Danfoss VACON NXP Liquid Cooled AC Drives Instructions

Contents

Danfoss VACON NXP Liquid Cooled AC Drives

Product Information

- **Specifications**
  - Robust, silent, and space-saving liquid-cooled drives
  - Up to 25% savings in total life cycle costs compared to air-cooled solutions
  - Suitable for demanding applications in marine & offshore, pulp & paper, renewable energy, mining & metal industries
  - Ultimate motor control for induction and permanent magnet motors, gearless drive applications, and paralleling solutions
  - Compact design with high power density
  - Silent operation without large cooling fans
  - Flexible and scalable system with built-in expansion slots for additional I/O, Fieldbus, and functional safety boards

Product Usage Instructions

- **Typical Segments**
  - The liquid-cooled drives are commonly used in various industries including marine and offshore, renewable energy, mining and metals, water and wastewater, energy management, pulp and paper, oil and gas, and machine building.
- **Benefits**
  - Minimizes investment and operational costs
  - Saves floor space and infrastructure needs

    - Compact and easy to install
    - Virtually silent operation
    - No large air conditioning systems needed
    - Easy to adapt to various uses due to ready-to-use applications
    - Typical Applications
    - Propeller and thruster systems
    - Compressors
    - Wind turbines
- **Extruders**
    - Pumps and fans
    - Test bench systems
    - Cranes and winch systems
    - Power conversion systems
    - Production lines
    - Oil rigs
    - Crushers
    - Conveyors
- **Climate Considerations**
    - Consider the impact on the electrical room infrastructure when choosing cooling technology solutions.
    - Evaluate geographical location, industry, and process requirements.
    - In warm climates, monitor the heat load transferred to the electrical room to manage energy consumption effectively.
- **The Liquid Way to Stay Cool**
    - Liquid-cooled drives offer cost-effective cooling solutions without the need for additional air conditioning or ventilation.
    - The energy savings increase with higher power requirements, making them an efficient choice for various applications.

FAQs

- **Q: What are the typical segments where liquid-cooled drives are used?**
    - **A:** Liquid-cooled drives are commonly utilized in marine and offshore, renewable energy, mining and metals, water and wastewater, energy management, pulp and paper, oil and gas, and machine-building industries.
- **Q: What are the benefits of using liquid-cooled drives?**
    - **A:** Liquid-cooled drives offer minimized investment and operational costs, save floor space, are easy to install, operate silently, and do not require large air conditioning systems.
- **Q: What are some typical applications of liquid-cooled drives?**
    - **A:** Liquid-cooled drives are used in propeller and thruster systems, compressors, wind turbines, extruders, pumps and fans, test bench systems, cranes and winch systems, power conversion systems, production lines, oil rigs, crushers, and conveyors.

Quiet Compact Cool

VACON® NXP Liquid Cooled AC drives are the ultimate in space-saving, high-power density AC drives. They are well suited for locations where air-cooling is difficult, expensive or impractical such as onboard ships or in locations affected by altitude, or simply 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 10 HP – 5900 HP, (7.5 kW – 5.3 MW) 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.
- Thanks to the high degree of protection (IP54) achieved with these drives, they can be installed almost anywhere in the plant or vessel. This eliminates 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 drives 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 the same package, and all this can be mounted in an 800 mm wide enclosure.
- Our liquid-cooled range offers the ultimate in motor control, for both induction and permanent magnet motors, gearless drive applications and paralleling solutions for high power motors.

Certification and grid expertise

- Our VACON® NXP liquid-cooled portfolio fulfills all relevant international standards and global requirements, including marine, safety and EMC & Harmonics approvals.
- VACON® NXP liquid-cooled AC drives can be used in regenerative energy and smart grid applications, which ensures customers can effectively monitor and control energy use and costs.

Typical segments

- Marine and offshore
- Renewable energy
- Mining and metals
- Water and wastewater
- Energy management
- Pulp and paper
- Oil and gas
- Machine building

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

What’s in it for you

Minimizes investment and operation costs

Saves floor space and infrastructure needs

Saves time and money

Compact and easy to install

Virtually silent operation

Benefits

- Compact size and high power density
- No large air conditioning systems are needed as state-of-the-art liquid-cooled AC drive design allows heat loss to be transferred to the most convenient place with no need for vast amounts of filtered air
- Easy to adapt to various uses due to ready-to-use applications
- Flexible and scalable system for additional I/O, field, and functional safety boards with five built-in expansion slots
- Silent operation due to eliminated need for large cooling fans

Typical applications

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

The liquid way to stay cool
VACON® NXP Liquid Cooled AC drives have been pioneering for more than a decade in demanding industries with a proven track record of highly reliable products. We have succesfully mitigated the common risks of leakage and reliability in our product design.

- Climate considerations
  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 and process.
  In warm climates, it is extremely important to observe the amount of heat load transferred to the electrical room because of its indirect effect on electrical energy consumption.
  The type-tested switchgear 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 higher the power, the greater the savings
- In many cases, liquid-cooled drives are the most cost-effective option, simply since there is no need for additional air conditioning capacity or extra ventilation for the areas in which they are used. The related savings enable shorter payback times and the higher the power, the greater the savings potential.
- The continuously growing cost of energy certainly supports wider use of liquid-cooled drives technology, and the number of installations is growing rapidly.

A driving force in wind energy

- VACON® AC drives are designed to provide proven performance in demanding environments. Our drives are serving the wind energy industry globally with a combined installed capacity of almost one gigawatt.

Exclusively designed for liquid cooling

- Many other liquid-cooled drives on the market are based on modifications of an air cooled drive, rather than exclusively designed for the purpose. The VACON® NXP Liquid Cooled dissipates only 0.1 – 0.15% of its heat losses to air.* A state-of-the-art cooling heatsink enables the cooling efficiency of the components to be higher than ever.

Cooling technology advantages

Extensive portfolio of liquid-cooled drive modules
Significant energy savings and optimal performance can be achieved with the right configuration. 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.

Dedicated frequency converter

- The VACON® NXP Liquid Cooled drives are available as 6- or 12-pulse frequency converters. In addition, our largest unit, the CH74, can also be used as an 18-pulse converter. The AC drive consists of a power unit, a 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 an internal option while in all other sizes, the brake chopper is available as an option and installed externally.

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 for 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 inverters, and controlled and monitored via fieldbus. Fuses, LCL filters, pre-charging rectifiers, and resistors can be specified and ordered 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 portfolio for all your needs

We provide a comprehensive range of AC drive modules and enclosed drive solutions to meet all your power and control requirements.

