ENGINEERING
TOMORROW

Danfoss

Marine and Offshore

Expand your efficiency horizons with powerful VLT® and VACON® drive and grid systems

Total range
for Marine and Offshore needs



www.danfossdrives.com

VLT® | VACON®

Dampskibsselskabet NORDEN A/S

"We save 30,000 USD per year on each vessel with drives. And we have used Danfoss' setup on all new vessels based on our experiences with the retrofit solution."

Martin Meldgaard, fleet manager for producttanker vessels at Damskibsselskabet NORDEN A/S



Single port of call

No matter what your motor control question, you can find the answer at Danfoss Drives. Obtain the optimum AC drive for the job, whatever the application is on board the ship. With a global presence and more than 40 years of experience, Danfoss Drives offers a complete low voltage portfolio of VLT® and VACON® drives for marine and offshore needs, coupled with access to expert advice and a comprehensive range, from low to high power.

Sharing

- Support for you to invent vessel-wide drive or grid systems
- Dimensioning and selection tools
- Professional advice in locations around the globe
- Experience and information about existing installations
- Digital EPLAN documentation to reduce your design cost

Inventing

- Modules, components and functionalities to suit any application on board
- Liquid-cooled or back-channel air-cooled drives
- Customer-specific fit using the best software development methods
- Constantly developing new technology capability in vessel construction

Engineering

- Total of nine marine certifications
- Drive modules up to 5.3 MW
- Long lifetime, robust performance and highly efficient equipment
- IP55 and IP66 drives suitable for engine rooms, designed for ambient temperatures from -10 to 131 °F*
- PLC function blocks for easy PLC integration

**derating may apply*

Established in 1864, DNV GL is an independent foundation with the objective of safeguarding life, property and the environment.

Since its founding in 1862, the American Bureau of Shipping (ABS), a New York not-for-profit corporation, has been committed to setting standards for safety and excellence as one of the world's leading ship classification societies.

Founded in 1828, Bureau Veritas was one of the first classification societies and a founding member of IACS (International Association of Classification Societies in the world).

KR is a world-leading, technical advisor to the maritime industry. About 70 flag administrations have authorized KR to conduct statutory surveys on their behalf.

Founded in 1956, China Classification Society (CCS) is the only specialized organization of China to provide classification services. CCS aims to provide services for the shipping, shipbuilding, offshore exploitation and related manufacturing industries and marine insurance.

The Rina Group's main activity areas are ship classification, certification and advanced services to industry.

The Lloyd's Register Group is an organization that works to enhance safety and to approve assets and systems at sea, on land and in the air.

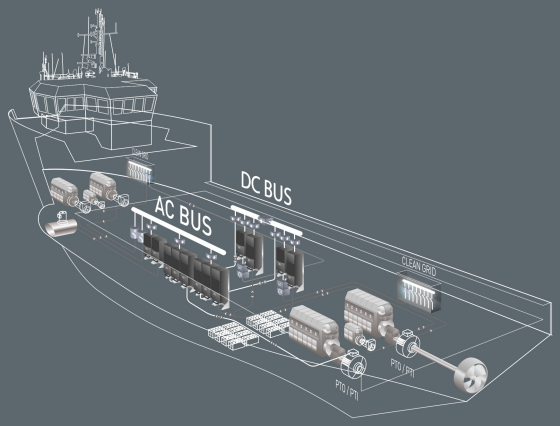
A classification society, the Russian Register, was established on 31 December 1913. Now its name is the Russian Maritime Register of Shipping (RS). Since 1969 RS has been a member of the International Association of Classification Societies (IACS).

Class NK (Nippon Kaiji Kyokai) is a Japanese ship classification society dedicated to ensuring the safety of life and property at sea, and the prevention of pollution of the marine environment.

Vessel-wide systems

Sea-going vessels are equipped with complex systems where all functionalities are integrated via an AC and/or DC bus. Therefore when optimizing performance and efficiency, it is never enough to consider individual components in isolation. We help you to assess the total impact and make informed choices on that basis.

In every corner of the ship, from the engine room to the ventilation system, from the cargo deck to the accommodation quarters, we consider the big picture. Then we can give concrete advice on the specific motor controls to optimize performance of the thruster, pump, winch, compressor or fan. No matter what the application, we are there to help you improve efficiency, safety and reliability.



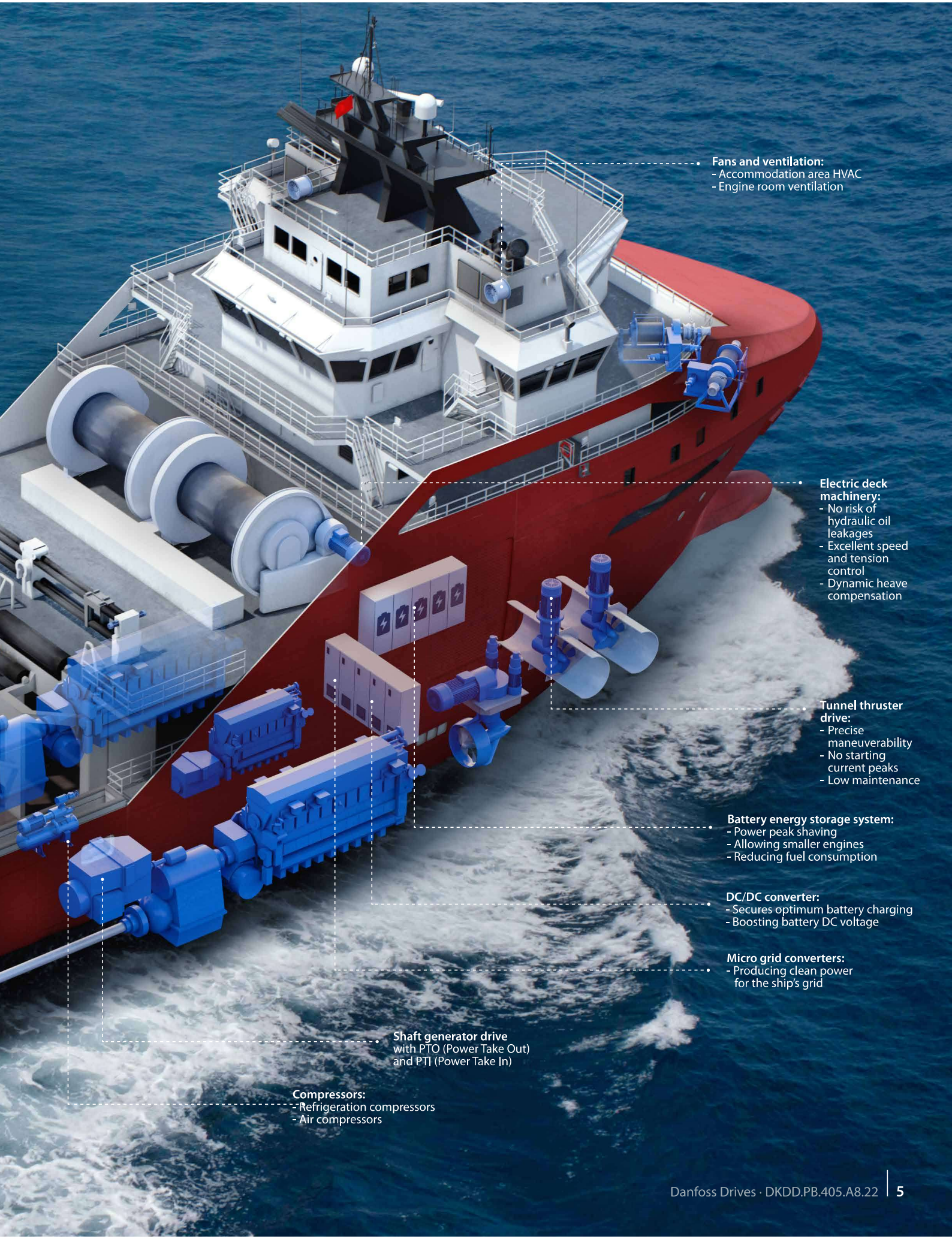
Separators:
- Fuel centrifuges
- Lube oil centrifuges
- Bilge water centrifuges

Electric crane:
- No risk of hydraulic oil leakages
- High efficiency

Pumps:
- Water pumps
- Fuel and oil pumps
- Cargo pumps

Steering gear:
- Safe and accurate rudder positioning
- Low stand-by losses

Azimuth thruster drives:
- Variable speed fixed pitch propeller drive
- Safe and accurate electrical steering


Fans and ventilation:
- Accommodation area HVAC
- Engine room ventilation
Electric deck machinery:
- No risk of hydraulic oil leakages
- Excellent speed and tension control
- Dynamic heave compensation
Tunnel thruster drive:
- Precise maneuverability
- No starting current peaks
- Low maintenance
Battery energy storage system:
- Power peak shaving
- Allowing smaller engines
- Reducing fuel consumption
DC/DC converter:
- Secures optimum battery charging
- Boosting battery DC voltage
Micro grid converters:
- Producing clean power for the ship's grid
Shaft generator drive
with PTO (Power Take Out) and PTI (Power Take In)
Compressors:
- Refrigeration compressors
- Air compressors

The modular VLT® technology platform adapted to your requirements

VLT® AutomationDrive, VLT® HVAC Drive and VLT® AQUA Drive are all built on a modular platform allowing for highly customized drives mass produced, tested, and delivered from the factory.

Upgrades and further options dedicated to the marine industry are a matter of plug-and-play. Once you know one, you know them all.



Enclosure size B, IP55/IP66

1 Display options
Danfoss drives' renowned removable Local Control Panel (LCP) has an improved user interface. Choose between 27 built-in languages (including Chinese) or have it customized with your own. Languages can be changed by the user.

2 Hot pluggable LCP
The LCP can be plugged in or unplugged during operation. Settings are easily transferred via the control panel from one drive to another or from a PC with MCT 10 set-up software.

3 Integrated manual
The info button makes the printed manual virtually redundant. Users have been involved throughout development to ensure optimum overall functionality of the drive. The user group has significantly influenced the design and functionality of the LCP.

The Automatic Motor Adaptation (AMA), the Quick Set-Up menu and the large graphic display make commissioning and operation a breeze.

4 I/O options
The general purpose I/O, relay and thermistor, expands the flexibility of the drives.

5 Control terminals
Specially developed removable spring-loaded cage clamps add to reliability and facilitate easy commissioning and service.

6 24 V supply
A 24 V supply keeps the VLT® drives logically "alive" in situations when the AC power supply is removed.

7 RFI filter suitable for IT-grids
Danfoss drives are suitable for IT-grids as standard due to selectable RFI filter switch.

8 Modular construction and ease of maintenance
All components are easily accessible from the front of the drive, allowing for ease of maintenance and side-by-side mounting of drives. The drives are constructed to a modular design allowing for the easy replacement of modular sub-assemblies.

9 Programmable options
Freely programmable Motion Control Option for user-specific control algorithms and programs allows the integration of PLC programs.

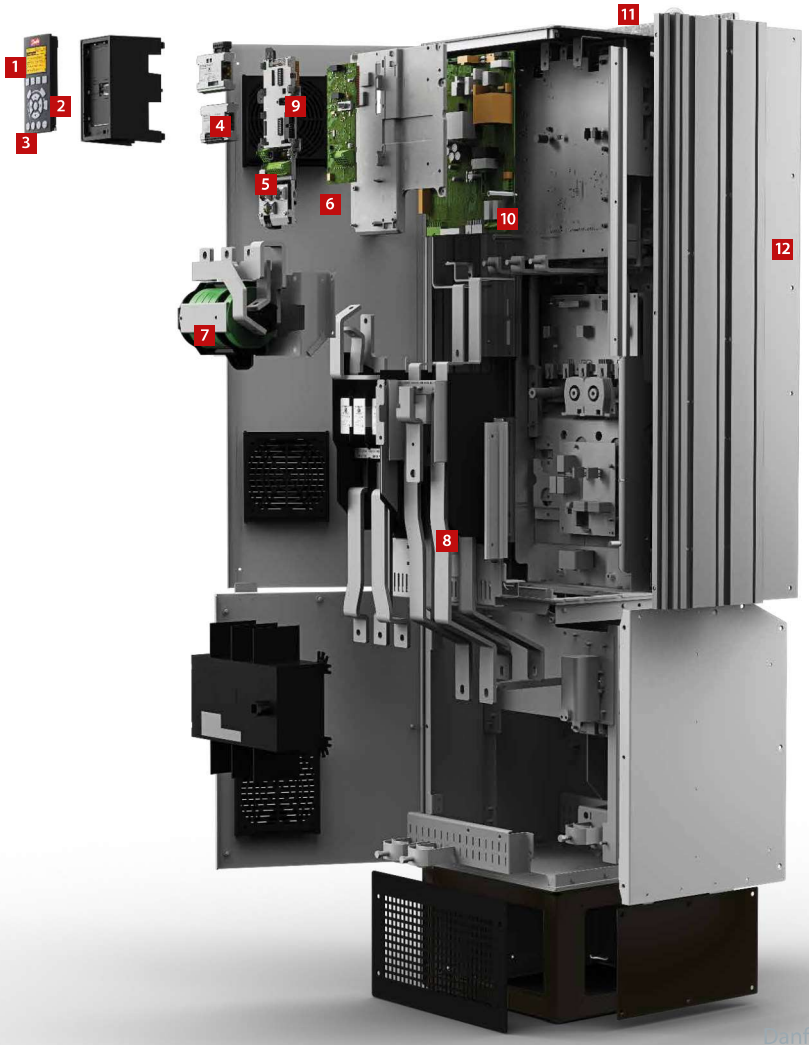
10 Ruggedized printed circuit boards
Drives for maritime use are ruggedized to withstand vibration levels and the conformal coated to withstand salt mist test.
Meets IEC 60721-3-3 Class 3C3.

11 Back-channel cooling
The unique design uses a back-channel to pass cooling-air over heat sinks. This design allows 85-90% of the heat losses to be exhausted directly outside of the enclosure with minimal air passing through the electronics area. This reduces temperature rise and contamination of the electronic components for improved reliability and increased functional life.

12 Enclosure
The drive meets relevant requirements for all possible installation conditions. Enclosure class IP00/chassis, IP20/chassis. IP21/NEMA 1, IP54/55/NEMA 12 or IP66/NEMA 4X.

VLT® Motion Control Tool MCT 10
software provides easy configuration via pc, and provides a comprehensive overview of all the drives in a system of any size. It adds a new level of flexibility in configuration, monitoring and troubleshooting.

MCT 10 is a Windows-based engineering tool, enabling data exchange over a traditional RS485 interface, fieldbus (PROFIBUS, Ethernet, and more) or via USB. Use of MCT 10 reduces the risk of incorrect configuration, and facilitates rapid troubleshooting. It is an especially useful tool for documenting and recording as-commissioned settings for each AC drive on board.



Enclosure size D, IP54

Options and features for ultimate performance

Fieldbus options
Options for serial bus communication are delivered ready to plug and play: PROFINET, PROFIBUS, EtherNet/IP, DeviceNet, CANopen, and more.

ATEX-certified thermistor input
An ATEX-certified thermistor option is available for VLT® AutomationDrive rendering the drive capable of providing sole protection for Ex d and Ex e motors within the installation. The only action required is to connect the PTC thermistors to the drive, for a significant reduction in costs.

Functional safety
VLT® drives can be ordered with Safe Torque Off (STO) functionality Performance Level (PL) "d" and Category 3, as well as SIL 2. This feature prevents the motor from starting unintentionally. Options for Safe Stop 1 (SS1) Safe Maximum Speed (SMS), Safe Limited Speed (SLS) are available both with and without speed feedback.

Harmonic suppression
Integrated DC chokes ensure very low harmonic disturbance of the power supply according to IEC-1000-3-2. This design eliminates the need for external chokes.

Smart Logic Control
Smart Logic Control is integrated into the VLT® drive. With this feature, you can make the drive react effectively to inputs and events, and often replace PLCs.

PELV
All VLT® drives comply to the PELV (Protective Extra Low Voltage) requirements and are surge-proof in accordance with VDE 0160. Inputs and outputs are electrically isolated.

