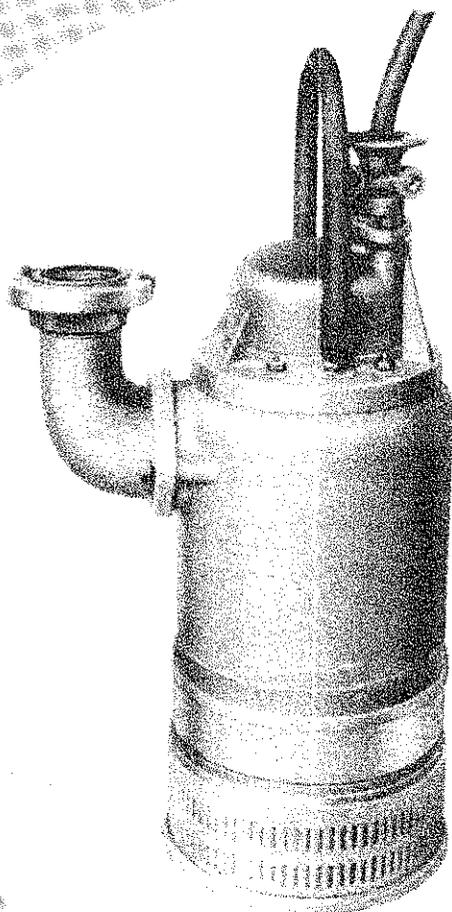


**INSTALLATION AND OPERATION INSTRUCTIONS
FOR SUBMERSIBLE SLUDGE PUMPS OF SERIES**

KDFU



CONTENT

- 1.0 IN GENERAL
 - 1.1 Application
 - 1.2 Rating Plate
- 2.0 SAFETY
 - 2.1 Summary of Important Notices
- 3.0 TECHNICAL SPECIFICATION
 - 3.1 Performance Characteristic
 - 3.2 Pump Sizes
- 4.0 PUMP TECHNICAL DESCRIPTION
 - 4.1 Cascade Connexion of Pumps 80-KDFU
 - 4.2 Section through the Pump
- 5.0 PERIPHERAL ELECTRICS
 - 5.1 In General
 - 5.2 Pump Connection
 - 5.3 Protection against Danger Contact Voltage
 - 5.4 Assembly
 - 5.5 Putting into Operation
 - 5.6 Operation and Service
 - 5.7 Maintenance
- 6.0 PUMP OPERATION
 - 6.1 General Requirements
 - 6.2 Preparation of the Pump for its Putting into Operation
 - 6.3 Pump Servicing within Operation
- 7.0 MAINTENANCE
 - 7.1 In General
 - 7.2 Oil Condition Inspection in a Mechanical Seal and Electric Motor Compartment
 - 7.3 Setting-up Clearances of the Suction Cover and the Impeller Plate
 - 7.4 Lubrication of Bearings, Pump Running „dry”
 - 7.5 Protection and Maintenance of Hoses
 - 7.6 Inspection of Mechanical Condition
- 8.0 REPAIR WORKS
 - 8.1 In General
 - 8.2 Impeller Replacement
 - 8.3 Replacement of the Impeller Plate
 - 8.4 Replacement of a mechanical seal and Radial Lip Seal Rings „gufero”
 - 8.5 Replacement of the Stator Tampings
- 9.0 SPARE PARTS
- 10.0 NOTES PREPARED TO HELP YOU PREVENT PROBLEMS AS WELL AS DEAL WITH THEM
- 11.0 DELIVERY SCOPE
- 12.0 CONFORMITY JUDGEMENT
- 13.0 BOOK OF RECORDS

This Installation and Operation Instruction is valid for submersible pump-set of the KDFU Series. In this Instruction there are instructions necessary for right operation, attendance, maintenance, safety of operation etc. are given

Inadmissible interventions into the pumps or breach of required rules may result in loss of rights for warranty.

1.0 IN GENERAL

1.1 Application

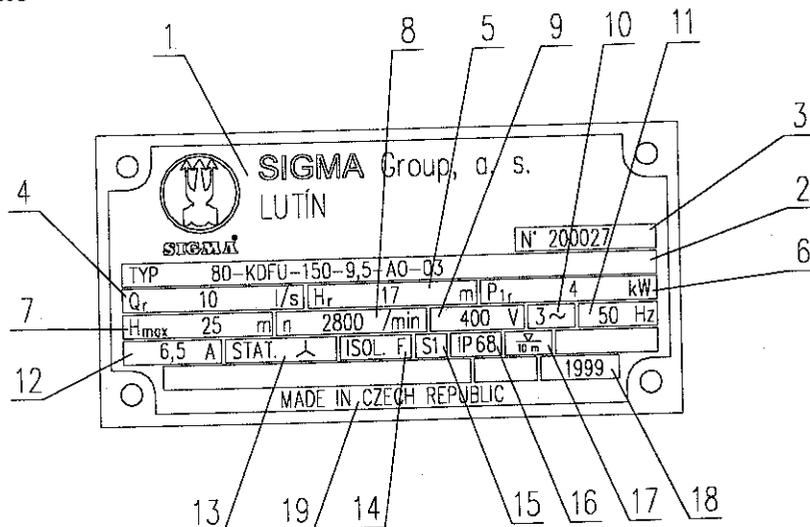
Portable submersible pumps of the KDFU Series are special ones, intended for pumping water polluted with sludge, sand, crushed material, clay and similar stuffs of abrasive effects, up to 30 volume percent of abrasive particles with the max. size of 5 mm and a liquid densities up to 1200 kg.m⁻³. Max. temperature of a pumped liquid is 40°C. Max. submersion is 10 m with a liquid density 1,000 kg.m⁻³. Values pH of a pumped liquid may range from pH 5 to 7.5.

These pumps are not suitable for pumping water containing oils and hydrocarbons.

They have been proved competent in civil engineering, dugout and land reclamation works, liquidation of flood consequences, draining-off flooded cellars, basements, and so on.

These pumps are intended for working in their vertical position, but they may be operated in horizontal position, too. In case of need of double delivery head H values corresponding the given pump capacity, it is possible to use so-called „cascade connection“ consisting of two pumps being interconnected with a hose, with the 80-KDFU Size. The lower pump is of a standard workmanship, with the upper pump - after the suction strainer dismantling - there the suction cover with a branch for a hose connection is to be mounted.

