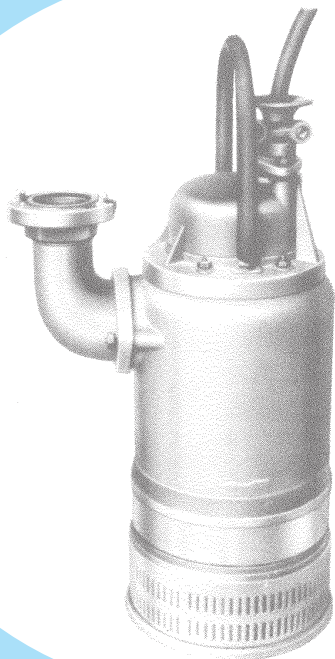
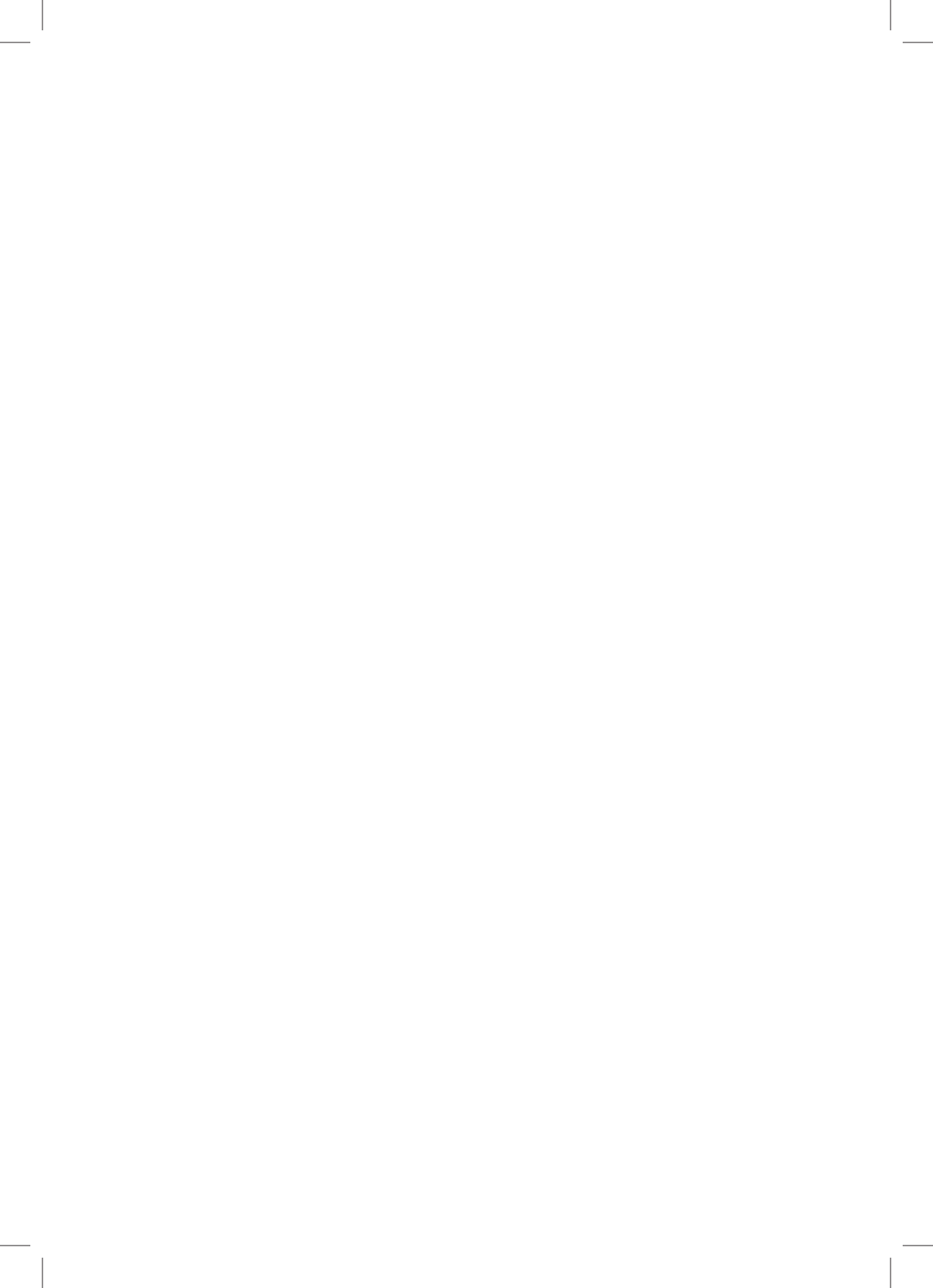


**SERVICE AND INSTALLATION INSTRUCTIONS
SUBMERSIBLE SLUDGE PUMPS OF TYPE**

KDFU



ORIGINAL DIRECTION FOR USE



CONTENTS

- 1.0 GENERAL DATA
 - 1.1 Application
 - 1.2 Rating plate
- 2.0 SAFETY
 - 2.1 Complex of important notices
- 3.0 PERFORMANCE DATA
 - 3.1 Power characteristic
 - 3.2 Dimensions of pumps
- 4.0 PUMP TECHNICAL CHARACTERISTIC
 - 4.1 Cascade connection of pumps
 - 4.2 Pump sectional view
- 5.0 ELECTRIC EQUIPMENT
 - 5.1 In general
 - 5.2 Pump circuitry
 - 5.3 Protection from dangerous touch voltage
 - 5.4 Assembly
 - 5.5 Putting into operation
 - 5.6 Operation and servicing
 - 5.7 Maintenance
- 6.0 PUMP OPERATION
 - 6.1 General instructions
 - 6.2 Pump preparation for putting into operation
 - 6.3 Pump servicing during operation
- 7.0 MAINTENANCE
 - 7.1 In general
 - 7.2 Check of mechanical seal oil and motor compartment
 - 7.3 Clearance adjustment between suction cover and impeller back plate
 - 7.4 Lubrication of bearings, pump running dry
 - 7.5 Protection and maintenance of hoses
 - 7.6 Check of mechanical condition
- 8.0 REPAIR WORKS
 - 8.1 In general
 - 8.2 Impeller replacement
 - 8.3 Replacement of impeller back plate
 - 8.4 Replacement of mechanical seal and radial shaft lip seal rings
 - 8.5 Replacement of stator laminations
- 9.0 SPARE PARTS
- 10.0 OPERATIONAL FAULTS, THEIR CAUSES AND FAULT CLEARANCE
- 11.0 SCOPE OF DELIVERY
- 12.0 WARRANTY
- 13.0 BOOK OF RECORDS
- 14.0 DISPOSAL OF WASTE

These Service and Installation Instructions apply to submersible pump set of the series KDFU. In these Instructions there are guidelines necessary for correct operation, servicing and maintenance, operation safety, and others. Disallowed interventions to the pump or breach of required instructions result in loss of warranty.

