	PARAFUSOS DE ARQUIMEDES	FOLHA DE CARACTERÍSTICAS Nº 01
		FOLHA 1 DE 2

Projecto e Construção da ETAR de Serzedo	Nº de unidades: 3
ÁGUAS DO AVE	Posição da Lista de Preços Unitários a que respeita: conforme lista de preços

CARACTERÍSTICAS

Corpo do parafuso

Marca ..... LANDUSTRIE SNEEK BV
Quantidade 3
Capacidade Unitária ..... 159 l/s
Ponto de toque – Ponto da rampa H0 ..... 11570 mm
Ponto de enchimento – Ponto da rampa H1 ..... 10760 mm
Ponto de Enchimento – Ponto máx. de bombagem ..... 10940 mm
Diâmetro Parafuso ..... 1200 mm
Diâmetro tubo ..... 914 mm
Passo ..... 1200 mm
Nº de voos 2
Comprimento das lâminas do parafuso – Trilho Lateral ..... 18000 mm
Espessura lâminas parafuso ..... 5 mm
Espessura da parede do tubo ..... 10 mm
Espessura do trilho lateral ..... 3 mm
Velocidade de rotação do parafuso ..... 36,9 rpm
Ângulo de inclinação 40º

Rolamentos

Marca ..... LANDUSTRIE SNEEK BV
Tipo de rolamento superior ..... Montagem mural
Tipo de rolamento inferior ..... ECO-Friendly
Rolamento superior do diâmetro do eixo ..... 140 mm
Rolamento inferior do diâmetro do eixo ..... 140 mm

Acoplamento secundário (entre a caixa redutora e o parafuso)

Marca ..... Flender
Tipo ..... N Eupex
Código fornecedor A-400
Torque nominal ..... 10300 Nm
Peso ..... +/- 130 Kg

Caixa redutora

Marca ..... Flender
Tipo ..... Co-Axial
Código fornecedor Z1 168PX
Potência Nominal (AGMA/ISO) ..... 54.10 Kw
Relação de redução 33,88

	PARAFUSOS DE ARQUIMEDES	FOLHA DE CARACTERÍSTICAS Nº 01
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Eficiência ..... 96 %
Óleo de lubrificação ..... +/- 50 dm³
Batente traseiro ..... Incluído
Peso ..... +/- 540 Kg

Acoplamento principal (entre o motor e a caixa redutora)

V-polia no eixo de caixa redutora ..... 280 mm
V-polia no eixo do motor ..... 236 mm
Número dos V-belts 3

Motor Eléctrico

Marca ..... Dutchi ou equivalente
Tipo ..... Patas
Código fornecedor DM1 225 S4
Potência instalada ..... 37 Kw
Velocidade nominal ..... 1500 rpm
Nº de fases 3
Tensão ..... 400 V
Frequência ..... 50 Hz
Corrente nominal ..... 66,90 A
Eficiência em carga completa ..... 92,00 %
Factor de potência carga completa 0.87
Índice de protecção ..... IP 55
Classe de protecção ..... F
Elementos do PTC ..... Incluídos
Peso ..... +/- 287 Kg

Protecção de superfície

Partes Submersas
Protecção Superfície ..... Decapagem jacto de areia ao grau SA 2.5
Sistema Revestimento ..... 2 camadas de Amercoat 78 Hbb dft 300 microns

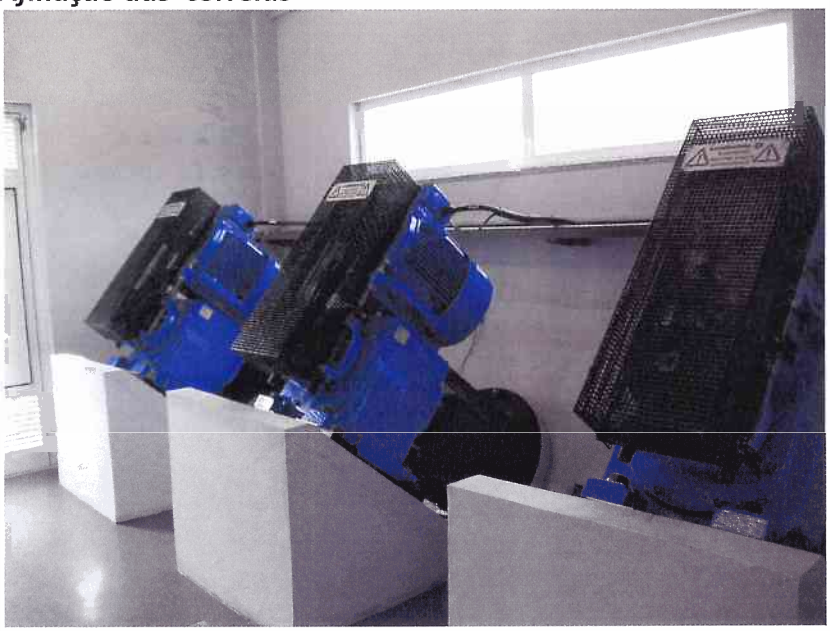
Partes Não Submersas
Protecção Superfície ..... Decapagem jacto de areia ao grau SA 2.5
Sistema Revestimento ..... 1 camada de Amercoat 4126 dft 80 microns

