Alternative Maritime Power Supply

Manufactured by **Cavotec Specimas**

CAVOTEC

Alternative Maritime Power Supply

Who we are

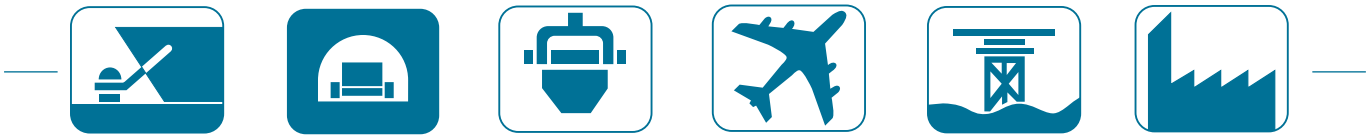
Cavotec is a multi-national group of companies serving the following industries: mining and tunnelling, ports and maritime, steel and aluminium, energy and offshore, airports, general industry and automation. In the early 1960's our main focus was the design and production of motorised cable reels primarily for manufacturers of tower cranes, harbour cranes and mining equipment. Today, Cavotec is connecting mobile equipment around the world in many diverse applications.

Where we are

The Cavotec Group consists of 7 manufacturing "Centres of Excellence" located in Canada, France, Germany, Italy, New Zealand, Norway and Sweden, and by 5 local manufacturing units located in Australia, China, Germany and the USA. For the distribution of products and providing support to customers Cavotec has 27 sales companies which, together with a network of distributors, serve more than 30 countries in five continents.
The ultimate objective is to be perceived as "local everywhere".

How we work

Our aim is to work closely with our customers in order to build long-term partnerships. To achieve this aim we have created a working environment that attracts the best people, encourages them to stay and brings out their best qualities. By producing totally reliable systems and backing them with efficient service, we strive to create true customer satisfaction.



Alternative Maritime Power Supply

Since the late 1960's we have designed and manufactured products and systems specifically for the port and maritime industries, with many becoming industry standards that are used all around the world. Today, some 30% of all ship-to-shore cranes in operation globally are equipped with our motorized cable reels, and more than 500 ports protect their crane power supply with our Panzerbelt cable protection system.

With all of our solutions - whether large or small - our goal is always to make ports safer and more efficient. This is why we are especially proud that dozens of port and ship operators enjoy the use of pollution-reducing, shore-based electricity while in port by utilizing our AMP (Alternative Maritime Power), powering their ships more efficiently and environmentally friendly than ever before.

Cavotec Group Organisation

As shown here the Cavotec Group is organised to support its customers around the world through its manufacturing units and sales companies.

Each Cavotec manufacturing company, no matter where it is located, aims at being a market leader in its field by providing innovative and reliable products to Group customers.

Each Cavotec sales company, in the 27 countries where they operate, aims at better serving its local market following the Group philosophy "to be local everywhere".

Manufacturing network

Centres of Excellence

France
Cavotec RMS
Spring Driven Reels

Germany
Cavotec Alfo
Spring Driven Reels
Slipring Columns

Cavotec Fladung
Aircraft Support Systems
Security Systems

Italy
Cavotec Specimas
Motorized Cable Reels
Panzerbelt Cable Protection
Slipring Columns

Norway
Cavotec Micro-control
Radio Remote Controls

Sweden
Cavotec Connectors
Electrical Plugs & Sockets

New Zealand
Cavotec MoorMaster
Automated Mooring Systems

Local Manufacturing

Australia
Cavotec Australia
Motorized Cable Reels

China
Cavotec China
Product Assembly

Germany
Cavotec Micro-control
Radio Remote Controls

Sweden
Cavotec Sweden
Product Assembly

USA
Cavotec USA
Product Assembly

Group Partners

Belgium
Gantry
Crane Rail Systems

Italy
Brevetti Stendalto
Cable Chains
Prysmian (Pirelli)
Flexible Cables
Tratos Cavi
Flexible Cables

