



Cable Management System(CMS)

SHIP-TO-SHORE CONNECTION
ELECTRICAL SYSTEMS



Introduction

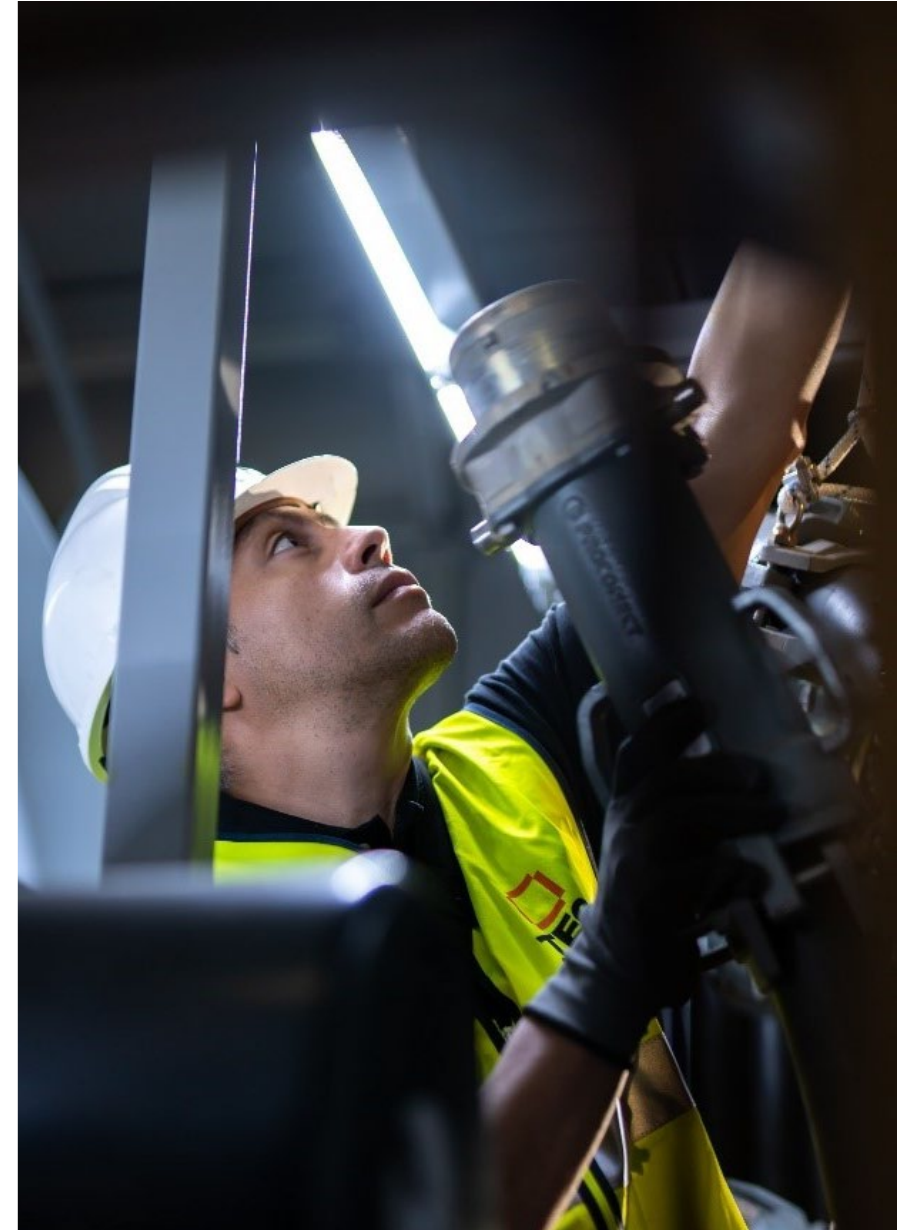
Since its founding in 1976, **TEC Container** has provided cutting-edge solutions to more than 80 countries, improving the operational efficiency of ports and contributing positively to the environment. With more than four decades of experience in design and manufacturing for ports and marine terminals, their commitment to excellence and innovation has led them to lead the way in advanced solutions for *electrical connection between ships and ports*, focusing on reducing emissions and complying with high environmental standards.

The OPS systems (Onshore Power Supply), also known as ShorePower, are central to their approach, allowing ships in port to connect to shore-side electricity, reducing harmful emissions and noise pollution. *TEC Container plays a crucial role as a manufacturer of Cable Management Systems (CMS), ensuring efficiency and safety in these electrical connections and supporting its commitment to innovation and sustainability in the maritime industry.*

Advantages of OPS Systems

OPS systems drive sustainability in the maritime industry with outstanding advantages:

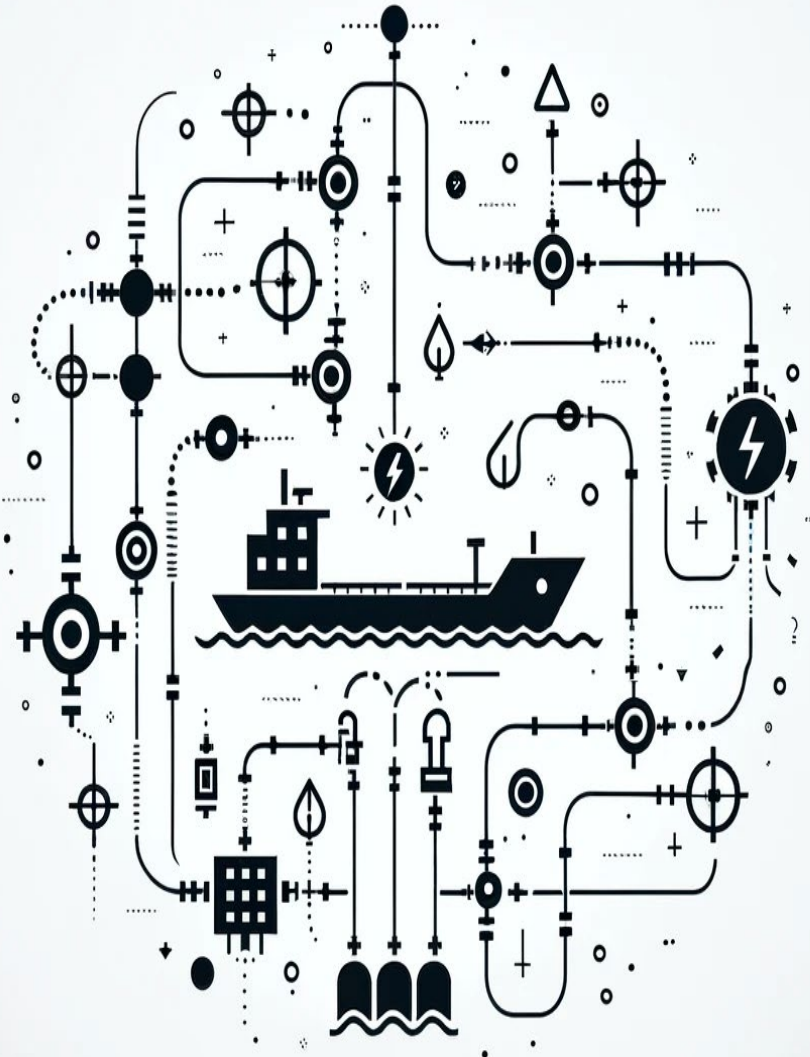
- *They significantly reduce polluting emissions*, improving air quality and reducing the carbon footprint.
- *They reduce noise pollution*, favoring local communities and port working conditions. They ensure regulatory compliance, facilitating adaptation to strict environmental regulations.
- *They improve energy efficiency*, resulting in fuel savings.
- *They promote long-term sustainability*, aligning with greater environmental awareness and sustainability commitments.



