OPERATORS MANUAL

DESMI TERMINATOR WEIR SKIMMER

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Original Instructions

Safety precaution when working with oil skimmer systems

- Carefully read this manual before connecting or starting the machines. Notice that it may not be possible to study the manual during operation of the machinery.
- Only connect skimmers and winders with power packs they have been delivered with or which have been approved on beforehand by DESMI Ro-Clean.
- Do not start combustion engines in closed or badly ventilated rooms or if there is a danger of hazardous atmospheres. Avoid breathing in of exhaust fumes.
- The machines are not ATEX approved and must not be used in explosive atmospheres.
- Only lift machines in for this purpose made lifting devices such as fork lift channels, lifting eyes or lifting handles.
- Stop engines and disconnect battery terminals and hydraulic hoses before maintaining the equipment.
- Stop all engines before connecting or disconnecting hydraulic hoses.
- Before starting the machine, make sure that nobody is in the danger area (moving parts on engine or machinery), that all safety guards are in place and that the operator has a clear view of the working area including personnel and machines connected to the power pack.
- Never use any spray starting aids.
- Keep all advice and warning stickers in legible condition.
- When stored or in operation on a ship secure all equipment safely to the deck.
- Operators must frequently train in the use of power pack / oil skimmer / Oil containment boom systems in order to work safely with these systems.
- Observe the hydraulic oil level and temperature frequently during operation.
- Stand in front of the control panel and keep safety distance to the sides of the power pack during operation. Do not lean against the machine as this may vibrate and the engine, exhaust pipe and fumes can be very hot.
- Never use power packs with detent control levers for powering boom winders.
- Always use ear protectors when operating power packs or hydraulic motors.
- Use safety gloves, safety shoes, and clothes during operation or maintenance.
- Sucking in of solid particles by air blower should at all times be avoided as these may be ejected from the discharge flange at high speed and cause injury.
- During operation all personnel must pay attention to the danger of falling due to oily surfaces and hoses between power packs and connected machinery.
- During deployment of skimmers the personnel must pay attention to the danger of skimmers and hoses being caught by moving/rotating element such as ships and ship screws.
- Keep a safety distance to skimmers of minimum 1,4 meter.
- The sound pressure level of skimmers in water or oil does not exceed 70 dB(A)
- When operating skimmers on land the safety area must be marked by barrier tape in a height of 1,0 meter and at least 1,4 meter from the skimmer.
- When testing skimmers on land make sure that these are grounded to avoid sparks from static electricity.

NOTE: Refer to user manuals for ancillary equipment.

Designation :

Type :

Spec :

Part no. :

Serial no. :

Week/Year :

Gross Weight :

Type of the pump

MANUFACTURED BY: **DESMI A/S**
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Phone +45 96 32 81 11
Telefax +45 98 17 54 99

WARNING !
This equipment can be dangerous if the safety precautions in this manual are not being followed.
Do not use the equipment without being familiar with the safety precautions in this manual. The customer is responsible for accidents caused by the equipment, if the safety instructions are not being followed.

WARNING !
Keep away from the rotating pump screw and cutting knives. The pump screw/cutting knives are designed for cutting debris normally found at oil spill sites and will also cut off fingers and other limbs.

WARNING !
Always keep a safety distance to the pump of minimum 2 m/7 ft. when the pump is connected to the hydraulic power supply. Do *not* connect the hydraulic hoses to the power supply until you are ready for operation.

C O N T E N T S

1.0 IN GENERAL

The DESMI DOP-DUAL TERMINATOR skimmer system is the second generation of DESMI's vertical Archimedes' screw skimmers.

New materials have been introduced, resulting in lower weight, increased buoyancy, and thus improved seaworthiness. Fewer parts make a more simple skimmer, easy to assemble and easy to maintain. Using DESMI's modified positive displacement Archimedes' screw pump in vertical design (DOP-DUAL), the DESMI DOP-DUAL TERMINATOR skimmer is able to efficiently recover light as well as heavy oil, also when mixed with debris normally found in connection with oil spills.

The DESMI DOP-DUAL TERMINATOR self-adjusting weir lip adapter, which is mounted on the hopper, makes the skimmer capable of dealing with even thin oil layers of light to medium viscosity oil, STILL obtaining high recovery efficiency. Thus the amount of water recovered along with the oil will be minimal at any pump RPM and recovery rate.

The skimmer is fitted with a flotation system with to provide the necessary buoyancy. Hydraulic power to the skimmer pump is supplied through hydraulic hoses connected to the power supply or remote control box. A discharge hose connects the skimmer to the storage tank.

The hoses will not affect the buoyancy of the skimmer, as they are equipped with their own floats.

The DESMI DOP-DUAL TERMINATOR skimmer is designed as an advancing skimmer to operate in conjunction with a floating containment boom. Do not start the skimmer pump before a sufficient oil layer is collected (DESMI recommend a minimum of 2 cm (3/4")). The recovery efficiency may vary from 50 to 100% subject to oil quantity (oil layer thickness), oil viscosity, boom make, wave conditions, towing speed, and maybe most important: The operator's skill.

WARNING!
This equipment is designed to cope with debris normally found in an oil spill, and can be dangerous if the safety precautions in this manual are not followed. Do not use the equipment without being familiar with the safety instructions. The customer is responsible for accidents caused by the equipment, if the safety instructions in this manual are not being followed.

2.0 TRANSPORTATION AND MOUNTING

2.1 Transportation of the skimmer

The DESMI DOP-DUAL TERMINATOR skimmer is equipped with a lifting device for transportation of the assembled skimmer or for transportation of the pump section alone. Also, the three float pipes are equipped with carrying handles so 3-6 persons can carry the assembled skimmer.

CAUTION!
Do not lift the skimmer in other parts than the lifting device or the carrying handles!

For towing and positioning the skimmer when deployed, use the tow point

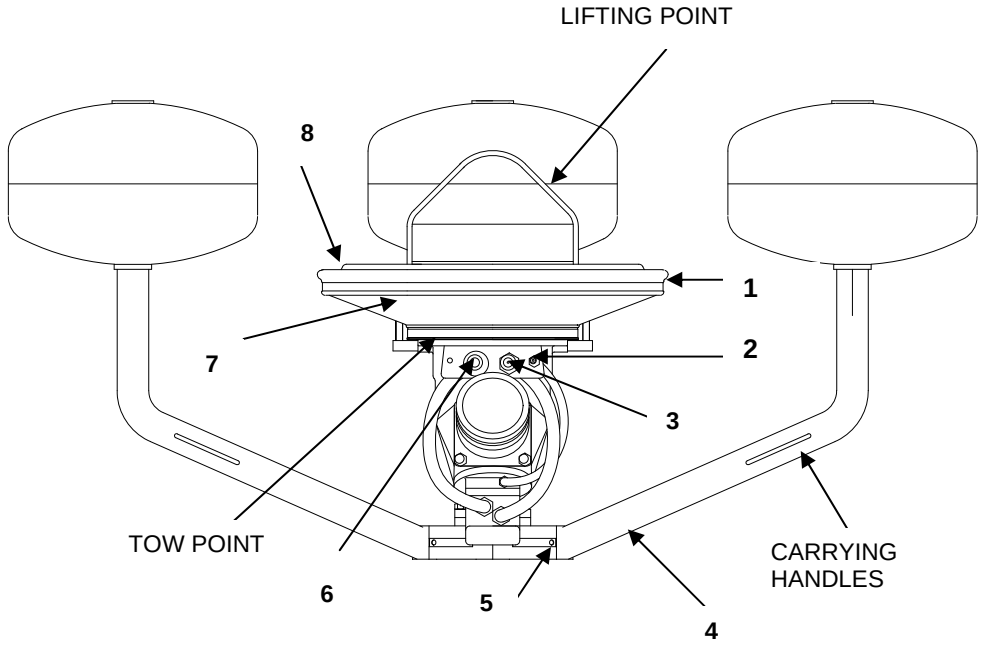


Fig. 1

1. Clamp
2. Hydr. drain
3. Hydr. pressure
4. Float pipe
5. Float pipe lock
6. Hydr. return
7. Hopper
8. Weir lip adapter

Weight:
162 kg/ 357 lbs (excl. thrusters)
195 kg/ 430 lbs (incl. thrusters)

2.2 Mounting

A. Remove from the container (OPTION) the pump section incl. hopper with weir lip adapter and the 3 float pipes (fig. 1, item 4) with the floats and the thrusters.