Sales network

Cavotec Sales Companies

Cavotec Australia
Cavotec Belgium*
Cavotec BeNeLux
Cavotec Brazil*
Cavotec Canada
Cavotec Chile
Cavotec China
Cavotec Denmark
Cavotec Finland
Cavotec France
Cavotec Germany
Cavotec Hong Kong
Cavotec India
Cavotec Italy
Cavotec Korea
Cavotec Latin America
Cavotec Mexico
Cavotec Middle East
Cavotec Norway
Cavotec Russia*
Cavotec Singapore
Cavotec South Africa
Cavotec Sweden
Cavotec Turkey
Cavotec UK & Ireland
Cavotec USA

* Branch Office

AMP – challenges and solutions

The risks of pollution and sustained environmental damage in ports all over the world is becoming more and more an issue. During the last 15 years increasing attention has been paid on how to reduce pollution coming from the auxiliary diesel engines of ships which traffic, in ever increasing numbers, the ports and terminals around the world. These ships keep their auxiliary engines running when moored to ensure a continued power supply for essential services.

To provide a solution the Cavotec Group has designed two different alternatives. The first alternative is to mount the cable management system on the ship or shore. The connection to shore is made via special high voltage cables to an integrated technical pit fitted into the quay. Thanks to its design, this technical pit occupies a minimum of space. The ship based cable management system consists of the following components: electrical connectors (up to 12 kV), flexible cables, slipring, optical fibre accumulator, motor reducer, cable drum, electrical control panel and a retractable hydraulic cable guide.

The second alternative is to have a similar system fitted inside a standard-size container. This container can then be placed on the ship either in front or behind the ships' accomodation area. As the whole system is placed inside a container, and therefore completely modular, it can either remain in a fixed position for longer periods or it can be moved according to shipping routes.

Technical solutions

SHORE BASED POWER SUPPLY SYSTEM

- Mobile AMP System 6,6kV (shore) – 6,6kV (ship)
- Fixed AMP System 6,6kV (shore) – 6,6kV (ship)
- Barge-mounted AMP system 6,6kV (shore) – 440V (ship)

SHIP BASED POWER SUPPLY SYSTEM

- Fixed AMP system – On Ship – 6,6kV (shore) – 6,6kV/450V (ship)
- Semi-fixed system 6,6 kV (shore) to 440 V (ship)

