P6-SW1600

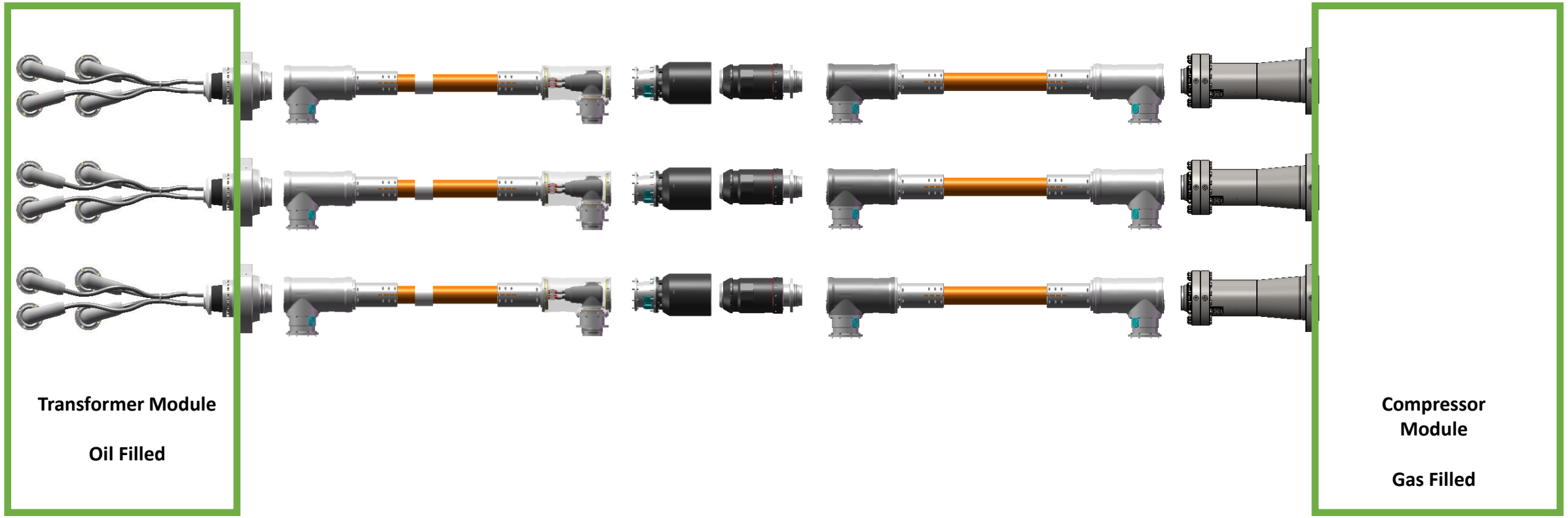
6/10(12)kV - 1600A connectors

August 2021

SCM
Systèmes et Connectique du Mans

Application

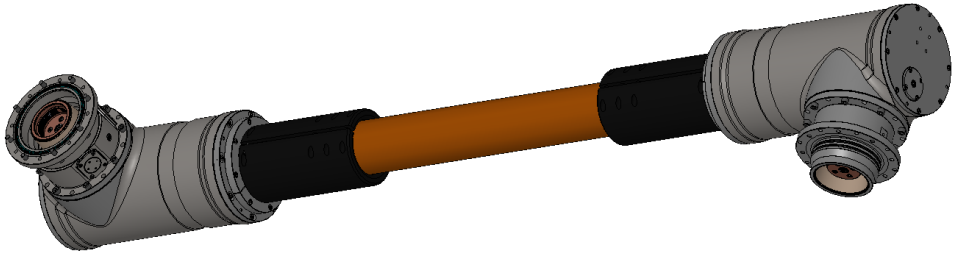
- SCM developed MV high current connectors for High Power Subsea Gas Compression.
- These connectors were used on Ormen Lange Pilot and are operating since Q3-2015 on Åsgard SSGC in Norway. See below an example of layout:

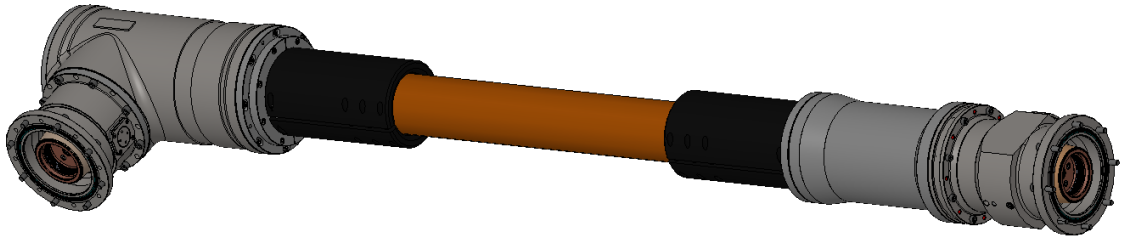


Product characteristics

Jumper Terminations

TRL7





Electrical Characteristics

- **Number of Contacts:** 1
- **Rated Voltage Uo/U(Umax):** 6/10(12)kV
- **Maximum Rated Current:** 1600A
- **Rated Power Frequency:** 200Hz
- **Insulation Resistance at 5kV DC:** >10GΩ
- **Contact Resistance:** <0,1mΩ per contact