B. Snap on the float pipes with the floats to the pump section.
Mount the thrusters to the float pipes.
Connect the drain hoses from the thrusters to the drain couplings on the skimmer manifold.

C. Check that the clamps on the hopper and the weir lip adapter are secured.

WARNING!
Always keep a safety distance to the skimmer/pump of minimum 2 m/7 ft. when the skimmer/pump is connected to the hydraulic power supply. Do *not* connect the hydraulic hoses to the power supply until you are ready for operation.

D. Connect the hydraulic hoses from the power source and discharge hose to the pump section.
Check that all hydraulic couplings are properly connected and locked.

E. Inflate the hose carrying floats and tie them and the hydraulic hoses to the discharge hose. The supplied nylon ropes in the toolbox are for that purpose.

3.0 RESPONSE TACTICS

3.1. General remarks

It is very difficult to generalise when discussing oil spill situations. Each spill has its own set of characteristics: Location, close to shore or far off shore, environmental sensitivity, shallow or deep water, waves, current, wind speed and direction, temperature, size of spill, type of oil, time after spill, debris, etc.

However, there are common factors that influence how successful the clean-up operation will be, and they should all be incorporated in an appropriate contingency plan:

- Availability and capability of equipment (ships, skimmer systems, booms, pumps, storage tanks etc.) and maintenance of the same
- Availability of manpower, well trained/not trained
- What to protect first of all
- Communication
- Information
- Surveillance
- Command
- Strategy/planning
- Etc.

Regarding the equipment described in this manual, the most important common factors for success are:

- Maintenance and
- Training

NOTE!
Training again and again is the only way to be sure to realise the full capacity of your DESMI DOP-DUAL TERMINATOR skimmer system. It is also critical to ensure proper preventative and corrective maintenance as described in this manual.

3.2. Oil spills at sea

An overflow weir skimmer should always be within sight of the operator. The closer the operator is to the skimmer, the better the control and recovery efficiency.

For best manoeuvrability use the skimmer(s) in a single or double sweep configuration with the skimmer(s) in the apex of the ship's side sweep boom(s). For larger oil spills the configuration may be combined with "J" sweep(s) (Fig. 2) which will feed oil into the system from a wider area. Use for instance towable storage bladders for storage.

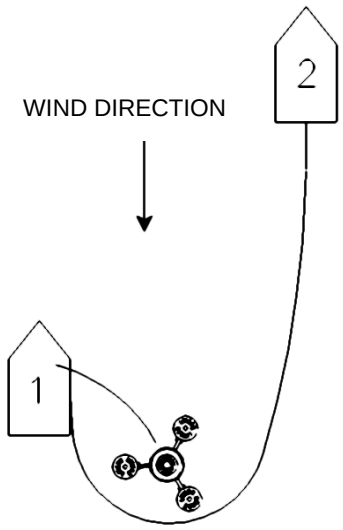


Fig. 2 - J-configuration

As the ship moves forward through the water, the side sweeping booms concentrate the oil as the surface area within the sweep is reduced. This naturally increases the thickness of the oil layer. It is important that the ship maintains a constant speed of approximately 0.75 knots with most boom systems.

Move through the slick and allow the oil layer to build up in the apex of the boom before starting the skimmer pump. **We recommend an oil layer of at least 2 cm (3/4") or more for best efficiency.**

Try to minimise the total time that the oil is within the collection area before being skimmed in order to reduce the risk of oil escaping under the boom. If in doubt, it is always better to start skimming too early than too late. Any excess water is not a serious problem since the DOP-DUAL skimmer pump does not emulsify the oil and water. The free water can easily be decanted from the storage tank or collapsible barge and pumped out in front of the collection sweep.

Debris is a universal problem in almost all oil spill situations. However, the cutting knives on the inlet of the DESMI DOP-DUAL pump will handle a lot of the debris normally found at a spill site: Seaweed, kelp, plastic bags, aluminium cans, bottles, dead birds, rope (up to 1/2"), wood (up to 1" pine dowel), etc.

Larger debris, such a lumber, tree trunks, large branches, dead animals, etc. must be manhandled in most situations. One way is to pull it away from the skimmer after it enters the sweep. The best way is to deflect the bigger debris before it enters the containment boom. Various techniques exist such as having personnel located in a boat in front of the sweep, using rakes to pull away the debris.

Deflecting debris may cause deflection of some oil as well. This is, however, far better than loosening all the oil contained in the boom due to damage or other complications caused by, for instance, a large tree branch.

Larger spills/high viscosity:

Attach the belt skimmer (OPTION) to the TERMINATOR COMBINATION SKIMMER and recover the high-viscous oil by using the thrusters (OPTION) to manoeuvre the skimmer to the most optimum recovery position. The belt should be operated either forwards or backwards dependent on the condition of the oil and how it floats to the skimmer.

3.3 Oil spills in lakes and shallow water

The recovery principle is the same as for open sea, but you normally use smaller vessels. You will soon realise the advantages of the lightweight DESMI DOP-DUAL TERMINATOR skimmer, its shallow draft, its flexibility and easy handling.

3.4 Oil spills in rivers

Again there is a large variety of situations depending on the characteristics as listed in para. 3.1 above. Unless the river is very large, the objective is to keep the recovery equipment fixed to the river bank or structures in the river, while the water with the spilled oil is doing the work. Always try to deflect the oil to the slow side of the river if possible.

The DESMI DOP-DUAL TERMINATOR must be placed in a way, which ensures the maximum flow of oil to the hopper. In some situations it is possible to form a small circulation area close to the river bank where the deflected and concentrated oil will rotate in a direction drive by the incoming oil flowing along the boom. A very efficient way to ensure this is to dig a small pond next to the river and lead the oil into it. Both solutions work very well with the DESMI DOP-DUAL TERMINATOR placed in the middle of the circulating oil. Control the skimmer from the power supply (or remote control) for instance placed on a truck together with the hose reel.

In some situations it is not possible to get close to the river bank as the ground is too soft or muddy. Now the easy handling of the DESM-TERMINATOR skimmer becomes obvious: Carry the pump section and the floats with the float pipes to the river bank and assemble the skimmer there. Also bring the discharge and hydraulic hoses and the wire (OPTION), and connect them to the skimmer. Lift the skimmer into the water and float it into the apex of the containment configuration. The shallow draft of the DESMI DOP-DUAL TERMINATOR enables the skimmer to operate very close to the river bank.

Large debris must be deflected before it enters the sweep. Rakes, nets or boat hooks used from small boats will be quite useful. In some situations it is even possible to deflect debris by means of a steel wire stretched across the river in or below the water surface and placed in a small angle relative to the direction of the current.

The combat of oil spills in large rivers will in most cases follow what is described in para. 3.2 or 3.3 above.

3.5 Oil spills on the shoreline

Unfortunately this kind of clean-up operation is not very unusual. It is very threatening to the wildlife environment and results in the most costly recovery method. Therefore, this situation should by all means be avoided by recovering the oil in open water. However, there are several ways of making your DESMI- TERMINATOR useful in the event of an oil spill on the shoreline, but they depend on the actual situation:

A. Regular sandy beaches:

Small to medium size spill: Use beach cleaning machines or bulldozers on the beach and/or wash and push oil back into the sea for the DESMI DOP-DUAL TERMINATOR to recover it, operating in a boomed-in area.

Larger spills/light oil to medium viscosity. Fence in the oil by means of a shoreline boom, and operate the shallow draft DESMI DOP-DUAL TERMINATOR skimmer from the beach. If possible, try to push or wash oil on the beach back into the water in order to let the DESMI DOP-DUAL TERMINATOR recover it.
Pump the oil to a land-based storage or to a sea-based facility such as a barge or a towable storage bladder.

Larger spills/high viscosity: As above, but due to the viscosity it may be necessary to dismantle the DOP-DUAL pump from the floats and use it for transfer of the spilled oil. See pump manual, para. 3.1.

