PCM PUMP FOR BIOGAS PLANT

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keep it **m**oving



YOUR DAILY PARTNER FOR BIOGAS **PRODUCTION OPTIMIZATION**

The production of **environmentally friendly** energy is of crucial importance today for the preservation of our planet. **PCM pumps play a vital role in this sector** by optimizing the transfer of waste involved in the biogas manufacturing process, such as plant, animal, or food waste.

In anaerobic digestion facilities, pumping equipment is essential as it ensures the profitability and safety of the process, whether it's for transferring organic materials, feeding digesters, or other stages of the process.

PCM pumping solutions cover a wide range of applications and are designed to deliver high performance in anaerobic digestion facilities, whether for the transfer of liquid, thick, or dehydrated organic raw materials, or the transfer of digestate.

PCM accompanies you throughout the process, from storage to the spreading of organic materials, including their fermentation and recirculation. With over 90 years of expertise and know-how, PCM has mastered the hydraulic design of its pumps to meet the challenges of this sector.

PCM IS COMMITTED TO SERVING YOU AND PROTECTING THE ENVIRONMENT. WE **SHARE YOUR COMMITMENT!**

PCM AT THE HEART OF THE **BIOGAS PROCESS**



- **Step 4** : Pasteurization/Sanitization
- **Step 5** : Digestate Transfer
- Step 6 : Phase Separation
- **Step 7** : Digestate Disposal



WE KNOW YOUR FLUIDS AND THE BEST TECHNOLOGY TO HANDLE THEM!

STEP 1

Storage of Raw Materials before Feeding the Digester. The raw materials used in the anaerobic digestion processes are diverse :

• ANIMAL BY-PRODUCTS (Pig and cattle slurry, pig, cattle, and poultry manure, fats, blood, bones...)



ABATTOIR WASTE

(Intestinal contents, brewery waste, flotation sludge, abattoir fats, molasses...)

• MUNICIPAL WASTE

(Used fats, sewage treatment plant sludge, household organic waste, lawn clippings, sewage treatment plant fats...)

• FOOD WASTE

(Expired supermarket products, restaurant and cafeteria waste...)

The pumped products have very high dry matter content (greater than 40%). They can also be highly abrasive depending on the organic materials used. Progressive cavity pumps, therefore, need to be equipped with Archimedean screws to allow effective pumping

STEP 2 Feeding Digesters and Fermentation

Organic material is transported to digesters where it undergoes fermentation, producing gas. To facilitate fermentation, a portion of the fluid can be transferred from one digester to another, initiating the process in a different digester.

At this stage, organic material is not fully digested, making the **transferred fluid particle-laden**, significantly increasing its viscosity. Depending on particle size and the variety of raw materials used, **progressive cavity pumps or peristaltic pumps will perfectly** meet the requirements for pumping these products

STEP 3 Recirculation

The raw materials used contain a high proportion of dry matter. To facilitate filling and transfer to the digesters, a closed recirculation circuit can be implemented. **The digestate is pumped into the digesters and then re-injected into the hopper pump body to be mixed with the raw materials.**

This recirculation helps liquefy the mixture for easier transfer and to prevent pump clogging. Since the digestate is liquid and low-viscosity, progressive cavity **pumps are perfectly suited for this application.**







STEP 4 Pasteurization/Sanitization

Regulations **mandate pasteurization or sanitization during anaerobic digestion** when using animal by-products (grease, blood, old foodstuffs, manure, etc.). Depending on the type of input, regulations vary and define hygienization or non-hygienization obligations according to different criteria. **Incoming materials must meet a specific size requirement (maximum 12 mm) and be heated for a minimum of 60 minutes at 70°C to ensure the health and safety of the anaerobic digestion process. In health regulations, the general principle is to sanitize before digestion. However, in certain cases, it is possible to request an exemption to sanitize animal matter between two digesters or after digestion.**

In the standard sanitization process, **pumps are used to transfer the materials to be sanitized from their storage** area to the grinding stage upstream of the sanitization tank or to pump the sanitized material back to the digester.



STEP 5 Digestate Transfert

The anaerobic digestion process occurs through the fermentation of organic materials. Once this process is completed, the liquid substrate, known as digestate, is transferred for filtration. At this stage, the fluid is highly liquid and therefore lowviscosity.

