

# **Instruction Manual for Freshwater Generator Type D-PU-36-CAS100**

Serial No.: N-009955

Shipname/  
Hull No.: H5186

Build at yard: Daewoo Shipbuilding

*Book Number ON-009955.fm*

Alfa Laval reserve the right to make changes at any time without prior notice.

Any comments regarding possible errors and omissions or suggestions for improvement of this publication would be gratefully appreciated.

Copies of this publication can be ordered from your local Alfa Laval company.

**Published by:** Alfa Laval Copenhagen A/S  
Maskinvej 5  
DK-2860 Søborg  
(Copenhagen) Denmark

© **Copyright Alfa Laval Copenhagen.**  
This document and its content must not be copied, reproduced, transmitted or disclosed to any third party without consent of Alfa Laval Copenhagen.

---

# Table of Contents

---

## Safety Instructions and Warnings

1.0.0 Safety Instructions and Warnings . . . . .	page 6
--	--------

## System Description

1.0.0 Working Principle . . . . .	page 8
1.1.0 Freshwater Quality . . . . .	page 8
1.2.0 Main Components . . . . .	page 8
1.3.0 Alternative Steam . . . . .	page 9

## Operating Instructions

1.0.0 Starting and Stopping Procedure . . . . .	page 10
1.1.0 Starting-up the Plant with Jacket Cooling Water Heating . . . . .	page 10
1.1.1 Evaporation . . . . .	page 10
1.1.2 Condensation . . . . .	page 11
1.2.0 Adjustment of Jacket Water Flow . . . . .	page 11
1.3.0 Adjustment of Sea Cooling Water . . . . .	page 12
1.4.0 Stopping the Plant . . . . .	page 12
2.0.0 Before Starting Up the Plant with Steam Injection Equipment . . . . .	page 13
2.1.0 Starting Up the Plant with Steam Injection Equipment (AS) . . . . .	page 14
2.1.1 Evaporation . . . . .	page 14
2.1.2 Condensation . . . . .	page 15
2.2.0 Adjustment of the Freshwater Production . . . . .	page 15
2.3.0 Stopping the Plant Working with Steam Injection Heating . . . . .	page 15
2.4.0 Changing from Steam Injection Heating to Jacket Cooling Water . . . . .	page 16
2.5.0 Long Term Standstill . . . . .	page 17

## Maintenance

3.0.0 Why you need to perform regular maintenance duties . . . . .	page 18
3.1.0 Overhaul Intervals . . . . .	page 18
3.2.0 Maintenance of Separator Vessel . . . . .	page 19
3.3.0 Maintenance of Evaporator Section . . . . .	page 20
3.4.0 Maintenance of Condenser Section . . . . .	page 21
3.5.0 Renewal of Plate Heat Exchanger Gaskets . . . . .	page 22
3.5.1 Removal of Old Gaskets . . . . .	page 22
3.5.2 Cleaning . . . . .	page 23
3.5.3 Preparation of new Gaskets . . . . .	page 23
3.5.4 Fitting new Gaskets . . . . .	page 23

## Pressure Test

4.0.0 Pressure Testing Separator . . . . .	page 25
--	---------

## Table of Contents

---

### Chemical Dosing of Scale Control Chemicals

5.0.0 Prevention of Scaling . . . . .	page 26
5.1.0 Feed Water Ratio . . . . .	page 26
5.2.0 Chemical Dosage . . . . .	page 26
5.2.1 Scale Inhibitor Dosage Equipment for Feed Water . . . . .	page 27
5.2.2 Safety Precautions with the use of Chemicals . . . . .	page 28

### Trouble-Shooting

6.0.0 Test Sheet . . . . .	page 29
6.1.0 Trouble Shooting Table . . . . .	page 30

### Maintenance of Freshwater Pump

7.0.0 Maintenance of Freshwater Pump Types PVVF 1525-1532-2040 . . . . .	page 33
7.1.0 Overhaul of the Pump . . . . .	page 33
7.1.1 Clearance . . . . .	page 34
7.1.2 Dismantling Pump Shaft . . . . .	page 34

### Maintenance of Ejector Pump

8.0.0 Maintenance of Ejector Pump . . . . .	page 37
8.1.0 Overhaul of the Pump . . . . .	page 37
8.1.1 Clearance . . . . .	page 38
8.1.2 Dismantling Pump Shaft . . . . .	page 40

### Salinometer

9.0.0 Salinometer Type DS-20 . . . . .	page 41
9.1.0 Technical Specification . . . . .	page 41
9.2.0 Installation (for DS-20). . . . .	page 41
9.3.0 Instructions for use . . . . .	page 42
9.3.1 Testing the Instrument . . . . .	page 42
9.3.2 Adjustment of Alarm Level . . . . .	page 42
9.3.3 Maintenance . . . . .	page 43

### Spare Parts

10.0.0 Ordering Spare Parts . . . . .	page 44
10.1.0 Alfa Laval Service . . . . .	page 44

### Index

### FWG Order Specification

9.2.3.1 General description, D-PU-36-C(AS)100/125 . . . . .	page 52
9.2.3.2-1 Technical data, D-PU-36-C(AS)100 . . . . .	page 54
9.2.3.2-2 Technical data, Pump and Motor for D-PU-36-C(AS)100 . . . . .	page 56
9.2.5.2-3 Dimensional drawing, CNL 80-80/200 . . . . .	page 57

## Table of Contents

---

9.2.5.1-3 Technical data, CNL 80-80/200 .....	page 58
9.2.3.4-1 Equipment Specification, D_PU-36-C(AS)100 .....	page 62
9.2.6.1-4 Technical data, Control panel for Freshwater Generator .....	page 63
9.2.9.1-4 Manometer set for Ejector pump. ....	page 68
9.2.9.2-3 Steel box for spare part kits .....	page 70
9.3.1.1 Included in delivery .....	page 71

---

# ***Safety Instructions and Warnings***

---

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

**Telephone**        +45 (for Denmark) 39 53 60 00

**Telefax**         +45 (for Denmark) 39 53 65 66

## **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.**



### 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).

---

# ***System Description***

---

## **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 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 condenser section.

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

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

## **1.1.0 Freshwater Quality**

To continuously check the quality 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.

## **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 in condensable 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 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.

### 1.3.0 Alternative Steam

1. **Steam injector**  
Instead of jacket cooling water heating, saturated live steam can alternatively be used as heating medium for the freshwater generator. In the steam injector the steam transfers partly heat, partly kinetic energy to the circulating water.  
  
The condensate produced in this circuit is transferred to the condensate well through G3.
2. **Safety valve**  
If the pressure after the steam injector exceeds 1 bar g the safety valve will open to secure the vessel.
3. **Steam quality**  
The steam supplied to the steam injector must be saturated steam.

---

# Operating Instructions

---



## 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.

### 1.0.0 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”).

### 1.1.0 Starting-up the Plant with Jacket Cooling Water Heating

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>).

### 1.1.1 Evaporation

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

### CAUTION

To secure that the boiler water and the jacket water do not mix the two butterfly **valves** in the steam injector circuit must be closed.

5. Close the two butterfly **valves** in the steam injector circuit.
6. Open valve for feedwater treatment, if any.
7. Open hot water inlet and outlet valves.
8. Start hot water supply to distiller by adjusting bypass valve 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.

### 1.1.2 Condensation

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

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

### NOTE

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

### 1.2.0 Adjustment of Jacket 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

## Operating Instructions

---

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=26.67 for 1-stage freshwater generator  
= Constant =15.52 for 2-stage freshwater generator

$\Delta t$  = 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 = 20m<sup>3</sup>  
 $T_{SW}$  = 32°C

$\Delta t_{JW}$  = 6°C

1-stage freshwater generator

$$M_{JW} = \frac{26.67 \times 20}{6} = 89 \text{ m}^3/\text{h}$$

### 1.3.0 Adjustment of Sea Cooling Water

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

### 1.4.0 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**.
7. Close inlet and outlet valves for ejector pump.
8. Close overboard valve for combined brine/air ejector.
9. Close the valve to fresh water tank.

### CAUTION

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

## 2.0.0 Before Starting Up the Plant with Steam Injection Equipment



### WARNING

The steam arrangement must be filled with fresh water from hydrophone system, before steam is supplied to the system.

When changing from jacket water heating to steam injection heating

1. Close in- and outlet valves for jacket cooling water system (yard supply)
2. Empty the jacket cooling water by G4 to the bilge
3. Open the plug at G2.
4. When empty: close the outlet G4

To fill up the steam injection system with clean fresh water or steam condensate.

5. Open the two butterfly **valves** in the steam injector circuit
6. Fit a water hose into **G2**.
7. Fill up the system, with boiler feed water or clean fresh water until water escape from ball valve at the steam condensate outlet G3.
8. Then close this valve.
9. Dismantle the water hose.

## Operating Instructions

---

10. Close the G2 with a plug.



### WARNING

No valve at all must be fitted on the pipe from the safety valve (G16) as this pipe must be open to the atmospheric pressure.

### 2.1.0 Starting Up the Plant with Steam Injection Equipment (AS)

1. Open valves on the suction and discharge side of the combined **ejector/cooling water pump PU-SC-01**.
2. Open overboard valve for **combined brine/air ejector EW-ES-01**.
3. Close **air screw VA-E1-01** on the separator.
4. Start **combined ejector/cooling water 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

5. Open the two butterfly valves in the steam injector circuit.
6. Open valve for feedwater treatment, if any.
7. Open the steam inlet valve (yard supply) slowly.
8. Wait a few minutes until the equipment will be noiseless.
9. Continue the supply of steam until the desired inlet pressure is reached. Steam pressure must be in accordance with pressure stated in "Technical specification".



### WARNING

Max. back pressure in condensate discharge line is 80 kPa (0.8 kp/cm<sup>2</sup>).

### 2.1.2 Condensation

10. Open valve to freshwater tank.
11. Switch on salinometer.
12. Start **freshwater extraction/transfer pump PU-FR-01/PU-FR-02.**
13. Readjust the steam supply to reach the freshwater production.

#### NOTE

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

### 2.2.0 Adjustment of the Freshwater Production

The freshwater production can be regulated by adjustment of the quantity of steam supplied to the steam injector.

The steam inlet pressure corresponding to the production of fresh water in question can be regulated either by means of a manually operated regulating valve (yard supply) or by an automatic reduction valve (yard supply).

Steam pressure must be in accordance with pressure stated in "FWG Order Specification".



#### WARNING

Do not open steam inlet valve for the steam injector before the ejector pump PU-SC-01 has been started and serves feed water to the evaporator.

### 2.3.0 Stopping the Plant Working with Steam Injection Heating

1. Close steam inlet valve (yard supply).
2. Close valve for feedwater treatment, if any
3. Stop **freshwater pump PU-FR-01/PU-FR-02.**

## Operating Instructions

---

4. Switch off salinometer.
5. Stop **ejector pump PU-SC-01**.
6. Open **air screw VA-E1-01**.
7. Close inlet and outlet valves for ejector pump.
8. Close overboard valve for combined brine/air ejector.
9. Close the valve to fresh water tank.

### CAUTION

When stopping the plant always check that the steam inlet valve is completely closed.

This to avoid high temperature in the evaporator, as this might cause:

- Scale formation on the inside of the heat exchanger plates.
- Damage the gaskets in the heat exchanger.

### 2.4.0 Changing from Steam Injection Heating to Jacket Cooling Water

1. Close the valve for steam supply (yard supply).
2. Close the two butterfly valves for **steam injection equipment**.
3. Open the ball valve at the steam condensate outlet G3.
4. Empty the boiler water by G4 to the bilge.
5. When empty: Close the outlet G4.
6. Close the ball valve mentioned above.
7. Open the valves for in- and outlet jacket cooling water to the evaporator (yard supply).
8. Start hot water supply to distiller by adjusting bypass valve step-wise until the desired jacket water temperature is reached.

### 2.5.0 Long Term Standstill

If the distiller is out of operation for periods longer than 14 days, please observe "Maintenance of separator vessel".

---

# Maintenance

---

## 3.0.0 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.

## 3.1.0 Overhaul Intervals

Component	Operating Hours	Action
Evaporator section	As required	Clean in inhibited acid bath
Condenser section	As required	Clean with pure freshwater and brush
Combined ejector/cooling water pump with motor Hot water circulating pump	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.
MV-valves	4000 h	Disassembly and inspect for damage.
Demister	8000 h	Clean in inhibited acid bath

<b>Component</b>	<b>Operating Hours</b>	<b>Action</b>
Manometers	8000 h	Adjust with control manometer
Salinometer	See separate instructions	See separate instructions

### 3.2.0 Maintenance of Separator Vessel

The separator vessels 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 separator vessels.

Further, there are isolating layers on the separator inside walls, where the heat exchanger sections are mounted.

Whenever the sections are dismantled, these isolating layers must be checked for defects. Repair any defects according to the maintenance guide for glass flake coating.

Whenever the separator vessel is opened,

- check that the anodes are functioning

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

**NOTE**

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

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

### 3.3.0 Maintenance of Evaporator Section

Clean evaporator as follows:

1. Remove bolts in front cover, and open.
2. Loosen the 6 nuts 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 5.4 mm 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, when vacuum has been reestablished.

### 3.4.0 Maintenance of Condenser Section

Clean condenser as follows:

1. Remove bolts in front cover, and open.
2. Loosen the 6 nuts for SWC-unit / 12 nuts for CL-unit 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 5.4 mm 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 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.

## 3.5.0 Renewal of Plate Heat Exchanger Gaskets

### 3.5.1 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*

### 3.5.2 Cleaning

Charred or loose glue and rubber remains must be removed, e.g. using a rotating stainless steel brush. The width should be adapted ( $\text{Ø}40\text{-}50$  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.*

### 3.5.3 Preparation of new Gaskets

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

### 3.5.4 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*

## Maintenance

---

*gradually be pushed into the groove towards the middle.*

*If necessary, tape gasket into groove.*

---

# *Pressure Test*

---

## **4.0.0 Pressure Testing Separator**

If there are leaks in the system, it will be necessary to carry out a pressure test in order to identify the leak:

1. Close valve on discharge side of combined cooling water/ejector pump.
2. Close discharge valve on overboard line from combined brine/air ejector.
3. Close valve on discharge line to freshwater tanks.
4. Open air screws on the separator vessel in order to vent the vessel, when supplying water for pressure test.
5. Supply water (sea or freshwater) at the socket for the connection of feed water treatment.

### **CAUTION**

Maximum pressure on the separator vessel is 150 kPa (1.5 kp/cm<sup>2</sup>) (21 PSI).

---

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

---

## **5.0.0 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.

## **5.1.0 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.

## **5.2.0 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.

### **5.2.1 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.

### 5.2.2 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.***

---

## ***Trouble-Shooting***

---

### **6.0.0 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

### 6.1.0 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
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.	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.
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).	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.
Salinity too high (more than 2.0 ppm).	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 stetoscope, and replace bearings, if defective.
	Contactors defective.	Examine and replace contactor set, if defective.
	Breaking of phases.	Max. 5% difference in amperage between phases.

---

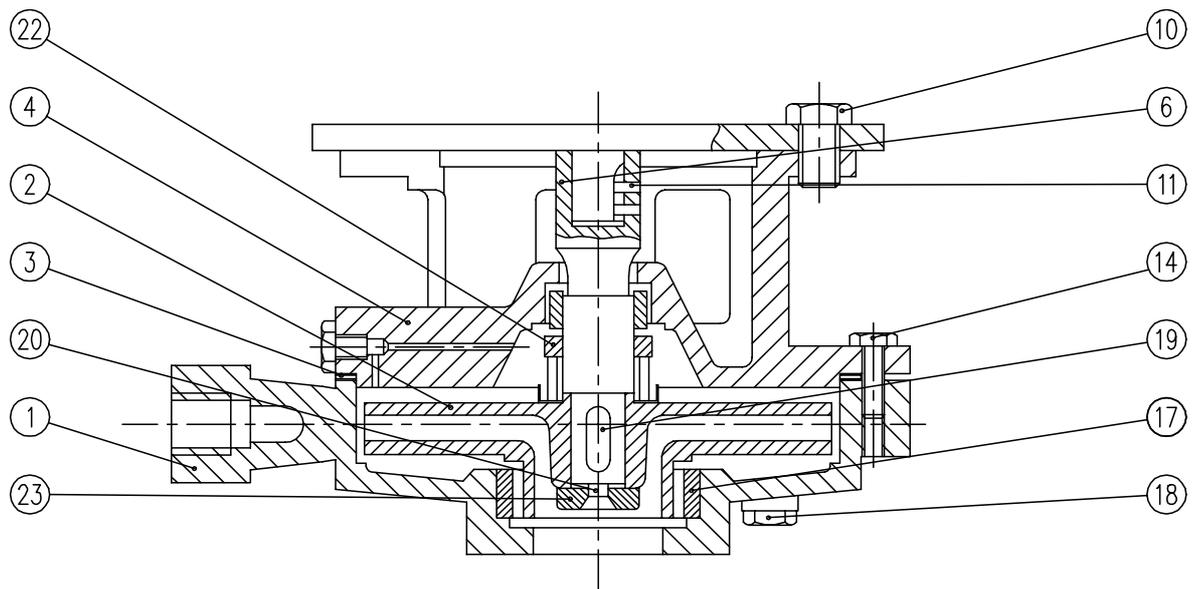
# Maintenance of Freshwater Pump

---

## 7.0.0 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.



### 7.1.0 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.

### 7.1.1 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.

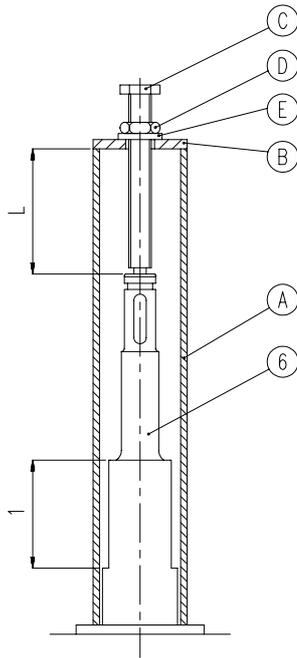
In this case carefully observe “Dismantling pump shaft”.

### 7.1.2 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.



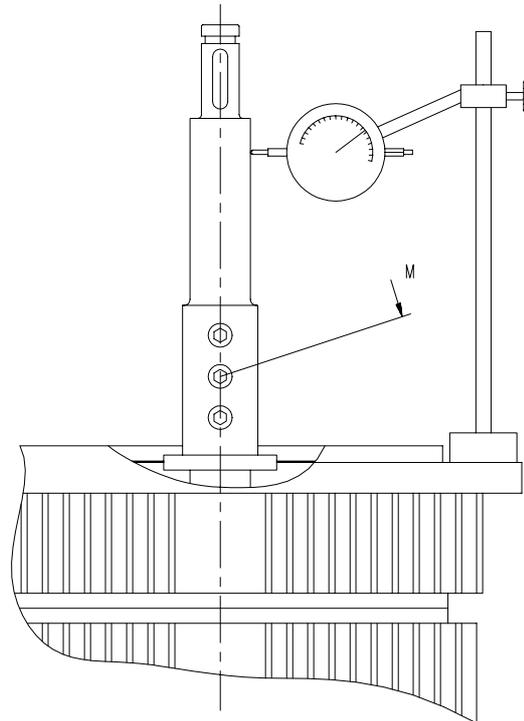
### CAUTION

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.

---

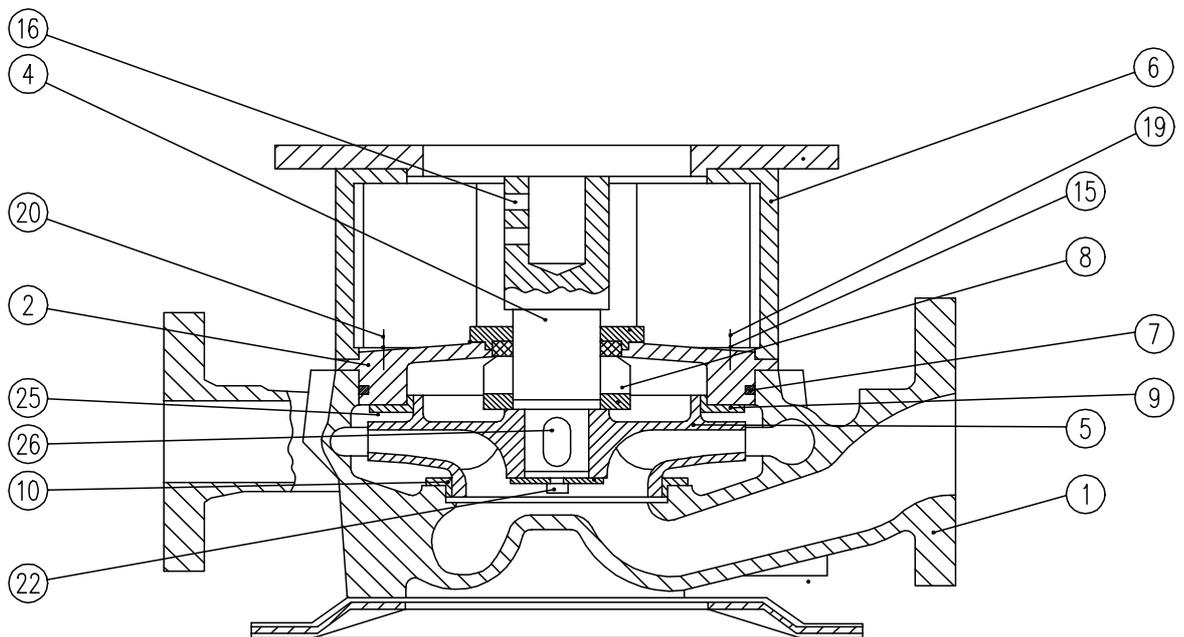
# Maintenance of Ejector Pump

---

## 8.0.0 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.



### 8.1.0 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**.

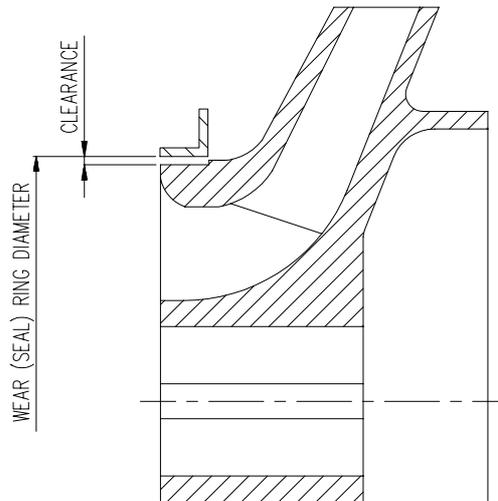
7. Inspect impeller and threaded holes for clogging.

