METALCHEM-WARSZAWA
SPÓŁKA AKCYJNA

SUBMERSIBLE PUMPS

USER MANUAL

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Contents

KEEP FOR FUTURE USE !

I. GENERAL INFORMATION

These instructions apply to sewage submersible pumps such as: MSV, MSK1, MSK2, MSV-R

The manufacturer of pumps is: **Metalchem Warszawa SA**
01-259 Warszawa, ul. Studzienna 7A
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This user manual contains information and instructions concerning the purpose, range of applications, basic requirements for safety, proper operation and description of the technical parameters of the pump.

- Understanding and using the manual will ensure safe and efficient operation.
- Before starting the unit, comply with all the recommendations contained in this user manual.
- Staff servicing and overhauling the pump should be familiar with the contents of the instructions and properly trained.
- Improper handling, incorrectly performed maintenance or complete lack thereof will void the warranty.
- In case of doubt as to the contents of this manual, or problems with operation of the pump, please contact the manufacturer.

II. BASIC REQUIREMENTS FOR SECURITY AND HEALTH PROTECTION

To ensure safety, this user manual contains a number of comments concerning safety at work, which must be strictly adhered to.

1. Warning symbols

The symbols and commands presented below indicate relevant information on the risks and threats which must be strictly observed.

The hazard symbol placed in the remarks means that failure to comply could pose a threat to the life or health of personnel.

The electrical hazard symbol placed in the remarks means that failure to comply could pose a threat to the life or health of personnel from the electrical system.

NOTE: The information marked with the word **NOTE** requires special attention. Failure to comply with, might cause danger to the operation of the pump and the environment.

2. Safety

- Before installing and starting up the pump, it is essential to refer to this manual.
- It is not allowed to operate the pump by personnel who are not familiar with this manual.
- The work related to the implementation, repair and maintenance of electrical installations may only be carried by persons having authority SEP to 1 kV.
- The pump must not be operated beyond specified its destinations and range of applications.
- **Always disconnect the pump** from the electrical system in a save manner to prevent accidental activation, during the handling, repair, maintenance or adjustment, etc.
- Housing of the electric motor may be hot. Do not touch without gloves.
- Do not use the pump for pumping liquids flammable or explosive
- Do not use the power cable to lift or transport pumps
- Do not operate the pump dry (without immersion)
- To raise and lower the pump one should use chains and lifting devices of capacity in excess of the pump weight.
- Protect the pump cable from mechanical damage and avoid wetting the cable ends
- **NOTE:** When adjusting the clearance in the cutting device (type MS VR) be careful of the sharp edges of the blades. Take special precautions.

III. TRANSPORT AND STORAGE

1. Technical acceptance

MSV pumps, MSK1, MSK2 and MSV-R are supplied as a fully assembled unit with power cable with a standard length of 10 meters. On request it is possible to supply a longer cable.
Control boxes to control pumps can be delivered on request.
With the pump is supplied user manual and warranty card.

2. Transportation

NOTE: When handling and transport pumps, exercise adequate caution and observe the general health and safety regulations.

Pumps can be transported by any means of transport in a fully assembled state. When selecting the means of transportation, take into account the weight of the pump with accessories. During transport, be careful not to damage the electric cable. It should be rolled, tied and attached to the pump.

The pump can be lifted only by its lifting bracket. It is **unacceptable to raise pump by electric cable.**
For lowering and lifting the pump, use of chains and lifting equipment with a capacity in excess of the weight of the pump.. Wear protective gloves for activities related to the handling of the pump.

Protect the pump cable from mechanical damage and ends keep away from moisture. Do not place the pump on the cable, as this may cause damage.

3. Storage

Pumps should be stored in a dry, dust-free room particularly when storing them for a long period of time.
It is recommended to check periodically (every three months) that the impeller rotates freely and also to check the oil level.

NOTE: Do not store unused pump submerged in liquid. This can cause damage to the pump.

IV. SPECIFICATIONS

Electric motors of the pumps, built in protection class IP68, are equipped with winding insulation class F and have the thermal sensors in three phases and moisture sensor. These items exclude the possibility of damage to the motor in case of overload or moisture getting into it. The motor is separated from the pump unit by dual mechanical seals immersed in oil chamber. Pump's shaft made of stainless steel is supported by heavy duty ball bearings which do not require any extra lubrication and adjustment.
The hydraulic pump consists of a cast iron body with flange and balanced vortex impellers for pumps MSV series, single-channel for pumps MS K1 or dual channel for MSK 2 pumps.
To the pump's flange is mounted a sliding bracket (designated as - Z) that allows lowering the pump on guide rails to auto- coupling.
Pumps up to 4 kW (pumps with higher power should be agreed with Metalchem) can be fixed to the basket or rack and equipped with a connector adapted to connect the hose (portable version; designation -SP or -KP).