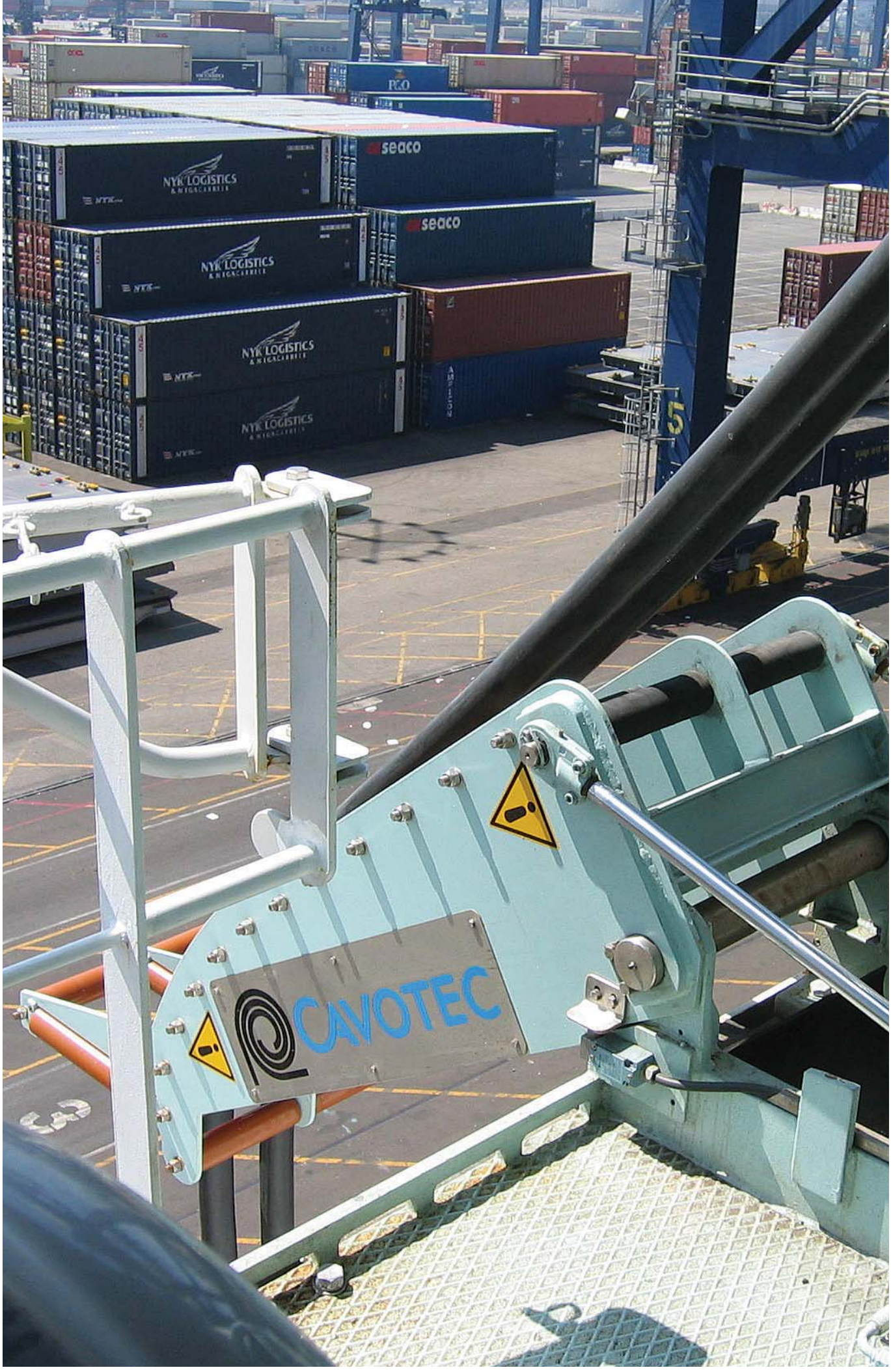
INTEGRATED TECHNICAL PIT

- Stainless steel housing (IP66)
- Electrical connectors up to 12kV, fitted with safety features such as pilots and interlocks
- Optical fibre connectors

References

Customer	Country
Royal Navy	UK
Devenport	UK
Port of Los Angeles	USA
Swedish Navy	Sweden
Qatar Petroleum Co	Qatar
Kuwait oil Co	Kuwait
Finnlines	Finland
Halil cement Co	Kuwait
Stockholm Port	Sweden
Gothenburg Harbour	Denmark
Odense Harbour	Denmark
Wudam Navy base	Oman
Evergreen	Taiwan
Stora Enso	Finland
Malmö Port	Sweden
Kirkness	Norway
Limhamms Port	Sweden
Rönneport	Denmark

Customer	Country
Grisslehamn	Sweden
Helsinki Port	Finland
Finnish navy	Finland
Helsinborg Port	Sweden
Karlskrona Port	Sweden
U.S. Coast Guard	USA
NYK	Japan
China Shipping Lines	China
P&O Nedlloyd	Netherlands
Petor Doeble	Germany
Port of Long Beach	USA
MSC	Switzerland
Yang Ming	Taiwan
MOL	Japan
Italia Marittima	Italy
BP	UK
Stora Enso	Finland