Mechanical Characteristics

- **Rated Water Depth:** 2000m (6500ft)
- **Rated Pressure:** 200bar
- **Body Material:** 6Mo (254SMO)
- **Insulation Material:** PEEK

Environmental Characteristics

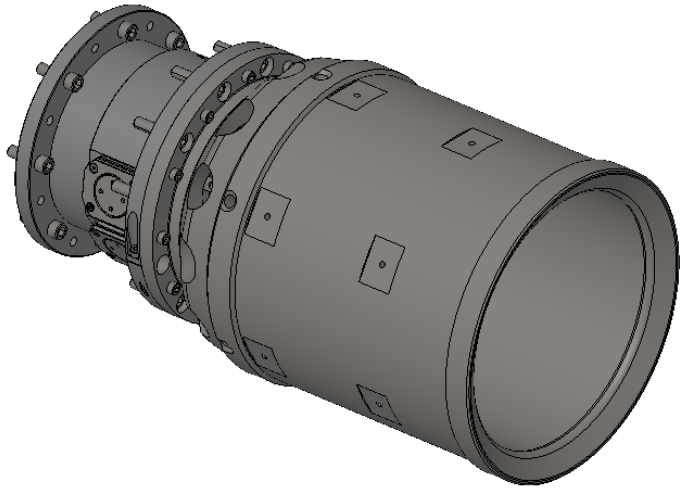
- **Rated Temperature:** -1°C to +15°C
- **Storage Temperature:** -25°C to +60°C
- **Design Life:** 25 years

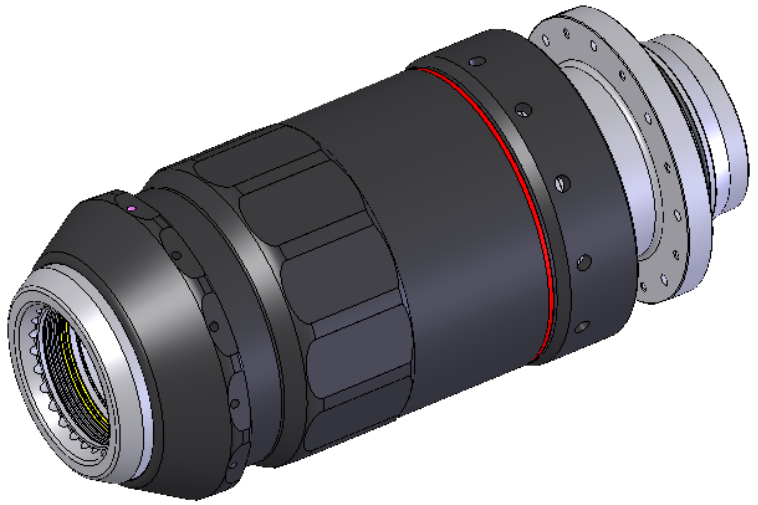
Other Informations

- **Hose size ID:** 125mm
- **Hose media:** di-electrical oil
- **Hose MBR (minimum bending radius):** 1000mm
- **Cable supplied in hose:** 4 cables of 185mm² 6/10(12)kV

WetMate Connectors

TRL7





Electrical Characteristics

- **Number of Contacts:** 1
- **Rated Voltage Uo/U(Umax):** 6/10(12)kV
- **Maximum Rated Current:** 1600A
- **Rated Power Frequency:** 200Hz
- **Insulation Resistance at 5kV DC:** >10GΩ
- **Contact Resistance:** <0,1mΩ per contact

