

PSV PX121 ULSTEIN X-BOW HULL DESIGN

VESSEL INTRODUCTION



PX121 VESSEL INTRODUCTION CATALOG

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1 General

1.1 Design Principle

ULSTEIN X-BOW HULL DESIGN

Higher transit speed in calm water due to low angles of entry and increased waterline length.

Negligible occurrences of green water on bridge deck.

Working deck and deck equipment better protected due to hull extended to full beam in accommodation area.

Comfort

When vessel normally sailing and DP operation, the noise, vibration and indoor climate meet the requirement of DNV notation COMF-V(3) and COMF-C(3).

Environmental protection

With DNV notation CLEAN DESIGN, Recyclable, COMF-V(3), COMF-C(3), BWM-T.

With DNV notation OILREC, can treat, storage and transport the recovery oil with flash point below 60 °C at emergency condition.

Safety

Satisfied SOLAS 2009, double bottom design though-out the cargo tank and engine room, stability satisfied the Det Norske Veritas rules.

Two bow thrusters and two stern azimuth thrusters, high reliability of the ship manoeuvring.

Three-dimensional in whole product design stage, rational equipment arrangement with well service space and passage, unhindered exit routeway.

PX121



1.2 Vessel Function

PX121 is an Platform Supply Vessel for worldwide operation, DNV class, the main function to be as follow:

Configured with FFS fire pump and monitors can carry out external fire fighting operation.

Carrying below deck in integrated tanks diesel oil, potable water, liquid mud, drill water, brine base oil and LFL*. Carrying dry bulk in separate vertical tanks with conical bottom, suitable for barites, bentonite, cement.

Carrying a combination of deck cargo consisting of tubulars, drill pipe, general cargo, and others.

Carry out oil recovering operation.



1.3 Vessel Performance

Class Notation:

DNV+1A1 Offshore Service Vessel, SF, E0, DYNPOS-AUTR, CLEAN DESIGN, Recyclable, NAUT-OSV(A), COMF-V(3), COMF-C(3), LFL*, Fire Fighter I, OILREC, BIS, HL(ρ), DK(+), BWM-T, SPS.

Flag: Singapore.

Main Dimensions

Loa : 83.4m

Lpp : 76.5m

Breadth : 18.0m

Depth from Main deck: 8.0m

Deadweight: 4000 t

Onboard person: 30

Sea trial speed: 14.5 knots

Service speed: 10~13 knots

Load capability

Dry bulk: 255 m³

Fuel oil: 1475m³

Potable water: 1055m³

Mud: 1295 m³

Brine: 1295 m³

Base oil: 265 m³

LFL*: 155 m³

Recovered oil: 660 m³

Max. density of dry bulk: 2.4 t/ m³

Deck load: 840 m² , from fr. 35 to bow the deck load ability is 5t/m² , from fr. 35 to stern is 10t/m².

Liquid mud, brine, base oil ,low flash-point liquid and recover oil tanks are partly shared, drill water and ballast water are totally shared.

PX121 is an electric propulsion vessel, with 4 Caterpillar generator sets (1628 bkWX2, 994 bkWX2), 2 RRM azimuth thrusters (each 1520 kW), and 2RRM bow thrusters (each 880 kW).

The vessel has good sailing and operating ability even at bad weather and complex sea condition.

2 Arrangement

2.1 General Arrangement

PX121 is designed with double bottom design though-out the cargo tank and engine room. The materials used for the vessel as follow:

Material	Steel weight/ t	Weld material /t	Coat weight /t	Piping		Cable length/km	
				Weight/ t	unit/pcs		
Quantity	1870	66	55.0	384.3	28	24000	160

Superstructure and wheelhouse according to General Arrangement with the following heights, deck to deck:

- 2nd deck to 1st deck 3200 mm
- 1st deck to A deck 2900 mm
- A deck to B acc. deck 2900 mm
- B deck to C deck 2700mm
- C deck to D deck 2700 mm
- D deck to Bridge deck 2700mm
- Bridge deck to wheelhouse top 4150mm

Forebody

Forebody from forward of engine room to stem with tanks and side thrusters room. Soft nosed. Strengthened bulb in way of anchor drop. Two (2) self-stowing, watertight chain lockers are located forward as indicated on the General Arrangement. Increased bottom and 200 mm of sides to 16 mm. Grating approx. 200 mm above bottom in chain lockers.

Engine area

Tanks in engine area according to tank plan.

2nd deck in engine room with openings above the main engines.

Platforms in engine room according to engine room arrangement drawing.

Engine control room shall be sound insulated and shall have floating floor which located at 1st deck.

Double layer windows in engine control room and engine room workshop.

One (1) ship computer station with desk, chair and bookshelf in engine control room. Bookshelf to run full length of control room desk.

Railings in engine room shall be removable.

AFTERBODY

The aft ship shall be designed for twin (2) azimuth thrusters .

Room for main thruster and thruster motor.

2.2 Wheelhouse Arrangement

The wheelhouse is designed according to DNV-GL Class Notation, navigation operations can be achieved safely by one person. FWD console, AFT console, work station on both wing, chart table, safe station and communication station are provided in wheelhouse, these configured a integrated bridge system, which meet the functional requirements. Two sliding maneuvering chairs are provided between AFT control consoles, operator can complete ship maneuvering , DP operation and communication just sitting on the chair. Wheelhouse also arrange working table, coffee area, sofa and bathroom. All of these make the wheelhouse multi-functional, diverse and comfortable.



