TECHNICAL INSTRUCTION

SLOMAN

Rotary Lobe Pumps

Type _____

Manufacturing No. _____

CONTENT

1. GENERAL

This instruction manual is your immediate guide, when operating your SLOMAN rotary lobe pumps in different situations. It is recommended by SLOMAN to study these instructions from the beginning to the end carefully before mounting and putting into operation, since these may be specifically useful to those who install, maintain and service these pumps. To have the full benefit of these instructions, make them accessible to your staff at all times.

The product is under 12 months warranty from the date of product sale or until 18 months from the date of production. Warranty excludes damages occurred due to unprofessional and careless handling, which are determined by the technical service of the producer. SLOMAN assumes no responsibility for any damage and fault of the equipment caused by carelessness and the owner's negligence in implementing the instructions of this guide.

The warranty does not cover operating supplies, such as seals, O-rings and radial shaft seals thus it is recommended to purchase these spare parts, on special request, through the producer's service department.

In case there is any difficulty with your pumps, not covered by this guide, don't hesitate to call your SLOMAN representative. We will provide assistance wherever you are.

2. BASIC INFORMATION

The rotary lobe SLOMAN pumps are delivered as a single unit or as an aggregate set in monoblock execution or mounted on a base.

If the pump is delivered with drive unit, the basic standard monoblock design includes the coupling, adapter (protecting grid) and AC electric motor with integrated frequency inverter or geared motor and AC motor in IP55 protection class, and the technical instructions there of constitutes an integral part of this Instruction.

If the pump is not delivered with drive unit, slapping is not allowed when assembling transmission elements (coupling, gear, chain, pulley, etc.) on the shaft of gearbox, but mounting is to be carried out carefully, with the adequate accessories, and by preheating the transmission element hub up to 80 ℃. Therefore, the output journal of gearbox's shaft is supplied with an adequate, threaded centre hole, in compliance with ISO/R775. Tolerances and the threads of shaft journal centre hole are: Ø28 ISO j6, M8.

With dismountable rotor executions (model D), axial fixing is reached by tightening the M6 screws by the torque moment of 12 Nm.

The torque moment nuts of front cover pump are 45 Nm.

The pump and pump set is delivered ready for operation, filled with lubricating agent and in compliance with the desired mounting arrangement.

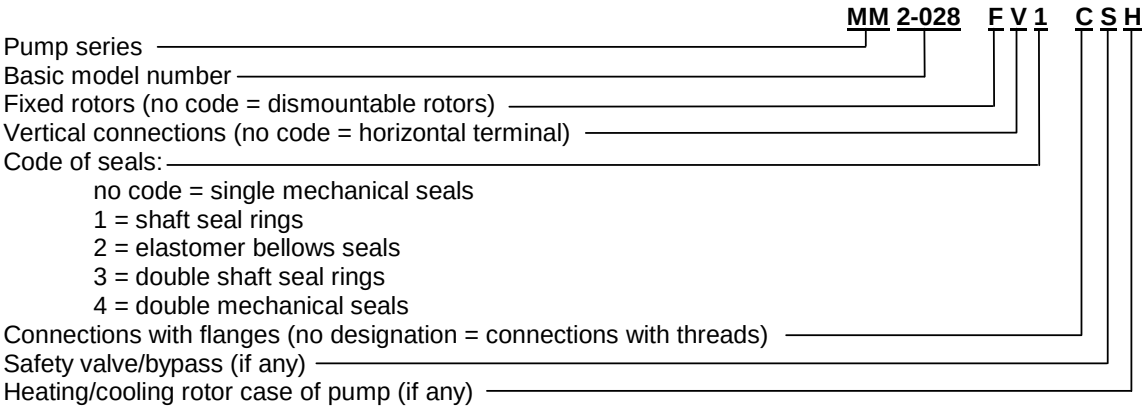
Before mounting, the pump must be stored in a dry room at temperature about 15-25 ℃ and moisture about 70 % in a position similar to the mounting arrangement. If the pump is kept stored for a longer time, it is recommended to coat all metal surfaces, which are not protected with paint and are not made of stainless steel, with grease not containing resins or acid. Conservation of mechanical seals, drive and coupling to be carried out in compliance with the manufacturer's instruction.

Pumps are transported packed in nylon foil and are fixed by screws to the wooden palette. Pumps should be stored in original packing till the moment of mounting.