1. Designation code

CODE TYPE OF PUMP

MS	V	–	80	–	4	2	H	–	Z
1	2		3		4	5	6		7

1 – Submersible pump manufactured by "METALCHEM-WARSZAWA" SA .
2 – Type of pump impeller
V – Vortex , K1 – one channel , K2 – two channel
3 – Free passage of pump (R – cutter device)
4 – Motor power in kW (without decimal places).
5 – Number of motor poles (indicating speed).
6 – Lifting head:
L – Low , M – Medium , H – High
no indication – there is only one version.
7 – Possible versions:
S – with a stand , K – with a basket , P – with a flexible hose connection
Z – With slide bracket (to connect on the auto- coupling).

EXAMPLE OF DESIGNATION: **MS V - 80 - 124 L - Z**
Submersible pump with **v**ortex impeller, free passage **80**mm, powered by motor **12,**5 kW, **4** poles, **l**ow head, with slide bracket (**Z**).

2. Technical specifications

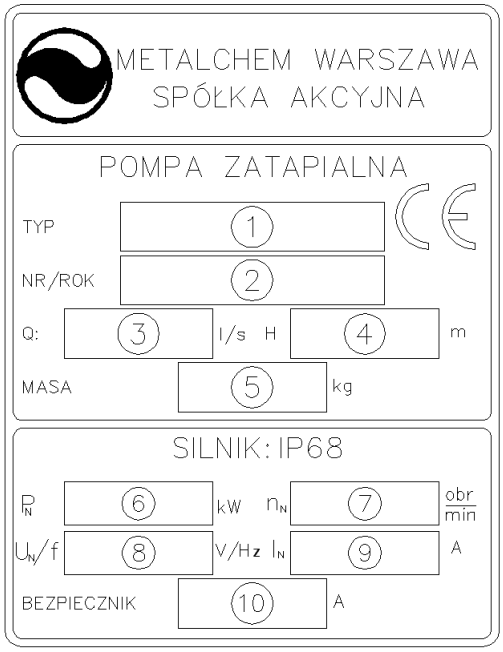
Series	Pump type	Power [kW]	Speed [rpm]	Rated current at 400V In [A]	Motor overload protection [A]	Overload protection in control box for 2 pumps [A]	Start-up	Oil volumne dcm³	Free passage [mm]	Weight [kg]
MSV-15	12	1,5	2835	3,2	4-6,3	10	Δ	0,4	12	62
	22	2,2	2855	4,7	4-6,3	16			12	64
	32	3,0	2845	6,6	6,3-10	20			12	66
	52	5,5	2890	10,7	10-16	32	Y/Δ	2,5	15	150
	72	7,5	2820	13,9	14-20	40			15	157
	92	9,2	2920	16,8	18-25	50			15	163
	112	11,0	2920	20,3	25	63			15	170
MSV-50	12	1,5	2835	3,2	4-6,3	10	Δ	0,4	50	54
	22	2,2	2855	4,7	4-6,3	16			50	55
	32	3,0	2845	6,6	6,3-10	20			50	57
	14L	1,1	1405	2,6	2,5-4	10			50	53
	14M	1,1	1405	2,6	2,5-4	10			50	54
	14H	1,5	1410	3,5	4-6,3	10			50	55
	24	2,2	1410	5,2	4-6,3	10			50	57
	42L	4,0	2885	8,2	10-16	25		1,9	50	73
	42H	4,0	2885	8,2	10-16	25			50	74
	52L	5,5	2890	10,7	10-16	32			50	78
	52H	5,5	2900	11,4	10-16	32			50	79

