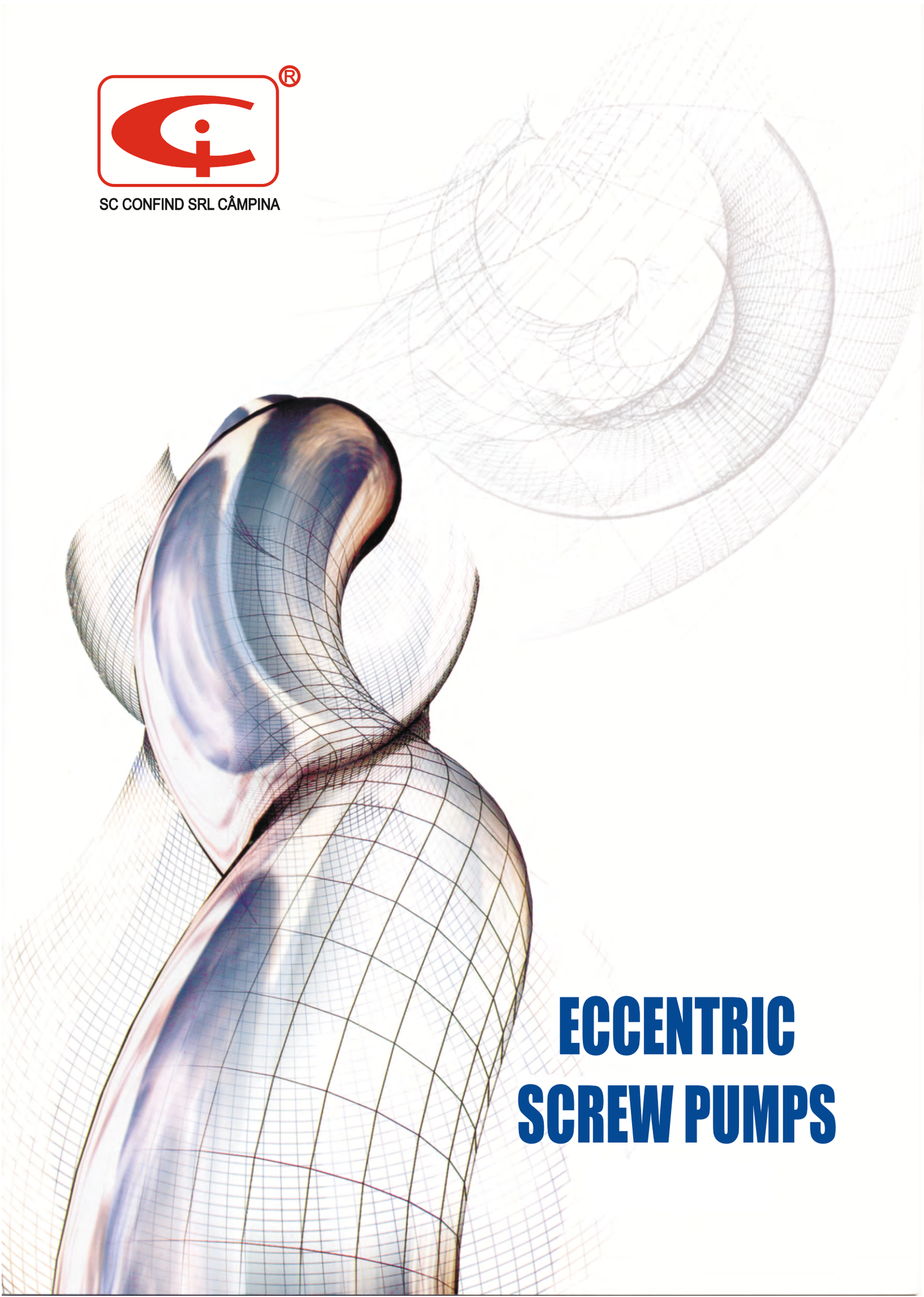
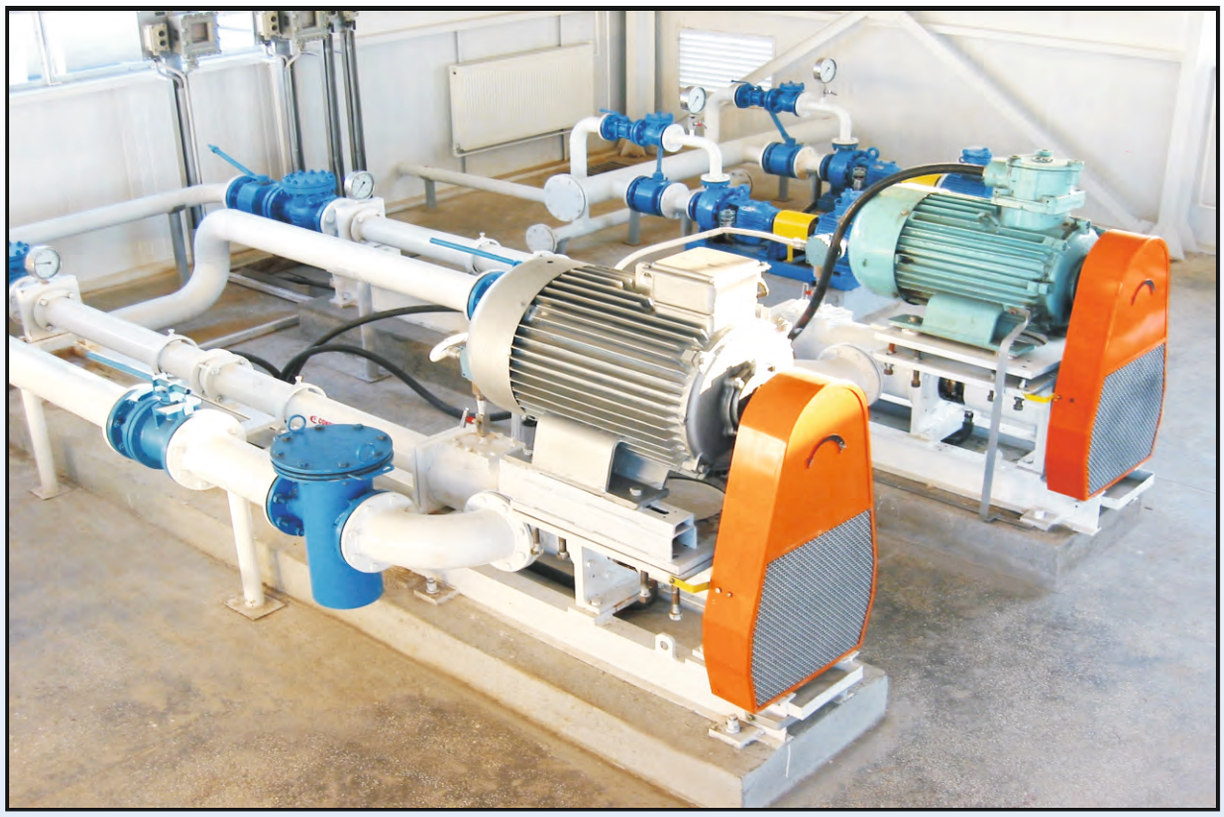
SC CONFIND SRL CÂMPINA



