

MARINE TRAINING SOFTWARE, SIMULATORS AND DIESEL ENGINE TESTERS

**MARINE TRAINING
SOFTWARE
Engineering CBT**

Operator's Handbook

Part 7

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Installation instruction

1. Start the computer and load the Windows 98 / Me / 2000 / XP / 2003 operating system.
2. Insert the CD into the CD-ROM drive.
3. Click the “Start” menu.
4. Select “Run...”.
5. Type “[CD-ROM drive letter]:\setup.exe” (e.g. d:\setup.exe), or click ‘Browse...’ button and locate ‘setup.exe’ file on the CD-ROM.
6. Click “OK” button.
7. Follow the instructions shown on the screen.
8. After the installation please run “Hardlock installation” and follow the instructions.
9. Insert the Hardlock Key.
10. Before running applications, please install the latest version of DirectX drivers. You will find “DirectX 9.0c” setup file on the CD-ROM in the following location:
“[CD-ROM drive letter]:\DirectX9.0c\dxsetup.exe”.
11. In order to read the manual file, please install the “Adobe Reader” from the following location:
 - for Windows 2000 / XP:
“[CD-ROM drive letter]:\Adobe Reader\AdbeRdr705_enu_full.exe”.
 - for Windows 98 / Me:
“[CD-ROM drive letter]:\]:\Adobe Reader\AdbeRdr505_enu.exe”.

REFRIGERATING PLANT 3D

1. Introduction

The educational program REFRIGERATING PLANT - training simulator, is designated for learning the essential principles of the refrigeration room maintenance. The program is based on a refrigerating plant with four cold chambers:

- Meat/fish cold chamber with temperature $-25\text{ }^{\circ}\text{C}$
- Dry provision cold chamber with temperature $+10\text{ }^{\circ}\text{C}$
- Dairy cold chamber with temperature $+4\text{ }^{\circ}\text{C}$
- Vegetables cold chamber with temperature $+4\text{ }^{\circ}\text{C}$

The chambers are serviced by two compressors. The refrigerant medium is freon R 404A.

The refrigerating plant consists of the following main components:

