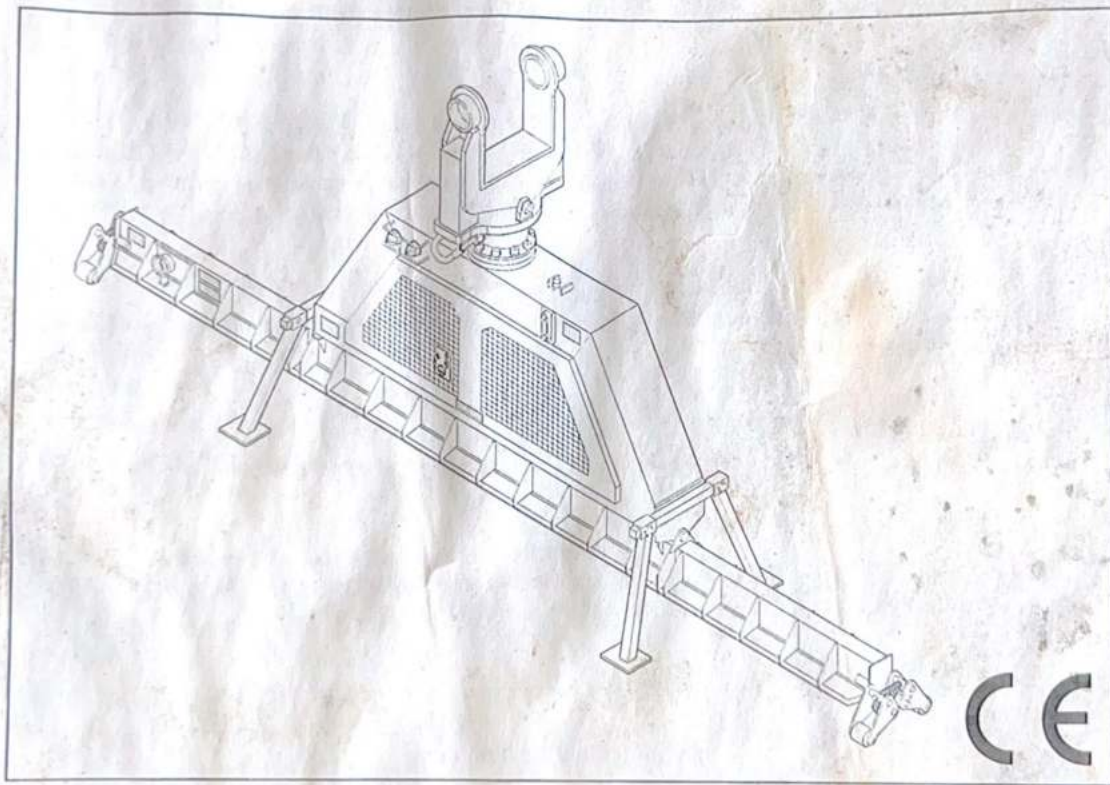




# SVL 130 Vacuum Lift



Code 5.201.0364- EN - 03.2007



Before starting  
the machine,  
read the  
instructions for  
operation and  
maintenance  
carefully.

## Instruction manual for operation and maintenance

## SVL 130 VACUUM LIFT

Instruction manual for operation  
and maintenance

Issue no. 5.201.0364- EN  
March 2007



**WARNING**

**DO NOT USE THE EQUIPMENT BEFORE READING AND FULLY UNDERSTANDING THIS MANUAL.**



**WARNING**

**THE WORK AREA MUST BE COMPLETELY CLEAR.**



**WARNING**

Make sure that the machine/equipment sits on the ground before repairing, adjusting or maintaining it. If the machine/equipment needs to be partially or totally lifted from the ground to gain access to some of its parts, make sure that the machine is suitably held in position by means other than hydraulic lifting cylinders, cables or mechanical devices used for controlling the machine/equipment.



**WARNING**

This symbol is used to draw attention to safety matters. It means: Warning! Be careful! The safety of people operating the machine is at stake!



**WARNING**

Read and comply with any safety measure introduced by the following key words **WARNING** and **DANGER**.



**WARNING**

Safety decals affixed on the machine have a codified color: they are yellow with a hem and black text for **WARNING** signs; whereas safety labels for **DANGER** signs are red with a hem and white texts.

### Machine identification data:

Machine type:

Engine:

Machine chassis number:

Machine delivery date:



## CONTENTS

<b>SECTION 1: Equipment description and main features</b>		4.7.1 Releasing the pipe .....	25
1.1	Presentation .....	4.8	Safety devices .....
	4	4.9	Using the equipment .....
1.2	Warranty .....		27
	4	4.9.1	Preliminary checks .....
1.2.1	Exclusions from the warranty .....		27
	4	4.9.2	Machine start-up .....
1.3	Equipment identification .....		27
	5	4.9.3	Work position .....
1.4	Scope of the equipment .....		27
	5	4.9.4	Machine stop .....
1.5	Description of the equipment .....		27
	7	4.9.5	Emergency stop .....
1.5.1	Control panel or electronic remote control		28
	7	4.10	During operation .....
1.5.2	Beam/Rotating tank .....		28
	7	4.10.1	Preliminary remarks .....
1.5.3	Suction pad .....		28
	9	4.11	After operation .....
1.5.4	Flexible pipes (supplied upon request) .....		28
	9	<b>SECTION 5: Maintenance</b>	
1.5.5	Hydraulic kit for rotating tank .....	5.1	Maintenance .....
	9		29
1.5.6	Electric cable .....	5.1.1	General .....
	9		29
1.6	Noise level .....	5.1.2	After the first 8 hours of operation .....
	9		29
1.7	Technical specifications .....	5.2	Lubrication and greasing .....
	10		30
1.7.1	Rotator tank-beam .....	5.3	Diesel engine .....
	10		30
1.7.2	Operating temperature .....	5.3.1	Diesel tank .....
	11		30
1.7.3	Suction pad .....	5.4	Electric system .....
	12		30
<b>SECTION 2: Safety rules and accident-prevention</b>		5.4.1	Battery .....
2.1	Safety .....		30
	14	5.4.2	Fuses .....
2.1.1	Terminology used in this manual .....		31
	14	5.5	Rotator hydraulic system (upon request) .....
2.2	Clothes and work gears .....		31
	15	5.5.1	Rotator hydraulic system oil tank
2.3	Ecology and pollution .....		(upon request) .....
	15		31
2.4	Safety signs .....	5.6	Vacuum pump .....
	15		32
2.5	Safe operation .....	5.6.1	Replacement of suction filters .....
	17		32
2.6	Safe maintenance .....	5.7	Suction pad .....
	18		32
2.7	Re-fill operations .....	5.7.1	Replacing the rubber seal .....
	19		32
<b>SECTION 3: Transportation and handling</b>		5.8	Periodic checks .....
3.1	Vacuum Lift transportation .....		33
	21	5.9	Re-fill operations .....
3.1.1	Loading and unloading operations .....		34
	21	5.10	Recommended lubricants .....
<b>SECTION 4: Operating instructions</b>			35
4.1	Installing the Vacuum Lift on an excavator .....	5.11	Lubricant viscosity chart .....
	22		35
4.2	Installing the wire type control panel .....	5.12	Scheduled maintenance .....
	22		36
4.2.1	Installing the electronic remote control .....	5.13	Putting the equipment out of service .....
	22		37
4.3	Installing the Rotator tank-beam	<b>SECTION 6: Spare parts</b>	
	on the excavator .....	6.1	Rules for ordering spare parts .....
	23		38
4.4	Installing the suction pad .....	<b>SECTION 7: Annexes</b> .....	
	23		39
4.5	Disassembling the equipment .....	Pneumatic system diagram	
	23	Electric system diagram	
4.6	Putting the Vacuum Lift in operation wire type	Vacuum Pumps Mink MM 1102 - 1144 AV	
	control (or electronic remote control) .....		
	24		
4.7	Hooking up and lifting the pipe .....		
	25		



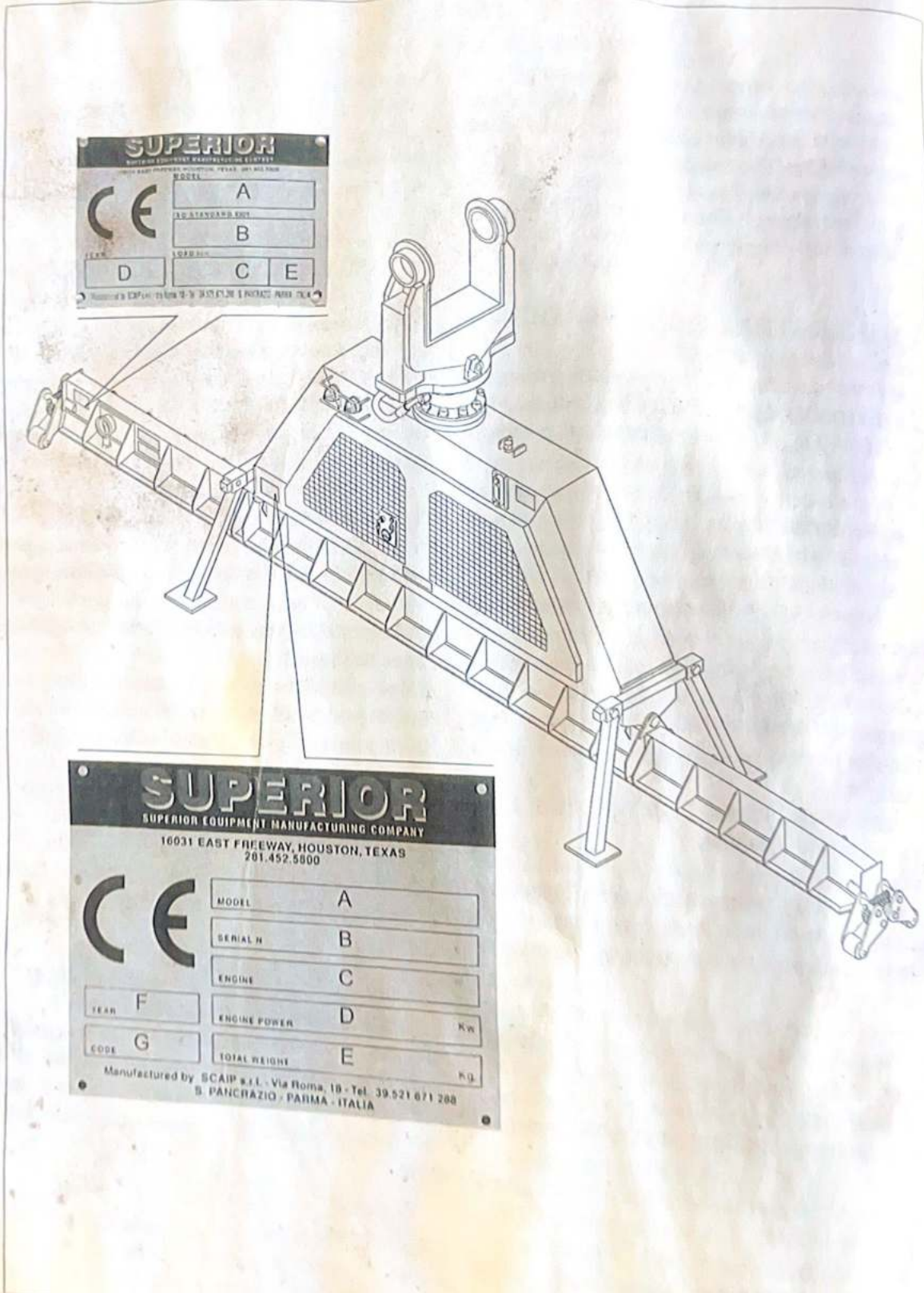


Fig. 1 - Beam/Tank and Suction pad identification plates and their location on the equipment



## 1.5 DESCRIPTION OF THE EQUIPMENT

The equipment is supplied with the following:

### 1.5.1 WIRE TYPE OR ELECTRONIC REMOTE CONTROL PANEL (Fig. 2)

#### Wire type control panel

The panel must be installed inside the cab of the receiving machine in an area that the operator can access easily and where it does not interfere with the controls of the receiving machine.

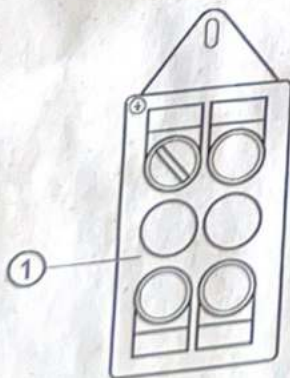
When the electronic remote control version is requested, the receiver unit is already installed on the rotator tank-beam, whereas the transmitter unit is supplied separately and must be fitted in the receiving machine cab like the wire type control panel.

- 1) Panel featuring: the green light power switch, the green light aspiration control button, two red light pipe release control buttons and corresponding electric cable.

#### Electronic remote control featuring:

- 2) The transmitter unit.
- 3) The receiver unit.

WIRE TYPE CONTROL PANEL



### 1.5.2 ROTATOR TANK-BEAM (Fig. 3)

The Rotator tank-beam is made of a metal frame that contains the following parts. All the listed parts are protected by safety grid doors.