The padding list is fixed with goods. Please, check all parts according to the padding list.

When ordering spare parts, all data from the pump nameplate should be indicated.

The type of SLOMAN rotary lobe pump is indicated on the nameplate, as follows:



3. INFORMATION FOR INSTALLERS AND OPERATORS

The direction of the arrow on the motor case and pump shows the direction of pump flow! Before installation, the pump should be secured in a way that welding and cutting works are performed externally and the piping system should be rinsed thoroughly.

In order to reduce the threat that cavitations forming pump consumption occurs, it is always necessary to reduce losses of suction piping, if possible. Therefore, the length of suction piping must be minimum. Operation safety and simplicity of putting into operation mainly depends on the quality of suction piping design. First of all, full hermetically suction piping is essential, in order to avoid that during operation deep vacuum is formed in it, and, owing to the leakiness of joints, aid is drawn in, since this not only that reduces discharge, but also leads to the prevention of vacuum. Suction piping is to be formed so as to avoid forming of "air pads" in it. Hence, the lowest point of suction piping should be 3 m at the most. Also, the suction piping should be mounted with at least 2 % rise toward the pump and all joints should be tightened well. In design of pump installation, it is recommended that suction and discharge have same size of ports. If the suction piping is reduced at the inlet of pump suction pipe, the confessor should have reduction only on its lower part under an angle of 5-6º.

The minimum submerge depth of suction piping, z_{min}, in compliance with the experimental data is:
$z_{min} = 0.1\ (Q^2/d^4 + 1)$,
where z_{min} is m; Q-pump flow is m^3/s; d-internal diameter of suction piping in m. If the flow level in the vessel is not steady, the suction pipe is executed with a deviation of 90º.

Suction piping should mount on distance to bottom of tank equal at least one half of the pipe diameter figure.

If the actual flow depends on the size of losses, the diameter of discharge piping should be so selected that the medium speed in the pump discharge pipe reaches 6-7 m/s, and that it is 2-3 m/s in discharge piping. It is recommended that a helical diffuser with central angle of 10-12º is mounted on the suction piping in order to reduce losses. The diameter of suction piping should be selected so that the medium fluid speed is max. 1.5 m/s.

Select installation position which is accessible for later supervision and dismantling.

Internal piping surfaces in which the fluid is transported, are to be cleaned by brush and wiped by the cloth.

Piping is to be joined with the pump only after it is checked and fixed to the base. It is essential to mark and level on the base the surfaces for base plates, with adjusting screws of 12-15 mm thickness. Deviation this surfaces of the horizontal should not be greater then 10 mm on 1 m, and height top plate should not exceed 10 mm. Deviation of the embedded anchor bolt in concrete from the vertical on the whole height of the protruded part should not exceed 1.5 mm. When checking, it is necessary to provide congruence of the set axis planes and the foundation axis of 10 mm; deviation of the project value of height 10 mm; deviation of the horizontal: 0.3 mm at 1 m.

Hold-down bolts must be cleaned of impurities, corrosion, and slag. It is forbidden to wash hold-down bolts with kerosene or protecting them with machine oil. Fouled threads should be cleaned with steel wire brush, rinse with solvents, wiped with dry cloth, coat with thin layer of consistent grease (e.g. Gleitmo 800 or similar) and nuts are to be turned out. After the pump is mounted, it is recommended to protect the threads of the hold-down bolts with Esso Rustban 326 grease or similar as a good protection against corrosion. The tightening torque of the hold-down bolts is 12-24 Nm.

The permanent check of the suction and discharge piping fitting's working capacity is essential.

To facilitate easy start, the connected piping up to pumps should be so led that after the pump operation is stopped, they may not run empty due to the discharge of media resulting from gravitation.

Horizontal pump distance longer than 10 m from the vessel where the mass is transported from, reduces suction capacity.

At parallel operation of rotary lobe pumps, mutually or with centrifugal pumps, stabilisers are to be used on the suction piping and a muffler on the discharge piping. The most efficiently work is realised by jointing same type pumps with equal head characteristics.

It is recommended that, at series operation of the pump, a very large joint suction piping, individual suction piping or stabilizer on the suction piping for total flow with individual outlet for each pump be used. Individual suction piping is to be mounted at a distance between the axes that equals the triple value of pipe diameter as the minimum. The distance of the axis of each piping from the tank wall is to equal at least three halves of the pipe diameter figure.

