THE DESMI GROUP

DESMI

OPERATORS MANUAL

DESMI
VERTICAL ARCHIMEDES' SCREW
OFF-LOADING PUMPS

DOP-160
DOP-200DUAL
DOP-250DUAL

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

Revision Date 17.November 2011

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.

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

C O N T E N T S

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

APPENDIX:

A1. TECHNICAL SPECIFICATIONS

1.1 Dimensions/capacities
1.2 Material specifications
1.3 Hydraulic systems

A2. PERFORMANCE CURVES

2.1	DOP-160	in water		No. 481006A
2.2	DOP 160	in oil	2.500cSt	No. 481040
2.3	DOP160	in oil	15.000 cSt	No. 481041
2.4	DOP 160	in oil	30.000 cSt	No. 481042
2.5	DOP 160	in oil	60.000 cSt	No. 481043
2.6	DOP-200 DUAL	in water		
2.7	DOP-250 DUAL	in water		No. 480390b
2.8	DOP-250 DUAL	in oil	2.500cSt	No. 480391a
2.9	DOP-250 DUAL	in oil	60.000 cSt	No. 480394a

A3. DRAWINGS

3.1	Dimension drawing	DOP-160	No. 480917
3.2	Dimension drawing	DOP-200 DUAL	No. 481488
3.3	Dimension drawing	DOP-250 DUAL	No. 481295
3.4	Assembly drawing	DOP-160	No. 480979B
3.5	Assembly drawing	DOP-200 DUAL	No. 481444
3.6	Assembly drawing	DOP-250 DUAL	No. 481154

A4. RECOMMENDED SPARE PARTS SET

4.1 Recommended standard spare parts set for DOP-160
4.2 Recommended standard spare parts set for DOP-200 DUAL
4.3 Recommended standard spare parts set for DOP-250 DUAL

A5. PARTS LIST

5.1 Parts lists for DOP-160
5.2 Parts lists for DOP-200 DUAL
5.3 Parts lists for DOP-250 DUAL

B1. DANFOSS HYDRAULIC MOTOR Spare parts list/service manual

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

1.0 IN GENERAL

WARNING!
This equipment is designed to cope with debris normally found at an oil spill site, and it 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 instructions. The customer is responsible for accidents caused by the equipment, if the safety instructions in this manual are not being followed.

The DESMI off-loading pump, see dimension drawing and assembly drawing in the appendix, has been specially developed for a wide range of emergency and auxiliary pumping operations. It is designed for handling liquids of an extremely high viscosity, like heavy crude oil or molasses, as well as low viscosity liquids as diesel fuel or water; and it will cope with debris normally found in oil spill sites. Nevertheless the pump will handle any medium very gently, without mixing or emulsifying e.g. oil and water.

Examples of applications are:

- X Emergency off-loading of heavy crude, bunker oil or emulsions
- X Transfer pump in oil recovery systems (Skimmers)
- X Cleaning of oil pits
- X Emergency fire fighting
- X Auxiliary discharge or ballasting
- X Emergency bilge pumping

WARNING!
When using the pump in hazardous atmospheres, always follow the instructions in section 4.4.

The DESMI DOP pump is in its basic design a modified Archimedes' screw pump. The vertical design means that the pump medium is forced into the pump by means of the end of the screw.

Inside the DESMI DOP pump the pressure is built up between the screw and the engaging plate wheel. In order to withstand this pressure and the wear caused by abrasive media, the plate wheel is specially designed: A high-tensile steel core carries easily replaceable sectional discs of polyethylene.

The high maximum discharge pressure results in very high axial forces on the bearings. This is overcome by a set of SKF conical roller bearings. The roller bearings also function as bearings for the hydraulic short motor, which transfers power to the screw via internal splines in the screw shaft. **For lubrication and protection the bearing housing is pressurized by the hydraulic drain line, which must always be connected during operation.**

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

CAUTION!
In order to balance the internal pressure in the bearing house against the discharge pressure of the pump, the hydraulic drain line is equipped with a 5 bar/75 PSI check valve. Do not remove the check valve as this may cause damage to the shaft seal.

The DOP pump is designed with no bearings on the inlet side. This design makes it easy for the screw to "catch" even extremely high-viscosity media.

To seal between the screw and the pump casing and to withstand abrasive media, the casing is equipped with a replaceable polyethylene sealing ring.

The DOP pumps are available in various versions for emergency off-loading and for dry permanent installation.

The materials are seawater resistant aluminium and ni-resist steel (screw).

Further the pump is equipped with a sharp cutting device which will cut almost all types of floating debris such as ½" nylon rope and 1½" pine dowels, cans bottles etc.
The pump is able to pump debris up to 1½" in diameter.

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

2.0 TRANSPORTATION AND MOUNTING

2.1 Transportation of the pump

For easy transportation, all pumps are equipped with a lifting eye (Fig. 1).

CAUTION!
Do not lift the pump in other parts than the lifting eye or the carrying handles!

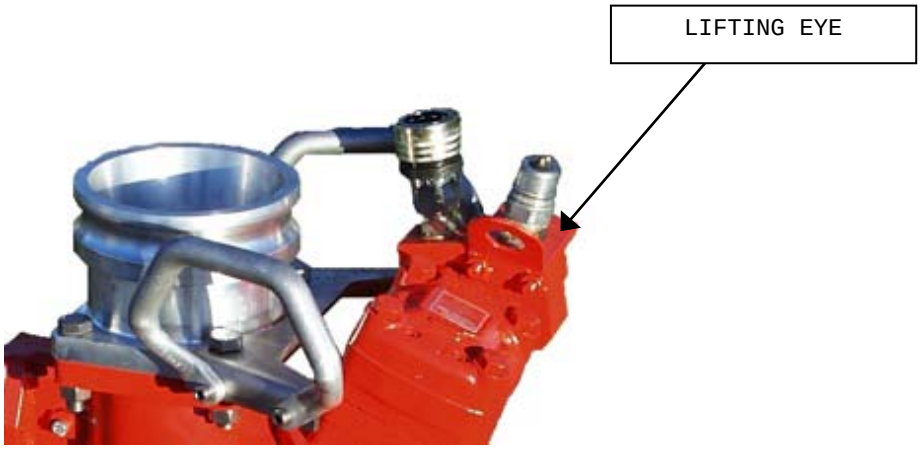


Fig. 1 – Lifting eye on DOP-200 DUAL pump

2.2 Mounting

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.

The pump is standard fitted with three Aeroquip or Tema hydraulic quick couplings for easy connection of hydraulic pressure, return and drain.

CAUTION!
Always remember to connect the hydraulic drain line, otherwise the hydraulic motor will be damaged.

NOTE!
When mating quick couplings, check that the O-ring inside the lip of the female fitting is properly seated before inserting the male fitting. Carefully align the fittings before pushing them together to avoid damaging the O-ring. If the fittings do not couple on the first try, check the O-ring before trying again.

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

To connect the hydraulic hoses, take off the dust caps/plugs. Pull back the ring on the female coupling, and push the two parts together. Lock with the locking ring.

NOTE!
Use hydraulic hoses with a length and dimension corresponding to the distance between the pump and the power station, to minimise loss of power.

E.g. if you are pumping 30 m (100 ft.) from the power station, use 40 m (130 ft.) hydraulic hoses.

If you use more than a 30 m (99 ft.) hydraulic hose set, use 1" hoses.

Power loss for ½", ¾" and 1" hose sets at a flow rate of 65/130/160 l/min, hydraulic oil viscosity of 20 cSt, density of 875kg/m^3 and pump pressure of 100 bar:

	65 l/min		130 l/min		160 l/min	
Length of hose set:	1/2" hose	3/4" hose	3/4" hose	1" hose	3/4" hose	1" hose
10 m (2 x 10 m)	1,7 kW	0,3 kW	0,9 kW	0,45 kW	3,4 kW	0,8 kW
20 m (2 x 20 m)	3,25 kW	0,6 kW	3,6 kW	0,9 kW	6,8 kW	1,6 kW
40 m (2 x 40 m)	6,5 kW	1,2 kW	7,3 kW	1,7 kW	13,6 kW	3,2 kW
60 m (2 x 60 m)	9,75 kW	1,8 kW	10,9 kW	2,6 kW	20,4 kW	4,8 kW
80 m (2 x 80 m)	13,0 kW	2,4 kW	14,5 kW	3,4 kW	27,2 kW	6,4 kW

Bear in mind the viscosity of the hydraulic oil has great influence on the pressure drop in the hose sets.

These considerations also apply to the discharge hose. Use as big a dimension as possible and as short a hose length as possible - especially if pumping high-viscous liquids.

The discharge hose is also equipped with a quick coupling of either the Snabb or the cam-locking type. Roll out the entire hose, and lay it flat on the ground without kinks and twists. Connect the hose to the pump.

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

3.0 Response Tactics

The DOP-200 DUAL pump is used in a wide range of applications including as an off-loading or transfer pump. Among other things DESMI Ro-Clean supplies the below equipment and special adapters for the proper use of the pump:

- DESMI Termite, Terminator and Tarantula. The self-adjusting weir skimmers for open sea skimming of spilled oil.

- DESMI BELT. Barbed conveyer belt, for open sea skimming of spilled very high viscous oil.

- DESMI ALLIGATOR. Brush belt-skimmer, for open sea skimming of spilled medium viscous oil. High recovery efficiency.

- DESMI HELIX. Circular brush skimmer for open sea skimming of spilled medium viscosity oil. High pickup rates and high recovery efficiency.

- DESMI DBD. Disc/Brush/Drum skimmer for open sea skimming of spilled low to high viscosity oil. High recovery efficiency.

- DESMI SWEEPER. The hydraulic crane adapter for beach cleaning, open barge off-loading, waste pit pumping, etc.

NOTE!
Response tactics for these systems are discussed in the relevant operation manuals supplied with each system.

3.1 Field operation of the DOP pump alone

A. In General

- During tank, pit or barge off-loading, lower the pump as deeply as possible into the oil/emulsion.

- Avoid sucking air, as this will reduce the pump efficiency, especially on highly viscous media.

- During beach cleaning the pump should be positioned in such a way that a sufficient flow of oil to the inlet is obtained. Dig a hole if possible, but be sure to keep the inlet 8-10 inches above the bottom to minimise the amount of stones and sand entering the pump.

- IN ALL SITUATIONS, run the pump as fast as possible without causing cavitation due to vacuum on the suction side. You may hear a loud "banging" noise when the pump is cavitating.

NOTE!
Operating the pump at high RPM allows the pump to better cope with large debris.

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

B. Tank Off-Loading:

> **WARNING!**
> **When using the pump in an explosive atmosphere, always follow the instructions in section 4.5.**

The DOP 160/200/250 pump will go through a hatch or manhole with a diameter of 400mm (16") / 525mm (21") / 600mm (24").

It is strongly recommended to use the following equipment:
- A crane or a tripod
- A lifting wire with straps to fit*)
- A discharge hose with straps*)

*) **Alternative: Separate lifting reel for discharge hose**

In this way there will be a uniformly distributed lift in the discharge hose, and the lifting eye of the pump will not have to carry the weight of the hoses filled with liquid.

3.2 Deployment:

1. Connect the lifting wire to the pump.

2. Connect discharge and hydraulic hoses to the pump.

3. Snap or tie the first couple of hose straps to the wire straps. Depending on the depth of the tank, it may be necessary to tie up the hydraulic hoses too.

4. Lift up the pump and hoses by crane or tripod and start lowering into the tank. Snap or tie up the wire and hose straps as they are entering the tank.

3.3 Employment: See Section 3.1 A.

3.4 Recovery:

1. Disconnect the hydraulic hoses at the power supply

2. Start lifting by crane or tripod.

3. Disconnect the strap-connections one by one as they reach the hatch or manhole opening and reel up hydraulic and discharge hoses. It is recommended to incorporate the outside cleaning of the hoses in this procedure.

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

4.0 OPERATION

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

4.1 Before Operation

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.

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

B. Check that the hydraulic hoses are properly connected. Do not connect the hydr. hoses to the power supply until you are ready for operation. **Keep the safety distance!**

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

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

E. Check that the discharge hose is properly connected to the pump discharge fitting. Lay the hose flat so that it is not blocked or twisted.

F. When pumping non-oily media, grease the plate wheel using the grease nipple on the plate wheel shaft.

4.2 Operation of the Pump

WARNING!
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. Connect the hydraulic hoses to the hydraulic power supply when you are ready for operation.

B. The DOP pump will operate submerged in any position.

C. The inlet is equipped with a grid to protect personnel during exercises. When using the pump in an oil spill, remove the grid and **be sure that all personnel are aware of the safety instructions in this manual.**

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

CAUTION!
The pump should not run dry for more than a few seconds, just enough to check direction of rotation.

D. To ensure maximum performance, the pump must always be fully sub-merged (to avoid sucking air).

E. If the pump stops due to excessive debris/solids, simply reverse the pump to discharge the blockage.

WARNING!
If it is necessary to remove debris from the pump 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 pump of minimum 2 m/7 ft. when the pump is connected to the hydraulic power supply.

4.3 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 contents of the discharge hose may be discharged by means of the pump:
Empty the discharge hose by slowly and carefully reversing the pump.

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. The contents of the discharge hose may **not** be discharged by means of the pump:

Flush the hose using diesel and water with the pump in pumping mode.

B. Before recovering the pump after operation, **disconnect the hydraulic hoses at the power supply for safety reasons.**

C. Follow the instructions in section 4.4.

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

4.4 Inspection after Operation

> **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. Do *not* connect the hydraulic hoses to the power supply until you are ready for operation.**

A. Empty the DOP pump and clean the pump outside and inside using a solvent consistent with the medium pumped.

> **NOTE!**
> **Do not use caustic cleaning solutions, as this will damage aluminium parts.**

Flush the pump with FRESH water letting the screw run slowly using the power supply. Stop and empty the pump, disconnect all hydraulic hoses.

B. Inspect the pump casing and pump screw (see 6.3) for possible excessive wear or damage. Repair or renew, if necessary.

C. Remove the plate wheel cover. Check the plate wheel sectional discs and wear plates for wear or damage (see section 6.2). Replace, if necessary.

D. Check the condition of the stator cutting knife. Adjustment/replacement is done according to section 6.4.

E. Connect the pump to the hydraulic power supply and restart the pump at low RPM and slowly pour 1 to 2 litres of lubrication oil or corrosion protection oil into the outlet to preserve the inner parts of the pump. Let the pump work with the oil for 2 minutes. Wait for 15-30 minutes and empty the pump again. **Keep the safety distance!** Disconnect all hydraulic hoses.

F. Check the hydraulic connections for leaks. Tighten, if necessary.

G. Clean the quick couplings and protect them against corrosion using corrosion protection oil. Fit the protection plugs on all couplings.

