

VACON

DRIVEN BY DRIVES



VACON NXP LIQUID COOLED AC DRIVES
POWERFUL PERFORMANCE IN
EXTREME CONDITIONS



SAVING FUEL AT SEA

In the highly competitive marine sector, increased demand for efficiency is the main reason for using AC drives in fan, winch, propeller, and various special applications across all vessel types, from large luxury liners and cargo ships to tugboats.

QUIET. COMPACT. COOL.

VACON NXP liquid cooled drives are the ultimate in space-saving, high power density AC drives, well suited for locations where air-cooling is difficult, expensive or impractical or where installation space is at a premium. Their robust, modular design makes the VACON NXP a suitable platform for all drive needs in demanding applications and are available in the power range from 7.5 to 5300 kW at 380-690 VAC supply voltages.

POWER PACKED

As no air ducts are required, liquid cooled drives are extremely compact and suitable for a wide variety of heavy industries with harsh operating conditions such as marine & offshore, pulp & paper, renewable energy and mining & metal. The VACON NXP liquid cooled drive is an advanced AC drive for induction and permanent magnet motors.

As a high degree of protection (IP54 or higher) can easily be achieved with these drives, they can be installed almost anywhere in the plant/vessel. This significantly reduces the load on the air-conditioning system in the electrical rooms – an important cost and space consideration in many retrofit applications. And since liquid cooled drives do not require large cooling fans, they are also among the most silent AC drive on the market.

We are committed to providing you with the ultimate in high power density. VACON NXP liquid cooled products have one of the best power/size ratios on the market. For example, our compact 12 pulse, 1.5MW drive includes a built-in rectifier, inverter and optional brake all in same package and can be mounted in an 800mm wide enclosure. Once you've tried liquid cooled, you'll never look back.

IN HARMONY WITH THE ENVIRONMENT

Vacon is also committed to being an environmentally responsible company and our energy saving products and solutions are a good example of that. Our Vacon liquid cooled portfolio fulfills all relevant international standards and global requirements, including marine, safety and EMC & Harmonics approvals. Likewise, we continue to develop innovative solutions utilizing ie. regenerative energy and smart grid technology to help customers effectively monitor and control energy use and costs.

VACON AT YOUR SERVICE

Vacon drives are sold in over 100 countries, with production and R&D on 3 continents, sales offices in 27 countries and close to 90 service centers in over 50 locations worldwide.

Whether you are an original equipment manufacturer (OEM), system integrator, brand label customer, distributor or end user, Vacon provides services to help you meet your business targets. Our global service solutions are available 24/7 throughout the product lifecycle with the intent to minimize the total cost of ownership and environmental load.



VACON NXP LIQUID COOLED PRODUCT RANGE

WHAT'S IN IT FOR YOU

Typical segments	Key features	Benefits
<ul style="list-style-type: none"> Marine & offshore Metal 	Full power range from 7.5 to 5.3 MW for both induction motors and permanent magnet motors.	Same software tool, same control option boards allowing for maximum utilization of NXP features over a wide power range.
<ul style="list-style-type: none"> Renewable energy Mining & minerals 	Five built-in expansion slots for additional I/O, fieldbus and functional safety boards	No additional modules required. Option boards are compact and easy to install at any time
<ul style="list-style-type: none"> Water & wastewater 	Extensive range of ready-to-use applications for basic to demanding needs.	No additional software engineering required, saving time and money.
<ul style="list-style-type: none"> Power stations Pulp & paper Oil & gas 	High-tech liquid cooled AC drive design, heat loss can be transferred to most convenient place with no need for vast amount of filtered air.	Minimizes investment and operation costs as there is no need for large air conditioning systems. Liquid cooled AC drives installed in high IP class enclosures can be used in demanding environments.
<ul style="list-style-type: none"> Machine building 	Compact size and high power density	Possibility to engineer compact solutions that save on floor space and infrastructure needs.

TYPICAL APPLICATIONS

- Propulsion and thrusters systems
- Wind turbines
- Pumps & fans
- Cranes and winch systems
- Compressors
- Extruders
- Test bench systems
- Power conversion systems
- Production lines
- Oil rigs
- Crushers
- Conveyors

A DRIVING FORCE IN WIND ENERGY

Vacon products, including liquid cooled drives are essential components in windmill installations that convert kinetic energy produced by the rotating blades into AC power for the local electricity grid.

THE LIQUID WAY TO STAY COOL

When comparing cooling technology solutions, it is important to understand the effects on the infrastructure of the electrical room, and the room's requirements. Additional comparison parameters are the geographical location, relevant industry/segment and process.

CLIMATE CONSIDERATIONS

In warm climates it is extremely important to observe the amount of heat load transferred to the electrical room because it is in direct relationship to the electrical energy consumption.

The type-tested switchgears standard EN 60439-1 specifies that the electrical room's 24-hour average temperature should be below +35°C and the maximum temporary temperature cannot exceed +40°C. As a result, the cooling system in electrical rooms is typically comprised of air conditioning chillers, which are dimensioned according to the maximum heat load, the temperature inside the electrical room and the maximum temperature outdoors. The typical electrical energy consumption of air conditioning is approx. 25 - 33% of the cooling power.

The initial investment in liquid cooled AC drives technology is slightly higher than in air cooled AC drives

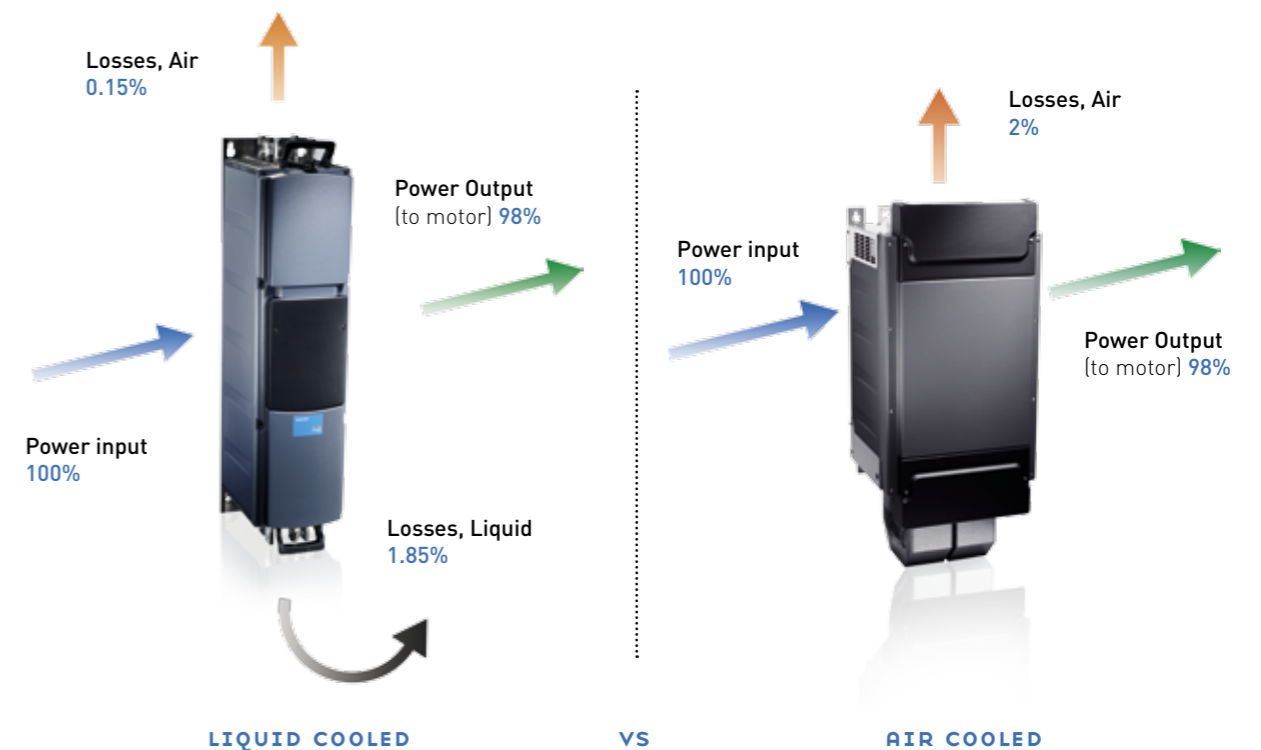
technology given the unique cooling pipe arrangements and heat exchanger systems. It is also important to consider that a heat exchanger should be compared with ventilation and air conditioning systems with ventilation ducts, ventilation machines and ventilation automation systems.

