

# **Instruction Manual for Freshwater Generator Type JWP-26-C80B**

Serial No.: NK-01211

Shipname/ Myrto  
Hull No.: 1124

Build at yard: Daewoo Heavy Industries

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# ***Safety Instructions and Warnings***

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Should you need further clarification regarding this manual, do not hesitate to contact your local Alfa Laval representative - or call Alfa Laval Desalt directly.

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## **1.0.0 Safety Instructions and Warnings**

The following symbols in this manual point out safety precautions. It means your attention is needed and your safety is involved.



### **WARNING**

This symbol is used to indicate the presence of a hazard which can or will cause severe personal injury, if the warning is ignored.



### **CAUTION**

Certain passages of the text will be marked with a caution mark. This mark indicates the presence of hazard which will or can cause property damage if the instructions are not observed.

### **NOTE**

This type of instruction indicates a situation which, if not avoided, could result in damage to the equipment.

**It is the owner's and operator's responsibility to see that any person involved with the use or operation of this equipment follow all safety instructions.**

**Read all safety instructions carefully and insist that they will be followed by those working with you and for you. Not following the instructions may cause severe personal injury or damage the equipment beyond repair.**

**Do not allow this equipment to be used if it is faulty or the operator does not understand the proper use.**

## Safety Instructions and Warnings

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### **WARNING**

The freshwater generator is not to be operated in polluted water or within 20 miles from the coast

Freshwater must not be produced from polluted water, as the produced water can be unsuitable for human consumption.

If manuals are translated to local language the unit comply with the EEC Machinery Directive and EN 292-1/2 standards. For EEC land installations manuals **MUST** be available in local language before installing and operating the unit.

The unit also comply with EN 50081-2 and EN 50082-2 “Industry” with regards to the EMC directive from EEC.



### **WARNING**

#### **Noise hazards**

- Use ear protection in noisy environments.

#### **Crush hazards**

- Use correct lifting tools.
- Do not work under hanging load.

#### **Burn hazard**

- Wear gloves to avoid burns by hot surfaces.

#### **Cut hazards**

- Wear gloves to avoid cuts by sharp edges when handling machined parts.
- Wear helmet to avoid cuts by sharp edges during maintenance of the equipment.

### **NOTE**

- Max. ambient temperature for the equipment is 50°C (122°F).
- Min. ambient temperature for the equipment is 0°C (32°F).

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# ***System Description***

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## **1.0.0 Working Principle**

The combined brine/air ejector driven by the ejector pump creates a vacuum in the system in order to lower the evaporation temperature of the feedwater.

The feedwater is introduced into the evaporator section through an spring loaded valve (full open by 2 bar) orifice, and is distributed into every second plate channel (evaporation channels).

The hot water is distributed into the remaining channels, thus transferring its heat to the feedwater in the evaporation channels.

Having reached boiling temperature - which is lower than at atmospheric pressure - the feed water undergoes a partial evaporation, and the mixture of generated vapour and brine enters the separator vessel, where the brine is separated from the vapour and extracted by the combined brine/air ejector.

Having passed a demister the vapour enters every second plate channel in the top of the condenser section.

The sea cooling water supplied to the condenser by the combined cooling/ejector water pump distributes itself into the remaining condenser channels, thus absorbing the heat being transferred from the condensing vapour.

From outlet side the condenser, the sea cooling water is used as jet water for the ejector and as feed water for evaporation.

The produced freshwater is extracted by the freshwater pump and led to the freshwater tank.

## **1.1.0 Freshwater Quality**

To continuously check the actual salinity of the produced freshwater, a salinometer is provided together with an electrode unit fitted on the freshwater pump delivery side.

If the salinity of the produced freshwater exceeds the chosen maximum value, the dump valve and alarm are activated to automatically dump the produced freshwater to the bilge.

If there are no special requirements from the authorities, the produced freshwater can be used directly as drinking water.

## System Description

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### 1.2.0 Main Components

The freshwater generator consists of the following components:

1. **Evaporator section**  
The evaporator section consists of a plate heat exchanger and is enclosed in the separator vessel.
2. **Separator vessel**  
The separator separates the brine from the vapour.
3. **Condenser section**  
Just like the evaporator section the condenser section consists of a plate heat exchanger enclosed in the separator vessel.
4. **Combined brine/air ejector**  
The ejector extracts brine and incondensable gases from the separator vessel.
5. **Ejector pump**  
Normally, the ejector pump is delivered by Alfa Laval, and the ejector pump is a single-stage centrifugal pump. This pump supplies the condenser with sea cooling water and the brine/air ejector with jet water as well as feed water for evaporation.
6. **Freshwater pump**  
The freshwater pump is a single-stage centrifugal pump. The freshwater pump extracts the produced freshwater from the condenser, and pumps the water to the freshwater tank.
7. **Salinometer**  
The salinometer continuously checks the salinity of the produced water. The alarm set point is adjustable.
8. **Control panel**  
Normally, the control panel is delivered by Alfa Laval. It contains motor starters, running lights, salinometer, contacts for remote alarm and is prepared for start/stop.

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# Operating Instructions

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## WARNING

DO NOT operate the plant in polluted water.

Freshwater must not be produced from polluted water, as the produced water will be unsuitable for human consumption.

## 2.0.0 Starting and Stopping Procedure



## CAUTION

Before starting up please observe instructions for feedwater treatment, see “Chemical dosing of scale control chemicals”.

Please refer to PI-diagram (see “FWG Order Specification”).

## 2.1.0 Starting

1. Open valves on the suction and discharge side of the **ejector pump PU-SC-01**.
2. Open overboard valve for combined brine/air ejector.
3. Close **air screw VA-E1-01** on the separator.
4. Start **ejector pump PU-SC-01** to create a vacuum of min. 90%.

*Pressure at combined brine/air ejector inlet minimum 300 kPa (3.0 kp/cm<sup>2</sup>).  
Back pressure at combined brine/air ejector outlet maximum 60 kPa (0.6 kp/cm<sup>2</sup>).*

## 2.1.1 Evaporation

When there is a minimum of 90% vacuum (after maximum 10 minutes).

5. Open valve for feedwater treatment, if any.

## Operating Instructions

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6. Open hot water inlet and outlet valves.
7. Start hot water supply to distiller by adjusting bypass valve or hot water pump if any, step-wise 10°C, until the desired jacket water temperature is reached.

The boiling temperature now rises, while the obtained vacuum drops to approx. 85%.

This indicates that evaporation has started.

### 2.1.2 Condensation

After approx. 3 minutes the boiling temperature will drop again, and normal vacuum is reestablished.

8. Open valve to freshwater tank.
9. Switch on salinometer.
10. Start **freshwater pump PU-FR-01/PU-FR-02**.

#### NOTE

The freshwater pump discharge pressure will be between 120 and 160 kPa (1.2 - 1.6 kp/cm<sup>2</sup>).

After starting the freshwater pump the flow sight glass in the air suction pipe must be empty.



#### CAUTION

If water remains in the flow sight glass in the air suction pipe, please refer to "Trouble shooting".

### 2.2.0 Adjustment of Hot Water Flow

Please refer to "FWG Order Specification" for specified hot water flow.

In order to obtain the specified flow of hot water, it is necessary to adjust the bypass valve until desired flow is achieved.

The flow can be calculated as follows:

$$M_{JW} = \frac{K_{JW} \times \text{cap.m}^3/24\text{h}}{\Delta t_{JW}} = \text{m}^3/\text{h}$$

Where:

$M_{JW}$  = Flow of hot water in one hour.

$K_{JW}$  = Constant = 25.6 for 1-stage freshwater generator.

$K_{JW}$  = Constant = 15.52 for 2-stage freshwater generator.

$\Delta t_{JW}$  = Difference in temperature of hot water in and out.

Cap.m<sup>3</sup>/24h = Freshwater production in 24 hours, i.e. production in 5 min. times 288.

Example:    cap. m<sup>3</sup>/24h = 15 m<sup>3</sup>  
                    $T_{SW}$             = 32°C  
                    $\Delta t_{JW}$            = 18.4°C

$$M_{JW} = \frac{25.6 \times 15}{18.4} = 20.9 \text{ m}^3/\text{h}$$

### 2.3.0 Adjustment of Sea Cooling Water

The sea cooling water flow is correct, when the pressure at the inlet side of the combined air/brine ejector is between 300 and 400 kPa (3.0 - 4.0 kp/cm<sup>2</sup>).

### 2.4.0 Stopping the Plant

1. Stop hot water supply to distiller.
2. Close valve for feedwater treatment, if any.
3. Stop **freshwater pump PU-FR-01/PU-FR-02.**
4. Switch off salinometer.
5. Stop **ejector pump PU-SC-01.**
6. Open **air screw VA-E1-01.**

## Operating Instructions

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7. Close valves on the suction and discharge side of the ejector pump.
8. Close overboard valve for combined brine/air ejector.
9. Close the valve to freshwater tank.

### **CAUTION**

All valves must be shut, while the distiller is out of operation. Except air screw.

### **2.5.0 Long Term Standstill**

If the distiller is out of operation for a period longer than 14 days.

- Open front covers and clean unit inside with freshwater.
- Let the unit dry out completely, before closing covers.

Please observe "Maintenance of separator vessel".

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# Maintenance

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## 1.0.0 Why you need to perform regular maintenance duties

Regular maintenance of the plant will improve performance and availability.

The maintenance schedule on the following pages will tell you how often service should be performed on the main components.

As the actual operating conditions of the plant are of major influence on the life time, the overhaul dates are not obligatory but only recommended intervals.

When the plant has been in operation for a longer period of time and experience has been established as to the actual performance, it will be possible to adapt the maintenance schedule.

For service on minor components please refer to component instructions.

## 1.1.0 Overhaul Intervals

Component	Operating Hours	Action
Evaporator section	As required	Clean in inhibited acid bath
Condenser action	As required	Clean with pure freshwater and brush
Separator vessel with anodes	2000 h	See separator instructions
Combined ejector/cooling water pump with motor	8000 h	Measure seal ring and impeller. Examine mechanical shaft seal, cooling water pipe passage. Megger-test electric motor. Clean pump thoroughly before reassembly.
Freshwater extraction pump with motor	8000 h	See above
Combined air/brine ejector	8000 h	Measure nozzles and diffuser and compare to measurements in technical specification. Max. wear 20% on diffuser cylindrical bore.

## Maintenance

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Component	Operating Hours	Action
MV-valves	4000 h	Disassembly and inspect for damage
Demister	8000 h	Clean in inhibited acid bath
Manometers	8000 h	Adjust with control manometer
Salinometer	See "Maintenance of salinometer type DS-20"	See "Maintenance of salinometer type DS-20"

### 1.2.0 Maintenance of Separator Vessel

The front cover and the pressure plates for the heat exchanger sections (evaporator and condenser) are made of stainless steel with a special chemical treatment. This treatment will reestablish normal surface oxidation after work-up at the factory. The preparation is a natural protection of the stainless steel.

#### **CAUTION**

To preserve this natural protection DO NOT scrape or scratch the inside surface of the front cover.

Whenever the separator vessel is opened,

- check that the anodes are functioning.

If the anodes are not functioning and/or scarified, replace them.

#### **NOTE**

If the unit is stopped for a longer period than 14 days.

- Open front covers and clean unit inside with freshwater.
- Let the unit dry out completely, before closing covers.

### 1.3.0 Maintenance of Evaporator Section

Clean evaporator as follows:

1. Remove bolts in front cover, and open.
2. Loosen the  
2 nuts for P-16 distiller  
4 nuts for P-26 distiller  
  
in plate stack gradually, so that no nut is carrying the entire load alone.
3. Remove plate stack.

#### NOTE

If some of the gaskets come loose on removing plate stack, please see section 1.5.2

4. Submerge plates completely in a hot, inhibited acid bath at maximum 50°C. For further instructions see “Chemical dosing of scale control chemicals”.



#### WARNING

Always follow carefully the suppliers instructions when using inhibited acids.

Remember to neutralize according to suppliers instructions.

5. Examine plates and gaskets for possible damage, and remove damaged plates and/or replace damaged gaskets.
6. If a defective plate is found, remove the plate together with one of the adjacent plates.

### NOTE

The assembly measurements must be reduced with

2.8 mm for P-16 distiller

3.5 mm for P-26 distiller

per plate, if plates are removed from plate stack.



### CAUTION

The ES and EE plate cannot be removed but must always be replaced with a corresponding plate.

7. Reassemble evaporator section in accordance with assembly scheme.
8. Tighten plate stack to measurements stated in technical specification.
9. Pressure test evaporator section before closing front cover.

The evaporator section is pressure tested by letting hot water circulate through the section with bypass valve for hot water in normal running position.

10. When the evaporator section is found to be tight, close front cover and tighten bolts.
11. Retighten cover, when vacuum has been reestablished.

### 1.4.0 Maintenance of Condenser Section

Clean condenser as follows:

1. Remove bolts in front cover, and open.
2. Loosen the

2 nuts for P-16 distiller

6 nuts for P-26 distiller

in plate stack gradually, so that no nut is carrying the entire load alone.

3. Remove plate stack.

### NOTE

If some of the gaskets come loose on removing plate stack, please see section 1.5.2

4. Scrub plates with a soft brush and plain hot water at maximum 50°C.
5. Examine plates and gaskets for possible damage, and remove damaged plates and/or replace damaged gaskets.
6. If a defective plate is found, remove the plate and one of the adjacent plates.

### NOTE

The assembly measurements must be reduced with

2.8 mm for P-16 distiller

3.5 mm for P-26 distiller

per plate, if plates are removed from plate stack.



### CAUTION

The KS and KE plate cannot be removed but must always be replaced with a corresponding plate.

7. Reassemble condenser section in accordance with assembly scheme.
8. Tighten plate stack to measurements stated in technical specification.
9. Pressure test condenser section before closing front cover.

The condenser section is pressure tested by letting sea water from the combined cooling water/ejector pump circulate through the section.

### CAUTION

Before starting the combined ejector/cooling water pump, the feed water must be sealed off.

10. When the condenser section is found to be tight, close front cover and tighten bolts.
11. Retighten, when vacuum has been reestablished.
12. Do not forget to remove the feed water sealing as mentioned above.

## 1.5.0 Renewal of Plate Heat Exchanger Gaskets

### 1.5.1 Removal of Old Gaskets

Pull the old gaskets out of groove.

If the gasket cannot come off directly, heat the back of the gasket groove with a hot-air blower or butane gas burner.

Pay attention not to overheat the plates.

You will obtain a suitable temperature, if the flame is held 10 to 15 cm behind the plate.



### WARNING

DO NOT use *acetylene gas*.

### 1.5.2 Cleaning

Charred or loose glue and rubber remains must be removed, e.g. using a rotating stainless steel brush. The width should be adapted ( $\varnothing$ 40-50 mm, width 8-10 mm). Thin layers of glue which are difficult to remove, may remain.

Clean the gasket groove with a clean cloth, dipped in a solvent (acetone, methyl ethyl ketone, trichlorethylene etc.).



### **WARNING**

Be careful when handling these solvents, as they may be hazardous to your health.

Observe suppliers' instructions.

Gaskets, that have loosened, can be glued on. Clean gasket groove carefully with a sharp tool. Then clean the loose part of the gasket with emery cloth or sandpaper. Finally clean groove and gasket with a solvent, and glue.

### **1.5.3 Preparation of New Gaskets**

Dry new gaskets with a clean cloth that has been slightly moistened with a solvent.

### **1.5.4 Fitting New Gaskets**

1. Apply a thin layer of glue to both gasket and groove.
2. Let the glue dry for 10-15 minutes.
3. Fit new gasket into groove.

Gaskets may sometimes be slightly short or long.

Short gaskets should be stretched before being fitted into the groove.

Long gaskets should be fitted into the grooves at the plate ends first and then gradually be pushed into the groove towards the middle.

If necessary, tape gasket into groove.

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# ***Chemical Dosing of Scale Control Chemicals***

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## **2.0.0 Prevention of Scaling**

During the evaporation of sea water there is always a risk of scaling on the heating surfaces. This will lead to a reduction of the K-values of the heating surface and decreasing freshwater production and reduction of plant efficiency.

In order to effectively prevent scaling the operators must be aware of the factors influencing the scale formation.

## **2.1.0 Feed Water Ratio**

The feedwater ratio is an extremely important factor. It is defined by the relationship between the feedwater amount fed into the plant and the produced amount of freshwater.

If the feedwater ratio is reduced, the concentration will rise in the plant subsequently resulting in scale formations.

Two things may shift the feedwater ratio: first of all direct adjustment of the feedwater system, and secondly exceeding the maximum freshwater production laid out for the plant. The operators must observe the following rules at all times.

### **CAUTION**

DO NOT adjust feedwater system. Feedwater pressure min. 3.0 max. 4.0 bar g.

## **2.2.0 Chemical Dosage**

In order to control scale formations on the heating surfaces and continuously ensure long operation periods without acid cleaning the plant, it is absolutely necessary to dose scale control additives to the feedwater. The operators must follow the instructions for chemical dosing given by the chemical supplier carefully.

### **CAUTION**

If the distiller is operated at boiling temperatures above 45°C without chemicals, frequent cleaning of the evaporator will be necessary.

We recommend that you do not operate the freshwater distiller without recommended chemical dosage at boiling temperatures above 45°C. Even at lower temperatures it can be recommended.

### **2.2.1 Scale Inhibitor Dosage Equipment for Feed Water**

Please refer to drawing, see “FWG Order Specification”.

- When adding chemicals mix thoroughly to ensure a homogenous blend of chemicals and water.

Use a fully soluble scale inhibitor, e.g. on polymer basis. The following products can be recommended:

NALFLEET Evaporator treatment 9-913

AMEROYAL EVAPORATOR TREATMENT

HEXAMETHAPHOSPHATE

1. Mix the required quantity for 24 hours operation in the tank according to maker's instructions.
2. Adjust flowmeter to cover the maximum freshwater output from the distiller.
3. Flush the dosage system regularly.

## Chemical Dosing of Scale Control Chemicals

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### 2.2.2 Safety Precautions with the use of Chemicals



#### **WARNING**

- 1 USE eye protection and gloves. Avoid direct skin contact, eye contact or contact with clothes.
- 2 CLEAN empty containers before disposal.
- 3 If chemicals are spilled on clothes, rinse with water and dispose off clothes.
- 4 If chemicals are spilled on the floor, rinse with water and suck remaining chemicals off with sand. Clean the spot immediately afterwards.
- 5 Scale inhibitor is hazardous, if consumed in a concentrated solution. If consumed by mistake.  
***IMMEDIATELY SEEK MEDICAL ATTENTION.***
- 6 If eyes get in contact with the chemicals, rinse for at least 20 minutes.  
***IMMEDIATELY SEEK MEDICAL ATTENTION.***

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## ***Trouble-Shooting***

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### **3.0.0 Test Sheet**

Before taking any action, please fill in a test sheet to find possible causes of malfunctions.

Test sheets can be found in the back of this binder.

## Trouble-Shooting

### 3.1.0 Trouble Shooting Table

Problem	Cause	Action
Drop in production.	Partially blocked feed water orifice and/or sludge deposits on hot water side.	Dismantle evaporator section, and clean evaporator and orifice.
	Sludge on the heat exchanger plates on the sea water side.	Dismantle condenser section, and clean.
	Inlet channel in evaporator/ condenser plate stack blocked, e.g. with rust scales, gasket fragments etc.	Dismantle evaporator/ condenser section, and clean.
	Too low ejector pump pressure.	See instructions for “Low Sea Cooling water/Ejector pump flow / pressure”, below.
	Leakages	Carry out a pressure test at max. 150 kPa (1.5 kp/cm <sup>2</sup> ) (21.8 PSI).a
	Foreign bodies in ejector nozzles.	Inspect nozzles, and clean. Replace nozzles, if damaged.
	Too high back pressure on ejector outlet side. Max 60 kPa (0.6 kp/cm <sup>2</sup> ) (8.7 PSI).	Check overboard pipe and valves for blocking / functionality.
	Non-return valve in air extraction pipe defect.	Replace non-return valve.
	Hot water temperature too high.	Reduce to specified temperature.
	Defective water clock.	Examine water clock. Let the produced water flow through water clock into a 10 l pail, and check production with a stop watch.

