ENGINEERING
TOMORROW

Selection Guide | VACON® NXP Common DC Bus | 0.55 kW – 2.2 MW

Utilize and **redistribute** energy **efficiently**

380 to 690 V

full voltage range of common DC bus products for IM and PM motors

drives.danfoss.com | VACON®

Modular drive solutions

We offer a comprehensive range of Common DC bus drive products comprising front-end units, inverter units and brake chopper units in the entire power range and voltages from 380 V to 690 V. The drive components are built on proven VACON® NX technology and provide the ideal energy sharing solution for a multitude of power systems.

Reliable. Robust. Proven.

When your goal is to ensure that all AC drives share energy within your industrial system, and that all energy is effectively utilized and redistributed, then VACON® Common DC bus drive solutions are the right choice. Our Common DC bus components are used in a multitude of combinations across a wide spectrum of high-power process industries from the pulp and paper, steel, metal and mining and marine cranes to smaller machines and production lines, which also demand cost-effective solutions.

DC bus systems comprise two main categories: regenerative and non-regenerative. In a regenerative DC bus system the front-end unit is capable of generating power back to the mains network. This kind of system is suitable for processes where braking is needed often and the braking power is relatively high. In a non-regenerative system the braking power is redistributed to the other drives in the system via the common DC bus, and possible excess power can be dissipated as heat using an optional brake chopper unit and brake resistors. In small production lines or small paper machines where braking is needed less often, a non-regenerative common DC bus system is a cost-efficient solution. In high power applications, it is possible to parallel multiple front-end units.

In addition to the welcome cost savings, you'll also benefit from reduced power cabling and installation time and reduced overall footprint of your drive system. Your drive line-up tolerance to voltage dips/sags will be improved and the harmonic distortions your drive system will be minimized.

In harmony with the environment

We are an environmentally responsible company and our energy saving products and solutions are a good example of that. Our Common DC bus portfolio fulfills key international standards and global requirements, including safety and EMC and Harmonics approvals. Likewise, we continue to develop innovative solutions utilizing for example regenerative energy and smart grid technology to help customers effectively monitor and control energy use and costs.

At your service

Whether you are an original equipment manufacturer (OEM), system integrator, brand label customer, distributor or end user, we provide 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.

Typical segments

- Metal
- Pulp and Paper
- Crane systems
- Mining and Minerals
- Marine

Pure performance

Speed and torque control must be just right when manufacturing top-class stainless steel products. VACON® AC drives have been succesfully implemented in various applications in the demanding metal processing industry.

What's in it for you

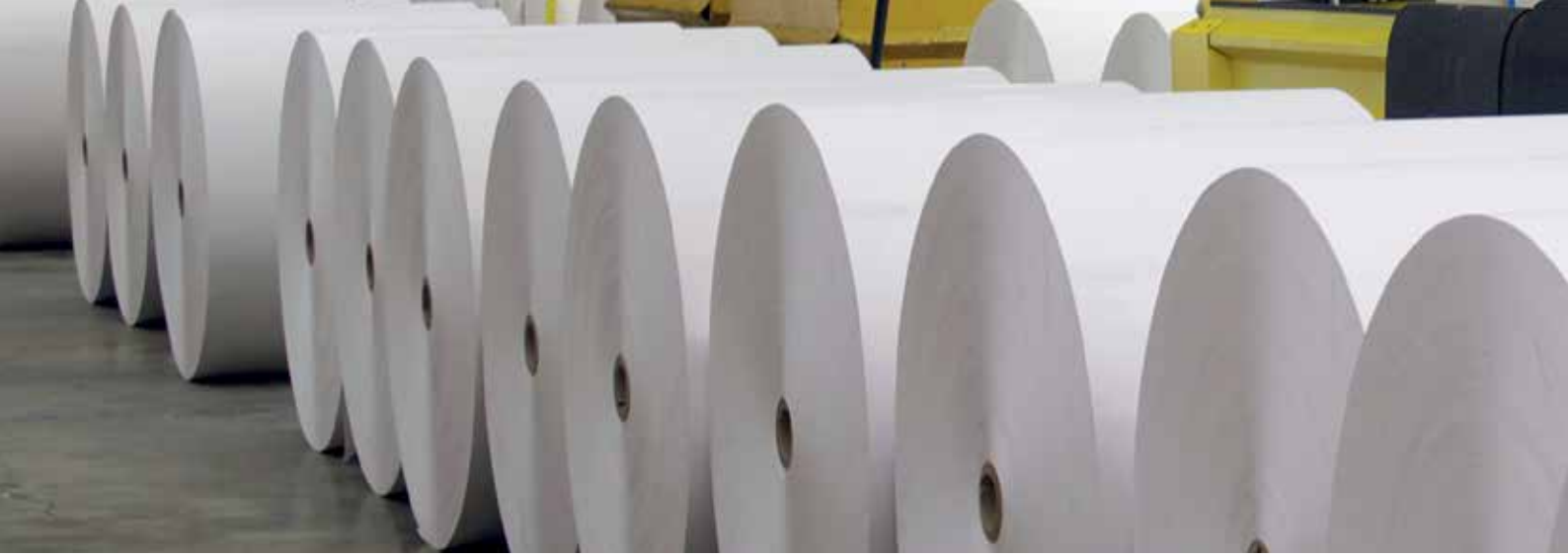
Air cooled drive modules within the VACON® NXP Common DC Bus product range