Up to 150 meters between the drive and the motor
The basic design of VLT® drives allows for up to 150 meters of shielded motor cable – without disturbing other electronic equipment. This allows the VLT® drive to be installed in a central control room.

Type approvals



Optimized for reliability and stability

Ruggedized for ultimate maritime protection
In order to reduce the potential negative effects of vibration, the drives have been 'ruggedized'. It is a process that ensures that critical components on the PCB have increased protection, significantly reducing the risk of malfunction while at sea.

The printed circuit boards in the drives are also all coated in accordance with IEC 60721-3-3 class 3C3, providing additional protection against moisture and dust.

Reliable operation at engine room temperatures up to 55 °C
VLT® drives can operate at full load in engine rooms with 50 °C temperature and 55 °C at reduced power close to, for example, pumps and thrusters. There is no need for installation in air-conditioned control rooms with long motor cables.

Compact and robust drives up to 800 kW for engine room installations
The redesigned enclosure sizes D and E in protection class IP54 are some of the most compact and robust air-cooled single unit drives available in the market. Offering a power range from 90 kW to 800 kW, they are suitable for installation directly in engine rooms.

Down to 12 months payback time

Drive-controlled sea-water-cooling pumps reduce energy consumption significantly. Usually the payback time is less than one year.

Adapt pump flow rate to actual cooling demand

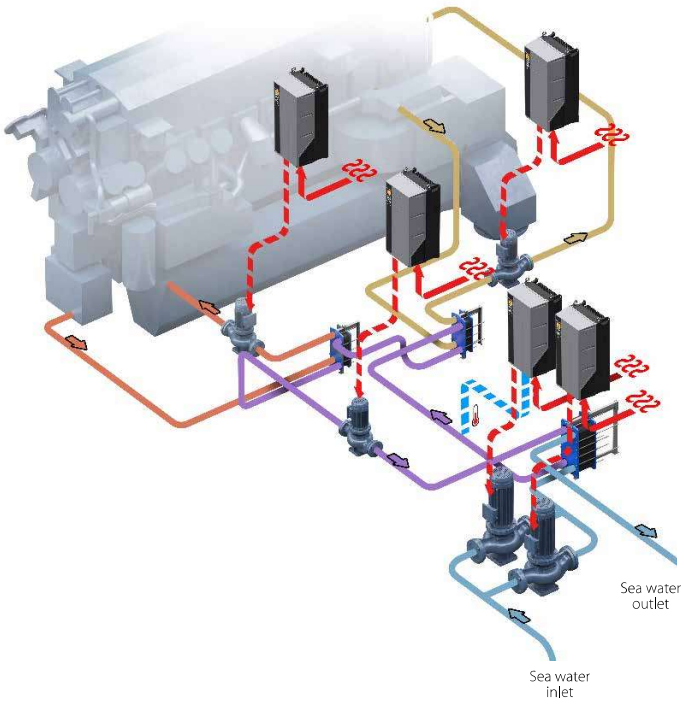
Ship cooling systems are designed for 100% load at 32 °C water temperature, regardless of the actual water temperature.

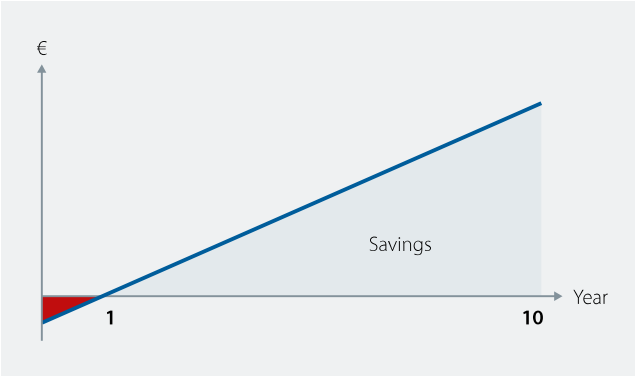
Given the fact that not all ships sail in equatorial waters or at maximum speed, the maximum cooling capacity is only rarely needed.

This makes it possible to achieve significant energy savings by allowing pumps to be controlled by a drive that constantly adapts the pump flow rate to the demand at any given time.

Reduce running costs

Once installed, Danfoss drives instantly have a positive impact on running costs. A kWh of electric energy typically costs about € 0.1 at sea. Lowering the average energy consumption of this single application from 75 kW to 14 kW equals 366,000 kWh per year.





Potential savings – example

Design sea water temperature	32 °C
Average sea water temperature	20 °C
Running hours (year)	6000
Cost per kWh	12 Cents
Standard system	75 kW = 450,000 kWh per year
Optimized system	14 kW = 84,000 kWh per year
Savings	80%
Annual savings	$44,000
Installed cost of Danfoss drives system	$38,000
Payback time	**Less than 12 months**







VACON® NXP Enclosure size FR10



VACON® 100 Enclosure size MR9



VACON® AC drives deliver precision and clean power

When the most demanding requirements for flexibility, robustness, compactness and service-friendliness apply, turn to the high-precision VACON® NXP range.

Alternatively, for more standard situations, the VACON® 100 range of AC drives exceeds expectations, being easy to use and allowing you to do much more than you would expect from a standard drive.

Quick set-up

Easy commissioning tools ensure a hassle-free set-up whatever the application. Easy diagnostics with help in plain text is provided for each parameter, signal and fault.

- Startup Wizard – for fast setup of basic pump or fan applications
- PID Mini-Wizard – for easy commissioning of internal PID Controller
- Multi-Pump Wizard – for easy commissioning of Multi-Pump system
- Fire Mode Wizard – for easy commissioning of Fire Mode function

Ethernet connectivity

There is no need to purchase additional communication tools, since the integrated Ethernet connectivity allows remote drive access for monitoring, configuring and troubleshooting.

- Ethernet protocols such as PROFINET IO, EtherNet/IP™ and Modbus TCP are available for all NXP drives. New Ethernet protocols are being continuously developed.

User-friendly keypad

The user interface is intuitive to use. You will enjoy the keypad's well-structured menu system that allows for fast commissioning and trouble-free operation.

VACON® NXP family

- Removable panel with plug-in connection
- Graphical and textual keypad with multiple language support
- Text display multi-monitoring function
- Parameter back-up and copy function with the panel's internal memory
- The start-up wizard ensures a hassle-free set up. Choose the language, application type and main parameters during the first power up.

VACON® 100 family

- Graphical and textual keypad with multiple language support
- 9 signals can be monitored at the same time on a single multi-monitor page which is configurable to 9, 6 or 4 signals
- 3-color LED status indication on the control unit
- Trend display for two signals at the same time

Functional safety

Safe Torque Off (STO) prevents the AC drive from generating torque on the motor shaft and prevents unintentional start-ups. The function also corresponds to an uncontrolled stop in accordance with stop category 0, EN 60204-1.

Safe Stop 1 (SS1) initiates the motor deceleration and initiates the STO function after an application-specific time delay. The function also corresponds to a controlled stop in accordance with stop category 1, EN 60204-1.

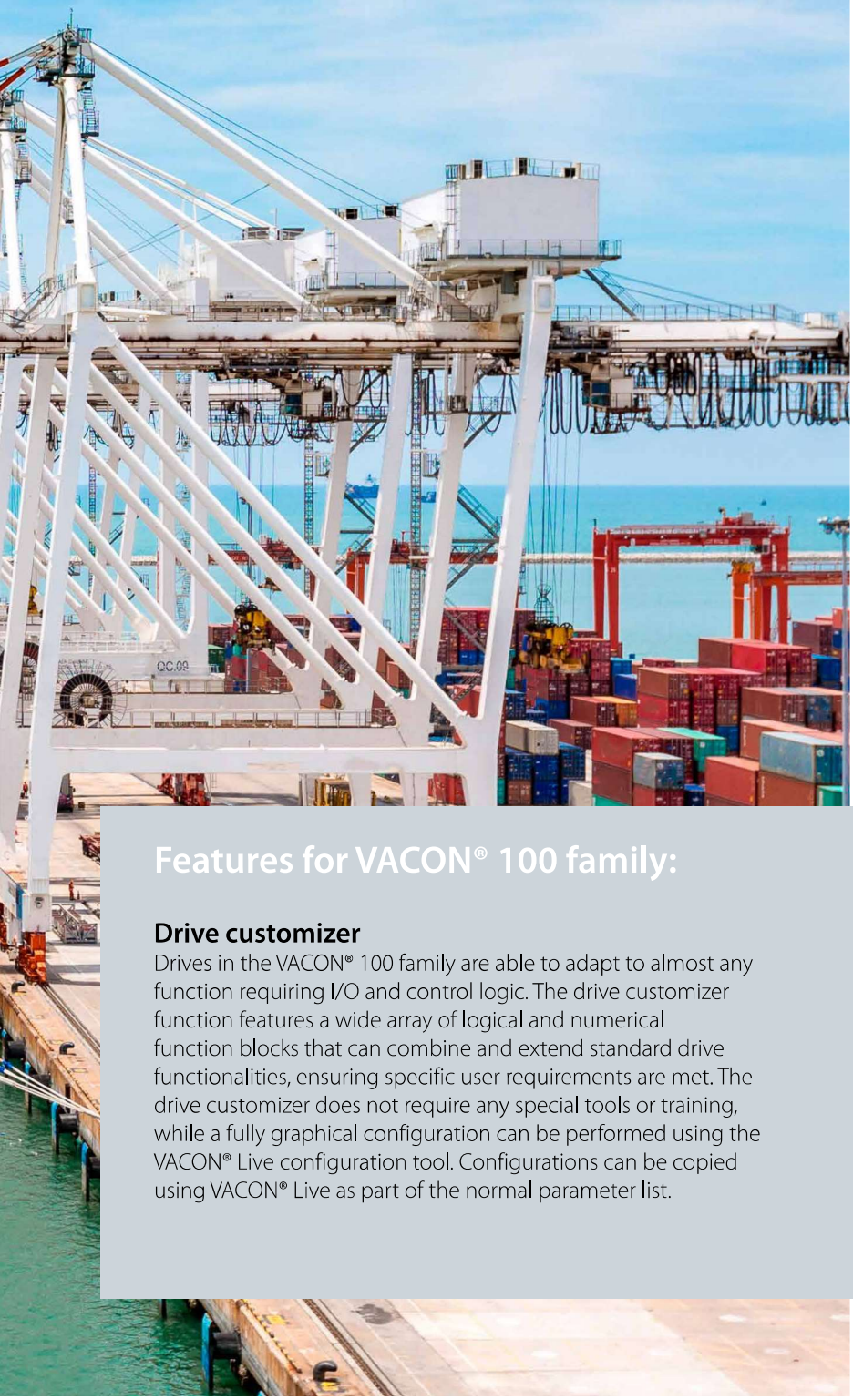
Integrated STO and SS1 safety options have several advantages over standard safety technology using electromechanical switchgear. For example, separate components and the efforts required to wire and service them are no longer necessary, but the required level of safety at work is maintained.


53m

ATEX-certified thermistor input

Certified and compliant with the European ATEX directive 94/9/EC, the integrated thermistor input is specially designed for the temperature supervision of motors that are placed in areas:

- In which potentially explosive gas, vapor, mist or air mixtures are present
- With combustible dustIf over-heating is detected, the drive immediately stops feeding energy to the motor. As no external components are needed, the cabling is minimized, improving reliability and saving on both space and costs.



Features for VACON® 100 family:

Drive customizer

Drives in the VACON® 100 family are able to adapt to almost any function requiring I/O and control logic. The drive customizer function features a wide array of logical and numerical function blocks that can combine and extend standard drive functionalities, ensuring specific user requirements are met. The drive customizer does not require any special tools or training, while a fully graphical configuration can be performed using the VACON® Live configuration tool. Configurations can be copied using VACON® Live as part of the normal parameter list.

Features for VACON® NXP family:

DC cooling fans

VACON® NXP high-performance air-cooled products are equipped with DC fans. This design significantly increases the reliability and lifetime of the fan, also fulfilling the ERP2015 directive on decreasing fan losses. Likewise, the DC-DC supply board component ratings fulfill industrial requirement levels.

Built-in expansion slots

Connect additional I/O, fieldbus and functional safety boards to the VACON® NXP family of drives, using five built-in expansion slots.

Conformal coating

To increase performance and durability, conformal coated circuit boards are standard for VACON® NXP family power modules (FR7 – FR14). The coated boards offer reliable protection against dust and moisture, and extend the lifetime of the drive and critical components.

VACON® DriveSynch

To facilitate design for redundancy when paralleling high-power liquid-cooled drives from the VACON® NXP family, use the VACON® DriveSynch control concept. This control concept allows a motor to be controlled by two to four power units each of 100-1500 kW. VACON® DriveSynch is suitable for controlling single and multi-winding AC motors, and is especially relevant for marine and offshore applications, providing a high degree of redundancy and system safety.


MAERSK
AQUALIFE

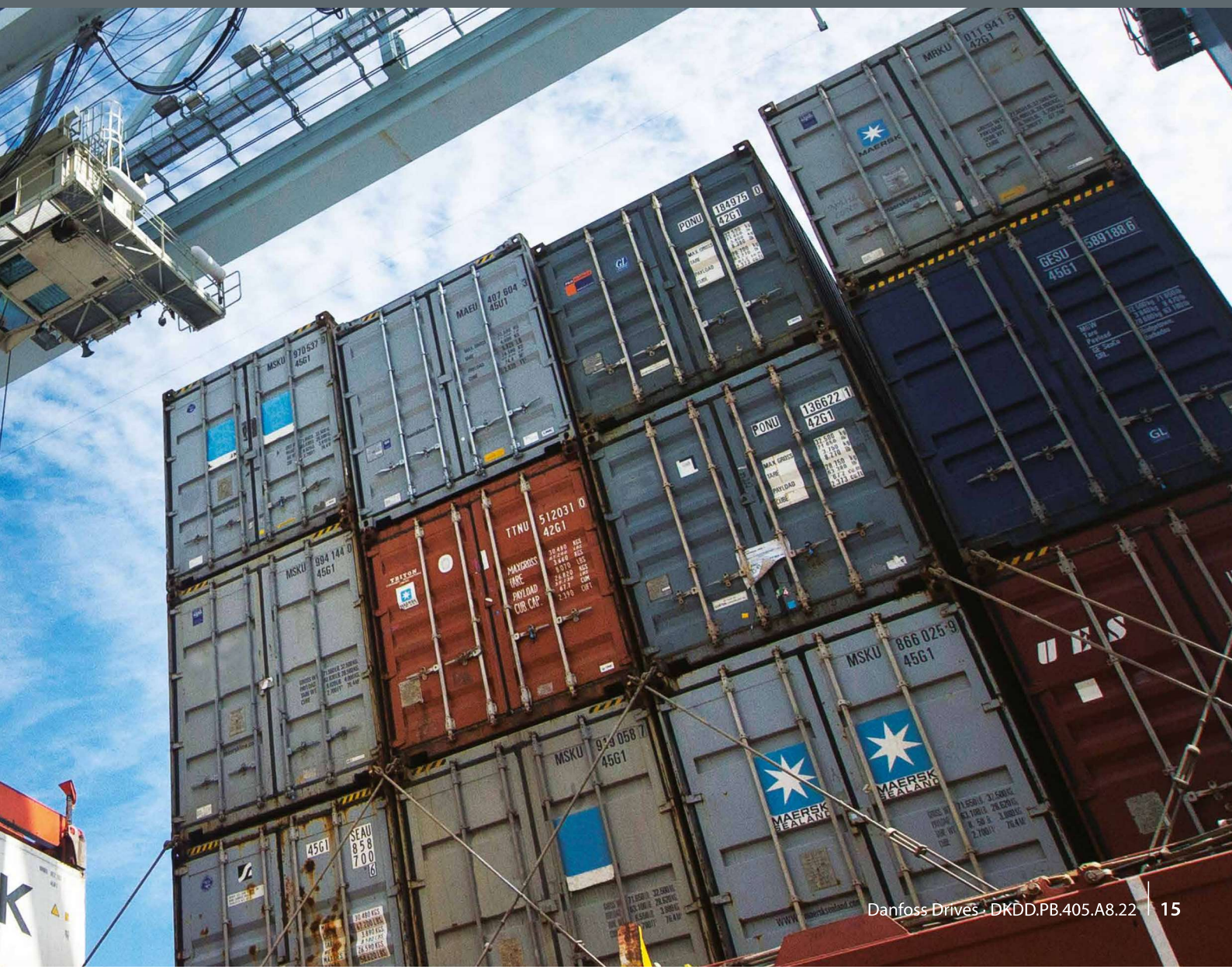
Marine references

A.P. Moller-Maersk

The A.P. Moller-Maersk Group is a worldwide conglomerate with operations in some 130 countries. The company owns the world's largest container shipping fleet, including the 31 Triple-E class vessels, the largest and most efficient of their kind.