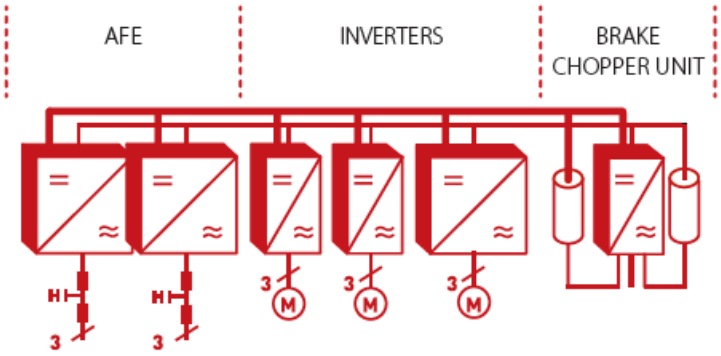
Inverter unit (INU)

- 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 a unidirectional power converter for the supply of excessive energy from a common DC bus drive line-up or big AC 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 can be specified and ordered separately.
- BCU's improve a drive's dynamic performance in a regenerative operating point and protect common DC bus voltage level from overvoltage. In some cases they also reduce the need for AFE investments.

A regenerative Common DC bus system



VACON® NXP Liquid Cooled Enclosed Drive
The low harmonic and regenerative VACON® NXP Liquid Cooled Enclosed Drives range has been developed especially with ease of use in mind. Packed full of features, these fully standardized, compact and robust AC drives with a full power range help maximize the utilization of space while minimizing overall costs.

- These enclosed drives are the ideal solution for applications and locations where space is at a premium. The sturdy cabinet makes it ideal for harsh environments. See technical ratings and dimensions on page 19 for further information.

High power density

- VACON® NXP Liquid Cooled Enclosed Drive can be used with AC motors in power sizes from 800–1550 kW. However, using the patented VACON® DriveSynch control concept, four enclosed drives can be run in parallel taking the power range up to
  an outstanding 5 MW.

Fast installation

- VACON® NXP Liquid Cooled Enclosed Drives are pre-designed and engineered. That means they’re good to go as soon as you receive them. Simply connect to the cooling system and the power and motor supplies. Being liquid cooled, the product is virtually silent and you’ll have greater flexibility with where to put it. You don’t have to worry about leaving space for air flow, and you’ll save on air-conditioning energy costs.

Packed with cool performance

- The enclosed unit comes equipped with the same advantages of efficient and quiet cooling performance as the rest of the VACON® NXP product family. When we say that this product is liquid cooled, we are talking about the entire product. The modules and also all its main components, such as LCL and dV/dt filters, are liquid cooled as standard. The reliable heat exchanger is offered as an option to provide a worry-free life cycle for the product.
- You can also enjoy the same fast commissioning with the aid of the easy to use Startup Wizard. The slide-out racks provide easy access for maintenance. Leakage indicators alert the operator to

A solution for all your needs
We provide enclosed solutions to any segment and application. And while we focus on the drives, you can concentrate on your performance.

Eliminate production disturbances

- Continuous energy supply is important to ensure your processes are optimized.
- Distortions in the energy supply, caused by the presence of harmonic currents and voltages, can trigger equipment disturbances and create energy losses.
- VACON® front-end drives with low harmonic technology maintain a constant energy supply and eliminate the disruption harmonics can cause to production.

Advanced monitoring

- The VACON® NXP Liquid Cooled Enclosed Drive’s built-in Fieldbus interface communicates effectively with your process automation system. This reduces the need for cabling and gives you increased monitoring and control of process equipment.

Safety is a given

- One of the most visible features of the enclosed product is the integrated main breaker switch.
- This simple on/off switch quickly and easily disconnects and activates the power supply as and when necessary.

Benefits

- Saves floor space and infrastructure needs
- Saves time and money in installation
- Faster and easier servicing
- Improves safety
- Enhances reliability
- Low harmonic input
- Virtually silent operation

Key features

- Optimized design with power range up to 5 MW
- All standard protection components included
- Silent design with no large cooling fans needed
- Slide-out feature
- Leakage detector
- Silent design with no large cooling fans needed
- Slide-out feature
- Leakage detector

Multiple options

VACON® NXP control
High-performance control platform for all demanding drive applications

- Excellent processing and calculation power
- Supports induction and permanent magnet motors
- Maximum utilization of control features over wide power and voltage range
- Built-in PLC functionality
- Integration of customer-specific functionalities

Option boards
VACON® NXP control provides exceptional modularity

- 5 plug-in extension slots
- Fieldbus boards
- Encoder boards
- IO boards

- Easy plug-in without need to remove other components

Fieldbus options
Easy integration with plant automation systems

- PROFIBUS DP
- DeviceNet
- Modbus RTU
- CANopen
- EtherCAT

Ethernet connectivity
Ethernet connectivity allows remote drive access for monitoring, configuring, and troubleshooting

- Modbus/TCP
- PROFINET IO
- EtherNet/IP

Functional safety and reliability

Safe Torque Off (STO)
Available for all VACON® NXP drives

- Prevents the drive from generating torque on the motor shaft
- Prevents unintentional start-ups
- Corresponds to an uncontrolled stop
- By stop category 0, EN60204-1

Safe Stop 1 (SS1)
Available for all VACON® NXP drives

- Initiates motor deceleration
- Initiates STO function after application-specific time delay
- Corresponds to an uncontrolled stop
- By stop category 1, EN60204-1

Conformal coating

- Conformal coated circuit boards as standard

- Improved performance
- Increased durability
- Reliable protection against dust and moisture
- Extended lifetime of drive and components

ATEX-certified thermistor input
Specially designed for motor temperature supervision

- Stops feeding energy to motor in case of over-heating
- Certified and compliant with the European ATEX directive 94/9/EC

Commissioning made easy

User-friendly keypad

- 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
- The startup wizard ensures a hassle-free set up

Software modularity
All-in-One application package

- Seven built-in software applications

Several segment-specific and advanced applications such as:

- System Interface
- Marine
- and much more

VACON® NCDrive
For setting, copying, storing, printing, monitoring, and controlling parameters.

