

**OPERATING AND INSTALLATION
INSTRUCTIONS FOR
SMALL SUBMERSIBLE SLUDGE PUMP**

GFDF - 032



OEM'S SERVICE INSTRUCTIONS

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1.0 GENERAL DATA

1.1 Application

This small submersible pump GFDF – 032 is destined for pumping liquids and sludge with the content of dry residues no more than 10% of weight units, and also with a content of small fragmented materials up to the size Ø10 mm.

Max. temperature of a pumped liquid and ambience is 40°C. (Higher temperature is possible by agreement of the producer, after assessment of real operating conditions.)

Specific weight of a pumped liquid max. 1050 kg.m⁻³
Permitted range of pH of a pumped liquid..... 6.5 – 9
Pump max. submersion 10 m



PUMPS ARE NOT DESTINED FOR OPERATION IN EXPLOSION HAZARD ENVIRONMENTS!



This equipment is not destined for using by persons (including children), whose physical, sensory or mental deficiency and/or lack of experience and the knowledge do not make possible to use this equipment safely, 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 machine.

Noise level

Equivalent level of acoustic pressure A in the distance of 1 m from the pump set surface (while using a weighting filter A) does not exceed the value $L_{PA} = 70$ dBa.

1.2 Product data

ATTENTION!



Lead-in cable must not come into contact with oily water and waste water containing hydrocarbons!

Electric motor running can be continuous and/or intermittent. Number of equalized switching operations in an hour is given by the table in the Section 3.0 Performance data.

ATTENTION!



Pump running dry without filling the hydraulic space with a pumped liquid is not permissible. Only the instantaneous switching is permitted – there is a real danger of the mechanical seal damage.

If the pump is running continuously it is inevitable to keep the stated level depth of the pump submersion in a pumped liquid for reasons of an electric motor cooling, see the Fig. 1. When a sump final draining is required the pump can work with the motor part being surfaced entirely for a short time (about 10 min.).

The pump can work either in its horizontal or inclined positions (if all conditions of minimum submersion have been observed, see the Fig. 1).

Inadmissible ways of application

- Pump cannot convey other liquids than water
- Pump cannot be used in explosion hazard environments
- Pump cannot convey water containing acids, lyes, hydrocarbons, sea water, chemicals, and so on
- Pump cannot run dry
- This pump has got the definite specified purpose of using by its name, design and application given in the Section 1.1, and using it for any else purpose cannot be supposed owing to safety even intentionally, deliberately, accidentally or due to any ignorance

1.3 Delivery scope

Pump Electric Equipment

a) Single phase workmanship version 230V 50Hz

- 10m of the cable H07 RN-F 3G1
- Plug 2P+E according to the CEE 7/VI (e.g. the type 5537 for consumer's installations or the same type in the version "Flexo", or according to the CEE 17. IEC 309 (e.g. the type IV 1632 destined for industrial distribution systems, as well as for consumer's installations)
- Float switch MAC 3 10A, 250V

b) Three phase workmanship version 400V 50Hz

- Fixed connection – 10m of the cable H07 RN-F 4G1

c) Three phase workmanship version 400V 50Hz

- Portable workmanship version – 10m of the cable H07 RN-F 4G1
- Circuit breaker Mbs 25(1.5 - 2.5A), protection IP55
- 3 m of the cable H07 RN-F 4G1 for interconnection of the circuit breaker with the plug
- Plug 3P+E according to the IEC 309-1,2 (e.g. the type IV 1643)

Overview of proper circuit breakers (3PH) – they are not a part of delivery.

- NOLTA 80 202 206 (1.6A-2.5A)-(3P+E) IP44, Comp. Nolta (import)
- NOLTA 80 202 206 (1.6A-2.5A)-(3P+E+N) IP44, Comp. Nolta (import)
- SM1 – 2.5 (1.6-2.5A), Comp.OEZ Letohrad

For installation of a circuit breaker outside of an indoor enclosed switchgear it is necessary to deliver the following equipment:

- 1 pc - Box SI-SM1 (IP44) or SI1-SM1-M (IP55)
- 2 pcs - Cable entry relieved from tension HSK-K Pg 16 (Ø 7-12 mm), Company "Hummel" represented in the Czech Republic through the Company "Jork s.r.o".