Danfoss Drives is an approved supplier of drives and is on the official maker's list. Our drives have been chosen for a wide range of motor-control applications for the vessels, helping them achieve the A.P. Moller-Maersk Triple-E goals of Economy of scale, Energy efficiency and Environmental improvement.

On the Maersk platform supply vessels and oil tankers that provide quality services to the global oil and gas industry, Danfoss drives provide reliable control of essential equipment. Danfoss drives are also used to control the variable speed of the refrigeration compressor in the thousands of Maersk Container Industry reefers that carry perishable foods from continent to continent in perfect condition.





Ulstein Verft

Ulstein Verft AS is one of the world's foremost suppliers of advanced vessels; primarily anchor handling tug supply vessels, platform supply vessels and specialized and multifunctional vessels.

The shipyard serves as the Ulstein Group's development base for the detailed design and assembly of capital and equipment intensive specialized vessels and is the group's most important expertise base for carrying out projects.

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AIDA Cruises

AIDA Cruises is Germany's largest cruise line. The ships of the AIDA fleet are dedicated to the German market and renowned for their young and casual style in combination with a high quality of service. AIDA Cruises is a member of the Carnival Group – the world´s largest cruise shipping company.

Viking River Cruises

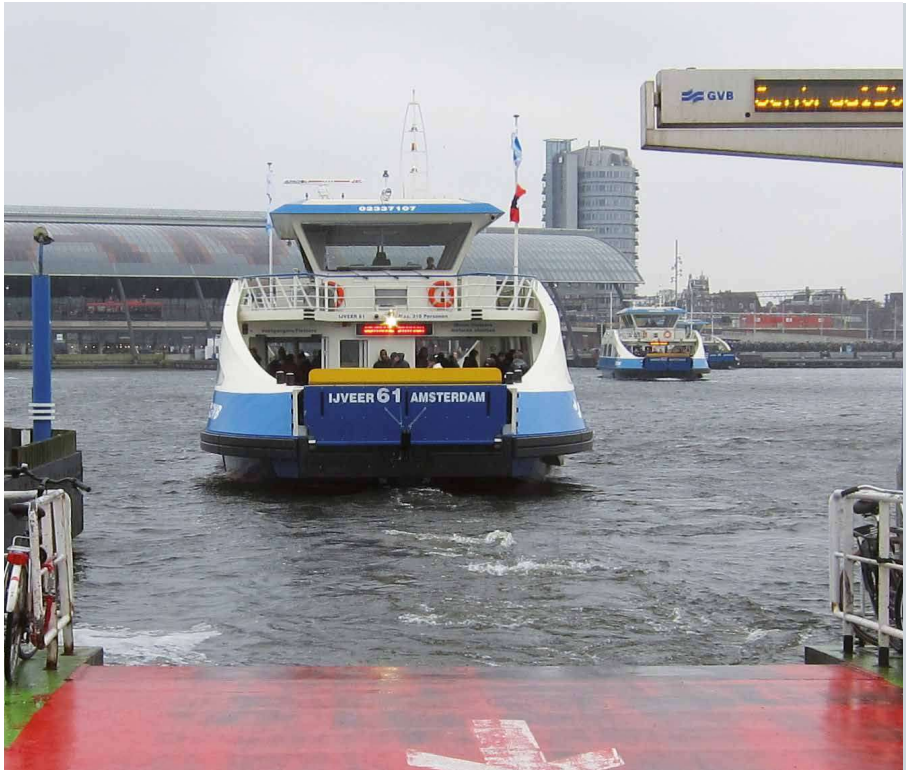
Viking River Cruises is the world's largest river cruise line, offering cruises along the rivers of Europe, Russia, China, South-East Asia and Egypt.

The vessels' diesel-electric propulsion system is based solely on synchronous and/or asynchronous generators and propulsion motors driven by an AC drive.

The VACON® NXP Common DC Bus solution was the first of its kind to be installed on these vessel types. This solution is already implemented on board 52 of Viking River Cruises' vessels, making it the world´s largest installed base on this vessel type.

VACON® drives and grid converter technologies:

- Reduce fuel consumption and CO_2, NO_x and SO_x emission levels significantly
- Improve maneuverability
- Reduce maintenance costs
- Improve comfort by reducing noise and vibration



GVB

Amsterdam's waterfront, the IJ River, is one the busiest Dutch waterways connecting the Port of Amsterdam with the North Sea. Every day many passengers cross the IJ River with bicycles, mopeds or on foot, on the 6 free ferry routes which are operated by GVB – the public transport company of Amsterdam.

"We selected a hybrid solution from Holland Shipyard and their electrical propulsion partner, Holland Ship Electric which has very good experience using VACON® NXP drives for their electric propulsion systems."

Casper van der Werf
Project manager at GVB



MS Nadorias

On board the MS Nadorias, the huge potential in converting to hybrid is no longer a vision but a reality. A hybrid retrofit has given this inland container carrier a huge 15% saving not only in fuel, but also in CO_2 emission. Since the main diesel engine now runs much less, there is 60% less maintenance cost and higher uptime than for its identical sister ship.



MS Goblin

Venturing into hybrid propulsion was a bold step for the Vranken family's dry cargo bulk carrier business, which serves the inland waterways of the Rhine. It has paid off fast, delivering rock-bottom operating costs, thanks to an innovative diesel electric propulsion system. This hybrid system replaces the traditional diesel propulsion system used for example on the family's sister ship, the MS Lutin.



Telstar

Telstar was built by Holland Shipyards and has the unique EDDY Tug design. This makes it easy to drive, easy to maintain and easy to move in any direction. EDDY Tugs are equipped as standard with a hybrid powertrain to minimize operational costs and realize savings. The powertrain consisting of electric, diesel or direct diesel-electric drive was chosen because its low power profile is well-suited to tugboat operating requirements.



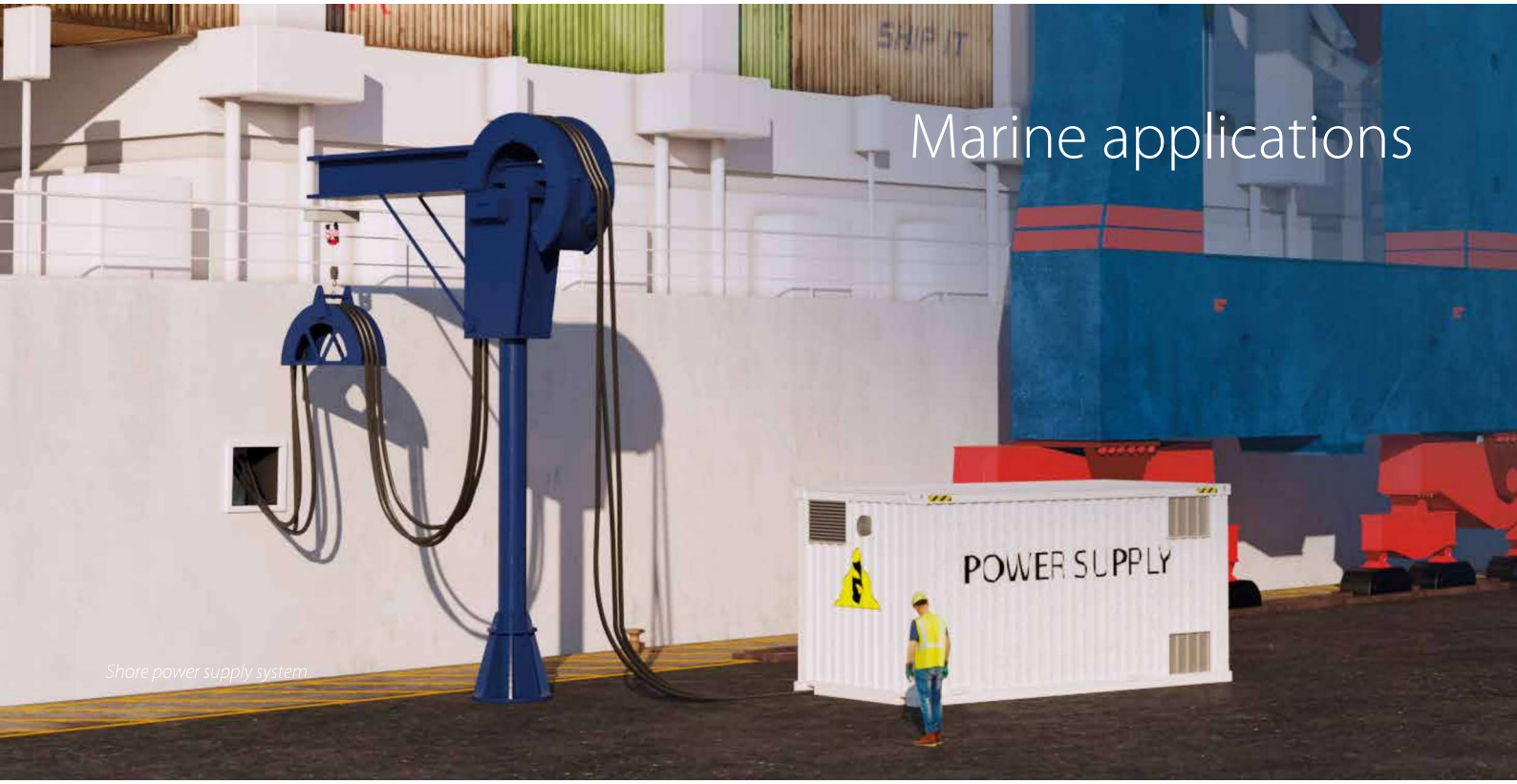
Northern Leader

One of the largest longliners in the world is also one of the most eco-friendly commercial fishing vessels constructed thanks to its fully diesel-electric propulsion system. With low emissions, the propellers controlled by AC drives have a minimal impact on the ocean's ecosystem, and the high fuel efficiency allows the vessel to maintain the lightest possible operational fossil fuel footprint.

The VACON® NXP drives with active front-end technology were chosen for their optimal performance, compact footprint and ability to minimize harmonic distortion to vessel systems,"

Joe Martinac, President of J.M. Martinac Shipbuilding

Marine applications



Shore power supply system

Shore supply

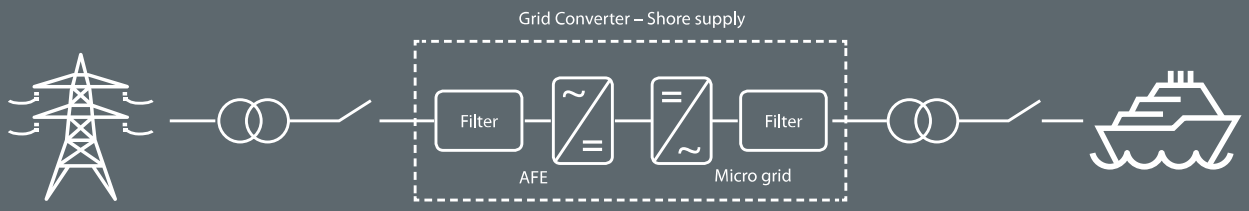
Ships consume a large amount of fuel to power their on-board electrical grids during port stays. Burning fuel in sensitive port areas is also a significant source of local air pollution.

The obvious solution is to connect the ships to the on-shore electrical grid during berthing but the difference in frequency and voltage is a challenge. Most ocean-going ships have a 60 Hz grid, whereas the power supply in most of the world outside the Americas is 50 Hz.

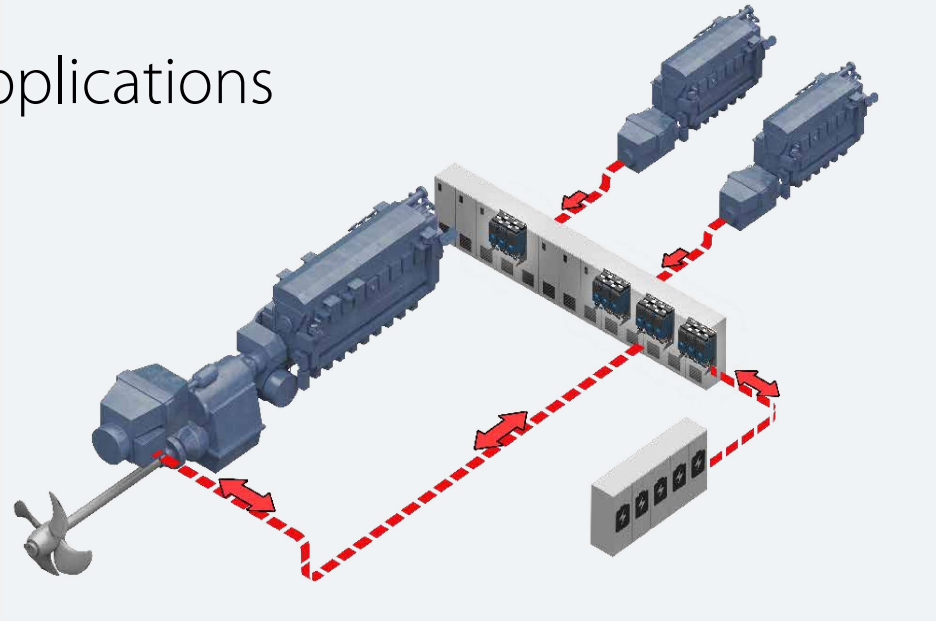
Shore supply systems convert the 50 Hz shore power to the ship's power system, and synchronize the voltage and frequency to the ship's electrical grid, with a smooth changeover. VACON® micro grid power conversion functionality ensures:

- Timely compliance with ever-more-stringent air quality regulations, for example MARPOL Annex VI Emission Control Areas and European Council Directive 2005/33/EC.
- No contribution to local harbor air pollution. A large proportion of the shore power in the relevant countries is generated from renewable and non-fossil sources.
- Clean power supply, free of harmonic distortion, for protection of the on-board grid.
- Very high system efficiency and low standby losses.