H. Grease the plate wheel bearing (Not necessary on DOP 200/250 DUAL pumps)

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

4.5 Explosive Atmosphere

NOTE!
The DOP pump in standard version is safe for use in Combustible Liquid Class D and E (as defined in CFR Title 46, part 30.10-15) following the operating procedures outlined in this manual.

WARNING:
When pumping liquids with a low flash point, do not start pumping unless the entire system (pump, hydraulic hoses, discharge hose and power station) has been adequately grounded. Do not disconnect ground wire during operation.
Failure to follow this warning can result in ignition of flammable vapours, and thereby explosion, caused by static electricity.

Follow these safety precautions:

X **Remove stator cutting knife from pump inlet.**

X **All components of the system must be electrically connected. Bond the pump and the discharge hose to the power supply. Bond the power supply to the deck. Bond the tripod to the deck.**

X **Do not free fall liquid into a tank.**

X **Make sure that the pump is completely submerged during operation.**

X **Operate pump as slowly as possible. Increase and decrease pump speed slowly.**

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

CAUTION!
The DOP pump can be safely used in **flammable liquid grade A, grade B and grade C** (as defined in CFR Title 46, part 30.10-22) operation under the following conditions:

A. Follow all operating and maintenance instructions in the Operator's Manual.

B. Before operation, check that the pump is properly maintained and in good condition. Worn or damaged wear parts (polyethylene sealing discs/sealing ring) must be replaced.

C. **Remove stator cutting knife from pump inlet.**

D. Ground the pump casing via its own individual cable, or via internal grounding cable in discharge hose fabric. In any case: Attach ground wire directly to casing using any assembly screw.

E. Ground the hydraulic motor via its own individual cable, or via the internal steel reinforcement in the hydraulic hoses. In any case: Attach directly to hydraulic motor using one of the screws that flange the motor to the pump casing.

F. As the hydraulic motor casing is made of cast steel, precautions must be taken in order to prevent it from direct contact with other steel items in the danger area. This could be overcome by covering the motor with a shield of aluminium or plastic.

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

5.0 PREVENTATIVE MAINTENANCE

Equipment for combating oil pollution should be treated as emergency equipment. It should be maintained and kept in a state of readiness in the same way that fire-fighters handle their gear. It is too late to inspect and repair this gear when the "alarm bell" of an environmental emergency rings.

5.1 Necessary Tools and Supplies

2 pcs. 10 or 12 inch adjustable (depending on type of hydr. quick couplings)

1 pc. metric CH-screw spanner set (inner hexagonal)

1 pc. screw driver, medium size

1 pc Grease gun (for DOP-160 pump only)

- corrosion protection oil

- thread-compound (e.g. "THREAD-EZE" from CHEMSEARCH), to protect screws and aluminium from “growing” together

5.2 **After Operation** (including training exercises):

CAUTION!
No matter how many hours a pump is operated, it must always be inspected afterwards as described in paragraph 4.4.

5.3 Between Operations and During Storage

It is necessary to perform paragraph 4.4, items D, E, F, and G every 6 to 8 weeks when the pump is not used. It may be convenient to use the same inspection/-maintenance intervals as for the power station.

5.4 Hydraulic Motor and Bearing Casing

The hydraulic motor and bearing casing are integral parts of the hydraulic system and need no preventative maintenance under normal conditions. The motor and bearings are designed for thousands of hours of operation provided that the hydraulic fluid is properly filtered and contamination is kept below the levels recommended by the hydraulic motor manufacturer.

Recommended hydraulic fluid

Ambient temperature in °C	Type of hydr. fluid	Viscosity
-10° up to +35°	Houghton Hydrodrive HPE120. ESSO Transmission Fluid Dexron. BP Autran GM-MP.	33 cSt at 40°C
Less than -10°C	Houghton Hydrodrive Special 22	index: 250
Above +35°C		40 cSt at 40°C

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

6.0 CORRECTIVE MAINTENANCE (See Assembly Drawing in Appendix)

WARNING!
Make sure the pump can not be started unintentional, make sure the hydraulic hoses are disconnected before any work are done with the pump!

6.1 Necessary Tools and Supplies:

1 pc. work bench and large vice with "soft bite"

2 pcs. 10" or 12" adjustable spanner (depending on type of hydraulic quick couplings)

1 pc. metric CH-screw spanner set (inner hexagonal)

1 pc. screw driver, medium size

1 pc grease gun (for DOP-160 pump only)

1 pc. Ratcheting 36 mm metric socket wrench for item 25 (lock nut M24), including extension holder

1 pc. feeler gauge

1 pc. nylon or rubber hammer

1 pc. slim steel point punch

1 pc. hydraulic hose, length 1 m (3 ft.) with male and female hydraulic quick couplings matching the pump couplings

1 pc. locking ring compressor tool

- thread-compound (e.g. "THREAD-EZE" from CHEMSEARCH), to protect screws and aluminium from “growing” together.

6.2 Inspection/Replacement of Plate Wheel Sectional Discs (Item 8), and Wear Plates (DOP-160 Item 17, DOP200/250 DUAL Item 16)

A. Fig 2. Remove the plate wheel cover (DOP-160 item 6, DOP-200/250 item 3).

On DOP-200 unscrew the M5 screws (item 94) and pull out the wear ring (item 90) from the sectional disc cover.

B. Fig. 3. Unscrew the M8 screws and pull out the wear plates
DOP-160 item 22+17 / DOP-200 item 93+16 / DOP-250 item 37+16.

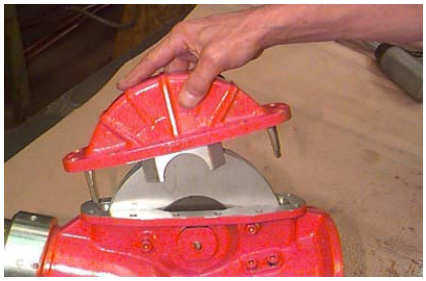


Fig. 2

Fig. 3

C. Short circuit the hydraulic motor by connecting the 1 m (3 ft.) section of hydraulic hose between hydraulic pressure and return couplings on the motor.

This allows the pump screw to be rotated manually.

D. Fig 4. Remove the protection grid, item 5.

E. Fig 5. Place the pump on its side and fit the socket wrench with extension to the lock nut, item 25, on the screw shaft.

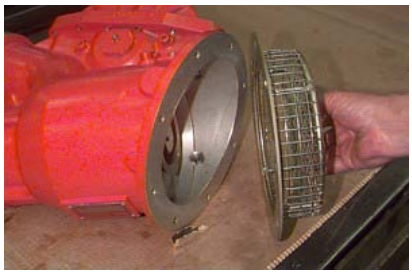


Fig 4.

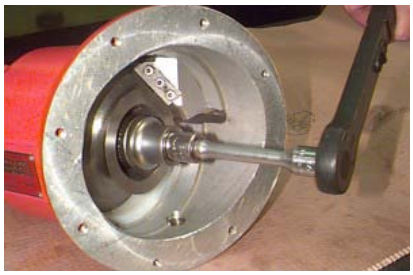


Fig. 5

F. Rotate the pump screw clockwise (as seen from the pump inlet) using the ratcheting wrench. Each revolution of the screw allows access to the disc section for inspection and replacement, if necessary.

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

G. Fig. 6 + 7. To replace a sectional disc, remove the locking screw (DOP-160 ITEM 33, DOP200/250 item 44) and pull the sectional disc (item 8) off the steel core. Replace with a new sectional disc and lock it in place with the screw.

Fig. 6

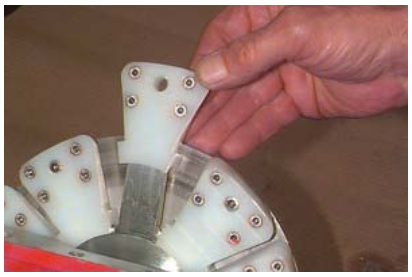


Fig. 7

H. Inspect the wear plates (DOP-160 item 17, DOP200/250 item 16) and on DOP- 200 the wear ring (item 90) and if necessary replace.

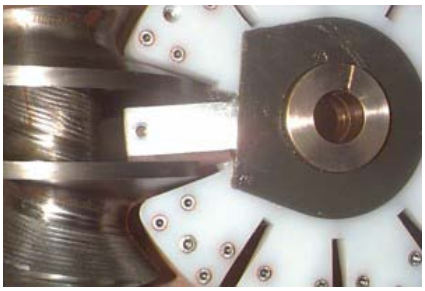
I. Mount the M8 screws (DOP-160 item 22, DOP-200/250 item 37) to fix the wear plates. On DOP-200 also mount the M5 screws (item 94) / bracket (item 91) to fix the wear ring (item 90).

J. Mount the plate wheel cover and the protection grid. The pump is now ready for operation.

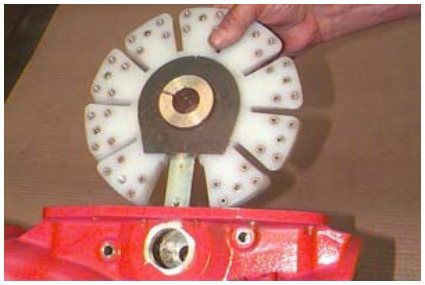
DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

6.3 Inspection/Replacement of:

Pump Screw **DOP-160 item 1, DOP-200/250 item 2**
Sealing Ring **DOP-160/200/250 item 9**
Plate Wheel Shaft **DOP-160/200/250 item 11**
Plate Wheel Bearing **DOP-160 item 13, DOP-200/250 item 12**
Sealing/Bearing Discs **DOP-160 item 18, DOP-200 item 17, DOP-250 item 17+18**
V-seal DOP-160/200/250 item 21

A.	Short circuit the hydraulic motor by connecting the 1 m (3 ft.) section of hydraulic hose between hydraulic pressure and return couplings on the motor.
B.	Hold the pump in a fixed position with the inlet facing upwards, using a vise to clamp the sides of the hydraulic motor.
C.	Fig. 4. Remove the protection grid (DOP-160/200/250 item 5)
D.	Fig. 2. Remove the plate wheel cover (DOP-160 item 6, DOP-200/250 item 3)
E.	Fig. 3. Unscrew the M8 screws (DOP-160 item 22, DOP-200 item 93, DOP-250 item 37) and pull out the wear plates (DOP-160 item 17, DOP-200/250 item 16)
F.	Fig. 6 + 7. Remove locking screws (DOP-160 item 33, DOP-200/250 item 44) and pull one sectional disc (DOP-160/200/250 item 8) off the steel core.
G.	Fig. 8. Fit the socket wrench to the lock nut (DOP-160/200/250 item 25) on the screw shaft and rotate the pump screw clockwise (as seen from the pump inlet) until the naked steel core engages with the pump screw.
H.	Fig. 9. **DOP-200:** Loosen the screw (item 29) and turn it two, three times anticlockwise, then gently tap the head of the screw with a nylon hammer to push out the plate wheel shaft (item 11), remove the screw and pull out the plate wheel shaft. Press out the stub shaft (item 28) taking care not to damage the bearing bushing inside the plate wheel core. **DOP-160/250:** Unscrew the nut (item 29) from the plate wheel shaft and remove the washer (item 28). Remove the plate wheel shaft by tapping lightly on the end of the shaft with a nylon hammer (Fig. 9).
	 

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

	Fig 8.	Fig. 9
I. J.	Fig. 10. Pull out the plate wheel. Unlock the M24 (DOP160/200) / M30 (DOP250) lock nut (item 25) by loosening the pointed screw (item 24). Unscrew the M24/M30 lock nut (item 25) using the socket wrench etc. Remove the washer (item 26).	
		Fig. 10
K.	Fig. 11 + 12. Unscrew the M8 screws (DOP-160 item 42 + 43, DOP-200/250 item 84 and 85) and remove the stator cutting devise (DOP-160 item 47, DOP-200/250 item 39) (Fig. 11) and the locking ring (DOP-160 item 41, DOP-200/250 item 40 + 41) (Fig. 12).	
		
	Fig. 11	**Fig. 12**
L.	Fig. 13. Pull out the pump screw (DOP-160 item 1, DOP-200/250 item 2).	
M.	Fig. 14. Pull out the sealing ring (DOP-160/200/250 item 9).	
		
	Fig. 13	**Fig. 14**

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

N. Before reassembling the pump, inspect and, if necessary, replace the following parts:

		DOP160	DOP200	DOP250
- Pump screw	Item no.	1	2	2
- Sealing ring	Item no.	9	9	9
- Plate wheel shaft	Item no.	11	11	11
- Wear discs	Item no.	12		
- bearing bushing for plate wheel	Item no.		12	12
- Bearings for plate wheel	Item no.	13		
- Wear plates	Item no.	17	16	16
- wear ring for plate wheel cover	Item no.		90	
- Plate wheel sectional discs	Item no.	8	8	8
- Seals for plate wheel bearings	Item no.	18	17	17+18
- V-sealing ring	Item no.	21	21	21

O. Grease all inner aluminium surfaces and bearings and reassemble the pump in the opposite order as described above.

NOTE!
Fit the alignment screws and nuts and the plate wheel shaft nuts before screwing the rest of the screws into the split casing. Also, observe that the O-rings are in proper position and use grease as glue, if necessary. Tighten all screws gradually in order not to cause damage to the casings.

NOTE!
Remember to lock the locknut (item 25) by tightening the pointed screw (item 24) before mounting the protective grid (item 5).

6.4 Inspection/Adjustment/Replacement of Stator Cutting Knife
(DOP 160, item 49, DOP-200/250 Item 38)

A. Dismantle the protective grid (item 5) (Fig. 4).

B. Fit the 1 m (3 ft.) hydraulic hose to the hydraulic motor pressure and return couplings.

C. Attach the socket wrench etc. to the lock nut on the pump screw shaft (Fig. 8).

D. Rotate the pump screw clockwise and place the cutting edge of the pump screw close to the stator cutting knife. Move the pump screw while observing that the clearance between stator and rotor knife is

DOP-200 pump: 0.1 – 0.2mm
DOP-160/250: 0.3 – 0.5mm
on the full length of the stator knife. Use the feeler gauge, (Fig.15).

Fig. 15

E. Replace/adjust the stator knife by using the metric CH-screw spanner (inner hexagonal) for the screws, observing clause D above.

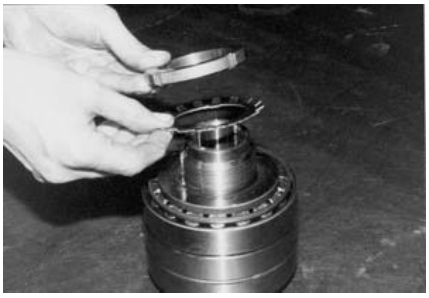
F. Mount the protective grid.