The organic materials have been fully digested, resulting in the liquid being low in particle content. **Progressive cavity pumps are used to transfer the digestate from the digester to the phase separator.**



STEP 6

Phase Separation

The digestate undergoes filtration through a phase separator to separate solid material residues from liquid material. This makes it easier to store the solid components and also reduces the volume of liquid digestate by approximately 25%.

The solid residues are then stored for use as bedding in animal husbandry or spread in agricultural fields. The liquid digestate is stored in tanks for spreading.

STEP 7 Digestate Disposal

The liquid digestate that has been previously stored is discharged and spread in agricultural fields. It may sometimes be transported over several kilometers. The greater the distance and length of the pipes, the more there are losses in pressure, resulting in an increase in internal pressure. **Progressive cavity pumps are capable of handling high pressures, making them an effective solution to counteract these challenges.**





PCM TECHNOLOGIES FOR YOUR BUSINESS

PRINCIPLE OF MOINEAU™ TECHNOLOGY

A Moineau[™] pump consists of a helical rotor turning into a helical stator. When the rotor turns inside the stator, the honeycomb progresses spirally along the axis of the pump without changing either shape or volume. This action transfers the product from the pump suction to the pump discharge without degrading the product. This basic principle of Moineau™ pumps allows a high accuracy of flow and pressure, making these pumps extremely efficient for transferring and dosing the most complex fluids

PRINCIPE OF THE PERISTALTIC PCM DELASCO™ TECHNOLOGY

The peristaltic pumping principle is based on the capacity of a soft elastomer hose to accept a deformation and subsequently recover its initial shape. Peristaltic pumps are provided with either high- or low-pressure hoses, covering a wide range of applications which need versatility and flexibility. Thanks to its all-elastomers construction, this technology is perfect for the dosing of reagent and chemicals that are not compatible with metallic parts. Moreover, the peristaltic pumps are seal-less constructed, are able to dry run, and quiet (very low shear of the pumping action).



PRINCIPLE OF THE METERING PUMP LAGOA

The PCM Lagoa pump is composed of a diaphragm connected to a piston, whose alternating movement successively fills and empties the pump head. This pump is most used in the dosing of chemically aggressive reagent, thanks to its stainless steel or plastic mono-material construction, with a PTFE membrane. Dosing accuracy and repeatability are guaranteed.





PRINCIPLE OF THE GRINDER PCM X-GUARD

The mechanical action of the rotating knife throwing the static knife, makes the PCM Xguard the best solution to protect your equipment. Installed before the pumps and the dewatering machines, it prevents failures by grinding all the large pieces found in the liquid. Its heavy duty design makes the PCM X-Guard machine a real asset in minimizing downtime and maintenance operations.







PCM SOLUTIONS FOR BIOGAS **INSTALLATIONS**



PCM ECOMOINEAU[™] MX : **HIGH-PRESSURE DIGESTATE TRANSFER**

The easy-to-use pump specially designed to adapt to your anaerobic digestion processes:

- Withstands pressures of up to 48 bar.
- High-performance, with flow rates of up to 240 m3/h.
- Transfers products with low viscosity and low dry matter content.
- Robust, highly resistant to abrasion.
- Easy transfer of particle-laden fluids.
- Maintenance-in-place system enables stator and rotor to be replaced without moving the **pump** from its installation.
- Patented **3-screw** connection system facilitates rapid seal replacement.

Compared to other technologies such as the lobe pump, **the PCM EcoMoineau™ MX is better** suited to transferring abrasive or particle-laden products. They therefore require very little maintenance on anaerobic digestion applications, which greatly reduces their cost of ownership.

PERFORMANCE	CONSTRUCTION
 Flowrate : 240 m3/h / 1056 US GPM Pressure : 48 bars / 696 PSI Viscosity : 20 000 cPo Size of admissible particles : 40mm / 1.57 inch 	 Monobloc mounting PCM CR elastomer stator AISI 420 chromium-plated stainless-steel rotor 100µ or 400µ Lubricated gland or lubricated mechanical seal (depending on concentration ratio) Cast iron body

) MAINTENANCE IN PLACE SYSTEM

The new maintenance system in place as standard on the entire **PCM Ecomoineau™ MX** range allows the stator and/or rotor to be replaced in just 5 steps and without having to remove the pump from its installation. Maintenance time is considerably reduced, which in turn reduces downtime and life-cycle costs.



