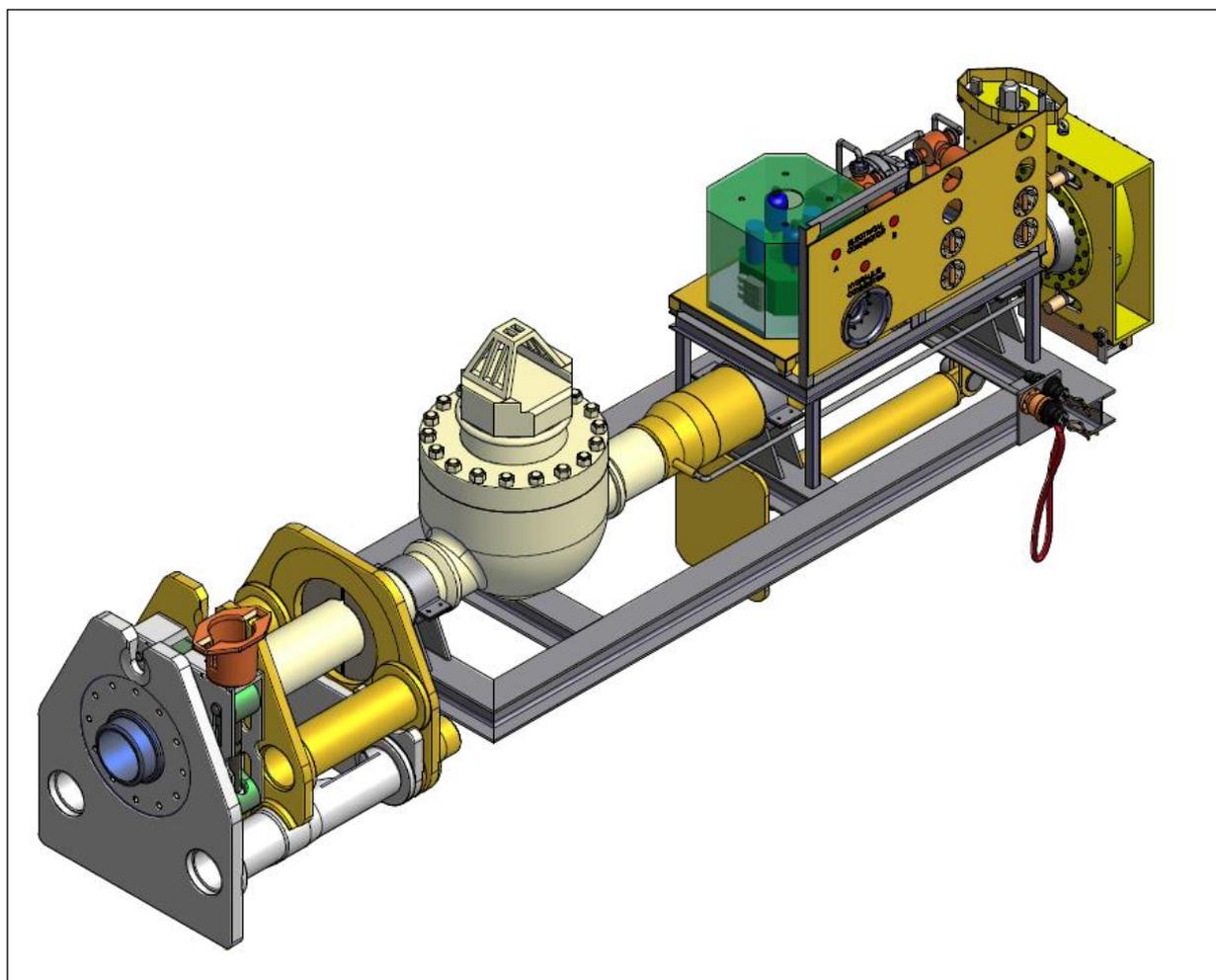


# NEMO AUTOMATED PIG LAUNCHER

Product Data Sheet



KONGSBERG



Kongsberg Nemo Automated Pig Launcher with our proprietary tie-in system, Thor

## References

A version of Kongsberg Nemo Automated Pig Launcher has been procured by Statoil for the Fram Vest Field. It is designed to remotely launch 4 off 10" ID wax removal pigs and will be delivered spring 2013. It will interface with a production template manifold.