1.2 Rating Plate



- 1 - Manufacturer commercial name and place of business
- 2 - Model designation
- 3 - Serial number
- 4 - Capacity
- 5 - Delivery head
- 6 - Pump-set power input
- 7 - Max. delivery head

- 8 - Speed
- 9 - Rated voltage
- 10 - Kind of current, number of phases
- 11 - Nominal frequency
- 12 - Breaking current
- 13 - Stator connection
- 14 - Class of insulation

- 15 - Type of load
- 16 - Motor covering
- 17 - Max. working depth
- 18 - Year of production
- 19 - Country of provenience

2.0 SAFETY

This Installation Instruction contains basic instructions which shall be observed within installation, operation and maintenance of pumps. That is why it will be inevitable for competent staff/operators to learn this Instruction carefully even before the pump installation and putting into operation. Keep this Manual handy for future reference at site.

Further, not only above mentioned safety rules - as given in this Clause - but all specific rules listed under other clauses should be observed.

Safety rules included in this Installation Instruction, breach of which could be a menace to people are marked with the symbol



or in cases covering electric safety they are marked with the symbol



Safety rules, that should be considered with the pump and/or pump-set safe operation and protection of the pump itself and/or the pump-set are marked with the advice

CAUTION!

2.1 Summary of Important Notices

that shall be observed within manipulation, attendance and pump application

CAUTION!



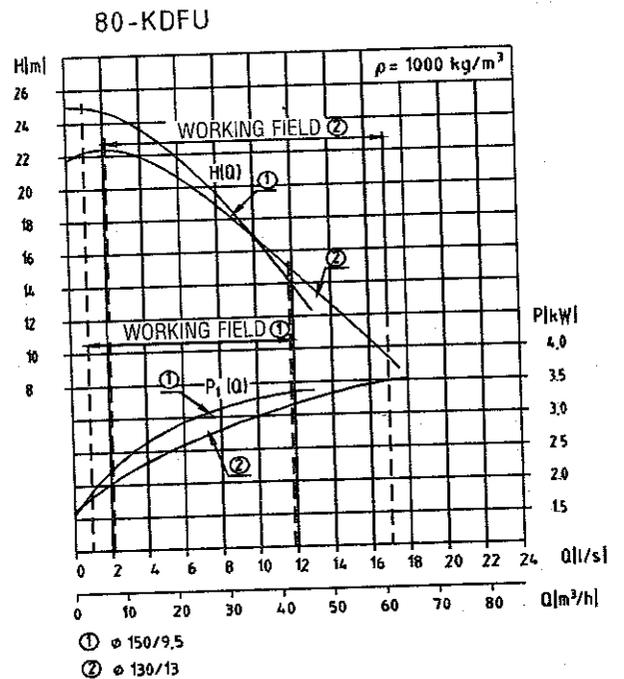
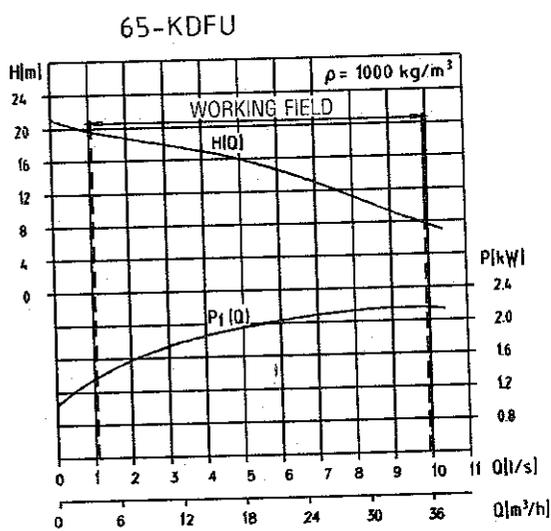
1. Connection across voltage according to name plate ratings
2. Right sense of rotation.
3. **Lift and lower the pump by its handle, not by a leading-in cable.**
4. When pumping out pits with loose sediments with their abrasive effects it is recommended to suspend the pump by a rope and/or a chain or sit it on a solid fundament. Like this it is possible to prevent surplus wear of the hydraulic part and the pump „digging-in“.
5. **When suspending the pump by a rope and/or a chain, it is necessary to prevent its rotation or rotary „swinging“ about the pump vertical axis. Like that it is possible to prevent damage of the leading-in-cable.**
6. With oil filling-up or oil condition check-up inspect whether the packing under plugs has not been damaged and the plugs should be tightened thoroughly.
7. All bolted joints shall be tightened thoroughly and locked against loosing by inserting a spring washer. Under the spring washer it is necessary to place a flat washer.
8. All cylindrical joints and bearing surfaces inclusive of o-rings and rolling contact bearings shall be clean and intact even before mounting. Cover o-rings with oil or grease before their re-mounting. All parts shall be positioned as before their dismantling.
9. When mounting the pump motor leading-in cable care of its inserting into a terminal board cover seal inlet so far, to reach insulation overhang into the terminal board space by 8 mm at least over the bottom of the terminal board cylindrical orifice.
10. Before every longer operational pause it is necessary to immerse the pump into clean water with its motor being running - provided it has been used for pumping mixtures or highly-corrosive water - then let the pump run „dry“ within 10 - 15 minutes. Mechanical impurities drying-up and sticking in the hydraulic part would cause useless wear with its putting into operation again.
11. After a several-week operational pause, before its putting into operation again it is recommended to turn the impeller several times after removal of the suction strainer.
12. In frosty weather it is not allowed to leave the pump in water, as it may get frozen in the pump being out of operation.
13. If it has happened, that some water got frozen in the pump after its lifting out of water without its drying-up - as given in the Clause 10, it is necessary to immerse the pump into water to reach its de-freezing. In no case flame can be used for its de-freezing.
When removing the suction strainer within the pump running, it is necessary to be very cautious in manipulation to prevent a person injury by a rotating impeller either with direct inserting fingers or tools inwards.
14. With every revision and repair of the pump it is recommended to check the el. motor insulation resistance.
15. **Be mindful of the outlet for leading-in cable condition and replace it with any damage immediately.**
16. **With any manipulation in the pump electrical part it is necessary to disconnect current supply lead out of mains in advance and prevent any possibility of its connection across the line by mistake. The very same operations shall be provided within maintenance and adjustment of rotating parts.**
17. Inspection, revisions and repairs of the pump electric motor shall be realized, in view of a duty and according to the keeper internal rules and standards being in force.
18. Dismantling and setting-up, or revisions of the pump sophisticated parts are going to be described in a more detailed manner. Digits given in brackets behind the single parts agree with positions used for these parts designation in the pump cross section. However, before each mounting it is necessary to learn arrangement of the pump single parts using the sectional view being enclosed
20. Little pollution of a pumped staff with oil from the oil pool cannot be excluded (e.g. with a seal wear).
21. **It is not allowed to transport the pump-set being energized.**
22. **Submersible pump-set is not intended for explosion-hazard environments.**