THE HIGHER THE POWER, THE GREATER THE SAVINGS

Since there is no requirement to provide additional air conditioning capacity or extra ventilation for the areas in which the drives are used, liquid cooled drives may therefore be the most cost-effective option. Likewise, the related savings enable shorter payback times and the higher the power, the greater the savings potential.

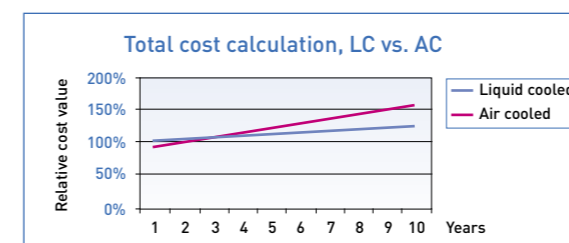
The electrical energy cost trend certainly supports a wider use of liquid cooled drives technology, and the number of on-shore installations is growing rapidly.

COOLING TECHNOLOGY ADVANTAGES



EXCLUSIVELY DESIGNED FOR LIQUID COOLING

The VACON NXP liquid cooled dissipates less than 5% of its total heat losses to air, only 0.1...0.15% of the drive rated load. A high-tech cooling heatsink enables better cooling efficiency and makes the cooling utilization ratio of the components higher than ever. Many other liquid cooled drives on the market are based on modifications of an air cooled drive, rather than exclusively designed for the purpose.



A 400 kW, 690 VAC liquid cooled drive is:

- 32 % of the volume of the air cooled drive
- 50 % of the width of the air cooled drive
- 70 % of the weight of the air cooled drive
- 20 dBA more silent than the air cooled drive



PURE PERFORMANCE

Speed and torque control must be accurate in order for many demanding production lines to reach optimum process control. Vacon AC drives have successfully been implemented in various applications across a wide spectrum of industries.

EXTENSIVE PRODUCT PORTFOLIO

Liquid cooled AC drives can be used in a multitude of combinations - from a single dedicated frequency converter to large-scale Common DC bus systems. With the right configuration, optimal performance and significant energy savings can be achieved.

DEDICATED FREQUENCY CONVERTER

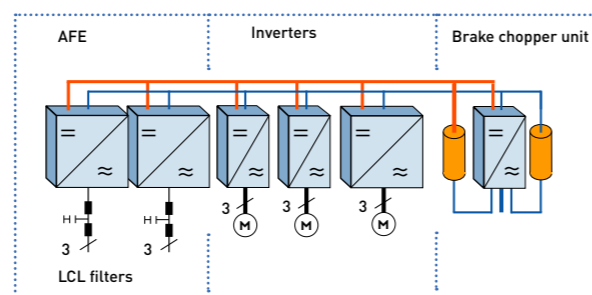
The Vacon liquid cooled single drives are available as 6- or 12-pulse frequency converters. Our largest unit, the CH74, can also be used as an 18-pulse converter. A frequency converter consists of a IP00 power unit, control unit and possibly one or more input chokes.

An internal brake chopper is available as standard for our smallest unit CH3. For CH72 (only 6-pulse) and CH74, it is available as internal option while in all other sizes the brake chopper is available as option and installed externally.

inverters, and controlled and monitored via fieldbus. Fuses, LCL filters, pre-charging rectifiers and resistors must be ordered and specified separately.

The LCL filter guarantees that harmonics are not an issue in any network. With a power factor > 0.99 and low harmonics, the supply chain transformers, generators, etc. can be sized very accurately without reserving margins for the reactive power. This can mean a saving of 10 % in supply chain investments. Likewise the payback time is faster as regenerative energy is fed back to the grid.

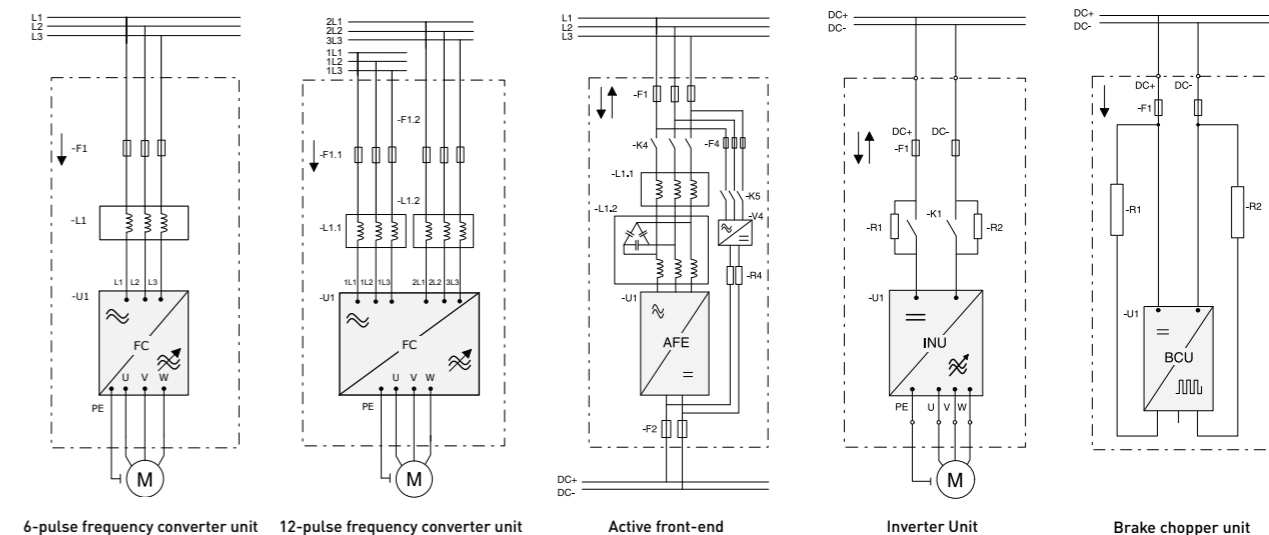
A regenerative common DC bus system



ACTIVE FRONT-END (AFE)

The AFE unit is a bi-directional (regenerative) power converter (supply unit) for the front-end of a common liquid cooled DC bus drive line-up. An external LCL filter is used at the input. This unit is suitable in applications where a low level of mains harmonics and high power factor are required. AFE units can operate in parallel to provide increased power and/or redundancy without any drive to drive communication between the units. AFE units can also be connected to the same fieldbus with

TYPICAL DEVICE CONFIGURATIONS



INVERTER UNIT (INU)

The INU is a bidirectional DC-fed power inverter for the supply and control of AC motors. The INU is supplied from a common DC bus drive line-up. A charging circuit is needed in case a connection to a live DC bus is required. The DC-side charging circuit is external for inverter types.

Pre-charging resistors and switches or fuses are not included in an INU delivery and must be specified and ordered separately.

BRAKE CHOPPER UNIT (BCU)

The BCU is unidirectional power converter for the supply of excessive energy from a common DC bus drive line-up or big single drive to resistors where the energy is dissipated as heat. External resistors are required. However, resistors or fuses are not included in a BCU delivery and must be specified and ordered separately.

BCU's improve drive dynamic performance in a load regenerative operating point and protect common DC bus voltage level from overvoltage. In some cases they also reduce the need for AFE investments.