ECCENTRIC SCREW PUMPS

From 2000, S.C. CONFIND Campina manufactures and delivers pumping units with eccentric screw pumps and rubber stator. These units are produced in partnership with KACHELE of Germany, the most important world producer of stator-rotor sets for eccentric screw pumps, also known under the name of PCP Progressive Cavity Pumps.

Brief characterization of the eccentric screw



20 cm/h at 48 bars pump - Oil extraction sector

Operation principle: the eccentric screw pumps have two active elements: a steel rotor and a rubber stator. The rotor is in the shape of a one-head screw. In cross-section, the rotor profile is a circle, with the center on a cylindrical helix.
The stator is a two-head helical surface, with the front profile made up of two circle arcs of the same radius as the rotor, connected to two straight segments.

The rotor and the stator close a lens-shaped space which is moved axially in the engagement of the rotor inside the stator: one step stator movement by each rotation.

Outlet pressure: the pump with a single step-stator provides pressures up to 6 bar. At pressures higher than 6 bar/step-stator, the hydraulic output drops.
For the 2 steps-stator, the allowed pressure is 12 bar, for the 4-steps-stator pumps, it is 24 bar and for the 8 steps-stator, it is 48 bar.
For pumps with pressures over 48 bar, KACHELE has developed stators with helical metal support (jacket). In section, the contour of the metal jacket follows the work space of the stator and the elastomer layer is of constant thickness.
For the pumps with stator with helical jacket, pressures of 9 bar/step-stator are allowed. In such conditions, CONFIND-KACHELE produce pumps for up to 100 bar, with monolith stator.

