

Ports & Maritime

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Who works with us:

- ABB
- APMT
- Cargotec
- DP World
- Konecranes
- MSC
- Narvik
- Norled
- Port of Hong Kong
- Port of Los Angeles
- Port of Long Beach
- Port of Shanghai
- PSA
- Schneider Electric
- TIL
- Transnet National Ports Authority (TNPA)
- ZPMC



About Cavotec

Cavotec is a leading cleantech company that designs and delivers connection and electrification solutions to enable the decarbonization of ports and industrial applications. Backed by more than 40 years of experience, our systems ensure safe, efficient and sustainable operations for a wide variety of customers and applications worldwide.

Ports & Maritime

Electrification and automation from berthing to shipping.

Cavotec develops and manufactures innovative automation and electrification technologies for the global ports and maritime sectors.

We continually innovate and develop our technologies to ensure that we deliver the levels of operational performance, safety and sustainability that our customers demand at all types of ports and terminals.

Cavotec is the global leader in automated mooring, shore power, crane electrification, connection and charging systems.

Industry & Mining

Connecting, powering and controlling industry and mining equipment.

Cavotec develops technologies that drive productivity and contribute to customers' operational efficiency. We improve existing systems, and bring new technologies to the market to meet the cost and operational challenges our customers face. We support customers in a wide variety of industrial sectors, such as cranes, energy, processing and transportation, surface and underground mining, and tunnelling.

Our solutions for the Industry & Mining sector include motorised cable and hose reels, Human Operator Interface (HOI) systems, Radio Remote Controls (RRC), power connectors, slip rings and spring driven cables and hose reels.



MoorMaster® Automated Mooring

MoorMaster® is a vacuum-based automated mooring technology that eliminates the need for conventional mooring lines. Remote controlled vacuum pads recessed in, or mounted on the quayside or pontoons, moor and release vessels in seconds.

MoorMaster dramatically improves safety and operational efficiency, optimises the ship-to-shore interface, and in many cases enables ports to make infrastructure savings. The technology helps ports boost their revenue and lets shipping lines save time and fuel.

Thanks to its modular design and vacuum pads that attach to any flat surface, MoorMaster is used with a wide variety of vessels and applications, irrespective of vessel size and design. MoorMaster systems are used to moor ferries as well as 400m container ships and bulk carriers of more than 300m.



Benefits

Mooring in less than 30 seconds

- Faster turn-around times and more ship calls result in improved productivity
- Reduced energy consumption and emissions from tugs and vessel thrusters
- Reduced cruising speeds result in reduced energy consumption
- More than 90% reduction in emissions during ship berthing due to reduced use of tugs and ship engines
- Fast and simple connection to shore power
- Reduced erosion of seabed driving cost savings

Mooring at the push of a button by one remote operator

- Frees up resources such as tugs and hands-on crews
- Reduces risk of mooring accidents as personnel are removed from hazardous working areas
- Mooring can be undertaken from any location, thereby reducing reliance on personnel present at the berth

Vessel overhang

- No infrastructure investment needed to berth larger vessels since MoorMaster only needs to attach to the parallel sideboard of the vessel
- Quay length can be "virtually" extended as vessels' bows can overhang the end of the quay
- Any vessel can use the berth, even vessels that are longer than the berth

Reduced vessel motion due to advanced control system

- Increased productivity for ship loading/unloading operations
- Improved pier utilisation due to closer vessel spacing
- Real-time monitoring of mooring processes and forces
- Superior vessel control due to patent protected Active Control technology
- MoorMaster can potentially reduce breakwater extension requirements



“

I was a captain of a container ship, and frequently moored my vessel at the Port of Salalah using Cavotec MoorMaster. Despite challenging berthing conditions due to long waves, Cavotec MoorMaster makes mooring safe, easy, and fast.

Capt. Vasileios Velmachos
COSTAMARE

Applications

Two decades after the first MoorMaster system entered service, this unique technology remains the only widely used vacuum mooring technology on the market. Over the years, Cavotec has developed MoorMaster systems for a wide range of applications and customer requirements.



Container

MoorMaster closes the technological gap between container ships and today's highly automated facilities, and is increasingly seen as part of fully automated port design.

