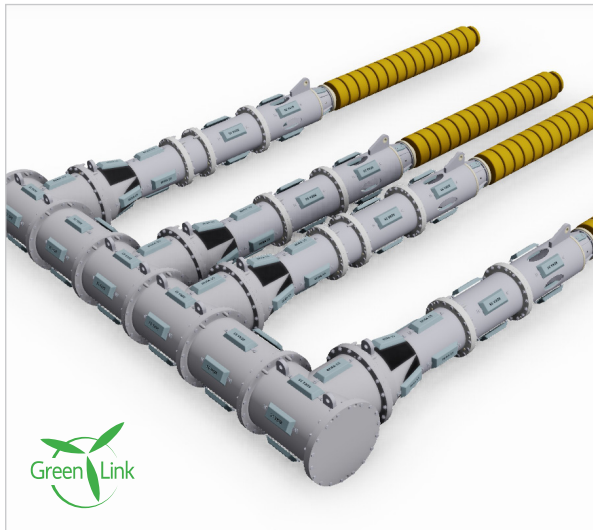


GreenLink Hub

Modular underwater termination units



MacArtney GreenLink hubs are heavy-duty, dry-mate modular 'subsea sockets' made up to house multiple cables. Each module is mechanically linked to other modules using GreenLink inline termination technology. Extra sections can be added at initial launch or at a later stage, making the GreenLink hub a flexible option over time.

Speed and flexibility for offshore terminations

The innovative GreenLink hub design is connector based and all connections are mechanical, eliminating the need for moulding and drying, hereby making vessel based preparations fast and efficient. Bolts and flanges have replaced cutting, splicing and terminations. Therefore, should a GreenLink hub need dismantling and remounting, it merely needs to be raised, unbolted, rebolted and lowered back into the water. This makes subsequent system adjustments and additions comparatively fast and straightforward. The hub comes with pressure caps for sealing unused ports.

MacArtney has designed the GreenLink hub with all cable entry points located on the same side. This makes the hub easier to handle after termination and minimises the risk of cable damage as the system is deployed on the seabed. Alternative configurations available upon request.

GreenLink hubs can be used for multiple subsea marine renewable energy applications including wind, tidal and wave energy converters which are typically located close to shore.

As standard, GreenLink hubs are manufactured from stainless steel AISI 316L, with sacrificial anodes for protection against corrosion inflicted by seawater. Moreover, the hubs come with external O-ring test ports on the hub housing. These can be used for testing the O-ring seal on the fully assembled hub.

Finally, GreenLink hubs are available with water blocking at the cable cut between the hub housing and the inline termination connector ports.

Highlighted specifications

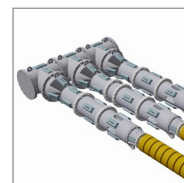
- Standard working voltage: up to 36 kV
- Up to 1,250 A
- Conductor range: 35-630 mm²
- Working depth: 100 m (other working depths available upon request)
- Housing material: stainless steel AISI 316L (other materials available upon request)
- Design life: 25 years (with 5 year maintenance periods)
- O-ring test ports on hub housing
- Connectable with GreenLink inline termination

Applications

- Subsea hub
- UTU - underwater termination unit
- Connecting multiple dynamic cables to export cable
- Connecting multiple cables from wind, tidal and wave energy converters to export cables
- Interconnecting multiple energy converters
- Interconnecting subsea installations

Options

- Water blocking between the hub housing and the inline termination connector ports - up to 10 bar pressure (Note: May depend on actual cable - case by case verification required)
- The hub can be dry or nitrogen filled



Mechanical specifications

Standard hub pipe size:	20" (other pipe sizes available upon request)	Pull out/lift SWL:	Depends on cable specifications or working depth (verified case by case)
Working depth:	100 m (other working depths available upon request)	O-ring test ports:	All flange connectivity interfaces are fitted with test ports for pressure testing prior to system deployment
Housing material:	AISI 316L (other materials available upon request)	Third party qualification/approval:	Available on request - to be verified case by case
Design life:	25 years (with 5 year maintenance intervals)	Field installation and offshore support:	Performed by experienced and fully certified MacArtney technicians
Zinc anode design life:	5 years (with 2½ year inspection intervals)		
Straight line pull SWL:	Depends on cable specifications or working depth (verified case by case)		

Electrical specifications

GreenLink hub solutions are designed for specification compatibility with the following standard size GreenLink inline termination set-ups:

- Size 1 (12" pipe size)
- Size 2 (14" pipe size)
- Size 3 (16" pipe size)

Beyond the overall physical size of the inline termination to be used with the hub, the sizes also reflect the voltage rating and current capacity of the systems.

Number of MV contacts

All sizes:	3 phases
DC applications:	2 conductors +/-

Voltage rating (size 1)

Rated voltage Un:	30 kV
Rated voltage Uo:	18 kV
Max operating voltage Um:	36 kV

Voltage rating (size 2)

Rated voltage Un:	36 kV
Rated voltage Uo:	20.8 kV
Max operating voltage Um:	42 kV

Voltage rating (size 3)

Rated voltage Un:	36 kV
Rated voltage Uo:	20.8 kV
Max operating voltage Um:	42 kV

Current rating

Size 1:	630 A
Size 2:	800 A
Size 3:	1,250 A

Please note: All electrical components used are rated to maximum current, hence the current is limited by the square of the cable only.

Short-circuit levels (size 1)

Max thermal short circuit (1 sec):	31.5 kA
Max dynamic short-circuit current:	108 kA

Short-circuit levels (size 2)

Max thermal short circuit (1 sec):	40 kA
Max dynamic short-circuit current:	125 kA

Short-circuit levels (size 3)

Max thermal short circuit (1 sec):	60 kA
Max dynamic short-circuit current:	150 kA

Cable cross sections

Size 1:	35-185 mm ² (up to 240 mm ² at 24 kV)
Size 2:	50-300 mm ²
Size 3:	120-630 mm ²

Operational environment

GreenLink hubs are suited for deployment in seawater
Temperature range: To be verified case by case

Standards

Internal electrical connectors are manufactured to EN 50181 and tested to IEC 60502-4.
Please note: As there are no specific EN or IEC standards applicable for this product, testing will be according to customer specification.

Testing procedures are arranged upon order of hardware.