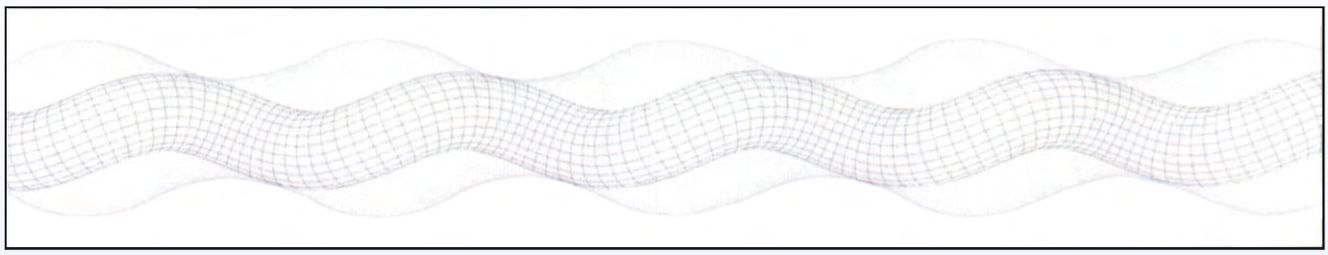
1 step - 6 bars

2 steps - 12 bars

4 steps - 24 bars

8 steps - 48 bars

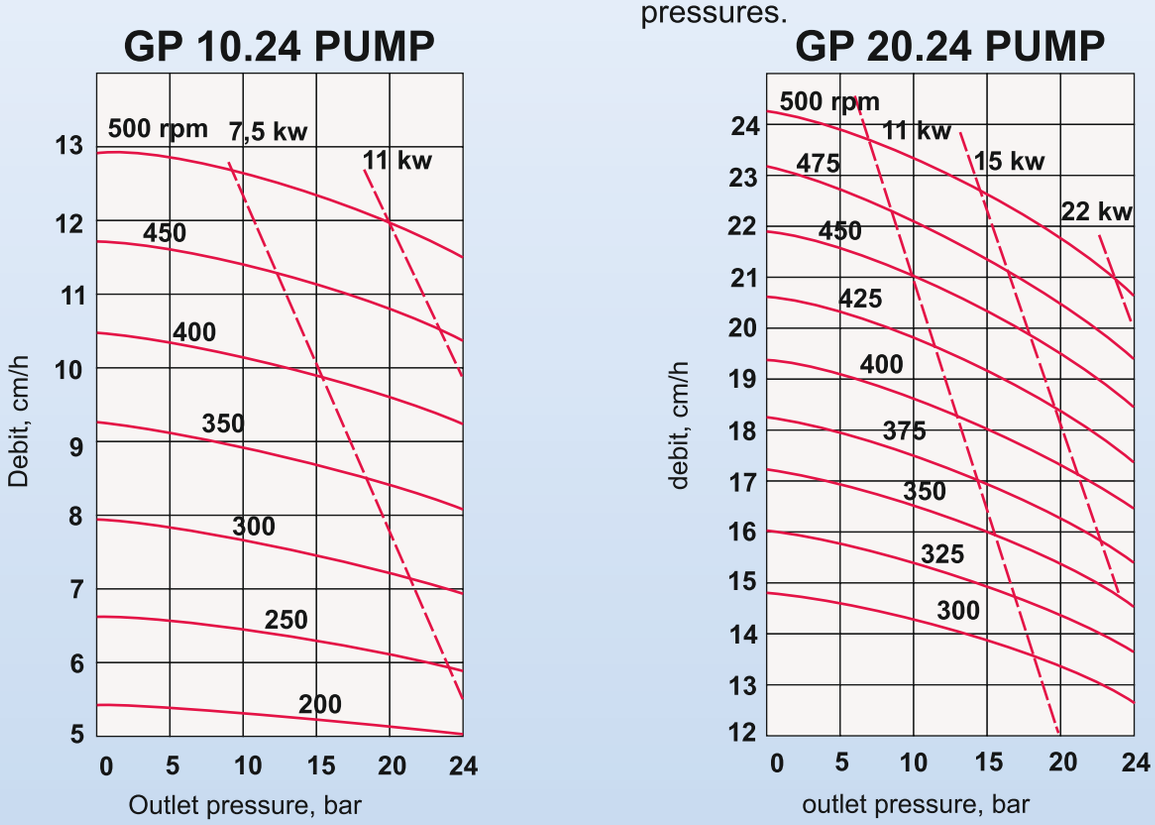
The pump output is determined by the stator-rotor set eccentricity, diameter of the rotor's circular section diameter, step, tightness between stator and rotor, pressure and rotation speed.