1. Two compressors
2. Two condensers
3. Control panel
4. Four cold chambers with air coolers and valve's block

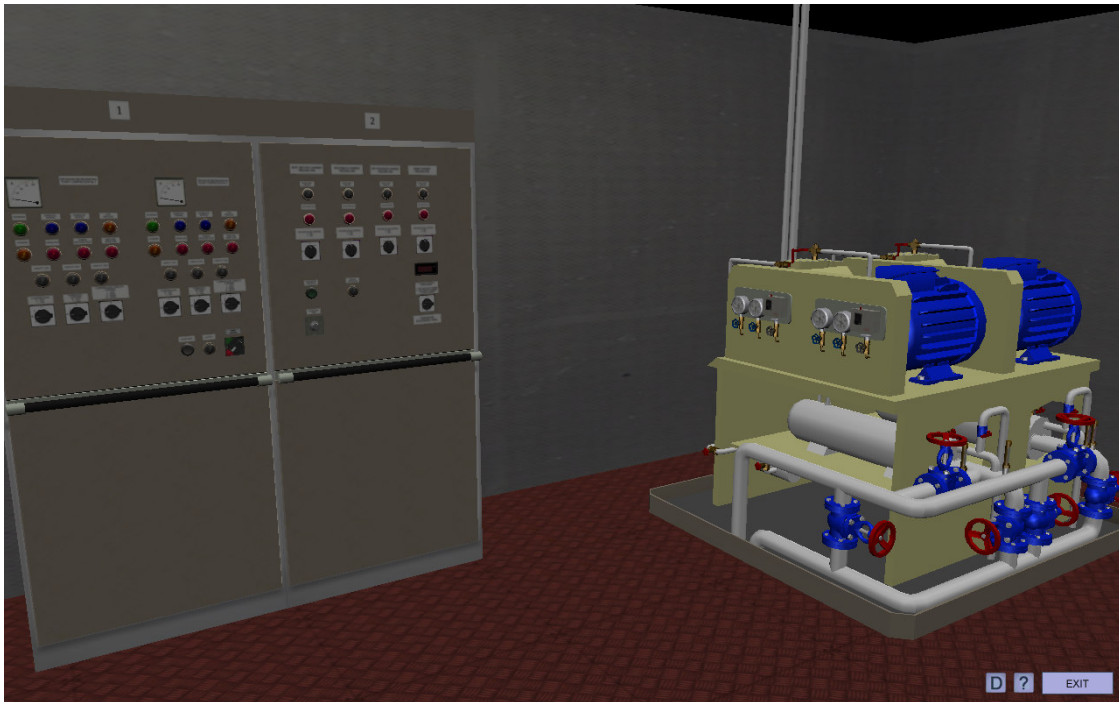


Fig. 1. Refrigerating plant – general view

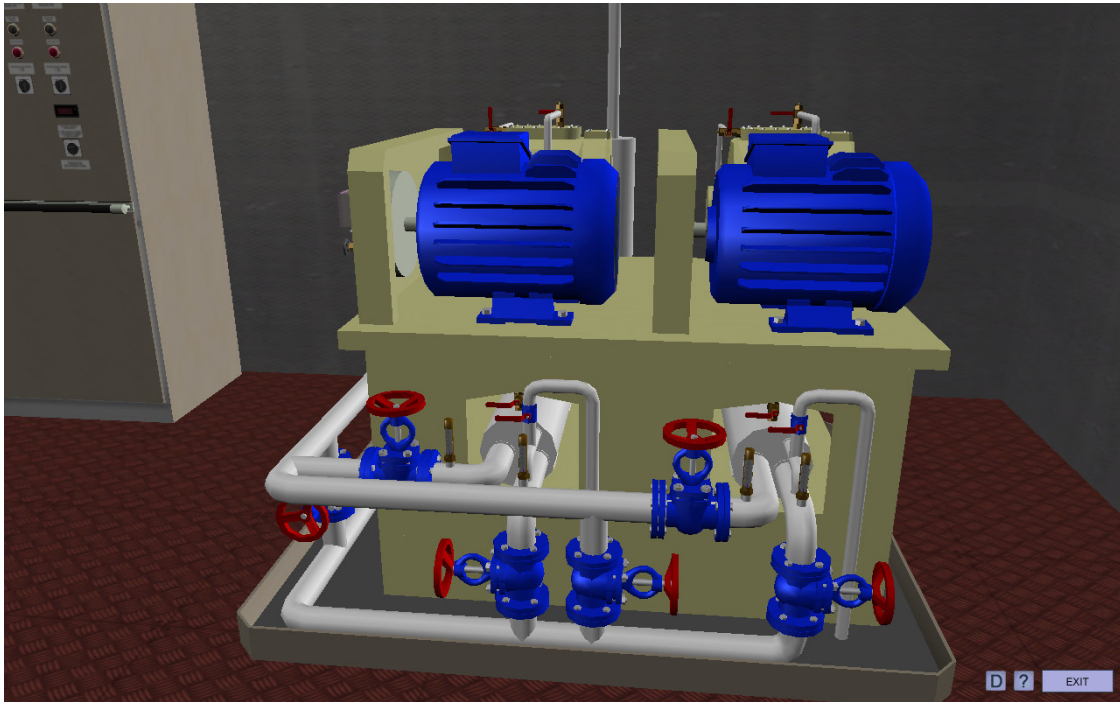


Fig. 3. Compressors with condensers