3.0 TECHNICAL SPECIFICATION

Table 1

Technical data		Dimension	65-KDFU	80-KDFU		100-KDFU	125-KDFU
1	Impeller diameter	mm	130	130	150	150	170
2	Performance characteristic		see Fig. 1				
3	Dimensional drawing		see Fig. 2				
4	Electric motor		single-purpose				
5	Motor rated power output P_{mot}	kW	1,5	3		3	10
6	Rated voltage U	V	400	400 (500 on the customer wish)		400	400
7	Rated current (breaking) I	A	4	7,5	6,5 (6)	10	19
8	Rated speed n_{mot}	min ⁻¹	2800	2800		2800	2800
9	Frequency f	Hz	50				
10	Insulation class and motor covering		Insulation Class F, covering IP 68				
11	Hose: I.D., material option	mm	52, PAD/P	75, PAD/P	110, PAD/P		
12	Connecting cable, type $\frac{\text{section}}{\text{length}}$		H07 RN-F $\frac{6 \text{ G}1,5}{15}$	H07 RN-F $\frac{6 \text{ G}1,5}{15}$	H07 RN-F $\frac{6 \text{ G}1,5}{15}$	H07 RN-F $\frac{6 \text{ G}2,5}{15}$	H07 RN-F $\frac{6 \text{ G}2,5}{15}$
13	Pump informatory weight without hose and cable	kg	27	38	43	85	
14	Informatory weight of 10 m Hose	kg	4,8	6,75	11,5	11,5	
15	Cable informatory weight	kg	4,5	4,5	4,5	7	
16	Cut-out temp. of thermal receptor	°C	130±5				
17	Recommended motor starter for the network 400V		SAM1 6A	SAM1 10A	SAM1 16A	SAM1 20A	
			Insulating cabinet IP54 with a motor socket-outlet 3P+PE 16A		For placing into a switchboard		
			Undervoltage release with the coil 400 V				

3.1 Performance Characteristic



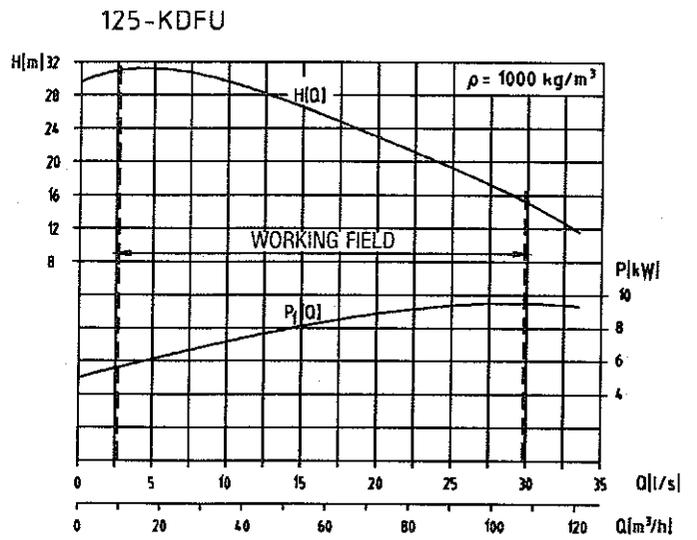
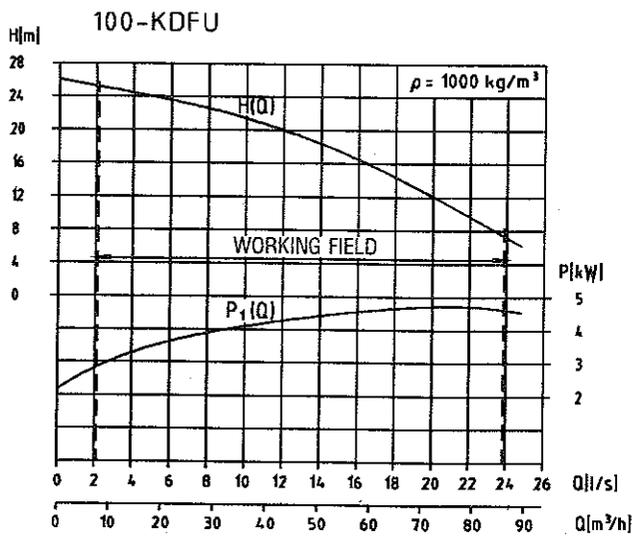