1.0 GENERAL DATA

1.1 Application

Portable submersible pumps of the series KDFU are special pumps destined for pumping water polluted with content of sludge, sand, crushed rocks, clay and similar materials of abrasive effects. Content of admixtures can be up to 30 percent of mass and grain size up to 5 mm, with liquid density up to 120 kg.m^{-3} . Maximum temperature of a pumped liquid is 40°C . Maximum submersion is 10 m at a liquid density of $1,000 \text{ kg.m}^{-3}$. Pumped liquids have got an allowed range of pH values from 5 to 7.5.

These pumps are not suited to pumping of water containing oil and carbons.

This machine is not destined for using by persons (including children), whose physical, sensory or mental inadequacy and/or lack of experience and knowledge do not make possible to use this equipment in a safe way without supervision and initial briefing and training by a person responsible for their safety in respect of this equipment using.

It is necessary to watch the children and prevent their playing with this equipment.

Wide use of pumps is namely in civil engineering, at site excavations, reclaiming of land, removal of consequences of floods – draining-off flooded cellars, basements, and so on.

These pumps are destined for work in their vertical position, but they can also work in their horizontal position. If double head H is needed, which conforms to the pump discharge rate, it is possible to use so-called cascade connection with the pump type sizes 80-KDFU and 125-KDFU (Fig. 3) consisting of two pumps being interconnected by a hose. The lower pump is in its standard workmanship version, as for the upper pump - it is necessary to install a suction cover with a socket for hose connection.

Noise level

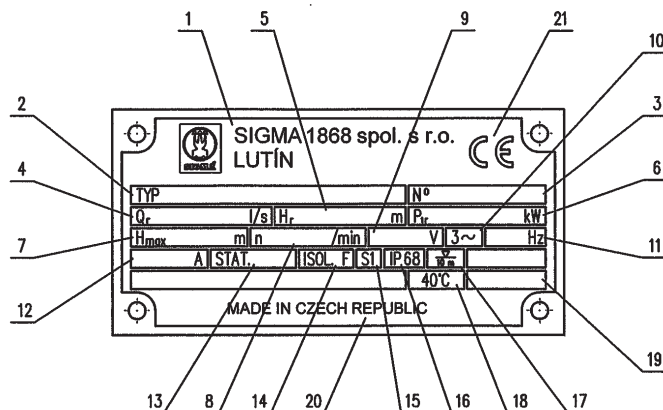
Actual value of acoustic pressure level A in the distance of 1m from the pump set surface (when using a weighting filter A) is $L_{pA} = 77 \text{ dBA}$ (ISO 3764, ISO 9614).

2.0 SAFETY

These Service and Installation Instructions contain basic instructions that shall be observed within operational installation, operation and maintenance of this pump. That is why it is inevitable for competent and responsible workers and service staff to learn these Instructions carefully even before the pump installation and putting into operation. Keeping this Manual handy for future reference at site is also absolutely necessary.

Not only all above mentioned general safety rules devoted to safety given in this Clause, but also all specific safety rules given in other Clauses shall be observed.

1.2 Rating plate



- 1 Manufacturer's trade name and place of business
- 2 Type designation
- 3 Serial number
- 4 Rate of flow
- 5 Delivery head
- 6 Pump set power input
- 7 Max. delivery head
- 8 Speed
- 9 Rated voltage
- 10 Current type, number of phases
- 11 Rated frequency
- 12 Rated current
- 13 Stator connection
- 14 Class of insulation
- 15 Sort of load
- 16 Motor protection
- 17 Maximum working depth
- 18 Maximum temperature of liquid
- 19 Year of production
- 20 Country of origin
- 21 Mark of conformity

Safety rules included in these Service and Installation Instructions, 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 shall be considered due to safe working of the pump or the pump set and/or protection of the pump itself or the pump set shall be provided with the advice

ATTENTION!

Safety rules, breach of which could endanger quality of human living environment, are marked with the symbol



2.1 Complex of important notices

which must be followed during manipulation, servicing and using these pumps.

ATTENTION!



1. Connection to voltage network according to nameplate data.
2. Correct sense of rotation.
3. **Pump shall be lifted and lowered by using a handle entirely, in no case by a supply cable.**
4. When pumping-out sumps with loose sediments having abrasive actions on the pump it is necessary to hang the pump on a rope or a chain, or place it on a hard floor. In this manner it is possible to prevent excessive wear of the hydraulic part and the pump "digging-in".
5. **When the pump is hung on a rope or on a chain it is necessary to prevent turning or "revolving & swinging" round the pump axis. In this way it is possible to prevent any damages of a supply cable.**
6. When re-filling oil or re-checking oil condition it is always necessary to ensure undamaged condition of packing under the plug and plugs thorough retightening.
7. All screwed joints must be re-tightened thoroughly and locked against release by inserting a lock washer. So, it is necessary to place a flat gasket under the lock washer.
8. Before assembly all cylindrical joints and contact surfaces / seating faces, including "o"-rings and a rolling-contact bearing must be clean and undamaged. "O" -ring shall be brushed-over by oil or grease before assembly. All parts must be assembled in the relative position in the same way, as they were before disassembly.
9. During assembly of the pump motor lead-in cable it is necessary to insert it into the stuffing box inlet of terminal board housing in such a manner so the external insulation laps 8mm at least over the bottom of a cylindrical hole of the terminal board space.

10. Before every longer operational break it is necessary to submerge the pump in clean water with the motor running – if some mixtures or corrosive water are pumping – and then the pump should run dry for 10 – 15 seconds. If mechanical admixtures become dry or stick in the hydraulic part it could be the cause of excessive wear at re-putting into operation.

11. After any operational breaks lasting several weeks, and after the suction screen removal, it is necessary to turn the impeller for several times.

12. In frosty weather the pump cannot be left in water which can freeze in the pump being out of operation.

13. If water residues freezing happened after the pump lifting out of water because the pump had not been dried according to the Clause 10, it is necessary to immerse the pump into water before its re-putting into operation in order to defrost it. Do not use any flame for defrosting in any case.

If the pump is running with the suction screen being removed it is necessary to be very careful to prevent injury due-to rotating impeller, either by inserting fingers, or tools.

14. During the pump checking-on and repairs it is recommended to re-check the electric motor insulation resistance.

15. It is necessary to take a special care of condition of the supply cable entry and replace it immediately, if any damage was found out.

16. When preparing a manipulation in the pump electrical part, at first, it is necessary to disconnect supply from mains and prevent any possibility of connecting across the line by mistake. Same goes for any maintenance and adjustment works on rotating parts.

17. Inspections, revisions and repairs of the pump electric motor shall be carried out with regard to ambient, according to the operator's in-home regulations and ČSN standards being in force.

18. Disassembly and adjustment, or checks of more demanding and complex parts of the pump are described in more detail.

Numbers given in brackets behind the single component parts are consistent with positions used for the component parts designation in the pump sectional view. Otherwise, it is necessary to make the acquaintance with arrangement of the pump single parts, according to the pump sectional view being enclosed.

19. If it is necessary to use "levering" for dismantling it is necessary to put some suitable metallic washers of a larger area below a lever to prevent crushing of the pump parts, because they are almost made of aluminium alloy. If tapping is used for dismantling (e.g. for the outer jacket removing – 151), it is necessary to use a lead, rubber or another soft mallet.