2.3 Accommodation Arrangement

Total 30 person on board , 26 sleeping cabins in all (1 man room 22, 2 man room 4,) . All the room satisfied the ILO rules , with separate wet room. Besides, there are mess room, galley, hospital and gymnasium on board, supplied with TV, computer and recreation establishment. Comfort living and work on board, the noise, vibration and indoor climate full meet the DNV notation COMF-V3C3.

- Wardrobe, hospital, laundry, gymnasium, ECR, deck workshop and incinerator room are arranged on main deck.

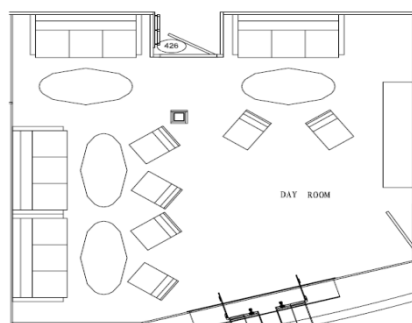


Change room/ hospital (main deck)

- Dry provision, refrigeration room, galley, mess room, dayroom are arranged on A deck.

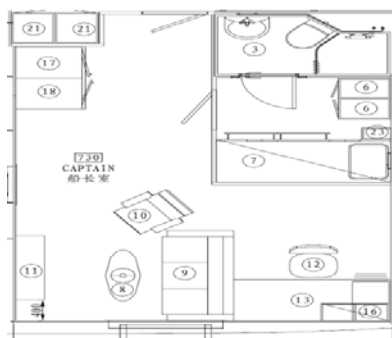


Galley (A deck)



Day room (A deck)

- 2 man room, 1 man room, meeting room and so on are arranged on B deck and C deck and D deck .



Master cabin (D deck)

2.4 Engine Room Arrangement

ER located in fore and middle of the vessel. Switchboard Room located at the aft of the tween deck, and ECR arranged at the forward of the main deck, 4 generator sets are in symmetrical distribution, the portside engine with shaft driven fire fighting pump, single casing located in PS fore of the ER, 2 air trunks separately located PS and SB, and jointed together at tween deck and down to the tank top of ER. ER hatch located near the center of the ER.



Arrangement of tank top and tween deck

2.5 Bow and Stern Thruster Room Arrangement

Bow Thruster Room (BTR) located forward, can be entered through ER by a hydraulic watertight sliding door. Electrical motors for two thrusters are arranged in the middle of BTR circled by control boxes, servo pumps, ER water mist spray pump unit and emergency fire pump etc.. The hydraulic header tank and storage tank are arranged on tween deck.



Arrangement of Bow Thruster Room Tank Top and Tween Deck

Stern Thruster Room (STR) is located on aft of the vessel whose entry can be made through hydraulic watertight sliding door from cargo pump room. 2 RRM azimuth thrusters, 2 propulsion motors and their accessories (servo plants, transformers, converters, control cabinets) are located at STR.