Includes handy Datalogger function:

- Track failure modes & perform root cause analysis

Communicates with drive via:

- RS232
- EtherNet TCP/IP
- CAN (fast multiple drive monitoring)
- CAN@Net (remote monitoring)

Independent paralleling
Our patented independent paralleling configuration of front-end (AFE) units:

- Offer high redundancy
- Eliminate the need for drive-to-drive communication
- Enables automatic load-sharing

Dedicated applications

Intelligent system interfaces for heavy industries
VACON® System Interface Application (SIA) provides a flexible and extensive interface for use in coordinated drives, which have an overriding control system. VACON® SIA utilizes the most advanced functions of our VACON® 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.

Benefits

- Power extension with VACON® DriveSynch
- Master Follower functions for torque sharing
- Freely configurable PLC logic

Dedicated marine application
Our Marine Application provides flexibility and performance across all marine segment applications. VACON® Liquid Cooled drives 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.

Benefits

- Black Out prevention logic
- Cost savings in electric propulsion system
- State-of-the-art load sharing and load trooping

VACON® NXP Grid Converter
The VACON® NXP Grid Converter is a solution that improves energy efficiency and environmental performance in marine industry use. It enables ships to source energy from local grids on shore, allowing for the ship’s main generators to be completely switched off.

Benefits

- Reduces fuel consumption and emissions
- Reduces noise and vibrations

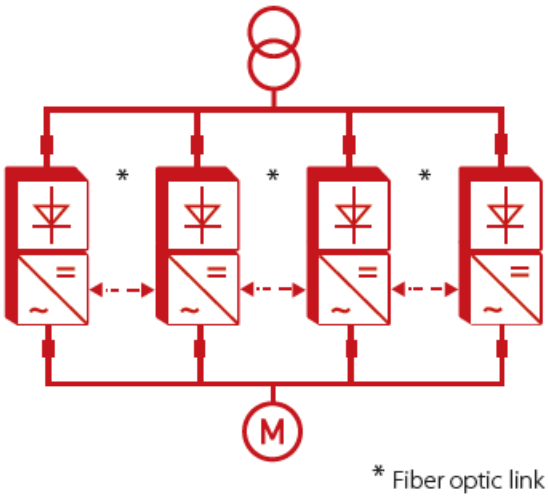
High power and improved redundancy

- VACON® DriveSynch is a patented 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.

Benefits

- System redundancy is higher than in a conventional drive because each unit can run independently
- Identical units and standard modules reduce overall costs by reducing need for spares and specialist skills in engineering, installation, commissioning and maintenance



Liquid to liquid heat exchangers

We have 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. The heat exchanger is a pre-designed, pre-tested and fully functional package that ensures safety and reliability.

Intelligent system interfaces for heavy industries

- Self-supporting module rack construction
- Cooling circuit equipped with threaded joints or flanges
- Heavy industry, lightweight PVC-C
- Industrial water heat exchanger, three-way-valve, pump, AC drive
- Flow and pressure sensors
- Stainless steel AISI piping
- Two-way-valve
- Heat exchanger installed inside a Rittal TS8 or VSG VEDA 5000 cabinet
- Double pumps for marine class requirements, types 120 kW and 300 kW

Ratings and dimensions

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

		Drive output current			Motor shaft power					
AC drive type 6-pulse	**AC drive type 12-pulse**	**Thermal I_{th}**	**Rated cont. I_L**	**Rated cont. I_H**	**Optimum motor at I_{th}**	**Optimum motor at I_{th}**	**Power loss c/a/T*) [kW]**	**Chassis**	**Choke type 6-pulse**	**Choke type 12-pulse**
		[A]	**[A]**	**[A]**	**(400 V) [kW]**	**(500 V) [kW]**				
NXP00165A0N1SWS		16	15	11	7.5	11	0.4/0.2/0.6	CH3	CHK0023N6A0	
NXP00225A0N1SWS		22	20	15	11	15	0.5/0.2/0.7	CH3	CHK0023N6A0	
NXP00315A0N1SWS		31	28	21	15	18.5	0.7/0.2/0.9	CH3	CHK0038N6A0	
NXP00385A0N1SWS		38	35	25	18.5	22	0.8/0.2/1.0	CH3	CHK0038N6A0	
NXP00455A0N1SWS		45	41	30	22	30	1.0/0.3/1.3	CH3	CHK0062N6A0	
NXP00615A0N1SWS		61	55	41	30	37	1.3/0.3/1.5	CH3	CHK0062N6A0	
NXP00725A0N0SWS		72	65	48	37	45	1.2/0.3/1.5	CH4	CHK0087N6A0	

NXP00875A0N0SWS		87	79	58	45	55	1.5/0.3/1.8	CH4	CHK0087N6A0	
NXP01055A0N0SWS		105	95	70	55	75	1.8/0.3/2.1	CH4	CHK0145N6A0	
NXP01405A0N0SWS		140	127	93	75	90	2.3/0.3/2.6	CH4	CHK0145N6A0	
NXP01685A0N0SWS		168	153	112	90	110	4.0/0.4/4.4	CH5	CHK0261N6A0	
NXP02055A0N0SWS		205	186	137	110	132	5.0/0.5/5.5	CH5	CHK0261N6A0	
NXP02615A0N0SWS		261	237	174	132	160	6.0/0.5/6.5	CH5	CHK0261N6A0	
NXP03005A0N0SWF		300	273	200	160	200	4.5/0.5/5.0	CH61	CHK0400N6A0	
NXP03855A0N0SWF		385	350	257	200	250	6.0/0.5/6.5	CH61	CHK0400N6A0	
NXP04605A0N0SWF	**NXP04605A0N0TWF**	460	418	307	250	315	6.5/0.5/7.0	CH72	CHK0520N6A0	2 x CHK0261N6A0
NXP05205A0N0SWF	**NXP05205A0N0TWF**	520	473	347	250	355	7.5/0.6/8.1	CH72	CHK0520N6A0	2 x CHK0261N6A0
NXP05905A0N0SWF	**NXP05905A0N0TWF**	590	536	393	315	400	9.0/0.7/9.7	CH72	CHK0650N6A0	2 x CHK0400N6A0
NXP06505A0N0SWF	**NXP06505A0N0TWF**	650	591	433	355	450	10.0/0.7/10.7	CH72	CHK0650N6A0	2 x CHK0400N6A0
NXP07305A0N0SWF	**NXP07305A0N0TWF**	730	664	487	400	500	12.0/0.8/12.8	CH72	CHK0750N6A0	2 x CHK0400N6A0
NXP08205A0N0SWF		820	745	547	450	560	12.5/0.8/13.3	CH63	CHK0820N6A0	
NXP09205A0N0SWF		920	836	613	500	600	14.4/0.9/15.3	CH63	CHK1030N6A0	
NXP10305A0N0SWF		1030	936	687	560	700	16.5/1.0/17.5	CH63	CHK1030N6A0	
NXP11505A0N0SWF		1150	1045	766	600	750	18.5/1.2/19.7	CH63	CHK1150N6A0	
NXP13705A0N0SWF	**NXP13705A0N0TWF**	1370	1245	913	700	900	19.0/1.2/20.2	CH74	3 x CHK0520N6A0	2 x CHK0750N6A0
NXP16405A0N0SWF	**NXP16405A0N0TWF**	1640	1491	1093	900	1100	24.0/1.4/25.4	CH74	3 x CHK0650N6A0	2 x CHK0820N6A0
NXP20605A0N0SWF	**NXP20605A0N0TWF**	2060	1873	1373	1100	1400	32.5/1.8/34.3	CH74	3 x CHK0750N6A0	2 x CHK1030N6A0
NXP23005A0N0SWF		2300	2091	1533	1250	1500	36.3/2.0/38.3	CH74	3 x CHK0820N6A0	