Shore power supply system



Marine applications



Variable speed shaft generator system with battery – hybridization

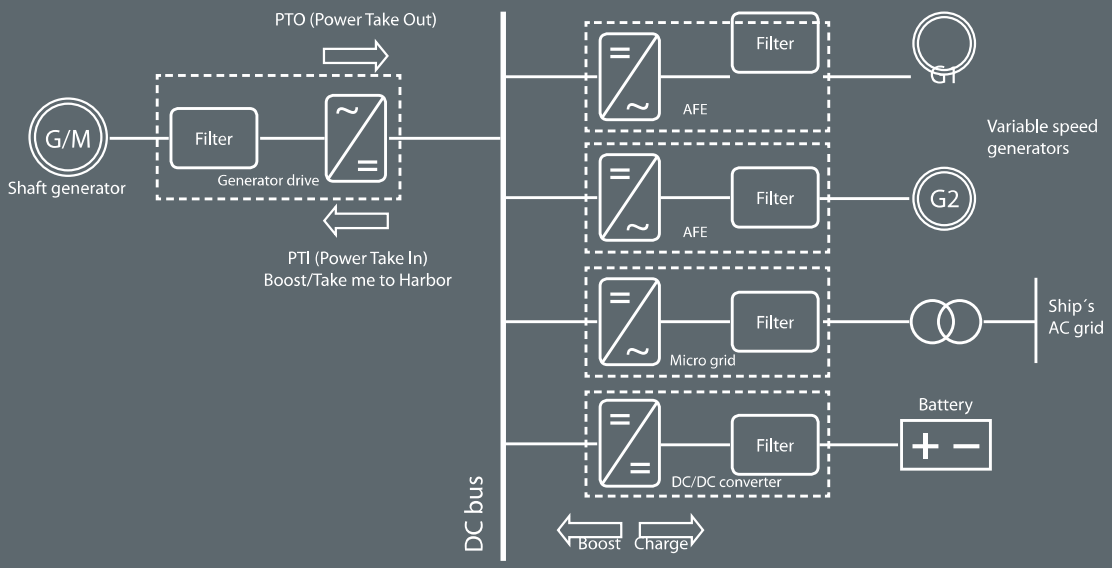
Variable speed shaft generator with PTI/PTO and hybrid energy storage

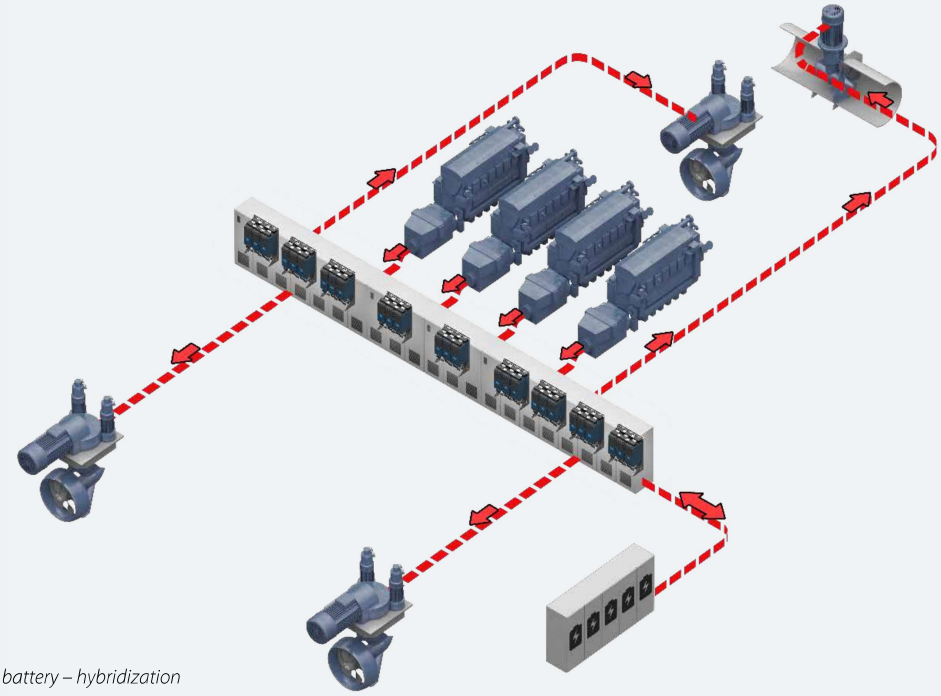
The variable speed shaft generator with power take in/power take out (PTI/PTO) allows the main engines and axillary gen-sets to run at their most efficient point. The additional hybrid energy storage battery allows smaller and more efficient engines. Vessels benefit from Danfoss VACON® power conversion technology in these ways:

- The speed of the engines can be optimized to the actual load demand with up to 30% fuel savings, reduced CO_2 and NO_x emissions.
- During normal operation (PTO) the shaft generator supplies power to the ship grid.
- If an additional propulsion power boost is needed (PTI) the shaft generator receives power from the battery (peak shaving) or from the auxiliary gen-sets.
- In the event of a main engine failure the vessel can travel safely back to port (Take Me to Harbor) using the power from the gen-sets and the battery.
- The common DC bus technology reduces the conversion losses and allows easy integration of the hybrid battery system.
- The micro-grid converter produces a fixed-frequency clean ship grid.
- The DC/DC converter secures optimum battery charging and boosting of the battery voltage.
- Optional shore power supply.

The variable speed shaft generator system and hybrid battery system can be retrofitted on existing vessels – typically with an attractive pay back time.

Variable speed shaft generator system with battery – hybridization





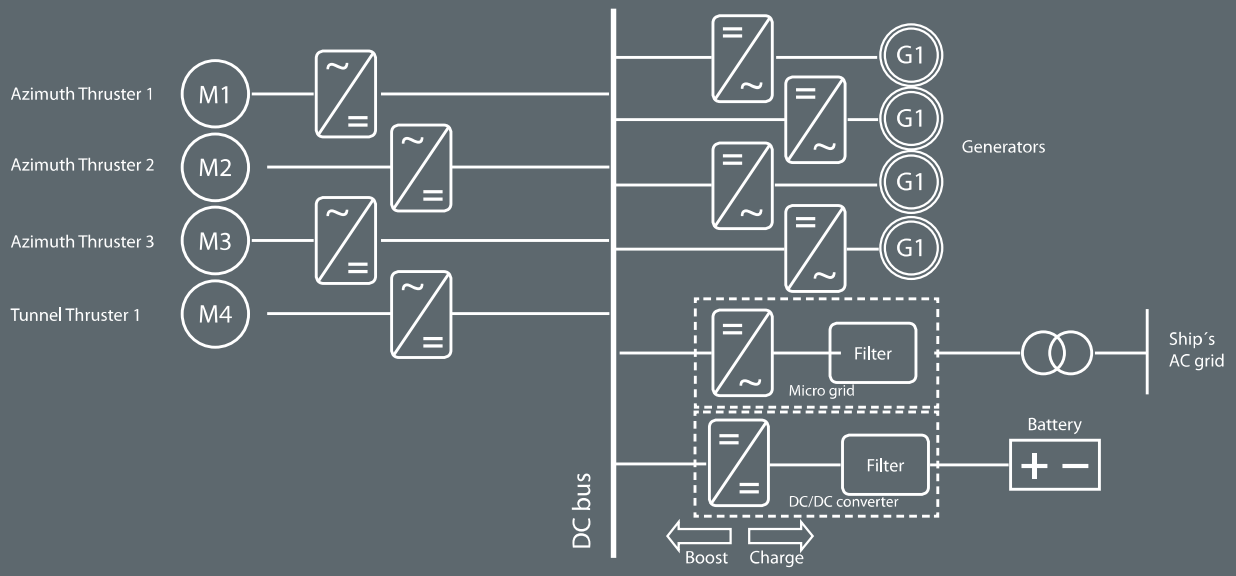
Electric propulsion with battery – hybridization

Electric propulsion with hybrid energy storage

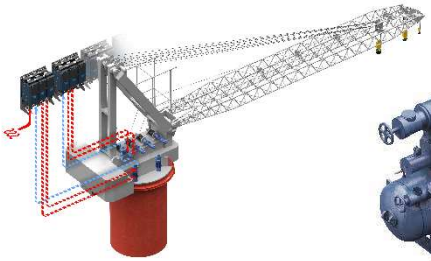
The vessel is fully electric powered using electric azimuth thrusters and tunnel thrusters. The power is generated by variable speed gen-sets. This topology is often used for ferries and offshore vessels. The additional hybrid energy storage system offers peak shaving and allows smaller and more efficient gen-sets. This type of hybridization technology is well suitable for LNG powered vessels. Vessels benefit from Danfoss VACON® power conversion technology in these ways:

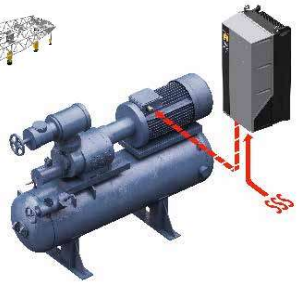
- The number of the gen-sets in operation and the speed of the gen-sets can be optimized for fuel savings, reduced CO_2 and NO_x emissions.
- The electrical azimuth thruster provides the ship with a high maneuverability.
- If an additional propulsion power boost is needed the thrusters receive power from the battery (peak shaving) or from the additional auxiliary gen-sets.
- The common DC bus technology reduces the conversion losses and allows easy integration of the hybrid battery system.
- The micro-grid converter produces a fixed frequency clean ship grid.
- The DC/DC converter secures optimum battery charging and boosting of the battery voltage.
- Optional shore power supply.

Electric propulsion with battery – hybridization

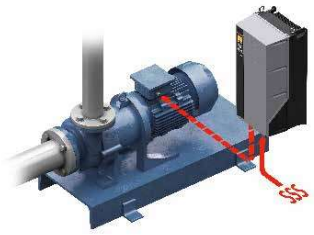


Marine applications









Crane

- Elimination of hydraulic fluid leakages
- Only marginal losses in standby mode
- High efficiency during normal operation
- Environmentally friendly and efficient system

Danfoss drive control of cranes provides higher availability and productivity, compared to traditional hydraulic cranes. By using a drive, owners avoid overheating in the hydraulic oil system and typically benefit from a 15% shorter cycle time, due to faster movements.

Refrigeration compressors

- Improved efficiency
- Built-in compressor control functions
- Improved compressor lifetime

Screw compressors controlled by a Danfoss drive typically use 15% less energy than traditional screw compressors with slide valve control only.

Optimized start/stop cycles reduce wear and tear on the compressor. Drive-controlled reciprocating and scroll compressors have higher COP at part loads. Danfoss drives are particularly suitable for controlling scroll compressors.

Pumps

- Built-in pump features
- Automatic Energy Optimizer (AEO) saving additional 5-15%
- Pay back down to 12 months using speed controlled pumps

Danfoss drives control the pump to match actual process need, leading to reduced energy consumption. Reducing the speed by 20% reduces the power consumption by 50%.

As well as saving energy, these AC drives also protect the pump in many different marine applications. Pump-dedicated features include built-in PID controllers, dry pump detection, flying start, sleep mode, cascade control, end of curve, and flow compensation.

Typical pump applications: scrubbers, ballast water, bilge water, circulation, cargo, firefighting, feeding pumps, lubrication, and sea water pumps.

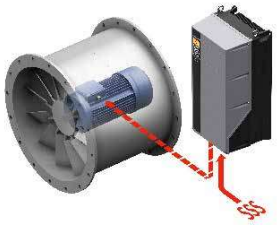
Separators

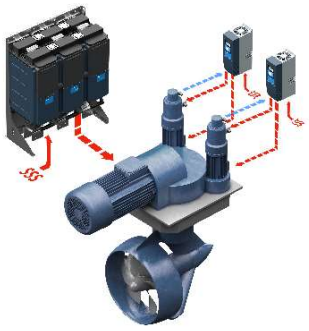
- High operation reliability
- Low maintenance cost
- Safe Maximum Speed (SMS) safety function without external speed sensor

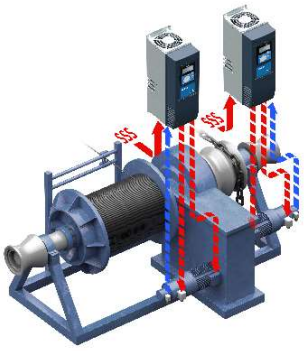
Danfoss drives enable reliable operation of bilge water, fuel conditioning and oil centrifuge separators.

The AC drive ensures smooth acceleration that protects both the gearbox and high-speed bowl bearings.

Control by the AC drive provides tolerance against discharge shock loads. In the event of power failure the drive can catch the spinning separator on the fly, and brake it without needing resistors.









Fan and ventilation

- Typically 30-50% energy savings
- Reduced acoustic noise
- Fire mode improves safety in HVAC systems

Load-dependent capacity control and Automatic Energy Optimization save energy and reduce audible noise in ventilation systems in engine rooms, galleys, thruster rooms, cargo, pump rooms, defroster systems, dehumidifiers and cargo-room refrigeration. In the event of fire, the fans will maintain smoke extraction under all conditions running in fire mode.

Thrusters

- Safe and precise maneuverability
- 20-30% energy savings compared to variable pitch thrusters
- Low maintenance cost

Danfoss drives' high torque capabilities and their fast and accurate performance provide precise maneuverability in all seas.

Danfoss drive-controlled variable speed propellers with fixed pitch are typically 20-30% more energy efficient than fixed-speed variable-pitch propellers – which waste approximately 20% of the power at zero thrust.

Frequency-controlled variable-speed propellers use 50% less energy than hydraulic variable-speed propellers.

Electrically-steered thrusters, gives more accurate control and responds more quickly than a hydraulic steering system. A minimum of two parallel motors and drives are always in use. If one combination stops, the steering system continues to operate.

Winch

- No risk of hydraulic fluid leakages
- Low energy consumption and no stand-by losses
- Low acoustic noise level

Compared to hydraulic systems, electrical motors controlled by a Danfoss drive provide substantial energy savings, low noise operation and no risk of hydraulic oil leaks. Drives enable excellent speed and tension control and load sharing with several motors driving the same winch.

Advanced mechanical brake control eases stress on both gear and brake, while automatic DC hold preheating keeps the motor dry in standby mode. Robust open-loop control eliminates the need for fragile encoders in open deck environments. To enhance reliability, use highly dynamic active heave compensation functionality, which actively maintain a steady position of the load.

Steering gear

- Fast and precise rudder positioning
- Extremely safe due to live back-up system
- More than 70% energy savings compared to fixed speed hydraulic pump system

With variable-speed control, it is possible to achieve accurate rudder positioning, enabling a precise analog control system. In rotary-vane steering gear with reversible hydraulic pumps, use a Danfoss drive to change speed and direction, saving energy by only running when the vessel is changing course.

AC drives for marine applications

VLT® drives have proved their worth in demanding applications all over the world, for decades. They also offer distinct advantages in marine applications.

VLT® AutomationDrive

The VLT® AutomationDrive FC 302 is a single drive concept that covers the entire range of marine applications. Designed to provide control, stability and efficiency, the drive ensures that applications such as thrusters, winches, hoists and steering gear function reliably in all conditions.

Featuring high torque capabilities with overload as high as 160%, the VLT® AutomationDrive always takes firm grip on its application. Often, the strength of the drive will enable owners to eliminate other components.

VLT® HVAC Drive

Reduce energy consumption and increase energy efficiency in HVAC applications. VLT® HVAC Drive FC 102 provides precise and intelligent control of on-board pumps, fans and compressors.

All functions are built into the drive upon delivery and save space while enabling easy installation. The integrated Automatic Energy Optimizer function can save an additional 5-15% more energy through advanced control of the application in question. Due to the fact that the drive supports a wide range of HVAC protocols, the VLT® HVAC Drive reduces the need for extra gateway solutions.

VLT®AQUA Drive

Optimized for on-board, water and wastewater applications the VLT® AQUA Drive FC 202 provides optimized, energy-saving operation of pumps and fans.

Featuring dedicated pump features, such as auto-tuning of PI controllers, the drive monitors and learns how the system reacts to corrections made by the drive to quickly achieve precise and stable operation.