Problem	Cause	Action
<p>Low Sea Cooling water/Ejector pump flow / pressure. Minimum pressure 300 kPa (3.0 kp/cm<sup>2</sup>) (43.5 PSI). At inlet side of ejector.</p>	Too low ejector pump pressure.	Clean, or replace pressure gauge.
	Suction strainer blocked.	Clean suction strainer.
	Valves on suction or pressure pipe defect.	Examine and overhaul defective valves.
	Leakage from suction pipe to pump.	Repair.
	Impeller / seal ring defective.	Check pump maximum clearance See "Maintenance of Ejector Pump"
	Clocked up condenser plate stack.	Dismantle condenser plate stack and clean.
	Pump rotating in wrong direction.	Interchange phases.
<p>Sight glass overflow. Normal back pressure for freshwater pump is 120 - 160 kPa (1.2 - 1.6 kp/cm<sup>2</sup>) (17.4 - 23.2 PSI). Except for JWP-16-C40 generator type, where the max. back pressure is 80 kPa (0.8 kp/cm<sup>2</sup>) (11.6 PSI).</p>	Suction pipe leakage.	Check suction pipe especially unions and connections. Repair.
	Mechanical seal in freshwater pump defect.	Replace mechanical seal.
	Impeller / seal ring in freshwater extraction pipe defect.	Check pump maximum clearance See "Maintenance of Freshwater Pump"
	Pump rotating in wrong direction.	Interchange phases.
	Valves to freshwater tank closed.	Check all valves.
	Inlet filter for water clock blocked.	Clean filter.
<p>Salinity too high (more than 2.0 ppm).</p>	Demister not fitted correctly.	Check that demister is fitted against baffle and front cover.
	Front cover gasket defect or not fitted correctly.	Replace front cover gasket.
	Insufficient brine extraction.	See separate instructions for insufficient brine extraction, below.
	Electrode unit defective or dirty.	Examine electrode unit for cracks. Check that it is fitted correctly. Clean, if necessary.

## Trouble-Shooting

Problem	Cause	Action
	Leakage in condenser section.	Open distiller and pressure test condenser. Max. 600 kPa (6.0 kp/cm <sup>2</sup> ) (87 PSI). If there is a defective plate, remove together with adjacent plate assemble plate stack according to new plate number with reduced assembly measurements. Check plate gaskets and replace, if necessary.
Insufficient brine extraction - brine level in sight glass higher than 20 mm.	Ejector pump pressure too low.	See special instructions for "Low Sea Cooling water/Ejector pump flow / pressure", above.
	Foreign bodies in ejector nozzles.	Check nozzles, and clean. Replace damaged nozzles.
	Too high back pressure downstream of ejector.	Examine overboard pipe and valves.
	Wrong dimension of feedwater orifice.	Examine orifice dimension - check technical specification.
	Non-return valve in brine suction pipe of ejector defect.	Examine valve and repair, or replace.
Frequent refill of freshwater expansion tank due to loss of hot water.	Leakage in evaporator section.	Open distiller and pressure test condenser. Max. 600 kPa (6.0 kp/cm <sup>2</sup> ) (87 PSI). If there is a defective plate, remove together with adjacent plates assemble plate stack according to new plate number with reduced assembly measurements. Check plate gaskets and replace, if necessary.
Abnormal amperage consumption of ejector pump motor.	Ejector nozzles defective.	Replace nozzles.
	Wrong dimension of feedwater inlet orifice.	Check dimensions on spare parts list, See List of spare part drawings", and replace if necessary.
	Bearings in motor defective.	Examine with stethoscope, and replace bearings, if defective.
	Contactors defective.	Examine and replace contactor set, if defective.
	Breaking of phases.	Max. 5% difference in amperage between phases.

---

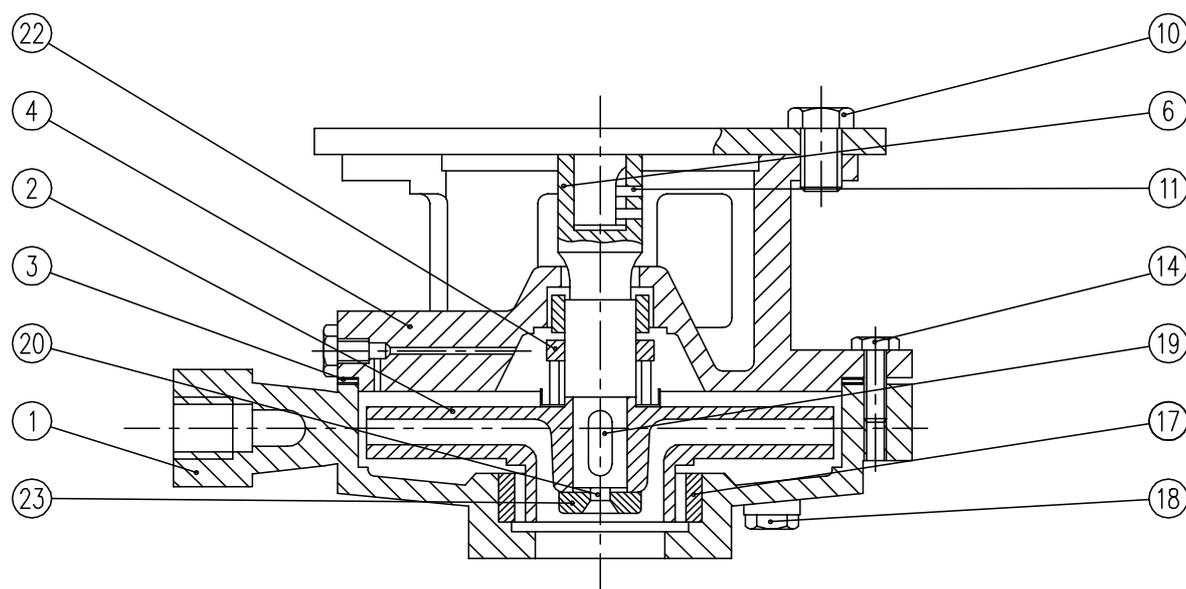
# Maintenance of Freshwater Pump

---

## 4.0.0 Maintenance of Freshwater Pump Types PVVF 1525-1532-2040

The following instructions must be carefully observed whenever it becomes necessary to overhaul or repair the freshwater pump.

Please refer to drawing for item references in the text.



### 4.1.0 Overhaul of the Pump

1. Remove the **nuts 14** on the **pump casing 1**.
2. Lift motor with **pump cover 4** and **impeller 2** clear of **pump casing 1**.
3. Unscrew **countersunk screw 20** (right hand thread).
4. Remove impeller. Normally, it can be removed without using dismantling tools.
5. Remove **key 19**.
6. Remove the **mechanical shaft seal 22**.
7. Inspect the ceramic ring, the carbon ring and the spring.
8. Replace mechanical shaft seal, if necessary. It is recommended to grease the shaft and seat for the ceramic ring with glycerine in order to make it easier to assemble the mechanical shaft seal. Please also observe separate instructions for mechanical shaft seal delivered together with the seal.

## Maintenance of Freshwater Pump

---

9. Fit carbon ring, spring and spring holder on pump shaft.
10. Inspect impeller and the drilled sealing water channel for clogging, and clean.
- 11. Remember to replace gasket 3.**
12. Reassemble in reverse order.

### 4.1.1 Clearance

In connection with the inspection be sure to measure the **impeller and wear ring 17** in order to secure that the clearance is no more than 0.5 mm on the diameter.

#### **CAUTION**

The **pump shaft 11** must only be dismantled, if pump shaft or electric motor bearing has to be replaced.

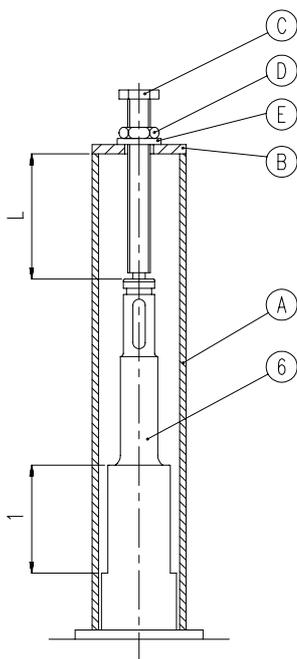
In this case carefully observe “Dismantling pump shaft”.

### 4.1.2 Dismantling Pump Shaft

1. Dismantle the pump as described above.
2. Unscrew **pointed screws 11**.
3. Carefully insert two screw drivers behind the pump shaft, and loosen it.

*If the pump shaft does not come loose, use the special dismantling tools shown below.*

*The tool is not Alfa Laval Desalt supply.*



The tool consists of a pipe (A), a disc (B) with hole for the screw (C) and a nut (D), washer (E).

***Please note that the length L must be longer than the length l.***

Place pipe around the shaft. Fasten the screw with nut and washer into the threaded hole (M12) on the shaft end.

Loosen shaft by tightening the nut while holding on to the screw.



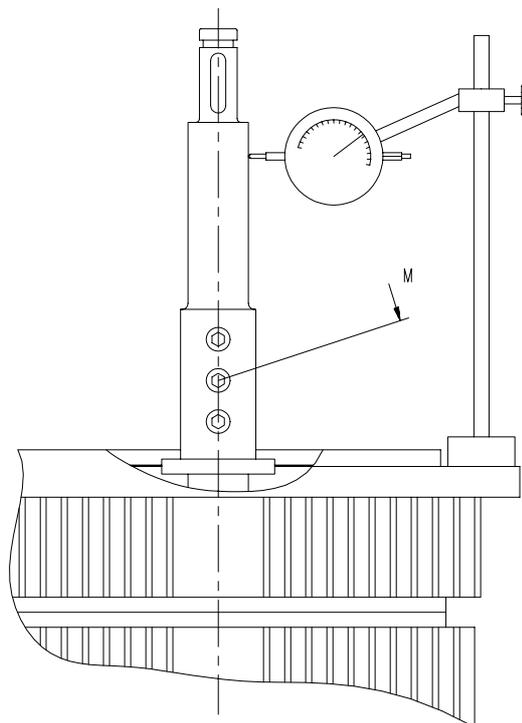
### CAUTION

DO NOT grind the motor shaft.

4. Mount the new pump shaft on the motor shaft.
5. Make sure that the pump shaft fits the motor shaft without any obstructions, before final shaft fitting as follows:
  - Tap onto the end of the pump shaft slightly with a RUBBER hammer.
6. Tighten **pointed screws 11** as follows:

## Maintenance of Freshwater Pump

---



### NOTE

The torque should be 5 Nm (0.5 kpm) and the maximum wobble 60  $\mu$ .m.

7. Check the wobble of the pump shaft with a dial indicator.
8. Assemble the pump as described above.

---

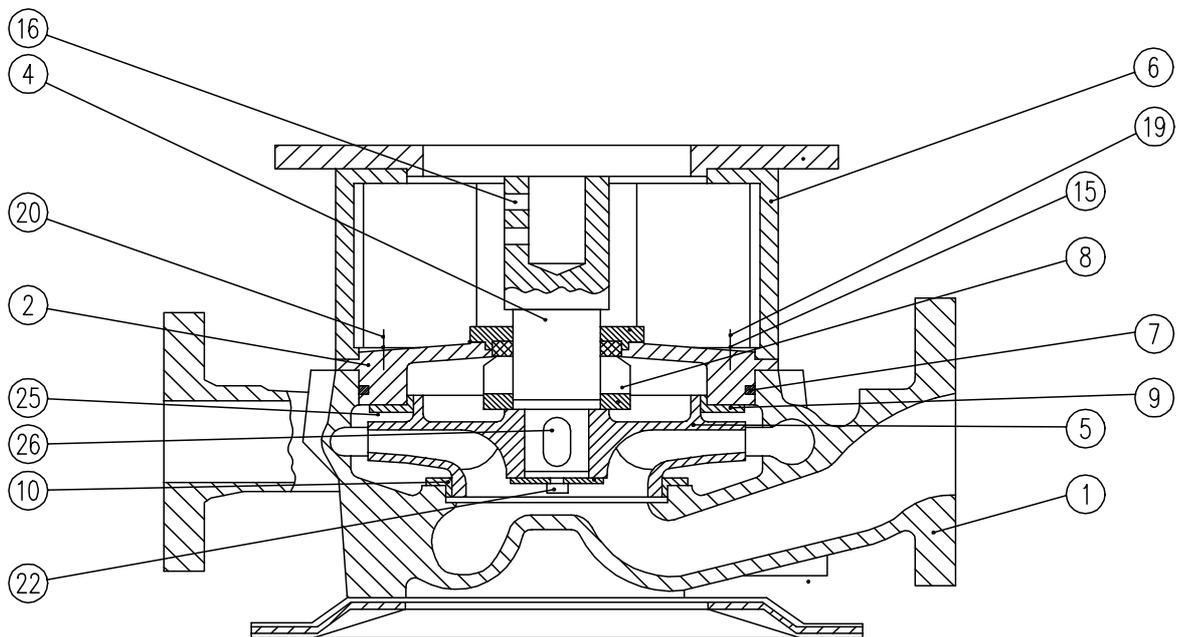
# Maintenance of Ejector Pump

---

## 5.0.0 Maintenance of Ejector Pump

(If supplied from Alfa Laval)

The following instructions must be carefully observed whenever it becomes necessary to overhaul or repair the above mentioned pump. Please refer to drawing for item references in the text.



### 5.1.0 Overhaul of the Pump

1. Remove the **set screws 19** in **pump cover 2**.

*Motor with motor bracket 6, pump cover 2, and impeller 5 can now be lifted clear of the **pump casing 1**.*

2. Unscrew the **screw 22** (right-hand thread).
3. Remove impeller.

## Maintenance of Ejector Pump

---

### NOTE

Normally, the impeller can be removed without using dismantling tools.

If not, you can fit dismantling screws into the two threaded holes in the impeller.

4. Remove the key 26 and the mechanical seal 8 (including spring holder, spring and carbon ring).

5. Inspect the ceramic ring, the carbon ring and the spring. Replace, if necessary

*If mechanical seal has to be replaced, proceed as follows:*

- *Unscrew **set screw 20** to remove **pump cover 2** from **motor bracket 6** in order to gain access to ceramic ring.*

*In order to make it easier to assemble the mechanical seal, the shaft and ring seat may be greased with glycerine. Please also refer to separate instructions for mechanical seal delivered together with the seal.*

- *After fitting the ceramic ring, fit **pump cover 2** to **motor bracket 6**.*
- *Fit carbon ring, spring and spring holder.*

6. Clean drilled cooling water channel in **pump cover 2**.

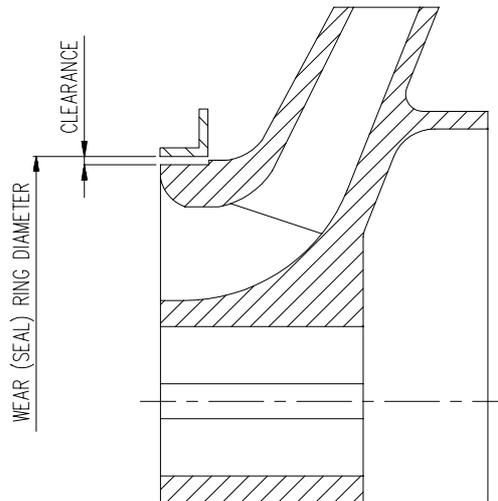
7. Inspect impeller and threaded holes for clogging.

8. **Remember to change the O-ring 7.**

9. Reassemble in reverse order.

### 5.1.1 Clearance

In connection with the inspection, the **impeller 5** and **wear rings 10** are measured in order to secure that the clearance is not larger than stated in the diagram below.



Wear ring Ø	Clearance maximum	Clearance minimum
100 mm	0.5 mm	0.15 mm
150 mm	0.6 mm	0.2 mm
200 mm	0.7 mm	0.25 mm
250 mm	0.8 mm	0.28 mm
300 mm	0.85 mm	0.3 mm
350 mm	0.9 mm	0.3 mm

If the clearance is too big, replace wear rings as follows:

1. Unscrew **countersunk screws 25**.
2. Pull out wear (seal) rings.
3. Fit new wear rings and tighten countersunk screws.



### CAUTION

The pump shaft may only be dismantled, if pump shaft or bearings, in the electric motor have to be replaced.

Carefully observe instructions for “Dismantling pump shaft”.

## Maintenance of Ejector Pump

---

### 5.1.2 Dismantling Pump Shaft

If the **shaft 4** has to be dismantled due to a defect or if electric motor bearing has to be replaced, proceed as follows:

1. Unscrew **pointed screws 16**.
2. Remove **shaft 4**. Normally this can be done without using dismantling tools.

#### **CAUTION**

DO NOT grind the motor shaft.

3. Fit **shaft 4**.
4. In order to make sure that the coupling is fitted correctly, tap slightly at the shaft end with a RUBBER hammer.
5. Tighten **pointed screws 16** with a torque of 35 Nm (3.5 kpm).

---

# Salinometer

---

## 6.0.0 Salinometer Type DS-20

### 6.1.0 Technical Specification

<b>Function</b>	Measuring (Dot Bar) and supervising salinity of freshwater produced by seawater desalination.
<b>Supply voltage</b>	90-120 V or 200-240 V AC.
<b>Frequency</b>	50/60 Hz
<b>Power consumption</b>	Salinometer 10 VA.
<b>Relay contacts</b>	Max. load 100 VA.
<b>Salinity display</b>	0,5 - 20 ppm (Dot Bar).
<b>Temperature correction</b>	Automatic in the range 5 - 85°C.
<b>Alarm level</b>	Can be set to any value between 0,5 - 20 ppm.
<b>Test</b>	Can be checked by test switch, 10 ppm.
<b>Output</b>	4-20 mA Current Loop.
<b>Max. ambient temperature</b>	55°C.
<b>Protection degree</b>	IP 54.

### 6.2.0 Installation (for DS-20)

1. Open front cover.
2. Select correct voltage select according to the main supply voltage 115 V or 230 VAC.
3. Screw salinometer on to bulkhead with six nuts.
4. Connect necessary cables to the terminals.
5. Close front cover.
6. Test salinometer function (see instructions for use).

## Salinometer

---

### 6.3.0 Instructions for use

1. Switch on mains.
2. Switch on sec. alarm.

Green pilot LED should light up. Dot. Bar displays the measured salinity.

### 6.3.1 Testing the Instrument



#### **WARNING**

The salinometer must be tested at least once a month, and the electrode unit must be cleaned.

Push TEST switch on.

*The Dot Bar should read 10 ppm.*

*If the alarm level is less than 10 ppm, the salinometer will give an alarm.*

### 6.3.2 Adjustment of Alarm Level

1. Switch "MAINS" on.
2. Push sec. alarm off.
3. Adjust Alarm Set to desired alarm level by using the switches.
4. Switch "Sec. Alarm" on.

The salinometer is now ready for use.

If the salinity exceeds the alarm level,

- The two red alarm LEDs flash.
- Solenoid valve is activated.
- Buzzer (if fitted) and external alarm system is activated.

Cancel buzzer and external alarm system by switching "Sec. Alarm" off. Solenoid valve is not affected.

Switch "Sec. Alarm" on as soon as the salinity is normal again; i.e. when the two red

LEDS are off.

### 6.3.3 Maintenance

**CAUTION**

Remove electrode unit and inspect/clean after every 1000 hours of operation. Use a clean and dry rag. Avoid touching the electrodes with the fingers.

---

# *Spare Parts*

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## **7.0.0 Ordering Spare Parts**

When ordering spare parts please always state:

1. Serial number.
2. Capacity.
3. Designation.
4. Spare parts drawing number.
5. Position number.
6. Article number.

In order to identify article numbers, please refer to FWG Order Specification and other drawings.

When ordering parts for pumps proceed as follows:

1. Find article number in the list of drawings.
2. Check spare part drawing and item list with corresponding article number to identify the item to be ordered.