Architecture of OPS Systems

The architecture of the OPS systems is adapted according to the specific needs of *each port, vessel and berthing point*, highlighting key elements such as:

- **Main Supply Voltage (MSV):** Main source of electricity, varying input voltages according to the local electrical grid.
- **Reception Interface:** Electricity transfer point to the port, which can be aerial or underground.
- **OPS Central/Port Substation:** Includes circuit breakers, transformers, and, in centralized systems, frequency conversion for each vessel.
- **Port Distribution:** Conducts medium/low voltage electricity to OPS modules on the docks.
- **OPS Dock and Dock Distribution Modules:** They provide electrical energy to OPS supply points.
- **Ship-Shore Interface:** Design and manufacture of key components such as junction boxes and cable management units, ensuring efficient and safe handling of electrical connections.

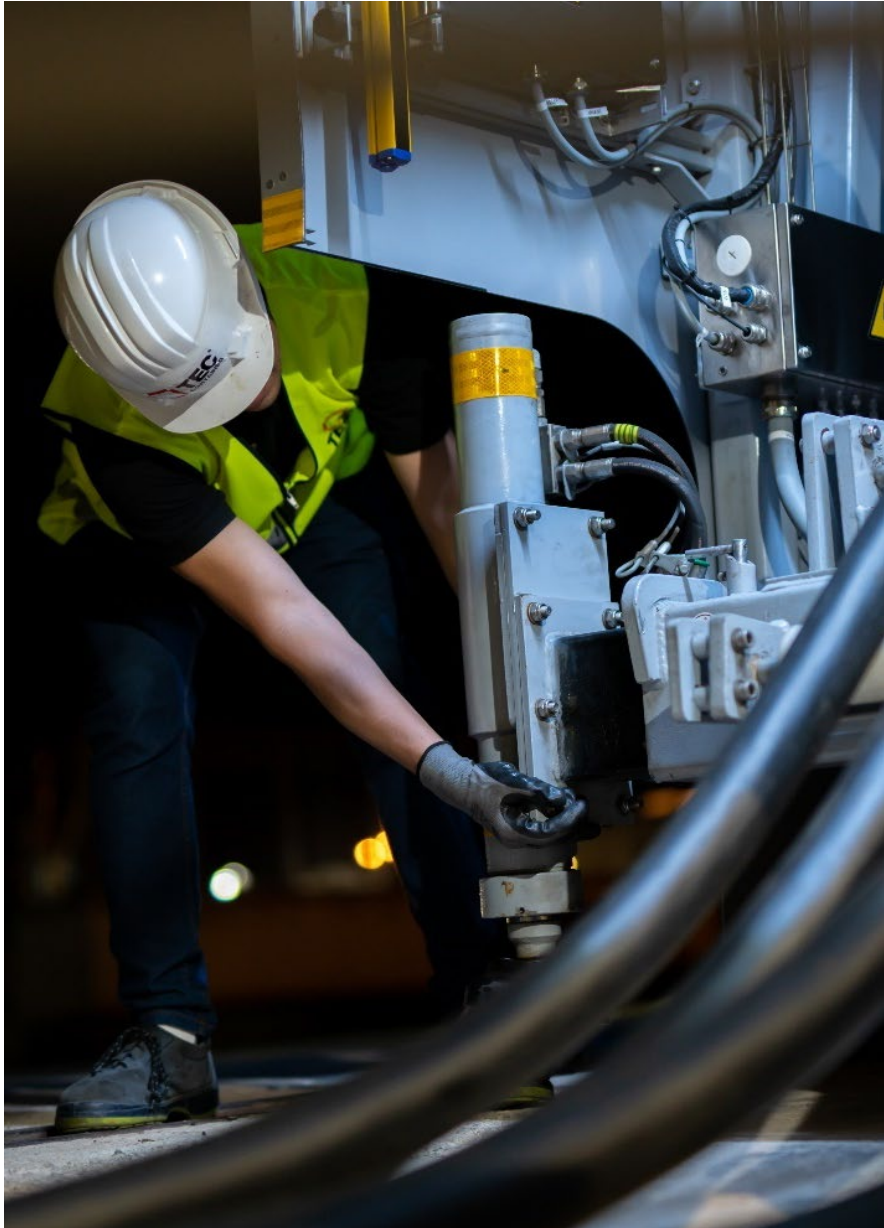


Regulatory Framework and Regulations

The global regulatory framework for electrical connection in ports has evolved significantly, driving the adoption of OPS Systems to reduce emissions and benefit the environment. Since 2012, China has required OPS Systems in new terminals, while Europe's Directive 2014/94/EU seeks to equip all ports with these connections by 2025. California, since 2020, and financing programs in Canada and the EU support its development. The EU, with "Fit for 55", mandates OPS infrastructure in ports by 2030. Technical regulations such as IEC/IEEE 80005 and IMO OPS Guidelines ensure safe and efficient implementation.

TEC Container is fully aware of these regulations and works meticulously on the design of its cable management units to ensure strict compliance with these regulations, focusing on safety and operational efficiency.

