 300 seconds

Progressing cavity pumps generally have a high starting torque. For this reason, the frequency converter must be dimensioned sufficiently large; a frequency converter with a power jump greater than the motor is usually sufficient.

The structure and insulation of the motor are suitable for the use of frequency converters, provided that certain operating conditions are met:

- The electromagnetic compatibility regulations must be observed
- Overheating protection must be built into the motor winding;
- Unless otherwise agreed, the threshold frequency must be set in such a way that the device never operates below **30%** of the nominal frequency; If lower speeds are required, either a power jump with a larger motor or an external fan should be provided.
- Unless otherwise agreed, the upper threshold frequency must be set so that it does not exceed the nominal frequency of the motor.
- Exception 87 Hz operation: If the speed range needs to be extended, this technology allows the constant torque to be achieved instead of up to 50 Hz up to 87 Hz. However, it should be noted that this technology is only possible with motor windings of 230/400 V and the output power of the frequency converter must be at least 1.73 times greater than that of the motor. Star connection is reconnected to delta connection. When setting the parameters for the frequency converter, observe the manufacturer’s instructions!

The recommended procedure for 87 Hz operation using the example of a SINAMICS S120 (Siemens) frequency converter is:

- Wire the motor in a delta;
- Enter the identification plate data for the delta wiring (50/60 Hz) as the motor data;
- Set the maximum speed p1082 to at least 87*60/pole pair number;

This ensures that:

- the correct motor data are used as the basis for motor identification and rotating measurement;
- the correct nominal speed is used and therefore many parameters that are related to the nominal speed do not have to be adjusted;
- the U/f characteristic curve is maintained until the maximum possible output voltage is reached;

All start-up devices have to be provided with:

- Main power switch with minimum contact gap of 3 mm and open position lock;
- Motor protection set to a maximum current of $\geq 5\%$ compared to the nominal current stated on the motor identification plate and intervention time ≥ 30 seconds;
- Suitable magnetic cable protection against short circuit;
- Suitable protection against earthing faults;
- Device against phase failure;
- Voltmeter and ammeter.

The plant engineer has to make sure the main supply is protected against accidental start up after blackout and the ensuing restoring of the supply.

5.7 Protection system of the motor

It is essential to provide on-site temperature monitoring for the motor.

In general, a motor protection switch must also be provided for the temperature monitoring. The temperature monitoring provides protection in the event of insufficient cooling or overloading, but not or only inadequately in the case of a blocked rotor or single-phase operation.

Motor protection switch:

The motor protection switch must be set to the nominal motor current of the progressing cavity pump according to the motor identification plate. (See also the assembly, operating and maintenance instructions for the motor).

Overheating protection:

The motor is protected against overheating by heat sensors. They are normally closed bimetal switches inserted in the motor windings.

The cable terminals must necessarily be connected to a suitable trip device.

When the maximum permissible temperature is reached in the electrical winding, the bimetallic switches of the thermal probes open and interrupt the power supply circuit of the remote switch coil, causing the motor to stop. After the windings are cooled, the bimetallic switch contacts close back and allow the motor to be started.

In the case of motors whose windings are equipped with 3 thermistors (PTC), the heat monitoring works via a resistance evaluation.

The cable must necessarily be connected to a suitable triggering device.

If the temperature in the winding exceeds the triggering temperature, the change in resistance is converted into a control signal via a triggering device. This interrupts the power supply to the motor – it switches itself off automatically. If the switched off motor cools down again, the sensor resistance also drops and the motor normally starts up again. The automatic start-up must be prevented and instead the equipment must display a fault. After resetting the equipment, the motor can be restarted manually.

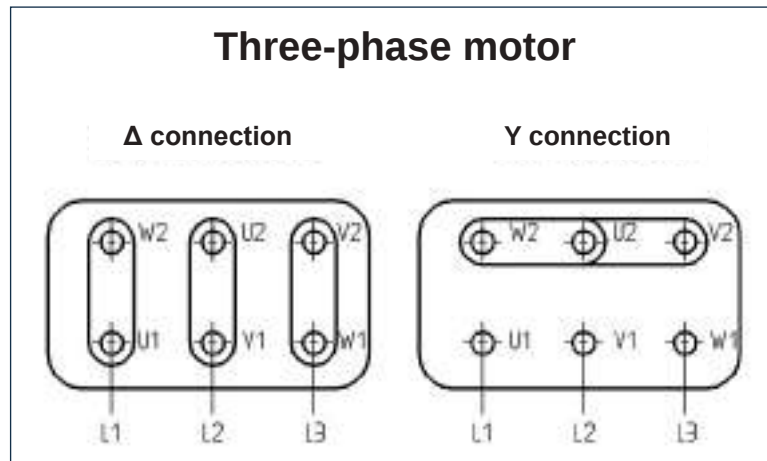
5.8 Supply voltage diagram of the progressing cavity pump

Type WAM	POWER (kW)	Voltage (V)	Frequency (Hz)	CONNECTIONS	Voltage according to connection type	
					“D” delta connection	“Y” connection star
MT100LR041453	2.2	230/400	50	Y	-	380-420
MT1120M041453	4	230/400	50	Y	-	380-420
MT1320S041453	5.5	230/400	50	Y	-	380-420
MT1320M041453	7.5	230/400	50	Y	-	380-420
MT1600M042453	11	400/690	50	D	380-420	-
MT1600L042453	15	400/690	50	D	380-420	-

Type WAM	POWER (kW)	Voltage (V)	Frequency (Hz)	CONNECTIONS	Voltage according to connection type	
					“D” delta connection	“Y” connection star
MT100LR041453	2.2	265/460	60	Y	-	440-480
MT1120M041453	4	265/460	60	Y	-	440-480
MT1320S041453	5.5	265/460	60	Y	-	440-480
MT1320M041453	7.5	265/460	60	Y	-	440-480
MT1600M042453	11	460/795	60	D	440-480	-
MT1600L042453	15	460/795	60	D	440-480	-