STEP 1 :

the top two.

STEP 2 :

Unscrew the suction flange. Shift it towards the pipe to hold and support it.

STEP 3:

rotor head.

STEP 4 :

The rotor/stator assembly is now free. The space left by the MIP ring makes it easy to remove them.



The rotor head has two flats. These allow the rotor to be removed from the stator using a simple spanner.



Then simply repeat these steps in reverse to reassemble the pump. Maintenance is now completed!!!

Unscrew the two screws on the MIP ring to remove it. Then unscrew the tie rods on the suction pipe and remove

Remove the inspection hatches from the body. Then unscrew the 3 screws on the shaft line to release the



PCM X-BIO: TRANSFER OF RAW MATERIALS WITH HIGH DRY MATTER CONTENT

PCM X-BIO hopper pumps facilitate the transfer of **thick**, **viscous**, **pasty**, **sticky**, **high-drying**, solids-containing fluids encountered in many industrial applications.

Simple in design, this range combines several advantages:

- Robust bearing / integral bearing construction to guarantee reliability and extend service life
- Equipped with a large 1500mm hopper and an Archimedean screw, it is ideally suited to the transfer of fibrous, high-dry-matter products.
- Two inspection/maintenance hatches on either side of the hopper and feed barrel allow connection of a recirculation circuit.

The modular design of the **PCM X-BIO** series means it can be perfectly adapted to any anaerobic digestion plant. The different PCM stator materials available in this series meet different process requirements for transferring fluids up to 12 bar.

PERFORMANCE	CONSTRUCTION
 Flowrate : 240 m3/h / 1056 US GPM Pressure : 12 bars / 174 PSI Viscosity : 500 000 cPo Size of admissible particles : 30 - 120 mm / 1.18 - 4.72 inch Percentage of dry matter : 50 % 	 Bearing mounting PCM CR elastomer stator Chrome-plated stainless-steel rotor 250µ Lubricated gland or lubricated mechanical sea (depending on concentration level) 2 inspection doors on each side of hopper 304L stainless steel body



THE ALTERNATIVE SOLUTION FOR MIXING AND TRANSFERRING RAW MATERIALS

This pump is a robust, high-performance solution, designed to meet the needs of biogas applications. **Coupled with a grinder**, it ensures the efficient transfer of raw materials, even the most solid, to the digesters.

Thanks to the design of the shaft line, this pump ensures homogeneous substrate preparation to maximize the performance of anaerobic digestion systems. An ideal choice for **demanding** environments where durability and efficiency are essential.

- It uses the PCM range of elastomers, renowned for their long service life when pumping fluids with abrasive particles.
- **The rotor is hard chromium-coated** to guarantee its robustness and long-term resistance to complex fluids.
- **Inspection ports on the body** to connect various sensors or for maintenance.
- installation.



PERFORMANCE

- **Flowrate :** 100 m3/h
- **Pressure :** 6 bars
- Viscosity : High
- Size of admissible particles : 40 mm

In-place maintenance of the stator and/or rotor, without moving the pump from its

CONSTRUCTION

- Monobloc assembly
- Chloroprene (CR) elastomer stator for abrasion resistance
- AISI 420 stainless steel rotor with hard chrome plating
- Connecting rod with volute for efficient mixing
- Lubricated stuffing box or lubricated mechanical seal (depending on concentration ratio)
- 304L stainless steel body



PCM X-GUARD : PROTECT YOUR PUMPS

The **PCM X-Guard** in-line grinder reduces the size of solids contained in wastewater or other fluids to fine particles. It crushes and shreds rags, pieces of wood, plastics or other solid or semi-solid parts to a size of 5-6mm so as not to damage pumps or other downstream treatment equipment.

Its extremely robust cartridge cutting system, offering high torque at low rotational speeds, is ideal for improving the performance of equipment used to treat and dewater sludge or highly charged fluids. PCM X-Guard therefore prevents costly damage, time-consuming repairs and unscheduled maintenance.

PCM DELASCO™ DX : **DIGESTATE TRANSFER**

Thanks to their different constructions and the variety of their elastomer tubes, Delasco™ PCM peristaltic pumps can cover multiple applications requiring versatility and flexibility.

Simple to use and maintain, they offer an efficient solution for transferring **fragile**, abrasive and corrosive products.