Combined scheme of connection is applied in systems where a wide range of flow and pressure exchange is essential.

Water, steam, anti-freeze, oil, and cooling agent are used as media for heating/cooling rotor case of pump.

The water most frequently used for heating/cooling of pump rotor case should comply with the following demands: carbonate hardness (time) must not exceed 2.85 mg-eqv/kg; composition of the measured solids-larger than 25 mg/kg; water must not be polluted with waste waters nor contain free mineral acids, organic acids and mechanic mixtures.

4. INSTALLATIONS AND PUTTING INTO OPERATION

After the pump set is delivered to the place of installation, the presence of measuring-control instruments and the technical documentation are checked suction and discharge pipes are also checked, for any possible damage. The surplus grease from the external surface of pump is to be removed thereafter.

When assembling the pump set, the following requirements are to be met:

- Ensure free access to the pump set for service purposes during exploitation, and also for dismantling and installation;
- Install on the discharge piping the bypass valve and the gate valve (bypass valve to be placed between the gate valve and the pump) and check the position (opened or closed);
- Install on the pump inlet and outlet the pressure gauge for the transported fluid;
- When installing the pump set there check the horizontal level of the surface, the deviation may not exceed 0.1 mm at a length of 1 m;
- Piping to be connected in a manner, which ensures the exclusion of load transfer to the pump;
- After centring, the pump set is to be fixed;
- Perform motor preparation in compliance with the corresponding guide;
- Check grease presence and level;
- Check the free rotation of rotor (shaft) by making 1-2 rotations;
- If a pump cooling/hearing system is provided, the temperature and discharge of water should also be checked;
- Check proper rotor turning by short time switching on the motor.

The pumps should be mounted on a flat base with the permitted vibration level according to ISO 2372, and IEC 34-14. The setting of all the machines of the set, except the basic one, includes providing the prescribed horizontality, coaxial and orthogonal of their axes with the basic machine at shaft centring by half-coupling. Parallelism and misalignment of the gearbox axes and the geared motor (motor) may not exceed 0.4 mm. Pumping sets are adapted to vertical and horizontal mounting arrangement in compliance with IEC 34-7, but they may be fit for any other mounting arrangement.

If the pump is not delivered as a set, shaft centring at half-coupling is made in the following order: set the distance between the machines, on the half-coupling fix the accessories for testing the coaxial, register the indicated figures at the initial position of the controlled shafts, turn simultaneously the shafts of both machines to 90^o, 180^o, 270^o, 360^o and register the values in every position. After centring and joining the shaft half-couplings, it is necessary to check free rotor turning.

Before starting operation, it is necessary to pull out the cord from the ventilation screw, which is on the highest level of the geared motor.

If due to specific ambient conditions the geared motor is covered by sheath, the free supply and circulation of air should be provided.

Before the first operation session of the pump, the valves on the discharge piping should be fully opened in order to remove the sucked-in air, and to fill the pump with liquid.

Prior to each start of pump, it is essential to check the free rotation of the pump rotor by hand as well as the possible lack of contact of rotor and the pump case, and the correctness of electric installation. Automatic and semi-automatic pumping stations are set into operation in accordance with the worked out scheme. When such stations are put into operation, only controls activities are necessary.

After the pump turned on, the pressure and the suction height are to be checked. The operating parameters of pump are determined according to its characteristics or according to the nameplate data.

In case of operation by means of frequently inverters, the control of the number of revolutions is not permitted when the motor is out of operation. At the beginning of the operation, the frequently inverters should be set to the minimum number of revolutions and the desired pump capacity is to be selected from that position.

All pump piping is to be provided with independent supports so to reduce the effects of force on the pump. The forces can cause deviation of position of pump parts and excessive wear of rotor, bearings and shafts.

Thermal expansion of piping may cause very large forces. Using thermal dilatation minimizes the force effect on the pump.

Flexible joints may also be used for limiting the transmission of mechanical vibration. The free ends of the flexible hose in the system need to be fixed.

On the suction side non-return valves should be used for keeping the fluids in the suction connection, especially under operation with low-viscous fluids and in start-stop action. At low absolute pressure (vacuum) above the media of the suction tank a non-return valve should be used on the outlet side, which prevents the return of air or fluid and facilitates putting into operation (minimizing the pump differential pressure is to be satisfied by the initial flow).