NXP24705A0N0SWF	**NXP24705A0N0TWF**	2470	2245	1647	1300	1600	38.8/2.2/41.0	2 x CH74	6 x CHK0520N6A0	4 x CHK0650N6A0
NXP29505A0N0SWF	**NXP29505A0N0TWF**	2950	2681	1967	1550	1950	46.3/2.6/48.9	2 x CH74	6 x CHK0520N6A0	4 x CHK0750N6A0
NXP37105A0N0SWF	**NXP37105A0N0TWF**	3710	3372	2473	1950	2450	58.2/3.0/61.2	2 x CH74	6 x CHK0650N6A0	4 x CHK1030N6A0
NXP41405A0N0SWF	**NXP41405A0N0TWF**	4140	3763	2760	2150	2700	65.0/3.6/68.6	2 x CH74	6 x CHK0750N6A0	4 x CHK1150N6A0
2 x NXP24705A0N0SWF	**2 x NXP24705A0N0TWF**	4700	4300	3100	2450	3050	73.7/4.2/77.9	4 x CH74	12 x CHK0520N6A0	8 x CHK0650N6A0
2 x NXP29505A0N0SWF	**2 x NXP29505A0N0TWF**	5600	5100	3700	2900	3600	88/5/93	4 x CH74	12 x CHK0520N6A0	8 x CHK0750N6A0
2 x NXP37105A0N0SWF	**2 x NXP37105A0N0TWF**	7000	6400	4700	3600	4500	110.6/5.7/116.3	4 x CH74	12 x CHK0650N6A0	8 x CHK1030N6A0
2 x NXP41405A0N0SWF	**2 x NXP41405A0N0TWF**	7900	7200	5300	4100	5150	123.5/6.9/130.4	4 x CH74	12 x CHK0750N6A0	8 x CHK1150N6A0

- **Ith =** Thermal maximum continuous RMS current. Dimensioning can be done according to this current if the process does not require any overloadability or the process does not include any load variation or margin for overloadability.
- **IL =** Low overloadability current. Allows +10% load variation. 10% exceeding can be continuous.
- **IH =** High overloadability current. Allows +50% load variation. 50% exceeding can be continuous.
- All values with cosφ = 0,83 and efficiency = 97%
- ***) c =** power loss into coolant; a = power loss into the air; T = total power loss; power losses of input chokes not included. All power losses obtained using
- max. supply voltage, Ith, and switching frequency of 3.6 kHz and Closed Loop control mode. All power losses are worst-case losses.
- If some other mains voltage is used, apply the formula P = √3 x Un x In x cosφ x eff% to calculate the NX Liquid-Cooled drive output power.
- The enclosure class for all NX Liquid-Cooled AC drives is IP00.
- If the motor is continuously run at frequencies below 5 Hz (besides start and stop ramps), please pay attention to the drive dimensioning for low frequencies,
- i.e. maximum I = 0.66* Ith or choose drive according to IH. It is recommended to check the rating with your distributor or Vacon.
- Drive overrating may also be necessary if the process requires high starting torque.

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

		Drive output current			Motor shaft power					
AC drive type 6-pulse	**AC drive type 12-pulse**	**Thermal Ith**	**Rated cont. I_L**	**Rated cont. I_H**	**Optimum motor at I_{th}**	**Optimum motor at I_{th}**	**Power loss c/a/T*) [kW]**	**Chassis**	**Choke type 6-pulse**	**Choke type 12-pulse**
		[A]	**[A]**	**[A]**	**(525 V) [kW]**	**(690 V) [kW]**				
NXP01706A0T0SWF		170	155	113	110	160	4.0/0.2/4.2	CH61	CHK0261N6A0	
NXP02086A0T0SWF		208	189	139	132	200	4.8/0.3/5.1	CH61	CHK0261N6A0	
NXP02616A0T0SWF		261	237	174	160	250	6.3/0.3/6.6	CH61	CHK0261N6A0	
NXP03256A0T0SWF	**NXP03256A0T0TWF**	325	295	217	200	300	7.2/0.4/7.6	CH72	CHK0400N6A0	2 x CHK0261N6A0
NXP03856A0T0SWF	**NXP03856A0T0TWF**	385	350	257	250	355	8.5/0.5/9.0	CH72	CHK0400N6A0	2 x CHK0261N6A0
NXP04166A0T0SWF	**NXP04166A0T0TWF**	416	378	277	250	355	9.1/0.5/9.6	CH72	CHK0520N6A0	2 x CHK0261N6A0
NXP04606A0T0SWF	**NXP04606A0T0TWF**	460	418	307	300	400	10.0/0.5/10.5	CH72	CHK0520N6A0	2 x CHK0261N6A0
NXP05026A0T0SWF	**NXP05026A0T0TWF**	502	456	335	355	450	11.2/0.6/11.8	CH72	CHK0520N6A0	2 x CHK0261N6A0
NXP05906A0T0SWF		590	536	393	400	560	12.4/0.7/13.1	CH63	CHK0650N6A0	
NXP06506A0T0SWF		650	591	433	450	600	14.2/0.8/15.0	CH63	CHK0650N6A0	
NXP07506A0T0SWF		750	682	500	500	700	16.4/0.9/17.3	CH63	CHK0750N6A0	
NXP08206A0T0SWF	**NXP08206A0T0TWF**	820	745	547	560	800	17.3/1.0/18.3	CH74	3 x CHK0400N6A0	2 x CHK0520N6A0

