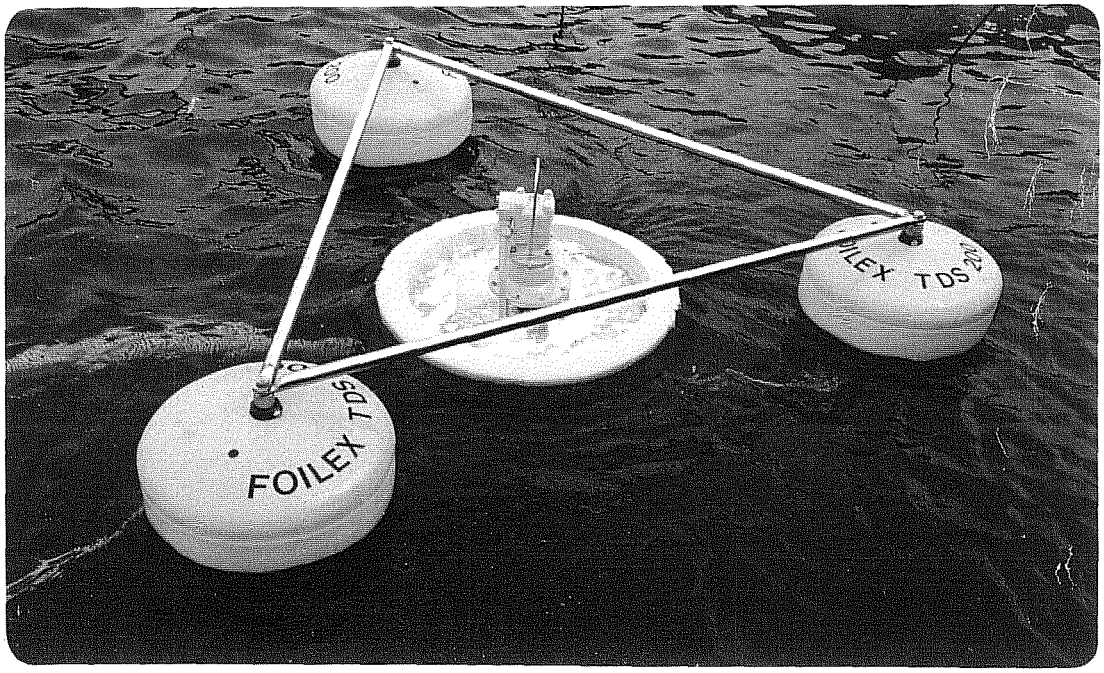
FOILEX

SKIMMER/PUMP

TDS 250



Instructionmanual

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FOILEX TDS 250 Skimmer system

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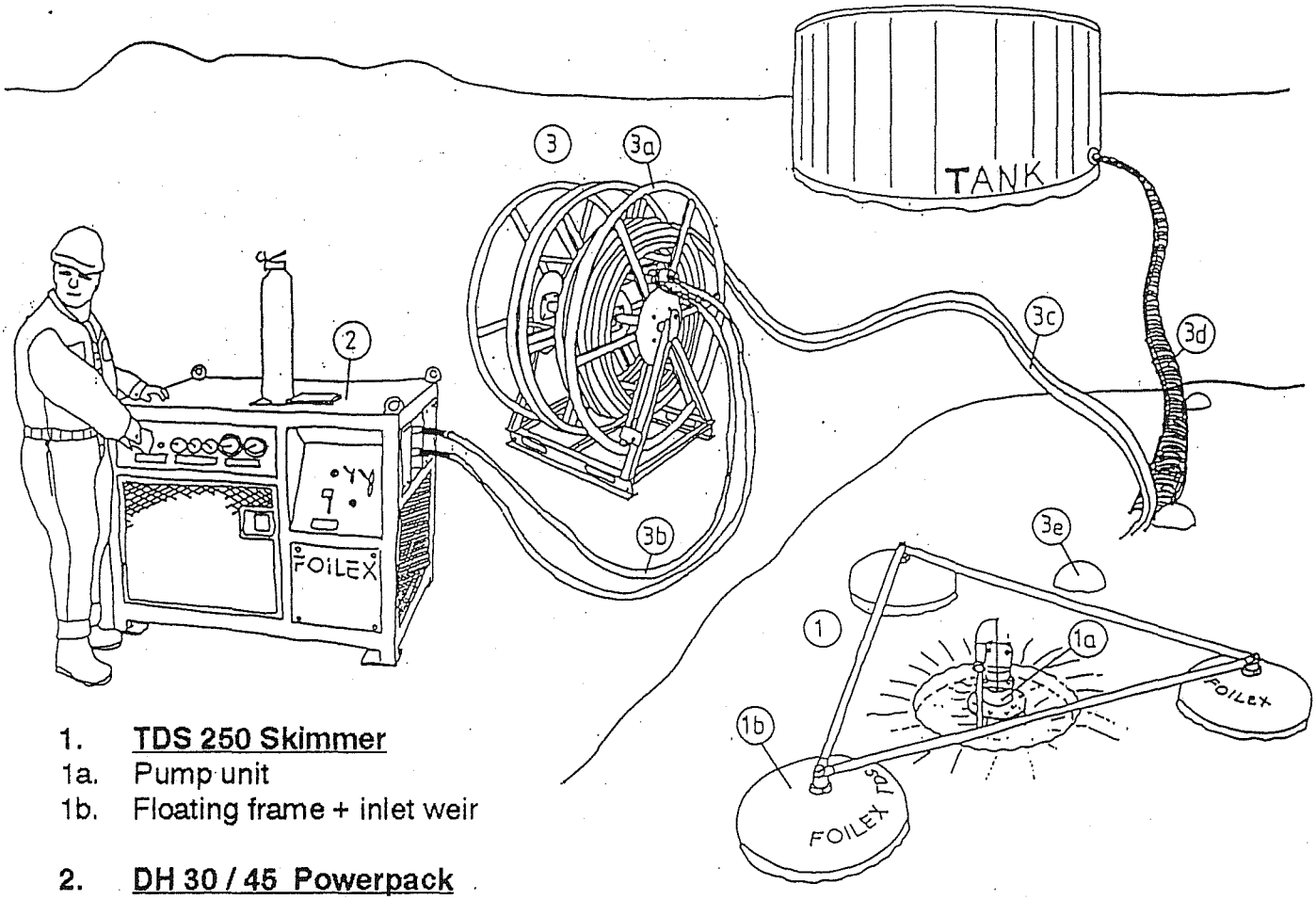

1. **TDS 250 Skimmer**
1a. Pump unit
1b. Floating frame + inlet weir

2. **DH 30 / 45 Powerpack**

3. **Hose package**
3a. Hose reel
3b. Hydraulic short hoses
3c. Hydraulic hoses
3d. Discharge hose
3e. Inflatable floats

The TDS 250 skimmer (1) is a new patented high performance weir skimmer for coastal and offshore oil spills. The design is based on the smaller and reliable TDS 200 pump wich has been in operation sinc 1990.

The heart of the skimmer system is the hydralic driven TDS 250 pump unit (1a) which is fitted in a three pontoon floating frame (1b) with its special inlet weir. The skimmer handles all types of oil from light diesel fuel to heavy crude oil mixed with debris. Special cutting knives are fitted in both inlet and outlet end of the pump.

The skimmer unit is powered from the dieseldriven hydralic Powerpack (2) via hydraulic hoses (3b & 3c). Recovered oil is discharged from the skimmer up to the collecting tank trough the Ø 6" discharge hose (3d). The hose package is kept together and floating with the inflateble floats (3e).

All hoses can be stored on the hose reel (3a) and they are easy to handle due to the dubble wheels with quick coupplings in the hub for the hydraulic hoses.

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FOILEX

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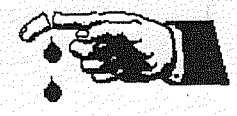
1. Safety regulations.

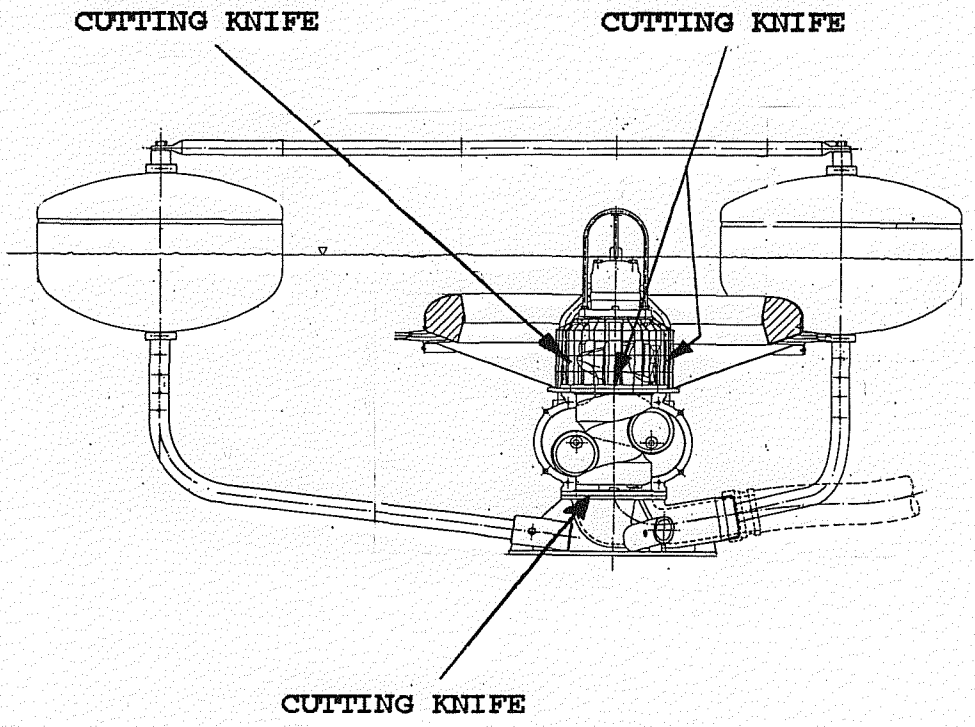
Each person who will operate the skimmer/pump, must thorougly study these regulations before starting the pump.

1. "DANGER !"

Keep hands and feet away from the rotating pump screw and its rotating cutting knives which are on both the inlet as well as the outlet side. "The cutting knives can cause severe injury to hands and feet".

"SHARP KNIVES !"





2. The skimmer must under no circumstances be operated without the pump inlet gridnet mounted.

3. The pump screw must under no circumstances be touched before the hydraulics are disconnected from the motor. This is especially important at an unintentional standstill.

4. See to that the pumped media is kept as clean as possible from contaminations which can cause unnecessary stops or be thrown out from the inlet side.

5. Never allow unauthorized persons to be near the skimmer/pump while in operation.

6. Never leave the pump in motion without supervision.

7. The pump must under no circumstances be operated dry as there is a risk for overheating and breakdown.

8. The pump must only in utmost emergency be operated against a closed valve and then only during very short intervals.

9. Always choose the largest available diameter of the discharge hose and use the shortest possible length to minimize the flow losses.

10. Inform every person who will operate the skimmer/pump about the risks with the SHARP KNIVES and how to avoid accidents.

Before making use of your new FOILEX TDS 250 skimmer, we ask you to first thoroghly read through this instruction booklet. You will then be able to use the skimmer more efficiently and more profitably.

FOILEX AB assume no responsibility for any injury to persons or on damaged property caused by the pump. All use of the pump and its surrounding equipment is entirely at the user´s own risk.

2. Introduction.

2.1 FOILEX TDS 250 Skimmer.

The unit is a new high performance weir skimmer for harbour, coastal and offshore oil spills. The design is based on practical experience from the cleanup operations from Exxon Valdez oil spill in Alaska 1989.

The heart of the skimmer system is the hydralic driven TDS 250 pump unit, (130 ton/h, 10 bar), which is fitted in a three pontoon floating frame with its special inlet weir.
The skimmer handles all types of oil from light diesel fuel to heavy crude oil mixed with debris. Special cutting knives are fitted in both inlet and outlet end of the pump.
The skimmer can easily be converted to a light weight transfer or off-loading pump due to simple design.
Both skimmer and pump provides easy service and maintenance.

FOILEX TDS 250 Skimmer has the following advantages compared to traditional weir skimmers with screw pumps.

- Unique flow controlled inlet weir for optimal skimming performance in most weather conditions and oil viscousities
- Vertical mounted pump with long feeding screw which cuts through the skimming surface and catches the oil.
- Easy access to sealing discs in the pump whithout dismounting of inlet weir.
- Symmetric three pontoon floating frame for easy handling and smooth movements in swell and waves.
- Easy operation and handling with only two hydralic hoses.
- Extremely easy to convert from skimmer to transfer pump.

2.2 FOILEX TDS 250 Pump

The pump is a positive deplacement screw pump with a patented system for pressure build up. Transportation of the media is performed by the main screw and the increase of the pressure is provided by two identical circular sealing discs.
The name TDS 250 stands for "Twin Disc Screw" where 250 is the main screw´s diameter in millimeter.

The construction is a further development of the traditionally modified Archimedian screw pumps. It is specially suited for high viscous liquids, contaminated with larger particles, but can also manage low viscous liquids such as water, diesel oil etc.

The hydralic driven pump has a displacement of 3,8 liter which gives an output flow of 130 ton/h at 600 rpm.

FOILEX TDS 250 Pump has the following advantages compared to traditional screw pumps with single disc.

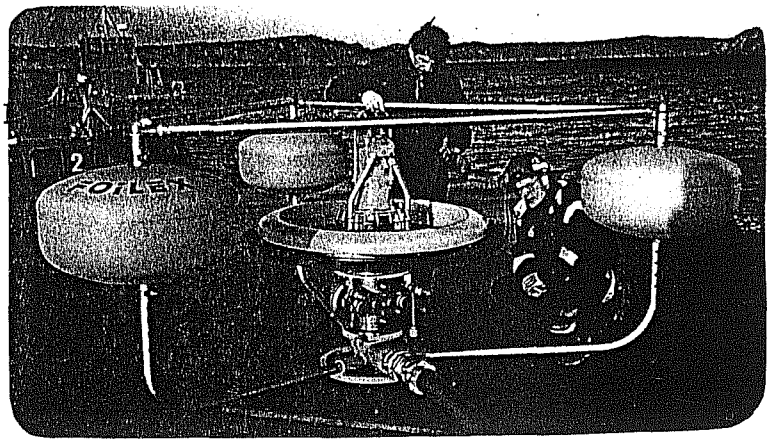
- Up to 70% higher capacity than other screw pumps with equivalent screw diameter.
- Easy replacable and inexpensive sealing disc packings.
- Completely machine-made meshing parts in the screw for optimal sealing and minimum wear.
- Less outer dimensions than other pumps with equivalent screw diameters.
- Cutting knives in both in and outlet end of the pump for debris handling.
- 360° pump inlet and long feeding screw.