5.9 Wiring diagram

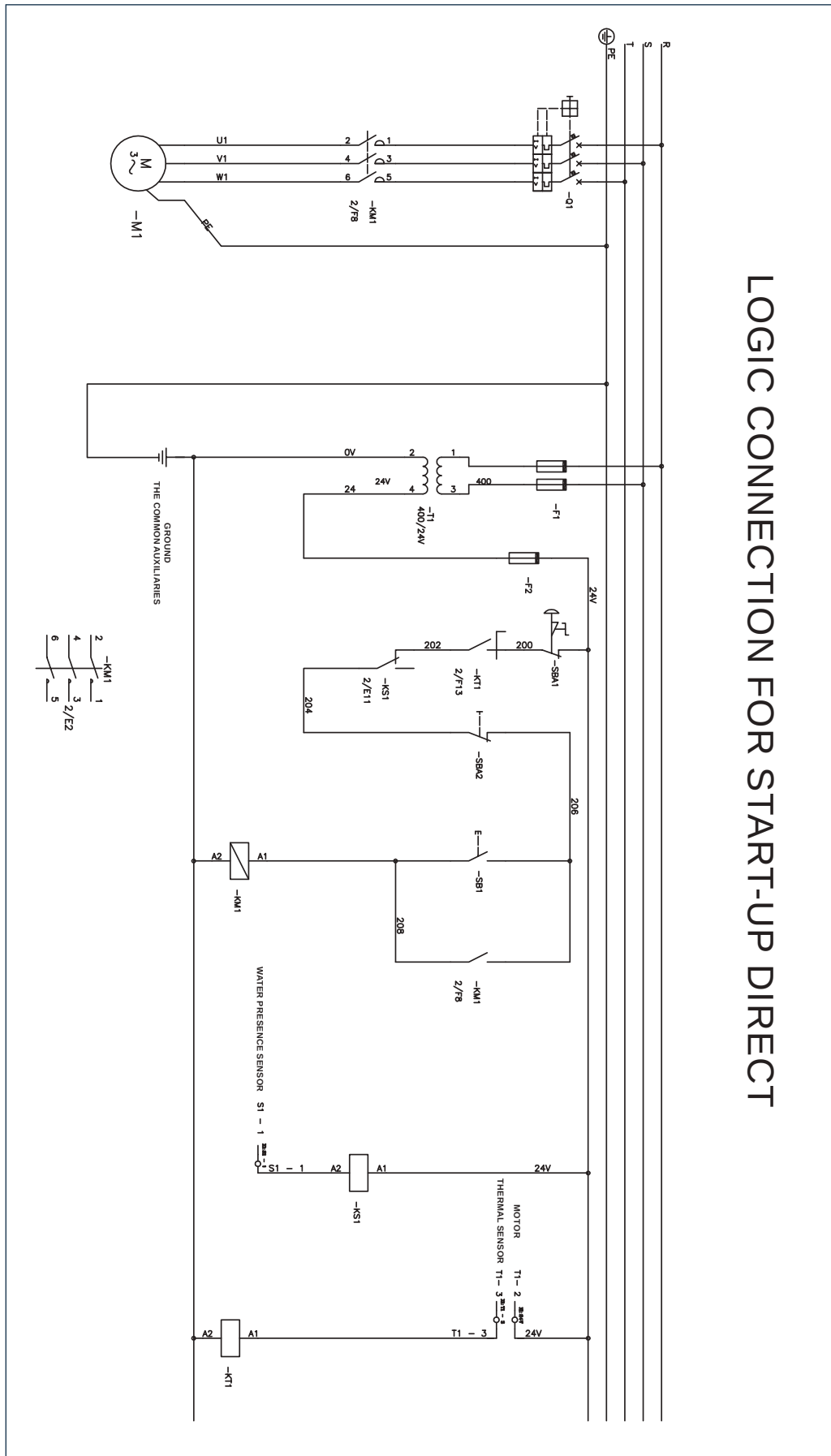
The illustration shows the wiring diagrams of the motors envisaged.



5.0 INSTALLATION AND FIXING

CHIOR.PCP.--.M.A.0123.EN Issue: A

LOGIC CONNECTION FOR START-UP DIRECT



**Important****THREE PHASED MOTOR - SUPPLY AND CONNECTION**

If the three-phase electric motor plate indicates the values 230/400, the connection type is Y.

If the three-phase electric motor plate indicates the values 400/690, the connection type is Δ.

5.10 Inspection**Important**

The equipment was tested at the Manufacturer's factory to make sure it matches the operational purposes was created for. When installation is complete, authorized personnel must carry out a general test to ensure that the safety conditions have been completely satisfied.

General recommendations

Only authorised personnel have access to the pump housing for possible inspections.

Obligations of the operator during the control operation:

- When positioning the electric pump, the operator must pay particular attention to the working area, especially to the proximity of obstacles.
- The operator must wear clothing that cannot compromise his/her safety. Avoid clothing with wide sleeves, collars or folds that can get caught in moving parts. Pulling long hair back in braids or a topknot is recommended for the same reason.
- The operator must take appropriate protective measures, such as suitable clothing, shoes, gloves, etc.
- The operator cannot carry out repairs or adjustments unless he/she has been personally trained and expressly authorised to do so.

For repair work that may be necessary due to an inspection, please contact the CHIOR customer service.

In the event of failures, accidents, loss of function, suspected cases of malfunction, contact WAM customer service immediately.

Do not make any modifications to the progressing cavity pump to obtain functions other than those for which it is intended. The Customer is not authorised to modify the pump.

6.1 Start up and normal operation

The inspections specified in this section must always be carried out before starting up the progressing cavity pump.

- Please note that, especially with viscous or inhomogeneous liquids, the pressure in the pressure line increases with the pump speed. When the maximum pressure is reached (max. +5% above the motor's nominal current), the controller must stop the pump and display an error message.
- We recommend providing an overpressure protection device to safely switch off the pump.
- After starting the pump, make sure that there is always liquid to be pumped in the pump housing. Secure the pump against dry running with suitable dry running protection (flow meter, temperature monitor in the stator, etc.) so as not to destroy the stator!

Checking the pipeline connected to the electric pump

The correct fastening of the pipeline must be checked.



Danger - Warning

FAILURE OF THE PIPING

Do not use the pump if you have found failures in the pipe.