Individual valves allow pump maintenance and safe removal even without the discharge of the whole system.

A safety valve is to be installed for the protection of pump and piping system against overpressure. Integral safety valve, designed with a return circulation bypass from the outlet to the inlet of pump, may not be used if the discharge is to be closed for several minutes. Extended pump action with closed discharge causes the heating of the fluid, which circulates through the safety valve. When such an action is needed, the safety valve, regardless whether it is integral, fixed or mounted to the piping, will press the fluid out through the piping connected with the fluid source, or, if it is unpractical, in the suction piping near the source. Pressure increase for the designed valve depends on the mounted valve, flow and viscosity of fluid, which is being pumped. If at full flow the bypass pressure reaches the maximum allowed value for a specific pump and piping system, the overload of the safety valve may be used sometimes to limit the bypass pressure full flow to an acceptable value.

Filters and impurity separators on the suction side may be used to prevent damages by solid bodies. They are to be selected carefully, in order to prevent outlet, cavitations and flow stoppage limitations.

Whenever possible, installing pressure and vacuum indicators is essential, so that normal and abnormal pressure, overload, flow, change of pump conditions, piping system and fluid viscosity values may be displayed anytime.

5. SAFETY AT WORK

Electric installations are to be fixed by an authorized expert and are to be made depending on the electric motor type according to the scheme attached to the motor.

Protection against touch over-voltage is provided by protective ear thing.

Motor protection switch is needed only on types without thermal protection.

Since it may cause injury, it is not allowed to start the pump without cover.

Since it may cause injury, it is not allowed to assembling, maintenance and disassembling the pump unit, which is connected to voltage.

6. HANDLING AND EXPLOITATION REQUIREMENTS

When transporting fluids that may modify their physical state, solid agglomeration, sedimentation, sticking and compressing (crystallization, resin formation, hardening, evaporation, etc.), the temperature must be different from the temperature at which the modification of physical properties occurs, from at least 10 ℃ (i.e. it is necessary to provide condit ions so that the transported medium stays in liquid state).

In case of pumps with 10-15 m head and long piping, it is recommended to provide a non-return valve directly behind the discharge pipe, in order to protect pump against reverse movement at accidental shut-down of drive.

Pump operation in overload regime (at larger flows) often leads to cavitations.

Avoiding dry operation is essential.

Dry operation warms up the mechanical seals and the rotor. A short duration of dry operation represents no risk for the pump.

It is strongly forbidden to control the pump operation by choking the suction or discharge pipe.

When the pump is installed outdoors, attention should be devoted to permanent warming up at low temperatures (cold) in standstill and also to due discharge of the fluid from the pump and piping.

Putting the pump into operation in cold state while transporting different viscosity fluid is not permitted, since it may damage the pump.

Most rotor pumps are provided with a safety valve to prevent non-permitted pressure increase in the discharge piping so to avoid the damage of the pump or motor overheating in case the discharge line is closed, or in cases of clogging. At pump installations without safety valve, it is recommended to provide a valve in the pressure piping with discharge of the transported fluid, if possible in the suction tank. At fluid discharge to the pump, the phenomenon of non-permitted heating should be taken into consideration since it may cause rotor pump jamming.

In the discharge line, as required, a critical pressure adjusting tap is to be built in.

Unchanged pump flow in the opening process of gate valve causes indication changeability of the mano-vacuum meter and manometer, noise in the pump and suction piping, and it means that air remained in the installation. In such cases, the air is to be removed from the pump, which is to be re-filled (re-started) with fluid.

In their process of exploitation, practically there is no need to service or maintain mechanical seals/radial shaft seals. Occasional check, external examination, of the required tightness of shaft will suffice. Similarly, during their exploitation the manufacturer's instruction is to be strictly observed. By applying double mechanical seals, generally, the rinsing fluid, in a quantity of 4 to 8 l/h, is injected in the sealing space at a pressure higher for 0.1-0.15 MPa than the pump suction pressure. In order to maintain the required flushing fluid pressure, its cooling and automatic addition in the circulation contour, a spring-hydraulic accumulator (delivered together with pump) is provided, which is mounted in the autonomous circulation contour.