Fig. 4. Cold chambers – general view

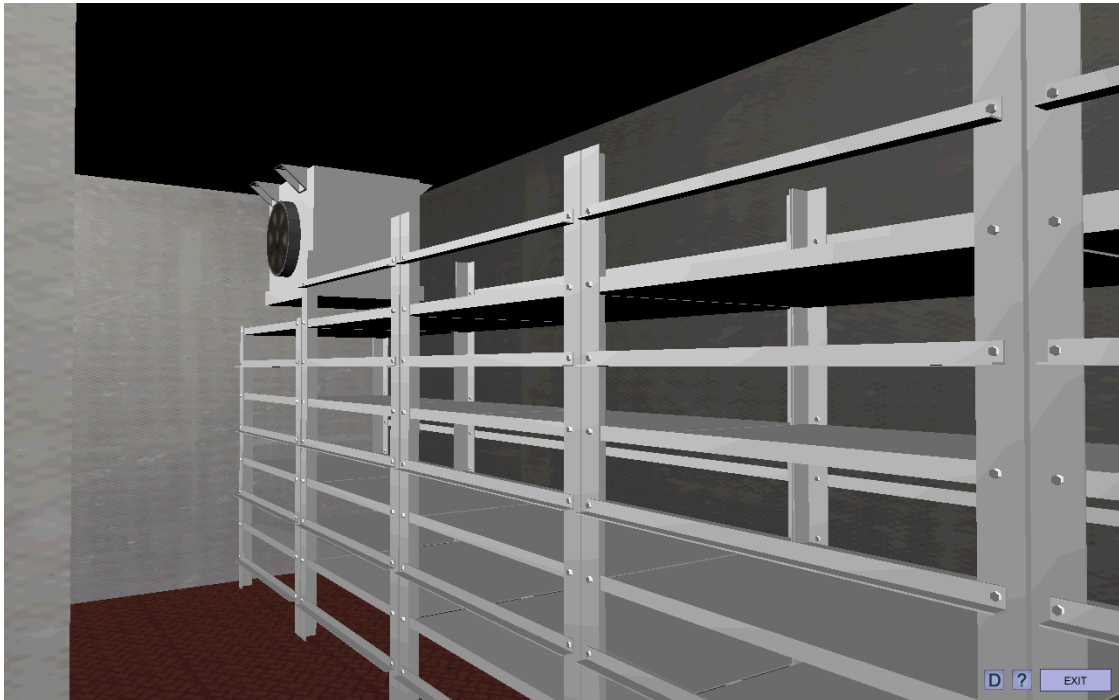


Fig. 5. Cold chambers with air cooler

The simulator diagram shows the basic configuration of freshwater generator and status of main element and valves. Basic parameters of the system are also presented.