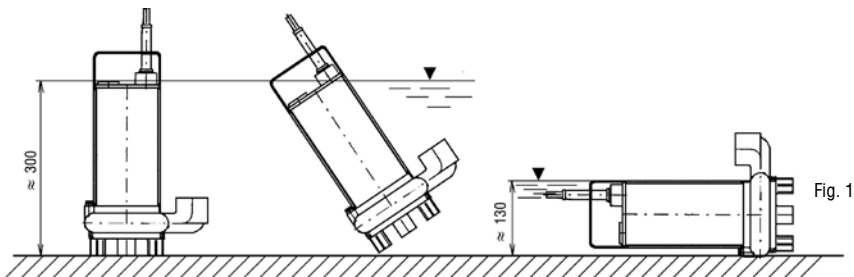
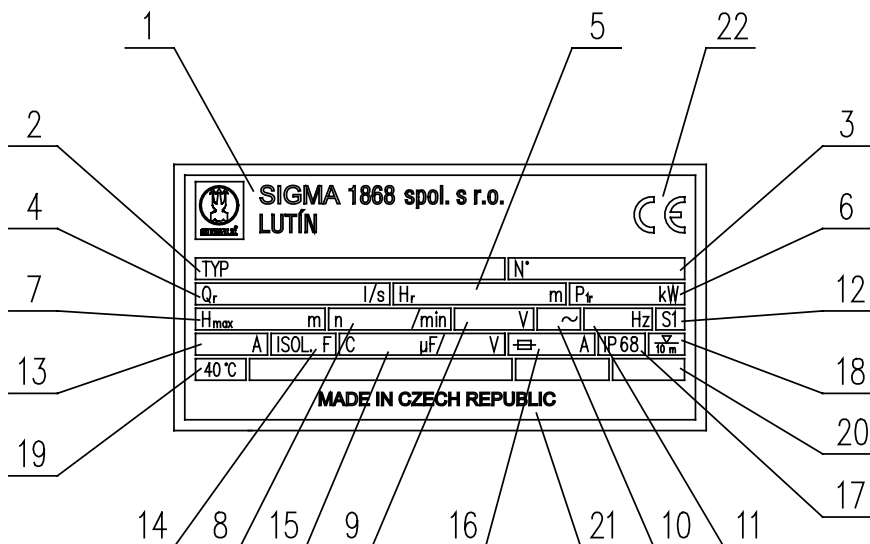