20. Little pollution of a liquid by oil from the filling is possible (e.g. with stuffing box wear).

21. Submersible pump set may not be carried out, if it is under voltage.

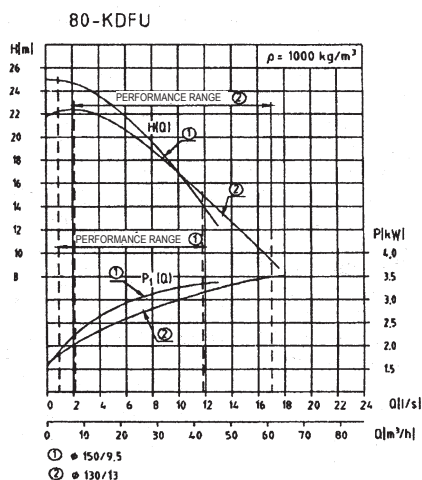
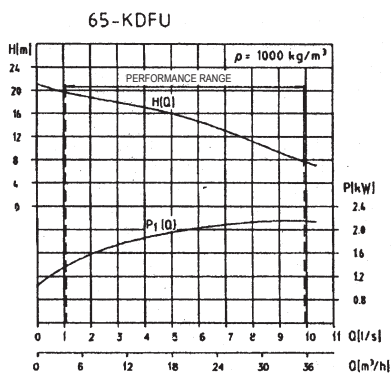
22. Submersible pump set is not destined for explosion hazard environments.

3.0 PERFORMANCE DATA

Table 1

Performance data	Dimension	65-KDFU	80-KDFU		100-KDFU	125-KDFU	
Impeller diameter	mm	130	130	150	150	170	
Power characteristic		See Fig. 1					
Dimensional drawing		See Fig. 2					
Electric motor		Definite purpose					
Motor rated output P_{mot}	KW	1.5	3		3	10	
Rated voltage U	V	400	400 (500 – on request)		400	400	
Rated current (tripping) I	A	4	7.5	6.5 (6)	10	19	
Rated speed n_{mot}	Min ⁻¹	2800	2880		2800	2830	
Frequency f	HZ	50					
Insulation class and motor protection		Insulation class F, protection IP 68 ∞ 10m					
Hose: internal diameter, material option	mm	52, PAD/P	75, PAD/P		110, PAD/P		
Connecting cable – type		HO7 RN-F	HO7 RN-F		HO7 RN-F	HO7 RN-F	
Cross section / length		6 G1.5 15	6 G1.5 15		6 G1.5 15	6 G1.5 15	
Informative weight of pump without hose and cable	kg	27	38		43	85	
Informative weight of 10m of hose	kg	4.8	6.75		11.5	11.5	
Informative weight of cable	kg	4.5	4.5		4.5	7	
Cut-out temperature of thermal sensor	°C	130±5					
Recommended motor starter for power line of 400 V		ESM 1-4	ESM 1-10		ESM 1-10	ESM 1-20	
		Protection cabinet IP55+plug 3P+N+PE 16A					Into a switch board
		Undervoltage release with a coil 230V					

3.1 Power characteristic



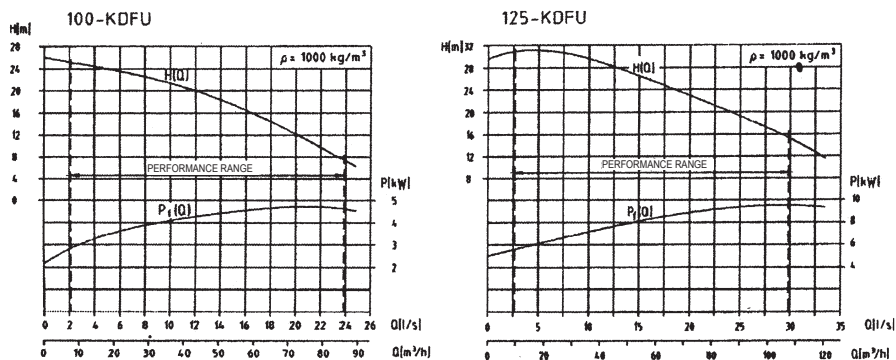


Fig. 1

3.2 Dimensions of pumps

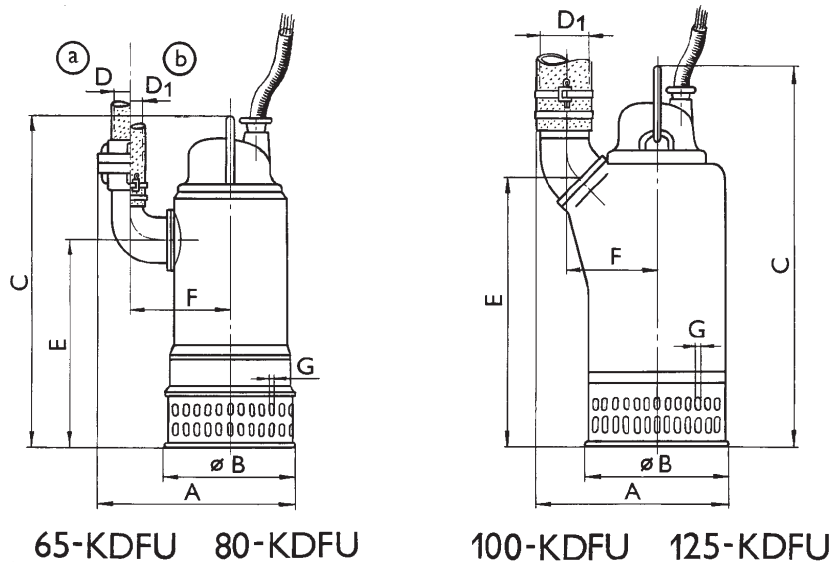


Fig. 2

Table 2

Type	Workmanship of discharge connection	~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 75*			
100-KDFU	-	380	265	720	-	DN 110	410	190	4
125-KDFU	-	412	320	800	-	DN 110	545	193	8

DN52 – on request (replacement of a discharge branch)

4.0 PUMP TECHNICAL CHARACTERISTIC

Submersible portable sludge pump of the KDFU type (Fig. 4) is a single stage pump with a diffuser (149), and with an open multi-blade wear-proof impeller (230).

And behind the impeller there is a rubberized back plate (135) that is moulded according to the shape of the impeller rear disk and blades protruding over the rear disk. For setting-up minimum clearance between the impeller and its back plate the impeller is provided with a sliding sleeve (544) that can be used also as a forcing-off device.

Rubberized suction cover (162) is of a conical shape with a vertex angle consistent with inclination of the impeller blades.

Position of the suction cover towards to the impeller can be set up with the aid of threaded nuts (920.4) placed on five bolts (902.1) on which the suction cover is put on.