MoorMaster secures vessels up to and including Super Post-Panamax vessels with a capacity of more than 20,000 TEUs in a matter of seconds, enabling loading operations to begin more quickly and reducing vessel motion, thereby increasing crane moves per hour.



Ro/Pax and Ro/Ro

Cavotec has supplied MoorMaster to a wide variety of Ro/Ro and ferry applications that reduce mooring times, thereby allowing more time for passenger and vehicle boarding and disembarking, or lower cruising speeds. Shorter mooring times reduce fuel consumption as well as air pollution and noise at terminals, which are often located close to city centres.



Electric vessels

In close co-operation with customers, Cavotec has led the development of innovative solutions for e-vessels since 2014. Today, our automated mooring and charging solutions are used at more than 60 sites.

MoorMaster keeps vessels in position for safe charging and allows thrusters to be shut off, drastically reducing energy consumption.



Bulk

MoorMaster has been in operation at major bulk terminals in Australia and Europe for more than a decade. The technology improves safety and productivity, while reducing the need for infrastructure investment.

MoorMaster also contributes to improved efficiency in the oil and gas sector by providing innovative systems that safely moor LNG and tanker vessels, thereby making loading and offloading operations faster and safer.



Locks

MoorMaster hands-free mooring is revolutionizing the operation of locks: shortening lockage time, eliminating dangerous rope-handling activities, increasing safety, and enabling greater vessel throughput.

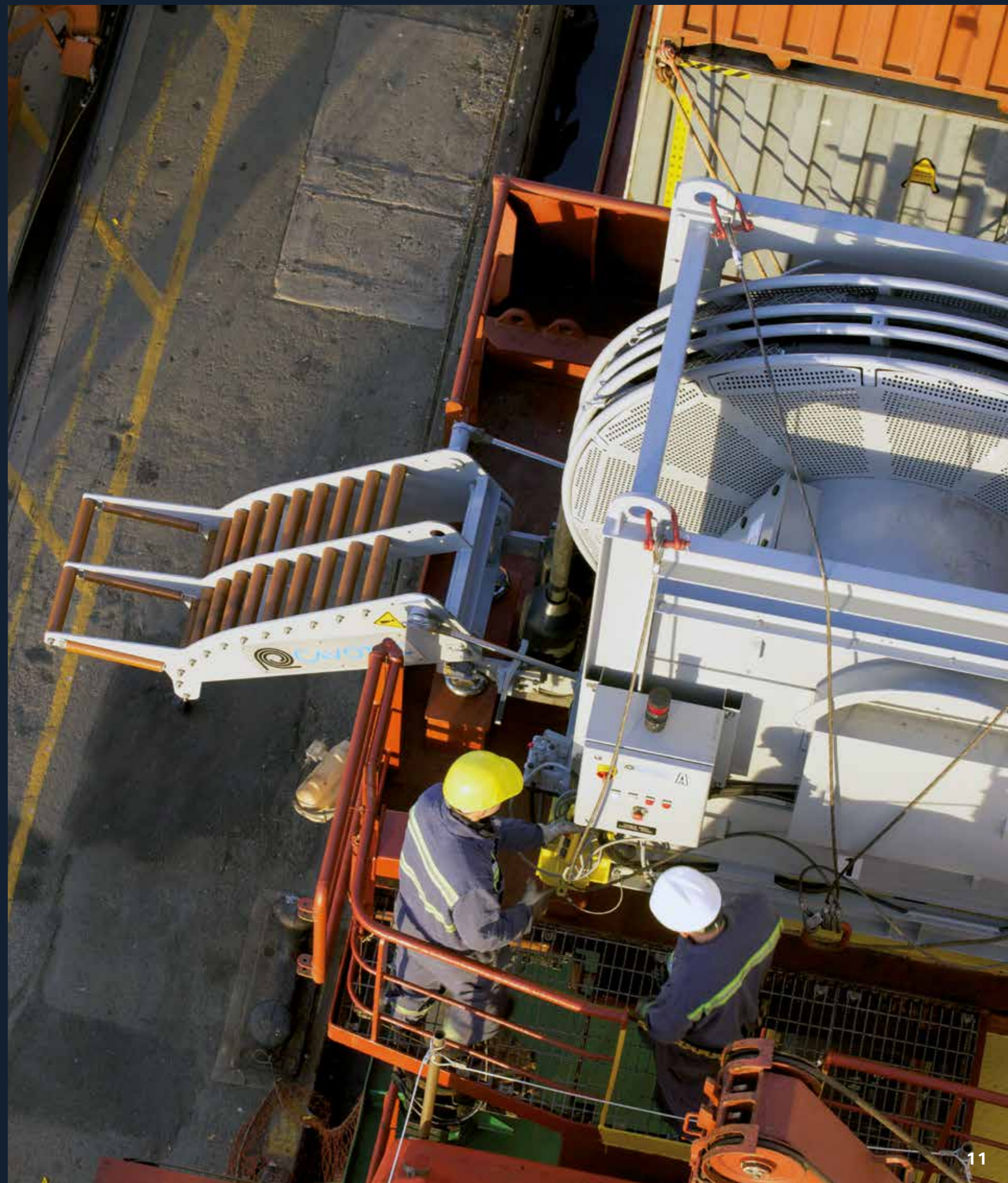
At some 13 locks to date, MoorMaster systems are mounted on vertical rails inside lock chamber walls to secure ships during the lockage process as they are raised or lowered while keeping them at a fixed distance from the lock wall.