6.5 Inspection/Replacement of Hydraulic Motor (Item 3)

A.	Place the pump on the inlet in such a way that escaping hydraulic oil may be recovered.
	NOTE! **Do not reuse spilled hydraulic oil unless it has been pumped through a 10 micron filter!!**
B.	Fig. 16. Unscrew the four screws (DOP 160, item 35, DOP-200/250 Item 31) and lift up the motor. Wrap the complete motor arrangement in plastic film for protection. Please observe the blue conical sealing ring that seals between motor and pump screw shaft. The bigger diameter must always be on the motor side. This seal ensures that the drain oil from the motor is led into the spline connection between motor shaft and pump shaft for lubrication. From there the oil is directed inside the shaft to a position under the main bearings. This ensures a continuous flow of new oil to the roller bearings. Via a hole in the motor casing, the drain oil is led through the 5 bar/75 psi check valve and into the drain line.
C.	Fig. 17. Mount a new O-ring (DOP 160, item 34, DOP-200/250 Item 33) on the new or repaired motor for proper sealing between motor and bearing housing.
	 
	Fig. 16 **Fig. 17**
D.	Mount the new or repaired motor following the instructions above, but in opposite order. Please note Section A. above: Keep the blue sealing ring in position with some grease, if necessary.

NOTE!
If for some reason the hydraulic oil in the bearing housing has been spilled, pour in new, clean hydraulic oil before mounting the motor.

6.6 Inspection/Replacement of Conical Roller Bearings (Item 19) and Shaft Seals (Item 20)

A.	Dismantle the pump as described in paragraph 6.3 (A to M).	
B.	Dismantle the hydraulic motor as described in paragraph 6.5 A and B (Fig. 16).	
C.	Fig. 18. Unscrew and remove the outer ring lock nut using the slim steel punch.	
D.	Fig. 19. The complete bearing arrangement can now be pushed out of the bearing housing.	
		
	Fig. 18	**Fig. 19**
E.a	Fig. 20a. DOP160: Unlock the lock nut (item 39) by loosening the pointed screw (item 40). Please note the nylon bit to avoid damage to the threat on the pump screw shaft.	
E.b	Fig. 20a. DOP200/250 DUAL: Open the lock washer (item 43) for the lock nut (item 42) and loosen this nut using the slim steel punch.	
		
	Fig. 20a DOP-160	**Fig 20b (DOP-200/250 DUAL)**
F.	Inspection and replacement of the conical roller bearings are easily done after unscrewing the lock nut on the pump shaft.	

NOTE!
The conical roller bearings are designed for several thousand hours of operation. If they need to be replaced, you should look for a reason why:

1. Quality/cleanliness of hydraulic oil OK ?
2. Is the 5 bar/75 psi non-return valve on the drain line in position ?
3. Has the pump been running without the drain line connected ?

Reasons 2 and 3 could cause damage to the shaft seals (item 20), thus resulting in damage to the bearings.

G. Replacement of the shaft seals is easily done after unlocking the lock ring (item 27). Please observe that two sealing rings turn the opening towards the bearing housing and one turns towards the pump medium. Grease the sealing rings (item 20) carefully.

H. Inspect the shaft for damages in the sealing area. Repair, if necessary/possible, or replace the shaft.

I. Assembly is done following the instructions A-G in opposite order, but observing the following: After inspection/replacement of the roller bearings onto the pump screw shaft, the lock nut (DOP160 item 39, DOP200/250 item 42) must be tightened until the outer rings of the bearings are difficult to turn. Then loosen the lock nut approx. one (1) step and check that the outer rings rotates easily, lock the locknut by means of the lock washer (item 43).

6.7 Replacement of Discharge Coupling (DOP 200/250 item 49)

On DOP 200/250 DUAL the discharge coupling (item 49) can be switched with the flange cover (item 6).

Replacement of Discharge coupling:

On DOP200/250 DUAL:

A. Loosen the screws and nuts (item 51 and 52)
B. Remove the discharge coupling (item 49) and the o-ring (item 50).
C. Fit a new o-ring and discharge flange to the pump casing. Tighten the screws and nuts (Item 51 and 52).

On DOP160:

A. Unscrew the locking screws (item 76) approximately 4 mm/1/6".
B. Unscrew the coupling (item 75) by using the special fire hose coupling tool.
C. Before screwing on a new or repaired coupling the threads must be coated with a compound (e.g. "THREAD-EZE" from CHEMSEARCH) that will protect the two aluminium parts from "growing" together.
D. Screw the coupling on and ensure that the rubber seal (item 77) inside the coupling seals against the discharge pipe of the pump.
E. Tighten the locking screws (item 76).

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

7.0 TROUBLESHOOTING

Problem	Probable Cause	Action
The pump does not run.	Hydraulic hoses not connected.	Check hydraulic connection.
	Large debris clogs the pump.	Reverse the direction of rotation of the pump to eject debris.
Will pump heavy oil at a high discharge pressure, but water at only a low pressure.	Worn wear parts. Sealing ring, sectional discs, wear plates or all.	Inspect plate wheel discs and wear plates. Replace, if necessary. Inspect sealing ring. Clearance between screw and pressure ring should not exceed DOP200 : 0.2 mm (0.008") DOP160/250: 1.5 mm (0.06”).
Same as above but wear parts have been replaced.	Worn down outer diameter of pump screw due to long term pumping of abrasive media.	Replace pump screw. Under certain conditions repair of the pump screw is possible.
The pump is running, but will not pump the high viscosity media in which it is deployed, or has poor capacity.	The pump is sucking air.	Deploy the pump deeper into media.
The pump makes a "banging" noise.	Pump is cavitating due to blockage of suction inlet.	Stop the pump and: a) Clean inlet strainer (if mounted) b) Valve on adapter unit may be shut. Open it. c) Adapted unit such as floating storage tank may be sucked dry. Stop operation.
Discharge line pulsates under high pressure.	Pump geometry/design.	None, this is normal.
Will not cut debris.	Cutting knives wrongly adjusted or too large debris.	Adjust or replace stator cutting knife and grind rotor cutting knife. Reverse pump, if the debris is too large.
Water enters hydraulic system at pump.	Loose hydraulic fittings.	Tighten, replace seals, if necessary.
	Screw shaft seal is damaged.	Replace shaft seal, and check if the pump has been operated without: a) Hydraulic drain/line or without b) The check valve on the hydraulic motor. A+B must always be used.
	O-ring seal between hydraulic motor and bearing house has been damaged when mounting the hydraulic motor.	Dismantle hydraulic motor and replace O-ring seal.

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

OPERATORS MANUAL

DESMI
VERTICAL ARCHIMEDES' SCREW
OFF-LOADING PUMPS

DOP-160
DOP-200DUAL
DOP-250DUAL

APPENDIX

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

A1.0 TECHNICAL SPECIFICATIONS

A1.1 Dimensions/Capacities

	Unit	DOP-160	200 DUAL	250 DUAL
Weight:	kg	31	58	80
L x W x H:	cm	39x24x52	50x29x48	55x36x59
Min manhole dia.	m	0,4	0,525	0,58
Standard outlet:		3” Camlock	4“ Camlock	5” Camlock
Capacity/pressure/power:		According to performance curves		
Max. pressure:	bar	10	13	10
Max. capacity:	m^3/h	30	66	100
Viscosity range:	cSt	1 to > 1 million		

A1.2 Material Specification:

Screw: Double-curved Archimedes' screw in cast stainless steel (Ni-Resist).
Casing: Standard seawater resistant aluminium. Optional stainless steel. Replaceable polyethylene sealing ring.
Plate wheel: High-tensile steel core with replaceable sealing discs of polyethylene HD.
Bearings: SKF heavy duty conical roller bearings.
Screw shaft: Standard heat treatable steel. Optional stainless steel.

A1.3 Hydraulic System:

	Unit	DOP 160	DOP 200DUAL	DOP 250DUAL	
Prime mover: (Danfoss hydr. motor)		OMSS 80	OMTS 160	OMTS 200	OMTS 315
Max. speed*:	rpm	960	800	800	800
Max. output power*:	kW	23,5	32	38	38
Max. oil flow*:	l/min.	80	130	160	160
Max. inlet pressure:	bar	210	210	210	210

* : Continuous

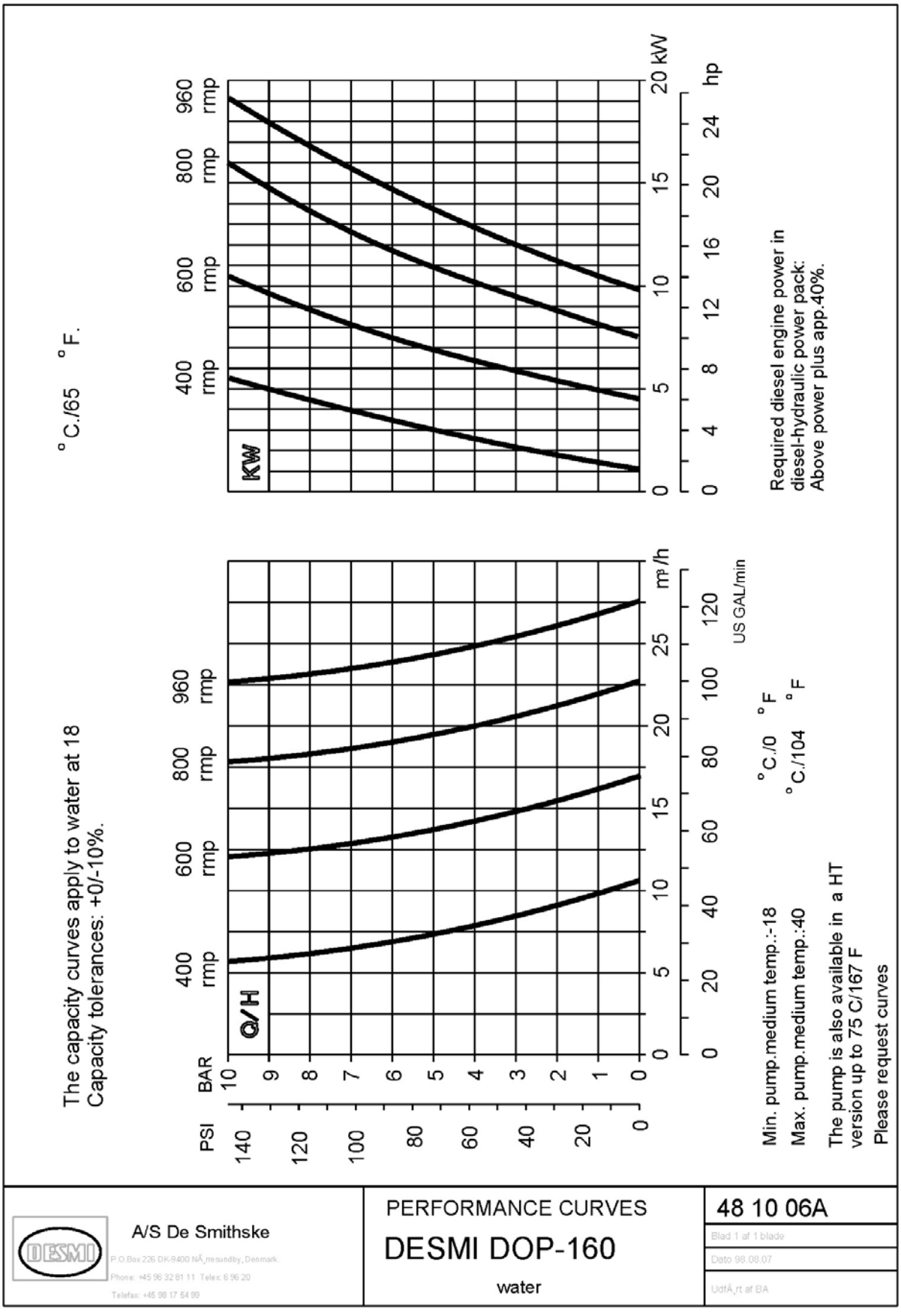
Standard Hydraulic connections:
Pressure line: 3/4" Aeroquip quick coupling female
Return line: 3/4" Aeroquip quick coupling male
Drain line: 3/8" Aeroquip quick coupling male

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

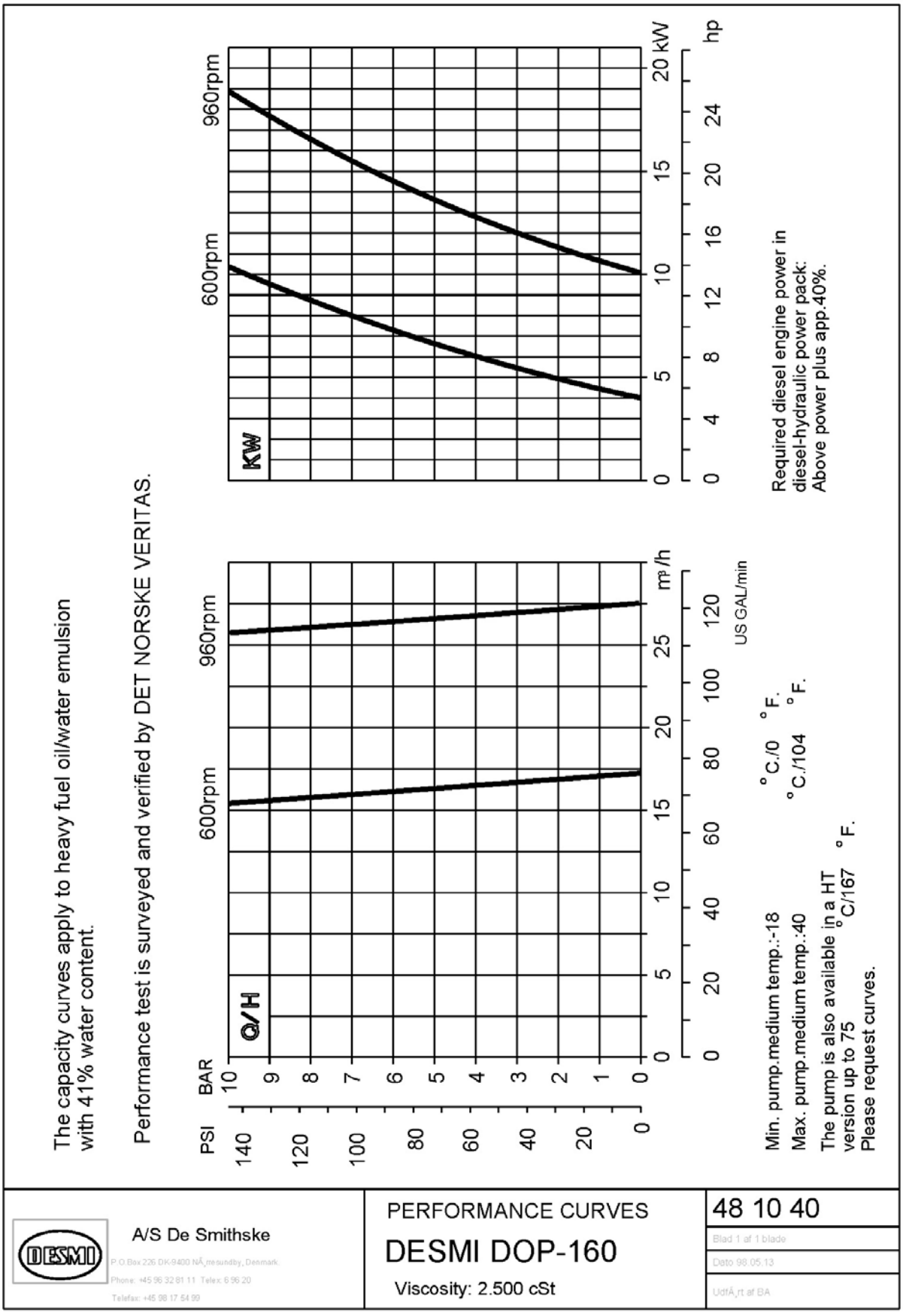
A2.0 PERFORMANCE CURVES

2.1	DOP-160	in water		No. 481006A
2.2	DOP 160	in oil	2.500cSt	No. 481040
2.3	DOP160	in oil	15.000 cSt	No. 481041
2.4	DOP 160	in oil	30.000 cSt	No. 481142
2.5	DOP 160	in oil	60.000 cSt	No. 481143
2.6	DOP-200 DUAL	in water		
2.7	DOP-250 DUAL	in water		No. 480390b
2.8	DOP-250 DUAL	in oil	2.500cSt	No. 480391a
2.9	DOP-250 DUAL	in oil	60.000 cSt	No. 480394a