VACON® NXP Common DC Bus

Key features	Benefits
Full power (0.55 to 2.2 MW) and voltage (380 to 690 V) range for both induction and permanent magnet motors.	Same software tool, same control option boards allowing the maximum utilization of VACON® NXP features over a wide power range.
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.
Low harmonic regenerative front end. Cost effective non-regenerative front end.	Optimized drive system configurations enabling minimized overall investment cost. Excessive braking energy can be fed back to network saving energy costs.
Compact drive modules and easy integration to cabinets.	Optimized module design reduces need for additional engineering and saves in cabinet space reducing overall costs.

Typical applications

- Continuous web systems
- Metal lines eg. roller table systems
- Winders and unwinders
- Crane systems eg. main hoists, gantry and trolley drives
- Centrifuges
- Winches
- Conveyors
- Excavators



The complete range

VACON® Common DC Bus product portfolio meets all the requirements with a flexible architecture, comprising a selection of active front-ends, non-regenerative front ends, inverters and brake choppers in the entire power range and voltages from 380 V to 690 V.

Flexible configuration, customized solutions

Common DC bus components can be used in a multitude of combinations. In a typical DC bus configuration, the drives that are generating can transfer the energy directly to the drives in motoring mode. Common DC bus drive systems have different kinds of front-end units to meet the requirements of the electricity network and the process where the drives are used.

With the right configuration, the drive system can achieve optimal performance and significant energy savings can be made when braking energy is utilized to its full potential.

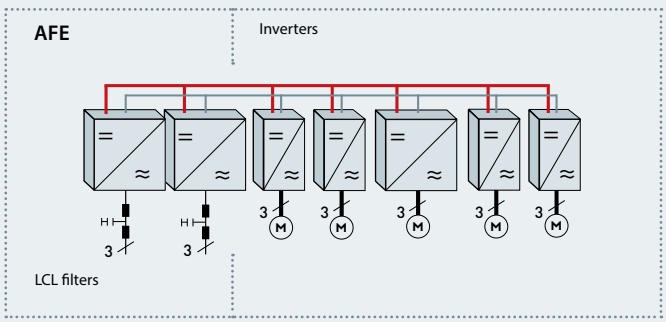
Front-end units

The front-end units convert a mains AC voltage and current into a DC voltage and current. The power is transferred from the mains to a common DC bus and, in certain cases, vice versa.

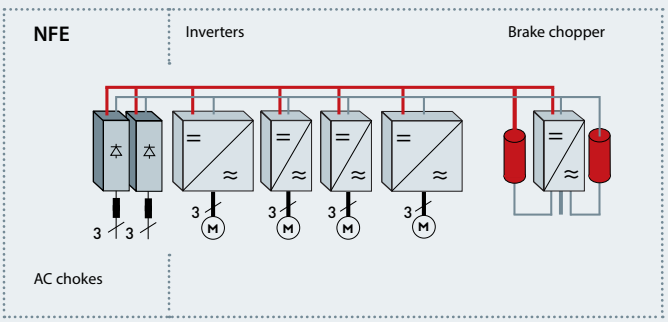
Active front-end (AFE)

The AFE unit is a bidirectional (regenerative) power converter for the front-end of a common DC bus drive line-up. An external LCL filter is used at the input. This unit is suitable in applications where low mains harmonics are required. AFE is able to boost DC link voltage (default +10%) higher than nominal DC link voltage (1,35x UN). AFE needs an external pre-charging circuit. However, AFE does not need any external grid side measurements to operate. 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.