## **7.1.0 Alfa Laval Service**

The **Alfa Laval** group is represented in all major ports of the world.

DO NOT hesitate to contact your **Alfa Laval** representative if you have any questions, problems or require spare parts.

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# FWG Order Specification

## FWG Order Specification

INI.: JOM	Date: 000119	BPCS: 10123	Serial no.: NK-01211	Page 1/2
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### Technical data

Type of generator: JWP-26-C80B	Capacity [m <sup>3</sup> /24h]: 20	NE/NK: 60/60
Power supply, main/control	Main [Volt / Hz]: 3 x 440/60	Control [Volt]: 220
Jacket water temperature	Inlet [°C]: 80	Outlet [°C]: 68,6
Jacket water flow /pressure drop	Flow [m <sup>3</sup> /h]: 45,1	Pressure drop [bar] 0,43
Heat consumption from jacket water	[Mcal/h]: 515,6	or [kW]: 600,1
Seawater temperature	Inlet [°C]: 32	Outlet [°C]: 41,4
Seawater flow /pressure drop	Flow [m <sup>3</sup> /h]: 49	Pressure drop [bar] 0,5
Alternative heating: steam:	Capacity [m <sup>3</sup> /24h]:	
Steam flow /pressure:	Flow [kg/h]:	Pressure [bar]:

### Pump / motor data

	Fresh water	Ejector water	Condensate pump	Hot water
Nominal flow x pressure [ m <sup>3</sup> /h x mwc ]:	1,05 x 24	49 x 42	-	-
Marked output power [kW]:	0,75	17,8	-	-
Consumed electrical power [kW]:	0,56	12,2	-	-
Current [A]:	1,6	28,5	-	-
Rotating speed [rpm]:	3360	3505	-	-

### Quality data

Certificate: Workshop	Connections: JIS
-----------------------	------------------

### Extra / special equipment


### Note:

- Max. inlet temperature for evaporator section must NEVER exceed 100°C (212°F)
- Max. inlet pressure for condenser section must not exceed 4 bar g (400 kPa)
- Max. ambient temperature for freshwater generator is 50°C (122°F)

## FWG Order Specification

<i>INI:</i> JOM	<i>Date:</i> 000119	<i>BPCS no.:</i> 10123	<i>Serial no.:</i> NK-01211	Page 2/2
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Spare parts, steam injector	-



# Bill Of Material

Parent item no.: SPE-NK-01211 R: 00	Description: SPECIFICATION PARTS LIST JWP-26-C80B DRAWING NO. 985 17907	Date: 20051102	Page 1 of 2
Drawing no.:		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
3	1.000000	EA	MOTOR 71B-2 380/440V 50/60HZ 0.55/0,75KW 1.4/1.6A		984 20313-00		
10	1.000000	EA	COMBINED BRINE/AIR EJECTOR	984 12200-R05	985 00004-63		
19	1.000000	EA	FRONT COVER P-26 0,2 M2	984 58054-R05	984 58054-80		
32	1.000000	EA	ORIFICE D = 10,0 (FEED WATER)	984 57863-R04	984 57863-17		
48	1.000000	EA	FRESHWATER PUMP PVVF-1532.2X-012	984.10230.00	984 10231-00		
49	8.000000	EA	CLAMPING BOLT L=345 MM P-26	984 58083-R05	984 58083-03	Stainles Steel A4, min. tensile	
52	1.000000	EA	PLATE P-26 KS/ES TITAN 0,5	984 70192-R06	119291-2183		ASS.MEASURE = 210 MM
52	1.000000	EA	PLATE P-26 KE/EE TITAN 0,5	984 70192-R06	119281-4116	TITAN/NITRIL	
52	29.000000	EA	PLATE P-26 KV TITAN 0,5	984 70192-R06	119281-4103	TITAN/NITRIL	
52	29.000000	EA	PLATE P-26 KD TITAN 0,5	984 70192-R06	119281-2103	TITAN/NITRIL	
54	4.000000	EA	SUPPORTING SHAFT L=335 MM	984 58182-R03	984 58182-03	ISO 683/13/74 ; TYPE 11	
56	1.000000	EA	DEMISTER AREA 0,2 M2	984 58034-R04	984 58034-80		
57	1.000000	EA	PLATE P-26 KS/ES TITAN 0,5	984 70192-R06	119291-2183		ASS.MEASURE = 210 MM
57	1.000000	EA	PLATE P-26 KE/EE TITAN 0,5	984 70192-R06	119281-4116	TITAN/NITRIL	
57	29.000000	EA	PLATE P-26 EV TITAN 0,5	984 70192-R06	119479-2103	TITAN/NITRIL	
57	29.000000	EA	PLATE P-26 ED TITAN 0,5		119281-3103	TITAN/NITRIL	
90	1.000000	EA	SOLENOID VALVE 1/2" EV220B 15 220V 50/60 CS NO (EVSI 15)	984.23482.0	984 23486-00		
500	.000000	EA	ACCESSORIES:		ACCESSORIES		
501	1.000000	EA	CONTROL PANEL - FWG - OPT. A (DIAGR:985 16645)MUNS.7.5BG7/2	985 16646	985 00057-45		BUILD-ON
502	.000000	EA	EJECTOR PUMP CNL-80-80/200 DIN/JIS	984.10302.00	984 10337-00		
502	.000000	EA	MOTOR 160M-2 380/440V 50/60HZ 15,5/17,5KW IN 29A		985 00033-81		
502	1.000000	EA	SET OF MANOMETERS FOR PUMP TYPE CNL 65/80/100	984 58196-R08	984 58196-83		
503	1.000000	EA	FEED WATER TREATMENT, SCALE INHIBITOR DOSAGE EQUIPMENT	985 14867-R08	985 14867-80		

## Alfa Laval Copenhagen A/S

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BIC/SWIFT: ESSEDKKK  
**Accounts:** DKK IBAN Acc. DK5752950010008069  
EUR IBAN Acc. DK4552950013000735  
USD IBAN Acc. DK4252950015000929



# Bill Of Material

Parent item no.: SPE-NK-01211 R: 00	Description: SPECIFICATION PARTS LIST JWP-26-C80B DRAWING NO. 985 17907	Date: 20051102	Page 2 of 2
Drawing no.:		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
504	1.000000	EA	SPARE PARTS KIT JWP-26-C80B		SPARES-NK-01211		
505	1.000000	EA	START/STOP BOX TELEMECANIQUE XAL-D211H29		985 00022-83	6661	
506	1.000000	EA	SPARE AND TOOL BOX 400X400X150 MUNSELL 7.5 BG 7/2 (JIS)		985 00024-06	Munsell 7.5 BG 7/2	
507	2.000000	EA	NUT PG 21		984 21625-06	702	LOOSE SUPPLY
507	2.000000	EA	GLAND PG 21		984 21625-02	4590	LOOSE SUPPLY
508	3.000000	EA	THERMOMETER W/POCKET 160 MM		985 00053-69	SoMs59	LOOSE SUPPLY
509	2.000000	EA	GLAND PG 21		984 21625-02	4590	FOR EJ-MOTOR
509	2.000000	EA	NUT PG 21		984 21625-06	702	FOR EJ-MOTOR

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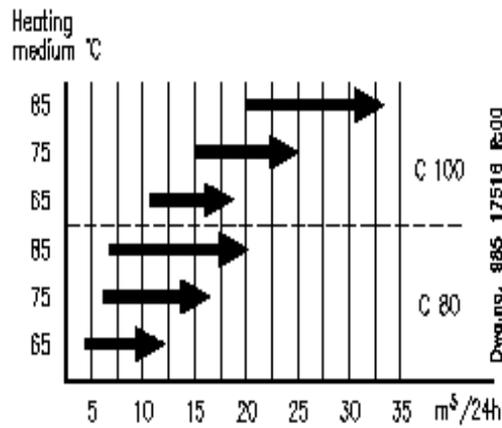
9.2.2.1 General description, JW(S)P-26-C80(B)/C100

Application

Conversion of seawater into fresh water by vacuum distillation, for drinking, process water, and domestic use on ships and rigs, and in small power stations. Max. salinity 2 ppm.

Capacity

The JW(S)P-26-C80(B)/C100 covers a capacity range from 4 to 35 m<sup>3</sup>/24h, depending on the heating medium and seawater temperature. The capacities shown below are at a seawater temperature of 32°C.



Working principle

The seawater to be distilled evaporates at a temperature of about 40°C as it passes between the hot plates in the evaporator. This evaporating temperature corresponds to a vacuum of approximately 93% which is maintained by the brine/air ejector. The vapours generated pass through a demister where any drops of seawater entrained are removed and fall to the bottom of the distiller chamber. The vapours continue to the condenser where they condense to fresh water as they pass between the cold plates.

Basic Equipment

Titanium plate heat exchanger in evaporator and condenser.  
 Red brass separator and stainless steel demister, front cover and pressure plates.  
 Seawater pipes in CuNi.  
 The freshwater generator is equipped for jacket water heating and with a combined condenser cooling and ejector water system. Furthermore the freshwater generator is equipped with dump valve, water clock, automatic feed water regulator, combined brine/air ejector, instruments, freshwater pump with electric motor, internal piping and bed frame.

Options

Flanges:	DIN, JIS or ANSI
Power/control:	3 x 380 V 50 Hz 100/110/220 V 3 x 440 V 60 Hz 100/110/220 V 3 x 460 V 60 Hz 110 V (ul)

## **Additional equipment necessary for operation**

---

- Ejector pump/electric motor.
- Control panel with motorstarters and salinometer.
- Feed water treatment.

## **Optional equipment/design**

---

- Steam heating systems type JWSP.
- Hot Water Loop Module for steam boosting of jacket water.
- Salinometer.
- Manual motor starters and salinometer.
- Remote start/stop.
- Water clock by-pass.
- Return pipe to brine sump.
- Electric panel build-on the unit.
- Optional spares kit for 1, 2 or 5 years of operation.
- Steel box for spares kit.
- Class test certificate.
- Freshwater treatment equipment.



**9.2.2.2-3 Technical data, JW(S)P-26-C80B**

**Power consumption**

Ejector and freshwater pump:	<u>NE/NK</u>	<u>50 Hz</u>	<u>60 Hz</u>
	60/60 - 70/70:	12.6 kW	12.8 kW

**Pressure**

	bar(g)	lbs/in <sup>2</sup>
Max. jacket water pressure:	4.0	58
Max. back pressure to freshwater tank:	1.3	19
Max. seawater pressure to inlet condenser:	4.0	58
Min. seawater pressure to ejector:	3.0	43
Max. back pressure at ejector outlet:	0.6	8.7
Max. back pressure for safety valve on steam equipment:	1.0	14.5
Max. steam pressure for steam equipment:	7.0	101
Normal operation pressure for steam equipment:	2-4.5	29-65
Back pressure to condensate well for steam equipment:	0.6-0.8	8.7-11.6

**Temperature**

Seawater temperature: 0-32°C	Jacket water temperature: 55-95°C
------------------------------	-----------------------------------

**Flow**

Seawater flow: 49 m <sup>3</sup> /h	Jacket water flow: 39-50 m <sup>3</sup> /h
-------------------------------------	--

**Materials**

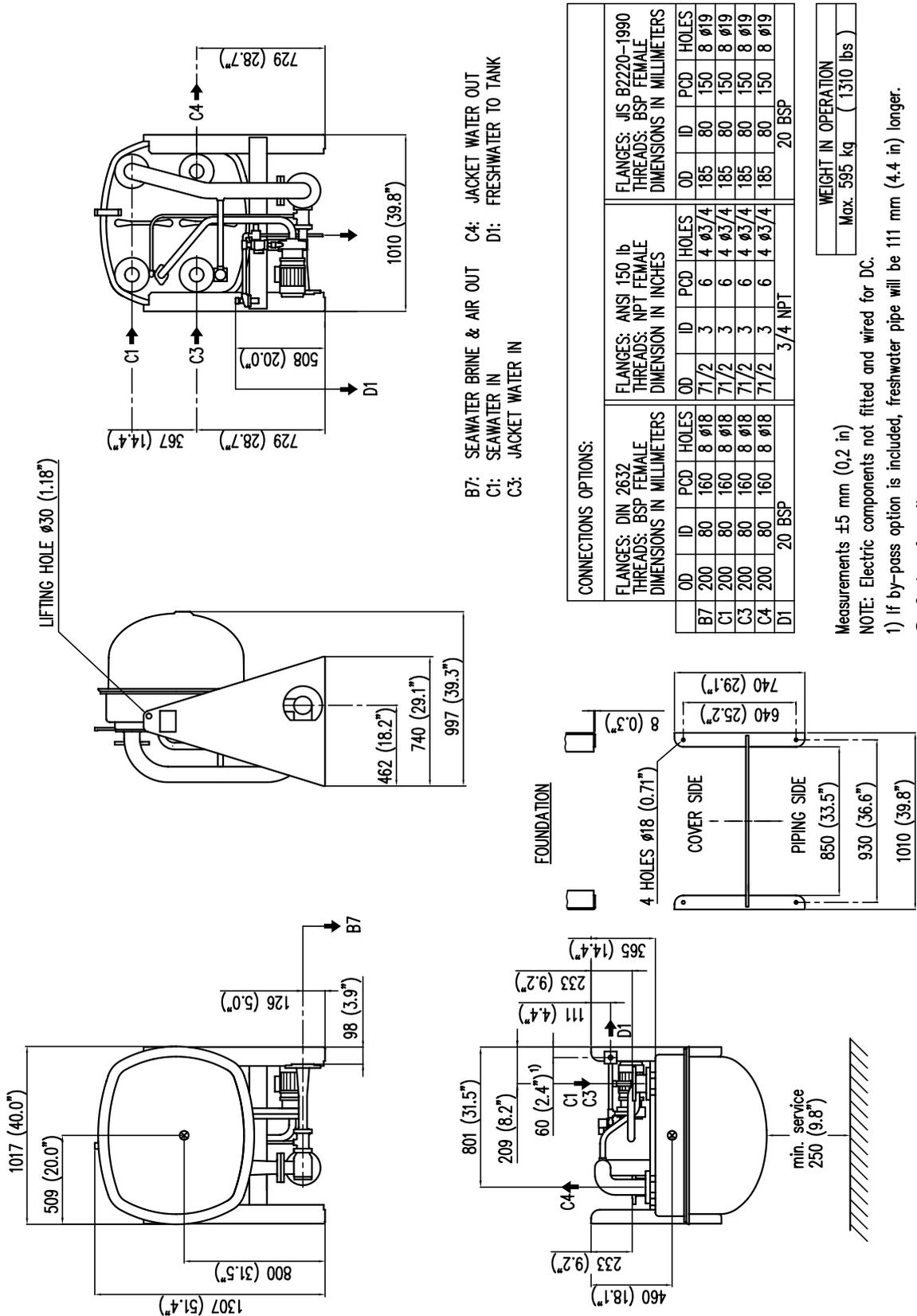
Separator:	Red brass
Front cover:	Stainless steel
Bed frame:	Steel (hot dip galvanized)
Pipe for brine discharge:	Red brass
Evaporator/condenser plates:	Titanium
Demister:	Stainless steel
Pipe for seawater:	CuNi 90/10
Pipe for fresh water:	CuNi 90/10
Combined brine/air ejector housing:	Red brass
Combined brine/air ejector nozzle:	Stainless steel
Flange for evaporator/condenser:	SG-iron (hot dip galvanized)
Steam equipment type JWSP and SP.	
Pipe:	Steel (hot dip galvanized)
Steam injector housing:	Cast iron (painted)
Steam injector nozzle:	Stainless steel

**Shipping data**

Freshwater generator, complete with ejector pump, electrical panel, dosing unit and standard spares.

Weight:	net: 700 kg, gross: 790 kg
Dimensions:	l x w x h: 2200 x 1300 x 1620 mm
Volume:	4.6 m <sup>3</sup>

9.2.2.5-1 Dimensional drawing, JWP-26-C80(B)



B7: SEAWATER BRINE & AIR OUT C4: JACKET WATER OUT  
 C1: SEAWATER IN D1: FRESHWATER TO TANK  
 C3: JACKET WATER IN

CONNECTIONS OPTIONS:														
FLANGES: DIN 2632 THREADS: BSP FEMALE DIMENSIONS IN MILLIMETERS					FLANGES: ANSI 150 lb THREADS: NPT FEMALE DIMENSION IN INCHES					FLANGES: JIS B2220-1990 THREADS: BSP FEMALE DIMENSIONS IN MILLIMETERS				
OD	ID	PCD	HOLES		OD	ID	PCD	HOLES		OD	ID	PCD	HOLES	
B7	200	80	160	8 $\phi 18$	7 1/2	3	6	4 $\phi 3/4$		185	80	150	8 $\phi 19$	
C1	200	80	160	8 $\phi 18$	7 1/2	3	6	4 $\phi 3/4$		185	80	150	8 $\phi 19$	
C3	200	80	160	8 $\phi 18$	7 1/2	3	6	4 $\phi 3/4$		185	80	150	8 $\phi 19$	
C4	200	80	160	8 $\phi 18$	7 1/2	3	6	4 $\phi 3/4$		185	80	150	8 $\phi 19$	
D1	20 BSP				3/4 NPT				20 BSP					

WEIGHT IN OPERATION	
Max.	595 kg ( 1310 lbs )

Measurements  $\pm 5$  mm (0,2 in)  
 NOTE: Electric components not fitted and wired for DC.  
 1) If by-pass option is included, freshwater pipe will be 111 mm (4.4 in) longer.  
 ⊗ Centre of gravity

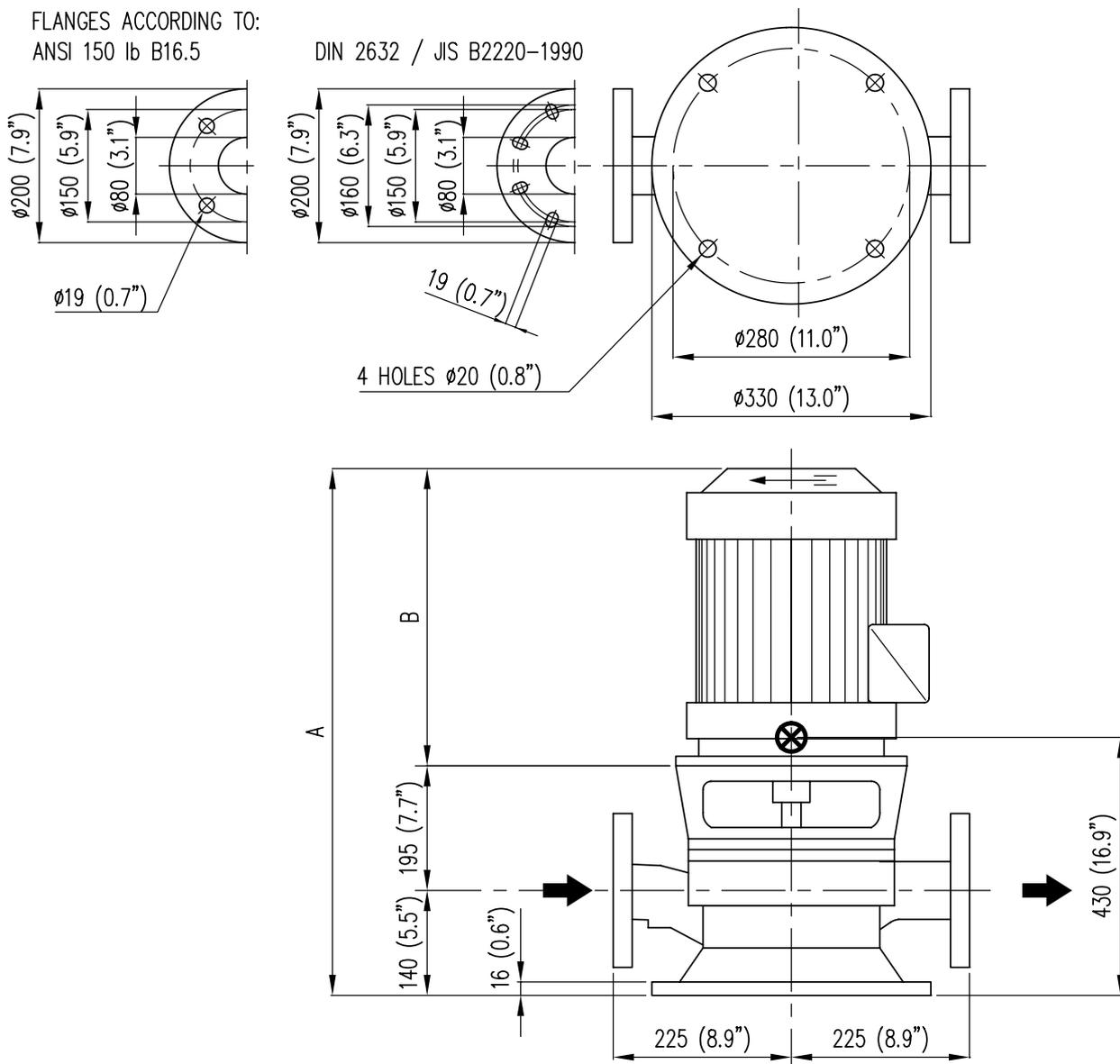
Drw.no. 985 17313 R:00



9.2.2.2-4 Technical data, Pump and Motor for JW(S)P-26-C80B

No. of plates NE/NK:		60/60-70/70	
Pump function		Freshwater	Ejector
Pump Type		PVVF-1532	CNL 80-80/200
Motor type		71 B	160 M
Nom. flow x pressure m <sup>3</sup> /h x mwc		1.05 x 24	49 x 42
Impeller size 50 Hz : mm		ø135	ø205
Impeller size 60 Hz : mm		ø116	ø172
Rotating speed 50 Hz : RPM		2820	2905
Rotating speed 60 Hz : RPM		3360	3505
<b>3 x 380 V 50 Hz:</b>			
Rated output power kW		0.55	15.5
Consumed power kW		0.52	12.1
Current (full load) A		1.4	28.5
Current (start) A		7	157
<b>3 x 440 V 60 Hz:</b>			
Rated output power kW		0.75	17.8
Consumed power kW		0.56	12.2
Current (full load) A		1.6	28.5
Current (start) A		7	157
<b>3 x 460 V 60 Hz:</b>			
Rated output power kW		0.75	17.8
Consumed power kW		0.56	12.2
Current (full load) A		1.5	27.2
Current (start) A		7	157