Rubberized diffuser regulates water flow in the direction of the pump longitudinal axis, i.e. through connecting channels in the lower bearing housing (350.1), and further over the annular space between the electric motor stator jacket (811) and the pump outer shell (151), in which upper part of the discharge branch is provided with an end thread for screwing a fixed part of fire quick-coupler on which a movable part of the quick-coupler together with a rubber-lined fire hose are to be put. With some pump sizes a hose is attached to the discharge elbow with the aid of fastening clamps – see Fig. 2.

The electric motor and the pump form a closed compact unit. Electric motor rotor (818) is supported on rolling-contact bearings (321.1; 321.2) which are grease-lubricated, with an extended shaft destined for the impeller attachment. The upper bearing (321.2) is in its closed version to prevent a leak of grease.

Between the pump hydraulic part and the electric motor there is an oil cup with oil cartridge that is sealed by a mechanical seal (433) provided by wear rings of sintered carbides against a pumped liquid penetration. The rings are lubricated and cooled by oil. Oil should also prevent direct penetration of water into the bearing space.

Against the electric motor compartment the oil cup with oil cartridge is sealed by means of radial shaft lip seal rings (420) of heat-stable rubber that are placed below the lower ball bearing (321.1) for preventing leakage of grease out of the bearing.

The electric motor connection to an electric power supply system is carried out with the aid of a watertight six-core cable (824), two cores of which shall be connected to the contactor control circuit or to the circuit breaker under-voltage coil network. The supply cable is led out of a terminal board compartment with the aid of the cable entry (826.1) sealed in the terminal board cover against water penetration.

Thermal sensors shall open the contactor circuit at the winding temperature $130^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and protect the motor from

overheating or burning out, so they must be connected over the whole period of warranty, including over-current protection, otherwise the warranty coverage cannot be granted. If the pump is working in its normal mode, when water is flowing round the motor, the motor is cooled intensively and winding temperature is considerably lower than the cut-out temperature of thermal sensors.

Rise of winding temperature up to a critical cut-out limit can only occur after a long-lasting running “dry”, or with a closed outlet on the discharge side and/or with a pump being submerged insufficiently, and so on.

This pump shall be operated with a conformable control and protective device.

4.1 Cascade connection of pumps (80-KDFU 125-KDFU)

The device for cascade connection of two submersible pumps (Fig. 3) in its standard arrangement consists of:

- a) Suction cover that replaces a protective suction screen with the upper pump (II);
- b) Connecting hose of a standard length 1m.

Connecting hose is of polyamide fibre; one of its ends is connected to the lower pump discharge side (I) being placed on the sump bottom or right in the field, another end is connected to a specially adapted suction cover of the upper pump (II). The suction cover is to be slipped onto the upper pump (II) diffuser body, sealed with a rubber ring and tightened with the aid of five nuts.

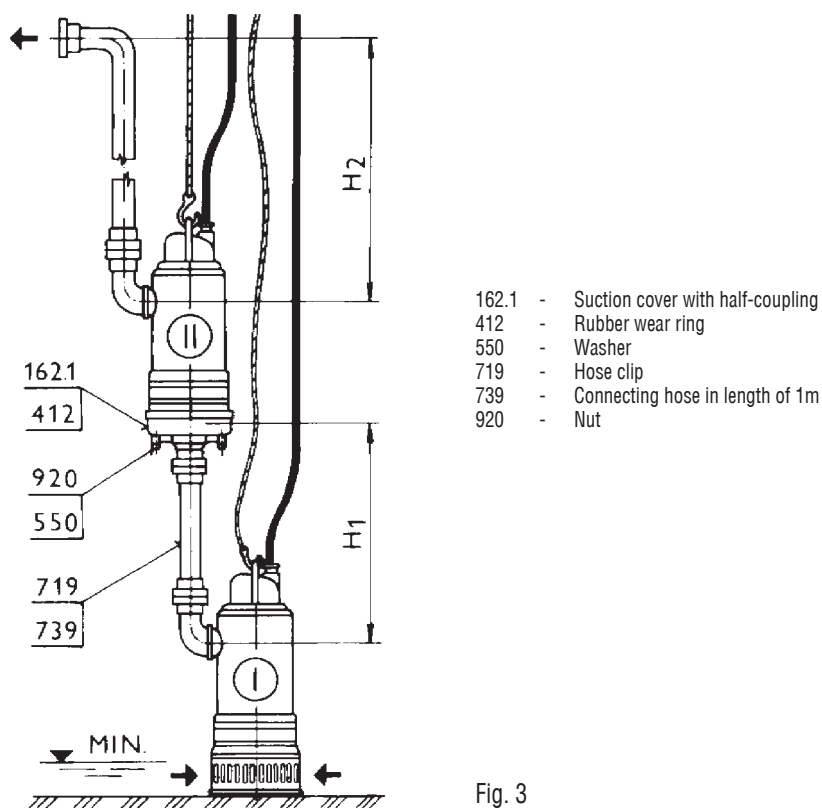
Concerning cascade pumping, it is necessary to keep the condition $H_2 > H_1$, otherwise the connecting hose flattening would happen between the both pumps due-to suction effect of the upper pump (II), and volume delivered by the same pump would fluctuate as well. So H_2 may not be lower than H_1 . The most optimum solution is the cascade connection according to the standard adaptation with one-metre hose, which creates no problems as for both technical and operational aspects.

If it is not expected that both pumps in cascade connection would be started up at the same time by means of the only one switching circuit, it is recommended to start them up separately and in turn, according to their spatial arrangement. That means, that the lower pump (I) must be started up as the first one, and then the upper pump (II) is to be started up - always successively in time interval from 1 to 5 seconds.

And it is recommended to stop the pumps in the opposite sequence of operations than with starting-up.

Re-starting pump should not be realized before draining a pumped liquid out of the discharge system that flows through both pumps back to the sump, because due-to the above-mentioned return flowing the pumps could start rotate spontaneously in their opposite direction.