Series	Pump type	Power [kW]	Speed [rpm]	Rated current at 400V In [A]	Motor overload protection [A]	Overload protection in control box for 2 pumps [A]	Start-up	Oil volume dcm^3	Free passage [mm]	Weight [kg]
MSV-80	32	3,0	2845	6,6	6,3-10	20	Δ	0,4	80	60
	42L	4,0	2885	8,2	10-16	25		1,9	80	103
	42H	4,0	2885	8,2	10-16	25			80	104
	52L	5,5	2890	10,7	10-16	32	Y/Δ		80	150
	52H	5,5	2900	11,4	10-16	32			80	110
	72	7,5	2820	13,9	14-20	40		2,5	80	158
	92L	9,2	2920	16,8	18-25	50			80	162
	92H	9,2	2920	16,8	18-25	50			80	162
	112L	11,0	2920	20,3	25	63			80	165
	112H	11,0	2920	20,3	25	63			80	166
	152L	15,0	2920	26,2	32	80		2,4	80	252
	152M	15,0	2920	26,2	32	80			80	252
	152H	15,0	2920	26,2	32	80			80	252
	182L	18,5	2930	32,1	40	100			80	261
	182H	18,5	2930	32,1	40	100			80	261
	222L	22,0	2930	39,4	63	100			80	272
	222H	22,0	2930	39,4	63	100			80	272
MSV-80	14L	1,1	1405	2,6	2,5-4	10	Δ	0,4	80	57
	14M	1,1	1405	2,6	2,5-4	10			80	58
	14H	1,5	1410	3,5	4-6,3	10			80	58
	24	2,2	1410	5,2	4-6,3	10			80	61
	34	3,0	1415	6,6	6,3-10	20		1,9	80	86
	44	4,0	1415	9,2	10-16	25			80	96
	54	5,5	1425	11,3	10-16	32	Y/Δ	2,5	80	142
	74	7,5	1425	14,6	14-20	40			80	154
	94	9,2	1455	18,5	18-25	50			80	161
	114	11,0	1450	22,0	25	63			80	166
MSV-80	124L	12,0	1455	24,1	32	80	Y/Δ	1,9	80	262
	124M	12,0	1455	24,1	32	80			80	264
	124H	12,0	1455	24,1	32	80			80	266
	154L	15,0	1460	27,7	32	80			80	275
	154M	15,0	1460	27,7	32	80			80	277
	154H	15,0	1460	27,7	32	80			80	279
	184L	18,0	1455	35,1	40	100			80	295
	184M	18,0	1455	35,1	40	100			80	297
	184H	18,0	1455	35,1	40	100			80	299
	224L	22,0	1455	43,2	63	100			80	308
	224M	22,0	1455	43,2	63	100			80	310
	224H	22,0	1455	43,2	63	100			80	312

Series	Pump type	Power [kW]	Speed [rpm]	Rated current at 400V In [A]	Motor overload protection [A]	Overload protection in control box for 2 pumps [A]	Start-up	Oil volume dcm^3	Free passage [mm]	Weight [kg]
MSK1-80	44	4,0	1435	8,3	10-16	25	Y/Δ	2,5	80	150
	54	5,5	1425	11,3	10-16	32			80	160
	74	7,5	1425	14,6	14-20	40			80	168
	94	9,2	1455	18,5	18-25	50			80	175
	124	12,5	1455	24,1	32	80		1,9	80	285
	154	15,0	1460	27,7	32	80			80	298
	184	18,5	1455	35,1	40	100			80	318
	224	22,0	1455	43,2	63	100			80	331
MSK1-100	124	12,5	1455	24,1	32	80	Y/Δ	1,9	100	254
	154	15,0	1460	27,7	32	80			100	269
	184	18,5	1455	35,1	40	100			100	289
	224	22,0	1455	43,2	63	100			100	304
MSK2-90	18	1,1	705	3,4	4-6,3	10	Δ	1,9	90	112
	26	2,2	925	5,4	4-6,3	10			90	114
	44	4,0	1415	9,2	6,3-10	25			90	116
	124	12,5	1455	24,1	32	80	Y/Δ	1,9	90	285
	154	15,0	1460	27,7	32	80			90	298
	184	18,5	1455	35,1	40	100			90	318
	224	22,0	1455	43,2	63	100			90	331
MSV-R	12	1,5	2835	3,2	4-6,3	10	Δ	0,4	-	62
	22	2,2	2855	4,7	4-6,3	16			-	64
	32	3,0	2845	6,6	6,3-10	20			-	66
	52	5,5	2890	10,7	10-16	32	Y/Δ	2,5	-	150
	72	7,5	2820	13,9	14-20	40			-	157
	92	9,2	2920	16,8	18-25	50			-	163
	112	11,0	2920	20,3	25	63			-	170

MSV-... - pumps with Vortex impeller
MSK1-... - single-channel impeller pumps
MSK2-... - two-channel impeller pumps
MSV-R-... - pumps with cutter device
Noise: noise level below 70 dB (A) for each pump

3. Nameplate



1 - pump type

2 - serial / year

3 – pump flow [l / s]

4 - head [m]

5 - weight [kg]

6 - pump power [kW]

7 - engine speed [r / min]

8 - voltage [V] / frequency [Hz]

9 - rated current [A]

10 - safety fuse protection

In the event of reclamation, please state the pump type and serial number.