NYK LOGISTICS
seaco
CAVOTEC

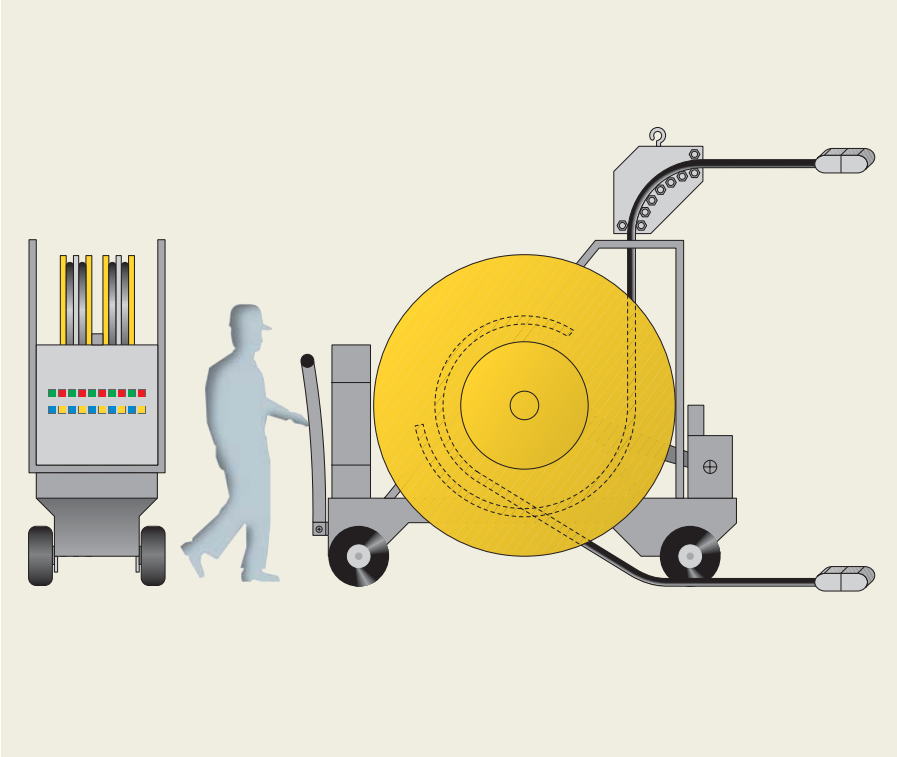
Shore-based power supply

Fixed or mobile AMP system 6,6kV (shore) – 6,6kV (ship)

A unique feature of this AMP unit is its relative small size, making it an interesting option for installations where there is restricted space. Of course the fixed installation does not provide the flexibility of the mobile AMP system as it becomes an integrated part of the quay and cannot be moved after installation.

The mobile AMP system's main advantage is the flexibility it provides. When a ship comes into port it can be deployed and activated immediately. Once it is no longer needed it can either be stored or used at another berth.

The fixed AMP system consists of:
- heavy-duty drums
- special flexible cables
- electrical control panel
- Cavotec Connectors (up to 12kV)
- special slipring assembly
- motor-reducer
- telescopic lifting arm (optional)



The mobile AMP system consists of:
- self-propelled Cavotec Power Caddy
- special flexible rubber cables
- Cavotec Connectors (up to 12kV)
- motor-reducer
- electrical control panel
- special slipring assembly
- twin heavy-duty drums
- telescopic lifting arm (optional)

Barge-mounted AMP system 6,6kV (shore) – 440V (ship)

A third alternative in the shore-based AMP systems range is to install the cable management system and other electrical equipment on a barge. This solution has been specifically designed to accommodate AMP supply to ships that cannot approach the quay in close. Traditional power supply systems do not allow for this but by using the barge-mounted solution, the AMP system can approach the ship and provide a continuous 440V power supply. This type of system is operating succesfully at the Port of Los Angeles, USA.

The barge-mounted AMP system consists of:
- specially designed cable drums
- Cavotec electrical connectors (< 12kV)
- slipring assemblies
- motor-reducer
- optical fibre accumulator
- step-down transformer
- electrical control panel