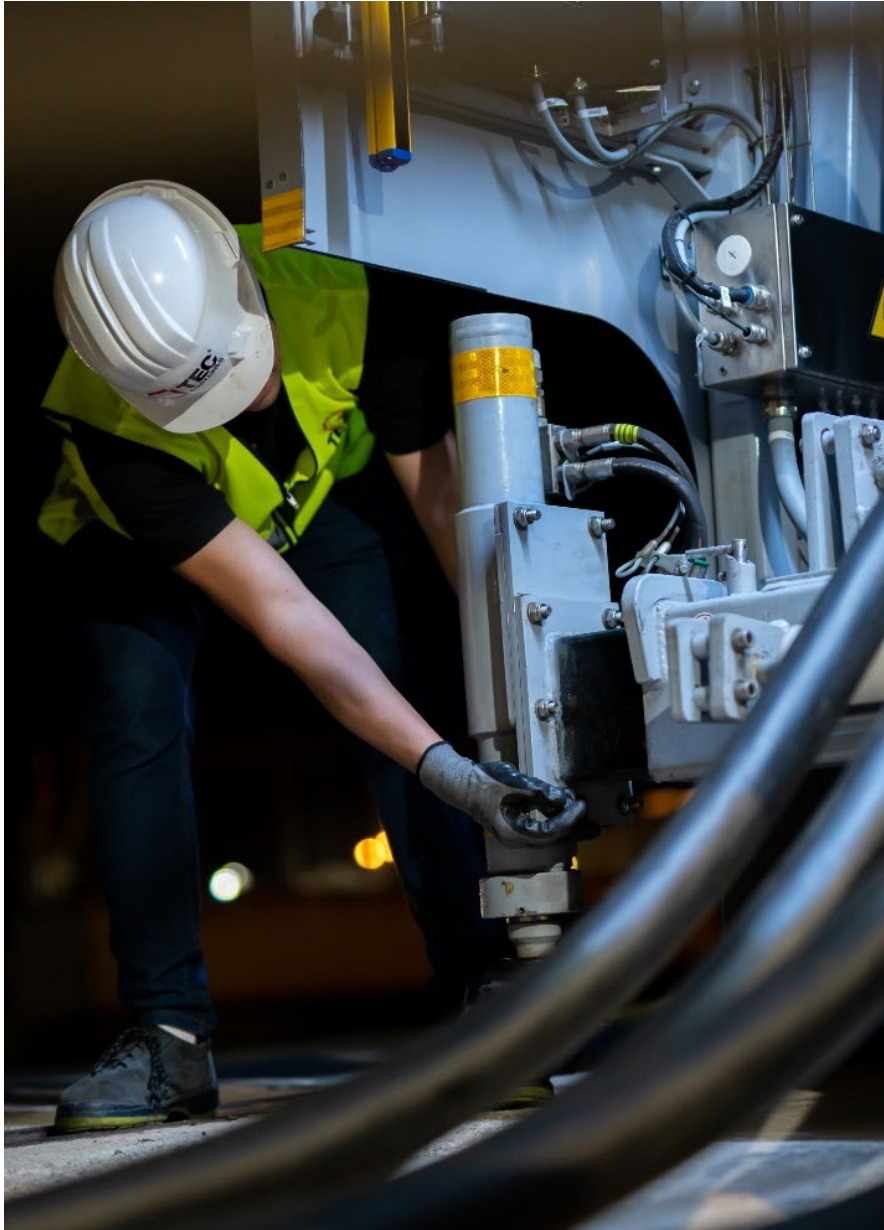




TEC Container CMS

TEC Container's Cable Management Units (CMUs) are designed to provide a safe and efficient electrical connection between ports and ships, adapting to the specifications of each location. These units are IEC/IEEE 80005 compliant and include advanced features to optimize performance:

- ***Cable Movement:*** Facilitate cable movement between supply and vessel.
- ***Optimum Length Maintenance:*** Prevent excess cable and trigger safety measures if uncoiling limits are exceeded.
- ***Bend Radius Maintenance:*** Ensure proper bend radius at all times.
- ***Tension Monitoring:*** Monitor cable tension with alarm and emergency stop systems.

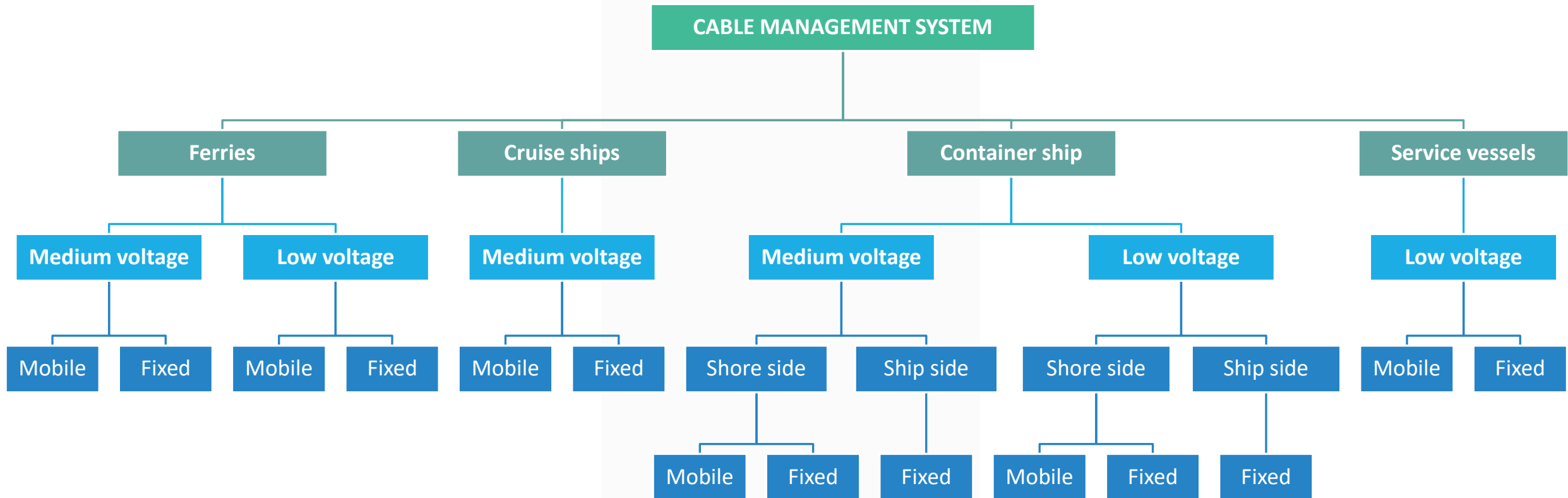


TEC Container CMS

- ***Submersion Prevention:*** They implement measures to prevent equipment submersion.
- ***Strategic Positioning:*** Can be located so as not to interfere with berthing or mooring systems.
- ***Drafts and Tides Support:*** Maintain functionality in the face of tidal variations and vessel draft.
- ***Recovery and Storage:*** Allow efficient post-operation storage.
- ***Connector Protection:*** They have measures against current imbalances.
- ***Equipotential Bonding Monitoring:*** Verify equipotential bonding to avoid potential differences.

These features ensure that TEC Container's CMS are integral solutions for the management of electrical connections in ports, focusing on safety, efficiency and adaptability to various operating conditions.