9.2.5.2-3 Dimensional drawing, CNL 80-80/200



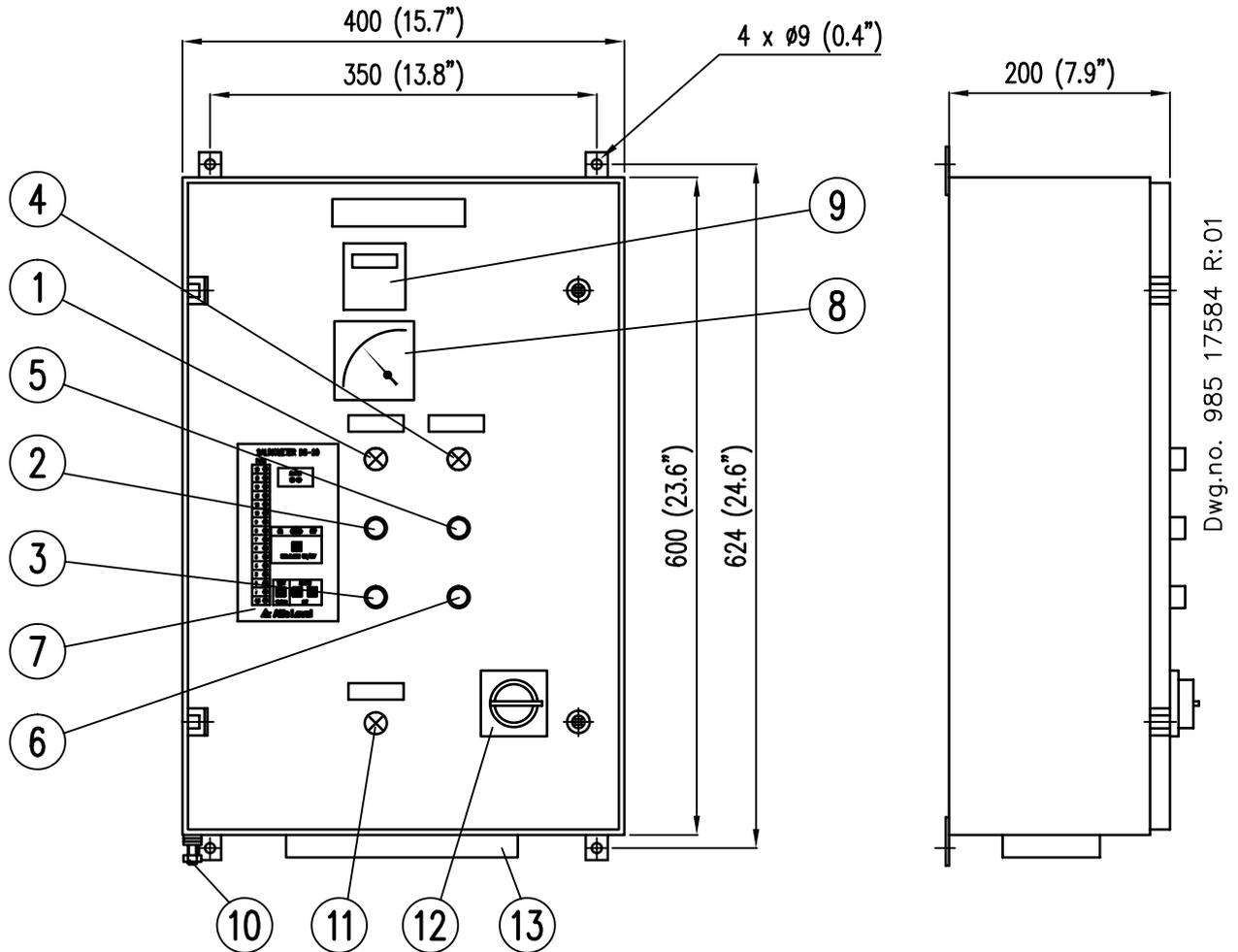
⊗ CENTRE OF GRAVITY

EJECTOR PUMP TYPE	MOTOR TYPE	FLANGE TYPE	A mm	B mm	WEIGHT (INCL. MOTOR) Kg	CABLE GLANDS KVM 36
CNL 80-80/200	160 M	DIN/JIS/ANSI	814 (30.05")	479 (18.9")	166 (366 lbs)	$\phi$ 22,5-24,5
CNL 80-80/200	160 L	DIN/JIS/ANSI	858 (33.8")	523 (20.6")	170 (375 lbs)	$\phi$ 22,5-24,5

MECHANICAL PROTECTION	INSULATION	COOLING SYSTEM	SHAFT SEAL	POLES FOR MOTOR
IP 55	CLASS F	FAN COOLED	MECH. SEAL	2 POLES

Dwg.no. 985 17500 R:02

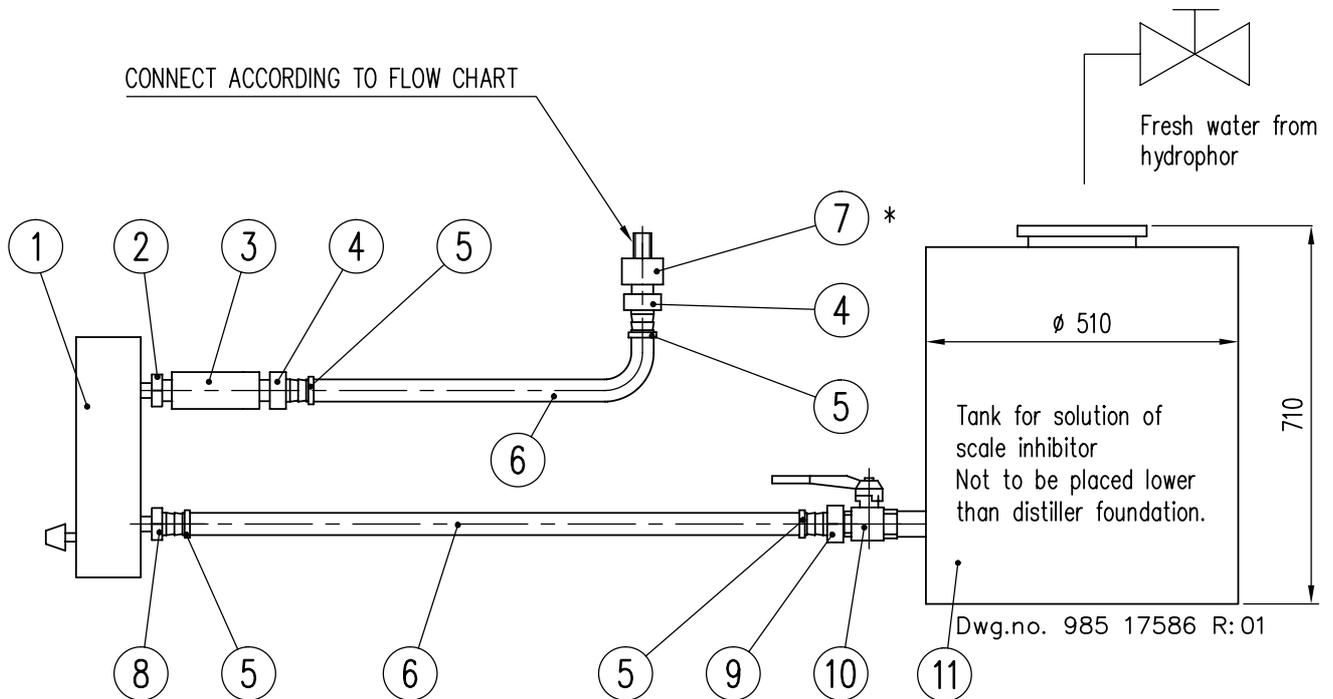
9.2.6.2-41 Dimensional drawing, Panel for Single-stage FWG (option A)



Legend

- |                                    |                                   |
|------------------------------------|-----------------------------------|
| 1 Running light, ejector pump      | 10 Earth connection point         |
| 2 Start, ejector pump              | 11 Source on                      |
| 3 Stop, ejector pump               | 12 Main switch                    |
| 4 Running light, freshwater pump 1 | 13 Connections: 1 PG29 (20–27 mm) |
| 5 Start, freshwater pump 1         | 2 PG21 (14–20 mm)                 |
| 6 Stop, freshwater pump 1          | 2 PG16 (8–15 mm)                  |
| 7 Salinometer                      | 2 PG13,5 (7–13 mm)                |
| 8 Ammeter                          | Additional 6 PG16                 |
| 9 Running hour meter               |                                   |

9.2.9.3-2 Feed Water Treatment - 130 liter



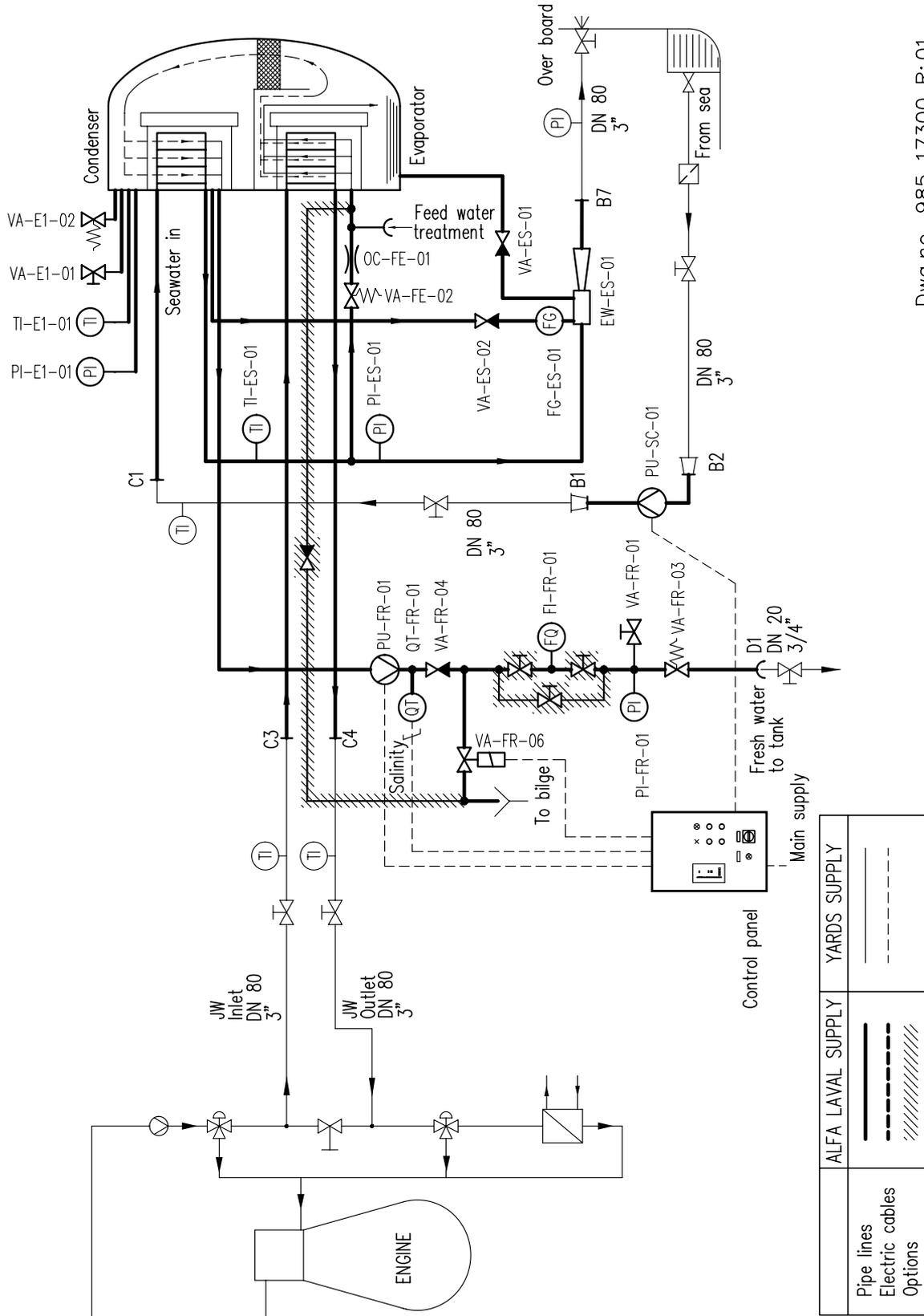
Recommendation

Use fully soluble scale inhibitor for instance on polymere basis.  
 Mix quantity required for 24 hours operation in tank according to maker's instruction and adjust dosage to cover max. freshwater output from distiller.  
 Flush regularly.

- |   |                            |    |                          |
|---|----------------------------|----|--------------------------|
| 1 | Flowmeter incl. reg. valve | 7  | Connection 3/8" x 1/4" * |
| 2 | Nipple 3/8" x 1/8"         | 8  | Connection 1/8" x 10     |
| 3 | Non return valve 3/8"      | 9  | Connection 1/2" x 10     |
| 4 | Hose connection 3/8" x 10  | 10 | Ball Valve 1/2"          |
| 5 | Hose clip                  | 11 | PE tank (130 l)          |
| 6 | Hose 3/8" (4000 mm)        |    |                          |

\* Only for JWP-36-C

9.2.2.3-2 Flow Chart (incl. options), JWP-26-C80(B)



Dwg.no. 985 17300 R:01



9.2.2.4-1 Equipment specification, JW(S)P-26-C80(B)

Equipment supplied by Alfa Laval:

Tag No.	Description	Article No.	Connection
	<u>Unit:</u>		
EW-ES-01	Ejector	See specification	-
FG-ES-01	Flow sight glass	984 35686-00	1/2" BSP
FI-FR-01	Water meter	985 42600-03	1/2" BSP
OC-FE-01	Orifice	See specification	-
PI-ES-01	Pressure gauge	984 30305-00	1/4" BSP
PI-E1-01	Mano/vacuum gauge	984 30343-00	3/8" BSP
PI-FR-01	Pressure gauge	984 30306-00	1/4" BSP
PU-FR-01	Freshwater pump	See specification	-
PU-SC-01	Ejector pump	See specification	-
QT-FR-01	Electrode unit	984 22500-00	-
TI-ES-01	Thermometer	984 30366-00	1/2" BSP
TI-E1-01	Thermometer	984 30366-00	1/2" BSP
VA-ES-01	Non return valve	984 35501-01	DN 50
VA-ES-02	Non return valve	984 35686-00	1/2" BSP
VA-E1-01	Air screw	984 40939-03	1/4" BSP
VA-E1-02	Safety valve	984 35360-00	1" BSP
VA-FE-02	Spring loaded valve	984 35535-00	DN 40
VA-FR-01	Ball valve	984 35683-00	1/2" BSP
VA-FR-03	Spring loaded valve	984 35166-00	-
VA-FR-04	Non return valve	984 35672-00	1" BSP
VA-FR-06	Solenoid valve	See specification	-
	Control panel <sup>1)</sup>	See specification	-
	<u>Steam arrangement: <sup>2)</sup></u>		
IS-SS-01	Steam injector	See specification	-
PI-SS-01	Mano/vacuum gauge	984 30285-00	3/8" BSP
TI-SS-01	Thermometer	984 30366-00	1/2" BSP
TI-SS-02	Thermometer	984 30366-00	1/2" BSP
VA-SS-01	Butterfly valve	984 35619-00	DN 80
VA-SS-02	Safety valve	See specification	-
VA-SS-03	Ball valve	984 35618-00	3/8" BSP
VA-SS-04	Seated valve	985 56110-04	3/4" BSP
VA-SS-05	Butterfly valve	See specification	-

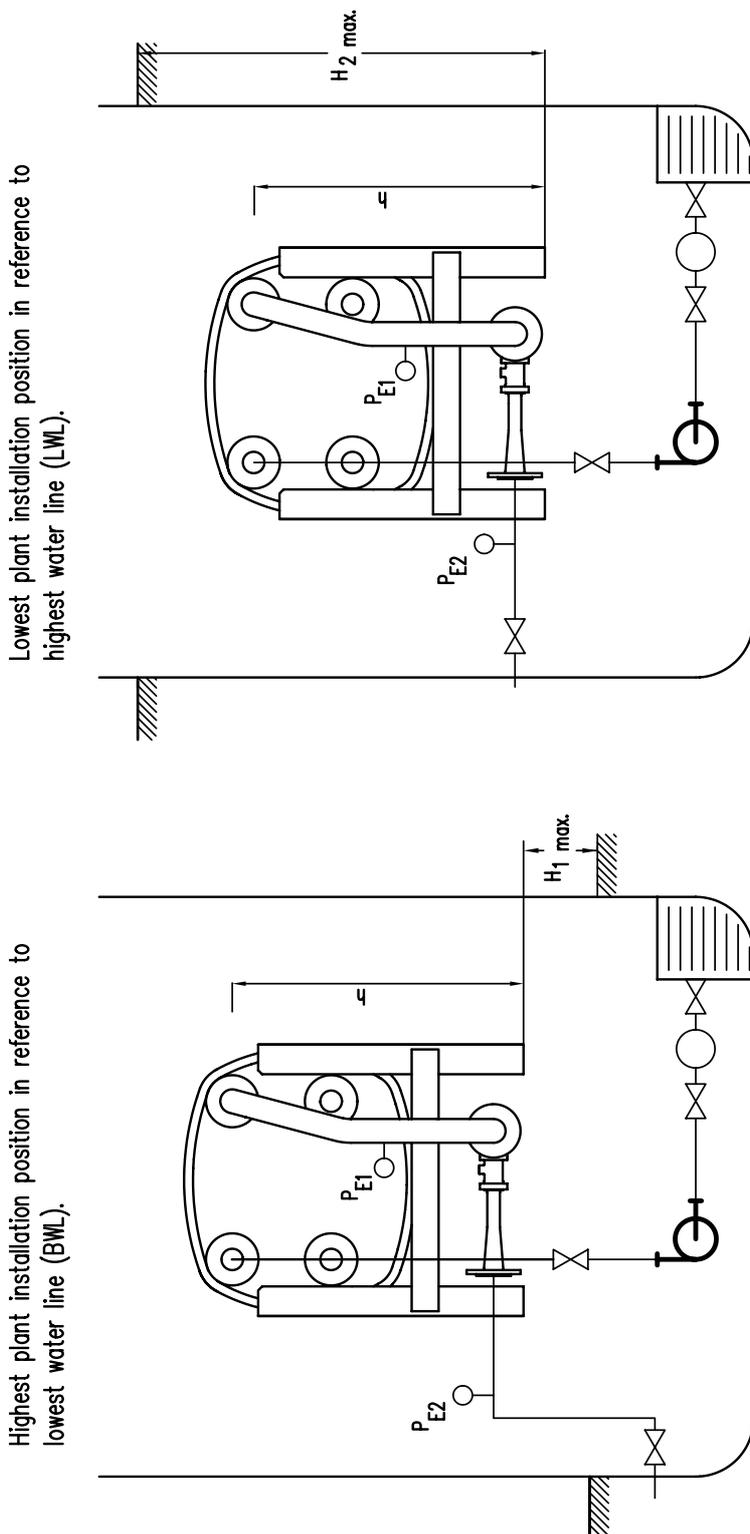
Dwg.no. 985 17321 R:00

<sup>1)</sup> Normally supplied by Alfa Laval

<sup>2)</sup> Type JWSP



9.2.8.1 Vertical Plant Positioning, JWP-16/26 and D-PU-(2)-36



The stated installation heights are given under the conditions that the line pressure drop does not exceed 0.1 bar (1.5 lbs/in<sup>2</sup>) which should account for all normal installations. If the 0.1 bar (1.5 lbs/in<sup>2</sup>) is exceeded the heights must be diminished accordingly.

