

Hydraulic Piston Pumps

Reliable and efficient positive displacement pumps for manure transfer



CHRIS PECK, Maintenance Manager
Herrema Dairy – Fair Oaks, IN, USA

Years ago, Herrema Dairy installed four GEA Futuro pumps. These pumps have been pumping every day for over 17 years, with minimal maintenance. "They can be carefree if you look after them," says Chris Peck. Herrema Dairy has now added six additional Futuro pumps for a total of ten.

Time tested and farmer approved

Reputable manure evacuation systems for over 40 years

The range of hydraulic piston pumps offered by GEA comprises three different models: the Electromix system, Futuro, and Magnum. All models enable efficient, low-energy transfer of manure with or without bedding from a free stall or a tie-stall type of barns. GEA always strives to produce durable equipment that is capable of operating in the most extreme conditions. For this reason, the hydraulic piston pumps, like all of the manure management equipment offered by GEA, are manufactured from high-quality steel, and then treated with an epoxy base coat and two coats of urethane paint.

GEA is also concerned with its environmental impact, and works continually to implement efficient environmental management systems. As a result, GEA has achieved ISO 14001 certification. The manure management equipment developed by GEA is rooted in more than 50 years of field-proven experience. This knowledge is available through our sales specialists and established dealership network to provide sound guidance in designing a suitable manure evacuation system that exceeds your requirements.

Join the ranks of the many satisfied customers operating an Electromix system, Futuro and Magnum. Don't hesitate to get in touch with your nearest GEA representative for assistance and advice.

Advantages

- **Proven reliability** - included in the product range for over 40 years, this equipment has evolved alongside livestock farms to provide the same high level of satisfaction and performance.
- **Nothing but quality** - robust equipment that is manufactured from top-quality components.
- **Long service life** - efficient mechanical design requires minimal maintenance, and smooth operation leads to a long service life for your equipment.
- **Adaptable equipment** - multiple configurations to suit your installations and type of herd management.

Main features

- **Stainless steel pump tube** - for longer service life.
- **Double mechanical piston seal** - upper and lower mechanical seals made of high-quality flexible polyurethane that enable hermetic operation with minimal friction against the pump tube wall, reducing the amount of lubricant required.
- **Low-pressure reversing mechanism** - for quiet and smooth operation without backlash.
- **Lubrication lines** - accessible from the top of the pump to facilitate equipment maintenance.
- **Hydraulic unit**
 - 5 or 7½ HP (4 or 5.5 kW) motor
 - 15 US gal. (57 l) oil tank
 - Pressure and oil level gauges
 - Electric oil heater and ventilated hydraulic unit available

Electromix system

The Electromix system enables free stall or tie-stall barn manure to be sufficiently agitated and homogenized before transfer

The Electromix system is versatile and offers remarkable performance in a wide variety of applications. In addition to transferring manure to an outside pit, the Electromix system is well suited to feed a manure digestion system or a separation system.

Key features

- **Efficient design** - able to transfer manure with limited bedding a long distance with a smaller diameter evacuation line.
- **Minimum and easy maintenance** - easily accessible grease lines for lubricating the bronze bearings valve pivots.
- **Versatile pump** - multiple installation configurations to suit the design of your reception pit. 8" (203 mm) diameter suction pipe enabling a suction depth of up to 10 feet (3 m).
- **A system adapted to your needs** - standard 3" (76 mm) hydraulic cylinder with 5 HP (4 kW) motor. The option includes a 4" (102 mm) cylinder and a 7.5 HP (5.5 kW) motor with a robust pumping tube.
- **Efficient and smooth operation** - the Electromix pump is equipped with a pressure damper allowing smooth transfer without backlash.
- **Evacuation line measuring 6" or 8" (152 or 203 mm) in diameter** - allowing manure evacuation over a greater distance than the Magnum and the Futuro.
- **Everything you need for an efficient installation** - 6" (76 mm) cast-iron and 8" (203 mm) steel guillotines as well as a wide range of parts and accessories to complete the installation of your system.
- **Electromix agitator** - high-performance propeller agitator allowing homogenization of the manure before it is transferred to main storage.

Dairy manure Free stall & tie-stall barns

Maximum consistency	1½" (38 mm)		
Straw & hay	Sawdust	Separated fiber	*Sand

* Mandatory to have air risers in the evacuation line.



Electromix system on the floor above the reception pit. Installation with double discharge for manure transfer in two different pits.

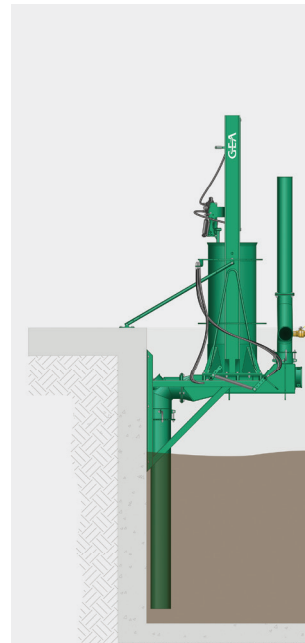
Electromix pump configurations



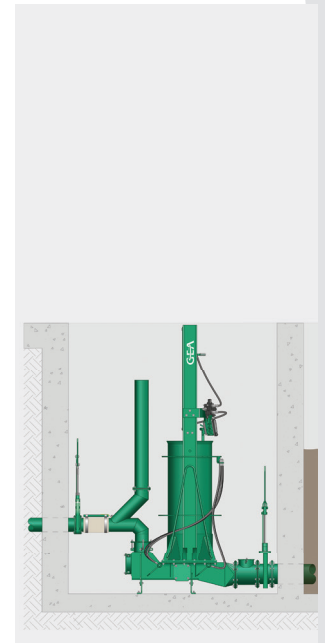
Installation on the floor above the reception pit
 Suitable for a reception pit with a depth of 10 feet (3 m) maximum.



