



# Integrated Automation System Solution for Tankers





# Technical Proposal (example)



- 
- *Cargo Tank Monitoring System*
  - *High Level and Overfill Alarm System*
  - *Remote Sounding System*
  - *Loading and Stability Software*



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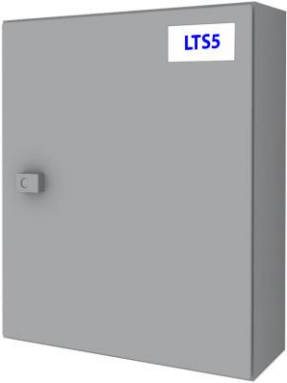

## Scope of Supply





### TSS/Cargo - Cargo Tank Monitoring System

Pos.	Illustration	Qty	Description
1		2	<p><b>Operator Stations OS1 &amp; OS3</b></p> <p>Marine Approved Panel PC, Display 19" LCD keyboard and, trackball. Windows, SCADA System, OSSY, Ethernet. Power supply 220VAC, SSD Hard drive, USB Port, No CD Drive</p> <p><b>Locations to be agreed.</b></p> <p>Provides: Receiving information from <b>LTS3, LTS4 &amp; LTS5</b> Indication of level, temperature and vapor pressure in cargo tanks Control of pumps and valves Indication of drafts and levels in ballast, fuel and service tanks. Indication of pressure in cargo manifolds and vapor return line High Alarms indication Controlling of valves and pumps Transmitting data to IAS and Loading Computer</p>
2		1	<p><b>LTS3 cabinet</b></p> <p>On wall mounted cabinet. Dimensions (WxHxD): 600x600x210 mm (approximately). Protection: IP44. Output: Ethernet / RS-485/Modbus RTU. Power supply: 24VDC</p> <p>Located in cargo control room or machinery spaces.</p> <p>LTS3 cabinet provides connection for Radars and TGD sensors through the Ex-barriers and collecting data from sensors through 4-20mA and HART®-protocol. MODBUS Interface connection to valve maker control cabinet and cargo pump supplier cabinet</p>


3		14	<p><b>TGD-R Radar</b>  Connected to <b>LTS3</b>.  Measure range: until 35 m  Level Accuracy: <math>\pm 2</math> mm.  Temperature: -40 °C...+80 °C  Process pressure: 1..3 bar  Connection: DN80-DN120 Flange  Housing material: 316L  Electrical connection: two wires  4..20mA Explosion protection: ATEX II  1G, 1/2G, 2G EEx ia IIC T6.  Protection level: IP66/IP67.</p> <p><b>Cargo &amp; slop tanks (14)</b></p>
4		14	<p><b>Combined temperature and pressure sensor</b></p> <p>The temperature/pressure sensor measures <b>temperatures in 2 levels, and IG pressure in cargo tanks</b></p> <p>All measured data is transferred to LTS3 cabinet <b>by 2-wire connection</b>.</p> <p>2 x PT100 sensors for each tank  Housing material: AISI 316L  Process connection: TBA  Explosion protection: Exia IIC T5  Protection level: IP67  Ambient temperature: -40 °C...+80 °C  Approval: ABS  Cable protective hose 0.5 m.</p> <p><b>Cargo &amp; slop tanks (14)</b></p>