In order to minimize the pressure drop we recommend to avoid the use of seat valves in the system.  
Ejector pump is not self priming.

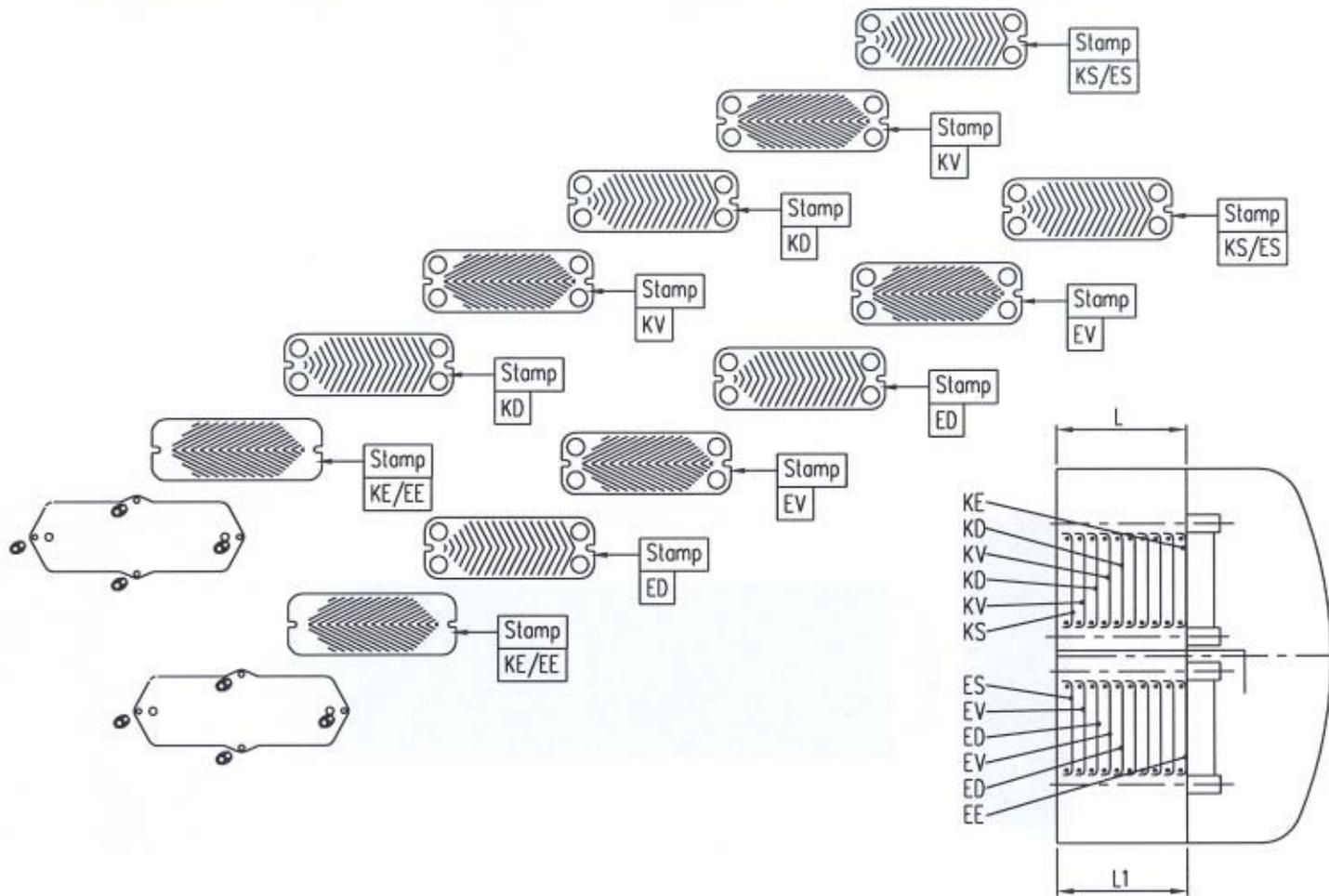
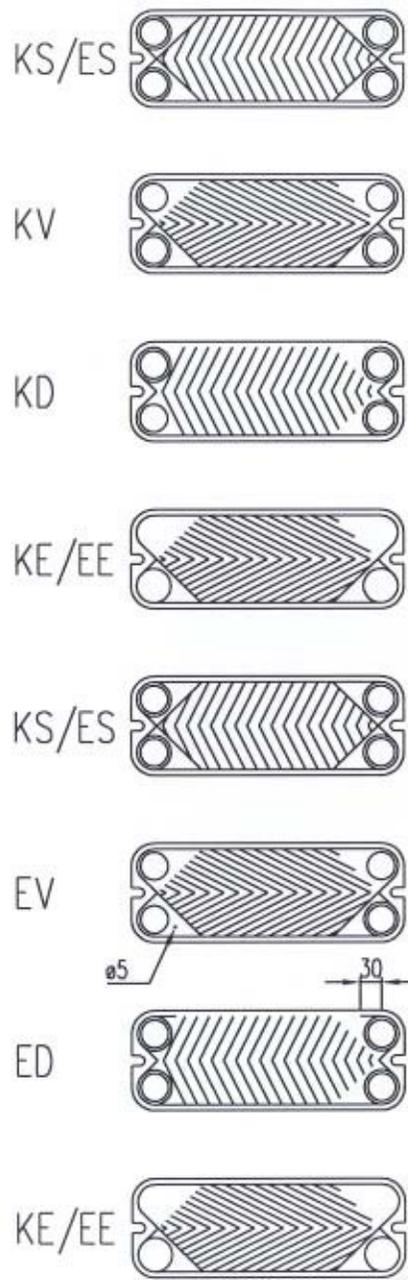
Freshwater Generator type	P <sub>E2</sub> max. bar (lbs/in <sup>2</sup> )	h mm	Highest vertical plant positioning		Lowest vertical plant positioning	
			P <sub>E1</sub> min. bar (lbs/in <sup>2</sup> )	H <sub>1</sub> max. mm	P <sub>E1</sub> max. bar (lbs/in <sup>2</sup> )	H <sub>2</sub> max. mm
P-16	0.5 (7.3)	913	3 (43.5)	3000	3.85 (55.8)	5000
P-26	0.6 (8.7)	1100		4000		6000
D-PU-36			1500			
D-PU-2-36						

Dwg.no. 985 17495 R:00

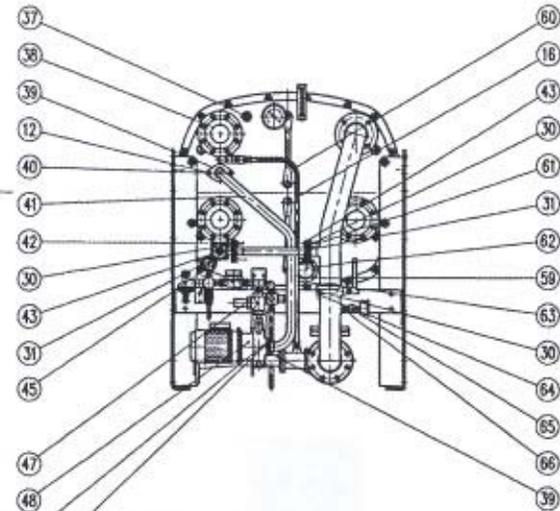
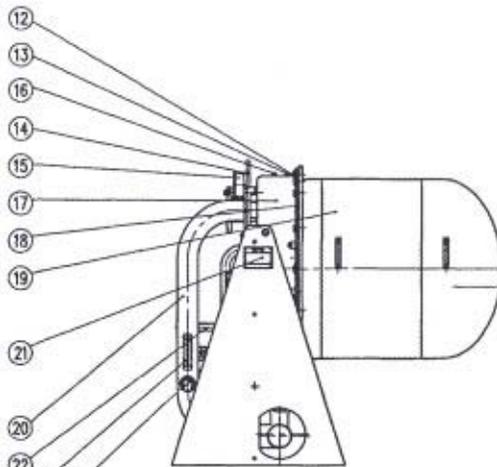
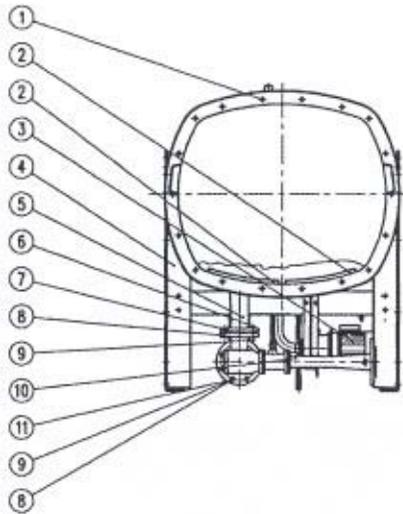


elongation on our part.

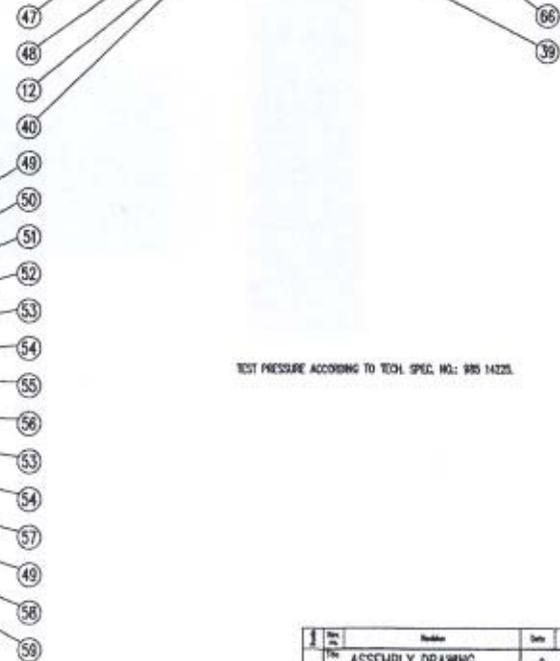
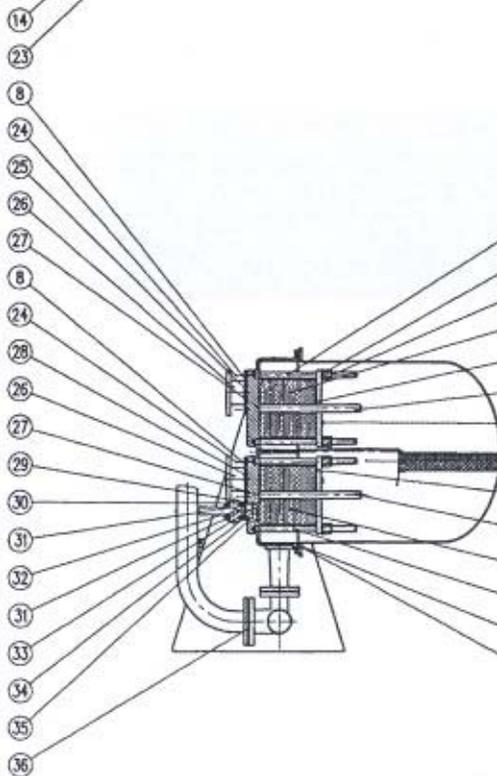
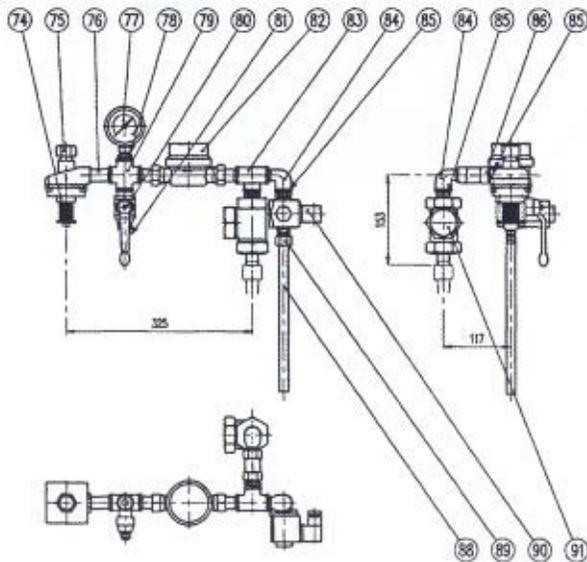
or used for purposes not expressly permitted by us.



03	New Drawing Head.	05.05.2004	MFN	MFN	PJE
Rev. No.	Revision text	Date	Drawn	Checked	Appr.
Title					
Proj No	Proj Type				
Dimensions Without Tolerances:		Size	Location		
ISO 2768-M or ISO 13920-B		A3	Alfa Laval Copenhagen A/S - Denmark		
Date	Drawn	ISO Method E	Scale	Drawing No	
26.06.2000	PGR		1:20	985 16610	
Checked	Approved		Sheet	Rev.	
HJO	HJO	2		03	



FRESHWATER PIPE (2.5:1)



TEST PRESSURE ACCORDING TO TECH. SPEC. NO.: 985 14225.

See Note 1 on page 15 of this drawing for details of the test pressure.

See Note 2 on page 15 of this drawing for details of the test pressure.

Rev	Revision	Date	Revised	Revised	Approved
1	ASSEMBLY DRAWING FRESHWATER GENERATOR P-26-CROB (BOOSTED)	14.02.97			
		Alfa Laval South Africa 985 17908			
Date: 14.02.97 Drawn by: [Signature] Checked by: [Signature]	Scale: 1:1 Title: P-26-CROB (BOOSTED)	Drawing No.: 985 17908			
Scale: 1:1 Title: P-26-CROB (BOOSTED)					



# Bill Of Material

Parent item no.: 985 17908-80 R: 00	Description: ASSEMBLY DRAWING NE/NK 70/70 P-26-C80B DIN / JIS	Date: 20040608	Page 1 of 4
Drawing no.: 985 17908-R00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
	.000000	EA	EJECTOR PUMP		SEE SPECIFIC.H		
	.000000	EA	MOTOR FOR EJECTOR PUMP		SEE SPECIFIC.I		
	.000000	EA	CONTROL PANEL		SEE SPECIFIC.P		
	1.000000	EA	CAUTION PLATE FOR EJECTOR PUMP		19.00000.01		
	1.000000	EA	LOGO FRONT COVER 380 X 102 MM		19.00000.11		
	.000000	EA	JWP-26-C80/100 MANOMETER SET	985 58196	SEE SPECIFIC.MS		
1	18.000000	EA	NUT M12 DIN 934		985 00001-71	QUALITY 8.8 ; DELTA-MAGNI	
2	2.000000	EA	ZINC ANODE	984 58033-R04	984 58033-80		
3	.000000	EA	P-26-C80/C100 DPU-36-C100/125 MOTOR FOR FRESHWATER PUMP		SEE SPECIFIC.M		
4	1.000000	EA	BED FRAME	985 12705-R04	985 12705-80		
5	1.000000	EA	NE/NK 24-60/24-60 BRINE PIPE P-26-C80	984 58239-R04	984 58239-01		
6	4.000000	EA	SCREW M16 X 40 DIN 933		985 80011-38	QUALITY 8.8 ; DELTA-MAGNI	
7	1.000000	EA	NON RETURN FLAP Ø 50 MED TEXTILINDLÆG	984 57281-R03	985 00036-39		
8	28.000000	EA	WASHER M16 DIN 125 A		985 32512-20	A4	
9	12.000000	EA	NUT M16 DIN 934 HOT DIP GALVANIZED		984 40910-45	HOT DIP GALVANIZED	
10	.000000	EA	COMBINED BRINE/AIR EJECTOR		SEE SPECIFIC.B		
11	8.000000	EA	SCREW M16 X 60 DIN 933		984 40910-43	QUALITY 8.8 ; DELTA-MAGNI	
12	22.000000	EA	WASHER M12 ISO 887/83		985 32512-16	ISO 683/13/86 ; TYPE 20A	
13	18.000000	EA	SCREW M12 x 40 DIN 912		985 00002-15	QUALITY 8.8 ; DELTA-MAGNI	
14	2.000000	EA	THERMOMETER W/POCKET - ANGLE 63 MM	984 30366-R01	984 30366-00	CuNi10Fe	
15	1.000000	EA	COMPOUND GAUGE -100% - 2 BAR LB/IN2,BAR= KGF/CM2,Ø100,3/8"BN	984 30308-R01	984 30308-00		
16	2.000000	EA	AIR VALVE 1/4" BSP	VVS 40 5501 002	984 40939-03	BRASS	
17	1.000000	EA	SEPARATOR P-26	984 58215-R06	984 58215-01		

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**BIC/SWIFT:** ESSEDKKK

**Accounts:** DKK IBAN Acc. DK5752950010008069  
EUR IBAN Acc. DK4552950013000735  
USD IBAN Acc. DK4252950015000929



# Bill Of Material

Parent item no.: 985 17908-80 R: 00	Description: ASSEMBLY DRAWING NE/NK 70/70 P-26-C80B DIN / JIS	Date: 20040608	Page 2 of 4
Drawing no.: 985 17908-R00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
18	1.000000	EA	GASKET FOR FRONT COVER P-26-C	984 58058-R02	984 58058-01		
19	.000000	EA	FRONT COVER		SEE SPECIFIC.C		
20	1.000000	EA	SEAWATER PIPE FROM CONDENSER	984 58112-R04	984 58112-80	CuNi10Fe1,6Mn	
21	.000000	EA	NAME PLATE		SEE SPECIFIC.NP		
22	1.000000	EA	PIPE FOR FEED WATER	984 58070-R06	984 58070-80	CuNi10Fe1,6Mn	
23	1.000000	EA	PRESSURE GAUGE 0-6 BAR LB/IN2, BAR = KGF/CM2. Ø63, 1/4"BC	984 30297-R01	984 30297-00		
24	16.000000	EA	SCREW M16 x 40 DIN 912		985 00002-16	QUALITY 8.8 ; DELTA-MAGNI	
25	2.000000	EA	RUBBER SLEEVE	984 58085-R02	984 58085-01		
26	3.000000	EA	FLANGE Ø 80 DIN/ANSI/JIS	984 58068-R05	984 58068-03		
27	4.000000	EA	STUD BOLT M16 X 43	984 58183-R03	984 58183-01	S 235 JR	
28	2.000000	EA	GASKET Ø127/77 X 2	VVS 00 0662 076	984 40942-02	NITRIL	
29	4.000000	EA	SCREW M10 X 50 DIN 912		985 80011-32	QUALITY 8.8 ; DELTA-MAGNI	
30	16.000000	EA	WASHER M10 DIN 125 A		985 32512-14	A4	
31	4.000000	EA	GASKET Ø56/30 X 2	984 57843-R02	984 57843-01		
32	.000000	EA	ORIFICE FOR FEED WATER		SEE SPECIFIC.O		
33	1.000000	EA	CONNECTION Ø59/28 (FEED WATER) P-26-C	984 58065-R03	984 58065-01		
34	1.000000	EA	RUBBER SLEEVE	984 58084-R02	984 58084-01		
35	.000000	EA	PLUG 3/8" BSP	EV 109 B	984 40941-17	ISO 426/2/83 ; CU ZN39 PB3	
36	1.000000	EA	GASKET Ø142/75 x 2	984 58094-R02	984 58094-01		
37	1.000000	EA	SAFETY VALVE 1" BSP	VVS 43 2240 108	984 35360-00	BRASS	
38	1.000000	EA	RUBBER SLEEVE Ø80	984 58120-R02	984 58120-01		
39	2.000000	EA	GASKET Ø75/43 X 2	984 58093-R02	984 58093-01		
40	4.000000	EA	SCREW M12 X 30 DIN 912		985 80011-33	HOT DIP GALVANIZED	