MULTIPLE OPTIONS



VACON NXP CONTROL

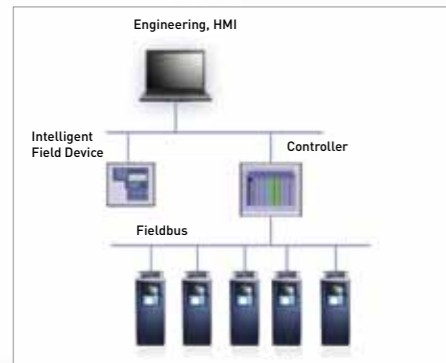
VACON NXP offers a high-performance control platform for all demanding drive applications. The micro controller provides both exceptional processing and calculation power. The VACON NXP supports both induction and permanent magnet motors in open and closed loop control modes. The VACON NXP features built-in PLC functionality without the need for any additional hardware. VACON NC61131-3 Engineering can be used to improve performance and create cost savings by integrating customer-specific functionality into the drive. The same control board is used in all NXP liquid cooled drives, allowing the maximum utilization of NXP control features over a wide power and voltage range.



OPTION BOARDS

Our NXP Control provides exceptional modularity by offering five (A, B, C, D and E) plug-in extension slots. Fieldbus boards, encoder boards as well as wide range of IO boards can simply be plugged-in at any time without the need to remove any other components.

A listing of all options boards is provided on pg. 23



FIELDBUS OPTIONS

Your VACON NXP is easily integrated within a plant's automation system by using plug-in fieldbus option boards including Profibus DP, Modbus RTU, DeviceNet and CANopen. Fieldbus technology ensures increased control and monitoring of the process equipment with reduced cabling - ideal for industries where the need to ensure that products are produced under the right conditions is of paramount importance. An external +24 V supply option enables communication with the control unit even if the main supply is switched off. Fast drive-to-drive communication is possible using Vacon's fast SystemBus fiber optic communication.

Profibus DP • DeviceNet • Modbus RTU • CANopen



ETHERNET CONNECTIVITY

VACON NXP is the smart drive of choice, as there is no need to purchase additional communication tools. Ethernet connectivity allows remote drive access for monitoring, configuring and troubleshooting. Vacon's Ethernet protocols such as Profinet IO, Ethernet IP and Modbus/TCP are available for all NXP drives. New Ethernet protocols are being continuously developed.

Modbus/TCP • Profinet IO • Ethernet I/P

FUNCTIONAL SAFETY AND RELIABILITY

SAFE TORQUE OFF, SAFE STOP 1

Safe Torque Off (STO) is available for all NXP drives. It prevents the 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, EN60204-1.

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.

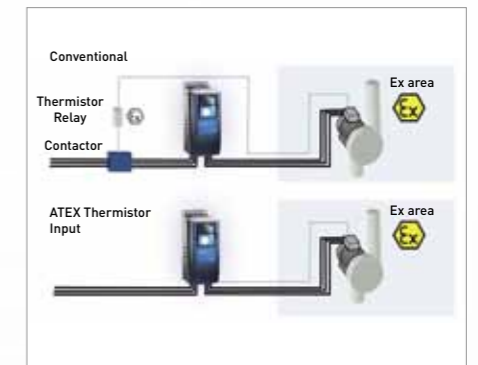
The advantage of the integrated STO and SS1 safety options compared to standard safety technology using electromechanical switchgear is the elimination of separate components and the effort required to wire and service them, while still maintaining the required level of safety at work.



ATEX CERTIFIED THERMISTOR INPUT

Vacon has developed an ATEX approved thermistor input, as an integrated option. 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 and areas with combustible dust. Typical industries requiring such supervision include chemical, petrochemical, marine, metal, mechanical, mining, and oil drilling.

If 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.



MARINE APPROVALS

With over 15 years of experience across a wide range of Marine & Offshore AC drives applications, Vacon liquid cooled AC drives fulfill type approvals of major classification societies:

- Type approval: DNV, BV, Lloyd's Register
- Delivery based approval: ABS, GL, Class NK, CCS, KR, RINA

We have delivered AC drives for over 700 propulsion drives systems and 1000 thrusters. Vacon has represented world-first and leading-pioneer AC drive technologies in several Marine & Offshore applications, e.g. diesel-electric propulsion systems with AFE drives, redundant electrical cargo pump systems, hybrid tugboats and shaft generator systems.



CONFORMAL COATING

To increase performance and durability, conformally coated circuit boards (also known as varnished boards) are provided as standard for power modules.

The upgraded boards offer reliable protection against dust and moisture and extend the lifetime of the drive and critical components.



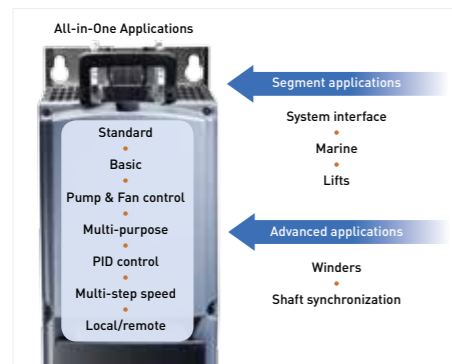
COMMISSIONING MADE EASY



USER-FRIENDLY KEYPAD

Vacon has ensured that 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.

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

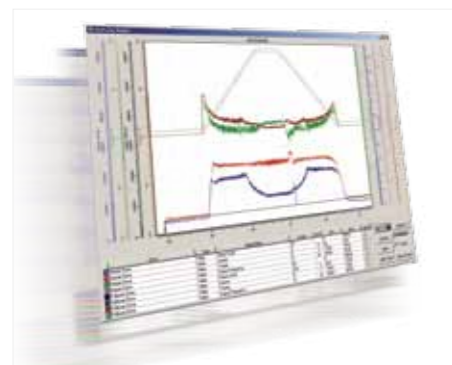


SOFTWARE MODULARITY

Vacon's handy All-in-One application package has seven built-in software applications, which can be selected with one parameter.

In addition to the All-in-One package, Vacon offers several segment specific and advanced applications such as System Interface, Marine, Lift (see page 11) and Shaft Synchronisation for more demanding uses.

VACON NXP applications can be downloaded from www.vacon.com



VACON NCDRIVE

Vacon NCDrive is used for setting, copying, storing, printing, monitoring and controlling parameters. The Vacon NCDrive communicates with the drive via the following interfaces: RS-232, Ethernet TCP/IP, CAN (fast multiple drive monitoring), CAN@Net (remote monitoring).

Vacon NCDrive also includes a handy Datalogger function, which offers you the possibility to track failure modes and perform root cause analysis.

Vacon PC-tools can be downloaded from www.vacon.com



INDEPENDENT PARALLELING

Benefit from Vacon's patented independent paralleling configuration of front-end (AFE) units.

- High redundancy
- No drive-to-drive communication needed
- Automatic load sharing

DEDICATED APPLICATIONS



DEDICATED MARINE APPLICATION

Our **Vacon Marine Application** provides flexibility and performance across all Marine segment applications. We have pioneered several technologies and applications in the field of Marine & Offshore such as redundant electrical cargo pump systems, liquid cooled AFE propulsion systems, pipe-laying tensioners and winches as well as oil exploration fibre cable winches.

Vacon liquid cooled drives fulfill all major approvals and bring many benefits to this segment in particular such as: energy efficiency, improved process availability due to high redundancy, better process quality and control, as well as silent operation and substantially reduced emissions.

Added benefits:

- Power extension with Drive Synch
- Interface for power handling for power management system
- Black Out prevention logics
- Freely configurable PI control logic

INTELLIGENT SYSTEM INTERFACE

Our **Vacon System Interface Application (SIA)** provides flexible and extensive interface for use in coordinated drives, which have an overriding control system. The recommended interface to control the system is fieldbus communication through hardwired analogue and digital signals or via keypad and PC control.

Vacon SIA utilizes the most advanced functions of our NXP motor control software and is suitable for demanding drive systems such as those in the pulp & paper and metal industries, processing lines as well as many other standard applications.

Added benefits:

- Power extension with Drive Synch
- Master Follower functions for torque sharing
- Freely configurable PI control logic

ENGINEERED DRIVES PACKAGES

Vacon also offers high power liquid cooled engineered drive packages. For example, a single NXP CH64 cabinet solution can be used with AC motors in power sizes up to 1550kW. The power range can also be extended up to 5MW by using the innovative DriveSynch control concept.