TEC Shore Power Product Portfolio



Applications

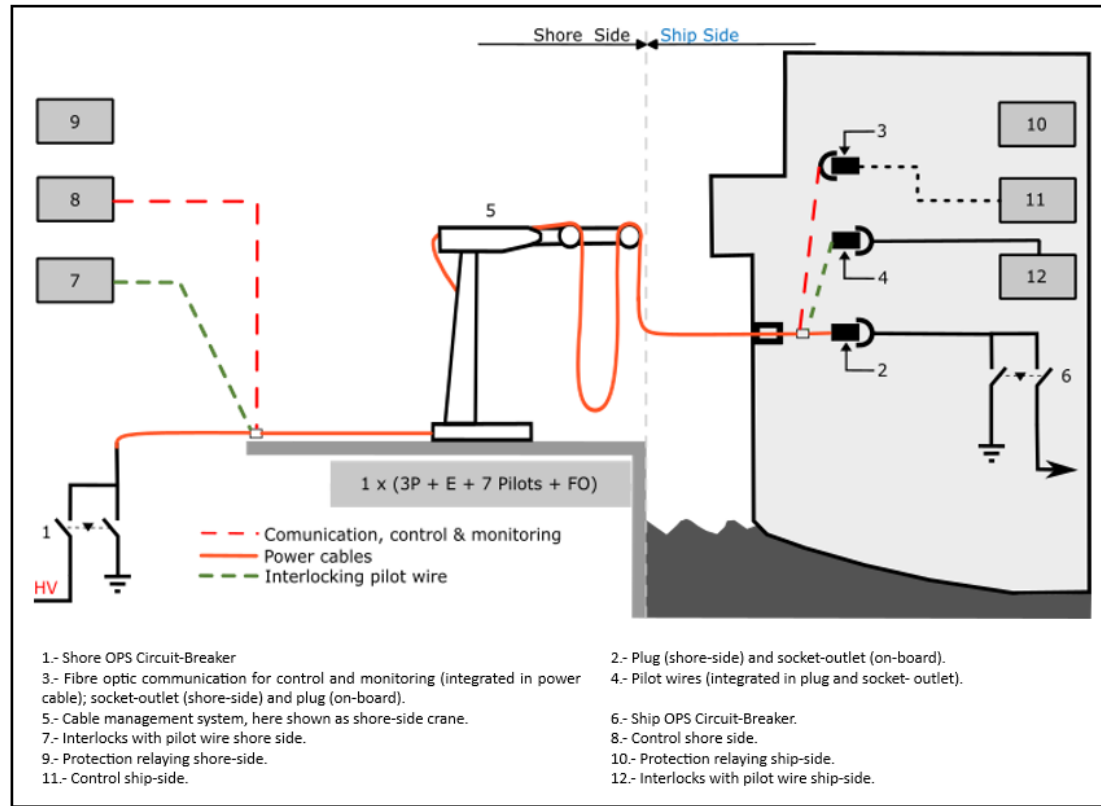
EACH ELECTRICAL SYSTEM

EACH VESSEL



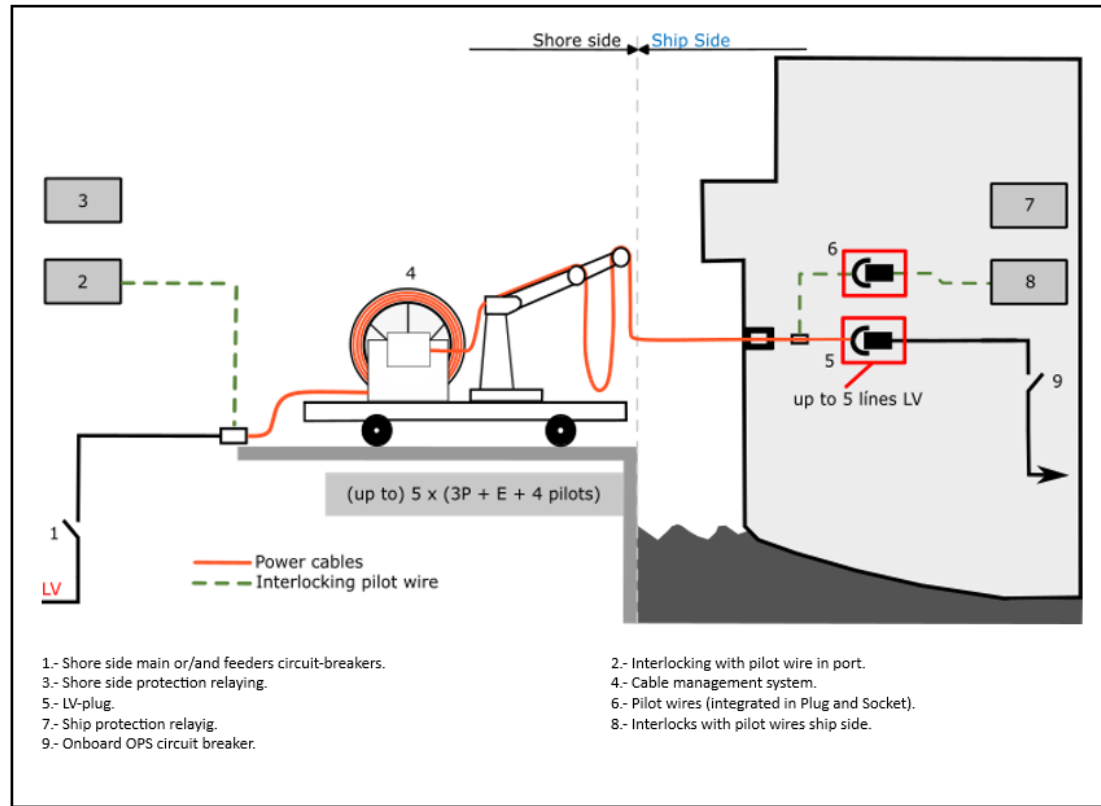
Ferries (Medium voltage)

Location of the CMS:	Berth
Physical structure:	Fixed or mobile with double cable store (shore and ship)
Rated connection voltage:	11 kV and/or 6.6 kV
Recommended rated power:	6,5 MVA
Number of cables to feed the vessel:	1 power cable (3P+E+7p+FO)
Number of cables for control and Monitoring	Only pilots integrated in the power supply cable.
Number of cables for communication:	Only fibre optics integrated in the power cable.
Safety circuits:	Control supply voltage less than 60 VDC or 25 VDC
Emergency stop system:	Cable tension force alarm, cable length alarm, pilot contacts integrated in the power cable, emergency stop pushbuttons
Equipotentiality	Fault monitor and grounding verification (available on request).
Power Connectors:	<ul style="list-style-type: none"> • Three-phase 500 A (IEC 62613-2:2016/Annex J). • The withstand short-circuit current is 16 kA RMS for 1s and a maximum peak short-circuit of 40 kA. • The data link (if provided) shall use a 4-terminal fibre optic connector. Will use a connector

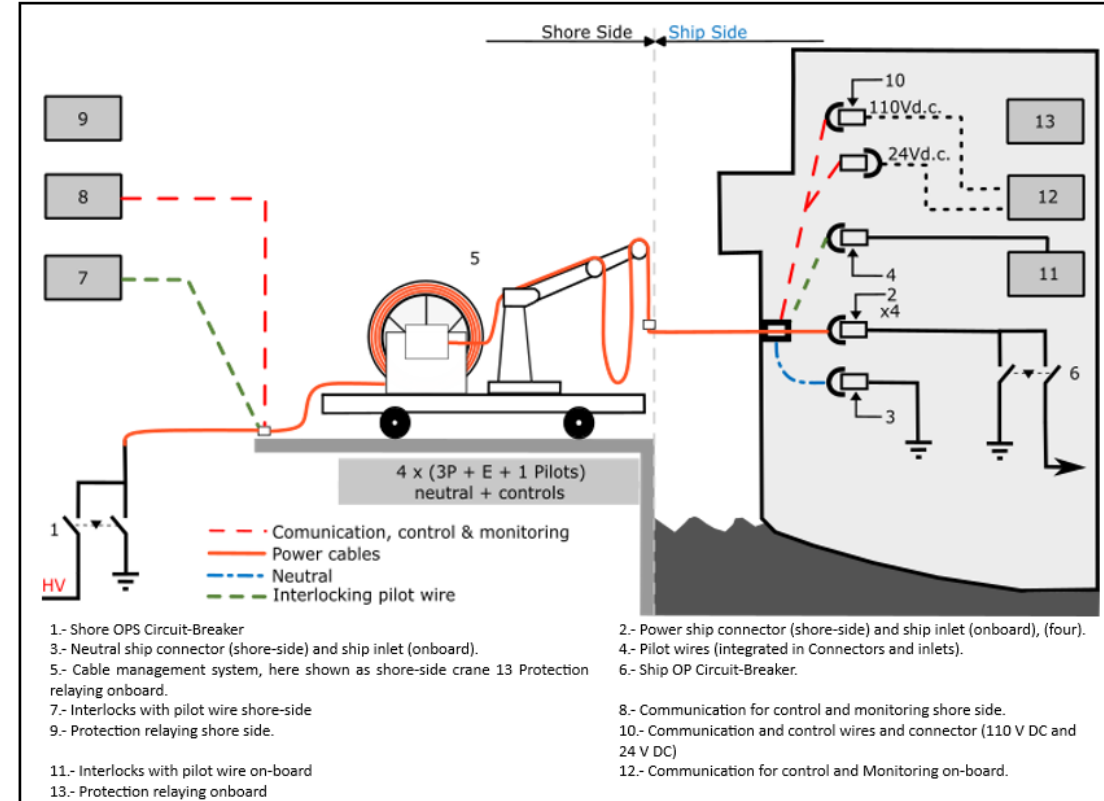


Ferries (Low voltage)

Location of the CMS:	Berth
Physical structure:	Fixed or mobile with double cable store (shore and ship)
Rated connection voltage:	400/440/690 V
Recommended rated power:	< 1 MVA
Number of cables to feed the vessel:	Up to 5 power cables (3P+E+4p)
Number of cables for control and Monitoring	Only pilots integrated in the power supply cable.
Number of cables for communication:	Without communication cable.
Safety circuits:	Based on pilot continuity check
Emergency stop system:	Cable tension force alarm, cable length alarm, pilot contacts integrated in the power cable, emergency stop pushbuttons
Equipotentiality	Fault monitor and grounding verification (available on request)
Power Connectors:	<ul style="list-style-type: none"> • Three-phase 350 A (IEC 60309-5). • The withstand short-circuit current is 16 kA RMS for 1s and a maximum peak short-circuit of 40 kA.