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

9. Reassemble in reverse order.

### 8.1.1 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

---

### 8.1.2 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

---

## 9.0.0 Salinometer Type DS-20

### 9.1.0 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.

### 9.2.0 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

---

### 9.3.0 Instructions for use

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

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

### 9.3.1 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.*

### 9.3.2 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.

### 9.3.3 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***

---

## **10.0.0 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.

## **10.1.0 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.

---

# Index

---

## Numerics

9.2.3.1 General description, D-PU-36-C(AS)100/125	page 52
9.2.3.2-1 Technical data, D-PU-36-C(AS)100	page 54
9.2.3.2-2 Technical data, Pump and Motor for D-PU-36-C(AS)100	page 56
9.2.3.4-1 Equipment Specification, D_PU-36-C(AS)100	page 62
9.2.5.1-3 Technical data, CNL 80-80/200	page 58
9.2.5.2-3 Dimensional drawing, CNL 80-80/200	page 57
9.2.6.1-4 Technical data, Control panel for Freshwater Generator	page 63
9.2.9.1-4 Manometer set for Ejector pump	page 68
9.2.9.2-3 Steel box for spare part kits	page 70

## A

Adjustment of alarm level	page 42
Adjustment of Jacket Water Flow	page 11
Adjustment of sea cooling water	page 12
Adjustment of the freshwater production	page 15
Alfa Laval service	page 44
Alternative Steam	page 9

## B

Before starting up the plant with steam injection equipment	page 13
---	---------

## C

Changing from steam injection heating to jacket cooling water	page 16
Chemical dosage	page 26
Cleaning	page 23
Clearance	page 38
Condensation	page 15

## D

Dismantling pump shaft	page 40
------------------------	---------

## E

Ejector Pump	page 37
Evaporation	page 14

## F

Feed water ratio	page 26
Fitting new gaskets	page 23
Freshwater Pump Types PVVF 1525-1532-2040	page 33
Freshwater quality	page 8
FWG	page 48

## Index

---

<b>H</b>	
HWL Order Specification .....	page 48
<b>I</b>	
Installation (for DS-20) .....	page 41
Instructions for use .....	page 42
<b>L</b>	
Long term standstill .....	page 17
<b>M</b>	
Main components .....	page 8
Maintenance .....	page 43
Maintenance of condenser section .....	page 21
Maintenance of ejector pump .....	page 37
Maintenance of evaporator section .....	page 20
Maintenance of Freshwater pump .....	page 33
Maintenance of freshwater pump types PVVF 1525-1532-2040 .....	page 33
Maintenance of separator vessel .....	page 19
<b>O</b>	
Operating Hours .....	page 18
Ordering spare parts .....	page 44
Overhaul intervals .....	page 18
Overhaul of the pump .....	page 37
<b>P</b>	
Perform regular maintenance duties .....	page 18
Preparation of new gaskets .....	page 23
Pressure testing separator .....	page 25
Prevention of scaling .....	page 26
<b>R</b>	
Removal of old gaskets .....	page 22
Renewal of plate heat exchanger gaskets .....	page 22
<b>S</b>	
Safety instructions and warnings .....	page 6
Safety precautions with the use of chemicals .....	page 28
Salinometer type DS-20 .....	page 41
Scale inhibitor dosage equipment for feed water .....	page 27
Spare Parts .....	page 44
Starting and Stopping Procedure .....	page 10
Starting up the plant with steam injection equipment (AS) .....	page 14
Starting-up the Plant with Jacket Cooling Water Heating .....	page 10
Stopping the plant .....	page 12

Stopping the plant working with steam injection heating ..... page 15

**T**

Technical specification ..... page 41

Telefax ..... page 6

Telephone ..... page 6

Test sheet ..... page 29

Testing the instrument ..... page 42

Trouble shooting table ..... page 30

**W**

Warning ..... page 6

Why you need to perform regular maintenance duties ..... page 18

Working principle ..... page 8

# FWG Order Specification

## FWG Order Specification

INI.: BBU	Date: 01.05.30	BPCS: 23213	Serial no.: N-009955
--------------	-------------------	----------------	-------------------------

Page 1/2

### Technical data

Type of generator: D-PU-36-CAS100	Capacity [m <sup>3</sup> /24h]: 40	NE/NK: 46/46
Power supply, main/control	Main [Volt / Hz]: 3 x 440/60	Control [Volt]: 230
Jacket water temperature	Inlet [°C]: 80	Outlet [°C]: 67,8
Jacket water flow /pressure drop	Flow [m <sup>3</sup> /h]: 85,4	Pressure drop [bar] 0,3
Heat consumption from jacket water	[Mcal/h]: 1041,5	or [kW]: 1212,2
Seawater temperature	Inlet [°C]: 32	Outlet [°C]: 42,4
Seawater flow /pressure drop	Flow [m <sup>3</sup> /h]: 88	Pressure drop [bar] 0,3
Alternative heating: steam:	Capacity [m <sup>3</sup> /24h]: 40	
Steam flow /pressure:	Flow [kg/h]: 1900	Pressure [bar]: 7

### Pump / motor data

	Fresh water	Ejector water	Brine water	Hot water
Nominal flow x pressure [ m <sup>3</sup> /h x mwc ]:	2,1 x 39	88 x 38	-	-
Marked output power [kW]:	0,75	21,4	-	-
Consumed electrical power [kW]:	0,75	18,2	-	-
Current [A]:	1,6	33,5	-	-
Rotating speed [rpm]:	3360	3515	-	-

### Quality data

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

### Extra / special equipment

Special painting : Munsell 7,5 BG 7/2 (ejector pump/motor, control panel, box for spare parts)

### 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 (113°F)

## FWG Order Specification

INI: BBU	Date: 01.05.30	BPCS no.: 23213	Serial no.: N-009955	Page 2/2
-------------	-------------------	--------------------	-------------------------	----------

### Documentation

General description, freshw ater generator	Doc. No.	9.2.3.1
Technical data, freshw ater generator	Doc. No.	9.2.3.2-1
Dimension draw ing, freshw ater generator	Doc. No.	985 18984
Technical data, pump and motor	Doc. No.	9.2.3.2-2
Dimension draw ing, ejector pump	Doc. No.	9.2.5.2-3
Technical data, ejector pump	Doc. No.	9.2.5.1-3
Outline draw ing, motor for ejector pump	Doc. No.	985 16662
Outline draw ing, motor for freshw ater pump	Doc. No.	985 16704
Flow chart, incl. options	Doc. No.	985 18983
Equipmnt specification	Doc. No.	9.2.3.4-1
Technical data, control panel option A	Doc. No.	9.2.6.1-4
Dimension draw ing, control panel option A	Doc. No.	9.2.6.2-4.1
Electric diagram	Doc. No.	9.2.6.3-4.1
Technical data, remote start/stop	Doc. No.	9.2.9.2-1
Technical data, manometer set	Doc. No.	9.2.9.1-4
Dimension draw ing. Control panel build-on	Doc. No.	9.2.9.1-2
Technical data, box for spare parts box	Doc. No.	9.2.9.2-3
Spare parts included in the delivery	Doc. No.	9.3.1.1
Dimension draw ing, thermometer	Doc. No.	984 30365
Spare parts draw ing, generator	Doc. No.	985 15765
Spare parts list, generator	Doc. No.	985 18920-80
Spare parts list, steam arrangement	Doc. No.	985 18985
Assembly scheme		985 13474
Spare parts, steam arrangement	Doc. No.	985 18985-81
Spare parts, steam injector	Doc. No.	985 00033-72



# Bill Of Material

Parent item no.: SPE-N-009955 R: 00	Description: SPECIFICATION PARTS LIST D-PU-36-CAS100 DRAWING NO. 985 18920	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	SOLENOID VALVE 1/2" EV220B 15 220V 50/60 CS NO (EVSI 15)	984.23482.0	984 23486-00		
4	1.000000	EA	MOTOR 71B-2 380/440V 50/60HZ 0.55/0,75KW 1.4/1.6A		984 20313-00		
6	1.000000	EA	FRESHWATER PUMP PVVF-2040.2X-012	984.10230.00	984 10253-00		
7	1.000000	EA	COMBINED BRINE/AIR EJECTOR	984 12200-R05	984 12229-00		
35	12.000000	EA	CLAMPING BOLT L1 = 370 MM	985 13949	985 13949-81		
37	1.000000	EA	PLATE P-36-C KS DPU		119377-7185	TITAN/NITRIL	ASS.MEASURE = 248 MM
37	1.000000	EA	PLATE P-36 EE/KE		119418-8116	TITAN/NITRIL	
37	22.000000	EA	PLATE P-36 KV		119371-7103	TITAN/NITRIL	
37	22.000000	EA	PLATE P-36 KD		119377-7103	TITAN/NITRIL	
38	1.000000	EA	PLATE P-36 ES/KS		119377-7183	TITAN/NITRIL	ASS.MEASURE = 248 MM
38	1.000000	EA	PLATE P-36 EE/KE		119418-8116	TITAN/NITRIL	
38	22.000000	EA	PLATE P-36 EV		119418-7103	TITAN/NITRIL	
38	22.000000	EA	PLATE P-36 ED		119418-6103	TITAN/NITRIL	
40	1.000000	EA	ORIFICE D = 11,8	984 57864	984 57864-07		
501	.000000	EA	ACCESSORIES:		ACCESSORIES		
501	1.000000	EA	CONTROL PANEL - FWG - OPT. A (DIAGR: 985 16645-R01)	985 16646-R01	985 00034-85		MUNSELL 7,5 BG 7/2
502	1.000000	EA	SET OF MANOMETERS FOR PUMP TYPE CNL 65/80/100	984 58196-R08	984 58196-83		
502	.000000	EA	MOTOR 160L-2 380/440V 50/60HZ 18,5/21KW IN 34A ABB		985 00057-36		
502	.000000	EA	EJECTOR PUMP (STAINL.ST.IMP.) CNL-80-80/200 DIN/JIS	984.10302.00	985 00064-01		
503	1.000000	EA	FEED WATER TREATMENT, SCALE INHIBITOR DOSAGE EQUIPMENT	985 14867-R08	985 14867-80		
504	1.000000	EA	SPARE AND TOOL BOX 400X400X150 MUNSELL 7.5 BG 7/2 (JIS)		985 00024-06	Munsell 7.5 BG 7/2	
504	1.000000	EA	SPARE PARTS KIT JWSP-26-C100		SPARES-N-009955		
505	1.000000	EA	START/STOP BOX TELEMECANIQUE XAL-D211H29		985 00022-83	6661	

## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
**BIC/SWIFT:** ESSEDKKK

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



# Bill Of Material

Parent item no.: SPE-N-009955 R: 00	Description: SPECIFICATION PARTS LIST D-PU-36-CAS100 DRAWING NO. 985 18920	Date: 20051102	Page 2 of 2
Drawing no.:		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
506	1.000000	EA	GLAND PG 21		984 21625-02	4590	FOR EJECTOR PUMP
506	1.000000	EA	NUT PG 21		984 21625-06	702	FOR EJECTOR PUMP
507	1.000000	EA	GLAND PG 13		984 21625-04	4588	FOR REMOTE BOX
507	1.000000	EA	NUT PG 13,5		984 21625-08	700	FOR REMOTE BOX

## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
BIC/SWIFT: ESSEDKKK  
**Accounts:** DKK IBAN Acc. DK5752950010008069  
EUR IBAN Acc. DK4552950013000735  
USD IBAN Acc. DK4252950015000929

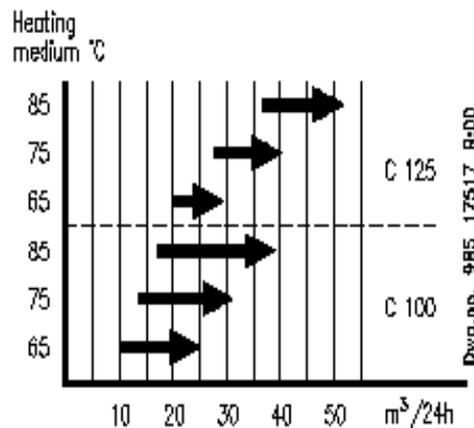
### 9.2.3.1 General description, D-PU-36-C(AS)100/125

#### Application

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

#### Capacity

The D-PU-36-C(AS)100/125 covers a capacity range from 10 to 52 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 50°C as it passes between the hot plates in the evaporator. This evaporating temperature corresponds to a vacuum of approximately 88% 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.  
Stainless steel separator 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. Further more the freshwater generator is equipped with dump valve, water clock, automatic feed water regulator, combined brine/air ejector, instruments, fresh water 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 motor starters and salinometer.
- Feed water treatment.

## **Optional equipment/design**

---

- Steam heating systems type CAS.
- 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.
- Control 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.



**9.2.3.2-1 Technical data, D-PU-36-C(AS)100**

**Power consumption**

Ejector and freshwater pump:	<u>50 Hz</u> 18.9 kW	<u>60 Hz</u> 19.0 kW
------------------------------	-------------------------	-------------------------

**Pressure**

	bar(g)	lbs/in <sup>2</sup>
Max. jacket water pressure:	4.0	58
Max. back pressure to freshwater tank:	1.6	23
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: 88 m <sup>3</sup> /h	Jacket water flow: 40-110 m <sup>3</sup> /h
-------------------------------------	---

**Materials**

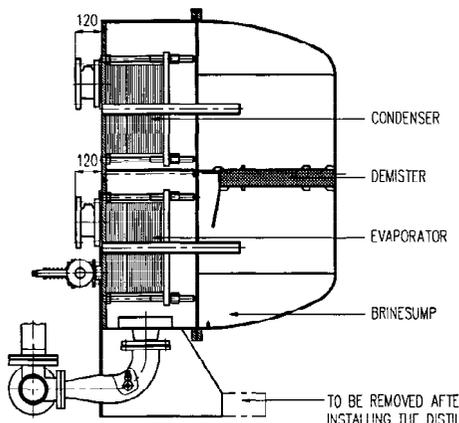
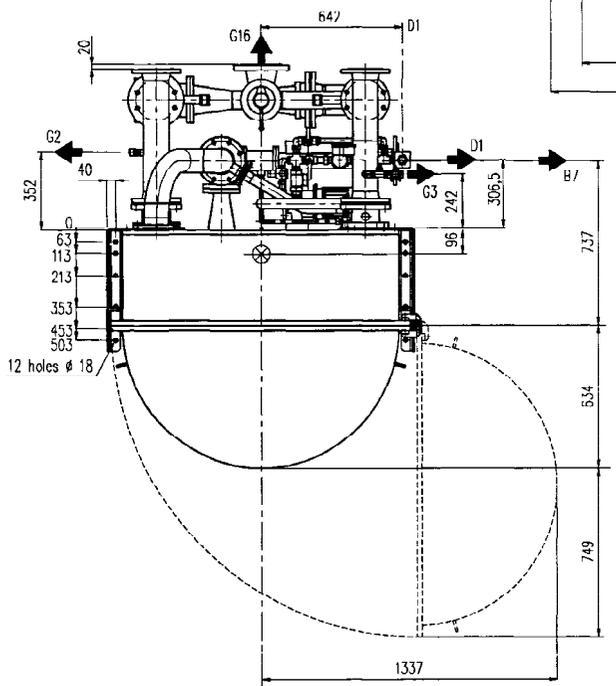
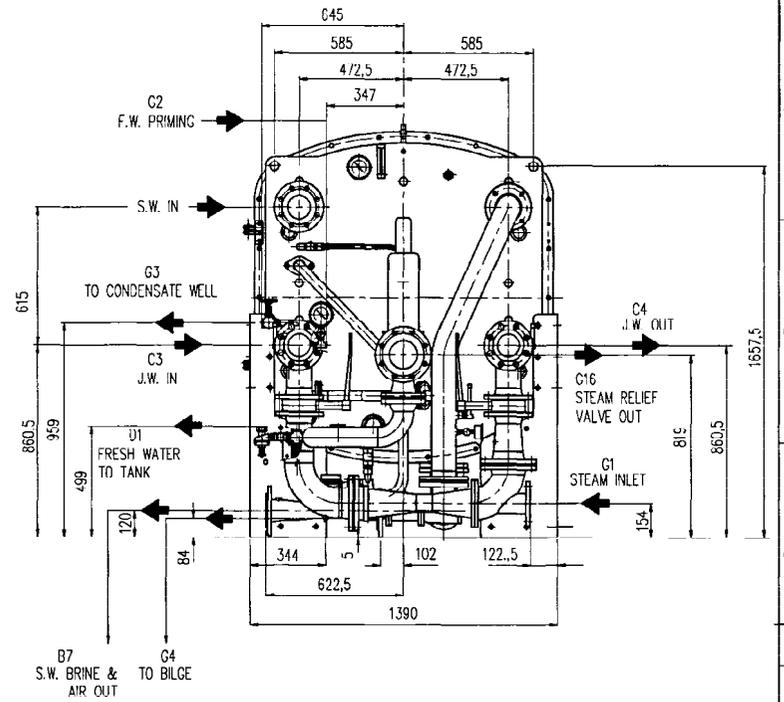
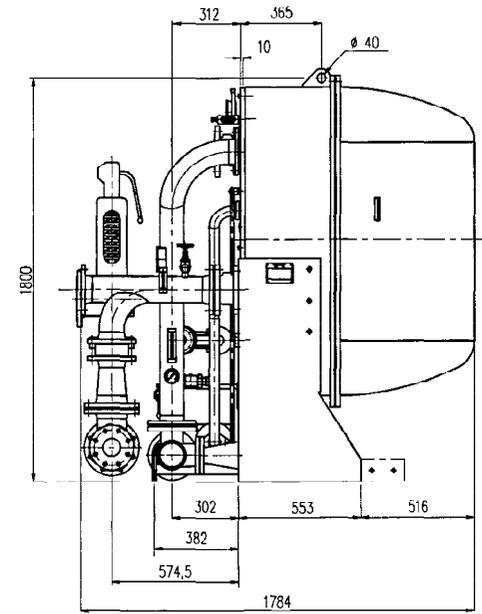
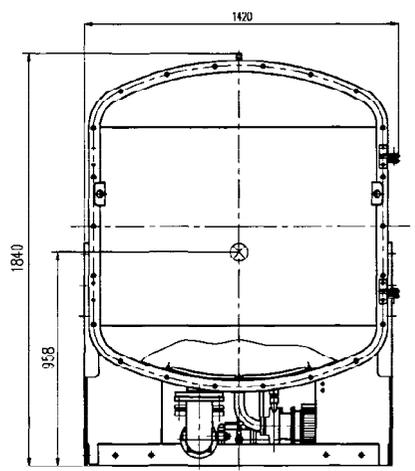
Separator:	Stainless steel
Front cover:	Stainless steel
Bed frame:	Steel (hot dip galvanized)
Pipe for brine discharge:	SG-iron (hot dip galvanized)
Evaporator/condenser plates:	Titanium
Demister:	Stainless steel
Pipe for seawater:	CuNi 90/10
Pipe for fresh water:	CuNi 90/10
Combined brine/air ejector 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:	SG-iron (painted)
Steam injector nozzle:	Stainless steel

**Shipping data**

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

Weight:	net: 1480 kg, gross: 1950 kg
Dimensions:	(l x w x h) 1900 x 2400 x 2090 mm
Volume:	9.5 m <sup>3</sup>

FORM NO. 985 18984 DX



TO BE REMOVED AFTER INSTALLING THE DISTILLER

Measurements ± 5 mm  
 ○ CENTRE OF GRAVITY

FLANGES:

STANDARD DELIVERY				OPTIONAL DELIVERY FITS TO ANSI/JIS							
DIN 2632 DIMENSIONS IN MILLIMETERS FEMALE THREAD BSP				ANSI 150 lb DIMENSIONS IN INCHES FEMALE THREAD NPT				JIS B2220-1990 DIMENSIONS IN MILLIMETERS FEMALE THREAD BSP			
FLANGE	OD	ID	BC HOLES	FLANGE	OD	ID	BC HOLES	FLANGE	OD	ID	BC HOLES
B7	220	100	180 8 Ø18	9	4	71/2	8 Ø3/4	210	100	175	8 Ø19
C1	220	100	180 8 Ø18	9	4	71/2	8 Ø3/4	210	100	175	8 Ø19
C3	220	100	180 8 Ø18	9	4	71/2	8 Ø3/4	210	100	175	8 Ø19
C4	220	100	180 8 Ø18	9	4	71/2	8 Ø3/4	210	100	175	8 Ø19
D1	20						3/4" NPT				21
C1	200	80	160 8 Ø18	71/2	3	6	4Ø3/4	185	80	150	8 Ø19
G2		10					3/8" NPT				10
G3		20					3/4" NPT				20
G4		10					3/8" NPT				10
G18	250	125	210 8 Ø18				*				250 125 210 8 Ø18

\* G16 TO BE DELIVERED WITH DIN BLIND FLANGE

WEIGHT OF UNIT MAX.	kg	lbs
EMPTY	1590	3506
OPERATION	1712	3775
WATER FILLED	2720	5998

Rev. No.	Revision	Date	Revised	Revised	Approved
Rev. 01		11.11.98			
<b>DIMENSIONAL DRAWING</b> <b>FRESHWATER GENERATOR</b> <b>D-PU-36-CAS100/N2</b>					
Date: 11.11.98 Drawn by: [Signature] Checked by: [Signature] Approved by: [Signature]			Alfa Laval Casati A/S Copenhagen Denmark Drawing No. <b>985 18984</b>		
Scale: 1:1 Unit: mm			Date: 11/11/98 Rev. 01		