Fig. 1

3.2 Pump Sizes

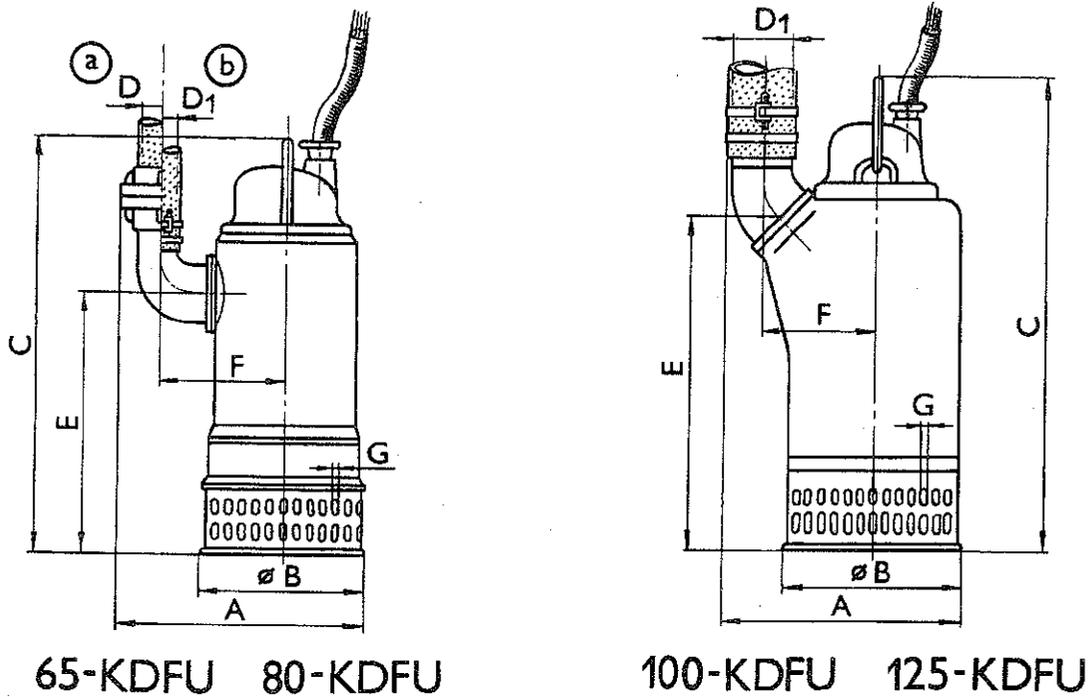


Fig. 2

Table 2

Type	Discharge connection version	~ A	B	~ C	D	D ₁	~ E	~ F	G
65-KDFU	a	330	235	600	DN 52	-	330	160	4
	b	305			-	DN 52			
80-KDFU	a	390	265	650	DN 75	-	370	163	4
	b	325			-	DN 52			
100-KDFU	-	380	265	720	-	DN 110	410	190	4
125-KDFU	-	412	320	800	-	DN 110	545	193	8

4.0 PUMP TECHNICAL SPECIFICATION

Submersible portable sludge pump of the KDFU Series is of the single-stage type, provided with a diffuser (149) and a multi-vane open impeller (230), wear-resistant.

Behind the impeller there is a rubberized liner plate (135) being shaped according to the impeller rear disc profile and vanes overhanging the rear disc. To make setting-up minimal clearance between the impeller and its liner plate possible, the impeller should be provided with a sliding sleeve (544), that may be used for its tightening, too.

Rubberized suction cover (162) is of conical form with the very same vertex angle as for the impeller vanes inclination. Position of suction cover towards to the impeller is to be set up with the aid of threaded nuts (920.4) installed on five coupling bolts (902.1), on which there the suction cover has been slid.

Rubberized diffuser directs water flow in direction of the pump longitudinal axis, that is through transfer passages in the bearing lower housing (350.1), and further, through an annular space between an electric motor stator tube (811) and the pump outer mantle (151), in the upper part of which the discharge branch end has been provided with a thread for screwing the fast section of a fire quick coupler, on which the quick coupler movable section with a fire hose having been rubberized inside may be put.

With some sizes, the hose may be attached to the discharge elbow using hose clips - see Fig. 2.

Electric motor is close-coupled to the pump. Electric motor rotor (818) is supported on rolling-contact bearings (321.1; 321.2), grease-lubricated, with an elongated shaft intended for the impeller fixing. The upper bearing (321.2) is available in the close workmanship to prevent grease flowing-out.

Between the pump hydraulic part and the electric motor there is an oil pool with oil filling, being sealed against a pumped liquid with the mechanical seal (433) provided with wear rings made of sintered carbide. They are lubricated and cooled with oil. Oil may also be used as a prevention against water direct penetration into the bearing space.

Oil pool with oil filling is sealed with the radial lip seal rings „gufero“ (420) being made of heat-resistant rubber and placed below the lower ball bearing (321.1) and preventing flowing grease out of the bearing simultaneously.

For connecting an electric motor across the line the six-core watertight cable (824) has been used, two cores of which should be connected into a contactor control circuit or into a circuit of a circuit breaker undervoltage coil. Leading-in cable is directed out of the terminal board space using the bushing (826.1) being sealed against water penetration in the terminal board cover.

Thermal receptors disconnect the contactor control circuit with winding temperature of $130^{\circ}\text{C} \pm 5'$ and protect the motor against overheating, or burning-out and they shall be connected within the whole warranty period, inclusive of an overcurrent protection, otherwise the warranty cannot be given. With the pump normal working with water

flowing round the motor, it is cooled intensively and winding temperature is far low under cut-out temperatures of thermal receptors. Temperature rise of winding up to the critical cut-out limit may be considered after long-term running „dry“ or running with the discharge being closed and the pump being submerged insufficiently, and so on. The pump shall be operated with the respective control and cut-out devices.

4.1 Cascade Connection of Pumps 80-KDFU

The equipment for cascade connection of two submersible pumps in a standard modification consists of:

- a) a suction cover as a replacement for the protective suction strainer with the upper pump (II)
- b) from the connecting hose in standard length of 1 m.

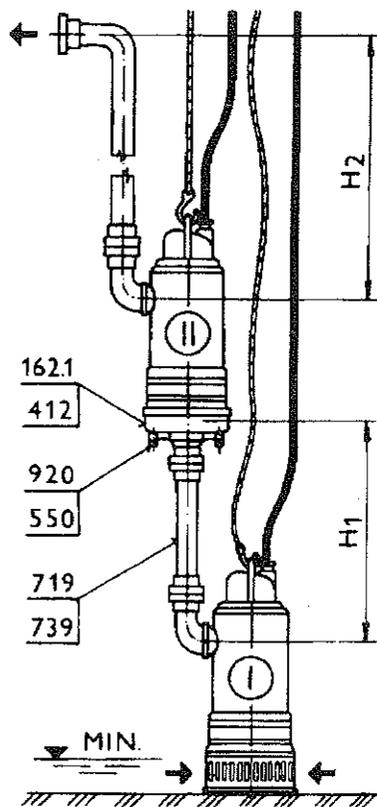
Connecting hose is of polyamide fibre, provided with half-couplings on either side, one of its ends is connected to the discharge side of the lower pump (I) sitting at the pit bottom or direct in the field, and the other end is connected to a special and modified suction cover of the upper pump (II) suspended by a rope or a chain, which should increase delivery head. Suction cover is slid on the diffuser casing of the upper pump (II) being sealed with the aid of a rubber ring and screwed down with five nuts.

With cascade pumping it is necessary to obtain conditions $H_2 > H_1$, otherwise a connecting hose flattening may happened between two pumps due to suction effect of the upper pump (II) and irregular capacity of the same pump. Then, H_2 may not be lower than H_1 . The most optimum the cascade connection is according to the standard modification with 1 m connecting hose, that is unperturbed considering both technology and operation.

Provided the both pumps in their cascade connection are not considered to be started up simultaneously with the aid of only one switching circuit, it is recommended to start them up separately in sequence of a layout. That is, first start up the lower pump (I) and then the upper pump (II), always in succession within $1 \div 5$ seconds.