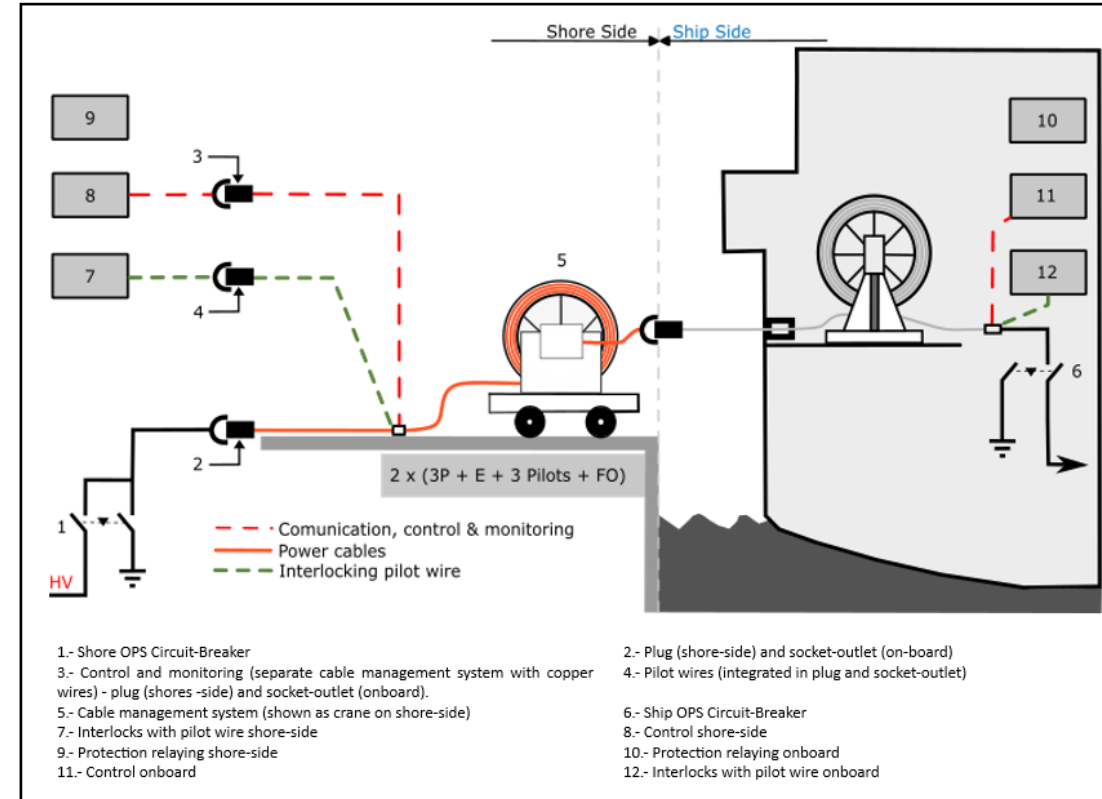


Location of the CMS:	Berth
Physical structure:	Fixed or mobile with double cable store (shore and ship)
Rated connection voltage:	11 kV and/or 6.6 kV
Recommended rated power:	20 MVA
Number of cables to feed the vessel:	4 power cables (3P+E+1p) + 1 neutral cable
Number of cables for control and Monitoring	2 cables
Number of cables for communication:	1 cable
Safety circuits:	110VDC Safety and Control Circuit, 24VDC Safety and Control Circuit, Ground Check Circuit and SCADA Circuit
Emergency stop system:	Cable tension force alarm, cable length alarm, ground monitoring trip, ground check trip, emergency stop pushbuttons.
Equipotentiality:	Fault monitor and grounding verification (available on request).
Power Connectors:	<ul style="list-style-type: none"> • Three-phase 500 A (IEC 62613-2:2016/Annex G) and 250 A single-pole neutral (IEC 62613-2:2016/(Annex H)) • The withstand short-circuit current is 25 kA for 1 s and a maximum peak short-circuit current of 63 kA.



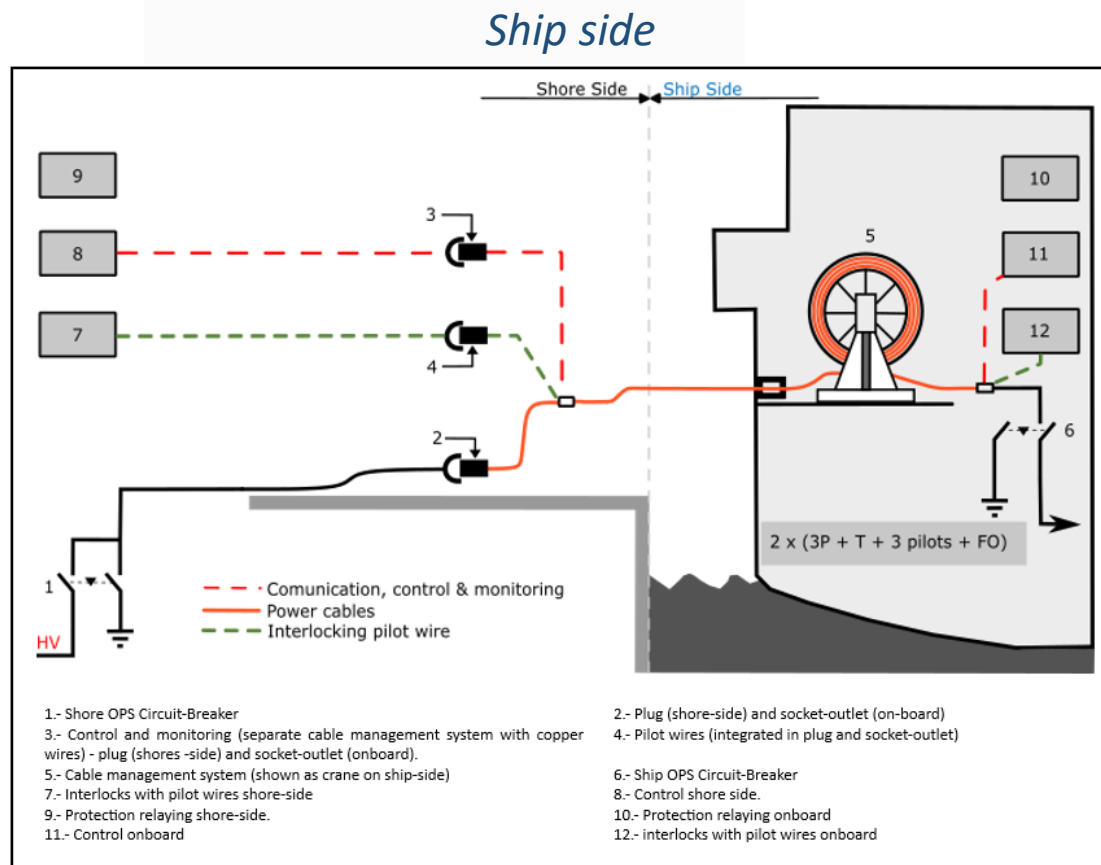
Location of the CMS:	Berth
Physical structure:	Mobile with shore cable store
Rated connection voltage:	6.6 kV
Recommended rated power:	7.5 MVA
Numbers of cables for power supply to vessel	2 power cables (3P+E+3p+FO)
Number of cables for control and Monitoring	Only pilots integrated in the power supply cable.
Number of cables for communication:	Only fibre optics integrated in the power supply cable.
Safety circuits:	Control supply voltage less than 60 V DC or 25 V AC
Emergency stop system:	Cable tension force alarm, cable length alarm, pilot contacts integrated in the power cable, emergency stop pushbuttons.
Equipotentiality:	Fault monitor and grounding verification (available on request).
Power Connectors:	<ul style="list-style-type: none"> • Three-phase 500 A (IEC 62613-2:2016/Anexo II). • The withstand short-circuit current is 16 kA RMS for 1s and a maximum peak short-circuit of 40 kA. • The data link (if provided) shall use a 4-terminal fibre optic connector. Will use a connector