ShorePower Systems

Shore power technologies, also called cold ironing or Alternative Maritime Power (AMP), enable the connection of ships in port to shore side electricity to power on board services. This enables ships' diesel generators to be switched off, thereby reducing noise and emissions, (such as particulate matter, nitrogen oxides, sulphur oxides, carbon oxides, and volatile organic compounds).

Since 2012, an international standard on shore power has been in place to ensure worldwide compatibility between ports and vessels. Shore connection is included in California's CARB regulations, which require 80 per cent of vessels' power to come from shore power by 2020. EU Directive 2014/94/ EU on the Deployment of Alternative Fuel Infrastructure requires European ports to progressively equip berths with shore power connection technologies, and for all ports, with certain exceptions, to be shore power-ready by 2025.

Cavotec advanced shore power systems are integrated into the heart of some of the busiest and most dynamic ports in the world, helping to drive the prosperity of local economies, improve local air quality and facilitate the shift towards a more sustainable future. With some 40 years' experience of designing, manufacturing and installing shore power Cable Management Systems, Cavotec now supports ports and shipping lines through the entire shore power journey.



ShorePower for passenger terminals

ShorePower for Ro/Ro and ferry applications

According to the international shore connection standard, shore power cables for Ro/Ro and passenger vessels must be connected from the shore to the ship, rather than using on board systems.

PowerRange

- 30 seconds to connect and disconnect
- High operational flexibility and safety with telescopic boom, operated with radio remote control system
- Able to connect vessels' different hatch positions
- Adjusts to tidal, weather conditions
- Highly accurate hatch connection

PowerReach

- 30 seconds to connect and disconnect
- No onshore personnel requirement
Fully radio remote controlled from on board ship



ShorePower for cruise ports

As per international standard (ISO/IEC/IEEC 80005-1), cruise vessels must be connected to an electrical supply from the shore, at either 6.6kV or 11kV up to 20MVA.

PowerMove

PowerMove is a mobile shore power system that connects cruise vessels to shore power quickly and safely. It offers the following benefits:

- Reliability: proven technology with a large number of units successfully operating for many years at cruise terminals worldwide
- Limited civil works costs: this above ground solution does not require the digging of trenches along the quayside
- High operational flexibility along the berth: accommodating a wide range of vessels, regardless of connection point location
- Easy storage: when not in use, PowerMove can be moved from the quayside and parked elsewhere



Our shore power solutions are taking the shipping industry to a new level of energy efficiency, while ensuring compliance with the strictest emissions regulations. We provide state-of-the-art technologies for both existing ships, and new-build container and bulk vessels.

Over 650 container vessels and 40 container terminals globally are equipped with Cavotec shore power technologies. All our systems comply with IEC/ISO/IEEE 80005-1 standard, ensuring full vessel compatibility while berthing in ports around the world.