Some of the advantages of this cabinet solution include:

- Bi-directional (regenerative) power converter, optimal performance and significant energy savings can be made when braking energy is utilized to its full potential.
- Current distortion below 5%
- Totally enclosed IP54 cabinet solutions that can be used in demanding environments and no need for large air conditioning systems
- Liquid cooled input and output filters
- Designed for easy installation and maintenance

The Vacon NXP is a state-of-the-art AC drive for use in all applications where robustness, dynamic performance, precision and power are required. Vacon NXP supports both induction motors and permanent magnet motors in open and closed loop control modes as well as high speed motors.

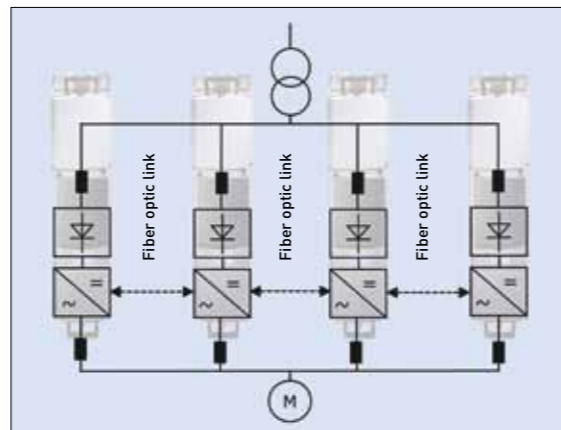


HIGH POWER AND IMPROVED REDUNDANCY

Vacon DriveSynch is an innovative control concept for running standard drives in parallel to control high-power AC motors or increase the redundancy of a system. This concept suits high power single or multiple winding motors typically above 1 MW.

High power AC drives up to 5 MW can be built using standard drive components and have the following benefits:

- The system is modular and easy to extend
- High total power can be obtained by combining smaller drives
- System redundancy is higher than in a conventional drive because each unit can run independently
- Individual drive is easy to maintain and service
- Identical units reduce the required amount of spare parts thus reducing overall costs
- No special skills are required for the engineering, installation, commissioning and maintenance of high-power drives as they are comprised of standard modules
- It is possible to run multiple winding motors with a phase shift between the windings



Example of the DriveSynch configuration.

LIQUID TO LIQUID HEAT EXCHANGERS

In cooperation with HVAC professionals, Vacon has designed a range of cooling units based on liquid-to-liquid heat exchangers (HX), which improve the availability and usability of AC drive systems. The cooling units belong to the liquid cooled VACON NXP range and offer reliable and cost-effective cooling without ventilation concerns.

PROVEN RELIABILITY

Vacon's standardized heat exchanger makes the use of liquid cooled drives easier, because a well-planned and sized unit is easier to apply than a project solution. In addition, a standard heat exchanger solution offers proven reliability.

To minimize the risk of possible leaks, splitting the cooling circuit into segments is worthwhile, because even in a large group of AC drives the volume of the liquid stays under 100 litres. An additional advantage of separated cooling segments is the opportunity to use inhibitors and glycol against corrosion, freezing and micro-organisms.

The Vacon heat exchanger has versatile protection and control functions. The whole system is supervised by the drive's control application software, which meets

the standards of our most demanding customers. The operation of the unit can be monitored by an upper level automation system. The system controls the cooling conditions of the drives and supervises the flow, while detecting any possible leaks in the cooling system.

The Vacon heat exchanger can be used in different types of electrical networks where frequencies and voltages may vary, as the cooling pump is controlled by an AC drive. Such networks are typically used in the marine industry and other electrical island networks using diesel generators. This solution offers the added advantage of being able to adjust the flow capacity to meet the demand. Higher than expected pressure losses within the cooling circuit may be easily compensated for by changing the speed of the pump, thus raising the pressure and flow.

A standard cooling unit delivery consists of:

- Self-supporting module rack construction, which can be integrated into generic switchgear and cabinet solutions
- Cooling circuit equipped with threaded joints or flanges
- Heavy industry PVC-C pipework, which is excellent as it is lightweight and prevents corrosion
- Industrial water heat exchanger, three-way-valve, pump, AC drive

Available cooling unit options:

- Stainless steel AISI piping
- Two-way-valve capable of optimizing the quantity of the cooling water, when the temperature of the process liquid is low
- Heat exchanger can be delivered installed inside a Rittal TS8 or VSG VEDA 5000 cabinet
- Double pumps can be selected for marine class requirements, types 120 kW and 300 kW
- Titanium heat exchanger is used in seawater circuits. The structure and performance differs from the fresh water models.



	HXL-M/V/R-040-N-P	HXL/M-M/V/R-120-N-P	HXS/T-M/V/R-070-N-P	HXL/M-M/R-300-N-P
Cooling power	0...40 kW	0...120 kW	0...69 kW	0...300 kW
Mains supply	380...420 VAC	380...420 VAC	380...420 VAC	380...500 VAC
Flow	40...120 l/min	120...360 l/min	120...200 l/min	360...900 l/min
Distribution pressure	0.3 bar / l=10 m, DN32*	HXL: 1 bar / l = 40 m, DN50 HXM: 0.7 bar / l = 30 m, DN50	HXS: 1 bar / l = 40 m, DN50 HXT: 0.7 bar / l = 25 m, DN50	HXL: 1 bar / l = 40 m, DN80 HXM: 0.7 bar / l = 25 m, DN80
Double pump		HXM	HXT	HXM
Cabinets	VEDA, Rittal	VEDA, Rittal	VEDA, Rittal	Rittal

* l = maximum distribution distance with specific DN diameter

RATINGS AND DIMENSIONS

VACON NXP LIQUID COOLED INVERTER UNITS, DC BUS VOLTAGE 465-800 VDC

AC drive type	Drive output current			Motor shaft power		Power loss c/a/T* [kW]	Chassis
	Thermal I _m [A]	Rated cont. I _L [A]	Rated cont. I _H [A]	Optimum motor at I _m (540 VDC) [kW]	Optimum motor at I _m (675 VDC) [kW]		
NXP00165A0T1IWS	16	15	11	7.5	11	0.4/0.2/0.6	CH3
NXP00225A0T1IWS	22	20	15	11	15	0.5/0.2/0.7	CH3
NXP00315A0T1IWS	31	28	21	15	18.5	0.7/0.2/0.9	CH3
NXP00385A0T1IWS	38	35	25	18.5	22	0.8/0.2/1.0	CH3
NXP00455A0T1IWS	45	41	30	22	30	1.0/0.3/1.3	CH3
NXP00615A0T1IWS	61	55	41	30	37	1.3/0.3/1.5	CH3
NXP00725A0T1IWS	72	65	48	37	45	1.2/0.3/1.5	CH4
NXP00875A0T1IWS	87	79	58	45	55	1.5/0.3/1.8	CH4
NXP01055A0T1IWS	105	95	70	55	75	1.8/0.3/2.1	CH4
NXP01405A0T1IWS	140	127	93	75	90	2.3/0.3/2.6	CH4
NXP01685A0T1IWS	168	153	112	90	110	2.5/0.3/2.8	CH5
NXP02055A0T1IWS	205	186	137	110	132	3.0/0.4/3.4	CH5
NXP02615A0T1IWS	261	237	174	132	160	4.0/0.4/4.4	CH5
NXP03005A0T1IWF	300	273	200	160	200	4.5/0.4/4.9	CH61
NXP03855A0T1IWF	385	350	257	200	250	5.5/0.5/6.0	CH61
NXP04605A0T1IWF	460	418	307	250	315	5.5/0.5/6.0	CH62
NXP05205A0T1IWF	520	473	347	250	355	6.5/0.5/7.0	CH62
NXP05905A0T1IWF	590	536	393	315	400	7.5/0.6/8.1	CH62
NXP06505A0T1IWF	650	591	433	355	450	8.5/0.6/9.1	CH62
NXP07305A0T1IWF	730	664	487	400	500	10.0/0.7/10.7	CH62
NXP08205A0T1IWF	820	745	547	450	560	12.5/0.8/13.3	CH63
NXP09205A0T1IWF	920	836	613	500	600	14.4/0.9/15.3	CH63
NXP10305A0T1IWF	1030	936	687	560	700	16.5/1.0/17.5	CH63
NXP11505A0T1IWF	1150	1045	766	600	750	18.4/1.1/19.5	CH63
NXP13705A0T1IWF	1370	1245	913	700	900	15.5/1.0/16.5	CH64
NXP16405A0T1IWF	1640	1491	1093	900	1100	19.5/1.2/20.7	CH64
NXP20605A0T1IWF	2060	1873	1373	1100	1400	26.5/1.5/28.0	CH64
NXP23005A0T1IWF	2300	2091	1533	1250	1500	29.6/1.7/31.3	CH64
NXP24705A0T1IWF	2470	2245	1647	1300	1600	36.0/2.0/38.0	2 x CH64
NXP29505A0T1IWF	2950	2681	1967	1550	1950	39.0/2.4/41.4	2 x CH64
NXP37105A0T1IWF	3710	3372	2473	1950	2450	48.0/2.7/50.7	2 x CH64
NXP41405A0T1IWF	4140	3763	2760	2150	2700	53.0/3.0/56.0	2 x CH64
2 x NXP24705A0T1IWF	4700	4300	3100	2450	3050	69.1/3.9/73	4 x CH64
2 x NXP29505A0T1IWF	5600	5100	3700	2900	3600	74.4/4.6/79	4 x CH64
2 x NXP37105A0T1IWF	7000	6400	4700	3600	4500	90.8/5.2/96	4 x CH64
2 x NXP41405A0T1IWF	7900	7200	5300	4100	5150	101.2/5.8/107	4 x CH64