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BIC/SWIFT: ESSEDKKK  
**Accounts:** DKK IBAN Acc. DK5752950010008069  
EUR IBAN Acc. DK4552950013000735  
USD IBAN Acc. DK4252950015000929



# Bill Of Material

Parent item no.: 985 17908-80 R: 00	Description: ASSEMBLY DRAWING NE/NK 70/70 P-26-C80B DIN / JIS	Date: 20040608	Page 3 of 4
Drawing no.: 985 17908-R00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
41	1.000000	EA	FRESHWATER PIPE TO PUMP	984 58069-R04	984 58069-80	CuNi10Fe1,6Mn	
42	8.000000	EA	NUT M10 DIN 934		984 40900-27	QUALITY 8.8 ; DELTA-MAGNI	
43	4.000000	EA	SCREW M10 X 35 DIN 933		984 40910-38	QUALITY 8.8 ; DELTA-MAGNI	
45	1.000000	EA	SPRING LOADED VALVE MVF-25-2.5	984.35177.00	984 35177-00		
47	1.000000	EA	ELECTRODE (FOR SL-3000,DS-20)		985 42985-05		
48	.000000	EA	FRESHWATER PUMP		SEE SPECIFIC.F		
49	.000000	EA	CLAMPING BOLT		SEE SPECIFIC.G		
50	8.000000	EA	WASHER M24 ISO 887/83 316L		985 32510-28	ISO 683/13/86 ; TYPE 20A Aisi 3	
51	8.000000	EA	NUT M24	984 57822-R01	984 57822-01	ISO 1338/77 ; CU PB5 SN5 ZN5	
52	.000000	EA	HEAT EXCHANGER-CONDENSER		SEE SPECIFIC.K		
53	2.000000	EA	PRESSURE PLATE	984 58024-R04	984 58024-01		
54	.000000	EA	SUPPORTING SHAFT		SEE SPECIFIC.A		
55	1.000000	EA	ASSEMBLY PLATE P-26-C	984.70140.00	19.00000.06		
56	.000000	EA	DEMISTER		SEE SPECIFIC.D		
57	.000000	EA	HEAT EXCHANGER-EVAPORATOR		SEE SPECIFIC.E		
58	3.000000	EA	NUT M6 ISO 4032/86		985 32010-07	AISI 316 L	
59	7.000000	EA	WASHER M6 ISO 887/83		985 32510-08	A4	
60	1.000000	EA	VACUUM PIPE P-26-C80	984 58295-R01	984 58295-80		
61	4.000000	EA	SCREW M10 X 45 DIN 933		985 80011-29	QUALITY 8.8 ; DELTA-MAGNI	
62	1.000000	EA	SIGHT GLASS WITHOUT INNER PART	984 57862-R03	984 57862-82		
63	1.000000	EA	GASKET Ø95/Ø70 X 2	984 58244-R02	984 58244-01		
64	4.000000	EA	SCREW M10 x 30 DIN 912		985 00002-17	QUALITY 8.8 ; DELTA-MAGNI	
65	1.000000	EA	PRESSURE GAUGE COCK 1/4" BSP BRASS	EV 5100-8	984 35533-00	BRASS	

## Alfa Laval Copenhagen A/S

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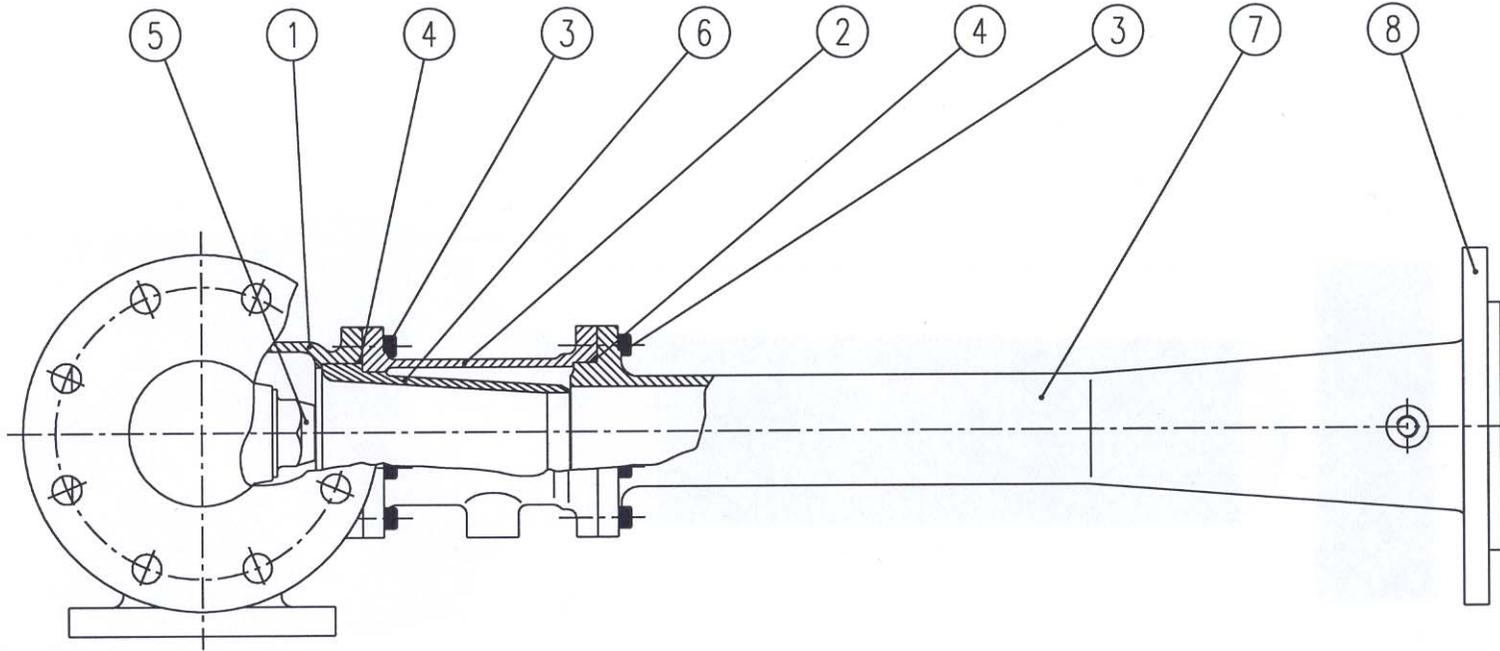
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Drawing no.: 985 17908-R00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
66	1.000000	EA	NIPPLE 1/4" BSP	EV 206 B	984 40941-29	ISO 426/2/83 ; CU ZN39 PB3	
74	1.000000	EA	SPRING LOADED VALVE MV-15-1.0	984.35166.00	984 35166-00	BRONZE	
75	1.000000	EA	CONNECTION 3/4" BSP X 1/2" BSP	EV 120 B	984 40941-01	ISO 426/2/83 ; CU ZN39 PB3	
76	1.000000	EA	NIPPLE PIPE 1/2" BSP X 60	B 3530	984 40943-11	ISO 1338/77 ; CU PB5 SN5 ZN5	
77	1.000000	EA	PRESSURE GAUGE 0-3 BAR LB/IN2, BAR = KGF/CM2, Ø63, 1/4"N	984 30298-R01	984 30298-00	AISI 316	
78	1.000000	EA	BUSHING 1/2" X 1/4" BSP	B 3241	985 52720-02	ISO 1338/77 ; CU PB5 SN5 ZN5	
79	1.000000	EA	CROSS 1/2" BSP	B 3180	984 40943-07	ISO 1338/77 ; CU PB5 SN5 ZN5	
80	1.000000	EA	BALL VALVE 1/2" BSP BRASS		984 35683-00	BRASS	
81	1.000000	EA	HOSE CONNECTION 1/2" BSP X 15	VVS 74 4700 104	984 40939-01	ISO 426/2/83 ; CU ZN39 PB3	
82	1.000000	EA	WATER METER B&R 15 EVW-DK1/2" BPS CONNECT		985 42600-03		
83	1.000000	EA	TEE 1/2" BSP	B 3130	985 52710-03	ISO 1338/77 ; CU PB5 SN5 ZN5	
84	2.000000	EA	ELBOW 1/2" BSP	B 3092	985 52700-03	ISO 1338/77 ; CU PB5 SN5 ZN5	
85	3.000000	EA	HEXAGON NIPPLE 1/2" BSP	B 3280	985 52721-03	ISO 1338/77 ; CU PB5 SN5 ZN5	
86	1.000000	EA	NON RETURN VALVE 1/2" BSP	985 13952-R00	984 35671-00	ISO 426/2/83 ; CU ZN39 PB3	
88	300.000000	MM	PIPE Ø 16/12,7		984 40938-29	COPPER DIN 1754/1787/17671	
89	1.000000	EA	CONNECTION 1/2" BSP X 16	EV 68 F	984 40941-39	ISO 426/2/83 ; CU ZN39 PB3	
90	.000000	EA	SOLENOID VALVE		SEE SPECIFIC.S		
91	1.000000	EA	HOUSING FOR ELECTRODE 1/2". 1/2" BSP	984 57672-R04	984 22212-00		
95	.000000	EA	PAINTED PARTS FOR BED FRAME		SEE SPECIFIC.PP		

## Alfa Laval Copenhagen A/S

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BIC/SWIFT: ESSEDKKK  
**Accounts:** DKK IBAN Acc. DK5752950010008069  
EUR IBAN Acc. DK4552950013000735  
USD IBAN Acc. DK4252950015000929



985 00027-14	2
985 00008-36	2
985 00004-63	2
984 12288-00	2
984 12285-00	2
984 12272-00	2
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984 12200-00	2

04	Ar.l. no. 985 00027-14 added	8.07.94	RMS	X	X
03	Ar.l. no. 985 00004-63 added	6.09.93	AJE	HJD	JBN
02	Ar.l. no. 985 00008-36 added	6.02.93	AND	KIM	HPA
01	New drawing in CAD	0.02.92	AJE	HJD	EWB
COMBINED BRINE / AIR EJECTOR X					
11.11.85	AJ	AP	EWB	984.12200.00 03	
Scale	X		984.12200.00		
	X	X		X	X



# Bill Of Material

Parent item no.: 985 00004-63 R: 04	Description: COMBINED BRINE/AIR EJECTOR 24,0/33,4/38,0 JIS	Date: 20040608	Page 1 of 1
Drawing no.: 984.12200.00		Ini DKSOABK	

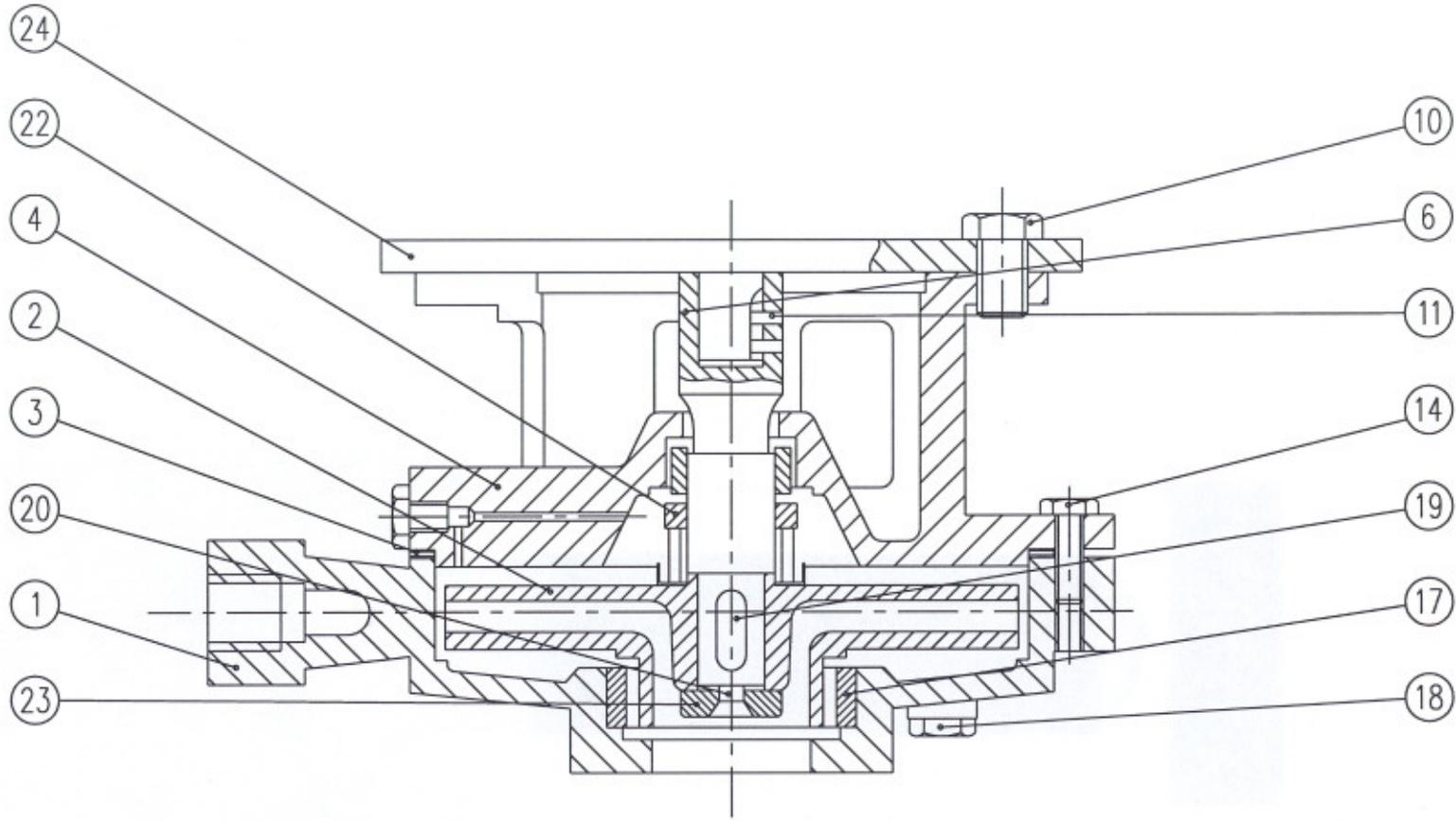
BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	EJECTOR HOUSING		984 12200-10	RG 5	
2	1.000000	EA	INTERMEDIATE HOUSING		984 12200-20	RG 5	
3	8.000000	EA	SCREW M8 X 25 DIN 912	HFC 1790	984 40908-07	ISO 683/13/86 ; TYPE 20A	
4	2.000000	EA	O-RING 59.92 X 3.53		984 40999-01	NITRIL	
5	1.000000	EA	NOZZLE Ø 24		984 12288-50	AISI 329	
6	1.000000	EA	NOZZLE Ø 33.4		984 12288-60	RG 5	
7	1.000000	EA	+DIFFUSOR Ø 38		984 12288-70	RG 5	
8	1.000000	EA	+FLANGE JIS		984 12210-80	ST.00	

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USD IBAN Acc. DK4252950015000929



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985 00025-83	2
984.10270.00	2
984.10262.00	2
984.10255.00	2
984.10254.00	2
984.10253.00	2
984.10252.00	2
984.10241.00	2
984.10240.00	2
984.10231.00	2
984.10230.00	2

02	ART.NO.985 00025-83&0027-60 AD	281195	BCU	X	X
01	New drawing in CAD	29.02.92	AJE	HJO	EWA
FRESHWATER PUMP PVF-1532 PVF-2040					
27.06.84		AJ	X	984.10230.00 01	
			X	984.10230.00	
		X	X	X	X



Bill Of Material

Parent item no.: 984 10231-00 R: 02	Description: FRESHWATER PUMP PVVF-1532.2X-012 17,5 L/MIN, 24 MWC, 3360	Date: 20040608	Page 1 of 1
Drawing no.: 984.10230.00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	PUMP HOUSING		984 10230-01	RG 5	
2	1.000000	EA	IMPELLER Ø 116		984 10231-01	RG 9	
3	1.000000	EA	GASKET PVVF 1532	985 13380	984 10230-03	Fj. 2639	
4	1.000000	EA	PUMP COVER		984 10230-04	RG 5	
6	1.000000	EA	SHAFT COMPLETE		984 10230-05	AISI 316	
10	4.000000	EA	SCREW M8 X 16 DIN 933 KVAL. 8.8	HFC 473	984 40908-11	HARDENED STEEL ; EL. ZINCED	
11	2.000000	EA	SCREW M5 X 8 DIN 916	HFC 710	984 40905-03	STEEL ; KVAL. 45 H	
14	4.000000	EA	SCREW M8 X 20 DIN 933 KVAL. 8.8	HFC 473	984 40908-03	HARDENED STEEL ; EL. ZINCED	
17	1.000000	EA	SEAL RING	984 57785	984 10230-06	ISO 1338/77 ; CU PB5 SN5 ZN5 (R	
18	2.000000	EA	PLUG 1/8".	BRONZE	984 10030-87	BRASS	
19	1.000000	EA	KEY 4 X 4 X 15		984 10230-07	ISO 683/13/86 ; TYPE 20A	
20	1.000000	EA	SCREW M5 X 16 DIN 7991	HFC 1795	984 40905-04	ISO 683/13/86 ; TYPE 20A	
22	1.000000	EA	MECH. SEAL Ø 16		984 10230-08	316 C/CE	
23	1.000000	EA	WASHER	984 57763	984 10230-09	ISO 683/13/86 ; TYPE 20A	