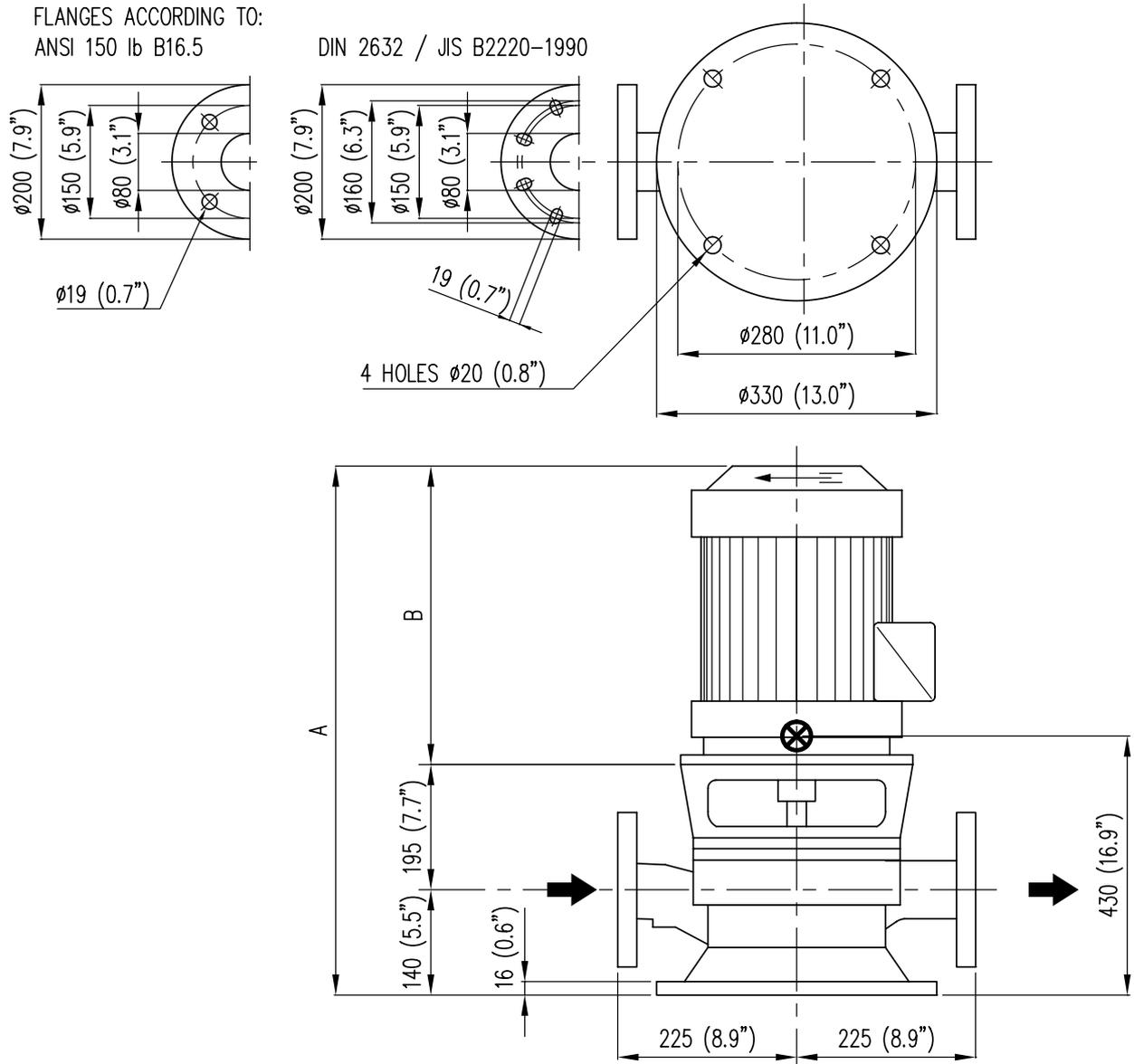
Alfa Laval is a registered trademark of Alfa Laval AB, Sweden. All other trademarks are the property of their respective owners.



**9.2.3.2-2 Technical data, Pump and Motor for D-PU-36-C(AS)100**

No. of plates NE/NK:		34/34-48/48	
Pump function		Freshwater	Ejector
Pump Type		PVVF-2040	CNL 80-80/200
Motor type		71 B	160 L
Nom. flow x pressure	m <sup>3</sup> /h x mwc	2.1 x 28	88 x 38
Impeller size	50 Hz : mm	ø149	ø192
Impeller size	60 Hz : mm	ø128	ø168
Rotating speed	50 Hz : RPM	2820	2915
Rotating speed	60 Hz : RPM	3360	3515
<b>3 x 380 V 50 Hz:</b>			
Rated output power	kW	0.55	18.6
Consumed power	kW	0.67	18.2
Current (full load)	A	1.4	33.5
Current (start)	A	7	211
<b>3 x 440 V 60 Hz:</b>			
Rated output power	kW	0.75	21.4
Consumed power	kW	0.75	18.2
Current (full load)	A	1.6	33.5
Current (start)	A	7	211
<b>3 x 460 V 60 Hz:</b>			
Rated output power	kW	0.75	21.4
Consumed power	kW	0.75	18.2
Current (full load)	A	1.5	32
Current (start)	A	7	211

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

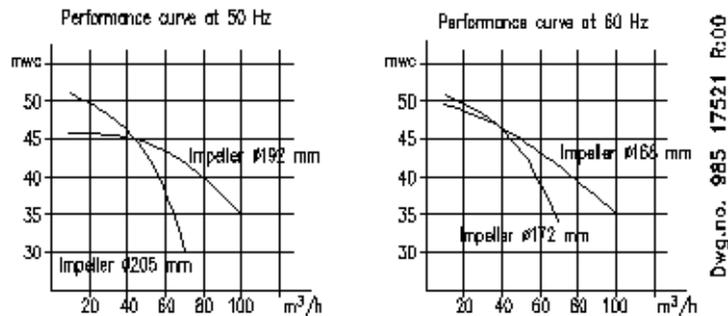
**9.2.5.1-3 Technical data, CNL 80-80/200**

**Description**

Vertical centrifugal pump with design in accordance with DIN 24255 and ISO 2858.  
 Close coupled in-line top pull out version.  
 As a standard discharge and suction flanges are drilled alike.

**Capacity**

The CNL 80-80/200 covers a capacity range of 30-70 m<sup>3</sup>/h with a lifting height at min. 42 mwc according to curve below.



**Dimensions**

See dimensional drawing No. 9.2.5.2-3

**Materials**

Pump casing: Red Brass  
 Impeller: NiAlBr  
 Shaft: Stainless steel  
 Painting: Alfa blue C 310

**Flanges**

DIN/JIS/ANSI

**Options**

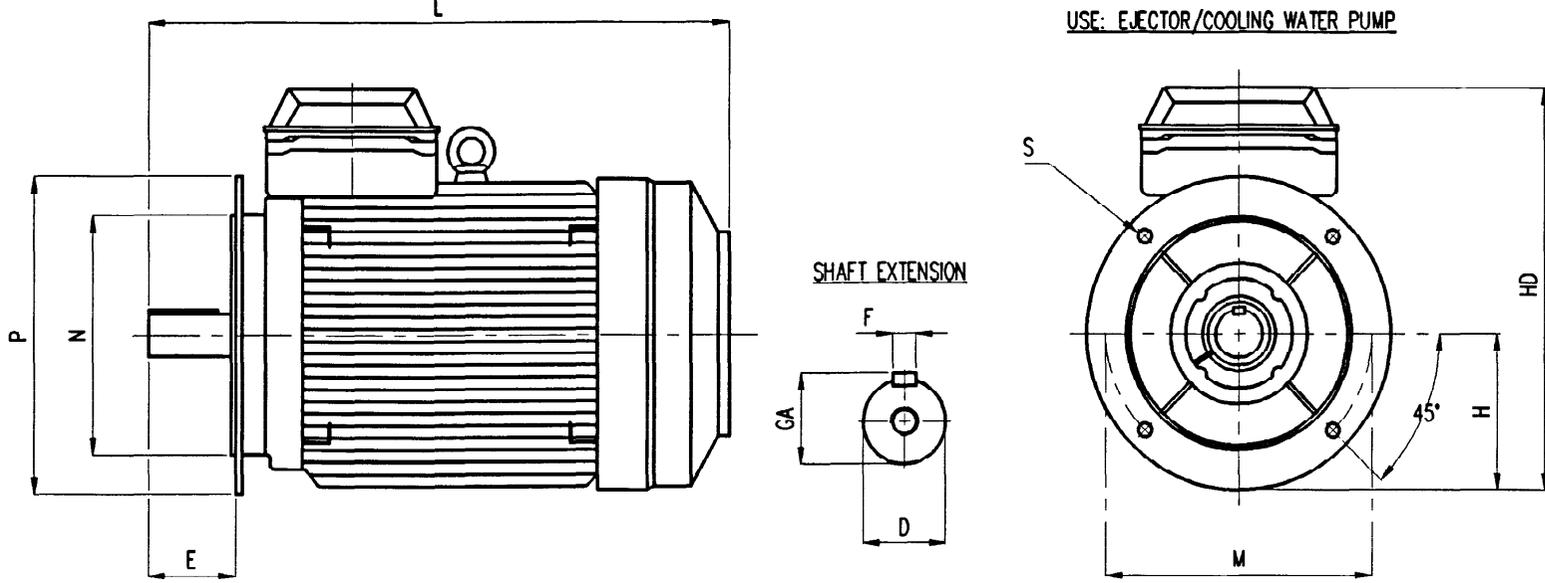
- Stainless steel impeller.
- Manometers on inlet and outlet.
- Class test certificate.

**Warning**

Pump is not self-priming.

Rev. 04  
Drawing no. 985 16662

Only to the extent expressly agreed by us this document may constitute a contractual obligation on our part.



TYPE	OUTPUT (kW)	SPEED (RPM)	VOLTAGE (V)	FREQUENCY (Hz)	CURRENT (A)	PROTECTION	COOLING	INSULATION CLASS	WEIGHT (KG)	BEARING D-END	BEARING N-END	CABLE GLANDS
160 M	17,8	3505	440	60	28,5	IP 55	IEC 34-6	F	84	984 20643-00 6209-C3	984 20643-00 6209-C3	PG 29

OPTION:

WINDING HEATER	OUTPUT (W)	VOLTAGE (V)	FREQUENCY (Hz)
	20/25	100/110	50/60

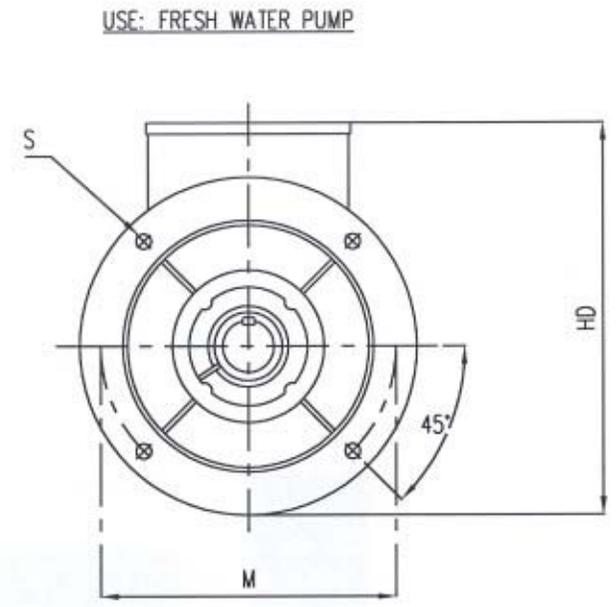
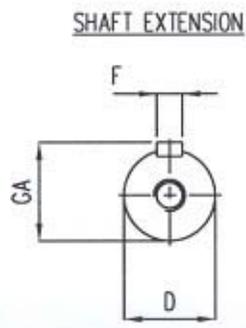
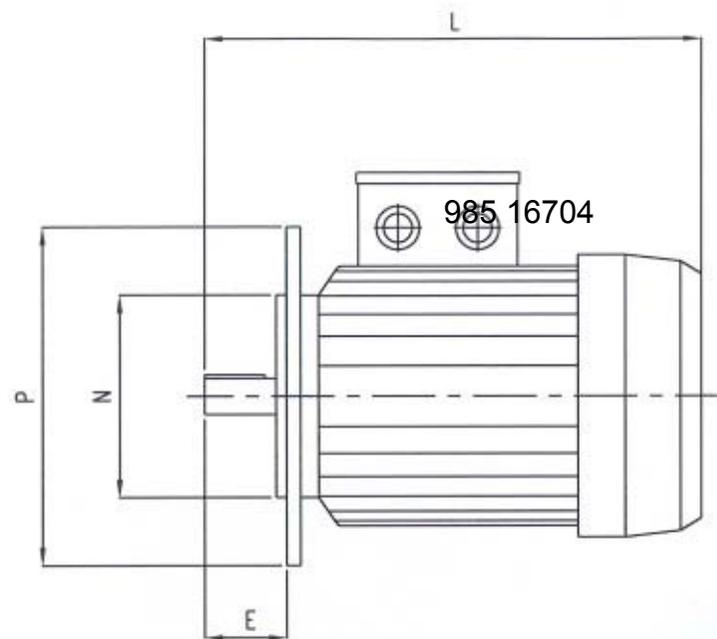
FLANGE-MOUNTED MOTOR IM 3001, B5										
D	GA	F	E	L	M	N	P	S	HD	H
42	45	12	110	602	300	250	350	19	368	160

THREE PHASE INDUCTION MOTOR FOR MARINE ENVIRONMENT  
TOTALLY ENCLOSED FAN COOLED SPLASH PROOF

Sheets	Rev. no.	Revision				Date	Revised	Reviewed	Approved
Article no.	Title					 Alfa Laval COPENHAGEN DENMARK			
	OUTLINE DRAWING ELECTRICAL MOTOR 160 M								
	Date	13.03.97	Drawn	Reviewed	Approved	Repl. for 985 16662		rev. 03	
	ISO method E	~	Weight			Drawing No. 985 16662			
ISO method E	CAD	Basic drawing no.	rev.		Repl. by				

This document and its contents are our exclusive property and must not be copied, reproduced, transmitted or communicated to any other party or used for purposes not expressly permitted by us.

Rev. 03  
 Drawing no. 985 16704



TYPE	OUTPUT (kW)	SPEED (RPM)	VOLTAGE (V)	FREQUENCY (Hz)	CURRENT (A)	PROTECTION	COOLING	INSULATION CLASS	WEIGHT (KG)	BEARING D-END	BEARING N-END	CABLE GLANDS
71 B	0,75	3360	440	60	1,6	IP 55	IEC 34-6	F	6,3	984 20645-00 6203 22 C3	984 20645-00 6203 22 C3	ø10.5 - 12

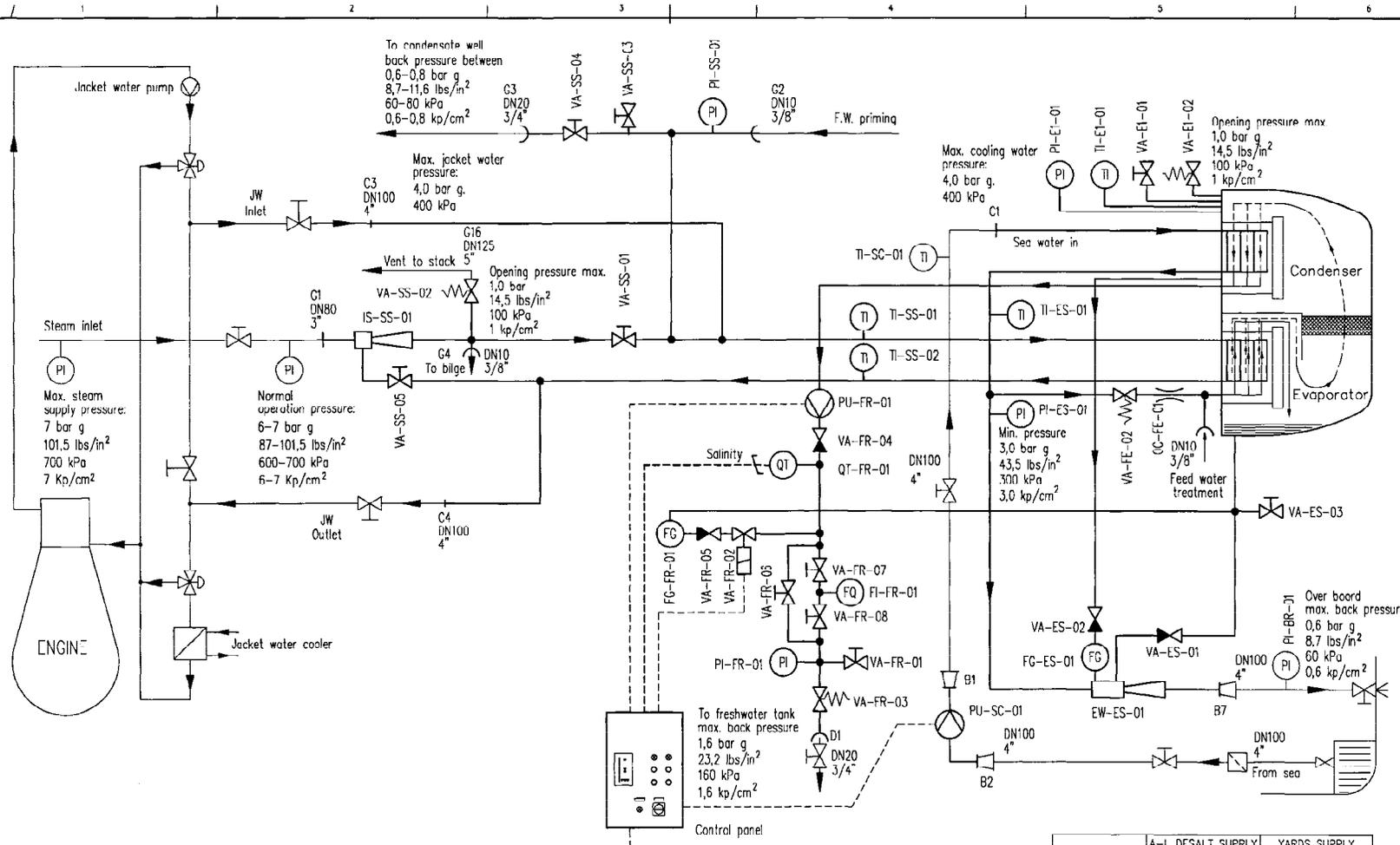
FLANGE-MOUNTED MOTOR IM 3001, B5									
D	GA	F	E	L	M	N	P	S	HD
14	16	5	30	241	130	110	160	10	185

THREE PHASE INDUCTION MOTOR FOR MARINE ENVIRONMENT  
 TOTALLY ENCLOSED FAN COOLED SPLASH PROOF

Article no.	Rev. no.	Revision				Date	Revised	Reviewed	Approved
	Title						 Alfa Laval Desalt A/S COPENHAGEN DENMARK		
	Date	Drawn	Reviewed	Approved	Repl. for 985 16704 rev. 02				
	20.01.2000	PGR	JBN	HJO	Drawing No. 985 16704				
	ISO method E	Scale	Weight		Repl. by rev.				
	CAD	Basic drawing no.	rev.						

E-mail for purchase and enquiry: purchase@alfalaval.com

Rev. 00  
 Drawing no. 985 18983



TAG	DESCRIPTION	TAG	DESCRIPTION	TAG	DESCRIPTION	TAG	DESCRIPTION
FW-FS-01	EJECTOR	PI-SS-01	MANO/VACUUM GAUGE	VA-ES-01	NON RETURN VALVE	VA-FR-05	NON RETURN VALVE
PI-FR-01	WATER METER	PU-FR-01	FRESHWATER PUMP	VA-ES-02	NON RETURN VALVE	VA-FR-06	BALL VALVE
FG-ES-01	FLOW SIGHT GLASS	PU-SC-01	EJECTOR PUMP	VA-ES-03	BALL VALVE	VA-FR-07	BALL VALVE
FG-FR-01	FLOW SIGHT GLASS	QT-FR-01	ELECTRODE UNIT	VA-EI-01	AIR SCREW	VA-FR-08	BALL VALVE
IS-SS-01	STEAM INJECTOR	ST-SC-01	STRAINER	VA-EI-02	SAFETY VALVE	VA-SS-01	BUTTERFLY VALVE
OC-FE-01	ORIFICE	TI-ES-01	THERMOMETER	VA-FE-02	SPRING LOADED VALVE	VA-SS-02	SAFETY VALVE
PI-BR-01	PRESSURE GAUGE	TI-EI-01	THERMOMETER	VA-FR-01	BALL VALVE	VA-SS-03	BALL VALVE
PI-ES-01	PRESSURE GAUGE	TI-SC-01	THERMOMETER	VA-FR-02	SOLENOID VALVE	VA-SS-04	SEALED VALVE
PI-EI-01	MANO/VACUUM GAUGE	TI-SS-01	THERMOMETER	VA-FR-03	SPRING LOADED VALVE	VA-SS-05	BUTTERFLY VALVE
PI-FR-01	PRESSURE GAUGE	TI-SS-02	THERMOMETER	VA-FR-04	NON RETURN VALVE		

	A-L DESALT SUPPLY	YARDS SUPPLY
Pipe lines		
Electric cables		

Rev. no.	Revision	Date	Revised	Reviewed	Approved
1		11.11.98			

Title: **PI-DIAGRAM FRESHWATER GENERATOR D-PU-36-CAS100/N2**  
 Alfa Laval Desalt A/S  
 Copenhagen DENMARK

Date: 11.11.98  
 Scale:  Scale  Weight  
 Method: E  
 CAD: Basic drawing no. 985 18112 rev. 00

Drawing No. **985 18983**  
 Repl. by: rev.