2.3 General description of the skimmer system.

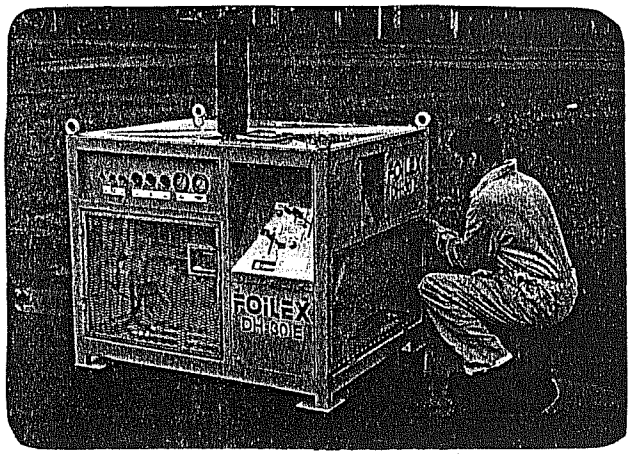
The skimmer system consists of the following units:

1. TDS 250 Pump. Hydraulic driven screw pump with twin disc sealing system for pressure build up. Mounted in the Floatation system this forms the Skimmer unit. The pump can separately be used as a transfer- or offloading pump for emptying of tanks etc.

2. TDS floating system:
   Three pontoon floating frame with a discharge platform for mounting of the TDS 250 Pumpunit when used for skimming operation. On the pump inlet is a weir hopper including a vertical and automatic up/down control fitted. Skimming gap is controlled by the pump speed.

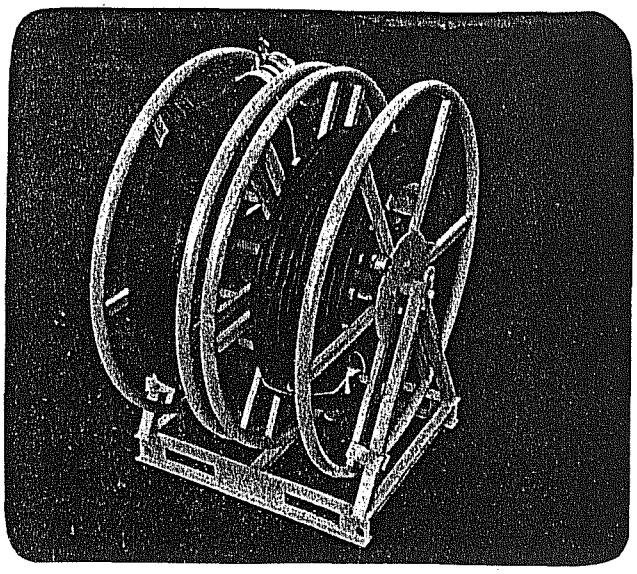


3. Powerpack: The FOILEX DH-30/45 Powerpack is a self contained diesel driven hydraulic unit specially designed to operate the FOILEX TDS 250 Skimmer and Pump. Hydraulic outlets are available for auxiliary equipment such as cranes, winches etc. The Powerpack incorporates either electric or hydraulic start. All components are well protected behind a strong steelframe and all necessary controls can be reached behind gridnet doors. Each unit is equipped with toolbox including spare parts.



4. Hosepackage: Hydraulic hoses for the transmission of power from the powerpack to the skimmer unit and discharge hoses from the skimmer to the storage tank. Included in the package is also floating bouys which compensates for the variation of density in the disharge hose.

5. Hosereel: The reel is specially designed to accomodate 40 m of discharge and 40 m of hydraulic hoses. The hydraulic hose wheel incorporate quick couplings in the hub for easy handling together with an independent brake for each wheel.



6. Remote control: A unit for remote control of the skimmer unit in those cases where other source of power than the standard powerpack is used such as ship hydraulics or similar.

2.4 General description of operation, Pump unit.

FOILEX TDS 250 Pump is a pump screw which has two identical, circular sealing discs fitted to each side of the pump screw. These sealing discs, fully driven by the screw´s own rotation are to maintain the required pressure when pumping. They are made in metal with easy replaceable packings.

Both sealing discs are exentrically attached to their respective axes and connected to each other with a 180° phase difference through the gear package underneath the pump. The discs then operate in an alternating fashion.

The first disc operates through 180° of one revolution and at the same time drives the second disc to its starting position. The second disc then comes into function, operating through the second 180° phase, driving the first disc back to its starting point.

This system with so called "Twin Discs" allows the screw diameter to be fully utilized during 2x180° of each revolution, thereby facilitating maximum displacement and capacity.

2.5 General description of operation, Skimmer unit.

FOILEX TDS 250 Skimmer consists mainly of the following parts:

A. TDS 250 Pump unit.
B. Skimmer hopper with floatation ring.
C. 3-pontoon floating frame including a discharge platform.

By placing the pump unit vertically in the floating frame and thread the hopper over the pump´s motor side and then fit it to the inlet flange, the pump will swiftly be converted to an effective weir skimmer.

The principle of function for the skimmer/pump is to work just below the liquid surface and skim the oil through its inlet

hopper and then pump the oil up through the discharge hose to the storage tank concerned.

The hopper is designed so that its upper edge is always adjusted parallell to the oil layer. The distance to the oil surface is half automatically adjusted through the number of revolutions of the pump. This is because the hopper´s float ring always endeavour to balance the incoming streaming oil with the outgoing quantity of pumped oil.

The capacity of the skimmer is therefore varying depending on the thickness of the oil layer. The pump must therefore be operated with higher number of revolutions with thicker oil layers than with thinner oil layers.

3. Preparations before start.

3.1 Unpacking the new skimmer.

Carefully control that the delivery corresponds to the valid order.

Enclosed in the delivery is a packing list, showing the units ordered and stating Positions No, Quantity and Description. Should anything be out of stock already from the factory, it will be marked with an "R" and will be delivered to you as soon as possible.

Should, however, something be missing without being marked, we ask you to contact your retailer or FOILEX AB immediately to obtain the missing part.

It is adviseable to note the pump serial number in this instruction book to simplify ordering of spare parts in the future. The serial number can be read off a stainless steel plate mounted on the bearing house.

3.2 Control of the new pump.

Visually check that the pump has not received any damage during transportation.

All bearing housing, except for the main bearing at the motor side (pos 709) wich will be greased automatically with hydraulic oil, must be filled with greace before start and normally they are filled when coming from the factory. There are three positions bearings one must check:

Front screw bearing	(pos 602)
Disc bearings	(pos 303 & 403)
Cog-wheel	(pos 405 & 409)

All bearings and the cog-wheels can easily be checked and filled with waterproof lubricating grease through its greace nipples (pos 305 & 607) until it starts to pour out from each shaft packing, (pos 207 & 604).

Make sure that the pump casing and the engine casing are completely free from strange objects. This is easiest done by removing the upper half of the pump casing so that the inside of the pump can be inspected. The upper half of the pump casing is released by loosening the eight vertical and the eight flange M10 socket head cap screws, (pos 203, 204 & 903).

Also check that the two sealing disc packings (pos 503) are intact and properly tightened with their M8 countersunk socket head cap screw as well as that the discs themselves are firmly mounted on respective shaft.Tighten the two sealing disc screws hard, (pos 507)

Without the hydraulics connected, the rotation of the pump screw should also be checked manually. Lubricate the screw well around the sealing discs with waterproof grease or similar.

"Short-circuit" the hydraulic motor by connecting one of the hydraulic hoses from the pressure side around to the return side. Now, one can easily pry the screw around with help of a strong rod or similar, placed into the "prying holes" on the feed part of the screw.

By prying the screw around a couple of turns, one can easily make sure that no strange objects are in the screw track as well as that the sealing discs mesh in a correct way. This also gives an excellent opportunity to study and get an understanding of the pump´s way of functioning.

NOTE! Be extremely careful during prying, as the screw is equipped with cutting knives on both the inlet and the outlet side. Keep hands and feet away from the screw during the rotation.

When the rotation control is done, lubricate the screw and sealing discs once more and then reassemble the upper half of the pump casing. Properly tighten the screw by hand.

The pump can now be connected to the hydraulics and is now in working order.

NOTE ! Before connecting the hydraulics, make sure you have fitted the gridnet.

3.3 Build up of the skimmer unit.

FOILEX TDS 250 Skimmer and Pump consists of the following parts (see drwn A2171 & A2199):

A. TDS 250 Pump unit
B. Skimmer hopper with floatation-ring.
C. 3-pontoon floating frame with discharge platform.

Start by mounting the central lifting yoke (pos 815) on the pump's motor side. Properly lock with the nylock nut (pos 816).

Then mount the pump unit on the discharge platform (pos 1.1).

Tighten the screws on the discharge connection (pos 903) to avoid any risk of the screws to loosen due to vibrations during operation.

Prepare the floats (pos 1.6) by mounting them on the pontoon legs (pos 1.5). See to that the rounder part of the pontoon is pointing downwards. Fix them with the position rings (pos 1.7) in its second upper securing hole. The position rings are locked with screw and nut (pos 1.3 & 1.4).

Attach the pontoon legs to the discharge platform and lock with the same type of screw and nut (pos 1.3 & 1.4).
Continue with the bracing-pipes (pos 1.10). These are attached to each other with a screw (pos 1.11) in the pontoon legs.

Mount the hopper unit (pos 2.1) and its skimming device. Thread the hopper on the motor side and fix it in the inletpipe´s lower flange with the screw (pos 903).Tighten the screws properly to avoid leakage.

Finally, fit the inlet gridnet, (pos 905) and secure it with the two hose clamps, (pos 906) around the hydralic pipes.

The skimmer unit is now ready in working order.

3.4 Connection of the hydraulic power source and the hydraulic hoses.

The skimmer, which is driven by a low revolution, hightorque motor with fixed displacement, can be connected with both open and closed hydraulic system. To be able to use the pump in an effective way, the hydraulic source must fulfil certain requirements regarding the oilflow and pressure.

The number of revolutions of the pump, i.e. its capacity, is determined by the oilflow and its torque is determined by the working pressure. Furthermore, the oilflow must be able to run in the opposite direction when reversing the pump in case it gets stuck in the contaminations.

FOILEX TDS 250 is equipped with a Danfoss OMTS 200 motor which does not need a drain hose. Only a pressure and a return line are needed to operate the pump. The motor has the following data regarding connection to the hydraulic source:

Max oilflow:	Continously	125 l/min	
	Intermittent	150 l/min (max 10% of each minute)	
Max input pressure:	Continously	210 bar	
	Intermittent	250 bar (max 10% of each minute)	
Max return pressure:	Continously	0-100 rpm	75 bar
		100-300 rpm	40 bar
		>300 rpm	20 bar
	Intermittent	0-max rpm	75 bar

Couplings.

The pump is equipped with quick couplings for connection of the hydraulic hoses.

To avoid faulty connections of the hydraulic hoses, the pump pressure side has a female coupling and the return side has a male coupling. For this arrangement, hoses which have corresponding female and male couplings at each end are well suited. Then the hoses can be combined and extended in a simple way without risk for faulty connections. In such case a hose can also be used when "short-circuiting" the hydraulic motor according to chapter 3.2.

This is always applicable when the pump, together with the hoses and hydraulic unit, are delivered by FOILEX AB.

For detail brand and size of the couplings, see chapter 7.3 Material list, pos 811 & 812.

Connections.

Before connecting the hoses to the pump they must be completely free from pressure. If, for example, they have been exposed to sunlight and heat, a considerable pressure can be built-up within the hoses although they have been completely disconnected from the hydraulic system.

To make the hose free from presure, press the point of the male coupling against a piece of wood or similar and drain out some of the oil from the hose.

Should the hose already be connected to the hydraulic source, the pressure is easily removed by turning the oilflow control to zero (0) and then the directional control handle from "PUMP" to "REVERSE" and then back to neutral position.

Connect the hoses to the pump´s quick coupling and lock with the spring bolt on the female coupling. Press in the bolt and rotate

a quarter turn. Also connect the quick couplings´ protection caps to each other to protect them from dirt etc.

3.5 Connection of the discharge hose.

When connecting the discharge hose, there are three things of utmost importance for the function and efficiency of the pump:

1. Use the shortest possible hose combination
2. Choose the largest possible diameter
3. Avoid sharp folds and bends in the hose

This is necessary to minimize the pressure drop in the hose and thereby making the pump work more efficiently with higher capacity and less wear.

Outlet connection

The connection at the outlet is equipped with an external BSP R6" pipethread. This is to facilitate fitting of any type of hose coupling according to what is available on the discharge hose. As a standard, Camlock 6" male coupling is delivered on the pump´s outlet connection.

Hose set

The standard discharge hose set consists of three 6" dia. flathoses in different lengths: 5, 10, and 20 meters. With this set one can always combine shortest useful length in 5-meter intervals from 5 to 35 meters. Each hose is equipped with a CAMLOCK 6" male- respectively female coupling in each end.

4. Operating the Skimmer/Pump.

Before starting the pump, one should read the safety regulations and make sure of the following (see chapter 3.2):

- The bearings must be filled with grease
- The sealing disc packings are intact
- The screw track is free from strange objects such as stones, rags etc.
- The screw joint reinforcements are thoroghly tightened
- The gridnet must be fitted

NOTE! The pump must under no circumstances be runned dry as there is a risk for overheating and breakdown.

4.1 Basic theory.

FOILEX TDS 250 belongs to the design category of pumps whose theory is very simple.

For each working cycle or each turn of the screw, a certain volume of liquids is shut in and transported from the inlet of the screw to its outlet. This is theoretically done independent of the existing counter pressure. The confined liquid volume depends solely on the cavity between the two sealing discs, the pump casing and the working part of the screw.

Should the inner leakage be neglected, the volume flow Q_{teor} (lit/min) becomes as follows:

$$Q_{teor} = D \; n$$

D = Displacement 3,9 litre

n = Number of revolutions (rpm)

In most cases the use of D=3,8 litre gives a sufficiant estimation of expected capacity or necessary number of revolutions. One should, however, learn how the inner leakage influences the pump´s performance in different situations.

The loss of leakage is proportional to the increase of pressure and reversed proportional to viscosity and number of turns, i.e. the pump becomes "tighter" at tighter number of revolutions and higher viscosity. Furthermore, the loss of leakage is also proportional to the third power of the pump´s inner gap.

Possible increase of pressure mainly depends upon the available power and naturally upon the mechanical strength of the construction. Therefore, do not operate the pump against a closed valve more than in utmost emergency and do not over power the engine when pumping (see chapter 3.3).

In practice however, due to its mechanical design, the pump is afflicted with a certain inner leakage. This contributes to a reduced volume flow, reduced maximum pressure and less strain on the different parts of the pump.

4.2 Pumping of low viscous liquids.

When pumping low viscous liquids such as water, diesel oil etc, it is especially important to minimize the inner leakage, and as always it is also important to minimize the counter pressure which the pump has to work against.

Futhermore, the lower the viscosity, the more dependent the pump gets on the number of revolutions, and therefore it is important not to run with too low speed.

The only way to minimize the inner leakage in the pump is to regularly inspect the sealing disc packings (pos 503) and replace them when needed. With worn packings, the leakage is increased and the capacity is decreased. If there is a spare capacity, one can compensate this with an increased number of revolutions, but at the same time this also increases the strain. Therefore, one should never run the pump with a speed which is higher than the situation demands.

4.3 Pumping of high viscous liquids.

In this case the most important factor is the system counter pressure. Furthermore, it is important to operate with a low number of revolutions as possible to enable for the liquid to be sucked up and to run to the inlet side.