Example of illustration and accessories for cascade connection 80-KDFU



4.2 Pump sectional view

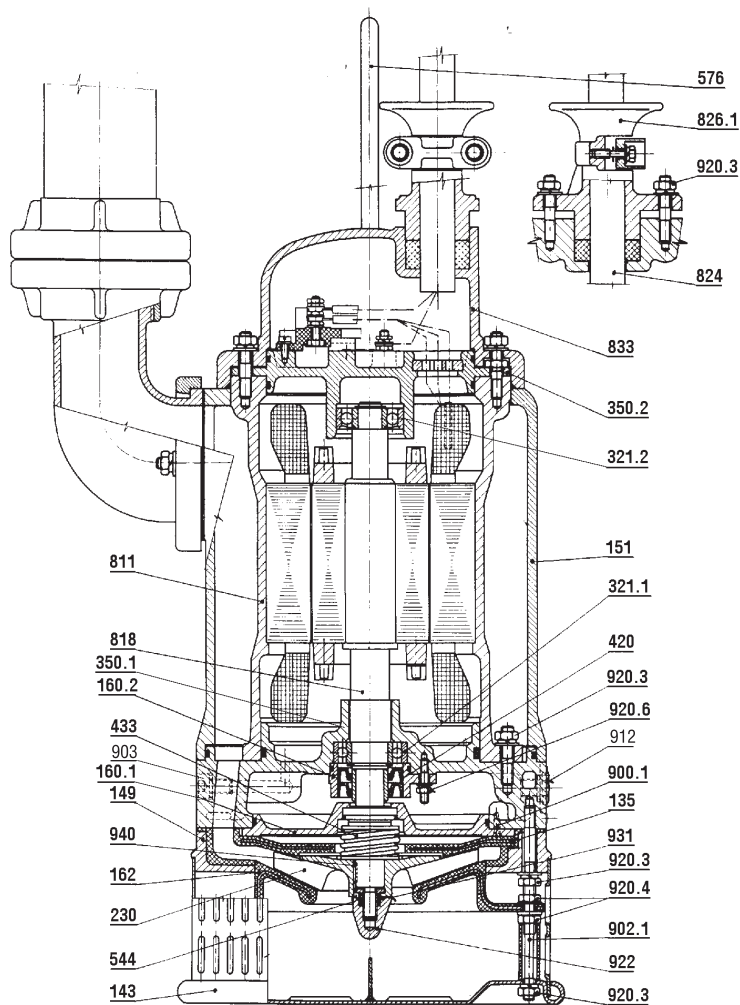


Fig. 4

135 - Impeller back plate	350.2 - Upper bearing housing	902.1 - Grub screw
143 - Suction screen	420 - Shaft radial lip seal ring	903 - Check screw (hexagon socket key)
149 - Diffuser	433 - Mechanical seal	912 - Plug
151 - Outer shell	544 - Threaded sliding sleeve	920.3 - Nut M8
160.1 - Oil cup bottom	576 - Handle	920.4 - Nut M8
160.2 - Bearing cover	811 - Stator jacket	920.6 - Nut M5
162 - Suction cover	818 - Rotor	922 - Impeller nut
230 - Impeller	824 - Cable	931 - Safety washer
321.1 - Lower bearing	826.1 - Cable entry	940 - Key
321.2 - Upper bearing	833 - Terminal board cover	
350.1 - Lower bearing housing	900.1 - Bolt M5x12	

5.0 ELECTRIC EQUIPMENT

5.1 In general

Electric equipment of the sludge pump of KDFU type can consist of a circuit breaker, a portable switchbox or a stationary-mounted switchgear provided with a water level sensor monitoring and controlling automatically the pump running according to the water level height.

The pump should be disconnectable from mains by means of a tripping device that is able to release contacts at all pole terminals to ensure full disconnection even under condition of overvoltage category III. This device is to be built into stationary-mounted lines, according to all regulations in force.

5.2 Pump circuitry

Pump wiring diagram is shown in the Fig. 5.

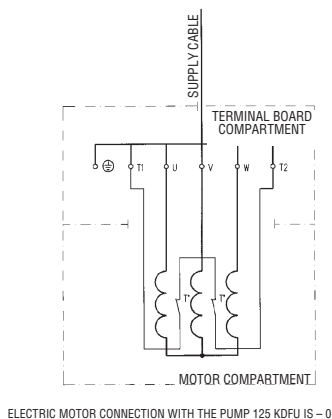


Fig. 5

Single conductors of a supply cable and the electric motor winding wires have been re-marked as follows:

Terminal	Colour	Terminal	Colour
U	black	\oplus	green/yellow
V	brown	T1, T2	white
W	dark grey		

Terminals T1, T2 - The circuit of bimetallic thermal indicators of the electric motor winding.

Circuit of bimetallic thermal sensors shall be connected to the pump control circuit, otherwise it is not possible to grant warranty for the pump!

Thermal sensors are provided with circuit-openings contacts of min. parameters as follows:

$$U_n = 250V$$

$$I_n = 2,5A (\cos \varphi = 1)$$

$$I_n = 1,6A (\cos \varphi = 0.6)$$

This pump shall be protected from overcurrent with an overcurrent circuit-breaker or an overcurrent relay of the inertia class T1 or T2, as well as from short-circuit. The overcurrent protection shall be set up to the pump (an

electric motor) break current given in the Section 3.0, in the Table 1 or on the pump rating plate label.

Pump protection from dangerous touch voltage of exposed conductive parts is to be ensured according to all regulations being in force.

Pump electric connection diagram with the electric equipment delivered (a circuit-breaker and a cable plug connected to the cable) is illustrated in the Fig. 6. However, the circuit breaker and the plug can be delivered only for pumps 65-KDFU and 80-KDFU.

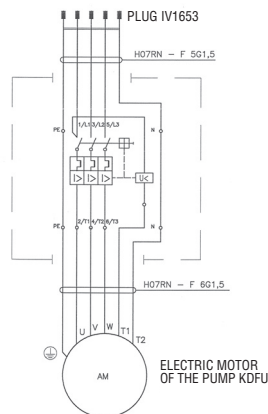


Fig. 6

5.3 Protection from dangerous touch voltage

Pump protection from dangerous touch voltage is to be guaranteed according to the CSN 33 200-4-41 and associated standards (as for a place of installation), mainly by protection, that is, by fully automatic switching-off from the power source and by an earth-leakage circuit breaker. Submersible sludge pump cannot be carried over if it is under voltage.

5.4 Assembly



Assembly of electric equipment (that is, transportable fast-moving switch and socket boxes of a stationary installed switchgear, and so on) must only be carried out by a person qualified in electrical engineering, according to standards in force and in accordance with by-laws.

When mounting it is necessary to recheck (set up) a breaking current value of the overcurrent relay according to the Table 1 in the Sub-section 3.0.

5.5 Putting into operation

Before putting the pump into operation it is necessary to recheck (to review) the electrical part, namely:

- Checking the pump supply cable for intactness

- Measurement of insulation resistance (it must be greater than 20 MΩ)
- Inspection of right setup of overcurrent protection
- Inspection of right setup from dangerous touch voltage.

Rechecking of the right direction of the pump rotation is to be realized according to the sub-section 6.2.

5.6 Operation and servicing



Submersible pump set may be operated by people enlightened and educated by course of the Law 50/1978 of the Code of Law, § 4, Sub-section 1.

Submersible pump set cannot be carried over if it is under voltage!!

ATTENTION!

If any damages of the pump or of electric equipment were detected it is inevitable to disconnect the pump from mains without delay and notify a qualified electrical engineer of the given problem.

5.7 Maintenance

If the pump is operated more frequently the electric equipment is to be rechecked once a month at least, and with the pump intermittent service – every two months and before every putting the equipment into operation, of course. All maintenance works must be carried out by a **person qualified in electrical engineering by course of the Law 50/1978 of the Code of Law, § 4, Sub-section 1.**

The most important measures are the full protection from dangerous touch voltage, measurements of insulation resistance (greater than 20 MΩ), checking the supply cable and/or the pump for intactness.

If the supply cord is damaged, it must be replaced by the producer's engineering inspector or by another competent specialist to prevent the occurrence of any potentially dangerous conditions.

All repair works can be only carried out on the pump being switched off and ensured against accidental starting-up. Replacement of a cable, as well as repairs of the pump other parts within which sealing surfaces are to be released and/or removed should be done by an authorized service centre only, because it is inevitable to guarantee tightness of all dismantled sealing joints in the future.