Ship Retrofit solutions

Cavotec solutions keep older ships fit for the future and help to minimise their environmental footprint while berthing in ports.

Since the 1980s, we have partnered with shipping lines to define retrofitting plans and onboard power supply solutions to meet their fleets' operational challenges and technical requirements.

The value of our work goes beyond technology, it includes a total systems approach to support customers up to and including the first electrical connection of the vessel to onshore power supply in port.



ShorePower for new-build vessels

We work closely with shipyards to provide Cable Management Systems for shore power. Our broad range of PowerAMPReel solutions fit all the needs of future bulk and container vessels, with products providing different power levels, cable lengths, installation options (solutions can be skid mounted or welded onto the ship) and the option to include weather-proof enclosures.

ShorePower for container terminals

Limited available space at berth is a key concern at container terminals, so Cavotec shore power solutions are designed to allow full flexibility while minimising interference with regular container port operations and equipment, such as Ship-To-Shore cranes, bollards and mooring ropes.

PowerWrap

PowerWrap is the ShorePower pit installed on the quayside to power on board shore power cable management systems. PowerWrap offers the following advantages:

- Minimum footprint
- Minimum CAPEX and civil works
- Easy operations and maintenance access

PowerExtend

PowerExtend offers the flexibility to move the point of ShorePower connection away from crane operations, or ensure safe connection even if a vessel's power cables are unaligned with a shore power unit.



Shore power for e-vessels

Cavotec is proud to be part of the journey towards autonomous vessels and a zero emission shipping industry. Cavotec's solutions are already connecting and charging e-vessels in over 30 ports around the world.

Cavotec has developed a broad range of innovative onshore power supply solutions for charging e-vessels, from manual to fully automated connection systems. Our ShorePower Next Generation (NxG) solutions for e-vessels come with modern designs that blend seamlessly in to port and public environments.



PowerAdaptNxG

PowerAdaptNxG is a counterweight solution, allowing automatic connection with charging point on the vessel bow.

Benefits:

- Fast, safe and automatic connection to maximize the charging capacity during off- and on-loading the vessels
- Reduced footprint on shore and on ship side
- Increased operating ampacity
- Compatible with MoorMaster® automated mooring solution



PowerRampNxG

PowerRampNxG is a ramp-based solution, placed directly on link span/car ramp to intrinsically take up tidal variations.

Benefits:

- Fast, safe and automatic connection to maximize the charging capacity during off- and on-loading the vessels
- No installation on the quay
- Compatible with MoorMaster® automated mooring solution



PowerReach and PowerReachNxG

PowerReach is a jib-crane solution for connecting vessels manually.

Benefits:

- Quick and accurate access to ship connection points
- Minimal quay side footprint
- Safe and easy to operate thanks to Cavotec Radio Remote Control and status monitoring systems.



Electrification of mobile equipment

As national and international legislative requirements on environmental standards in ports continue to be tightened, the industry has been intensifying efforts to operate more efficiently and more sustainably. The electrification of cranes and other mobile equipment is a major step towards this goal.

Cavotec supports customers with the design of advanced electrification systems that maximise asset utilisation.

We design and manufacture motorised cable reels, Panzerbelt cable protection systems and power connectors according to specific technical requirements and environmental conditions.

Cavotec has also developed manual and automated systems for the safe and efficient connection of Electrified Rubber Tyred Gantry cranes (E-RTG) and Automatic Stacking Cranes (ASC) to power grids. Other applications include automatic plug-in systems for electrical and hybrid heavy duty vehicles, trucks and Automated Guided Vehicles (AGV).



Cavotec's extensive experience and comprehensive range of innovative technologies help customers to connect and electrify STS, RTG, ASC, RMG and mobile harbour cranes, thereby improving efficiency and reducing environmental impact.

Motorised cable reels

Cavotec manufactures motorised cable reels for horizontal, vertical, continuous and intermittent use for ship-to-shore (STS) cranes, automatic stacking cranes, (ASC), rail-mounted gantry, (RMG), E-RTG, and other ship loaders.