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

RATINGS AND DIMENSIONS

VACON NXP LIQUID COOLED INVERTER UNITS, DC BUS VOLTAGE 640-1100 VDC

AC drive type	Drive output current			Motor shaft power		Power loss c/a/T* [kW]	Chassis
	Thermal I _m [A]	Rated cont. I _L [A]	Rated cont. I _H [A]	Optimum motor at I _m (710 VDC) [kW]	Optimum motor at I _m (930 VDC) [kW]		
NXP01706A0T1IWF	170	155	113	110	160	4.5/0.2/4.7	CH61
NXP02086A0T1IWF	208	189	139	132	200	5.5/0.3/5.8	CH61
NXP02616A0T1IWF	261	237	174	160	250	5.5/0.3/5.8	CH61
NXP03256A0T1IWF	325	295	217	200	300	6.5/0.3/6.8	CH62
NXP03856A0T1IWF	385	350	257	250	355	7.5/0.4/7.9	CH62
NXP04166A0T1IWF	416	378	277	250	355	8.0/0.4/8.4	CH62
NXP04606A0T1IWF	460	418	307	300	400	8.5/0.4/8.9	CH62
NXP05026A0T1IWF	502	456	335	355	450	10.0/0.5/10.5	CH62
NXP05906A0T1IWF	590	536	393	400	560	10.0/0.5/10.5	CH63
NXP06506A0T1IWF	650	591	433	450	600	13.5/0.7/14.2	CH63
NXP07506A0T1IWF	750	682	500	500	700	16.0/0.8/16.8	CH63
NXP08206A0T1IWF	820	745	547	560	800	16.0/0.8/16.8	CH64
NXP09206A0T1IWF	920	836	613	650	850	18.0/0.9/18.9	CH64
NXP10306A0T1IWF	1030	936	687	700	1000	19.0/1.0/20.0	CH64
NXP11806A0T1IWF	1180	1073	787	800	1100	21.0/1.1/22.1	CH64
NXP13006A0T1IWF	1300	1182	867	900	1200	27.0/1.4/28.4	CH64
NXP15006A0T1IWF	1500	1364	1000	1050	1400	32.0/1.6/33.6	CH64
NXP17006A0T1IWF	1700	1545	1133	1150	1550	38.0/1.9/39.9	CH64
NXP18506A0T1IWF	1850	1682	1233	1250	1650	34.2/1.8/36.0	2 x CH64
NXP21206A0T1IWF	2120	1927	1413	1450	1900	37.8/2.0/39.8	2 x CH64
NXP23406A0T1IWF	2340	2127	1560	1600	2100	48.6/2.5/51.1	2 x CH64
NXP27006A0T1IWF	2700	2455	1800	1850	2450	57.6/3.0/60.6	2 x CH64
NXP31006A0T1IWF	3100	2818	2066	2150	2800	68.4/3.4/71.8	2 x CH64
2 x NXP18506A0T1IWF	3500	3200	2300	2400	3150	75.2/3.8/79	4 x CH64
2 x NXP21206A0T1IWF	4000	3600	2700	2750	3600	85.5/4.6/90.1	4 x CH64
2 x NXP23406A0T1IWF	4400	4000	2900	3050	3950	106/5.5/111.5	4 x CH64
2 x NXP27006A0T1IWF	5100	4600	3400	3500	4600	130/6.5/136.5	4 x CH64
2 x NXP31006A0T1IWF	5900	5400	3900	4050	5300	130/6.5/136.5	4 x CH64

The voltage classes for the inverter units used in the tables above have been defined as follows:

Input 710 VDC = Rectified 525 VAC supply
Input 930 VDC = Rectified 690 VAC supply

VACON NXP LIQUID COOLED DIMENSIONS: DRIVES CONSISTING OF ONE MODULE

Chassis	Width [mm]	Height [mm]	Depth [mm]	Weight [kg]
CH3	160	431	246	15
CH4	193	493	257	22
CH5	246	553	264	40
CH61/62	246	658	372	55
CH63	505	923	375	120
Ch64	746	923	375	180
CH72	246	1076	372	90
Ch74	746	1175	385	280

One-module drive dimensions (mounting base included)
Please note that AC chokes are not included

RATINGS AND DIMENSIONS

VACON NXA LIQUID COOLED ACTIVE FRONT-END, DC BUS VOLTAGE 465-800 VDC

AC drive type	AC Current			DC power				Power loss c/a/T* [kW]	Chassis
	Thermal I _{th} [A]	Rated I _L [A]	Rated I _H [A]	400 VAC mains I _{th} [kW]	500 VAC mains I _{th} [kW]	400 VAC mains I _L [kW]	500 VAC mains I _L [kW]		
NXA01685A0T02WS	168	153	112	113	142	103	129	2.5/0.3/2.8	CH5
NXA02055A0T02WS	205	186	137	138	173	125	157	3.0/0.4/3.4	CH5
NXA02615A0T02WS	261	237	174	176	220	160	200	4.0/0.4/4.4	CH5
NXA03005A0T02WF	300	273	200	202	253	184	230	4.5/0.4/4.9	CH61
NXA03855A0T02WF	385	350	257	259	324	236	295	5.5/0.5/6.0	CH61
NXA04605A0T02WF	460	418	307	310	388	282	352	5.5/0.5/6.0	CH62
NXA05205A0T02WF	520	473	347	350	438	319	398	6.5/0.5/7.0	CH62
NXA05905A0T02WF	590	536	393	398	497	361	452	7.5/0.6/8.1	CH62
NXA06505A0T02WF	650	591	433	438	548	398	498	8.5/0.6/9.1	CH62
NXA07305A0T02WF	730	664	487	492	615	448	559	10.0/0.7/10.7	CH62
NXA08205A0T02WF	820	745	547	553	691	502	628	10.0/0.7/10.7	CH63
NXA09205A0T02WF	920	836	613	620	775	563	704	12.4/0.8/12.4	CH63
NXA10305A0T02WF	1030	936	687	694	868	631	789	13.5/0.9/14.4	CH63
NXA11505A0T02WF	1150	1045	767	775	969	704	880	16.0/1.0/17.0	CH63
NXA13705A0T02WF	1370	1245	913	923	1154	839	1049	15.5/1.0/16.5	CH64
NXA16405A0T02WF	1640	1491	1093	1105	1382	1005	1256	19.5/1.2/20.7	CH64
NXA20605A0T02WF	2060	1873	1373	1388	1736	1262	1578	26.5/1.5/28.0	CH64
NXA23005A0T02WF	2300	2091	1533	1550	1938	1409	1762	29.6/1.7/31.3	CH64