B. Stony or rocky beaches:

Small to medium spills/light to high viscosity: The best way to recover the oil under these conditions is to fence in the oil using a shoreline boom if possible, due to weather and sea conditions.
Wash the oil back into the sea using high pressure/hot water cleaners and let the DESMI DOP-DUAL TERMINATOR recover it there. Operate the skimmer from the shore or a vessel or barge, and store the oil in a land or sea based facility.

Large spills/light to medium viscosity: As above

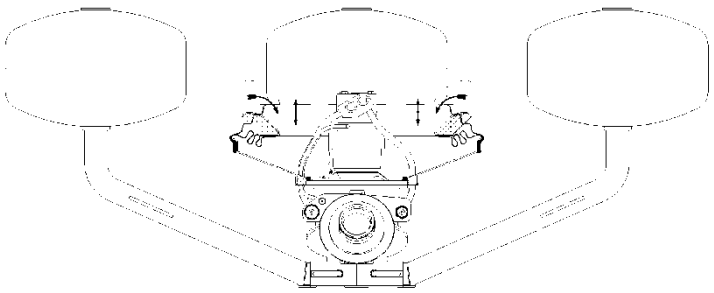
Large spills/high viscosity: As above, but dismantle the DOP-DUAL pump from the floats for transfer of the oil. See pump manual, para. 3.1.

4.0 OPERATION OF THE DESMI DOP-DUAL TERMINATOR SKIMMER

WARNING!
WHEN OPERATING: A safety distance to the skimmer/pump of minimum 2 m/7 ft. must be observed by all personnel when the skimmer/pump is connected to the hydraulic power supply. Also when the skimmer/pump is not running.

4.1 Operation principle

The DESMI DOP-DUAL TERMINATOR is an overflow weir type skimmer. It consists of the pump section, the three floats with connecting tubes and the hopper with the weir lip adapter. The weir lip consists of a corrugated rubber membrane with a ring-shaped float floating inside the hopper.



On land the ring float on the weir lip adapter will be in its lowest position due to the empty hopper. When the skimmer is being deployed the oil starts flowing over the weir lip and into the hopper. The ring float will begin floating on the oil in the hopper. The buoyancy will lift up the ring float, until the oil stops entering the hopper.

Fig. 3 - Weir lip adapter operation principle

As soon as the pump starts pumping (causing a lower oil level in the hopper), the ring will automatically adjust its vertical position downwards, allowing more oil to enter the hopper.

At low pump RPM the ring float will float high inside the hopper, allowing only little oil to enter the skimmer. At higher RPM the pump will remove the oil under the ring float, the float will thus obtain a lower position and more oil will enter the skimmer. The weir lip will automatically adjust its weir lip to the most optimal position at any recovery rate.

Besides the up/down movement the weir lip adapter is able to float independently of the skimmer due to its extremely low inertia mass, and the very flexible connection to the skimmer. This enables the ring float to keep its weir lip parallel to the oil/water interface even in small swells, which the skimmer is not able to follow.

4.2 Before operation

WARNING !
Keep away from the rotating pump screw and cutting knife. The pump screw/cutting knives are designed for cutting debris normally found at oil spill sites and will also cut off fingers and other limbs.

WARNING !
Always keep a safety distance to the pump of minimum 2 m/7 ft. when the pump is connected to the hydraulic power supply. Do *not* connect the hydraulic hoses to the power supply until you are ready for operation.

A. Operate the hydraulic power supply of the skimmer according to the operator's manual delivered by the supplier of the hydraulic power source.

B. Check that the discharge and hydraulic connections are properly connected to the skimmer.

C. Check that the locking devices on the hydraulic quick couplings are locked.

D. The hydraulic drain line must always be used and must go directly to the hydraulic tank on the power supply.

E. Check that the discharge hose is unblocked and free of twists.

F. Connect the hydraulic hoses to the hydraulic power supply and lock the locking device on the hydraulic quick couplings.

G. Check that all the hydraulic functions can be operated from the remote control box.
Check direction of rotation of the pump screw and direction of the thrusters.

CAUTION!
The pump should never run dry for more than a few seconds, just enough to check direction of rotation. Observe the safety distance of 2 m/7 ft.!

H. Disconnect the hydraulic hoses at the power supply. Do not connect hydraulic hoses before the equipment has been deployed.

4.3 Operation

WARNING !
A safety distance to the skimmer/pump of minimum 2 m/7 ft. must be observed by all personnel when the skimmer/pump is connected to the hydraulic power supply. Also when the skimmer/pump is not running.

NOTE!
When pumping non-oily media (e.g. water during a training session), grease the plate wheel bearings every 8 hours of operation, using the grease nipple on the plate wheel shaft.

A. Launch the skimmer, using a crane or winch (or even a helicopter), and use the thrusters to place the skimmer in the right position for recovering oil. Now connect the hydraulic hoses to the power supply.

The best recovery rate and efficiency are obtained when the skimmer is used in conjunction with a boom equipped with a U or V pocket at the apex (Fig. 5). This enables the boom to concentrate even minor oil spills thus getting a thicker oil layer and more efficient skimming. Do not start the skimmer pump before a sufficient oil layer has been collected. **DESMI recommends an oil layer of at least 2 cm (3/4") or more for the best efficiency.**

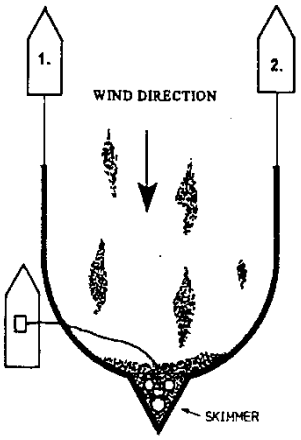


Fig. 5 - U-formation with V-apex

B. As soon as the oil layer has reached a minimum of 2 cm (3/4") start the skimmer pump at low speed and increase pump speed gradually while monitoring the oil coming out of the discharge hose. Increase pump speed until too much water is coming with the oil out of the discharge hose, and then decrease a little.

If it is not possible to monitor the discharge hose adjust the pump speed so that the collected oil layer in the apex of the boom stays over 2 cm (3/4").

C. If the skimmer pump stops due to excessive debris/solids, simply reverse the pump to expel the blockage. Then restart the skimming operation.

D. When recovering high-viscous oil it is recommended to attach the belt skimmer (OPTION) and to use the "water injection system" (OPTION). The water capacity is to be adjusted according to the properties of the recovered oil. See Operator's manual for belt skimmer.

WARNING !
If it is necessary to remove debris from the skimmer by hand, stop the skimming operation and *disconnect the hydraulic hoses at the hydraulic power supply*. For safety reasons always keep a distance to the skimmer of min. 2 m/7 ft. when the skimmer is connected to the hydraulic power supply.

Off-loading with the DOP-DUAL skimmer pump dismantled from the floats is described in the DOP-DUAL pump manual, section 3.

4.4 Recovery after operation

WARNING !
Always keep a safety distance to the pump of minimum 2 m/7 ft. when the pump is connected to the hydraulic power supply.

A. The thrusters can be used to move the skimmer to the crane or winch.

B. The contents of the discharge hose may be discharged by means of the pump: Empty the discharge hose by slowly and carefully reversing the pump (LOW ROTATIONS).

CAUTION !
Take care that the discharge hose is not being sucked into the pump as this will result in severe damage to the hose.

If possible, lift up the hose with a crane so that the liquid runs back to the pump.
If it is not possible to discharge the hose by means of the pump:
Flush the hose using diesel and water with the pump in pumping mode.

C. Disconnect the hydraulic hoses at the power supply for safety reasons.

D. Follow the instructions in section 5.

5.0 INSPECTION AFTER OPERATION AND PREVENTATIVE MAINTENANCE

NOTE !
See DOP-DUAL pump manual, section 5, for preventative maintenance and section 6 for corrective maintenance.

5.1. Clean the DESMI DOP-DUAL TERMINATOR skimmer

WARNING !
Keep away from the rotating pump screw and cutting knives. The pump screw/cutting knives are designed for cutting debris normally found at oil spill sites and will also cut off fingers and other limbs.

Always keep a safety distance to the pump of minimum 2 m/7 ft. when the pump is connected to the hydraulic power supply.