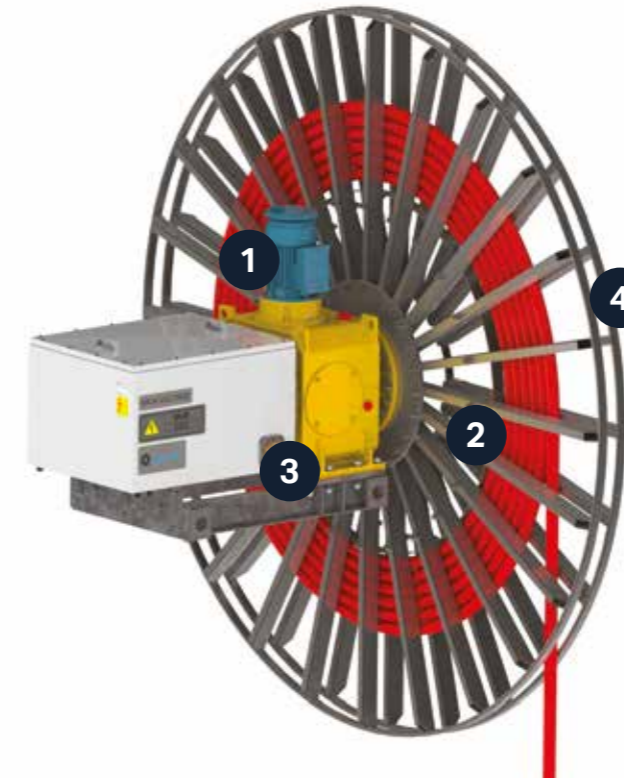
Intermittent use

Our hydrodynamic system is recommended for intermittent use applications. Key features of this system include compact design, constant torque output in reeling and unreeling mode, standard motor and low maintenance. Normal torque outputs are 10-700 daNm with speeds ranging from 10 to 60 m/min.

Continuous use

For continuous use applications, we recommend our T-series gearboxes. These can be used with several drive systems and fitted with different drums such as monospiral, random lay and parallel lay.

We recommend our Torque Motor units for small reels and slow speed applications (5-40 daNm and 0-60 m/min), while our Cavotec Reel Control (CRC) is best suited for larger reels (torque output 40-1200 daNm).



1. Motor (with drive)

Standard squirrel cage or torque motors, according to IEC Norms. Hydrodynamic cable reels can be supplied with a pneumatic or hydraulic motor

2. Gearbox or Torque Unit

Seven gearboxes and eight torque units are available with variable output torque from 10-1200 daNm

3. Collector

Standard sizes of collectors are available for power and signals. Current ratings vary from 10 to 2400Amp, voltages up to 30kV. We also manufacture customised collectors exceeding the above parameters

4. Drum

The drums are composed of standard elements and can easily be adjusted to required widths. Standard drum diameters range from 300mm to 8700mm



Cable Reel Control (CRC)

The CRC system achieves precise speed and torque control of standard maintenance-free squirrel cage motors. A torque limiter between motor and gearbox is not needed.

CRC offers an almost constant pull on the cable. In fact, by following the torque reference signal computed on the basis of reeling variables – such as cable weight, reeled cable on the drum, acceleration or deceleration of the crane, position on the track – the CRC minimises the pulling force on the cable.

Cavotec has also chosen to use oversized, not force ventilated, motors for reliability and for simplicity in system layout. The result is a longer cable life and improved reliability of the cable reel system.

KP brushes

Standstill slip ring applications often require a high degree of de-rating of existing capacity of conventional carbon brush gears. Increasing the physical size of brushes is not always a solution, since the actual contact area does not increase proportionally.

Cavotec has overcome this problem by developing a multi-contact brush gear, which has substantially increased capacity. This is achieved by the separation of the brush into many independent sections ensuring a larger effective contact area.

Fibre optic rotary accumulator

Optical signals are increasingly used in ports and terminals, where composite cables with fibreoptic bundles are common.

To meet these demands, Cavotec has developed a fibre-optic rotary accumulator. Thanks to its innovative design, this unit can also be used as a stand-alone rotary accumulator if the reel is equipped only with fibre-optic cable.

