



## MEETING GLOBAL STANDARDS SINCE 1975

Founded in 1975, PH Hydraulics & Engineering is Asia's leading offshore oil and gas equipment manufacturer.

From our corporate offices and manufacturing facilities in Singapore and Malaysia, PH is committed to deliver total solutions in electro-hydraulic systems that meet global standards.

Our group's dedication in delivering total solutions have strengthen our position as a leading FPSO deck equipment manufacturer in Asia.

PH's total solution will guide you through every aspect of your equipment from detailed engineering design to fabricating, testing and commissioning. We have the engineering capability and experience to deliver complete packages for FPSO.



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## FPSO Floating Production, Storage and Offloading



Designed, engineered and delivered by  
**Asia's Leading Offshore Oil & Gas  
Equipment Manufacturer**

## FPSO - Floating Production, Storage and Offloading

A FPSO is a floating production vessel and a spread mooring system is required to hold the FPSO in a fixed position while risers carrying crude oil is connected to the vessel.

Each FPSO would require equipment like Spread Mooring System and Riser Pull-in System or Turret Mooring System. We design and manufacture 3 systems and can offer customers a custom design to suit the different demands of a FPSO.

### Spread Mooring System

A Spread Mooring System is used to anchor the FPSO and such systems typically have 24 units of Fairleads and Chain Stoppers as well as 4 units of Chain Jacks and Chain Handling System installed on deck.

#### Fairleads

- Typically 24 units of Fairleads on a FPSO.
- Used for anchoring an FPSO while processing oil.
- To allow supply vessels to operate closer to the FPSO to supply daily necessities and support FPSO's operations.
- Used to divert the anchoring chain from the chain stopper.

#### Chain Jacks and Chain Stoppers

- The Chain Jack is used to pull and tension the mooring chain.
- The Chain Stopper is used to secure the top link of the chain on deck the FPSO.

#### Chain Handling System

- A system used to divert excess chains to the Chain Locker from the chain jack while the chains are being pulled up.
- Makes use of an auxiliary winch on the top of the chain handling system to hoist excess chains.

### Riser Pull-in System

A Riser Pull-in system is an important deck equipment of the FPSO. It is used to pull the Riser or Umbilical for connection to the FPSO in which the crude oil and gas will flow through the subsea manifold and onto the FPSO Storage tank. Each FPSO has about 60 of such connection points and once connected, the Riser System may not be in used for a period of time.

A typical Riser Pull-in System consists of a

- Riser Pull in Winch. This winch is used to pull the Riser or Umbilical from the sea bed. Such risers can weigh as much as 200 ton.
- Sheave Trolley. This trolley is used with a turn down sheave. The turn down sheave guides the wire rope from the Riser Pull-in Winch for connection to the Riser before any pull-in operation is possible. A Typical FPSO have multiple riser slots and the sheave trolley is able to move along the rails by means of a skidding system. The skidding system positions the deviation sheave on top a riser to begin pull operations.

### Spread Mooring System

- Underwater Fairlead & Chain Stopper
- Chain Jack • Chain Handling System
- Hydraulic Power Unit



**Chain Jacks, Chain Stoppers, Chain Handling System & Fairlead for P57**



**Hydraulic Power Unit**

### Spread Mooring System Track Record

Year	Vessel Name	Equipment Supplied
2019	Guanabara (MV31)	<ul style="list-style-type: none"> <li>• Underwater Fairlead &amp; Chain Stopper for 120mm Chain (24 sets)</li> <li>• 500T Chain Jack</li> <li>• Chain Handling System</li> <li>• 3 x 152 kW Hydraulic Power Unit</li> </ul>
2019	Carioca (MV30)	<ul style="list-style-type: none"> <li>• Underwater Fairlead &amp; Chain Stopper for 120mm Chain (24 sets)</li> <li>• 500T Chain Jack</li> <li>• Chain Handling System</li> <li>• 3 x 152 kW Hydraulic Power Unit</li> </ul>
2018	Exxon Liza Destiny	<ul style="list-style-type: none"> <li>• Fairlead &amp; Chain Stopper for 160mm chain (16 sets)</li> <li>• 300T Chain Jack</li> <li>• Chain Handling System</li> <li>• Chain Locker</li> </ul>
2014	Cidade de Itaguaí FPSO (MV26)	<ul style="list-style-type: none"> <li>• Underwater Fairlead &amp; Chain Stopper for 120mm chain (24 sets)</li> <li>• 500T Chain Jack</li> <li>• Chain Handling System</li> </ul>
2013	Cidade de Mangaratiba FPSO (MV24)	<ul style="list-style-type: none"> <li>• Underwater Fairlead &amp; Chain Stopper for 120mm chain (24 sets)</li> <li>• 500T Chain Jack</li> <li>• Chain Handling System</li> <li>• 3 x 152 kW Hydraulic Power Unit</li> </ul>
2011	Joko Tole FPSO	<ul style="list-style-type: none"> <li>• 150T Mooring Pull In Winch</li> <li>• Deviation Sheave</li> <li>• Chain Stopper</li> <li>• Mooring Chain Chute</li> <li>• 2 x 75Hp HPU</li> </ul>
2011	Cidade de Itajai FPSO	<ul style="list-style-type: none"> <li>• 200T Mooring Pull-in Winch</li> <li>• Deviation Sheave</li> <li>• Chain Stopper</li> <li>• Mooring Chain Chute</li> </ul>
2010	FPSO Cidade de Santos MV 20	<ul style="list-style-type: none"> <li>• Underwater Fairlead &amp; Chain Stopper for 114mm Chain (20 sets)</li> <li>• 350T/230T Mooring Winch</li> <li>• Horizontal/Vertical Directional Sheave</li> <li>• 25T Gantry Crane for Chain Handling</li> <li>• 3 x 215Hp Hydraulic Power Unit</li> </ul>
2009	P-57 FPSO	<ul style="list-style-type: none"> <li>• Underwater Fairlead &amp; Chain Stopper for 120mm chain (21 sets)</li> <li>• 250T Chain Jack</li> <li>• Chain Handling System</li> <li>• 2 x 175 Hp Hydraulic Power Unit (Zone 2 Rated)</li> </ul>
2009	FPSO Cidade de Sao Mateus	<ul style="list-style-type: none"> <li>• 300T Gypsy Mooring Winch</li> <li>• Turn Down Sheave / Chain Stopper</li> <li>• Davit Crane for Chain Handling</li> <li>• 3 x 215Hp Hydraulic Power Unit</li> </ul>