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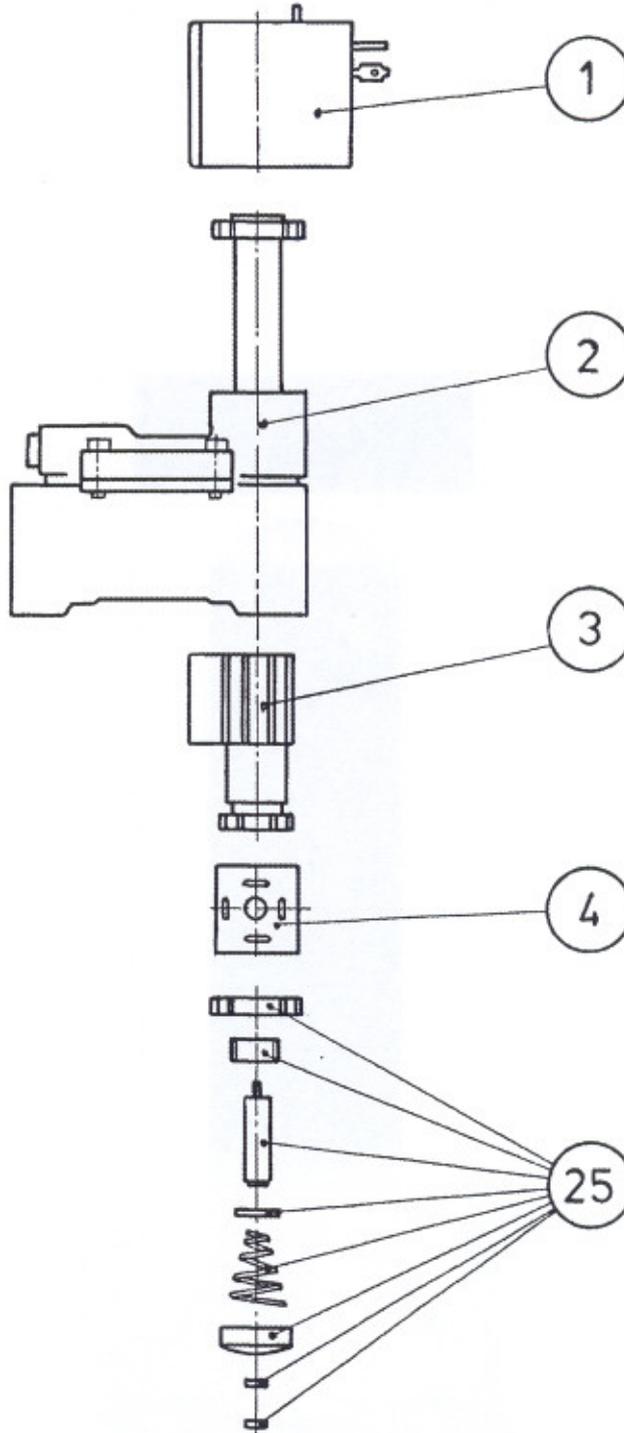
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Bank: SEB, Landemærket 10, Copenhagen  
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 <b>ALFA-LAVAL</b> NIREX ENGINEERING COPENHAGEN DENMARK	Scale	construct	
		drawn	14.11.86 AJ
		checked	14.11.86 JXP
		revised	
<b>SOLENOID VALVE</b> <b>DANFOSS</b>	Replacement for:		
	Drawing No: <b>984.23482.00</b>		
	Replaced by:		



# Bill Of Material

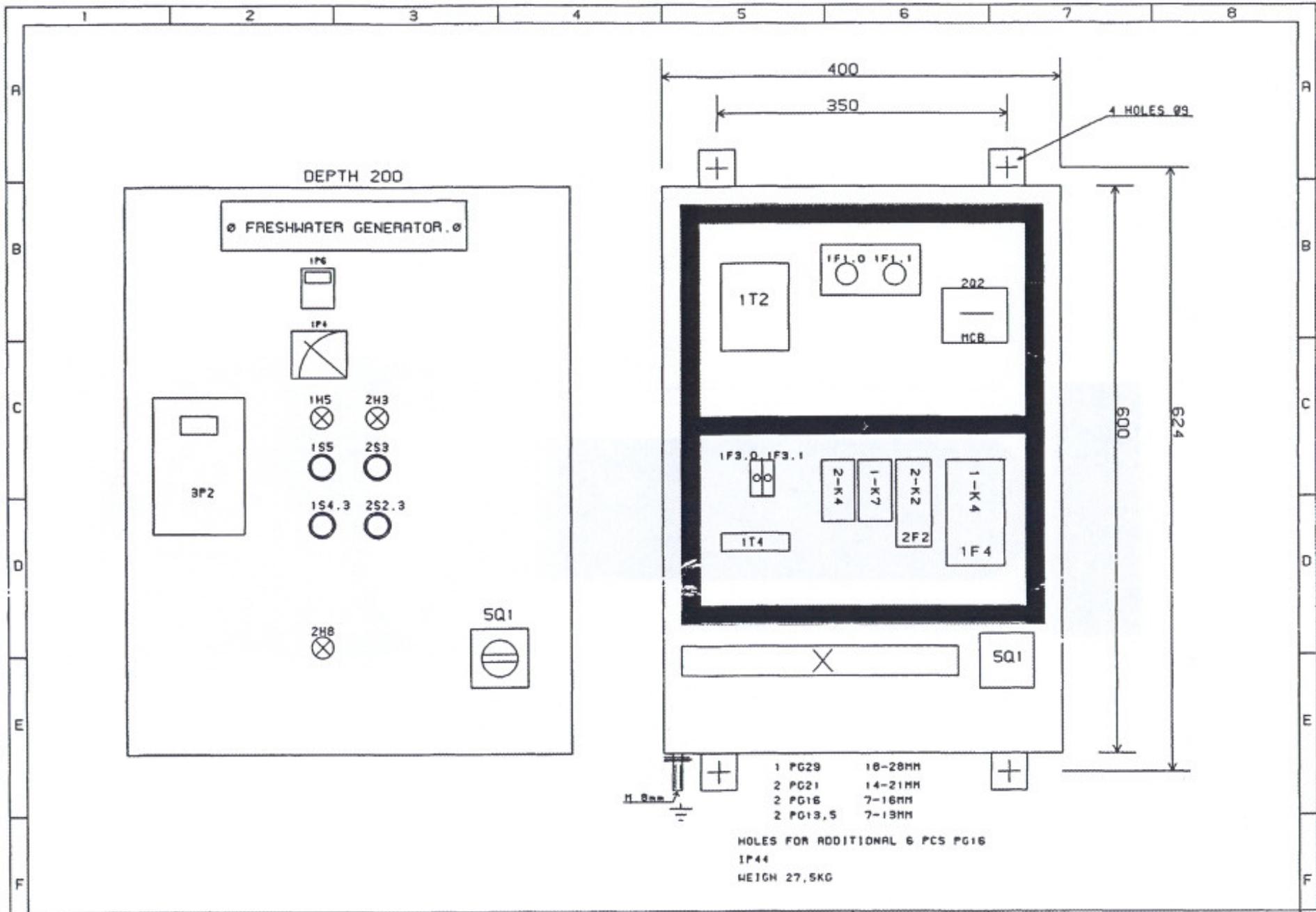
Parent item no.: 984 23486-00 R: 01	Description: SOLENOID VALVE 1/2" EV220B 15 220V 50/60 CS NO (EVSI 15)	Date: 20040608	Page 1 of 1
Drawing no.: 984.23482.0		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	COIL FOR SOLENOID VALVE 230V 50/60 CS		984 23480-01		
2	1.000000	EA	SOLENOID VALVE NO EV220B 15 (EVSI 15)		985 58810-18		
3	1.000000	EA	SEAL KIT N.O. FOR SOLENOID VALVE N.O.		985 00062-05		
25	.000000	EA	SPARE PART SET 1/2" NO		984 23486-25		

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EUR IBAN Acc. DK4552950013000735  
USD IBAN Acc. DK4252950015000929

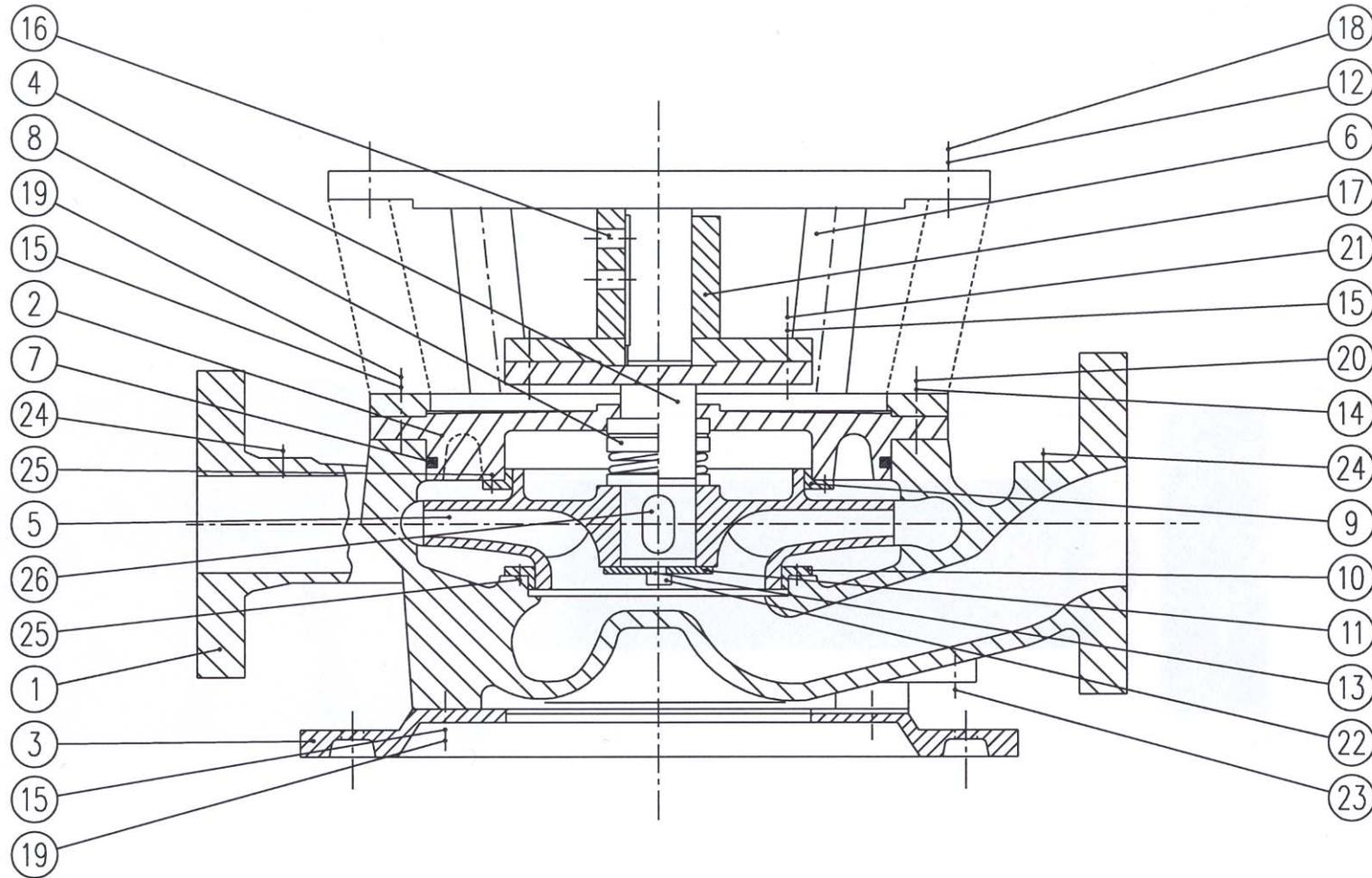


TYPE FRESHWATER GENERATOR.  
ARRANGEMENT DRAWING.



DATE 07/03-95  
SIGN. 02A

DRAWING NO. 985 16646 R:01



SCALED 2

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985 00005-51	3
985 00005-12	3
985 00004-59	3
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06	New article no. added	16.09.93	AJE	X	X
05	New article no. added	17.11.92	ANO	AJE	HJD
04	New article no. added	16.10.92	ANO	LSI	HJD
03	New article no. added	31.08.92	FJD	ANO	EWA
02	New article no. added	09.06.92	SJD	ANO	EWA
01	New drawing in CAD	23.10.91	AJE	HJD	EWA

EJECTOR PUMP  
XXX  
CNL-200

27.01.86	AJ		
Scale		X	
	X	X	

984.10.302.00 05  
984.10.302.00

X X



# Bill Of Material

Parent item no.: 984 10337-00 R: 06	Description: EJECTOR PUMP CNL-80-80/200 DIN/JIS 56 M3/H, 42 MWC, 3500RPM	Date: 20040608	Page 1 of 2
Drawing no.: 984.10302.00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	HOUSING INCL. ITEM 7 + 10 + 25		984 10308-01	RG 10	
2	1.000000	EA	COVER INCL. ITEM 7 + 9 + 25 241880112		984 10302-02	ISO 1338/77 ; CuSn10Zn2	
3	1.000000	EA	BASE		984 10301-03	ISO 185/61 ; GRADE 250	
4	1.000000	EA	SHAFT COMPLETE ITEM 11 + 13 + 15 + 21 + 22 + 26		984 10302-04	AISI 329	
5	1.000000	EA	IMPELLER Ø 172		984 10337-05	NIAL.BRZ.	
6	1.000000	EA	MOTOR BRACKET		984 10306-06	ISO 185/61 ; GRADE 250	
7	1.000000	EA	O-RING		984 40999-03	NITRIL	
8	1.000000	EA	MECH. SEAL Ø 35		984 10724-11	316 C/CE	
9	1.000000	EA	WEAR RING INCL. SCREWS		984 10301-14	AL.BRZ.	
10	1.000000	EA	WEAR RING INCL. SCREWS		984 10308-06	AL.BRZ.	
11	1.000000	EA	WASHER		984 10301-16	AISI 329	
12	4.000000	EA	SPRING WASHER Ø16	HFC 1837 I	984 40901-12	ISO 683/13/74 ; TYPE 11	
13	1.000000	EA	SPRING WASHER Ø12	HFC 1842	984 40901-18	ISO 683/13/86 ; TYPE 20A	
14	4.000000	EA	SPRING WASHER Ø8	HFC 1837 I	984 40901-15	ISO 683/13/74 ; TYPE 11	
15	15.000000	EA	*SPRING WASHER Ø10 ISO 887/83	HFC 1837 I	984 40901-14	ISO 683/13/74 ; TYPE 11	
16	2.000000	EA	SCREW M10 X 12 DIN 916	HFC 1792	984 40910-22	ISO 683/13/86 ; TYPE 20A	
17	1.000000	EA	COUPLING INCL. POINTED SCREWS		984 10336-07	AL.BRZ.	
18	4.000000	EA	+ *SET SCREW M16 X 40	HFC 1886	984 40916-20	ISO 683/13/74 ; TYPE 11	
19	11.000000	EA	SCREW M10 X 35 DIN 912	HFC 1790	984 40910-13	ISO 683/13/86 ; TYPE 20A	
20	4.000000	EA	SCREW M8 X 20 DIN 912	HFC 1790	984 40908-06	ISO 683/13/86 ; TYPE 20A	
21	4.000000	EA	*SET SCREW M10 X 30	HFC 1886	984 40910-23	ISO 683/13/74 ; TYPE 11	
22	1.000000	EA	SCREW M12 X 30 DIN 912	HFC 1790	984 40912-15	ISO 683/13/86 ; TYPE 20A	
23	1.000000	EA	PLUG 3/8" BSP	FTHPT	984 40944-03	ISO 683/13/86 ; TYPE 20A	

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# Bill Of Material

Parent item no.: 984 10337-00 R: 06	Description: EJECTOR PUMP CNL-80-80/200 DIN/JIS 56 M3/H, 42 MWC, 3500RPM	Date: 20040608	Page 2 of 2
Drawing no.: 984.10302.00		Ini DKSOABK	

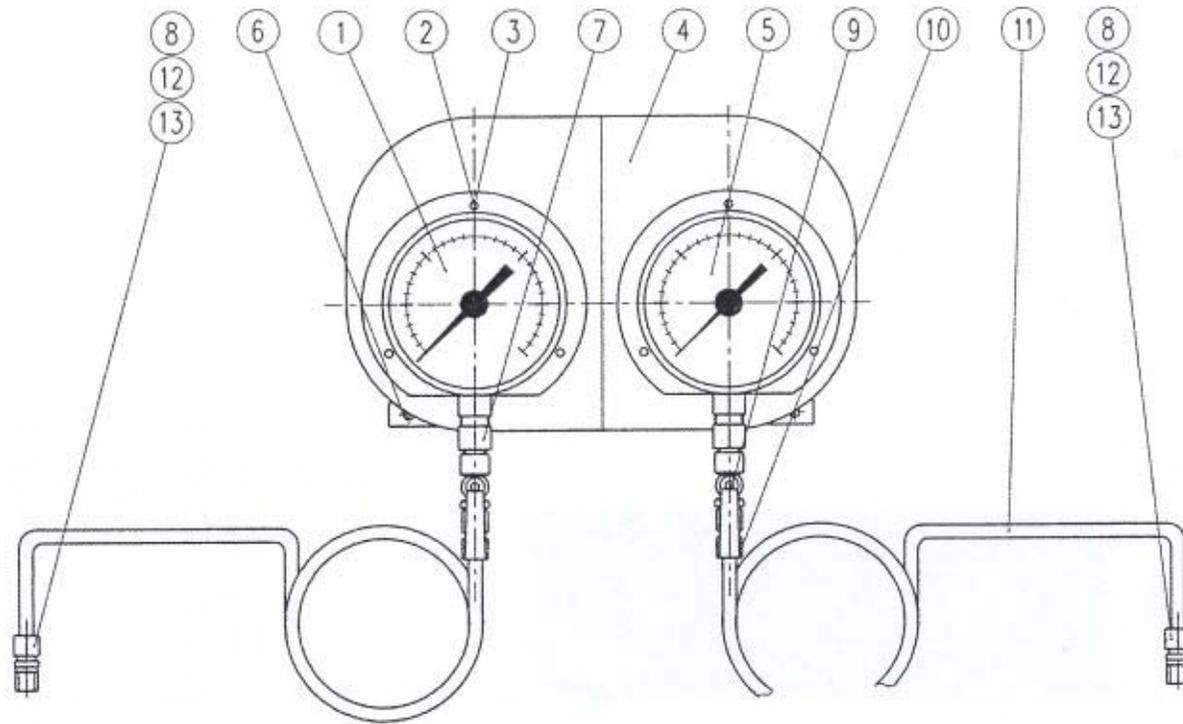
BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
24	2.000000	EA	PLUG 1/4" BSP	FTHPT	984 40944-04	ISO 683/13/86 ; TYPE 20A	
25	6.000000	EA	SCREW M5 X 12 DIN 963	HFC 1710	984 40905-06	ISO 683/13/86 ; TYPE 20A	
26	1.000000	EA	KEY 8 X 7 X 30		984 10724-16	AISI 316	

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984 58196-84	2	08	New Drawing Head.	Die. Rev. 07	01.06.04	MFN	MFN	PJE
984 58196-83	2	Rev. No.	Revision text		Date	Drawn	Checked	Appr.
984 58196-82	2	Title		SET OF MANOMETERS FOR PUMP.				
984 58196-81	2	Proj. No.	Proj. Type	Proj. Name	Production Drawing			
984 58196-80	2	Dimensions Without Tolerances:		ISO 2768-M or ISO 13820-B	Size	Location		
		Date	Drawn	ISO	Scale	Alfa Laval Copenhagen A/S - Denmark		
		17.08.98	AJ	Method C	1:2	Drawing No.	Rev.	
		Checked	Approved		Sheet	984 58196	08	
		AJ	AC		2			



# Bill Of Material

Parent item no.: 984 58196-83 R: 06	Description: SET OF MANOMETERS FOR PUMP TYPE CNL 65/80/100	Date: 20040630	Page 1 of 1
Drawing no.: 984 58196-R08		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	COMPOUND GAUGE -100% - 2 BAR LB/IN2, BAR = KGF/CM2, Ø100F, 3/8"N		984 30284-00		
2	6.000000	EA	SCREW M4 X 10 DIN 84		985 30470-16	ISO 683/13/86 ; TYPE 20A	
3	6.000000	EA	NUT M4 DIN 934		985 32010-03	QUALITY 8.8; DELTA MAGNI	
4	1.000000	EA	ATTACHMENT FOR MANOMETERS	984 58195-R02	984 58195-80		
5	1.000000	EA	PRESSURE GAUGE 0-6 BAR LB/IN2, BAR = KGF/CM2, Ø100F, 3/8"N		984 30318-00		
6	2.000000	EA	SCREW M6 X 10 DIN 84	HFC 9033	984 40906-01	STEEL ; EL. ZINCED KVAL. 4.8	
7	2.000000	EA	CONNECTION 3/8" BSP X 1/4" BSP	EV 120 B	984 40941-35	ISO 426/2/83 ; CU ZN39 PB3	
9	2.000000	EA	MANOMETER COCK 1/4"BSP		984 35661-00	BRASS	
10	2.000000	EA	CONNECTION 1/4" BSP X Ø 8	EV 66 F	984 40941-33	ISO 426/2/83 ; CU ZN39 PB3	
11	2000.000000	MM	COPPER PIPE Ø 6/8	VVS 04 0104 008	984 40938-03	COPPER	
12	2.000000	EA	CONNECTION 1/4" BSP X 8	EV 68 F	984 40941-05	ISO 426/2/83 ; CU ZN39 PB3	

