<table>
<tr><td>Package Number</td><td>12</td></tr>
<tr><td>Package Name</td><td>LV SIGNAL AND OPTICAL SWIVEL MODULES</td></tr>
<tr><td>Scope of Work
(* To be confirmed)</td><td>

LVESRO module – LV and signal

The Low Voltage (LV) and signal will be in one swivel enclosure for transmission of power to subsea system, mooring line monitoring unit, anti-condense heaters and signals.

Low voltage part of swivel:

<table>
<tr><th>Description</th><th>Number of paths</th><th>Voltage</th><th>Current</th><th>Comment</th></tr>
<tr><td>Small Power</td><td>19</td><td>230 V</td><td>20A</td><td></td></tr>
<tr><td>Subsea power</td><td>40</td><td>690 V</td><td>10A</td><td>10 of 6mm2 Quad cables</td></tr>
</table>

The LV part of swivel shall meet the following requirements:

- Short circuit level shall be minimum 1 kA/200 ms
- The dielectric strength of isolation between materials between each slip ring shall be minimum 2 xUn+1000V
- Minimum two sets of brushes shall be installed per ring with 100% current rating.
- All cables shall be in accordance with IEC 60331 – Fire resistant.
- Pigtail cables with suffisient lenght shall be terminated by the swivel vendor I swivel end

Signal part of swivel:

<table>
<tr><th>Description</th><th>Number of paths</th><th>Voltage</th><th>Current</th><th>Comment</th></tr>
<tr><td>NON-IS signals</td><td>60</td><td>24 V</td><td>1A</td><td></td></tr>
<tr><td>NON-IS comm.</td><td>18</td><td>24 V</td><td>1A</td><td></td></tr>
<tr><td>IS signals</td><td>50</td><td>24 V</td><td>1A</td><td></td></tr>
</table>

The Signal part of swivel shall meet the following requirements:

- All cables shall be in accordance with IEC 60331 - Fire resistance.
- Dielectric strength of isolation between materials between each slip ring shall be minimum 500 V
- Pigtail cables with suffisient lenght shall be terminated by the swivel vendor I swivel end

Swivel general requirements:

- Ingress protection: minimum IP56
- Slip ring unit will be Exde rated.

</td></tr>
</table>

- Rotation rate: <1,0 rpm
- Humidity detector system giving alarm in CCR upon high level of moisture
- 1 or 2 self-regulating anti-condensation heaters shall be installed in the housing to prevent condensation
- Enclosure Material: Stainless steel AISI 316 L or similar
- Material certificates to EN10204/3.1
- The LV/Signal/optical swivel will be located on the top of HUS (Hydraulic Utility Swivel) and cables will go inside an200 mm bore in HUS.

Figure Error! No text of specified style in document.**-1:** ESOR module (Catcher)

FORJ module – optical

The optical swivel will be located at the very top of the stack, as a separate unit on top of the LVESR.

Fiber optic swivel:

- No. of paths (fibers): 64 single mode fibers*
- Fiber size: 9/125 µm
- Operating wavelength: 1310 - 1550 nm
- Maximum inserting loss: 7.5 dB
- Fiber Optical swivel type: type SC
- Rotation rate: 1.0 rpm

* 64 single mode swivel is possible without multiplexing but 52 is the maximum number of single mode fibres that is field proven with SIL3 in accordance with applicable hardware reliability requirements as outlined in IEC 61508-2 Clause 7.4

Swivel modules range in weight from approximately 50-65 Te. Dimensions are indicatively H:2700mm, Ø:2100mm. There is a requirement for no single module to exceed 65Te.

	Schedule: Estimated package Sub-Contract Award Q1 2022 Estimated Package Delivery Time: 12 months FCA factory

Project Registration

Santos is committed to ensuring Australian Industry the opportunity to participate in the Barossa Project. Expressions of Interest are invited from contractors and suppliers with the relevant capability and capacity to undertake the scope of work.

This is a request for specific expressions of interest. Contractors and suppliers will be considered for prequalification and tender if suitably qualified against this package.

Note that an important part of the project registration process is to register an Expression of Interest at the correct Scope level.

Scope level definition:

Full scope: Able to produce / supply all the package.
Partial scope: Able to produce / supply one or more of the sub-packages.

All registrations are to be completed via ICN Gateway *BarossaOffshore.icn.org.au*. Please contact the ICNNT if registration assistance is required. Contact details: (08) 8922 9422 or *resources@icnnt.org.au*.

Project Website: Santos Australia