A regenerative common DC bus system



A non-regenerative common DC bus system

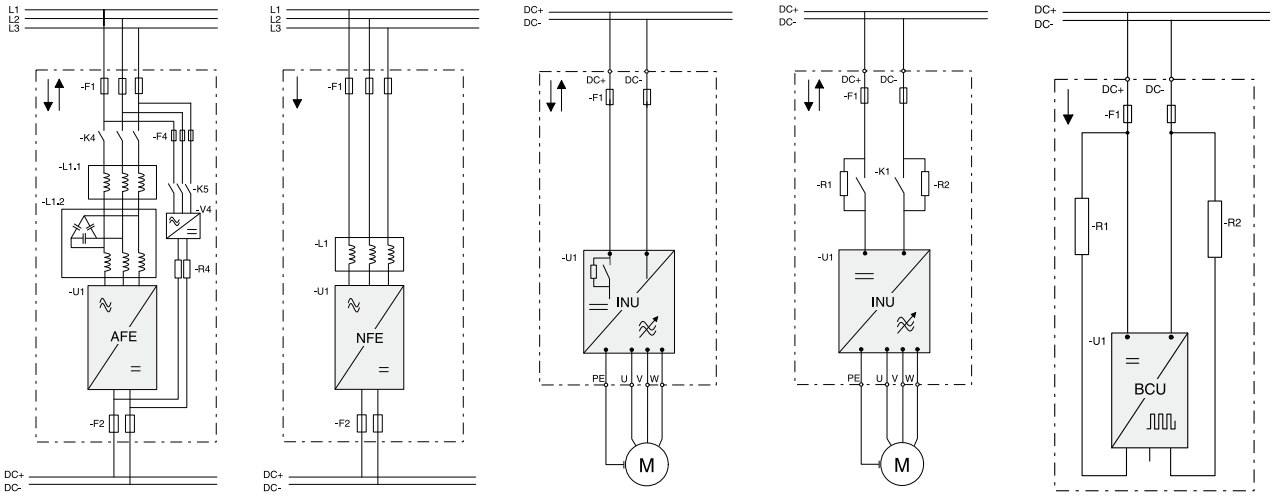


A common DC bus system consists of one or more front-end modules and inverter modules connected together by a DC bus.

Consistently reliable

Our proven performance, reliability and drive system modularity meet the needs of pulp and paper drive systems around the world.

Typical device configurations



AFE
Active front-end

NFE
Non-regenerative front-end

INU
Inverter Unit (FR4-FR8)

INU
Inverter Unit (FI9-FI14)

BCU
Brake chopper unit

Non-regenerative front-end (NFE)

The NFE unit is an unidirectional (motoring) power converter for the front-end of a common DC bus drive line-up. The NFE is a device that operates as a diode bridge using diode/thyristor components. A dedicated external choke is used at the input. The NFE unit has the capacity to charge a common DC bus, thus no external pre-charging is needed. This unit is suitable as a rectifying device when a normal level of harmonics is accepted and no regeneration to the mains is required. NFE units can be paralleled to increase power without any drive to drive communincation between the units.

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 the connection possibility to a live DC bus is required. The DC side charging circuit is integrated for powers up to 75 kW (FR4-FR8) and externally located for higher power ratings (FI9-FI14).

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 to resistors where the energy is dissipated as heat. External resistors are needed. By using two brake resistors, the braking power of the brake chopper is doubled.

Multiple options

VACON® NXP Control

VACON® NXP offers a high-performance control platform for all demanding drive applications. The microcontroller provides both exceptional processing power and small footprint. The VACON® NXP supports both induction and permanent magnet motors in open and closed loop control modes. It also provides bumpless control for transferring between open loop and closed loop. VACON® Programming tool can be used to improve performance and save costs by integrating customer-specific functionality into the drive. The same control board is used in all VACON® NXP drives, allowing the maximum utilization of VACON® NXP control features over a wide power and voltage range.

Option boards

The VACON® 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 page 13.

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 our fast SystemBus fiber optic communication.

PROFIBUS DP | DeviceNet | Modbus RTU | CANopen

Ethernet connectivity

There is no need to purchase additional communication tools, since the integrated Ethernet connectivity allows remote drive access for monitoring, configuring and troubleshooting.
Ethernet protocols such as PROFINET IO, EtherNet/IP and Modbus TCP are available for all VACON NXP drives. New Ethernet protocols are being continuously developed.

Modbus/TCP | PROFINET IO + System Redundancy S2 and PROFISAFE | EtherNet/IP

Functional safety

Advanced Safety Options

The VACON Advanced Safety Options operate the safety functions of an AC drive via the PROFIsafe fieldbus or I/O control. They improve flexibility by connecting safety devices within a plant.

Safe Stop functions

- STO – Safe Torque Off
- SS1 – Safe Stop 1
- SS2 – Safe Stop 2
- SBC – Safe Brake Control
- SQS – Safe Quick Stop

Safe Speed functions

- SLS – Safely-limited Speed
- SSM – Safe Speed Monitor
- SSR – Safe Speed Range
- SMS – Safe Maximum Speed

ATEX certified thermistor input

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

- In which potentially explosive gas, vapor, mist or air mixtures are present
- With combustible dust.

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.

DC cooling fans

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

Conformal coating

To increase performance and durability, conformally coated circuit boards (also known as varnished boards) are provided as standard for power modules (FR7 - FR14).