**WARNING**

**EXCLUSIVELY hook up GENUINE SUCTION PADS to the rotator tank-beam.**

- 1) Metal vacuum tank frame.
- 2) Vacuum gauge (showing the vacuum value in the tank).
- 3) Start-up panel.
- 4) Diesel tank.
- 5) Vacuum pump.
- 6) Tank suction filter.
- 7) Suction pad filter.
- 8) Diesel engine.
- 9) Inverter.
- 10) Double-articulating fastening bracket to receiving machine with rubber stabilizer. Manufactured in robust metal work and supplied with hooking eyebolts.

VERSION WITH ELECTRONIC REMOTE CONTROL

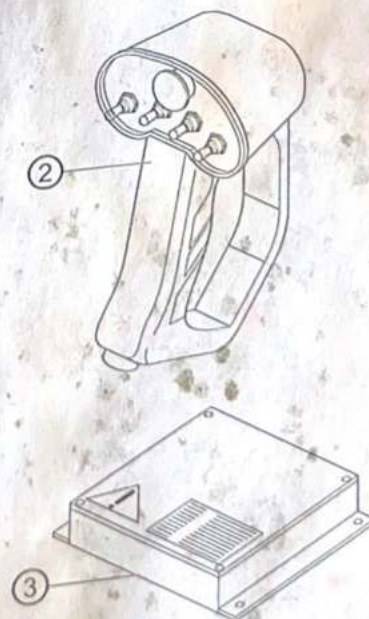


Fig. 2 - Control panel or electronic remote control



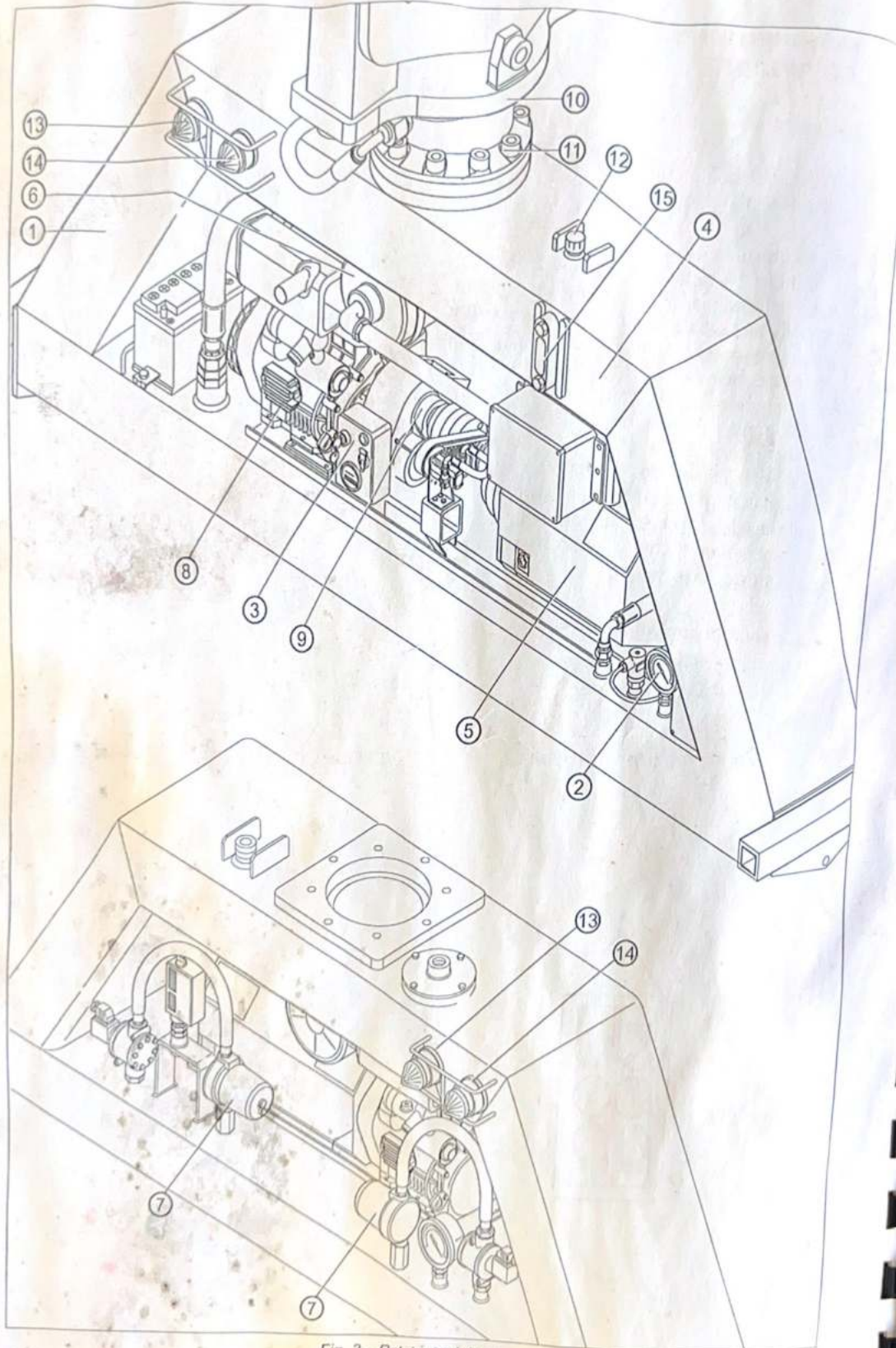


Fig. 3 - Rotator tank-beam



- 11) Rotation unit for miscellaneous models.
- 12) Diesel fuel plug.
- 13) Green light.
- 14) Red light.
- 15) Fuel level gauge.

### 1.5.3 SUCTION PAD (Fig. 4)

The suction pad consists of a robust metal work frame with a rubber seal that has been designed to firmly stick to the lifted pipe and adapt to the irregular surface of pipes. It must be connected to the rotator tank-beam using the supplied hooking points and hydraulic fittings.

- 1) Frame complete with rubber seal.
- 2) Hooking hinge to the upper beam.
- 3) Nipples for suction hose fastening.
- 4) Vacuum gauge (showing a vacuum range from 0 to -1 bar) inside the suction pad.
- 5) Centering wheels.

### 1.5.4 FLEXIBLE PIPES (supplied upon request)

N°2 flexible pipes for connection to the control pipes of the excavator bucket cylinder to control rotation using the bucket control when the equipment is installed on a hydraulic excavator.

### 1.5.5 HYDRAULIC KIT FOR ROTATOR

It is supplied upon request for electronic remote control versions and when the equipment is installed on pipe layers and cranes.

### 1.5.6 ELECTRIC CABLE

Electric cable supplying power to warning lights and buzzers.

### 1.6 NOISE LEVEL

The noise level was measured according to the standard ISO 3746 as follows:

- Sound power ..... LwA 110 dB (A)

The sound power levels measured during continuous operation of the equipment require the mandatory use of earmuffs to protect the hearing apparatus.



**DANGER**

The operator must always wear noise-proof personal protection equipment (e.g. earmuffs, etc.) during equipment operation.

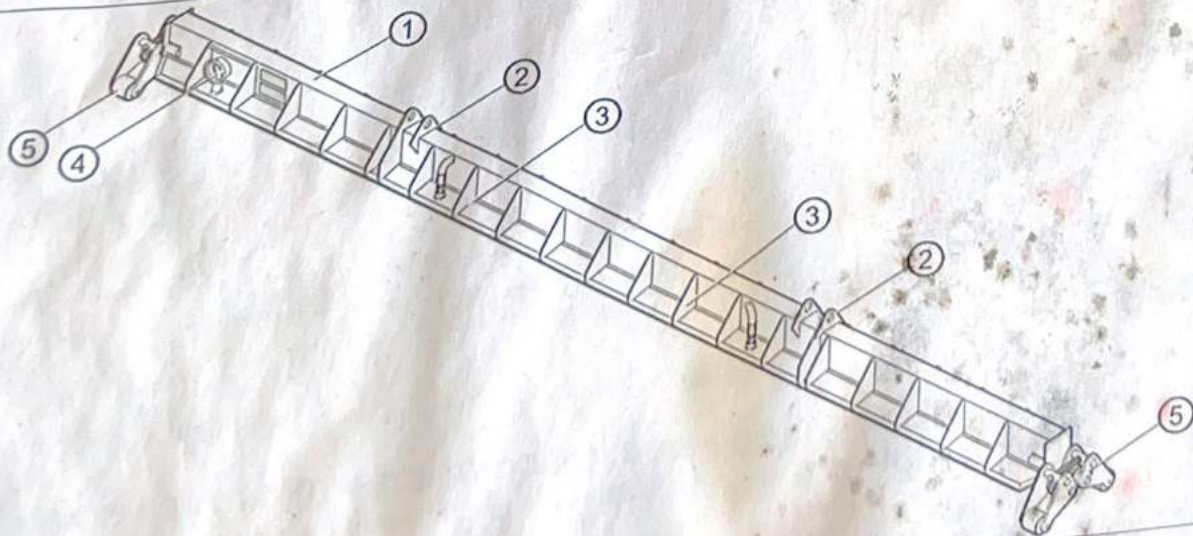


Fig. 4 - Suction pad



## 1.7 TECHNICAL SPECIFICATIONS

### 1.7.1 ROTATOR TANK-BEAM

Vacuum tank frame made of metal work, complete with vacuum gauge, valves, vacuum regulation device, check valve, electric control panel and fastening brackets.

Air capacity ..... 520 liters

#### DIESEL TANK

Capacity ..... 67 liters

#### DIESEL ENGINE

Brand ..... YANMAR

Model ..... L 100 AE

Power ..... HP 10

Electric starter

Battery ..... 12 Volt



**WARNING**

For further details about engine maintenance refer to the corresponding manual:  
YANMAR ENGINE, MODEL L100AE-DEYC

#### VACUUM PUMP

Brand ..... BUSCH

Suction pressure ..... 0.94 mbar

Max. flow rate (at 3000 rpm) ..... 105 c. m/h



**WARNING**

For further details about pump maintenance refer to the corresponding manual:  
Mink MM 1102 - 1144 AV BUSCH

#### TANK SUCTION FILTER

Q.ty ..... 1

Type ..... 2"1/2

#### SUCTION PAD FILTER

Q.ty ..... 2

Type ..... 1"

#### INVERTER

Type ..... mechanical, w/ countershaft

#### DOUBLE-ARTICULATING FASTENING BRACKET COMPLETE WITH RUBBER STABILIZERS

Manufactured in robust metal work and supplied with hooking eyebolts to the excavator arm.



### ROTATION UNIT

Model .....	SVL 130
Max. loading capacity .....	28,659 lb - 13 ton
Max. hydraulic pressure .....	4,640 p.s.i. - 320 bar
Max. hydraulic capacity .....	5 U.S. Gal./min - 20 lt/min
Max. torque .....	350da N/m 350
Rotation .....	continuous
Horizontal stabilizers .....	N. 2

### HYDRAULIC ROTATION SYSTEM

This system features:

an oil tank that has the following specs:

Capacity .....	33 l
Pump .....	gear pump
Solenoid valve .....	12V

### 1.7.2 OPERATING TEMPERATURE

The equipment can operate at external temperature ranges between -20°C and +40°C.



### 1.7.3 SUCTION PAD



**WARNING**

Suction pads can hook up to different rotator tank-beams. Make sure that the capacity of the suction pad never exceeds the Rotator tank-beam capacity. Use suction pads to exclusively lift pipes having a diameter included in the range listed in the table below and in the plate affixed on the suction pad.



**WARNING**

The pipe is hooked up thanks to the vacuum that forms inside the suction pads: the lifting capacity depends from the altitude upon sea level in which the equipment operates. As it is supplied the equipment can operate up to a height of 1800 m upon sea level. For heights above this value and up to 3000 m upon sea level the max. lifting capacity indicated on the suction pads must be reduced by 15%. In addition, it is necessary to reduce the setting of alarm devices.

This operation must be performed by qualified personnel only. See the table below for the max. lifting capacities at different heights.



**WARNING**

Failure to comply with the instructions above generates serious risks of pipe release.