## Features

The Kongsberg Nemo Automated Pig Launcher is designed to launch pigs remotely from the mother platform. It will reduce the need for dual pipelines with pigging loops and it allows production with arrival temperatures into the wax formation range. Its main features are:

- Individual launching of pigs, remotely controlled from mother platform
- Suitable for wax pigs with internal by-pass
- Internal pig cassette for easy replacement of pigs, can be designed to handle
  - Pre-commissioning and commissioning pigs
  - Wax removal pigs
  - Inspection pigs
- Interfaces with:
  - Client PLEM or manifold, new or existing. Pipe size, design pressure and connection system
  - Electrical power and signal from Client (SPS) control system. Electrical and hydraulic flying leads
  - MEG / Methanol as initial driving medium. The wellstream will take over once the pig has entered the manifold. Connection to Client PLEM or Manifold by flying lead or jumper bridge connection
- Diverless
- Monitoring, including pig detectors
- High reliability. E.g. dual redundant electronics, based on components proven in subsea production systems (SPS)

### **Description**

As a reference case the following main system elements are:

- Subsea connector for makeup to existing or new PLEM or manifold
- 10" ID pipe
- 4 pigs
- ROV operated ball valve
- Pig cassette receptacle
- Pig cassette for subsea installation of pigs
- Small bore methanol injection valves
- Integrated control pod and sensors
- Electrical and hydraulic flying leads

### **Connector**

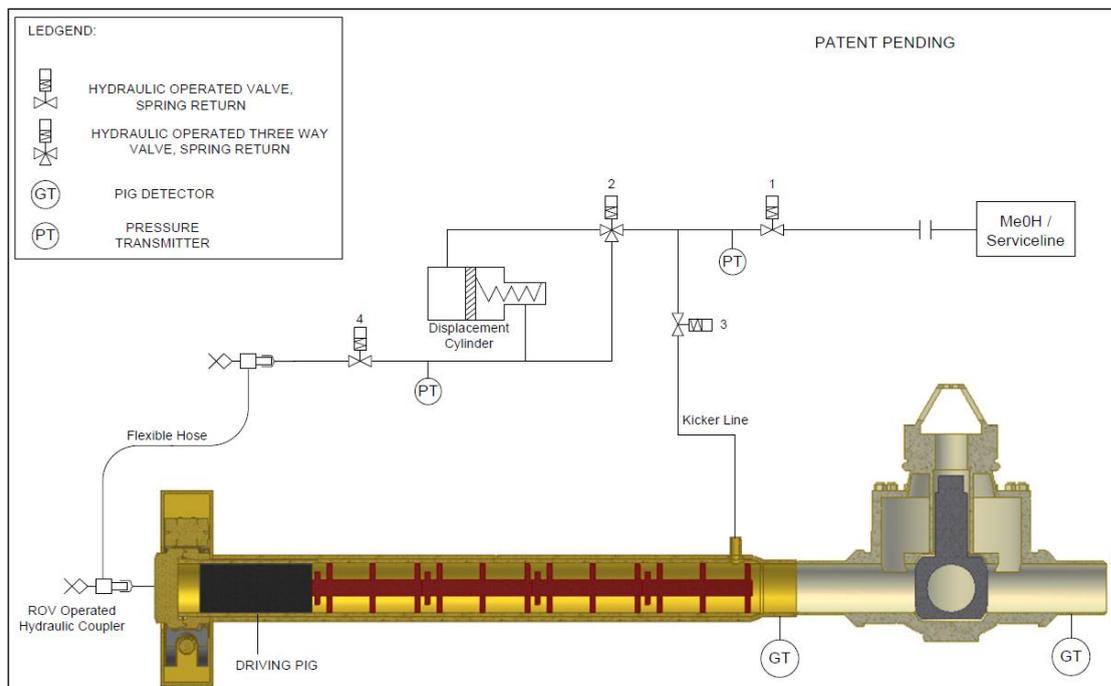
The Kongsberg Nemo Thor tie-in system as shown in the figure above is proposed.

### **Pipe, valve and pig cassette receptacle**

Kongsberg Nemo Automated Pig Launcher matches the mother pipe; typically 10" ID. An ROV operated ball valve is incorporated to allow replacement of pig cassette while producing. The pig cassette receptacle houses the pig cassette. It consists of a pipe welded to the ball valve and has an ROV operated clamp connector at the rear.

### **Pig launching and control system**

The pig launcher control system will interface the platform control system using standard communications interface. It will use the existing infrastructure for communication and power to the subsea system.