Shore side

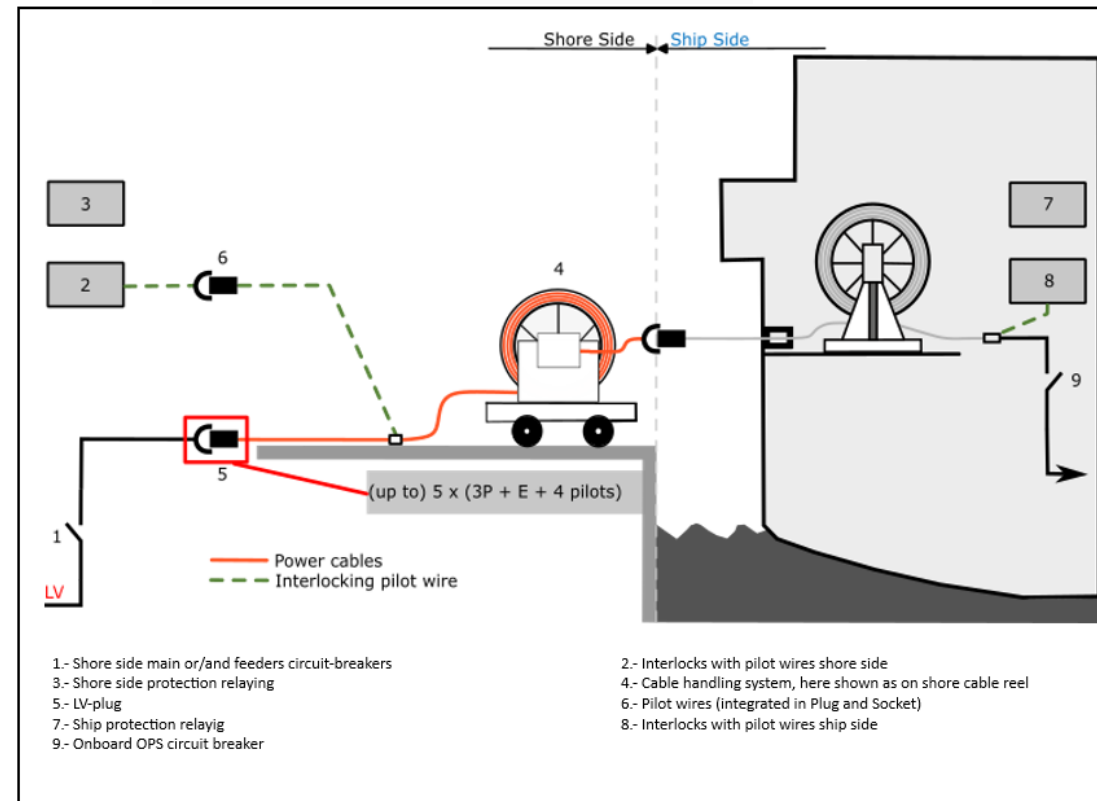


Container ship (High voltage)

Location of the CMS:	Ship
Physical structure:	Fixed with ship cable store
Rated connection voltage:	6.6 kV
Recommended rated power:	7.5 MVA
Number of cables to feed the vessel:	2 power cables (3P+E+3p+FO)
Number of cables for control and Monitoring	Only pilots integrated in the power supply cable.
Number of cables for communication:	Only fibre optics integrated in the power cable.
Safety circuits:	Control supply voltage less than 60 V DC or 25 V AC
Emergency stop system:	Cable length alarm, pilot contacts integrated in the power cable, emergency stop pushbuttons.
Equipotentiality:	Termination device (available on request).
Power Connectors:	<ul style="list-style-type: none"> • Three-phase 500 A (IEC 62613-2:2016/Anexo II). • Short-circuit withstand current: 16kA RMS 1 sec (maximum peak of 40kA (IEC 62613-1)). • The data link (if provided) shall use a 4-terminal fibre optic connector.



Shore side



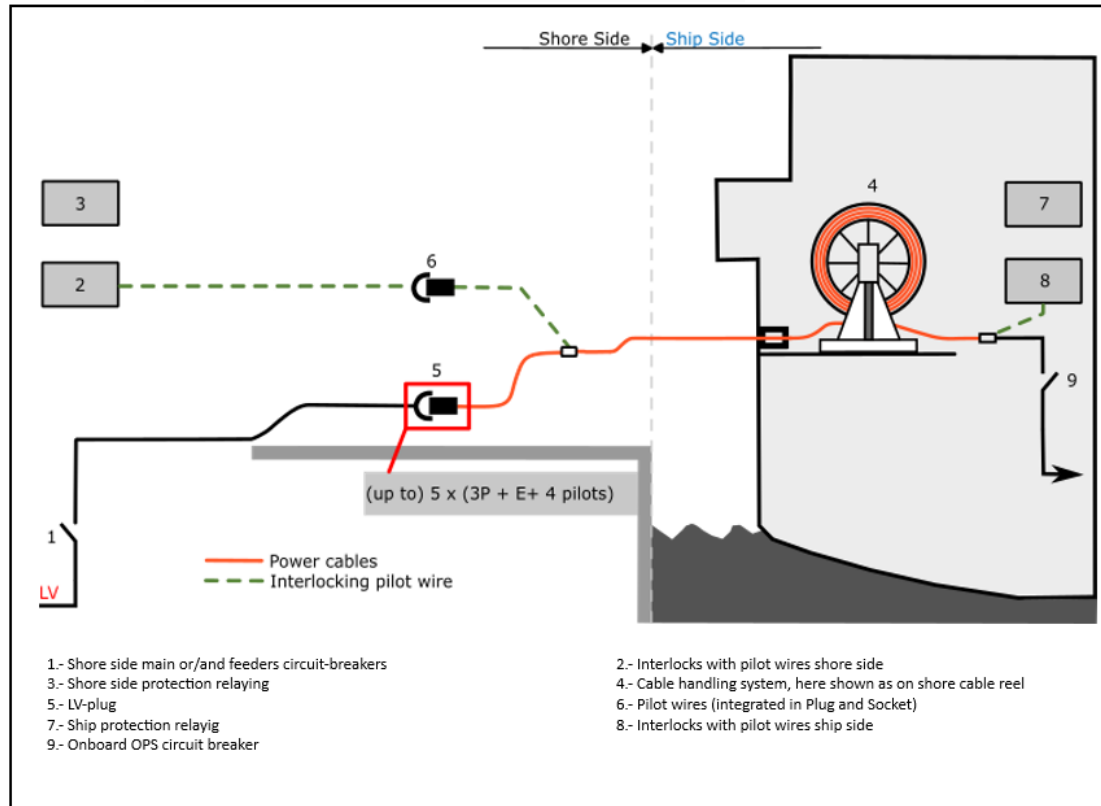
Container ship (Low voltage)