A. After the skimmer has been recovered connect the hydraulic hoses to the power supply and empty the DOP-DUAL pump of oil and water. Disconnect the hydraulic hoses again and remove the weir lip adapter from the hopper by unlocking the clamp and remove the rubber bellows. Clean the complete skimmer and weir lip adapter using a solvent consistent with the medium skimmed.

CAUTION !
Do not use caustic cleaning solutions as this may damage aluminium parts.

B. Wash the skimmer with FRESH water. Connect the hydraulic hoses to the power supply and flush the DOP-DUAL pump with fresh water letting the pump run slowly.

C. Disconnect the hydraulic hoses and clean carefully all hydraulic quick couplings as well as the discharge coupling. Check for leaks and tighten up if necessary.

D. Check the oil level in the thruster gear housing.

5.2 Inspection of the DOP-DUAL pump

A. Snap off the float pipes with the floats from the pump section by pulling the eyes on the locking devices.

B. Remove the hopper part from the mounting flange. The pump is now ready for inspection after operation according to pump manual section 4.4.

5.3 Protection of the DESMI DOP-DUAL TERMINATOR skimmer

A. After inspection of the pump: Reassemble the float pipes with the float and the hopper on the pump.

B. Reassemble the weir lip adapter in the hopper.

C. Lubricate all quick couplings using anti-corrosion oil and fit the dust caps or dust plugs on all couplings.

D. Store the skimmer in a dry place free of dust. The skimmer should be wrapped in plastic or by other means protected from a dusty environment when not in use.

E. Protect the skimmer against sunlight. The rubber bellows on the weir lip adapter may be damaged after long time exposure to sunlight.

5.4. Preventative maintenance of DESMI DOP-DUAL TERMINATOR floatation system

A. Very little effort is necessary to keep the floatation system in the necessary state of readiness, which is required for all oil spill recovery equipment. Follow the directions given in Section 5.1.

B. Inspect all surfaces for possible damage due to collision with for instance the recovery vessel. Check the floats and float tubes for leaks. (Water in the float or tube will indicate a leak). The floats are made of oil resistant polyethylene plastic which is almost shockproof, but nevertheless damage is possible. If a leak is detected contact your local DESMI RO-CLEAN representative for repair.

C. Check the O-sealing rings in the hydraulic quick couplings. Replace them if they look worn out. Keep the couplings clean. Dirt may affect the functioning of the couplings and the hydraulic system. Always use dust caps and dust plugs.

D. Check the lifting device. It must be safely secured to the casing.

E. Check the locking devices that lock the float pipes to the pump.

F. Check the rubber seal that seals the slot in the hopper to the plate wheel cover on the pump. A leak will allow a small amount of unnecessary water to enter the hopper from under the skimmer when in operation.

G. Check that the rubber bellows on the weir lip adapter is in good condition. The bellows is made of neoprene, which has a relatively low resistance to sunlight. Protect the weir lip adapter against sunlight during storage.

6.0 TROUBLESHOOTING

NOTE !
For troubleshooting of the pump refer to the pump manual section 6.0.

Problem	**Probable cause**	**Action**
The weir lip adapter will not adjust properly	Water too shallow	Move to deeper water, or if on the shore line: Dig a hole under the skimmer
	Viscosity of oil is extremely high and oil layer is very thick	Dismantle the DOP-DUAL pump from the floats and use it fully submerged
The skimmer recover too much water	Too small oil layer	Stop skimming. Collect and concentrate more oil in the apex of the boom before restarting
	Pumping is too fast compared to the available amount of oil	Slow down pump RPM, see just above. Check for leaks in the WLA
		The crane may pull side-ways in the lifting device. Make sure it does not disturb the free movement of the skimmer
Oil will not flow into the hopper	Debris prevents the oil from entering the hopper	Clear away debris
	The oil is very waxy. Behaves like ice flakes	Help feeding the skimmer using rakes etc. and concentrate more oil for the skimmer to work in

7.0 TECHNICAL SPECIFICATIONS FOR DESMI SKIMMER TYPE DESMI DOP-DUAL TERMINATOR

Dimensions	Length	: 2100 mm (82,7”)	
	Width	: 2330 mm (91,7”)	
	Height	: 930 mm(36,6”)	
Draft		: 700 mm (27,6”)	
Weight (dry)			
With DOP250DUAL pump		: 162 kg (357 lbs)	excl. thrusters
		: 195 kg (430 lbs)	incl. thrusters
With DOP200DUAL pump		: 150 kg (331 lbs)	excl. thrusters
		: 183 kg (404 lbs)	incl. thrusters

Skimmer pump : DOP-DUAL vertical positive displacement Archimedes’ screw type. For details see DOP-DUAL pump manual

Max. recovery rate : With DOP250DUAL pump with OMTS200 hydr. motor 100 m3/h at 1 bar.
With DOP250DUAL pump with OMTS160 hydr. motor 125 m3/h at 1 bar.
With DOP200DUAL pump 66 m3/h at 1 bar.

Max. Pressure : With DOP250DUAL motor 10 bar (145 psi)
: With DOP200DUAL motor 13 bar (188 psi)

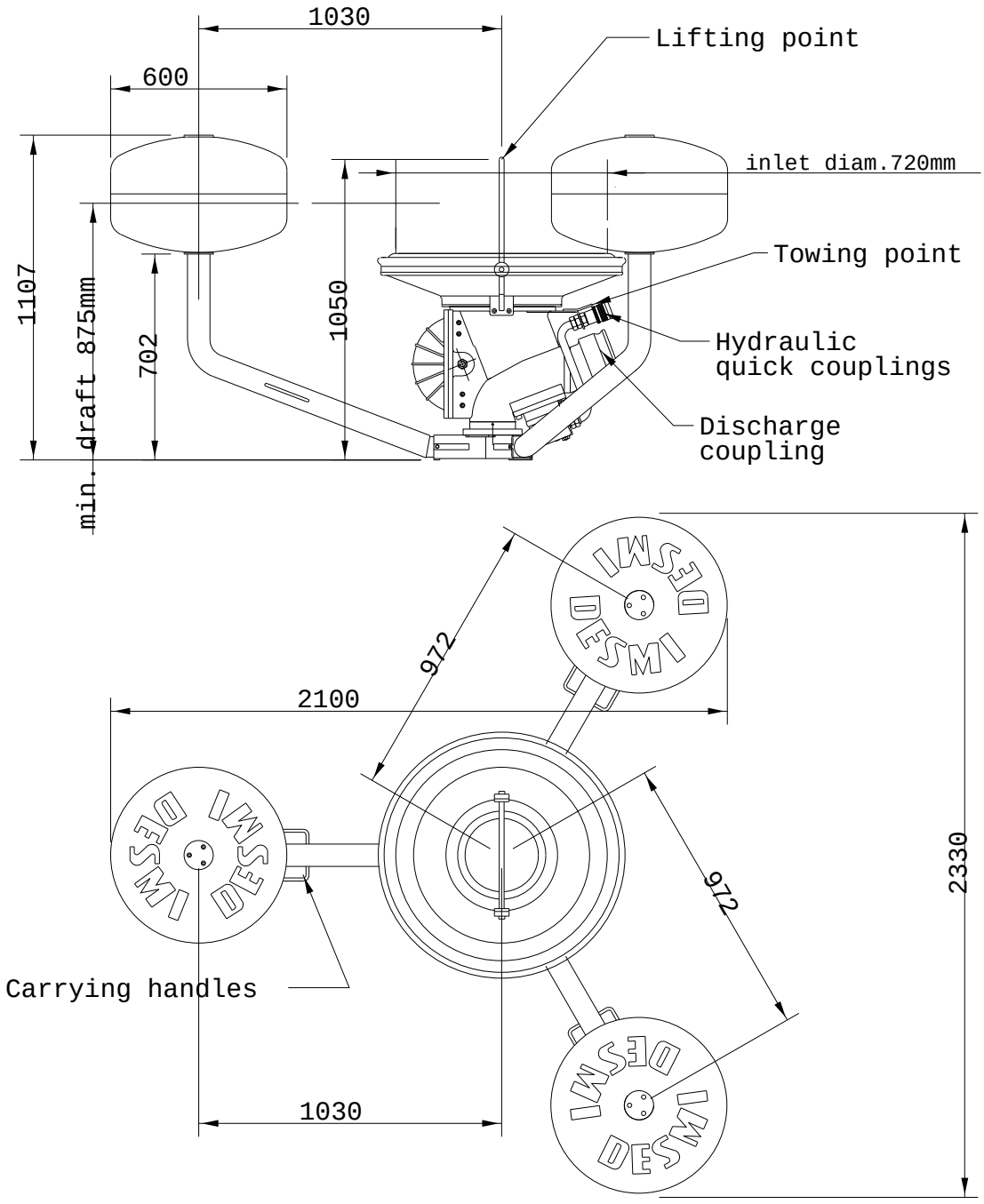
Thrusters : Optional

Materials

DOP-DUAL pump : See DOP-DUAL pump manual
Floats, hopper and floating collar : Oil resistant polyethylene plastic (PE-HD)
Bellows : Oil resistant neoprene rubber
Float pipes : Stainless steel
Other parts : Stainless steel and seawater resistant aluminium
Coating (Pump) : Primer/company paint