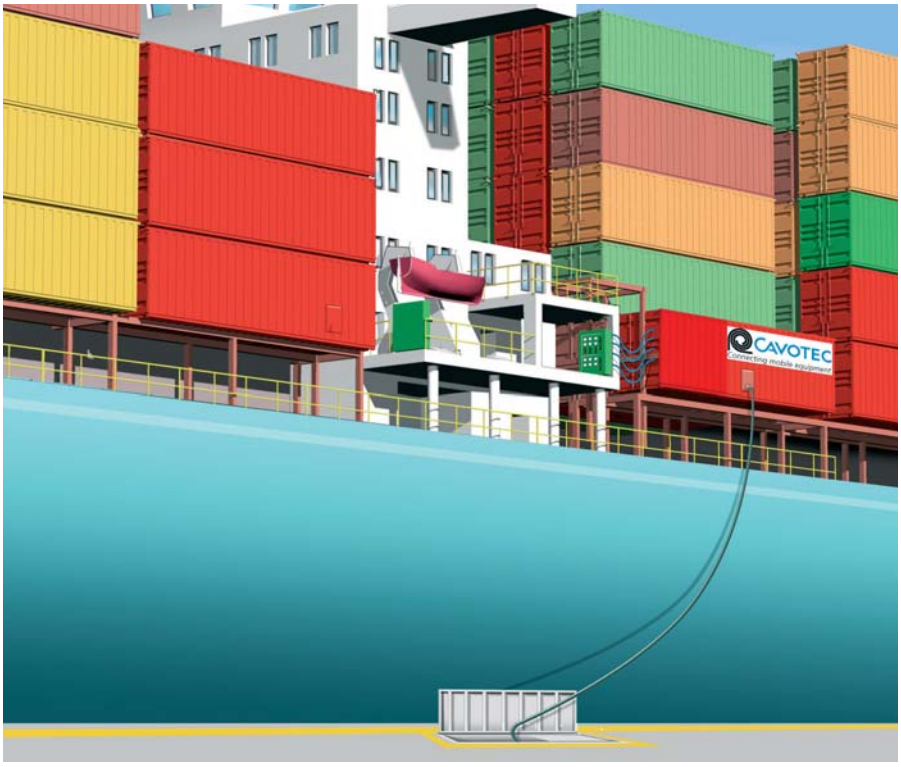
Ship based power supply

Semi-fixed AMP system – On Ship 6,6kV (shore) – 6,6kV/440V (ship)

Due to restricted space availability onboard ships it is not always possible to mount a fixed installation on the ships. To work around these restrictions, Cavotec has developed an innovative way of supplying power to the ship. With this solution the power supply system is mounted into either one 40ft container or two 20ft containers. The 40ft container solution is the so called All-in-One Concept.

With the two 20ft container option the customer retains the possibility to change the position of the containers or to move the system easily from one ship to the other. The cable management system is placed in the lower container and the electrical components in the upper one.

The All in One Concept consists of one 40ft container which can be placed on the port or starboard side of the ship. Cable management system and electrical components are fitted into the container. As with the other system the customer has the possibility to change the position of the container or to move the system from one ship to the other depending on the shipping routes.

