



Subsea Hydraulic Power Units – SHPUs

Buyers guide – Version 1.3



Content

- ▶ Subsea HPUs in general
- ▶ Seatools SHPU offerings
 - Standardized SHPU
 - Custom SHPU
 - 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

2.6 kW SHPU



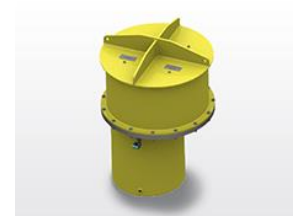
8.6 kW SHPU



21.3 kW SHPU



37 kW SHPU



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

[Product sheet](#)

[Product sheet](#)

[Product sheet](#)

[Product sheet](#)

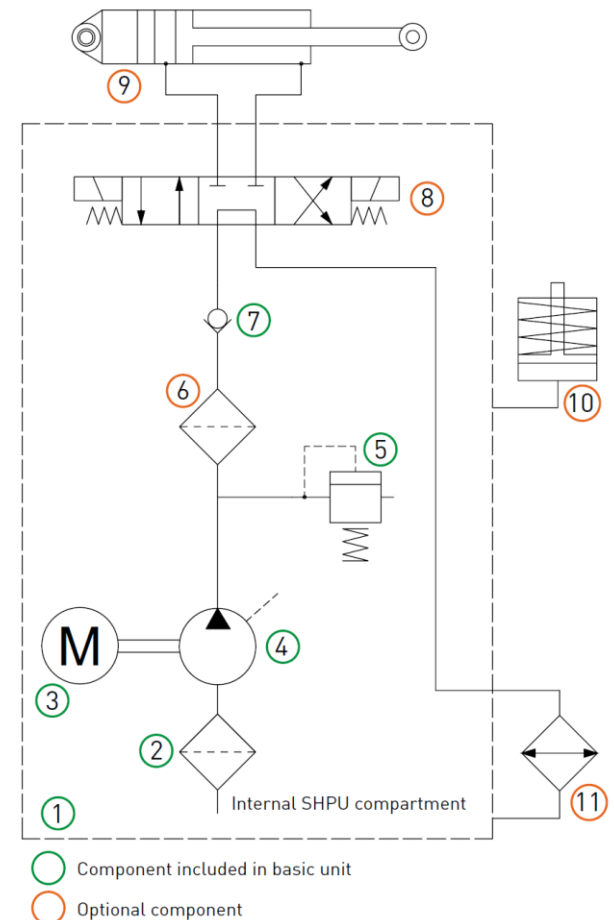
Standardized SHPUs – constituents

► 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



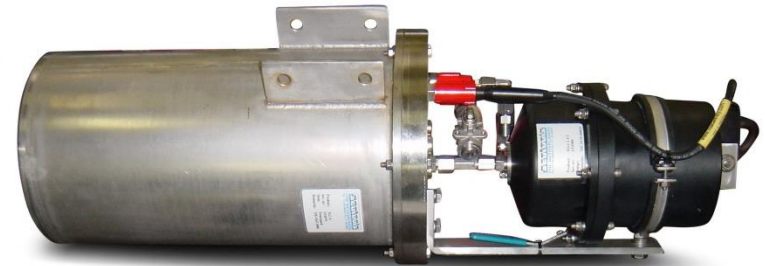
Custom made SHPUs

► 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.

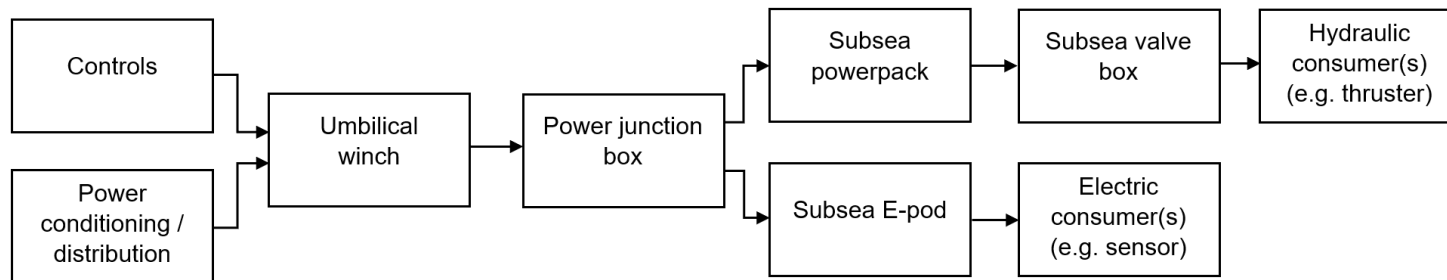
Electro-hydraulic drive train elements

- ▶ 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?

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