The rotary accumulator guarantees a dimming of less than 3dB, including any bilateral connection. The connection is made on either side via plug connectors in the fixed and rotating terminal boxes.

Cable guides

Engineered to the highest standards, Cavotec cable guides extend the service life of cables and ensure safe, continuous operations. Several features can be adapted to optimise cable guidance depending on the requirements of specific applications.

Key features of our cable guides include:

- Cable tension devices featuring mechanical switches or contactless sensors
- Pendulums fitted with sensors to identify cable position in a cable guide to ensure tight loop control of cable tension
- Rollers available in a variety of materials, including plastic, cast iron and hardened steel



Panzerbelt

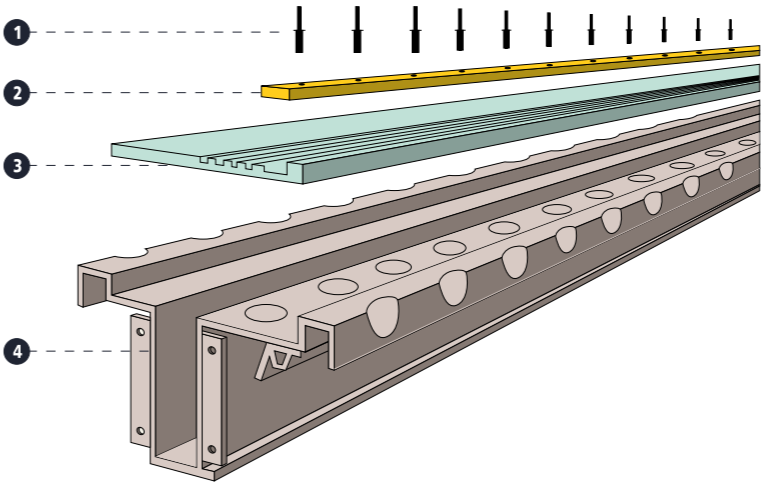
Panzerbelt is a cable protection system incorporating a continuous semi-flexible belt, fabricated from rubber with inlaid steel reinforcement, which lies over a channel cast in the quay.

The belt is riveted to the quay surface along one edge, while the other remains free to be raised by a cable guide and belt-lifting device fitted to the crane. Steel reinforcement has been incorporated to retain directional strength and flexibility of the belt.

Panzerbelt extends the lifetime of crane cables, and reduces downtime of cranes. It improves operational efficiency, and improves berth safety.

Panzerbelt offers several advantages over conventional systems, including:

- Full cable protection
- Optimal operational safety
- Low installation cost
- Cleaner channels, reduced obstructions
- Wide operational capacities
- Improved crane speeds
- Wide alignment tolerances
- Readily integrated with existing systems



The main components of the Panzerbelt system are:

1. Stainless steel rivets
2. Pre-drilled fixing strip
3. Panzerbelt steel reinforced rubber cover
4. Stainless steel channel profile



RTG electrification

Cavotec has developed a wide range of RTG electrification technologies: from conventional manual connection, to front-end automated technologies. Our solutions can be integrated on new E-RTG/A-RTG or RTG retrofits. Our engineering and local project management capabilities make Cavotec the ideal partner for turnkey RTG retrofits.



AUTOMATED CONNECTION – Automatic Plug-In System (APS)

APS automatically connects and disconnects E-RTGs to electrical power. It is the world's first cable connection system that allows cranes fitted with cable reels to automatically connect to an electrical power source. APS can be used in low or medium voltage applications, and includes fibre optic connectivity. It offers the following benefits:

- Reduced CAPEX: limited yard modification and easy integration with existing equipment, requiring limited civil works
- Low OPEX: automation backed by the high reliability and low maintenance cost of cable reel technology
- Improved productivity due to higher throughput
- Fibre optic ensuring reliable high data volume transmission and system redundancy
- Safer operations: unmanned connection

MANUAL CONNECTION – Power Units and Double Anchor Openable system (DACO)

Manual connection is ideal for terminals with a low number of daily relocations of the RTGs between different blocks. DACO speeds the connection and disconnection sequence ensuring rapid anchoring operations and provides the following benefits:

Improved efficiency

- Fast manual connection/disconnection of E-RTG, with Cavotec power units and junction boxes

Safe, easy handling

- Easy lift function - with counterweight opening mechanism - allows for single operator operation
- No underground electrical cable connection ensuring improved system reliability
- Drum system to ensure optimal positioning and alignment of cables during operations, and reduced mechanical stress on cables

Power units

Cavotec has developed a standard range of power units, made with 2mm stainless steel plate, for ports and terminal applications.