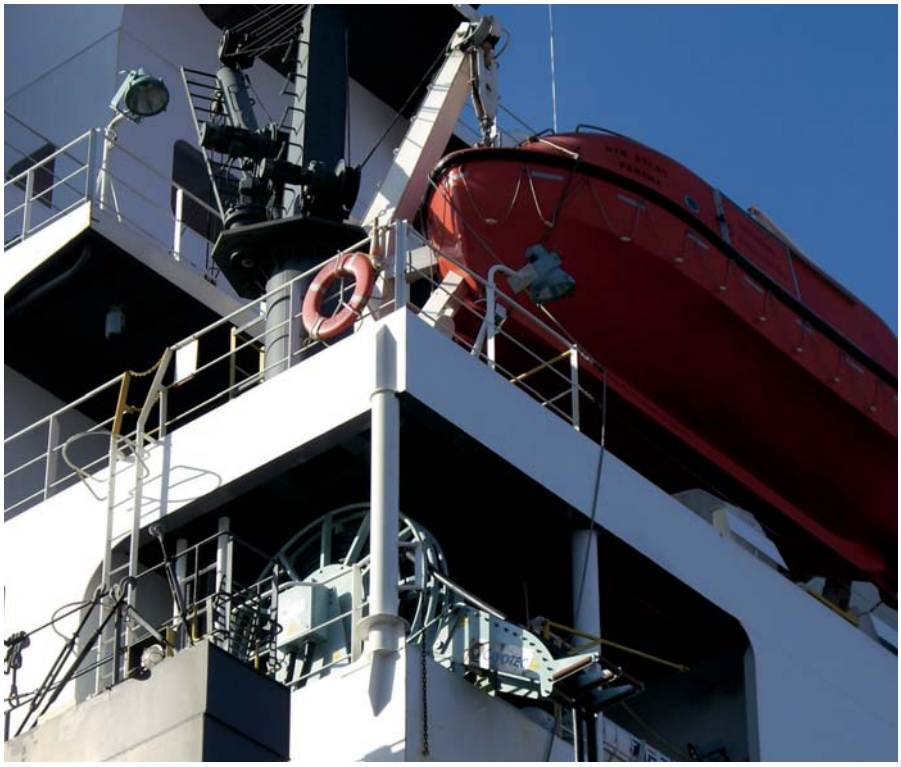


Fixed AMP system – On Ship 6,6kV (shore) – 6,6kV/440V (ship)

A completely different approach to AMP is offered by the "On- Ship" solutions. These systems are ideal when the quay is completely occupied by crane installations and auxiliary loading and unloading vehicles. In these situations it is not possible to install a shore-based AMP and a ship-based option becomes the obvious choice.

All equipment necessary for the shore connection, including the cable management system, is installed onboard the ship. This solution is only advised for "New building" projects and allows for quick and efficient connection of all power supply equipment. Normally the cable management system is installed near the crew quarters in the general vicinity of the electrical room.

The fixed "On Ship" AMP system consists of:
- electrical connectors (up to 12kV)
- flexible cables
- slipring assembly
- optical fibre accumulator
- motor-reducer
- cable drum
- electrical control panel
- retractable hydraulic cable guide



Integrated Technical AMP Pit

To be able to supply power to each individual cable management system an integrated technical pit must be install on the quay. This technical pit serves as the main connection point for all the cables leading from the main quay power supply up to the cable management system. Thanks to its compact design it occupies a minimum of space so it does not form an obstruction to any of the ports' operations.

The Integrated Technical Pit consists of:
- Stainless steel housing (IP66).
- Electrical sockets up to 12kV, fitted with safety features such as pilots and interlocks.
- Optical fibre connectors