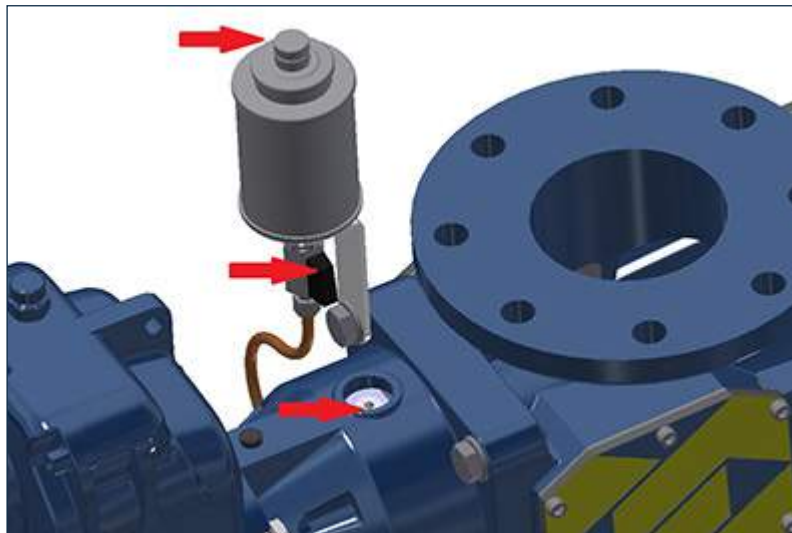
If during the operation of the electric pump a leakage is noticed, stop the motor immediately and replace the damaged pipeline.

Check and refill the oil in the oil tank (only with mechanical face seal)

The electric pump is supplied ready for use.

After the pump is installed in the intended position, the following steps are required:

- a) Open the ball valve, loosen the top screw plug on the seal and open the filling hole on the oil tank.



- b) Top up with oil until oil emerges from the vent hole. Close the opening again with the screw plug. Fill the oil tank half full and close the filling hole on the oil tank again.


Important

If necessary, top up the oil level inside the electric pump.


Danger - Warning
OIL TYPE

- For the features of the oil, see the “Lubricants Table”.

Do not mix different oil types inside the pump.

Before switching on the pump, also make sure that:

- there are no foreign objects inside the pump;
- the suction and pressure lines are connected to the correct nozzle on the pump;
- all guards, screws and tie rods are properly fastened;
- if the gear motor is present, the gear oil has been checked;
- for pumps with mechanical face seals, the ball valve below the oil tank is open and the screw plugs on the seal are closed;
- if necessary, the motor protection switch, soft starter or frequency converter are set correctly, the overheating protection of the motor is connected correctly and the electrical connection is in accordance with the locally applicable regulations;
- if the dry running protection and pressure monitoring are set correctly and reliably, switch off the pump;
- open the slides on the suction and pressure side, and check whether the pump is tight and no leakage is visible; If the pump needs to be primed and the liquid does not flow into the pump's suction housing on its own, fill the pipeline before you start it up so that the pump does not run dry;
- fix possible leakage by tightening tie rods and screws; If the leakage is not fixed, contact the CHIOR customer service.


Danger - Warning

Pumped medium and oil escaping in an uncontrolled manner can harm people and the environment.


Important

Before starting up the progressing cavity pump, be sure to carry out a visual inspection of the connection cable for damage.

- switch on the progressing cavity pump control;
- check that the direction of rotation is correct;
- if necessary, switch off the main switch and secure it against being switched on again unintentionally, e.g. with a padlock (remove the key) and attach a corresponding warning sign;
- change the polarity (direction of rotation) in the terminal box or on the system control and verify the direction of rotation using the arrow marked on the pump;
- check the function of the slider control and the time when the slider position was changed, and
- check the function of any monitoring units that may be used;

Once the electric pump has been secured to the ground and piping, and all pre-startup checks have been completed with no issues, the electric pump can be put into operation.

By default, the progressing cavity pump can only be switched on and off.

If the frequency converter is installed, it is possible to adjust the speed and thus the flow rate during operation.

Please note that, especially with viscous or inhomogeneous liquids, the pressure in the pressure line increases with the pump speed. When the maximum pressure is reached, the frequency converter must stop the pump and display an error message.

- However, we recommend providing an overpressure protection device to safely switch off the pump.
- After starting the pump, make sure that the pumped medium is always present in the pump housing. Secure the pump against dry running with suitable dry running protection (flow meter, temperature monitor in the stator, etc.) so as not to destroy the stator!

**Danger - Warning**

In the event of unusual noise levels, leaks or high vibrations, switch off the progressing cavity pump immediately! In case of danger, switch off via the nearest switch, emergency stop switch or main switch! Never switch the progressing cavity pump on again before the cause of the fault has been determined and eliminated.

Opening the pump during operation is forbidden. It is not possible to open maintenance openings or the pump by hand, without tools.

The surfaces of the machine reach high temperatures, which can lead to burns if touched. This applies in particular when the temperature of the pumped liquid is >50 °C.

After approximately 10 hours of operation, retighten all screws, nuts and tie rods on the progressing cavity pump to the specified torque.

**Important****Material damage due to dry running or freezing!**

Progressing cavity pumps are self-priming pumps. However, they must never run dry. Even a few revolutions in dry running can destroy the stator.

The fluid is primarily used as a lubricant and not as a suction aid (such as in the case of centrifugal pumps). However, during normal operation, enough liquid remains in the suction housing of the progressive cavity pump to lubricate the pump when it restarts.

Freezing of the progressing cavity pump can result in the housing bursting and damages to the pump set and seals. When the cold season sets in, the pumped medium must be drained through the drain plugs located at the bottom of the suction housing and the discharge nozzle. If necessary, the progressing cavity pump should first be rinsed with water and cleaned.

If the pump is installed outside, the pump itself and the pipes must be adequately insulated if there is a risk of frost. If necessary, a trace heating system should be used.

**Important****Material damage due to excess pressure!**

Progressing cavity pumps are positive displacement pumps. They must never be driven against closed sliders or valves. Regularly check the pipeline for narrowings, deposits and blockages.

Secure the pump with a pressure monitor on the suction and pressure side to prevent the pipeline from bursting, seals leaking and damage to downstream units. Pumped medium escaping in an uncontrolled manner can harm people and the environment.

6.2 Machine shut-down at the end of the work cycle

- Cut off the voltage by turning the related line separator to the position "0" or "OFF".
- Close the slider in the pressure line.
- The pump must be flushed through before longer interruptions in operation.
- If the pump is installed outside in the cold season, drain the liquid from the pump and protect the pump against freezing.

6.3 Emergency stop

The emergency stop must be used only in danger situations when the equipment must be stopped immediately.

To stop the equipment in case of an emergency, firmly press the emergency switches located on the control panel.

6.4 Decommissioning of the equipment

- Close the gate valves so that pump is not pressurised.
- Let the pump cool down.
- Empty the progressing cavity pump via the cleaning opening and drain plugs, collect the liquid so that it is safe to touch and dispose of it in an environmentally friendly manner.
- Dismantle the pipelines on the suction and discharge nozzles.