The best possible way of minimizing the counter pressure is by choosing a discharge hose with largest available diameter and shortest possible length (see chapter 3.4). The hoses should also be lead in such a way that the pressure head is minimized and so that sharp folds and bends can be avoided.

When pumping high viscous liquids, the inner leakage as well as the number of revolutions do not have such an important part as with low viscous liquids. In combination with properly chosen hoses, the best way of minimizing the loss of flow is simply to run with as low number of revolutions as possible. With that one can also avoid running the screw in a "tunnel", i.e. with such a high number of revolutions that the liquid doesn´t have time to run into the feeding part but get thrown out.

When pumping very high viscous liquids, for example cold crude oil or similar, it is advisable to "dilute" the liquid by mixing a smaller amount of a thinner liquid such as water or diesel to the inlet side.This naturally assumes that the products doesn´t take any harm from this.

4.4 Pumping of contaminated liquids.

This is a special case out of the two earlier described cases. Now, the most important issue is how to avoid the largest contaminations as well as how to pump in the most careful way and thereby minimize the risk for an unintentional standstill.

One should bear in mind that different types of contaminations affect the pump in different ways:

1. Most problems are caused by hard, strong objects such as: Nails, screws, nuts, stones, glass etc.

If these objects, when passing through the built-up pressure zone, i.e. in the passage of the sealing discs, get stuck between the sealing discs and the screw, they are often too strong to get cut off and will therefore not be able to pass through freely.

Best way to avoid this is to prevent this type of objects from entering the pump. This is done by mounting the inlet gridnet on the inlet side. However, one should be aware that these bars could be obstructive to the passage of thicker liquid through the inlet. In general more finemeshed bars can be used for lower viscosity, but practical tests more often determine what to chose from case to case.

One should also always try to place the pump so that the sealing discs lie horizontally. Thereby one can avoid that one of the sealing discs liew at the bottom of the screw track where the largest objects tend to pass through.

Should however, the pump stop, this will occur the moment the hydraulic motor reaches its maximum pressure and because the hydraulic unit´s upper pressure valve confines the pressuring power. Then one should only reverse the pump to loosen the object that is stuck to change its position and then retry once more. Reversing can be done immediately, but first of all, one should start the pump very carefully from 0 lit/min to avoid quick and large loading peaks.

2. Softer contaminations are more lenient, such as: pieces of wood, plastic bags, sea weed, fish etc.

The same rule as described above are naturally eligible even in this case, but the risk for standstill is much less. Most of these contaminations will be cut in pieces by cutting knives at the inlet side and will then be able to pass by without any major problems.

Major danger occurs when some larger object ufortunately covers the complete inlet and thereby prevents further run through.

4.5 Operating the skimmer.

The most important factors for a succesful weir skimmer operation is the skimmer floating position.
This is furtunatly automatic taken care of with the special Foilex inlet weir once it´s one time adjusted correct.

The pontoon stop rings, (pos 1.7) shall be in it´s second upper positon. The skimmer and specially the hopper operates well in that position to start with.

With the pump not operating and the hopper filled with water/oil shall the rubber bellow, (pos 2.3) be extended to 3/4 and the yellow flotation ring, (pos 2.4) shall be just abow the water surface and prevent water/oil from flowing into the hopper.

When the pump starts the surface inside the yellow flotation ring shall sink and draw the ring down to the actual working position. In its working position the rubber bellow shall be extended to approx. 50% and be able to move free and follow waves etc.
Skimming gap is then controlled by the pump rpm.
- Thin oil layer, low rpm.
- Thick oil layer, high rpm.

The amount of oil flowing over into the hopper is always in balance with the TDS 250 pump´s actual output flow. A large inlet diameter is therefore of great value to keep up the capacity when skimming thin oil layers.

If the yellow flotation ring doesn´t brake through the water/oil surface when the pump is in off-position move the pontoon stop rings one pin hole down.
If the yellow flotation ring reach the stainless steel hopper at full rpm, (max skimming capacity), move the pontoon stop rings one pin hole up.

4.6 Field instructions.

This type of skimmer/pump will often be used during very rough and varying situations when no other pump works.

Therefore, it is of utmost importance that each individual operator knows how to use the equipment, both in theory and in practice. The operator´s understanding, sense and inventiveness for the operation will be of vital importance to the result.

Therefore, it can often be difficult to give any specific instructions for use of your FOILEX TDS 250, but rather give advice of more general art.

However, below follows some simple ideas which can be of use to the field opearator.

1. Discharge hose should always be as short as possible.

2. Always choose largest possible hose diameter, min 3" dia.

3. Avoid sharp folds and bends in the discharge hose.

4. Do not let the pressure head get higher than needed.

5. Also use shortest possible hydraulic hose.

6. Use at least 1" dia. of the hydraulic hoses.

7. The hydraulic return hose must always go without pressure to the tank.

8. Always start pumping cautiously until the hydraulic oil has reached working temperature, about 40-50°C.

9. Always start the pump when the oilflow control is at 0 lit/min and then increase the flow gradually up to the required number of revolutions.

10. Always use the skimmer/pump with as low number of revolutions as possible to minimize the water intake.

11. Supervise the oilflow and working pressure which gives a good idea of the pump´s working condition.

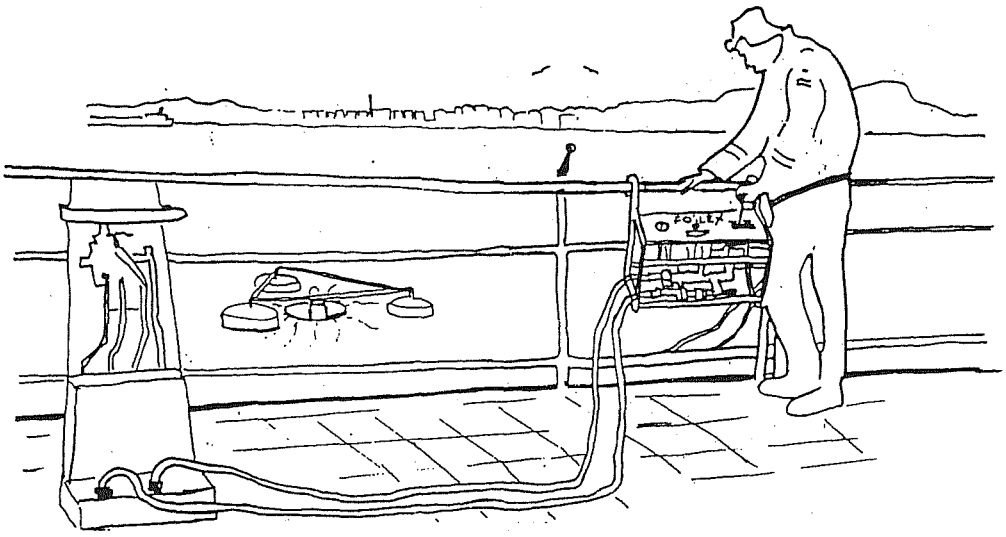
12. At stops due to contaminations, reverse the pump a few seconds. Then restart the pumping.

13. By keeping one hand upon the discharge hose, one can get a good sense of how the pump is working and receive a direct signal at stop according to the above.

14. Should the pump start loosing pressure and capacity, then the sealing discs should be controlled and if necessary replaced.

4.7 Operation of the Skimmer with the Remote Control RC 125.

The FOILEX Remote Control RC 125 is designed to provide remote operation for FOILEX Skimmer funtions when using other hydraulic power source than FOILEX standard Powerpack DH 30/45 E/H. The RC 125 provides safe control and maximum visibility when using the unit hinged on the rail of the ship or free standing. The Remote Control is equipped with 8 m short hoses to in order to easily connect the Control Panel to existing power source onboard the ship or else.

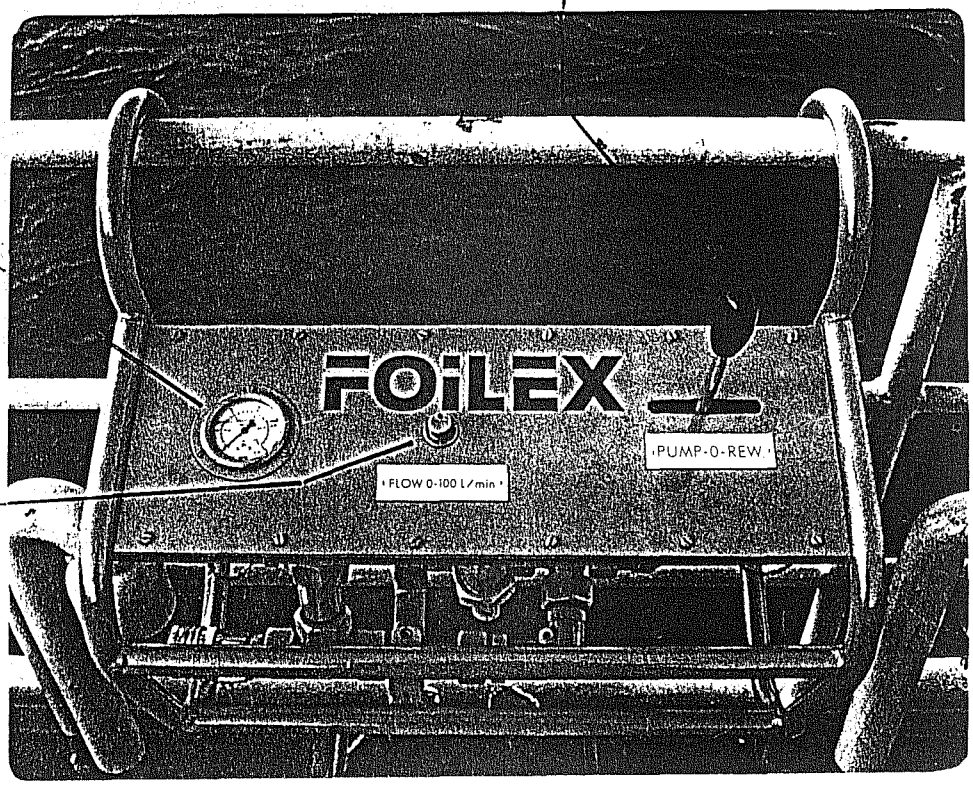


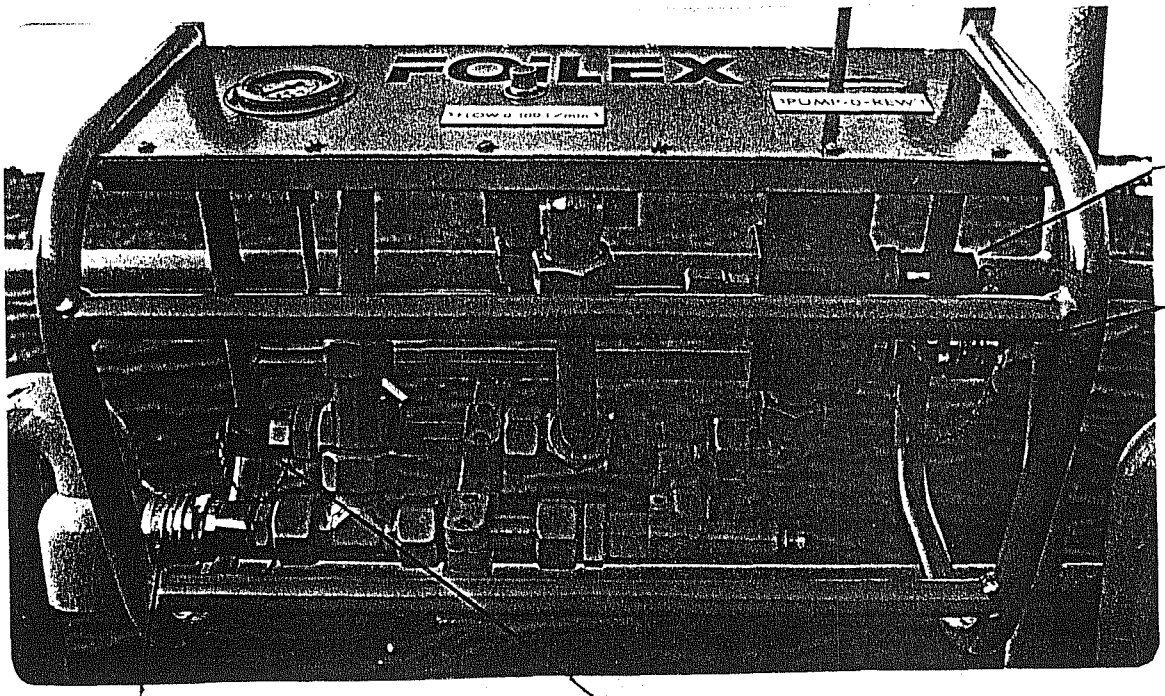
4.8 Pictures showing the Remote Control RC 125.

main lever for
Skimmer/Pump
Pump - 0 - Reverse

Hydraulic
oil pressure
Skimmer/pump

Flowcontrol
Skimmer/pump
(0-125 l/min)





Skimmer
pressure
1" Male

Skimmer
return
1" Female

Power source
pressure 1" Female

Power source
return 1" Male

5. Maintenance.

One condition for a long life and secure operation is that the maintenance is done regularly and in a accurate way.

This does not require any special tools and most things can be performed with the standard tools which are enclosed in the delivery of each pump.

5.1 After each operation.

After each completed operation, as well as after each working day, a simple control and if necessary a maintenance should be performed. There is no doubt about the importance of the rotating sealing discs being in good condition and without damage for the performance and function of the pump. Therefore, section 2 below, should be done with regular intervals even during the operation if opportunity arises.

The following should be performed after each operation:

1. Clean the skimmer/pump and rinse it with fresh water both inside and outside.

2. Open up the upper half of the pump casing and inspect the sealing discs and their packings. Replace the packings if they are worn or damaged (see chapter 5.2).

3. Drain out the water from the pump through the open drain plug, (pos 213) of the pump casing or drain it by placing the pump vertically.

4. Controll that the front and the rear bearing house are filled with grease. Fill through the grease nipples with water proof ball bearing grease until it starts pouring from respective shaft sealing.

5. Lubricate the screw, pump casing and the rear bearing house

with grease and pry the screw around a couple of turns before the upper half of the pump casing is reassembled. This gives an excellent protection against corrosion.

6. Control that the screw joint reinforcement and the connections are firmly tightened.

5.2 Replacement of the sealing disc packings.

Replacement of the rotating sealing disc packings must be done as soon as they have got so worn or damaged that they may jeopardize the function of the pump.

When new, these packings have a diameter which is adjusted to fit into the screw's machined space. This diameter is adjusted both to seal the pump and to secure the driving force of the rotation of the sealing discs. Since these packings enable the screw to drive the sealing discs, it is important that they are replaced when worn or damaged.

1. Before any kind of work is started, the hydraulic hoses must be disconnected from the hydraulic unit.

2. Start by "short-circuiting" the pump's hydraulic motor through a "round-connection" of one of the hydraulic hoses from the pressure side to the return side. This makes it easier when prying the screw later.

3. Now open the pump. Remove the upper half of the pump casing (pos 202). Use a 10 mm socket head cap screw-driver. First loosen the six screws at the outlet connection and the six screws at the feed pipe.