Installation on the floor next to the reception pit
 Suction pipe 36" (91 cm) from the wall. The pump must be installed in a recess when the reception pit is deeper than 10 feet (3 m).



Installation on the wall inside the reception pit
 Suitable for reception pits with depths exceeding 10 feet (3 m) and when head space or floor space is limited.

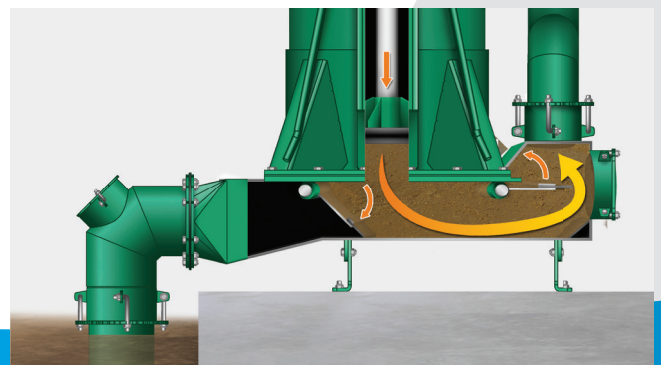
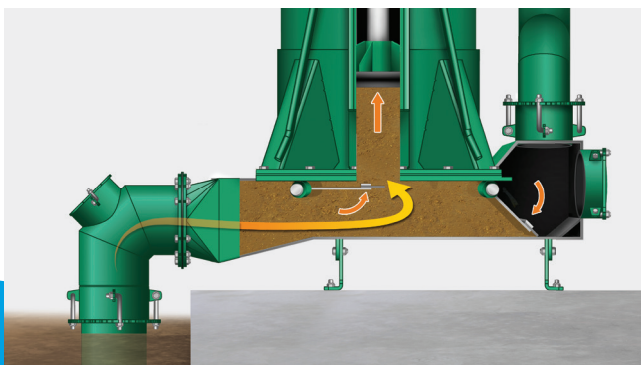


Installation inside a service pit next to the reception pit
 Provides a flooded inlet to the pump for worry-free operation.

Working principle

During the suction cycle, the upstroke of the piston creates a suction effect that forces the discharge valve to close and the intake valve to open, allowing the evacuation chamber to fill with manure.

During the evacuation cycle the downstroke of the piston creates sufficient pressure to close the intake valve and open the discharge valve, allowing evacuation of the manure.



Electromix system

Performances

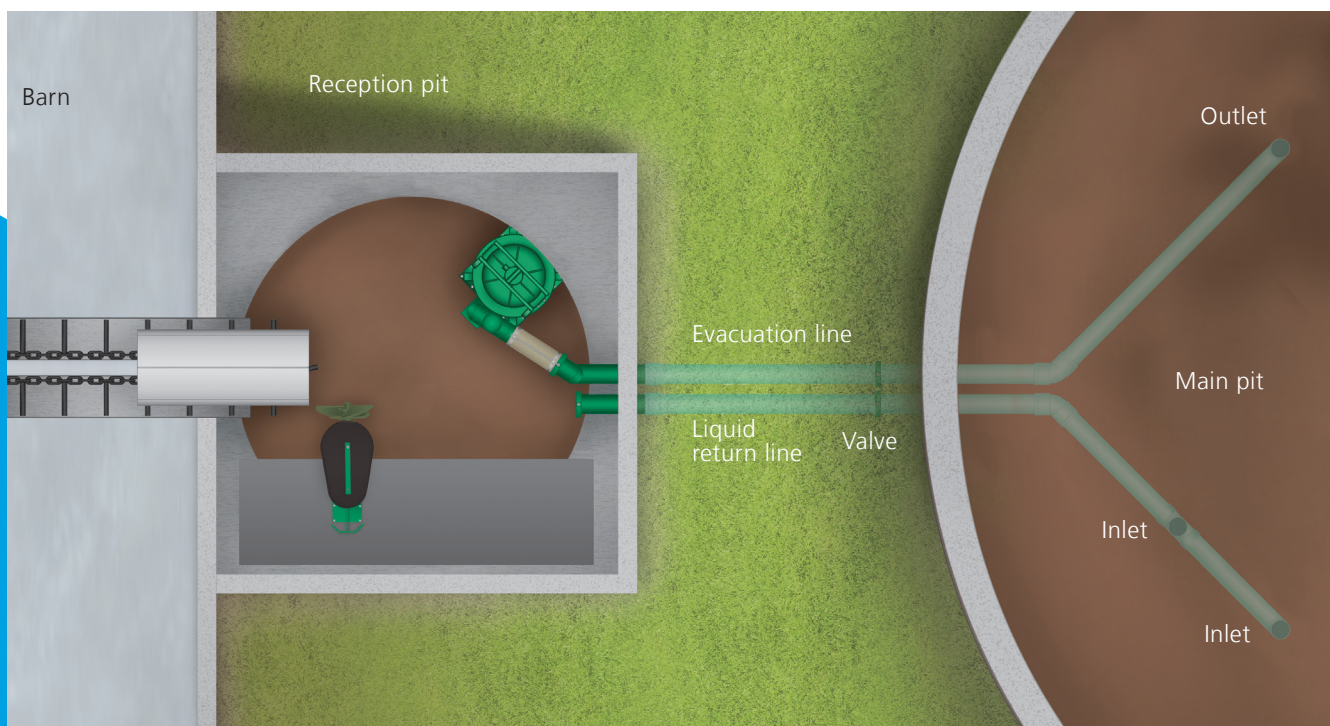
Hydr. unit	Cylinder	Output		Evacuation line	Max. transfer distance depending on manure consistency			
		60 Hz	50 Hz		½" (13 mm)	¾" (19 mm)	1" (25 mm)	1½" (38 mm)
5 HP 4 kW	3" (76 mm)	138 Imp gpm	522 lpm	6" (152 mm)	500 feet (152 m)	350 feet (107 m)	200 feet (61 m)	150 feet (46 m)
				8" (203 mm)	1600 feet (488 m)	1200 feet (366 m)	800 feet (244 m)	600 feet (183 m)
7.5 HP 5.5 kW	4" (102 mm)	106 Imp gpm	397 lpm	6" (152 mm)	800 feet (244 m)	500 feet (152 m)	350 feet (107 m)	200 feet (61 m)
				8" (203 mm)	2000 feet (610 m)	1800 feet (550 m)	1500 feet (457 m)	1200 feet (366 m)