This drawing is the property of Alfa Laval and is not to be reproduced or used in any way without the written permission of Alfa Laval.



**9.2.3.4-1 Equipment Specification, D\_PU-36-C(AS)100**

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 42600-04	3/4" BSP
OC-FE-01	Orifice	See specification	-
PI-ES-01	Pressure gauge	984 30297-00	1/4" BSP
PI-E1-01	Mano/vacuum gauge	984 30308-00	3/8" BSP
PI-FR-01	Pressure gauge	984 30298-00	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-ES-03	Ball valve	984 35683-00	1/2" BSP
VA-E1-01	Air screw	984 40939-02	3/8" 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-02	Solenoid valve	See specification	-
VA-FR-03	Spring loaded valve	984 35166-00	1/2" BSP
VA-FR-04	Non return valve	984 35672-00	1" BSP
	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 35620-00	DN 100
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	984 35635-00	DN 150

Dwg.no. 985 17323 R:00

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

<sup>2)</sup> Type CAS

Edition 99-01

### 9.2.6.1-4 Technical data, Control panel for Freshwater Generator

---

#### General

---

Control panel for single- and two-stage freshwater generators. Include start/stop of pumps and salinity supervision. The panel is internally connected, and needs only to be connected to main power and to the electrical components on the freshwater generator.

#### Standard design

---

Standard design consists of a box with the following components built in:

Main switch (locks panel if power is on).

Push button for freshwater and ejector pump

- Start (green)
- Stop (red)

Signal lamp for freshwater and ejector pump running (green).

Signal lamp for source on (white).

Thermal relay and contactor for:

- Freshwater pump(s)
- Ejector pump

Operating transformer.

Salinometer.

Fuses.

Nameplate (inside panel)

Painting: RAL 7032/DIN 43656

#### Electrical data

---

Supply voltage:

3 x 380 V 50 Hz or 3 x 440 V 60 Hz

Control voltage:

100, 110 or 220 V

Permissible tolerances:

Voltage: +10/-15%

Frequency: ±2%

Internal wire:

Class 70°C

External connections:

Remote alarm, thermal overload freshwater pump - NO

Remote alarm, thermal overload ejector pump - NO

Remote start/stop freshwater pump

Remote start/stop ejector pump

Contact set, freshwater pump running - NC

Contact set, freshwater pump running - NO

Contact set, ejector pump running - NC

Contact set, ejector pump running - NO

External connections (salinometer):

External meter

Electrode unit

External alarm contact - NC

External alarm contact - NO

Buzzer

Solenoid valve - NC

Solenoid valve - NO

## Other data

---

Protection degree: IP 44  
Max. ambient temperature: 50°C  
Dimensions: 400 x 600 x 200 mm  
Weight: approx. 27 kg

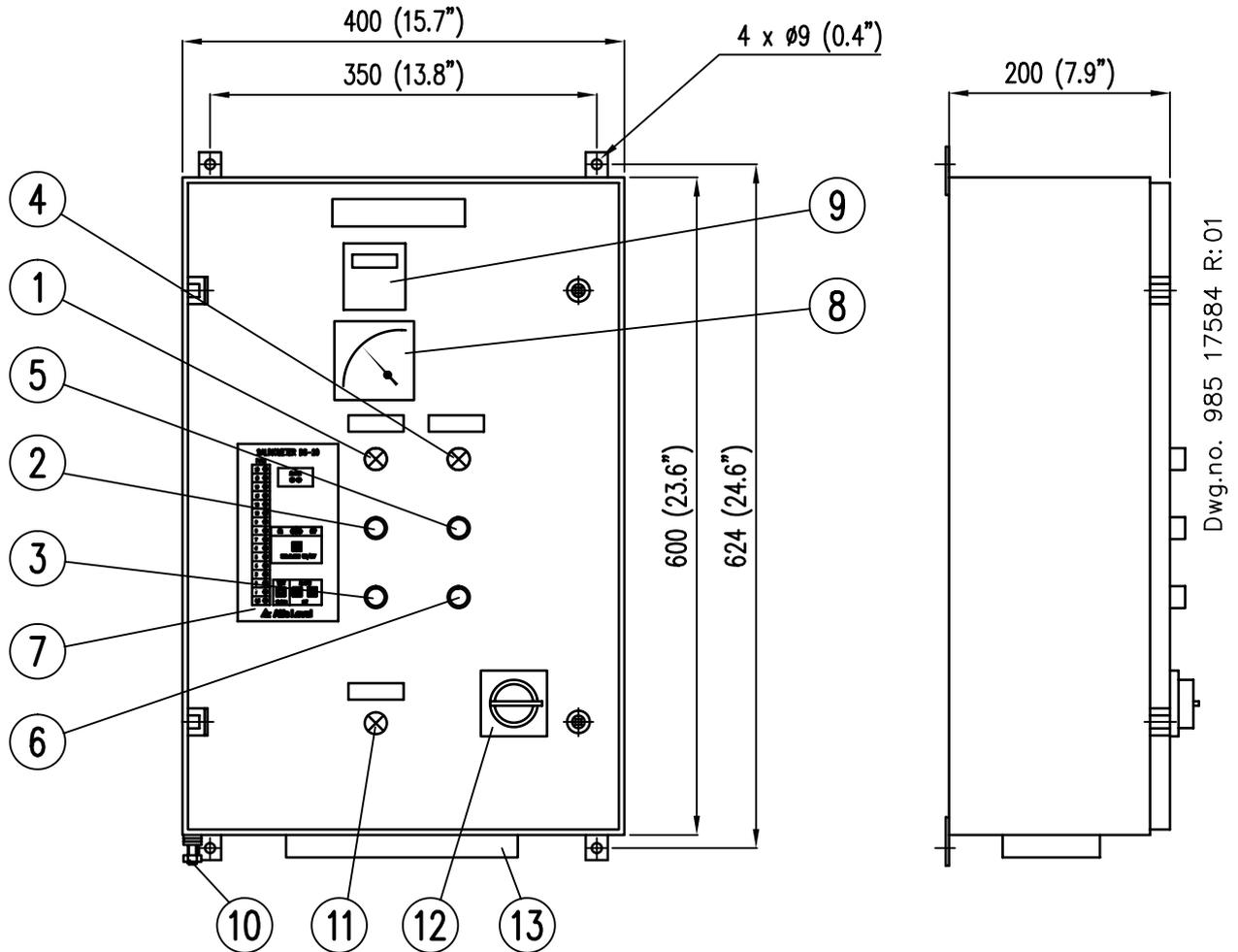
## Options

---

Option A includes standard and:  
- Ammeter for ejector pump  
- Running hour meter for ejector pump  
- Mini circuit breaker to protect freshwater pump  
- Relay for thermal overload - NC

Box for remote start/stop  
Supply voltage: 3 x 460 V 60 Hz (ul)

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



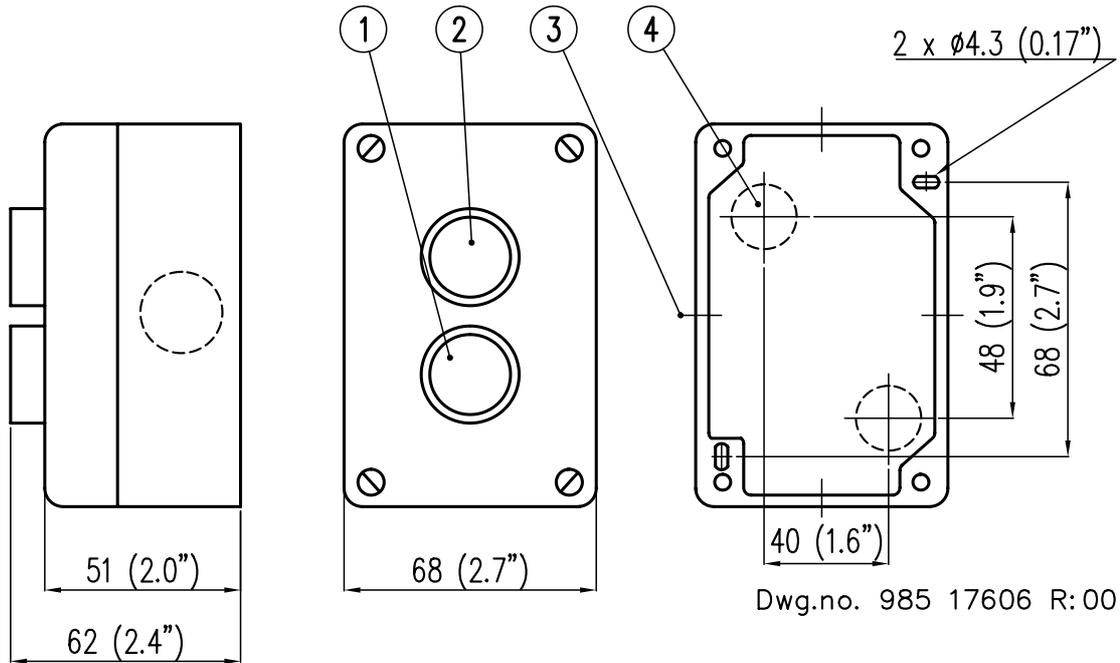
Dwg.no. 985 17584 R:01

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               |                                   |



**9.2.9.2-1 Remote start/stop**



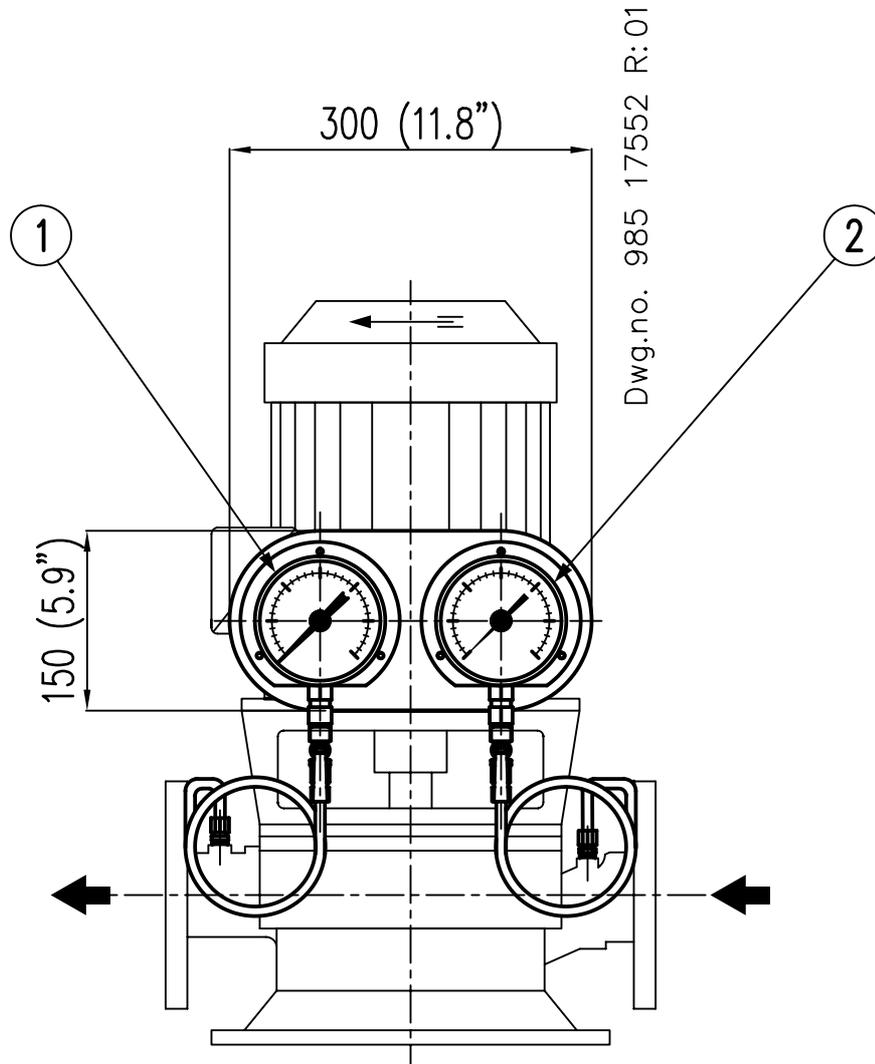
Double insulated. Only for control circuits.

Legend

- 1 Start (green)
- 2 Stop (red)
- 3 4 pcs. knock-outs in sides for addition of CM12 or 20 mm ISO cable glands
- 4 2 pcs. Ø 19 mm knock-outs for cable entry through base

- Colour: Light grey lid (RAL 7035) with dark grey base (RAL 7021)
- Protection degree: IP 65
- Max. ambient temperature: 70°C
- Weight: 0.165 kg

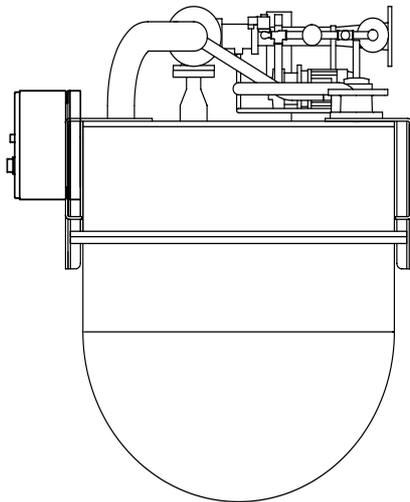
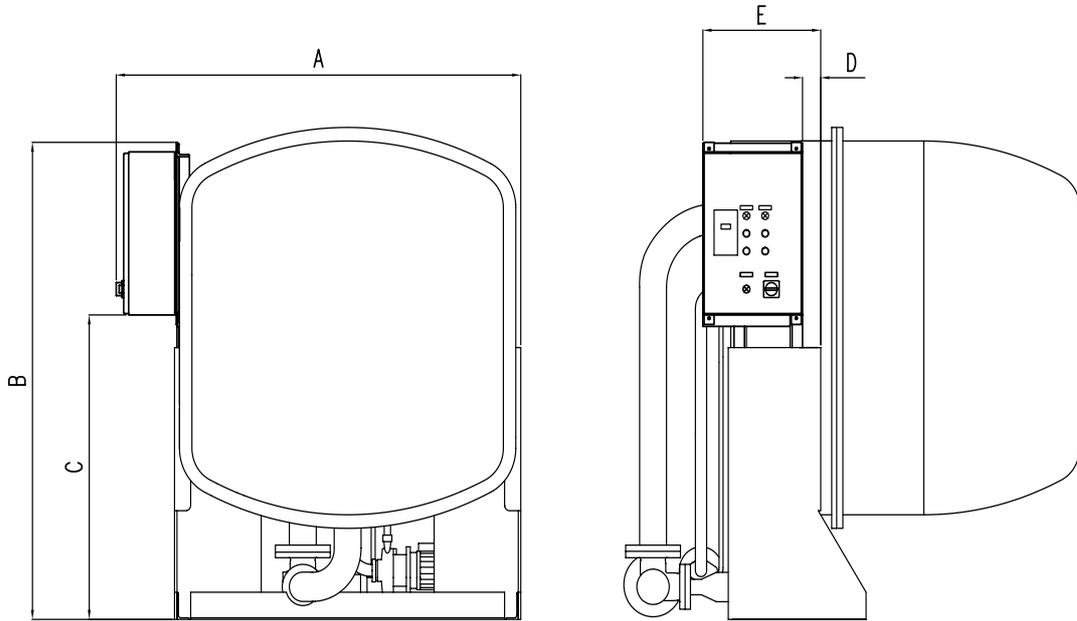
9.2.9.1-4 Manometer set for Ejector pump



1 Manometer  $\varnothing 100$  mm 0–6 bar / 0–87 Lb/in<sup>2</sup>

2 Mano/vacuummeter  $\varnothing 100$  mm –100% –2 bar / –100% –29 Lb/in<sup>2</sup>

**9.2.9.1-2 Control panel build-on D-PU-36-C(AS)100/125**



Panel is internally connected.  
Needs only to be connected to main power and ejector pump.

Frame for panel:  
Material: Steel (Hot dip galvanized)

Freshwater Generator	A	B	C	D	E
D-PU-36-C100	1624 (63.9")	1755 (69.1")	1120 (44.1")	73 (2.9")	473 (18.6")
D-PU-36-C125					

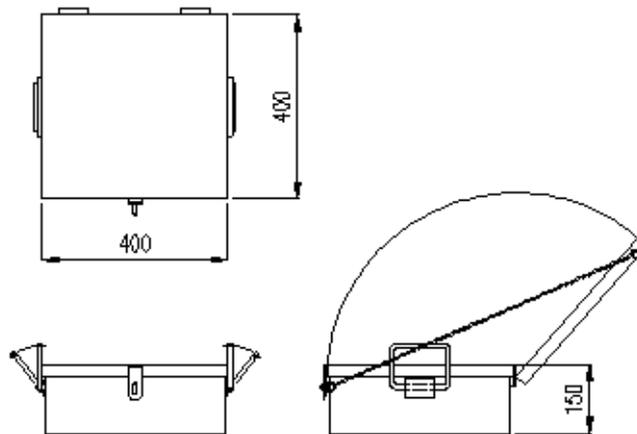
Drw.no. 985 17549 R:01

## 9.2.9.2-3 Steel box for spare part kits

### General

Spare part box storing spare parts and tools of machinery on ships. Made of steel and hinged in one side. Provided with a chain with hook and a lock with two keys. Made in accordance with Japanese standard JIS F 0902-1978.

### Dimensions



Dwg.no. 985 17526 R:00

### Materials

- Box: Steel (painted)
- Painting: Alfa Blue C310  
Munsell 7.5 BG 7/2 or  
Munsell 2.5 G7/2



## 9.3.1.1 Included in delivery

---

### Description

---

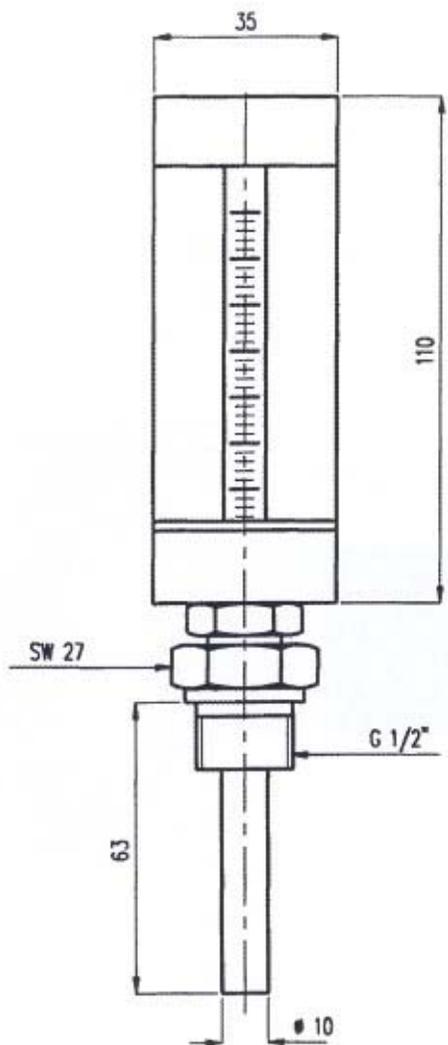
**Content:**

- a) 1 Rubber joint for front cover.
  
- b) For each of the pumps.
  - 1 Mechanical seal
  
- c) For each electric motor:
  - 1 Ball bearing (D-end)

1 2 3 4 5 6 7 8

Rev. 01  
 Drawing no. 984 30365

Only in the extent expressly  
 stated by us this document  
 may constitute a contractual  
 obligation on our part.