4. Rotate the screw around until one of the sealing discs points 45° obliquely ahead. Watch out for the pump's cutting knives during the rotation.

   NOTE! Place a strong rod in the prying hole of the screw to rotate it. Remove this sealing disc from its shaft by

loosening the counter sunk securing screw (pos 507) with a 8 mm socket head cap screw. Then use an ordinary screw driver to coax the sealing disc away from the squared part of the shaft.

5. Now split the disc by loosening the seven countersunk screws (pos 505) and replace the old packing with a new. Use a 5 mm socket head cap screw-driver. See to that the new packing and both sealing discs are clean and dry before they are reassembled again.

6. Replace the sealing disc in the same position without rotating the screw.

7. Now rotate the screw until the second sealing disc also goes free from the screw and then repeat from section 4.-6.

8. Now when both sealing discs have got new packings the only thing left to do is to lubricate the screw and discs with grease and test-rotate the screw by hand before the upper half of the pump casing is reassembled. Tighten the eight screws at the pumps dividing plane, thereafter the remaining ones at the axial plane.

9. Connect the hydraulics and one can now start pumping.

5.3 Adjustment and control of the cutting tool.

The purpose of the pump´s cutting knives are to divide the larger contaminations into pieces which could otherwise be transported along with the media and cause unintentional standstill. It is therefore important that they are in good condition.

At the inlet side there is a large circle cutting tool, (pos 706) which cuts against the broad part of the pumpscrew. This is mounted inbetween the inlet pipe´s front flange and the pump casing. Make sure that the circle cutting tool is well sharpened

at an angle of about 45°.

Furthermore there are three saw cutting tools, (pos 703) at the inlet pipe which cuts three times per revolution together with the big circle cutting tool.The saw cutting tools shall be monted with its cylindric pins and properly thighten with its screw, (pos 704)

At the outlet side there are three smaller cutting knives, (pos 605) which all cut against a corresponding cutting tool, (pos 106) mounted at the rotating screw.

These are mainly designed for cutting ropes and similar which could have passed the built-up pressure zone and then got entangled in the front bearing supports. It is therefore important that they are all sharp as well as positioned with a distance between each other of about 0.1 mm.

When these have become blunt they can be resharpened and remounted. Use 5 mm hexagon socket head screw-driver for the securing screw. To maintain a 0.1 mm distance, the steel upon the screw has to be fit with distance pieces. See to that all the steel are mounted plane on repective level and that they are properly tightened.

5.4 Replacement of shaft sealings.

The pump has three different types of bearings which should be protected by a sealing ring, i.e. shaft sealings:

A - Main shaft at the motorside. (pos 707).
B - Front screw bearing. (2 off). (pos 604).
C - Sealing discs shaft bearing (pos 207).

The most exposed parts on the pump scew are the sealing rings which are attached behind the pressure built-up zone. Therefore, it is specially important to keep these sealings completely filled with grease. Should they start to leak out of the outer sealing ring, it is time to replace these shaft sealings.

A - Replacement of the main bearing´s sealing rings (pos 707).

1. Start by releasing the hydraulic motor from the bearing house. It is attached by two M12 socket head cap screws plus two M12 nylock nuts. Use the 10 mm hexagon socket head screwdriver and the open end spanner 19 mm.

2. Before the motor can be released, the hydraulic pipes must also be loosened from manifold on the motor casing. Use 46 mm open end spanner.

3. Now the motor can be removed from the bearing house. Drive a wedge alternately between the motor´s corner and the bearing flange and pry the motor loose. Be careful with the thin O-ring, (pos 802) which is attached to the motor´s steering edge.

4. Release the screw from the main bearing by loosen the circlip (pos 102).

5. Release the bearing house and the inlet pipe by loosening the twelve M12 screws (pos 702). Use 8 mm hexagon socket head screw driver.Tighten the pumpcasing in a jaw vice on a bench.

6. Now use a withdrawing tool and loosen the Inlet pipe, inclouding the bearing house, the bearing and the sealing ring from the pumpscrew itself. See to that the screw´s shaft end is well protected before the centre of the withdrawing tool is pressed against the end.
NOTE ! Make sure the pumpscrew do not damage the cutting tools and that the schims are replaced in the same possision as they were loosen.

7. Loosen the circlip (pos 708) from the bearing house. The sealing ring can now easily be changed. Be aware that the sealing ring should seal against water and oilpressure from the outside.

8. Lock the sealing ring with circlip and assemble the pump in reversed order. The bearing house will be greased automatically with hydraulic oil. READY!

B - Replacement of the screw´s front sealing rings (pos 604)

When these sealing rings shall be exchanged, we recommend you also to check the roller bearing (pos 602). Also replace this when required.

1. Start by loosening the outlet connection which is mounted with 12 off M12 socket head cap screws. Use 8 mm haxagon socket head screw driver.

2. To release the bearing flange (pos 601) including the bearing and sealing rings lose the countersunk screw, (pos 903) from the flange and it can be pulled carfully away from the pump casing.

3. Now release the circlip (pos 603) and take out the outer sealing ring and the shims, (pos 604). Continue with the inner sealing ring.

4. The ball bearing has to be removed from the screws front shaft and replaced before the reassembly starts.

5. Exchange the sealings and possibly the bearing when required. Be aware that the sealing rings should seal against pressure and that the seal washer should lay between the sealings.

6. Reassemble in reversed order and fill with waterproof grease until it starts to pour out from the shaft sealings.

C - Replacement of the disc shaft sealing ring (pos 207).

Here, there are only one shaft sealing per shaft. They are identical to those which protect the front shaft of the screw and therefore they are interchangeable with each other.

1. Start by "short-circuit" the pump´s hydraulic motor through a "round-connection" of one of the hydraulic hoses from the pressure side around to the return side. This makes it easier when prying the screw around manually later.

2. Now open the pump. Remove the upper half of the pump casing. Use 8 mm hexagon socket head screw driver. First loosen the six screws at the outlet connection and the six screw at the feed pipe. Then loosen the eight screws in the deviding plane.

3. Rotate the screw around until one of the sealing discs are free from the screw and points 45° obliquely ahead. Note! Watch out for the pump´s cutting knives during the rotation. Place a strong rod into the screw´s "prying-holes".

4. Release this sealing disc from its shaft by loosening the securing screw, (pos 507) with a 8 mm hexagon socket head screw driver. Then use an ordinary screw-driver to coax the sealing disc away from the squared part of the shaft.

5. Release the second sealing disc as above.

6. Open the cover plate, (pos 301) and remove the two steel cog-wheels. They are locked with a circlip, (pos 407) and has to be losen with a withdrawing tool.

7. Remove the shafts, (pos 401 & 402) by losen the circlip, (pos 404) and lift the shaft package including bearings.The shafts can easily be knocked out from the inside of the pump casing.

8. Now replace the old sealing rings, (pos 207) to new ones.

The sealing shall protect the cog-wheel house from internal pump pressure and has to be positioned so that the waterproof grease can expand out when exposed to heat.

9. Reassemble in reversed order and make sure that both square shaft ends are parallel to each other when the cog-wheels are placed in position.

10. Fill with waterproof grease until it starts to pour out from the shaft sealings. Remember to seal of the cover plate towards the pump casing with sealing compound.

11. Now when both sealing rings are new and the casing is open, one should take the opportunity to check that the disc packings, (pos 503) are intact. If not, they should also be exchanged.

12. Mount the complete sealing discs package and secure them with its countersunk screws, (pos 507). Tighten hard !

13. Now lubricate the screw and sealing discs with grease and pry the screw around a couple of turns before the upper half of the pump casing is reassembled. Always tighten the screws in the dividing level before those in the axial way.

6. Storage.

Should the skimmer/pump not be in use for a long time, it is important that it is stored in a proper way to avoid any damage.

First of all one should do the same things as after each operation., (see chapter 5.1).

Unlike the short time storing, both sealing discs should be dismounted to avoid that their packings get deformated by the static load that exists when the pump is not in work.

NOTE! The discs must be marked so that they are remounted on the proper shaft when starting up later. See chapter 5.2 for dismounting the sealing discs.

Furthermore, the pump casing, the inlet pipe and the screw must be treated with an antirust agent such as TECTYL or DINITROL.

If necessary, external damage on the painting should be improved. This is easiest done by brush painting the damage with some kind of yellow two-component colour which is resistant to oil and chemicals.

Then store the skimmer/pump under roof protected from dirt and rain.

7. Technical data.

7.1 Technical specification — FOILEX TDS 250 Pump.

Swedish patent no:	9001145
Capacity:	Max: 130 m^3/h (580 gal/min)
Pressure:	Max: 10 bar (140 psi)
Viscosity range:	0-10^6 cSt
Debris handling:	Cutting knives at inlet and outlet
Motor:	Hydraulic Danfoss OMTS 200
Max rpm cont:	625 rpm
Max rpm int:	750 rpm
Max oil flow cont:	125 l/min (32 gal/min)
Max oil flow int:	150 l/min (39 gal/min)
Max inlet pressure cont:	175 bar (2450 psi)
Max inlet pressure int:	210 bar (2940 psi)
Max return pressure cont:	0-100 rpm: 75 bar (1050 psi) 100-300 rpm: 40 bar (560 psi) >300 rpm: 20 bar (280 psi)
Max return pressure int:	0-max rpm: 75 bar (1050 psi)
Max power cont:	30,5 kW (40,8 hp)
Hydraulic couplings:	
Pressure:	Tema or Aeroquip 1" Female
Return:	Tema or Aeroquip 1" Male
Discharge coupling:	Outer BSP thread R6" with CAMLOCK male or custom choice.
Material:	
Pump screw:	Chem. nickel/Teflon coated steel
Pump casing:	Stainless steel
Sealing disc:	Al.bronze/Stainless steel
Disc sealing:	Synthetic rubber
Cutting knives:	Hardened stainless steel
Coating:	Oil and chemical resistant polyurethane.
Weight:	110 kg (230 lb)
Dimensions LxWxH:	2450x2700x1100 mm (96x106x43 in)
Inlet area:	1000 cm^2 (156 in^2)

7.2 Technical specification — FOILEX TDS 250 Skimmer.

Pump unit:	FOILEX TDS 250
Capacity:	Max: 130 m^3/h (580 gal/min)
Pressure:	Max: 10 bar (140 psi)
Viscosity range:	0-10^6 cSt
Debris handling:	Cutting knives at inlet and outlet
Hydraulic flow:	0-125 l/min (0-32 gal/min)
Max hydr. oil pressure:	175 bar cont. (2450 psi)
Controls:	Flow controlled surface parallell up and downward movement. Pump-0-Reverse direction. Speed, 0-600 rpm
Hopper:	
Entrance diameter:	Ø 800 mm (32 in)
Inlet area:	1200 cm^2 (190 in^2)
Inlet opening:	Ø 200 mm (8 in) 360°
Hydraulic couplings:	
Pressure:	Tema or Aeroquip 1" Female
Return:	Tema or Aeroquip 1" Male
Discharge couplings:	Outer BSP thread R6" with Camlock male or custom choice.
Materials:	
Floating frame:	Stainless steel
Pontoons:	Oil and chemical resistant polyethylene
Hopper:	Stainless steel
Skimming ring:	Fibreglass reinforced polyester
Draught:	800 mm (32 in)
Coating:	Oil and chemical resistant polyurethane/epoxy
Dimensions	
Frame incl pump, LxWxH:	2450x2700x1100 mm (96x106x43 in)
Weight:	
Pump	110 kg (230 lb)
Frame incl. hopper	70 kg (145 lb)
Skimmer unit total:	180 kg (378 lb)
Lifting yoke:	Center lift

7.3 Technical specification FOILEX Hose package.

All hydraulic hoses are of high pressure rubber type, with double steel reinforcements, equipped with male and female quick couplings including protection caps in each end.

Hydraulic hoses:

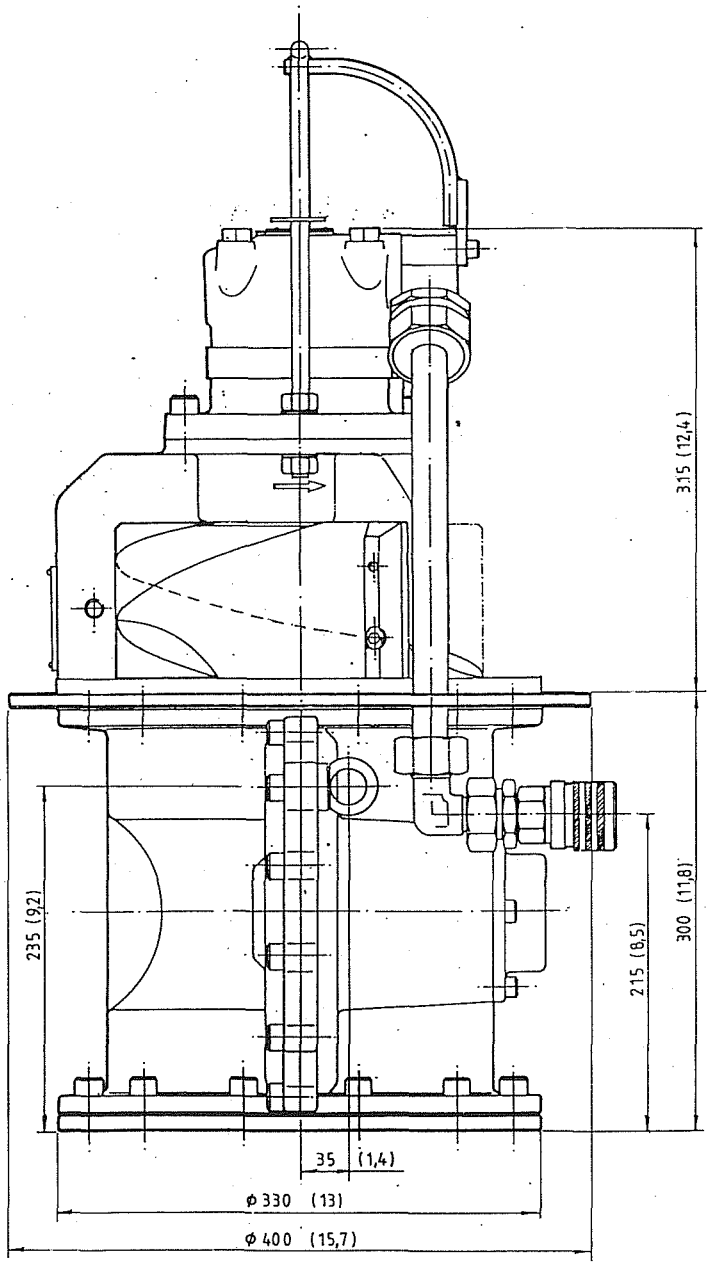
Bursting pressure:	850 bar (11900 psi)
Working pressure:	215 bar (3010 psi)
Diameter:	Ø 1"
Inner:	Ø 24,4 mm (1")
Outer:	Ø 39,5 mm (1 3/4")
Min bend radius:	240 mm (10")
Length:	2x35 m (115 ft) or custom choice
Couplings:	Tema or Aeroquip 1" Male and Female in each end.