V. APPLICATION

1. Submersible pumps for sewage and sludge with "free passage"

They are designed to pump communal and industrial sewage containing solids with a maximum size of impurities **80 and 100 mm.**
Pumps series designation code starts with the symbols MSV-15, MSV-50, MSV-80, MSK1 and MSK2.
The pump is lowered on guide rails to auto- coupling (marked **-Z**).
Pumps up to 4,0 kW (pumps with higher power should be agreed with Metalchem) can be furnished with a stand, shielding basket or a connector to flexible hose (portable version labeled -SP or -KP).

2. Submersible pumps for wastewater with cutting device

They are designed for pumping communal and industrial sewage, which may include **soft solids,** eg cotton, tissue paper, paper etc. It is not acceptable to pump wastewater containing sand, stones, rags, diapers, long strips, pieces of wood and metal, etc.
They are particularly useful in systems of high-pressure systems up to 0,6 MPa, with a low flow.
Pump symbol ends with **- R.**

NOTE: Damage to the mechanical components resulting from inflowing into the cutting device **hard solids,** eg sand, metal, wood, hard plastic, etc. are not covered by the warranty conditions. In these cases it is recommended to use settling tank or strainer in inflow pipeline.

3. Range of applications

Pumps are not designed for pumping flammable and dangerous liquids. It is not allowed the use of pumps in pools or tanks, where people may be, even if partial contact with the liquid is possible (eg, for recreational purposes).

Parameters of the liquid should not exceed the values given below:

- temperature max. 40 ° C
- density max. 1150 kg / mł
- solids content max. 25%
- hydration min. 95%

To ensure proper cooling of the electric motor, the pump must be immersed. The lowest level of sewage should be at about half the height of the motor housing i.e.:

- for pumps with power 1,1÷3,0 kW 400 mm
- for pumps with power 3,0÷5,5 kW 500 mm (MSV-...-34,-44,-42L;-42H;-52L;-52H)
- for pumps with power 4,0÷11,0 kW 600 mm
- for pumps with power 11,0÷22,0 kW 800 mm

The retention volume in the well must be chosen so as to avoid an excessive number of pump starts. Do not exceed 8 to 12 starts per hour.
In the case of pump's applications under conditions other than listed above, please contact the manufacturer.

VI. PUMPS INSTALLATION

1. Assembling auto- coupling unit and guides

- level auto-coupling unit and attach it to the bottom of the tank by anchor bolts. It is advisable to use produced by us a cast base frame that facilitates leveling and fastening auto-coupling assembly.
- insert the guide rails into the auto-coupling holes, and adjust length of rails to the guide rail bracket.
- fix the guide rail bracket in a position. The rails should be perpendicular to the base of auto- coupling.

2. Electrical connection of the pump

- Remove the protective cover from the end of the cable and see if it is dry (protect the cable ends from moisture),
- make sure that the supply voltage corresponds with that stated on the pump nameplate,
- connect the cable marked ends according to the wiring diagram,
- to ensure proper protection of the motor, wires marked "1" and "2" are to be connected in control box so that the open circuit (1-2) caused the disconnection of the pump.

NOTE: If the lines "1" and "2" are not connected or are connected improperly with the result that the pump is damaged (motor winding will burn as a result of moisture or as a result of the overload) warranty on the pump in this case expires.

- check the direction of rotation of the motor pump: pump set on a hard surface, switch on for about 2 seconds. - if the pump will jerk in counter-clockwise direction, the pump has correct direction of rotation (The affixed label **"odrzut startowy"** with red arrow on it, indicates the proper direction of jerk).

NOTE: (for users who choose to install and to operate pumps on their own).

Failure to comply with the following technical requirements concerning control box, ***could void*** your warranty in the case of the pump's motor burnout.
Basic technical requirements to be met by supply-control box designed to work with pumps METALCHEM:

- power supply with 5-wire installation (L1, L2, L3, N, PE),
- residual current protection (residual current device) general for up to 11,0 kW, and separate protection for each pump fore up to 12,5 ÷ 22 kW
- overload protection for each pump,
- protection against phase failure,
- protection against asymmetry phase sequence,
- blockade of starting up the pump when circuit "1" - "2" is opened
- time counters for each pump,
- a control mode switch (manual or automatic control)
- alternating operation of pumps for the pumping station with two pumps,
- automatic control system, dependent of the liquid level with mandatory protection against dry running pumps (blocking the pumps).