Movement of liquid flow determined by the rotor

The pump characteristics express graphically the connection between the main operating parameters.
We present below the characteristics in the stators of two types of pumps (sets of 50-4 and 60-4, respectively, with the rotor section ϕ 50 and ϕ 60, with 4 steps-stator) at various rotation speeds.

The connection flow rate-outlet pressure for several operating pressures is highlighted. The limits imposed by the electric motors are also indicated. The CONFIND technical specifications (catalogs) present graphically or in table-form the constructional characteristics of pumping units at various rotation speeds, the flow rate and the power absorbed by the motor for various outlet pressures.

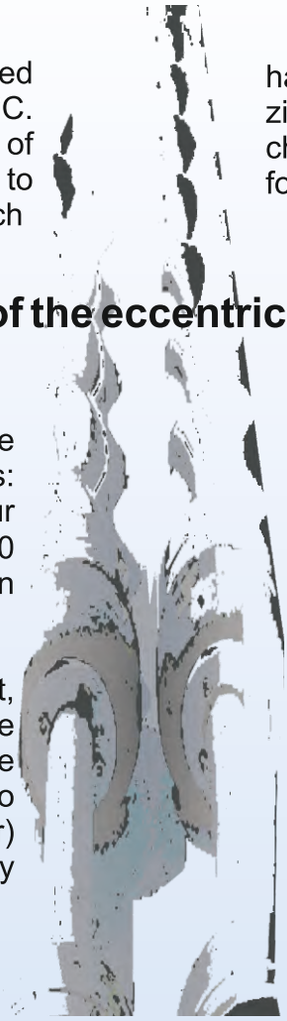


Specific curves for GP 10.24 and GP 20.24 pumps

Materials: to keep wear as low as possible even in the presence of solid particles in suspension and the drops in time of the flow rates insignificant even after a long period of operation, the following materials are used:
Generally, the rotors are made of stainless steel and their working surface is chrome-plated (hardening the surfaces).

The stator elastomer is selected according to the characteristics of the liquid to be pumped. These precautions are taken by KACHELE, an expert in elastomers for the widest range of applications. The stator elastomer is adapted to the concrete operating conditions of the pump: fluid transferred, its temperature, contents of solid particles.

In regular production, the elastomers used allow temperatures up to approximately 70°C. For special production, stators made of elastomers for operating temperatures up to 170°C can be provided. The other parts which have contact with the transferred liquid are zinc-coated in normal uses, or with a hard chrome plating or stainless steel when used for aggressive fluids (e.g. salt water).



Advantages of the eccentric screw pumps

The screw pumps work with a very diverse range of liquids and at various parameters: flow rates from a few cubic meters per hour up to 60-70 m^3/hour, pressures from 6 to 100 bar. The pumps are self-priming and can operate intermittently of continuously.

Operation of the screw pumps is very quiet, without pulsation. In such conditions, the pumping unit's chassis (on which the supplier structures the product from motor to outlet flange) may be relatively light (slender) and may be set on foundations only by connecting pads.

In the case of vertical units, setting may be achieved on the lid of the tank in which the pump operates.

Using the drive mode made by a simple drive-belt transmission, the parameters of the pumping unit can be easily adapted with the requirements of the concrete application.

The small slips between rotor-stator and the high elasticity of the stator in case of transferred liquids with solid particles produce a much smaller wear than in other types of pumps, still maintaining a high hardness.

Fluids transferred by eccentric screw pumps

Eccentric screw pumps can transfer many kinds of fluids: liquids of various viscosities (but which must flow), neutral or aggressive, liquids with contents of fibers of solid grains.