VACUUM LIFT		SUCTION PAD			
MODEL	CAPACITY	MODEL	PIPE SIZE	MAX. CAPACITY <small>For heights up to 1,800 m / 6,000 ft (u.s.f.) and pressures (ATM) up to 0.8 bar / 11.6 psi</small>	MAX. CAPACITY (-15%) <small>For heights up to 3,000 m / 10,000 ft (u.s.f.) and pressures (ATM) up to 0.68 bar / 9.96 psi</small>
SVL 90	9,000 kg	PD 6 - 8	6" - 8"	1,600 Kg	1,360 Kg
		PD 10 - 14	10" - 14"	3,000 Kg	2,550 Kg
		PD 16 - 22	16" - 22"	4,000 Kg	3,400 Kg
		PD 24 - 32	24" - 32"	6,000 Kg	5,100 Kg
SVL 130	13,000 kg	PD 6 - 8	6" - 8"	1,600 Kg	1,360 Kg
		PD 10 - 14	10" - 14"	3,000 Kg	2,550 Kg
		PD 16 - 22	16" - 22"	4,000 Kg	3,400 Kg
		PD 24 - 32	24" - 32"	6,000 Kg	5,100 Kg
		PD 34 - 42	34" - 42"	7,700 Kg	6,545 Kg
		PD 42 - 48	42" - 48"	11,550 Kg	9,775 Kg
SVL 220	18,000 kg	PD 6 - 8	6" - 8"	1,600 Kg	1,360 Kg
		PD 10 - 14	10" - 14"	3,000 Kg	2,550 Kg
		PD 16 - 22	16" - 22"	4,000 Kg	3,400 Kg
		PD 24 - 32	24" - 32"	6,000 Kg	5,100 Kg
		PD 34 - 42	34" - 42"	7,700 Kg	6,545 Kg
		PD 42 - 48	42" - 48"	11,500 Kg	9,775 Kg
		PD 50 - 54	50" - 54"	15,000 Kg	12,750 Kg
		PD 56 - 62	56" - 62"	18,000 Kg	15,300 Kg



WEIGHT  
SVL 130 ..... 1850 Kg

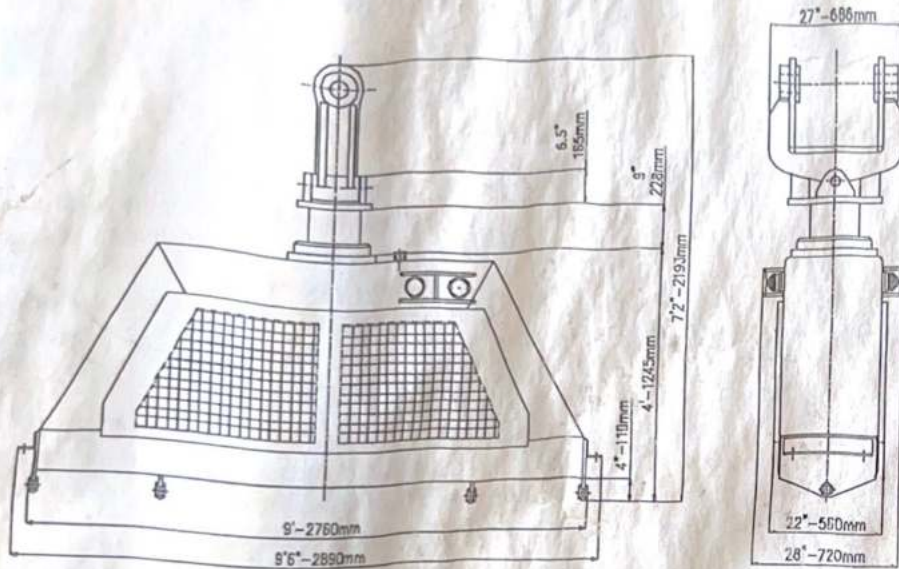
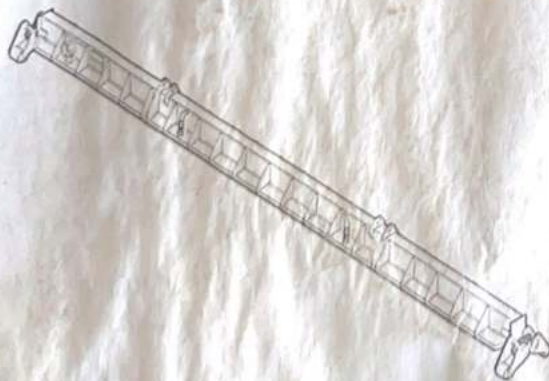


Fig. 5 - Rotator tank-beam overall dimensions



MODEL	LENGTH	WIDTH	HEIGHT	WEIGHT
PD 6"-8"	5500 mm	250 mm	320 mm	210 Kg
PD 10"-14"	5500 mm	320 mm	420 mm	386 Kg
PD 16"-22"	6300 mm	350 mm	420 mm	435 Kg
PD 24"-32"	6300 mm	410 mm	420 mm	530 Kg
PD 34"-42"	6300 mm	510 mm	450 mm	660 Kg
PD 42"-48"	7300 mm	630 mm	490 mm	790 Kg
PD 50"-54"	7300 mm	790 mm	540 mm	1210 Kg
PD 56"-62"	7300 mm	890 mm	550 mm	1450 Kg

Fig. 6 - Suction pad overall dimensions



## SECTION 2

### Safety rules and accident-prevention

#### 2.1 SAFETY

The user shall inform his personnel about the accident risks, the safety devices installed for operator's safety and the accident-prevention rules provided for by the existing directives and regulations.

The operator's safety is one of the main concerns of the manufacturer. When a new product is built, the manufacturer tries to foresee all the possible dangerous situations and to provide the product with the necessary safety devices.

Despite this, the rate of accidents due to careless and improper use of the equipment is still high. Distraction, negligence and too much confidence are frequent causes of accidents together with tiredness and sleepiness.

For this reason this instruction manual must be read very carefully, particularly the section on safety rules, paying special attention to the sections dealing with especially dangerous operations.



#### WARNING

The Manufacturing Company declines any and all responsibility for failure to comply with the safety rules and accident-prevention measures described in this manual.

It also declines all responsibility for damage caused by improper use of the equipment or unauthorized changes.

Needless to say, taking the risk of improperly using the equipment means taking the relating responsibilities.

Compliance with the operation and maintenance instructions described in this manual is an essential requirement for using the equipment as intended by the Manufacturing Company.

This equipment **must** be operated, serviced or repaired exclusively by previously trained personnel who are aware of the equipment features and safety rules, and have been authorized to operate the equipment.

The user must comply with general safety and accident-prevention rules.



#### WARNING

Pay attention to this symbol, whenever you see it in this manual. It indicates possible dangerous situations.

There are three different levels of danger:



#### DANGER

It is the symbol of maximum danger. It warns that if the operations described are not carried out correctly, they cause serious injuries, death or long-term risks to the operator's health.



#### WARNING

The WARNING symbol indicates that if the operations described are not carried out correctly, they cause serious injuries, death or long-term risks to the operator's health.



#### CAUTION

This symbol warns that the operations described can cause damage to the equipment and/or to persons, if they are not performed correctly.

#### 2.1.1 TERMINOLOGY USED IN THIS MANUAL

To complete the description of the different risk levels, situations are described and defined below that may directly involve the equipment and/or operators.

- **USER:** The user is the person, the company or contractor who has purchased or rented the equipment and intends to use it according to its intended use.
- **DANGER AREA:** Any area inside and/or near the shelter where an exposed person may be subjected to a risk for his safety and health.



- **EXPOSED PERSON:** Any person finding himself partially or wholly in a danger area.
- **OPERATOR:** The person(s) given the task of installing, operating, adjusting, maintaining, cleaning, repairing and transporting the equipment.
- **SKILLED PERSONNEL:** Any person who has been trained and enabled to carry out maintenance or repair works, requiring a special knowledge of the shelter, its installation and operation, its safety devices, intervention measures, and any person who is also able to recognize the risks originating from shelter operation and can therefore avoid them.

## 2.2 CLOTHES AND WORK GEARS



When using or maintaining the shelter, always wear suitable clothes.

Do not wear rings, wrist watches, jewels, large and bulky clothes, unbuttoned or hanging clothes such as, for instance, ties, torn clothes, scarves, unbuttoned jackets or blouses with open zips. They may get entangled in rotating parts. Gather up long hair. We recommend that the operators wear approved, safety gear such as hard hats, slip-proof footwear, gloves, earmuffs, safety goggles, reflecting and respiratory jackets.

Ask your employer about the existing safety rules and accident-prevention devices.

## 2.3 ECOLOGY AND POLLUTION



- Comply with acoustic pollution rules and regulations.
- Replace the engine exhaust pipe if it is worn or if it produces a higher noise level than normal. The new exhaust pipe must be genuine.
- Comply with existing laws for the use and dumping of products to clean and maintain the machine.

Also follow instructions given by the manufacturer of these products.

- Keep the labels and instructions of these products. If fuel oils or other chemicals are spilled, go for "First Aid", bringing with you the labels and instructions mentioned above.
- Do not dump batteries. They must be given to authorized dumping companies or bodies.
- Dump the waste substances and material inside the waste box into the suitable dump boxes or containers meant for this purpose.
- If the machine needs dismantling, comply with the pollution rules of the country where this operation is carried out.

## 2.4 SAFETY SIGNS



The machine has been manufactured in compliance with all the necessary safety rules to safeguard operators. However, residual risks may still be present and are therefore signaled on the machine with decals. These signs (decals) have been attached to the equipment as shown in figure 7 and warn about any unsafe and dangerous situation.

Keep these signs clean and replace them immediately when they get detached or damaged.

With reference to figure 7 read the instructions below carefully and memorize their meaning.

- 1) **Before starting operation.** Carefully read the instructions for equipment operation and maintenance.
- 2) **Before any maintenance operation.** Stop the equipment and read the instructions for its operation.
- 3) **High noise levels.** Protect your ears using suitable ear defenders.
- 4) **Greasing points.**
- 5) **Danger. Keep at least 10 meters away.**
- 6) **Maximum lifting capacity of the suction pad.**
- 7) **Maximum pipe lifting capacity.**
- 8) **Pipe diameter.**
- 9) **Sound power measured in LWA.**





MAX CAPACITY .... KG

PIPE DIAMETER  
... " TO ... "

MAX LIFT CAPACITY  
... METRIC TON / ... Lb

MAX CAPACITY .... KG

PIPE DIAMETER  
... " TO ... "

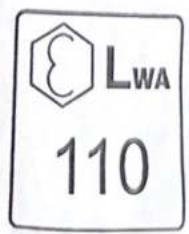


Fig. 7 - Safety signs



## 2.5 SAFE OPERATION



- The machine and its equipment must be operated exclusively by skilled and authorized operators from the control station.
- Under no circumstances should operators be allowed to use the equipment if they have not read and understood the instructions described in this manual and are not competent or in good psycho-physical conditions.
- Do not operate the equipment from any other position different from the control station. In any case, the operator must always keep his head, body, arms, hands and feet within the control platform, so that exposure to external risks is minimized.
- Keep the equipment accessories low or in a suitable position to guarantee the widest and the best visibility and control conditions.
- Never use the equipment to lift people or move them onto the machine.
- Constantly make sure that persons and/or animals are not within the machine outreach (10 meters), when the equipment is lifted, because accidents may occur and persons/animals be injured.
- Constantly keep the working areas under control to identify possible dangerous conditions. Some examples of these dangerous conditions are: slopes, rocky soils, forests, demolitions, fires, steep places, slope soils, heaps of soil, unsafe soils, ditches, excavations, and high traffic areas. Be very careful in these situations.
- Pay great attention during operation on slopes; it is very dangerous.
- Always appoint a suitable person to give indications to the operator when there is limited visibility of the work area. This person must be able to communicate directly with the operator and the operator must pay attention to his indications.
- Work with maximum caution on slope walls, keeping an eye on falling objects and on landslides.
- Do not forget that sometimes these dangers are hidden beyond bushes or underwood.
- During operation in ditches or near protruding overhanging high elements make sure that the walls are properly supported to avoid landslides.
- Before starting work near gas or supply pipelines of other public utility companies, get in touch with the closest public utility supplying body you can find.
- Jointly with the representative of the public utility supplying body, decide the precautions to be taken to guarantee the safety of workers.
- Before starting work get familiar with the different control devices installed and with their functions.
- Under no circumstances must moving parts be touched.
- If the equipment proves unsafe, ask qualified personnel for help.
- Whenever you are forced to work near electric lines, the equipment and its parts must be kept at a safe distance from them. Get in touch with the competent electric power supplying body. As the equipment is mainly made of metal, touching an electric line may imply a flash-over between the line and the equipment involving the operator with fatal consequences for him. If the equipment is struck by an electric flash-over, stand still and do not touch any metal part of the equipment. Then, wait for the arrival and help of expert personnel.
- Do not leave the receiving machine unattended if the engine is running. The equipment can be lowered if the control lever is moved.
- Before leaving the control platform, turn the machine off.
- If the machine is not supplied with a fire extinguisher, it is necessary to buy one and place it in the cab in a visible place where anyone can see it.
- Periodically check that the extinguisher is charged and that everyone is aware of how to use it.
- Free objects and tools must not be stored in the operator's cabin, because they might get entangled in the existing devices and prevent them from being activated, thus creating serious accidents.
- The area where the equipment is used is to be considered as a "danger area", especially for people who are not trained to use the equipment. Before starting the equipment, make sure that there are no persons, animals or objects around and in the working area.
- Whenever someone is "exposed", namely finds



himself in a "danger area", the operator must stop the equipment immediately and ask the exposed person to go away.

- The operator and/or any other person must make sure they are in such a position as to avoid accidental falls during equipment operation.



**DANGER**

Keep at a minimum safety distance of 10 meters from the equipment outreach.