However, for best results we recommend to purchase, along with pumps, control box type RZS METALCHEM and use our specialized services.

3. Lowering the pump into the tank

The company making the installation should provide employees with the necessary safety equipment and lifting appliance having a good capacity for lowering and hoisting the pump.

- place the pump slide bracket on top of the rails,
- using the chain, lower the pump on guide rails so that it settled firmly on its auto- coupling automatically ensuring a tight connection,
- care not to damage the cable sheath while lowering (it should fall loosely along with the pump)
- roll up the cable excessive length and hang it on the hook to prevent it from falling into the tank,
- the free end of the pump cable must be protected from the weather influence (eg rain) to prevent penetration of moisture into the motor .

4. Installation and connection of float switches

- put the float switch cable in the correct position using its manual
- connect the wires to the power supply and the control cabinet,
- test the signaling devices on expected levels of switching on, off and alarm

NOTE: The lowest level to switch off the pump and the recommended numbers of starts, is given in Chapter V, paragraph 3 of User's Manual.

VII. OPERATION AND MAINTENANCE

Although the pump is maintenance-free and functioning normally in automatic mode, each device requires a technical routine maintenance. In particular it concerns the maintaining of the technical efficiency of pumps and control system. It is not allowed to use the pumps when any of cooperating devices is out of order. It is recommended to repair a faulty pump at an authorized service center.

1. When handling and maintenance the pumps, particular attention should be paid to:

   - Safety. Before starting work on the pump, make sure that the electrical supply is switched off and cannot be accidentally switched on.
   - Checking the correct direction of rotation of the pumps. Each time the cable is reconnected the pump, check the direction of rotation assessed on the basis of the so-called "Jerk Startup" (see chapter VI, paragraph. 2)
   - Compliance with the terms of periodic maintenance of pumps and oil changing in the oil chamber,
   - Periodic cleaning and removing impurities accumulated in the pump housing and impeller,
   - Regular checking and verification of the correct functioning of the pumps on the basis of the indicators on the control panel or based on measurement of the current drawn by the pump:
     - Big difference in the pumps operation times indicates one pump clogging or blockage of the pipeline.
     - Increased current consumption indicates impeller or pump housing contamination,
     - Reduced current consumption indicates air in pump.
2. Each time the pump is lowered on auto-coupling knee, there should be checked that the pump has not air in (particularly for MSV- type pumps). This is accomplished by observation of lowering of the sewage level in the tank when pump is switched on. If the level of sewage does not change, use the chain to slightly raise the pump and again to lower for full seating on auto-coupling knee, then retry the operation.
3. In the event of malfunction of the pump, which should be indicated on the control panel cabinet, it is essential to determine the cause of the fault and only after removing the cause, the pump can run. No response to signaled alarm can destroy the pump.
4. If there is need to unplug the pump from control box, the free end of the cable must be protected from the weather influence (eg rain) to prevent penetration of moisture into the motor.

When overhauling the pump, additionally check the correct operation of the pumping station built in facilities (valves and check valves in the discharge line) and the control system.

1. Pump maintenance

It is recommended at the very beginning to check daily operation of pumps for one week.
In a further period of operation, pumps should be checked at least once a month, making sure that:

- control system is working properly
- all mounted pumps work without excessive vibration,
- pumps do not work too loudly,
- timers of the pumps (if fitted) have similar values for the individual pumps,
- there is not significant drop in pump performance.

2. Pump inspection

- it is recommended to make technical inspection every 12 months or after every 1,000 hours of operation of the pump, and in all cases indicating a decline in pump performance.
- MS-type pumps and MSK1, MSK2 (one and two-channel impeller) need to adjust the gap between the body and the impeller pump as described in Section 5.
- pumps such as MSV-R – with cutter device require adjustment of clearances between the cutting edges.

Inspection should be made by the manufacturer or by a specialist company.