Thanks to their construction, **Delasco™ DX** pumps have a low life-cycle cost:

- Only the tube is in contact with the product
- Low operating speed reduces tube wear-Low power requirements, reducing energy costs

PCM MX-V : FOR THE EVACUATION OF LIQUID DIGESTATES UP TO 5 METERS IN DEPTH

PCM MX-V pumps are specially designed to meet the challenges of pumping digestates, whether liquid or loaded with solid particles. Thanks to their **vertical suction capacity**, they enable efficient pumping from basins or tanks **up to 5 meters deep.**

Ideal for biogas digestate evacuation applications, these robust pumps provide reliable performance and a solution suited to demanding environments, combining efficiency and durability.

This pump is designed for flexibility and ease of use:

- Its triangular fixation system and lifting mechanism enable **easy** handling of the pump for installation or maintenance.
- The **PCM MX-V** is equipped with a rotating disc fixed to the rotor to prevent the pumping of foreign bodies, thus ensuring the safety of the pump.
- It uses the **PCM elastomer range**, enabling the pumping of fluids laden with particles, viscous or corrosive fluids.

PERFORMANCE

- Flowrate : 234 m3/h / 1049 PSI
- Pressure : 4 bars / 58 PSI
- **Particles** : reduction to 5-6 mm / 0,19 0,23 inch

CONSTRUCTION

- 4 interchangeable and reversible knives
- 4 gearmotor powers available

PERFORMANCE

- **Flowrate**: 98 m3/h / 431 US GPM
- Pressure : 15 bars / 217 PSI
- **Viscosity** : 40 000 cPo
- Size of admissible particles : 35 mm / 1.33 inch

CONSTRUCTION

- EPDM or NR tube
- No dynamic sealing
- Cast iron body

PERFORMANCE

- Flowrate : 100 m3/h
- **Pressure :** 6 bars
- Viscosity : 20 000 cPo
- Size of admissible particles : 40 mm

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CONSTRUCTION

• Monobloc assembly • Chloroprene (CR) elastomer stator • AISI 420 stainless steel rotor, chromeplated 100µ • Flexible connecting rod • 304L stainless steel body

PCM ELASTOMERS **EXPERTISE**

René Moineau[™] invented the progressing cavity pumps in 1932. For over 90 years, PCM has been dedicated to continuous research, development, and testing of new elastomer blends tailored to meet the diverse requirements of various industries. Throughout this time, PCM has accumulated extensive knowledge and expertise, investing in essential equipment and resources to enhance our ability to select, develop, and produce optimal elastomers for our customers' specific applications.

Elastomer selection demands specialized knowledge and experience, qualities that few companies possess worldwide. PCM stands out as the only progressing cavity pump manufacturer managing its own elastomer production. Leveraging our expertise, laboratory facilities, and dedicated production unit, we can meticulously develop and customize each elastomer blend to align with the unique characteristics of every type of fluid.

PCM's customers encounter a wide array of fluids requiring careful consideration and solutions to ensure that the elastomers used in **PCM equipment deliver optimal functional** characteristics. These include:

- Mechanical resistance to abrasion,
- Chemical resistance to the pumped fluid,
- Desired color,
- Regulations compliance and rules,
- Optimized lifetime,
- Product integrity (structure, turbidity...),
- Resistance to cleaning procedures.



) ELASTOMERS TESTING

From laboratory testing equipment to large mixers, injection presses and vulcanization ovens, PCM has all the necessary equipment and knowledge within its premises to assure perfect control of its elastomer selection and manufacturing.

- Mechanical tests (static, dynamic, compression, bonding),
- Tribology (abrasion, friction),
- Chemical tests (swelling tests, volume and hardness variation, thermal analysis, infrared spectroscopy.