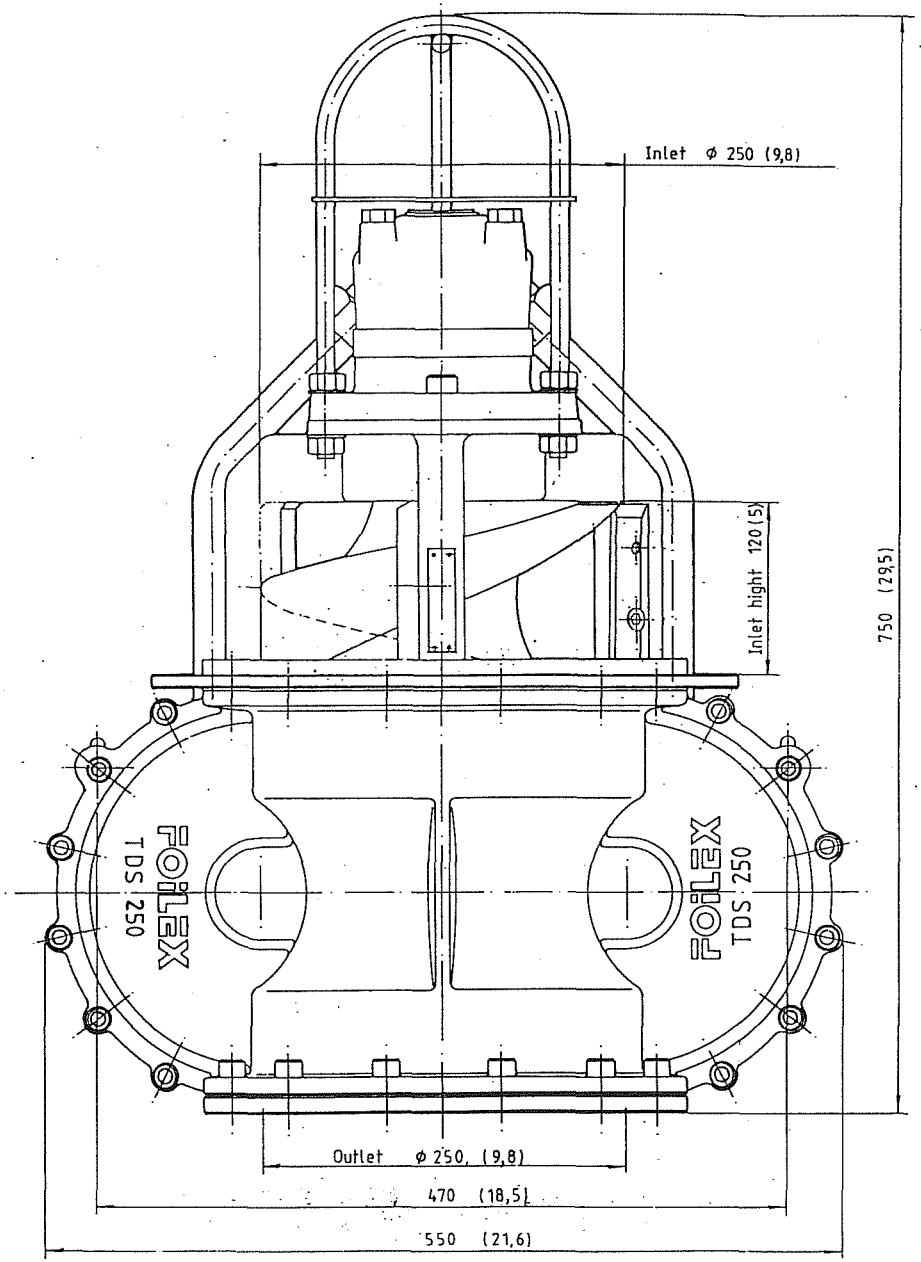
Discharge Hoses:
All discharge hoses are of flat synthetic rubber type with antistatic wire and fitted with male and female Camlock quick couplings in each end.

Reinforcement.	100% round woven polyester fibres
Coating	Corrugated synthetic black rubber. resistant to oil, chemicals abrasion and outdoor exposure.
Bursting press.	40 bar (560 psi)
Working press.	20 bar (280 psi)
Diameter	Ø 100 mm (6") or custom choice
Length	5+10+20 m (15+30+60 ft) To be combinated in any 5 m lengths from 5-35 m (15-105 ft)
Couplings	Camlock 6" or custom choice

Hose Reel:

Dimensions (LxWxH)	1400x1000x1200 mm (55x40x48 in)
Weight (incl hoses):	350 kg (730 lb)
Coating:	Oil and chemical resistant polyurethane/epoxy

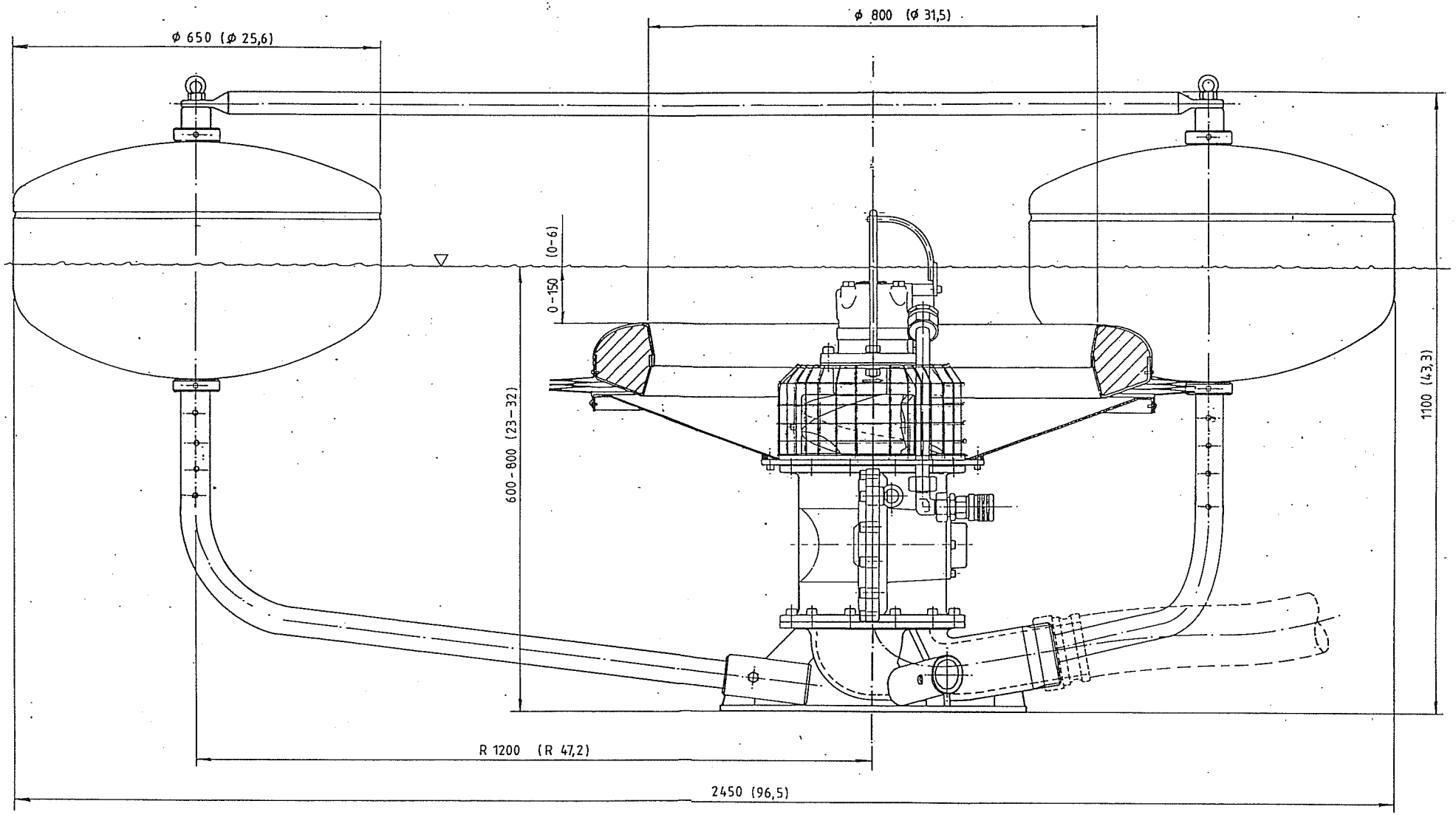




All mesurements in mm, (inch)
Weight: 110 kg (230 lb)

Ändring och / eller medd.-nr	Datum	Int.	Godk.	Nr	Ant.	Ändring och / eller medd.-nr	Datum	Int.	Godk.	Nr	Ant.	Ändring och / eller medd.-nr	Datum	Int.	Godk.

Det.-nr	Ant.	Benämning	Material	Medd.-nr Ämne Dimension	Anm
Konstr.	Ritad	Kop. Kontr. Stand. Godk.	Skala 1: 2,5	Ersätter	Ersatt av
FOILEX	TDS 250 PUMP Dimensional drawing			Ritn.-nr A2115	Dat 921015



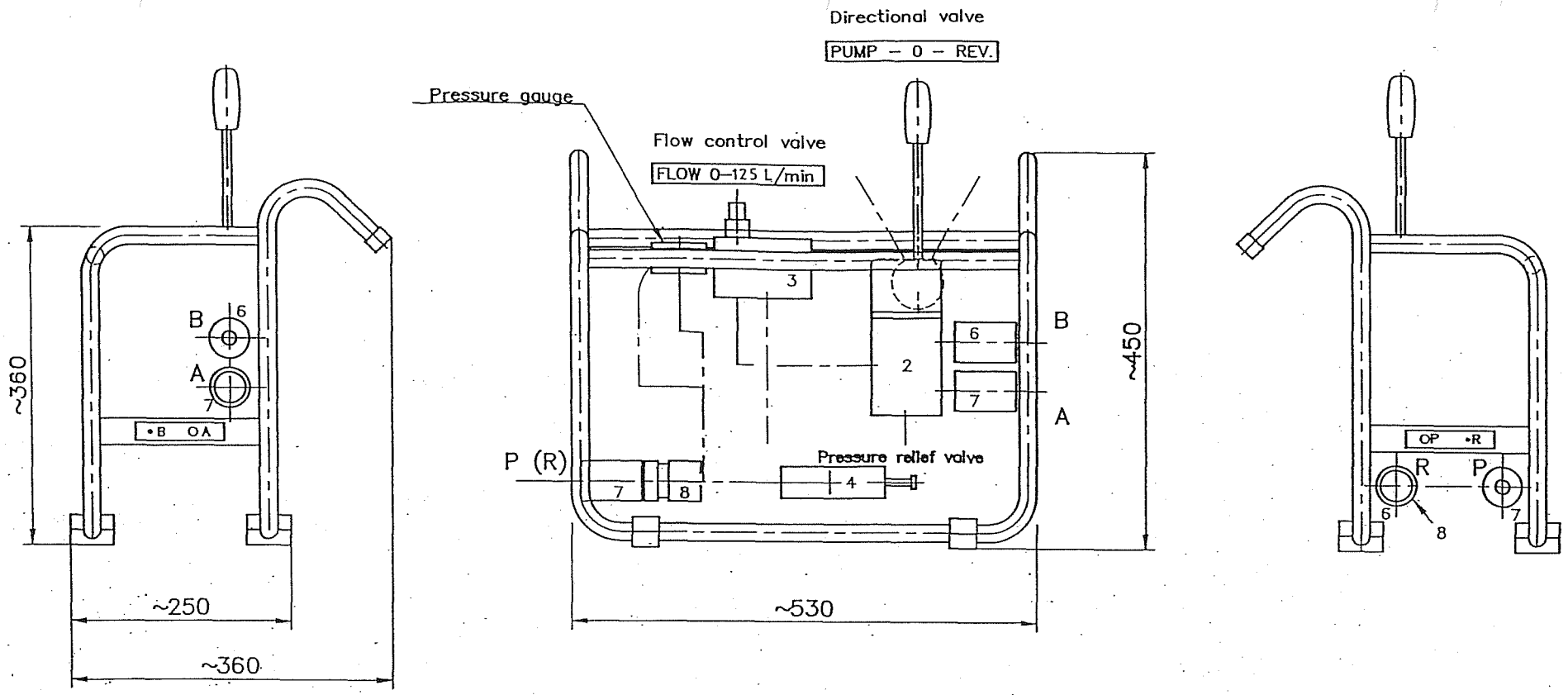
All mesurement in mm, (inch).

WEIGHT:

TDS 250 PUMP:	110 kg (230 lb)
FLOATING FRAME and HOPPER:	70 kg (145 lb)
TDS 200 SKIMMER TOTAL:	180 kg (380 lb)

FOILEX AB
Box 53251
S-400 16 GOTHENBURG, SWEDEN
Phone: +46 31-132555 Fax: +46 31-132504

Det.-nr	Ant.	Benämning	Material	Mod.-nr Ämne Dimension	Anm.
Konstr.	Ritad	Kontr.	Kontr.	Skala 1:5	Ersätter / Ersatt av
FOILEX	TDS 250 SKIMMER Dimensional drawing				Del 921015
					A2114



7.6 Drawing of dimension Remote Control RC 125.

P and A: Quick connections—Female
R and B: Quick connections—Male
Weight: 25 kg

Det.-nr	Ant.	Benämning	Material	Mod.-nr Ämne Dimension	Anm.
Konstr.	Ritad MK	Kop. Konstr. Stand. Godk.	Skala 1:5	Ersätter	Ersatt av
FOILEX AB Box 53251 S-400 16 GOTHENBURG, SWEDEN		Remote Control RC 125		Dat. 940309	
				Ritn.-nr A3200	

r	Ant.	Ändring och / eller medd.-nr	Datum	Inf.	Godk.	Nr	Ant.	Ändring och / eller medd.-nr	Datum	Inf.	Godk.