Liquid return line or addition of wastewater required. Performance varies according to the installation, the manure consistency and the quantity and type of bedding. Can manage up to 40 lb of straw/hay bedding per 10 dairy cows daily.

Typical installation with liquid return line

The liquid return line enables the liquid in the main storage to be recovered and returned underground to the reception pit to maintain proper consistency. Also, the liquid return line makes it possible to limit the addition of fresh water so that the volume of manure stored can be reduced.

Even with a liquid return line, 1 to 2 Imp gallons (4 to 8 liters) of water per cow per day must be added to the manure to facilitate agitation of the main pit. Typically, the quantity of water used for cleaning the milking system is more than sufficient.



Electromix agitator

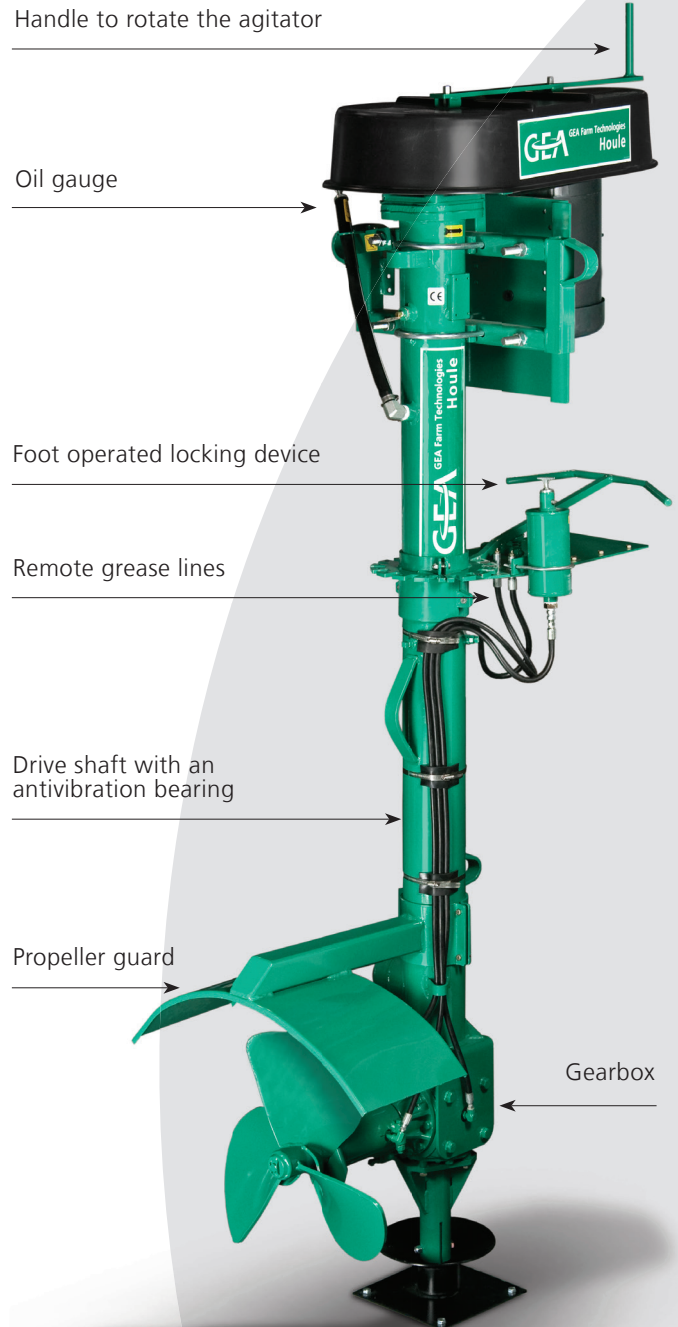
The Electromix agitator is the perfect equipment for homogenizing manure in a reception pit. It efficiently mixes solids and liquids to obtain homogeneous manure to maximize the pumping and transfer of manure.