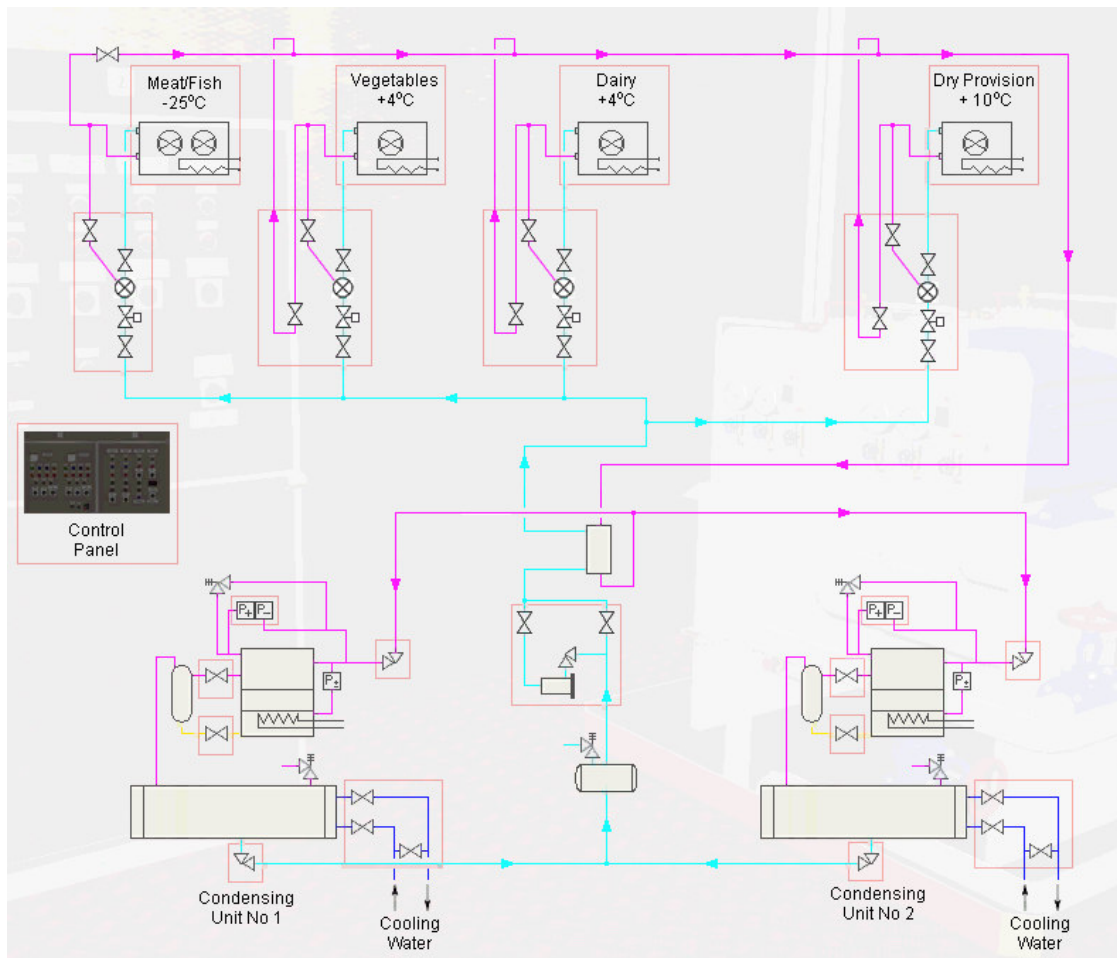


Fig. 6. Refrigerating plant diagram

2. Operating procedures

After program starting all devices are off and valves are closed.

The compressor is unloaded during start (there is no pressure difference between the suction line and the compression side).

Regulator's setting while starting the program:

- low pressure safety cut-out /LPC/:
 - a) START 0,197 MPa,
 - b) difference DIFF 0,142 MPa.
- high pressure safety cut-out /HPC/:
 - a) STOP 1,8 MPa.
- Differential pressure control /DPC/:

- a) DIFF 0,003 MPa.
- thermostat in the meat/fish chamber:
 - a) setting - 25 °C,
 - b) DIFF 2.
- thermostat in the dry provision chamber:
 - a) setting + 10 °C,
 - b) DIFF 2.
- thermostat in the dairy chamber:
 - c) setting +4 °C,
 - d) DIFF 2.
- thermostat in the vegetables chamber:
 - c) setting + 4 °C,
 - d) DIFF 2.

2.1. Starting procedure

1. Condenser no 1 inlet valve should be open
2. Condenser no 1 outlet valve should be open
3. Condenser no 1 vent valve should be open
4. Condenser no 1 vent valve should be closed
5. Refrigerating compressor no 1 discharge valve should be open
6. Refrigerating compressor no 1 oil return valve should be open
7. Dehydrator inlet valve should be open
8. Dehydrator outlet valve should be open
9. Dehydrator by-pass valve should be CLOSED
10. All valve before meat/fish cold chamber should be open
11. All valve before dry provision cold chamber should be open
12. All valve before dairy cold chamber should be open
13. All valve before vegetables cold chamber should be open

14. Main Switch should be set to ON position
15. Compressor no 1 standstill heating switch should be set to ON position
16. Compressor no 1 capacity control switch should be set to AUTO position
17. Compressor no 1 switch should be set to ON position
18. Manual reset on compressors high press safety cut-out switch should be pressed
19. Meat and fish chamber freezing fan switch should be set to ON
20. Vegetables chamber freezing fan switch should be set to ON
21. Dairy chamber freezing fan switch should be set to ON
22. Dry provision chamber freezing fan switch should be set to ON
23. Refrigerating compressor no 1 suction valve should be open

If temperature in chambers is higher than the setting temperatures on the proper thermostat then the green lamps 'START' of the fans and the solenoid valves shall light, indicating their activity.

The yellow lamp 'STAND BY' indicates that the compressor is ready to work. At the same time the blue lamp 'OIL HEATER' lights indicating that lubricating oil in the compressor crankcase is heated. The compressor starts (the green lamp 'START' turns on while the lamp 'OIL HEATER' turns off) when suction pressure p_s , (shown in display) increases above the setting pressure at the low pressure safety cut-out LPC. The compressor stops when the suction pressure will be lower than stop compressor pressure set on LPC. START - DIFF = STOP.

24. Condenser no 1 refrigerant outlet valve should be open

2.2. Continuous running procedure

After starting the refrigerating plant according to the procedure described above, the refrigerating plant works in an automatic cycle. The chamber temperatures decrease gradually until temperatures reach values set at the proper thermostat. Then the solenoid valve is automatically closed and fans are switched off. After standing period, when temperature in the particular cold chamber rises over the value set on the thermostat, the solenoid valve opens automatically and fan turns on.