NOTE: once removed from the pump: bearings, mechanical seals and O-rings can not be re-used

3. Checking the oil level

Bearing in mind the requirements of ecological environment, Metalchem use **white mineral oil, paraffin oil** to fill the chambers**.** The oil does not pollute the environment, its main components are inherently biodegradable. And it does not contain hazardous ingredients according to the Minister of Health. In its pure state is colorless oil.
Paraffin oil should be replaced after the first 1000 hours of the pump, and in subsequent periods as needed (ie, if it is found water content in oil) but not less frequently than **once a year.** To do this:

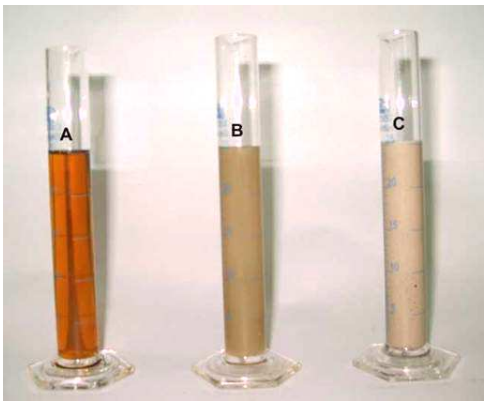
- lay pump flat so that one of the two plugs of the oil chamber is directed vertically upwards,
- clean the plugs from the outside,
- put a clean container under the pump
- unscrew the top cap slowly to cause decompression in the oil chamber,

NOTE: In the oil chamber may be increased pressure, which can cause fluid ejaculation.

- remove the second cap,
- rotate the pump and drain the oil into the prepared dish,
- check the oil condition: in its pure state is a colorless transparent oil i.e., it can be used again, if the oil is milky (opaque) or mixed with water it should be replaced (if the amount of water in the oil is large or appears in a short period of time, check the condition of mechanical seals and O rings)
- allows the water content of the oil up to 30% in the period between inspections (low penetration of water to oil is normal).

If the amount of water in the oil is high, this indicates wear of the mechanical seals, and is advisable to replace the seals at an authorized repair shop.

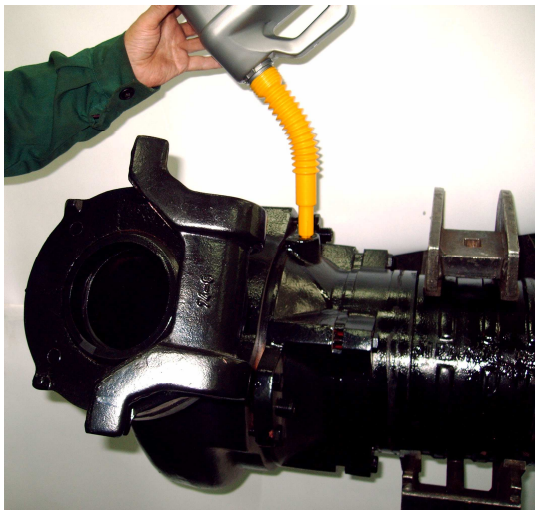
Draining the oil chamber



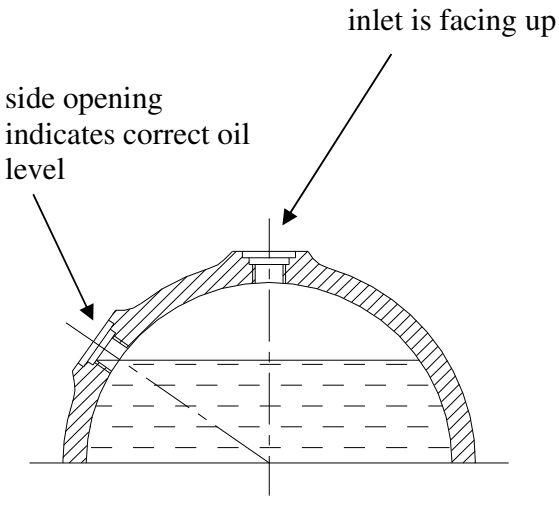
The oil (Fig. concerning mineral engine oil)
A - oil in good condition,
B - water in oil: oil change,
C - excess water in oil: replace oil, check the seals

4. Oil change

- use **white mineral oil, paraffin oil** (or alternatively mineral oil 10W40, in applications where its harmful properties are of less importance) in the amounts shown in the table of pumps specifications. In its pure state is colorless paraffin oil and mineral oil is bright yellow.
- the oil chamber to be filled through an opening facing vertically upwards until the oil begins to flow through the second opening (side),
- replace O rings under the plugs, lubricate them with oil, making sure that the mating surfaces are clean,
- put plugs in the holes and tighten.