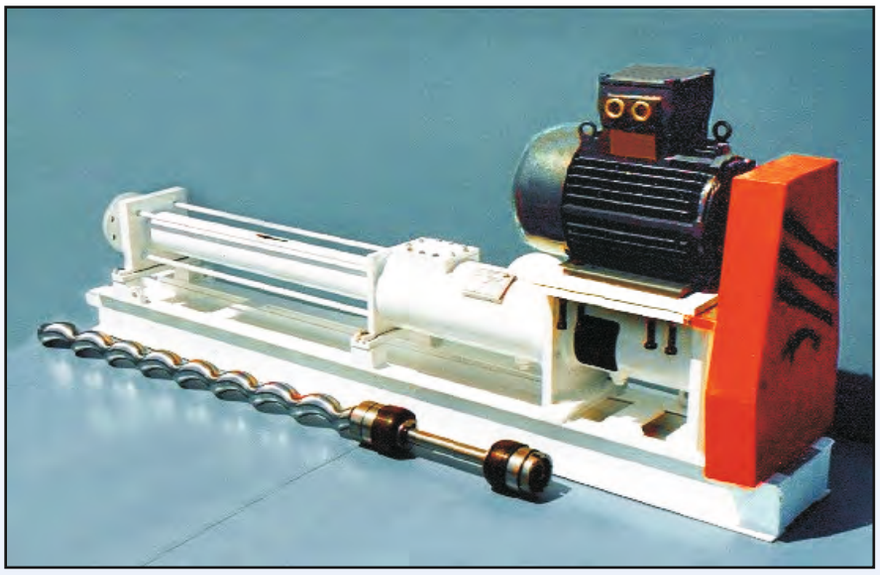
In operation the pumps must be full of liquid; when operating without fluid, due to the friction between the rotor and the stator, the stator temperature increases rapidly to such values as to produce irreversible degradation of the elastomer (possibly, of the rotor plating). The elastomer degrades irreversibly in approximately two minutes when exposed to temperatures higher than the allowed maximum (which is not the maximum operating temperature).
To avoid such instances, the too viscous liquids must be fluidized by heating, possibly by heaters inside the tank from which the liquid is being aspired; at the same time, thermal insulation of the piping and suction chamber must be provided.

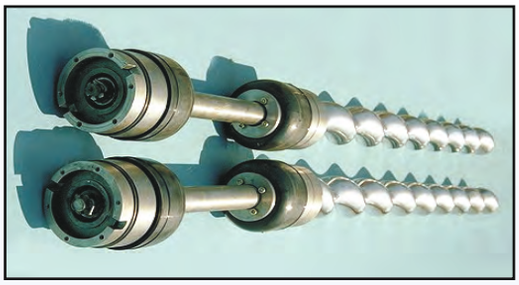
The problem of having the liquid to be pumped “freeze” becomes acute when pumping is intermittent and the environmental temperature drops so much as to freeze the liquid inside the pump (such as pumps which transfer crude oil with water content and are installed outdoors).

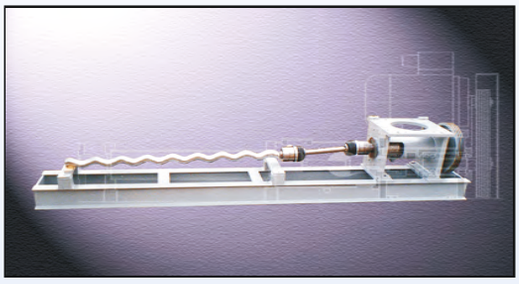
The screw pumps can also transfer liquids with significant gas contents. There are no problems as long as the gas remains in solution and does not form “bags” leading to dry operation of the pump.

MAIN FIELDS OF UTILIZATION OF THE KACHELE-CONFIND PUMPS

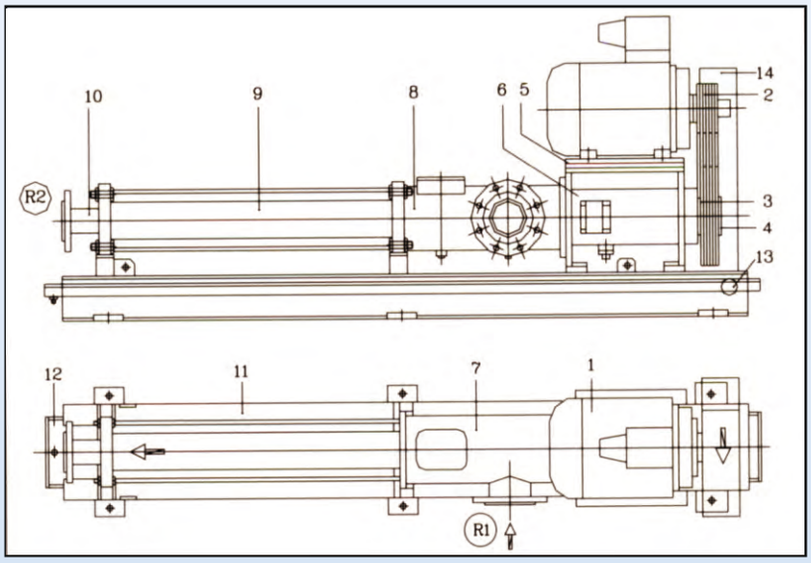
- OIL AND GAS PRODUCTION SECTOR - crude oil separation parks, salt water injection into oil-bearing formations;
- REFINERIES
- PETROCHEMICAL INDUSTRY
- PLASTIC MATERIALS INDUSTRY;
- NAVAL INDUSTRY: NAVAL CONSTRUCTION, PORT INSTALLATIONS;
- WATER TREATMENT PLANTS.