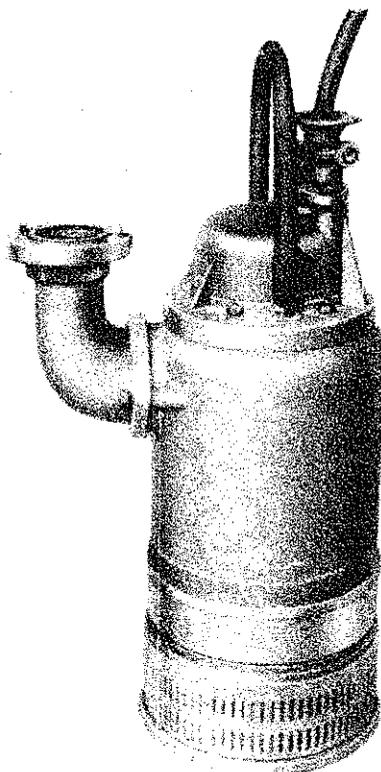
The pump stopping is recommended to be provided in opposite sequence of works as with starting-up.

Repeated starting the pumps up should not be provided sooner than draining a pumped liquid from the discharge system through both pumps is finished, because with the backward flowing the pumps spontaneous turning in the reverse sense may happen.



- 162.1 - Suction cover with half-coupling 75
- 412 - Rubber wear ring 240 x 3
- 550 - Washer 8,4
- 719 - Hose coupling 75
- 739 - Connecting hose DN 75 in length of 1 m
- 920 - Nut M8

Fig. 3



4.2 Section Through the Pump

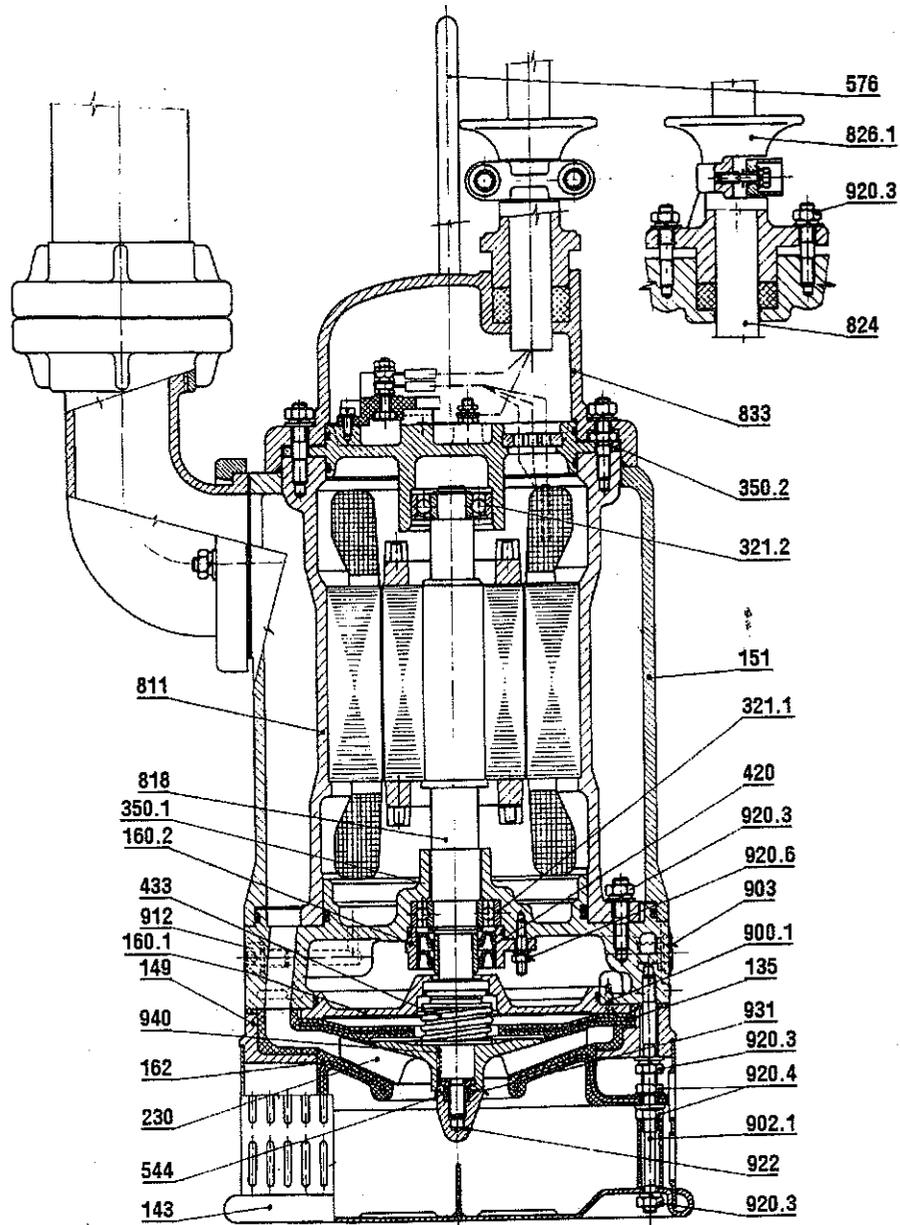


Fig. 4

135 - Impeller plate
 143 - Suction strainer
 149 - Diffuser
 151 - Outer mantle
 160.1 - Oil pool bottom
 160.2 - Bearing cap
 162 - Suction cover
 230 - Impeller
 321.1 - Lower bearing
 321.2 - Upper bearing

350.1 - Lower bearing housing
 350.2 - Upper bearing housing
 420 - Radial lip seal rings „gufero“
 433 - Mechanical seal
 544 - Threaded sliding sleeve
 576 - Handle
 811 - Stator casing
 818 - Rotor
 824 - Cable
 826.1 - Bushing

833 - Terminal board cover
 900.1 - Bolt M5x12
 902.1 - Cap screw
 903 - Checking screw
 912 - Plug
 920.3 - Nut M8
 920.4 - Nut M8
 920.6 - Nut M5
 922 - Impeller nut
 931 - Lock washer
 940 - Key

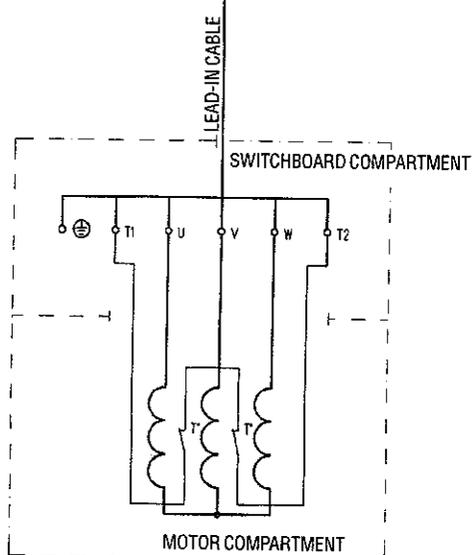
5.0 PERIPHERAL ELECTRIC

5.1 In General

Peripheral electrics of the sludge pump KDFU may consist of a socket-type breaker or a movable instrument cabinet, and/or a permanently installed switchboard equipped with a device intended for water level monitoring that may control the pump automatic running according to its height.