Oil filling

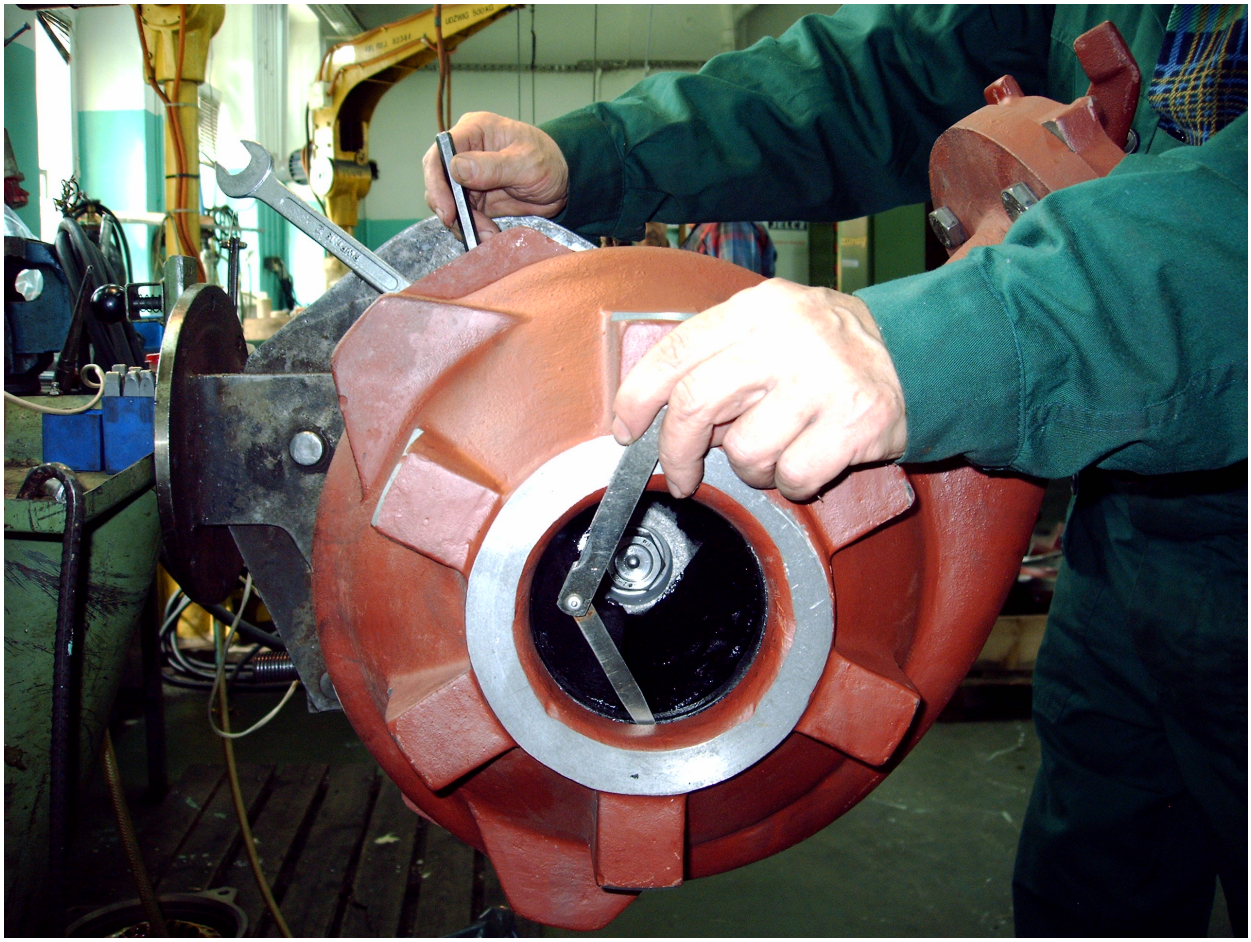


The correct oil level

5. Inspection and adjustment of impeller axial clearance (for pumps type MSK1 and MSK2)

Pumps of series MSK1 and MSK2 have clearance 0.7 ± 0.2 mm between the impeller and the pump body. In order to maintain maximum pump efficiency, once a year, check the value of the gap. Any deviation from it needs to be revised to proper value as follows:

- the adjustment is done by adjusting screws and the clamping screws placed between the motor body and the pump housing
- before adjusting, loosen the screws,
- measure the width of the gap several times in different places, and set it to the desired values,
- tighten the screws.