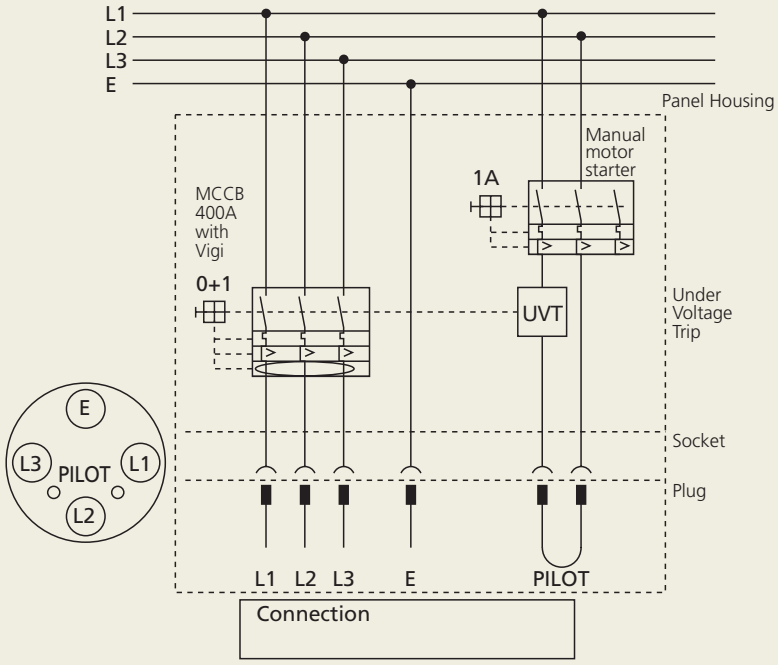
Cavotec Power Connectors

Standard AMP Connectors 7200V; 12000V

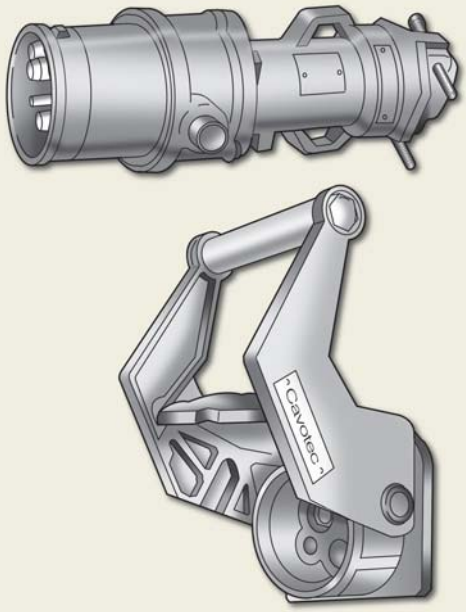
The Cavotec AMP high voltage power connectors are fitted with either the Push & Pull or Screw Ring system which makes them uniquely suited to applications where the connector has to frequently be connected and disconnected, either by hand or automatically. Thanks to their robust design these connectors are used all around the world in the most extreme working environments. The cams are made from marine grade bronze while the mating ears in the plugs are from stainless steel. The connector is rated IP66 when connected.

Cavotec Power Connectors comply to the following standards:
NFC 20 040, VDE 0110, NFC 63300
IEC 309-1, CEE 17, BS 4343
IEC 529, DIN 40050, NFC 20010

All our connectors are electrically interlocked by the pilot contacts. To the right is a typical circuit for the pilot contacts where the pins are loop connected and the female pilot contacts are connected to the operating coil terminals of the switching device. For safety reasons, the pilots are last to connect and first to disconnect. This ensures that no disconnection under load can take place. Mechanical interlocking and fibre optic connections can be provided on request for all two plug types. All materials are made of marine grade aluminium and bronze.



Size X5 Power Connector 350A, 7200V and X6 Power Connector 500A, 12000V
Push & Pull System



Представительство Cavotec в России и СНГ

ООО "ТАУБЕР"
г. Москва
ул. Михалковская, д.63б с.4
тел.: +7(495)617-00-04

Head Office

Cavotec MSL Holdings Ltd.
Cavotec MSL is listed on the NZX

Corporate Office

Cavotec (Swiss) SA
Via Serafino Balestra 27
CH-6900 Lugano, Switzerland

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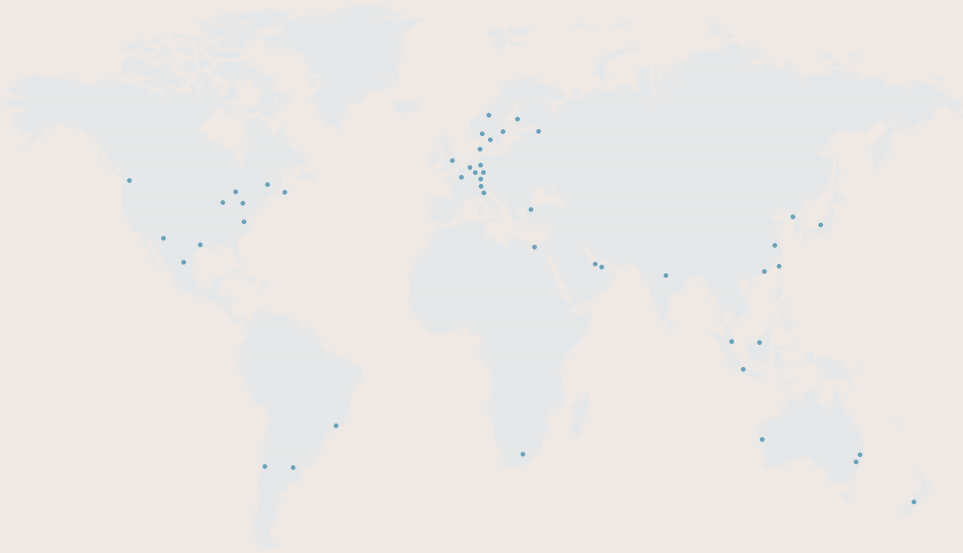

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www.cavotec.com
www.cavotec.com.ru
Вы можете связаться с нами по адресу : info@cavotec.com.ru

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