- Clean and decontaminate the progressing cavity pump especially when
 - * the storage location is not protected from frost and the medium can freeze due to weather conditions;
 - * solids can settle or the liquid can harden through chemical reaction;
 - * the progressing cavity pump is to be repaired, dismantled or shipped;
- Disconnect the connection cable in the motor terminal box.
- Transport and store the progressing cavity pump appropriately.

6.5 Reuse after long shut-down



Important

If the equipment is to be used in different conditions and with materials other than the previous application, it must be ensured beforehand that the instructions in the “Permitted use” section are observed.

Before starting the equipment after a prolonged inactivity, proceed as described:

- Make sure that the equipment is depressurised before opening the pump.
- Check the inside of the equipment (take all safety measures). Make sure that inside the pump there are no foreign bodies, snow or animals blocking the rotating parts of the pump or blocking the passage of the liquid that may have accidentally gotten into the equipment during the long period of inactivity.
- Clean the equipment in order to provide a proper inspection of damaged parts.
- Check for corrosion and other damages (deformations, damaged paint, etc.) of all areas. Carry out the necessary repairs or part replacement.
- Check and correct damaged exposed threads.



Important

- If, depending on the liquid and structural situation, the medium has settled or evaporated, liquid must be introduced between the rotor and stator on the pressure and suction sides. Silicone oil or pure soft soap must be used to loosen adhesions in the pump set. Otherwise the drive train could be overloaded.

- make sure the fixing screws have been tightened to the prescribed torque;
- check the integrity and correct coupling of all geared mechanisms, chain or belt transmissions, or other moving couplings. Carry out the necessary repairs or part replacement. Use recommended lubricants or grease upon necessity.
- check the oil level inside the electric pump. Check for possible lubricant leaks.
- lubricate the mechanical parts unpainted (shafts, couplings, guides, etc.).

- for electric parts (motor, control panels, etc.), remove the internal condensation or dust through the available openings, using a special vacuum cleaner for electric components. Pay attention not to damage or tamper from its socket any component or connection during this step.
- carry out a visual check of all electric and electronic components.
- an electrician shall also check the integrity of all electrical cables, and electrical contacts. Use special spray for electrical parts to clean all electrical contacts.

**Important**

- **A faulty electrical contact can cause equipment malfunction, or even fire hazards.**
- **A faulty mechanical or electrical component can cause damages to other components or to the entire equipment, or they can cause injuries to personnel present near the equipment.**

**Danger - Warning**

The personnel shall wear suitable personal protective equipment.

7.1 Recommendation for maintenance



Danger - Warning

MAINTENANCE OPERATIONS

- It is forbidden carrying out other maintenance operations than those indicated in the present manual.
- Carry out the operations on a flat surface having the proper strength and hardness.
- All interventions have to be carried out after having disconnected the pump from the mains and after having cleaned it and sanitizing it perfectly. Only touch the machine parts when they have come to a complete standstill and are disconnected from the power grid, as there is a risk of all limbs being pulled in, especially when starting up automatically.
- Maintenance and repairs may only be carried out on the depressurised system.

Follow the maintenance intervals indicated.

Carry out all maintenance operations according to the indications and the timing given by the Manufacturer. When properly performed, maintenance increases pump life and performance, reducing the possibility of breakdowns and high operating costs.

Wear is significantly influenced by different liquid mixtures, temperatures and operating pressures.

If defects are detected, they must be remedied immediately by trained specialist personnel.

Calculate the required maintenance and inspection intervals for the wear parts of each equipment. The following maintenance schedule specifies maximum inspection intervals under normal operating conditions.

Document the maintenance.



Danger - Warning

Not following the timing and method indicated for a proper maintenance, or allowing untrained, unauthorized personnel taking charge of it will decay the warranty of the pump.

Warning plate:

The warning plate must be attached to the pump housing to prevent the accidental start-up of the motor.


Maintenance in progress warning sign
Use only ORIGINAL SPARE PARTS:

Use only original CHIOR parts as specified in the Spare Parts Catalogue.


Important

Failure to use original spare parts will void the pump warranty.

7.2 Scheduled maintenance table

COMPONENT	OPERATIONS CARRIED OUT	IF REQUIRED	MONTH- LY	EACH 6 MONTHS
Electric pump	Cleaning and rinsing	X		
Electric pump	Visual inspection (corrosion, leakage, dust accumulation, etc.)	X		
Electric pump	Check the flow rate of the pump set	X		
Electric pump	Check and top up the mechanical face seal oil level		X	
Electric pump	Check the vibrations and noise level to make sure it hasn't changed since the first start up.			X
Electric pump	Check that the externally accessible screws and guards are secure			X
Electric pump	Check the joint sleeve for tightness			X
Electric components	Checking the cables			X
Electric components	Check that the voltage suits the values envisaged.			X
Electric components	Using a clamp meter check the power absorption on the three phase and ensure they do not exceed the values given on the ID plate.			X
Testata motrice	Check the clearance of the bearing and the alignment of the gear drive shaft			X
Testata motrice	Check the gear oil, filling level and the leak tightness of the gear motor			X
Safety and information signs	Check the condition and legibility			X

7.3 Cleaning the equipment (the machine)

The flushing and cleaning of the electric pump in the flow area helps to maintain the suction efficiency and correct pump operation.

Never clean the pump with a high-pressure water jet.

Clean the outer housing - especially the motor with fan guard - with a clean cloth to ensure the proper ventilation of the drive.

7.4 Visual inspection

Check for corrosion on the housing and the tightness of seals, and, if necessary, repair or replace the defective parts.

7.5 Verification of the throughput rate

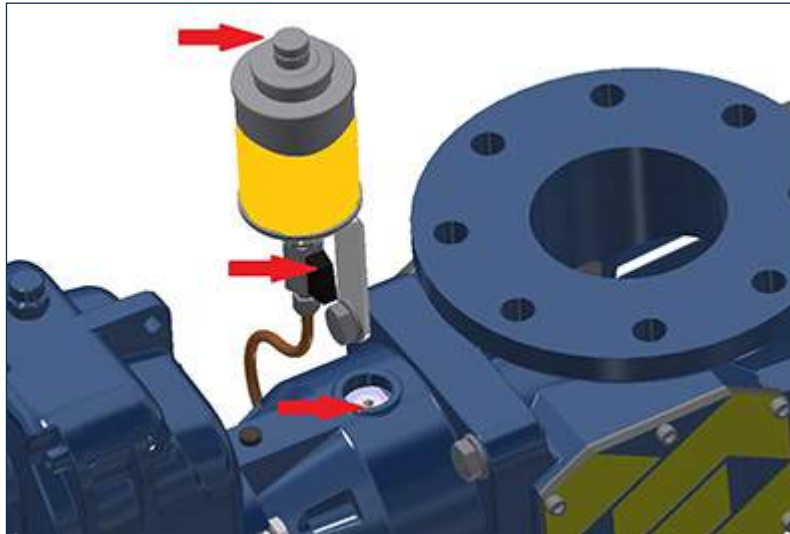
Regularly check and record the flow rate and conveying pressure.