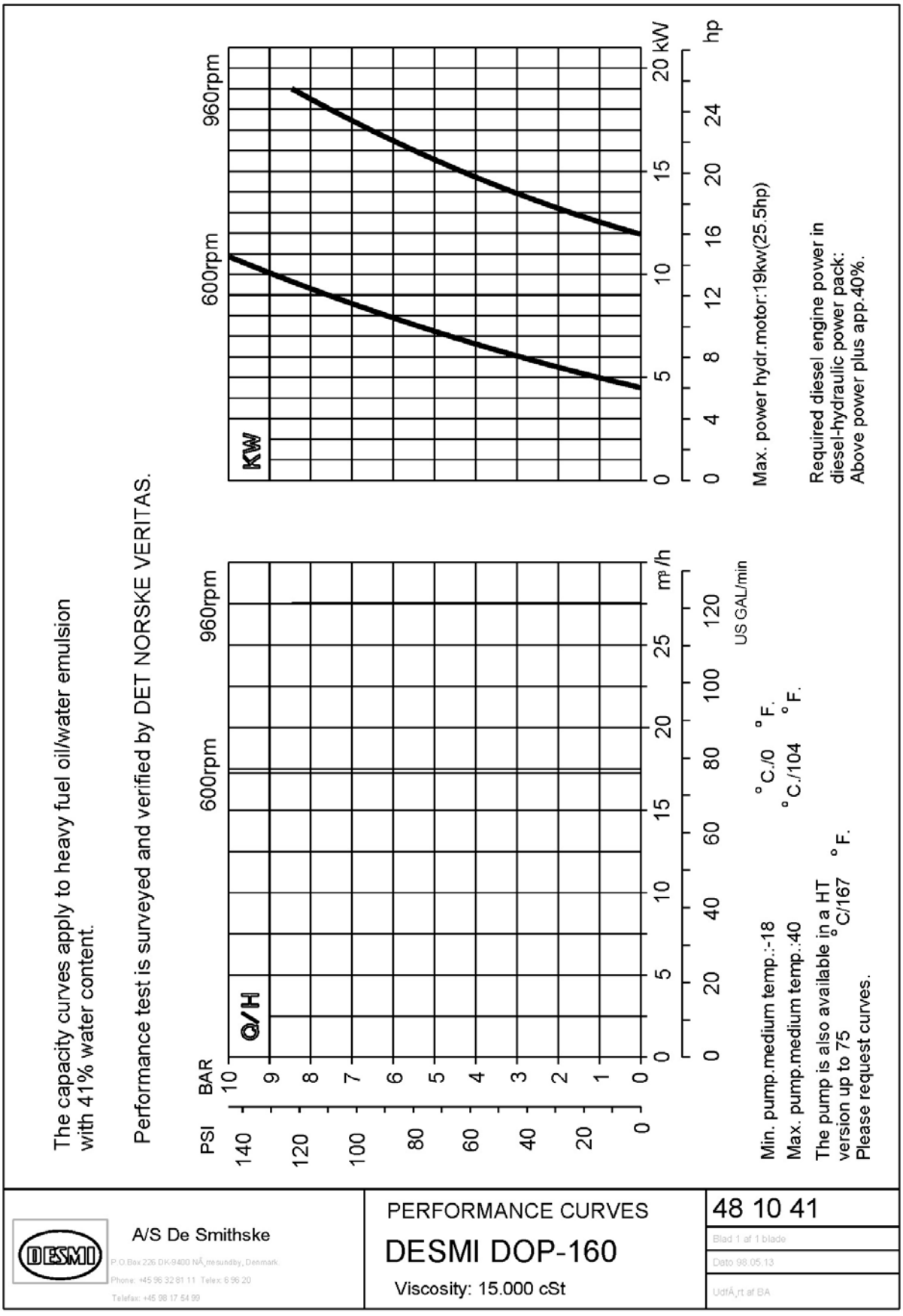
DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com



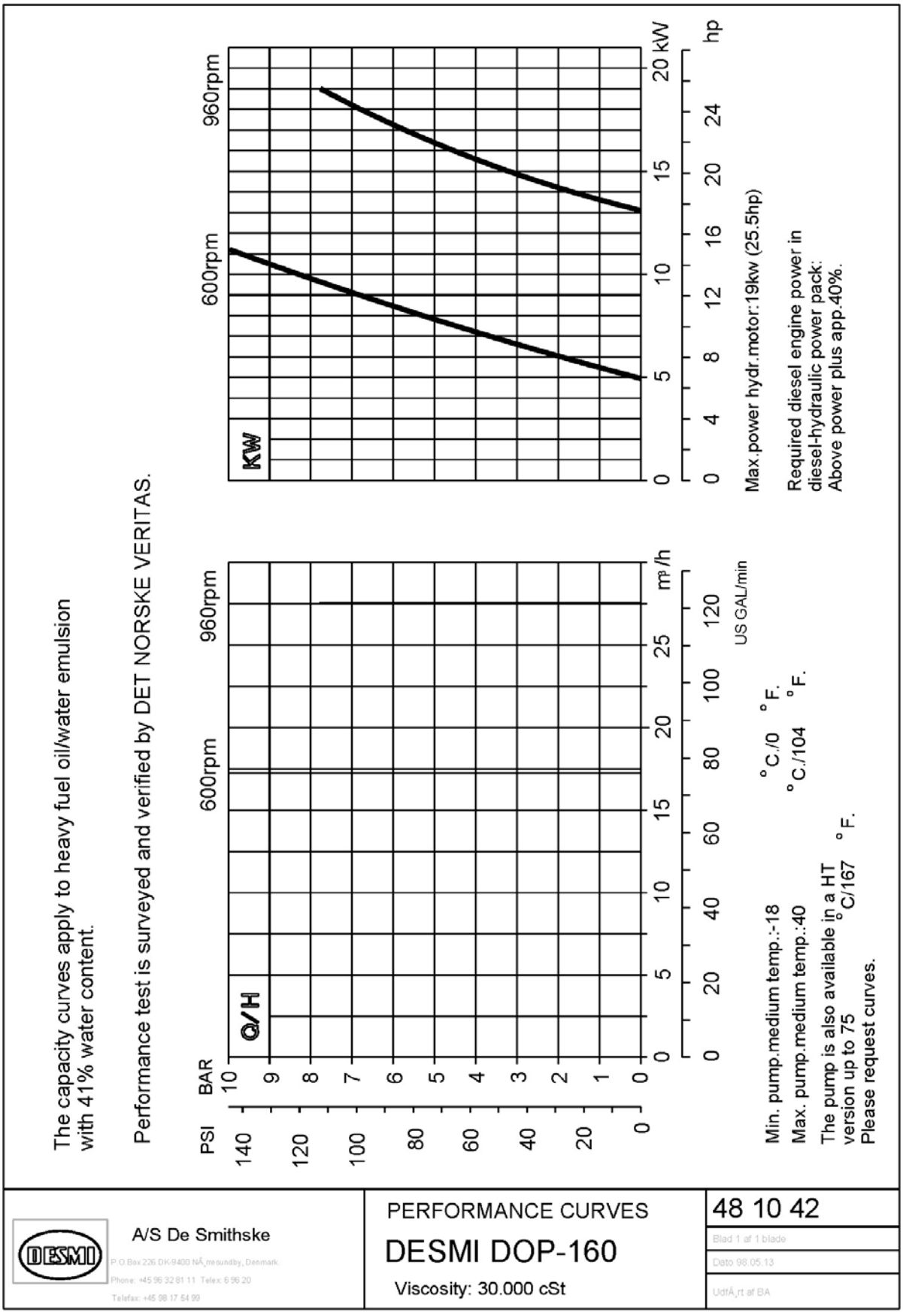
DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com



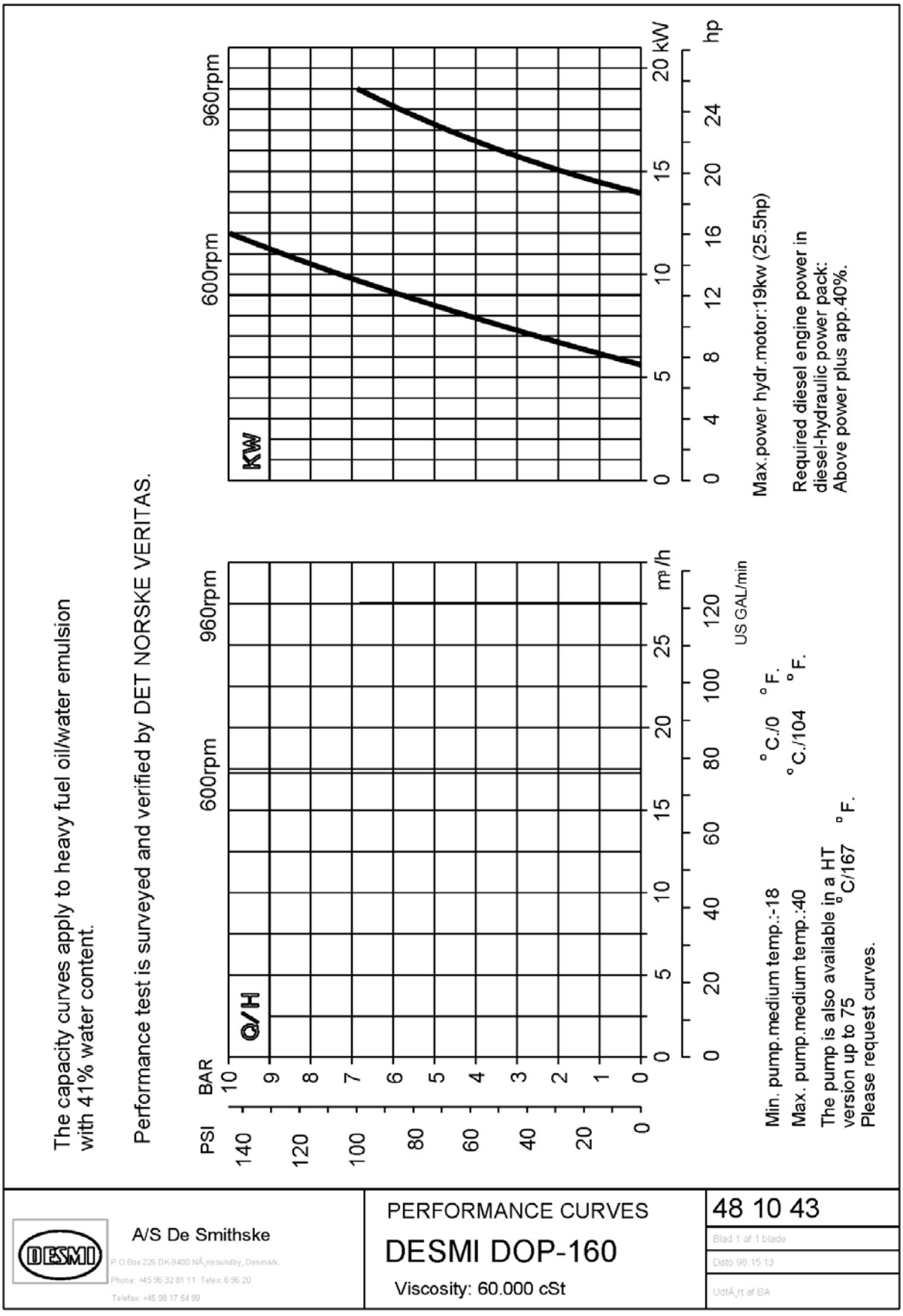
DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com



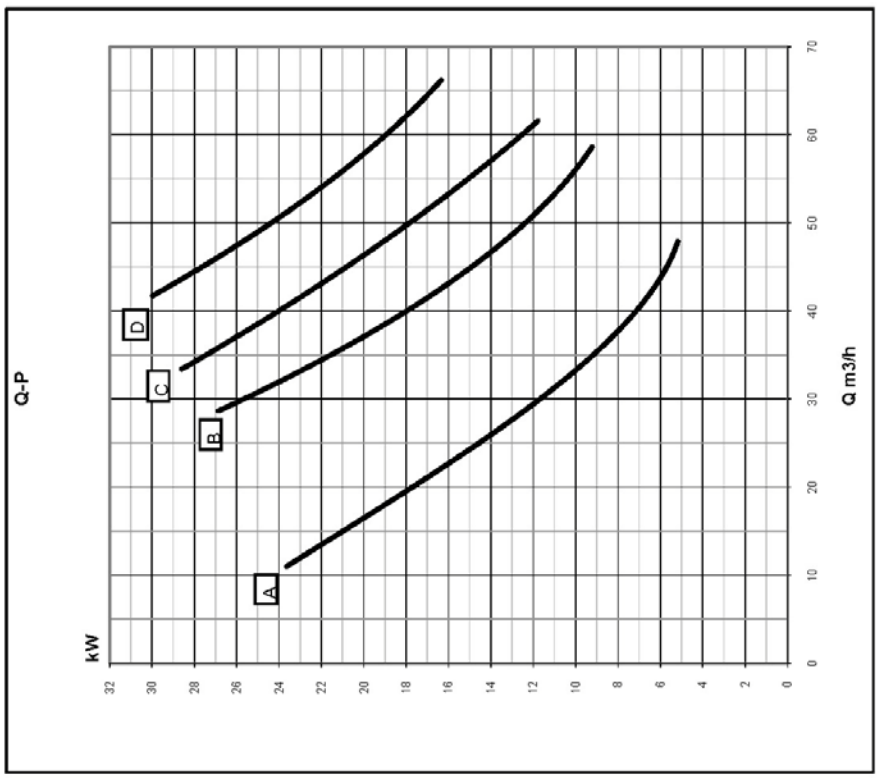
DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com