- **Rapid and efficient homogenizing** - the agitator can be rotated 150° manually with the included handle and foot lock.
- **Robust agitation propeller** - 20" (508 mm) or 24" diameter propeller equipped with a knife kit for shredding fiber. Available with a propeller guard to protect against splashing.
- **Several agitator lengths available** - to suit reception pit depths ranging between 6 and 20 feet (1.8 and 6 m) in 2 feet (61 cm) increments.
- **Performance and durability** - thanks to the greasable three seal mechanism exclusive to GEA, which prevents contaminant infiltration.

Double propeller for Electromix agitator

The double propeller is typically used for very deep reception pits, and where the pit volume is kept at a constant level (minimum level of 6 feet (2 m)).

A minimum distance of 48" (122 cm) is necessary between the two agitation propellers. The double propeller is also an excellent replacement for agitating substrates in an agricultural digester system.



The Electromix agitator is mandatory when using the Electromix pump to obtain a homogeneous mixture before pumping out the reception pit.

Futuro

The Futuro enables liquid manure from a free stall barn to be transferred underground to long-term storage

The Futuro is a low energy pump equipped with robust valves. It allows the transfer of manure containing a small amount of bedding, such as sawdust, wood chips, chopped straw, and sand. The Futuro can be fitted with a hopper to collect manure from a cross-gutter cleaner or skid-steer loader. It can also pump the contents of a reception pit using a flooded inlet.

Key features

- **Efficient design** - the Futuro is equipped with robust valves fitted with a rubber gasket to seal the valve.
- **Minimum and easy maintenance** - easily accessible grease lines for lubricating the bronze bearing valve pivots. The interior of the evacuation chamber is accessible from both sides of the pump.
- **Completely safe operation** - the outlet valve of the Futuro is fitted with a spring ensuring closure of the valve. 12³/₄" (324 mm) and 16" (406 mm) inlet and outlet guillotines also are available with hydraulic cylinders allowing remote operation of the guillotines from the hydraulic unit. The hydraulic outlet guillotine can also be equipped with a pneumatic spring allowing your installation to be protected against backflow by automatically closing the guillotine in the event of a system shutdown.

Dairy manure Free stall barns

Maximum consistency	5" (127 mm)		
Straw & hay	Sawdust	Separated fiber	*Sand

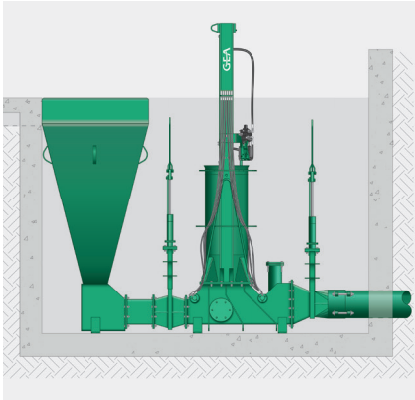
** Mandatory to have air risers in the evacuation line.*

Hydr. unit	Output		Max. transfer distance depending on manure consistency	
	60 Hz	50 Hz	2" (51 mm)	5" (127 mm)
5 HP 4 kW	93 gpm Imp	355 lpm	600 feet (183 m)	200 feet (61 m)
7.5 HP 5.5 kW	106 gpm Imp	405 lpm		

Performance varies according to the installation, the manure consistency and the quantity and type of bedding. Can manage up to 40 lb of straw/hay bedding per 10 dairy cows daily. It may be necessary to add water.

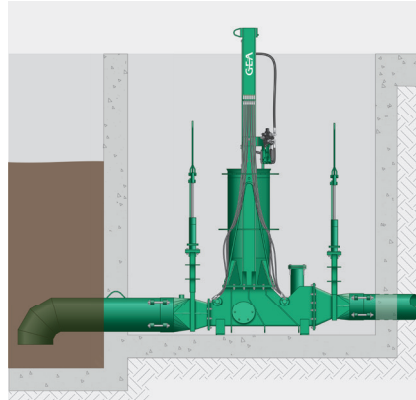


Futuro models



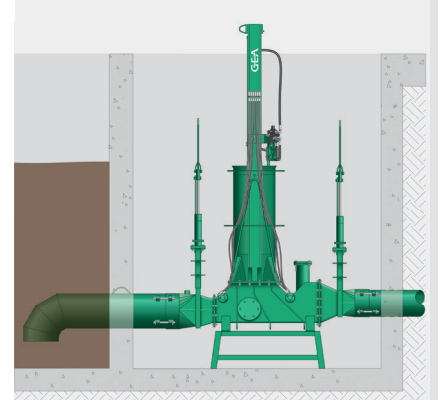
Futuro with manual inlet and outlet guillotines and fitted with a hopper to collect the manure from a cross-gutter cleaner or skid-steer loader

Two hopper models are available: 60" x 48" (152 cm x 122 cm) or 84" x 72" (213 cm x 183 cm).



Futuro with manual inlet and outlet guillotines and fitted with a 16" (406 mm) diameter suction pipe

The suction pipe can be installed with the opening facing upwards or downwards, downwards is required when the manure is laden with sand.