7.0 DRAWINGS

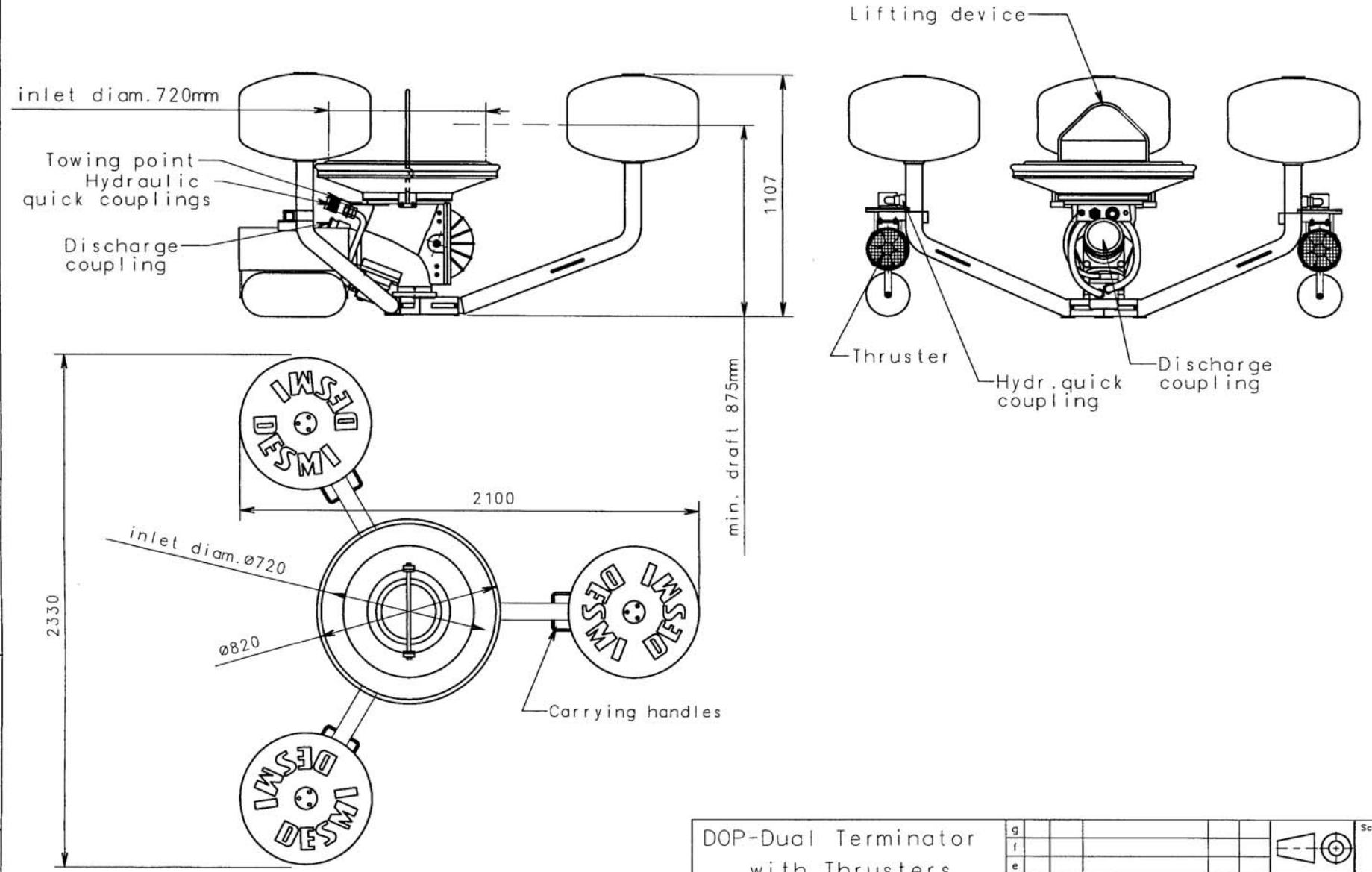
WHERE MEASUREMENTS ARE CRITICAL REQUEST CERTIFIED DRAWINGS



Weight: 165kg

A/S De Smithske P.O.Box 226 DK-9400 N°rresundby, Denmark. Phone: +45 96 32 81 11 Telefax: +45 98 17 54 99	DESMI TERMINATOR SKIMMER DOP-DUAL	48 11 62 Blad 1 af 1 blade Dato 01.09.13 Udf°rt af BA Scale

Subject to alterations



DOP-Dual Terminator with Thrusters

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Telefax: +45 98 17 54 99

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f						
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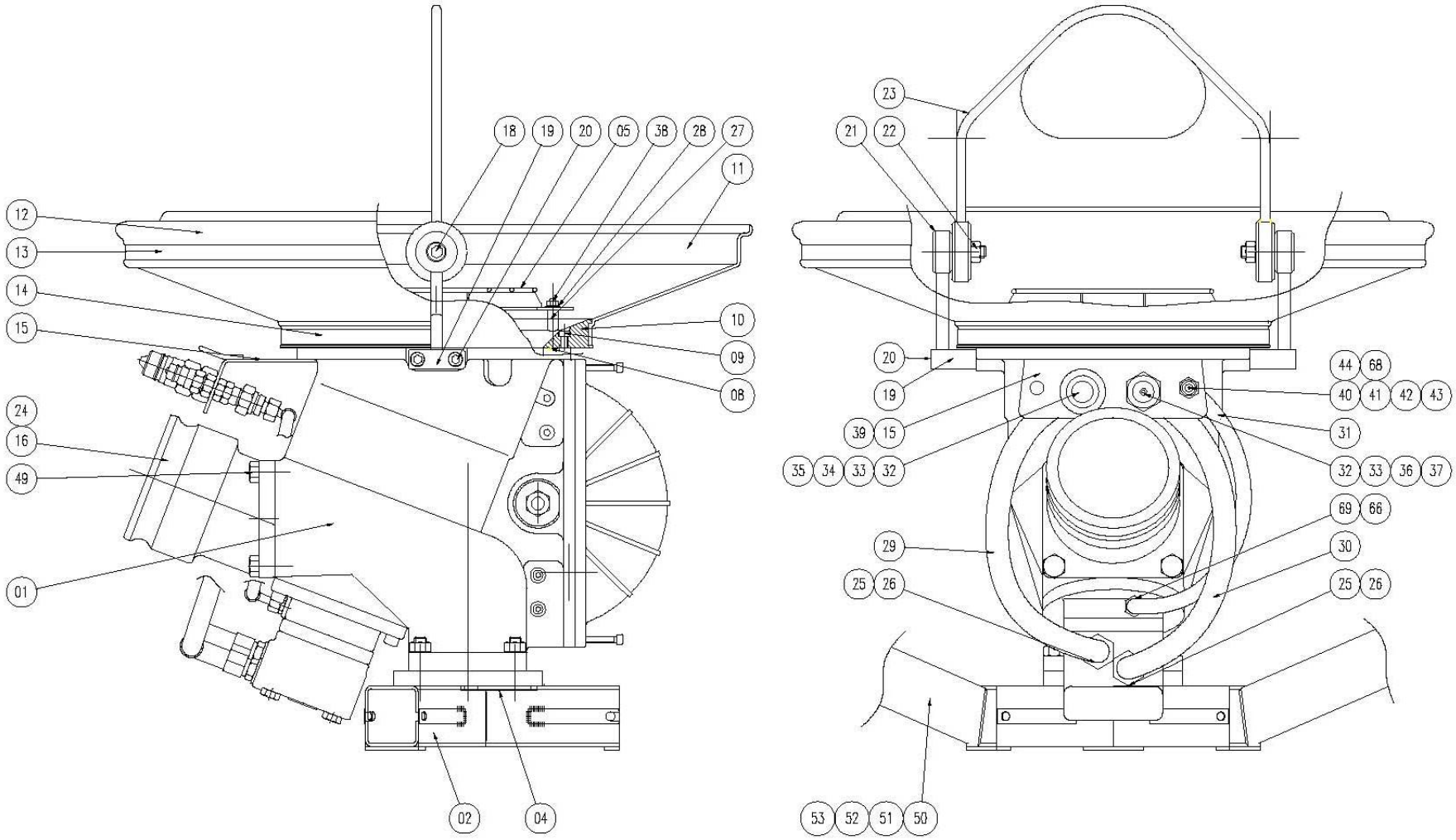
	BA	02.05		HSJ	PEM	
	Draw	Date	Correction	Check	Appr	