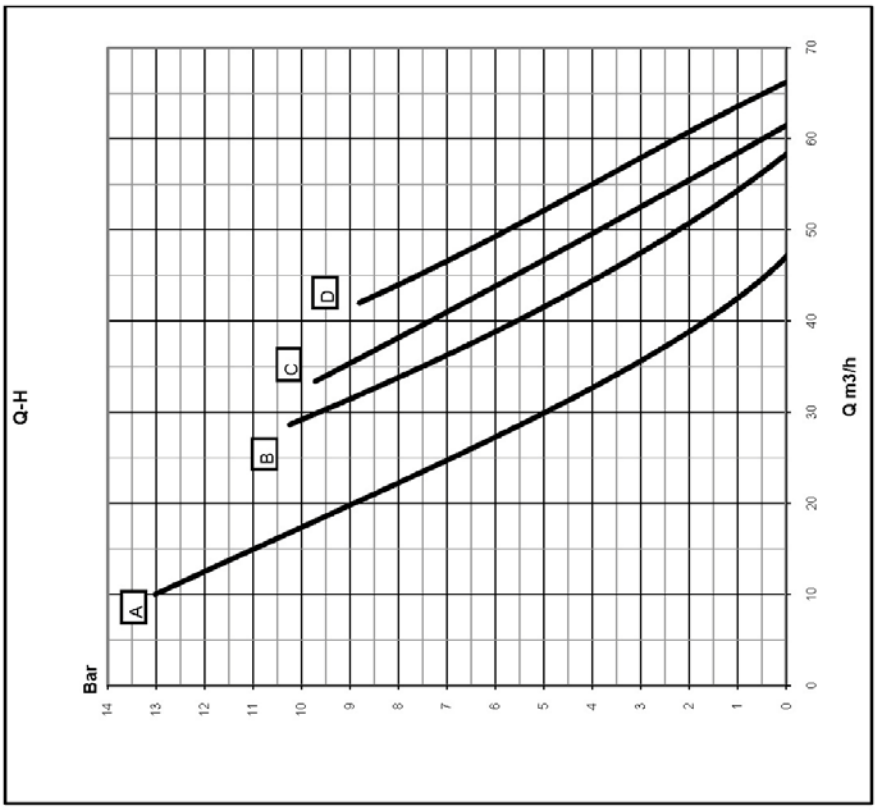
DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com



DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com



Power curves showing hydraulic power at the hydraulic motor

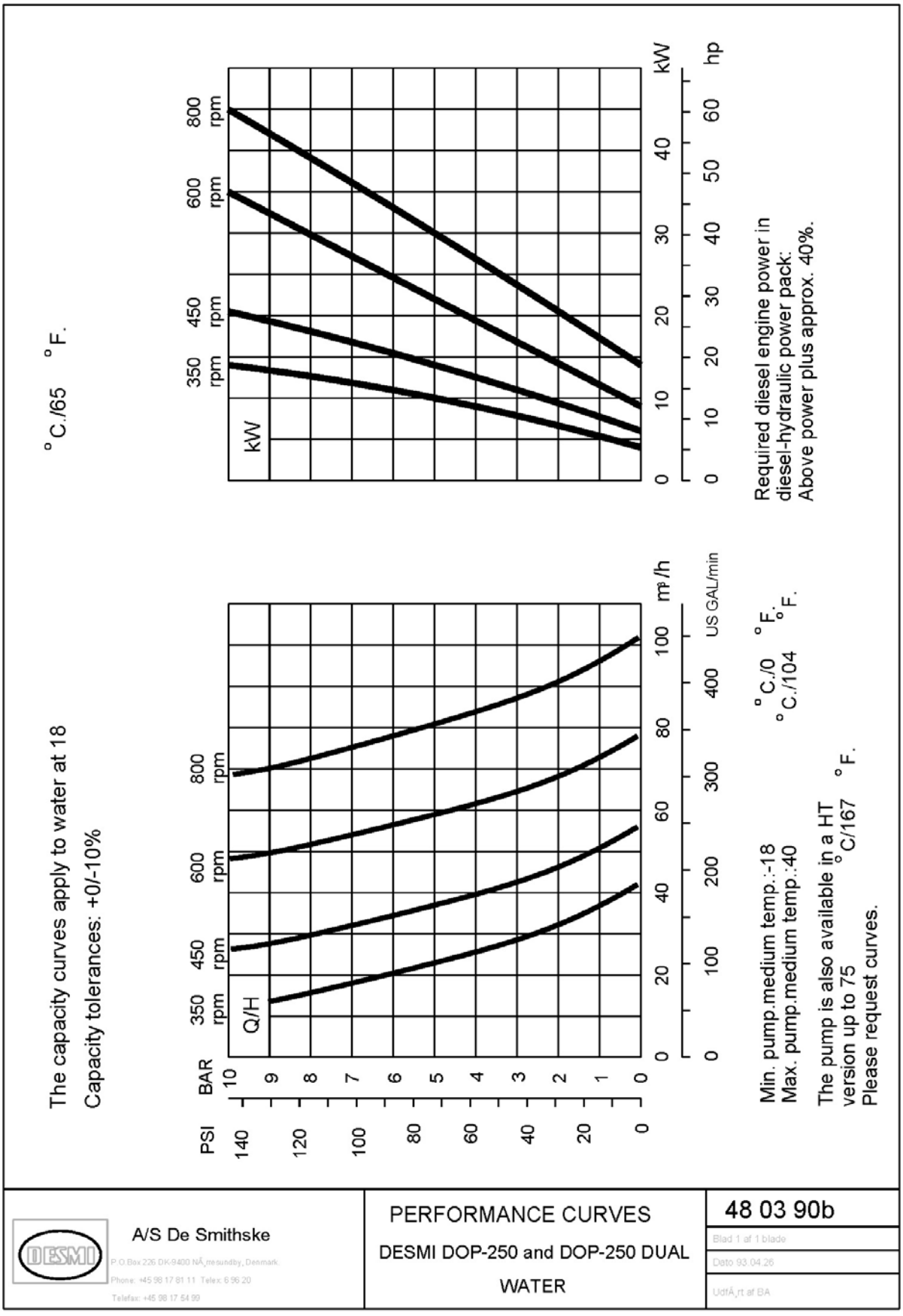


Performance curves apply to water at 18°C /65°F

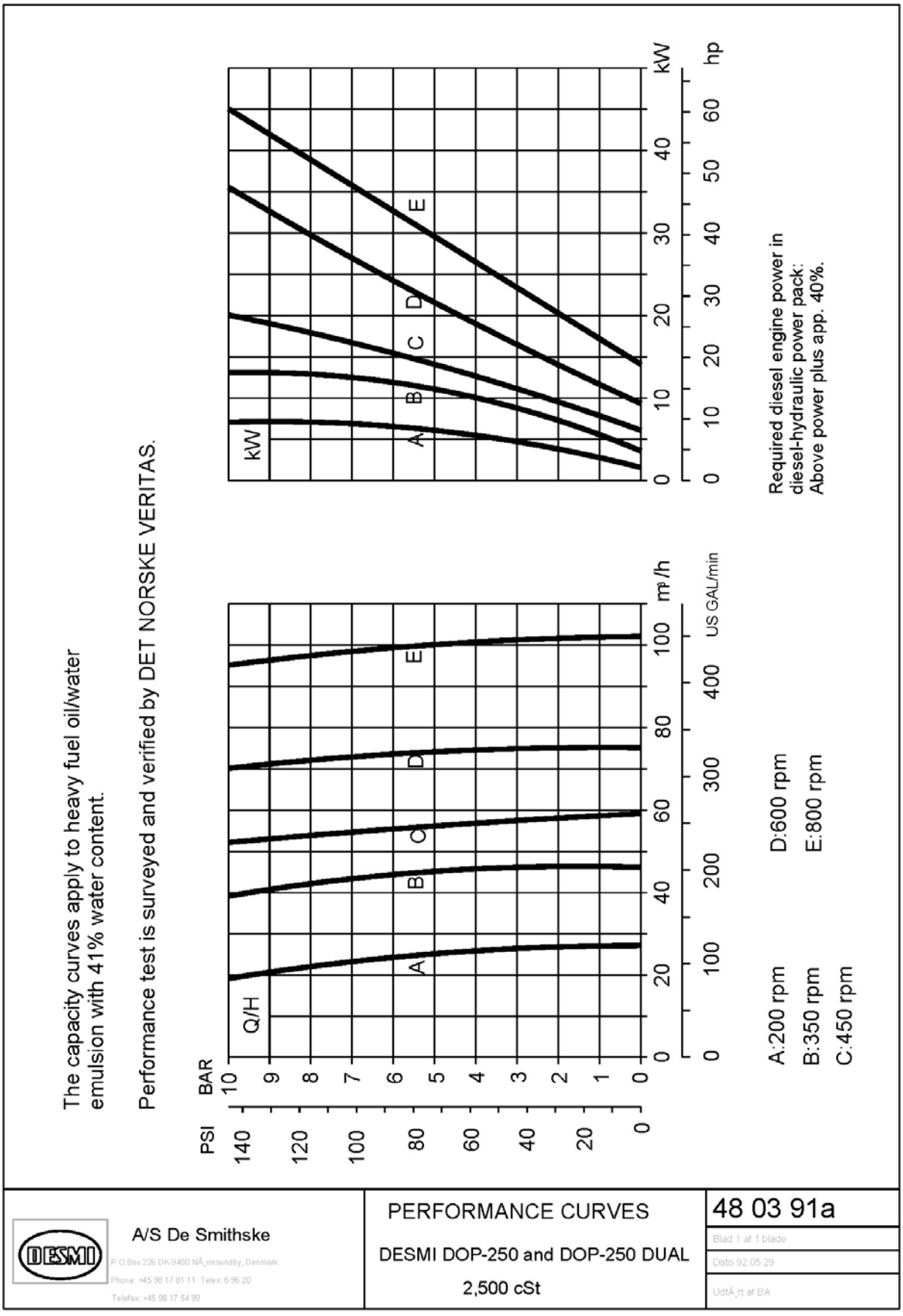
A: 650 rpm – B: 800 rpm – C: 850 rpm – D: 915 rpm