Location of the CMS:	Berth
Physical structure:	Mobile with shore cable store
Rated connection voltage:	400/440/690V
Recommended rated power:	< 1 MVA
Number of cables to feed the vessel:	Up to 5 power cables (3P+E+4p)
Number of cables for control and Monitoring:	Only pilots integrated in the power supply cable.
Number of cables for communication:	Without communication cable.
Safety circuits:	Based on pilot continuity check.
Emergency stop system:	Cable tension force alarm, cable length alarm, pilot contacts integrated in the power cable, emergency stop pushbuttons.
Equipotentiality:	Not applicable
Power Connectors:	<ul style="list-style-type: none"> Three-phase 350 A (IEC 60309-5). The withstand short-circuit current is 16 kA RMS for 1 s and a maximum peak short-circuit current of 40 kA.

Service vessels (Low voltage)

Location of the CMS:	Ship
Physical structure:	Fixed with ship cable store
Rated connection voltage:	400/440/690V
Recommended rated power:	< 1 MVA
Number of cables to feed the vessel:	Up to 5 power cables (3P+E+4p)
Number of cables for control and Monitoring:	Only pilots integrated in the power supply cable.
Number of cables for communication:	Without communication cable.
Safety circuits:	Based on pilot continuity check.
Sistema de parada de emergencia:	Cable length alarm, pilot contacts integrated in the power cable, emergency stop pushbuttons.
Equipotentiality:	Fault monitor and grounding verification (available on request).
Power Connectors:	<ul style="list-style-type: none"> • Three-phase 350 A (IEC 60309-5). • The withstand short-circuit current is 16 kA RMS for 1 s and a maximum peak short-circuit current of 40 kA.

Ship side



Morphology

EACH PORT

EACH VESSEL

EACH DOCKING POINT





Telescopic Jib Crane

Type of vessel:	Ro-Ro / Ro-Pax
Column height:	4 a 16 m.
Arm reach:	2 a 10 m (fixed or telescopic).
Rotation:	Up to 120°.
Useful cable length:	Up to 22m
Cable storage method:	Hanging (front or rear).
Cable traction:	Motorized with controlled speed.
Protection:	IP 56.
Distribution voltage:	Medium or low tensión.
Connectors:	Certified under standard IEC 80005-1 or IEC 80005-3.
Fibre optics:	4 multimode channels (available on request).
Distribution cable:	<ul style="list-style-type: none"> • Between 1 and 5 cables. • Section of up to 185 mm². • Up to seven signal wires. • All these parameters according to project requirements.
Distribution power:	0,5 MVA to 7,5 MVA
Auxiliary power:	5kW to 400V

Options

- Remote control radio
- Cable protection cage
- Extension of the cable length on the quay side to avoid the low voltage power junction box in the vicinity of the mast.
- Special paint or colours
- Collision prevention system
- Telescopic arm system
- Cable storage in rear or inner arm area
- They implement measures to prevent equipment submersion



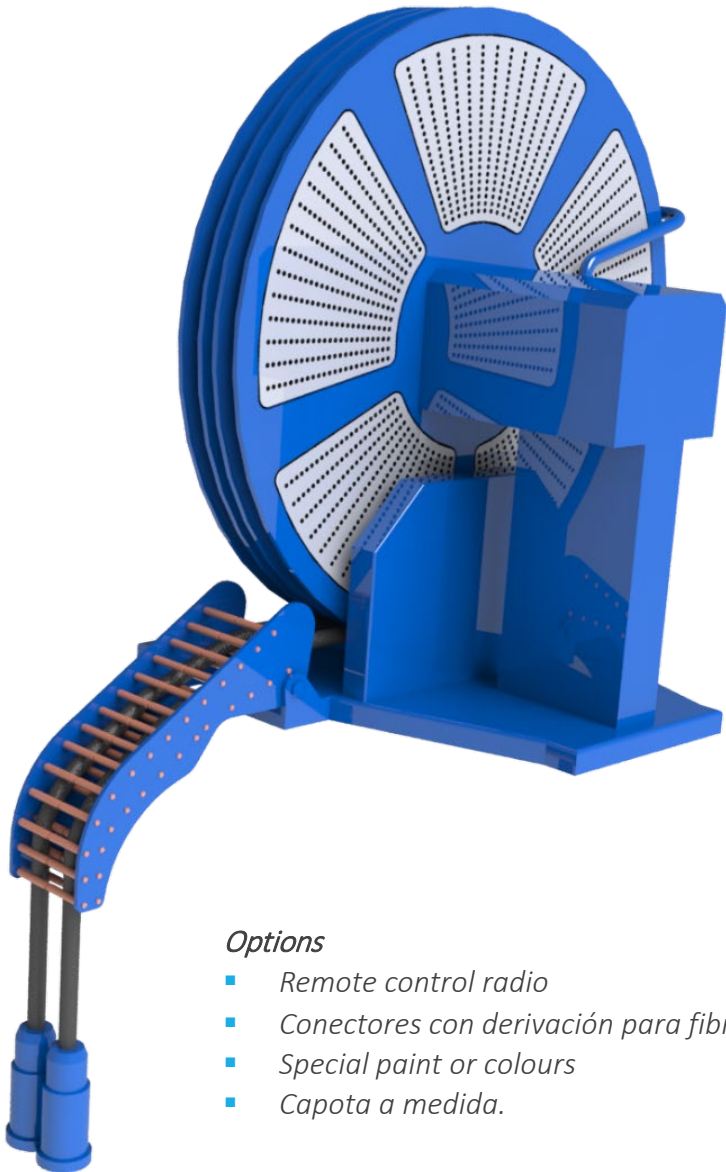
Telescopic Crane

Type of vessel:	Ro-Ro / Ro-Pax / Warships
Column height:	From 8 to 16 m
Angle of inclination:	From 0° to 75°
Rotation:	Up to 120°
Useful cable length:	Up to 50 m
Cable storage method:	Cable reel
Cable traction:	Motorized with controlled speed.
Protection:	IP 56
Distribution voltage:	Medium voltage
Connectors:	Certified under IEC 80005-1 standard
Fibre optics:	4 multimode channels (available on request).
Distribution cable:	<ul style="list-style-type: none"> • Between 1 and 2 cables • Section of up to 185 mm² • Up to seven signal wires. • All these parameters according to project requirements
Distribution power:	Up to 16 MVA
Auxiliary power:	30kW to 400V

Operations

- Remote control radio
- Special paint or colours
- Collision avoidance system and/or camera at the moving end for precise and safe manoeuvring.