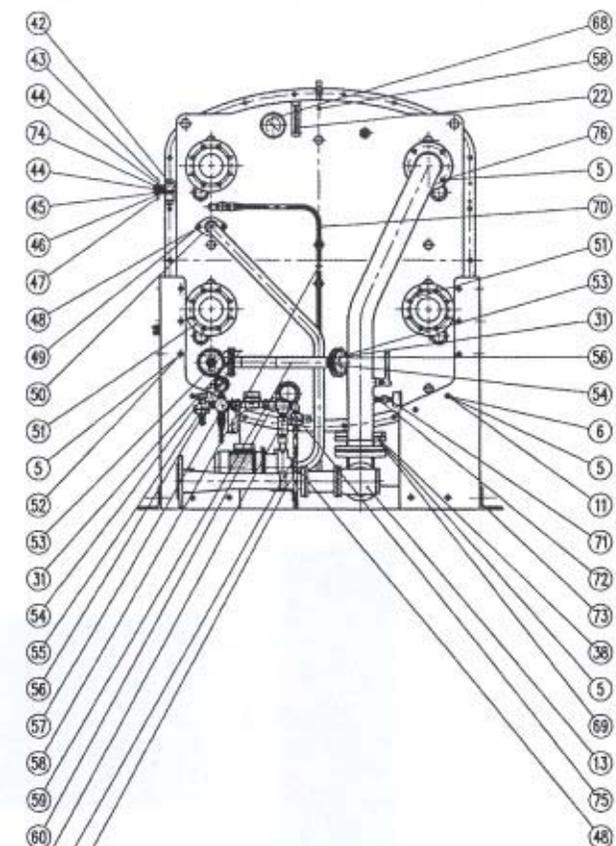
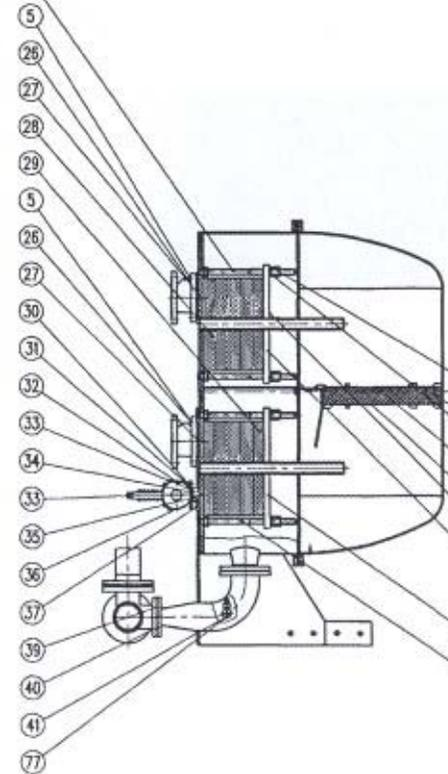
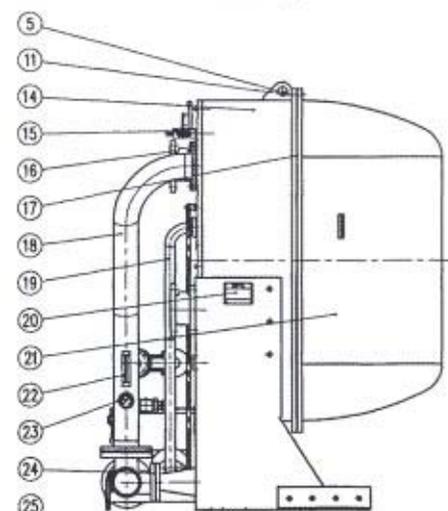
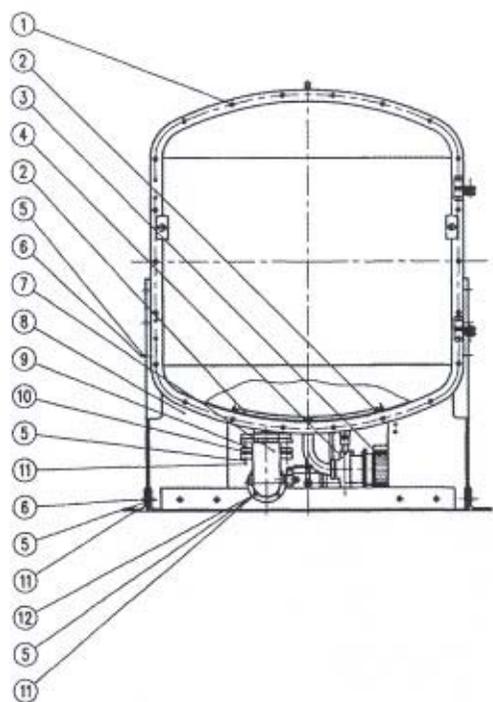
Scale:  
 0 - 100° C  
 32 - 212° F

This document and its contents are our exclusive  
 property and must not be made, reproduced,  
 transmitted or communicated to any other party  
 or used for purposes not expressly permitted by us.

1 2 3 4 5 6 7 8

Sheet	Rev. no.	Revision			Date	Revised	Reviewed	Approved
Article no.	Title				Alfa Laval			
	Thermometer, Straight Pocket, Brass Dimensional Drawing				Alfa Laval Design A/S COPENHAGEN DENMARK			
	Date	Drawn	Reviewed	Approved	Repl. for 985 30365-00 00			
	21.02.97	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	Drawing No. 984 30365			
ISO method E	Scale	Weight		Repl. by				
	~			rev.				
CAD		Basic drawing no.		rev.				

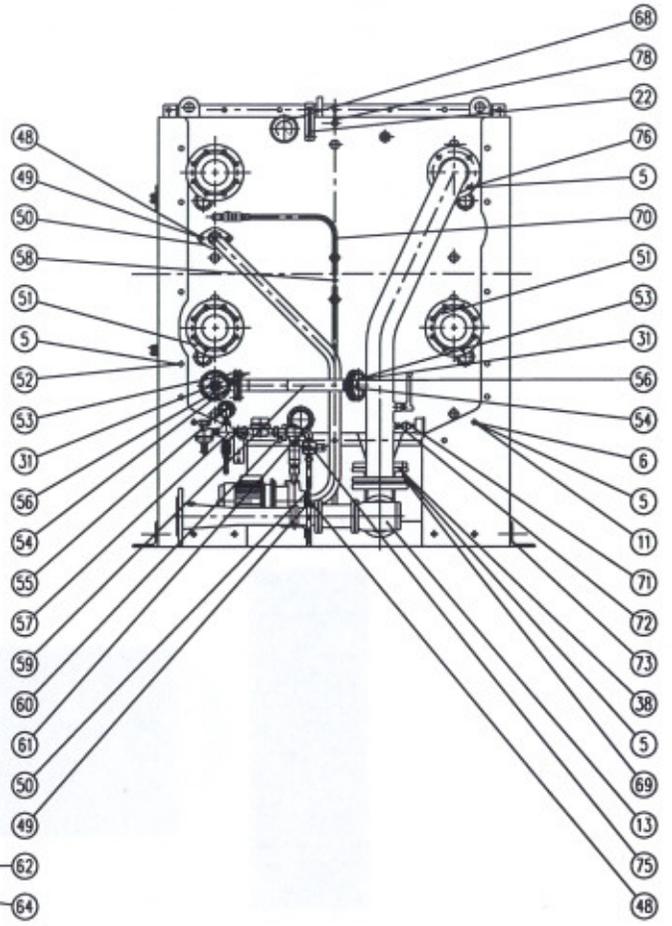
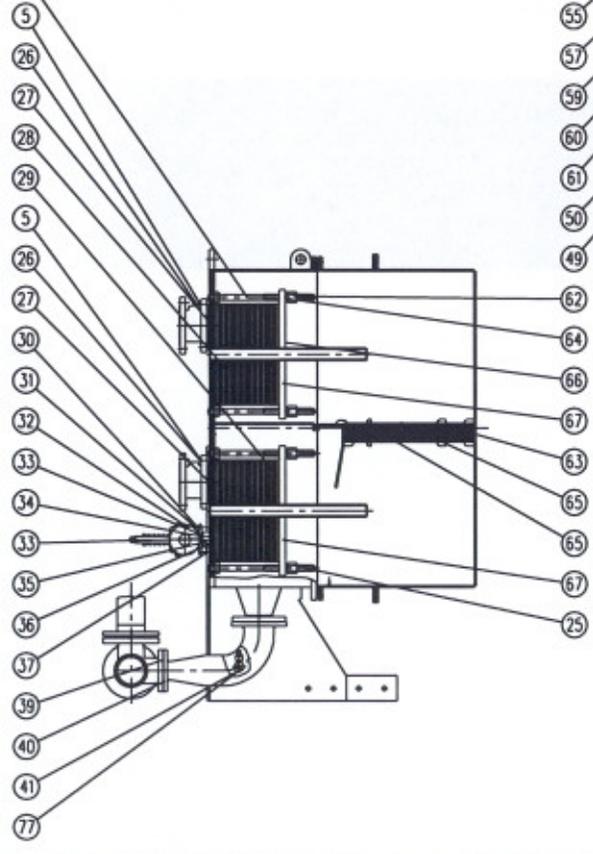
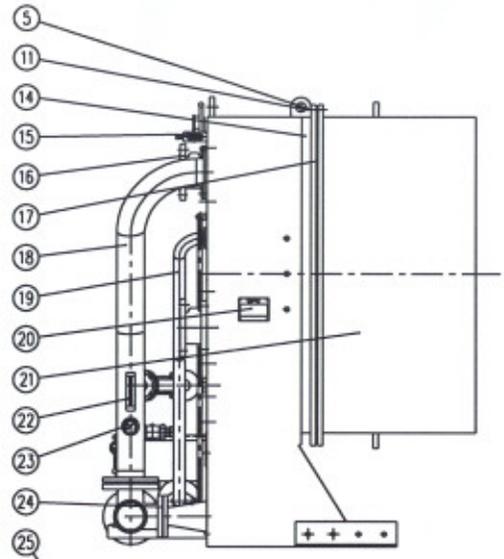
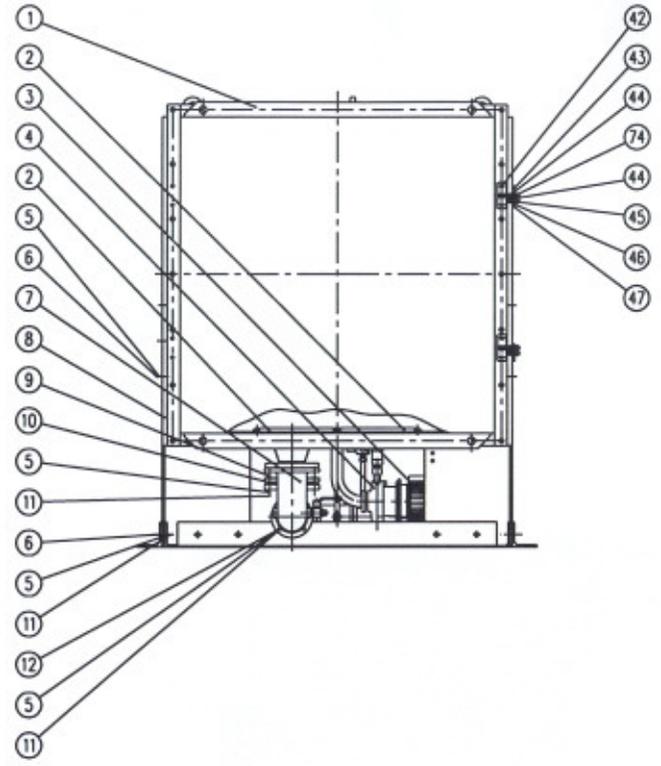
985 15765 10



10-10-68

10-10-68

985 15765-02	5	02	Pos.18 chg. Pos. 77 added.	210995	10/1/68	LDR	HFA	HFA
985 15765-01	5	01	PART LIST REVISED.	180795	LDR	HFA	HFA	
985 15765-00	5							
<b>MOUNTING DRAWING</b> <b>FRESHWATER GENERATOR</b> <b>D-PU-36-C100</b>								
Date: 06.02.94 Drawn: ALE Checked: TLO Approved: [Signature]				Part No: 985 15765 Drawing No: 985 15765 Page 1 of 1				



985 18920-81	5	5	Revision	Date	Revised	Revised	Approved
985 18920-80							
MOUNTING DRAWING FRESHWATER GENERATOR D-PU-36-C100			Allin Level Allin Level Design A/S Copenhagen				
Date	Rev	By	Checked	Approved	Rev	Rev	Rev
08.02.02		BCU	MP H	MP H			
Scale	1:1	Weight			Drinking No.	985 19922	
Scale	1:1	Weight			Rev		
CAO					Rev		



# Bill Of Material

Parent item no.: 985 18920-80 R: 02	Description: MOUNTING DRAWING FRESHWATER GENERATOR DPU-36-C100 DIN/JIS	Date: 20040608	Page 1 of 4
Drawing no.: 985 19922-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 520 X 140 MM		19.00000.30		
1	22.000000	EA	DPU-36-C100/125 SCREW M16 X 65 DIN 933		984 40910-44	QUALITY 8.8 ; DELTA-MAGNI	
2	2.000000	EA	ZINC ANODE	985 12258-R01	985 12258-80		
3	.000000	EA	D-PC-PRO MOTOR FOR FRESHWATER PUMP		SEE SPECIFIC.M		
4	.000000	EA	FRESHWATER PUMP		SEE SPECIFIC.F		
5	74.000000	EA	WASHER M16 DIN 125 A		985 32512-20	A4	
6	18.000000	EA	SCREW M16 X 55 DIN 933		984 40910-42	QUALITY 8.8 ; DELTA-MAGNI	
7	1.000000	EA	BRINE PIPE	985 15277-R02	985 15277-01		
8	1.000000	EA	BED FRAME	985 18917	985 18917-80		
9	8.000000	EA	SCREW M16 X 65 DIN 933		984 40910-44	QUALITY 8.8 ; DELTA-MAGNI	
10	1.000000	EA	GASKET	985 15932-R00	985 15932-01		
11	46.000000	EA	Ø 162 / Ø 90 X 2 NUT M16 DIN 934		984 40910-45	HOT DIP GALVANIZED	
12	4.000000	EA	HOT DIP GALVANIZED SCREW M16 X 60 DIN 933		984 40910-43	QUALITY 8.8 ; DELTA-MAGNI	
13	.000000	EA	COMBINED BRINE/AIR EJECTOR		SEE SPECIFIC.B		
14	1.000000	EA	SEPARATOR	985 18897-R01	985 18897-01		
15	1.000000	EA	WITH INSULATION AREA SAFETY VALVE 1" BSP	VVS 43 2240 108	984 35360-00	BRASS	
16	1.000000	EA	FLANGE Ø 100 D/A/J COATED	984 57893-R09	984 57893-05		
17	1.000000	EA	P-36-C GASKET Ø17 FOR FRONT COVER	985 19957-R02	985 19957-01	Nitrile rubber (NBR) SHORE 70	
18	1.000000	EA	AND SEPARATOR SEAWATER PIPE	985 13910-R02	985 13910-80	AISI 316 L	
			FROM CONDENSER AISI 316 L				

## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemærket 10, Copenhagen  
BIC/SWIFT: ESSEDKKK

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



# Bill Of Material

Parent item no.: 985 18920-80 R: 02	Description: MOUNTING DRAWING FRESHWATER GENERATOR DPU-36-C100 DIN/JIS	Date: 20040608	Page 2 of 4
Drawing no.: 985 19922-R00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
19	1.000000	EA	F.W. PIPE TO PUMP D-PU-36-C	985 13911-R00	985 13911-80	CuNi10Fe1,6Mn	
20	1.000000	EA	NAME PLATE	985 13505-R04	985 13505-01	Navneskilt ALFA LAVAL Copenhagen	
21	1.000000	EA	FRONT COVER C100 0.5 M2	985 18900-R06	985 18900-80		
22	2.000000	EA	THERMOMETER W/POCKET - ANGLE 63 MM	984 30366-R01	984 30366-00	CuNi10Fe	
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	1.000000	EA	NON RETURN FLAP Ø 50 MED TEXTILINDLÆG	984 57281-R03	985 00036-39		
25	.000000	EA	CLAMPING BOLT		SEE SPECIFIC.G		
26	12.000000	EA	SCREW M16 X 45 DIN 912		985 80011-36	QUALITY 8.8 ; DELTA-MAGNI	
27	4.000000	EA	RUBBER SLEEVE H = 20 MM	985 13921-R01	985 13921-01	Nitrile rubber	
28	.000000	EA	HEAT EXCHANGER-CONDENSER		SEE SPECIFIC.K		
29	.000000	EA	HEAT EXCHANGER-EVAPORATOR		SEE SPECIFIC.E		
30	4.000000	EA	SCREW M10 X 50 DIN 912		985 80011-32	QUALITY 8.8 ; DELTA-MAGNI	
31	12.000000	EA	WASHER M10 DIN 125 A		985 32512-14	A4	
32	1.000000	EA	SPRING LOADED VALVE MVF-40-2.5	984 35535-02	984 35535-00	RG 5	
33	4.000000	EA	GASKET Ø84/46 X 2	984 58335-R01	984 58335-01		
34	.000000	EA	ORIFICE FOR FEED WATER		SEE SPECIFIC.O		
35	1.000000	EA	CONNECTION FOR FEED WATER	985 13931-R00	985 13931-01		
36	1.000000	EA	RUBBER SLEEVE FOR FEED WATER	985 13918-R01	985 13918-01	Nitrile rubber (NBR)	
37	.000000	EA	PLUG 3/8" BSP	EV 109 B	984 40941-17	ISO 426/2/83 ; CU ZN39 PB3	
38	1.000000	EA	GASKET DN100 Ø162/115 X 1,5 MM DIN 2690 PN10		985 80009-19	FERJOSEAL 2639	
39	1.000000	EA	SEAL RING Ø 108/Ø 54	984 57269-R01	984 57269-01		
40	1.000000	EA	GASKET Ø107/61 X 2	VVS 00 0662 060	984 40942-01	NITRIL	
41	1.000000	EA	BALL VALVE 1/2" BSP BRASS		984 35683-00	BRASS	

## Alfa Laval Copenhagen A/S

Maskinevej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
BIC/SWIFT: ESSEDKKK  
**Accounts:** DKK IBAN Acc. DK5752950010008069  
EUR IBAN Acc. DK4552950013000735  
USD IBAN Acc. DK4252950015000929



# Bill Of Material

Parent item no.: 985 18920-80 R: 02	Description: MOUNTING DRAWING FRESHWATER GENERATOR DPU-36-C100 DIN/JIS	Date: 20040608	Page 3 of 4
Drawing no.: 985 19922-R00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
42	8.000000	EA	SCREW M12 X 25 DIN 933		984 40910-40	QUALITY 8.8 ; DELTA-MAGNI	
43	2.000000	EA	FITTED BOLT M12 - 16 X 40	HFC 728	984 40912-32	STEEL ; KVAL. 12.9	
44	4.000000	EA	WASHER Ø 16 MM	HFC 1207	984 40901-28	BRASS	
45	2.000000	EA	HINGE	985 13932-R02	985 13932-01		
46	2.000000	EA	WASHER Ø 12 MM	HFC 1207	984 40901-27	BRASS	
47	2.000000	EA	LOCK NUT M12	HFC 840	984 40900-19	8.8	
48	4.000000	EA	SCREW M12 X 35 DIN 912		985 80011-34	QUALITY 8.8 ; DELTA-MAGNI	
49	4.000000	EA	WASHER M12		985 32512-16	ISO 683/13/86 ; TYPE 20A	
50	2.000000	EA	ISO 887/83 GASKET Ø75/43 X 2	984 58093-R02	984 58093-01		
51	2.000000	EA	FLANGE Ø 100 DIN/ANSI/JIS P-36-C	984 57893-R09	984 57893-03		
52	6.000000	EA	SCREW M16 X 25 DIN 933 HOT DIP GALVANIZED		985 80011-30	HOT DIP GALVANIZED	
53	8.000000	EA	NUT M10 DIN 934		984 40900-27	QUALITY 8.8 ; DELTA-MAGNI	
54	2.000000	EA	GASKET Ø84/46 X 2	984 58335-R01	984 58335-01		
55	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	
56	8.000000	EA	SCREW M10 X 35 DIN 933		984 40910-38	QUALITY 8.8 ; DELTA-MAGNI	
57	.000000	EA	FRESHWATER PIPE FROM PUMP		SEE SPECIFIC.FP		
58	1.000000	EA	AIR VALVE 3/8" BSP	VVS 40 5501 003	984 40939-02	BRASS	
59	1.000000	EA	PIPE FOR FEED WATER	985 13912-R00	985 13912-80	CuNi10Fe1,6Mn	
60	1.000000	EA	ELECTRODE		985 42985-05		
61	1.000000	EA	(FOR SL-3000,DS-20) SIGHT GLASS WITHOUT INNER PART	984 57862-R03	984 57862-82		
62	12.000000	EA	NUT M24	984 57822-R01	984 57822-01	ISO 1338/77 ; CU PB5 SN5 ZN5	
63	1.000000	EA	DEMISTER 0.5 M2	985 13680-R00	985 13680-01		
64	12.000000	EA	WASHER M24 ISO 887/83 316L		985 32510-28	ISO 683/13/86 ; TYPE 20A Aisi 3	

## Alfa Laval Copenhagen A/S

Maskinevej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
**BIC/SWIFT:** ESSEDKKK

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



# Bill Of Material

Parent item no.: 985 18920-80 R: 02	Description: MOUNTING DRAWING FRESHWATER GENERATOR DPU-36-C100 DIN/JIS	Date: 20040608	Page 4 of 4
Drawing no.: 985 19922-R00		Ini DKSOABK	

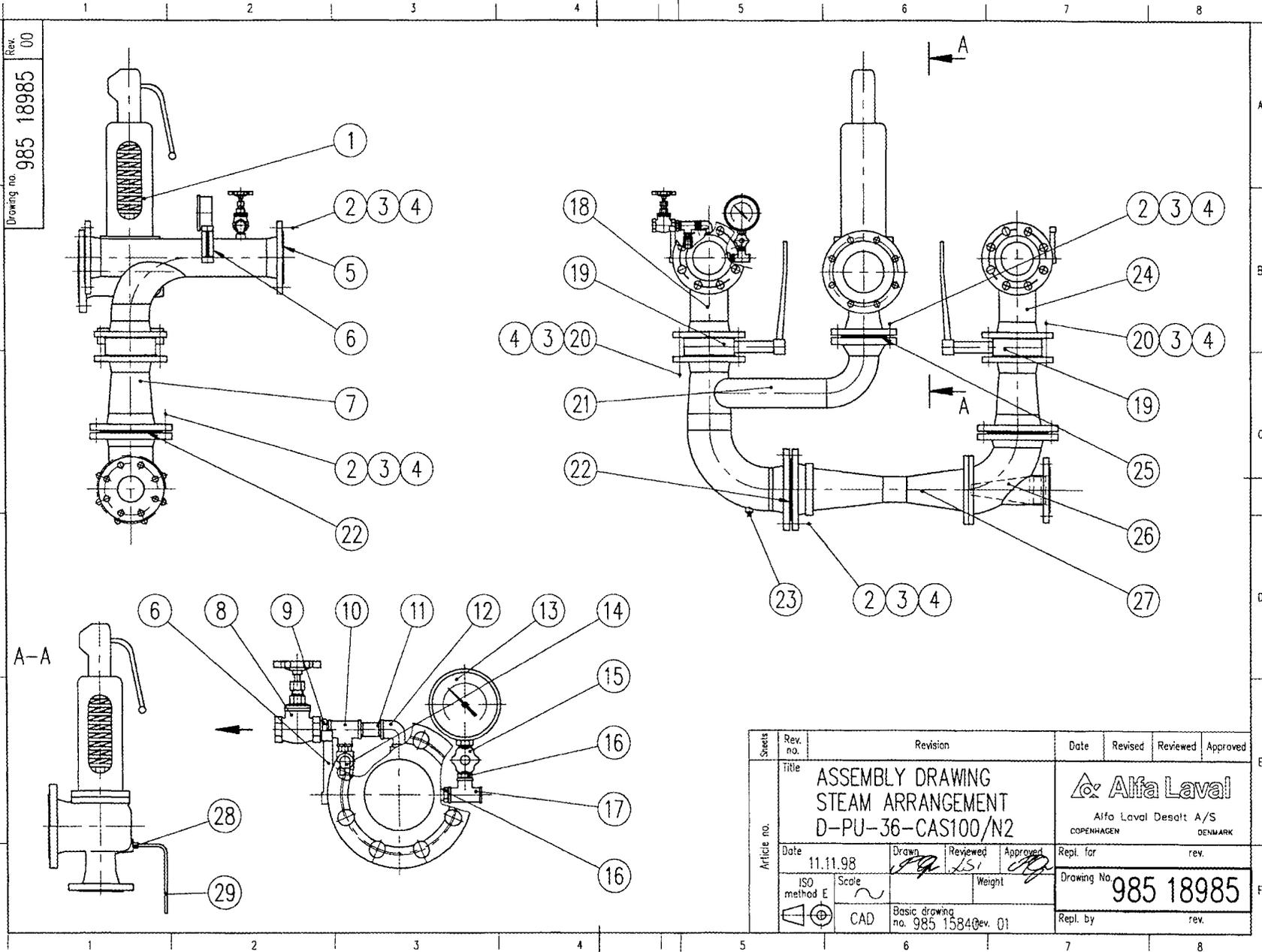
BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
65	2.000000	EA	DEMISTER CLAMP 0.5 M2	985 13919-R01	985 13919-01		
66	1.000000	EA	ASSEMBLY PLATE	985 15917	985 15917-01		
67	2.000000	EA	PRESSURE PLATE	985 13909-R01	985 13909-01		
68	1.000000	EA	COMPOUND GAUGE -100% - 2 BAR LB/IN2, BAR = KGF/CM2, Ø100, 3/8" BN	984 30308-R01	984 30308-00		
69	8.000000	EA	SCREW M16 X 35 DIN 912		985 80011-35	QUALITY 8.8 ; DELTA-MAGNI	
70	1.000000	EA	VACUUM PIPE D-PU-36-C	985 13914-R00	985 13914-80		
71	1.000000	EA	PRESSURE GAUGE COCK 1/4" BSP BRASS	EV 5100-8	984 35533-00	BRASS	
72	1.000000	EA	NIPPLE 1/4" BSP	EV 206 B	984 40941-29	ISO 426/2/83 ; CU ZN39 PB3	
73	2.000000	EA	TRANSPORT IRON L = 400 MM ANGLE IRON 100 X 100 X 10	985 13920-R02	985 13920-01	MATERIALE: S235 JR	
74	2.000000	EA	HINGE	984 57903-R05	984 57903-01		
75	.000000	EA	SOLENOID VALVE		SEE SPECIFIC.S		
76	4.000000	EA	SCREW M16 X 30 DIN 912		985 00013-56	QUALITY 8.8 ; DELTA MAGNI	
77	1.000000	EA	BUSHING 3/4" X 1/2" BSP	B 3241	985 52720-06	ISO 1338/77 ; CU PB5 SN5 ZN5	
78	1.000000	EA	BALL VALVE 3/8" BSP		984 35618-00	BRASS	UPPER MOUNTED

## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
BIC/SWIFT: ESSEDKKK

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



Rev. 00  
 Drawing no. 985 18985

Only to the extent expressly agreed by us this document may constitute a contractual obligation on our part.