NXP09206A0T0SWF	**NXP09206A0T0TWF**	920	836	613	650	850	19.4/1.1/20.5	CH74	3 x CHK0400N6A0	2 x CHK0520N6A0
NXP10306A0T0SWF	**NXP10306A0T0TWF**	1030	936	687	700	1000	21.6/1.2/22.8	CH74	3 x CHK0400N6A0	2 x CHK0520N6A0
NXP11806A0T0SWF	**NXP11806A0T0TWF**	1180	1073	787	800	1100	25.0/1.3/26.3	CH74	3 x CHK0400N6A0	2 x CHK0650N6A0
NXP13006A0T0SWF	**NXP13006A0T0TWF**	1300	1182	867	900	1200	27.3/1.5/28.8	CH74	3 x CHK0520N6A0	2 x CHK0650N6A0
NXP15006A0T0SWF	**NXP15006A0T0TWF**	1500	1364	1000	1050	1400	32.1/1.7/33.8	CH74	3 x CHK0520N6A0	2 x CHK0820N6A0
NXP17006A0T0SWF	**NXP17006A0T0TWF**	1700	1545	1133	1150	1550	36.5/1.9/38.4	CH74	3 x CHK0650N6A0	2 x CHK1030N6A0
NXP18506A0T0SWF	**NXP18506A0T0TWF**	1850	1682	1233	1250	1650	39.0/2.0/41.0	2 x CH74	6 x CHK0400N6A0	4 x CHK0520N6A0
NXP21206A0T0SWF	**NXP21206A0T0TWF**	2120	1927	1413	1450	1900	44.9/2.4/47.3	2 x CH74	6 x CHK0400N6A0	4 x CHK0650N6A0
NXP23406A0T0SWF	**NXP23406A0T0TWF**	2340	2127	1560	1600	2100	49.2/2.6/51.8	2 x CH74	6 x CHK0400N6A0	4 x CHK0650N6A0
NXP27006A0T0SWF	**NXP27006A0T0TWF**	2700	2455	1800	1850	2450	57.7/3.1/60.8	2 x CH74	6 x CHK0520N6A0	4 x CHK0750N6A0
NXP31006A0T0SWF	**NXP31006A0T0TWF**	3100	2818	2066	2150	2800	65.7/3.4/69.1	2 x CH74	6 x CHK0520N6A0	4 x CHK0820N6A0
2 x NXP18506A0T0SWF	**2 x NXP18506A0T0TWF**	3500	3200	2300	2400	3150	74,2/3,8/77,9	4 x CH74	12 x CHK0400N6A0	8 x CHK0520N6A0
2 x NXP21206A0T0SWF	**2 x NXP21206A0T0TWF**	4000	3600	2700	2750	3600	85,4/4,5/89,9	4 x CH74	12 x CHK0400N6A0	8 x CHK0650N6A0
2 x NXP23406A0T0SWF	**2 x NXP23406A0T0TWF**	4400	4000	2900	3050	3950	93,4/5,0/98,4	4 x CH74	12 x CHK0400N6A0	8 x CHK0650N6A0
2 x NXP27006A0T0SWF	**2 x NXP27006A0T0TWF**	5100	4600	3400	3500	4600	109,7/5,8/115,5	4 x CH74	12 x CHK0520N6A0	8 x CHK0750N6A0

2 x NXP31006A0T0SWF	**2 x NXP31006A0T0TWF**	5900	5400	3900	4050	5300	124,8/6,5/131,3	4 x CH74	12 x CHK0520N6A0	8 x CHK0820N6A0

Standard air cooled chokes for VACON® NX Liquid Cooled product range

Choke type	Losses to air [W]	Dimensions W x H x D [mm]	Weight [kg]
CHK0023N6A0	145	230 x 179 x 121	10
CHK0038N6A0	170	270 x 209 x 145	15
CHK0062N6A0	210	300 x 214 x 160	20
CHK0087N6A0	250	300 x 233 x 170	26
CHK0145N6A0	380	200 x 292 x 185	37
CHK0261N6A0	460	354 x 357 x 230	53
CHK0400N6A0	610	350 x 421 x 262	84
CHK0520N6A0	810	497 x 446 x 244	115
CHK0650N6A0	890	497 x 496 x 244	130
CHK0750N6A0	970	497 x 527 x 273	170
CHK0820N6A0	1020	497 x 529 x 275	170
CHK1030N6A0	1170	497 x 677 x 307	213
CHK1150N6A0	1420	497 x 677 x 307	213

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_{th} [A]	Rated cont. I_L [A]	Rated cont. I_H [A]	Optimum motor at I_{th} (540 VDC) [kW]	Optimum motor at I_{th} (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
NXP00725A0T0IWS	72	65	48	37	45	1.2/0.3/1.5	CH4
NXP00875A0T0IWS	87	79	58	45	55	1.5/0.3/1.8	CH4
NXP01055A0T0IWS	105	95	70	55	75	1.8/0.3/2.1	CH4
NXP01405A0T0IWS	140	127	93	75	90	2.3/0.3/2.6	CH4
NXP01685A0T0IWS	168	153	112	90	110	2.5/0.3/2.8	CH5
NXP02055A0T0IWS	205	186	137	110	132	3.0/0.4/3.4	CH5
NXP02615A0T0IWS	261	237	174	132	160	4.0/0.4/4.4	CH5
NXP03005A0T0IWF	300	273	200	160	200	4.5/0.4/4.9	CH61
NXP03855A0T0IWF	385	350	257	200	250	5.5/0.5/6.0	CH61
NXP04605A0T0IWF	460	418	307	250	315	5.5/0.5/6.0	CH62
NXP05205A0T0IWF	520	473	347	250	355	6.5/0.5/7.0	CH62
NXP05905A0T0IWF	590	536	393	315	400	7.5/0.6/8.1	CH62
NXP06505A0T0IWF	650	591	433	355	450	8.5/0.6/9.1	CH62
NXP07305A0T0IWF	730	664	487	400	500	10.0/0.7/10.7	CH62
NXP08205A0T0IWF	820	745	547	450	560	12.5/0.8/13.3	CH63
NXP09205A0T0IWF	920	836	613	500	600	14.4/0.9/15.3	CH63