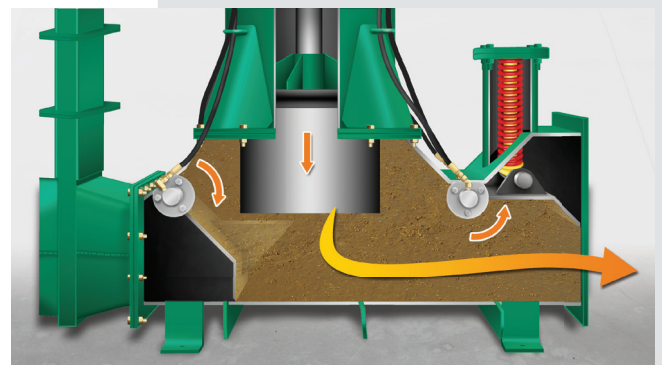
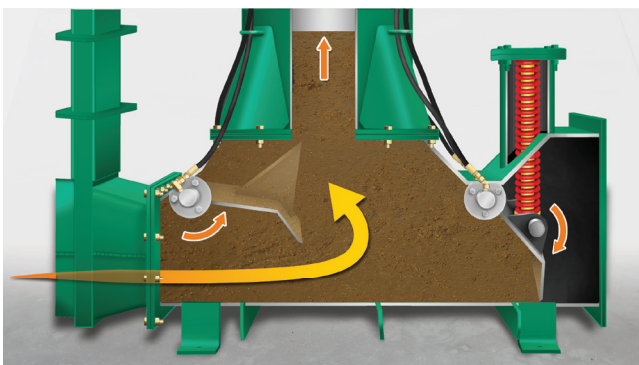
Futuro with manual inlet and outlet guillotines set on a riser and fitted with a 16" (406 mm) diameter suction pipe

The riser allows building the service and reception pits at the same floor level when using the suction pipe facing downward.

Working principle

During the suction cycle, the piston upstroke creates vacuum, which closes the discharge valve and forces the intake valve to open, allowing the evacuation chamber to fill with manure.

During the evacuation cycle the pressure exerted by the piston downstroke closes the intake valve and forces the discharge valve to open, allowing evacuation of manure. The downstroke lever attached to the intake valve ensures complete closure of the pump inlet.



Magnum

The Magnum is a made-to-order piece of equipment for efficiently transferring thick manure from a free stall or tie-stall barn



Several types of hoppers are available for installations comprising 1 or 2 barn cleaners, or for skid-steer loader scraped alleys in free stall barns. The pump hopper can be replaced by a suction pipe and reception pit if the manure does not contain bedding.

Key features

- **Robust and durable guillotines** - hydraulically operated inlet and outlet guillotines and 16" (406 mm) manual safety guillotines equipped with a sharp blade to cut through straw and organic bedding.
- **Completely safe operation** - the hydraulic outlet guillotine equipped with a pneumatic spring prevents the risk of backflow by automatically closing in the event of a system shutdown.
- **Sand-laden manure option** - in addition to a sequence valve, QPQ treatment of the guillotine blade, doors, and walls of the evacuation chamber for better abrasion resistance.
- **Hopper available in stainless steel**
- **16" (406 mm) diameter evacuation outlet** - optional 24" (610 mm) outlet.

Dairy manure Free stall & tie-stall barns

Maximum consistency	5" (127 mm)
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Magnum fed by a 7/8" chain gutter cleaner system and fitted with hydraulic inlet and outlet guillotines and 16" (406 mm) manual safety guillotine.

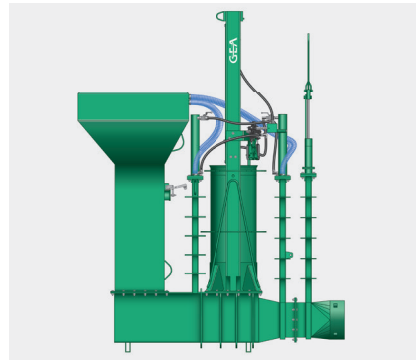


Magnum models



Straw & hay Sawdust Separated fiber

Magnum with hydraulic inlet and hydraulic outlet guillotines



Straw & hay Sawdust Separated fiber

Magnum with hydraulic inlet guillotine, hydraulic outlet guillotine and 16" (406 mm) manual safety guillotine

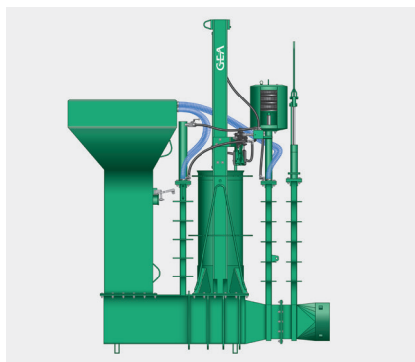
The safety guillotine offers an additional precaution against backflow when carrying out maintenance work.



Straw & hay Sawdust Separated fiber

Magnum with hydraulic inlet guillotine and hydraulic outlet guillotine with pneumatic spring

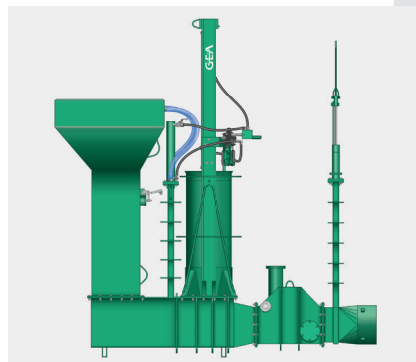
Mandatory when the storage tank is higher than the bottom of the gutter. The pneumatic spring protects against backflow by automatically closing the guillotine in the event of a sudden system shutdown.