**TSS/Alarm – Independent 95/98% alarm system**

Pos.	Illustration	Qty	Description
5		1	<p><b>LTS5 cabinet</b></p> <p>Local Technological Station <b>LTS5</b> (on wall version cabinet) for <b>TSS/Alarm</b></p> <p>On wall mounted cabinet.</p> <p>Dimensions (WxHxD): 600x600x210 mm. Housing protection: IP44. Power supply: 24VDC from MSB.</p> <p>In technical accommodation The LTS5 provides:</p> <ul style="list-style-type: none"> <li>• Intrinsically safe connection of level switches <b>TLA</b> placed on the deck, for measuring high 95% &amp; high/high 98% level alarm in cargo tanks.</li> <li>• 95, 98% level alarm generating</li> </ul>
6		14	<p><b>TLA Ultrasonic level switch 95%/98%</b></p> <p><b>TLA for TSS/Alarm</b> Dual point (95%/98%) acoustic switch</p> <p>Acoustic - no moving parts, no maintenance, local testing of sensor without opening tank.</p> <p>Housing: stainless steel AISI 316L. Housing protection: IP67. Length of rod 95% &amp; 98% to be agreed Explosion protection: 0ExialICT6 X Process connection: flange DN50 PN40 Flexible protective hose 0,5 meter TEST function (button) is provided for TLA. Operating temperature: -55...+85°C. Output signal: 4-20 mA HART® (2 x 2-wire). Power supply: 24 VDC from LTS5 cabinet. Approval: TBA</p> <ul style="list-style-type: none"> <li>• <b>Cargo Tanks (14)</b></li> </ul>




7		4	<p><b>95-98% Alarm panels for TSS/Alarm</b></p> <p>Alarm panel for high 95% and high/high 98% indication of level in the cargo tanks fuel. Includes indicators, buzzers, buttons and dimmer.</p> <p>Located in cargo control room.</p> <p>14 High Alarms for cargo tanks 14 High-High Alarms for cargo tanks</p>
8		1	<p><b>Yellow flashing lamp</b></p> <p>Protection: IP56 or higher. Power supply: 24 VDC.</p> <p>Provide light 95% level alarm indication on top of wheelhouse</p>
9		1	<p><b>Red flashing lamp</b></p> <p>Protection: IP56 or higher. Power supply: 24 VDC.</p> <p>Provide light 98% level alarm indication on top of wheelhouse</p>
10		2	<p><b>Siren</b></p> <p>Protection: IP56 or higher. Power supply: 24 VDC.</p> <p>Provide sound 95%/98% level alarm indication on top of wheelhouse</p>

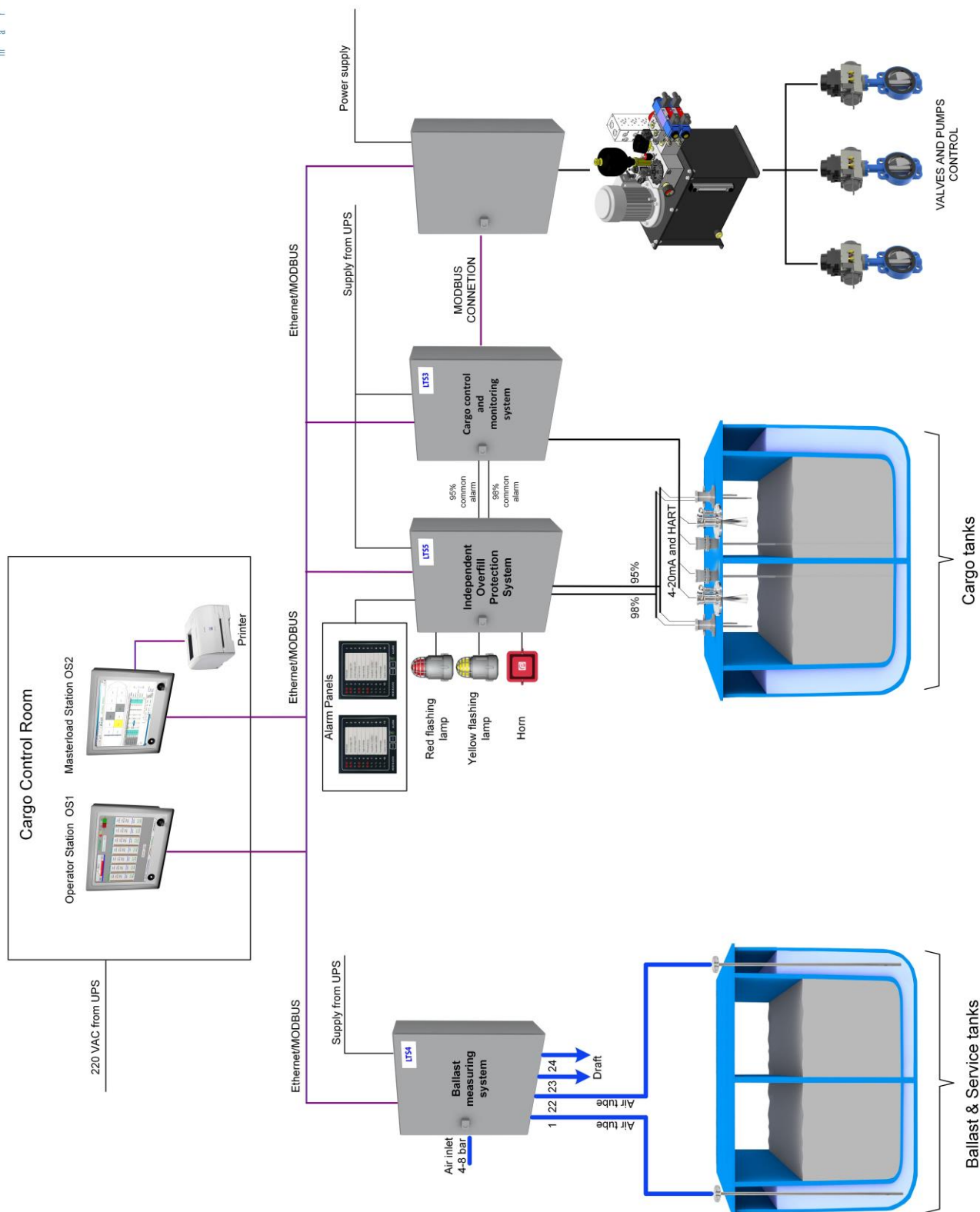
**TSS/BMS – Level measurement for ballast tanks and draft**