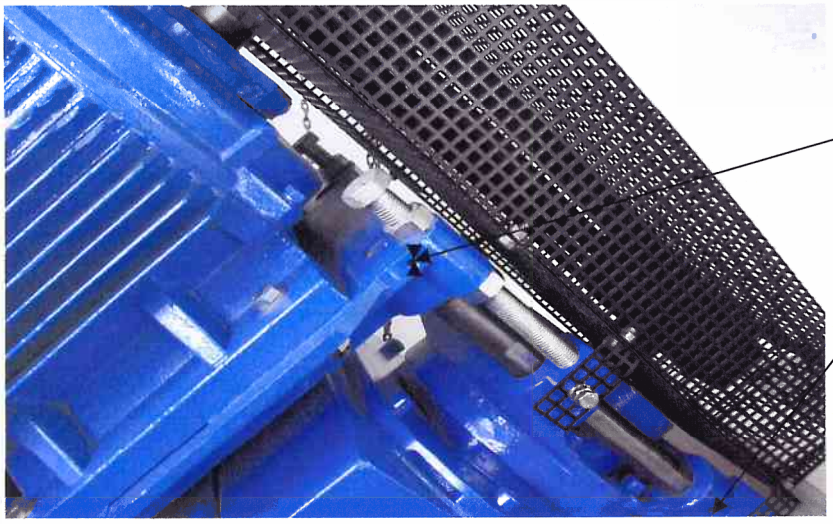
Veio Transmissão

Protecção Superfície ..... Standard Fornecedor

PARAFUSOS DE ARQUIMEDES

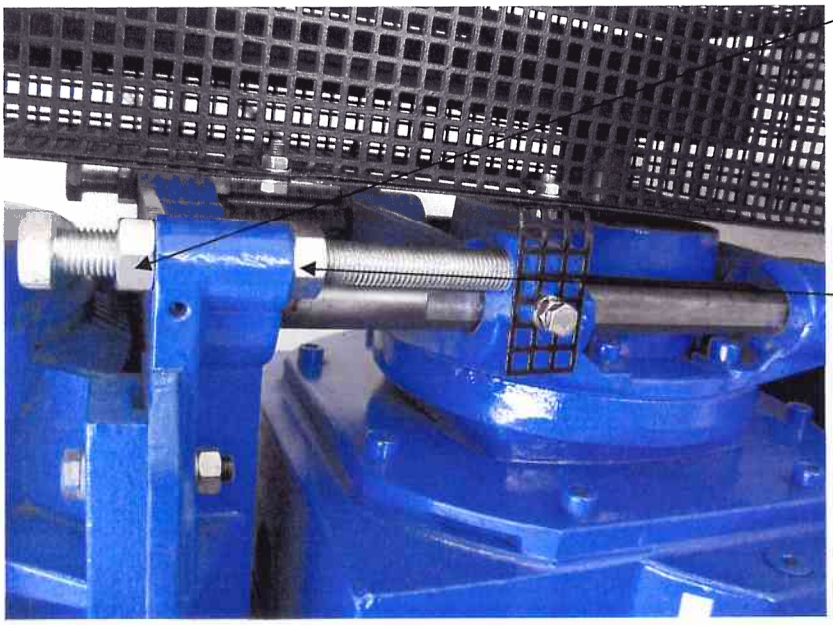
Afinação das correias





1º Desapertar antes e depois de esticar as correias

2º Para esticar as correias desaperta-se esta fêmea



3º Aperta-se esta fêmea, até sentir as correias com tensão

Landustrie

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1. Technical details
2. CE-declaration
3. Installation and maintenance instructions for Landy screwpumps
4. Flender gearbox
5. Dutchi electric motor
6. Flender coupling
7. Fenner V-belt transmission
8. Layout drawing with parts list
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10. Drawing side rail with parts list
11. Drawing upper bearing with parts list
12. Drawing sealing plate coupling upper bearing with parts list
13. Drawing lower bearing with parts list
14. Painting schedule