Products

Type code power	VLT® HVAC Drive FC 102	VLT® AQUA Drive FC 202		Type code power	VLT® AutomationDrive FC 302		T2 200 – 240 V					T4 380 – 480 V T5 380 – 500 V					T7 525 – 690 V				
	Hp	Hp			Hp																
	NO[1]	NO[1]	HO[2]		NO[1]	HO[2]	IP20	IP21	IP54	IP55	IP66	IP20	IP21	IP54	IP55	IP66	IP20	IP21	IP54	IP55	IP66
PK25		0.33		PK25	0.33		A2	A2		A4/A5	A4/A5	A2	A2		A4/A5	A4/A5	A3	A3		B2	B2
PK37		0.5		PK37	0.5																
PK55		0.75		PK55	0.75																
PK75		1		PK75	1																
P1K1	1.5	1.5		P1K1	1.5																
P1K5	2	2		P1K5	2																
P2K2	3	3		P2K2	3																
P3K0	4	4		P3K0	4		A3	A3		A5	A5										
P3K7	5	5		P3K7	5																
P4K0	5.5	5.5		P4K0	5,5							A2	A2		A5	A5					
P5K5	7.5	7.5	5.5				B3	B1		B1	B1	A3	A3								
P7K5	10	10	7.5	P5K5	10	7.5															
P11K	15	15	10	P7K5	15	10						B3	B1		B1	B1					
P15K	20	20	15	P11K	20	15	B4	B2		B2	B2										
P18K	25	25	20	P15K	25	20						B4	B2		B2	B2	B4	B2		B2	B2
P22K	30	30	25	P18K	30	25	C3	C1		C1	C1										
P30K	40	40	30	P22K	40	30						C3	C1		C1	C1	C3	C2		C2	C2
P37K	50	50	40	P30K	50	40	C4	C2		C2	C2										
P45K	60	60	50	P37K	60	50						C4	C2		C2	C2	D3h	D1h/ D5h/ D6h	D1h/ D5h/ D6h		
P55K	75	75	60	P45K	75	60															
P75K/ N75K*	100	100	75	P55K	100	75						D3h	D1h/ D5h/ D6h	D1h/ D5h/ D6h							
P90K/ N90K*	125	125	100	P75K/ N75K*	125	100											D4h	D2h/ D7h/ D8h	D2h/ D7h/ D8h		
N110	150	150	125	N90K/ N90K*	150	125						D4h	D2h/ D5h/ D6h	D2h/ D7h/ D8h							
N132	200	200	150	N110	200	150															
N160	250	250	200	N132	250	200															
N200	300	300	250	N160	300	250															
N250	350	350	300	N200	350	300															
N315	450	450	350	N250	350	300															
N400*	550	550	450	N315	550	450															
N355	500	500	550	N400*	500	550						E3h	E1h	E1h							
N400	550	550	500	N355	550	500															
N450	600	600	550	N400	600	550															
N450*	600	600	600	N450	600	600											E3h	E1h	E1h		
N500*	650	650	600	N450*	650	600															
N500	650	650	650	N500*	650	650						E4h	E2h	E2h							
N560	750	750	650	N500	750	650															
N630/ P630**	750	900	750	N560	900	750							F1/F3	F1/F3			E4h	E2h	E2h		
N710/ P710**	900	1000	900	N630/ P630**	1000	900															
N800/ P800**	1000	1200	1000	N710/ P710**	1200	1000							F2/F4	F2/F4							
P1M0**	1200			P800/ 800**																	
P900				P1M0**														F1/F3	F1/F3		
P1M0*				P900																	
P1M2				P1M0*														F2/F4	F2/F4		
P1M4				P1M2																	

[1] Normal overload
[2] High overload
* @ 690 V
** @ 400 V

Note:
T4/T5: All ratings @ 400 V
T7: All ratings @ 690 V

- IP20/Chassis
- IP21/Type 1
- IP21 with upgrade kit
- IP54/Type 12
- IP55/Type 12
- IP66/NEMA 4X



Dimensions [mm]

	A2	A3	A4	A5	B1	B2	B3	B4	C1	C2	C3	C4	D1h	D2h	D3h	D4h	E1h	E2h	E3h	E4h	F1	F2	F3	F4
H	10.55		15.35	16.53	18.90	25.59	15.71	20.47	26.77	30.31	21.65	25.98	35.47	43.58	35.79	44.17	80.43	80.43	62.13	62.13	89.76	89.76	89.76	89.76
W	3.54	5.12	7.87	9.53			6.50	9.06	12.13	14.57	12.13	14.57	12.80	16.54	9.84	13.78	23.62	27.56	19.96	23.90	55.12	71.02	78.62	94.53
D	8.07		6.89	7.87	10.24		9.80	9.53	12.20	13.19	13.11		14.88		14.76		20.08	20.08	18.98	18.98	23.90	23.90	23.90	23.90
H+	14.76						18.70	26.38			29.72	37.40												
W+	3.57	5.12					6.49	10.04			12.95	15.39												

Note: H and W dimensions are with back-plate. H+ and W+ are with IP upgrade kit. D-frame dimensions are without options (extended versions).

AC drives for marine applications

VACON® 100 INDUSTRIAL

The VACON® 100 INDUSTRIAL serves a wide range of industrial applications. It is easy to integrate into systems and easy to adapt to different needs.

One drive - many applications
VACON® 100 INDUSTRIAL is full of smart features dedicated to a wide range of constant power/torque applications. It integrates easily into all major control systems and adapts quickly to different needs.

Easy integration
Integrated RS485 and Ethernet interfaces support all major industrial protocols. Save on extra cards – and use the same drive no matter what the protocol required.

Easy adaptation
Built-in PLC functionality enables you to create new functionality in the drive. The VACON® CUSTOMIZER facilitates smaller logic adaptations for special needs or retrofit situations.

High availability
Enjoy enhanced reliability due to long-life DC link capacitors which are electrolytic-free, using plastic foil technology.

Performance is ensured even after many years of storage.

VACON® 100 FLOW

Dedicated functionality helps you to improve flow control in industrial applications.

Dedicated flow control
In additional to general convenient usability and systems support functions, VACON® 100 FLOW provides specific flow-control functions to enhance pump and fan performance and protect pipes and equipment.

Connectivity included
No extra parts are required for connection to the leading industrial fieldbus systems, thanks to on-board RS485 and Ethernet interfaces as standard.

Run high-efficiency motors
Select the most efficient motor for your task, with the ability to run the new high-efficiency motor technologies, such as permanent magnet and synchronous reluctance motors.



AC drive type	Low overload VACON® FLOW, VACON® INDUSTRIAL		High overload VACON® INDUSTRIAL		Enclosure size
	Motor shaft power		Motor shaft power		
	230 V 40 °C [kW]	230 V 40 °C NEC [HP]	230 V 50 °C [kW]	230 V NEC 50 °C [HP]	
Mains voltage 208-240 V, 50/60 Hz					
VACON 0100-3L-0003-2-xxxx	0.55	0.75	0.37	0.5	MR4
VACON 0100-3L-0004-2-xxxx	0.75	1	0.55	0.75	
VACON 0100-3L-0007-2-xxxx	1.1	1.5	0.75	1	
VACON 0100-3L-0008-2-xxxx	1.5	2	1.1	1.5	
VACON 0100-3L-0011-2-xxxx	2.2	3	1.5	2	
VACON 0100-3L-0012-2-xxxx	3	4	2.2	3	
VACON 0100-3L-0018-2-xxxx	4	5	3	4	MR5
VACON 0100-3L-0024-2-xxxx	5.5	7.5	4	5	
VACON 0100-3L-0031-2-xxxx	7.5	10	5.5	7.5	
VACON 0100-3L-0048-2-xxxx	11	15	7.5	10	MR6
VACON 0100-3L-0062-2-xxxx	15	20	11	15	
VACON 0100-3L-0075-2-xxxx	18.5	25	15	20	MR7
VACON 0100-3L-0088-2-xxxx	22	30	18.5	25	
VACON 0100-3L-0105-2-xxxx	30	40	22	30	
VACON 0100-3L-0140-2-xxxx	37	50	30	40	MR8
VACON 0100-3L-0170-2-xxxx	45	60	37	50	
VACON 0100-3L-0205-2-xxxx	55	75	45	60	
VACON 0100-3L-0261-2-xxxx	75	100	55	75	MR9
VACON 0100-3L-0310-2-xxxx	90	125	75	100	

AC drive type	Low overload VACON® FLOW, VACON® INDUSTRIAL		High overload VACON® INDUSTRIAL		Enclosure size
	Motor shaft power		Motor shaft power		
	690 V 40 °C [kW]	600 V NEC/NEMA 40 °C [HP]	690 V 50 °C [kW]	600 V NEC/NEMA 50 °C [HP]	
Mains voltage 525-690 V, 50/60 Hz					
VACON 0100-3L-0007-7-xxxx	5.5	5	4	3	MR6
VACON 0100-3L-0010-7-xxxx	7.5	7.5	5.5	5	
VACON 0100-3L-0013-7-xxxx	11	10	7.5	7.5	
VACON 0100-3L-0018-7-xxxx	15	15	11	10	
VACON 0100-3L-0022-7-xxxx	18.5	20	15	15	
VACON 0100-3L-0027-7-xxxx	22	25	18.5	20	
VACON 0100-3L-0034-7-xxxx	30	30	22	25	
VACON 0100-3L-0041-7-xxxx	37	40	30	30	MR7
VACON 0100-3L-0052-7-xxxx	45	50	37	40	
VACON 0100-3L-0062-7-xxxx	55	60	45	50	
VACON 0100-3L-0080-7-xxxx	75	75	55	60	MR8
VACON 0100-3L-0100-7-xxxx	90	100	75	75	
VACON 0100-3L-0125-7-xxxx	110	125	90	100	
VACON 0100-3L-0144-7-xxxx	132	150	110	125	MR9
VACON 0100-3L-0170-7-xxxx	160	150	132	150	
VACON 0100-3L-0208-7-xxxx	200	200	160	150	
VACON 0100-3L-0261-7-xxxx	250	250	200	200	MR10
VACON 0100-3L-0325-7-xxxx	315	300	250	250	
VACON 0100-3L-0385-7-xxxx	355	400	315	300	
VACON 0100-3L-0416-7-xxxx	400	450	355	300	
VACON 0100-3L-0460-7-xxxx	450	450	400	400	MR12
VACON 0100-3L-0520-7-xxxx	500	500	450	450	
VACON 0100-3L-0590-7-xxxx	560	600	500	500	
VACON 0100-3L-0650-7-xxxx	630	650	560	600	
VACON 0100-3L-0750-7-xxxx	710	700	630	650	
VACON 0100-3L-0820-7-xxxx	800	800	630	650	

AC drive type	Low overload VACON® FLOW, VACON® INDUSTRIAL		High overload VACON® INDUSTRIAL		Enclosure size
	Motor shaft power		Motor shaft power		
	400 V 40 °C [kW]	480 V NEC/NEMA 40 °C [HP]	400 V 50 °C [kW]	480 V NEC/NEMA 50 °C [HP]	
Mains voltage 380-500 V, 50/60 Hz					
VACON 0100-3L-0003-5-xxxx	1.1	1.5	0.75	1.0	MR4
VACON 0100-3L-0004-5-xxxx	1.5	2.0	1.1	1.5	
VACON 0100-3L-0005-5-xxxx	2.2	3.0	1.5	2.0	
VACON 0100-3L-0008-5-xxxx	3	4.0	2.2	3.0	
VACON 0100-3L-0009-5-xxxx	4	5.0	3	4.0	
VACON 0100-3L-0012-5-xxxx	5.5	7.5	4	5.0	
VACON 0100-3L-0016-5-xxxx	7.5	10.0	5.5	7.5	MR5
VACON 0100-3L-0023-5-xxxx	11	15.0	7.5	10.0	
VACON 0100-3L-0031-5-xxxx	15	20.0	11	15.0	
VACON 0100-3L-0038-5-xxxx	18.5	25.0	15	20.0	MR6
VACON 0100-3L-0046-5-xxxx	22	30.0	18.5	25.0	
VACON 0100-3L-0061-5-xxxx	30	40.0	22	30.0	
VACON 0100-3L-0072-5-xxxx	37	50	30	40	MR7
VACON 0100-3L-0087-5-xxxx	45	60	37	50	
VACON 0100-3L-0105-5-xxxx	55	75	45	60	
VACON 0100-3L-0140-5-xxxx	75	100	55	75	MR8
VACON 0100-3L-0170-5-xxxx	90	125	75	100	
VACON 0100-3L-0205-5-xxxx	110	150	90	125	
VACON 0100-3L-0261-5-xxxx	132	200	110	150	MR9
VACON 0100-3L-0310-5-xxxx	160	250	132	200	
VACON 0100-3L-0385-5-xxxx	200	300	160	250	MR10
VACON 0100-3L-0460-5-xxxx	250	350	200	300	
VACON 0100-3L-0520-5-xxxx	250	450	250	350	
VACON 0100-3L-0590-5-xxxx	315	500	250	450	
VACON 0100-3L-0650-5-xxxx	355	500	315	500	MR12
VACON 0100-3L-0730-5-xxxx	400	600	355	500	
VACON 0100-3L-0820-5-xxxx	450	700	400	600	
VACON 0100-3L-0920-5-xxxx	500	800	450	700	
VACON 0100-3L-1040-5-xxxx	560	900	500	800	
VACON 0100-3L-1180-5-xxxx	630	1000	500	800	



Dimensions

Enclosure size	IP21 and IP54		IP00		Enclosed drive IP21 and IP54	
	W x H x D		W x H x D		W x Hx D	
	mm	inch	mm	inch	mm	inch
MR4	128 x 328 x 190	5.04 x 12.91x7.48				
MR5	144 x 419 x 214	5.67 x 16.5 x 8.43				
MR6	195 x 557 x 229	7.68 x 21.93 x 9.02				
MR7	237 x 645 x 259	10.2 x 25.98 x 10.2				
MR8	290 x 996 x 343	11.42 x 39.21 x 13.5	290 x 794 x 343	11.42 x 31.26 x 13.5	406 x 2100 x 600	16.0 x 82.7 x 23.6
MR9	480 x 1150 x 365	18.9 x 45.28 x 14.37	480 x 840.5 x 365	18.9 x 33.09 x 14.37	606 x 2100 x 600	23.9 x 82.7 x 23.6
MR10			506 x 980 x 525**	19.92 x 38.58 x 20.67**	606 x 2100 x 600	23.9 x 82.7 x 23.6
MR12			2 x (506 x 980 x 525)**	2 x (19.92 x 38.58 x 20.67)**	1212 x 2100 x 600	47.7 x 82.7 x 23.6
MM4*	190.7 x 315.3 x 213.8	7.51 x 12.41 x 8.42				
MM5*	232.6 x 267.4 x 230.8	9.16 x 14.46 x 9.08				
MM6*	349.5 x 499.8 x 254.2	13.76 x 19.68 x 10				

* *Depth with panel / ** Without extension box*

AC drives for marine applications

VACON® NXP Air Cooled

With a wide power range, the VACON® NXP Air Cooled drive is the ideal drive for enhanced performance for marine and offshore applications.

Top performance
With VACON® NXP control flexibility, you obtain maximum motor control performance combined with easy usability.

Fully configurable I/O and fieldbuses cater for any connectivity need. Fast drive-to-drive communication gives you the flexibility of load sharing and paralleling of power units.

High-power units are available in 6-pulse and 12-pulse versions.

Extremely flexible
Adapt the drive to many diverse usage requirements by loading the VACON® application software that best suits your needs. Built-in PLC functionality enables you to create new functionality in the drive.

VACON® NXC Air Cooled Enclosed

The VACON® NXC Air Cooled Enclosed Drive comprises a VACON® NXP drive which is cabinet-mounted, factory-tested and certified.

Easy to configure
Choose between a wide range of control and power options when ordering.

Select 6-pulse or 12-pulse supply compatibility as required. System integrators and panel builders will benefit from easy integration ability, pre-tested cabinet solutions and many control benefits.

Safety first
Ensure safe and easy installation by choosing this enclosed drive, which is delivered pre-mounted in its own cabinet, fully factory-tested and certified. It is internally protected against unintentional human contact.

Access to the control equipment is easy and safe, due to the dedicated control compartment located at the front of the cabinet.