VACON NXA LIQUID COOLED ACTIVE FRONT-END, DC BUS VOLTAGE 640-1100 VDC

AC drive type	AC Current			DC power				Power loss c/a/T* [kW]	Chassis
	Thermal I _{th} [A]	Rated I _L [A]	Rated I _H [A]	525 VAC mains I _{th} [kW]	690 VAC mains I _{th} [kW]	525 VAC mains I _L [kW]	690 VAC mains I _L [kW]		
NXA01706A0T02WF	170	155	113	150	198	137	180	4.5/0.2/4.7	CH61
NXA02086A0T02WF	208	189	139	184	242	167	220	5.5/0.3/5.8	CH61
NXA02616A0T02WF	261	237	174	231	303	210	276	5.5/0.3/5.8	CH61
NXA03256A0T02WF	325	295	217	287	378	261	343	6.5/0.3/6.8	CH62
NXA03856A0T02WF	385	350	257	341	448	310	407	7.5/0.4/7.9	CH62
NXA04166A0T02WF	416	378	277	368	484	334	439	8.1/0.4/8.4	CH62
NXA04606A0T02WF	460	418	307	407	535	370	486	8.5/0.4/8.9	CH62
NXA05026A0T02WF	502	456	335	444	584	403	530	10.0/0.5/10.5	CH62
NXA05906A0T02WF	590	536	393	522	686	474	623	10.0/0.5/10.5	CH63
NXA06506A0T02WF	650	591	433	575	756	523	687	13.5/0.7/14.2	CH63
NXA07506A0T02WF	750	682	500	663	872	603	793	16.0/0.8/16.8	CH63
NXA08206A0T02WF	820	745	547	725	953	659	866	16.0/0.8/16.8	CH64
NXA09206A0T02WF	920	836	613	814	1070	740	972	17.8/1.0/18.4	CH64
NXA10306A0T02WF	1030	936	687	911	1197	828	1088	19.0/1.0/20.0	CH64
NXA11806A0T02WF	1180	1073	787	1044	1372	949	1247	21.0/1.1/22.1	CH64
NXA13006A0T02WF	1300	1182	867	1150	1511	1046	1374	27.0/1.4/28.4	CH64
NXA15006A0T02WF	1500	1364	1000	1327	1744	1207	1586	32.0/1.6/33.6	CH64
NXA17006A0T02WF	1700	1545	1133	1504	1976	1367	1796	38.0/1.9/39.9	CH64

* C = power loss into coolant, A = power loss into air, T = total power loss

VACON NX OPTIONS LIQUID COOLED REGENERATIVE LINE FILTERS

LCL Filter Type	Suitability	Power loss c/a/T* [kW]	Dimensions L _{net} 1 pcs, WxHxD [mm]	Dimensions L _{drive} 1 pcs, (total 3 pcs) WxHxD [mm]	Dimensions C 1 pcs, WxHxD [mm]	Total weight [kg]
RLC-0385-6-0	CH62/690VAC: 325A & 385A	2,6/0,8/3,4	580 x 450 x 385	410 x 415 x 385	360 x 265 x 150	458
RLC-0520-6-0	CH62/500-690VAC	2,65/0,65/3,3	580 x 450 x 385	410 x 415 x 385	360 x 265 x 150	481
RLC-0750-6-0	CH62/500VAC, CH63/690VAC	3,7/1/4,7	580 x 450 x 385	410 x 450 x 385	360 x 275 x 335	508
RLC-0920-6-0	CH63/500VAC, CH64/690VAC	4,5/1,4/5,9	580 x 500 x 390	410 x 500 x 400	360 x 275 x 335	577
RLC-1180-6-0	CH63/500VAC, CH64/690VAC	6,35/1,95/8,3	585 x 545 x 385	410 x 545 x 385	350 x 290 x 460	625
RLC-1640-6-0	CH64/500-690VAC	8,2/2,8/11	585 x 645 x 385	420 x 645 x 385	350 x 290 x 460	736
RLC-2300-5-0	CH64/500VAC: 2060A & 2300A	9,5/2,9/12,4	585 x 820 x 370	410 x 820 x 380	580 x 290 x 405	896

RATINGS AND DIMENSIONS

VACON NXB LIQUID COOLED EXTERNAL BRAKE CHOPPER, DC BUS VOLTAGE 460-800 VDC

AC drive type	Current				Braking power		Power loss c/a/T* [kW]	Chassis
	BCU rated cont. braking current I _{br} [A]	Rated min resistance @800VDC (Ω)	Rated min resistance @600VDC (Ω)	Rated max input current (Adc)	Rated cont. braking power 2*R@ 800VDC [kW]	Rated cont. braking power 2*R@ 600VDC [kW]		
NXB00315A0T08WS	2*31	25.7	19.5	62	49	37	0.7/0.2/0.9	CH3
NXB00615A0T08WS	2*61	13.1	9.9	122	97	73	1.3/0.3/1.5	CH3
NXB00875A0T08WS	2*87	9.2	7.0	174	138	105	1.5/0.3/1.8	CH4
NXB01055A0T08WS	2*105	7.6	5.8	210	167	127	1.8/0.3/2.1	CH4
NXB01405A0T08WS	2*140	5.7	4.3	280	223	169	2.3/0.3/2.6	CH4
NXB01685A0T08WS	2*168	4.7	3.6	336	267	203	2.5/0.3/2.8	CH5
NXB02055A0T08WS	2*205	3.9	3.0	410	326	248	3.0/0.4/3.4	CH5
NXB02615A0T08WS	2*261	3.1	2.3	522	415	316	4.0/0.4/4.4	CH5
NXB03005A0T08WF	2*300	2.7	2.0	600	477	363	4.5/0.4/4.9	CH61
NXB03855A0T08WF	2*385	2.1	1.6	770	613	466	5.5/0.5/6.0	CH61
NXB04605A0T08WF	2*460	1.7	1.3	920	732	556	5.5/0.5/6.0	CH62
NXB05205A0T08WF	2*520	1.5	1.2	1040	828	629	6.5/0.5/7.0	CH62
NXB05905A0T08WF	2*590	1.4	1.1	1180	939	714	7.5/0.6/8.1	CH62
NXB06505A0T08WF	2*650	1.2	1.0	1300	1035	786	8.5/0.6/9.1	CH62
NXB07305A0T08WF	2*730	1.1	0.9	1460	1162	833	10.0/0.7/10.7	CH62

VACON NXB LIQUID COOLED EXTERNAL BRAKE CHOPPER, DC BUS VOLTAGE 640-1100 VDC

AC drive type	Current				Braking power		Power loss c/a/T* [kW]	Chassis
	BCU rated cont. braking current I _{br} [A]	Rated min resistance @1100 VDC (Ω)	Rated min resistance @840 VDC (Ω)	Rated max input current (Adc)	Rated cont. braking power 2*R@1100 VDC [kW]	Rated cont. braking power 2*R@840 VDC [kW]		
NXB01706A0T08WF	2*170	6.5	4.9	340	372	282	4.5/0.2/4.7	CH61
NXB02086A0T08WF	2*208	5.3	4	416	456	346	5.5/0.3/5.8	CH61
NXB02616A0T08WF	2*261	4.2	3.2	522	572	435	5.5/0.3/5.8	CH61
NXB03256A0T08WF	2*325	3.4	2.6	650	713	542	6.5/0.3/6.8	CH62
NXB03856A0T08WF	2*385	2.9	2.2	770	845	643	7.5/0.4/7.9	CH62
NXB04166A0T08WF	2*416	2.6	2	832	913	693	8.1/0.4/8.4	CH62
NXB04606A0T08WF	2*460	2.4	1.8	920	1010	767	8.5/0.4/8.9	CH62
NXB05026A0T08WF	2*502	2.2	1.7	1004	1100	838	10.0/0.5/10.5	CH62

NOTE: The rated currents in given ambient (+50°C) and coolant (+30°) temperatures are achieved only when the switching frequency is equal to or less than the factory default.