NXP10305A0T0IWF	1030	936	687	560	700	16.5/1.0/17.5	CH63
NXP11505A0T0IWF	1150	1045	766	600	750	18.4/1.1/19.5	CH63
NXP13705A0T0IWF	1370	1245	913	700	900	15.5/1.0/16.5	CH64
NXP16405A0T0IWF	1640	1491	1093	900	1100	19.5/1.2/20.7	CH64
NXP20605A0T0IWF	2060	1873	1373	1100	1400	26.5/1.5/28.0	CH64
NXP23005A0T0IWF	2300	2091	1533	1250	1500	29.6/1.7/31.3	CH64
NXP24705A0T0IWF	2470	2245	1647	1300	1600	36.0/2.0/38.0	2 x CH 64
NXP29505A0T0IWF	2950	2681	1967	1550	1950	39.0/2.4/41.4	2 x CH 64
NXP37105A0T0IWF	3710	3372	2473	1950	2450	48.0/2.7/50.7	2 x CH 64
NXP41405A0T0IWF	4140	3763	2760	2150	2700	53.0/3.0/56.0	2 x CH 64
2 x NXP24705A0T0IWF	4700	4300	3100	2450	3050	69.1/3.9/73	4 x CH 64
2 x NXP29505A0T0IWF	5600	5100	3700	2900	3600	74.4/4.6/79	4 x CH 64
2 x NXP37105A0T0IWF	7000	6400	4700	3600	4500	90.8/5.2/96	4 x CH 64
2 x NXP41405A0T0IWF	7900	7200	5300	4100	5150	101.2/5.8/107	4 x CH 64

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

- **Input 540 VDC =** Rectified 400 VAC supply
- **Input 675 VDC =** Rectified 500 VAC supply

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

AC drive type	**Drive output current**			**Motor shaft power**		**Power loss c/a/T*) [kW]**	**Chass is**
	Thermal I_{th} [A]	**Rated c ont. I_L [A]**	**Rated c ont. I_H [A]**	**An optimum motor at I_{th} (7 10 VDC) [kW]**	**Optimum mot or at I_{th} (930 V DC) [kW]**		
NXP01706A0T0IWF	170	155	113	110	160	3.6/0.2/3.8	CH61

NXP02086A0T0IWF	208	189	139	132	200	4.3/0.3/4.6	CH61
NXP02616A0T0IWF	261	237	174	160	250	5.4/0.3/5.7	CH61
NXP03256A0T0IWF	325	295	217	200	300	6.5/0.3/6.8	CH62
NXP03856A0T0IWF	385	350	257	250	355	7.5/0.4/7.9	CH62
NXP04166A0T0IWF	416	378	277	250	355	8.0/0.4/8.4	CH62
NXP04606A0T0IWF	460	418	307	300	400	8.7/0.4/9.1	CH62
NXP05026A0T0IWF	502	456	335	355	450	9.8/0.5/10.3	CH62
NXP05906A0T0IWF	590	536	393	400	560	10.9/0.6/11.5	CH63
NXP06506A0T0IWF	650	591	433	450	600	12.4/0.7/13.1	CH63
NXP07506A0T0IWF	750	682	500	500	700	14.4/0.8/15.2	CH63
NXP08206A0T0IWF	820	745	547	560	800	15.4/0.8/16.2	CH64
NXP09206A0T0IWF	920	836	613	650	850	17.2/0.9/18.1	CH64
NXP10306A0T0IWF	1030	936	687	700	1000	19.0/1.0/20.0	CH64
NXP11806A0T0IWF	1180	1073	787	800	1100	21.0/1.1/22.1	CH64
NXP13006A0T0IWF	1300	1182	867	900	1200	24.0/1.3/25.3	CH64
NXP15006A0T0IWF	1500	1364	1000	1050	1400	28.0/1.5/29.5	CH64
NXP17006A0T0IWF	1700	1545	1133	1150	1550	32.1/1.7/33.8	CH64
NXP18506A0T0IWF	1850	1682	1233	1250	1650	34.2/1.8/36.0	2 x CH 64
NXP21206A0T0IWF	2120	1927	1413	1450	1900	37.8/2.0/39.8	2 x CH 64
NXP23406A0T0IWF	2340	2127	1560	1600	2100	43.2/2.3/45.5	2 x CH 64
NXP27006A0T0IWF	2700	2455	1800	1850	2450	50.4/2.7/53.1	2 x CH 64

NXP31006A0T0IWF	3100	2818	2066	2150	2800	57.7/3.1/60.8	2 x CH 64
2 x NXP18506A0T0IWF	3500	3200	2300	2400	3150	64,9/3,5/68,4	4 x CH 64
2 x NXP21206A0T0IWF	4000	3600	2700	2750	3600	71,8/3,8/75,6	4 x CH 64
2 x NXP23406A0T0IWF	4400	4000	2900	3050	3950	82,1/4,4/86,5	4 x CH 64
2 x NXP27006A0T0IWF	5100	4600	3400	3500	4600	95,8/5,1/100,9	4 x CH 64
2 x NXP31006A0T0IWF	5900	5400	3900	4050	5300	109,7/5,8/115,5	4 x CH 64

1. High power 525-690V AFE, INU and BCU units available as wide voltage range version (NX_8 models) with DC bus voltage 640-1200 VDC. The units are ordered with the nominal mains voltage code 8 instead of 6 as for the standard version.

The following additional requirements applies to the wide voltage version:

- output filter with an inductance of at least 0.7% needed
- external 24VDC supply for the control unit

The voltage classes for the inverter units used in the tables above have been dened 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 Ch74	246 746	1076 1175	372 385	90 280

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

VACON® NXA Liquid Cooled active front-end, DC bus voltage 465-800 VDC

AC drive type	AC			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

NXA23005A0T02 WF	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 1)

AC drive type	AC			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	3.6/0.2/3.8	CH61
NXA02086A0T02WF	208	189	139	184	242	167	220	4.3/0.3/4.6	CH61
NXA02616A0T02WF	261	237	174	231	303	210	276	5.4/0.3/5.7	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	8.0/0.4/8.4	CH62
NXA04606A0T02WF	460	418	307	407	535	370	486	8.7/0.4/9.1	CH62
NXA05026A0T02WF	502	456	335	444	584	403	530	9.8/0.5/10.3	CH62
NXA05906A0T02WF	590	536	393	522	686	474	623	10.9/0.6/11.5	CH63
NXA06506A0T02WF	650	591	433	575	756	523	687	12.4/0.7/13.1	CH63
NXA07506A0T02WF	750	682	500	663	872	603	793	14.4/0.8/15.2	CH63
NXA08206A0T02WF	820	745	547	725	953	659	866	15.4/0.8/16.2	CH64
NXA09206A0T02WF	920	836	613	814	1070	740	972	17.2/0.9/18.1	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	24.0/1.3/25.3	CH64
NXA15006A0T02WF	1500	1364	1000	1327	1744	1207	1586	28.0/1.5/29.5	CH64
NXA17006A0T02WF	1700	1545	1133	1504	1976	1367	1796	32.1/1.7/33.8	CH64