7.7 Part list, Pump

FOILEX

ASSEMBLEY DRAWING NO:				A2171		
POS	NO	S.P	DESCRIPTION	DRAW/DIM	MAKE	OK
101	1		Pump screw	A1122	FOILEX	
102	1		Circlip	SGA 55 x 2,0	EMILCO	
103	2		Wearing sleave	A4128	FOILEX	
104	3		Schims	Ø 55x68x0,5	KULAN VÄST	
105	5		Schims	Ø 55x68x0,1	KULAN VÄST	
106	1	1	Cutting knife, screw	A4129	FOILEX	
107	2	2	Screw	SR MC6S 6x10	BULTEN	
201	1		Pump casing, lower half	A1118	FOILEX	
202	1		Pump casing, upper half	A1119	FOILEX	
203	10	4	Screw	SR MC6S 12x25	BULTEN	
204	2		Screw	SR MC6S 12x35	BULTEN	
205	2		Lifting eye	LHM-12 fzb	TINGSTRÖMS	
206	4	2	Cylindric pin	SR CP 8x16 m6	TINGSTRÖMS	
207	2	2	Sealing ring	ATD 45x65x6	EMILCO	
208	2		Schims	Ø 80x63x1	KULAN VÄST	
209	2		Circlip	SGH 80 x 2,5	EMILCO	
210	1		Steel couppling	SWVE 12-PLR SY	ERMETO	
211	1		Steel couppling	EVGE 12-PLR ED SY	ERMETO	
212	1		Quick couppling, male	Type 3820	TEMA	
213	1		Protection cup for Male	Type 3825	TEMA	
214	1		O-ring	Ø 2,4 x 7,3	EMILCO	
301	1		Cover plate	A2127	FOILEX	
302	10	2	Screw	SR MC6S 10x20	BULTEN	
303	2		Ball bearing	6206 (30x62x16)	SKF	
304	2		Circlip	SGH 62 x 2,0	EMILCO	
305	1	1	Grease nipple	H1K M10x1	TEMETO	
401	1		Disc shaft, 0°	A3121	FOILEX	
402	1		Disc shaft, 11,25°	A3121	FOILEX	
403	2		Ang. contact ball bearing	3208 A (80x40x30,2)	SKF	
404	2		Circlip	SGA 40 x 1,75	EMILCO	
405	2		Gear, Ø 80 mm	A4132	FOILEX	
406	4	2	Wedge	7x8x20 SMS 2306	TINGSTRÖMS	
407	2	1	Circlip	SGA 30 x 1,50	EMILCO	
408	2		Gear shaft	A4131	FOILEX	
409	2		Gear, 85 mm	A4130	FOILEX	
410	6	2	Washer	BRB 25x40x3,0 fzb	BULTEN	
501	2		Sealing disc, lower	A3133	FOILEX	
502	2		Sealing disc, upper	A3134	FOILEX	
503	2	4	Disc sealing	A3135	FOILEX	
504	14		Bushing	Ø 11x1,5-15	FOILEX	
505	14	4	Screw	SR MF6S 8x30	BULTEN	
506	2		Clamp washer	A4136	FOILEX	
507	2		Screw	SR MF6S 12x25	BULTEN	
601	1		Bearing flange	A2137	FOILEX	
602	1	1	Ball bearing	6011 (55x90x18)	SKF	

7.7 Part list, Pump

FOiLEX

603	2		Circlip	SGH 90 x 3,0	KULAN VÄST	
604	2	2	Sealing ring	CCP 70x90x7	EMILCO	
605	3		Cutting knife, flange	A4129	FOILEX	
606	6		Screw	SR MC6S 6x10	BULTEN	
607	1	2	Grease nipple	H1K M6	TEMETO	
608	2		Screw, counter sunk	SR MF6S 12x25	BULTEN	
701	1		Inlet pipe, 360°	A1139	FOILEX	
702	12		Screw	SR MC6S 12x25	BULTEN	
703	3		Cutting knife, leg	A3150	FOILEX	
704	3		Screw	SR MC6S 10x20	BULTEN	
705	6		Cylindric pin	SR CP 8x16 m6	TINGSTRÖMS	
706	1		Cutting knife, inlet	A3140	FOILEX	
707	3	3	Sealing ring	CCP 70x90x7	EMILCO	
708	1		Circlip	SGH 90 x 3,0	KULAN VÄST	
709	1		Ang. contact ball bearing	3311 (55x120x49,2)	SKF	
710	1		Machine sign	A4141	FOILEX	
711	4		Rivet	KDS Ø2 Stainless	TINGSTRÖMS	
801	1		Hydraulic motor	OMTS 200. 151B3037	DANFOSS	
802	1	1	O-ring	Ø 125x3 Nitril	EMILCO	
803	2		Screw	SR MC6S 12x40	BULTEN	
804	6		Washer	SR BRB 13x24x2,5	BULTEN	
805	1		Manifold	A2142	FOILEX	
806	2	2	O-ring	Ø30,2x3	EMILCO	
807	3		Screw	SR MC6S 10x45	BULTEN	
808	4		Steel coupling	GE 25-PSR 3/4", crome	ERMETO	
809	4		Steel coupling	GE 25-PSR 3/4", crome	ERMETO	
810	1+1		Hydraulic pipe (Left&Right)	A3149	FOILEX	
811	1		Quick coupling, female	Type 7511, Gate A	TEMA	
812	1		Quick coupling, male	Type 7521, Gate B	TEMA	
813	1		Protection cap, for female	Type 7521	TEMA	
814	1		Protection cap, for male	Type 7525	TEMA	
815	1		Lifting yoke	A2143	FOILEX	
816	1		Warning sign	A4192	FOILEX	
817	2		Nut	SR M6M 12M	Tingströms	
818	2		Nut	SR M6M 12 Nylock	Tingströms	
819	1		Screw	SR MC6S 10x50	Tingströms	
820	2		O-ring	Ø25x3	EMILCO	
901	1		Discharge connection 6"	A3188	FOILEX	
902	1		Quick coupling, male	R 6" 633A AL	CAMLOCK	
903	12		Screw	SR M6S 12x45	BULTEN	
904	12		Washer	SR BRB 13x24x2,5	BULTEN	
905	1		Gridnet	A2145	FOILEX	
906	2		Hose clamp	SR 28-36 mm	TINGSTRÖMS	

POS	NO	SP	DESCRIPTION	DRAW/DIM	MAKE	OK	R
101	1		Discharge platform	A2060/A	FOILEX		
102	1		Quick connection	Camlock 4"	CAMLOCK		
103	9		Screw	SRM6S 12x90	BULTEN		
104	9		Nut	SRM6M 12 Nylock	BULTEN		
105	3		Pontoon leg	A3058/A	FOILEX		
106	3		Pontoon	A2052	FOILEX		
107	6		Position ring	A4061	FOILEX		
110	3		Upper pipe	A3059/B	FOILEX		
111	3		Screw	SRM6S 20x40	BULTEN		
112	1		Sticker	FOILEX TDS 200	LINDBERGS		
201	1		Hopper	A1056/A	FOILEX		
202	6		Screw	SRMC6C 10x20	BULTEN		
203	1		Rubber bellow	A.021586	FOILEX		
204	1		Floatation ring	A2076	FOILEX		
205	2		Bellow clamp	A4073	FOILEX		
206	24		Screw	SR MC6S 5x12	BULTEN		
207	3		Internal ring	Ø6 x 1135 mm	FOILEX		
208	3		Connection pipe	Ø8 x 1 - 30 mm	FOILEX		
301	1		Lifting yoke	A4062	FOILEX		
302	2		Nut	SRM6M 10	BULTEN		
303	2		Nut, Nylock	SRM6M 10, Nylock	BULTEN		

7.9 Part list, Remote Control RC 125

FOILEX AB
Box 53251
S-400 16 GOTHENBURG, SWEDEN
Phone: +46 31 13 25 55 Fax: +46 31 13 25 01

SCHEDULE OF PARTS

Part list No.: 48HA411

Hydr. circuit diagram: A4201 Dim. drwg: A3200

Date: 94-02-22

Pos.	No.	Designation	Symbol	Article No.
		Remote control: RC100		
1	1	Frame	34C9624/C	
			stainless pipe	
			ø20x2,5	
2	1	Directional control valve	SG5H-CKS	200-20-703
3	1	Flow control valve	SD3-5	200-53-110
4	1	Pressure relief valve	MV64C-210	
5	1	Pressure gauge	2750, ø63, 0-250	403-00-104
6a	2	Quick connection - Male	0856021212	
		Dust cover	0800565712	
7a	2	Quick connection - Female	0856011212	
		Dust cover	0800565912	
8	1	Check valve	RB4F	200-60-519
9	4	Feet	Pipe clip ø20	
10	1	Sign-board (plastic)	PUMP-O-REV	
			70 x 20 mm	
11	1	Sign-board (plastic)	Flow 0-100 l/min.	
			100 x 20 mm	
12	1	Sign-board (plastic)	OP oR	
		Connections: P and R	100 x 20 mm	
13	1	Sign-board (plastic)	oB OA	
		Connections: A and B	100 x 20 mm	

7.10 Hydraulic oil specification.

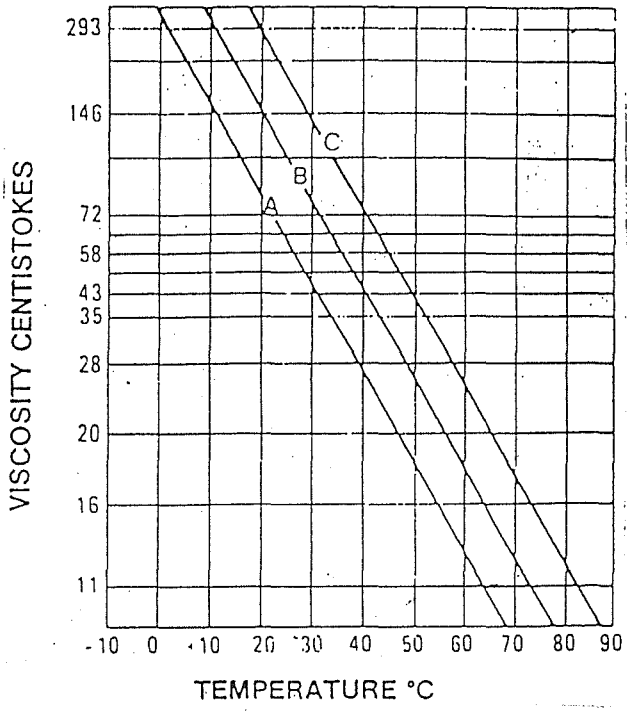
The oil in the hydraulic system mainly transfers the energy from the powerpack to the pump and winch system, but also lubricate the movable parts in the hydraulic motors and protect them against corrosion. Furthermore, the oil should also withdraw contaminations and heat from the system.

Therefore, it is important to use the proper oil and the proper adulterants to ensure an operation without problems and a long life. Among the hydraulic oils we recommend the following:

Viscousity	A	B	C
cSt at 50°C	16 - 20	24 - 28	31 - 39
AGIP	OSO 32	OSO 46	OSO 68
IP	Hydrus 32	Hydrus 46	Hydrus 68
BP	Energol HLP 32	Energol HLP 46	Energol HLP 68
CASTROL	Hyspin AWS 32	Hyspin AWS 46	Hyspin AWS 68
ESSO	Nuto H 32	Nuto H 46	Nuto H 68
MOBIL	DTE 24	DTE 25	DTE 26
SHELL	Tellus 32	Tellus 46	Tellus 68
CHEVRON	EP Hyd Oil 32	EP Hyd Oil 46	EP Hyd Oil 68

Oil temperature and Viscosity.

The temperature of the oil should be between +40°C and +60°C at normal operation. The oil´s length of life is greatly reduced at temperatures over +60°C. We recommend an oil type with viscosity of about 35 cSt with present temperature during operation.



Hydraulic motor
OMT

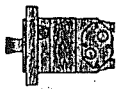
ode numbers and weight

	OMT 160	OMT 200	OMT 250	OMT 315	OMT 400	OMT 500
Cylindrical shaft	151B3000	151B3001	151B3002	151B3003	151B3004	151B3005
Splined shaft	151B3006	151B3007	151B3008	151B3009	151B3010	151B3011
Tapered shaft	151B3012	151B3013	151B3014	151B3015	151B3016	151B3017
P.t.o. shaft	151B3018	151B3019	151B3020	151B3021	151B3022	151B3023
Weight (kg)	20	20,5	21	22	23	24

Wheel motor

	OMTW 160	OMTW 200	OMTW 250	OMTW 315	OMTW 400	OMTW 500
Cylindrical shaft	151B3024	151B3025	151B3026	151B3027	151B3028	151B3029
Tapered shaft	151B3030	151B3031	151B3032	151B3033	151B3034	151B3035
Weight (kg)	22	22,5	23	24	25	26

Short motor

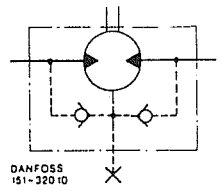


	OMTS 160	OMTS 200	OMTS 250	OMTS 315	OMTS 400	OMTS 500
Without output shaft	151B3036	151B3037	151B3038	151B3039	151B3040	151B3041
Weight (kg)	15	15,5	16	17	18	19

Motors with tacho connection
For code numbers of motors with tacho connection, please contact Danfoss sales organisation for hydraulics.

Technical data

Motor type			OMT OMTW OMTS	OMT OMTW OMTS	OMT OMTW OMTS	OMT OMTW OMTS	OMT OMTW OMTS	OMT OMTW OMTS
Motor size			160	200	250	315	400	500
Geometric displacement	(cm^3)		161,1	201,4	251,8	326,3	410,9	523,6
Max. speed	(r/min)	cont.	625	625	500	380	305	240
		int.[1]	780	750	600	460	365	285
Max. torque	(daNm)	cont.	47	59	73	95	108	122
		int.[1]	56	71	88	114	126	137
		peak [2]	66	82	102	133	144	160
Max. output	(kW)	cont.	26,5	33,5	33,5	33,5	30	26,5
		int.[1]	32	40	40	40	35	30
Max. pressure drop	(bar)	cont.	200	200	200	200	180	160
		int.[1]	240	240	240	240	210	180
		peak [2]	280	280	280	280	240	210
Max. oil flow	(l/min)	cont.	100	125	125	125	125	125
		int.[1]	125	150	150	150	150	150
Max. inlet pressure	(bar)	cont.	210	210	210	210	210	210
		int.[1]	250	250	250	250	250	250
		peak [2]	300	300	300	300	300	300
Max. return pressure without drain line or Max. pressure in drain line [3]	(bar)	cont. 0-100 r/min	75	75	75	75	75	75
		cont. 100-300 r/min	40	40	40	40	40	40
		cont. > 300 r/min	20	20	20	20	20	-
		int.[1] 0-max. r/min	75	75	75	75	75	75
Max. return pressure with drain line	(bar)	cont.	140	140	140	140	140	140
		int.[1]	175	175	175	175	175	175
		peak [2]	210	210	210	210	210	210
Max. starting pressure with unloaded shaft	(bar)		10	10	10	10	10	10
Min. starting torque	(daNm)	at max. press. drop cont.	34	43	53	74	84	95
		at max. press. drop int.[1]	41	52	63	89	97	106
Min. speed [4]	(r/min)		10	9	8	7	6	5



OMT motors have built-in check valves [3]

[1] Intermittent operation: the permissible values may occur for max. 10% of every minute.
[2] Peak load: The permissible values may occur for max. 1% of every minute.
[3] The built-in check valves ensure that the pressure on the shaft seal never exceeds the pressure in the return line. Max. pressure for OMTS is dictated by the technical data for the component to be attached.
[4] Operation at lower speeds may be slightly less smooth.