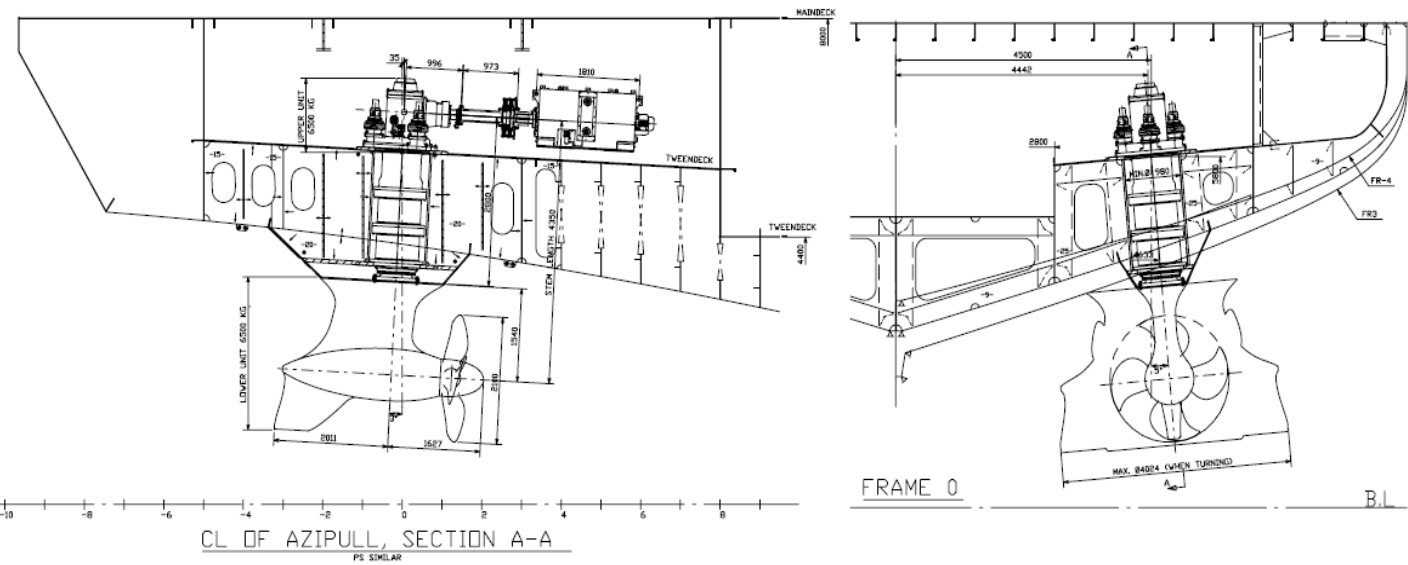


Arrangement of Stern Thruster Room Upper and Lower

3 Main System

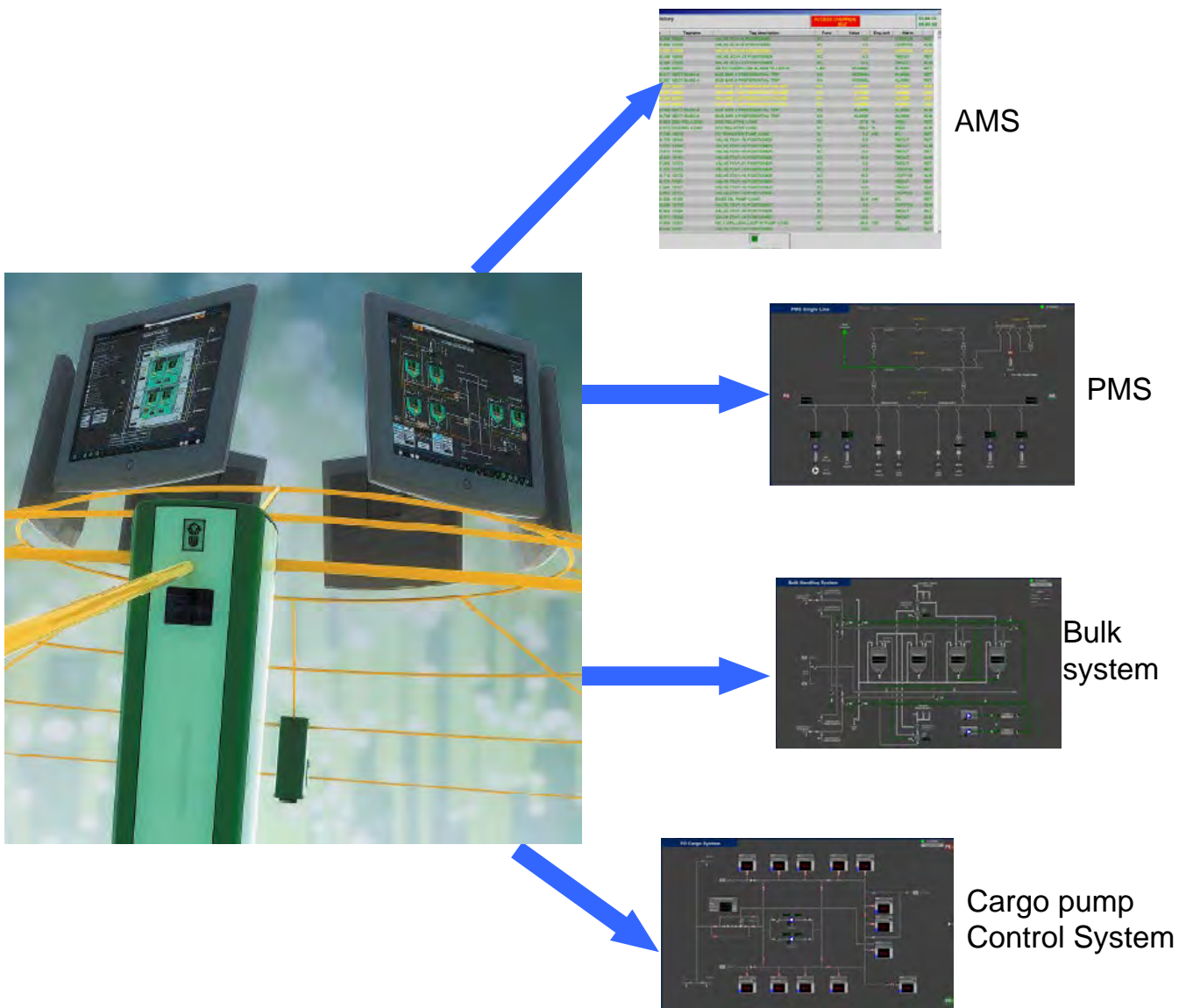
3.1 Propulsion System

The main propulsion system consist of 4 generator sets (2X1628 kW Caterpillar 3512C and 2X999 kW Caterpillar C32)and 2 X1520 kW Rolls-Royce AZP85CP azipull thrusters. Rolls-Royce AZP85CP azipull thruster ensures a homogeneous inflow to the blades influenced only by the hull boundary layer. A clean inflow to the propeller is a crucial factor in obtaining low propeller induced noise/vibration as well as high efficiency.