Scale

Repl. for

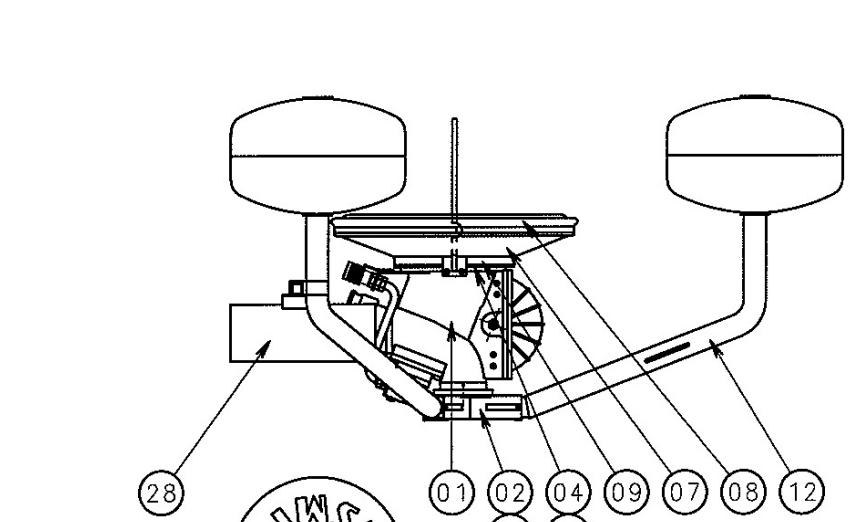
48 12 45

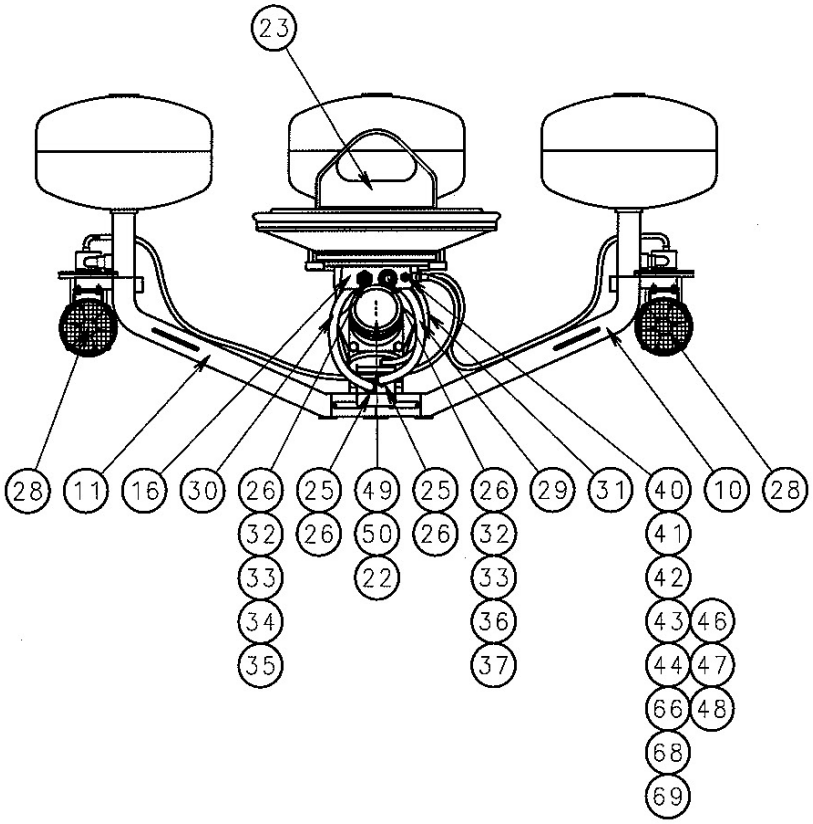
Replacement of

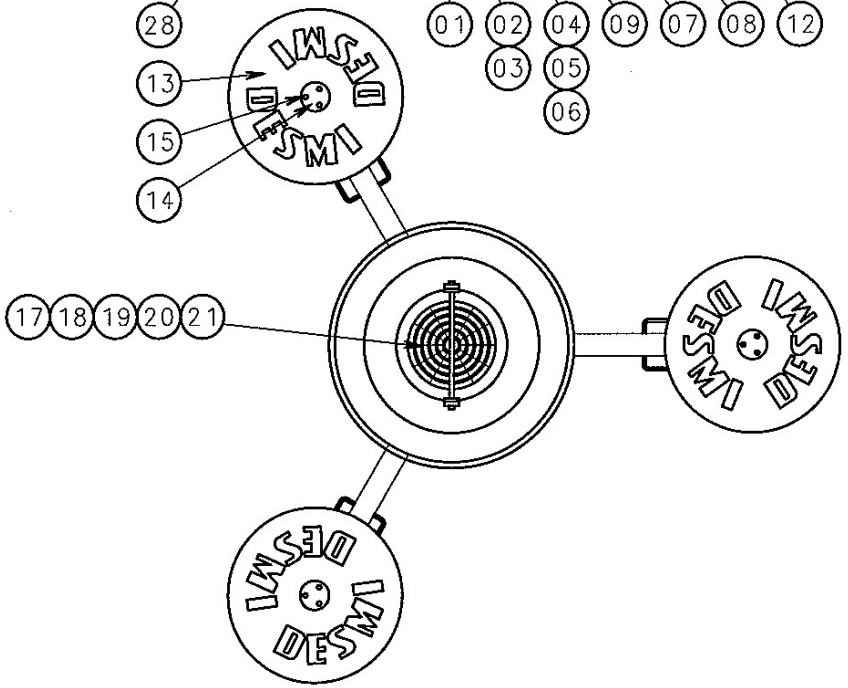


681460							
Item no.	Description	Dimension	Qty	Standard			Raw weight kg
Assembling drawing							Scale 1:1
DOP-DUAL Terminator							Ref. for 48 12 43
A/S De Smithske							Replacement of
							© DESTA 1999 ALL RIGHTS RESERVED