This document and its contents are our exclusive property and must not be copied, reproduced, transmitted or communicated to any other party or used for purposes not expressly permitted by us.

Sheets	Rev. no.	Revision			Date	Revised	Reviewed	Approved
Article no.	Title				 Alfa Laval Desalt A/S COPENHAGEN DENMARK			
Date	11.11.98	Drawn	Reviewed	Approved	Repl. for rev.			
ISO method E	Scale	Weight		Drawing No. 985 18985				
CAD	Basic drawing no. 985 15840ev. 01			Repl. by rev.				



# Bill Of Material

Parent item no.: 985 18985-81 R: 00	Description: ASSEMBLY DRAWING STEAM ARRANGEMENT JIS D-PU-36-CAS100/N2	Date: 20051102	Page 1 of 2
Drawing no.: 985 18985-R00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
	.000000	EA	PIPE PARTS FOR STEAM ARR.		SEE SPECIFIC.PS		
1	1.000000	EA	SAFETY VALVE DN80/125 JIS TYPE SV603-7 PRES 1.0 BAR		985 00023-95		
2	28.000000	EA	SCREW M16 X 65 DIN 933		984 40910-44	QUALITY 8.8 ; DELTA-MAGNI	
3	88.000000	EA	WASHER M16 DIN 125 A		985 32512-20	A4	
4	44.000000	EA	NUT M16 DIN 934 HOT DIP GALVANIZED		984 40910-45	HOT DIP GALVANIZED	
5	1.000000	EA	GASKET DN100 Ø162/115 X 1,5 MM DIN 2690 PN10		985 80009-19	FERJOSEAL 2639	
6	2.000000	EA	THERMOMETER W/POCKET - ANGLE 63 MM	984 30366-R01	984 30366-00	CuNi10Fe	
7	.000000	EA	REDUCTION		PIPING PART.D		
8	1.000000	EA	VALVE 3/4". GLOBE		985 56110-04	CU PB5 SN5 ZN5 ISO 1338	
9	1.000000	EA	HEXAGON NIPPLE 3/4" X 1/2" BSP	B 3245	985 52722-03	ISO 1338/77 ; CU PB5 SN5 ZN5	
10	1.000000	EA	TEE 1/2" X 3/8" X 1/2" BSP	B 3130	985 00010-58	ISO 1338/77 ; CU PB5 SN5 ZN5	
11	1.000000	EA	NIPPLE PIPE 1/2" BSP X 60	B 3530	984 40943-11	ISO 1338/77 ; CU PB5 SN5 ZN5	
12	1.000000	EA	ELBOW 1/2" BSP	B 3092	985 52700-03	ISO 1338/77 ; CU PB5 SN5 ZN5	
13	1.000000	EA	COMPOUND GAUGE -100% - 2 BAR LB/IN2, BAR = KGF/CM2, Ø100, 3/8" N	984 30285-R01	984 30285-00		
14	1.000000	EA	BALL VALVE 3/8" BSP		984 35618-00	BRASS	
15	1.000000	EA	PRESSURE GAUGE COCK 3/8" BSP		984 35538-00	BRASS	
16	2.000000	EA	HEXAGON NIPPLE 3/8" BSP	B 3280	985 52721-02	ISO 1338/77 ; CU PB5 SN5 ZN5	
17	1.000000	EA	TEE 3/8" BSP	B 3130	985 52710-02	ISO 1338/77 ; CU PB5 SN5 ZN5	
18	.000000	EA	STEAM ARRANGEMENT INLET		PIPING PART.B		
19	2.000000	EA	BUTTERFLY VALVE DN100	984 35620-R00	984 35620-00	GG 22	
20	16.000000	EA	SCREW M16 X 110 DIN 931		985 00012-43	QUALITY 8.8 ; DELTA-MAGNI	
21	.000000	EA	CONNECTION FOR SAFETY VALVE		PIPING PART.A		
22	2.000000	EA	GASKET DN125 Ø192/141 X 1,5 MM DIN 2690 PN10		985 80009-20	FERJOSEAL 2639	

## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
BIC/SWIFT ESSEDKKK

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



# Bill Of Material

Parent item no.: 985 18985-81 R: 00	Description: ASSEMBLY DRAWING STEAM ARRANGEMENT JIS D-PU-36-CAS100/N2	Date: 20051102	Page 2 of 2
Drawing no.: 985 18985-R00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
23	1.000000	EA	PLUG 3/8".	B 3291	985 52730-02	ISO 1338/77 ; CU PB5 SN5 ZN5	
24	.000000	EA	STEAM ARRANGEMENT OUTLET		PIPING PART.C		
25	1.000000	EA	GASKET DN65 Ø127/77 X 1,5 MM DIN 2634 PN10		985 80009-17	FJ 2880	
26	.000000	EA	NOZZLE FOR STEAM INJECTOR		SEE SPECIFIC.N		
27	.000000	EA	STEAM INJECTOR		SEE SPECIFIC.J		
28	1.000000	EA	CONNECTION 3/8" BSP X 8	EV 68 F	984 40941-30	ISO 426/2/83 ; CU ZN39 PB3	
29	750.000000	MM	COPPER PIPE Ø 6/8	VVS 04 0104 008	984 40938-03	COPPER	

## Alfa Laval Copenhagen A/S

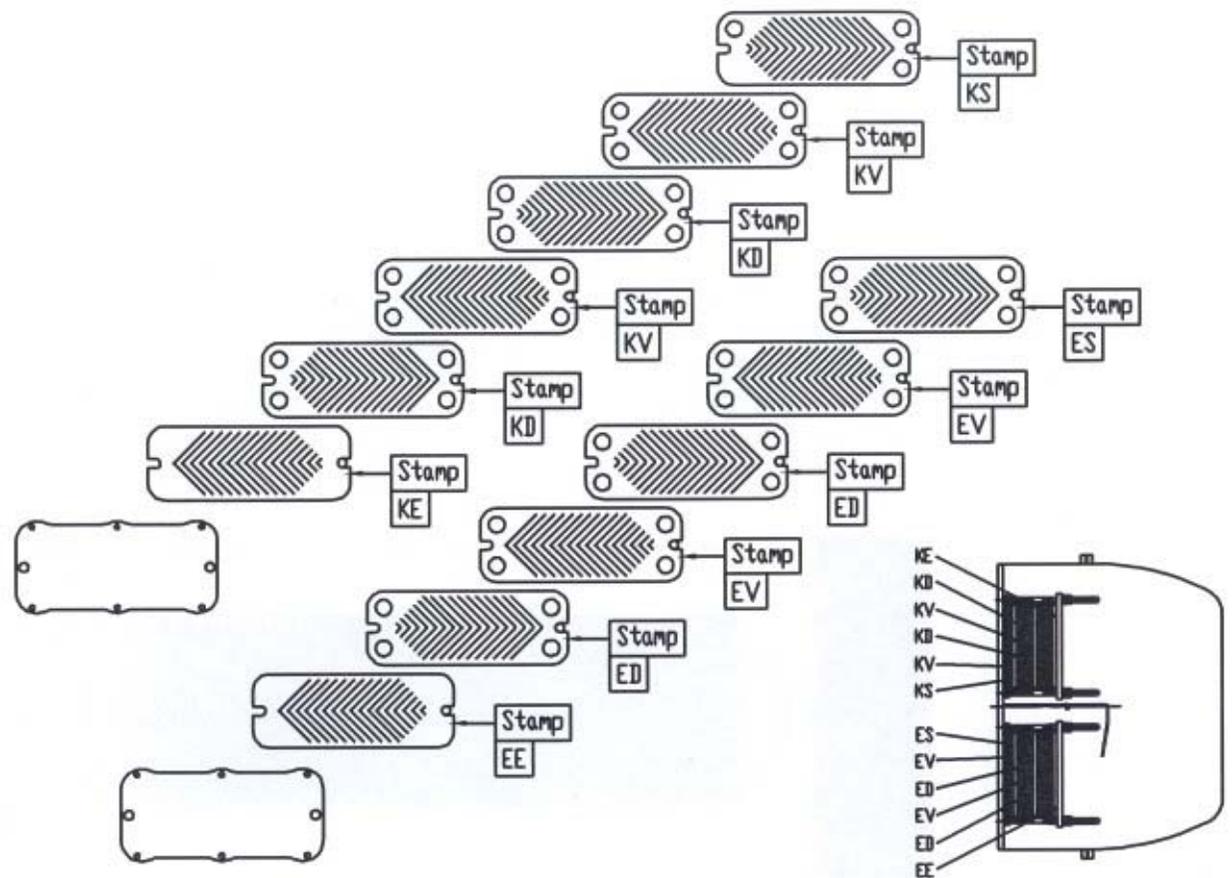
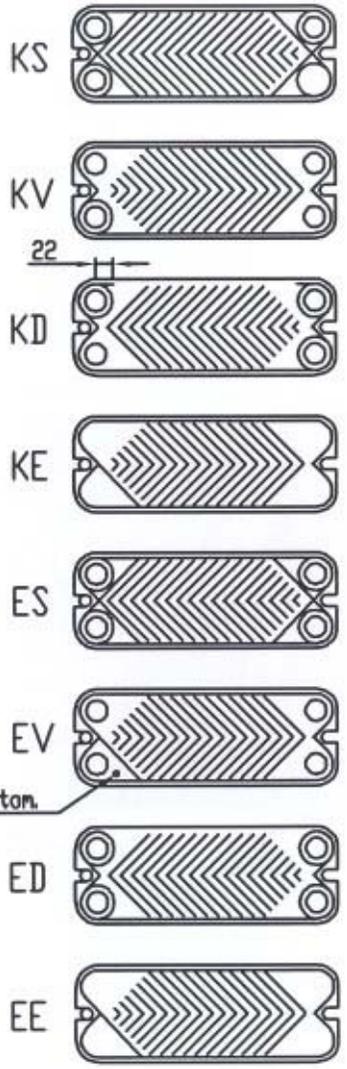
Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemærket 10, Copenhagen  
BIC/SWIFT: ESSEDKKK

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

Only to the extent expressly agreed by us this document may constitute a contractual obligation on our part.

This document and its contents are our exclusive property and must not be copied, reproduced, transmitted or communicated to any other party or used for purposes not expressly permitted by us.



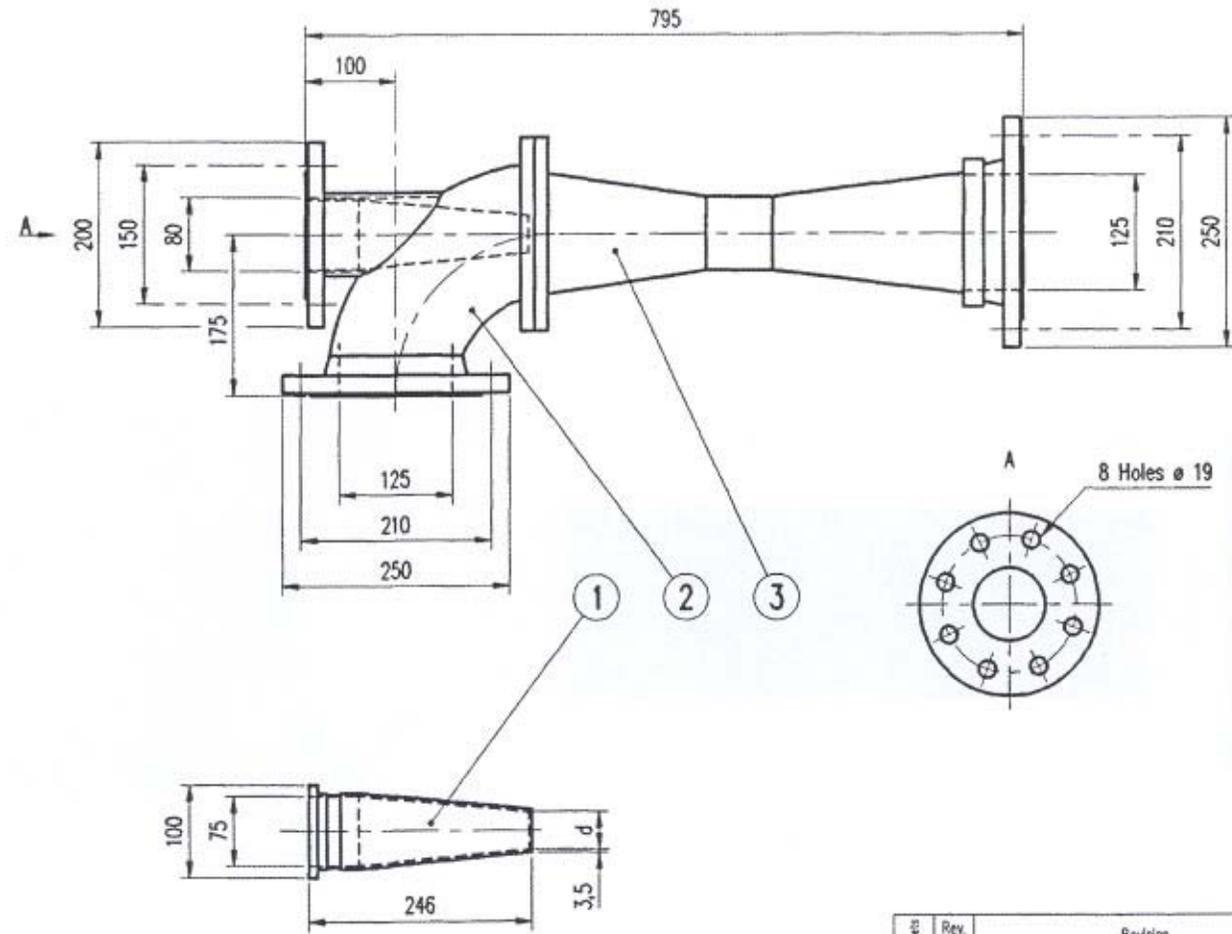
04	New Drawing Hesd.	11.05.04	MFN	MFN	P.JE
03	Text chg. on hole/EV plate.	25.08.03	AH	MFN	MFN
02	KD gasket add. 22 mm	03.02.00	PGR	HJD	HJD
01	1 HOLE in KS plate removed.	18.04.94	AJE	XX	XX

Rev. No.	Revision text	Date	Drawn	Checked	Appr.
Title					
ASSEMBLY SCHEDE					
Article no.	Proj. No	Proj. Type	Proj. Name	Location	
			DPU-36-C100/125	Mfa Laval Copenhagen A/S - Denmark	
	Dimensions Without Tolerances		Size	Drawing No	
	ISO 2768-M or ISO 13920-B		A3	985 13474	
Date	Drawn	ISO Method E	Scale	Rev.	
22.08.91	ASE	E	1:5	04	
Checked	Approved		Sheet		
FRE	EWA		2		

Only if the client expressly agreed by us this document may constitute a contractual obligation on our part.

This document and its contents are our exclusive property and must not be copied, reproduced, transmitted or communicated to any other party or used for purposes not expressly permitted by us.

Drawing no. **984 12568**  
Rev. **01**



Sheets	Rev. no.	Revision		Date	Revised	Reviewed	Approved
Article no.		Title		 <b>Alfa Laval</b> Alfa Laval Desalt A/S COPENHAGEN DENMARK			
Date		Drawn	Reviewed	Approved	Repl. for 984 12568 rev. 00		
ISO method E		Scale	Weight		Drawing No. <b>984 12568</b>		
CAD		Basic drawing no.		rev.	Repl. by rev.		



# Bill Of Material

Parent item no.: 985 00033-72 R: 00	Description: STEAM INJECTOR N 2 JIS GG20/RG5, 42,5/26,5MM	Date: 20040827	Page 1 of 1
Drawing no.: 984 12568-R01		Ini MFN	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	EJECTOR NOZZLE Ø 26,5		985 00036-78	RG 5	
2	1.000000	EA	INJECTOR HOUSING JIS N2 FL A JIS B2222-1977 FL B DIN		984 12568-01	GG 20	
3	1.000000	EA	DIFFUSOR Ø 42,5 MM		985 00036-77	GG 20	
4	1.000000	EA	GASKET Ø120/105 X 1,5	FJ 650	984 40942-06	NON-ASBESTOS	
5	4.000000	EA	SCREW M16 X 40 (SET) KVAL. 8.8 HFC 473		984 40916-03	HARDENED STEEL ; EL. ZINCED	

## Alfa Laval Copenhagen A/S

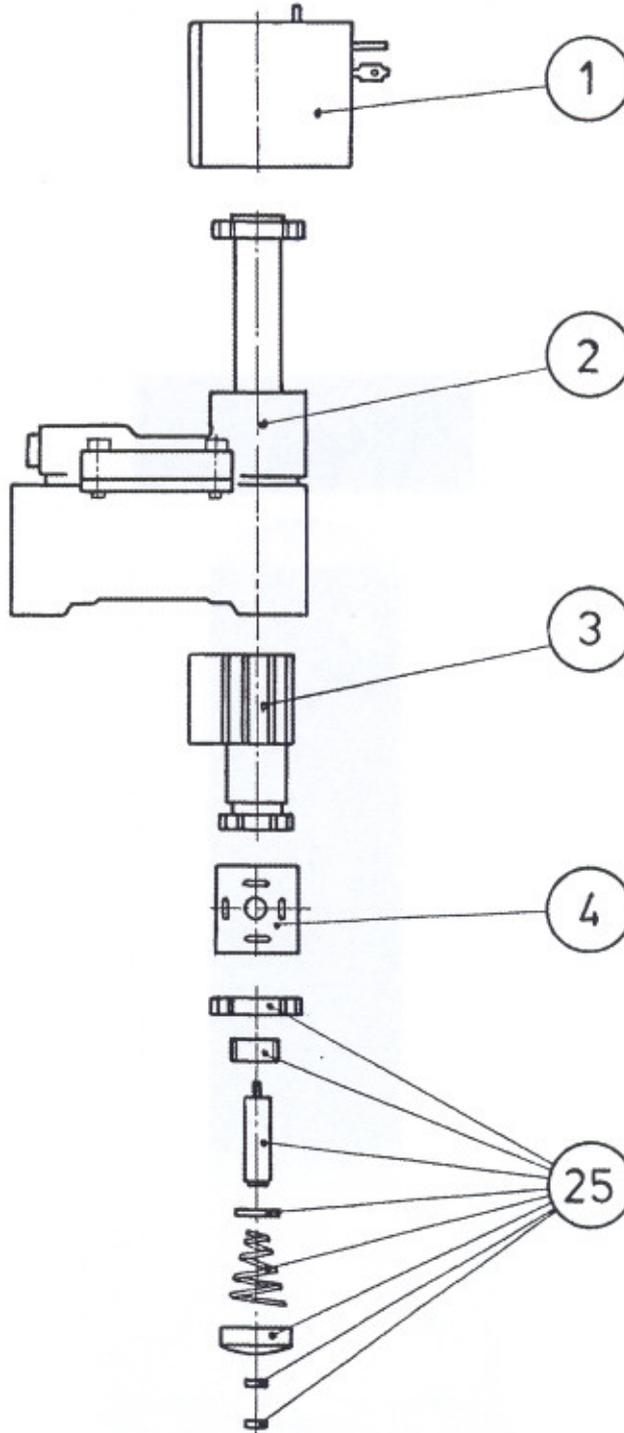
Maskinvej 5  
 DK-2860 Søborg, Denmark  
 CVR No. 10134285, VAT No. 14646647  
 Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemærket 10, Copenhagen  
 BIC/SWIFT: ESSEDKKK

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

This drawing is our property. Without our written consent it is not allowed to copy the drawing or to show it to third party. The drawing is to be returned when called for.

