An abstract, wireframe-style landscape graphic in shades of yellow and black, featuring rolling hills and valleys, positioned across the middle and bottom of the page.

**Subsea Hydraulic Power Units – SHPUs**  
Buyers guide – Version 1.2



# Content

- ▶ Subsea HPUs in general
- ▶ Seatools SHPU offerings
  - Standardized SHPUs
  - Custom SHPUs
  - Subsea electro-hydraulic drive train elements & solutions
- ▶ In need for a SHPU?

# Subsea HPUs in general

Purpose, applications, and considerations

# Why use SHPUs?

- ▶ Obviously because hydraulic power is required for a subsea actuator (valve, cylinder, thruster etc.)
- ▶ Often alternative to direct hydraulic power via hydraulic umbilical from surface
- ▶ Advantages electro-hydraulic configuration via SHPU:
  - Eliminates burden of hydraulic hose handling
  - Improved efficiency.  $\eta_{\text{umbilical}}$  can be easily be 75% for high power applications
  - Minimization of system latency. Of particular importance for e.g. dredging process control or subsea vehicle DP
  - Reducing chance of oil spillage
- ▶ Sometimes it is the only option, e.g.:
  - Depth is too great for direct hydraulic
  - Electric actuator not available or TRL is insufficient (e.g. DHSV)

# Advantage SHPU – Umbilical handling

- ▶ Example: 40 kW of subsea hydraulic power required for cylinder actuation

Umbilical comparison		
Configuration	<i>Direct hydraulic</i>	<i>Electro-hydraulic</i>
Umbilical type	Optic-electric-hydraulic	Optic-electric
Required hydraulic power	40 kW	
Umbilical Ø	Ø 120 mm	Ø 30 mm
Umbilical weight	13000 kg/km	1450 kg/km
Umbilical MBR	1200 mm	295 mm

- ▶ Umbilical handling more difficult, especially in current conditions (umbilical catenary)
- ▶ Far larger umbilical reel required, with higher installed power (for CT function)
- ▶ Forces on tool can become significant, with tool positioning difficulties as a result

# Differences with surface HPU

- ▶ Marinization of subsea hydraulic systems is not a straight forward matter
- ▶ Amongst many others aspects the following should be considered:
  - Pressure compensation
  - Reservoir design
  - Marine growth
  - Hyperbaric effect on hydraulic oil
  - Material selection
  - Intervention & maintainability
  - Dynamic seal design
  - Permeability of dynamic barriers
  - Connectors
- ▶ Furthermore, typical reliability levels of subsea HPUs need to be higher than surface HPUs because subsea HPUs are often used at remote locations, harsh environments, and involve high OPEX operations

# Seatools SHPUs

And related drive train elements

# Seatools SHPU solutions

Standardized SHPU solutions



Custom SHPU solutions



Electro-hydraulic drive train solutions





# Standardized SHPU range

- ▶ Benefits
  - Short lead times
  - Plug & play units
  - Customization
- ▶ Customization
  - For each unit flow & pressure range
  - The basic configuration of the subsea HPU can be further complemented with a range of components and auxiliary systems
- ▶ Example applications
  - Dredging components (e.g. suction arm) & tools
  - Subsea installation tools
  - Subsea valve actuation



# Standardized SHPU range (2)

- ▶ Product sheet contents:
  - Detailed hydraulic, electric & mechanical specifications
  - Configurational items
  - Optional items



Maximum operating depth	1000 msw	150 msw	150 msw	75 msw
Volume flow capacity range	1.42 - 8.7 l/min	8.27 - 26.6 l/min	20.9 - 60.6 l/min	up to 103.7 l/min
Maximum continuous pressure range	135 - 260 bar	145 - 276 bar	160 - 300 bar	50 -350 bar
	<a href="#">Product sheet</a>	<a href="#">Product sheet</a>	<a href="#">Product sheet</a>	<a href="#">Product sheet</a>