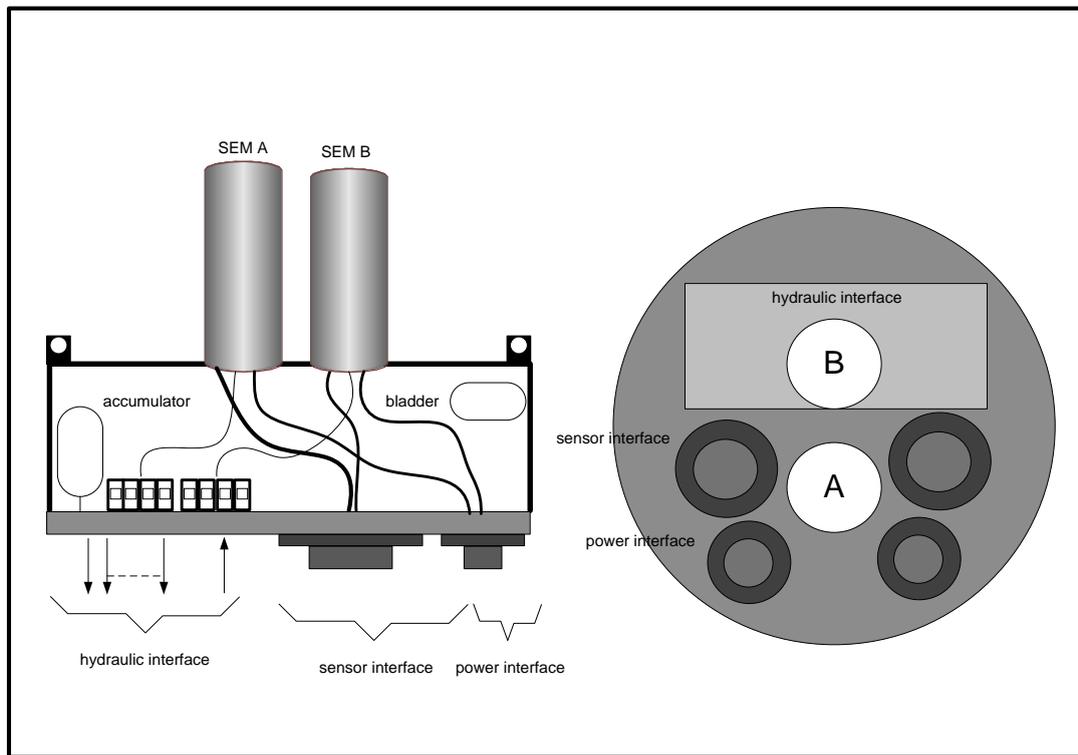


**Kongsberg Nemo Automated Pig launcher, pipe and valve schematic**

The ball valve is ROV operated and normally open during operations. At the hub end of the pigging cassette there is a "kicker line" enabling injection of methanol behind the driving pig. The displacement cylinder acts as a dosage valve, moving the driving pig a pre-determined distance forward.

Kongsberg Nemo Automated Pig Launcher will be instrumented and e.g. have a pig detector for detecting that the front pig has reached launching position, and another pig detector for detecting that the pig has passed the ball valve.

Control equipment for controlling and operating Kongsberg Nemo automated Pig Launcher will be located in a subsea control module, integrated with Kongsberg Nemo Automated Pig Launcher. The control module will consist of three separate units integrated into one module, two electronic canisters for redundancy, and one electro-hydraulic container. The electronic canisters are filled with nitrogen at 1 atmosphere, while the electro-hydraulic container is pressure compensated and filled with a dielectric fluid.



**Kongsberg Nemo Automated Pig Launcher Control Module**

There is one Directional Control Valve (DCV) for each function. For each function line there is a pressure transmitter which is used for indication of valve position. In addition flowmeters are included in the hydraulic supply and return line, which are used for confirmation of valve travel, and hydraulic leakage detection.

## Options

The Kongsberg Nemo Automated Pig Launcher will be designed to meet Client requirements. For a final design the following options can be considered:

- Higher number of pigs;  
Application studies indicate that the number of pigs can be increased to 10
- Larger or smaller pipe size;  
Typical applicable pipeline sizes are in the 6" to 16"ID range
- No ball valve;  
The ball valve is required for pig cassette replacement and can be integrated with its interfacing PLEM or manifold
- DPE ball valve should «block and bleed» test function be required
- Vertical arrangement;  
Where vertical connection system, combined with no requirements to over-trawlability, exists, the pig launcher can be arranged vertically
- SPS proprietary pig launcher connector;  
The Thor tie-in system can be replaced with a connection system from an interfacing SPS supplier
- No pigging cassette;  
If a recovery of Kongsberg Nemo Automated Pig Launcher for pig replacement is preferred, the pigging cassette can be avoided
- Kongsberg Nemo Automated Pig Launcher support;  
A landing cradle might be required. Also if the bending moments onto inboard hub becomes excessive, a support foot at the rear end of the structure might be required
- Protection against dropped objects and requirements to over trawlability can be incorporated

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