Cable Reel for Ship



Options

- Remote control radio
- Conectores con derivación para fibra óptica
- Special paint or colours
- Capota a medida.

- Weather-resistant enclosure.

Type of vessel:	Container ship
Cable storage method:	Cable reel
Drum:	Mono-spiral (1,2 or 3 cables)
Collector:	<ul style="list-style-type: none">• Power rings• Ground ring• Ring group for pilot lights in LV• FO (available on request)
Cable length:	Up to 75m
Cable guide:	Multiple rollers
Protection:	IP 56
Distribution voltage:	Medium voltage/low voltage
Connectors:	Certified under IEC 80005-1 standard
Distribution cable:	<ul style="list-style-type: none">• Between 1 and 3 cables• Section up to 185 mm²
Distribution power:	Up to 1 MVA (LV) or 7.5 MVA (MV)
Auxiliary power:	10kW a 400V

Mobile Shore Cable Reel



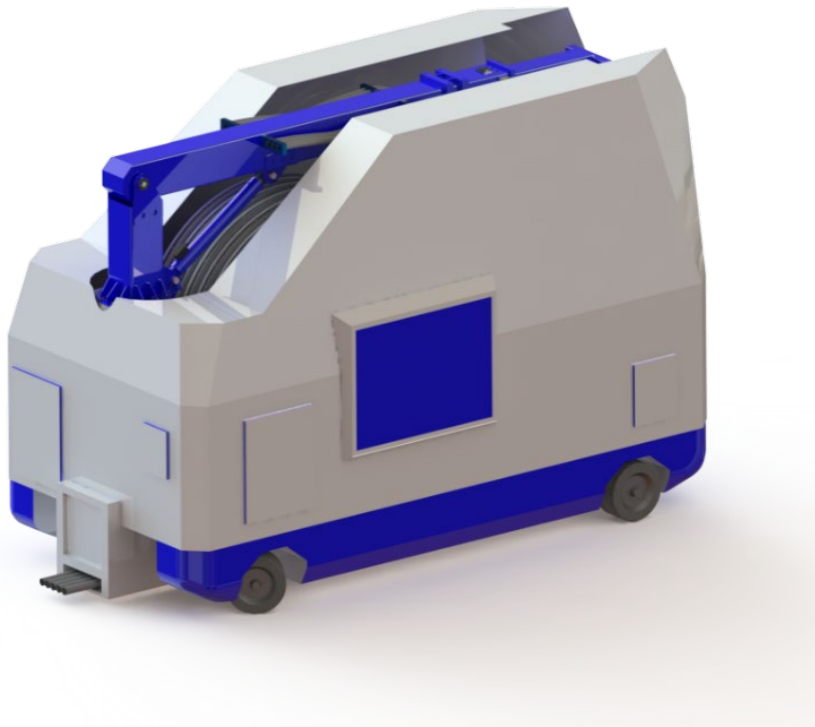
Type of vessel:	Cargo / Dry dock / Container ship
Cable storage method:	Cable reel
Drum:	Multi-spiral / Mono-spiral (1, 2 or 3 cables)
Collector:	Available on request
Cable length:	Up to 70m
Cable guide:	
Protection:	IP 56
Distribution voltage:	Medium voltage/low voltage
Connectors:	Certified under IEC 80005-1 standard
Distribution cable:	<ul style="list-style-type: none">• Between 1 and 3 cables• Section up to 185 mm²
Distribution power:	Up to 1 MVA (LV) or 7.5 MVA (MV)
Auxiliary power:	10kW

Options

- Battery-powered self-propelled unit
- Remote control radio
- Special paint or colours
- Collision avoidance system and/or camera at the moving end for precise and safe manoeuvring.

- Automatic Guidance System

Mobile Cable Reel with Articulated Arm



Type of vessel:	Cruise ships / Ferries
Cable storage method:	Cable reel
Ground-side drum:	Mono-spiral (1,2,3,4 or 5 cables)
Ground-side collector:	<ul style="list-style-type: none"> • Power rings • Ground ring • Ring group for pilot lights in LV • FO (available on request)
Ground-side cable length:	Up to 70m
Arm reach:	Design on requirement
Protection:	IP 56
Distribution voltage:	Medium voltage/low voltage
Connectors:	Certified under IEC 80005-1 standard
Distribution cable:	<ul style="list-style-type: none"> • Between 1 and 5 cables • Section up to 185 mm²
Distribution power:	Up to 1 MVA (LV) o 20 MVA (MV)
Auxiliary power:	20kW to 400V
Battery system for traction	<ul style="list-style-type: none"> • Onboard charger • Autonomy according to requirements

Options

- Remote control radio
- Cable protection cage
- Extension of the cable length on the quay side to avoid the low voltage power junction box in the vicinity of the mast
- Special paint or colours
- Collision prevention system
- Telescopic arm system
- Cable storage in rear or inner arm area
- They implement measures to prevent equipment submersion

Questionnaire



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Onshore Power Supply (OPS) Mobile Cable Management Unit (MCMS)

Essential questionnaire for quotation

Company:

Contact person:

Address:

Postal code/city:

Telephone:

Email:

Project details

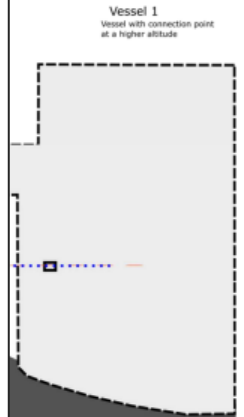
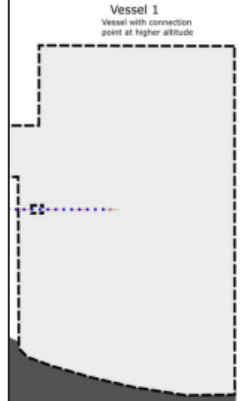
- | | | |
|----|--|----------------|
| 1 | Type of vessel | |
| 2 | Required quantity of Mobile Cable Management Units (MCMS) | units |
| 3 | Distance between the edge of the quay and the MCMS (figure 1) | mm |
| 4 | Distance between the edge of the quay and the MCMS (figure 1) | mm |
| 5 | Maximum distance between the edge of the quay and the ship (figure 1) | mm |
| 6 | Distance between the hatch and the onboard connectors (figure 1) | mm |
| 7 | High tide, maximum height of the connection hatch, measured between the centre of the hatch and the quay (vessel 1) (figure 2) | mm |
| 8 | High tide, maximum height of the connection hatch, measured between the centre of the hatch and the quay (vessel 2) (figure 2) | mm |
| 9 | Low tide, minimum height of the connection hatch, measured between the centre of the hatch and the quay (vessel 1) (figure 3) ¹ | mm |
| 10 | Low tide, minimum height of the connection hatch, measured between the centre of the hatch and the quay (vessel 2) (figure 3) ¹ | mm |
| 11 | Hatch dimensions (width x length) mm | (x)mm |
| 12 | Ambient temperature (min - max) °C | (-) °C |

¹ If the hatch is below the surface of the quay, use the negative sign and indicate the maximum spacing between surface and centre of the hatch

	kVA/	A
y)	V/	Hz
	kVA /	A
ncia)	V/	Hz
		V

yes no

Connected Autonomus





TEC[®]
SHORE POWER



TEC
CONTAINER
Asia Pacific

Thanks

ANY QUESTIONS?

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