Fig. 1

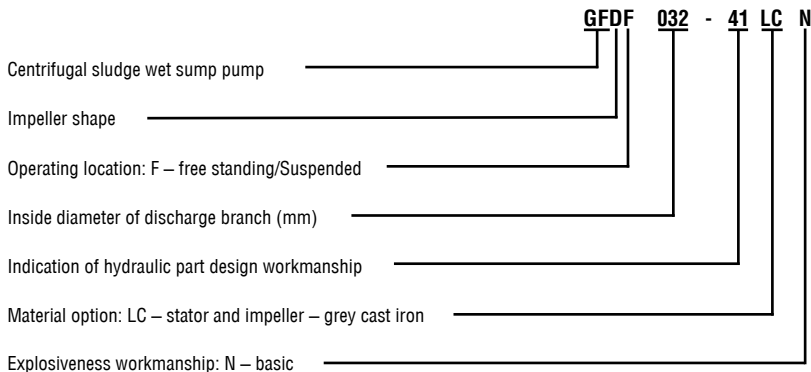
1.4 Pump Rating Plate



- | | |
|---|---|
| <ul style="list-style-type: none"> 1 - Producer's Business name and Headquarters 2 - Type designation 3 - Serial number 4 - Range of rate of flow 5 - Range of delivery head 6 - Pump set power demand 7 - Max. delivery head 8 - Speed 9 - Rated voltage 10 - Number of phases, Current type 11 - Rated frequency 12 - Load type | <ul style="list-style-type: none"> 13 - Rated breaking current 14 - Class of insulation 15 - Capacity and voltage of capacitor 16 - Rated value of incoming fuse (if it is required by standards) 17 - Protection 18 - Maximum working depth 19 - Temperature of a pumped liquid 20 - Year of production 21 - Country of origin 22 - Mark of conformity |
|---|---|

1.5 PUMP MODEL KEY

Meaning of the given notation:



2.0 SAFETY

These Service and Installation Instructions contain basic instructions that shall be observed within installation, operation and maintenance of these pumps. 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. Keep this Manual handy for future reference at site. All general rules given in these Service and Installation Instructions shall be observed, without exception.

Safety rules included in these 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 breach of which could cause damage of the pump and endanger its safe functioning shall be provided with the advice

ATTENTION!

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



2.1. Safety in operation and maintenance

- Only a specialist qualified in electrical engineering is allowed to mount and install electrical accessories, according to the standards in force any by-laws.

- When disassembling a pump, the pump must be perfectly clean and all remains of a pumped liquid are to be removed.
- After pumping chemically polluted liquids it is necessary to carry out their neutralization prior to handling.
- It is inevitable to keep perfect personal hygiene (a risk of infection).



At any manipulation with the pump (handling, impeller turning, dismantling) it is necessary to disconnect it from mains and prevent its connection across the line by mistake



Before any manipulation it is necessary to make sure that the pump has been disconnected from the mains with pulling the plug out of the socket.



In case of the single motor overloading the thermal receptor built into the motor winding will switch the pump off, and it will switch the pump on again after cooling the pump motor down.

2.2 Analysis of residual risks

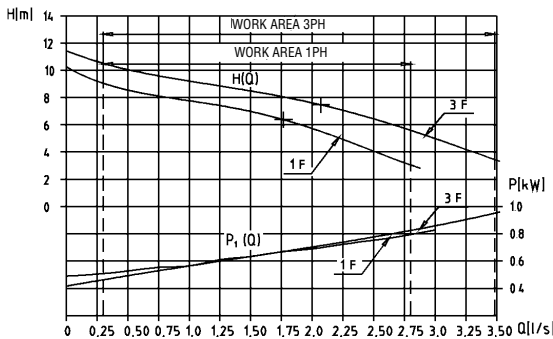
Due-to declared throughput rate of the pump hydraulic part and installation of a grinding tool (disintegrator) on the suction side it is not possible to avoid absolutely the access to the suction and impeller spaces. That is why it is needed to observe all warnings given in the section 2.1.

3.0 PERFORMANCE DATA

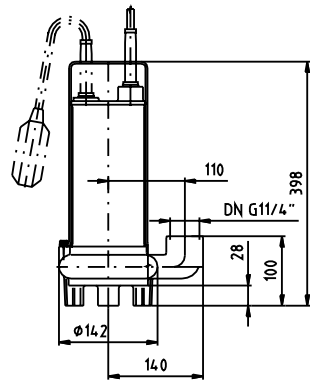
Impeller	Torque-flow	
Impeller throughput rate \varnothing (mm)	10	
Pumped liquid	Sludge, sewage, raw waste water with content of gases and fibrous matters	
Electric motor	Definite purpose	
No. of switching operations an hour	10	
Insulation and protection	Class F, IP 68 \approx 10 m	
Frequency f (Hz)	50	
Voltage U (V)	230	400
Number of phases	1	3
Breaking current for the circuit breaker setting I (A)	3.8	1.8
Capacitor C (μ F) / 450 V	20	-
Speed n (min^{-1})	2840	2800
Lead-in cable HO7 RN - F	3x1	4x1
Weight, including the cable m (kg)	11.5	12.2
Max. power input in the work area P_1 (kW)	0.83	0.95
Incoming fuse	16	According to the overload protection