Denne tegning er vor ejendom og må ikke uden skriftlig tilladelse overføres til, benyttes eller kopieres af uvedkommende. Vi forbeholder os ret til at kræve tegningen returneret.



**ALFA-LAVAL**  
NIREX ENGINEERING  
COPENHAGEN DENMARK

Scale	construct	
	drawn	14.11.86 AJ
	checked	14.11.86 JXP
	revised	

SOLENOID VALVE  
DANFOSS

Replacement for:
Drawing No: <b>984.23482.00</b>
Replaced by:



# Bill Of Material

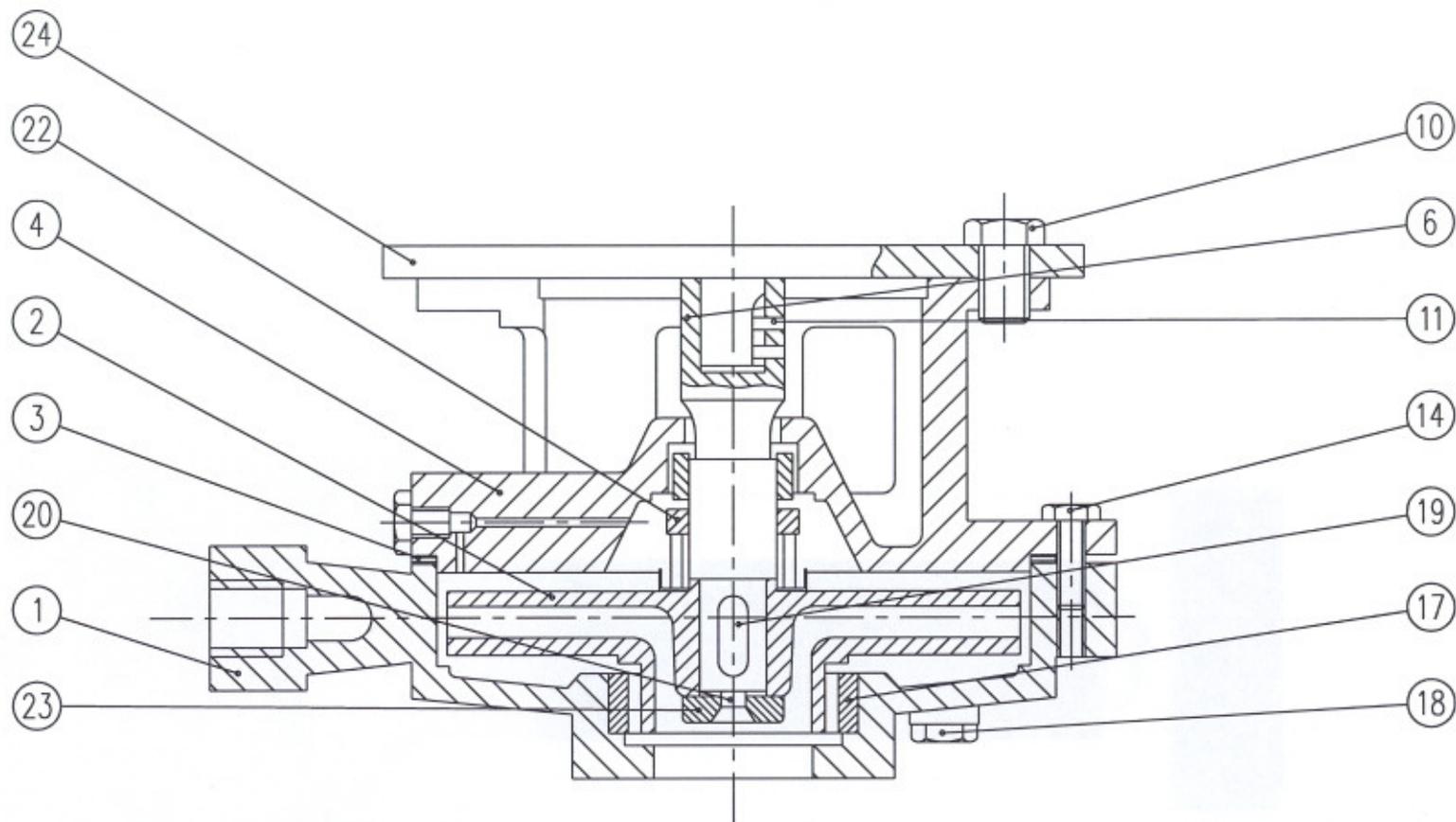
Parent item no.: 984 23486-00 R: 01	Description: SOLENOID VALVE 1/2" EV220B 15 220V 50/60 CS NO (EVSI 15)	Date: 20040608	Page 1 of 1
Drawing no.: 984.23482.0		Ini DKSOABK	

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		

## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
BIC/SWIFT: ESSEDKKK  
**Accounts:** DKK IBAN Acc. DK5752950010008069  
EUR IBAN Acc. DK4552950013000735  
USD IBAN Acc. DK4252950015000929



985 00027-60	2
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 10253-00 R: 02	Description: FRESHWATER PUMP PVVF-2040.2X-012 35 L/MIN, 28 MWC, 3360 R	Date: 20040608	Page 1 of 1
Drawing no.: 984.10230.00		Ini DKSOABK	

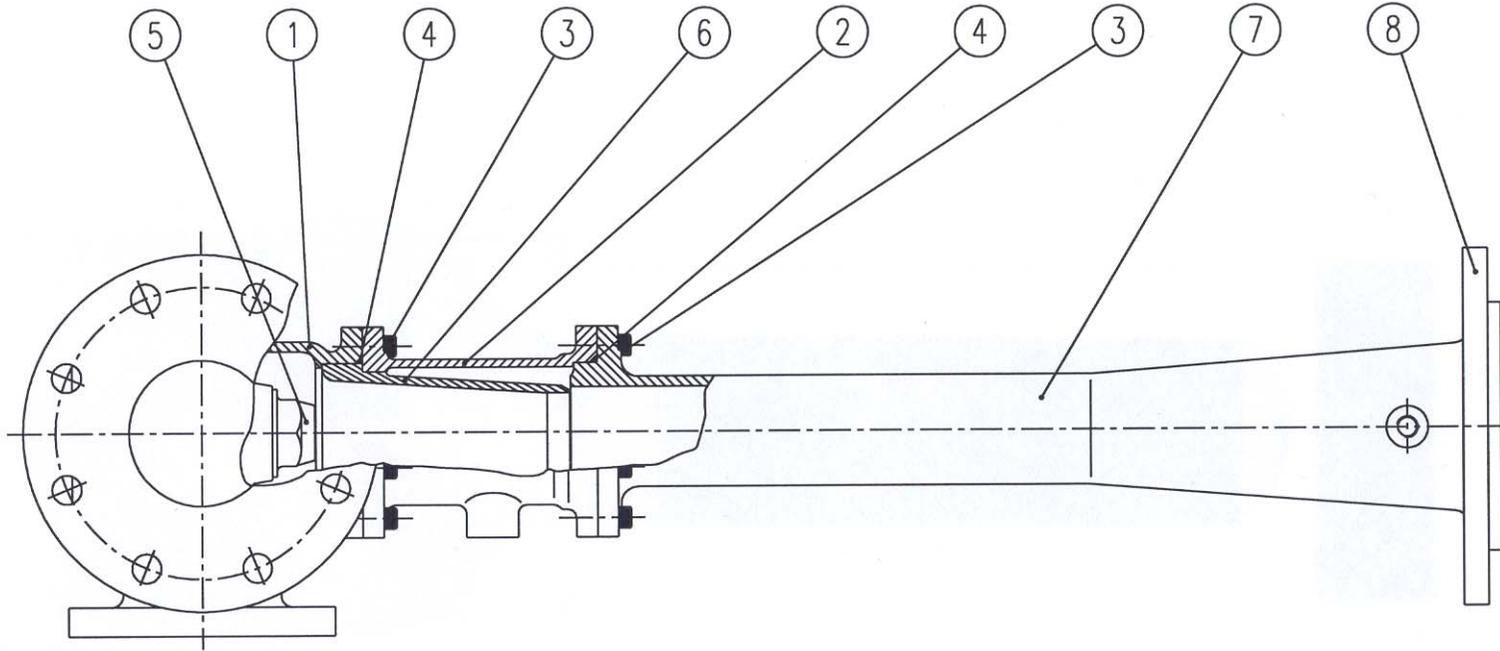
BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	HOUSING INCL. ITEM 3+17		984 10252-01	ISO 1338/77 ; CuPb5Sn5Zn5	
2	1.000000	EA	IMPELLER Ø 128		984 10253-02	RG 9	
3	1.000000	EA	GASKET PVVF 2040	985 13382-R01	984 10252-03	NON-ASBESTOS	
4	1.000000	EA	COVER INCL. ITEM 3		984 10252-04	ISO 1338/77 ; CuPb5Sn5Zn5	
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 M10 X 25 (SET) KVAL. 8.8	HFC 473	984 40910-03	HARDENED STEEL ; EL. ZINCED	
17	1.000000	EA	SEAL RING		984 10252-06	ISO 1338/77 ; CuPb5Sn5Zn5	
18	2.000000	EA	+ *PLUG 1/8" BSP UDGÆT. ERST. AF 984 10030-87	EV 109 B	984 40941-15	ISO 426/2/83 ; CU ZN39 PB3	
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	

Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

Bank: SEB, Landemærket 10, Copenhagen  
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
984 12271-00	2
984 12270-00	2
984 12269-00	2
984 12268-00	2
984 12267-00	2
984 12266-00	2
984 12265-00	2
984 12264-00	2
984 12263-00	2
984 12262-00	2
984 12261-00	2
984 12229-00	2
984 12228-00	2
984 12227-00	2
984 12226-00	2
984 12225-00	2
984 12224-00	2
984 12223-00	2
984 12222-00	2
984 12221-00	2
984 12220-00	2
984 12219-00	2
984 12218-00	2
984 12217-00	2
984 12216-00	2
984 12215-00	2
984 12214-00	2
984 12213-00	2
984 12212-00	2
984 12211-00	2
984 12210-00	2
984 12209-00	2
984 12208-00	2
984 12207-00	2
984 12206-00	2
984 12205-00	2
984 12204-00	2
984 12203-00	2
984 12202-00	2
984 12201-00	2
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.: 984 12229-00 R: 04	Description: COMBINED BRINE/AIR EJECTOR 31,3/48,0/55,2 JIS	Date: 20050712	Page 1 of 1
Drawing no.: 984.12200.00		Ini DKSOABK	

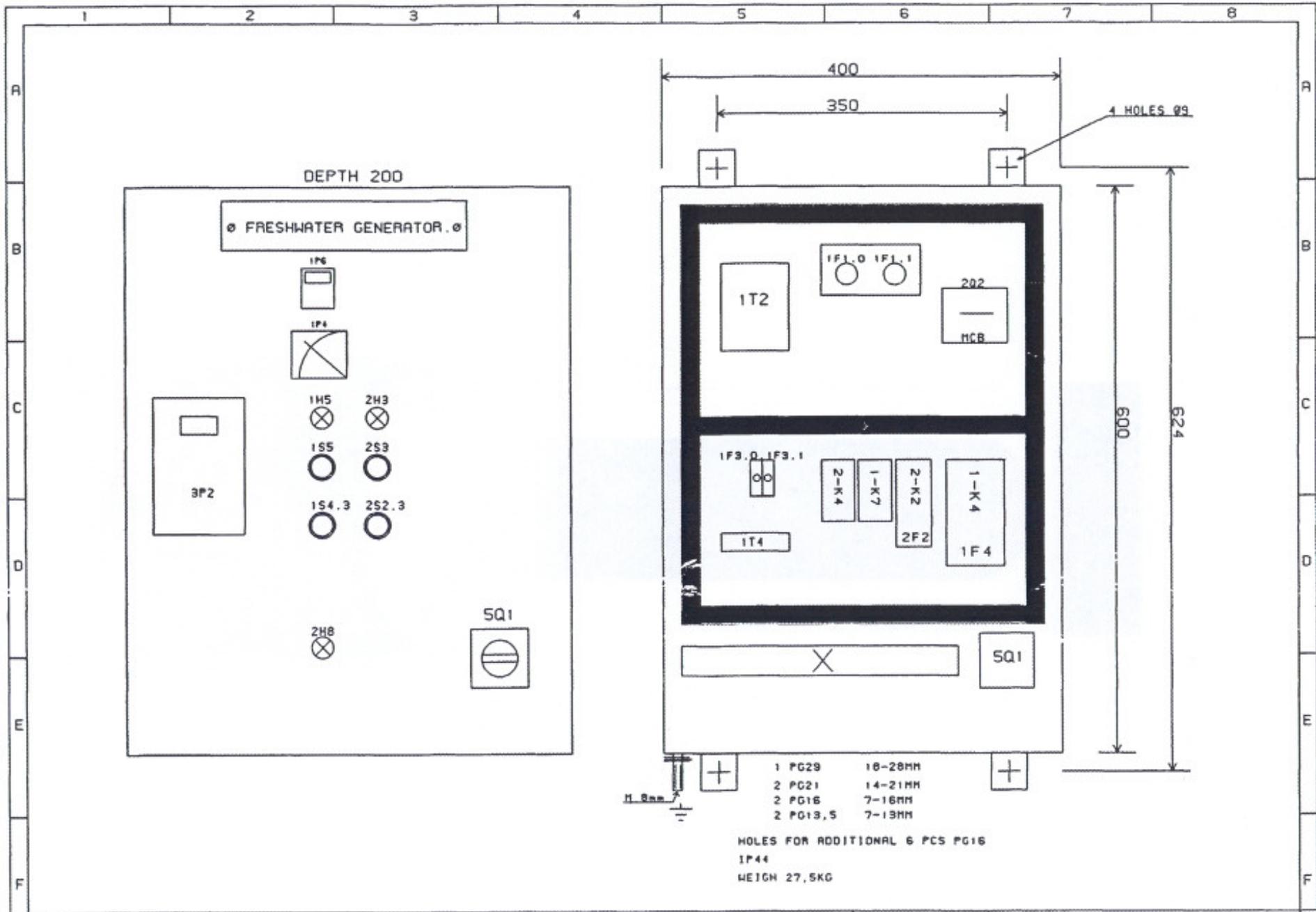
BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	EJECTOR HOUSING		984 12215-10	RG 5	
2	1.000000	EA	EJECTOR INTERMEDIATE HOUSING		984 12215-20	RG 5	
3	16.000000	EA	SCREW M8 X 30 DIN 912	HFC 1790	984 40908-08	ISO 683/13/86 ; TYPE 20A	
4	2.000000	EA	O-RING 85.32 X 3.53		984 40999-02	NITRIL	
5	1.000000	EA	EJECTOR NOZZLE Ø 31.3		984 12219-40	AISI 329	
6	1.000000	EA	EJECTOR NOZZLE Ø 48.0		984 12219-50	RG 5	
7	1.000000	EA	DIFFUSOR Ø 55.2 MM		984 12219-70	RG 5	
8	1.000000	EA	+FLANGE JIS		984 12225-80	ST.00	

## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
BIC/SWIFT: ESSEDKKK

**Accounts:** DKK IBAN Acc. DK5752950010008069  
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



# Bill Of Material

Parent item no.: 985 00034-85 R: 02	Description: CONTROL PANEL - FWG - OPT. A (DIAGR: 985 16645-R01) 220/380/440V - 220V	Date: 20040608	Page 1 of 2
Drawing no.: 985 16646-R01		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
10	1.000000	EA	BOX 400 X 600 X 200		984 21625-20	2490	
20	1.000000	EA	MAIN SWITCH OETL 63 K3		984 21622-82	6289	5Q1
30	1.000000	EA	HANDLE OETL ZX104/150		984 21622-83		5Q1
40	3.000000	EA	AUX. CONTACT CA5-10 HJÆLPEKONTAKT FOR A9-A110-N		984 21621-80	5096	1K4,2K2
50	2.000000	EA	AUX. CONTACT CA5-01 HJÆLPEKONTAKT FOR A9-A110-N		984 21621-81	5095	1K4,2K2
60	1.000000	EA	CONTACTOR A9 220V/50-60CS A9 220-230/230-240 50/60CS		984 21620-02	362	2K2
70	1.000000	EA	CONTACTOR.		SEE SPECIFIC.CO		1K4
80	1.000000	EA	THERMAL RELAY TA25 (1.3-1.8A) TA25		984 21621-01	5252	2F2.0
90	1.000000	EA	THERMAL RELAY.		SEE SPECIFIC.TR		1K4
120	2.000000	EA	FUSE CAP KII 5SH 112		984 21624-61	121	1F1.0,1F1.1
130	2.000000	EA	FUSE 6A DZ II 6A DZ II		984 21624-44	182	1F1.0,1F1.1
141	1.000000	EA	NO FUSE BREAKER C60H/C 6A 3PO C60H/C 6A 3POL ' MERLIN GERIN		985 00022-80	24998	2Q2
160	1.000000	EA	*UNIVERSAL TRANSFORMER		985 00013-47		1T2
170	3.000000	EA	BULB FOR PILOT LAMP 240V 220-240V		984 21622-01	4494	1H5,2H3,2H8
180	2.000000	EA	GLASS FOR PILOT LAMP (GREEN)		984 21622-02	4621	1H5,2H3
190	1.000000	EA	GLASS FOR PILOT LAMP (WHITE)		984 21622-03	5232	2H8
200	2.000000	EA	PUSH BUTTON (ON)		984 21622-30	4489	1S5,2S3
210	2.000000	EA	PUSH BUTTON (OFF)		984 21622-31	4490	1S4.3,2S2.3
220	2.000000	EA	PLATE FOR PUSH BUTTON (GREEN)		984 21622-40	4618	1S5,2S3
230	2.000000	EA	PLATE FOR PUSH BUTTON (RED)		984 21622-41	4617	1S4.3,2S2.3
240	2.000000	EA	FUSE 1A 143-241 5X20MM 143-241 RUDOLPH SCHMIDT		985 00016-25		1F3.0,1F3.1
276	2.000000	EA	AUX.RELAY N22E 220-240V50/60CS N22E 220-230V/230-240V 50/60CS		984 21620-92	3538	1K7,2K4
390	1.000000	EA	SALINOMETER DS-20 MUNSELL 7.5		984 22510-00	7443	3P2

## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
**BIC/SWIFT:** ESSEDKKK

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



# Bill Of Material

Parent item no.: 985 00034-85 R: 02	Description: CONTROL PANEL - FWG - OPT. A (DIAGR: 985 16645-R01) 220/380/440V - 220V	Date: 20040608	Page 2 of 2
Drawing no.: 985 16646-R01		Ini DKSOABK	

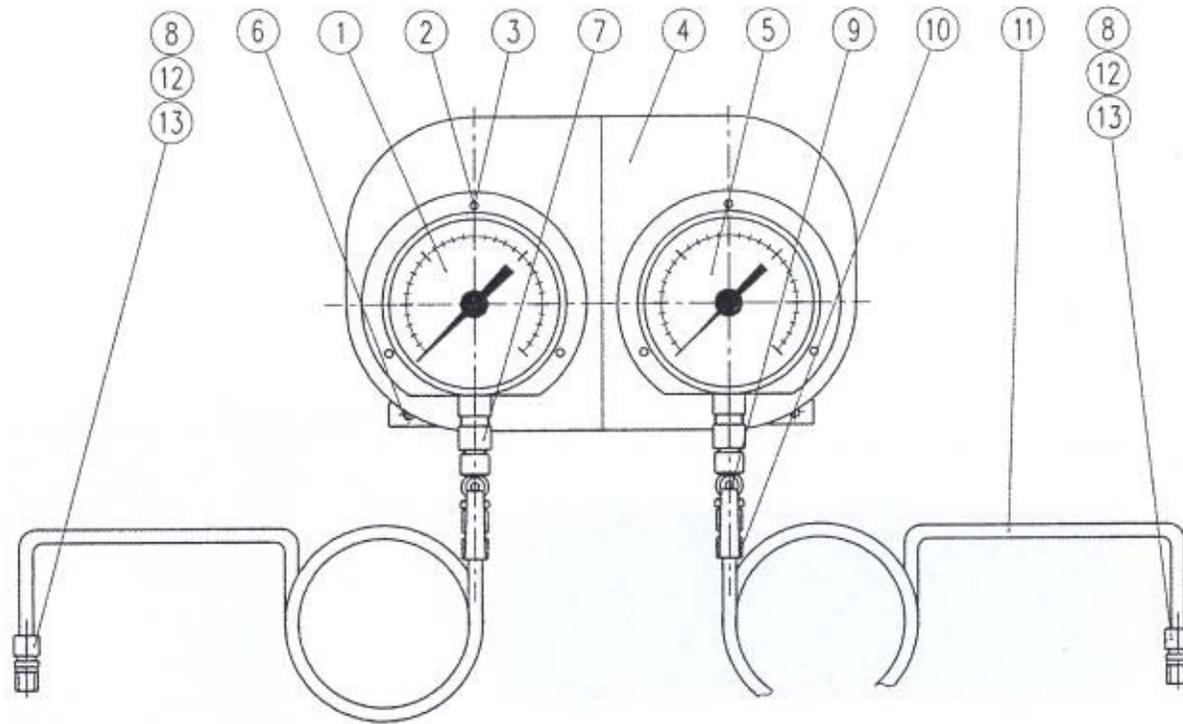
BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
411	1.000000	EA	A-METER EQ72 0-50/5-250A		984 21623-21	6197	1P4
412	1.000000	EA	CURRENT TRANSFORMER. 50/5A CELSA IBA ACL 9000018		985 00014-90		1T4
413	1.000000	EA	HOUR COUNTER 230V-50/60HZ UL BAUSER 633 UL.		984 21623-43	6494	1P6

## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
BIC/SWIFT: ESSEDKKK

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



Only in the extent expressly agreed by the drawing adaptation in our part.