If a flow meter is not available, at a constant speed and constant viscosity of the liquid, changes in the conveying pressure can be used to determine the wear on the pump set. If the conveying pressure decreases, the flow rate is reduced and proportionately more and more quantity flows back, and the wear becomes greater on the pump set.

7.6 Filling up with oil

Fill the oil tank for shaft lubrication with the specified oil type. Whenever the oil level in the oil tank is less than half full, the oil tank must be refilled.

For refilling: Unscrew the filler cap on the oil tank, pour the required amount of oil into the oil tank to reach the level shown in the figure below and screw the filler cap back on. If necessary, vent the oil chamber of the seal at the top screw plug of the seal housing and close it again if oil escapes.



7.7 Checking the vibrations

During operation, check the vibrations with a vibration meter and record the results. The logged measuring point and operating parameters (speed, liquid temperature and viscosity, etc.) must remain identical over time. If the vibration values increase compared to the start-up, this can be due to the following reasons:

- clearance of the bearing
- clearance in the universal joint
- pulsation caused by damage to the pump set
- deposits in the pressure line lead to increased pressures and backflow in the pump set
- deposits in the suction line lead to cavitation and reduced flow rate

During operation, check the noise levels with a precision sound level meter and record the results. The logged measuring point and operating parameters (see above) must remain identical over time. If the noise level increases compared to the start-up, this can be due to the following reasons:

- motor damage
- gear reducer damage
- oil quantity in the gear reducer is too low
- pulsation caused by damage to the pump set
- cavitation noise

If necessary, contact the CHIOR customer service if the logged data changes.

7.8 Inspection of the sleeve

For this measure, the pump must be shut down, secured against restarting and depressurised. The liquid is to be drained off via the drain plugs and the maintenance openings on the pump housing.

Check the sleeve for tears. If more liquid flows out when you press the sleeve in the area of the universal joints, the sleeve is leaking and must be replaced.

After the sleeve maintenance, clean all sealing surfaces and close the drain plugs and maintenance openings again.

7.9 Inspection of the gear reducer

Check the tightness of the gear reducer by looking for oil leakage. Check the oil level in the gear reducer according to the manufacturer's instructions.

In order to check the bearing and the drive shaft, the pump must be shut down, secured against restarting and depressurised. The liquid is to be drained off via the drain plugs and the maintenance openings on the pump housing.

At the joint connection, try to move the drive shaft radially and axially through the maintenance openings on the drive side. There should be no noticeable clearance in the gear reducer bearing.

If there is an impermissible clearance in the drive shaft, contact the CHIOR customer service. Repair or replace the gear reducer.

7.10 Maintenance of the electrical system



Danger - Warning

MODIFICATIONS TO THE ELECTRICAL PLANT

- Do not remove or disassemble any electrical components installed on the progressive cavity pump.
- Do not install electrical components other than those indicated by the MANUFACTURER.
- Checks on the electrical system and any repairs must only be carried out by an electrician.

CHECKING THE CABLES

Each 6 months carry out a thorough visual control of the connections and cables of the electrical system. The damaged or worn cables which have their insulation deteriorated, have to be immediately replaced. The rust on the connections must be removed by cleaning the contacts or cable lugs.

Carry out the repairs on the electrical parts only after having disconnected from the mains.

Checking the mains voltage and current consumption

Checking the electrical equipment on the voltmeter, especially if electrical faults (under-/overvoltage, etc.) are logged, whether the mains voltage is constantly within the permissible values.

If the voltage value is often outside the tolerance, motor damage can occur.

Use a current clamp to check all three phases for the same current consumption and record the current consumption. In the case of frequency converter operation, the current must be measured upstream of the frequency converter and not between the converter and the motor.

If the measured current consumption is above the nominal current specified on the identification plate, the pump is overloaded or defective. Please note that the pump has an increased starting torque and that the current consumption can only be measured after the nominal speed has been reached.

7.11 Standard tightening torque of the nuts and bolts

Unless otherwise specified, apply to the nuts and bolts only tightening torques hereafter indicated. The tightening torque depends on the size of the nut or screw to be tighten.

The values given refer to commercially available screws without lubrication. Additional lubrication of the thread significantly changes the coefficient of friction and leads to undeterminable tightening conditions.

In the event of a replacement, always use nuts and screws of the same size, material and strength as those to be replaced. Stainless steel bolts of strength A2-70 are used as standard.

7.0 INFORMATION REGARDING MAINTENANCE

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Threading	Resistance class 70 Standard A2-70, A4-70	
	Preload force in N	Tightening torque in Nm
M 6	6.850	5.9
M 8	12.600	14.5
M 10	20.000	30
M 12	29.100	50
M 16	55.000	121
M 20	88.600	224
M 24	142.000	400

7.12 Checking the legibility of the symbols and identification plate

Check the symbols and identification plate for condition and legibility, and have them replaced by the manufacturer if necessary.

7.13 Maintenance register

It is recommended to be provided with and fill in a Control Register during the entire lifetime of the equipment. This will provide a proper record of all interventions history on the equipment and a trace of personnel responsibility according to the actions performed.

The Maintenance Register must include all operations stated in the maintenance schedule and all interventions for extraordinary maintenance.

It is responsibility of the maintenance operator, to fill all fields of the Control Register.

The Control Register must contain information as well as the name of maintenance operator who performed the operation (full name and signature), date of intervention, description of interventions. The records must be written clearly visible.

DATE	INTERVENTION DESCRIPTION	OPERATOR

8.1 Safety recommendations for replacement



Danger - Warning

The replacement operations must be carried out by a specialist authorized technician with specific skills in the sector concerned (mechanical, electrical etc).

Before carrying out any work, take all safety measures and use the appropriate equipment to eliminate the risk of accidents at work.

Activate all the safety devices envisaged and prevent access to controls which, if activated, could cause work injuries to the persons involved in the operations.