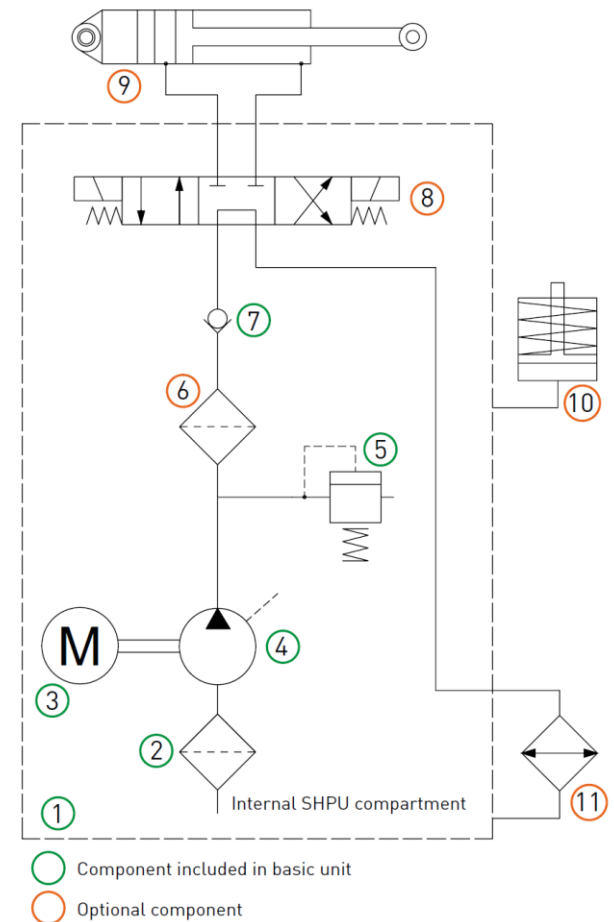
# Standardized SHPUs – constituents

## ► Basic configuration includes:

- Housing / fixed volume oil reservoir (1)
- Suction filter (2)
- Electric motor (3)
- Hydraulic pump (4)
- Overpressure relief valve (5)
- Check valve (7)
- Piping
- Sensors (water ingress, E-motor temp.)
- Hydraulic and electric connectors

## ► Optional items:

- External box cooler (11)
- Subsea pressure compensator / reservoir (10)
- Pressure filter (6)
- Hydraulic consumers (9)
- Control components (8)
- Instrumentation



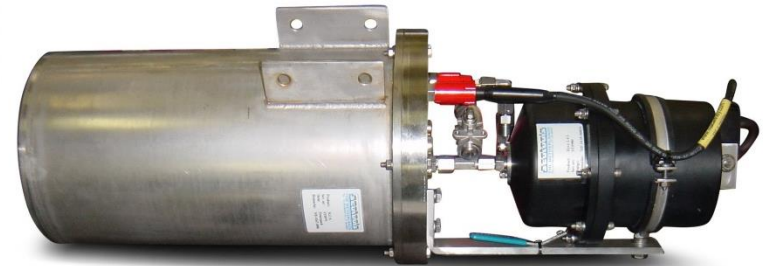
# Custom made SHPUs

## ► Benefits

- A suitable SHPU for every application
- Plug & play units
- One-stop shop

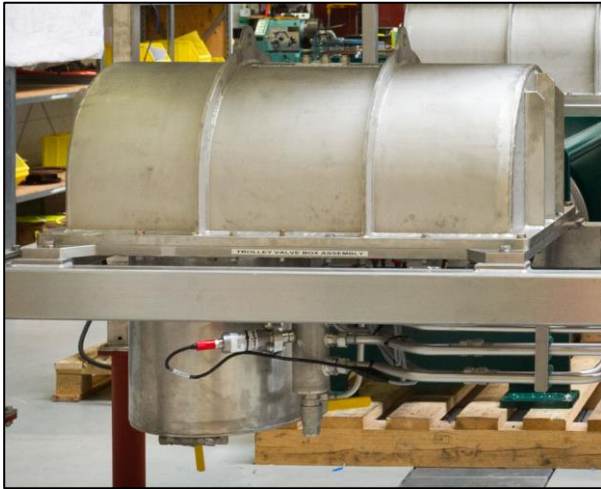
## ► Extensive track record

- Water depth rating: 0 – 6000 msw
- Power rating: 0.1 – 450 kW
- Supply voltage: Up to 6 kV
- Shock loads: Up to 15G, 5 ms
- E-motor types: AC/DC and servo
- Battery powered



▲ Small sized, 0.2 kW SHPU. This custom designed and build SHPU is battery powered and has a depth rating of 3500 msw.