Notice



All works on the pumps relating to disassembly of the terminal board compartment, the motor electrical connection and disconnection should be performed by a competent and qualified specialist, observing all rules and regulations of electrical machines being in force. Connection of a supply cable MAY NOT BE done by an incompetent and unauthorized person.



If a fault was found out in the electrical installation or in the pump, it is necessary to switch the pump off immediately and notify a qualified electrical engineer of the problem.

6.0 PUMP OPERATION

6.1 General instructions

Before putting this pump into operation it is necessary to acquaint the service personnel with instructions given in this Manual that are inevitable for right and safe operation. It is insisted on strict observance of these rules and regulations, because this equipment works in a wet environment that is considered and classified as extra-hazardous as for electrical accidents.

6.2 Pump preparation for putting into operation

1. If a new pump and/or a pump after a longer operational shutdown (2-3 weeks) shall be put into operation, it is necessary to remove a suction screen and turn the pump rotor for several times with the aid of a wrench put on the impeller nut (230).

2. After the pump connection to mains it is necessary to re-check the right sense of rotation. Because the impeller and the pump rotating components parts cannot be seen if the pump is being fully-assembled it is recommended to proceed as follows:

The pump is to be either submerged into water or lifted and suspended on a rope and/or a chain, and then when holding the pump by handle the electric motor can be started up for a short time. Direction of rotation is right if the pump is moving round a slight amount (jerking) anticlockwise, which is opposite sense of rotation to a directional arrow marked on the pump that shows the pump right direction of rotation.

Check of rotation can also be carried out as follows: place the pump on the floor and lean it a bit to the side in such a way that the pump can stand on the suction screen bottom peripheral edge, and again - holding the pump by its handle the electric motor can be started up for a short time.

If the pump is trying to turn in the clockwise direction, sense of rotation is evidently wrong and it is necessary to interchange any of two phases.

Wrong sense of the impeller rotation can result in a considerable reduction of the pump performance. If electricity supply is cut off it is necessary to re-check the pump right sense of rotation. As for the new pump, it is inevitable to check the pump sense of rotation only with the whole suction screen submersion in water. Without application any of methods above-mentioned it is possible to re-check the right sense of rotation by monitoring rate of the hose filling, if the pump is submerged. However, this method can be solely acquired in practice.

When pumping from sumps, where some loose materials are settled, it is not suitable to put a pump on these sediments, because the pump can "dig in earth" and working surfaces of the hydraulic part can be worn-out unnecessarily. In such a case it is necessary to put a hard support plate under the suction screen, if suspension of the pump is not possible.

6.3 Pump servicing during operation

During operation this pump needs no servicing, however it is necessary to prevent bending, or even "breaking" of the hose, because of considerable reduction from normal performance, and further, the hose should not lie, to prevent its flattening and pushing against sharp edges of engineering structures, stones and so on, due to attack of flowing water.

7.0 MAINTENANCE

7.1 In general

During operation these pumps require only a minimum maintenance and it is limited to simple operations of preventive character that are specified thereafter. Nevertheless, it is necessary to devote reasonable care to maintenance works, because reliability, trouble-free operation and operating life of important component parts – e.g. the mechanical seal, electric motor, bearings and so on, as well as safety of operation - depend to a great extent on careful and strict implementation of all required maintenance works.

7.2 Check of mechanical seal oil and motor compartment

As for a new pump and/or after the mechanical seal replacement it is necessary to re-check oil after 20-30 operation hours, whether there was not water loss or penetration of water to oil, which can be realized as follows:

Put the pump on raised supporting pads, loosen and remove the plug (912). Oil level shall reach up to 5 to 10 mm below the tapped hole edge; and the plug shall be screwed by hand. Then turn the pump so that the plug was in the lowest position. That is, if any water penetrated in water it would settle at the bottom, so water would flow out as the first after removing the plug. So, it is recommended to place a clean cup and/or a palm to the hole and drain several cm³ of volume and determine whether there is an emulsion, water or oil. If everything is all right, retighten the plug but not before oil cooling, if it was warmed up during operation.

It is recommended to repeat the above mentioned check after 600 to 800 operation hours, however, if a suspense having highly abrasive effects is pumped the check must be repeat more frequently.

ATTENTION!

If water or light-coloured emulsion is found out after a longer time of operation, it is recommended to replace oil and re-check it after 50 to 60 operation hours. If water or emulsion is found out again, it is necessary to replace the mechanical seal (433).

After every check of oil filling it is recommended to carry out also checks of the motor compartment tightness. Put the pump in its vertical position and remove the check screw (903). Then the pump should be inclined a bit and found out through the hole, whether the electric motor is dry. **If water or oil emulsion is running out, it is necessary to take the pump out of service immediately and get the pump repaired! Neglect of these procedures could be the cause of the pump breakdown and the electric motor winding burning-out.**

It is recommended to use turbine oil TB 32 (classification ISO according to viscosity 3448 ISO WG 32).

7.3 Clearance adjustment between suction cover and impeller back plate

As for a new pump, the optimum clearance among the suction cover (162), the back plate (135) and the impeller (230) has been adjusted in the manufacturing plant. If the impeller and rubberized components, that is, the suction cover (162) and the impeller back plate have been worn-out the pump is still serviceable, but its performance has been substantially reduced. It is necessary to re-adjust all clearances enlarged due to wear.

a) Adjustment of clearance between impeller (230) vanes profile and its back plate:

Adaptation of this clearance is to be realized before adjustment of a suction cover. Put the pump on the mounting table, loosen up and screw together five nuts (920.3) together with spring washers and remove the suction screen (143) together with its bottom. Then unlock the lock washer (931), loosen up and remove the impeller washer (922) and retighten it up to the stop, then push the impeller down unless it touches the back plate with its profile and loosen the threaded sliding sleeve (544) preferably by hand, unless it sits down with its recess on the impeller hub, which appears from this that with further turning the impeller would move outwards. Clearance between the back plate (135) and the impeller (230) is to be set up so that after the threaded sliding sleeve sitting down on the impeller, this one can be "lifted" by the sleeve turning through 180°. Then slide the lock washer (931) and the impeller nut (922) on and retighten it. The impeller must rotate easily. And in the end lock the impeller nut with a washer.

b) Adjustment of clearance between suction cover and impeller

Loosen five nuts (920.4) that are located on the diffuser (149) side and unscrew them upwards. By retightening the lower nuts (920.4) the suction cover (162) can be pressed slightly to the impeller (230) so that the rotor

puts up a stronger resistance, when it is turning. This state determines the starting position for setting-up the right clearance.

Screw the upper nuts together unless they are attached to the suction cover and then the clearance can be taken up. This operation can be started from any of grub screws. At first it is necessary to retighten the upper nuts unless the rotor can be turned with slight and continuous resistance. If and until the rotor can be still turned tightly, loosen slightly the lower nut and pull the suction cover back a bit, until the desired rotor turning is achieved.