VACON® NXP wall-mounted

AC drive type	Motor shaft power 230 V / 400 V / 690 V				Enclosure size
	10% overload P (kW)	10% overload NEC/ NEMA P [HP]	50% overload P (kW)	50% overload NEC/ NEMA P [HP]	
Mains voltage 208-240 V, 50/60 Hz, 3~					
NXP 0003 2 A 2 H 1 S S S	0.55	0.75	0.37	0.5	FR4
NXP 0004 2 A 2 H 1 S S S	0.75	1	0.55	0.75	
NXP 0007 2 A 2 H 1 S S S	1.1	1.5	0.75	1	
NXP 0008 2 A 2 H 1 S S S	1.5	2	1.1	1.5	
NXP 0011 2 A 2 H 1 S S S	2.2	3	1.5	2	
NXP 0012 2 A 2 H 1 S S S	3	4	2.2	3	
NXP 0017 2 A 2 H 1 S S S	4	5	3	4	FR5
NXP 0025 2 A 2 H 1 S S S	5.5	7.5	4	5	
NXP 0031 2 A 2 H 1 S S S	7.5	10	5.5	7.5	
NXP 0048 2 A 2 H 1 S S S	11	15	7.5	10	FR6
NXP 0061 2 A 2 H 1 S S S	15	20	11	15	
NXP 0075 2 A 2 H 0 S S S	22	30	15	20	FR7
NXP 0088 2 A 2 H 0 S S S	22	30	22	25	
NXP 0114 2 A 2 H 0 S S S	30	40	22	30	
NXP 0140 2 A 2 H 0 S S S	37	50	30	40	FR8
NXP 0170 2 A 2 H 0 S S S	45	60	37	50	
NXP 0205 2 A 2 H 0 S S S	55	75	45	60	
NXP 0261 2 A 2 H 0 S S F	75	100	55	75	FR9
NXP 0300 2 A 2 H 0 S S F	90	125	75	100	
Mains voltage 380-500 V, 50/60 Hz, 3~					
NXP 0003 5 A 2 H 1 S S S	1.1	1.5	0.75	1.0	FR4
NXP 0004 5 A 2 H 1 S S S	1.5	2.0	1.1	1.5	
NXP 0005 5 A 2 H 1 S S S	2.2	3.0	1.5	2.0	
NXP 0007 5 A 2 H 1 S S S	3	4.0	2.2	3.0	
NXP 0009 5 A 2 H 1 S S S	4	5.0	3	4.0	
NXP 0012 5 A 2 H 1 S S S	5.5	7.5	4	5.0	
NXP 0016 5 A 2 H 1 S S S	7.5	10.0	5.5	7.5	FR5
NXP 0022 5 A 2 H 1 S S S	11	15.0	7.5	10.0	
NXP 0031 5 A 2 H 1 S S S	15	20.0	11	15.0	
NXP 0038 5 A 2 H 1 S S S	18.5	25.0	15	20.0	FR6
NXP 0045 5 A 2 H 1 S S S	22	30.0	18.5	25.0	
NXP 0061 5 A 2 H 1 S S S	30	40.0	22	30.0	
NXP 0072 5 A 2 H 0 S S S	37	50	30	40	FR7
NXP 0087 5 A 2 H 0 S S S	45	60	37	50	
NXP 0105 5 A 2 H 0 S S S	55	75	45	60	
NXP 0140 5 A 2 H 0 S S S	75	100	55	75	FR8
NXP 0168 5 A 2 H 0 S S S	90	125	75	100	
NXP 0205 5 A 2 H 0 S S S	110	150	90	125	
NXP 0261 5 A 2 H 0 S S F	132	200	110	150	FR9
NXP 0300 5 A 2 H 0 S S F	160	250	132	200	
Mains voltage 525-690 V, 50/60 Hz, 3~					
NXP 0004 6 A 2 L 0 S S S	3	4.0	2.2	3.0	FR6
NXP 0005 6 A 2 L 0 S S S	4	5.0	3	4.0	
NXP 0007 6 A 2 L 0 S S S	5.5	7.5	4	5.0	
NXP 0010 6 A 2 L 0 S S S	7.5	10.0	5.5	7.5	
NXP 0013 6 A 2 L 0 S S S	11	15.0	7.5	10.0	
NXP 0018 6 A 2 L 0 S S S	15	20.0	11	15.0	
NXP 0022 6 A 2 L 0 S S S	18.5	25.0	15	20.0	
NXP 0027 6 A 2 L 0 S S S	22	30.0	18.5	25.0	
NXP 0034 6 A 2 L 0 S S S	30	40.0	22	30.0	
NXP 0041 6 A 2 L 0 S S S	37.5	50.2	30	40	FR7
NXP 0052 6 A 2 L 0 S S S	45	60	37.5	50.2	
NXP 0062 6 A 2 L 0 S S S	55	75	45	60	FR8
NXP 0080 6 A 2 L 0 S S S	75	100	55	75	
NXP 0100 6 A 2 L 0 S S S	90	125	75	100	
NXP 0125 6 A 2 L 0 S S F	110	150	90	125	FR9
NXP 0144 6 A 2 L 0 S S F	132	200	110	150	
NXP 0170 6 A 2 L 0 S S F	160	250	132	200	
NXP 0208 6 A 2 L 0 S S F	200	300	160	250	

VACON® NXP drive module

AC drive type	Motor shaft power 400 V / 690 V				Enclosure size
	10% overload P (kW)	10% overload NEC/ NEMA P [HP]	50% overload P [HP]	50% overload NEC/ NEMA P [HP]	
Mains voltage 380-500 V, 50/60 Hz, 3~					
NXP 0385 5 A 0 N 0 SSA	200	268.1	160	214.5	FR10
NXP 0460 5 A 0 N 0 SSA	250	335.1	200	268.1	
NXP 0520 5 A 0 N 0 SSA	250	335.1	250	335.1	
NXP 0590 5 A 0 N 0 SSA	315	422.3	250	335.1	FR11
NXP 0650 5 A 0 N 0 SSA	355	475.9	315	422.3	
NXP 0730 5 A 0 N 0 SSA	400	536.2	355	475.9	
NXP 0820 5 A 0 N 0 SSA	450	603.2	400	536.2	FR12
NXP 0920 5 A 0 N 0 SSA	500	670.2	450	603.2	
NXP 1030 5 A 0 N 0 SSA	560	750.7	500	670.2	
NXP 1150 5 A 0 N 0 SSF	630	844.5	560	750.7	FR13
NXP 1300 5 A 0 N 0 SSF [1]	710	951.7	630	844.5	
NXP 1450 5 A 0 N 0 SSF [1]	800	1072	710	951.7	
NXP 1770 5 A 0 N 0 SSF	1000	1340.5	900	1206	FR14
NXP 2150 5 A 0 N 0 SSF	1200	1608.6	1100	1474.5	
Mains voltage 525-690 V, 50/60 Hz, 3~					
NXP 261 6 A 0 N 0 SSA	250	335.1	200	268.1	FR10
NXP 325 6 A 0 N 0 SSA	315	422.3	250	335.1	
NXP 385 6 A 0 N 0 SSA	355	475.9	315	422.3	
NXP 416 6 A 0 N 0 SSA*	400	536.2	315	422.3	
NXP 460 6 A 0 N 0 SSA	450	603.2	355	475.9	FR11
NXP 502 6 A 0 N 0 SSA	500	670.2	450	603.2	
NXP 590 6 A 0 N 0 SSA*	560	750.7	500	670.2	
NXP 650 6 A 0 N 0 SSA	630	844.5	560	750.7	FR12
NXP 750 6 A 0 N 0 SSA	710	951.7	630	844.5	
NXP 820 6 A 0 N 0 SSA*	800	1072	630	951.7	
NXP 920 6 A 0 N 0 SSF	900	1206	800	1072	FR13
NXP 1030 6 A 0 N 0 SSF	1000	1340.5	900	1206	
NXP 1180 6 A 0 N 0 SSF*	1150	1541.6	1000	1340.5	
NXP 1500 6 A 0 N 0 SSF [2]	1500	2010.7	1300	1742.6	FR14
NXP 1900 6 A 0 N 0 SSF	1800	2412.9	1500	2010.7	
NXP 2250 6 A 0 N 0 SSF*	2000	2680	1800	2412.9	

** Max. ambient temperature of +35 °C*
1) 12-pulse units, 4 x (497 x 449 x 249/130)
2) 12-pulse units, 2 x (354 x 319 x 230/53 kg)

VACON® NXP standalone

AC drive type	Motor shaft power 400 V / 690 V				Enclosure size
	10% overload P [kW]	10% overload NEC/ NEMA P [HP]	50% overload P [kW]	50% overload NEC/ NEMA P [HP]	
Mains voltage 380-500 V, 50/60 Hz, 3~					
NXP 0385 5 A 2 L 0 SSA	200	268.1	160	214.5	FR10
NXP 0460 5 A 2 L 0 SSA	250	335.1	200	268.1	
NXP 0520 5 A 2 L 0 SSA	250	335.1	250	335.1	
NXP 0590 5 A 2 L 0 SSA	315	422.3	250	335.1	FR11
NXP 0650 5 A 2 L 0 SSA	355	475.9	315	422.3	
NXP 0730 5 A 2 L 0 SSA	400	536.2	355	475.9	
Mains voltage 525-690 V, 50/60 Hz, 3~					
NXP 261 6 A 2 L 0 SSA	250	335.1	200	268.1	FR10
NXP 325 6 A 2 L 0 SSA	315	422.3	250	335.1	
NXP 385 6 A 2 L 0 SSA	355	475.9	315	422.3	
NXP 416 6 A 2 L 0 SSA*	400	536.2	315	422.3	
NXP 460 6 A 2 L 0 SSA	450	603.2	355	475.9	FR11
NXP 502 6 A 2 L 0 SSA	500	670.2	450	603.2	
NXP 590 6 A 2 L 0 SSA*	560	750.7	500	670.2	

** Max. ambient temperature of +35 °C*

Dimensions

Enclosure size	Height		Width		Depth	
	mm	inch	mm	inch	mm	inch
FR4	327	12.87	128	5.04	190	7.48
FR5	419	16.5	144	5.67	214	8.43
FR6	558	21.97	195	7.68	237	9.33
FR7	630	24.8	237	9.33	257	10.12
FR8	758	29.88	291	11.47	344	13.54
FR9	1150	45.28	480	18.9	362	14.25
FR10	2018	79.45	595	23.43	602	23.70
FR11	2018	79.45	794	31.26	602	23.70
FR12	2275	89.57	1206	47.48	605	23.82
FR13	2275	89.57	1406	55.35	605	23.82
FR14	2275	89.57	2406 2806	94.72 110.47	605	23.82



AC drives for marine applications

VACON® NXC Low Harmonic

With a built-in active filter, the VACON® NXC Low Harmonic drive is the ideal choice for the most demanding power quality requirements.

Harmonics compliance

There is no need for additional harmonics mitigation, since the drive already complies with regulatory standards and requirements for power quality in electrical networks.

Save infrastructure costs

The low total current distortion (THDi) of the supply power contributes to a considerably lower supply current. As a result, the dimensions of fuses, supply cables and supply transformers can be kept optimal. And, as there's no need to oversize cables and transformers, you can achieve up to 30% savings on network infrastructure costs in both new and retrofit projects.

VACON® NXP Liquid Cooled

Active front-end (AFE)

The AFE unit is ideal for a wide range of applications where there is a need for energy regeneration.

Regenerative braking

The most significant benefits of an AFE unit come when the drive is used with applications with a braking need – such as cranes. The braking energy can be fed back to the mains to be effectively used elsewhere.

Clean power

Enjoy the benefits of a clean power supply, with virtually harmonics-free input current. AFE technology reduces the THDi to less than 5%.

Non-regenerative front-end (NFE)

The NFE unit is a unidirectional (motoring) power converter for the front-end of a common DC bus drive line-up. A dedicated external choke is used at the input.

Multi-pulse option for lower harmonics

This unit is suitable as a 6- or 12-pulse rectifying device when no regeneration to the mains is required. Connect NFE units in parallel to increase power without any drive-to-drive commutation between the units.





VACON® NXC Low Harmonic

AC drive type	Motor shaft power 400 V/690 V				Enclosure size
	10% overload P [kW]	10% overload NEC/NEMA P [HP]	50% overload P [kW]	50% overload NEC/NEMA P [HP]	
Mains voltage 380-500 V, 50/60 Hz					
NXC 0261 5 A 2 L 0 RSF	132	176.9	110	147.5	AF9
NXC 0300 5 A 2 L 0 RSF	160	214.5	132	176.9	
NXC 0385 5 A 2 L 0 RSF	200	268	160	214.5	AF10
NXC 0460 5 A 2 L 0 RSF	250	335	200	268	
NXC 0520 5 A 2 L 0 RSF	250	335	250	335	
NXC 0650 5 A 2 L 0 RSF	355	475.9	315	422	AF12
NXC 0730 5 A 2 L 0 RSF	400	536	355	475.9	
NXC 0820 5 A 2 L 0 RSF	450	603	400	536	
NXC 0920 5 A 2 L 0 RSF	500	670	450	603	
NXC 1030 5 A 2 L 0 RSF	560	750.7	500	670	
NXC 1150 5 A 2 L 0 RSF	630	844.5	560	750.7	AF13
NXC 1300 5 A 2 L 0 RSF	710	951.7	630	844.5	
NXC 1450 5 A 2 L 0 RSF	800	1072	710	951.7	
NXC 1770 5 A 2 L 0 RSF	1000	1340.5	900	1206	AF14
NXC 2150 5 A 2 L 0 RSF	1200	1608.6	1100	1474.5	
NXC 2700 5 A 2 L 0 RSF	1500	2010.7	1200	1608.6	
Mains voltage 525-690 V, 50/60 Hz					
NXC 0125 6 A 2 L 0 RSF	110	147.5	90	120.6	AF9
NXC 0144 6 A 2 L 0 RSF	132	176.9	110	147.5	
NXC 0170 6 A 2 L 0 RSF	160	214.5	132	176.9	
NXC 0208 6 A 2 L 0 RSF*	200	268	160	214.5	
NXC 0261 6 A 2 L 0 RSF	250	335	200	268	AF10
NXC 0325 6 A 2 L 0 RSF	315	422	250	335	
NXC 0385 6 A 2 L 0 RSF	355	475.9	315	422	
NXC 0416 6 A 2 L 0 RSF*	400	536	315	422	
NXC 0460 6 A 2 L 0 RSF	450	603	355	475.9	AF12
NXC 0502 6 A 2 L 0 RSF	500	670	450	603	
NXC 0590 6 A 2 L 0 RSF	560	750.7	500	670	
NXC 0650 6 A 2 L 0 RSF	630	844.5	560	750.7	
NXC 0750 6 A 2 L 0 RSF	710	951.7	630	844.5	
NXC 0820 6 A 2 L 0 RSF*	750	1005.4	650	871	
NXC 0920 6 A 2 L 0 RSF	900	1206	800	1072	AF13
NXC 1030 6 A 2 L 0 RSF	1000	1340.5	900	1206	
NXC 1180 6 A 2 L 0 RSF*	1150	1541.6	1000	1340.5	
NXC 1500 6 A 2 L 0 RSF	1500	2010.7	1300	1742.6	AF14
NXC 1900 6 A 2 L 0 RSF	1800	2412.9	1500	2010.7	
NXC 2250 6 A 2 L 0 RSF*	2000	2680	1800	2412.9	

** Max. ambient temperature of +35°C*

Dimensions VACON® NXC Low Harmonic

Enclosure size	Height		Width		Depth		Weight	
	mm	inch	mm	inch	mm	inch	kg	lb
AF9	2275	89.57	1006	39.61	605	23.82	680	1499.14
	2275	89.57	1006	39.61	605	23.82	680	1499.14
AF10	2275	89.57	1006	39.61	605	23.82	700	1543.24
	2275	89.57	1006	39.61	605	23.82	700	1543.24
	2275	89.57	1006	39.61	605	23.82	700	1543.24
AF12	2275	89.57	2006	78.98	605	23.82	1400	3086.47
	2275	89.57	2006	78.98	605	23.82	1400	3086.47
	2275	89.57	2006	78.98	605	23.82	1400	3086.47
	2275	89.57	2006	78.98	605	23.82	1400	3086.47
	2275	89.57	2006	78.98	605	23.82	1400	3086.47
AF13	2275	89.57	2206	86.85	605	23.82	1950	4299.01
	2275	89.57	2206	86.85	605	23.82	1950	4299.01
	2275	89.57	2206	86.85	605	23.82	1950	4299.01
AF14	2275	89.57	4406	173.46	605	23.82	3900	8598.03
	2275	89.57	4406	173.46	605	23.82	3900	8598.03
	2275	89.57	4406	173.46	605	23.82	3900	8598.03

VACON® NXA Liquid Cooled AFE

AC drive type	DC power				Enclosure size
	400 VAC mains I_{th} [kW]	500 VAC mains I_{th} [kW]	400 VAC mains I_L [kW]	500 VAC mains I_L [kW]	
DC bus voltage 465-800 VDC					
NXA01685A0T02WS	113	142	103	129	CH5
NXA02055A0T02WS	138	173	125	157	
NXA02615A0T02WS	176	220	160	200	
NXA03005A0T02WF	202	253	184	230	CH61
NXA03855A0T02WF	259	324	236	295	
NXA04605A0T02WF	310	388	282	352	CH62
NXA05205A0T02WF	350	438	319	398	
NXA05905A0T02WF	398	497	361	452	
NXA06505A0T02WF	438	548	398	498	
NXA07305A0T02WF	492	615	448	559	
NXA08205A0T02WF	553	691	502	628	CH63
NXA09205A0T02WF	620	775	563	704	
NXA10305A0T02WF	694	868	631	789	
NXA11505A0T02WF	775	969	704	880	
NXA13705A0T02WF	923	1154	839	1049	CH64
NXA16405A0T02WF	1105	1382	1005	1256	
NXA20605A0T02WF	1388	1736	1262	1578	
NXA23005A0T02WF	1550	1938	1409	1762	

AC drive type	DC power				Enclosure size
	525 VAC mains I_{th} [kW]	690 VAC mains I_{th} [kW]	525 VAC mains I_L [kW]	690 VAC mains I_L [kW]	
DC bus voltage 640-1100 VDC [1)]					
NXA01706A0T02WF	150	198	137	180	CH61
NXA02086A0T02WF	184	242	167	220	
NXA02616A0T02WF	231	303	210	276	
NXA03256A0T02WF	287	378	261	343	CH62
NXA03856A0T02WF	341	448	310	407	
NXA04166A0T02WF	368	484	334	439	
NXA04606A0T02WF	407	535	370	486	
NXA05026A0T02WF	444	584	403	530	
NXA05906A0T02WF	522	686	474	623	CH63
NXA06506A0T02WF	575	756	523	687	
NXA07506A0T02WF	663	872	603	793	
NXA08206A0T02WF	725	953	659	866	CH64
NXA09206A0T02WF	814	1070	740	972	
NXA10306A0T02WF	911	1197	828	1088	
NXA11806A0T02WF	1044	1372	949	1247	
NXA13006A0T02WF	1150	1511	1046	1374	
NXA15006A0T02WF	1327	1744	1207	1586	
NXA17006A0T02WF	1504	1976	1367	1796	

[1)] DC bus voltage 640-1200 VDC for wide range voltage version (NX_8)

Dimensions VACON® NXA Liquid Cooled AFE

Enclosure size	W x H x D [inch]
CH5	9.68 x 21.77 x 10.39
CH61	9.68 x 25.91 x 14.72
CH62	9.68 x 25.91 x 14.72
CH63	19.88 x 36.34 x 14.76
CH64	29.37 x 36.34 x 14.76



AC drives for marine applications

VACON® NXP Liquid Cooled

This dedicated liquid-cooled drive is well-suited to applications where air quality is critical, space is limited, and efficient heat transfer is required.