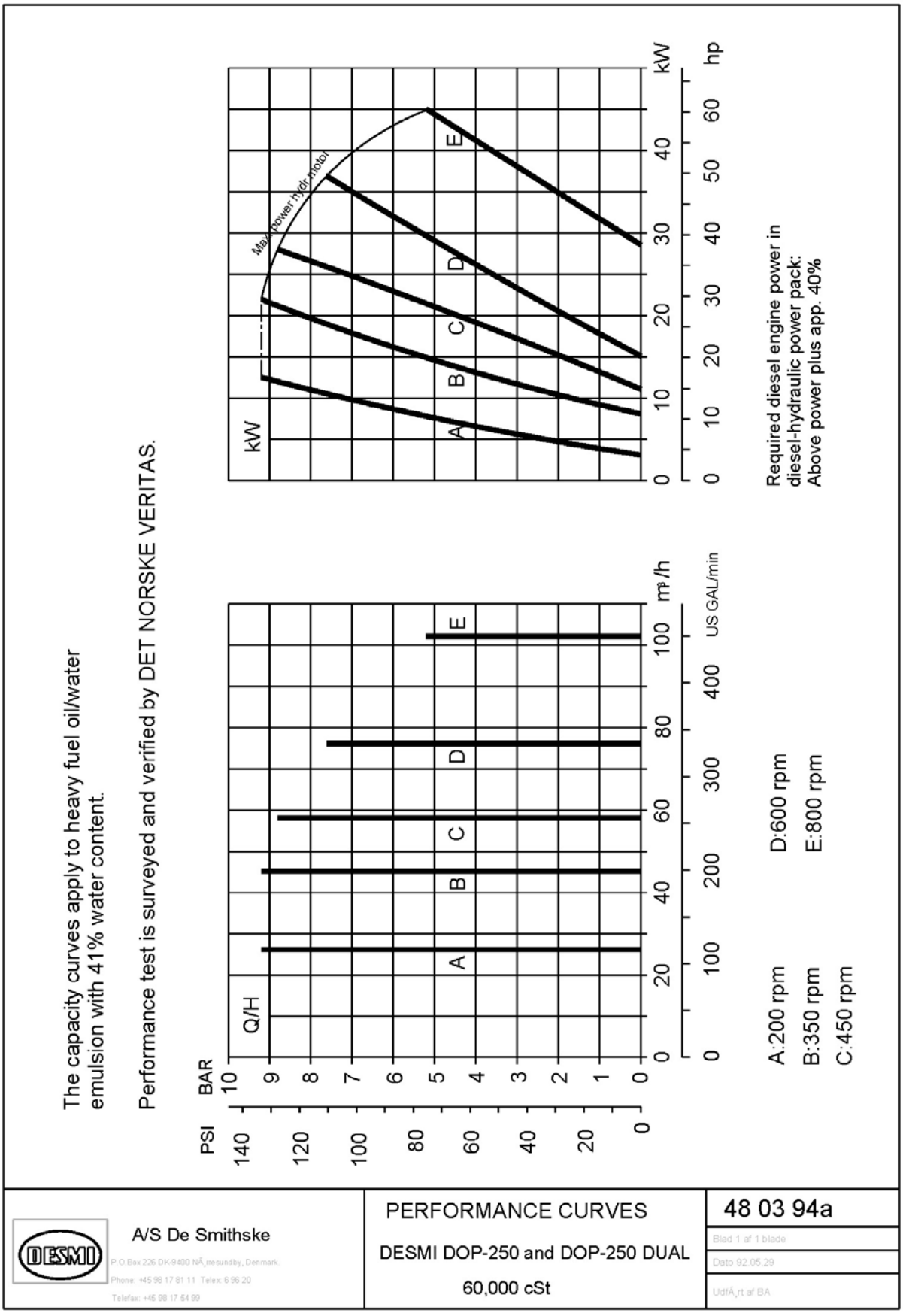
PERFORMANCE CURVES
DESMI DOP-200 DUAL

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com



DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

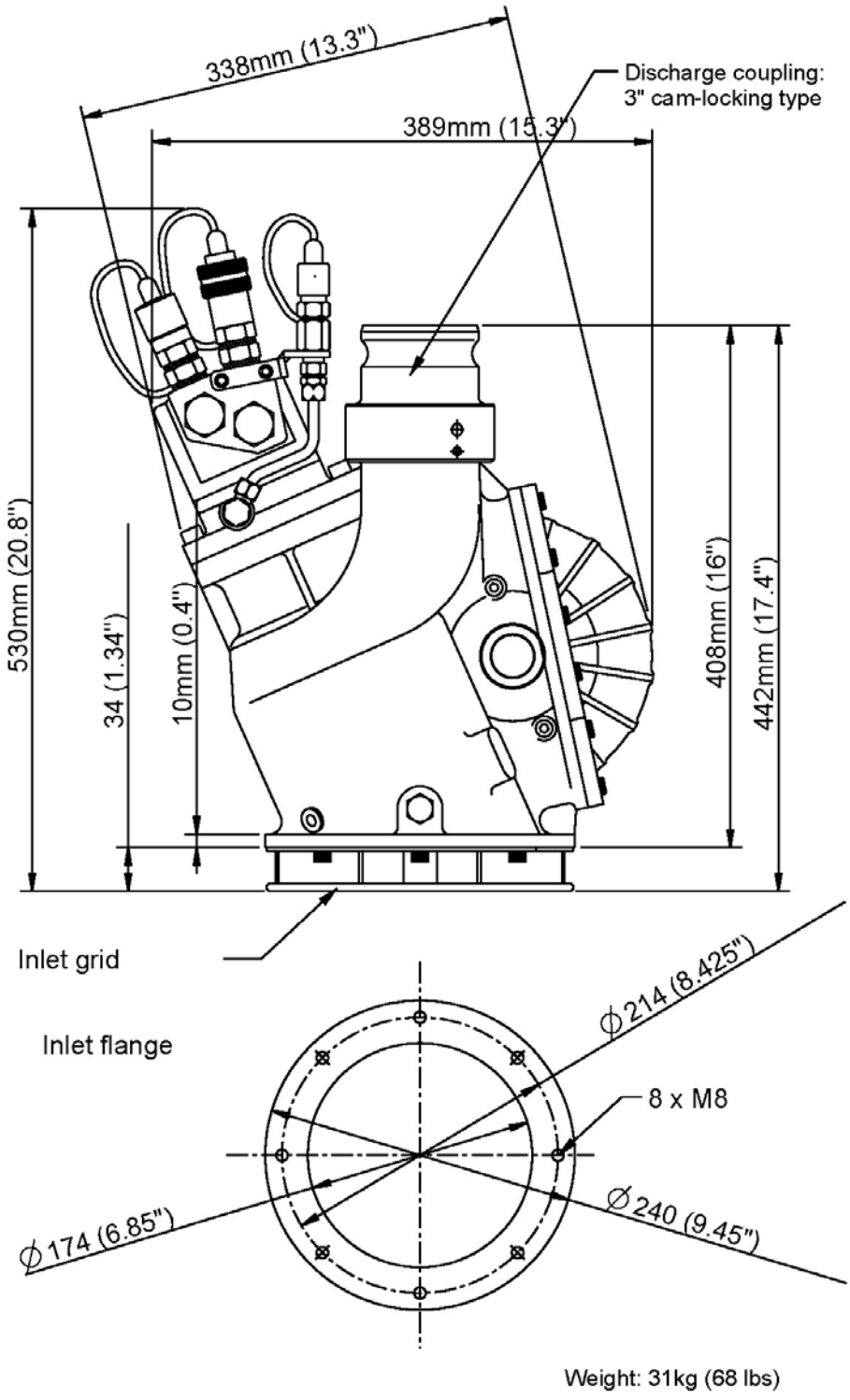

kW
hp
A
B
C
D
E
Required diesel engine power in diesel-hydraulic power pack: Above power plus app. 40%.
PSI
BAR
Q/H
m³/h
US GAL/min
A:200 rpm
B:350 rpm
C:450 rpm
D:600 rpm
E:800 rpm
The capacity curves apply to heavy fuel oil/water emulsion with 41% water content.
Performance test is surveyed and verified by DET NORSKE VERITAS.
A/S De Smithske
PERFORMANCE CURVES
DESMI DOP-250 and DOP-250 DUAL
2,500 cSt
48 03 91a


kW
hp
Max. power hydr. motor
A
B
C
D
E
Required diesel engine power in diesel-hydraulic power pack:
Above power plus app. 40%
PSI
BAR
Q/H
m³/h
US GAL/min
A:200 rpm
B:350 rpm
C:450 rpm
D:600 rpm
E:800 rpm
The capacity curves apply to heavy fuel oil/water emulsion with 41% water content.
Performance test is surveyed and verified by DET NORSKE VERITAS.
A/S De Smithske
PERFORMANCE CURVES
DESMI DOP-250 and DOP-250 DUAL
60,000 cSt
48 03 94a

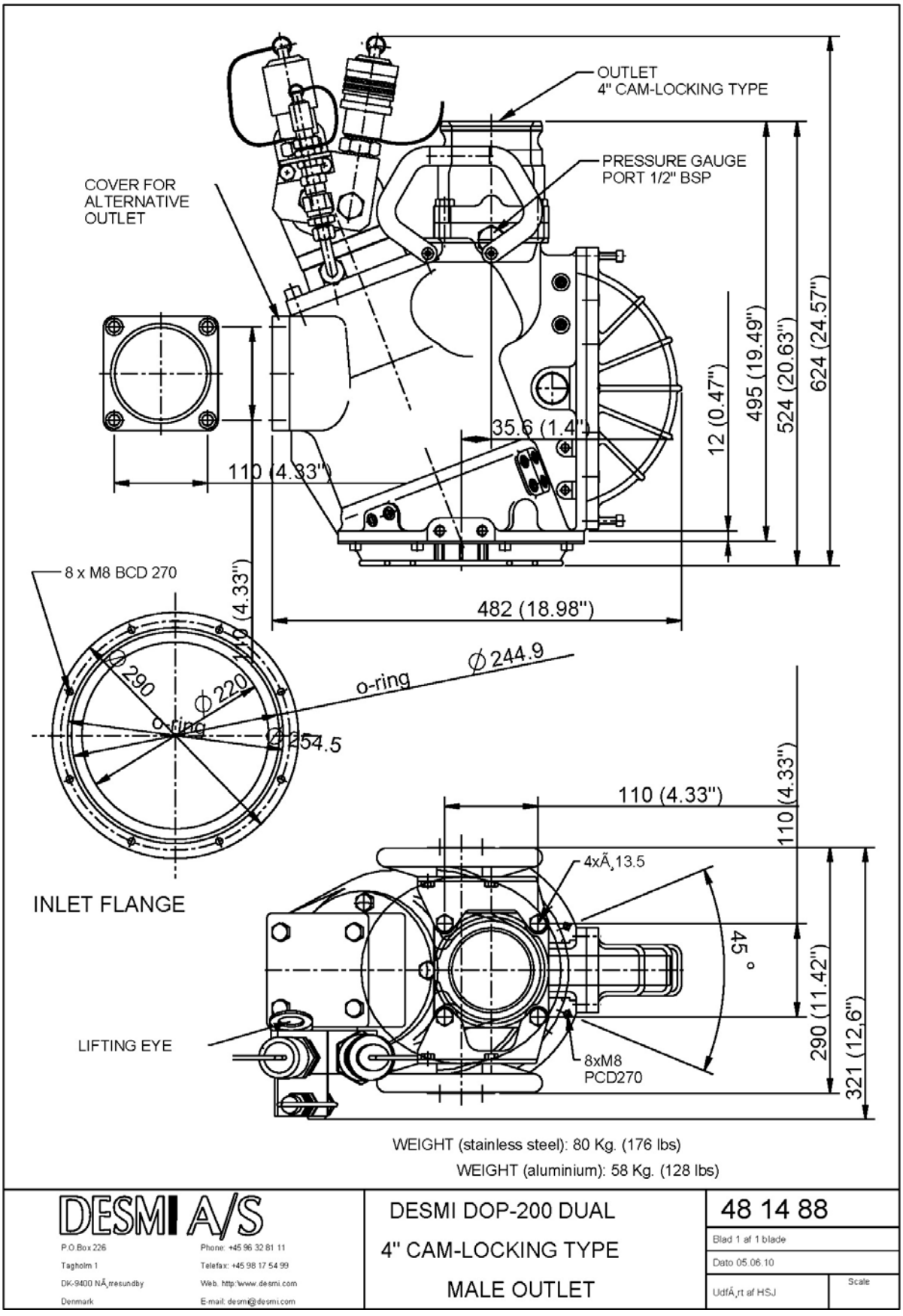
A3.0 DRAWINGS

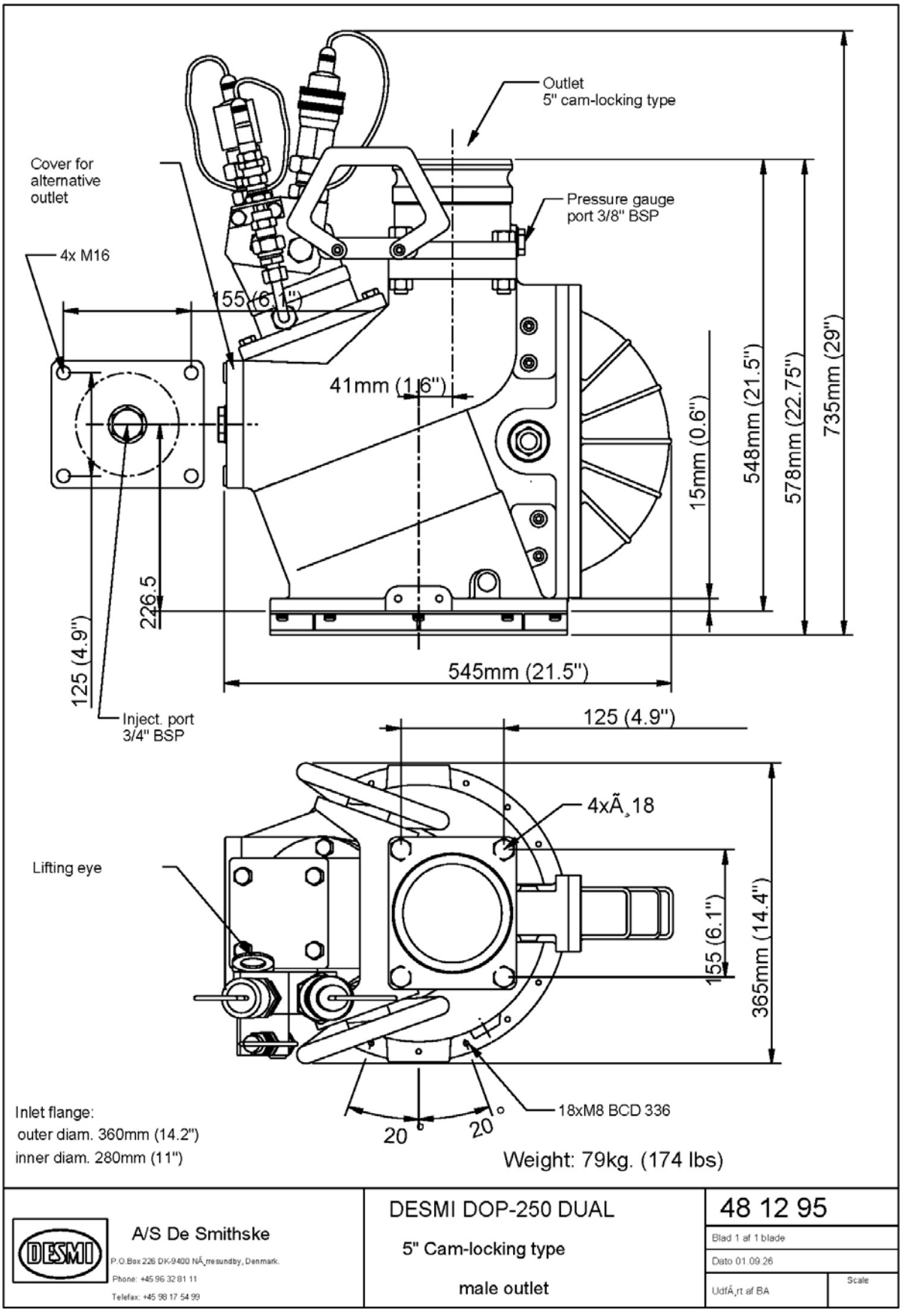
3.1	Dimension drawing	DOP-160	No. 480917
3.2	Dimension drawing	DOP-200 DUAL	No. 481488
3.3	Dimension drawing	DOP-250 DUAL	No. 481295
3.4	Assembly drawing	DOP-160	No. 490979B
3.5	Assembly drawing	DOP-200 DUAL	No. 481444
3.6	Assembly drawing	DOP-250 DUAL	No. 481154

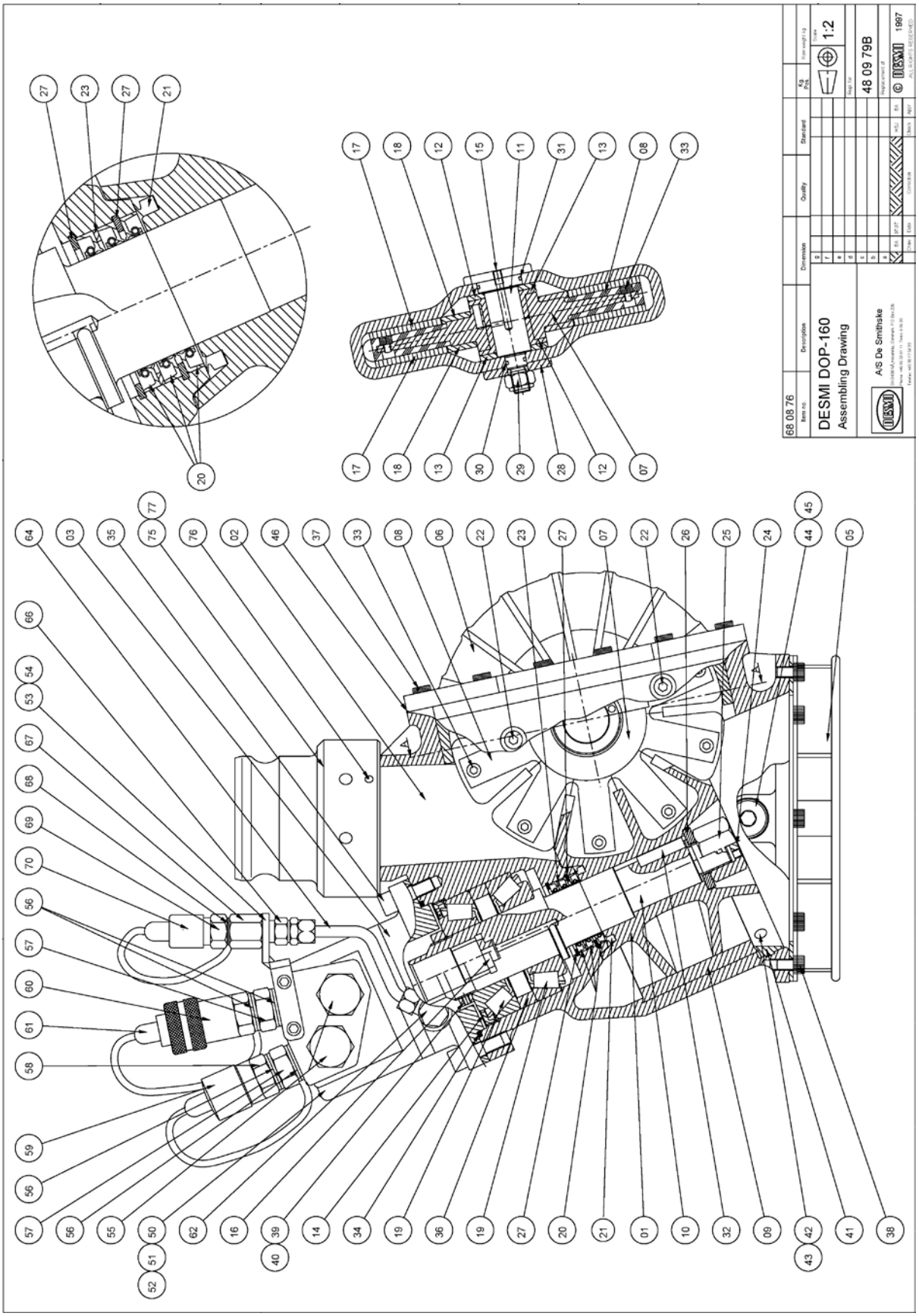
DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com