Make sure that the equipment is depressurised before opening the pump.

8.2 Returning the equipment (the machine)

When returning the equipment (machine) use the original packaging if it has been preserved, otherwise fix it on a pallet and cover it with nylon shrink-wrap, to protect it as best as possible from impact during transport. In any event, make sure there is no residue material inside the equipment (machine).

8.3 Dismantling and disposal

Dismantling of the equipment (machine) must be entrusted to personnel specialized in these activities and equipped with adequate skills.

Dismantle the components of the equipment (machine) concerned; if necessary contact the Manufacturer for further information.

The components dismantled have to be separated on the basis of the nature of the materials of which they consist, in compliance with the laws on the matter of "differential collection and disposal of wastes".

With reference to the WEEE Directives, electrical and electronic components, marked with a special symbol, have to be disposed off in authorized collection centres meant for the purpose.

Unauthorized disposal of "Waste Electrical and Electronic Equipment" (WEEE) is punishable with fines governed by the laws concerning the matter.

The oil or grease contained must be disposed of in accordance with regulations.

9.1 Trouble-shooting

Minor problems can be solved without consulting a specialist.

The following Table contains a list of the most common problems, the possible causes and possible remedies. For particularly difficult actions which are not mentioned in the Table, contact the Manufacturer's Customer Service Department.



Danger - Warning

Before carrying out any operation "set the equipment (machine) concerned in safety" (see "Glossary and terminology"). Operate according to the indications on the "Operation and Maintenance Manual" and in accordance with and in compliance with the standards in force as regards health and safety.

9.0 INFORMATION REGARDING FAULTS

CHIOR.PCP.--.M.A.0123.EN Issue: A

TYPE OF MALFUNCTION	POSSIBLE CAUSE OF THE MALFUNCTION	MEASURES TO RECTIFY THE MALFUNCTION
The progressing cavity pump does not start	Foreign objects in the pump set	Remove the foreign objects and replace the defective parts. If necessary, integrate a stone trap in the suction line if the foreign objects are too large. Crush, stir or dilute the medium with liquid beforehand. Do not install screens or filters in the pipelines that could become clogged.
	Sedimentation at a standstill	Clean the pump immediately. Replace the defective parts. Shorten downtimes or perform a flushing cycle after each pump stop. Install a joint with mixing function. Do not install screens or filters in the pipelines that could become clogged.
	The medium hardens (due to temperature or chemicals)	Clean the pump immediately and, in the case of temperature-related hardening, apply heating or, in the case of chemical-related hardening, prevent the reaction by excluding air, etc. Carefully convey media that tend to coagulate (low shearing).
	Solids content too high, blockage	Clean the pump immediately and check the operating conditions, stir or dilute the liquid.
	Equipment pressure too high	Measure the operating pressure of the pump and take measures to reduce the pressure: - Increase the operating temperature (lower viscosity) - Increase the pipe diameter - Shorten the pipe - Reduce the speed - Dilute the liquid
	Stator is swollen	If cooling the stator does not solve the jamming, the elastomer is not resistant to the medium. If the temperature cannot be reduced permanently, use an under-sized rotor. Check the order data and change the stator material if necessary, or have it checked for resistance.
	Pumped liquid temperature too high or in direct sunlight	The stator stretches too much, increasing the clamping of the pump set, overloading the drive. If the temperature cannot be reduced, use an undersized rotor.
	The static friction of the stator is too high or the pump set is stuck due to a long standstill.	Fill the pump with liquid or apply silicone oil or soft soap to the stator and turn the pump by hand using a suitable lever arm on the gear input. Then reassemble the motor and try to start the pump.
	The slipping clutch trips, the motor protection switch has been tripped, the frequency converter goes into malfunction due to overcurrent.	Conversion to a smaller pump set or change of the coupling dimensioning or drive parameterisation. For frequency converters, the pump characteristic curve is often selected as a parameter, but its configuration refers to centrifugal pumps. Change to e.g. characteristic curve for elevators or conveyor belts, whereby the parameters still have to be adjusted in detail. Contact the service department of the frequency converter manufacturer.
	The electrical data of the drive do not match the network. Electrical supply line too weak. 2-phase operation	Checking for correct wiring, changing the drive specification or changing the supply line.
	Shut-off devices are partially closed or there are blockages and/or deposits in the pipeline	Open the shut-off devices and remove the blockages and/or deposits in the pipeline. If the liquid is frozen, heat or insulate the pipeline.

9.0 INFORMATION REGARDING FAULTS

CHIOR.PCP--..M.A.0123.EN Issue: A

TYPE OF MALFUNCTION	POSSIBLE CAUSE OF THE MALFUNCTION	MEASURES TO RECTIFY THE MALFUNCTION
The flow rate decreases or is no longer reached	The rotor is worn and/or the stator is worn or brittle.	Replace the rotor and/or stator.
	Seals are defective	Replace the seals
	The speed is too low	Increase the speed
	Air pockets in the liquid	Check and tighten/replace the seals in the suction line. Tighten the flange connections. If the liquid is degassing, reduce the temperature or increase the tank/liquid level in order to reach the suction-side inflow.
	The electrical data of the drive do not match the network. Electrical supply line too weak. 2-phase operation	Checking for correct wiring, changing the drive specification or changing the supply line.
	The operating pressure is too high	Measure the operating pressure of the pump and take measures to reduce the pressure: - Increase the operating temperature (lower viscosity) - Increase the pipe diameter - Shorten the pipe - Reduce the speed - Dilute the liquid
	In case of an undersized rotor, the operating temperature has not yet been reached	Increase the speed until the operating temperature is reached. Warm up the rotor and stator to the operating temperature.
	Suction height too high or inlet height too low (cavitation)	Reduce the operating temperature (lower vapor pressure), set up the pump at a lower level, reduce the pipe resistance, reduce the speed.
The pump does not prime	The pump is running dry	Provide protection against dry running, change the course of the pipeline, fill up the pump. Measure the operating pressure of the pump and take measures to reduce the pressure: - Lower the operating temperature (lower vapor pressure) - Increase the operating temperature (lower viscosity) - Set up the pump at a lower level (lower geodetic height) - Increase the pipe diameter - Shorten the pipe - Reduce the speed - Dilute the liquid
	Seals are defective	Replace the seals
	In case of an undersized rotor, the operating temperature has not yet been reached	Increase the speed until the operating temperature is reached. Warm up the rotor and stator to the operating temperature.
	The rotor is worn and/or the stator is worn or brittle.	Replace the rotor and/or stator.
	Shut-off devices are partially closed or there are blockages and/or deposits in the pipeline	Open the shut-off devices and remove the blockages and/or deposits in the pipeline. If the liquid is frozen, heat or insulate the pipeline.
	Air pockets in the liquid	Check and tighten/replace the seals in the suction line. Tighten the flange connections. If the liquid is degassing, reduce the temperature or increase the tank/liquid level in order to reach the suction-side inflow.
	Liquid viscosity increased	Dilute the liquid, warm it up.
	The pump is running dry	Provide protection against dry running, change the course of the pipeline, fill up the pump. Measure the operating pressure of the pump and take measures to reduce the pressure: - Lower the operating temperature (lower vapor pressure) - Increase the operating temperature (lower viscosity) - Set up the pump at a lower level (lower geodetic height) - Increase the pipe diameter - Shorten the pipe - Reduce the speed - Dilute the liquid
	Connecting bolts broken, joint defective, gear reducer damage	Replace the connecting bolts, the joint and/or gear reducer