The transported fluids, hardened or precipitated in the state of standstill are to be drained out of the pump and piping, then the pump and piping are to be washed carefully and, if possible, the precipitate is to be removed.

In order to decrease noise and vibration, it is recommended to mount the pump on the floating base having a mass greater for 3-5 times than the mass of pump set. In order to decrease the transfer of vibration from pump to the piping and further to the installation, inlet and outlet parts of piping are to be provided with flexible inserts (compensators, connections, hoses, etc.) The permitted non-parallel of the pump connections may not exceed 0.1 mm.

Pumps may not be put into operation when the gate valve on the discharge piping is closed, since non-permitted pressure increase may cause damage. Gate valves on the suction and discharge piping remain open. It is recommended, that on pumps having high suction height the gate valve is kept closed on the suction line after stopping the pump, in order to prevent pump idle running when the suction (feeding) valve is not fully closed.

Grey cast fittings are not permitted for explosive and toxic fluids.

Fluid inlet and outlet of pumps that are heated for the transport of high-viscous fluids is to be regularly controlled.

7. CONTROLS AND MONITORING

In view of the exploitation safety of the pump, it is necessary to ensure its permanent control:

- Inlet pipe pressure;
- Discharge pipe pressure;
- Power, consumed by the electric motor;
- Oil level in the gearbox;
- Temperature of the oil in the gearbox.

In addition to the control of the pump aggregate set parameters the following is also required:

- To monitor the accuracy of the measuring-control equipment;
- Periodically, to check the grease quality and quantity in the gearbox;

- To monitor the tightness of flanges, joints and leakage of seals;
- To follow the position of rotor according to the visual demonstration of axis moving;
- To follow the periodicity of change of grease of pumps generating set.

At the same time, it is very important to strictly observe the instructions on technical handling given in this guide; in general, operation control and monitoring is required only in the first 3000 h of pump operation.

Working shift maintenance-basic and decisive prophylactic measures is called upon to provide safe operation of equipment between overhauls. Observation is a basic method of maintenance, and during this time the technical state of the vital plant elements is determined, and on the base of it the scope of the forthcoming overhaul is precisely determined.

Regular maintenance during shifts is carried out as a rule, without stoppage in the technological process.

The following activities are to be accomplished during a shift: wiping, cleaning, regular external observation, lubrication, seal tightening, check of bearing state, monitoring the state of component parts, connections and their tightening, removal of minor defects, partial regulation, check of state of protecting devices for the purpose of providing safe operating conditions, etc.

In this regard, the shift register must contain the following: results of control of the observed plant; all defects, disorders and malfunction, disturbances of normal operation of the plant or safety of operating condition; measures, taken to clear the faults and disorders; disarranged rules of technical exploitation of plant by technological personnel and families of perturbation; note on removal of defects and inaccuracies.

Periodical maintenance is a maintenance implemented in the intervals of 720 h with a period of stoppage of 8 h.

For plant with continuous maintenance process technological maintenance may be carried out at plan-periodic stoppage of operation in compliance with the requirements of technological regulations.

The basic task of the periodic maintenance is the elimination of defects, which were not possible to discover or remove in the period of plant operation, and small services (removal of small defects, seal rings, adjustment, check of fastening of pump to the base, check of state of coupling, etc.; replacement of spare parts is not foreseen). Given instructions may be exploited by exploitation characteristics depending on concrete conditions and duty.

8. TECHNICAL MAINTENANCE

Maintenance, washing and mechanical cleaning of the pump is made “on site”, and depending on the transported medium it is implemented by washing with water, water jet under pressure or water steam of temperature up to 130 ℃ and pressure up to 5 bar, without dismantling the pump, only by removing the cover from the pump head by means of groove on its top.

Gearboxes are delivered in proper drive condition filled with suitable oil (ISO 3448), by which gears and bearings are lubricated.

The standard exploitation temperature of bearings is 45-60 ℃, and the maximum allowed temperature is 80 ℃. If it is reached or exceeded, the pump is to be switched off, the bearings are to be disassembled and their state is to be checked. Bearing temperature should be controlled permanently. Overheating of bearings is caused by the lack of grease or if the quality of the grease inadequate. Bearings are filled with grease up to 1/3 of their internal space. No bearing grease refill is necessary.

Change of oil is necessary.