### Riser Pull-in System

- Riser Pull-in Winch • Auxiliary Winch
- Hydraulic Power Unit • Foldable Crane
- Movable Trolley by Skidding System



**550 ton Riser Pull-in Winch System for P74**



**550 ton Riser Pull-in Winch System for P66**



**160 ton Riser Pull-in Winch Platform for P61**



**200 ton Riser Pull-in Winch System for ASENG FPSO**

### Riser Pull-in System Track Record

Year	Vessel Name	Equipment Supplied
2019	HYSY119- Liu Hua	<ul style="list-style-type: none"> <li>• 310T Linear Winch</li> <li>• Storage Winch</li> <li>• 2 x 100 Hp Hydraulic Power Unit</li> <li>• (ATEX Zone 2)</li> </ul>
2018	Guanabara (MV31)	<ul style="list-style-type: none"> <li>• 560T Riser Pull-in Winch</li> <li>• 150T Auxiliary Winch</li> <li>• 10T Telescopic Crane</li> <li>• Sheave Trolley</li> </ul>
2014	P-66 FPSO P-68 FPSO P-69 FPSO P-71 FPSO P-74 FPSO P-75 FPSO P-76 FPSO P-77 FPSO	<ul style="list-style-type: none"> <li>• 550T Riser Pull-in Winch</li> <li>• 30T Aux. Winch</li> <li>• 3 x 160kW HPU</li> <li>• 20T Foldable Crane</li> <li>• Movable Trolley by Skidding System</li> </ul>
2012	OSX-2 FPSO	<ul style="list-style-type: none"> <li>• 210T Turret Winch (for Chain &amp; Riser Pull-in)</li> <li>• 2 x 105kW HPU (Zone 2 Rated)</li> <li>• Winch Trolley</li> </ul>
2012	OSX-3 FPSO	<ul style="list-style-type: none"> <li>• 250T Turret Winch (for Chain &amp; Riser Pull-in)</li> <li>• 2 x 75 Hp HPU (Zone 2 Rated)</li> </ul>
2012	Knarr FPSO	<ul style="list-style-type: none"> <li>• 200T Turret Winch &amp; HPU (Note: CE Marking)</li> <li>• 32 nos. of Vertical Turret Bearing</li> <li>• 24 nos. of Horizontal Turret Bearing</li> </ul>
2012	P-61 TLP	<ul style="list-style-type: none"> <li>• 160T Riser/Umbilical Pull-in Winch Platform</li> <li>• 2 x 200kW HPU (Zone 2 Rated)</li> </ul>
2011	ASENG FPSO	<ul style="list-style-type: none"> <li>• 200T Turret Winch (for Chain &amp; Riser Pull-in)</li> <li>• 2 x 104kW Main HPU (Zone 2 Rated)</li> <li>• 20T Aux. Winch</li> <li>• Winch Trolley</li> <li>• CTU Trolley</li> </ul>
2010	BP Angola FPSO	<ul style="list-style-type: none"> <li>• 175T Turret Winch (for Chain &amp; Riser Pull-in)</li> <li>• 2 x 90kW Main HPU</li> <li>• SDV HPU</li> </ul>
2010	FPSO Cidade de Santos MV 20	<ul style="list-style-type: none"> <li>• 470T Riser Pull-in Winch</li> <li>• 50T Aux. Winch</li> <li>• Sheave/Coil Tube Trolley</li> </ul>
2009	P-57 FPSO	<ul style="list-style-type: none"> <li>• 350T Riser Pull-in Winch</li> <li>• Sheave/Coil Tube Trolley</li> </ul>
2009	FPSO Cidade de Sao Mateus	<ul style="list-style-type: none"> <li>• 420T Riser Pull-in Winch</li> <li>• 50T Aux. Winch</li> <li>• Sheave/Coil Tube Trolley</li> </ul>
2008	Ningaloo Vision FPSO	<ul style="list-style-type: none"> <li>• 600T Turret Winch for Disconnectable Turret Mooring</li> <li>• 3 x 175Hp HPU (Zone 2 Rated)</li> <li>• Axial Bearing &amp; Seal Lubrication HPU</li> <li>• Turret HPU for ESD Valves &amp; Locking Cylinder</li> </ul>
2007	Cidade de Niteroi (MV18)	<ul style="list-style-type: none"> <li>• 470T Riser Pull-in Winch</li> <li>• 50T Aux. Winch</li> <li>• Sheave/Coil Tube Trolley</li> </ul>