Straw & hay Sawdust Separated fiber

Magnum with hydraulic inlet guillotine, hydraulic outlet guillotine with pneumatic spring and 16" (406 mm) manual safety guillotine

Mandatory when the storage tank is higher than the bottom of the gutter. The pneumatic spring protects against backflow by automatically closing the guillotine in the event of a system shutdown.



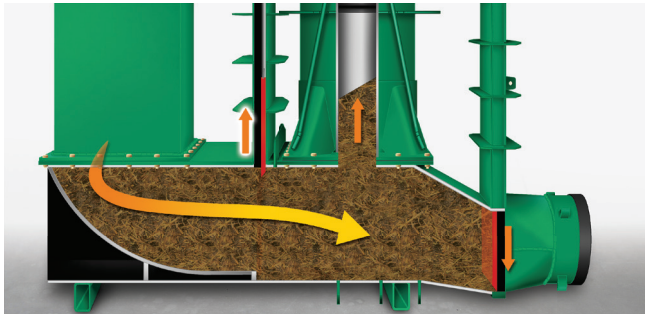
Sand Sawdust Separated fiber

Magnum with hydraulic inlet guillotine, outlet valve with spring and 16" (406 mm) manual safety guillotine

Model designed for transferring manure containing sand bedding. This configuration enables safe management of the manure originating from a storage tank located lower or higher than the bottom of the gutter thanks to the outlet valve fitted with a spring.

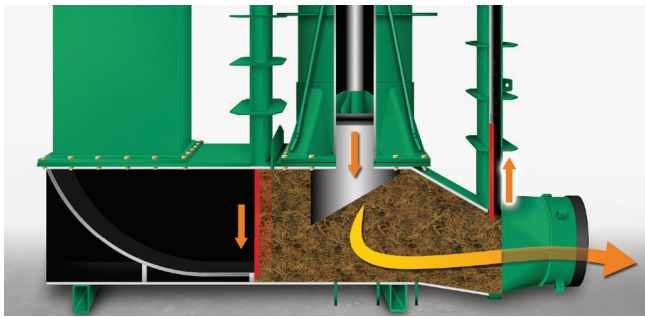
Our expertise in manure management and over 50 years of manure experience enables us to offer you design advice on configuring the hydraulic piston pump so that it perfectly suits your installation.

Magnum



Working principle and performances

During the suction cycle, the reversing valve directs the pressure to close the outlet guillotine and then open the inlet guillotine, and finally to the piston cylinder to start its upstroke, allowing the evacuation chamber to fill with manure.

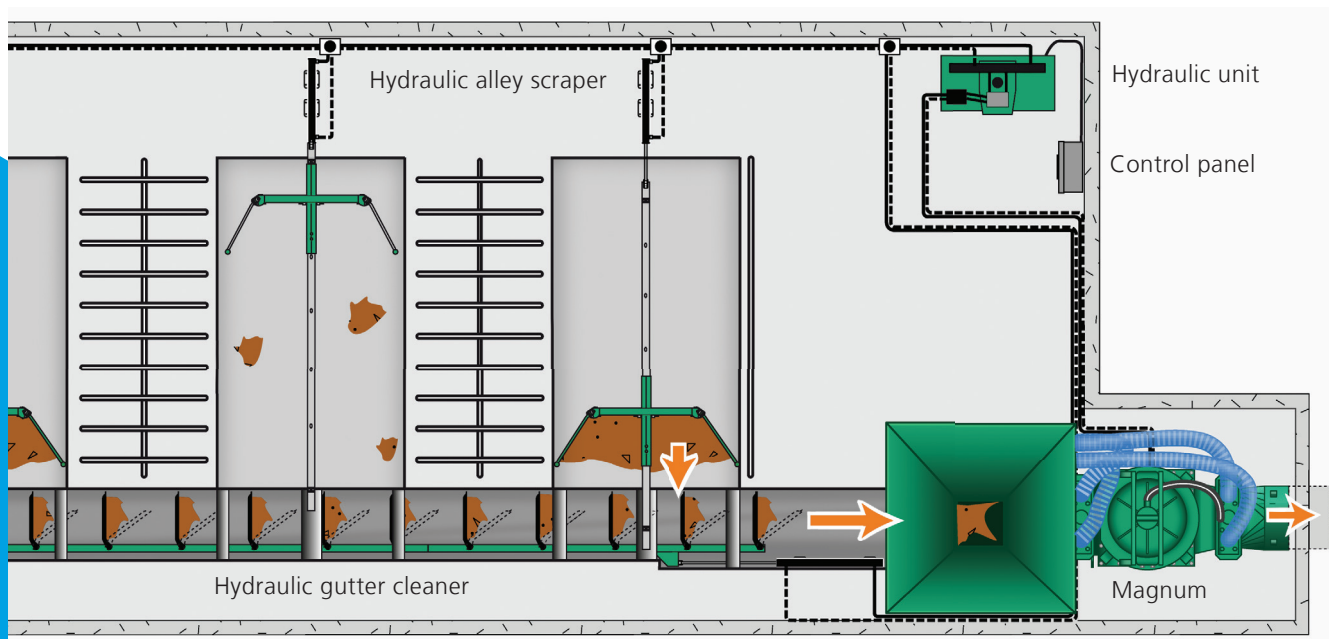


During the evacuation cycle, the hydraulic pressure closes the inlet guillotine and opens the outlet guillotine. Then the piston cylinder starts its downstroke, allowing the manure to be evacuated. The design of the angled piston bottom efficiently clears the manure inside the evacuation chamber.