Construction of the horizontal pumping units



1	Electric motor
2	Drive pulley
3	Narrow V-belts (imported)
4	Driven pulley
5	Belt tightener
6	Main shaft module
7	Suction chamber
8	Transmission from main shaft to pump rotor
9	Rotor (eccentric screw) - rubber stator (imported) set
10	Evacuation chamber
11	Chassis
12	Collecting pipe for possible fluid leaks
13	Earthing connection
14	Belt-transmission guard

The horizontal pumping units are developed on a chassis. The driving motor, mounted on top of the main shaft module, provides versatility and balance to the construction at small dimensions across. The inlet and the outlet are connected to the installation via the R1 and R2 flanges. In these units, rotor rotation is achieved by a driving-belt transmission, which provides flexibility at possible changes of flow rates required by the concrete application.

The connection between the main shaft and the driving end of the rotor is made by an intermediate transmission formed of two couplings with an angular mobility of a few degrees and a torsion shaft. The CONFIND units use high-performance belts: narrow V-belts with notches at the inside, to increase flexibility imported from GATES U.S.A.

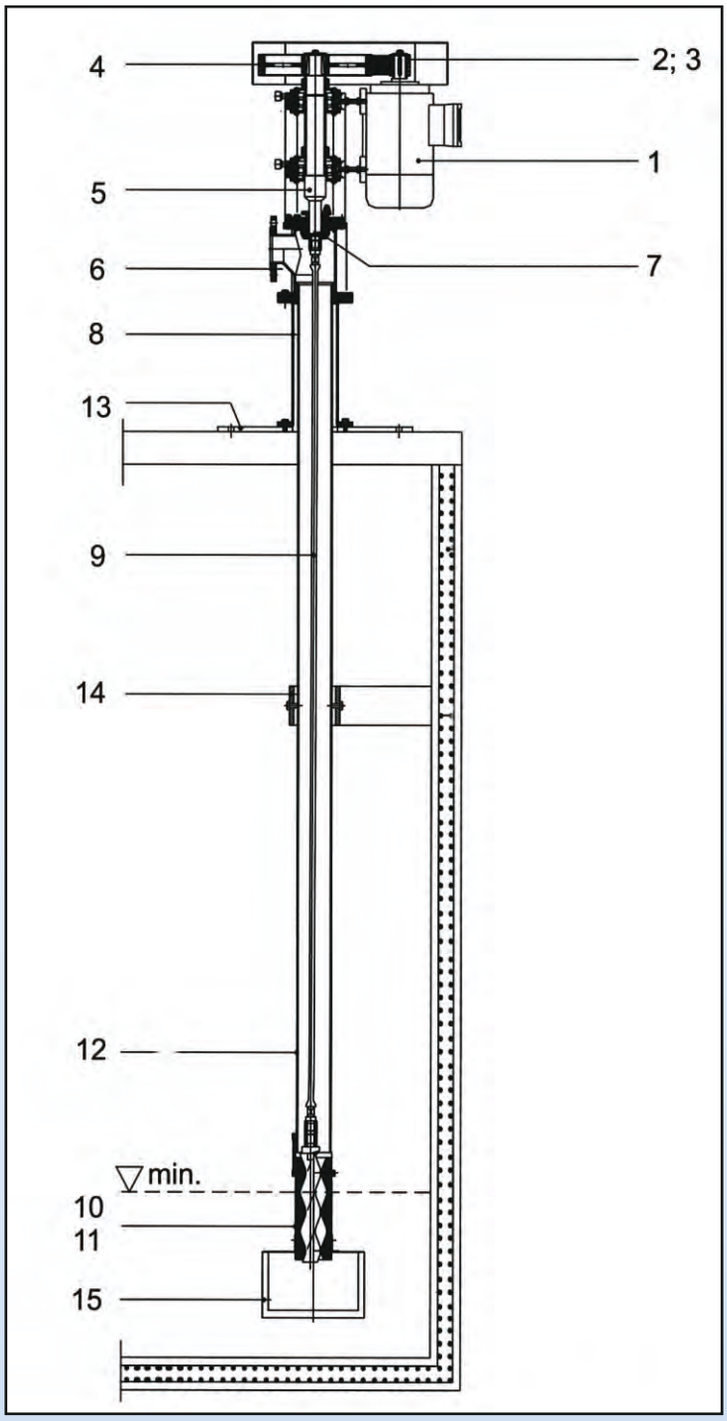
The drives with belts are calculated for 25,000 hours operation.