- Personnel other than the operator must be prevented access to the work area.
- Before lifting operations, make sure that pipes are not fastened to the ground.
- Ensure that the pipe presents no holes in the area contacting the suction pad.
- Ensure that the pipe is centered with the central line of the suction pad so as to prevent unbalances during handling operations.
- The pipe must be lifted exclusively in a vertical position.
- It is strictly forbidden to operate at a distance from electric lines inferior to 5 meters.
- It is forbidden to work on soils having a gradient exceeding 6 degrees.
- It is forbidden to lift more than one pipe at a time.
- It is forbidden to lift a pipe shorter than the suction pad.
- It is forbidden to lift pipes having a different diameter from that shown in the plate affixed to the suction pad.



**DANGER**

Do not lift the equipment if red lights are flashing.

If the equipment motor switches off or the air intake pipes break, a danger situation is created that is signaled by the switching on of red flashing lights and a buzzer.

When these warning signs are engaged, the pipe is not immediately released and must be lowered to the ground in safe conditions.

If the motor switches off, the pipe is not released immediately thanks to a stop valve, the spare tank

and poor leaks in the system that guarantee a temporary hold until the pipe is lowered to the ground in safe conditions.

Air pipe breakage or drilling causes the lifted pipe to be released immediately. Complete breakage of the pipe is to be excluded, however, because the working pressure is very low and the pipe resists high pressures. In addition, the external structure of the pipe is such as to prevent it from being subject to shocks and friction.



**WARNING**

Do not use this equipment to lift or move persons.



**DANGER**

The maximum lifting capacity of the rotator beam and suction pads must never be exceeded.

## 2.6 SAFE MAINTENANCE



**WARNING**

- Read and understand all the warning decals on the equipment. Thoroughly follow maintenance instructions.
- Do not start or move the machine during maintenance works. Affix a notice reading "DO NOT START" on the controls.
- Do not attempt to make any adjustment while the equipment is operating or the engine is running.
- If a control lever is moved or if a hose breaks down, any of the machine equipment may fall down. So, great care must be taken when performing control operations.
- Under no circumstances must the safety devices be removed or changed.
- Do not lubricate or repair the equipment when the engine is running unless it is expressly indicated in this manual. This will prevent annoying inconveniences.
- Whenever equipment units requiring support by means of lifting equipment must be removed or installed, make sure that the equipment used is suitable for this purpose.



- When the machine components are at the operating temperature, lubricants running through them are so hot that they can cause serious burns. Let them cool down before draining the oil. All lubricants must be stored in suitable containers, marked and kept away from children.
- Never put liquid substances used for maintenance in glass bottles or containers, if there is a risk that they can be reached by children.
- Periodically check that the entire equipment and protection/safety devices are in good condition. Respect the conformity of recommended oils.
- Spare parts must be in line with the Manufacturer's requirements. **Use genuine spare parts exclusively.**
- Carry out maintenance thoroughly following the instructions provided in this manual. Ask skilled personnel to replace damaged or worn parts.
- Do not perform repair operations if you are not authorized and specifically trained for this purpose.
- Constantly check that the fixing devices of the different equipment components and particularly those of the hose fittings are not loose.
- Do not tamper with the engine or other parts of the equipment to obtain performances different from those intended by the manufacturer.
- Ensure that the working ground can bear the equipment weight in operation. Do not go too close to slopes or ditches. Always consider the equipment weight.
- Do not perform works on the fuel tank or the feed pipes when the engine is running or when it is too hot.
- Check the possible sources of noise or vibrations, which may result in breakdowns or faults, if they are not taken care of.
- Before carrying out works on the hydraulic system, ensure that it is not under pressure. It is, anyway, better to wear gloves, goggles and any other protection equipment to prevent the operator from being contacted by oil leaks.
- Do not work on the hydraulic system without having discharged the pressure.
- Immediately report oil, fuel or battery acid leaks.
- Before working on any component of the hydraulic system, disengage the battery. The battery electrolytic solution is an acid. Prevent this solution from getting in touch with your skin and eyes. Do not smoke when you check batteries or work on them.
- To avoid damages to the electric system: do not disengage the battery and motor alternator cables while they are in operation; do not make welding on the machine without disconnecting the battery cables; do not charge the battery before disengaging it by turning the battery disconnection key.
- Before any work is performed on the equipment, turn the engine off, remove the keys from the control panel and wait until all the moving parts reach a complete stop.
- Before starting the equipment, make sure all the safety devices are in perfect conditions.
- Do not carry out operations or maneuvers which may jeopardize the operator's safety and that of other people.
- If the equipment does not work properly, the operator must report the malfunctioning to competent personnel who will reduce it or solve it.

## 2.7 RE-FILL OPERATIONS



### WARNING

- Refill fuel outdoor. During refilling it is forbidden to smoke. Do not drop fuel on the equipment or around it. If you do, before starting the engine, dry fuel wet parts.
- Pay attention when storing fuels and lubricants, because they may be flammable, explosive, hazardous and corrosive. Store them in their containers, capping them well and keeping them away from unauthorized people.
- The operator must never forget that fuel tanks, barrels, piping and accessories for flammable or explosive substances are easy to break and wear (although they are empty).
- Do not smoke or approach fuel, barrels and fuel tanks with flames or sparks, even when they are empty.
- The equipment overheated parts can cause fires, burns, deformations, explosions, etc., if they get close to or in touch with specific solids, liquids and gases.



- Fuel and all lubricating oils are flammable. It is, therefore, forbidden to weld fittings and hoses containing these substances.
- Oil or grease deposits on the machine represent a serious risk of fire. Clean the machine with a steam-powered device.
- Tighten fittings, piping, hoses and seals, replacing the ones that are missing. Ensure that piping, hoses and the pipes for liquids are well fixed following given marks.
- Never direct the air jet under pressure against people or animals.
- Keep greasy cloths and other flammable materials in a safe container.
- Keep this container away from fire, welding and flame-cutting areas.
- If the engine needs to be operated indoor, convey exhaust gases outdoor.
- **The instruction manual for operation and maintenance must be read, remembered and stored throughout the equipment life until its final dismantling. If the manual gets damaged or lost, immediately ask for a copy from the manufacturing Company.**



## SECTION 3

### Transportation and handling

#### 3.1 VACUUM LIFT TRANSPORTATION

##### 3.1.1 LOADING AND UNLOADING OPERATIONS

If the equipment needs to be transported over long distances, it can be positioned on trucks or railway wagons. Use a suitable crane having the correct capacity to lift the equipment from ground level onto the vehicle bed. Hook it up to the lifting points supplied (Fig. 8).



**CAUTION**

Handle the equipment taking maximum care and following the instructions below.



**DANGER**

Loading and unloading operations can be very dangerous if maximum care is not taken in carrying them out. Keep unauthorized people away. Keep the loading area clear and fenced. Check that the available equipment is suitable and in good condition. Ensure that the work area is clear and that there is enough "run-away space", i.e. a free and safe area to move to, if the machine should fall down.



**CAUTION**

The platform on which the equipment is loaded must be perfectly flat in order to prevent load movements.

- The machine must be loaded and unloaded on a flat ground and at a safety distance from ditches and street edges.
- Make sure that the crane used has a suitable capacity for equipment lifting. Then, hook the equipment in the supplied points. Lift the equipment with extreme caution and slowly move it onto the truck or railway wagon without any brisk movement.
- Secure the equipment on the transportation platform using suitable chains and/or wire ropes so that equipment movements during transportation are prevented and the equipment does not pose any risk for others.



**CAUTION**

After the machine has reached its destination and before all the blocking devices are removed, check that the equipment is in good condition and in a position preventing it from being a danger. Finally, remove the wire ropes and blocks and unload the equipment using the same means and following the same procedure as for loading operations.

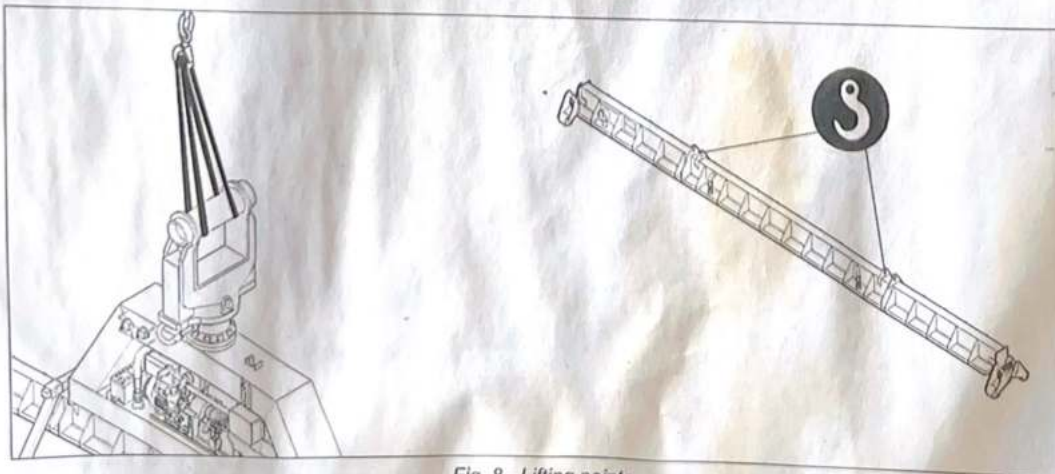


Fig. 8 - Lifting points



## SECTION 4

### Operating instructions

#### 4.1 INSTALLING THE VACUUM LIFT ON AN EXCAVATOR



**DANGER**

The excavator must be in line with the equipment lifting specifications. For further information about these specs, refer to paragraph "1.7 Technical Specifications".

#### 4.2 INSTALLING THE WIRE TYPE CONTROL PANEL

- Position the control panel inside the receiving machine cabin in a location where the operator can easily operate it without interfering with the receiving machine controls. Let the control cable run out of the cab (Fig. 9) through the supplied runway.

- Position the control cable along the arms letting it run along the existing rigid and flexible pipes. Then, secure it to the pipes using the supplied clamps. Make sure that the cable allows for full arm movement in all arm hinges. Fit the cable into the supplied plug of the rotator tank-beam.

#### 4.2.1 INSTALLING THE ELECTRONIC REMOTE CONTROL

When the electronic remote control is requested, the rotator tank-beam is supplied with a receiver unit already installed.

The transmitter unit, that is supplied in a separate box, must be installed in the cabin of the receiving machine like the wire type control panel.

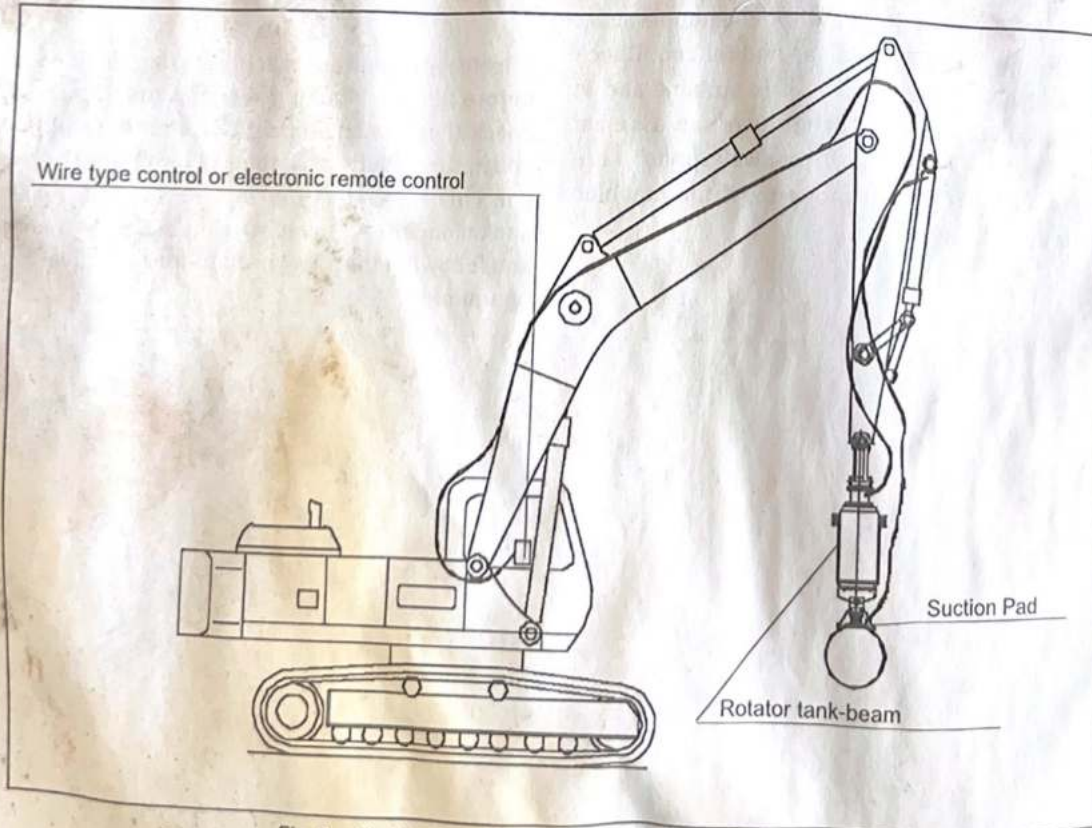


Fig. 9 - Machine configuration including the equipment



### 4.3 INSTALLING THE ROTATOR TANK-BEAM ON THE EXCAVATOR

- Remove the bucket from the excavator arm. Place the bucket control cylinder all the way back and secure it to the arm. Unscrew the two hoses from the bucket cylinder.
- Operate the excavator arm until it fits into the articulated support of the rotator tank-beam on the arm and secure it using the bucket pin that was disassembled previously.
- Connect the two rotator hoses to the bucket control hoses that were unscrewed previously.