NOTE: Braking power: $P_{brake} = 2 * U_{brake}^2 / R_{resistor}$ when 2 resistors are used

NOTE: Max input DC current: $I_{in,max} = P_{brake,max} / U_{brake}$

VACON NXP LIQUID COOLED FREQUENCY CONVERTER, INTERNAL BRAKE CHOPPER UNIT, BRAKING VOLTAGE 460-800 VDC

Converter Type	Loadability	Braking capacity @ 600 VDC		Braking capacity @ 800 VDC		Chassis
	Rated min resistance [Ω]	Rated cont. braking power [kW]	BCU rated cont. braking current, I _{br} [A]	Rated cont. braking power [kW]	BCU rated cont. braking current, I _{br} [A]	
NX_460-730 5 1)	1.3	276	461	492	615	CH72
NX_1370-2300 5	1.3	276	461	492	615	CH74

1) Only 6 pulse drives

VACON NXP LIQUID COOLED FREQUENCY CONVERTER, INTERNAL BRAKE CHOPPER UNIT, BRAKING VOLTAGE 840-1100 VDC

Converter Type	Loadability	Braking capacity @ 840 VDC		Braking capacity @ 1100 VDC		Chassis
	Rated min resistance [Ω]	Rated cont. braking power [kW]	BCU rated cont. braking current, I _{br} [A]	Rated cont. braking power [kW]	BCU rated cont. braking current, I _{br} [A]	
NX_325-502 6 1)	2.8	252	300	432	392	CH72
NX_820-1700 6	2.8	252	300	432	392	CH74

1) Only 6 pulse drives

The internal brake chopper can also be used in motor application where 2...4 x Ch7x drives are used for a single motor, but in this case the DC connections of the power modules must be connected together.

VACON EXTERNAL BRAKE RESISTORS FOR LIQUID COOLED CH72 (CH74) DRIVES - IP20

Product code	Voltage range [VDC]	Maximum brake power [kw]	Maximum average power [kW] (1 pulse/2min)	Resistance [Ω]	Maximum energy [kJ] (predefined power pulse)	Dimensions W x H x D [mm]	Weight [kg]
BRW-0730-LD-5 ¹⁾	465...800VDC	637 ³⁾	13.3	1.3	1594	480 x 600 x 740	55
BRW-0730-HD-5 ²⁾	465...800VDC	637 ³⁾	34.5	1.3	4145	480 x 1020 x 740	95
BRW-0502-LD-6 ¹⁾	640...1100VDC	516 ⁴⁾	10.8	2.8	1290	480 x 760 x 530	40
BRW-0502-HD-6 ²⁾	640...1100VDC	516 ⁴⁾	28	2.8	3354	480 x 1020 x 740	85

NOTE: Thermal protection switch included

¹⁾ LD = Light Duty: 5s nominal torque braking from nominal speed reduced linearly to zero once per 120s

²⁾ HD = Heavy duty: 3s nominal torque braking at nominal speed + 7s nominal torque braking from nominal speed reduced linearly to zero once per 120s.

³⁾ at 911 VDC

⁴⁾ at 1200 VDC

Mains connection	Input voltage U _{in}	400...500 VAC; 525...690 VAC; (-10%...+10%) 465...800 VDC; 640...1100 VDC (-0%...+0%)
	Input frequency	45...66 Hz
Motor connection	Output voltage	0—U _n
	Output frequency	0...320 Hz
Control characteristics	Control method	Frequency control U/f Open loop vector control (5-150% of base speed): speed control 0.5%, dynamic 0.3%/sec, torque lin. <2%, torque rise time ~5 ms Closed loop vector control (entire speed range): speed control 0.01%, dynamic 0.2% sec, torque lin. <2%, torque rise time ~2 ms
	Switching frequency	NX_5: Up to and including NX_0061: 1...16 kHz; Factory default 10 kHz From NX_0072: 1...12 kHz; Factory default 3.6 kHz NX_6: 1...6 kHz; Factory default 1.5 kHz*
	Field weakening point	8...320 Hz
	Acceleration time	0...3000 sec
	Deceleration time	0...3000 sec
	Braking	DC brake: 30% of TN (without brake resistor), flux braking
Ambient conditions	Ambient operating temperature	-10°C (no frost)...+50°C (at I _n); The NX liquid cooled drives must be used in an heated indoor controlled environment.
	Installation temperature	0...+70°C
	Storage temperature	-40°C...+70°C; no liquid in heatsink under 0°C
	Relative humidity	5 to 96% RH, non-condensing, no dripping water
	Air quality - chemical vapours - mechanical particles*	No corrosive gases IEC 60721-3-3, unit in operation, class 3C2 IEC 60721-3-3, unit in operation, class 3S2 (no conductive dust allowed)
	Altitude	NX_5: (380...500 V): 3000 m ASL; in case network is not corner grounded NX_6: (525...690 V) max. 2000 m ASL. For further requirements, contact factory 100-% load capacity (no derating) up to 1,000 m; above 1,000 m derating of maximum ambient operating temperature by 0,5°C per each 100 m is required.
	Vibration	5...150 Hz
	EN50178/EN60068-2-6	Displacement amplitude 0.25 mm (peak) at 3...31 Hz Max acceleration amplitude 1 G at 31...150 Hz
	Shock EN50178, EN60068-2-27	UPS Drop Test (for applicable UPS weights) Storage and shipping: max 15 G, 11 ms (in package)
	Enclosure class	IP00/Open Frame standard in entire kW/HP range
	EMC	Immunity
Emissions		EMC level N, T (IT networks)
Safety		EN 50178, EN 60204-1, IEC 61800-5-1, CE, UL, CUL; (see unit nameplate for more details)
	Functional safety *)	STO EN/IEC 61800-5-2 Safe Torque Off (STO) SIL2, EN ISO 13849-1 PL'd Category 3, EN 62061: SILCL2, IEC 61508: SIL2. SS1 EN /IEC 61800-5-2 Safe Stop 1 (SS1) SIL2, EN ISO 13849-1 PL'd Category 3, EN /IEC62061: SILCL2, IEC 61508: SIL2. ATEX Thermistor input 94/9/EC, CE 0537 Ex 11 (2) GD
Approvals	Type tested	SGS Fimko CE, UL
	Type approval	DNV, BV, Lloyd's Register (other marine societies delivery based approvals)
	Approvals our partners have	Ex, SIRA
Liquid cooling	Allowed cooling agents	Drinking water Water-glycol mixture
	Temperature of cooling agent	0...35°C (I _n)/input); 35...55°C, please see manual for further details Temperature rise during circulation max. 5°C No condensation allowed
	System max. working pressure	6 bar/ 40 bar peak
	Pressure loss (at nominal flow)	Varies according to size, please see manual for further details
Protections		Overvoltage, undervoltage, earth fault, mains supervision, motor phase supervision, overcurrent, unit overtemperature, motor overload, motor stall, motor underload, short-circuit of +24 V and +10 V reference voltages.

* with OPT-AF board

NXP 0000 5 A 0 N 1 S W V A1 A2 00 00 C3

- NXP** **Product Range**
 NXP = Frequency converter or inverter unit
 NXA = Active front-end unit
 NXB = Brake-chopper unit

- 0000** **Nominal current** (low overload)
 0007 = 7 A, 0022 = 22 A, 0205 = 205 A etc.