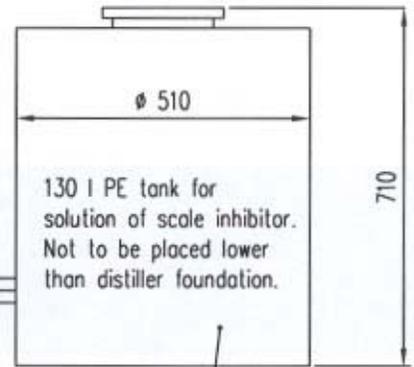
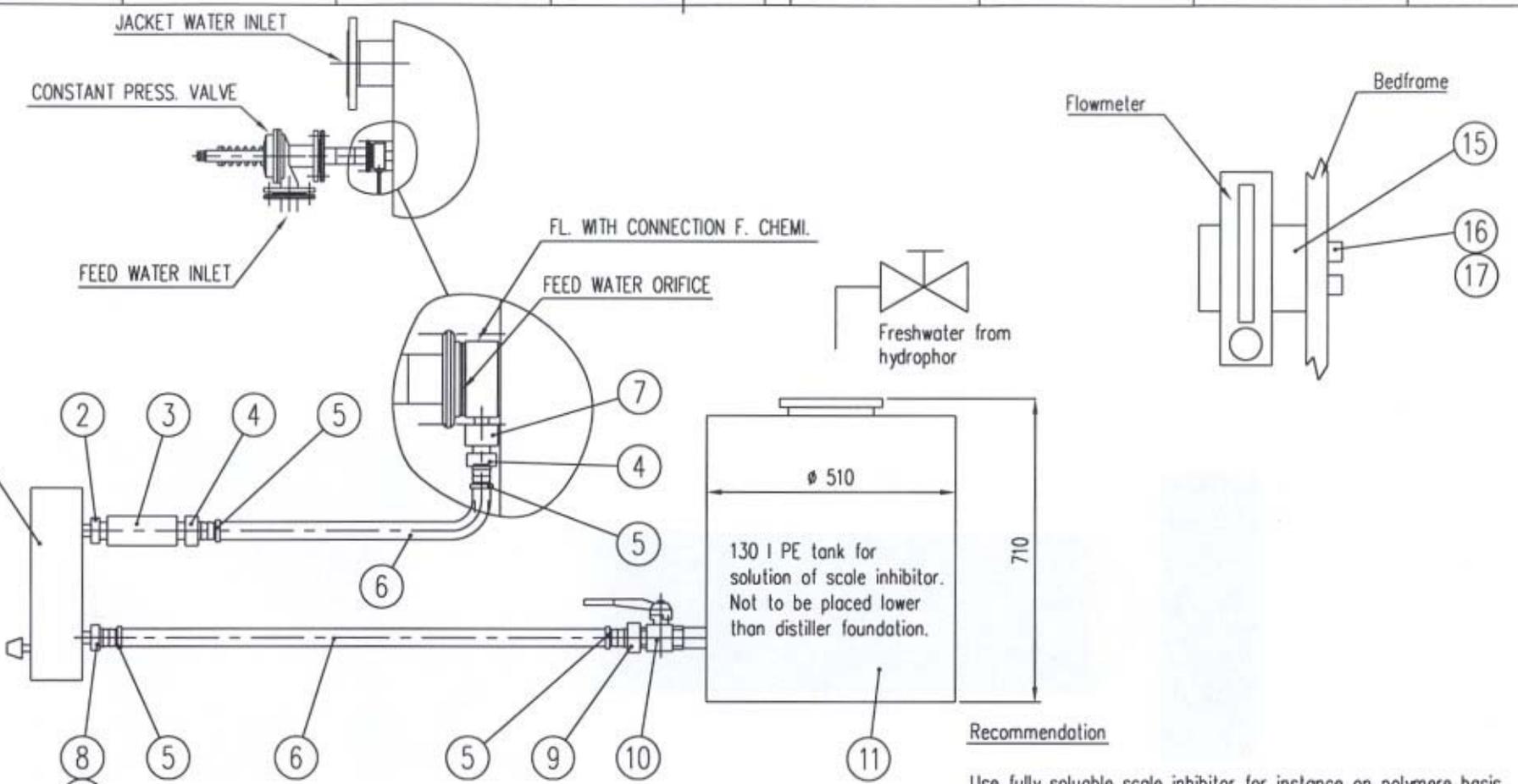
## Alfa Laval Copenhagen A/S

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Rev. 06  
 Drawing no. 985 14867



Recommendation

Use fully soluble scale inhibitor for instance on polymere basis.  
 Mix quantity required for 24 hours' operation in tank according to  
 maker's instruction and adjust dosage to cover max. fresh water  
 output from distiller.  
 Flush regulary.

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Rev. no.	Revision	Date	Revised	Reviewed	Approved
6	Att. pos 15. 16. 17.	291001	MFN	HJO	HJO
5	PARTS LIST -83 ADDED	961106	LSI	PGR	PGR
4	PART LIST ADDED	180895	CSM	JBN	JBN
3	NEW PRINT; REV. 02- DISAPPERED	110895	LGR	HPA	HPA
2	MATR. FOR TANK: PVC TO PE	141094	FBJ	HJO	HJO
1	CORRECTION CONCERNING ORIFICE	300694	FBJ	HJO	HJO

Rev. no.	Revision	Date	Revised	Reviewed	Approved
2					
2					
2					
2					

Article no. 985 14867-83 985 14867-82 985 14867-81 985 14867-80	Rev. no.	Revision			Date	Revised	Reviewed	Approved
	Title	FEED WATER TREATMENT SCALE INHIBITOR DOSAGE EQUIPMENT				Alfa Laval Alfa Laval Desalt A/S COPENHAGEN DENMARK		
	Date	14.01.93.	Drawn	OAN	Reviewed	AJE	Approved	AMS
	ISO method E	Scale	Weight		Repl. for 985 14867 rev. 05			
	CAD	Basic drawing no.	rev.		Drawing No. 985 14867		Repl. by X rev. X	



# Bill Of Material

Parent item no.: 985 14867-80 R: 07	Description: FEED WATER TREATMENT, SCALE INHIBITOR DOSAGE EQUIPMENT P-26-C/D-PU-36-C 130 L	Date: 20040623	Page 1 of 1
Drawing no.: 985 14867-R07		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	FLOWMETER INCL. REG. VALVE TILSLUTNING 1/8 NPT	985 20164-R00	985 00037-66	ACRYL	MOUNTED ON FWG
2	1.000000	EA	NIPPLE 3/8" BSP X 1/8" BSP	EV 206 B	984 40941-40	ISO 426/2/83 ; CU ZN39 PB3	MOUNTED ON FWG
3	1.000000	EA	NON RETURN VALVE 3/8" BSP		984 35623-00	BRASS	MOUNTED ON FWG
4	2.000000	EA	HOSE CONNECTION 3/8" BSP X 12	EV 265-2	984 40941-28	ISO 426/2/83 ; CU ZN39 PB3	MOUNTED ON FWG
5	4.000000	EA	HOSE CLIP		984 35543-00	ST.37	2PCS MOUNTED ON FWG
6	4.000000	ME	HOSE 3/8"		984 09607-01	Reinforced PVC-materiale	1PCS = 2ME
7	1.000000	EA	VALVE 1/2" BSP	VVS 744004 204	984 35542-00	RG 5	
8	1.000000	EA	HOSE CONNECTION 1/8" BSP X 12	EV 265-1	984 40941-26	ISO 426/2/83 ; CU ZN39 PB3	MOUNTED ON UNIT
9	1.000000	EA	HOSE CONNECTION 1/2" BSP X 12	EV 265-3	984 40941-27	ISO 426/2/83 ; CU ZN39 PB3	
10	1.000000	EA	TANK 130 L		985 00004-51	PE	
11	1.000000	EA	SUPPORT FOR FLOWMETER	985 18092-R01	985 18092-01	AISI 304	
12	2.000000	EA	SCREW M6 X 16 DIN 933 ISO 4017/88		985 30010-43	ISO 683/13/86 ; TYPE 20A	
13	2.000000	EA	WASHER M6 ISO 887/83		985 32510-08	A4	

## Alfa Laval Copenhagen A/S

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**BIC/SWIFT:** ESSEDKKK

**Accounts:** DKK IBAN Acc. DK5752950010008069  
EUR IBAN Acc. DK4552950013000735  
USD IBAN Acc. DK4252950015000929



# Bill Of Material

Parent item no.: SPARES-NK-01211 R: 00	Description: SPARE PARTS KIT JWP-26-C80B	Date: 20051102	Page 1 of 1
Drawing no.:		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
	2.000000	EA	MECH. SEAL Ø 35 MECHANICAL SEAL		984 10724-11	AVPGG*	FOR EJECTOR PUMP
1	1.000000	EA	MECH. SEAL Ø 16 MECHANICAL AXLESEALING		984 10230-08	AVPGG*	FOR F.W. PUMP
2	3.000000	EA	BALL BEARING 6210 Z C3		985 00037-49		FOR EJECTOR PUMP
2	1.000000	EA	BALL BEARING 6203 Z-C 3		984 20638-00		FOR F.W. PUMP MOTOR
3	1.000000	EA	GASKET FOR FRONT COVER P-26-C	984 58058-R03	984 58058-01		FOR GENERATOR

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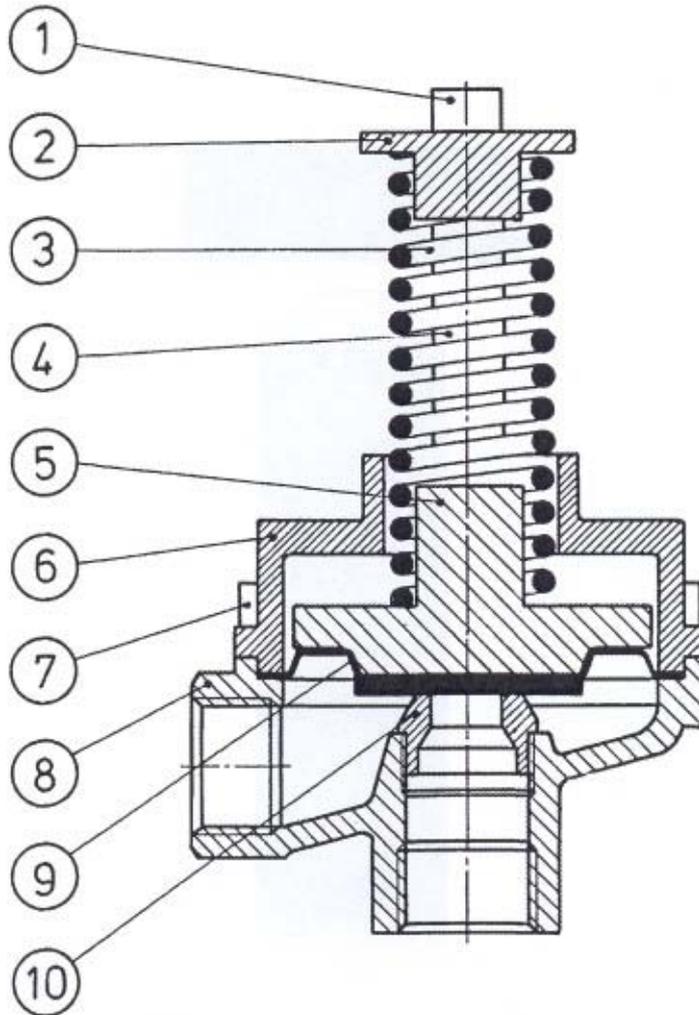
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 <b>ALFA-LAVAL</b> NIREX ENGINEERING COPENHAGEN DENMARK	Scale	construct	
		drawn	28.9.88 AJE
SPRING LOADED VALVE MV-15	Replacement for:		
	Drawing No:	984.35166.00	
	Replaced by:		



## Bill Of Material

Parent item no.: 984 35166-00 R: 01	Description: SPRING LOADED VALVE MV-15-1.0	Date: 20040608	Page 1 of 1
Drawing no.: 984.35166.00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	2.000000	EA	SCREW M6 X 50 DIN 912	HFC 1790	984 40906-26	ISO 683/13/86 ; TYPE 20A	
2	1.000000	EA	SPRING GUIDE		984 35685-02	RG 5	
3	1.000000	EA	SPRING		984 35685-03	AISI 304	
4	1.000000	EA	DISTANCE BUSHING L = 38 MM		984 35172-01	AISI 304	
5	1.000000	EA	DIAPHRAGM DISC.		984 35615-07	DELRIN	
6	1.000000	EA	+SPRING HOUSING		984 35166-02	BRASS	
7	4.000000	EA	SCREW M6 X 12 DIN 912	HFC 1790	984 40906-14	ISO 683/13/86 ; TYPE 20A	
8	1.000000	EA	VALVE HOUSING		984 35166-03	RG 5	
9	1.000000	EA	DIAPHRAGM TYPE MVF 25	984 58197	984 35615-09		
10	1.000000	EA	VALVE SEAT		984 35166-04	DELRIN	

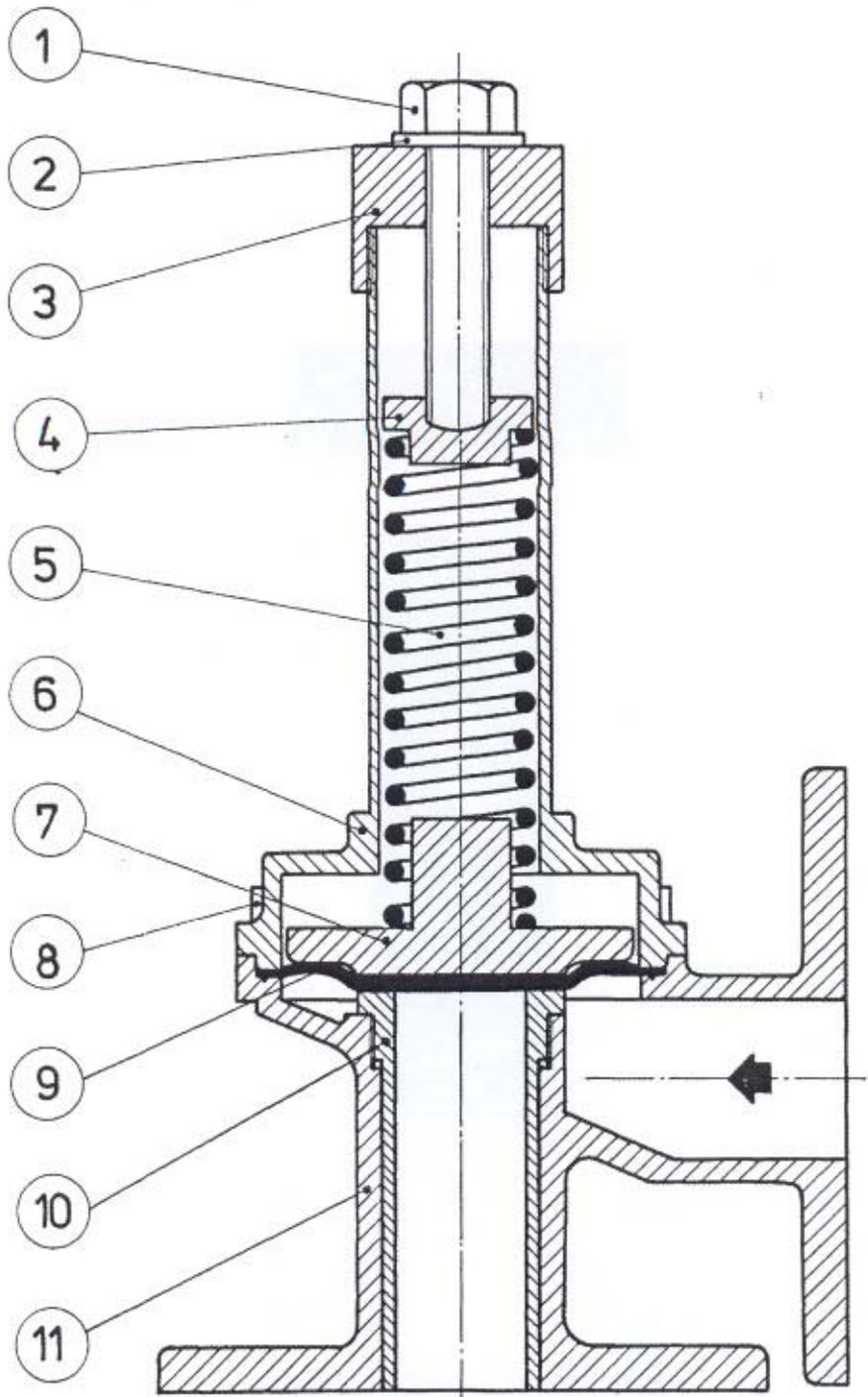
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USD IBAN Acc. DK4252950015000929

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**ALFA-LAVAL**  
NIREX ENGINEERING  
COPENHAGEN DENMARK

Scale	construct	FLOWMATIC
	drawn	8.2.89 RJE
	checked	
	revised	

**SPRING LOADED VALVE**  
**MVF-25 - 2.5**

Replacement for:	984.35615.00
Drawing No:	984.35177.00
Replaced by:	



# Bill Of Material

Parent item no.: 984 35177-00 R: 00	Description: SPRING LOADED VALVE MVF-25-2. REPLACES: 984.35615.00	Date: 20040608	Page 1 of 1
Drawing no.: 984.35177.00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	SCREW M10 X 45 DIN 933 KVAL. 8.8	HFC 473	984 40910-09	HARDENED STEEL ; EL. ZINCED	
2	1.000000	EA	+ *WASHER Ø 10 MM	HFC 1831	984 40901-08	ISO 683/13/86 ; TYPE 20A	
3	1.000000	EA	VALVE COVER		984 35615-03	BRASS	
4	1.000000	EA	SPRING GUIDE		984 35615-04	DELTRIN	
5	1.000000	EA	SPRING		984 35615-05	SPRING STEEL	
6	1.000000	EA	SPRING HOUSING		984 35615-06	BRASS	
7	1.000000	EA	DIAPHRAGM DISC.		984 35615-07	DELTRIN	
8	4.000000	EA	SCREW M6 X 12 DIN 912	HFC 1790	984 40906-14	ISO 683/13/86 ; TYPE 20A	
9	1.000000	EA	DIAPHRAGM TYPE MVF 25	984 58197	984 35615-09		
10	1.000000	EA	VALVE SEAT		984 35177-01	DELTRIN	
11	1.000000	EA	VALVE HOUSING		984 35177-02	RG 5	

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## TEST SHEET for Single-stage Freshwater Generator

Vessel/Rig:	Date:	Location:				
Distiller No.:	Type:	Capacity:			m <sup>3</sup> /24H	
No. of plates in evaporator:		Date for latest cleaning:				
No. of plates in condenser:		Date for latest cleaning:				
<b>TEST</b>						
Date						
Time from						
To						
Difference	min.					
Water clock to	m <sup>3</sup>					
From	m <sup>3</sup>					
Difference	m <sup>3</sup>					
Total output	m <sup>3</sup> /24h					
<b>Evaporator Section:</b>						
Hot water inlet	°C					
Hot water outlet	°C					
Difference	°C					
Hot water flow	m <sup>3</sup> /h					
Feed water temp.	°C					
<b>Separator Vessel:</b>						
Boiling temp.	°C					
Vacuum	%					
<b>Hot Water Pump:</b>						
Suction pressure	Bar					
Discharge pressure	Bar					
<b>Brine / Air Ejector:</b>						
Inlet pressure	Bar					
Discharge pressure	Bar					