2.3. Stopping procedure

1. Condenser no 1 refrigerant outlet valve should be closed
2. Wait until the compressor sucks off the refrigerant vapour from the installation and stops automatically (when the suction line pressure is lower than pressure set on low pressure safety cut-out LPC).
3. Suction pressure increases after a few minutes up to a value making possible the compressor start.
4. The compressor sucks off the rest of the refrigerant vapour from installation and automatically stops.
5. Refrigerating compressor no 1 discharge valve should be closed
6. Refrigerating compressor no 1 oil return valve should be closed
7. Dehydrator inlet valve should be closed
8. Dehydrator outlet valve should be closed
9. All valve before meat/fish cold chamber should be closed
10. All valve before dry provision cold chamber should be closed
11. All valve before dairy cold chamber should be closed
12. All valve before vegetables cold chamber should be closed
13. Refrigerating compressor no 1 suction valve should be closed
14. Condenser no 1 inlet valve should be closed
15. Condenser no 1 outlet valve should be closed

2.4. Cold chamber 1 defrosting procedure

Defrosting is performed in deep refrigeration meat/ fish chamber. Defrosting is effectuated by using electric heaters. It may be carried out in automatic or manual cycle. The thermostat

placed on the lowest evaporator coil signalizes when defrosting ends. The thermostat setting is constant, without a possibility of external changes. Defrosting takes place when temperature in the chamber is below 0°C.

Automatic defrosting:

Set the defrosting timer on control panel in order to determine defrosting frequency. This operation can be effectuated each 8 min. (timer set on 8), each 16 min. (timer set on 16) or each 24 min (timer set on 24).

After a period of time 8, 16 or 24 min. (according to the frequency set) the yellow lamp 'DEFROSTING START' turns on and subsequently the lamp 'START' of the solenoid valve and the fan in chamber 1 switch off. Next, the lamp 'EVAP. HEATER ON' turns on.

During defrosting operation, the meat/fish chamber temperature display turns red, indicating that defrosting proceeds.

When defrosting procedure is finished, the lamp 'EVAP. HEATER ON' turns off automatically and next, the lamp 'START' of the solenoid valve and the fan turn on.

Chamber meat/fish temperature display changes colours from red to blue.

Manual defrosting:

Press push- button 'MANUAL DEFROST.' on the control panel (by mouse clicking).

The yellow lamp 'DEFROSTING START' turns on and the lamp 'START' of the solenoid valve and the fan in the meat/fish chamber switch off simultaneously. Next, the lamp 'EVAP. HEATER ON' turns on.

During defrosting operation, the meat/fish chamber temperature display turns red, indicating that defrosting proceeds.

When defrosting procedure is finished, the lamp 'EVAP. HEATER ON' turns off automatically and next, the lamp 'START' of the solenoid valve and the fan turn on.

Meat/fish chamber temperature display changes colours from red to blue.

Attention:

During defrosting procedure 'EVAP. HEATER ON' the solenoid valve of meat/fish chamber is closed (the fan is off, the temperature in the chamber slowly rises).

HYDROPHORE INSTALLATION 3D

1. Introduction

The educational program HYDROPHORE INSTALLATION is intended for teaching the basic principles of how to operate a typical hydrophore installation for sanitary water used in marine power plant.

The simulator consists of the following elements:

1. Pressure vessel / hydrophore / provided with the following fittings:
 - pressure gauge
 - differential pressure control with cut-off valve
 - water level glass
 - compressed air system connection
 - safety valve
 - drain valves (release extraction)
 - inlet and outlet valves
2. Water pumps
3. Water tanks No 1 and No 2 and No 3
4. UV sterilizer
5. Hot water circulation pump
6. Hot water heater