3.1 Pump diagram

PERFORMANCE CHARACTERISTICS - 1PH WORKMANSHIP (230 V)
 - 3PH WORKMANSHIP (400 V)



3.2 Pump dimensions

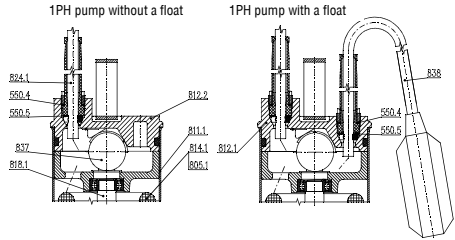
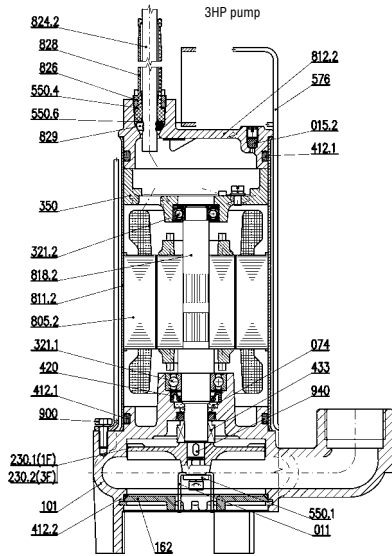


Pump workmanship version

- Single phase without a float
- Single phase with a float
- Three phase without a float, without a circuit breaker
- Three phase without a float, with a circuit breaker

4.0 PUMP DESCRIPTION AND ITS ACCESSORIES

4.1 Pump sectional view



- | | |
|---|--|
| 011 - CUTTING TOOL | 576 - HANDLE |
| 015.2 - PACKING OF THE PRESSURE RELIEF HOLE | 805.1 - ELECTRIC MOTOR 230V/50HZ |
| 074 - OIL (FRIENDLY TO THE ENVIRONMENT) | 805.2 - ELECTRIC MOTOR 400V/50HZ |
| 101 - PUMP CASING | 811 - CASING |
| 162 - SUCTION PIECE | 812.1 - TERMINAL BOX COVER – 1PH WITH A FLOAT |
| 230 - IMPELLER | 812.2 - TERMINAL BOX COVER – 3PH ... 1PH WITHOUT A FLOAT |
| 321.1 - LOWER BEARING | 818.1 - 1PH ROTOR |
| 321.2 - UPPER BEARING | 818.2 - 3PH ROTOR |
| 350 - UPPER BEARING HOUSING | 824.1 - CABLE H07 RN-F 3G1 |
| 412.1 - WEAR RING | 824.2 - CABLE H07 RN-F 4G1 |
| 420 - RADIAL SHAFT LIP SEAL RING | 826 - GLAND BOLT |
| 433 - MECHANICAL SEAL | 828 - CABLE JACKET |
| 550.1 - THRUST WASHER | 829 - CLAMPING ELEMENT |
| 550.4,6 - BUSHING WASHER 3PH | 837 - CAPACITOR |
| 550.4,5 - BUSHING WASHER 1PH | 838 - FLOAT SWITCH |
| | 900 - HANDLE SCREW |
| | 940 - KEY |