The dimensions and characteristics of horizontal pumping units are presented in separate catalogs.

Construction of the vertical pumping units

The vertical pumping units are designed for crude oil or residual water tanks and ponds. The rotor is driven by a belt-transmission, the main shaft module and a sucker rod.

The vertical unit is mounted on top of the tank/pond lid. In some construction alternatives, the pipe providing attachment of the stator and liquid pumping is also supported by the neck area of the tank or the wall of the pond. The dimensions and characteristics of the vertical pumping units are presented in separate catalogs.



Item Subassembly
1. Electric motor with base-plate
2. Drive pulley
3. Narrow V-belt
4. Driven pulley
5. Main shaft module
6. Evacuation chamber
7. Main shaft packing
8. Intermediate module
9. Sucker rod
10. Pump rotor
11. Pump stator
12. Stator attachment and liquid directing Pipe
13. Pumping group attachment plate
14. Intermediate attachment clamp
15. Filter

Range of pumping units in production

CONFIND developed horizontal pumping units and vertical pumping units.

The horizontal pumping units are designed for pressures of 12; 24; 48 and 100 bar, with flow rates from 4.5 to 70 m^3/h. The 12, 24 and 100 bar ones have monolith stators and the 48 bar ones have stators made of 2 or 4 modules of 4 or 2 steps-stator. The 100 bar units are conceived as pumps for injecting salt water into oil-bearing formations, with monolith stator.

There are synthesized here the main parameters of each CONFIND pumping unit: flow rate at 300 rpm and zero pressure, range of flow rates (for the range of rational operation rotation speeds) at maximum pressure, two characteristics of the rotor diameter of the generator circle (section), number of dual steps (double step at rotor equals the step-stator), three characteristics of the stator number of modules, generator circle diameter and number of steps-stator of the modules, main destination.

How to order pumping units with eccentric screw pumps

To obtain a quotation for an order of eccentric pumping units, CONFIND requires details on the concrete application:

- Working fluid: type, whether it includes or not fibrous material, whether it includes or not solid particles size, their percentage within the fluid, viscosity at operating temperature;