Qty .	Illustration	Qty	Description
11		1	<p><b>LTS4 cabinet (36 channels)</b>  On wall mounted cabinet.  Dimensions (WxHxD): 800x600x250 mm.  Housing protection: IP44.  Number of measuring channels: 36.  Power supply: ~220 VAC/ 24 VDC.  Output: 2xRS-485/Modbus RTU.  Air supply: 4-8 bar.  Measuring range: 0-20 m.</p> <p>Connected air tubes: stainless steel Ø8x1 mm (to be agreed).</p> <p>Compressed air: cleaned and dried according to <i>Class 7 ISO 8573-1</i>.</p> <p>LTS4.x cabinets provide level measuring in ballast and service tanks as well as draught measuring.</p> <p><u>Channels:</u>  Ballast and service tanks (22 pcs)  Drafts (2 pcs)</p>



**MasterLoad – Stability and loading software**

Pos.	Illustration	Qty	Description
12		1	<b>Operator Stations OS2 (for MasterLoad)</b>  Marine Approved Panel PC, Display 19" LCD keyboard and, trackball. Windows, SCADA System, OSSY, Ethernet. Power supply 220VAC, SSD Hard drive, USB Port, No CD Drive  <b>Locations to be agreed.</b>
13		1	<b>MasterLoad Software</b>  Loading Software's Maker: API Marine/VALCOM -Creation of loading and ballasting plans with calculation of: <ul style="list-style-type: none"> <li>- trim calculation by loading, discharging and/or shifting cargo</li> <li>- draft calculation (fwd, aft and mean)</li> <li>- dead-weight and displacement</li> <li>- ship's stability (metacentric GM) according to IMO requirement</li> <li>- bending moment and shearing force at the prescribed frame points</li> <li>- Online connection (RS422/485) to the tank measuring system to feed actual tank fillings and actual draught values into the loading case.</li> </ul> -Cargo Planning, Ullage and Stability report  <b>NOTE: Loading computer described under item 13</b>
14			Printer for loading computer (connected to OS2)  Locations to be agreed





