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USE AND MAINTENANCE BOOKLET

DIAPHRAGM PUMP

LIBELLULA 1/4"

Description:
Libellula pumps are manufactured by CAFFINI CIPRIANO SRL based at N° 46 Via G. Di Vittorio, Lemignano di Collecchio 43044 (Parma), ITALY.Tel. (0521) 804325 Fax. (0521) 804145 e-mail info@caffinipumps.it. The company is registered at the C.C.I.A.A. of Parma with the number: 175881 on the Companies Register of Parma, meccanogr. number: PR017469. VAT and Fiscal code number: IT02002550347.

The Libellula 1/4" is a self-priming diaphragm pump with 4" Bsp or flanged DN100 threaded suction and delivery openings.
The diaphragm is driven by a rigid piston rod made of aluminium alloy or anticorodal aluminium.
The reducer which connects the motor to the piston rod - crank system can be of light aluminium alloy, anticorodal aluminium, or cast iron. The transmission gears can have straight or helical teeth, with transmission ratios of 1:38, 1:31 or 1:55. The requested throughput is supplied by varying the number of revolutions of the drive motor. The materials used for the metallic parts in contact with the liquid can be: aluminium alloy, anticorodal aluminium alloy, cast iron, bronze, AISI 304 or AISI316 stainless steel, alluminium alloy with Rilsan plastication.
The diaphragm and the valves can be made of the following materials: neoprene, dutral, Hypalon, viton, nitrilic rubber, non-toxic rubber (FDA regulations).
The Libellula 1/4" pump can be driven by various types of motor, such as:
Internal-combustion engines:

Lombardini-Kohler	type PRO CS8,5T
Honda	type GX 270 R
Robin	type EX27

Diesel engines:

Lombardini	type 15LD350
Hatz	type 1B30-1D42C
Yanmar	type L100AE
Petter	type AD1
Robin	type DY27B

Electrical motors:
a)three-phase closed, externally self-ventilated insulated in class F, protection IP55, unified norms IEC or NEMA C, for example F100/112B5 or C184TC.
b) three-phase anti-deflagrating in conformity with the provisions of the Directive 2014/34/UE (ATEX).
c) single-phase closed externally self-ventilated.
d) in direct current closed externally self-ventilated.

The pump and engine are linked as a monoblock with suitable pinions and flanges.
A speed variator can be installed between the engine and the reducer; use a Stober R57.0000 or similar brand with the same characteristics.
The Libellula 1/4" can be installed: on a fixed base, on a portable handbarrow, or on a trolley designed for electrical, internal-combustion, or diesel engines with handbarrow guide or draw bar not approved for road use..
The machine has a fixed protection made of PVC or a metal net which covers the piston rod-crank system and prevents injury due to contact between the operator and the moving parts. The fixed protection is secured and maintained in the correct position by lock bolts.

The machine has an appropriate lifting hook which can be used to move the pump linked to the engine supplied by the manufacturer, and which depend on the type of installation (trolley or base) specified in the order.
N.B.: No additional accessory can be connected to the close-coupled pump or electrical-pump unit during hoisting and transport.
The version of the machine with electrical motor has an acoustic power level of Lwa = 89 dB and a level of guarantee acoustic power of Lwa = 90 dB(A).
As regards the other versions of the Libellula 1/4" pump equipped with diesel or internal-combustion engines, one should refer to the acoustic power level of the installed engines indicated in the EC Conformity Declaration.
If the user should so desire, the manufacturer is willing to send the cumulative distribution curves, and those referring to time and frequency measurements for the acoustic pressure levels of the Libellula 1/4" pump, for any acoustic treatment operation that might prove necessary.

INSTALLATION NORMS
Install the electrical pump or close-coupled pump units with metallic bases on stable foundations and anchor them securely to the ground.
Check that the stationary support foot, for the trolley versions, is locked in the supporting position by the securing pivot with inserted safety peg, which will stop the peg from moving out of position.
The connecting tubing to the pump must be flexible and must have flexible rubber tubes to damp the vibrations due to the pulse flow throughput.
It is good practice to block the entrance of large solid bodies (maximum 60 mm), which might break the diaphragm or piston rod, by mounting a protective suction filter, which can be supplied on request.
The suction and delivery piping must be of equal or greater diameter than that of the suction or delivery openings of the pump.
Whenever possible, avoid curves, elbows or throats which might limit the inflow or outflow of liquids to or from the pump.
Do not mount foot valves: the pump is provided with clapet valves which act as one way valves.
Do not install flow throttle valves on the delivery; to divide the throughput; use by-pass tubing with return to the suction basin, regulated by a gate valve or ball valve.
Check that all of the joints are perfectly airtight: check the threading, the flange opening seals and the quick-fit joints.
Install the pump as close as possible to the liquid to be pumped, whenever possible try to limit the length of the suction tube (the maximum total manometric head is 7 metres); in this way the priming time is reduced and a greater throughput is obtained.
The maximum total manometric head of the pump is 15 metres of water column; greater hydraulic pressures have a negative influence on the functioning of the pump and could limit the life of the diaphragm. When the pump is used continuously the the total discharge pressure must not exceed 10 metres of water column.
The correct installation of the suction and delivery tubing is ensured by verifying that the suction tubing is mounted on the curve which leads to the air chamber or insection cap.
For the versions with electrical motors the pump must be connected to an electrical unit which is earthed in accordance with the local electrical regulations in force.
For the mono-phase version adhere to the technical norms enforced.
Check that the voltage on the plate is the same as that of the mains supply.
Before any installation or maintenance operation make sure that the electrical pump is disconnected from the mains supply.
Do not use the electrical supply cable to move or hoist the pump.