74







DOP-Dual Terminator with Thrusters
assembling drawing

A/S De Smithske
DK-9400 Nørresundby, Denmark P.O.Box 225
Phone: +45 96 32 81 11
Telefax: +45 98 17 54 99

g					
f					
e					
d					
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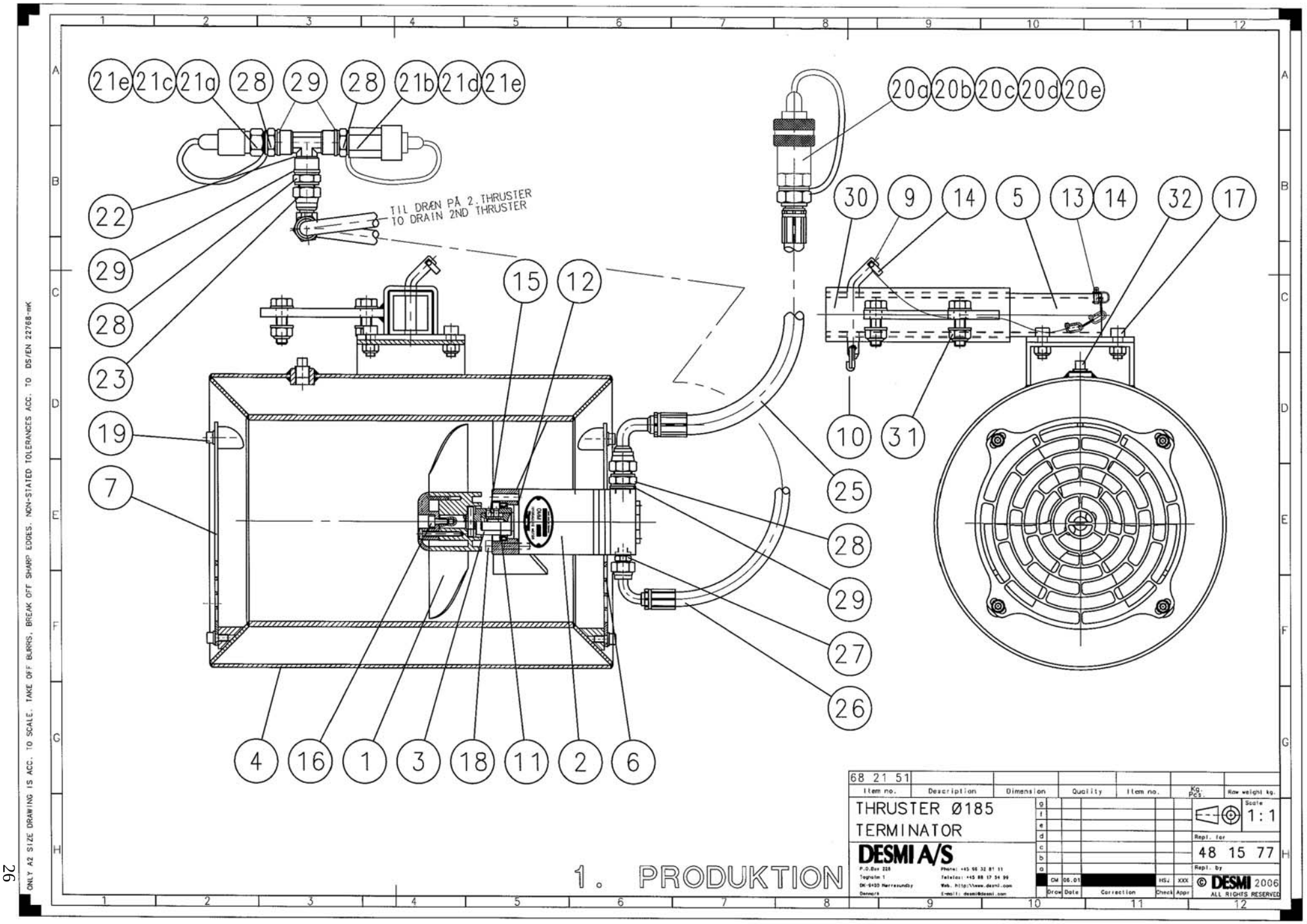
b					
a	BA	07.07	Tilt. af pos 51	HSJ	BA
	BA	02.05		HSJ	PEM
	Draw	Date	Correction	Check	Appr

Scale

Repl. for
48 12 76a
Replacement of


21e
21c
21a
28
29
28
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21d
21e
20a
20b
20c
20d
20e
TIL DRÆN PÅ 2. THRUSTER
TO DRAIN 2ND THRUSTER
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6
ONLY A2 SIZE DRAWING IS ACC. TO SCALE. TAKE OFF BURRS, BREAK OFF SHARP EDGES. NON-STATED TOLERANCES ACC. TO DS/EN 22768-mK
1. PRODUKTION
68 21 51
Item no.
Description
Dimension
Quality
Item no.
Kg. Pcs.
Raw weight kg.
THRUSTER Ø185
TERMINATOR
Scale 1:1
Repl. for
48 15 77
Repl. by
DESMI A/S
P.O.Box 228
Toghuim 1
DK-9400 Nørresundby
Denmark
Phone: +45 96 32 81 11
Telefax: +45 98 17 54 99
Web. http://www.desmi.com
E-mail: desmi@desmi.com
CW 06.01
HSJ
XXX
Drew
Date
Correction
Check
Appr
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8.0 DESMI DOP-250 DUAL TERMINATOR SKIMMER

Part list	Drawing	Pump couplings Pressure-Return-Drain	/ Discharge / Thruster P-R
020681460-02-02-01	481243	3/4" - 3/4" - 3/8" AQ	/ 5" Kamlok /
020681460-02-01-01	481243	1" - 1" - 3/8" AQ	/ 5" Kamlok /
020681460-02-08-01	481243	3/4" - 3/4" - 3/8" SS Tema	/ 5" Kamlok /
020681460-02-05-01	481243	1" - 1" - 3/8" Tema	/ 5" Kamlok /
020681630-03-01-01	481276	1" - 1" - 3/8" AQ	/ 6" Kamlok /
020681630	481276	3/4" - 3/4" - 3/8" AQ	/ 5" Kamlok /
020682150-01-02-01-01	481276 / 682151	3/4" - 3/4" - 3/8" AQ	/ 5" Kamlok / 1/2" – 1/2" AQ
020682860-02-02-01-01	481276 / 682151	3/4" - 3/4" - 3/8" AQ	/ 5" Kamlok / 1/2" – 1/2" AQ
000682151	481577	Thruster arrangement	

Pos. no.	Item No.	Description	681460-02-02-01	681460-02-01-01	681460-02-08-01	681460-02-05-01	681630-03-01-01	681630	682150-01-02-01-01	682860-02-02-01-01		Unit
1	681473	DOP-250 DUAL pump - OMTS200	1	1	1	1				1		Pc
1	681601	DOP-250 DUAL pump - OMTS160					1	1	1			Pc
2	181090	Foot piece for pump and float arms	1	1	1	1	1	1	1	1		Pc
3	181944	Intermediate flange	1	1	1	1	1	1				Pc
3	760079	CH-screw M10 x 25							6	6		Pc
4	760079	CH-screw M10 x 25	6	6	6	6	6	6				Pc
4	181106	Intermediate flange							1	1		Pc
5	180352	Protection grid	1	1	1	1	1	1				Pc
5	707318	BH screw M8x30							4	4		Pc
6	704037	Nut M16	4	4	4	4	4	4				Pc
6	181163	O-ring Ø304 x 3							1	1		Pc
7	710856	Stud M16 x 35	4	4	4	4	4	4				Pc
7	182180	Hopper							1	1		Pc
8	181163	O-ring Ø304 x 3	1	1	1	1	1	1				Pc
8	680726	Weir lip assembly							1	1		Pc
9	707318	BH-screw M8 x 30	4	4	4	4	4	4				Pc
9	680737	Clamp ring for hopper							1	1		Pc
10	181106	Mounting flange	1	1	1	1	1	1				Pc
10	182282	Float arm - right							1	1		Pc
11	182180	Hopper	1	1	1	1	1	1				Pc
11	182283	Float arm - left							1	1		Pc
12	181279	WLA Float	1	1	1	1	1	1				Pc
12	705767	Rubber bellows	1	1	1	1	1	1				Pc
12	181331	Ring	1	1	1	1	1	1				Pc
12	707310	Screw 6.3 x 16	16	16	16	16	16	16				Pc
12	182139	Float arm							1	1		Pc
13	681767	Clamp ring for WLA	1	1	1	1	1	1	3	3		Pc
13	181089	Float							3	3		Pc