3.2 Integrated Automation System (IAS)

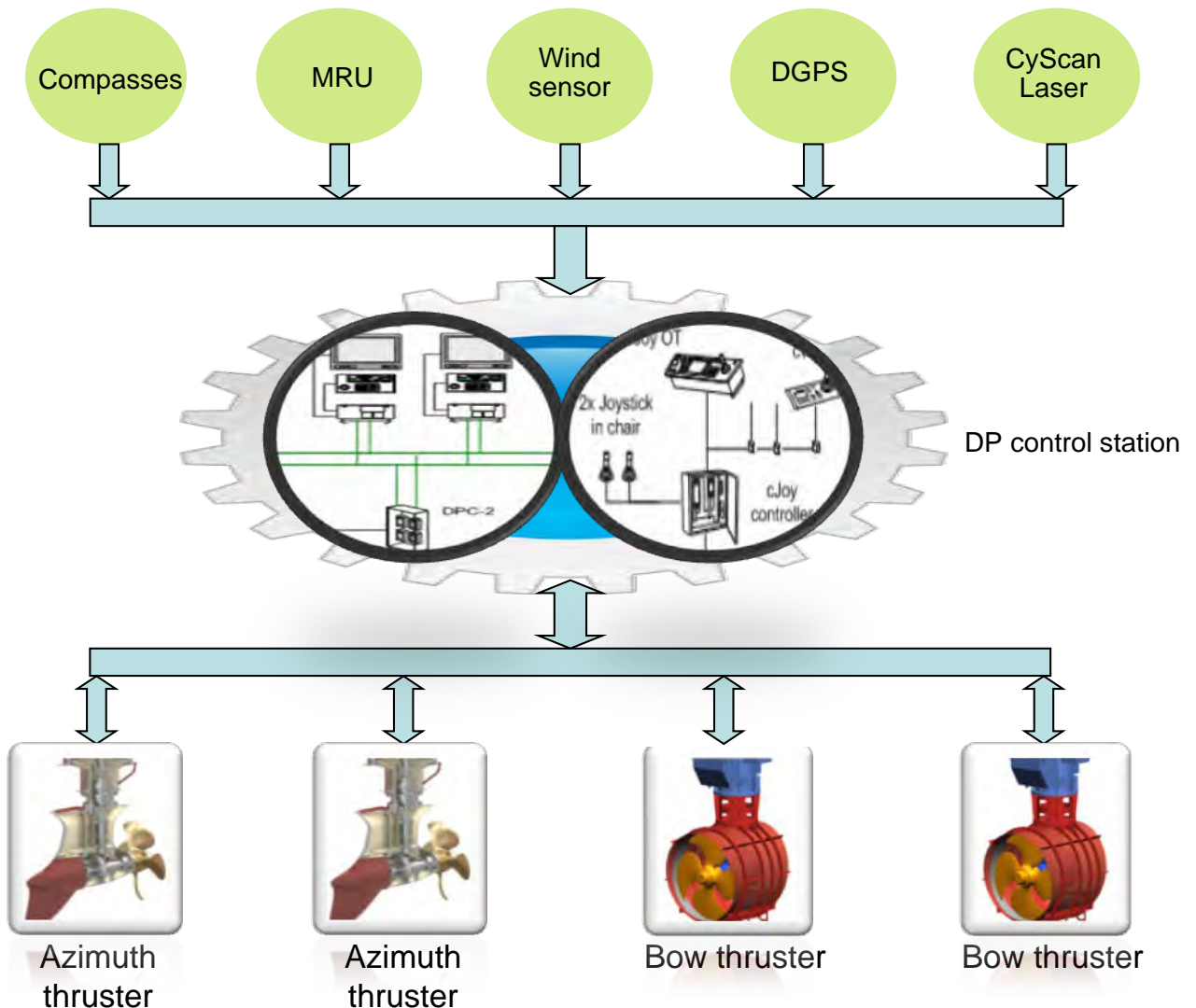
Vessel management system is supply by Ulstein UPC. The system is based on the Field bus technology(CAN), I/O cabinets are arranged in each area onboard, connecting and processing data, then upload to the net via the Field bus. These data is displayed and controlled on workstations in the ECR and wheelhouse. IAS integrates AMS, PMS, Bulk Discharge Control System, Sounding and Electric Valve Remote Control System, Cargo Pump Control System and so on. The system display the parameters, controllable devices and related alarm information by a lot of graphical control interface (MIMICs), this make the operation more humane, for example, the operator can know the work status of all components of the power station on one page, the parameter information is included the frequency, voltage, current, etc, operator can change working mode and operate generators, including generator circuit breaker and bus tie switch by clicking on the display, it's such intuitive and simple.



3.3 Dynamic Positioning System (DP)

The DP system of the ship is supply by Kongsberg Maritime Company, this system meet the DP AUTR of DNV. DP ERN index is 99.99.99.

- The system take 3 sets compasses and 3 sets MRUs as the position sensors, two sets of DGPS and a set of CyScan Laser System take as a position reference system.
- The configure of Dual network, dual processors and dual operation stations meet the relevant requirements of the specification.
- The wheelhouse aft control console configured independent Joystick operated panel, there are the pluggable portable operating junction boxes in the wings and forward control console, that can meet the different operating position requirements, such as the vessel arrival and navigation and so on.
- System use the extended Kalman filter model, it can select the ship handing and the position measurement best adaptive noise filtering based on the noise level and measurement rate. At the same time, it supply the optimum combination of the different reference location.
- In the case of no position measurement, the model provides “Calculated Freeze” mode.