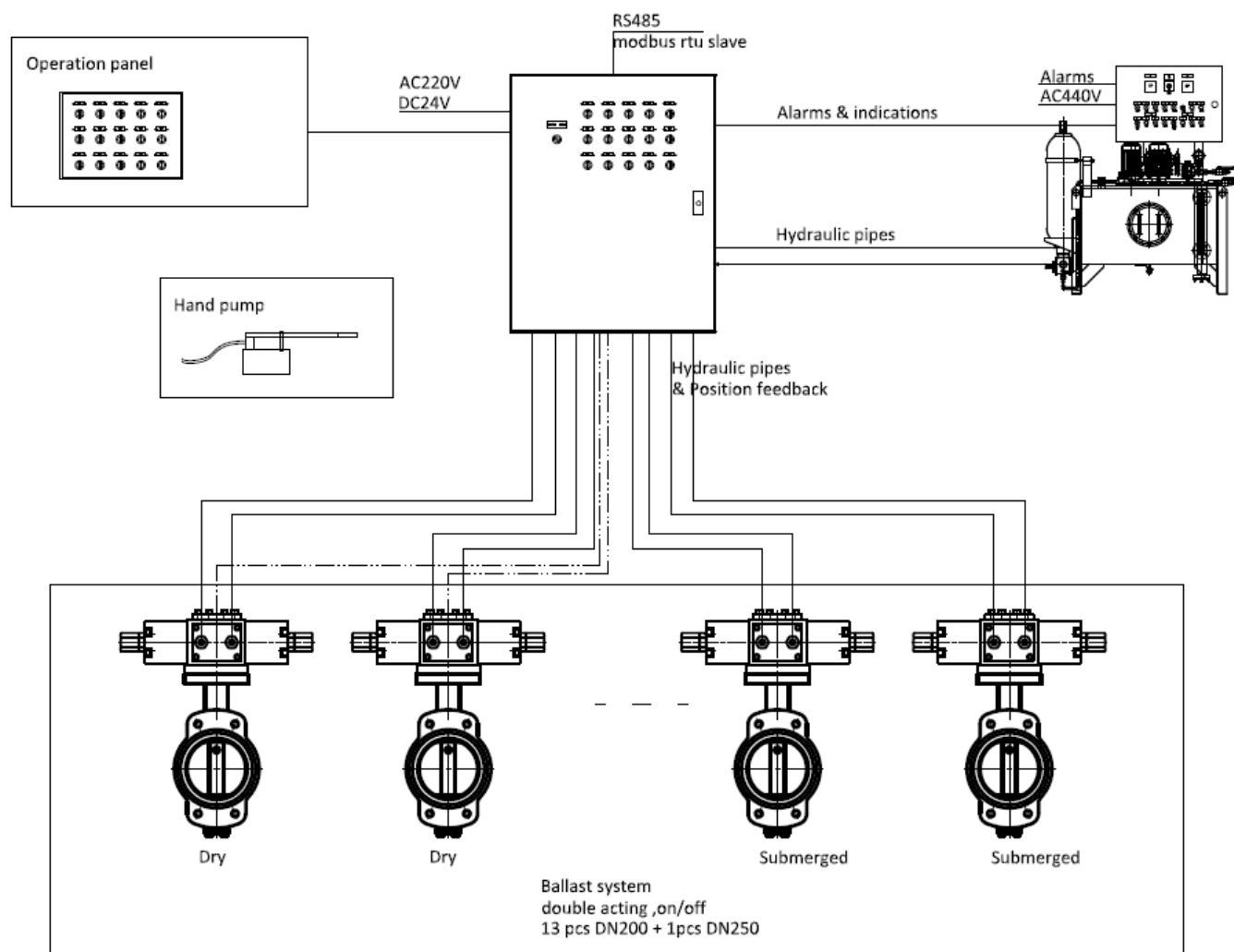
# Technical Proposal (example)