4.2 In general

This pump is of centrifugal vertical submersible single stage type in monobloc-arrangement, with a single stage and/or three stage electric motors. The hydraulic part consists of the torque-flow impeller (230) mounted on the extended shaft of the pump electric motor rotor with the aid of the key (940) and the impeller screw with the thrust washer (550.1) that brings the cutting tool (011) on the working position against the suction piece (162). The pump casing (101), the stator (805) and the terminal box cover (812) are joined into the only one unit with the aid of the belt handle (576), using screws (900). The rotor of electric motor and pump (818) is carried in rolling-contact bearings (321) with their own grease filling in the pump casing and the upper bearing housing (350). The compartment of the electric motor and the terminal box is watertight separated from the outer space and the hydraulic space with special highly-effective closures: the rotor shaft with the mechanical seal (433) and the radial shaft lip seal ring (420), the entries of cable and float with the cable jacket (828) and with their parts (826;550.4;550.6;829;550.5), the casing jacket with o-rings (412.1), and the pressure relief hole with packing. The space between the radial shaft lip seal ring (420) and the mechanical seal (433) is filled with biodegradable oil only because of a possibility of the pump momentary running dry. For reasons of increasing the safety against an electrical accident the pump handle gripping part is insulated with plastic. Electric current is supplied with the power cable (824). The single phase workmanship

version can be delivered together with a float unit (838) for level surface controlling.

Motor

Single phase workmanship version

Single phase asynchronous squirrel-cage motor, 230 V, 50 Hz. Starting-up is secured with the aid of a capacitor located inside the pump. Thermal insulation of winding is of the Class F. In the winding there is a thermal receptor built-in.

Three phase workmanship version

Three phase asynchronous squirrel-cage motor of 400 V, 50 Hz

Lubrication

Mechanical seal

For the mechanical seal lubrication and cooling during the pump putting into operation (for a short turn) in the space between the mechanical seal seat and the radial shaft lip seal ring there is some biodegradable oil (e.g. food oil LUKANA, CONNEXOL SKH-80). After the pump starting-up procedure finishing, the mechanical seal is cooled and lubricated with a pumped liquid.

Bearings

They are lubricated with a plastic lubricant already in the manufacturing plant (it is closed in the bearing with two side guards) and they do not have to be re-lubricated throughout the service life of these bearings. Replacement of these bearings is recommended after the lapse of 10,000 hours of work.

Radial shaft lip seal ring

It is grease-lubricated with the PM-LV2-3 TP 22-257-85

4.3 Material options

Main parts of this pump are of the following materials:
 Pump casing, upper bearing housing, impeller and terminal box cover Grey
 cast iron
 Shaft.....stainless steel
 Wear rings.....rubber
 Mechanical seal.....carbon + ceramics

5.0 INSTALLATION

5.1 Pump preparation before starting-up

ATTENTION!



- Carry out a visual check of condition of a lead-in cable (and a float) whether any damages did not happen during its manipulation. If the power supply cord was damaged it should be replaced for the new one by the producer, their service engineer or by a qualified person to avoid any potentially hazardous situations.

- Before turning the rotor by hand with the aid of a wrench make sure the pump has been disconnected from the mains. There is a real danger of a serious injury due to ejected tool with unexpected starting-up!

- Turn the rotor with the aid of a hexagon socket key "to the right" (after "unsticking" it must not rotate stiffly).

5.2 Mains connection

From overloading the 1PH pump is protected with automatic thermal fuses in the electric motor winding and it is not necessary to protect it with another circuit breaker.

ATTENTION!

It is necessary to protect the pump from a short circuit through incoming fuses of values according to the table – see 3.0 Performance data.

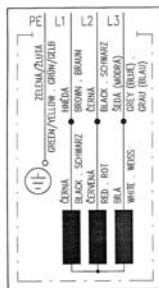
It is necessary to protect the pump 3PH motor with an overcurrent circuit breaker with motor characteristic or a motor starter set to the value of breaking current according to the Table – see 3.0 Performance data.

ATTENTION!

It is necessary to protect the pump with installation of incoming fuses to the value according to the table – see 3.0 Performance data.

In such a case the pump power supply is not and will not be provided with a plug and the pump shall be connected to the stationary, fixed-mounted distribution system, then a device for the pump disconnection from the mains shall be installed, with the distance of disconnected contacts of 3 mm, at least.