9. TROUBLESHOOTING OF ROTARY LOBE PUMPS

Malfunction	Causes	Way of elimination
Decrease of discharge pressure	Increased gap between rotor and rotor case or between the rotor	Check the state of pump case and rotor, change worn-out components
	Direct consolidation of suction and discharge hole (erosion of rotor case)	Dismantle and check the pump, change worn-out elements or have a manufacturer's overhaul
	Under-suction of air or unsealing in discharge piping	Check tightness of suction and discharge piping during the necessary sealing.
	Leakiness of mechanical seals	Re-tighten or change mechanical seals
	Decreased rotation speed	Measure the number of revolutions, check voltage on supply lead of electric motor
	Faulty rotation direction	Check direction of rotation; change electric motor poles
	Small viscosity of transported fluid	Improve cooling of transported fluid
	Extreme pressure is significantly higher than the one showed by the manometer	Repair or change the manometer, check discharge piping
	Increased viscosity of the transported fluid	Increase (take account of the max. allowed) temperature of the transported fluid
	Improper indication of manometer	Repair or change the manometer
	Pump filled improperly	Re-fill by taking into account that air is carefully eliminated
	Plugged of suction piping and strainer	Check and clean suction piping and strainer
	Leakiness of suction valve or its dirtiness	Check valve, clean it, if necessary
	Leakiness of suction piping	Check tightness of suction piping
	Low revolution number	Change rotation number, check voltage on the supply side of the electric motor
	Suction height above the allowed	Decrease geometric height of suction, check and clean suction piping
	Excessive piezometric height	Reduce counter-pressure or height of total pressure
Decrease of flow	Increased gap between rotor and rotor case or between rotors	Check the pump and rotor case, change elements if in excessive worn out condition
	Direct consolidation of suction and discharge hole (erosion of rotor case)	Disassemble pump and check, replace damaged elements or have a manufacturer's overhaul
	Under-suction of air or leakiness in discharge piping	Check suction and discharge piping sealing
	Leakiness of seals	Tighten or change seals
	Decreased number of revolution	Measure number of revolution, check voltage on supply of electric motor
	Small viscosity	Improve cooling of transported fluid
	Increased viscosity	Raise temperature of transported fluid (keep in mind the permitted maximum temperature)
	Choked suction piping and strainer	Check and clean suction piping and strainer
	Leakiness of suction valve or its dirtiness	Check valve, if necessary clean it
	Safety valve opens at operating pressure, leakiness in valve seat	Change valve, check dirtiness of valve seat and clean it
	Leakiness of suction piping	Check and seal suction piping

Malfunction	Causes	Way of elimination
Decrease of flow	Low rotation speed	Change revolution number, check voltage on supply of electric motor
	Suction height higher than the allowed	Reduce geometric height of suction, check and clean suction piping
Too large power is needed	Defects in the manufacturing of the drive motor	Check the motor and its power
	Operating pressure significantly higher then the manometer pressure	Repair or change manometer, decrease pressure
	Viscosity of transport fluid is significantly higher than the nominal one	Increase (keep in mind the permitted) temperature of the transported fluid, install motor of larger power
	Knocking of rotor	Disassemble pump and check, replace damaged elements
	Mechanical seal is too tightened	Check seal tightness and correct it
	Gate valve on the discharge piping is not opened fully	Open gate valve or valve totally
	Discharge piping is choked or it is too long	Control and provide initial state of piping
Non-stable pump operation, pump noise	Height of suction larger than the allowed	Set to initial level in the piping, check suction piping and valve on suction piping, clean them if necessary
	Formation of steam in the pump	Decrease height of suction or increase pressure in the feeding tank
	Penetration of air into the pump through the suction line	Seal suction line, control the seal
	Characteristic worn-out state of rotary elements and bearings	Dismantle pump, check rotating elements and bearings, and change them, if necessary
	Very high flow or very small total head	Regulate pump operation by valve till noise disappears
	Increase of rotor knocking	Check rotor knocking
	Disturbed rotor balancing	Check rotor on the balancing base
	Coupling in de-balance or not even	Adjust or centre the coupling
	De-centred rotor with drive unit	Centre rotor and drive unit
Increased vibration of pump	Defect in base manufacturing	Change base, insulate base, if necessary with cork or felt inserts
	Oscillation of piping	Fix piping carefully
	Reaching air in pump	Check tightness of piping
	Insufficient fixing of pump on the base	Retighten base screws
	Worked out gaps for lubrication in bearings carriers	Change bearings carriers, provide (secure) gap for lubrication
	Vibration of piping	Eliminate vibration
Pump wears out quickly	Mixtures in transport fluid in front of suction piping	Clean piping
	Mixtures in transport fluid in front of discharge rotor	Take out the rotor and clean it
	Abrasive and aggressive mixtures	Check the material quality on resistance to transported fluid
	Stress of piping is transferred to pump	Change fixing to piping, providing tacking of pumps without tightening; check aggregate set centricity
	Dry friction in bearings	Disassemble bearing, clean and reassemble, fill with new grease
	Insufficient flow of grease, wear out state of gear	Replace grease and gears, discharge grease, clean gearbox, and fill in clean grease