Landustrie

Technical details:

Landy Screwpumps

Make	Landustrie	
Number	3	
Type	Landy-120/91/1800-K1	
Screw diameter	1200	mm
Capacity	570	m^3/h
Screw speed	36.9	rpm
Thickness of screwblades	5	mm
Thickness of side rail	3	mm
Length of screwblades	18000	mm
Length of tube	18450	mm
Weight	± 5500	kgs

Gearbox:

Make	Flender	
Type	Z168PX (iec 225) d=120	
Reduction ratio	33.88	
Execution	with backstop	
Weight	± 540	kgs

Electric motor:

Make	Dutchi	
Type	DM1 225S 4	
P	37	kW
n	1485	rpm
Voltage	3 x 400	V
Frequency	50	Hz
Protection class	IP 55	
Insulation class	F	
Construction class	B3	
Execution	3 x PTC	
Weight	± 270	kgs

Secondary coupling:

Make	Flender	
Type	N-Eupex A400	
Weight	± 130	kgs

V-belt transmission

Make	Fenner	
Dimensions	∅ 236 (2517/60) - ∅ 280 (3020/60)	
Type	3 x XPB	
Lw	2000	mm

Upper bearing

Make	Landustrie	
Type	1155A	
Diameter	140	mm
Fixing torque flange bolts	770	Nm
Weight	± 470	kgs

Lower bearing

Make	Landustrie	
Type	1545A	
Diameter	140	mm
Fixing torque flange bolts	770	Nm
Weight	± 175	kgs

Landustrie

Declaration by the Manufacturer

(Directive 98/37/EG, Art. 4.2 and Annex II, sub B)

PROHIBITION TO PUT INTO SERVICE

Landustrie Sneek BV
Pieter Zeemanstraat 6
NL-8606 JR Sneek

herewith declares, that the Landy screw pumps for the project of ETAR Serzedo, as executed with Landustrie's projectnumber 860206-AE

- are intended to be incorporated into machinery or to be assembled with other machinery to constitute machinery covered by Directive 89/37/EC, as amended;
- do therefore not in every respect comply with the provisions of this directive

and that:

- the following (parts/clauses of) harmonized standards have been applied:
  NEN-EN-ISO 12100-1 / 2

and furthermore declares that it is not allowed to put the machinery into service until the machinery into which it is to be incorporated or of which it is to be a component has been found and declared to be in conformity with the provisions of Directive 98/37/EC and with national implementing legislation, i.e. as a whole, including the machinery referred to in this declaration.

Sneek, 7 november 2007

P.J.M. Jorna, Quality Assurance Manager

Landustrie

ERECTION INSTRUCTIONS FOR LANDY SCREWPUMPS IN CONCRETE TROUGHS

1. Erection of screw

1.1. Install the lower coupling half on the shaft of the upper bearing (if not supplied pre-assemble).

1.2. Fit the three rods (5) in the upper bearing, and fit nuts (6) and washers (3) correctly. The flange of the top bearing must be checked on clean lines and damage-free facing. Mount the complete top bearing assembly in the box-outs of the concrete. See to it that the LANDY name is positioned horizontally and above the shaft. Tighten the nuts, and use the two upper nuts to adjust the foundation ring, if necessary.

1.3. If the screw pump is not assembled with bottom bearing and bearing pedestal, fit those as yet and tighten the bolts well. Do not remove the accessory materials (painted red) before assembly (see 1.13). The bottom bearing is already fitted with Shell Rimula X40 oil (must be checked). Clean the top end plate of the screw, situated near the upper bearing, and remove the red protection plugs from the endplates.

1.4. Mount the screw pump completely with bottom bearing and anchor bolts into the concrete trough, and support it at the lower end in such a way that the center line is parallel to the concrete edge on which the side rail will be mounted. The anchor bolts of the bottom bearing pedestal must fit in the box-outs of the concrete.