9.0 INFORMATION REGARDING FAULTS

CHIOR.PCP.--.M.A.0123.EN Issue: A

TYPE OF MALFUNCTION	POSSIBLE CAUSE OF THE MALFUNCTION	MEASURES TO RECTIFY THE MALFUNCTION
The operating pressure is not reached.	The rotor is worn and/or the stator is worn or brittle.	Replace the rotor and/or stator.
	Shut-off devices are partially closed or there are blockages and/or deposits in the pipeline	Open the shut-off devices and remove the blockages and/or deposits in the pipeline. If the liquid is frozen, heat or insulate the pipeline.
	The pump is running dry	Provide protection against dry running, change the course of the pipeline, fill up the pump. Measure the operating pressure of the pump and take measures to reduce the pressure: - Lower the operating temperature (lower vapor pressure) - Increase the operating temperature (lower viscosity) - Set up the pump at a lower level (lower geodetic height) - Increase the pipe diameter - Shorten the pipe - Reduce the speed - Dilute the liquid
	The speed is too low	Increase the speed if the required speed is still within the permissible range. In case the permissible range is not sufficient, the pump must be designed by the manufacturer for the necessary adjustment range and the motor and frequency converter must be replaced accordingly. If the required speed cannot be reached with the existing pump, a pump with a larger pump set and drive unit must be installed.
	Air pockets in the liquid	Check and tighten/replace the seals in the suction line. Tighten the flange connections. If the liquid is degassing, reduce the temperature or increase the tank/liquid level in order to reach the suction-side inflow.
The flow rate fluctuates	Air pockets in the liquid	Check and tighten/replace the seals in the suction line. Tighten the flange connections. If the liquid is degassing, reduce the temperature or increase the tank/liquid level in order to reach the suction-side inflow.
	Seals are defective	Replace the seals
	Suction height too high or inlet height too low (cavitation)	Reduce the operating temperature (lower vapor pressure), set up the pump at a lower level, reduce the pipe resistance, reduce the speed.
Strong vibration	Cavitation	Check the geodetic height. Reduce the operating temperature (lower vapor pressure), set up the pump at a lower level, reduce the pipe resistance, reduce the speed.
	The rotor is worn and/or the stator is worn or brittle.	Replace the rotor and/or stator.
	The joints are worn out	Replace the joint
	The pump is running dry	Provide protection against dry running, change the course of the pipeline, fill up the pump. Measure the operating pressure of the pump and take measures to reduce the pressure: - Lower the operating temperature (lower vapor pressure) - Increase the operating temperature (lower viscosity) - Set up the pump at a lower level (lower geodetic height) - Increase the pipe diameter - Shorten the pipe - Reduce the speed - Dilute the liquid

9.0 INFORMATION REGARDING FAULTS

CHIOR.PCP.--.M.A.0123.EN Issue: A

TYPE OF MALFUNCTION	POSSIBLE CAUSE OF THE MALFUNCTION	MEASURES TO RECTIFY THE MALFUNCTION
Unusual operating noises	Motor or gear reducer damage	Call your CHIOR customer service for help.
	Loose parts	Retighten all the screws and nuts. If necessary, replace the damaged pump parts.
	Bearing or shaft damage	Replace the defective parts or have them replaced. Ensure sufficient lubrication.
	Oil level in gear reducer too low	Check the oil level, refill if necessary. Continue to monitor the oil level, call your CHIOR customer service for help if necessary. Collect the spilled oil to prevent slipping.
	Foreign objects in the progressing cavity pump.	Remove the foreign objects and replace the defective parts. If necessary, integrate a stone trap in the suction line if foreign objects are too large. Crush, stir or dilute the medium with liquid beforehand. Do not install screens or filters in the pipelines that could become clogged.
	Connecting bolts broken	Replace the connecting bolts.
	The universal joint is worn out.	Replace the joint.
Gear reducers are overheating	Incorrect oil level	Let the gear reducer cool down to ambient temperature. Check and, if necessary, correct the oil level. Attach the oil temperature sensor. Collect the spilled oil to prevent slipping.
The motor overheats	The voltage (V) is too low during pump operation (current consumption is too high, motor protection switch is triggered)	Let the motor cool down to ambient temperature. Check the supply voltage. Check the supply cable. Use a supply cable with a larger cross-section.
	The temperature sensor is not connected or it is incorrectly connected.	Let the motor cool down to ambient temperature. Connect the temperature sensor correctly.
	The motor protection switch is not connected or it is incorrectly connected or set.	Let the motor cool down to ambient temperature. Have the motor protection switch correctly connected or set, or have the motor housing with winding or motor replaced.
	Two-phase run	Correctly connect the connection cable to the controller
	Insufficient ventilation	Let the motor cool down to ambient temperature. Check the air circulation. If necessary, remove dirt. Increase the speed when operating with frequency converter. Mount and connect an external fan.
The motor is humming	The temperature sensor is not connected or it is incorrectly connected.	Have the temperature sensor correctly connected, or have the motor housing with winding or motor replaced.
	The frequency converter is incorrectly set	Check the parameters. If necessary, call your CHIOR customer service for help.
Motor burnt out	The motor protection switch is not connected or it is incorrectly connected or set.	Let the motor cool down to ambient temperature. Have the motor protection switch correctly connected or set, or have the motor housing with winding or motor replaced.
	The temperature sensor is not connected or it is incorrectly connected.	Let the motor cool down to ambient temperature. Have the temperature sensor correctly connected, or have the motor housing with winding or motor replaced.
Gear reducer leaks oil from the vent valve (during operation)	Incorrect oil level	Check the oil level and correct it if necessary
	Vent valve is defective	Call your CHIOR customer service for help.
	The oil filler and/or oil draining cap is loose	Tighten the screw/cap. Continue to monitor the gear reducer; if necessary, call your CHIOR customer service for help.
Gear reducer leaks oil from the oil filler and/or oil draining cap	Vent valve is clogged	Clean the valve and add lubricant if necessary.