These include outlet panels for 150A to 630A, with a voltage range of 380V to 12kV. Low Voltage power units are equipped with molded case circuit breakers interlocked via pilot contacts.

E-RTG battery package

To meet growing hybrid cargo handling equipment demands, Cavotec has developed an AC/AC battery package that replaces E-RTG on-board auxiliary diesel engines. This enables disconnection from the grid and block changing during normal operations. This plug and play solution can be supplied in different energy ratings, up to 60kWh.



Other mobile equipment electrification

Our connection technologies are used to connect and charge a variety of other mobile equipment such as electric and hybrid vehicles, trucks and AGVs.

We provide manual and automatic connection systems that withstand challenging port environments, and ensure safe operations.

Manual connection

In-ground hatch and pop-up pits

Our hatch and pop-up pits system provide the following benefits:

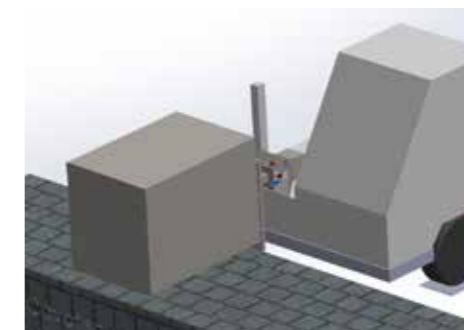
- Full protection of the system against damages and environmental conditions thanks to the possibility to close the pit, even in operation mode
- High flexibility: possibility to include multiple points of connection and sockets types, and to combined several utilities. Options available for sand proof design, EX environment and reinforced cover for vehicle passing over the pit
- High reliability: mechanical maintenance free system

Automatic connection

SPS charging stations

Cavotec's Smart Plug-in System (SPS) enables truck battery charging on the vehicle itself, without having to remove the battery pack.

- Safe automated charging
- Limited cost of charging station
- No extra battery pack required
- No extra vehicles required



Power connection and transmission

To support customers with fully integrated solutions for various applications including E-RTG, ASC and shore power, Cavotec manufactures a broad range of power connection and transmission technologies that ensure the fast and safe connection of mobile equipment to electrical power.

Cavotec works with customers worldwide to engineer and supply junction boxes and power units, integrating power connectors, plug and circuit breakers. Our range in this segment also includes flexible cables that are used in a large number of terminals worldwide.

Furthermore, to support the marine industry in developing more efficient propulsion systems, Cavotec has developed a set of slip rings offers.



Power units

Our comprehensive range of power units include:

- LV, up to 1100V, and MV Power connectors (3 Phases + PE + pilots), up to 25kV
- Multi-pin outlets for control cables have up to 50 pins and up to 40 Amp
- Two different operating systems available: Push & Pull and Screw Ring
- Options for higher amperage, mechanical interlocking and fibre optics.
- Pilot pin mechanism for electrical interlockin ensures safe operation
- Available auxiliary contacts or FO connector ensure reliable communication

Key benefits:

- Easy connection and disconnection due to Multi-Way lamellar contact technology that optimises contact between the male pin and female contact
- Safe operations due to interlocking pilots ensuring that disconnection under load is not possible
- IP66 connector protection

Flexible cables

Cavotec supplies a wide range of flexible cables from standard to highly advanced power and signal cables.

On request, cables are supplied terminated with lugs or connectors, (MV and LV) for easier application. Spreader and festooning cables are also available.