7.4 Lubrication of bearings, pump running dry

Operation life of bearings can be improved substantially using proper methods of re-lubrication. Lower bearing (321.1) shall be re-lubricated every time, when the bearing space is accessible for any reason – e.g. for stuffing seals checking. Otherwise it is recommended to re-lubricate after lapse of 4,500 – 6,000 running hours. Complete replacement of lubricating grease should be realized after eighteen months. Use the grease LV 2-3. As for the upper ball bearing - its grease charge is enough for 2,000 running hours. After lapse of this time it is necessary to replace grease charge for a new one. These types of bearings are provided with cover sheets either from one side or from both sides. If the cover sheets are one-sided, grease charge replacement is very easy. With double-sided covers it is necessary to remove one of the sheets (only on one side), and after the bearing dismantling and after re-filling the bearing is to be re-installed in such a manner the cover sheet is placed on the side of an electric motor rotor. Cover sheet prevents grease leakage out of the bearing, if the pump is in its working (that is vertical) position.

Pump running “dry” is not permitted.

7.5 Protection and maintenance of hoses

It is necessary to prevent so that any motor vehicles were driven over hoses being filled by water. The same is requested with empty hoses, because a hose could be broken in bends of flat width – namely of rubber layer - due-to local overload by a vehicle being driven over it. Before storage it is necessary to wash, rinse and dry up the hose properly, namely if it was used for pumping putrescent and foul water.

7.6 Check of mechanical condition

It consists of the pump visual inspection as for its mechanical condition. It is recommended to monitor namely:

- **Intactness of supply cable (824)** and its fastening in the cable entry. No crusted and hard-set impurities, as sand, clay and other materials of corrosive character, can remain in the cable entry to prevent abrasive wear of the outer cable sheath and penetration of moisture into the terminal board space and the motor compartment. And further, it is recommended to recheck, whether the cable entry

housing (826.1) is retightened sufficiently by nuts (920.3) for reasons of proper sealing of the supply cable.

- **Intactness of protective sieve on the pump suction side.**

Any larger holes caused by mechanical damage are unwanted and undesirable, because some solids can penetrate into the pump through them and damage mechanically the impeller or components.

- **Intactness of protecting components being under voltage,** that is, the terminal board space and the motor compartment. These are namely the cover of terminal board space (833), the upper discharge casing (350.2), the stator (811) body, the cable entry housing (826.1) and screwed/threaded joints. If any signs or appearances of intactness failure of these pump components were found out, it is necessary to take the pump out of service as soon as may be.

- **Degree of wear of hydraulic parts due-to operation.** It is recommended to give care to components of the hydraulic part (as for the impeller, rubberized components, and mechanical seal (433)). That is, stand-by hydraulic performance and the pump future operation efficiency depend on wear extent and depth.

8.0 REPAIR WORKS

8.1 In general

With respect to the construction workmanship of single component parts repairs of these pumps should be rather considered as replacement of parts and components. Repairs are possible only with the stator laminations of electric motors, that is, the winding can be rewound in case of its damage. Replacement of components and parts important in term of functionality and assembly is described in respective articles given below.

ATTENTION!

When mounting, the pump must be clean, without any remains of a pumped liquid. Carry out neutralization of the pump every time after pumping chemically polluted liquids. Use protective devices, observe all hygienic regulations!

8.2 Impeller replacement

If there is a need of replacement of a worn-out impeller (230) it is necessary to remove the suction screen (143) after loosening five nuts (920.3), and after screwing-together further five nuts (920.4) it is possible to push out the suction cover (162), and after unlocking, loosening and removing the impeller nut (922) it is possible to draw the impeller (230) off the shaft (818). In such a case the impeller cannot be drawn off easy the threaded sliding sleeve (544) and the nut wrench can be used for this purpose. We proceed as follows: slide the wrench leant against the bolts (902.1) on surfaces of the threaded

sliding sleeve (544) protruding from the impeller hub. Then turn the impeller in order to pull it off with the aid of a longer lever inserted among the impeller vanes. As for a new impeller assembly – please follow the procedure outlined under disassembly.

Clearance among the impeller back plate, the suction cover, the impeller itself shall be adjusted according to the Sub-section 7.3.

8.3 Replacement of impeller back plate

When replacing the impeller back plate (135) please, follow the procedure outlined under the paragraph of the impeller replacement. However, it is necessary to screw together additional nuts (920.4) and the diffuser (149) by which the back plate is pressed down to the oil cup bottom is to be pulled down.

After inserting a new back plate (135) of the impeller into the diffuser (149) the re-assembly can be carried out in the reverse order of works.

8.4 Replacement of mechanical seal and radial shaft lip seal rings

Dismantling can be carried out in the same way as with the impeller back plate replacement and further, two additional bolts (900.1) are to be removed. After taking the key (940) out, the mechanical seal moving parts shall be removed carefully after previous draining of oil and lubricating by oil this shaft part through which the mechanical seal can be forced off. After dismantling the oil cup bottom (160.1), the stationary part of the mechanical seal can be forced off as well. As for re-assembly – please follow the procedure outlined under disassembly.

You ought to be extremely cautious about the cleanliness!

When checking and/or replacing radial shaft lip seal rings (420), it is necessary to loosen and bolt together 5 nuts (920.6), remove the bearing cover (160.2), whereby replacement of wear rings is possible. And it is also necessary to inspect the shaft protective sleeve, whether at the point of contact there are not any worn-out grooves. If the grooves are worn-out, it is necessary to replace even the sleeve – with the models 65, 80, 100-KDFU, as for the model 125-KDFU it is sufficient to remove one or both washers under radial shaft lip seal rings.

Within these works it is recommended to re-grease the lower ball bearing.

8.5 Replacement of stator laminations

If during the stator insulation resistance checking it was found out that the value had decreased to zero, the stator would be replaced. A reduced insulation state with a dampish winding can be set right with the aid of drying-out, according to the Czech Standard CSN 35 0010. However, if replacement is necessary, the following procedures should be applied:

Dismantle the pump upper parts and the stator, including

the stator jacket, can be put on a hard supporting plate with the electric motor stop always up; then the stator jacket can be warmed up with the aid of a dispersed flame up to temperature 150 to 160°C, and if the stator could not be removed in that way, tap its laminations from the upper side. The stator cylindrical part must be cleaned up and any local unevennesses inside the jacket of aluminium alloy caused within disassembly works must be evened up, so the stator can be inserted freely after its warming-up. Replacement of a damaged stator by a new one is possible to carry out with warming-up the jacket only once.

9.0 SPARE PARTS

Every component part of these pumps is replaceable.

When ordering the spare parts and during any negotiations it is necessary to give:

- Pump type
- Pump serial number
- Correct nominal designation of parts, according to the Fig. 4

Pump model and its serial number are given on the rating plate label being attached to the pump.