9.0 INFORMATION REGARDING FAULTS

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TYPE OF MALFUNCTION	POSSIBLE CAUSE OF THE MALFUNCTION	MEASURES TO RECTIFY THE MALFUNCTION
The gear reducer leaks oil from the seals (during operation)	The seals are damaged or worn	Call your CHIOR customer service for help.
	Hardening of the seals due to prolonged storage	Clean the area and check for leaks again after a few days. If the leakage persists, contact your CHIOR customer service for help.
	Wrong oil filled in (e.g. wrong viscosity)	Check the oil that has been filled in and, if necessary, change the oil.
Increased power absorption and/or requirement	Medium is too thick	If necessary, dilute the filling accordingly (add water or liquid manure)
	Bearings are defective	Have the bearings replaced.
	The motor or gear reducer is defective	Have the electric motor or gear reducer replaced.
	The controller or electrical controller and/or electrical connection is defective	Have the connection repaired.
No function	Failure of the energy supply	The automatic restart after an energy supply failure is to be prevented via the control technology. The unexpected start-up after an energy supply failure and its sudden return must be prevented.
	The motor or gear reducer is defective	Replace the electric motor and/or gear reducer or have it replaced.
	The EMERGENCY STOP switch has been actuated	Eliminate the hazard and restart the pump. Life-threatening hazard: Never bypass this function!
	Motor protection switch has tripped	Switch the circuit breaker back to the operating position, clarify the cause and, if necessary, rectify it or have it rectified.
	Control or electrical connection defective	Have the control or electrical connection repaired.

9.0 INFORMATION REGARDING FAULTS

CHIOR.PCP.--.M.A.0123.EN Issue: A

TYPE OF MALFUNCTION	POSSIBLE CAUSE OF THE MALFUNCTION	MEASURES TO RECTIFY THE MALFUNCTION
Service life of the pump is too short	The operating pressure is too high	Measure the operating pressure of the pump and take measures to reduce the pressure: - Increase the operating temperature (lower viscosity) - Increase the pipe diameter - Shorten the pipe - Reduce the speed - Dilute the liquid
	Pumped liquid temperature too high or in direct sunlight	The stator stretches too much, increasing the clamping of the pump set, overloading the drive. If the temperature cannot be reduced, use an undersized rotor.
	Stator is swollen	If cooling the stator does not solve the jamming, the elastomer is not resistant to the medium. If the temperature cannot be reduced permanently, use an under-sized rotor. Check the order data and change the stator material if necessary, or have it checked for resistance.
	The pump is running dry	Provide protection against dry running, change the course of the pipeline, fill up the pump. Measure the operating pressure of the pump and take measures to reduce the pressure: - Lower the operating temperature (lower vapor pressure) - Increase the operating temperature (lower viscosity) - Set up the pump at a lower level (lower geodetic height) - Increase the pipe diameter - Shorten the pipe - Reduce the speed - Dilute the liquid
	Shut-off devices are partially closed or there are blockages and/or deposits in the pipeline	Open the shut-off devices and remove the blockages and/or deposits in the pipeline. If the liquid is frozen, heat or insulate the pipeline.
	Suction height too high or inlet height too low (cavitation)	Reduce the operating temperature (lower vapor pressure), set up the pump at a lower level, reduce the pipe resistance, reduce the speed.
Service life of the seals is too short	Liquid with solid particles, sedimentation	Clean the pump after the pump has stopped. If necessary, integrate a stone trap in the suction line to ensure that solid particles settle out before the pump. Conversion to a multi-stage pump set to reduce the backflow. Conversion to a larger pump set to reduce the speed. Call your CHIOR customer service for help.
	Pump and/or drive bearing is defective	Replace the bearing.
	Pressure in the suction housing is too high.	Check the pump's direction of rotation and change it if necessary. Switch to another type of seal. Call your CHIOR customer service for help.
	Seal type unsuitable for the liquid to be pumped	Switch to another type of seal. Call your CHIOR customer service for help.
	Deposits on the slide ring	Switch to another type of seal. Call your CHIOR customer service for help.

9.2 Check-list in case of fault

If you have been unable to solve the problem on the equipment (machine) even after having carried out the operations suggested in paragraph "Trouble-shooting" please contact the plant technician/installer/or the Manufacturer.

If technical assistance is required, in addition to the equipment data, the plant technician/installer or Manufacturer will also need information concerning the plant in which the equipment (machine) is installed, its installation and its working, for better identification of the problem that has occurred.

Obviously many of the checking operations which are requested have already been performed in the various steps during installation, testing and start-up of the equipment (machine) concerned.



Danger - Warning

Before carrying out any operation "set the equipment (machine) concerned in safety" (see "Glossary and terminology"). Operate according to the indications on the "Operation and Maintenance Manual" and in accordance with and in compliance with the standards in force as regards health and safety.

1) Information necessary

- a) Description of the problem.
- b) Photos showing the ID plate of the equipment
- c) Photos showing the electric pump in its entirety and how it is installed
- d) If possible, provide a video showing the concerned parts of the equipment which may be the cause of malfunctions. The more details are made available, the better the support the Manufacturer can offer
- e) Total working hours
- f) Operation frequency (hours per day or month).
- g) Motor absorption.
- h) Type of electrical connection.

2) Checking the material

- a) Material description? What kind of liquid manure is treated, is it biogas digestate? (What is the composition of the digestate?)
- b) The material contains straw? What dimensions does it have?
- c) What is the solid material rate?
- d) Has the material been homogeneously mixed prior to being processed?

A1 Table of lubricants

The lubricant brands are listed in the table in alphabetic order with no reference to the product quality. The list does not cover the entire range of lubricants. It is therefore possible to use other lubricants as long as they have the same characteristics

MINERAL OIL (ISO VG 220)	BRAND
Blasia 220	AGIP
Alpha SP 220	CASTROL
Mobilgear XMP 220	MOBIL
Omala S2 G 220	SHELL
Carter EP 220	Total