3.4 Deck Machinery

One anchor windlass, two capstans, and two tigger winches on board.

Anchor windlass

Double hydraulic windlass / mooring winch, consist of:

Cable lifters:

Two declutchable cable lifters with band brakes.

Brake holding load: 77.1 T

Duty of cable lifters: Normal pull chain lifter: 10T

Maximum pull chain lifter: 15T

Drums:

Two declutchable mooring drums with band brakes.

Drum capacity: 180mxDia. 44mm P.P. Rope @7

Layers

Two fixed warping ends.

Driving unit to be hydraulic motor.

Chain stoppers:

Chain stoppers of Roller type with lashing screw.



Capstans

Hydraulic capstans each consisting of:

One fixed warping head dia. 450mm, height 864mm.

Rated pull: 10TX0~30m/min



Tigger winch

Hydraulic tigger winch.

Pull capacities: 10TX0~35m/min (1st Layer)

Drum capacities: 110xDia.20mm SWR@5 Layers



3.5 FRC and Fire Fighting System

3.5 .1 Fast Rescue Craft

PX121 is equipped with fast rescue craft and integrated fire fighting appliances, well security

FRC & davit

The Alusafe 700 MKII is a rigid fast rescue craft with a hull of marine aluminium specially

designed for service in the offshore business and other demanding environment.

The boat davit has following functions:

- Normal operation
- Dead-Ship operation
- Hook stop
- Constant Tension system
- Shock absorber



Rescue boat (C deck PS)

3.5 .2 Fire Fighting System

Fire Fight System with Water

Protection system of water mist type designed in accordance with SOLAS Chapter II-2, IMO MSC/Circ. 913 and rule of DNV.

Local protection:

Main generator sets

Hot water boiler

Fuel oil separator

Incinerator



Fire Fight System with Gas

Unitor 1230 clean agent system is a central manually pneumatic operated system with one cylinder for single space protection using Novec 1230 Fluid extinguishing agent.

Protected areas:

Engine room including casing

Switchboard room

Galley duct

Incinerator room



Fire Fight System with Foam

Foam system for LFL* cargo tank system.

Protected areas:

LFL* cargo deck area.



4 Ship Function

4.1 Ship Cargoes

PX121 is capable of storage and transport various cargoes as below:

No.	Cargo	Capacity (m ³)	Remark
1	Fuel Oil	1475	
2	Fresh Water	1055	
3	Drill Water	1620	
4	Liquid Mud	1295	Ten combined tanks
5	Brine	1295	Ten combined tanks
6	Base Oil	265	Two tanks
7	Low Flashpoint Liquids*	155	Four tanks
8	Dry Bulk	255	Four tanks
9	Recovery Oil	660	Slop tk's plus LFL* tk's

Low Flashpoint Liquids*: Cargo liquids with flashpoint below 43 °C.

Loading / Discharging Pumps

N o.	Cargo pumps	Capacity approx.	Pump drivern by	Qty.
1	Fresh Water Cargo Pump	200m ³ /h@9bar	Centrifugal type. El. Motor, Frequency controlled.	2
2	Base Oil Pump	150m ³ /h@9bar	Centrifugal type. El. Motor, Frequency controlled.	2
3	Drill / Ballast Water Pump	200m ³ /h@9bar	Centrifugal type. El. Motor, Frequency controlled.	2
4	Fuel Oil Cargo Pump	200m ³ /h@9bar	Centrifugal type. El. Motor, Frequency controlled.	2
5	Brine / Slop Pump	75m ³ /h@18bar	Eccentric screw type. El. Motor, Frequency controlled.	2
6	Mud Pump/ Oilrec	75m ³ /h@24bar	Eccentric screw type. El. Motor, ex. Type. Frequency controlled.	2
7	LFL* Pump / Oilrec	75m ³ /h@9bar	Centrifugal type. Hydraulic driven.	4

All cargo system configured with dual pumps, special product LFL* configured with four pumps.

4.2 Oil Recovery Operation

There are 8 ORO tanks, symmetric located on PS and SB, also as liquid mud tank, brine tank and partial as LFL* tank. There is an ORO loading station and discharge station on aft starboard.

More details see ORO manual.