Work of a disconnecting device can be eventually done by a disconnecting circuit breaker.



Internal wiring diagram of the 3PH pump

Connection of conductors to the mains connection:

Brown core – Phase L1

Black core – Phase L2

Grey (blue) – L3

Green / yellow core – protective earth conductor

- Re-check whether the data on the pump rating plate correspond to that power supply to which the pump should be connected (voltage, frequency).

- With the aid of the cable end connector (a plug, a plug-in circuit breaker) it is possible to connect the pump to the electrical power networks.

- Re-check the right sense of rotation with a short switching-on "dry", either visually or with the aid of the pump reaction when switching-on (the pump can jerk in the opposite direction of rotation).

5.3 Pump installation to its working position

This pump is able to work (if the minimum submersion depth is observed and kept):

- Hung (on a rope or on a chain)
- Installed on a hard flat foundation
- Free installation in a place in different positions

The pump discharge can be connected to:

- Hose
- Fixed pipeline (forces from the pipeline must not be transferred onto the pump)

ATTENTION!



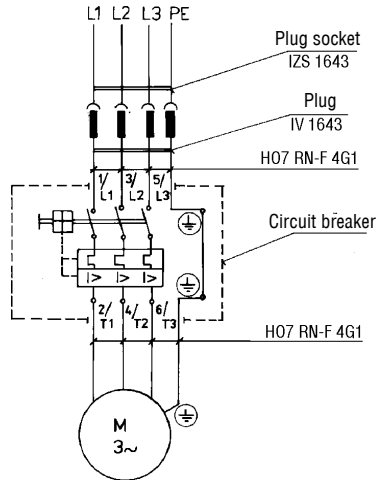
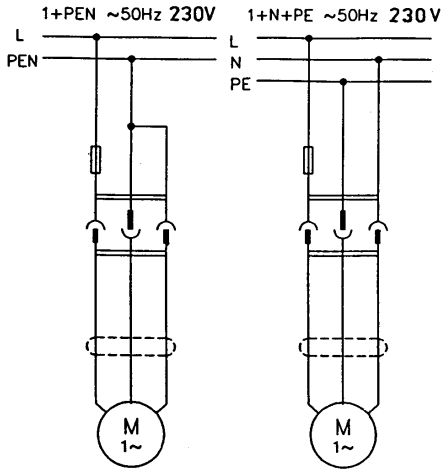
When lowering the pump into an excavation pit, a sump and at any other manipulation it is strictly forbidden to pull the cable!

6.0 PUTTING INTO OPERATION AND PUTTING OUT OF OPERATION

6.1 Putting into operation

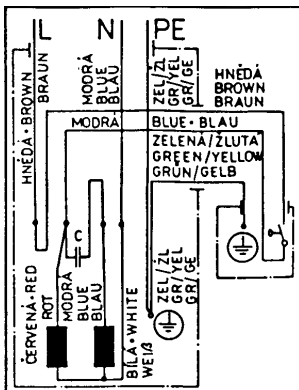
After installing the pump into its working position and connecting the discharge it will be possible to start up the pump by connecting a cable to the mains, and with respect to the three phase pump it is also necessary to depress the starting push button of the circuit breaker integrated to the mains connection, and further it is necessary to place the float of the single phase pump to the switching position (submersion of the pump into the appropriate depth or lifting the float into the switching position).

Pump connection to the mains

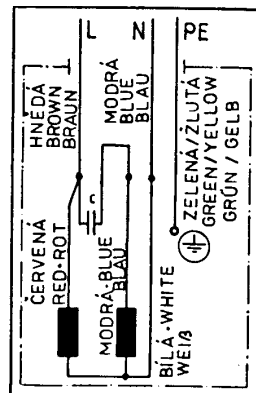


Note: Circuit breaker Mbs 25 has got also short-circuit protection

Internal wiring diagram of the 1PH pump



a) With a float



b) Without a float

Connection of conductors to the mains connection:

Brown (black) core – phase conductor

Light blue core – centre / neutral conductor

Green / yellow core – protective earth conductor

6.2 Putting out of operation

1PH pump – disconnection of the cable end connector from the mains.