Pos. no.	Item No.	Description	681460-02-02-01	681460-02-01-01	681460-02-08-01	681460-02-05-01	681630-03-01-01	681630	682150-01-02-01-01	682860-02-02-01-01		Unit
14	180959	Cover for float							3	3		Pc
14	680737	Clamp ring for hopper	1	1	1	1	1	1				Pc
15	710601	LH screw M8x12							9	9		Pc
15	182105	Manifold	1	1	1	1	1	1				Pc
16	183199	Manifold							1	1		Pc
16	181947	Discharge flange 5” Camlocking type	1	1	1	1		1				Pc
16	681946	Discharge flange 6” Camlocking type					1					Pc
17	182161	Support bolt							3	3		Pc
18	710213	CH-screw M16 x 60	2	2	2	2	2	2				Pc
18	704062	Nut M8							7	7		Pc
19	182177	Clamping block for lifting device	2	2	2	2	2	2				Pc
19	704066	Disc M8							7	7		Pc
20	760125	CH-screw M12 x 55	4	4	4	4	4	4				Pc
20	1845462	CH-screw M8x40							4	4		Pc
21	182178	Bar for lifting device	2	2								Pc
21	182179	Bar for lifting device			2	2	2	2				Pc
21	180352	Protection grid							1	1		Pc
22	710380	Lock nut M16	2	2	2	2	2	2				Pc
22	706279	Set screw M16x40							4	4		Pc
23	182179	Lifting device	1	1	1	1	1	1				Pc
23	681505	Lifting device							1	1		Pc
24	710850	O-ring Ø135 x 3.5	1	1	1	1	1	1				Pc
25	703641	Nipple 3/4" x 3/4" BSP	2	2	2	2	2	2	2	2		Pc
26	703636	Bonded seal	2	2		2	2	2	4	4		Pc
26	711429	Bonded seal			2							Pc
27	682161	Support bolt	3	3	3	3	3	3				Pc
28	682151	Thruster MkII							2	2		Pc
28	704066	Disc M8	7	7	7	7	7	7				Pc
29	710857	Hydr. hose 3/4" length 300 mm	1	1	1	1	1	1	1	1		Pc
30	710858	Hydr. hose 3/4" length 320 mm	1	1	1	1	1	1	1	1		Pc
31	710859	Hydr. hose 3/8" length 275 mm	1	1	1	1	1	1	1	1		Pc
32	180925	Bulkhead connection 3/4"-3/4" BSP	2		2				2	2		Pc
32	181348	Bulkhead connection 1"-3/4" BSP		2		2	2	2				Pc
33	705989	Counter nut 3/4"	2	2	2	2	2	2	2	2		Pc
34	708303	Hydr. coupling 3/4" AEROQUIP BSP female	1	1				1	1	1		Pc
34	711352	Hydr. coupling 3/4" TEMA St. St. female			1							Pc
34	705183	Hydr. coupling 1" TEMA female				1						Pc
34	708302	Hydr. coupling 1" AEROQUIP BSP female					1					Pc
35	705573	Dust plug 3/4" AEROQUIP	1					1	1	1		Pc

Pos. no.	Item No.	Description	681460-02-02-01	681460-02-01-01	681460-02-08-01	681460-02-05-01	681630-03-01-01	681630	682150-01-02-01-01	682860-02-02-01-01		Unit
35	703622	Dust plug 3/4" TEMA			1							Pc
35	705458	Dust plug 1” AQ		1			1					Pc
35	705184	Dust plug 1" TEMA				1						Pc
36	705121	Hydr. coupling 3/4" AEROQUIP BSP male	1					1	1	1		Pc
36	705128	Hydr. coupling 1" AEROQUIP BSP male		1			1					Pc
36	711353	Hydr. coupling 3/4" TEMA St. St. Male			1							Pc
36	705454	Hydr. coupling 1" TEMA Male				1						Pc
37	705572	Dust cap 3/4" AEROQUIP	1					1	1	1		Pc
37	705457	Dust cap 1" AEROQUIP		1			1					Pc
37	703623	Dust cap 3/4” TEMA			1							Pc
37	705455	Dust cap 1” TEMA				1						Pc
38	704062	Nut M8	7	7	7	7	7	7				Pc
39	1845462	CH-screw M8 x 40	4	4	4	4	4	4				Pc
40	180395	Bulkhead connection 3/8"-3/8"	1	1	1	1	1	1	1	1		Pc
41	703332	Counter nut 3/8" BSP	1	1	1	1	1	1	1	1		Pc
42	705120	Hydr. coupling 3/8" AEROQUIP Male	1	1			1	1	1	1		Pc
42	711357	Hydr. coupling 3/8" TEMA St. St. Male			1							Pc
42	703349	Hydr. coupling 3/8" TEMA Male.				1						Pc
43	705456	Dust cap 3/8" AEROQUIP	1	1			1	1	1	1		Pc
43	703619	Dust cap 3/8” TEMA			1	1						Pc
44	703331	Sleeve 3/8”	1	1	1	1	1	1				Pc
44	712298	3/8" Tee							2	2		Pc
45	184267	Drain pipe ø42 x 40 mm							1	1		Pc
46	708305	Hydr. coupling 3/8" AEROQUIP female							2	2		Pc
47	705688	Dust plug 3/8" AEROQUIP							2	2		Pc
48	703650	Bonded seal 3/8"							1	1		Pc
49	706279	Set screw M16 x 40	4	4	4	4	4	4				Pc
49	181948	Discharge flange 4" camlock type							1	1		Pc
50	182139	Float pipe	3	3	3	3	3	3				Pc
50	710850	O-ring ø135x3.5 nitrile							1	1		Pc
51	181089	Float	3	3	3	3	3	3				Pc
52	180959	Cover for float	3	3	3	3	3	3				Pc
53	710601	LH-screw M8 x 12	9	9	9	9	9	9				Pc
66	703684	Bonded seal 1/4"	1	1		1	1	1	1	1		Pc
66	711439	Bonded seal 1/4"			1							Pc
68	705113	Counter valve 5 bar 3/8"	1	1	1	1	1	1	1	1		Pc
69	705115	Fitting 1/4"	1	1	1	1	1	1	1	1		Pc

THRUSTER ARRANGEMENT FOR DESMI DOP-DUAL TERMINATOR

Parts lists No. 682151
Drawing Number 481577

Pos.	Part No.	Description	Qty.
1	712147	Propeller f. Vetus 90 KGF (ø185)	2
2	712146	Hydr. motor OMM12.5	2
3	183340	Shaft end - thruster	2
4	183720	Thruster pipe	2
5	183722	Slide rail for thruster	2
6	183337	Net for thruster	2
7	183338	Net for thruster	2
9	182258	Pin Ø10x50	2
10	712392	Split	2
11	700835	Oil sealing ring 25x35x07	2
12	711341	O-ring Ø31.38x1.78 nitrile	2
13	704394	Chain	0.4 m
14	706070	Shackle 4mm	4
15	1833480	Pointed screw M5x6	4
16	1852620	Allen screw M5x12	2
17	704367	Allen screw M8x20	8
17	705450	Lock nut M8	8
18	1848097	Allen screw M6x35	6
19	704389	Disc M6	16
19	705002	Allen screw M6x12	16
20a	705129	Hydr. coupling Aeroquip 1/2" BSP male	1
20b	708304	Hydr. coupling Aeroquip 1/2" BSP female	1
20c	705799	Dust cap Aeroquip 1/2"	1
20d	705125	Dust plug Aeroquip 1/2"	1
20e	710844	O-ring Ø17.86x2.62	2
21a	705120	Hydr. coupling Aeroquip 3/8" BSP male	1
21b	708305	Hydr. coupling Aeroquip 3/8" BSP female	1
21c	705456	Dust cap Aeroquip 3/8"	1
21d	705688	Dust plug Aeroquip 3/8"	1
21e	710846	O-ring Ø13.30x2.4	2
22	703047	Socket T 3/8" BSP	1
23	712209	T-piece 3/8" w/one union	1
25	712545	Hydr. hose 3/8"	4
26	712546	Hydr. hose 1/4"	2
27	706185	Hexagon nipple 1/8"-1/4" BSP	2
28	703330	Hexagon nipple 3/8"-3/8" BSP	7
29	703650	Bonded seal 3/8"	7
30	183790	Fitting for thrusters	2
31	703135	Lock nut M10	2
31	704003	Disc M10	4
31	705258	Set screw M10x35	2
32	704390	Pipe plug 1/4"	2