Funktionsdiagram

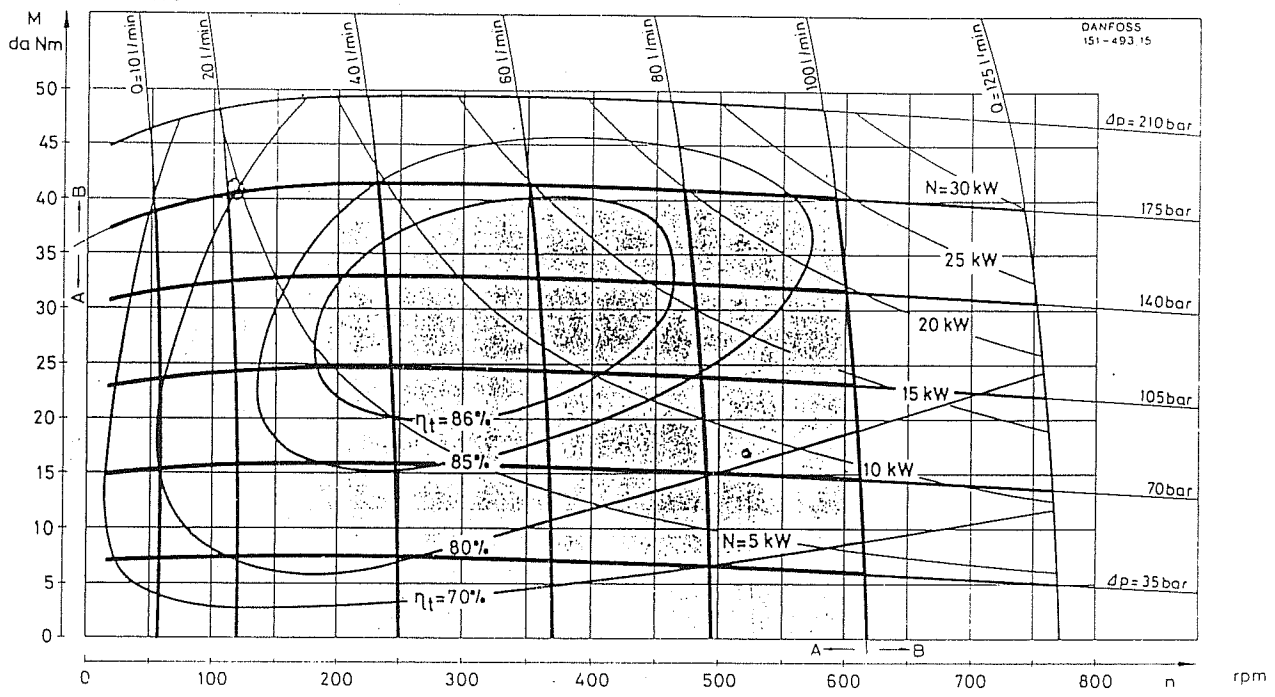
Nedanstående funktionsdiagram används på sätt som beskrivs i kapitel, Val av hydraulmotor sid 59.

Diagrammen grundar sig på resultat från funktionsprov som utförts på ett representativt urval av motorer ur vår produktion.

Diagrammen gäller för mineraloljebaserad hydraulolja med viskositet 35 cSt och temperatur 50°C.

Vid varvtal lägre än 5-10 rpm får man räkna med något oregelbunden gång.
Se Lägsta varvtal, sid 61.

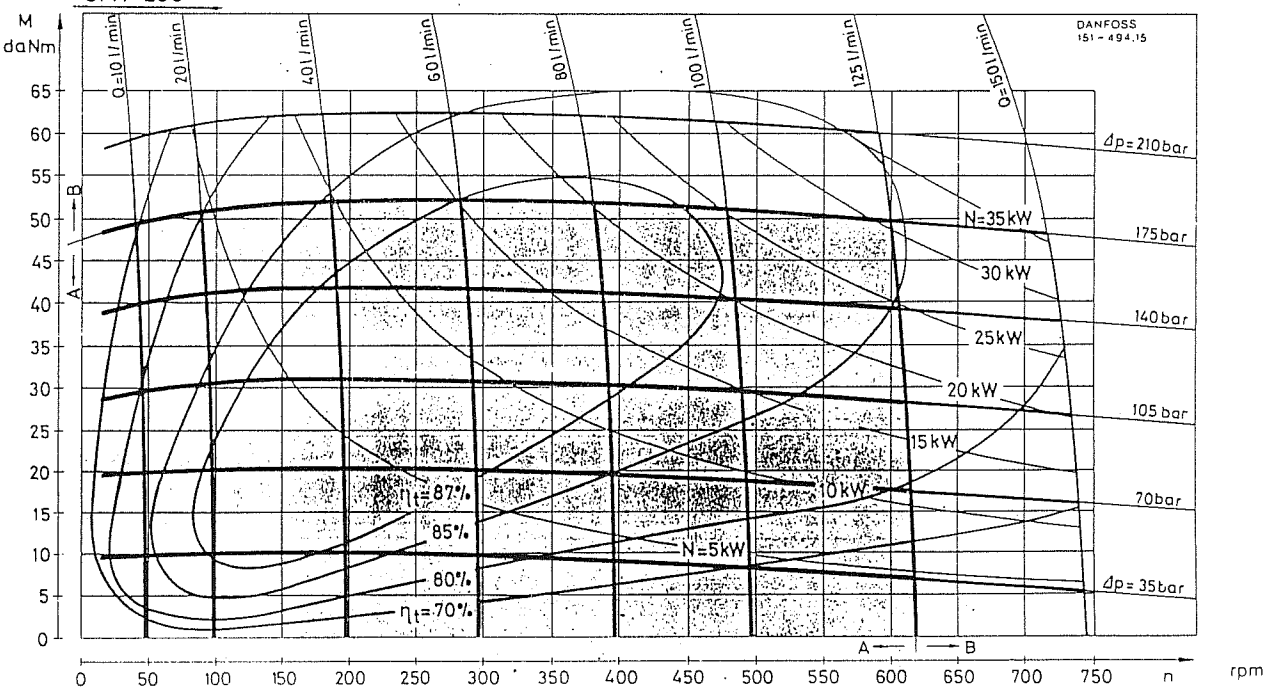
OMT 160



A: Område för kont. drift
B: Område för int. drift (drift under max 10% av var minut)

Tryckfall över 175 bar och oljeflöde över 100 l/min *får inte förekomma samtidigt.*

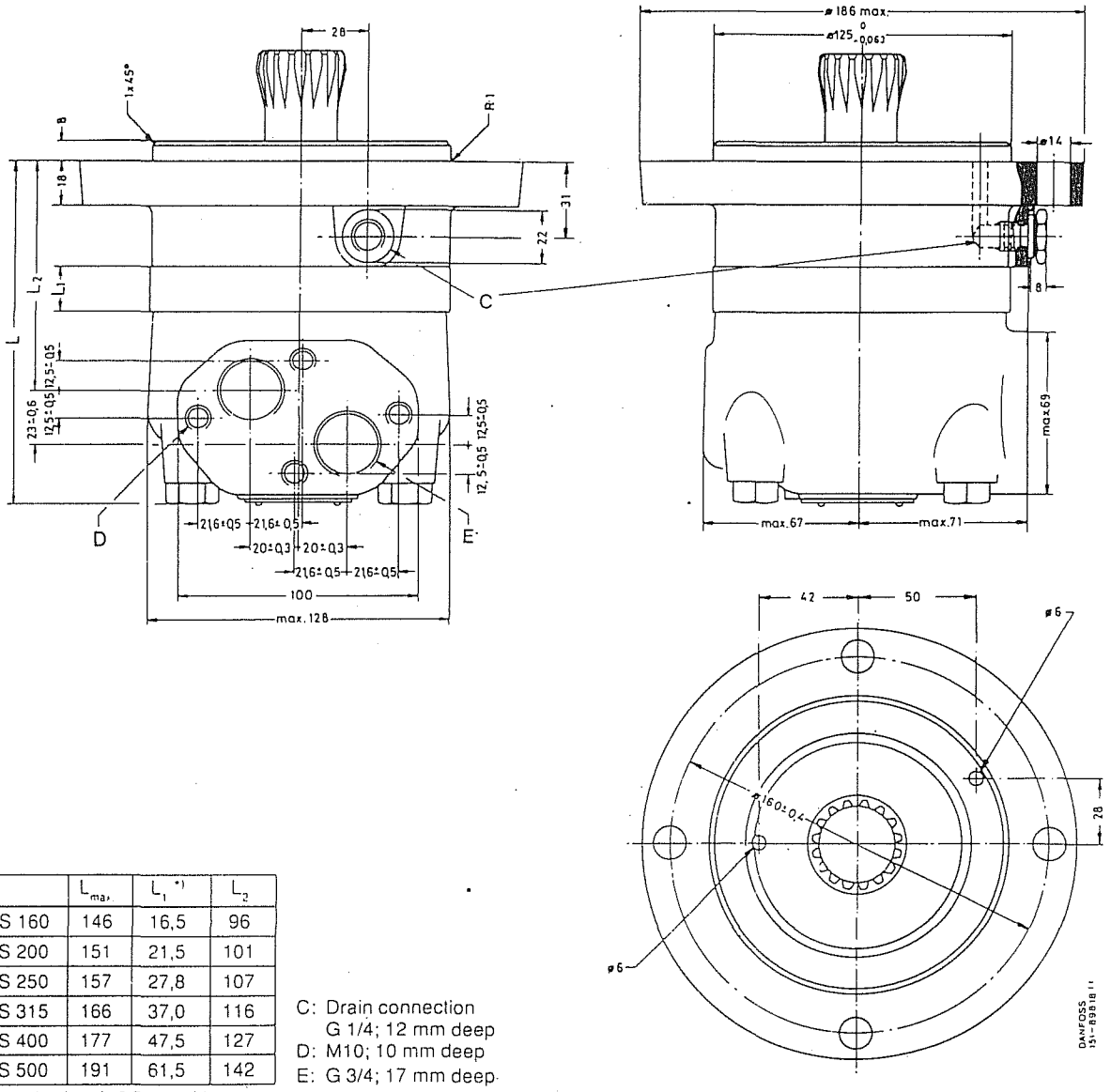
OMT 200



A: Område för kont. drift
B: Område för int. drift (drift under max 10% av var minut)

Tryckfall över 175 bar och oljeflöde över 125 l/min *får inte förekomma samtidigt.*

OMTS short motor



Type	$L_{max.}$	L_1 *)	L_2
OMTS 160	146	16,5	96
OMTS 200	151	21,5	101
OMTS 250	157	27,8	107
OMTS 315	166	37,0	116
OMTS 400	177	47,5	127
OMTS 500	191	61,5	142

*) The gearwheel set is 3,5 mm wider across the rollers than the L_1 dimensions

C: Drain connection G 1/4; 12 mm deep
D: M10; 10 mm deep
E: G 3/4; 17 mm deep

Installing the OMTS

The cardan shaft of the OMTS motor acts as an "output shaft". Because of the movement of the shaft, no seal can be fitted at the shaft output. Internal oil leakage from the motor will therefore flow into the attached component.

During start and operation it is important that the spline connection and the bearings in the attached component receive oil and are adequately lubricated. To ensure that the spline connection receives sufficient oil, a conical sealing ring between the shaft of the attached component and the motor intermediate plate is recommended. This method is used in the OMTS.

The conical sealing ring (code. no. 633B9022) is supplied with the motor.

To ensure that oil runs to the bearings and other parts of the attached component, the stop plate must have a hole in it (see fig. overleaf).

We recommend an O-ring between motor and attached component. The O-ring (code no. 151B1040) is supplied with the motor. If motor and attached component have been separated, remember to refill before starting up. Fill the oil through the drain connection.

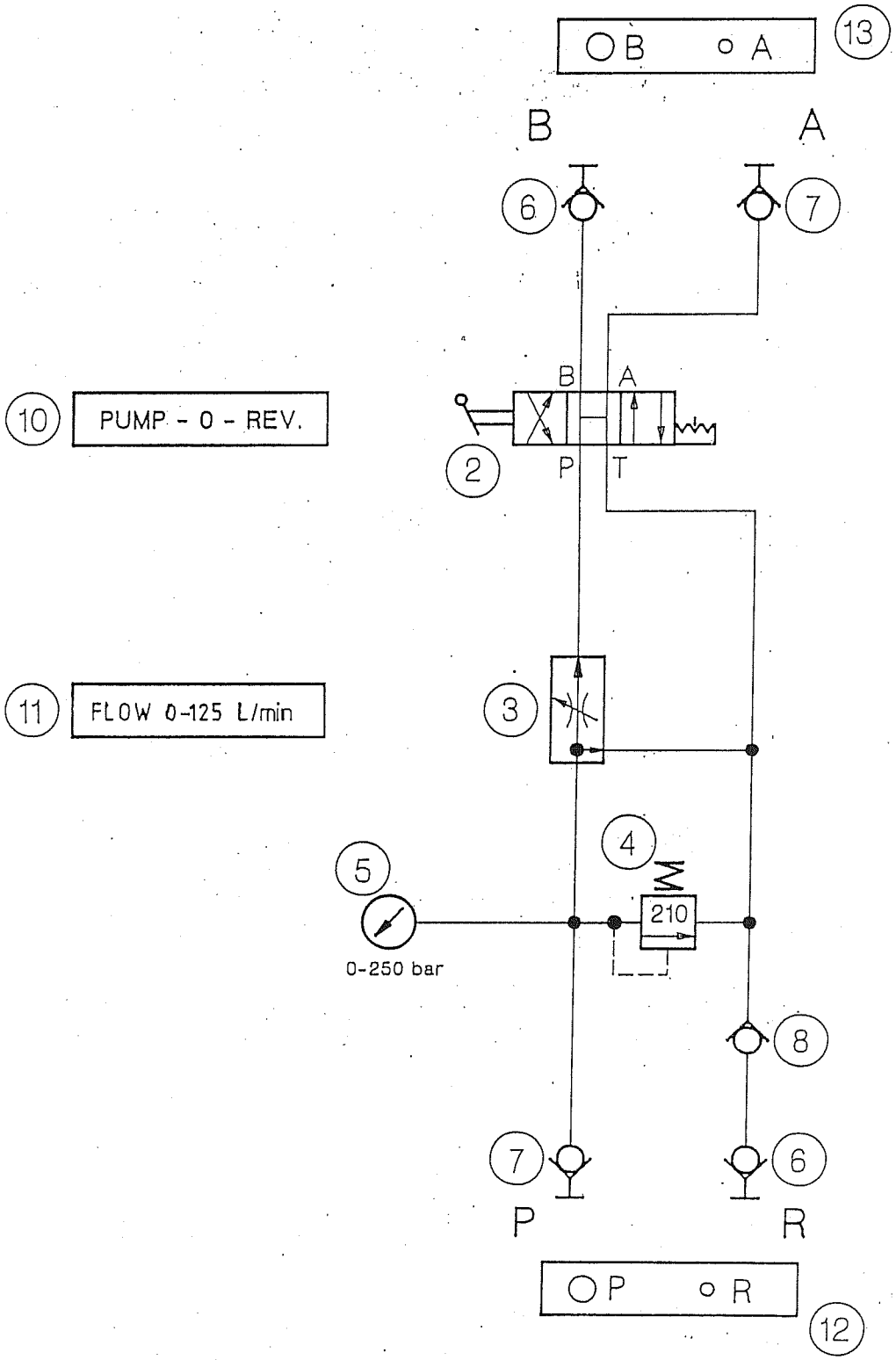
7.12 Technical specification Remote Control RC 125, with hoses.