**WARNING**

Max. hydraulic pressure ..... 320 bar

Max. hydraulic capacity ..... 20-30 l/min



**WARNING**

Install the two adjustable flow reducing valves between the rotator hoses and the rotator (Fig. 10). Let the rotator move for a while and then adjust the rotator speed, which must be very slow.

### 4.4 INSTALLING THE SUCTION PAD

- Hook the suction pad up to the rotator tank-beam using the two pins supplied (det. 2, Fig. 4).
- Connect the two suction hoses to the corresponding nipples (det. 3, Fig. 4).

### 4.5 DISASSEMBLING THE EQUIPMENT

To disassemble the equipment perform the previous operations in reverse sequence. Put the suction pads to the ground letting the external wheels sit on the wooden pieces that keep the rubber seal away from the ground and from any other object.



**WARNING**

Periodically check that the rubber seal is in good condition. If the suction pad seal is damaged, replace it because vacuum will not be preserved and the warning lights and buzzers trigger. The equipment must not be operated in this case.

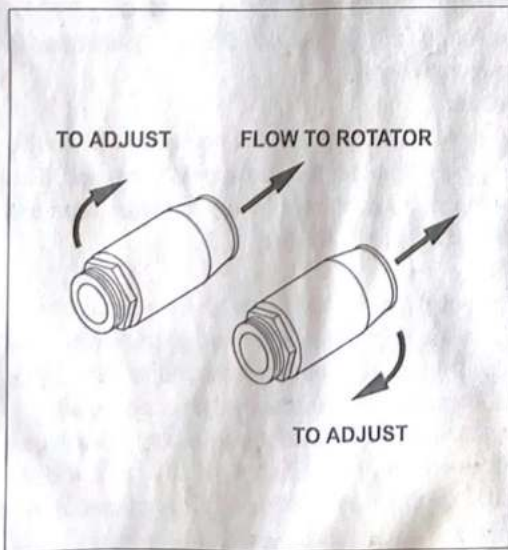


Fig. 10 - Reducing valves

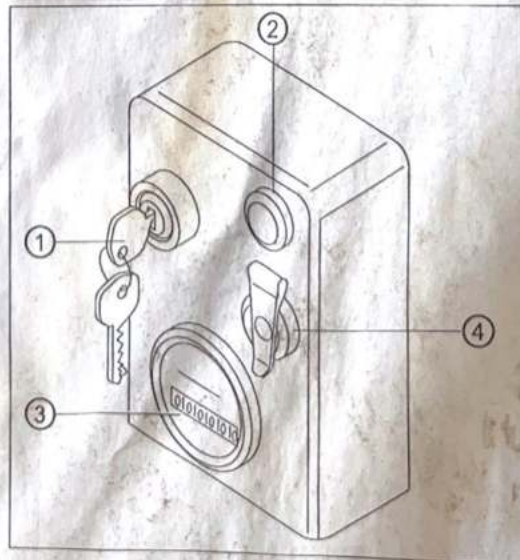


Fig. 11 - Start-up panel



#### 4.6 PUTTING THE WIRE TYPE CONTROL (OR ELECTRONIC REMOTE CONTROL) VACUUM LIFT IN OPERATION



##### WARNING

DO NOT ENGAGE the engine control or any other control, if a danger warning decal is affixed on it. Before starting the engine, talk to the person who put the danger warning decal.

Before starting the equipment and climb to the control station of the receiving machine, make sure that no-one is working around the machine or the equipment connected to it.

First, make sure that the receiving machine is in good condition and filled with fuel (diesel, oil), and that it operates in perfectly safe condition. Only then, reach the control station and start up the machine.



##### WARNING

When needing information about the engine, refer to the following chapters:

- using the engine;
- engine start-up;
- engine operation;
- engine stop

in the instruction manual of the YANMAR engine.

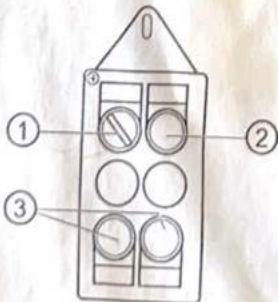


Fig. 12 - Wire type control

- Use the start-up panel on the rotator tank-beam to start the diesel engine after turning the supplied key (det. 1, Fig. 11) (the warning light for the alternator, det. 2 Fig. 11 turns on and then off).
- The diesel engine revolutions are set to 3000 rpm. If further adjustment is required, use the throttle lever on the engine.
- The start-up panel is equipped with an hour meter (det. 3, Fig. 11).
- The start-up panel is equipped with a 12V socket (det. 4, Fig. 11).
- Climb to the control station of the receiving machine and make sure that the suction pad is free to move: it must not sit on the pipe and must be lifted from the ground.
- Turn the switch (det. 1, Fig. 12) on the control panel (Fig. 9) in the ON position. The green light goes on, the red flashing lights on the rotator tank-beam are on and the buzzer triggers.
- Close the suction system of the tank from the outside by simultaneously pressing the 2 red buttons (det. 3, Fig. 12). The red lights go on. For the version featuring an electronic remote control, push the levers det. 3 (Fig. 13) upwards and the lever det. 4 (Fig. 13) downwards simultaneously.



##### WARNING

After igniting the engine, simultaneously press the 2 red buttons (det. 3, Fig. 12). The red lights go on. For the version featuring an electronic remote control, push the levers (det. 3, Fig. 13) upwards and the lever det. 4 (Fig. 13) downwards simultaneously.

##### NOTE:

If these operations are not performed when the engine is ignited, the pump gets damaged. The pump is not subjected to any damage when the tank pressure is -0.9 bar.

The pump aspirates all the air from the tank and creates vacuum. When the pressure gauge on the tank shows 0.8 bar (green area), the red flashing lights on the rotator tank-beam and the buzzer go off. Now, the equipment can start operating. Pressing of the emergency button (det. 5, Fig. 13) on the electronic remote control stops all the functions of this control, if an operating malfunctioning occurs.



#### 4.7 HOOKING UP AND LIFTING THE PIPE



##### WARNING

Make sure that the pipe is clear from blocks that may prevent it from lifting.

- Use the excavator to bring the suction pad on the pipe to be lifted. Position it exactly on the pipe center line to prevent unbalances. Lower the excavator arm until the side centering wheels of the suction pad sit on the upper part of the pipe. Then, lower the arm a bit more and exert a slight pressure to enable the rubber seal to stick against the pipe.
- Engage the suction button (det. 2, Fig. 12) on the control panel. For the electronic remote control, push the lever det. 1 (Fig. 13) upwards. The tank vacuum is reduced thanks to the air suction effect created by the pad and the seal is squeezed until the suction pad fully adheres to the pipe. The red flashing lights and the buzzer trigger. When vacuum goes back to **-0.8 bar** (pressure gauge arrow in green area), the red flashing lights and buzzer go off and the green flashing lights go on.



##### WARNING

For safe operation the green flashing light on the rotator beam must always be on. (The gauge arrow must always be in the green area).

- Now, the suction pad has hooked the pipe up. Use the excavator to lift it and bring it to the required position. For further position adjustments, use the rotator by engaging the bucket control lever of the excavator (for the version with a remote control rotation, use lever 2, Fig. 13 - option).



##### WARNING

The rotator rotates constantly. Perform rotations with reduced angles to prevent the pipe from crushing against obstacles and hoses and the electric cable from getting damaged.

#### 4.7.1 RELEASING THE PIPE

Let the pipe sit on a stable surface. Press the 2 red buttons (det. 3, Fig. 12) in order to release the pipe. For the electronic remote control, push the levers

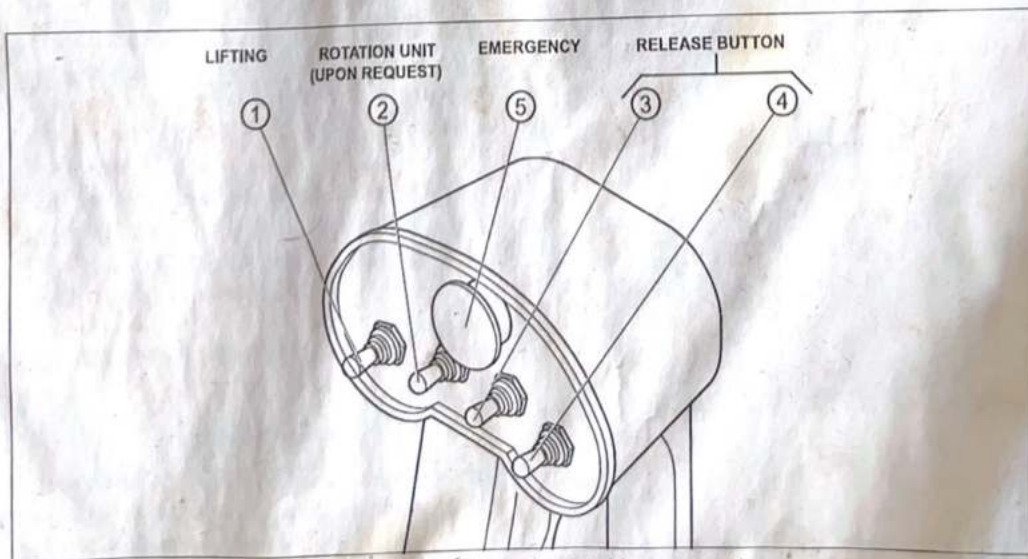


Fig. 13 - Electronic remote control (upon request)



#### 4.9.5 EMERGENCY STOP

If the machine needs to be stopped immediately, for any reason whatsoever, immediately lower the equipment and let the pipe sit on the ground.



#### WARNING

DO NOT STRAT the machine again before the problem causing the emergency stop is identified and removed.

#### 4.10 DURING OPERATION

##### 4.10.1 PRELIMINARY REMARKS

Skilled and experienced operators must comply with basic and simple behavioral rules to protect their personal safety, that of other people and the equipment from possible damage.

For this purpose the operator shall carry out even the simplest operations with maximum care.

- Before work is started with the equipment, the operator must ensure that he perfectly knows the equipment controls and their related functions.
- During operational phases, the operator must be positioned in the control station of the receiving machine.



#### DANGER

Always make sure that the working area is clear from people, animals and/or obstacles.

#### 4.11 AFTER OPERATION

After equipment use or when the work cycle is completed, the equipment must be switched off as described in paragraph "4.9.4 Machine stop".

Keep the equipment clean and orderly. Maximum performance is obtained when the equipment is preserved in the conditions described above.



## SECTION 5

### Scheduled maintenance

#### 5.1 MAINTENANCE

##### 5.1.1 GENERAL

Below is a description of scheduled maintenance operations. Needless to say, compliance with the rules laid down in this manual determines a longer machine life and reduced operating costs.

Contact the Manufacturing Company for unscheduled maintenance operations that are not contemplated in this manual.



**DANGER**

Before carrying out any operation ensure that the equipment is on a flat ground. Maintenance operations must always be carried out with the machine blocked and the engine off.

The servicing intervals recommended in this manual serve as mere information and depend on normal and proper use of the equipment. Therefore, they change according to the way the machine is used, to seasonal factors, and so on. If the equipment is used in tougher conditions, intervals must of course be shorter.



**WARNING**

Before injecting lubricating grease in the greasing nipples, thoroughly clean the greasing nipple fittings to prevent mud, dust or foreign matters from mixing with the grease, thus decreasing or even eliminating the lubricating effect.

- Putting too much grease into the greasing points using high pressure may damage the gaskets/seals. Perform this operation with care.
- Lubricate and grease each expected point.
- Paint dented areas with rust-preventing chemicals.
- Discharge the pressure from the hydraulic system.

- When oil is either replaced or refilled, use the same oil as recommended (see para. 5.9).
- Keep lubricants away from children.
- Read the warning and precaution recommendations on the lubricants containers very carefully.
- After using lubricants wash your hands thoroughly.
- Dump the used oils according to anti-pollution regulations.



**DANGER**

AVOID ENVIRONMENTAL POLLUTION. Dispose of accumulators, hydraulic liquids, lubricants, refrigerating agents, filtering elements and absorbing material soaked with these liquids in compliance with the existing local and national regulations, which classify these materials as polluting, hazardous or toxic agents.

Do not use gasoline, solvents or other flammable fluids to clean parts. Use type-approved commercial solvents which are not flammable and toxic.

##### 5.1.2 AFTER THE FIRST 8 HOURS OF OPERATION

Check the equipment and its unit/accessories making sure that:

- all the bolts are tightened properly;
- none of the parts of the hydraulic system presents oil leaks;
- moving or rotating parts are lubricated properly;
- recommended lubricants only are used;
- spare parts are in line with the Manufacturer's requirements. **Use genuine spare parts only.**

Before operating the equipment again, make sure that no oil has leaked to the ground.