- *Monitoring and control of pumps and valves*
- *Valve and remote control system*

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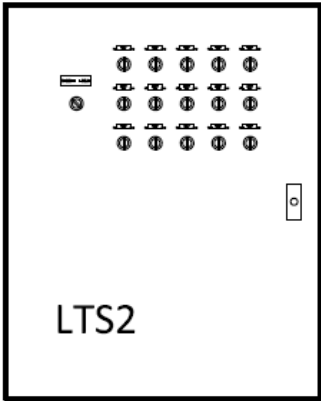
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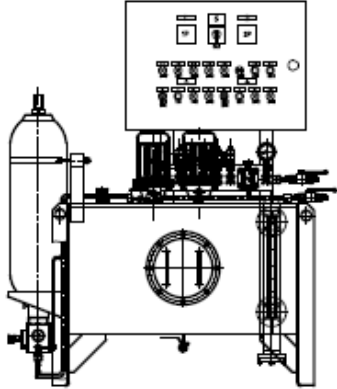
## System Block Diagram

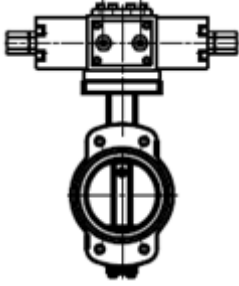
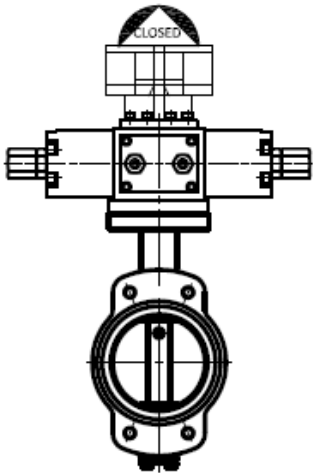


## Scope of Supply

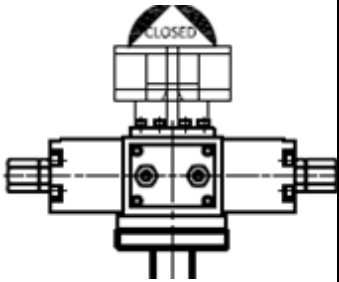

### ***TSS/Control – Control and monitoring of pumps and valves***

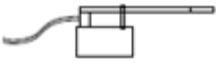
Pos.	Illustration	Qty	Description
1		1	<p><b>LTS2 cabinet</b>  On floor mounted cabinet.  Dimensions (WxHxD): 800x950x400 mm <i>(TBD)</i>.  Colour: 7032 (TBD)  Protection: IP44.  Output: ETHERNET, RS-485.  Power supply: 24VDC ,AC220V.</p> <p>Located in cargo control room or machinery spaces.</p> <p>LTS2 cabinet provides control of ballast valves, ballast pumps and transmitting data to operator stations by Ethernet/RS-485.</p> <p>Functions include:</p> <ul style="list-style-type: none"> <li>- Remote control and emergency stop for ballast pumps</li> <li>- Open/close remotely/local controlled valves</li> <li>- Valve Emergency operation</li> <li>- Pick up the signals of valve position</li> </ul> <p>Components:</p> <ul style="list-style-type: none"> <li>- Power unit</li> <li>- PLC logic unit</li> <li>- Solenoids for 28 pcs valves</li> <li>- Emergency valve block for valves x12pcs</li> <li>- Pressure switch used for location feedback for submerged valves x12pcs</li> <li>-spare chanel 5pcs</li> <li>- Other accessory</li> </ul> <p><u><i>Subject to number of input / output</i></u></p>