Hydr. unit	Output		Max. transfer distance depending on manure consistency	
	60 Hz	50 Hz	2" (51 mm)	5" (127 mm)
5 HP 4 kW	53 Imp gpm	200 lpm	350 feet (107 m)	200 feet (61 m)
7.5 HP 5.5 kW	67 Imp gpm	255 lpm		

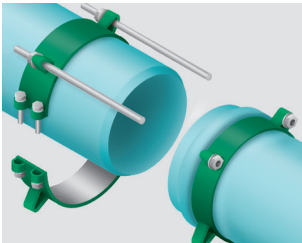
Performance varies according to the installation, the manure consistency and the quantity and type of bedding. Can manage up to 40 lb of straw/hay bedding per 10 dairy cows daily. It may be necessary to add water.

Typical installation



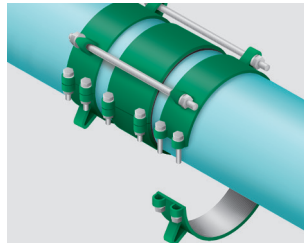
Futuro and Magnum Evacuation Line

GEA offers 12 ¾" (324 mm) and 16" (406 mm) diameter steel pipes, as well as a variety of elbows, discharge pipes, coupling kits, and other accessories for steel or PVC evacuation line installation.



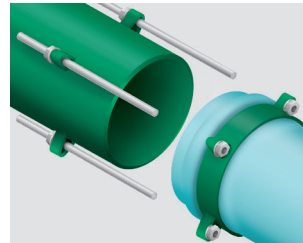
Coupling kit for male PVC end to female PVC end

Anti-slip collar and retaining ring connected by four threaded rods - 12 ¾" (324 mm) and 16" (406 mm).



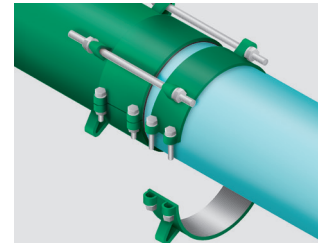
Coupling kit for male PVC end to male PVC end

Two anti-slip collars connected by four threaded rods and one split coupler - 12 ¾" (324 mm) and 16" (406 mm).



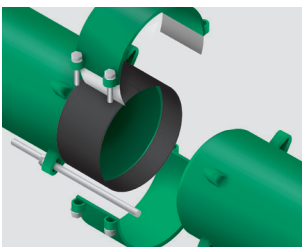
Coupling kit for male steel end to female PVC end

Retaining ring connected to steel pipe by four threaded rods - 12 ¾" (324 mm) and 16" (406 mm).



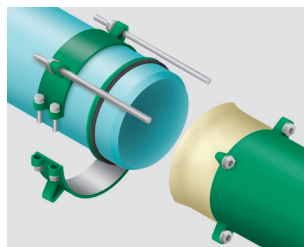
Coupling kit for male steel end to male PVC end

Anti-slip collar connected to steel pipe by four threaded rods and one split coupler - 12 ¾" (324 mm) and 16" (406 mm).



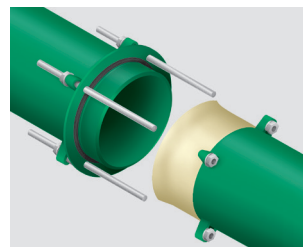
Coupling kit for male steel end to male steel end

One split coupler with seal connecting the steel pipes by four threaded rods - 12 ¾" (324 mm) and 16" (406 mm).



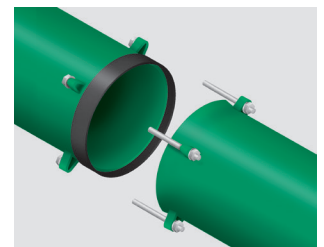
Coupling kit for male PVC end to female stainless steel end

Anti-slip collar with retaining ring and O-ring connected to steel pipe by four threaded rods - 12 ¾" (324 mm).



Coupling kit for male steel end to female stainless steel end

Retaining ring with O-ring connected to steel pipe by four threaded rods - 12 ¾" (324 mm).



Coupling kit for male steel end to female steel end

Steel pipes connected by four threaded rods and a seal - 16" (406 mm).

Futuro and Magnum Evacuation Line

An underground evacuation line made of steel is susceptible to corrosion. How can this phenomenon be explained? How can the effects of corrosion be prevented and the evacuation line protected against premature wear?

Very-low voltage electricity travels through soil and the amount of electricity transmitted is closely related to soil type. Hard and wet clay soil offers high conductivity while coarse and dry sand has almost no capacity for conduction.

If electricity traveling through the soil meets a steel evacuation line, it will use the steel line as a conductor. Then, at the point where the electricity leaves the steel evacuation line, a chemical corrosion reaction occurs. This corrosion can occur rapidly or slowly, depending on the soil type.