Compact

No need for air ducts or large fans, combined with a more compact enclosure, mean you achieve a high power density in your installation – and virtually silent operation.

Achieve cost savings

Save on both investment and operating costs, since there is no need for large air-conditioning systems to remove heat. Achieve maximum uptime, because the drive operates reliably even in demanding conditions. There is no need for air filtering in dusty conditions.

Highest control flexibility

The drive utilizes the full VACON® NXP family control functionality to achieve modularity and scalability in your application.

VACON® NXP Liquid Cooled AC drives, 6-pulse and 12-pulse, mains voltage 400-500 VAC

AC drive type 6-pulse	AC drive type 12-pulse	Motor shaft power		Enclosure size
		Optimum motor at I_{th} (400 V) [kW]	Optimum motor at I_{th} (500 V) [kW]	
NXP00165A0N1SWS		7.5	11	CH3
NXP00225A0N1SWS		11	15	
NXP00315A0N1SWS		15	18.5	
NXP00385A0N1SWS		18.5	22	
NXP00455A0N1SWS		22	30	
NXP00615A0N1SWS		30	37	
NXP00725A0N0SWS		37	45	CH4
NXP00875A0N0SWS		45	55	
NXP01055A0N0SWS		55	75	
NXP01405A0N0SWS		75	90	
NXP01685A0N0SWS		90	110	CH5
NXP02055A0N0SWS		110	132	
NXP02615A0N0SWS		132	160	
NXP03005A0N0SWF		160	200	CH61
NXP03855A0N0SWF		200	250	
NXP04605A0N0SWF	NXP04605A0N0TWF	250	315	CH72
NXP05205A0N0SWF	NXP05205A0N0TWF	250	355	
NXP05905A0N0SWF	NXP05905A0N0TWF	315	400	
NXP06505A0N0SWF	NXP06505A0N0TWF	355	450	
NXP07305A0N0SWF	NXP07305A0N0TWF	400	500	
NXP08205A0N0SWF		450	560	CH63
NXP09205A0N0SWF		500	600	
NXP10305A0N0SWF		560	700	
NXP11505A0N0SWF		600	750	
NXP13705A0N0SWF	NXP13705A0N0TWF	700	900	CH74
NXP16405A0N0SWF	NXP16405A0N0TWF	900	1100	
NXP20605A0N0SWF	NXP20605A0N0TWF	1100	1400	
NXP23005A0N0SWF		1250	1500	
NXP24705A0N0SWF	NXP24705A0N0TWF	1300	1600	2 x CH74
NXP29505A0N0SWF	NXP29505A0N0TWF	1550	1950	
NXP37105A0N0SWF	NXP37105A0N0TWF	1950	2450	
NXP41405A0N0SWF	NXP41405A0N0TWF	2150	2700	
2 x NXP24705A0N0SWF	2 x NXP24705A0N0TWF	2450	3050	4 x CH74
2 x NXP29505A0N0SWF	2 x NXP29505A0N0TWF	2900	3600	
2 x NXP37105A0N0SWF	2 x NXP37105A0N0TWF	3600	4500	
2 x NXP41405A0N0SWF	2 x NXP41405A0N0TWF	4100	5150	



VACON® NXP Liquid Cooled AC drives, 6-pulse and 12-pulse, mains voltage 525-690 VAC

AC drive type 6-pulse	AC drive type 12-pulse	Motor shaft power		Enclosure size
		Optimum motor at I_{th} (525 V) [kW]	Optimum motor at I_{th} (690 V) [kW]	
NXP01706A0T0SWF		110	160	CH61
NXP02086A0T0SWF		132	200	
NXP02616A0T0SWF		160	250	
NXP03256A0T0SWF	NXP03256A0T0TWF	200	300	CH72
NXP03856A0T0SWF	NXP03856A0T0TWF	250	355	
NXP04166A0T0SWF	NXP04166A0T0TWF	250	355	
NXP04606A0T0SWF	NXP04606A0T0TWF	300	400	
NXP05026A0T0SWF	NXP05026A0T0TWF	355	450	
NXP05906A0T0SWF		400	560	CH63
NXP06506A0T0SWF		450	600	
NXP07506A0T0SWF		500	700	
NXP08206A0T0SWF	NXP08206A0T0TWF	560	800	CH74
NXP09206A0T0SWF	NXP09206A0T0TWF	650	850	
NXP10306A0T0SWF	NXP10306A0T0TWF	700	1000	
NXP11806A0T0SWF	NXP11806A0T0TWF	800	1100	
NXP13006A0T0SWF	NXP13006A0T0TWF	900	1200	
NXP15006A0T0SWF	NXP15006A0T0TWF	1050	1400	
NXP17006A0T0SWF	NXP17006A0T0TWF	1150	1550	
NXP18506A0T0SWF	NXP18506A0T0TWF	1250	1650	2 x CH74
NXP21206A0T0SWF	NXP21206A0T0TWF	1450	1900	
NXP23406A0T0SWF	NXP23406A0T0TWF	1600	2100	
NXP27006A0T0SWF	NXP27006A0T0TWF	1850	2450	
NXP31006A0T0SWF	NXP31006A0T0TWF	2150	2800	
2 x NXP18506A0T0SWF	2 x NXP18506A0T0TWF	2400	3150	4 x CH74
2 x NXP21206A0T0SWF	2 x NXP21206A0T0TWF	2750	3600	
2 x NXP23406A0T0SWF	2 x NXP23406A0T0TWF	3050	3950	
2 x NXP27006A0T0SWF	2 x NXP27006A0T0TWF	3500	4600	
2 x NXP31006A0T0SWF	2 x NXP31006A0T0TWF	4050	5300	



VACON® NXP Liquid Cooled inverter units, DC bus voltage 465-800 VDC

AC drive type	Motor shaft power		Enclosure size
	Optimum motor at I_{th} (540 VDC) [kW]	Optimum motor at I_{th} (675 VDC) [kW]	
NXP00165A0T1IWS	7.5	11	CH3
NXP00225A0T1IWS	11	15	
NXP00315A0T1IWS	15	18.5	
NXP00385A0T1IWS	18.5	22	
NXP00455A0T1IWS	22	30	
NXP00615A0T1IWS	30	37	
NXP00725A0T0IWS	37	45	CH4
NXP00875A0T0IWS	45	55	
NXP01055A0T0IWS	55	75	
NXP01405A0T0IWS	75	90	
NXP01685A0T0IWS	90	110	CH5
NXP02055A0T0IWS	110	132	
NXP02615A0T0IWS	132	160	
NXP03005A0T0IWF	160	200	CH61
NXP03855A0T0IWF	200	250	
NXP04605A0T0IWF	250	315	CH62
NXP05205A0T0IWF	250	355	
NXP05905A0T0IWF	315	400	
NXP06505A0T0IWF	355	450	
NXP07305A0T0IWF	400	500	
NXP08205A0T0IWF	450	560	CH63
NXP09205A0T0IWF	500	600	
NXP10305A0T0IWF	560	700	
NXP11505A0T0IWF	600	750	
NXP13705A0T0IWF	700	900	CH64
NXP16405A0T0IWF	900	1100	
NXP20605A0T0IWF	1100	1400	
NXP23005A0T0IWF	1250	1500	
NXP24705A0T0IWF	1300	1600	2 x CH64
NXP29505A0T0IWF	1550	1950	
NXP37105A0T0IWF	1950	2450	
NXP41405A0T0IWF	2150	2700	
2 x NXP24705A0T0IWF	2450	3050	4 x CH64
2 x NXP29505A0T0IWF	2900	3600	
2 x NXP37105A0T0IWF	3600	4500	
2 x NXP41405A0T0IWF	4100	5150	

The voltage classes for the inverter units used in the tables above have been defined as follows:
Input 540 VDC = Rectified 400 VAC supply
Input 675 VDC = Rectified 500 VAC supply

VACON® NXP Liquid Cooled enclosed drive

AC drive type	Electrical output power		Enclosure size
	Motor at I_{TH} (525 VAC) [kW]	Motor at I_{TH} (690 VAC) [kW]	
0820_6	560	800	CH64
0920_6	650	850	
1030_6	700	1000	
1180_6	800	1100	
1300_6	900	1200	
1500_6	1000	1400	
1700_6	1150	1550	

VACON® options for Liquid Cooled NXP Heat exchangers

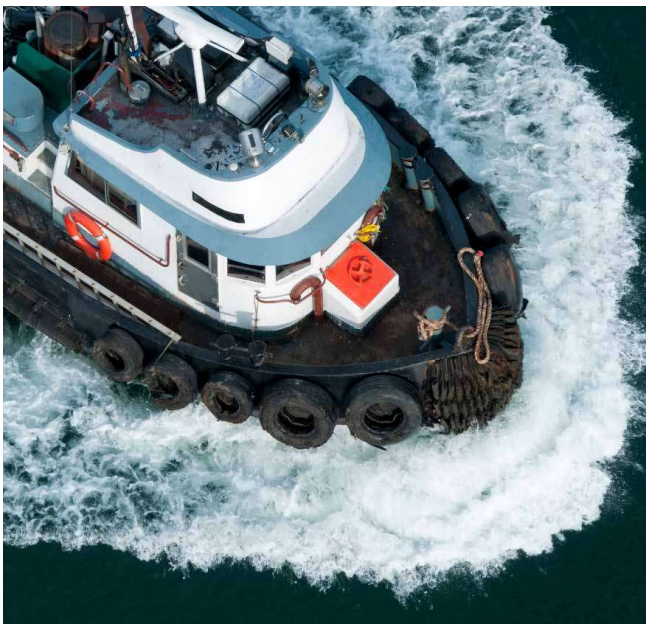
Product code	Description
HXM-M-120-N-S	Heat exchanger unit stand; up to 120 kW, 360 l/min; Stainless steel piping, 2-pump
HXM-M-300-N-S	Heat exchanger unit stand; up to 300 kW, 900 l/min; Stainless steel piping, 2-pump
HXM-R-120-N-S	Heat exchanger unit installed into Rittal TS8 cabinet; up to 120 kW, 360 l/min; Stainless steel piping, 2-pump
HXM-R-300-N-S	Heat exchanger unit installed into Rittal TS8 cabinet; up to 300 kW, 900 l/min; Stainless steel piping, 2-pump
HXM-V-120-N-S	Heat exchanger unit installed into VEDA cabinet; up to 120 kW, 360 l/min; Stainless steel piping, 2-pump

VACON® NXP Liquid Cooled inverter units, DC bus voltage 640-1100 VDC [1)]

AC drive type	Motor shaft power		Enclosure size
	Optimum motor at I_{th} (710 VDC) [kW]	Optimum motor at I_{th} (930 VDC) [kW]	
NXP01706A0T0IWF	110	160	CH61
NXP02086A0T0IWF	132	200	
NXP02616A0T0IWF	160	250	
NXP03256A0T0IWF	200	300	CH62
NXP03856A0T0IWF	250	355	
NXP04166A0T0IWF	250	355	
NXP04606A0T0IWF	300	400	
NXP05026A0T0IWF	355	450	
NXP05906A0T0IWF	400	560	CH63
NXP06506A0T0IWF	450	600	
NXP07506A0T0IWF	500	700	
NXP08206A0T0IWF	560	800	CH64
NXP09206A0T0IWF	650	850	
NXP10306A0T0IWF	700	1000	
NXP11806A0T0IWF	800	1100	
NXP13006A0T0IWF	900	1200	
NXP15006A0T0IWF	1050	1400	
NXP17006A0T0IWF	1150	1550	
NXP18506A0T0IWF	1250	1650	2 x CH64
NXP21206A0T0IWF	1450	1900	
NXP23406A0T0IWF	1600	2100	
NXP27006A0T0IWF	1850	2450	
NXP31006A0T0IWF	2150	2800	
2 x NXP18506A0T0IWF	2400	3150	4 x CH64
2 x NXP21206A0T0IWF	2750	3600	
2 x NXP23406A0T0IWF	3050	3950	
2 x NXP27006A0T0IWF	3500	4600	
2 x NXP31006A0T0IWF	4050	5300	

Dimensions [mm]

Frame size	W x H x D [inch]
CH3	
CH4	
CH5	9.68 x 21.77 x 10.39
CH61	9.68 x 25.91 x 14.72
CH62	9.68 x 25.91 x 14.72
CH63	19.88 x 36.34 x 14.76
CH64	29.37 x 36.34 x 14.76
CH72	
CH74	



AC drives for marine applications

VACON® NXP System Drive

The VACON® NXP System Drive provides a strong package, comprising the complete offering for enclosed common DC systems, supplied consistently and quickly.

Simplicity in your project
Using pre-designed sections enables a short engineering lead time. The systems are fully documented, and adaptable to the specifics of your project for easy implementation.

Reliability is key
You can rest assured that performance is absolutely reliable, with verified and tested solutions that combine VACON® AC drives, DC bus components and options.

Easy serviceability
Enjoy easy access with design for fast service. Safety is a priority with internal touch protection and high power busbar sections in separate compartments. Any problem which arises is contained, and does not cause widespread failure.

VACON® NXP Grid Converter

This range of air- and liquid-cooled drives is specifically designed for energy storage and marine energy management applications.

Reliable grid
By creating and maintaining a stable electrical power grid, a reliable grid is assured in all applications.

The VACON® NXP Grid Converter provides a reliable shore supply for ships in harbor, meaning no need to run on-board generators.

Save on fuel and emissions
Fuel savings and reduced emissions are the immediate benefits achieved by eliminating generators.

VACON® NXP DC/DC Converter

Utilizing any of the air- or liquid-cooled NXP inverter modules , the DC to DC converter includes a specific licensed firmware to provide DC power conversion.

Connect to other DC sources
The DC to DC converter allows common DC bus systems or individual drives to connect their DC bus to alternate DC sources such batteries or super capacitors to create hybrid systems.