1.5. Fasten the top bearing to the top end plate of the screw. Put a little grease on the thread and tighten the bolts (4) with normal tools.

1.6. Remove the brass stay bolts (2). Fit the accessory nuts (1) to the bolts, and apply them first. Now the bolts should no longer press against the shaft! Adjust the top bearing; the clearance (at point 8) around the shaft should be equal.

1.7. Fit upper coupling half to secondary shaft of gearbox and tighten the set bolts (if not supplied pre-assemble) and the V-belt pulley to the primary shaft. Fasten, if not already done, the gearbox to the steel foundation plate (or girders) and fit the anchor bolts. Place the assembly on the foundation, next apply shims between the two coupling halves (thickness depending on type of coupling). Align accurately by placing a steel rule on the coupling and use a water level for horizontal positioning in cross direction. Undergrout the assembly carefully in such way that the whole is immovable.

1.8. Fill the gearbox with oil and check the oil level.

1.9. If necessary fit the V-belt pulley to the motor, fasten the motor to the slide rails and fit the anchor bolts. Place the assembly on the foundation, align the V-belt transmission and undergrout the slide rails.

1.10. Check the whole assembly on correct position and alignment. Check with the bottom bearing if the adjustable outer ring with bearing pedestal is set square with the centre line of the screw. Check if the ridge of the bearing house fitts into the recess of the pedestal. The bearing house should not be able to rotate in the ring. The ring should come close to the filling strips.

1.11. Next grout the recesses (which should be clean and dry) and the spacings between lower and upper bearing, gearbox and motor, with suitable mortar (unshrinkable concrete mortar or artificial resin mortar).

1.12. Once the mortar has hardened, remove shims between coupling halves. Tighten all bolts, check once again the alignment of the V-belt transmission, and remove the V-belts (eventually use V-belts for auxiliary drive).

1.13. Remove the mounting accessories (painted red) from the bottom bearing. Turn the two bolts M8 in the released holes of the flange. The connecting bolts between the screw and upper and lower shaft must be tightened with the right torque.

Bearing type	Bolt size		Torque (Nm)	
	Upper bearing	Lower bearing	Upper bearing	Lower bearing
Ø40	M12	M10	92	53
Ø60	M16	M12	230	92
Ø80	M20	M16	445	230
Ø100	M20	M16	445	230
Ø120	M20	M16	445	230
Ø140	M24	M24	770	770
Ø160	M30	M24	1550	770
Ø180	M36	M24	2725	770
Ø200	M36	M24	2725	770
Ø240	M42	M24	4190	770
Ø280	M42	M24	4190	770
Ø320	M42	M24	4190	770
Ø360				

1.14. Use a good torque wrench or torque multiplier if necessary. Follow the tool instructions.

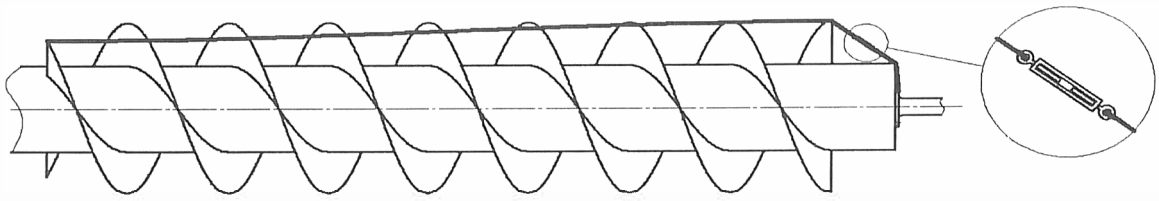
1.15. Check if there is sufficient oil in the bearing and if necessary refill uptil the filling opening.

1.16. Remove fillings around the screw. Check the rotation of the screw by turning it manually.

2. Concrete trough

2.1. Make a wooden casing on both ends and along both sides of the screw in order to keep the mortar in the trough.

2.2. For the clearance between screw and mortar, a steel cable has to be strained across the screwblades. A hole has to be drilled in the blade at the lower end of the screw and the cable has to be fastened at this point. Fasten a stretching device at the other end of the cable. Strain the cable to the upper end flange as straight as possible (the cable has to be strained over the blade end at the upper end of the screw) and fasten it with a flange bolt.