Pos	Illustration	Qty	Description
2	<p>Hydraulic power unit</p> 	1	<p><b>Hydraulic power unit</b></p> <p>Location: Engine room  Power supply: AC440V 60HZ  Size(WXHXD):1500X1400X600MM (TBD)  Colour: (TBD)  Functions include:</p> <ul style="list-style-type: none"> <li>- Keep the pressure between 7Mpa to 9Mpa</li> <li>- Pressure low/high alarm output</li> <li>-Level low alarm output</li> <li>-Pressure ind.</li> <li>-Current ind.</li> </ul> <p>Components:</p> <ul style="list-style-type: none"> <li>- Hydraulic oil tank 200LX1</li> <li>- Accumulator 16LX2</li> <li>- Motor &amp; pump 3KWX2 (switched automatically)</li> <li>- Motor control cabinet AC440V 60HZ</li> <li>- Filters and over pressure release valve</li> <li>- Sensors</li> <li>- Other accessory</li> </ul>

3	<p>Valves and actuator (submerged)</p> 	12	<p><b>Valves and actuators (submerged)</b></p> <p>Location:</p> <p>Power supply:</p> <p>Size(WXHXD):484X578X182</p> <p>Colour: (TBD)</p> <p>Functions include:</p> <ul style="list-style-type: none"> <li>- Open/close the valve</li> </ul> <p>Components:</p> <ul style="list-style-type: none"> <li>- Valves DN200X12pcs</li> <li>-Actuators X12pcs</li> </ul>
3	<p>Valves and actuator (dry)</p> 	2	<p><b>Valves and actuators (dry)</b></p> <p>Location:</p> <p>Power supply:</p> <p>Size(WXHXD):484X578X182 (DN200) 484X657X192 (DN250)</p> <p>Colour: (TBD)</p> <p>Functions include:</p> <ul style="list-style-type: none"> <li>- Open/close the valve</li> <li>- Valve position feedback</li> <li>- Valve position ind.</li> <li>-Emergency operation</li> </ul> <p>Components:</p> <ul style="list-style-type: none"> <li>- Valves DN150X1pcs DN250X1pcs</li> <li>-Actuators X2 pcs</li> <li>- Position feedback switch X2</li> <li>-Position feedback ind. X2</li> <li>-emergency unit X2</li> </ul>



4	<p>Double action actuator</p> 	14	<p><b>Double action actuators (dry)</b></p> <p>Location:</p> <p>Power supply:</p> <p>Size(WXHXD): 475X335X158</p> <p>Colour: (TBD)</p> <p>Functions include:</p> <ul style="list-style-type: none"> <li>- Open/close the cargo valves (CS16100 CB/T3036-94)</li> <li>- Ind. and feedback the cargo valves position</li> <li>-emergency operation</li> </ul> <p>Components:</p> <ul style="list-style-type: none"> <li>- ind. box x14 pcs</li> <li>-Double actuators X14pcs</li> <li>-emergency unit X14pcs</li> </ul>
5		2	<p><b>Operator Stations OS1..OS2</b></p> <p>Marine Approved Panel PC, Display 19" LCD keyboard and, trackball. Windows, SCADA System, OSSY, Ethernet. Power supply 220VAC, SSD Hard drive, USB Port, No CD Drive Built-in dimmer and buzzer</p> <p><b>Locations to be agreed.</b></p> <p>Provides:</p> <ul style="list-style-type: none"> <li>Receiving information from <b>LTS2,LTS3, LTS4 &amp; LTS5</b></li> <li>Indication of level, temperature and vapor pressure in cargo tanks</li> <li>Indication of drafts and levels in ballast, fuel and service tanks.</li> <li>Indication of pressure in cargo manifolds and vapor return line</li> <li>High Alarms indication</li> <li>Transmitting data to IAS and Loading Computer</li> </ul>

6		4	<b>hydraulic hand pump</b> Dimensions (LxWxH): Colour: Yellow Work pressure: 2~12Mpa Oil tank volume: 1.6L Rubber hose: 3M  -1pcs portable -3 pcs fixed
7	UPS (no illustration)		<b>UPS</b>  function: Keep the system on more than 30MIN.
8	Sea chest system valve (no illustration)	2	<b>Sea chest system valve</b>  DN300 PN10 Cast steel Ai-br Ss NBR  ABS type approval