- **1)** DC bus voltage 640-1200 VDC for wide range voltage version (NX_8).
- *** C =** power loss into coolant, A = power loss into air, T = total power loss

VACON® Liquid Cooled regenerative line filters

LCL filter type	Suitability	Power loss c/a/T*) [kW]	Dimensions L_{net} 1pcs WxHxD [mm]	Dimensions L_{drive} 1pcs (total 3pcs) WxHxD [mm]	Dimensions C_{bank} 1pcs 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

VACON® NXP Liquid Cooled Enclosed drive

AC drive type	Rated current			Electrical output power		Chassis	Dimensions W x H x D W/O Cooling unit [in]
	Thermal ITH [A]	Cont. I_L [A]	Cont. I_H [A]	A motor at I_{TH} (400 VAC) [kW]	Motor at I_{TH} (500 VAC) [kW]		
NXP13705A5T0RWN-LIQC	1370	1245	913	700	900	CH64	2000 x 2100 x 900
NXP16405A5T0RWN-LIQC	1640	1491	1093	900	1100	CH64	2000 x 2100 x 900

C	Rated current			Electrical output power		Chassis	Dimensions W x H x D W/O Cooling unit [in]
	Thermal ITH [A]	Cont. I_L [A]	Cont. I_H [A]	Motor at I_{TH} (525 VAC) [kW]	Motor at I_{TH} (690 VAC) [kW]		
NXP08206A5T0RWN-LIQC	820	745	547	560	800	CH64	2000 x 2100 x 900
NXP09206A5T0RWN-LIQC	920	836	613	650	850	CH64	2000 x 2100 x 900
NXP10306A5T0RWN-LIQC	1030	936	687	700	1000	CH64	2000 x 2100 x 900
NXP11806A5T0RWN-LIQC	1180	1073	787	800	1100	CH64	2000 x 2100 x 900
NXP13006A5T0RWN-LIQC	1300	1182	867	900	1200	CH64	2000 x 2100 x 900
NXP15006A5T0RWN-LIQC	1500	1364	1000	1000	1400	CH64	2000 x 2100 x 900
NXP17006A5T0RWN-LIQC	1700	1545	1133	1150	1550	CH64	2000 x 2100 x 900

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 800 VDC (0)	Rated min resistance 600 VDC (0)	Rated max input current (Adc)	Rated cont. braking power 2*R 800 VDC [kW]	Rated cont. braking power 2*R 600 VDC [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 1)

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 (0)	Rated min resistance 840 VDC (0)	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

- DC bus voltage 640-1136 VDC for wide range voltage version (NX_8).
  - **NOTE:** The rated currents in given ambient (+50 °C) and coolant (+30 °C) temperatures are achieved only when the switching frequency is equal to or less than the factory default.
  - **NOTE:** Braking power: Pbrake = 2*Ubrake 2 / Resistor when 2 resistors are used
  - **NOTE:** Max input DC: Iin_max = Pbrake_max / Ubrake

VACON® NXP Liquid Cooled AC drive, internal brake chopper unit, braking voltage 460-800 VDC

Converter Type	Loadability	Braking capacity 600 VDC		Braking capacity 800 VDC		Chassis
	Rated min resistance [0]	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 AC drive, internal brake chopper unit, braking voltage 840-1100 VDC

Converter Type	Loadability	Braking capacity 840 VDC		Braking capacity 1100 VDC		Chassis
	Rated min resistance [0]	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

Only 6 pulse drives
The internal brake chopper can also be used in motor applications 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 puls/2min)	Resistance [0]	Maximum energy [kJ] (predefined power pulse)	Dimensions W x H x D [mm]	Weight [kg]
BRW-0730-LD-5 1)	465…800 V DC	637 3)	13.3	1.3	1594	480 x 600 x 740	55
BRW-0730-HD-5 2)	465…800 V DC	637 3)	34.5	1.3	4145	480 x 1020 x 740	95
BRW-0502-LD-6 1)	640…1100 V DC	516 4)	10.8	2.8	1290	480 x 760 x 530	40
BRW-0502-HD-6 2)	640…1100 V DC	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

Liquid-to-liquid heat exchangers

	HXL-M/V/R-040-N-P	HXL/M-M/V/R-120-N-P	HXL/M-M/R-300-N-P
Cooling power	0…40 kW	0…120 kW	0…300 kW
Mains supply	380…420 VAC	380…420 VAC	380…500 VAC
Flow	40…120 l/min	120…360 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	HXL: 1 bar / l = 40 m, DN80 HXM: 0.7 bar / l = 25 m, DN80
Double pump		HXM	HXM
Cabinets	VEDA, Rittal	VEDA, Rittal	Rittal
Dimensions W x H x D [mm] (without cabinet)	305 (506) x 1910 x 566	705 (982) x 1885 x 603	1100 x 1900 x 750

l = maximum distribution distance with specific DN diameter

Technical Data

Mains connection	Input voltage U_{in}	NX_5: 400…500 VAC (–10%…+10%); 465…800 VDC (–0%…+0%) NX_6: 525…690 VAC (–10%…+10%); 640…1100 VDC (–0%…+0%) NX_8: 525…690 VAC (–10%…+10%); 640…1136 VDC (–0%…+0%)[1)] NX_8: 525…690 VAC (–10%…+10%); 640…1200 VDC (–0%…+0%)[2)]
	Input frequency	45…66 Hz
Motor connections	Output voltage	0-U_{in}
	Output frequency	0…320 Hz
	Output filter	VACON® liquid cooled NX_8 unit must be equipped with a output filter with an inductance of at least 0.7%.
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…6 kHz; Factory default 3.6 kHz (1…10 kHz with special application) NX_6/NX_8: 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_{th}); 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/NX_8: (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 / standard in entire kW/HP range
EMC	Immunity	Fulfils all EMC immunity requirements
	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_{th})(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/ 30 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, unitover-temperature, motor overload, motor stall, motor underload, short-circuit of +24 V and +10 V reference voltages.