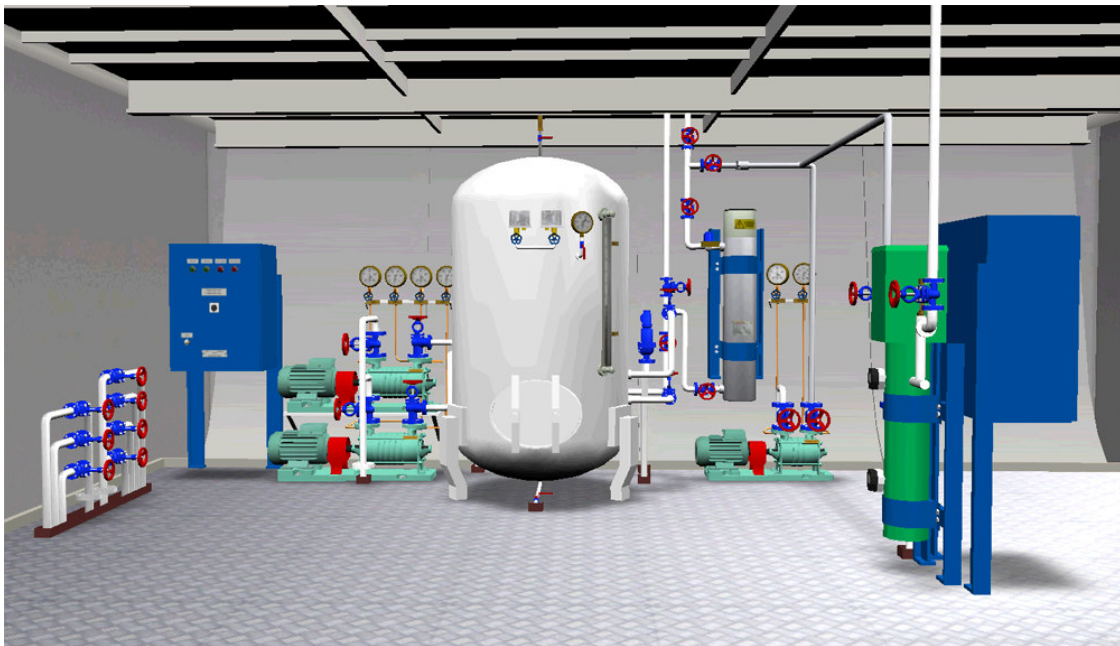


Fig. 1. Hydrophore installation – general view

The simulator diagram shows the basic configuration of freshwater generator and status of main element and valves. Basic parameters of the system are also presented.