- Suction height, in meters;
- Flow rate at operating pressure, m^3/h;
- Destination of the unit (within the complex plant);
- Mounting position (horizontal/vertical);
- For vertical units, a drawing indicating the dimensions of the tank/pond will be attached;
- Whether for pumping unit's mounting and commissioning technical assistance is required.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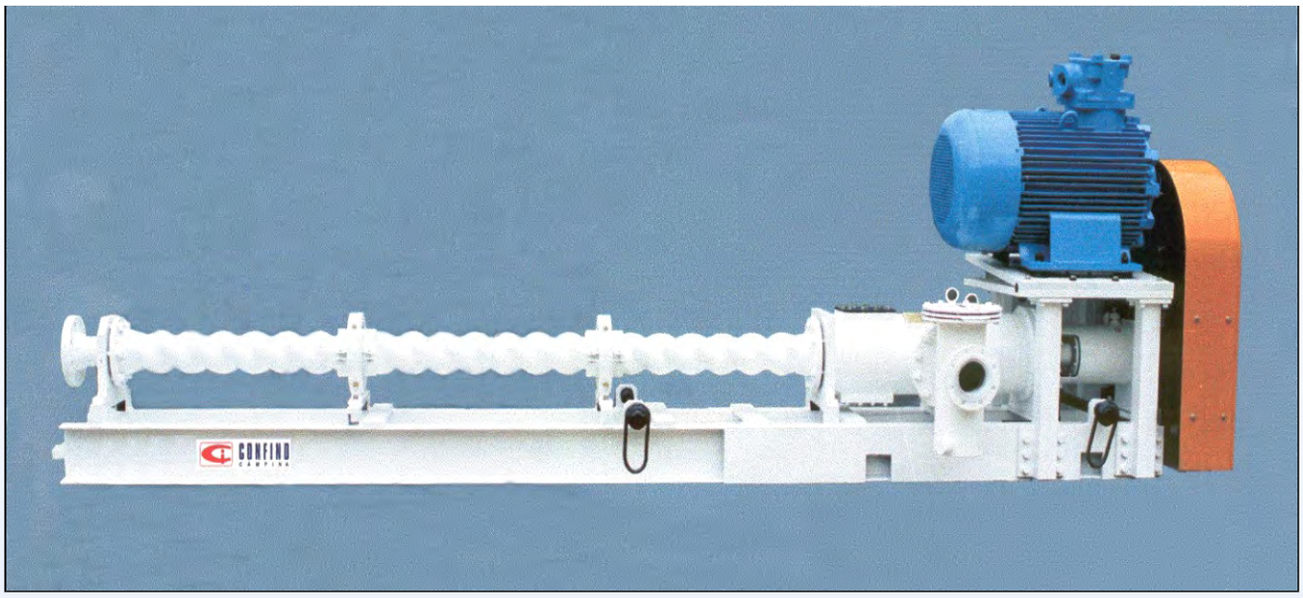
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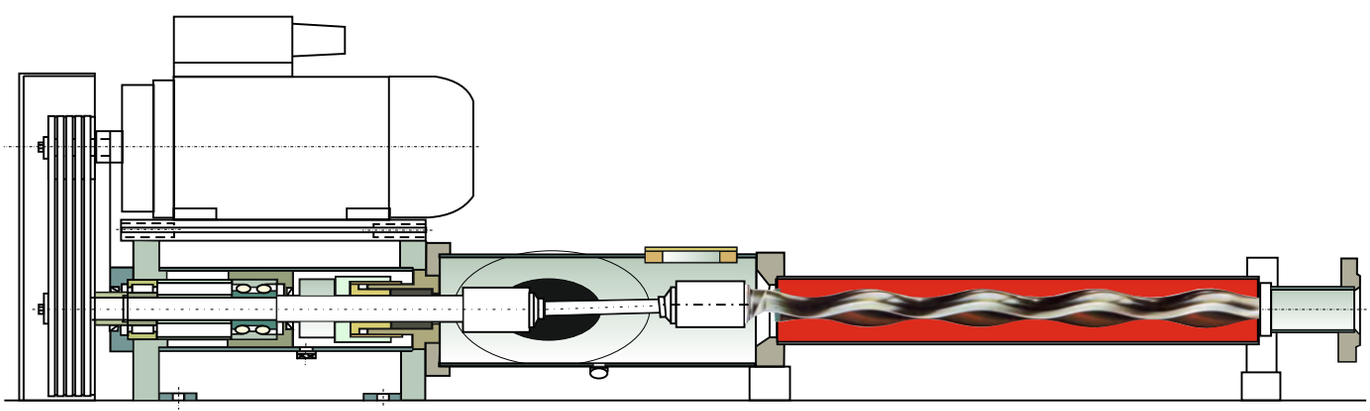
HORIZONTAL PUMPING UNITS

PRESSURE	DEBIT	ROTOR	STATOR	Number of Stator modules X Diameter of Generated Circle	Pumping units symbol	Main destination
MAX.	p=0 n=300 rpm	p_{max} n≠ct.	Diameter of Generated Circle - Number of Double steps			
Bars	cm/h	cm/h				
12	4,5		40-2	40-2		For crude oil/crude oil + salt water
	8,5	5-10	50-2	50-2	GP 10.12	
	15	10-20	60-2	60-2	GP 20.12	
	35		80-2	80-2		
	45		90-2	90-2		
	70	30-55	100-2	100-2	GP 70.12	
24	4,5		40-2	40-2		For crude oil/crude oil + salt water
	8,5	5-10	50-4	50-4	GP 10.24	
	15	10-20	60-4	60-4	GP 20.24	
	35		80-4			
	45		90-4			
	70	30-55	100-4	100-4	GP 70.24	
48						For crude oil/crude oil + salt water
	8,5	5-9	50-8	2x(50 - 4)	GP 10.48	
	15	8-16	60-8	2x(60 - 4)	GP 20.48	
	35					
	45	20-30	90-8	4x(90 - 4)	GP 30.50	
100	35	15	90 - 11	90 - 11	GP 15.100	Salt water injection
		20			GP 20.100	
		25 / 60 bars			GP 25.80	
		30 / 80 bars			GP 30.60	



VERTICAL PUMPING UNITS

PRESSURE	DEBIT	ROTOR	STATOR	Number of Stator modules X Diameter of Generated Circle	Pumping units symbol	Main destination
MAX.	p=0 n=300 rpm	pmax n=ct.	Diameter of Generated Circle - Number of Double steps			
bars	cm/h	cm/h				
6	4,5	5-10	50-1	50-1	PV 10.06	- Used water tanks
	8,5	10-20	60-1	60-1		
12	8,5	5-10	50-2	50-2	PV 10.12	
	15	10-20	60-2	60-2	PV 20.12	- Inside oil separation Installations
24	8,5	5-10	50-4	50-4		
	15	10-20	60-4	60-4	PV 20.24	

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