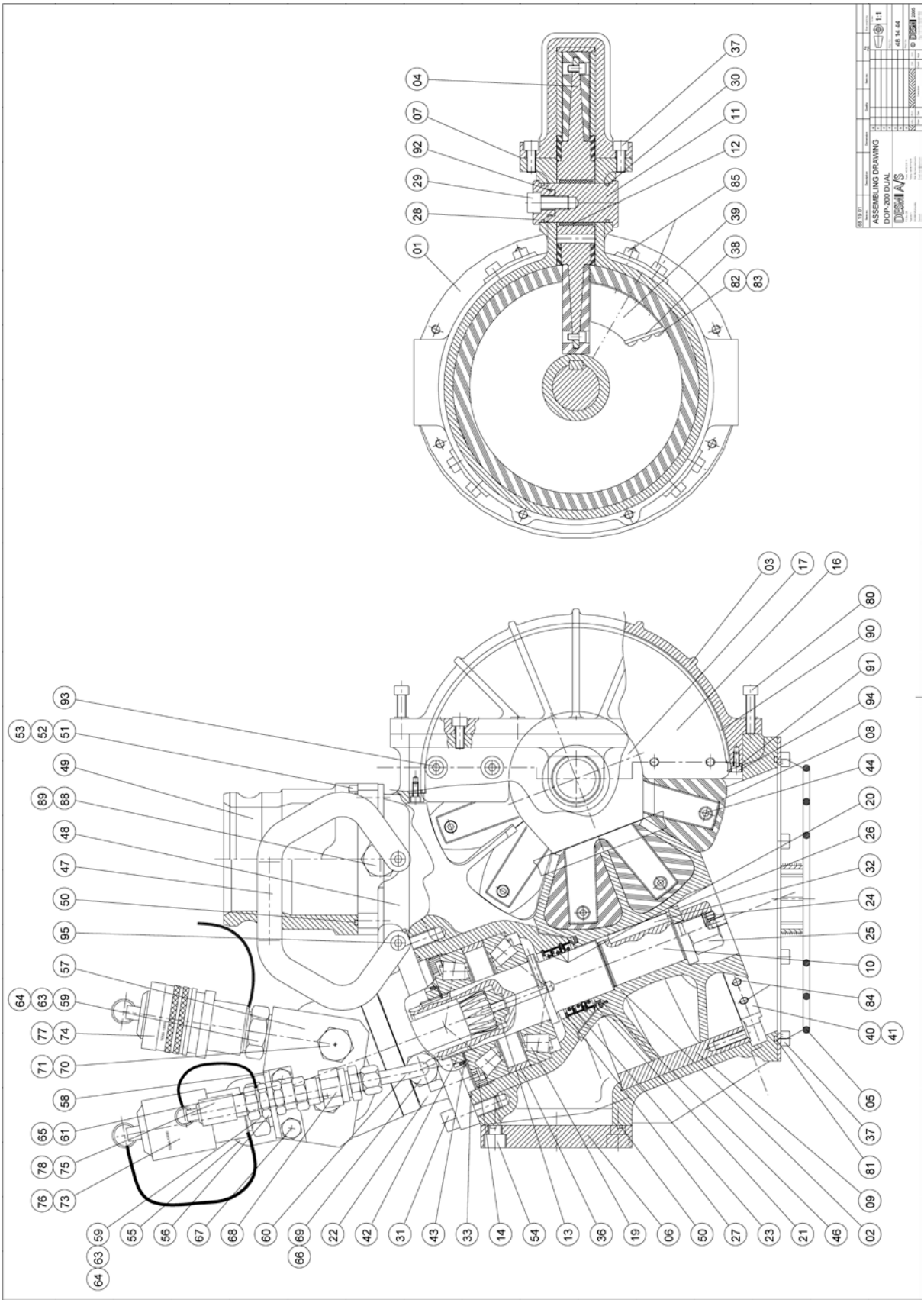
A/S De Smithske P.O.Box 226 DK-9400 NÃ¸rresundby, Denmark. Phone: +45 96 32 81 11 Telefax: +45 98 17 54 99	DESMI DOP-160 3" CAM-LOCKING type 3/4" Aeroquip couplings	48 09 17 Blad 1 af 1 blade Dato 01.06.99 UdfÃ¸rt af BA Scale


OUTLET
4" CAM-LOCKING TYPE
PRESSURE GAUGE
PORT 1/2" BSP
COVER FOR
ALTERNATIVE
OUTLET
35.6 (1.4")
110 (4.33")
12 (0.47")
495 (19.49")
524 (20.63")
624 (24.57")
8 x M8 BCD 270
110 (4.33")
482 (18.98")
Ø290
Ø220
o-ring
Ø244.9
o-ring
Ø254.5
INLET FLANGE
110 (4.33")
110 (4.33")
4xÃ¸13.5
45 °
290 (11.42")
321 (12,6")
LIFTING EYE
8xM8
PCD270
WEIGHT (stainless steel): 80 Kg. (176 lbs)
WEIGHT (aluminium): 58 Kg. (128 lbs)
DESMI A/S
P.O.Box 226
Tagholm 1
DK-9400 NÃ¸rresundby
Denmark
Phone: +45 96 32 81 11
Telefax: +45 98 17 54 99
Web. http:\www.desmi.com
E-mail: desmi@desmi.com
DESMI DOP-200 DUAL
4" CAM-LOCKING TYPE
MALE OUTLET
48 14 88
Blad 1 af 1 blade
Dato 05.06.10
UdfÃ¸rt af HSJ
Scale

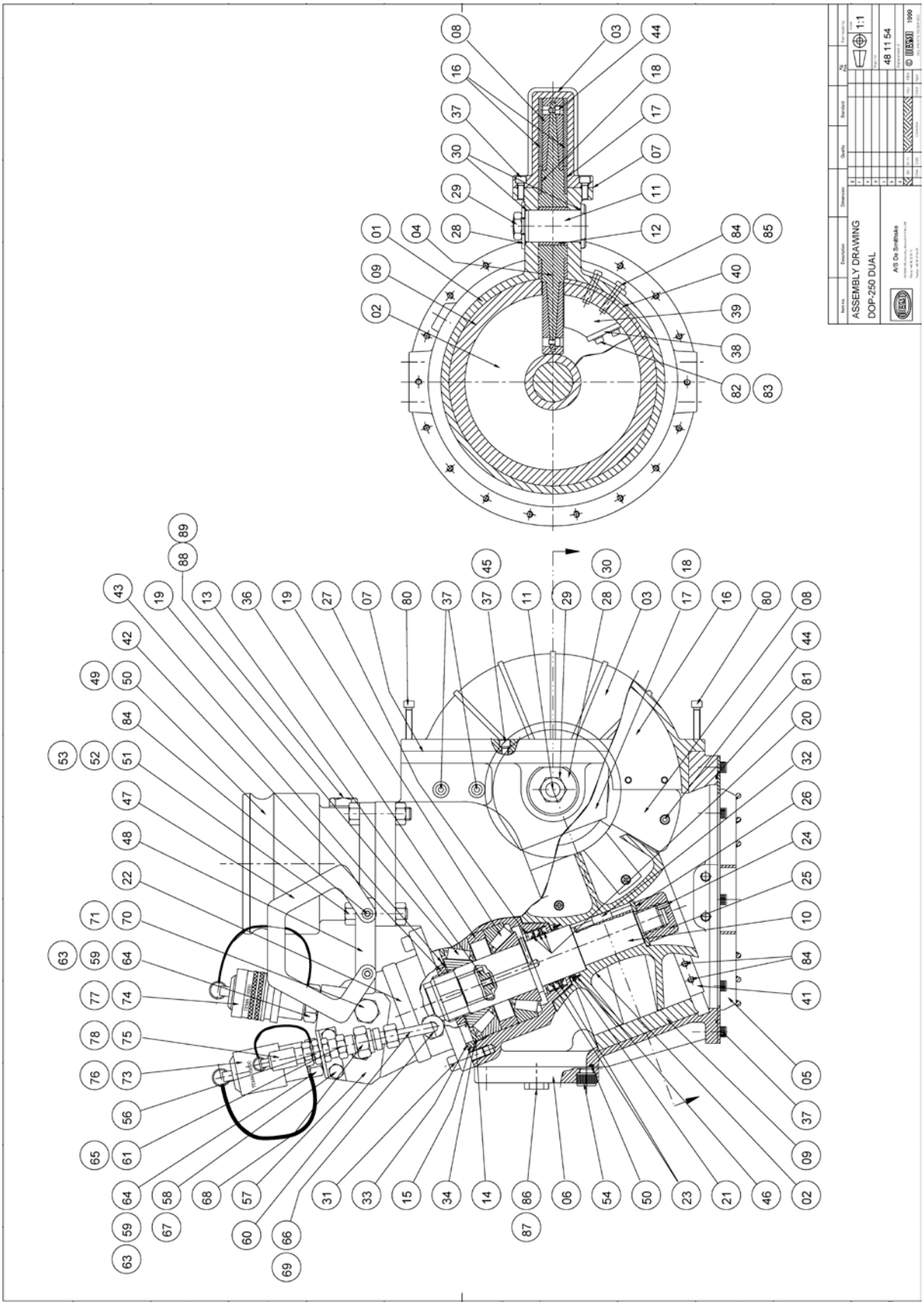

Outlet
5" cam-locking type
Cover for
alternative
outlet
Pressure gauge
port 3/8" BSP
4x M16
155 (6.1")
41mm (1.6")
15mm (0.6")
548mm (21.5")
578mm (22.75")
735mm (29")
226.5
125 (4.9")
545mm (21.5")
Inject. port
3/4" BSP
125 (4.9")
4xÃ¸18
Lifting eye
155 (6.1")
365mm (14.4")
18xM8 BCD 336
20
20
Inlet flange:
outer diam. 360mm (14.2")
inner diam. 280mm (11")
Weight: 79kg. (174 lbs)
A/S De Smithske
P.O.Box 226 DK-9400 NÃ¸rresundby, Denmark.
Phone: +45 96 32 81 11
Telefax: +45 98 17 54 99
DESMI DOP-250 DUAL
5" Cam-locking type
male outlet
48 12 95
Blad 1 af 1 blade
Dato 01.09.26
UdfÃ¦rt af BA
Scale



DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com



DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com



DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

A4.0 RECOMMENDED SPARE PARTS SET

The level of spare parts necessary depends on the situation the pump will work under. As an absolute minimum, Desmi recommends the standard 1 year spare parts set. For more often use, Desmi recommends the 2 year spare parts set.

A4.1 RECOMMENDED STANDARD SPARE PARTS SET for DOP-160

Item No.	Part No.	Description	Unit	1 year*	2 year**
8	181451	Plate wheel disc	pc	10	30
9	181452	Sealing ring	pc	1	2
11	181454	Plate wheel shaft	pc	1	1
12	181458	Wear disc	pc	2	2
13	181456	Slide ring	pc	2	2
15	703355	Grease nipple	pc	1	1
17	181455	Wear plate	pc	2	4
18	181459	Seal, slide bearing	pc	2	4
20	708337	Oil sealing ring BABSL 40x55x6x5.5	pc	3	6
21	181471	V-ring. Teflon	pc	1	2
28	181460	Washer	pc	1	1
29	703232	Nut	pc	1	1
30	708336	O-ring Ø11.0x2.0	pc	1	1
31	703109	O-ring Ø28.0x2.5	pc	1	1
33	708331	CH-screw M5x6	pc	10	10
34	708349	O-ring Ø100.0x3.0	pc	1	1
48	706318	CH-screw M5x10	pc	3	9
49	181467	Cutting knife	pc	1	3

*** Part No. 681071, ** Part no. 681072**

A4.2 RECOMMENDED STANDARD SPARE PARTS SET for DOP-200 DUAL

Item No.	Part No.	Description	Unit	1 year*	2 year**
7	183159	Gasket for plate wheel cover	pc	1	3
8	580790	Plate wheel sectional disc	pc	10	30
44	712106	Allen screw M6x10	pc	10	10
9	183160	Sealing ring	pc	1	2
11	580820	Plate wheel shaft	pc	1	1
12	712080	Slide bearing	pc	1	2
13	180440	Stop plate	pc	1	2
16	183166	Wear plate	pc	2	4
17	183168	Wear disc	pc	2	2
20	712042	Shaft sealing ring	pc	3	6
21	183170	V-seal, Teflon	pc	1	2
28	580830	Stop for plate wheel shaft	pc	1	2
29	707766	Allen screw M12x25	pc	1	2
30	712078	O-ring Ø29.82x2.62	pc	1	2
37	183178	Stator cutting knife	pc	1	2
50	711200	O-ring Ø119.62x3.5	pc	1	2
71	705397	O-ring Ø32.2x3.0	pc	1	2
90	183184	Wear ring	pc	1	2

*** Part No. 681945, ** Part no. 681985**

A4.3 RECOMMENDED STANDARD SPARE PARTS SET for DOP-250 DUAL

Item No.	Part No.	Description	Unit	1 year*	2 year**
8	180290	Plate wheel sectional disc	pc	10	30
44	705002	CH screw M6x12	pc	10	10
9	181928	Sealing ring	pc	1	2
11	181925	Plate wheel shaft	pc	1	1
13	180440	Stop plate	pc	1	2
16	181926	Wear plate	pc	2	4
17	181927	Right sealing/bearing disc	pc	1	2
18	182084	Left sealing/bearing disc	pc	1	2
20	703347	Shaft sealing ring	pc	3	6
21	180939	V-seal, Teflon	pc	1	2
30	709664	O-ring Ø40x2 nitrile	pc	2	4
38	182145	Stator cutting knife	pc	1	3
82	704389	Washer M6	pc	2	6
83	705282	CH-screw M6x20	pc	2	6