Malfunction	Causes	Way of elimination
Pump wears out quickly	Increased pressure in the pump head due to poured under rotor	Check points of sealed joints (connections), put in new O-ring
When putting the pump into operation, fluid flow doesn't disappear and there is no pressure in the discharge	The lateral side of valve on the inlet piping is broken off	Dismount gate valve
	Dirty filter on the inlet piping	Clean the filter
	Leakiness in the suction piping	Check the connection on the joint of suction piping
	Suction height is greater than the allowed	Establish the level in the feeding tank, check suction piping and feeding valve, clean if necessary
	Pump is not filled	Re-fill the pump.

10. TECHNICAL ASSISTANCE

If failure in the operation of the pump may not be eliminated even despite individual attempts, the SLOMAN service should be contacted. All claims should state the detailed description of pump stoppage.

This Technical instruction is accompanied to each SLOMAN rotary lobe pump separately and the manufacturing number there of is indicated on the front page.

When using this guide, first control if manufacture number of pump on the front page is identical with the number on the pump nameplate.

In all contacts with SLOMAN, please indicate the manufacture number to facilitate the proper identification of SLOMAN rotary lobe pump.

11. TECHNICAL REQUIREMENTS AT OVERHAULING AND DISMANTLING OF PUMP

In case of failure, the dismantling and mounting of the pump is required in conformity with exploitation documentation for pump, geared and electric motor.

Pump and its component parts (elements) are given to capital overhaul after 25920 h of operation, with standstill in duration of 96 h for pumps with flow of 10 m^3/h, and 120 h for greater flows. When due to the technical state there is not provided exploitation deviation of pump total head at least –12 % at nominal flow or in case of operation drop out due to cancellation, overhauling is carried out before this period.

Deprecation of pump elements follows after 10000 h operation.

Warranty period of overhauled pumps is 6 months from the date of mounting and putting into operation and 12 months from the date of delivery. At the same time, replacement of seals and O-rings due to wearing doesn't represent a claim of overhauled pump.