- 5** **Nominal mains voltage** (3-phase)
 5 = 380-500 VAC 6 = 525-690 VAC (all 3-phase)

- A** **Control keypad**
 A = standard alpha-numeric B = no local control keypad
 F = dummy panel

- 0** **Enclosure class**
 0 = IP00

- N** **EMC emission levels**
 N = No EMC emission protection; to be installed on enclosures
 T = Fulfills standard 61800-3 for IT-networks

- 1** **Brake chopper**
 0 = no brake chopper
 1 = integrated brake chopper (CH3, CH72 [6-pulse] & CH74 only)

- S** **Hardware modifications: supply**
 1 = Inverter unit; DC-supply,
 2 = Active front-end unit
 S = Standard supply; 6-pulse connection with chokes
 N = Standard supply; 6-pulse connection without chokes
 T = 12-pulse connection with chokes
 U = 12-pulse connection without chokes

- W** **Hardware modifications: cooling**
 W = Liquid-cooled module with aluminium heatsink
 P = Liquid-cooled module with nickel-coated aluminium heatsink

- V** **Hardware modifications: boards**
 F = Fiber connection, standard (from CH61)
 G = Fiber connection, varnished (from CH61)
 S = Direct connection, standard
 V = Direct connection, varnished

- If OPT-AF option board is used**
 N = IP54 control box, fiber connection,
 standard boards, (from CH61)
 O = IP54 control box, fiber connection,
 varnished boards, (from CH61)

- A1** **Option boards; each slot is represented by two characters:**
 A = basic I/O boards, B = expander I/O boards
 C = fieldbus boards, D = special boards

Type	Card slot					I / O signal														Note										
	A	B	C	D	E	DI	DO	DI	AI	AI	AO	AO	RO	RO	+10V _{ref}	Therm	+24V/ EXT +24V	pt100	KTY84		42- 240 VAC input	DI/DO (10...24V)	DI/DO (RS422)	DI 1Vp-p	Re- solver	Out +5V/ +15V/ +24V	Out +15V/ +24V	Out +5V/ +12V/ +15V		
Basic I/O cards (OPT-A)																														
OPT-A1						6	1		2			1																		
OPT-A2													2																	
OPT-A3													1	1			1													
OPT-A4						2																	3/0	3/0			1			
OPT-A5						2																					1			
OPT-A7																							6/2				1			2 enc. input + 1 enc. output
OPT-A8						6	1		2			1				1		2												2.5 mm ² terminals
OPT-A9						6	1		2			1				1		2										1		DO = Dividers+Direction
OPT-AE								2															3/0							
OPT-AF						2							1	1			1													EN954-1, cat 3 / ATEX therm.
OPT-AK																														Sin/Cos/Marker
OPT-AN						6			2			2															3			Limited support
I/O expander cards (OPT-B)																														
OPT-B1							6											1												Selectable DI/DO
OPT-B2													1	1			1													
OPT-B4										1		2					1													2]
OPT-B5														3																
OPT-B8																	1	3												
OPT-B9						2							1										5							
OPT-BH																		3	3											3 x pt1000; 3 x Ni1000
OPT-BB						2																					0/2	2		1 Sin/Cos+EnDat
OPT-BC																							3/3			1			Encoder out = Resolver simulation	
OPT-BE																														EnDat/SSI
Fieldbus cards (OPT-C)																														
OPT-C2																														Modbus, N2
OPT-C3																														
OPT-C4																														
OPT-C5																														
OPT-C6																														
OPT-C7																														
OPT-C8																														Modbus, N2
OPT-CG																														
OPT-CI																														
OPT-CJ																														
OPT-CJ																														
OPT-CP																														
OPT-CQ																														
Communication cards (OPT-D)																														
OPT-D1																														
OPT-D2																														
OPT-D3																														
OPT-D6																														
OPT-D7																														

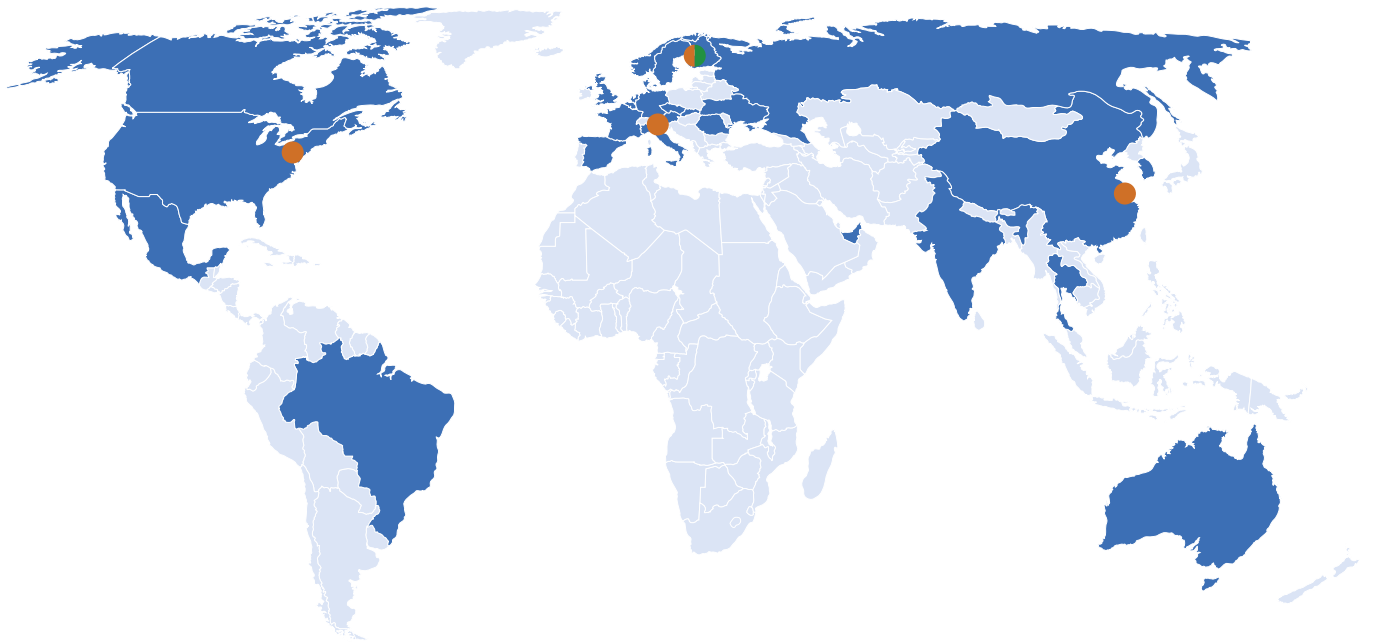
- 1) Analogue signals galvanically isolated as a group
- 2) Analogue signals galvanically isolated separately

NOTES

VACON AT YOUR SERVICE

Vacon is driven by a passion to develop, manufacture and sell the best AC drives and inverters in the world — and to provide efficient life-cycle services for its customers. Our AC drives offer optimum process control and energy efficiency for electric motors. Vacon inverters are a key component in producing energy from renewable sources. We have R&D and production units in Finland, the USA, China and Italy, and sales & service offices in 27 countries. In 2011, Vacon had revenues of EUR 380.9 million and globally employed 1,500 people. The shares of Vacon Plc (VAC 1V) are quoted on the main list of the Helsinki stock exchange.

VACON — TRULY GLOBAL



● Production and R&D ● Vacon PLC ■ Vacon own sales offices ■ Served by Vacon partner

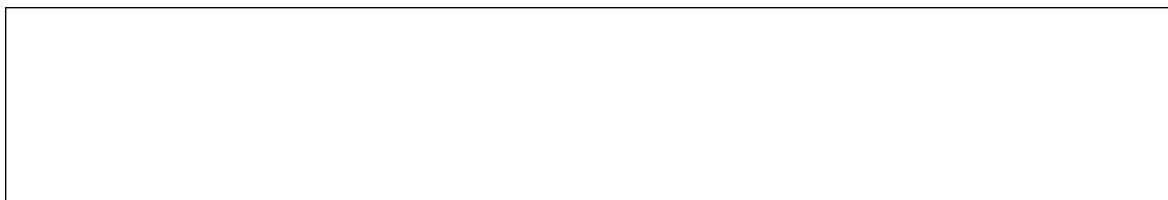
MANUFACTURING
and R&D on 3 continents

VACON SALES
and services in 27 countries

SERVICE CENTERS
in 52 countries (including partners)

VACON
DRIVEN BY DRIVES

Vacon partner



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