*** Part No. 681497, ** Part no. 681498**

A. 5.0 PARTS LIST

A5.1 Parts list for DOP-160

Part list 680876-01-03: DOP-160 - 3/4"-3/8" AQ NPTF - 3" Camlock
Part list 680876-01-06: DOP-160 - 3/4"-3/8" AQ BSP - 3" Camlock
Part list 680876-01-09: DOP-160 - 3/4"-3/8" AQ PARKER 6600 NPT - 3" Camlock

According to Assembly Drawing No. 480979B

No.	Part No.	Description	ID. Code 01-03	01-06	01-09
1	181444	Pump screw	1	1	1
2	181443	Pump casing	1	1	1
3	708342	Hydr. motor OMSS 80	1	1	1
4	181706	Lifting eye	1	1	1
5	181593	Protection grid	1	1	1
6	181446	Plate wheel cover	1	1	1
7	181447	Plate wheel steel core	1	1	1
8	181451	Plate wheel disc	10	10	10
9	181452	Sealing ring	1	1	1
10	181453	Pump screw shaft	1	1	1
11	181454	Plate wheel shaft	1	1	1
12	181458	Wear disc	2	2	2
13	181456	Slide bearing	2	2	2
14	181457	Lock nut	1	1	1
15	703355	Grease nipple	1	1	1
16	181468	Stop plate	1	1	1
17	181455	Wear plate	2	2	2
18	181459	Seal, slide bearing	2	2	2
19	708334	Conical roller bearing	2	2	2
20	708337	Oil searing ring BABSL 40 x 55 x 6 x 5.5	3	3	3
21	181471	V-ring, teflon	1	1	1
22	704367	CH-screw M8 x 20	4	4	4
23	181466	Distance ring	1	1	1
24	760049	Pointed screw M6 x 10	1	1	1
25	181462	Lock nut	1	1	1
26	181461	Washer	1	1	1
27	701106	Locking ring	2	2	2
28	181460	Washer	1	1	1
29	703232	Nut	1	1	1
30	708336	O-ring Ø11.0 x 2.0	1	1	1
31	703109	O-ring Ø28.0 x 2.5	1	1	1
32	700040	Key A10 x 8 x 25	1	1	1
33	708331	CH-screw M5 x 6	10	10	10
34	708349	O-ring Ø100.0 x 3.0	1	1	1
35	708540	BH-screw M10 x 35	4	4	4
36	181463	Distance ring	1	1	1
37	704367	CH-screw M8 x 20	12	12	12
38	705602	CH-screw M8 x 12	8	8	8
39	180640	Lock nut KM9	1	1	1

40	702042	Pointed screw M5 x 6	1	1	1
41	181464	Locking ring	1	1	1
42	703336	CH-screw M8 x 16	4	4	4
43	181638	Locking ring segment	3	3	6
44	506953	Plug 1/2” BSP	1	1	1
45	704188	Sealing disc 1/2” BSP	1	1	1
46	181465	Gasket	1	1	1
47	180654	Stator cutting device	1	1	1
47	703732	CH-screw M8 x 25	3	3	3
48	706318	CH-screw M5 x 10	3	3	3
49	181467	Cutting knife	1	1	1
50	181689	Console for hydr. couplings	1	1	1
52	708311	O-ring 25 x 3	2	2	2
53	183197	Console for drain coupling	1	1	1
54	703339	CH-screw M6 x 16	2	2	2
55	706922	Banjo nipple 1/2” BSP	2	2	2
56	703683	Bonded seal 1/2”	2	2	2
57	703532	Reducer nipple 1/2”-3/4"			2
57	703678	Hexagon nipple 1/2”-3/4" BSP	2	2	
57	706723	Nipple 3/4" BSP-3/4" NPTF	2		2
57	703636	Bonded seal 3/4"	2		2
58	710547	3/4” hydr. quick coupling NPT, PARKER, male			1
58	705423	3/4” hydr. quick coupling, Aeroquip NPTF, male	1		
58	705121	3/4” hydr. quick coupling, Aeroquip BSP, male		1	
59	710551	Dust cap 3/4" PARKER			1
59	705572	Dust cap 3/4" Aeroquip	1	1	
60	710546	3/4” hydr. quick coupling NPT, PARKER, female			1
60	705422	3/4” hydr. quick coupling, Aeroquip NPTF, female	1		
60	708303	3/4” hydr. quick coupling, Aeroquip BSP, female		1	
61	710550	Dust plug 3/4” PARKER			1
61	705573	Dust plug 3/4” Aeroquip	1	1	
62	706914	Banjo nipple Ø8 x 1/4” BSP	1	1	1
64	183198	Drain pipe	1	1	1
66	708310	Check valve	1	1	1
67	706873	Bushing 3/8" NPTF-1/4" BSP	1		1
67	706300	Bushing		1	
68	703650	Bonded seal 3/8”		1	1
69	705426	3/8” hydr. quick coupling, Aeroquip NPTF, male	1		
69	705120	3/8” hydr. quick coupling, Aeroquip BSP, male		1	
69	710549	3/8” hydr. quick coupling NPT, PARKER, male			1
70	710553	Dust cap 3/8” PARKER			1
70	705456	Dust cap 3/8” Aeroquip	1	1	
75	181578	3" Camlocking type male /3" NPSM	1	1	1
76	760049	Pointed screw M6 x 10	3	3	3
77	708482	3" Camlocking gasket	1	1	1

NOTE: Items 47, 48, and 49 are the complete stator knife arrangement. This is not shown.

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

A5.2 Parts lists for DOP-200 DUAL

Part list 681901-01-10: DOP-200 DUAL - 3/4"-3/8" AQ - 4" Camlock

According to Assembly Drawing No. 481444

No.	Part No.	Description	ID. Code 01-10
1	580720	Pump casing	1
2	580740	Pump screw	1
3	580760	Plate wheel cover	1
4	580780	Plate wheel steel core	1
5	183158	Protection grid	1
6	580800	Flange cover	1
7	183159	Gasket for flange cover	1
8	580790	Plate wheel sectional disc	10
9	183160	Sealing ring	1
10	183162	Pump screw shaft	1
11	580820	Plate wheel shaft	1
12	712080	Bearing bushing for plate wheel	1
13	180440	Stop plate	1
14	183165	Lock nut	1
16	183166	Wear plate	2
17	183168	Sealing/bearing disc	2
19	702291	Conical roller bearing	2
20	712042	Shaft sealing ring	3
21	183170	V-seal, teflon	1
22	706241	Hydr. motor Danfoss OMTS 160	1
23	183177	Spacer	1
24	1848712	Pointed screw M6 x 8	1
25	181462	Lock nut	1
26	183196	Washer	1
27	701107	Locking ring	2
28	580830	Stub Shaft	1
29	707766	Allen screw M12 x 25	1
30	712078	O-ring ø29,82 x 2,62 mm	2
31	705933	Allen screw M12 x 35	4
32	712085	Key	1
33	705582	O-ring ø125x3	1
36	183163	Spacer	1
37	704367	Allen screw M8 x 20	22
38	183178	Stator cutting knife	1
39	183179	Console for stator cutting knife	1

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

40	183180	Lock ring segment at knife arrangement	3
41	183181	Lock ring segment	1
42	701037	Lock nut	1
43	701048	Locking washer	1
44	712106	Allen screw M6 x 10 A4-80	10
46	712043	Retaining pin ø2.5 x 8	2
47	100494	Handle	2
48	183202	Lifting fixture	1
49	183228	Discharge flange 4" Cam-locking type	1
50	711200	O-ring ø 110,7x3.53 nitrile	1
51	703238	SK-screw M12x55	4
52	703232	Lock nut M12	4
53	704056	Washer M12	4
54	707766	Allen screw M16 x 30	4
55	180908	Lifting ring	1
56	705187	Bulkhead 3/8"	1
57	180606	Console for hydraulic couplings	1
58	180832	Console for drain coupling	1
59	703641	Nippel 3/4"-3/4" BSP	2
60	181068	Pipe for drain	1
61	703331	Connector 3/8" x 3/8" BSP	2
63	703636	Bonded seal 3/4"	4
64	710845	O-ring ø23.0x2.5	2
65	703650	Bonded seal 3/8"	1
66	703684	Bonded seal 1/4"	1
67	708173	Screw M10 x 65	2
68	705113	Check valve 5 bar/75 PSI	1
69	705115	Fitting GE12LR-1/4"	1
70	705117	Banjo screw	2
71	705397	O-ring 32.2 x 3 mm	2
73	705121	Hydr. quick coupling Aeroquip 3/4" BSP male	1
74	708303	Hydr. quick coupling Aeroquip 3/4" BSP female	1
75	705120	Hydr. quick coupling Aeroquip 3/8" BSP male	1
76	705572	Dust cap 3/4" Aeroquip	1
77	705573	Dust plug 3/4" Aeroquip	1
78	705456	Dust cap 3/8" Aeroquip	1
80	703723	Allen screw M8 x 35	2
81	710405	O-ring ø247.254 x 3.53	1
82	704389	Washer	3
83	705282	Allen screw M6 x 20	3
84	703335	Allen screw M8 x 30	6
85	703723	Allen screw M8 x 35	2
88	506953	Pipe plug 1/2” BSP	1
89	704188	Sealing washer 1/2” BSP	1
90	183184	Wear ring for plate wheel cover	1
91	183187	Retainer	2
92	712079	O-ring ø20.35x1.78	1
93	703336	Allen screw M8x16	8
94	1852620	Allen screw M5x12	4
95	704367	Allen screw M8x20	4

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com

A5.3 Parts lists for DOP-250 DUAL

Part list 681320-02-10 : DOP-250 DUAL - 3/4"-3/8" AQ - 5" Camlock
Part list 681320-03-10 : DOP-250 DUAL - 3/4"-3/8" AQ - 6" Camlock
Part list 682878 : DOP-250 DUAL - 3/4"-3/8" AQ - 5" Camlock

According to Assembly Drawing No. 481154

	Part		ID. Code		
No.	No.	Description	02-10	03-10	682878
1	181920	Pump casing	1	1	1
2	181935	Pump screw	1	1	1
3	181922	Plate wheel cover	1	1	1
4	181924	Plate wheel steel core	1	1	1
5	180352	Protection grid	1	1	1
6	181936	Flange cover	1	1	1
7	182130	Gasket for flange cover	1	1	1
8	180290	Plate wheel sectional disc	10	10	10
9	181928	Sealing ring	1	1	1
10	180173	Pump screw shaft	1	1	1
11	181925	Plate wheel shaft	1	1	1
12	182023	Bearing bushing for plate wheel	1	1	1
13	180440	Stop plate	1	1	1
14	181342	Lock nut	1	1	1
15	181344	Guide ring	1	1	1
16	181926	Wear plate	2	2	2
17	181927	Right sealing/bearing disc	1	1	1
18	182084	Left sealing/bearing disc	1	1	1
19	703279	Conical roller bearing	2	2	2
20	703347	Shaft sealing ring	3	3	
20	713675	HD-Shaft sealing ring			3
21	180939	V-seal, teflon	1	1	1
22	703699	Hydr. motor Danfoss OMTS 200	1	1	1
23	180884	Spacer	2	2	2
24	707256	Pointed screw M6 x 16	1	1	1
25	180774	Lock nut M30	1	1	1
26	180461	Washer	1	1	1
27	701112	Locking ring	1	1	1
28	506704	Distance ring	1	1	1
29	706244	Nut M20 x 1.5	1	1	1
30	709664	O-ring ø40 x 2 mm	2	2	2
31	705933	CH screw M12 x 35	4	4	4
32	700916	Key	1	1	1
33	705582	O-ring ø125x3	1	1	1
34	703689	O-ring, 134.5 x 3 mm	1	1	1
36	181343	Spacer	1	1	1
37	704367	CH screw M8 x 20	37	37	37
38	182145	Stator cutting knife	1	1	1
39	182164	Console for stator cutting knife	1	1	1

No.	Part No.	Description	ID. Code 02-10	03-10	682878
40	182157	Lock ring segment at knife arrangement	1	1	1
41	181929	Lock ring segment	3	3	3
42	701038	Lock nut	1	1	1
43	701049	Locking washer	1	1	1
44	705002	CH screw M6 x 12	10	10	10
46	706274	Retaining pin ø2 x 10	2	2	2
47	100494	Handle	2	2	2
48	182136	Lifting fixture	1	1	1
49	181938	Discharge flange 5" Camlocking type	1		1
49	181939	Discharge flange 6" Camlocking type		1	
50	710850	O-ring ø 135x3,5 nitrile	1	1	1
51	708676	SK-screw M16x65	4	4	4
52	704037	Nut M16	4	4	4
53	704033	Washer M16	4	4	4
54	707797	CH-screw M16 x 30	4	4	4
55	180908	Lifting ring	1	1	1
56	705187	Bulkhead 3/8"	1	1	1
57	180606	Console for hydraulic couplings	1	1	1
58	180832	Console for drain coupling	1	1	1
59	703641	Nippel 3/4"-3/4" BSP	2	2	2
60	181068	Pipe for drain	1	1	1
61	703331	Connector 3/8" x 3/8" BSP	2	2	2
63	703636	Bonded seal 3/4"	4	4	4
65	703650	Bonded seal 3/8"	1	1	1
66	703684	Bonded seal 1/4"	1	1	1
67	703337	Screw M10 x 70	2	2	2
68	705113	Check valve 5 bar/75 psi	1	1	1
69	705115	Fitting GE12LR-1/4"	1	1	1
70	705117	Banjo screw	2	2	2
71	705397	O-ring 32.2 x 3 mm	2	2	2
73	705121	Hydr. quick coupling Aeroquip 3/4" BSP, male	1	1	1
74	708303	Hydr. quick coupling Aeroquip 3/4" BSP female	1	1	1
75	705120	Hydr. quick coupling Aeroquip 3/8" BSP male	1	1	1
76	705572	Dust cap 3/4" Aeroquip	1	1	1
77	705573	Dust plug 3/4" Aeroquip	1	1	1
78	705456	Dust plug 3/8" Aeroquip	1	1	1
80	2040786	Set screw M8 x 60	2	2	2
81	181163	O-ring ø304 x 3 nitrile	1	1	1
82	704389	Washer	2	2	2
83	705282	CH-screw M6 x 20	2	2	2
84	703335	CH-screw M8 x 30	6	6	6
85	703723	CH-screw M8 x 35	2	2	2
86	506954	Pipe plug 3/4"	1	1	1
87	704189	Sealing washer 3/4" BSP	1	1	1
88	506952	Pipe plug 3/8” BSP	1	1	1
89	704187	Sealing washer 3/8” BSP 1	1	1	1

DESMI RO-CLEAN A/S
Hestehaven 61
5260 Odense S – Denmark
Tel.: +45 65 48 16 10
Fax +45 65 48 16 15
E-mail: info.ro-clean@desmi.com
www.desmiro-clean.com