***) with OPT-AF board (SS1 requires external safety relay)**

1. NX_8 drives are only available as Ch6x NXB units.
2. NX_8 drives are only available as Ch6x NXA/NXP units.

Typecode key

VACON® NXP Liquid Cooled drives

NXP	0000	5	A	0	N	1	S	W	V	A1 A2 00 00 C3	-LIQC	+HXC1

NXP — **Product Range**
NXP = AC drive or inverter unit
NXA = Active front-end unit
NXB = Brake-chopper unit

0000 — **Nominal current**
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
G = graphical keypad

0 — **Enclosure class**
0 = IP00
5 = IP54

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**
I = Inverter unit; DC-supply,
2 = Active front-end unit
S = Standard supply; 6-pulse
N = Standard supply; 6-pulse
T = 12-pulse
U = 12-pulse
R = Low harmonic

W — **Hardware modifications: cooling**
W = Liqued-cooled module with aluminium heatsink
P = Liqued-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 A2 00 00 C3 — **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

-LIQC — **Liquid Cooled Enclosed Drive**

+HXC1 — **Heat Exchanger option for enclosed drive**
+HXC1 = Stainless steel piping, 1-pump
+HXC2 = Stainless steel piping, 2-pumps

*) Note, the control unit of NX_8 drives need to be supplied with a external 24 Vdc power source.

Option boards

Type	Card slot	I/O signal

	A	B	C	D	E	DI	DO	DIDO	AI (mA/V/ ±V)	AI (mA) isolated	AO (mA/V)	AO (mA) isolated	RO (NO/NC)	RO (NO)	+10 Vref	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	Note
Basic I/O cards (OPT-A)																												
OPT-A1	D					6	1		2		1				1		2											
OPT-A2		D											2															
OPT-A3		D											1	1		1												
OPT-A4			D			2																3/0			1			
OPT-A5			D			2															3/0					1		

OPT-A7			D																	6/2					1		2 enc. input + 1 enc. output
OPT-A8	D					6	1		2		1				1		2										1)
OPT-A9	D					6	1		2		1				1		2										2.5 mm^2 terminals
OPT-AE			D				2													3/0					1		DO = Divider + Direction

OPT-AF		D				2							1	1		1											
OPT-AK			D																			3			1		Sin/Cos/Marker
OPT-AN	D					6			2		2																Limited support
OPT-AJ	D						1		23)		1						1			6				1	1		
I/O expander cards (OPT-B)																											
OPT-B1		D	D	D	D			6									1										Selectable DI/DO
OPT-B2		D	D	D	D								1	1		1											

OPT-B4		D	D	D	D					1		2					1										2)
OPT-B5		D	D	D	D									3													
OPT-B8		D	D	D	D												1	3									
OPT-B9		D	D	D	D	2								1						5							
OPT-BH		D	D	D	D													3	3								3xpt10000;3xNi10000
OPT-BB			D			2																0/2	2			1	Sin/Cos+EnDat

OPT-BC			D																			3/3			1				Encoder out = Resolver simulation
OPT-BE		D	D	D	D																								EnDat / SSI
Fieldbus cards (OPT-C)																													
OPT-C2				D	D	RS485 (Multiprotocol)																							Modbus, N2
OPT-C3				D	D	PROFIBUS DP																							
OPT-C4				D	D	LonWorks																							

OPT-C5					D	PROFIBUS DP (D9-type connector)	
OPT-C6				D	D	CANopen (slave)	
OPT-C7				D	D	DeviceNet	
OPT-C8				D	D	RS485 (Multiprotocol, D9-type connector)	Modbus, N2
OPT-CG				D	D	SELMA 2 protocol	
OPT-CI				D	D	Modbus/TCP (Ethernet)	
OPT-CJ				D	D	BACNet, RS485	
OPT-CP				D	D	PROFINET I/O (Ethernet)	

OPT-CQ				D	D	EtherNet/IP (Ethernet)	
Communication cards (OPT-D)							
OPT-D1				D	D	System Bus adapter (2 x fiber optic pairs)	
OPT-D2				D	D	System Bus adapter (1 x fiber optic pair) & CAN-bus adapter (galvanically decoupled)	
OPT-D3				D	D	RS232 adapter card (galvanically decoupled), used mainly for application engineering to connect another keypad	
OPT-D6		D				CAN-bus adapter (galvanically decoupled)	
OPT-D7			D			Line voltage measurement	

1. Analogue signals are galvanically isolated as a group
2. Analog signals galvanically isolated separately
3. Only voltage input

Marine approvals

Type approvals

Delivery based approvals

Danfoss Drives

- Danfoss Drives is a world leader in variable speed control of electric motors.
- We aim to prove to you that a better tomorrow is driven by drives. It is as simple and as ambitious as that.

We offer you an unparalleled competitive edge through quality, application-optimized products targeting your needs – and a comprehensive range of product lifecycle services. You can rely on us to share your goals. Striving for the best possible performance in your applications is our focus. We achieve this by providing the innovative products and application know-how required to optimize efficiency, enhance usability, and reduce complexity. From supplying individual drive components to planning and delivering complete drive systems; our experts are ready to support you all the way.

We draw on decades of experience within industries that include:

- Chemical
- Cranes and Hoists
- Food and Beverage
- HVAC
- Lifts and Escalators
- Marine and Offshore
- Material Handling
- Mining and Minerals
- Oil and Gas
- Packaging
- Pulp and Paper
- Refrigeration
- Water and Wastewater
- Wind

You will find it easy to do business with us. Online, and locally in more than 50 countries, our experts are never far away, reacting fast when you need them. Since 1968, we have been pioneers in the drives business. In 2014, Vacon and Danfoss merged, forming one of the largest companies in the industry. Our AC drives can adapt to any

motor technology and we supply products in a power range from 0.18 kW to 5.3 MW.

- 1-877-822-6606
- www.danfossdrives.com.
- EtherNet/IP™ and DeviceNet™ are trademarks of ODVA, Inc.
- DKDD.PB.909.A2.22
- © Copyright Danfoss Drives | 2016.06
- Selection Guide
- VACON® NXP Liquid Cooled
- 10 HP – 5900 HP, (7.5 kW – 5.3 MW)

Documents / Resources

	Danfoss VACON NXP Liquid Cooled AC Drives [pdf] Instructions VACON NXP Liquid Cooled AC Drives, VACON NXP, Liquid Cooled AC Drives, Cooled AC Drives, AC Drives, Drives

References

- User Manual