For the thickness of the steel cable, handle the following dimensional table:
4 mm at screw diameter smaller than or equal to 500 mm
6 mm at screw diameter larger than 500 and smaller or equal to 1800 mm
8 mm at screw diameter larger than 1800 mm

2.3. After the steel cable has been strained over the blades, the finishing mortar can be applied in the trough, as follows:

2.4. Grease the screw edges lightly to prevent that mortar will stick to it. Be careful not to spill oil or grease on concrete trough.

2.5. Remove concrete and mortar residue from the screw trough.

2.6. Clean the screw trough by means of a high-pressure sprain gun, thus removing the concrete fog (mortar at the surface of new casted concrete) as well.

2.7. Rub the moisturized substrate with an adhesive based on synthetic resin (pure) f.e. Seal All or Schonox.

2.8. Mix the mortar (consisting of sharp, rough sand an portland cement (ratio 2½ : 1) with equal adhesive and water (ratio 1 : 1). The water and the adhesive have to be mixed very carefully first (the mixture should be reasonably dry).

2.9. Spread the mortar in the trough and manually shape it into a circular form by means of a shovel. Mortar should be added sufficiently at the lower part of the screw. In case of longer screws, it is recommended to add mortar at more than one place (if sun is shining directly in the trough; keep it wet).

2.10. Now slowly turn the screw by means of an auxiliary drive and fill mortar where necessary (recommended r.p.m. 20/D, circumferential speed approx.1 m/sec).

2.11. Repeat this until the trough is filled completely upto the steel cable which is strained on top of the screwblades.

2.12. Now finish both trough ends.

2.13. Places where the mortar does not hold, when the screw is stopped, have to be retreated with adhesive, filled manually and finished to a flat and round shape.

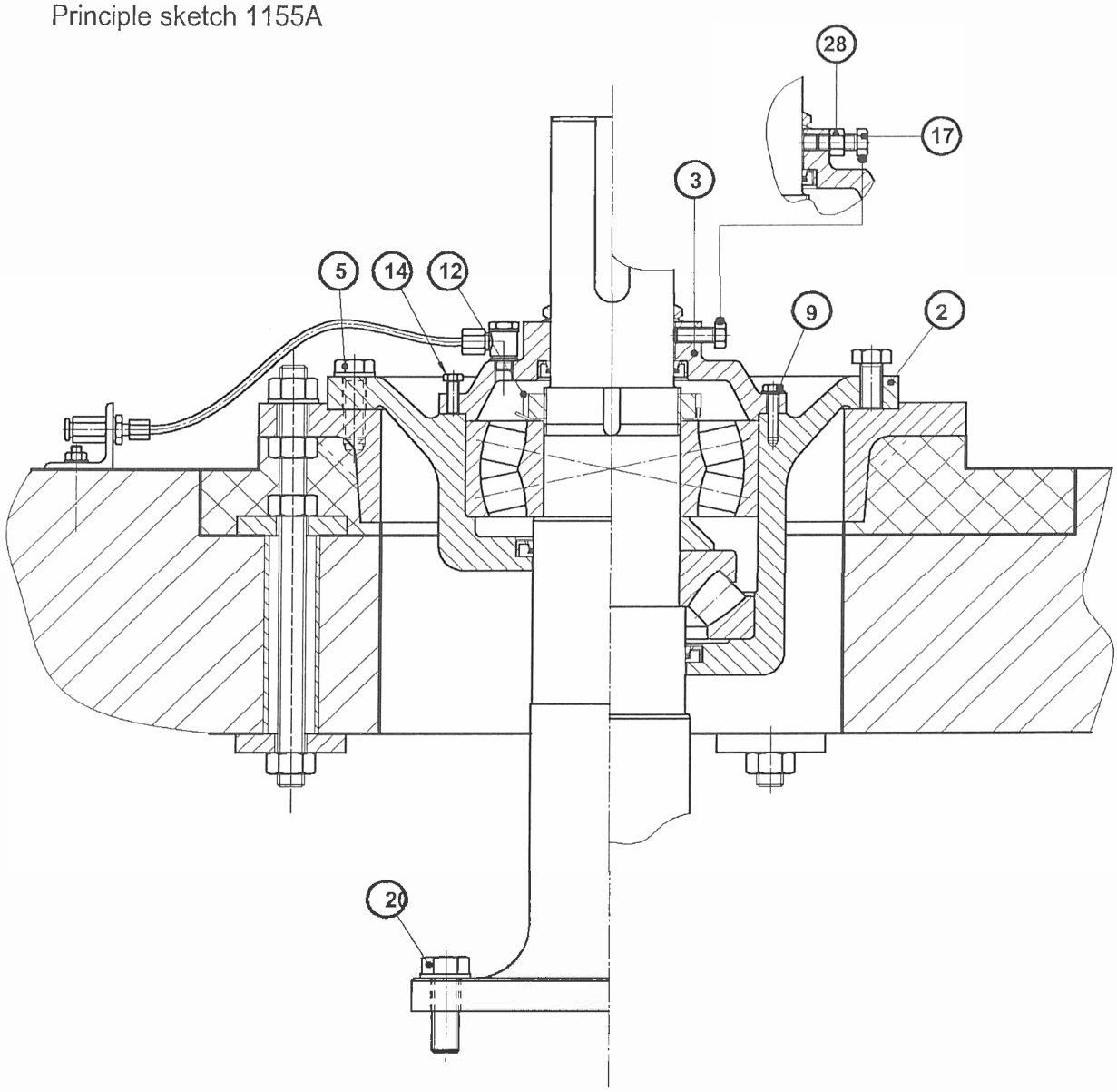
2.14. After the finishing mortar has hardened, remove the excess mortar from the screw as soon as possible, and remove the wooden casings and steel cable.