10.0 OPERATIONAL FAULTS, THEIR CAUSES AND FAULT CLEARANCE

OPERATIONAL FAULTS:

1. Pump is not starting-up and its motor is not working as well.

2. Pump is not starting-up and its motor is "buzzing".

3. Pump is starting-up, but its output/delivery is low.

4. Fuse elements are blown out.

5. Protection of electric motor cuts off.

6. Insulation resistance of electric motor winding has dropped under permissible limit.

7. Oil emulsion or water was found out during check of oil charge.

8. Efflux of a pumped liquid is interrupted.

CAUSES:

- 1.1 Dead electrical power network.
- 1.2 Fuse blown out or contactor cut-off.
- 1.3 Interrupted current supply.
- 1.4 Terminal unclamping.

- 2.1 One of fuses is blown out. Supply into one of phases has been interrupted. Unclamped terminal.
- 2.2 Impeller has been locked with material entering between the impeller and the suction cover, and/or the impeller back plate.
- 2.3 The pump is bogged in heavy sediment.

- 3.1 Discharge hose has been choked up or broken.
- 3.2 Discharge hose is clogged or broken in two.
- 3.3 Pump is sucking air.
- 3.4 Impeller gap is too large.
- 3.5 Clogged suction screen.
- 3.6 Excessive wear of hydraulic parts, namely of the impeller and the suction cover.
- 4.1 Clogged suction screen.
- 4.2 Heavy drop of voltage in mains.
- 4.3 Undersized supply.

- 5.1 Incorrect set-up of safety overload relay.
- 5.2 Electric motor overload due-to material entering among the impeller and the suction cover, and/or the back plate.
- 5.3 Electric motor overloading due-to pumping excessively heavy sludge or due-to digging into sedimented sludge.
- 5.4 Insufficient cooling of the stator body and the electric motor due-to a hydro mixture over permissible temperature 40°C, discharge chocking; running "dry" for too long time.

6.1 Winding wetting due-to defects of sealing elements, that is, "o"-rings and the mechanical seal.

7.1 See the sub-section "Check of mechanical seal oil and motor compartment".

8.1 Supply of a pumped liquid is lower than a pump maximum usable flow. Impeller flooding is not regular.

FAULT CLEARANCE

- 1.1 Repair
- 1.2 Repair.
- 1.3 Repair.
- 1.4 Repair.

- 2.1 -
- 2.2 Dismantle, remove impurities.
- 2.3 Lift a bit above the sludge level, clean the suction screen.

- 3.1 Interchange two of phases in the terminal board (a person qualified in electrical engineering).
- 3.2 Clean, straighten.
- 3.3 Suspend a bit lower.
- 3.4 Adjust.
- 3.5 Clean up the screen.
- 3.6 Replace for new component parts.

- 4.1 Repair.
- 4.2 Repair.
- 4.3 Repair.

- 5.1 Set up to the motor rated current.
- 5.2 Dismantle, remove all impurities.
- 5.3 Reduce consistency and volume density of a pumped sludge. Lift the pump a bit above the sludge level.
- 5.4 Clear all faults.

6.1 Dry out, re-wind – if it was damaged, replace damaged packing.

7.1 See the sub-section „Check of mechanical seal oil and motor compartment“.

8.1 Increase inflow, throttle the discharge a bit.

11.0 SCOPE OF DELIVERY

- Pump fully assembled with a cable of length 15m, another length on request (25 m)
- Tommy bar socket wrench 6, CSN 23 0710
- Wrench 8, CSN 23 0681
- Wrench 110/75 (only with deliveries containing delivery of a hose)
- Pumps 65-KDFU and 80-KDFU, with a number of alteration 04 in its type designation are provided with a circuit breaker and a plug.

On request it is possible to deliver:

- Hose in length of 10m, another length on request (20m), e.g. of the following sizes:
- C 52 with two half-couplings for the pump 65-KDFU
- B 75 with two half-couplings for the pump 80-KDFU
- A 110 with a screwed connection 110 (1pc) for pumps 100-KDFU and 125-KDFU.

12.0 WARRANTY

Time duration of the warranty is given in the Certificate of Warranty, or it is an integral part of the contract of purchase, however the producer does not answer for a damage caused due-to incorrect and unprofessional, incompetent service, the machine overload or due-to other accidental reasons and breach of recommendations and directives given in the Service and Installation Instructions. During the warranty period it is possible to carry out the pump disassembly solely with the agreement of the Producer.

13.0 BOOK OF RECORDS

LAST MAINTENANCE		PUMP WORKING PLACE	NOTICE	SIGNATURE
DATE	SERIAL NUMBER			

14.0 DISPOSAL OF WASTE



Directions to disposal of waste generating during life cycle of the pump (by course of § 10, Cl. 3 of the Law of Wastes No. 185/2001 of the Code of Law, as amended).

Sort of waste	Code *)	Category*)	Method of disposal
Paper and/or cardboard packing	15 01 01	0	Utilizable waste – after sorting-out it is necessary to hand it over to an authorized person ensuring purchase and taking waste or secondary raw materials.
Paper and/or cardboard	20 01 01	0	
Cables	17 04 08	0	
Other scrapped/disabled materials – pump metallic parts (without oil remains)	16 02 05	0	
Other scrapped/disabled parts – non-metallic elements of pumps (e.g. of carbon, carbide, ceramics, SiC)	16 02 05	0	Other waste – it is necessary to collect it and hand it over to an operator of a waste dump.
Other scrapped materials – rubber elements of pumps	16 02 05	0	
Wood packing	15 01 03	0	Other waste – it is necessary to collect and hand it over to disposal in a waste dump.
Plastic packing – foil of PE	15 01 02	0	
Small plastic matters **)	20 01 03	0	
Non-chlorinated motor, gearbox oil and/or lubrication oil	13 02 02	N	Hazardous waste – it is necessary to collect and hand it over to disposal by an authorized person.
Other motor, gearbox and/or lubrication oil	13 02 03	N	
Other solvents and their mixtures with preservative products (except of organic-decomposable)	14 01 03	N	
Products of tar – smooth roofing paper	17 03 03	N	
Materials containing unfixed asbestos	16 02 04	N	It is not used at present time

*) See the Public Notice No. 381/2001 of the Code of Law, in which the Catalogue of waste was published

0 – Other waste

N – Hazardous waste

) **ATTENTION! Polytetrafluoroethylene (Teflon, PTFE) shall not be incinerated elsewhere than in a waste incineration plant due to their toxicity!



Ecological disposal of this equipment is guaranteed within the scope of the collective system RETELA, by course of requirements of the Law No. 185/2001 of the Code of Law, of waste, as amended. Collection spots of electro-waste are disclosed at the Internet site www.retela.cz.



Re-acceptance and re-usage of waste of packing is guaranteed within the scope of the collective system EKO-KOM by course of requirements of the Law No. 477/2001 of the Code of Law, of packages, as amended. Information on collection, selection a utilization of waste of packing are given at the internet site www.ekokom.cz.

We reserve the right to alter specifications and illustrations without prior notice.

Certificate No. 041005278/000/E1



SIGMA 1868 spol. s r. o.

Jana Sigmunda 79

783 50 Lutin

Tel.: +420 585 651 302

Fax: +420 585 651 339

www.sigma1868.cz

TD 51 403	0110
-----------	------