Mechanical Characteristics

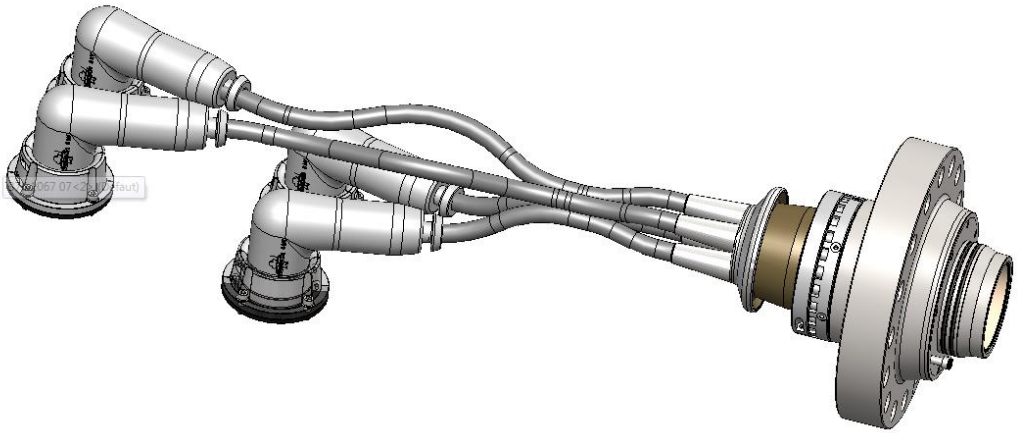
- **Rated Water Depth:** 2000m
- **Rated Number of Mating Cycles:** 100
- **Rated Pressure:** 200bar
- **Body Material:** 6Mo (254SMO)
- **Insulation Material:** PEEK

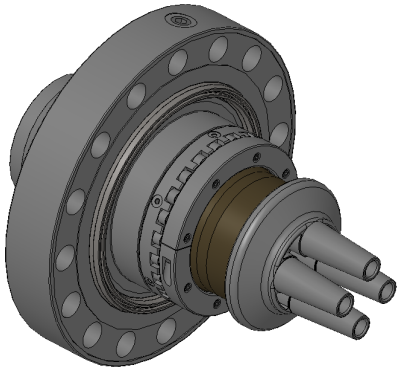
Environmental Characteristics

- **Rated Temperature:** -1°C to +15°C
- **Storage Temperature:** -25°C to +60°C
- **Design Life:** 25 years

Penetrators

TRL7





Electrical Characteristics

- Number of Contacts: 1
- Rated Voltage Uo/U(Umax): 6/10(12)kV
- Maximum Rated Current: 1600A
- Rated Power Frequency: 200Hz
- Insulation Resistance at 5kV DC: >10GΩ
- Contact Resistance: <0,1mΩ per contact

Mechanical Characteristics

- Rated Water Depth: 2000m (6500ft)
- Rated Pressure (seaside): 200bar
- Rated Pressure (module): 204bar
- Body Material: 6Mo (254SMO)
- Insulation Material: PEEK

Environmental Characteristics

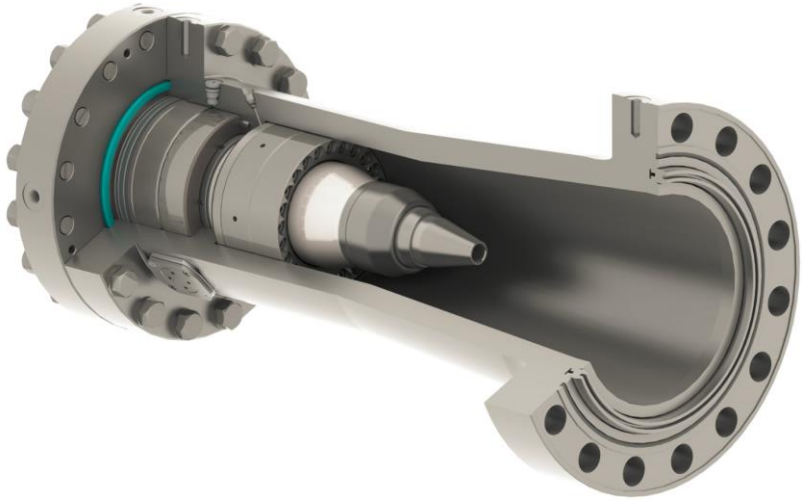
- Rated Seaside Temperature: -1°C to +15°C
- Rated Module Temperature: +30°C
- Storage Temperature: -25°C to +60°C
- Design Life: 25 years

Other Informations

- Internal module media: di-electrical oil or gas (nitrogen)

Penetrators

TRL7



Electrical Characteristics

- Number of Contacts: 1
- Rated Voltage Uo/U(Umax): 6/10(12)kV
- Maximum Rated Current: 1600A
- Rated Power Frequency: 200Hz
- Insulation Resistance at 5kV DC: >10GΩ
- Contact Resistance: <0,1mΩ per contact