Remark:

A good feeling, skilled labour and careful operation is required as well for achieving proper results.

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Principle sketch 1155A



Mounting:

- Grease and fit simmerrings.
- Draw up the shaft through the bearing housing, mount bearings, tighten shaft nut (12) and lock it with additional safety ring.
- Fill bearing housing and bearing cover fully with grease.
- Now follow, in reverse order, the instructions given for dismounting. Replace bolts (20) by new 8.8 bolts (can be secured only once) and tighten bolts on the right torque (770 Nm).

Recommended grease for upper bearing:

Mobil Mobilux EP 2, Shell Alvania EP 2 or similar.
Do not use various types of grease for one and the same bearing.

2. Maintenance of lower bearing:

Type: 1545A

Every 5 years:
Check the oil level in the lower bearing. If the oil level is lower or higher than the fill opening the sealings are damaged and have to be replaced. Check cone bearings for wearance.
If the oil is coloured white (emulsion) the sealings have to be replaced as well.

Every 10 years:
Renew the oil by taking off the bearing cover. Check the oil level and oil quality. In case of insufficient quality the sealings have to be replaced. Remount the bearing cover and fill the bearing with Shell Rimula X40 oil uptil the filling opening.

3. Final erection of screw

3.1. If present, the steel side rails can be placed. Assemble as follows:

- Position the sections in correct sequence along the side wall. Drill holes in the concrete for the fixing bolts supplied. Insert bolts complete with clamp plates - do not tighten.
- Fasten the supporting strips to the vertical wall and side rail.
- Adjust side rail partly with mortar.
- When the mortar hardens, the side rail has to be brought in the right position with regard to the screw, and all bolts must be tightenend.
- Fill up all openings between side rail and concrete with mortar.