Remote Control RC 125

Max flow	125 l/min (32 gal/min)
Max pressure	210 bar (2900 psi)
Hydraulic couplings	Tema or Aeroquip 1" male and female Controls
Pump/Skimmer	Forward - Neutral - Reverse
Flow control	0-125 l/min (0-32 l/min)
Coating	Oil and chemical resistant polyurethane/epoxy
Dimensions	L x W x H 530 x 360 x 360 mm (21 x 14 x 14 in)
Weight	25 kg (52 lb)
Shipping volume	0,06 m^3 (3 ft^3)

Hoses

Type	High pressure rubber type with double steel reinforcements.
Diameter	Ø 1"
Length	2 x 8 m (26 ft)
Couplings	Tema or Aeroquip 1", male and female quick couplings in each end.
Weight	10 kg (21 lb)
Shipping volume	0,2 m^3 (7 ft^3)



	M-LISTA:		FORMAT A4	ERSÄTTER
KONSTR.	RITAD. MK	KONTR.	SKALA - - -	DATUM 940309
FOILEX AB Box 53251	CIRCUIT DIAGRAM REMOTE CONTROL			RITN.NR.

8. Spare parts.

In chapter 8.1, there is a list over the standard spare parts that we recommend to each pump. The set covers normal wear under the first period of operation and contains also packings etc. which can be damaged during normal operation of the pump.

Naturally, other parts can also be ordered in addition to this list. We then ask you to study the Material list under chapter 7.3.

When ordering spare parts, the following information should be stated:

1. The pump´s serial number.

2. Position number, draw.no and description of the spare part.

3. Number of units wished for.

The order of spare parts should primary be sent to:

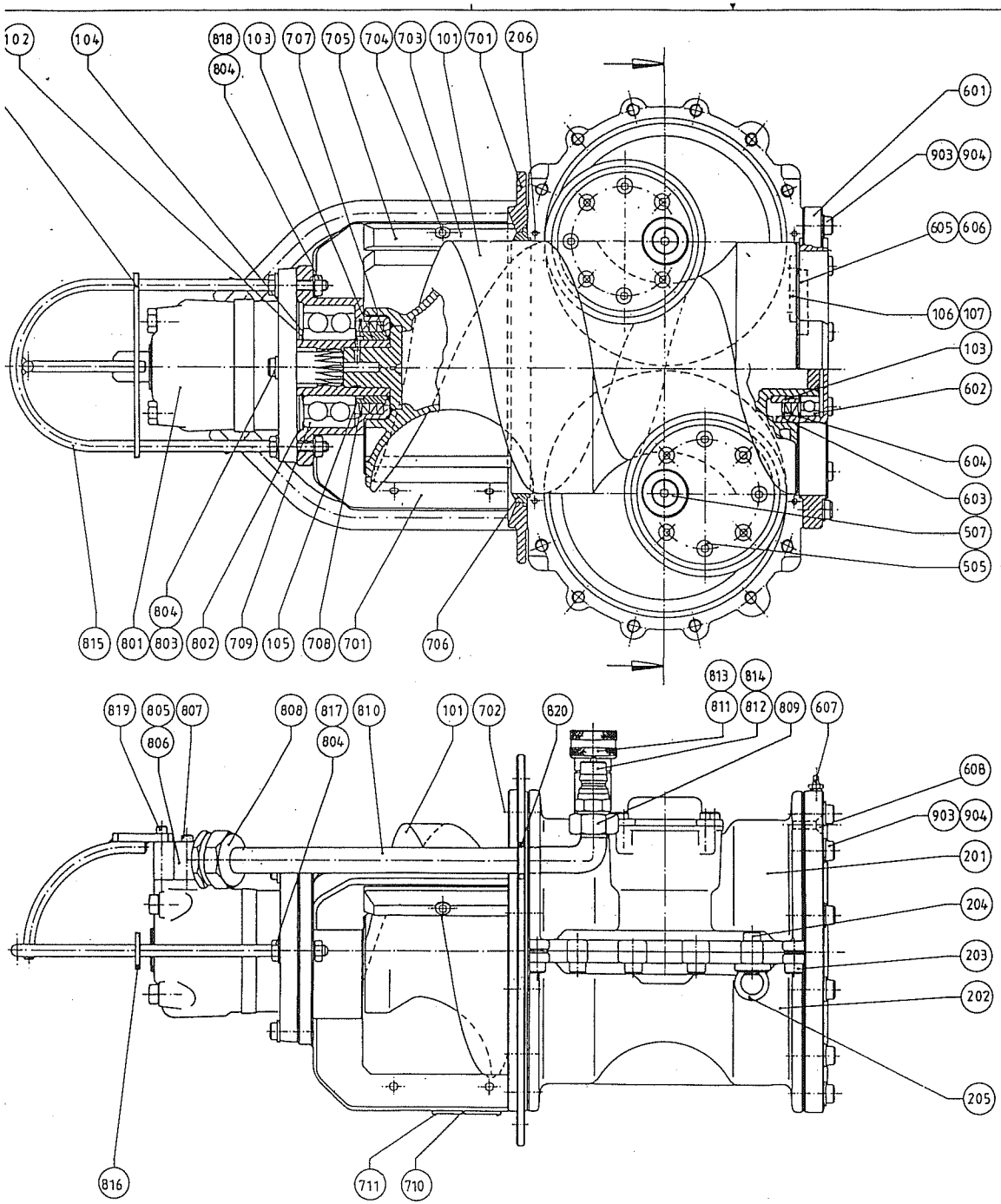
FOILEX AB
Box 53251
S-400 16 Göteborg
SWEDEN

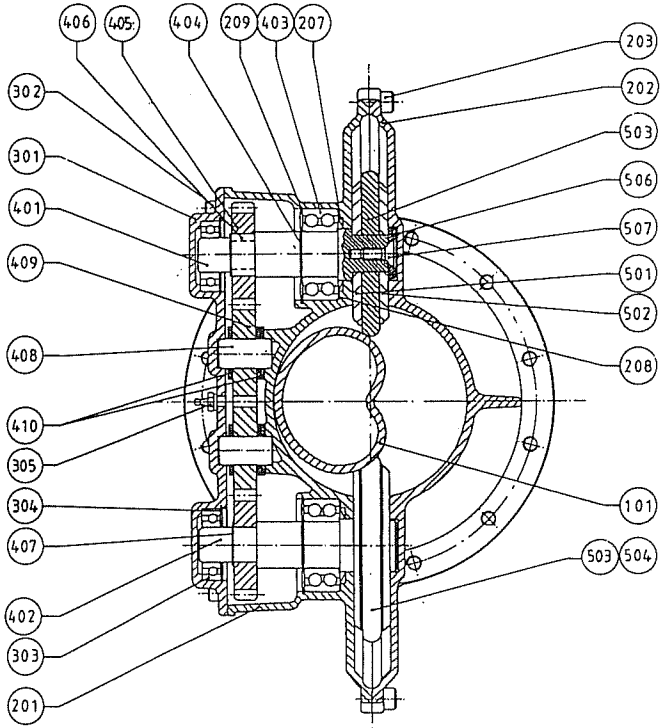
Tel: +46 31 132555
Fax: +46 31 132501

8.1 Standard spare part list

Standard spare parts TDS 250 Pump M101 94-03-10

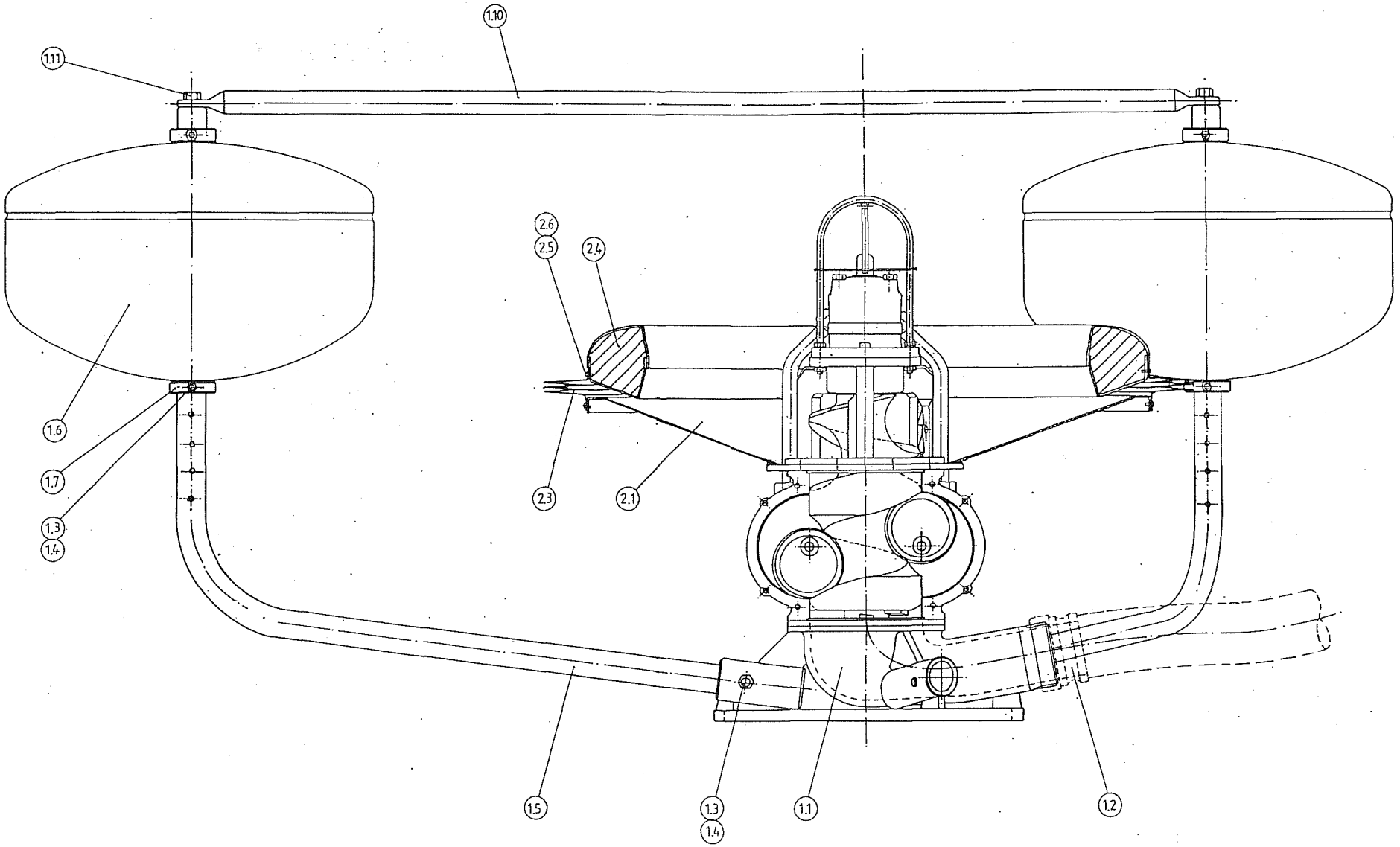
POS	NO	S.P	DESCRIPTION	DRAW/DIM	MAKE	OK
106	0	1	Cutting knife, screw	A4129	FOILEX	
107	0	2	Screw	SR MC6S 6x10	BULTEN	
203	0	4	Screw	SR MC6S 12x25	BULTEN	
206	0	2	Cylindric pin	SR CP 8x16 m6	TINGSTROMS	
207	0	2	Sealing ring	ATD 45x65x6	EMILCO	
302	0	2	Screw	SR MC6S 10x20	BULTEN	
305	0	1	Grease nipple	H1K M10x1	TEMETO	
406	0	2	Wedge	7x8x20 SMS 2306	TINGSTROMS	
407	0	1	Circlip	SGA 30 x 1,50	EMILCO	
410	0	2	Washer	BRB 25x40x3,0 fzb	BULTEN	
503	0	4	Disc sealing	A3135	FOILEX	
505	0	4	Screw	SR MF6S 8x30	BULTEN	
602	0	1	Ball bearing	6011 (55x90x18)	SKF	
604	0	2	Sealing ring	CCP 70x90x7	EMILCO	
607	0	2	Grease nipple	H1K M6	TEMETO	
707	0	3	Sealing ring	CCP 70x90x7	EMILCO	
802	0	1	O-ring	Ø 125x3 Nitril	EMILCO	
806	0	2	O-ring	Ø30,2x3	EMILCO	





Det.-nr	Ant.	Benämning	Material	Mod.-nr Ämne Dimension	Anm.
Konstr.	Ritad	Kop. Kons.	Stand. Godk.	Skala 1:3	Ersätter / Ersatt av
FOILEX	Spare part drawing TDS 250 PUMP				Dat. 930624
					Ritn.nr A2171

Ändring och / eller medd.-nr	Datum	Int.	Godk.	Nr	Ant.	Ändring och / eller medd.-nr	Datum	Int.	Godk.	Nr	Ant.	Ändring och / eller medd.-nr	Datum	Int.	Godk.



FOILEX TDS 250 SKIMMER.
(TDS 250 PUMP, HOPPER and FLOATING FRAME)

Det.-nr	Ant.	Benämning	Material	Mod.-nr Xmne Dimension	Anm.
				Skala 1:5	Ändr.
FOILEX		TDS 250 SKIMMER Spare part drawing			Ers. av
					Dat 940308
					Ritn.-nr A2199

8.4 Standard tools.

To each skimmer/pumpunit is a toolbox delivered including a tool kit sufficiant for most of the required maintenance work. The box contains also the standard spare parts that are included in each delivery.

1 off	Hexagon socket head screw-driver	4 mm
1 off	Hexagon socket head screw-driver	5 mm
1 off	Hexagon socket head screw-driver	6 mm
1 off	Hexagon socket head screw-driver	8 mm
1 off	Hexagon socket head screw-driver	10 mm
1 off	Open end spanner	19 mm
1 off	Screw-driver	10x175 mm
1 off	Adjustable spanner	27x205 mm
1 off	Grease gun	
2 off	Waterproof grease tubes	400 g

9. Service

For detailed information regarding service and maintenance, please contact your local agent or:

FOILEX AB

P.O Box 53251

S-400 16 Göteborg

SWEDEN

Tel: +46 31 132555

Fax: +46 31 132501

Chapter 9: Decontamination

Decontamination of all of the equipment is basically the same. After a spill, all of the equipment will be coated with a waxy substance that will probably be fairly hard or sticky. The boom, tank and Unitor bags can all be cleaned using warm water, scrub brushes and detergents. Steam cleaning may be effective in the tank, but is not recommended for the boom or bag, as the heat may destroy or damage the fabric. Marine grade detergents are recommended. Do not use solvents such as diesel fuel, gasoline or alcohol. These solvents create dangerous gases and will damage the equipment.

Care must be taken to contain and collect all waste water.

After returning to port, lay the boom out on tarpaulins on a hard, flat surface that is free of sharp objects that may puncture it. The boom is scrubbed with detergent as specified above. The tank and skimmer are also hand cleaned.

After decanting, water and detergent can be pumped into the Unitor bag, and it towed around. This "rock and roll' method will get detergent to most of the interior of the bag. This mixture can then be recovered. After the nose cone is removed, a person wearing a breathing apparatus can enter the bag to complete the cleaning. It will be necessary to blow air with a high volume fan into the bag in order to inflate it sufficiently for a person to enter. Bag decontamination should occur indoors, as a strong wind may blow the bag away. After thorough cleaning the bag should be allowed to dry completely. Mops may be used to remove puddles of water. The bag should be thoroughly dried before the nose cone is replaced and the bag restowed.