5.2 Pump Connection

Electrical connection in the pump is given in the Figure No. 5.



WITH THE PUMP 125 KDFU THE ELECTRIC MOTOR IS IN CONNECTION -0

Fig. 5

Single cores of the leading-in cable and the electric motor winding outlets have been re-marked as follows:

Clamp	Colour
U	black
V	brown
W	dark grey
⊕	green / yellow
T1, T2	white

Clamps T1, T2 - the circuit of bimetallic thermal receptors of the electric motor winding.

The circuit of bimetallic thermal receptors shall be connected into the pump control circuit, otherwise, the warranty on the pump cannot be granted. Bimetallic thermal receptors have been provided with disconnecting contacts with their minimal parameters, as follows:

$$U_n = 250V$$

$$I_n = 2.5A (\cos \varphi = 1)$$

$$I_n = 1.6A (\cos \varphi = 0.6)$$

The pump shall be protected against overcurrent either with a circuit breaker or an overcurrent relay with the Classes of inertia T1 or T2 and further, it shall be provided with a

short-circuit protection. Overcurrent protection shall be set at the pump breaking current (of an electric motor), that has been given in the Chapter 3.0, Table 1 or at the pump rating plate.

The pump protection against dangerous contact voltage of all dead elements shall be provided according to rules being in force.

For a wiring diagram of the pump and delivered peripheral electrics (a socket-type breaker) see the Fig. 6. Socket-type circuit breaker may be delivered only with the pumps of 65-KDFU and 80-KDFU types.

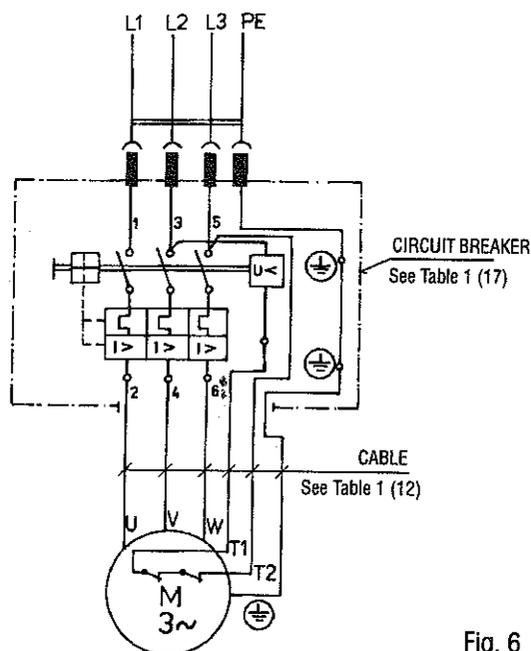


Fig. 6

5.3 Protection against Danger Contact Voltage

The pump protection against danger contact voltage shall be provided according to International Standards being in force and it is realized namely with the pump automatic disconnection from the mains and using a current protector. **The submersible sludge pump shall not be carried out being alive.**

5.4 Assembly



Peripheral electrics mounting (that is, movable instrument cabinets of the fast-installed switchboard, etc.) shall be provided only with a person expert in electrical engineering, according to respective standards being in force and in compliance with local rules.

Within assembly works it is necessary to re-inspect (set-up) the value of an overcurrent relay breaking current according to the Table 1, Clause 3.

5.5 Putting into Operation

Even before the pump putting into operation it is necessary to re-check (re-inspect) its electrical part, namely:

- inspect whether the pump lead-in cable has not been damaged
 - measure insulation resistance values (they have to be greater than 20 M Ω)
 - re-check the overcurrent protection correct setting-up
 - re-check the protection against danger contact voltage
- Re-checking the pump right sense of rotation shall be provided according to the Clause 6.2.

5.6 Operation and Service



Only competent and skilled person instructed according to the Edict No. 50/78 of the Codes of Law, § 4., Cl. 1.

CAUTION !

Provided any defects have been found out on peripheral electric or on the submersible pump, please, switch the pump out immediately and inform a specialist expert in electrical engineering.

5.7 Maintenance

With more frequent using the pump it is necessary to inspect peripheral electric once a month, at least, with occasional using once in two months and before its each putting into operation. These inspections shall be provided by skilled and competent person **instructed according to the Edict No. 50/78 of the Codes of Law, § 4., Cl. 1.**

Within inspection it is recommended to re-check namely a protection against dangerous contact voltage, measurement of insulation resistance (greater than 2 M Ω), inspection of the lead-in cable or the pump intactness.

All repair works may be only executed with the unit being switched off. Replacement of a cable and repairs of the pump further parts within which sealing surfaces are exposed shall be given in charge to a service centre or another maintenance facility, because it is necessary to ensure tightness of all sealing joints having been dismantled before.

Caution :



Any works on the pump in connection with dismantling the terminal board compartment, the motor connection and/or disconnection shall be carried out by a specialist expert in electrical engineering with observance of rules relate to electric machines connections being in force. Leading-in cable connection CANNOT be executed by an incompetent and unskilled person.

6.0 PUMP OPERATION

6.1 General Requirements

Even before putting the pump into operation it is necessary for service personnel to learn this Instruction thoroughly as

it is inevitable to secure the pump-set correct and safe operation. We must lay stress on it, because it is a product being intended for working in „wet“ environments which must be considered as to be very dangerous relate to electrical accidents.

6.2 Preparation of the Pump for its Putting into Operation

1. Provided a new pump or a pump after a longer operational outage (2 ÷ 3 weeks) should be put into operation, it is necessary to remove the suction strainer and turn the pump rotor several times with the aid of a wrench being put on the impeller (230) nut.

2. After the pump connection across the line it is necessary to recheck the right sense of rotation. However, with the pump being assembled completely you cannot see the impeller and other rotating parts, so it is necessary to check the right sense of rotation as follows:

It is recommended either to immerse the pump into water or it may be lifted a bit and/or hung by a rope and/or a chain, after that it may be held by its handle gently and the electric motor may be switched on for a short time. The pump runs in the right direction if it turns (or twitches) in counter-clockwise sense of rotation, which is the opposite direction against the direction of rotation being marked on the rotor directional plate.