If this is the case, **DO NOT OPERATE** the equipment and locate the oil leak.



cap. Use the kind of oil specified in para. "5.9 Fuel refill table".

## 5.6 VACUUM PUMP

For maintenance operations refer to the instruction manual for the BUSCH pump.

Make sure that the lubricant is suitable for the envisaged working temperature (see the LUBRIFICANT VISCOSITY CHART).

Check the oil level based on the type of equipment use.

Frequently clean the suction filters (det. 7, Fig. 3).

### 5.6.1 REPLACEMENT OF SUCTION FILTERS

Filters are replaced as follows (det. 7, Fig. 3):

- clean the filter attachment area and the surrounding points;
- manually unscrew each complete filter unit and replace it with a new one.

The filter cartridge is replaced as follows (det. 6, Fig. 3):

- open the closing cover, remove the cartridge and replace it with a new one.

## 5.7 SUCTION PAD

Frequently check that the rubber seal is in good condition. If it is damaged, replace it. Take care when putting the suction pad down to the ground. Always let the external wheels sit on suitable wooden pieces so as to prevent the rubber seal from sitting on the ground or any other object.

### 5.7.1 REPLACING THE RUBBER SEAL



**WARNING**

This operation must be performed by properly trained and qualified personnel only.

- Turn the suction pad upside down and place it on suitable supports (Fig. 15).



**WARNING**

Always make sure that the suction pad is stable.

- Remove the damaged seal from its seat.
- Ensure that the seal seat is in good condition. Clean it thoroughly both inside and outside.
- Place the new rubber seal on the suction pad crossing its two ends approx. half way through the suction pad.

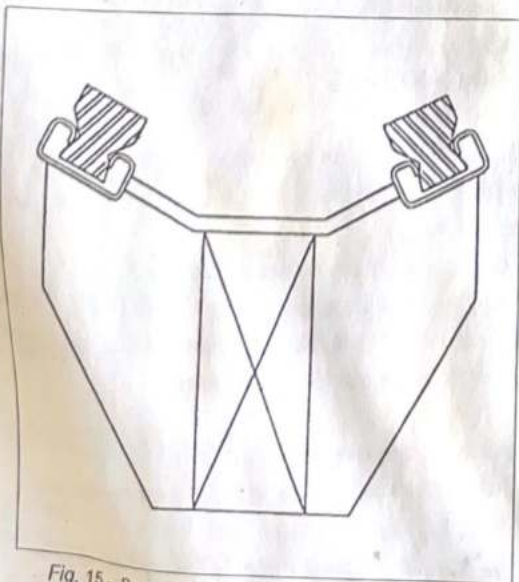


Fig. 15 - Suction pad sitting on suitable supports

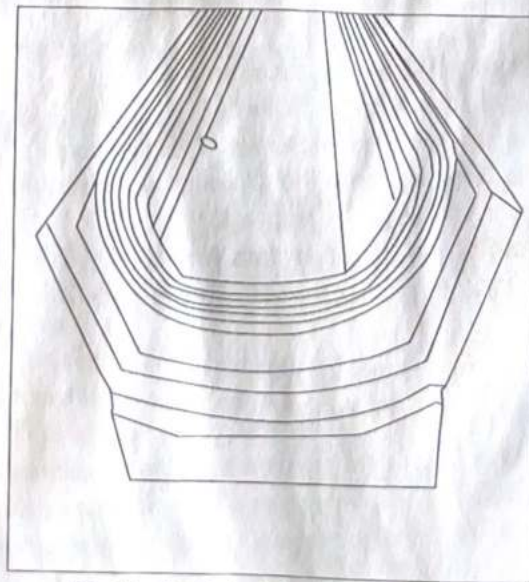


Fig. 16 - Seal being introduced into its seat



- Fit the seal in its seat pushing its two ends all the way down with the help of a rounded edge tool. Perform this operation with extreme caution in the area near the two heads.



**WARNING**

This operation must be performed thoroughly without causing any damage.

- Neatly cut the seal perpendicularly approx. 5 cm longer than required.
- Glue the two ends together. Then, apply a uniform amount of adhesive on both parts and connect them by pressing them for approx. 30 seconds.
- Let the connected parts dry and finish introducing this section in its seat after approx. 2 minutes.

## 5.8 PERIODIC CHECKS



**DANGER**

Any check, repair or maintenance operation must be performed when the machine is not running.

### Daily

To avoid accidents to operators and breakdowns we recommend that a visual check be carried out before starting work with the equipment. A special check must confirm that:

- the bolts are not loose;
- the connections are not loose;
- Check that the rubber seal of the suction pad is not worn.



**WARNING**

Any danger situation is better identified if the equipment/machine is constantly and properly cleaned.

### Every week:

- check that all the components are not worn. If they are excessively worn or broken, replace them. Check that the rubber seal of the suction pad is in good condition. If it is damaged, replace it.





**WARNING**

Clean the greasing nipples before lubrication. Injecting too much grease may be hazardous as it may cause overheating of the bearings. Using grease other than that described above requires total drainage of the grease with which the equipment is supplied. Especially hard working conditions may require shorter lubrication intervals.



### 5.9 RE-FILL OPERATIONS

PART TO BE REFILLED	QUANTITY <i>Liters (l) - U.S. Gal.</i>	RECOMMENDED PRODUCT	TYPE OF FUEL  <i>(International Classification)</i>
		 	
ENGINE	1,65 / 0,44	Sigma Truck Turbo SAE15W-40	ESSOLUBE, DELVAC 1330, VENELLUS C3, HP 300 MOTOROIL, RIMULA CT, MIL-L2104E, API CD/SF
HYDRAULIC SYSTEM WITH REMOTE CONTROLLED ROTATION	33 / 8,7	Sigma S SAE10W-20	ESSOLUBE, DELVAC 1330, VENELLUS C3, HP 300 MOTOROIL, RIMULA CT, MIL-L2104E, API CD/SF
MISCELLANEOUS GREASING NIPPLES		Grease MV EP	Lithium-calcium base grease, type N.L.G.I.2
FUEL TANK	67 / 17,7		Diesel fuel ASTM N.2.D, grade TT, of high quality and brand
VACUUM PUMP	0,33 / 0,09		ESSO SPARTAN SYNTHETIC EP 220
INVERTER	1	ROTRA MP SAE 80W-90	



### 5.10 RECOMMENDED LUBRICANTS

	SAE 10W-20	SAE 15W-40/30/40	SAE 80W-90	GREASE
AGIP	SIGMA S SIGMA TURBO	SIGMA TRUCK	ROTRA JD/F	GR-MU 2
ESSO	ESSOLUBE D3 HEAVY - TRUCK		GEAR-GX	
MOBIL	DELVAC 1330 DELVAC 1330 SUPER		MOBILUBE HD	
BP	VENELLUS C3 VENELLUS C3 EXTRA		HYPOGEAR-EP	
TAMOIL	HP 300 MOTOROIL		TAMGEAR MP	
SHELL	RIMULA CT		SPIRAX-HD	
US DEPARTMENT OF THE ARMY	MIL-L-2104E MIL-L-46152C	MIL-L-46152C	MIL-L-2105D	
API SERVICE	API CD/SF API CG-4/SG	CH-4 CG4	API GL-5	
CAT	TO-2			LX-BCHA 2
ISO				51 825 K2K 20
DIN				

### 5.11 LUBRICANT VISCOSITY CHART

RECOMMENDED LUBRICANT VISCOSITY																			
VISCOSITIES FOR START-UP TEMPERATURES RANGING BETWEEN -40°C AND +48°C																			
Temperature at start-up	°C	-40	-35	-28	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+43	+48	
	°F	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	
YANMAR ENGINE Model L100AE-DEYC																			
VACUUM PUMP BUSCH																			
INVERTER																			
HYDRAULIC ROTATION SYSTEM (UPON REQUEST)																			



## SECTION 6

### Spare parts

#### 6.1 CONDITIONS FOR SPARE PARTS ORDERS

Spare parts orders must be placed with the dealer that has supplied you with the equipment or directly with the company **SUPERIOR** at the following addresses.

##### ITALY

Via Roma, 18 - 43100 San Pancrazio  
Parma - Italy

Tel. 0039.0521.671288 - Fax 0039.0521.673295,  
e-mail: info@scaip-srl.it

##### U.S.A.

16031 East Freeway, Huston,  
Channelview, TX 77530

Tel. 281.452.5800 - Fax 281.452.0516  
e-mail: superior@wwmach.com

##### GERMANY

Alter Hellweg, 128-44379

Dortmund

Tel 0049.0231.9633073 - Fax 0049.0231.9633076

- **Shelter model and chassis number:** This information is stamped on the identification plate with which every shelter is supplied with.
- **Part description and quantity requested:** transportation costs are intended at the Purchaser's charge.
- **The goods are always shipped at the Purchaser's risk, although it is sold franco destination.**



## SECTION 7

### Annexes

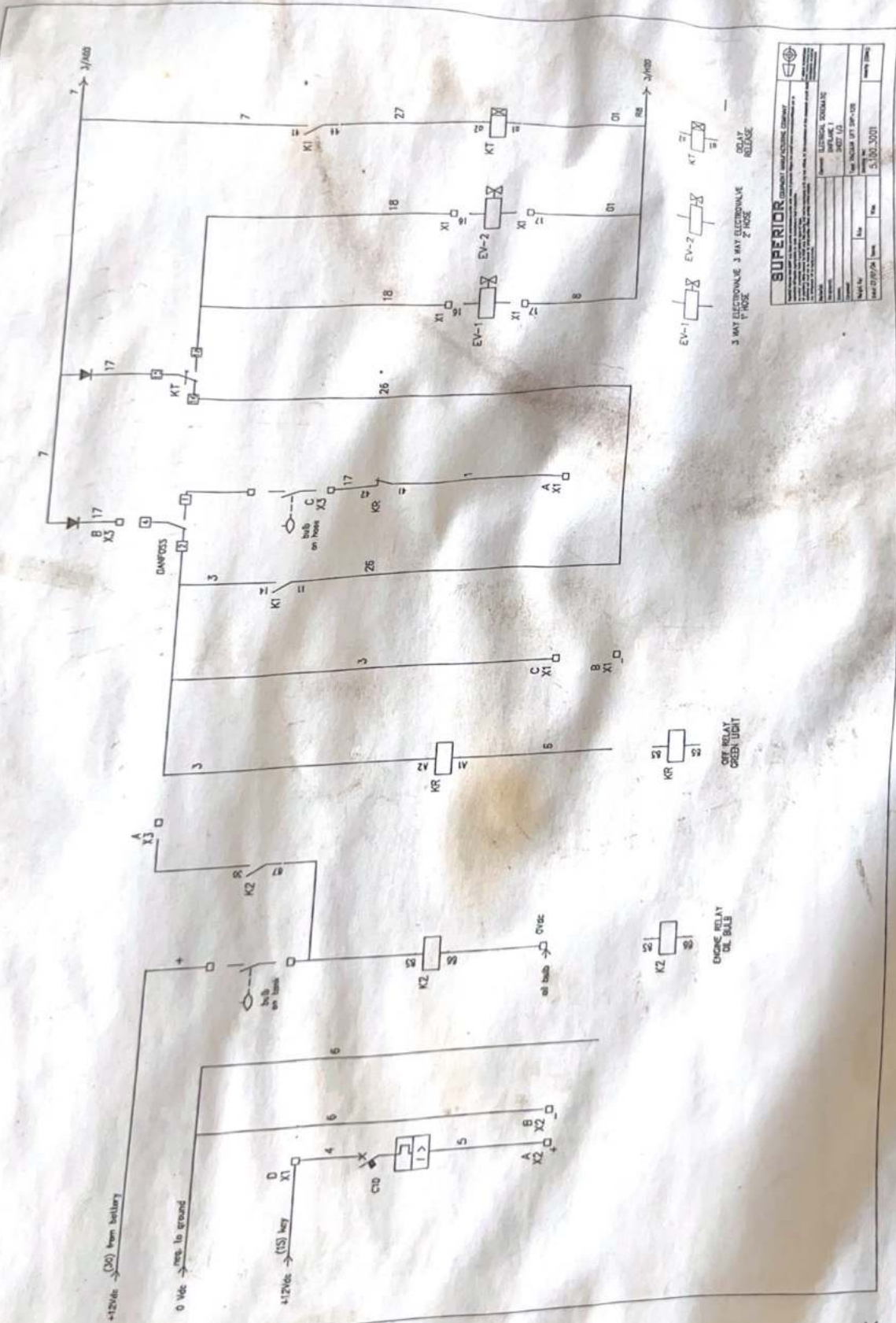
- Pneumatic system diagram.
- Electric system diagrams.
- Pump Mink MM 1102 - 1144 AV.