9. SPARE PARTS LIST

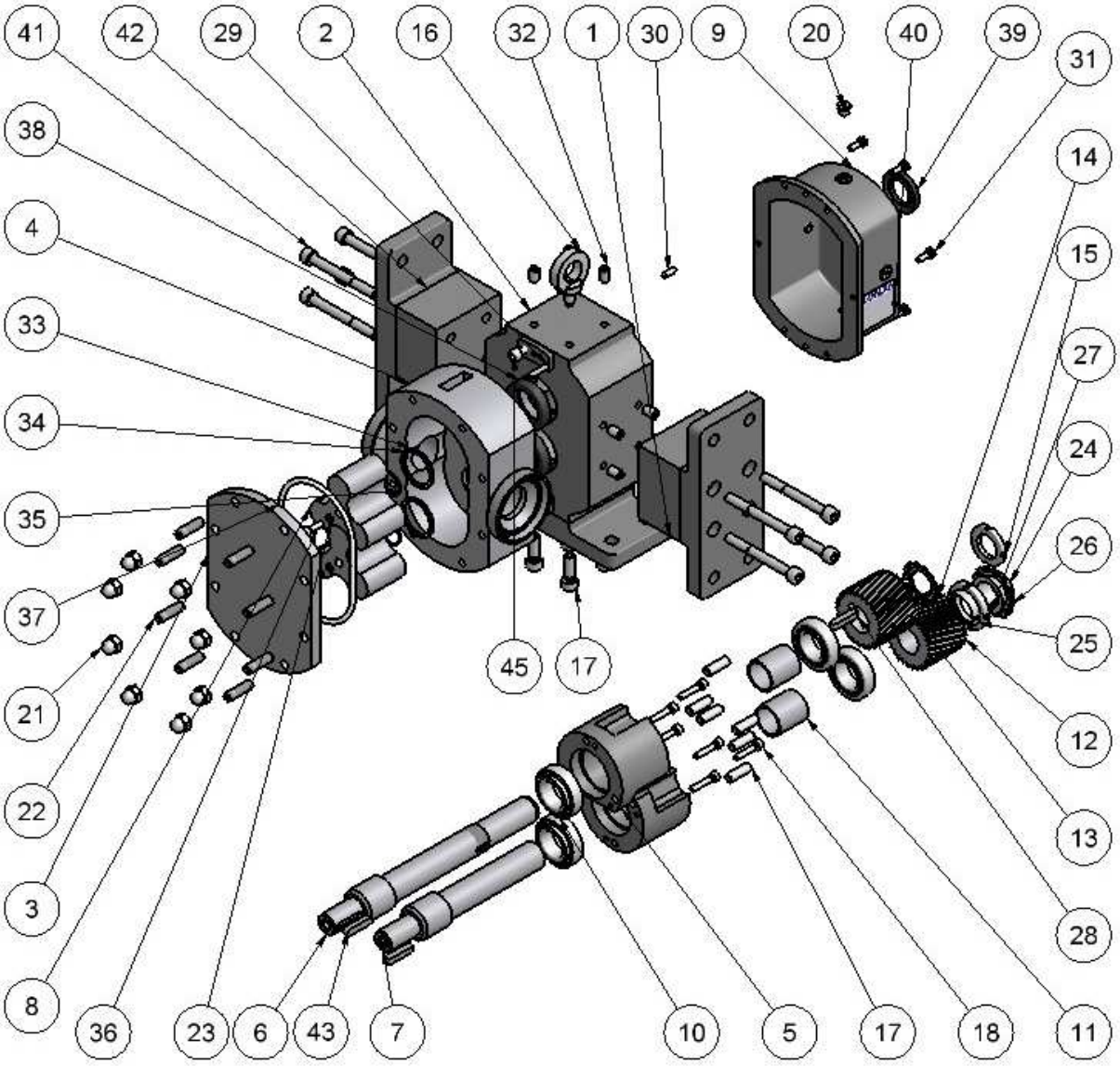
Spare parts list include a complete listing of parts that can be used to build any type of rotary lobe pumps. Therefore, for some items you will find a number of options. As an example, rotors are available in various lengths, but in your pump only one length is used.

For identification and ordering of spare parts please refer, consistently spare parts list, following:

- Item and name of the spare part of pump;
- Type of pump;
- Manufacturing no. of pump.

Additional spare parts (items) which not standard, i.e. not included a listing of spare parts, ordering by special request.

ITEM	QTY	PART NAME	DESCRIPTION
1	3	Horizontal base feet	
2	1	Gearbox case	
3	1	Front cover	
4	1	Rotor case	
5	2	Bearings carrier	
6	1	Shaft-longer	
7	1	Shaft-shorter	
8	2	Rotor	
9	1	Cover of gearbox	
10	4	Tapered roller bearing	
11	2	Distant sleeve	
12	1	Gear	
13	1	Gear	
14	1	Lock washer	
15	1	Slotted round nut	
16	1	Lifting eyebolt	
17	6	Socket set screw flat point	
18	6	Cylinder head cap screw	
19	2	Cylinder head cap screw	
20	4	Hexagon socket screw plug	
21	8	Hexagon domed cap nut	
22	8	Stud, tap end	
23	2	O-ring	
24	1	Clamping element 1	
25	1	Clamping element 2	
26	1	Lock washer	
27	1	Locknut	
28	3	Key	
29	2	Pin	
30	2	Pin	
31	6	Hex head cap screw	
32	11	Slotted set screw	
33	2	O-ring	
34	2	Mechanical seal/Shaft seal ring	
35	2	O-ring	
36	2	Cylinder head cap screw	
37	1	O-ring	
38	2	Radial shaft seal	
39	1	Radial shaft seal	
40	1	Nameplate	
41	8	Cylinder head cap screw	
42	2	Vertical base feet	
43	2	Key	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