The drawing and its contents are our exclusive property and must not be copied, reproduced, or used in any way without our written permission.

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						
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	A2		
		Date	Drawn	ISO Method C	Scale	1:2		
		Checked	Approved	Method C	Sheet	2		
						Drawing No.		Rev.
						984 58196 08		



# 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	

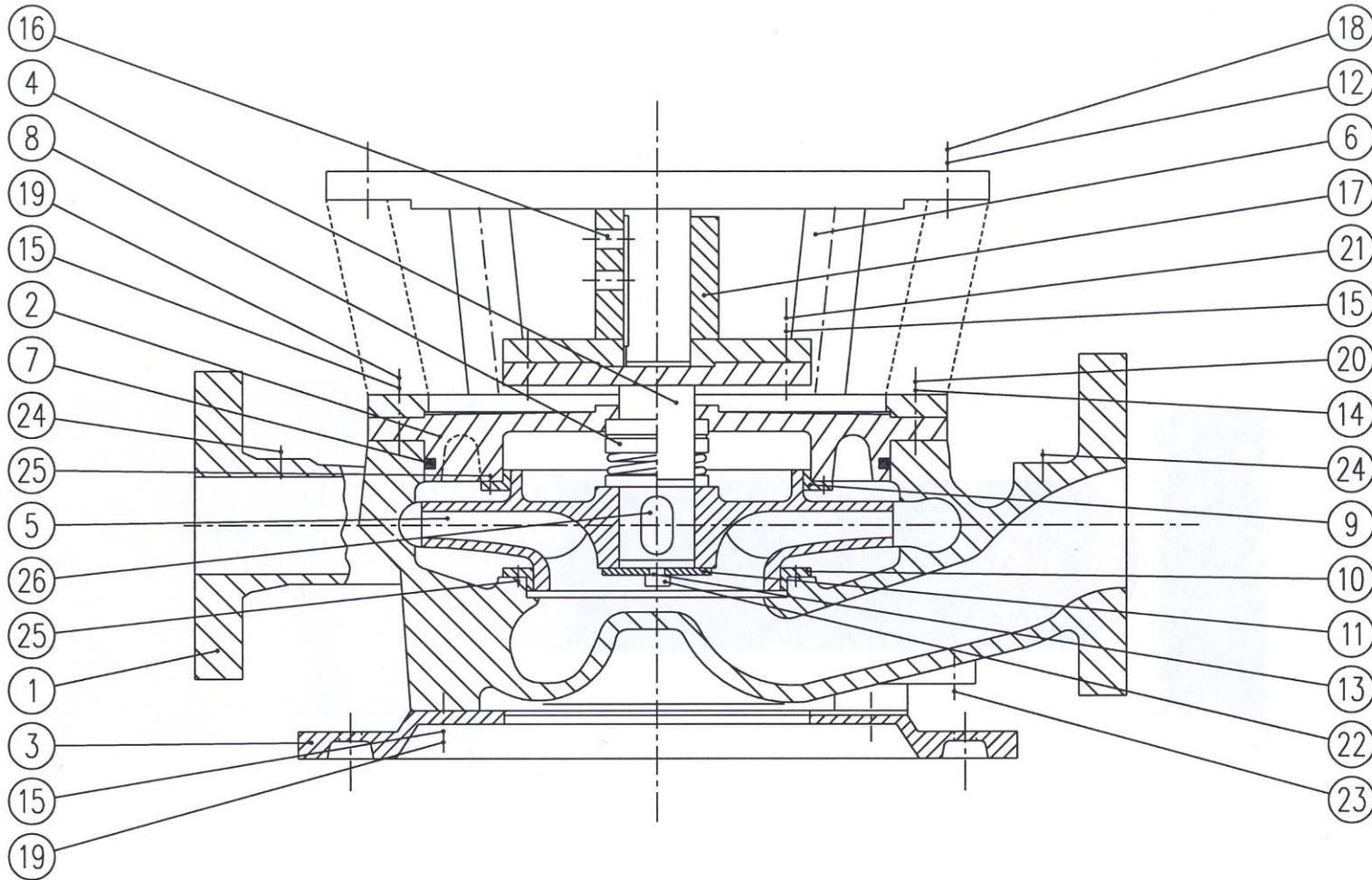
BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	COMPOUND GAUGE -100% - 2 BAR LB/IN2, BAR = KGF/CM2, Ø100F, 3/8"N		984 30284-00		
2	6.000000	EA	SCREW M4 X 10 DIN 84		985 30470-16	ISO 683/13/86 ; TYPE 20A	
3	6.000000	EA	NUT M4 DIN 934		985 32010-03	QUALITY 8.8; DELTA MAGNI	
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

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
**BIC/SWIFT:** ESSEDKKK

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



SCALED 2

985 00009-89	3
985 00009-16	3
985 00005-51	3
985 00005-12	3
985 00004-59	3
985 00004-55	3
985 00004-54	3
985 00003-31	3
985 00002-12	3
985 00002-11	3
984 10422-00	3
984 10407-00	3
984 10395-00	3
984 10394-00	3
984 10392-00	3
984 10383-00	3
984 10372-00	3
984 10370-00	3
984 10358-00	3
984 10357-00	3
984 10356-00	3
984 10355-00	3
984 10354-00	3
984 10351-00	3
984 10347-00	3
984 10346-00	3
984 10345-00	3
984 10344-00	3
984 10343-00	3
984 10342-00	3
984 10341-00	3
984 10340-00	3
984 10339-00	3
984 10338-00	3
984 10337-00	3
984 10336-00	3
984 10335-00	3
984 10334-00	3
984 10332-00	3
984 10328-00	3
984 10325-00	3
984 10324-00	3
984 10321-00	3
984 10319-00	3
984 10317-00	3
984 10316-00	3
984 10315-00	3
984 10313-00	3
984 10312-00	3
984 10311-00	3
984 10309-00	3
984 10308-00	3
984 10307-00	3
984 10306-00	3
984 10305-00	3
984 10304-00	3
984 10303-00	3
984 10302-00	3

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			
			X		X

984.10.302.00 05  
984.10.302.00



# Bill Of Material

Parent item no.: 985 00064-01 R: 06	Description: EJECTOR PUMP (STAINL.ST.IMP.) CNL-80-80/200 DIN/JIS 88 M3/H, 38 MWC, 3500RPM	Date: 20051102	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 168		985 00025-12	AISI 316	
5	1.000000	EA	IMPELLER Ø 175		985 00064-02	AISI 316	
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 MECHANICAL SEAL		984 10724-11	AVPGG*	
9	1.000000	EA	WEAR RING INCL. SCREWS		984 10301-14	AL.BRZ.	
10	1.000000	EA	WEAR RING INCL. SCREWS		984 10301-15	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 Ø 10 MM	HFC 1842	984 40901-30	ISO 683/13/86 ; TYPE 20A	
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	SCREW M16 X 40 DIN 933		985 80011-38	QUALITY 8.8 ; DELTA-MAGNI	
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	SCREW M10 X 30 DIN 933		984 40910-37	QUALITY 8.8 ; DELTA-MAGNI	
22	1.000000	EA	SCREW M12 X 30 DIN 912	HFC 1790	984 40912-15	ISO 683/13/86 ; TYPE 20A	

## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
BIC/SWIFT: ESSEDKKK

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



# Bill Of Material

Parent item no.: 985 00064-01 R: 06	Description: EJECTOR PUMP (STAINL.ST.IMP.) CNL-80-80/200 DIN/JIS 88 M3/H, 38 MWC, 3500RPM	Date: 20051102	Page 2 of 2
Drawing no.: 984.10302.00		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
23	1.000000	EA	PLUG 3/8" BSP	FTHPT	984 40944-03	ISO 683/13/86 ; TYPE 20A	
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	

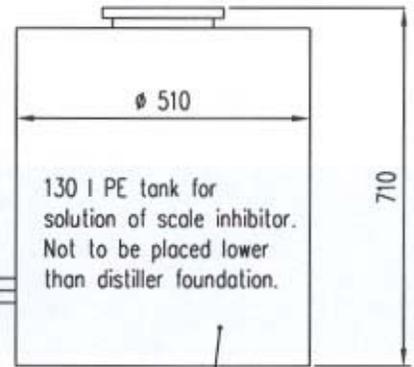
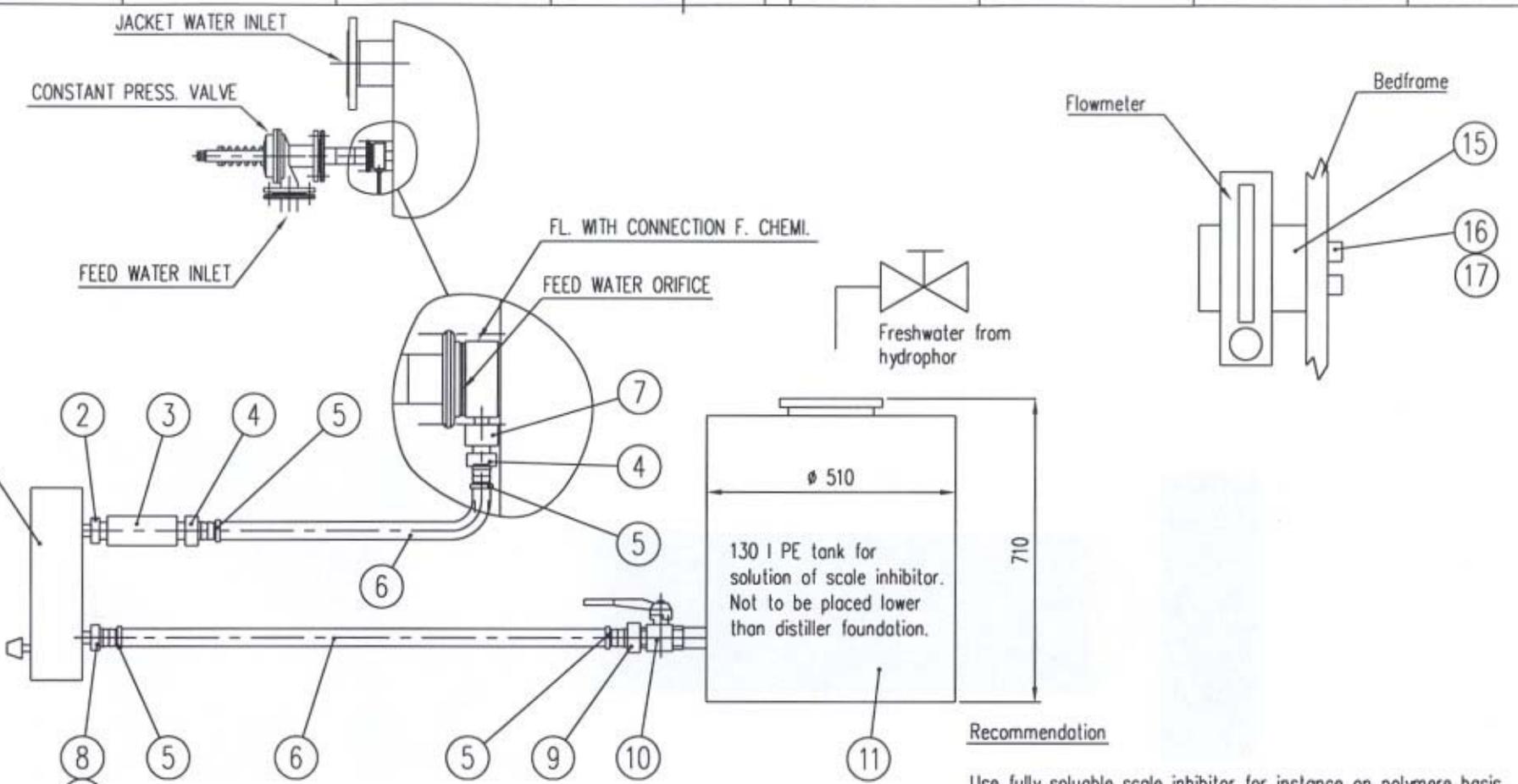
## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
BIC/SWIFT: ESSEDKKK

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

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.

Only to the extent expressly agreed by us, this document may constitute a contractual obligation on our part.

This document and its contents are our exclusive property and must not be copied, reproduced, transmitted or communicated to any other party or used for purposes not expressly permitted by us.

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



# 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

Maskinevej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemærket 10, Copenhagen  
**BIC/SWIFT:** ESSEDKKK

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



# Bill Of Material

Parent item no.: SPARES-N-009955 R: 00	Description: SPARE PARTS KIT JWSP-26-C100	Date: 20051102	Page 1 of 1
Drawing no.:		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	2.000000	EA	MECH. SEAL Ø 16 MECHANICAL AXLESEALING		984 10230-08	AVPGG*	FOR F.W. PUMP
1	2.000000	EA	MECH. SEAL Ø 35 MECHANICAL SEAL		984 10724-11	AVPGG*	FOR EJECTOR PUMP
2	2.000000	EA	BALL BEARING 6203 Z-C 3		984 20638-00		FOR F.W. PUMP MOTOR
2	2.000000	EA	BALL BEARING 6210 Z C3		985 00037-49		FOR EJ. PUMP MOTOR
3	1.000000	EA	GASKET FOR FRONT COVER DPU-36-C100/125	985 18903-R00	985 18903-01		FOR GENERATOR
4	1.000000	EA	GLUE		984 40002-00		

**Alfa Laval Copenhagen A/S**

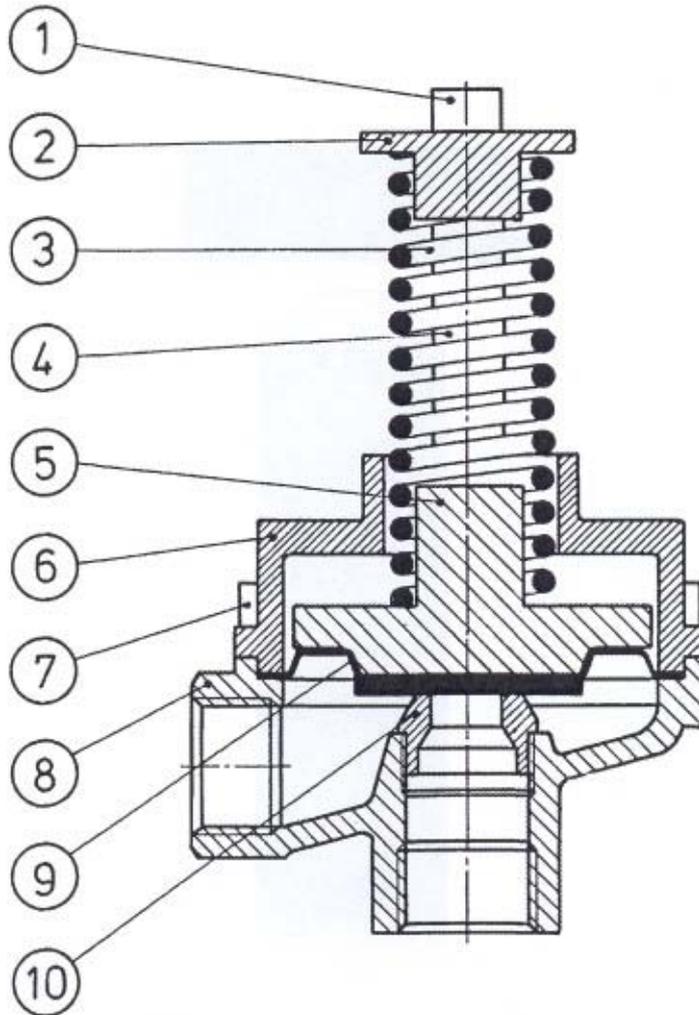
Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
**BIC/SWIFT:** ESSEDKKK

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

This drawing is our property. Without our written consent it is not allowed to copy the drawing or to show it to third party. The drawing is to be returned when called for.

Denne tegning er vor ejendom og må ikke uden skriftlig tilladelse overføres til. Betyntes eller kopieres af uvedkommende. Vi forbeholder os ret til at kræve tegningen returneret.



 <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	

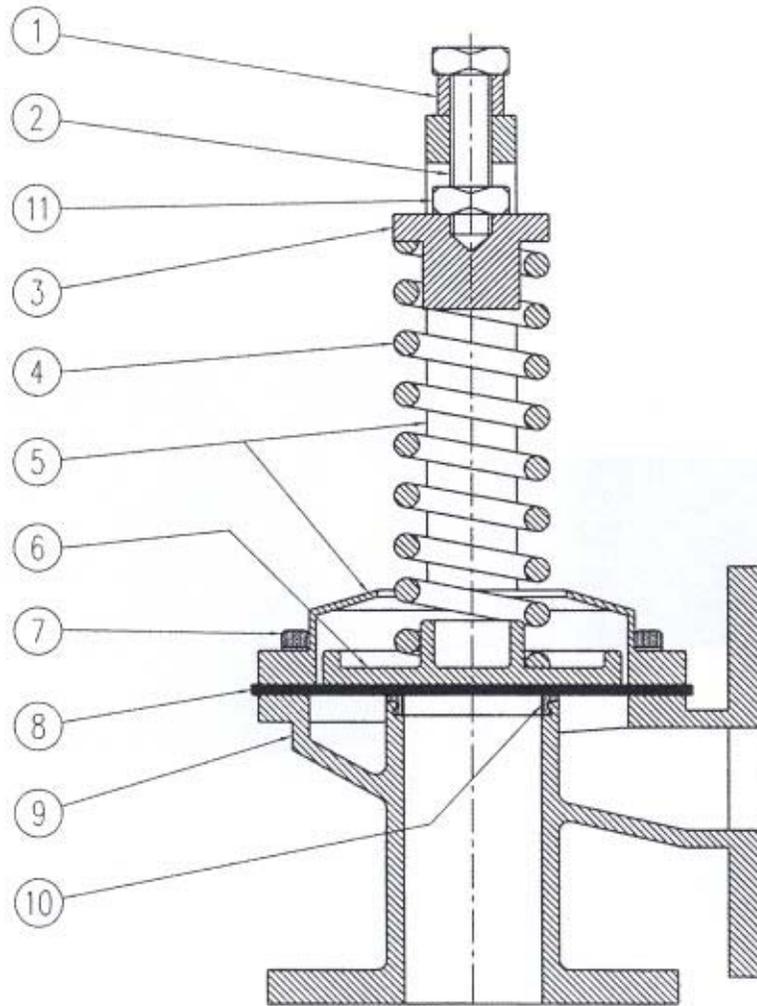
## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
**BIC/SWIFT:** ESSEDKKK  
**Accounts:** DKK IBAN Acc. DK5752950010008069  
EUR IBAN Acc. DK4552950013000735  
USD IBAN Acc. DK4252950015000929

Only in the subject standard  
 specified by us. This document  
 may describe a construction  
 different to the one shown.

No dimensions and/or materials are to be included  
 in this drawing. Dimensions and materials  
 specified in the drawing shall be used. This drawing  
 is valid for all parts unless otherwise specified.



SPRING LOADED VALVE	
984 35535-00	MVF-40-2.5
984 35536-00	MVF-50-3.0

2	New drawing in CAD	26.06.03	MFN		
Rev	Revision	Date	Revised	Reviewed	Approved
<b>Alfa Laval</b> Alfa Laval Copenhagen A/S DENMARK		Title <b>Spring loaded valve</b> <b>MVF-40-2.5 50-3.0</b>			
Dimensions without tolerances: ISO 2768-M or ISO 13920-B		ISO method E	Scale 1:1	Project name	
Date 26.06.03		Drawn MFN	Reviewed	Approved	Project type
Replace drawing no.		Drawing No.		Rev.	
		<b>984 35535</b>		<b>02</b>	



# Bill Of Material

Parent item no.: 984 35535-00 R: 01	Description: SPRING LOADED VALVE MVF-40-2.	Date: 20040608	Page 1 of 1
Drawing no.: 984 35535-02		Ini DKSOABK	

BUBL	QTY	U/M	DESCRIPTION	DRAWING NO.	ARTICLE NO.	MATERIAL	REMARKS
1	1.000000	EA	ADJUSTING RING		984 35516-01	AISI304	
2	1.000000	EA	ADJUSTING SCREW		984 35516-02	AISI304	
3	1.000000	EA	SPRING RETAINER		984 35516-03	DELTRIN	
4	1.000000	EA	SPRING		984 35504-04	SPRING STEEL	
5	1.000000	EA	SPRING GUIDE		984 35516-05	ALU/RILSAN	
6	1.000000	EA	DIAPHRAGM WASHER		984 35516-06	ALU/RILSAN	
7	6.000000	EA	SCREW M8 X 20 DIN 912	HFC 1790	984 40908-06	ISO 683/13/86 ; TYPE 20A	
8	1.000000	EA	DIAPHRAGM		984 35504-08	EPDM	
9	1.000000	EA	VALVE HOUSING		984 35535-01	RG 5	
10	1.000000	EA	VALVE SEAT		984 35535-02	DELTRIN	
11	1.000000	EA	NUT M12 DIN 934		985 00001-71	QUALITY 8.8 ; DELTA-MAGNI	

## Alfa Laval Copenhagen A/S

Maskinvej 5  
DK-2860 Søborg, Denmark  
CVR No. 10134285, VAT No. 14646647  
Phone/Fax: +45 3953 6000 / +45 3953 6568

**Bank:** SEB, Landemarket 10, Copenhagen  
BIC/SWIFT: ESSEDKKK

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

## 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					