Instruction manual for Operation and Maintenance - SVL 130





Installations- und Betriebsanleitung Mink MM 1102 - 1144 AV  
 Installation and Operating Instructions Mink MM 1102 - 1144 AV  
 Manuel d'installation et de maintenance Mink MM 1102 - 1144 AV

Diese Betriebsanleitung hat Gültigkeit für folgen-  
 de Pumpen:

- MM 1102 AV
- MM 1104 AV
- MM 1142 AV
- MM 1144 AV

These Installation and Operating Instructions are  
 valid for the following pumps:

- MM 1102 AV
- MM 1104 AV
- MM 1142 AV
- MM 1144 AV

Ces instructions d'installation sont valables pour  
 les pompes suivantes:

- MM 1102 AV
- MM 1104 AV
- MM 1142 AV
- MM 1144 AV

Diese Betriebsanleitung ist vor der Instal-  
 lation und Inbetriebnahme der Vakuump-  
 umpe Mink unbedingt zu lesen und zu  
 befolgen.

It is essential that these Operating In-  
 structions be read and understood prior  
 to Mink vacuum pump installation and  
 start-up.

Il est impératif que ce manuel d'instruc-  
 tion soit lu et compris avant de mettre en  
 marche la pompe à vide Mink.

Hersteller:

Dr.- Ing. K. Busch GmbH  
 Schauinslandstraße 1  
 D 79689 Maulburg  
 Deutschland  
 Telefon: +49 (0) 7622 681 - 0  
 Fax: +49 (0) 7622/ 5484  
 http://www.busch.de

Manufacturer:

Dr.- Ing. K. Busch GmbH  
 Schauinslandstraße 1  
 D 79689 Maulburg  
 Germany  
 Phone: +49 (0) 7622 681 - 0  
 Fax: +49 (0) 7622/ 5484  
 http://www.busch.de

Constructeur:

Dr.- Ing. K. Busch GmbH  
 Schauinslandstraße 1  
 D 79689 Maulburg  
 Allemagne  
 Téléphone: +49 (0) 7622 681 - 0  
 Fax: +49 (0) 7622/ 5484  
 http://www.busch.de

Inhaltverzeichnis	Seite
Sicherheit	2-3
- Anwendung	2
- Sicherheitshinweise	3
Funktionsprinzip	3
Transport und Verpackung	3-4
Inbetriebnahme	4
- Aufstellung	4
- Sauganschluss	4
Elektroanschluss	4
Betriebshinweise	5
Wartung	5-6
- Reinigung des Ansaugfilters	6
- Getriebeölwechsel	6-7
Technische Daten	7
Ersatzteilzeichnung	8
Ersatzteile	8
Konformitätserklärung	9

Index	page
Safety	2-3
- Application	2
- Safety advice	3
Principle of operation	3
Transport and packing	3-4
Start-up	4
- Setting-up	4
- Inlet connection	4
Electrical connection	4
Operation advice	5
Maintenance	5-6
- Cleaning of inlet filter	6-7
- Gear oil change	6
Technical data	6-7
Position view drawing	7
Spare parts	8
Declaration of Conformity	8
	9

Index	page
Sécurité	2-3
- Application	2
- Indications de sécurité	3
Principe de fonctionnement	3
Transport et emballage	3-4
Démarrage	4
- Préparation	4
- Raccordement	4
Raccordement électrique	4
Conseils d'utilisation	5
Entretien	5-6
- Nettoyage du filtre d'aspiration	6-7
- Vidange d'huile de boîte d'engrenage	6
Spécifications techniques	6-7
Vue de position	7
Plèces détachées	8
Déclaration de Conformité	8
	9

## Sicherheit

Diese Drehkolben-Vakuumpumpe Mink ist nach dem neuesten Stand der Technik und den anerkannten sicherheitstechnischen Regeln gebaut. Dennoch können bei unsachgemäßer Installation oder nicht bestimmungsgemäßem Betrieb Gefahren und Schäden entstehen.

### Anwendung

Mit diesen Mink-Drehkolben-Vakuumpumpen können außer Luft auch Gase und Gasgemische abgesaugt werden, die weder aggressiv noch explosiv sind. Die Temperatur der angesaugten Gase darf 40°C nicht überschreiten. Wenden Sie sich im Zweifelsfall an das Herstellerwerk.

## Safety

This Mink rotary lobe vacuum pump has been manufactured according to the latest technical standards and safety regulations. If not installed properly or not used as directed, dangerous situations or damage might occur.

### Application

Mink rotary lobe vacuum pumps can be used to suck off air, gases or gas mixtures which are not aggressive or explosive. The gas temperature at the suction side must not exceed 40°C. In case of doubt, please contact the manufacturer.

## Sécurité

Cette pompe à vide à lobes rotatifs Mink est fabriquée selon les plus récents standards techniques et règlements de sécurité connus. Une mauvaise installation ou une utilisation non conforme aux recommandations peut être dangereuse ou entraîner des dommages.

### Application

Les pompes à vide à lobes rotatifs Mink peuvent être utilisées pour aspirer de l'air, des gaz ou des mélanges de gaz qui ne sont, ni agressifs, ni explosifs. La température du gaz aspiré ne doit pas excéder 40°C. En cas de doute, consultez le constructeur.



Installations- und Betriebsanleitung Mink MM 1102 - 1144 AV  
 Installation and Operating Instructions Mink MM 1102 - 1144 AV  
 Manuel d'Installation et de maintenance Mink MM 1102 - 1144 AV

**Sicherheitshinweise**

Die Sicherheitshinweise in dieser Betriebsanleitung sind durch einen schattierten Rahmen hervorgehoben. Diese Hinweise sind unbedingt zu beachten.

**Safety Information**

The safety information in this manual is presented in shaded boxes for emphasis. Do not fail to observe the safety information.

**Indications de sécurité**

Les mises en garde de sécurité de ce manuel sont mises en relief par un encadrement grisé. Il est impératif que ces indications soient suivies.

**Vorsicht Geräteschaden!**

Feststoffe dürfen nicht in die Pumpe gelangen. Geringe Flüssigkeitsmengen können mitgefördert werden.  
 Im Zweifelsfall unbedingt Rücksprache mit dem Herstellerwerk halten.

**Caution - Equipment Damage!**

Solid particles must not enter the pump. The transport of small quantities of liquid is possible.  
 In case of doubt consult the manufacturer.

**Attention - Déformation de l'appareil !**

Des particules solides ne doivent pas entrer dans la pompe. Le pompage de petites quantités de liquide est possible.  
 En cas de doute, veuillez consulter le constructeur.

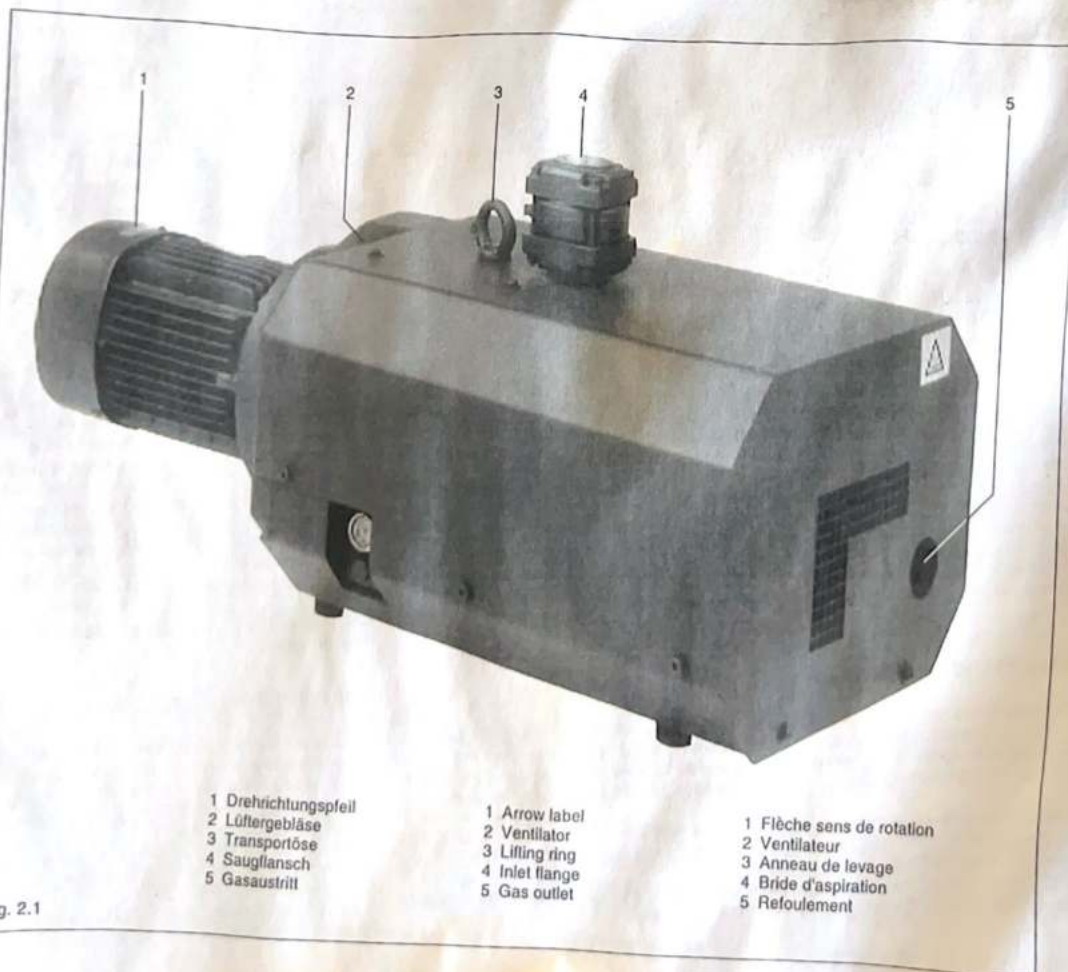


Fig. 2.1



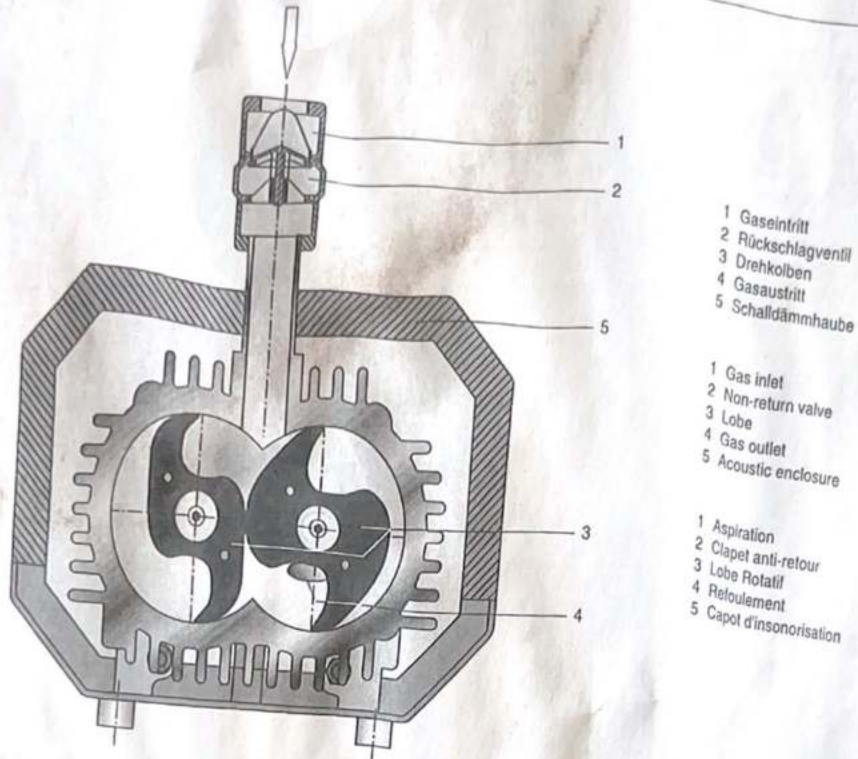


Fig. 3.1

- 1 Gaseintritt
- 2 Rückschlagventil
- 3 Drehkolben
- 4 Gasaustritt
- 5 Schalldämmhaube

- 1 Gas inlet
- 2 Non-return valve
- 3 Lobe
- 4 Gas outlet
- 5 Acoustic enclosure

- 1 Aspiration
- 2 Clapet anti-retour
- 3 Lobe Rotatif
- 4 Refoulement
- 5 Capot d'insonorisation

### Funktionsprinzip

Mink Vakuumpumpen arbeiten nach dem Drehkolbenprinzip. Sie verdichten vollkommen trocken, berührungsfrei und somit verschleißfrei. Zwei Drehkolben (3) drehen sich gegenseitig in einem Zylinder, saugen das Medium an und verdichten es. Die präzisen Formen der Drehkolben und der Zylinderinnenwand ermöglichen kleinste Toleranzen und somit eine gute Abdichtung, ohne einander zu berühren. Bei der Drehbewegung wird ständig Gas angesaugt, verdichtet und unter Druck ausgestoßen.

Mink Vakuumpumpen sind luftgekühlt.