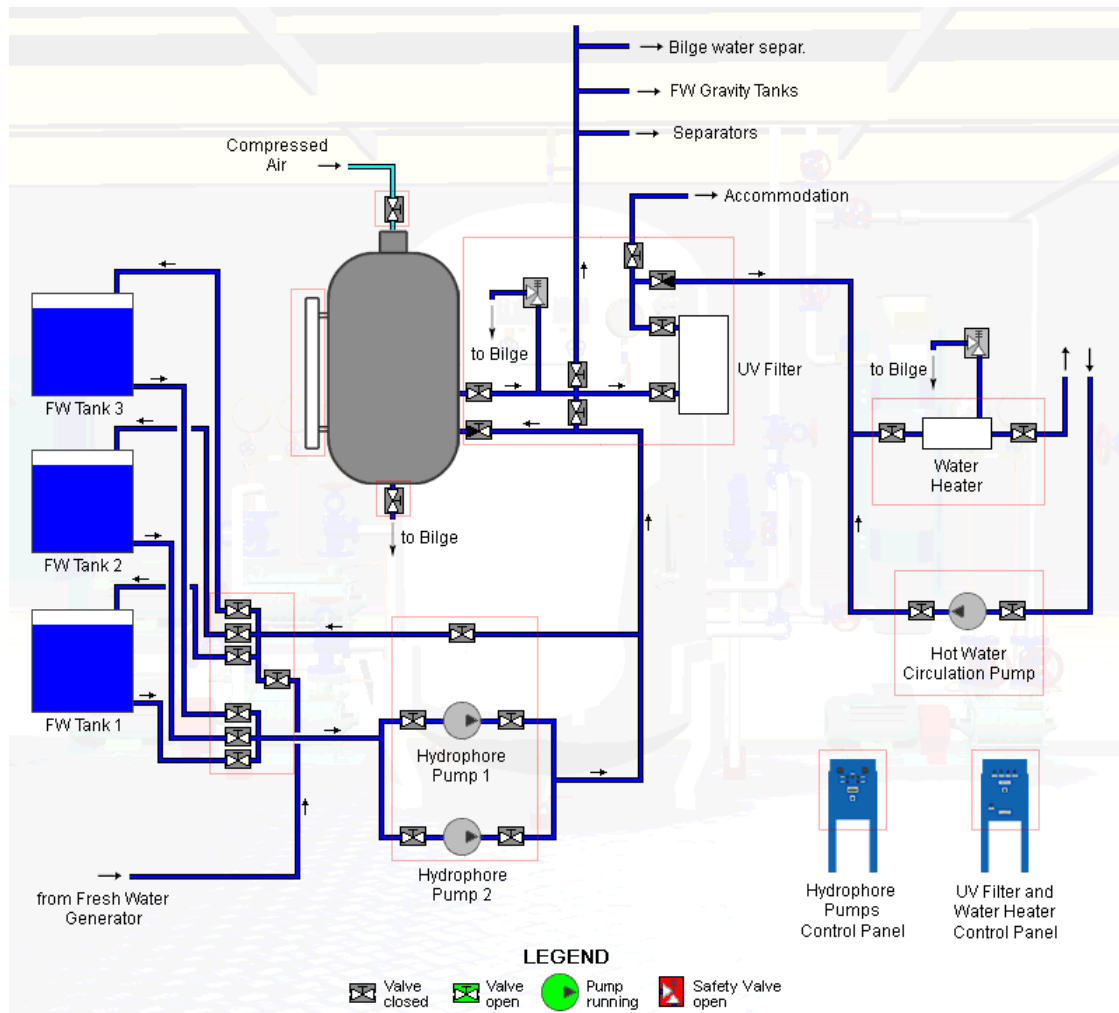


Fig. 2. Hydrophore installation diagram

2. Hydrophore installation

Hydrophore sets are designed for increasing water pressure in water supply systems.

The hydrophore's aim is to supply fresh sanitary water to the receivers by keeping a determined pressure in the installation.

Sanitary water from hydrophore is used for:

- cooling water system (refilling gravity tank)
- separator operating tank
- bilge water separator

- cold water accommodation
- hot water accommodation

The hydrophore installation functions automatically. An electrically - driven centrifugal pump sucks water from tanks through a filter. The pump forces the water into the pressure vessel, which is filled partly with water, partly with air. The differential pressure control, installed in the upper part of the pressure vessel, cuts - off the electricity supply to A/C motor of the pump when the pressure in the vessel is at high value (for example 0.6 MPa). The current is connected again when the pressure in the vessel decreases to low value (for example 0.3 MPa). The water level in the pressure vessel should be related with pressure, it means that in the event the pressure is about low value (0.3 MPa) (the moment of pump starting), the water level should be at minimum ('MIN' marked on right part of the vessel). In the event the pressure is about high value (0.6 MPa) the water level should correspond to maximum ('MAX'). From the pressure vessel /hydrophore/ water is conducted to the receivers.

The selfsuction impeller pumps with side ring channels and centrifugal pumps are used in ship domestic fresh water and sea water systems.

3. Operating procedures

Starting procedure:

1. Fresh water tank no 1 outlet valve should be OPEN
2. Hydrophore pump no 1 suction valve should be OPEN
3. Hydrophore pump no 1 discharge valve should be OPEN
4. Hydrophore pump no 2 suction valve should be OPEN
5. Hydrophore pump no 2 discharge valve should be OPEN
6. Hydrophore inlet valve should be OPEN
7. Hydrophore pumps control switch should be set to 1
8. Wait until water level in hydrophore tank reaches MIN value
9. Hydrophore pumps control switch should be set to 0
10. Hydrophore air inlet valve should be OPEN
11. Wait until pressure in hydrophore tank reaches 0.3 MPa
12. Hydrophore air inlet valve should be CLOSED
13. Hydrophore pumps control switch should be set to 1
14. Hydrophore outlet valve should be set to OPEN
15. Fresh water receivers inlet valve should be set to OPEN
16. UV filter inlet valve should be set to OPEN
17. UV filter outlet valve should be set to OPEN
18. Fresh water to accommodations inlet valve should be set to OPEN
19. Fresh water to hot water circulation system inlet valve should be set to OPEN
20. Hot water circulation pump suction valve should be set to OPEN
21. Hot water circulation pump discharge valve should be set to OPEN
22. Fresh water heater inlet valve should be set to OPEN
23. Fresh water heater outlet valve should be set to OPEN
24. Hot water circulation pump main switch should be set to ON

25. Fresh water heater control switch should be set to position 1 (step I)
26. UV filter control switch should be set to position 1 (lamp I)