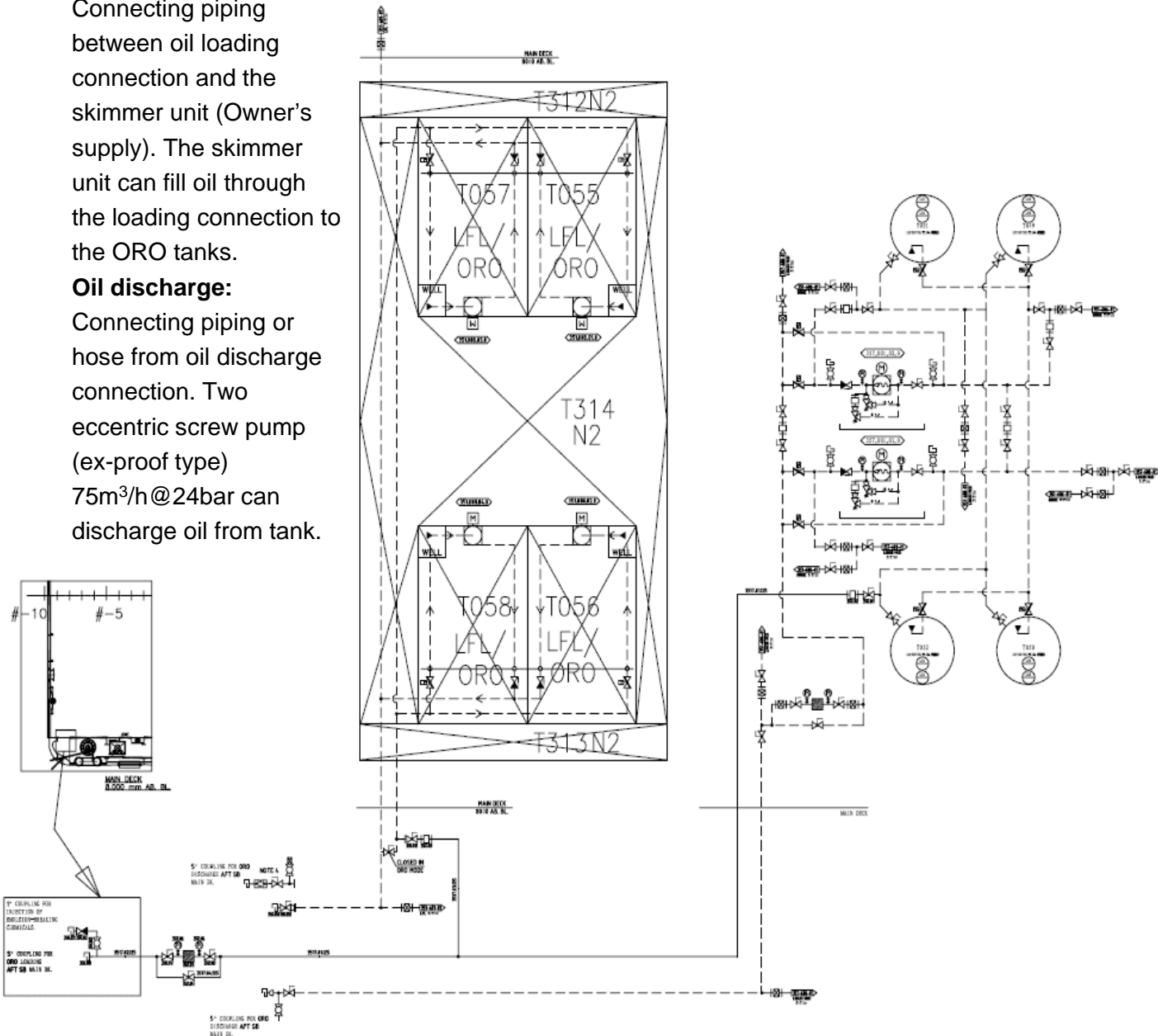
Note: ORO area are explosive area. At ORO mode, irrespective electric equipments in cargo pump room and on main deck shall be switched off. And the tank vent valves shall be in ORO mode.

Oil loading:

Connecting piping between oil loading connection and the skimmer unit (Owner's supply). The skimmer unit can fill oil through the loading connection to the ORO tanks.

Oil discharge:

Connecting piping or hose from oil discharge connection. Two eccentric screw pump (ex-proof type) 75m³/h@24bar can discharge oil from tank.



4.3 External Fire Fighting

PX121 is designed with active protection, giving it the capacity to withstand higher heat radiation loads from external fires, and it includes a sufficient set of fire fighting equipment:

One Fi-Fi pump capacity: 3638 m³/h at 123 mlc

One hydraulic clutch for main engine and Fi-Fi pump

Two Fi-Fi monitors:

Rotation: 360 degrees

Elevation: -20 to +80 degrees

Capacity: 1200m³/h

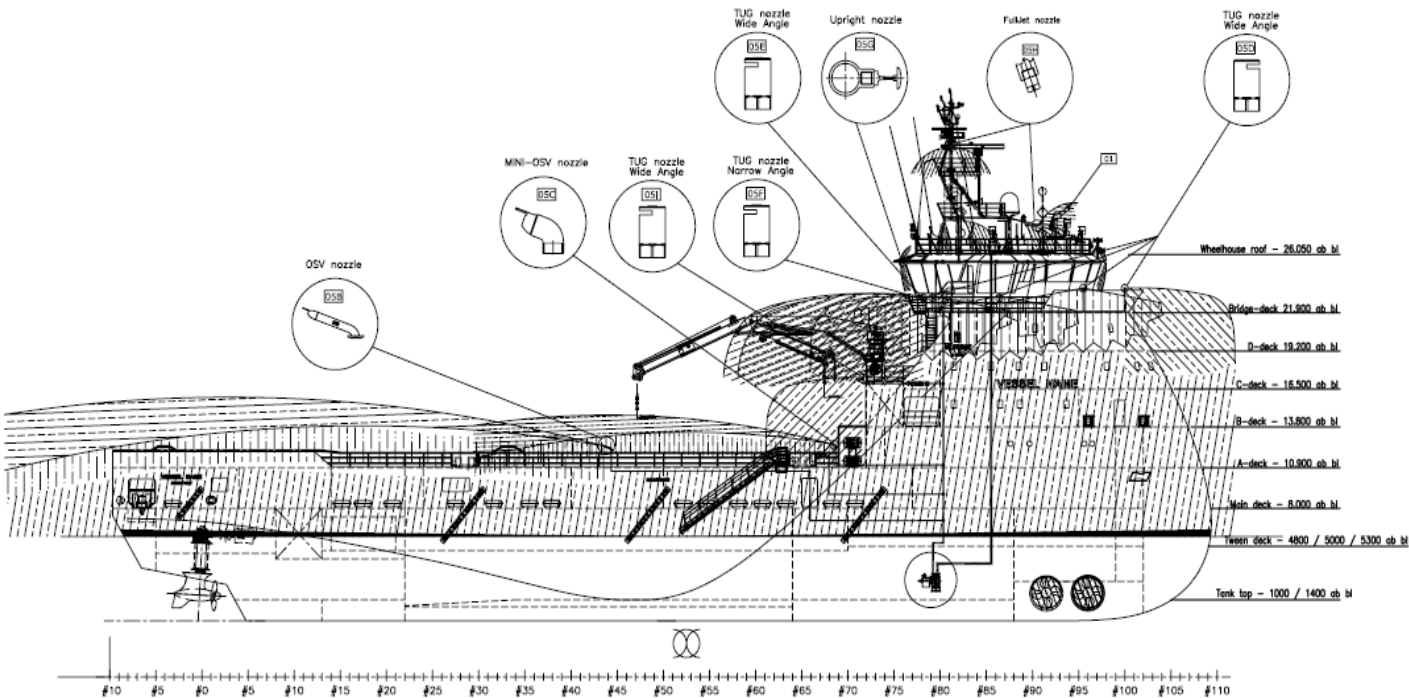
Throw length/height: >120m / 50m

A lot of water spray nozzles:

Complete water spray system for vessel self-protection.

Water supplied from Fi-Fi pump by FFS adjustable pressure reducer.

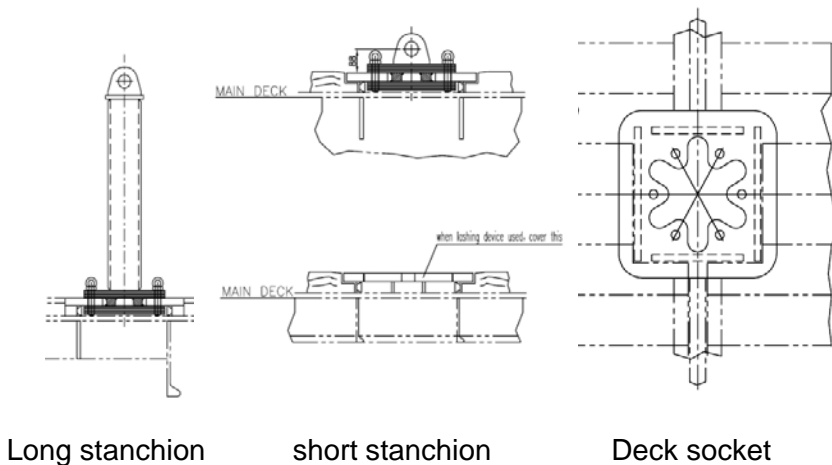
Integrated control system with fixed touch screen control panel and portable panel for two monitors.



4.4 Cargo Securing

Casing stanchion:

28 pcs of deck sockets and
20 casing stanchion
installed on 1st deck, which
have 10 long stanchions
and 10 short ones.