3.2. Remove auxiliary drive.

3.3. Connect electric cables and check correct direction of rotation of the motor.

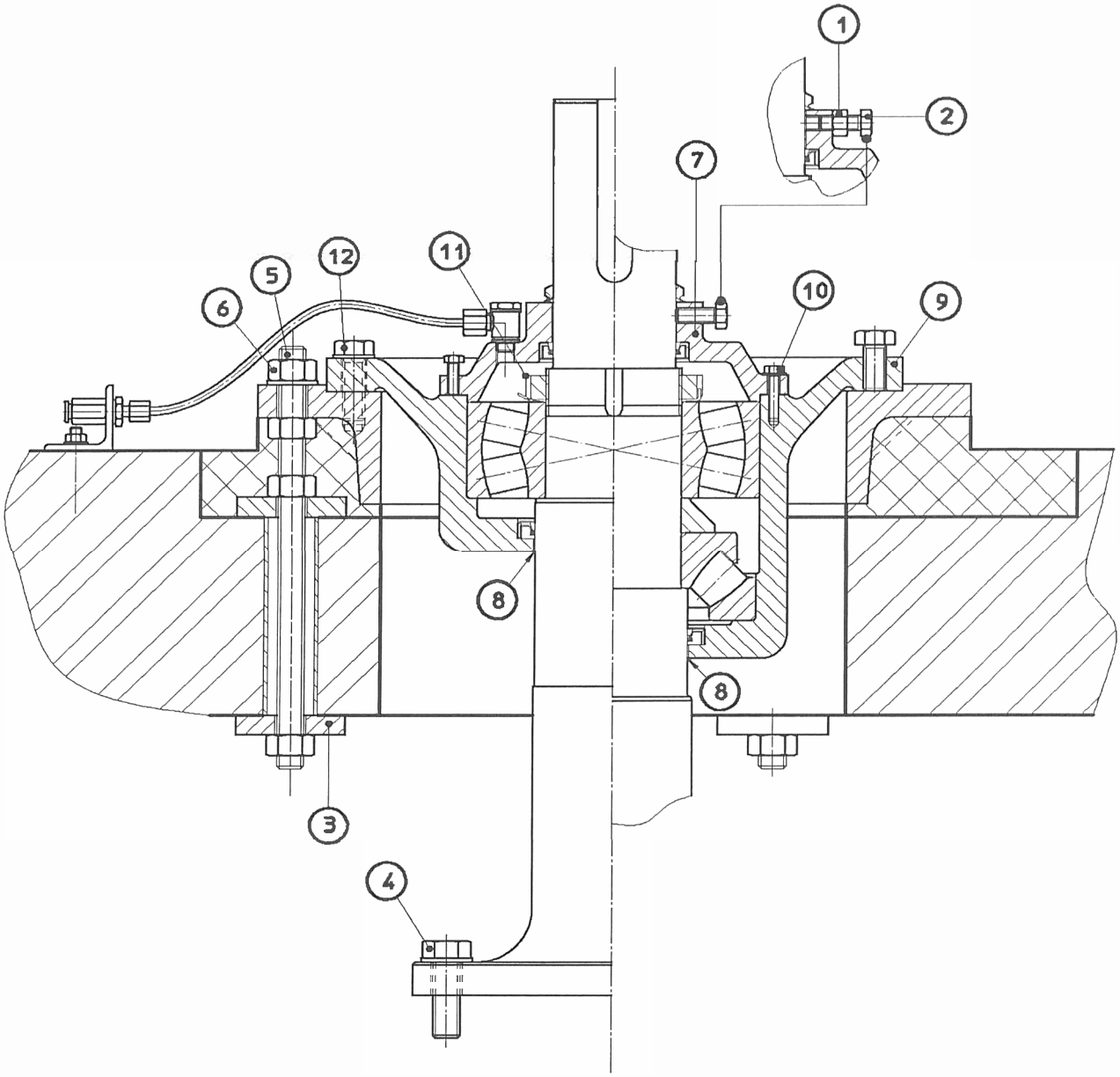
3.4. Fit and tighten the V-belts.