Marine slip ring systems

Cavotec has extensive experience of slip ring systems for marine propulsion and data transmission including:

- Data, controls and power phase tensions of up to 6 kV
- Slip ring design range from mA data and signals to 6000Amp power phase currents
- Hydraulic swivel joint design range from low pressure pneumatic or hydraulics to 350 Bar pressure

Cavotec slip rings provide the following benefits:

- All in one, complete slip ring with hydraulic joint and auxiliary equipment, supplied in one easily mounted unit
- Simple installation using standard mechanical, electric and pipe interfaces
- Carefully designed bus-bar system with symmetric current flow and multi contact point carbon brush system
- Self-cleaning ring and brush system
- Basic design test at resonance frequencies of up to 2G and at shock loads of up to 5G
- Low maintenance with easy and fast replacement of rings and brushes if required
- Customised design
- Client-specific auxiliary equipment available, for example: steering feedback, control and support equipment



Human Operator Interface (HOI)

To support automation in ports, Cavotec has developed a comprehensive range of wireless radio remote controls, tablets, video systems, screens, control chairs and joysticks. These advanced HOI systems enable remote-controlled, tele-operations and semi-autonomous operations.

Cavotec's HOI technologies offer the ports and maritime sector a number of benefits, including:

- Greater efficiency and safer working conditions by removing operators from hazardous areas
- Improved productivity due to safer and faster movement of materials
- Real-time process monitoring, and data storage, on remote displays and in control rooms



Radio Remote Controls

Cavotec RRC comply with all relevant international standards, including IEC 61508, (SIL3) and EN13849, (Cat3 Pl d and Ple). Our RRC are available in a wide variety of terminal designs and receiver options, ranging from hand-held solutions, to full belly packs with colour display screens and receivers that work as a stand-alone mini plc through to fully plc integrated solutions.

Visualisation devices

Our RRC units are readily integrated with rugged screens and cameras. These are sealed to IP66, and are fully HD1080P-compliant.



After-sales service

Cavotec's Services helps customers to maximise the availability of their assets, reduce operating costs and extend equipment lifespan.

With 85 service experts and more than 80 countries served, Cavotec supports customers with a range of service offerings, including:

- inspection, training and preventive maintenance
- spare parts
- repair and replacement
- equipment renovation and upgrades

Furthermore, four service level agreements have been developed to support the maintenance of the 24,000 Cavotec units currently in service worldwide:

- Cavotec Care
- Cavotec Care Enhanced
- Cavotec Care Enhanced Plus
- Total Cavotec Care



References

Ports and terminal operators:

Port of Antwerp
 APM Terminals
 Port of Bergen
 Port of Buenos Aires
 Port of Busan
 Port of Chennai
 Contship/Eurokay
 DP World
 Port of Dubai
 Port of El Callao
 Port of Everglades
 Port of Felixstowe
 Port of Gioia Tauro
 Port of Gothenburg
 Port of Guangzhou
 Port of Hamburg
 Port of Helsinki
 Port of Ho Chi Minh
 Port of Hong Kong
 Port of Long Beach
 Port of Los Angeles
 Port of Manzanillo
 Port of Marseille
 Port of Miami
 Port of Mumbai

Port of Ningbo
 Port of Piraeus
 PSA
 Port of Qingdao
 Port of Rotterdam
 Port of Salalah
 Port of San Antonio
 Port of Santos
 Port of Singapore
 Port of Shanghai
 Port of Shenzhen
 Port of St Laurence
 Port of St Petersburg
 Port of Stockholm
 Port of Tianjin
 Port of Vancouver
 Port of Virginia
 TIL
 Transnet

Shipping lines:

APL
 BP
 China Shipping Lines
 CMA CGM
 Cosco
 Evergreen
 Hapag-Lloyd
 Italia Marittima
 Maersk Line
 Matson Shipping
 Mitsui
 MOL
 MSC
 Norled
 NYK
 Qatar Petroleum Co
 Stora Enso
 Yang Ming

Port and marine equipment manufacturers:

ABB
 Aker
 Cargotec
 Hyundai Heavy Industry
 Impsa
 Koch
 Konecranes
 MacGregor
 Mitsubishi Heavy Industry
 Noell
 Samsung
 Schneider Electric
 Seawell
 Siemens
 STX Shipyard
 Sumimoto
 Techint
 ZPMC

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