Sacrificial anodes

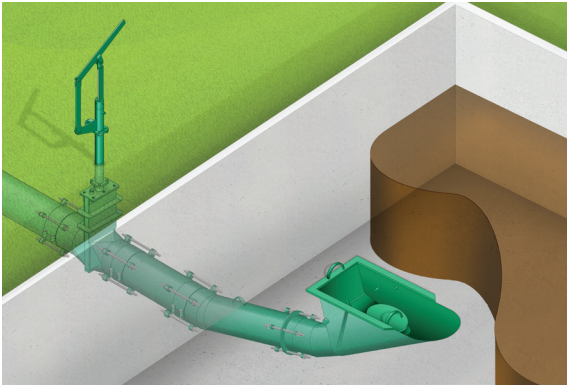
The steel evacuation line, whether that of the Futuro or the Magnum, can be protected against corrosion by installing sacrificial anodes at specific points along the buried line.

- **High-purity magnesium bar** - the sacrificial anodes are made of a material that corrodes faster than steel. They are designed to protect the steel pipes and elbows.
- **A greatly-extended service life** - the anodes gradually corrode over the years instead of the evacuation line. When properly installed, the sacrificial anodes can have a service life of 20 years.

Length of the evacuation line	Quantity of anodes
Up to 120 feet (36 m)	1 anode
Up to 240 feet (73 m)	2 anodes
Up to 360 feet (110 m)	3 anodes
Up to 480 feet (146 m)	4 anodes
Up to 600 feet (183 m)	5 anodes



The high purity magnesium bar inside the sacrificial anode will disintegrate slowly and will protect your evacuation line over several years.



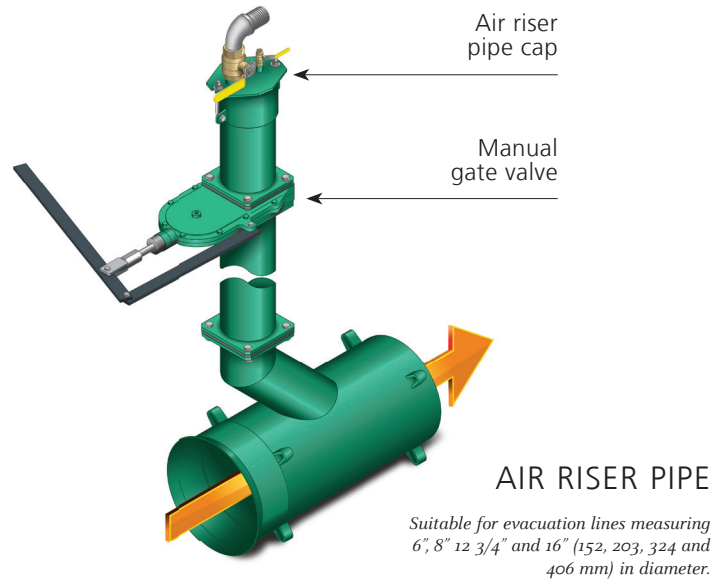
Flapper valve

- Safety first! - The flapper valve is attached to the end of the evacuation line to prevent the risk of backflow. An in-line model is also available for the 6" and 8" (152 and 203 mm) diameter evacuation lines.
- Suitable for thick manure - the flapper valve can seal in thick manure. A guillotine valve is recommended for manure containing more liquid.
- Suitable for evacuation lines - measuring 6", 8", 12¾" and 16" (152, 203, 324 and 406 mm) in diameter.

Air riser pipe for flushing the evacuation line

A 6" (152 mm) diameter steel pipe fitted with a 2" (51 mm) airline inlet is used to inject a large volume of air to flush the line free of sedimented material. The air riser pipe is mandatory when sand bedding is used, and is a great way to access the evacuation line for cleaning with a water jet.

Air riser pipes must be installed at least every 200 feet (61 m) along the evacuation line. However, certain lines require additional air riser pipes at points where the risk of blockage is higher, such as narrow-angle elbows or positive slopes.



Pit management devices

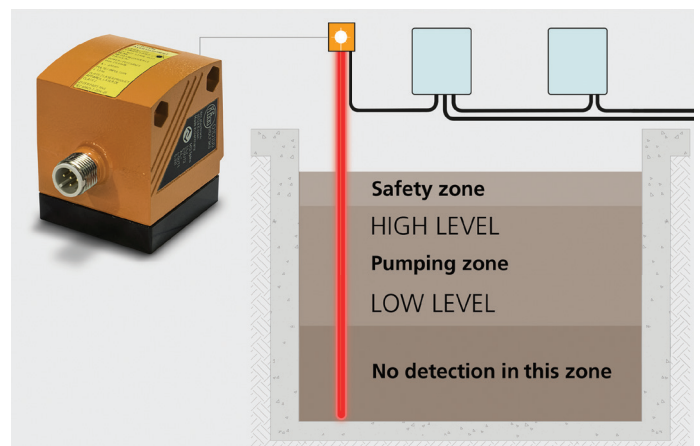
Accurately measure liquid levels inside a reception pit

Laser level sensor

The laser level sensor readings are done from a distance without being in contact with the material, even from an elevated distance and outside of the pit. It is not subject to manure build-up which may result in a false liquid level reading. The laser level sensor is an optional accessory offered with all hydraulic piston pumps. Accuracy is not affected by manure with foam.

Diaphragm switch

A diaphragm switch is a mechanical level measurement device installed inside the pit and acts as a high- or low-level switch. The diaphragm switch is optional with all hydraulic piston pump models.



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The global group specializes in machinery, plants, as well as process technology and components.

GEA provides sustainable solutions for sophisticated production processes in diverse end-user markets and offers a comprehensive service portfolio.

The company is listed on the German MDAX (G1A, WKN 660 200), the STOXX® Europe 600 Index and selected MSCI Global Sustainability Indexes.

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