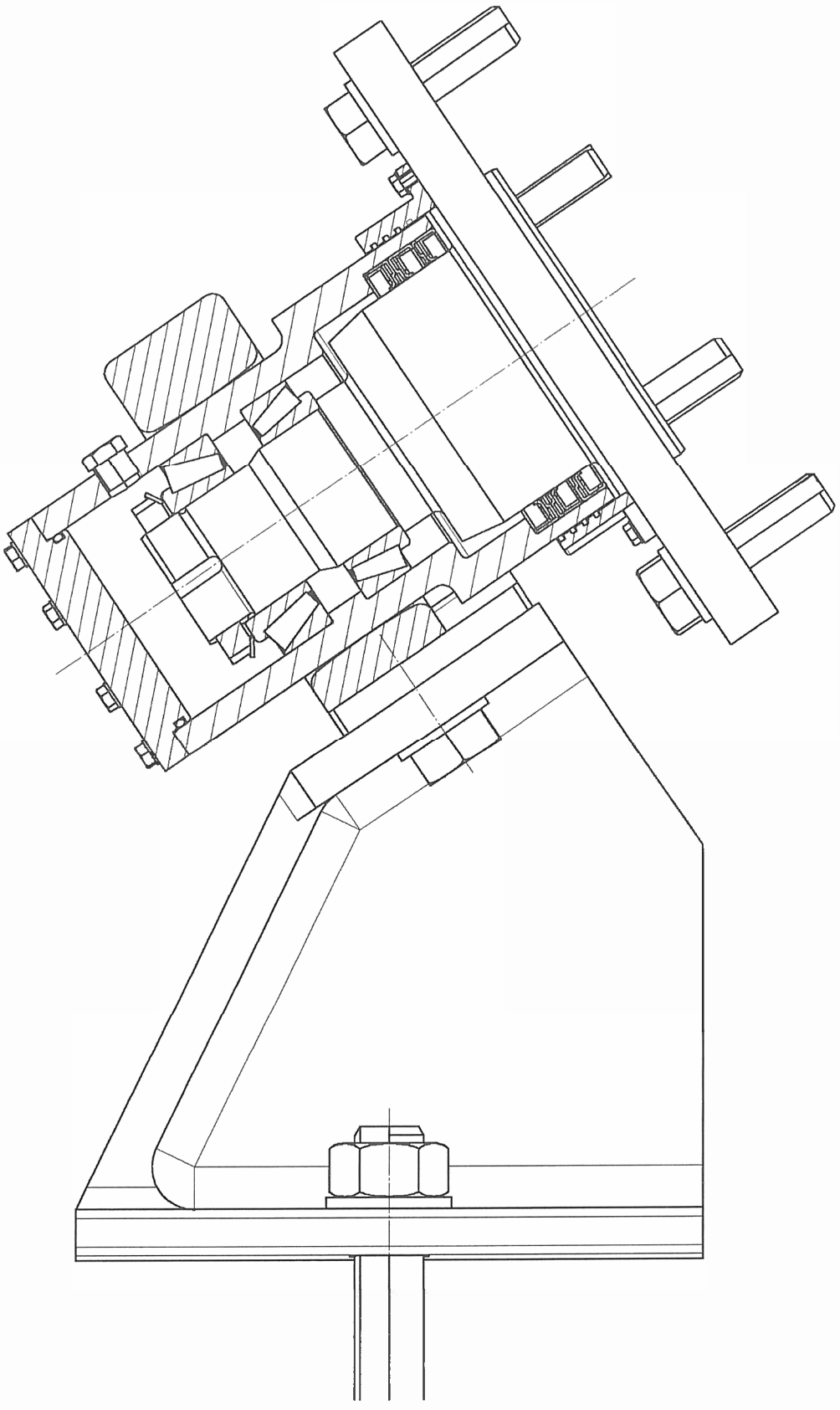
3.5. Switch on the unit for test-run and check the following:

- temperature of screw bearings, gearbox and motor

Note:

For erection of gearbox, motor and coupling, we refer to the additional instructions enclosed as well.


1
2
7
12
11
5
6
10
9
8
8
3
4



Landustrie

SERVICE INSTRUCTIONS FOR LANDY SCREWPUMPS

1. Maintenance of upper bearing:

Monthly:

Grease the upper bearing monthly through the grease nipple of the bearing cover (position 3 as shown on enclosed principle sketch 1155A). In order to protect the bearing parts during longer intervals, the screw should make a few rotations per week.

After approx. 45000 working hours, or 10 years at most:

Dismount the upper bearing for inspection and change of grease.

Dismounting:

- Dismount the gearbox with coupling half and, if necessary, the electric motor, after the V-belts have been removed.
- Support screw securily, in such way that it will not slide downwards.
- Remove nuts (position 28 on principle sketch 1155A), fit bolts (17) in bearing cover (3) again and tighten equally against the shaft.
- Remove bolts (20).
- Dismount bolts (5), remove bearing housing (2) completely from foundation ring by means of pressing bolts (15) and place the whole assembly with the flange of the bearing housing on two supports with the coupling half uppermost.
- Dismount the coupling half from the shaft.
- Loosen bolts (9) and dismount bearing cover (3) by means of pressing bolts (14).
- Dismount shaft nut with locking (12).
- Lower the shaft, eventually by means of hammer and lead hammerblock or a hydraulic press.
- Dismount remaining parts.
- Check bearings and simmerrings carefully for wear and tear and renew if necessary. If bearings will be reused, carefully clean them in pure gasoline or kerosene, dry well and fully refill with grease.
- Clean the inside of the bearing housing and all parts in contact with grease as well, and dry well.