3PH pump – switching-off with the aid of the mains power switch, or using the switching-off push button of the integrated circuit breaker.

If we expect that the pump will be out of operation for a longer time, it is necessary to lift the pump out of a pumped liquid and rinse it with clean water.

This pump must not be kept in water in frosty weather if it is not working.

ATTENTION!

For de-freezing ice residues it is necessary to immerse the pump in water (before its putting into operation). It is not allowed to use a flame for its de-freezing

7.0 SERVICE AND MAINTENANCE

This pump does not require professional service, as well as any maintenance. During operation it is necessary to check whether it reaches the set working capacity (flow volume and delivery head) and whether it is properly immersed. In the negative case it is inevitable to implement measures under the Clause 12.0 – Notes prepared to help you prevent problems as well as deal with them.

After 10.000 working hours of normal operation it is recommended to carry out the pump overhauling in the service centre. Because all repairs are very demanding it is recommended to have the pump repaired in the authorized service centre (See the Section 11.0).

Spare parts are delivered by the manufacturing plant or the authorized service centre.

8.0 PACKING

Single pumps are packed into wrappings specified by the technical documentation, including the certificate of warranty and the Operating and installation instructions.

9.0 TRANSPORT AND STORAGE

The pump can be transported in both horizontal and vertical positions.

When transporting, the pump must be protected against overturning or rolling-away.

Normal handling can be carried out with the aid of the plastic-coated handle.



It is not permitted to subject the cable to excessive axial tension, pressure, abrasive wear, and so on, or another mechanical stress

The pump should be stored in dry conditions at temperatures from -30°C to +40°C.

The pump may be stored in its horizontal or vertical position. Before storage the pump must be clean and dried thoroughly. If it is stored longer than one year, it is necessary to restore preservation of functional surfaces of the volute and the impeller. The biodegradable Vaseline SHELL BIOFETT AS 00 of the Company SHELL is recommended for this purpose.

10.0 WARRANTY

Duration of warranty is given in the Certificate of warranty. The producer is not liable for damages resulting from poor and unprofessional service, the machine overloading or other random causes. During the warranty period the pump disassembly can be solely carried out by the producer or by one of authorized service centres with the producer's consent.

11.0 SERVICE

The list of authorized service centres is usually included in the Certificate of warranty. However, it can be also enclosed separately to the accompanying technical documentation.

12.0 NOTES PREPARED TO HELP YOU PREVENT PROBLEMS AS WELL AS DEAL WITH THEM



Repairs of power supply and repairs associated with entering the terminal box space must be carried out by the manufacturer themselves or by an authorized professional service.

If the pump normal output gets reduced or it is zero during the pump normal operation, it can be caused by the following reasons:

PROBLEM	CAUSE OF PROBLEM	MEASURES
1. Pump cannot be started up, its motor is quiet.	1.1 Source is dead – absence of voltage.	-
	1.2 Interrupted power supply (cable, pump terminal box).	Direct to a nearest designated authorize service centre
	1.3 Float switch device is not working (single phase version)	Direct to a nearest designated authorized service centre
	1.4 Bimetal switches in winding are switched out. (1PH version)	Let the pump cool down and ensure its operation at the correct immersion (see the Clause 1.2 Product data)
2. Pump cannot be started up, the motor is buzzing.	2.1 Damaged capacitor, interrupted supply to the auxiliary phase (at the 1PH version)	Direct to a nearest designated authorized service centre
	2.2 Impeller has been locked due to an object penetrated between the impeller and the volute	Remove all objects and solids
	2.3 Rotor has been locked due to its sticking on sealing faces and gaps (it can namely occur at the 1PH pump after a longer operational shutdown)	Turn the impeller for several times
	2.4 At the 3PH pumps one of the fuses was blown or the power supply has been interrupted	Remove all failures and damages (a specialist qualified in electrical engineering)
3. Pump has started running, but volume rate of flow is too small and the running is sometimes noisy.	3.1 The motor reverse sense of rotation (at the 3PH pump)	Exchange any two conductors in the power supply (it can only be done by a specialist qualified in electrical engineering)
	3.2 Discharge hose (pipeline) or suction are clogged	Clean it thoroughly
4. The fuse has blown, the circuit breaker cuts off the power	4.1 Short circuit in the power supply, big drop of voltage in the mains, overloaded motor, or motor winding is overloaded.	Remove all failures and damages (a specialist qualified in electrical engineering)
5. Water in the terminal box space or in the motor winding (insulation condition 0)	5.1 One of the sealing parts was damaged (radial shaft lip sealing ring, mechanical seal, o – ring, and so on)	Direct to a nearest designated authorized service centre
6. Power supply has been damaged		ATTENTION! Replacement of the power supply can only be carried out by the producer or by a designated authorized organization with the aid of special tools
7. 1PH pump stops and runs in spontaneously	7.1 The pump is working out of its working area, the electric motor is overloaded	It is necessary to increase resistance on the discharge side (pumping can be carried out by the connected hose in length of 10 m - DN 32)

13.0 GUIDELINES ON 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).

1. Household appliances

Sort of waste	Code ¹⁾	Category	Method of disposal
Paper and cardboard packages	15 01 01	0	Other waste - Utilizable waste – through sorted refuse collection in communities it is necessary to hand it over to a person authorized to waste disposal. ³⁾
Scrapped/disabled electrical and electronic devices – pumps	20 01 36	0	Entirely worn-out electric devices shall be passed (free of charge) in a place destined for it (collection spot). In no case it may be disposed together with normal mixed municipal waste! ⁴⁾

2. Parts of industrial pumps

Sort of waste	Code ¹⁾	Category	Method of disposal
Waste of electrical and electronic devices - scrapped/disabled parts	16 02 14	0	Other waste – Utilizable waste – after sorting it is necessary to hand it over to a person authorized for purchase of waste or secondary raw material.
Paper and/or cardboard packages	15 01 01	0	
Other scraped devices – metallic components of pumps (without any oil remains)	17 04 07	0	
Other scraped devices – non-metallic components of pumps (e.g. of carbon, carbide, ceramics)	16 02 16	0	Other waste – it is necessary to collect and hand it over to a waste dump operator.
Other scrapped materials – rubber elements of pumps	16 02 16	0	Other waste – it is necessary to collect and hand it over to disposal in a waste incineration plant.
Wood packing	15 01 03	0	
Plastic packages– foil of PE	15 01 02	0	
Small plastic things ²⁾	16 02 16	0	
Other motor, gearbox and/or lubrication oils	13 02 08	N	
Solvents and their mixtures with preservative products (except of organic-decomposable)	14 06 01 14 06 02 14 06 03	N	Hazardous waste – it is necessary to collect and hand it over to disposal by an authorized person.

¹⁾ 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

²⁾ **ATTENTION !** Polytetrafluoroethylene (Teflon, PTFE) shall not be incinerated elsewhere than in a waste incineration plant due to their toxicity!



³⁾ 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 and utilization of waste of packing are given at the internet site www.ekokom.cz



⁴⁾ Ecological disposal of this equipment is provided within the collective system "RETELA" in accordance with the requirements of the Waste Act No. 185/2001 of the Code of Law, as amended. Collection spots of hazardous electro-waste are published on the Internet page: www.retela.cz.

SIGMA 1868 spol. s r.o.

Jana Sigmunda 79
783 50 Lufín
Czech Republic
Tel.: +420 585 651 302
Fax: +420 585 651 339
www.sigmapumpy.com
www.sigma1868.cz

NO 51 0093	0312
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