It is advisable to install a highly sensitive differential switch, so as to give added protection against electric shocks should the earthing be insufficient.
In the three-phase version connect the earth wire (yellow-green) of the supply cable to the mains earth.
It is the responsibility of the installer to ensure that the feed system is earthed in accordance with the norms in force.
With the three-phase version attach the pump to the supply line via an overload cut-out switch or a contactor with a cutout switch relay.
Every time that the pump with a three-phase motor is attached to a different feed line, there are equal possibilities that it could rotate in one direction or the other.
Rotation in the wrong direction will provoke a significant reduction in throughput and an incorrect functioning of the reducer.
If the motor does not turn in the correct direction, disconnect the power supply and invert the two phases.
When installing units with internal-combustion engines, check that the motor does not tilt more than 35° in the transverse or longitudinal directions, so as to guarantee a correct lubrication.

SAFETY NORMS
Do not operate internal-combustion or diesel engines in a closed environment. The exhaust fumes contain carbon monoxide, an odourless and deadly poison.
Keep hands and feet away from rotating or moving parts.
Do not hold, pour or use fuel in the presence of a naked flame or apparatus such as stoves, boilers or other equipment which might produce sparks.
Do not fill up with fuel in a closed or poorly ventilated environment.
Do not top up the fuel tank with the engine running. Let the engine cool before filling up. Keep the fuel in special containers which meet the safety norms.
Do not remove the fuel tank cap while the engine is running.
Do not run the engine if there is a smell of petrol or if there is any other risk of an explosion.
Do not start the engine if fuel leaks are noticed.
Do not transport the engine with petrol in the tank.
Do not check the ignition with the spark plugs or spark plug cable disconnected: use a special tester.
Do not make the engine turn with the spark plug disconnected.
Do not hit the flywheel with metallic or blunt objects, because this could cause the breakage or the detachment of the metal components during movement.
To not touch the silencers, cylinders or cooling fins when they are hot, because the contact could cause burns.

BEFORE STARTING
Read the instructions and the safety norms covering the engines linked to the supplied pump unit and adhere closely to the instructions cited by the manufacturer of the said motor.
With regard to the Libellula 1/4" pump unit, before starting, act as follows:
Fill the reducer crankcase with oil up to 10 mm from the edge of the filling cap. To make filling easier, open the air breather valve, located on the top of the reducer, a little way; this will reduce the air pressure inside the reducer. Then close the oil cap and the breather valve.

The following table shows the quantity and brand of oil to use:

LIBELLULA 1/4"	
Quantity of oil in reducer = 0.90 litres	**Viscosity ISO 150**
BRAND	TYPE
Shell	Omala 150
BP	Energol Gr-XP150
Esso	Spartan EP 150
Mobil oil	Mobilgear 600 XP150
Agip	Blasia 150

The gears are automatically lubricated by dashing inside the reducer casing.

Grease the piston rod-crank with type Shell Gadus S2 V100 2 or SKF LGMT/2 grease using the special greaser. For this operation use a greasing pump with a flexible tube which is suitable for reaching the greaser through the net located at the top of the piston rod-crank protective casing. Should one prefer to dismantle the the protective casing, make sure, after greasing, that the protective casing is perfectly secured.