### Principle of operation

Mink vacuum pumps work according to the rotary lobe principle. They are compressing dry, contact free and hence free of wear. Two rotary lobes (3) are rotating in opposite directions within a cylinder, inducting and compressing a gas medium. The shape of the lobe is such that a small gauged clearance is maintained between the adjacent lobe surfaces, the cylinder walls and also at the stantly, gas is sucked in, compressed and discharged under pressure.

Mink rotary lobe vacuum pumps are air-cooled.

### Principe de fonctionnement

Les pompes à vide Mink fonctionnent selon le principe des lobes rotatifs. Ils assurent une compression sèche, sans contact et donc sans usure. Deux lobes (3) tournent en sens contraire, dans un cylindre, en aspirant le gaz et en le comprimant. Les formes précises des lobes et des parois du cylindre autorisent de très faibles tolérances qui assurent une bonne étanchéité sans contact. Pendant la rotation, le gaz est aspiré, puis comprimé et rejeté sous pression.

Les pompes à vide à lobes rotatifs Mink sont refroidies par air.

### Transport und Verpackung

Mink Drehkolben-Vakuumpumpen werden im Werk auf Funktion überprüft und fachgerecht in Kartons verpackt. Achten Sie bei der Annahme der Pumpe auf Transportschäden.

Die Pumpen können an der Transportöse (3, Fig. 2.1) einer geeigneten Hebevorrichtung aus der Verpackung entnommen werden. Bei Pumpen mit Grundrahmen befinden sich die Transportösen am Grundrahmen.

### Transport and Packing

Mink rotary lobe vacuum pumps pass a rigorous operating test in the factory and are packed carefully to avoid transit damage. Please check packaging on delivery for transport damage.

The pump can be lifted from the packing with a suitable lifting device using the lifting ring (3, Fig. 2.1). On pumps with base frame the lifting rings are on the base frame.

### Transport et emballage

Les pompes à vide à lobes rotatifs Mink sont testées et contrôlées dans notre usine avant d'être soigneusement emballées. Veuillez vérifier lors de la réception que l'emballage n'a pas subi de dommage pendant le transport.

La pompe peut être sortie de son emballage en utilisant des moyens de levage appropriés ainsi que l'anneau de levage (3, Fig. 2.1). En cas de pompes avec cadre de base les anneaux de levage se trouvent au cadre de base.



Installations- und Betriebsanleitung Mink MM 1102 - 1144 AV  
 Installation and Operating Instructions Mink MM 1102 - 1144 AV  
 Manuel d'installation et de maintenance Mink MM 1102 - 1144 AV

Das Verpackungsmaterial ist nach den geltenden Bestimmungen zu entsorgen, bzw. wiederverwenden. Achten Sie darauf, dass es Kindern nicht zugänglich ist. Diese Betriebsanleitung ist Bestandteil der Lieferung.

Packing materials should be disposed of according to environmental laws or re-used. Keep packing materials out of children's reach!

Les matériaux d'emballage doivent être éliminés selon les lois en vigueur ou doivent être réutilisés. Veillez à ce que le matériel d'emballage reste hors de portée des enfants. Ce manuel fait partie de notre envoi.

These operating instructions are part of the consignment.

## Inbetriebnahme

Die Einhaltung der Reihenfolge der hier beschriebenen Arbeitsschritte ist für eine sicherheitsgerechte und funktionssichere Inbetriebnahme unbedingt erforderlich. Die Inbetriebnahme darf nur von geschultem Fachpersonal durchgeführt werden.

## Start-up

It is essential to observe the following instructions step by step to ensure a safe start-up.

Start-up may only be carried out by trained specialists.

## Démarrage

Il est impératif de suivre pas à pas les recommandations suivantes pour assurer un démarrage correct de la pompe.

Le démarrage doit être réalisé uniquement par un personnel qualifié.

### 1. Aufstellung

Die Pumpe muss waagrecht auf ebener Fläche aufgestellt bzw. montiert werden. Durch die Innengewinde an den Schwingmetallpuffern muss die Pumpe jedoch angeschraubt werden. Eine weitere Befestigung ist nicht notwendig.

### 1. Setting-up

The pump must be set up or mounted horizontally on a flat surface. The pump must be mounted with screws via the threads of the rubber feet of the pump. Additional mounting is not required.

### 1. Préparation

La pompe doit être placée ou fixée sur une surface plane horizontale. Un taraudage est prévu sous chaque support élastique pour la fixation. Un montage additionnel n'est pas nécessaire.

Standardmäßig ist die Pumpe für den Einsatz unter folgenden Umgebungsbedingungen vorgesehen:

The pump is constructed to operate in the following ambient operating environment:

La pompe à vide est conçue pour fonctionner dans l'environnement suivant:

Umgebungstemperatur: 12 - 40°C  
 Umgebungsdruck = Atmosphäre

Ambient temperature: 12 to 40°C  
 Ambient pressure = atmosphere

Température ambiante: 12 à 40°C  
 Pression ambiante = pression atmosphérique

Um ein Überhitzen der Pumpe zu vermeiden, ist stets auf genügend Frischluftzufuhr zu achten.

In order to avoid overheating of the pump, a constant fresh-air flow to the pump is necessary.

Pour éviter un échauffement anormal de la pompe, il faut prévoir une ventilation suffisante.

### 2. Sauganschluss

Der Anschluss an den Saugflansch kann über einen vakuumdichten, flexiblen Schlauch oder durch Rohrleitungen erfolgen. Dabei ist darauf zu achten, dass durch die Befestigung der Rohrleitung keine Spannungen auf die Pumpe übertragen werden. Gegebenenfalls müssen Kompensatoren verwendet werden.

### 2. Inlet connection

The inlet flange can be connected with a vacuum-tight flexible hose or pipe.

The interconnecting pipes should cause no stress on the pump's flanges. If necessary, bellows should be installed.

### 2. Raccordement aspiration

La bride d'aspiration doit être raccordée par une tuyauterie souple ou rigide étanche au vide.

Cette tuyauterie ne doit exercer aucune contrainte sur la bride d'aspiration; si nécessaire, il faut installer des compensateurs.

Verengungen in den Anschlussleitungen sind zu vermeiden, da sonst die Saugleistung vermindert wird. Die Nennweite der Anschlussleitungen muss mindestens dem Querschnitt des Saugflansches der Pumpe entsprechen.

Restriction of the pipes must be avoided in order not to decrease the displacement of the pump. The nominal diameter of the pipes has to be at least the same as the diameter of the pump inlet flange.

Il faut éviter les restrictions de tuyauteries qui diminuent les performances de la pompe. Le diamètre nominal doit être au moins égal au diamètre de la chambre d'aspiration de la pompe à vide.

Achten Sie darauf, dass sich keine Fremdkörper (z.B. Schweißzunder) oder Flüssigkeiten in der Ansaugleitung befinden.

No foreign particles (e.g. solder) or liquids should enter the inlet line.

Aucune particule solide (par exemple: soudure) ou liquide ne doit pénétrer dans la pompe.

### 3. Ein Luftfilter für die Ansaugluft ist anzuschließen.

3. An air filter must be connected to the inlet.

3. Un filtre à air doit être connecté à l'aspiration.

**Vorsicht Geräteschaden!**  
 Diese Vakuumpumpe läuft trocken.  
 Vakuumpumpe nicht mit Öl oder Fett im Verdichtungsraum schmieren!

**Caution - Equipment Damage!**  
 This vacuum pump is a dry running vacuum pump. Do not lubricate the vacuum pump with oil or grease in the compression chamber.

**Attention - Défioration de l'appareil!**  
 Cette pompe à vide fonctionne à sec.  
 Ne pas lubrifier la pompe à vide avec de l'huile ou avec de la graisse.



**EG Konformitätserklärung  
EC Declaration of Conformity  
CE Déclaration de Conformité**

Mit dieser Konformitätserklärung im Sinne der EG-Maschinenrichtlinie 98/37/EG Anhang II A erklärt die Firma

In compliance with the EC Machinery Directive 98/37/EC, appendix II A it is confirmed by

Avec cette déclaration de conformité dans le sens de la Directive Machines 98/37/CE, annexe II A, l'entreprise

**Dr.-Ing. K. Busch GmbH**  
Schauinslandstraße 1  
D 79689 Maulburg



dass nachfolgend beschriebene

that following

atteste que la

Vakuumpumpe	<ul style="list-style-type: none"> <li>- Mink MM 1102 AV</li> <li>- Mink MM 1104 Av</li> <li>- Mink MM 1142 AV</li> <li>- Mink MM 1144 AV</li> </ul>
-------------	--

Vacuum pump	<ul style="list-style-type: none"> <li>- Mink MM 1102 AV</li> <li>- Mink MM 1104 Av</li> <li>- Mink MM 1142 AV</li> <li>- Mink MM 1144 AV</li> </ul>
-------------	--

Pompe à vide	<ul style="list-style-type: none"> <li>- Mink MM 1102 AV</li> <li>- Mink MM 1104 Av</li> <li>- Mink MM 1142 AV</li> <li>- Mink MM 1144 AV</li> </ul>
--------------	--

In Übereinstimmung mit der EG-Maschinenrichtlinie I. d. F. 91/368/EWG und 98/37/EG, der EG-Niederspannungsrichtlinie 73/23/EWG, der EMV-Richtlinie 89/336/EWG, sowie den nachfolgend genannten Normen und Vorschriften hergestellt worden ist.

is manufactured in accordance to EC Machinery Directive 91/368/EEC and 98/37/CE, EC low voltage directive 73/23/EEC, EMC directive 89/336/EEC and all standards listed below.

a été fabriquée conformément à la Directive Machines CE, selon la version 91/368/CEE et 98/37/CE, la Directive Basse Tension CE 73/23/CEE, la Directive CEM 89/336/CEE, de même que selon les normes et prescriptions indiquées ci-après.

Norm Standard Norme	Titel der Norm Title of the standard Titre de la norme
Harmonisierte Normen/ harmonized standards/ normes harmonisées	
EN 292, 1 EN 292, 2	Sicherheit von Maschinen: Grundbegriffe, allgemeine Gestaltungsleitsätze; Teil 1 und 2 Safety of machinery: Basic concepts, general principles for design; Part 1 and 2 Sécurité des machines; Notions fondamentales, principes généraux de conception; Partie 1 et 2
EN 294	Sicherheit von Maschinen: Sicherheitsabstände gegen das Erreichen von Gefahrenstellen mit den oberen Gliedmaßen Safety of machinery: Safety distance to prevent danger zones being reached by the upper limbs Sécurité des machines, distances de sécurité pour empêcher que les zones de danger soient atteintes par les membres supérieurs
EN 60204	Elektrische Ausrüstung von Maschinen Electrical equipment of machines Équipement électrique des machines
DIN, EN 1012, 1 DIN, EN 1012, 2	Kompressoren und Vakuumpumpen; Sicherheitsanforderungen - Teil 1 und 2 Compressors and vacuum pumps; Safety requirements; Part 1 and 2 Compresseurs et pompes à vide; Exigences en matière de sécurité; Partie 1 et 2
EN 50081, 1 EN 50081, 2	Elektromagnetische Verträglichkeit; Fachgrundnorm Störaussendung; Teil 1 und 2 Electromagnetic compatibility; Generic emission standard; Part 1 and 2 Compatibilité électromagnétique; Norme générique émission; Partie 1 et 2
EN 50082, 1 EN 50082, 2	Elektromagnetische Verträglichkeit; Fachgrundnorm Störfestigkeit; Teil 1 und 2 Electromagnetic compatibility; Generic immunity standard; Part 1 and 2 Compatibilité électromagnétique; Norme générique immunité; Partie 1 et 2
VDE 0165	Errichten elektrischer Anlagen in explosionsgefährdeten Räumen Installation of electrical apparatus in hazardous areas Installations électriques en atmosphères explosives
Nationale Normen/ national standards/ normes nationales	
DIN 45635, 13	Geräuschmessung an Maschinen (Verdränger-, Turbo- und Strahlverdichter) Measurement of airborne noise emitted by machines (Displacement-, turbo- and jet-compressors) Mesure sonore sur les machines (compresseur volumétrique, centrifuge et faisceau)

**Dr.-Ing. Karl Busch**  
Geschäftsführer  
General director  
Directeur général



Dr.- Ing. K. Busch GmbH  
Postfach 1251  
D 79689 Maulburg  
Telefon +49 (0) 7622 681-0  
Telefax +49 (0) 7622 5484  
<http://www.busch.de>

Busch -  
weltweit im Kreislauf der Industrie  
Busch -  
all over the world in industry  
Busch -



Au cœur de l'industrie dans le monde entier





**U.S.A.**

16031 East Freeway, Huston,  
Channelview, TX 77530  
Tel 281.452.5800  
Fax 281.452.0516  
e-mail: superior@wwmach.com

**ITALY**

Via Roma, 18 - 43100  
San Pancrazio, Parma - Italy  
Tel. 0039.0521.671288  
Fax 0039.0521.673295,  
e-mail: info@scaip-srl.it

**GERMANY**

Alter Hellweg, 128-44379  
Dortmund  
Tel. 0049.0231.9633073  
Fax 0049.0231.9633076