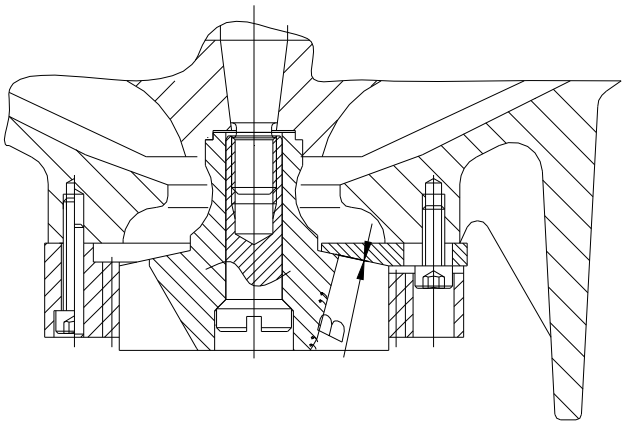


Adjusting the impeller clearance

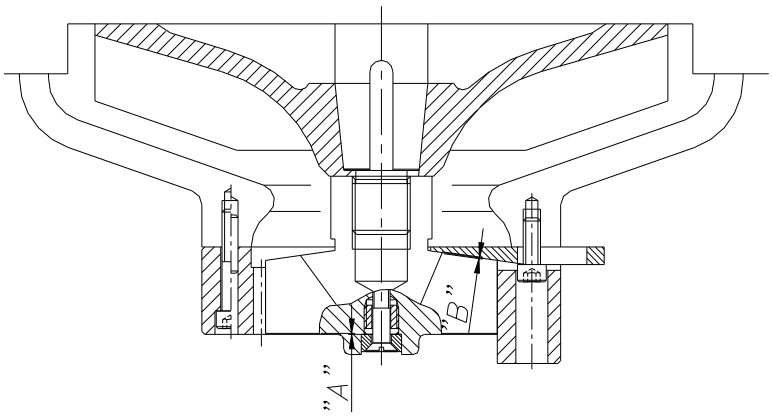
Pumps of series MSV-15, MSV-50, MSV-80 with vortex impellers require no gap adjustment. It is suffice to control wear of impeller and pump housing.

6. Adjusting of clearances in cutting device (for the type of MSV-R)

To ensure proper operation of the cutting device, it is needed periodically, (every 200 hours) monitoring and possible adjustment of clearance between rotating and fixed blades.



Schematic cutting device in pumps 1.5 kW-: -3.0 kW



Schematic cutting device in pumps 5.5 kW ÷ 11, 0 kW

There must be set the minimum value of clearances "A" and "B" (0.05 ± 0.02 mm).

To adjust the clearance "B" (for all types of MSV-R pumps), remove the screws that secure the bottom bar (bottom bar is used only in pumps of 5,5÷11,0 kW), remove it and loosen the hexagon socket screws securing the upper blades.
Then slide upper blades toward the axis of the cutting device, simultaneously controlling those blades are rotating freely without any drag.
After the adjustment, lock the upper blades by tightening the screws.

To adjust the play "A" (for pumps with a capacity of 5,5÷11,0 kW):
screw the adjusting screw sleeves which support the bottom bar. When the beam is applied to the sleeves, set play "A" uniform over the entire length of the beam.
After tightening the screws, check that the cutter rotates freely.

VIII. FAULTS- POSSIBLE CAUSES AND WAYS OF REMOVAL

Fault	Possible Cause	Remedy
Pump turns on but does not work (motor does not rotate)	No power supply	Restore power source.
	Faulty motor	Have the motor serviced.
	A damaged power cable	Check cable, repair in the service.
	Trigged thermal protection circuit 1-2	The pump will turn on automatically. Check the cause.
	Moisture sensor has triggered protective circuit 1-2	Return the pump to service.
	Bad connection of the pump automation	Check and correct the connection.
The pump runs, but gives no liquid (motor rotates)	Wrong direction of rotation of the impeller	Change the direction according to chapter VI paragraph 2.
	Clogged inlet	Clean the pump.
	High wear of working elements	Replace worn parts.
	A leaky discharge pipe	Seal or replace the damaged pipe.
	High discharge pressure	Blocked discharge line. Unblock.
	Damaged working parts of the pump (impeller, seals)	Have it serviced. Replace worn parts.
	Air in pump (pump type MSV-15, -50, -80)	Vent the pump (slightly lift working pump)
	Clogged cutting device (pump type MSV-R)	Check the wear of the chopper. Have it serviced.
	Closed gate valves or blocked check valves	Open gate valves, clean the check valves
	Improper voltage supply	Check the voltage and connect the supply line voltage complied with nameplate of the pump.
The pump is noisy and / or drawing too much current	Pump bearings are worn or damaged	Have it service for repair.
	Short circuit in one phase	Check the current in all phases. The same current means that the motor is OK.
	Winding insulation damaged	Check the insulation by an inductor.