MAIN ELASTOMERS USED IN INDUSTRY APPLICATIONS

NITRILE Good general resistance in many applications especially with oil, grease products and resists abrasion. PCM NBR 164 has a good PCM 164 mechanical property. Certified EU, FDA US & 3A, PCM NBR 209 is a versitale elastomer, PCM 209 that can be used in a lot of different food applications. White elastomer, which has good mechanical properties. Mainly NBR PCM 246 use in food application to transfer oil and fat product, due to his EU certification. NITRILE - "4-WHEEL DRIVE" Most versatile with its high ACN content, providing top performance PCM 159 across many applications. PCM 194 SOFT NITRILE High resistance to abrasion and top performer for handling PCM 205 solids with varying water cuts. HYDROGENATED NITRILE HNBR For higher temperature (150°C/300°F) applications and H2S&CO2 PCM 198 resistance. PCM 206 Extends the limits of 159. EPDM TERPOLYMERE ETHYLENE PROPYLENE DIENE PCM 185 Used mainly for his resistance to acids and alcohols. Meet with chemical challenge. **FLUOROCARBON** Excellent chemical resistance. Top-of-the-range elastomer capable **PCM 186** of withstanding extreme conditions. FKM Use to transfer chemical product in food application. PCM FKM 189 is **PCM 189** certified FDA US & 3A. Best performer for higher aromatics, and a good choice when nitriles **PCM 204** are no longer effective. POLYCHLOROPREN Mainly used for pumped fluids with particles. Has a good property to fight against abrasion and has good general properties to withstand PCM 174 chemical products. NR PCM 156 NATURAL RUBBER Very good mechanical properties and resists abrasion. Я, PCM 201

PCM ELASTOMER MANUFACTURING PROCESS





injection parameters to ensure the efficiency and its quantity to achieve the desired of production and guarantee the good characteristics properties of our parts

Numerical simulation: fine-tune our Chemical formulation: define each ingredient









Control : Then all stators are controlled to **Failure analysis :** Thanks to our expertise guarantee their performance. The tightening and knowledge we are able to analyze the is very important and must be precise to different stators failures to bring personalized have the right flowrate. Other parameters solutions to fix it. controlled are the dimensions, gluing, thickening ...



PCM SERVICES

At PCM, we offer a comprehensive range of services to analyze, start up, perform maintenance, and upgrade your pumps and equipment, ensuring optimal performance and reliability.

Our team of experts is dedicated to ensuring that your pumps operate at peak efficiency, delivering the best possible outcomes for your applications. By leveraging our deep industry knowledge and cutting-edge technologies, we are able to provide tailored solutions that address the unique challenges and requirements of your pumping solutions.

Our expertise spans from initial installation and auditing to ongoing maintenance and technical support, catering to all your needs to keep your systems running efficiently and effectively.

AFTER SALES

Maintaining your equipment is paramount for safety. Our Field Service engineers are here to support you with frequent inspections, create a service plan and carry out regular servicing of your pumps such as replacing stators/ hoses, rotor within the pumps and all seals and rings.

PCM has a dedicated after sales support team for all maintenance steps. This can include yearly service agreements to maintain and extend the life of the pumps. We can also renew third party equipment where we can offer on-site refurbishments to ensure safe operation of existing pumps and minimizing downtime at site.

MAINTENANCE

Maintenance is key to extending the life of your pumps and equipment. At PCM, we offer tailored maintenance solutions, including training, corrective maintenance, and preventive maintenance, to meet your specific requirements. Our goal is to help you maximize uptime and minimize the risk of unexpected failures.





) ROTOR AND MECHANICAL SEAL RENEWAL

Committed to reducing material waste, we also offer the possibility to renew rotors and mechanical seal. PCM can rechrome rotors to give them a second life. Similarly, we can reshape the faces of the mechanical seals so they can be reused on pumps.



RENTAL

For those in need of temporary solutions, we provide pumps and equipment rental. We understand the importance of keeping a plant operating whilst conducting regular service or refurbishment of existing critical equipment. We can rent pumps to keep your plant operating, which also allows engineers to conduct their work in a safe way, if the pump can be taken completely offline.



INSTALLATION AUDIT

Our installation audit service is designed to enhance the performance of your PCM pumps and equipment. Through detailed evaluations, we identify areas for improvement and provide actionable recommendations to optimize equipment operation and reduce maintenance costs. Our audits help you achieve higher efficiency and reliability in your installations, ensuring that your systems are always performing at their best.



) TRAINING & DIGITAL SUPPORT

Our experienced staff can provide on-site training for new or existing pumps to maintenance engineers or operators. This can help increase site safety, hazard awareness, and improve asset management. We can provide tailored training on operation, servicing, or hazard identification.

For easy access to information on installation and maintenance, our HELLO PCM digital application provides a fast and convenient way to access data and resources related to your pumps and equipment. This application ensures that you have all the information you need at your fingertips, helping you manage your systems more efficiently.





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