Inspection of the right sense of rotation shall be also carried in such a manner that the pump is put on the floor and inclined a bit to reach its standing at the suction strainer bottom peripheral edge, then it may be held by its handle and the motor may be switched on for a short time.

Provided the pump is trying to turn a bit in the clockwise direction, it is evident that the sense of rotation is incorrect and it is necessary to interchange any two phases.

The impeller incorrect sense of rotation may result in the pump capacity drop. After electric power supply interruption it is necessary to re-check the pump right sense of rotation, in such a case that phases interchanging has not been excluded. With a new pump it is necessary to carry it out with the whole suction strainer being submerged in water fully. Besides above mentioned methods there is a possibility to inspect the right sense of rotation with monitoring speed of the hose filling, provided the pump is working under water level. But this method may be learnt successfully only by practice.

When pumping from pits where some loose sediments may be found out, it is not suitable to sit the pump on those sediments, because the pump may „dig itself“ and further, surplus wear of the hydraulic part functional surfaces may happened. In such a situation it is reasonable to sit the pump on a solid support, provided there is no possibility to suspend the pump by a rope and/or a chain.

6.3 Pump Servicing within Operation

Within its operation the pump needs hardly no servicing, however, it is necessary to care of the discharge hose condition, whether it is not bent or broken, because

the output may drop considerably due to it, further, it should not lie or even be forced against sharp edges of engineering structures or stones due to dynamic effects of flowing water, and so on.

7.0 MAINTENANCE

7.1 In General

Within operation these pumps are nearly maintenance-free, so the maintenance may be limited to simple operations of preventive character, as evident from the next description. Despite of this fact it is recommended to pay due attention to these activities because your observing all rules and instructions may guarantee reliability, trouble-free operation and service life of important parts - as mechanical seal, electric motor, bearings and even safety of operation.

7.2 Oil Condition Inspection in a Mechanical Seal and Electric Motor Compartment

With a new pump or after a mechanical seal replacement it is necessary to inspect oil condition not later than after 20 ÷ 30 working hours whether there is not a loss of volume or whether there is not water in oil, which may be provided as follows:

Sit the pump on some solid and elevated supports, loose and unscrew the plug (912). Oil level shall be from 5 to 10 mm below the threaded orifice edge. Then screw the plug on, inclusive of packing, by hand. Turn the pump a bit, so that the plug is in the lowest position. If there is any water it should deposit down below and should flow out after the plug unscrewing first. So use a clean dish or your palm and drain off a little oil of several cubic centimetres, like that you may find out, whether there is an emulsion, water or oil, then - in such a case everything is o.k. - retighten the plug, but only after its cooling-down, provided it has been heated-up within an operation.

The same inspection is recommended to be repeated after 600 or 800 working hours and in such a case the pump deliver suspensions of heavy abrasive effects, then even more often.

CAUTION !

If water or light-coloured emulsion appear there after a longer operational time, it is recommended to replace oil and re-inspect it after 50 ÷ 60 working hours. If water or emulsion appear again, then it will be necessary to replace the mechanical seal (433).

Within every inspection of oil filling it is recommended to re-check whether motor compartment has been sealed hermetically. Sit the pump vertically and unscrew the checking screw. Then incline the pump a bit and inspect (through an orifice), whether the electric motor compartment is dry. **If water or oil emulsion is flowing out there, it is necessary to put the pump out of operation and let it repair. Neglect of these inspections may cause the pump breakdown and even the electric motor winding burning-out.**

It is reasonable to use turbine oil (according to the ISO classification - viscosity 3448 ISO WG 32).

7.3 Setting-up Clearances of the Suction Cover and the Impeller Plate

With a new pump the optimum clearances among the suction cover (162), the liner plate (135) and the impeller (230) has been set up in the manufacturing plant.

With wearing the impeller and further rubberized parts, that is, the suction cover (162) and the impeller liner plate wear, that pump may remain capable of working, but there is big drop of its capacity. That is why it is necessary to re-adjust too big clearances arisen due to wear.

a) Setting-up clearance between the impeller (230) rear profile and its liner plate:

This clearance modification shall be executed even before the suction cover setting-up. Sit the pump on a mounting table, loosen and screw five nuts (920.3) together, inclusive of spring washers, and then remove the suction strainer (143) together with the bottom. Then unlock the lock washer (931), loosen and take the impeller nut (922) off and retighten the threaded sliding sleeve (544) up to stop and force the impeller so far until it sits with its profile onto the plate, then loosen the threaded sliding sleeve (544) best - by hand, until it sits with its recess onto the impeller hub, which is evident from this, that with further turning the impeller could start to move out. So, the clearance between the plate (135) and the impeller (230) may be set in such a way that after the threaded sleeve bearing on the impeller this one may be „lifted“ with rotating the bush by 180°. Then the lock washer (931) and the impeller nut (922) may be slid on and retightened. The impeller must turn free. Then lock the impeller nut with a washer.

b) Setting-up clearance between the suction cover and the impeller:

Loosen five nuts (920.4) being placed at the diffuser (149) side and unscrew them upwards. With retightening lower nuts (920.4) push the suction cover (162) against the impeller (230) gently in such a manner the rotor would be able to put up considerable resistance with its turning. This state is significant for the initial position determination within a clearance setting-up.

Screw upper nuts together in such a manner they bear on the suction cover slightly and then clearance may be taken up. Select any screwed bolt which may be considered to be our starting point. You may start with further retightening the nuts unless the rotor may be turned over with only gentle and fluent resistance. Provided you have failed in doing it and rotor may be turned with difficulties, loosen slightly the lower nuts and continue with further moving the suction cover away a bit until you reach the desirable rotor turning over.

7.4 Lubrication of Bearings, Pump Running „dry“

Care of rolling-contact bearings additional lubrication, because this may affect their service life substantially. As far as additional lubrication of the lower bearing (321.1) is concerned it is necessary to take every and each opportunity of opening-up an access into the bearings space - e.g. within inspection of seals. Otherwise, it is necessary to provide additional lubrication after 2,500-3,000 working hours. Complete replacement of grease is recommended to be executed within 12 or 18 months.

CAUTION!

Pump running „dry“ cannot be tolerated!

With the upper ball bearing its grease charge should be sufficient for 2,000 working hours. Then it will be necessary to remove the old grease charge and fill it with a new one. With these types of bearings there are either single-ended cover sheets or two-sided ones used. Provided there single-ended cover sheets have been used, a grease replacement is easy. But with using two-sided cover sheets it is necessary to remove one of them (from one side only) and after bearing removal and filling it with grease it is recommended to mount it with cover sheet placing at the electric motor side. The cover sheet prevents grease flowing out of the bearing while the pump is in its working, that is, vertical position.