# Custom made SHPUs – Examples



◀ SHPU at which the powerpack is combined with a number of other hydraulic and electric components. Smart modularization allows for (cost-) efficient subsea hydraulic system designs.



◀ Modular 225 kW SHPU unit with 7 pump units. This SHPU, with an open pump housing configuration, also features integrated cooling means.



▲ Duo 120 kW, subsea hydraulic powerpacks in a closed pump housing configuration.

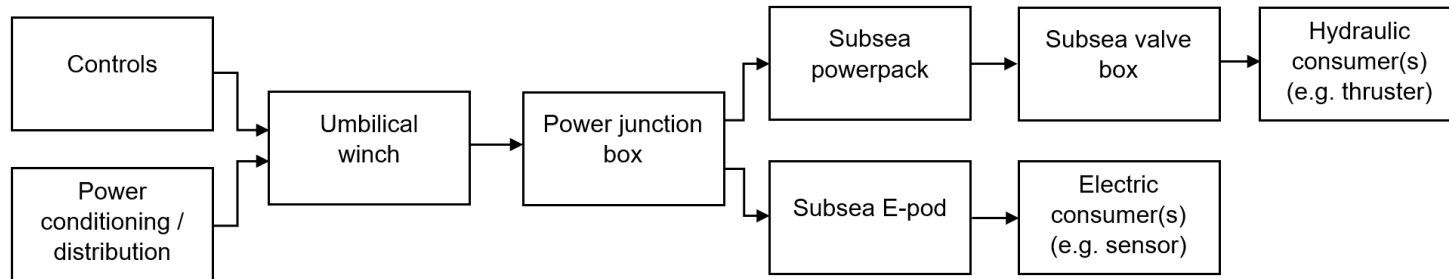
# Electro-hydraulic drive train elements

- ▶ Next to SHPUs, Seatools supplies auxiliary components and sub-systems of the subsea drive system
- ▶ This ranges from components such as
  - [Compensators & reservoirs](#)
  - [Subsea sensors](#)to sub-systems such as
  - [Controls](#)
  - [Umbilical winches](#)
- ▶ In fact, Seatools can deliver the entire subsea drive train from control panel to actuator



Seatools' subsea reservoirs with capacities from 0.6 (l) to 1000+ liters (r)

# Typical subsea drive train



# In need for a SHPU?



# In need for a SHPU?

- ▶ Seatools gladly assist you with finding an optimal SHPU solution
- ▶ As a starting point, the following basic information is useful to assess your case and advice on a potential SHPU solution:
  - Functional requirements
    - Required pressure & flow rate
    - Number and type of hydraulic consumers
  - Operational requirements
    - Depth rating
    - Type of hydraulic fluid
    - Operational temperature limits
  - System integration:
    - Available power supply
    - Mechanical integration limitations
    - Impression of remaining hydraulic circuit & modularization
  - General:
    - Desired scope of supply (i.e. single SHPU or other drive train elements)
    - Required delivery time
- ▶ On the basis of this information, Seatools drafts an initial hydraulic diagram to facilitate further discussions on potential solutions

# Get in touch

► Would you like to discuss your project with our experts?

Contact us via:

- General sales department:
  - E: [sales@seatools.com](mailto:sales@seatools.com)
  - T: +31 (0) 186 68 00 00
- Specialist sales engineer:
  - Jan-Cees Onderwater
  - E-: [jco@seatools.com](mailto:jco@seatools.com)
  - M: +316 51827673