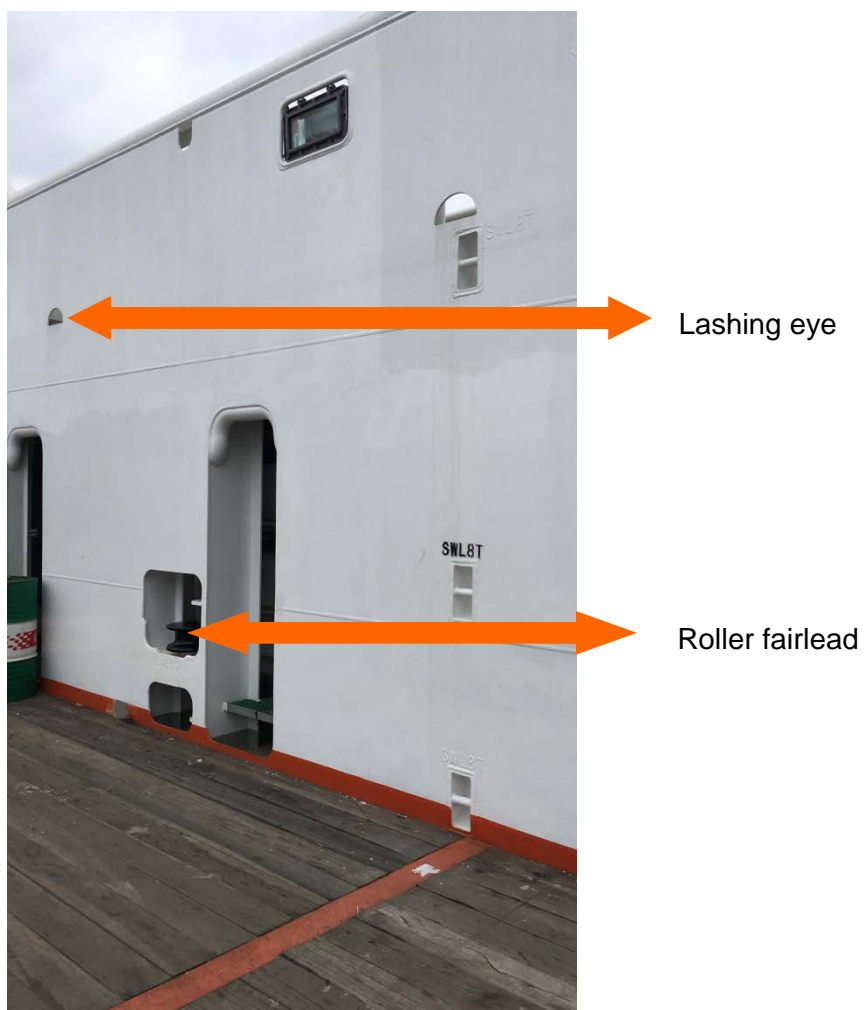


Roller fairlead:

Roller fairlead 12pcs in all,
are fitted on 1st deck both
side for cargo fastening.

Lashing eye:

SWL 8t recess type lashing
eye, fitted on the cargo rail
protected plate.



5 Equipment Maker List

5.1 Main Machinery Equipment

No.	Equipment	Maker	Remark
1	Main generator set	Pon Power Norway	Caterpillar engine, PPN assemble
2	Azimuth thruster	Rolls-Royce Marine AS	
3	Bow thruster	Rolls-Royce Marine AS	
4	Emergency generator set	Pon Power Norway	Caterpillar engine, PPN assemble
5	Ballast water treatment plant	Alfa Laval	
6	External Fi-Fi System	Fire Fighting System AS	
7	Remote sounding system	Ulstein Power & Control AS	BD SENSORS
8	Dry bulk handling system	Randberg Industries	
9	Engine room pumps / Cargo pumps	ALLWEILER AS	
10	Provision refrigeration plant	Sindex Refrigeration PTE LTD	With Bitzer compressors
11	Air conditioning plant	Sindex Refrigeration PTE LTD	With Bitzer compressors
12	Starting air and working air compressor	Sperre Industry AS	
13	Fuel oil purifier	Alfa Laval	
14	Anchor Windlass / Tugger Winch / Capstan	MacGregor PTE LTD	
15	Deck crane	MacGregor PTE LTD	

No.	Equipment	Maker	Remark
16	Hydraulic watertight Sliding door	IMS Inc.	
17	Local protection water mist system	Wilhelmsen Technical Solutions	
18	Fire fighting system with gas	Wilhelmsen Technical Solutions	
19	Fire fighting system with foam	Wilhelmsen Technical Solutions	
20	Incinerator	ATLAS INCINERATORS A/S	
21	Sewage treatment plant	JETS VACUUM AS	
22	High pressure cleaning machine	Nilfisk ALTO	
23	UV sterilizer	Profinor Aquafine Corporation	
24	Bilge water separator	Veolia-RWO	
25	Anti-fouling protection system	Cathelco	
26	Hot water boiler	Pyro	
27	Inert gas system	WME ETech	
28	Tank cleaning system	Alfa Laval	
29	Air horn	Kockum Sonics	
30	Machine tools	NANTONG TRAFFIC MACHINERY CO., LTD.	
31	Gas / Electrical welding equipment	Wilhelmsen Technical Solutions	
32	Garbage compactor	Global Enviro International AS	
33	Electrical fan heater	Frico	

No.	Equipment	Maker	Remark
34	Ventilaton fans	Sindex Refrigeration PTE LTD	
35	Fresh water cooler	Alfa Laval	For propulsion plant / tank washing / misc. equip.
36	Electrical remote control valves	i-Tork	
37	Pneumatic remote control valves	DMH Marine Solutions PTE LTD	
38	Quick closing valves	MESON	
39	Fuel oil monitoring system	ASCENZ SOLUTIONS PTE LTD	
40	Tank vent valves	Winteb	
41	Adjustable steel chock	Vibracon	

5.2 Main Electric Equipment

No.	Equipment	Maker	Remark
1	MSB/ESB	UDS	
2	Integrated Automation System	UDS	
3	DP	Kongsberg	
4	Distribution board	Ruite	
5	Starter	Ruite	Simens
6	Radar, ECDIS, Conning	Raytheon	
7	GMDSS	Sailor	
8	Fire & general alarm	Unitor	
9	Internal communication	UDS	
10	Lighting equipment	Haixing	
11	Navigation & Signal light, Floodlight	Glamox	
12	Cable	Draka	
13	Wiper	Wynn	
14	ICCP	Cathelco	
15	Battery	712th	
16	Loading computer	Cload	