USE

The pump is not suitable for the transfer of dangerous or inflammable liquids.
The pump can be used to move liquids or muds with solid particles in suspension.
The pump can function in dry conditions for extended periods of time.
Whenever the pump is used to transfer chemical products which are particularly dangerous to persons or things, one must check with the supplier the correct choice of metallic and elastomeric materials to be used for the parts of the pump which come into contact with the liquid. The installer will have to create a basin in the area where the pump is operating, suitable to contain the liquid which might escape because of the accidental
breakage of the pumping diaphragm. The installer should also set up remote controls for the starting and stopping of the machine and drainage tubing in the fluid collecting basin, so that maintenance operations can be performed.
Do not top the machine up with fuel while it is running.
Do not perform maintenance operations while the machine is running.
The Libellula 1/4" can also be used for the transferring of liquid foods; in this case the user must verify that the materials in contact with the product meet the relevant legal requirements.
The machine is designed and manufactured in such a way that all the parts in contact with the product to be pumped can be cleaned before each use; all of the components are smooth and without roughness or spaces in which organic materials might become lodged. The surfaces in contact with food products can be easily cleaned and disinfected.
The machine has been designed in such a way that auxiliary products (fuel and lubricants) cannot come into contact with the fluids being moved by the pump.
With regard to the use of engines linked to the pump one should refer to, and study with care, the norms cited by the manufacturers of the engines, which are enclosed with this use and maintenance manual.

MAINTENANCE

All maintenance operations must be performed with the machine stationary, with any feed lines disengaged, and with the suction and delivery tubing disconnected.

After the first 50 working hours, change the oil in the reducer by unscrewing the discharge cap located on the lower side of the reducer. Remember to clean the casing with naphtha before filling it.

The oil must be changed again after the next 200 working hours, and thereafter at intervals of 500 working hours.

Remember to regularly check the oil level through the filling cap (a centimetre below the pouring edge).

Every 90 hours, grease the piston rod bearing greaser with type Shell Gadus S2 V100 2 or SKF LGMT/2 grease.

Every three months, check the wear of the diaphragm and valves.

During winter, when the machine is stationary,it must be protected against freezing. It will therefore be necessary to remove all liquids from the body of the pump via the delivery valve by tipping the pump, or via the pump body discharge cap located under the said pump.

REPLACING SPARE PARTS

Diaphragm: Use a 19 and 22 mm spanners to unscrew the bolts which connect the body of the pump to the reducer support. Then unscrew the bolts which secure the piston rod to the diaphragm securing flange. For assembly, the operations are performed in the reverse order.Be sure to tighten the screws evenly, moving from one screw to that which is directly opposite.

Warning: during this operation the motor-reducer component must be supported by special hoisting gear, ensuring that, if the hoisting hook is not suitable for the correct balancing of the load, appropriate equipment is found.

Suction and delivery valves:

Use a 19 and 22 mm spanners to unscrew the two securing bolts, and then replace the component. A valve fixing pivot is located on the body of the pump, which makes correct installation easier.

Other spare parts:

To replace other components, consult the spare parts catalogue, with blow-up illustrations of the components. It is, however, better to have components repaired by your usual supplier.

All repair operations on the engine must be carried out as described in the motor instruction and maintenance booklet enclosed with this manual if it is mounted on the pump.

TIGHTENING TORQUE TABLE

Between	**And**	**Model**	**KGM**	**Note**
PUMP CASE	CURVES	LIB-1/4”	**2,5**	Tighten the valve
MOUNTING CASE	PUMP CASE	LIB-1/4”	**5**	Tighten the diaphragm
CONNECTING ROD	FLANGE	LIB-1/4”	**3,5**	
REDUCER	MOUNTING CASE	LIB-1/4”	**4**	

OPERATIONAL DEFECTS

Speed reducer defects:
Immediately inform your supplier who will provide personnel and equipment to correctly repair the component.
If the pump fails to deliver or delivers only a little water:
Causes:
Excessive suction height
Suction tube not sealed
Rotation speed too low
Obstructions in the pump
End of suction tube partially dry or immersed too little; in this case air could be drawn by turbulence
The suction filter is blocked or mudded up
The suction and delivery valves have remained open because of the presence of a solid body

For operational defects to the feed motors see the enclosed instruction booklets.

MOVING LIBELLULA 1/4" UNITS

The mass of the machine is shown clearly and indelibly on the machine.
The machine can be moved only with the suction and delivery tubing disconnected and with the feed motor stationary or disengaged.
Machines installed on a base plate can be moved using hoisting equipment which can be connected with suitable safety systems to the hoisting hook on the machine.
Machines installed on trolleys can be pulled using suitable pulling hook connections which are, or will be, fixed to the base plate via a pivot and safety peg, which stops the pivot from moving out of place. Check that the parking support foot has been raised and attached to the base plate with its pivot and safety peg.

SPARE PARTS

To order spare parts indicate:
a) Registration number of pump or motor.
b) Registration number and description of spare part required.

For general features of the pump (flow rate, max.head etc)please read enclose catalogue.
A spare parts list is enclosed with the use and maintenance manual.

CAFFINI CIPRIANO SRL