VACON® NXP Grid Converter 465-800 VDC, type open, liquid-cooled, EMC Class T

Product code	DC power				Enclosure size
	400 VAC mains	500 VAC mains	400 VAC mains	500 VAC mains	
	I_{TH} [kW]	I_{TH} [kW]	I_L [kW]	I_L [kW]	
NXA02615A0T02WVA1A2000000+MASG	176	220	160	200	CH5
NXA03855A0T02WGA1A2000000+MASG	259	324	236	295	CH61
NXA05205A0T02WGA1A2000000+MASG	350	438	319	398	CH62
NXA07305A0T02WGA1A2000000+MASG	492	615	448	559	
NXA09205A0T02WGA1A2000000+MASG	620	775	563	704	CH63
NXA11505A0T02WGA1A2000000+MASG	775	969	704	880	
NXA16405A0T02WGA1A2000000+MASG	1105	1382	1005	1256	CH64
NXA23005A0T02WGA1A2000000+MASG	1550	1938	1409	1762	

VACON® NXP Grid Converter 640-(1200)* IP00, liquid-cooled, EMC Class T

Product code	DC power				Enclosure size
	525 VAC mains	690 VAC mains	525 VAC mains	690 VAC mains	
	I_{TH} [kW]	I_{TH} [kW]	I_L [kW]	I_L [kW]	
NXA02616A0T02WGA1A2000000+MASG	231	303	210	276	CH61
NXA03856A0T02WGA1A2000000+MASG	341	448	310	407	CH62
NXA05026A0T02WGA1A2000000+MASG	444	584	403	530	
NXA07506A0T02WGA1A2000000+MASG	663	872	603	793	CH63
NXA11806A0T02WGA1A2000000+MASG	1044	1372	949	1247	
NXA15006A0T02WGA1A2000000+MASG	1327	1744	1207	1586	CH64
NXA17006A0T02WGA1A2000000+MASG	1504	1976	1367	1796	

** With voltage class 8*

VACON® NXP Grid Converter 380-500 V, IP00 air-cooled, EMC Class T

Product code	Low overload 110% / 40°C		High overload 150% / 40°C		DC power		Enclosure size
	I_L-cont [A]	$I_{1\ min}$ [A]	$I_{H\text{-}cont}$ [A]	$I_{1\ min}$ [A]	400 VAC mains $P_{L\text{-}cont}$ [kW]	500 VAC mains $P_{L\text{-}cont}$ [kW]	
NXA02615A0T02SGA1A2000000+MASG	261	287	205	308	176	220	FI9
NXA04605A0T02SGA1A2000000+MASG	460	506	385	578	310	388	FI10
NXA13005A0T02SGA1A2000000+MASG	1300	1430	1150	1725	876	1092	FI13

VACON® NXP Grid Converter 525-690 V, IP00, air-cooled, EMC Class T

Product code	Low overload 110% / 40°C		High overload 150% / 40°C		DC power	Enclosure size
	I_L-cont [A]	$I_{1\ min}$ [A]	$I_{H\text{-}cont}$ [A]	$I_{1\ min}$ [A]	600 VAC mains $P_{L\text{-}cont}$ [kW]	
NXA01706A0T02SGA1A2000000+MASG	170	187	144	216	198	FI9
NXA03256A0T02SGA1A2000000+MASG	325	358	261	392	378	FI10
NXA10306A0T02SGA1A2000000+MASG	1030	1133	920	1380	1195	FI13

VACON® NXP Liquid Cooled dimensions: drives consisting of one module

Enclosure size	IP00
	W x H x D [inch]
CH3	6.3 x 17 x 9.7
CH4	7.6 x 19.4 x 10.1
CH5	9.68 x 21.77 x 10.3
CH60	9.7 x 26.5 x 14.7
CH61/62	9.68 x 25.91 x 14.72
CH63	19.88 x 36.34 x 14.76
CH64	29.37 x 36.34 x 14.76
CH72	9.7 x 42.4 x 14.6
CH74	29.4 x 46.3 x 15.2

VACON® NXP Air Cooled dimensions: drives consisting of one module

Enclosure size	IP00
	W x H x D [inch]
FI9	9.4 x 40.5 x 14.6
FI10	9.4 x 40.6 x 21.7
FI13	27.9 x 40.6 x 21.8





Certified solutions to control harmonics

- Advanced active filters
- Advanced harmonic filters
- Low harmonic drives
- 12-pulse drives
- Active front end drives

Adverse effects of harmonics

- Limitations on supply and network utilization
- Increased transformer, motor and cable heating
- Reduced equipment lifetime
- Costly equipment downtime
- Control system malfunctions
- Pulsating and reduced motor torque
- Audible noise

Harmonics mitigation

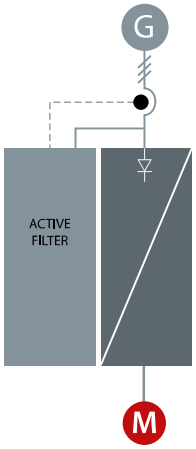
While AC drives increase precision, save energy and extend application lifetime, they also introduce harmonic currents to the on-board grid. If not kept under control, this can affect the performance and reliability of generators and other equipment and, ultimately, compromise safety.

Danfoss offers harmonic mitigation solutions to comply with the regulations imposed by marine certification bodies, which state that harmonics must be kept to 5 or 8% total harmonic voltage distortion (THDv) on the main busbar.

Danfoss has developed a wide range of mitigation solutions which can help restore weak networks, increase network capacity, and meet compact retrofit demands – or secure sensitive environments.

Low harmonic drives

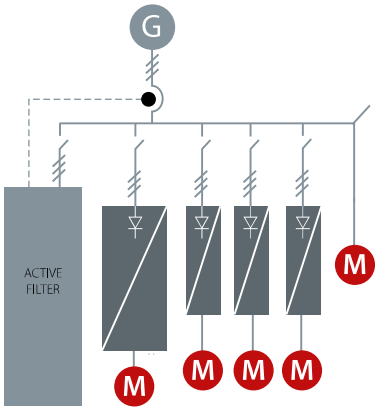
The VLT® and VACON® low harmonic drives continuously regulate the network and load conditions without affecting the connected motor. The drives combine the well-known performance and reliability of standard VLT® and VACON® drives with an Advanced Active Filter. The result is a powerful, motor-friendly solution that provides the highest possible harmonic mitigation with total harmonic current distortion (THDi) of maximum 5%.



Advanced active filters

Advanced active filters identify harmonic distortion from non-linear loads and inject counter-phase harmonic and reactive currents into the AC line to cancel out the distortion. The result is distortion levels of no more than 5% THDi. The optimal sinusoidal waveform of the AC power is restored and the power factor of the system is re-established at 1.

Advanced active filters follow the same design principles as all our other drives. The modular platform provides high energy efficiency, user-friendly operation, efficient cooling and high enclosure ratings.

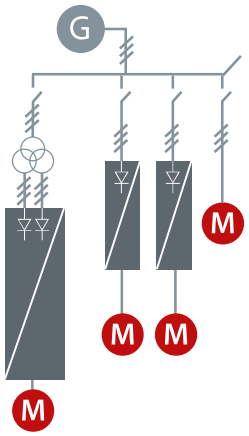


12-pulse drives

A robust and cost-effective harmonic solution for the higher power range, the Danfoss 12-pulse drive variants offer reduced harmonics for demanding industry applications above 250 kW.

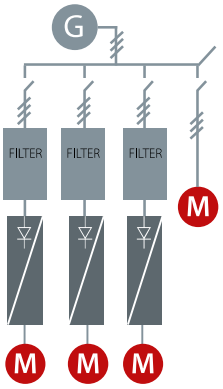
VLT® and VACON® 12-pulse drives are high efficiency AC drives which are built with the same modular design as the popular 6-pulse drives. The 12-pulse variant is available with similar drive options and accessories and can be configured according to your specific needs.

The VLT® and VACON® 12-pulse drives provide harmonic reduction without adding capacitive or inductive components which often require network analysis to avoid potential system resonance problems.



Advanced harmonic filters

The Danfoss harmonic filters are specially designed to be connected in front of a VLT® or VACON® drive, and ensure that the harmonic current distortion generated back to the mains is reduced to a minimum.
Easy commissioning saves installation costs, and due to the maintenance-free design, running expenses for the units are eliminated.



Active front-end drives

The clear advantage of active front-end (AFE) drives is that any back power generated can be used by other equipment on the vessel. This adds to the overall fuel saving and reduces costs in running equipment.
An AFE system is a regenerative power converter located at the front end of a common DC bus drive line-up, and is suitable in applications where:

- Low harmonics are required
- The frequency inverter load is up to 100% of the total generator capacity

The AFE system comprises two identical inverters with a common DC bus. There is one motor inverter and one supply inverter. The supply inverter works together with a tuned sinus filter, and the current distortion (THDi) at the supply is about 3-4%.
When an AFE system is installed, then the motor voltage can be increased above that of the network, because adjustment of the DC link voltage is enabled. Any excessive energy can be returned to the network as clean (active) power, rather than reactive power, which only produces heat.



We know Marine and Offshore

Working in the challenging world of the maritime and offshore industries, you demand a supplier who contributes to improving efficiency, safety and reliability while reducing total cost of ownership. Danfoss is a single supplier who delivers on all these criteria – and more.

For over 40 years, we have worked to make the marine industry safer and more efficient, by building and consolidating successful relationships with:

- Ship owner-operators
- Shipyards
- System integrators
- OEMs
- Naval design engineers
- Naval architects

Represented in all major marine hubs with full marine certification and global service, Danfoss is committed to creating a sustainable, competitive future for the marine industry.



VLT® and VACON® drives

Maximum uptime and efficiency

VLT® and VACON® drives are designed and built for maximum uptime and robust performance, which is critical in the marine business, where repair and maintenance must be kept to a minimum. Our drives have the highest number of class type approvals – from nine authorities. This gives you the best possible choice when selecting drives for your marine application.



High Pressure Pumps

Ultra-low energy consumption
Rugged construction

Danfoss' dedicated high-pressure pumps are built on decades of development experience to provide exceptional efficiency and reliability in seawater reverse osmosis applications. Small in size and unsurpassed in engineering quality, the Danfoss range of APP pumps is at the heart of more than 15,000 seawater reverse osmosis systems throughout the world.



Industrial Refrigeration

Precise temperature control and zero corrosion

The fishery industry requires fast, efficient and durable refrigeration solutions, both when at sea and during on-shore processing. Danfoss offers a wide range of stainless steel components for the fishery industry. These components make design easy, reduce maintenance, and lower operating costs, even at high pressure and in demanding marine conditions.



Industrial Automation

Increased efficiency throughout the entire ship

With a solid 40 years' marine expertise in control and monitoring solutions, Danfoss Industrial Automation offers the widest product portfolio in the market. Danfoss sensors, switches and fluid controls empower operators to sail smarter, faster and more efficiently. Our product portfolio put you in control of the processes that let you fine-tune performance. Controls for marine applications must be as dependable as they are safe. That's why the Danfoss range of controls have all achieved independent type approval and certification.



Danfoss IXA

Emission gas measurement

Danfoss IXA's marine emission sensor provides the marine industry with a solution that meets the constantly increasing focus on the environment, and regulations regarding emissions control that have followed from this. Built extremely robust and with cutting edge technology, the sensor enables ships to precisely- and continuously measure the environmentally harmful gases NOx, SO2 and NH3. These data provide valuable input for documentation and performance optimization.



Danfoss Semco

Leaders in marine firefighting

At sea, safety is paramount. With over 50 years of experience in designing and installing water mist, CO_2 and foam systems, Danfoss Semco is a global leader in delivering total solutions for certified fixed firefighting systems.



Hydronic Balancing and Control

Save fuel and installation costs and increase passenger comfort

Pressure-independent balancing and control valves ensure that the precise amount of cooling reaches passenger cabin fan coils and air handling units. Their linear control characteristic enables stable flow modulation to match demand, radically reducing energy used by chillers and pumps while providing higher comfort for passengers. No other HVAC solution is as efficient.



Sondex® Heat Exchangers

Highly efficient and service friendly heat exchangers

Our heat exchangers are designed for best possible thermal performance. On top of this, features developed over time ensure that our heat exchangers are easy to install and service. For example, we use the clever carrying- and guide bar, that ensures perfect alignment of the individual plates, while allowing good access during servicing. Our wide range of plate types are available in materials suitable for marine applications, with connections ranging from DN 25 up DN 650.



Power Solutions

Powerful hydraulics for highest efficiency and minimum downtime

When hydraulics and electronic controls are preferred, Danfoss Power Solutions offers the highest quality products and systems expertise to match your customers' demands. The broad portfolio includes rugged PVG load-sensing proportional valves for enhanced design flexibility and safety, powerful H1 axial piston pumps and bent axis motors for improved reliability and efficiency, and easy system integration and control with PLUS+1® microcontrollers and software. With Danfoss hydraulic marine solutions, you get the best of quality and a minimum of downtime.

ENGINEERING
TOMORROW

Danfoss products are **everywhere on the ship** – improving **efficiency, safety** and **reliability**

Cargo deck

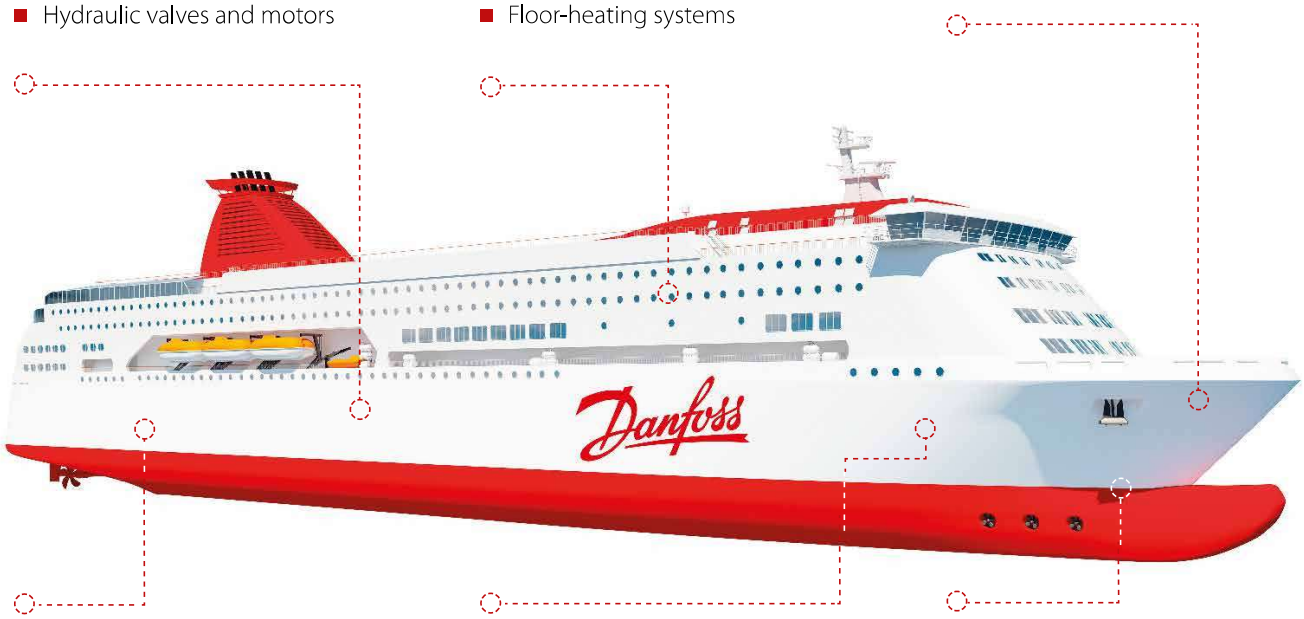
- Firefighting systems
- VLT® and VACON® drives
- Pressure and temperature sensors and controls
- Hydraulic valves and motors

Accommodation

- Control valves for air-conditioning
- Firefighting systems
- VLT® and VACON® drives
- Floor-heating systems

Winches

- VLT® and VACON® drives
- Hydraulic valves, motors and control systems



Engine room

- VLT® and VACON® drives
- Pressure and temperature sensors and controls
- IXA emission sensors
- Fluid controls
- Firefighting systems
- Hydraulic pumps, valves and motors
- Heat exchangers

Utilities

- High-pressure pumps
- VLT® and VACON® drives
- Pressure and temperature sensors and controls
- Fluid controls
- Refrigeration controls
- Firefighting systems
- Heat exchangers

Thrusters

- VLT® and VACON® drives
- Pressure and temperature sensors and controls
- Firefighting systems
- Hydraulic valves and motors

For further information please visit **www.marine.danfoss.com**

VLT® | VACON®

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