7.5 Protection and Maintenance of Hoses

It is necessary to prevent running over hoses being filled with water by vehicles. The same is valid for empty hoses, because there a hose local loading due to vehicles running over and its breaking in bends of its flat width may happen, namely in their rubber layers. Before storing it is necessary to wash the hoses thoroughly, namely with their using for pumping foul water, then wash them with clean water and dry them.

7.6 Inspection of Mechanical Condition

It consists of visual inspection of the pump considering its mechanical condition. It is recommend to monitor namely:

- **Leading-in cable (824) intactness** and its fitting into a bushing. Hard-set impurities e.g. sand, clay and other aggressive stuffs are not permissible there, because the cable outer serving might be worn out and humidity may penetrate into the terminal board and the motor compartment, which is undesirable. Further, it is recommended to check, whether the bushing body (826.1) has been retightened sufficiently with nuts (920.3) to reach the lead-in cable proper sealing
- **Intactness of a protective sieve on the pump suction side**
Holes of greater sizes caused by mechanical damages are undesirable, because through them some impurities of greater sizes may penetrate into the pump

and the impeller may be clogged or even further parts may be damaged mechanically.

- **Intactness of parts securing covering all parts being alive**, that is, compartments of the terminal board and the electric motor. Namely, the terminal board compartment cover (833), the upper bearing housing (350.2), the stator case (811), the bushing body (826.1) and bolted joints/connections. With even a small damage being found out with these parts it is necessary to put the pump out of operation immediately.

- **Extent of parts wear caused by the pump operating**
Care of the hydraulic part components (impeller, rubberized components, mechanical seal (433) thoroughly. To a large extent hydraulic output availability and operating efficiency depend on wear extent.

8.0 REPAIR WORKS

8.1 In general

Considering the design of single parts and components these pumps repair works may be characterized as a replacement of parts or assemblies. It is possible to repair electric motor stator windings, that is, its winding re-winding, provided it has been damaged. Replacement of important functional parts or assemblies will be described below.

CAUTION!

When dismantling some parts the pump must be clean and all residues of a pumped liquid must be removed thoroughly. When pumping chemically polluted liquids it is recommended to neutralize all those parts. Please, use safety aids and observe all hygienic rules.

8.2 Impeller Replacement

Provided there is necessity of the impeller (230) replacement, remove suction strainer (143) but not before five nuts (920.3) loosening and screwing another five nuts (920.4) together, then it would be possible to pull the suction cover (162) out with unlocking, loosening and removing the impeller nut (922) and then the impeller (230) may be forced off the shaft (818). In such a case it is not possible to force the impeller off easily use a threaded sliding sleeve (544) and a nut wrench. Put the wrench on the threaded sliding sleeve (544) flats protruded out of the impeller hub, then lean the wrench against the bolts (902.1). Then, using a longer lever being inserted among the impeller vanes, and turning the impeller, the impeller may be forced off.
Clearance among the liner plate, the suction cover and the impeller shall be adjusted as described in the Clause 7.3.

8.3 Replacement of the Impeller Plate

The impeller liner plate (135) replacement may be executed in the same sequence as with the impeller replacement.

But - on top of it - it is necessary to screw other nuts (920.4) together and force the diffuser (149) off, by which the impeller liner plate may be pushed against the oil pool bottom.

Not before inserting the impeller new liner plate (135) into the diffuser (149) the assembly may be realized in the opposite sequence of works as with dismantling.

8.4 Replacement of a mechanical seal and Radial Lip Seal Rings „gufero”

The sequence of works shall be the same as with the impeller liner plate replacement, but besides it will be necessary to unscrew two bolts (900.1). After the key (940) removal the mechanical seal movable part may be forced off with care, however, not before oil draining-off and covering the shaft part with oil, that is that part through which the mechanical seal shall be forced off. After dismantling the oil pool (160.1) bottom force the mechanical seal stationary part off. Assembly shall be carried out in the opposite sequence of works.

It is inevitable to keep cleanness on principle!

While inspecting radial lip seal rings „gufero” (420) or within their replacement loosen and screw five nuts (920.6) together, remove the bearing cap (160.2) - like that it is possible to provide wear rings replacement. Further, inspect protective sleeve on the shaft, whether there are not worn-out grooves at the contact spots. Provided it has happened, it is necessary to replace also sleeves with the sizes 65, 80, 100-KDFU, with the size 125-KDFU removal of one or both washers under radial lip seal rings „gufero” is sufficient. Simultaneously, it is recommended to provide additional lubrication of the lower ball bearing with grease.

8.5 Replacement of the Stator Tappings

Provided the zero-value of insulation resistance has been found out, the stator should be replaced. Reduced insulation resistance with moistened winding may be cleared with drying-up. Provided, the replacement seems to be necessary, proceed as follows:

Remove upper parts of the pump and the stator, inclusive of a mantel and sit them on a support in such a manner the electric motor stop being up, then warm the stator sheating, using „scattered” flame up to temperatures $150 \div 160^{\circ}\text{C}$. Provided the stator cannot be unlocked in such a manner, please, tap tappings from the upper side slightly. A new stator is to be cleaned in its cylindrical part. Then smooth and even possible unevenness in the aluminium alloy sheating inner part caused by dismantling, so that the stator could be inserted without any difficulties after its warming-up. Replacement of a damaged stator may be realized with only one warming-up the sheating. A moistened stator may be dried out according to instructions given in standards being in force.

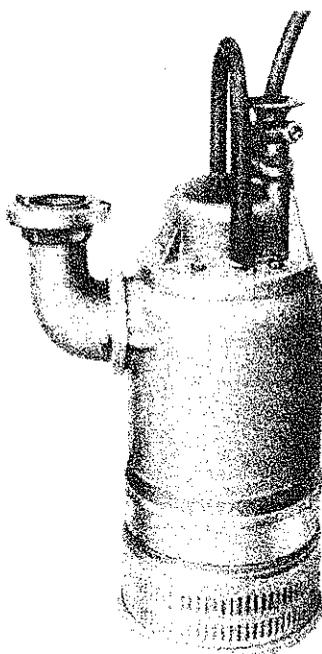
9.0 SPARE PARTS

All parts of the pumps are interchangeable.

When ordering spare parts or with other negotiations it is recommended to give:

- Pump type
- Pump serial number
- Correct numerical and alphabetical notations of parts according to Figs. 7, 8 or 9.

The pump type and its serial number are given at the rating plate attached to the pump.



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