Mechanical Characteristics

- Rated Water Depth: 2000m
- Rated Pressure (seaside): 200bar
- Rated Pressure (module/compressor): 285bar
- Body Material: 6Mo (254SMO)
- Insulation Material: Ceramic

Environmental Characteristics

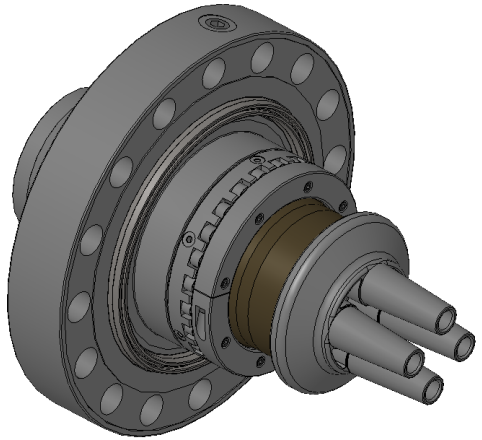
- Rated Seaside Temperature: -1°C to +15°C
- Rated Module Temperature: +50°C
- Storage Temperature: -25°C to +60°C
- Design Life: 25 years

Other Informations

- Internal module media: Dry Gas
- Insulation between cable and penetrator: VPI

Penetrators

TRL7



Electrical Characteristics

- Number of Contacts: 1
- Rated Voltage Uo/U(Umax): 6/10(12)kV
- Maximum Rated Current: 1600A
- Rated Power Frequency: 200Hz
- Insulation Resistance at 5kV DC: >10GΩ
- Contact Resistance: <0,1mΩ per contact

Mechanical Characteristics

- Rated Water Depth: 2000m (6500ft)
- Rated Pressure (seaside): 200bar
- Rated Pressure (module): 204bar
- Body Material: 6Mo (254SMO)
- Insulation Material: PEEK

Environmental Characteristics

- Rated Seaside Temperature: -1°C to +15°C
- Rated Module Temperature: +50°C
- Storage Temperature: -25°C to +60°C
- Design Life: 25 years

Other Informations

- Internal module media: Dry Gas
- Insulation between cable and penetrator: Boot seal

Qualification Information

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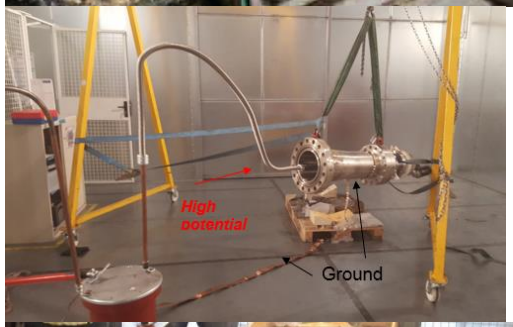
Qualification Information

Qualification Tests (Non exhaustive list)	Conditions
Prototype Acceptance Tests	Helium leak test / CR < 0,1mΩ per contact / IR > 10GΩ PD level < 10pC at 10,4kV & < 200pC at 15kV HVAC 24kV for 4 hours Impulse voltage test 10 negative pulses, 10 positive pulses, with a peak of 75kV
Temperature Rise Test	Current rised at 1800A
Thermal Cycles Tests	15 cycles 8h minimum - ambient pressure at 15kV - 1800A 15 cycles 8h minimum - 200bar at 15kV - 1800A
Wet Mating Tests	100 mating cycles in **Turbid water** at 200bar
Thermal Short Circuit Test	2 shock of each 16kA for 5s
Long Term & Flooded Test	Maintained at pressure of 200bar at 80°C for 14 days and ambient temperature 25 pressure cycles in mated configuration then 10 mating cycles
Thermal Shock Tests	3 x High temperature: 70°C - 4 hour then dropped in water between 0°C and 4,5°C 3 x Low temperature: -25°C - 4 hour then dropped in water between 0°C and 4,5°C
Vibration Test	5 Hz to 190 Hz : 25mm/s 190 Hz to 1000 Hz : 3g acceleration Sweep rate : 1 octave per min Double sweep from 5 to 1000 Hz
Drop Test	0,5m on 5mm thick rubber mattress
Electrical Breakdown Test	Breakdown at 40kV



Penetrators have been submitted to 30 pressure tests at 1,5 x design pressure in both directions.
Other specific tests for compressor penetrators have been done such as rapid gas decompression test.

Track Record

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Track Record

- SCM supplied more than 120 off HV 6kV – 1600A connectors for Nyhamna pilot test and Asgard project in Norway. The Nyhamna pilot project for Equinor & Shell proved the SSGC concept which led to Asgard success with nearly 100% availability.

THANK YOU

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