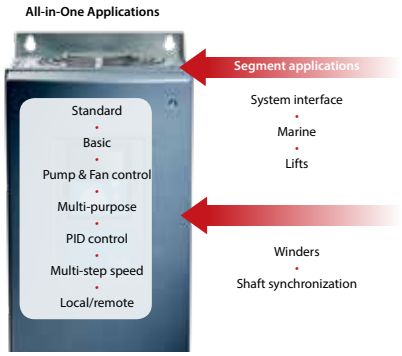
The upgraded boards offer reliable protection against dust and moisture and extend the lifetime of the drive and critical components.

Commissioning made easy

User-friendly keypad

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
- 9 signals can be monitored at the same time on a single multi-monitor page and is configurable to 9, 6 or 4 signals
- Parameter backup and copy function with the panel's internal memory
- The Startup Wizard ensures a hassle-free set up. Choose the language, application type and main parameters during the first power-up.

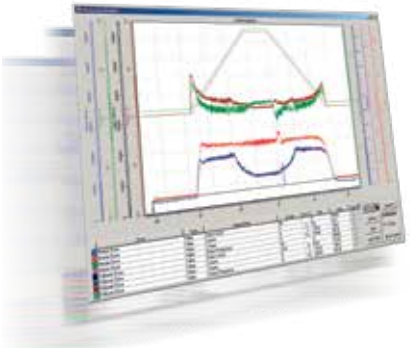


Software modularity

The 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, several segment specific applications as well as applications for demanding uses are available. These include System Interface, Marine, Lift and Shaft Synchronization application.

VACON® NXP applications can be downloaded from drives.danfoss.com



NCDrive

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

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

Independent paralleling

Benefit from our patented independent paralleling configuration of (AFE) front-end units.

- High redundancy
- No drive-to-drive communication needed
- Automatic load sharing
- NFE units can also be independently paralleled

Electrical ratings

380-500 VAC Inverter modules (INU)

Type	Unit		Low overload (AC current)		High overload (AC current)		I_{max}
	Code	Enclosure size	$I_{L\text{-}cont}$ [A]	I_{1min} [A]	$I_{H\text{-}cont}$ [A]	I_{1min} [A]	I_{2s} [A]
INU	NXI_0004 5 A2T0CSS	FR4	4.3	4.7	3.3	5.0	6.2
	NXI_0009 5 A2T0CSS		9	9.9	7.6	11.4	14
	NXI_0012 5 A2T0CSS		12	13.2	9	13.5	18
	NXI_0016 5 A2T0CSS	FR6	16	17.6	12	18	24
	NXI_0022 5 A2T0CSS		23	25.3	16	24	32
	NXI_0031 5 A2T0CSS		31	34	23	35	46
	NXI_0038 5 A2T0CSS		38	42	31	47	62
	NXI_0045 5 A2T0CSS		46	51	38	57	76
	NXI_0072 5 A2T0CSS	FR7	72	79	61	92	122
	NXI_0087 5 A2T0CSS		87	96	72	108	144
	NXI_0105 5 A2T0CSS		105	116	87	131	174
	NXI_0140 5 A0T0CSS	FR8	140	154	105	158	210
	NXI_0168 5 A0T0ISF	FI9	170	187	140	210	280
	NXI_0205 5 A0T0ISF		205	226	170	255	336
	NXI_0261 5 A0T0ISF		261	287	205	308	349
	NXI_0300 5 A0T0ISF		300	330	245	368	444
	NXI_0385 5 A0T0ISF	FI10	385	424	300	450	540
	NXI_0460 5 A0T0ISF		460	506	385	578	693
	NXI_0520 5 A0T0ISF		520	572	460	690	828
	NXI_0590 5 A0T0ISF	FI12	590	649	520	780	936
	NXI_0650 5 A0T0ISF		650	715	590	885	1062
	NXI_0730 5 A0T0ISF		730	803	650	975	1170
	NXI_0820 5 A0T0ISF		820	902	730	1095	1314
	NXI_0920 5 A0T0ISF		920	1012	820	1230	1476
	NXI_1030 5 A0T0ISF		1030	1133	920	1380	1656
	NXI_1150 5 A0T0ISF	FI13	1150	1265	1030	1545	1854
	NXI_1300 5 A0T0ISF		1300	1430	1150	1725	2070
	NXI_1450 5 A0T0ISF		1450	1595	1300	1950	2340
	NXI_1770 5 A0T0ISF	FI14	1770	1947	1600	2400	2880
	NXI_2150 5 A0T0ISF		2150	2365	1940	2910	3492
	NXI_2700 5 A0T0ISF		2700	2970	2300	3278	3933

525-690 VAC Inverter modules (INU)

Type	Unit		Low overload (AC current)		High overload (AC current)		I_{max}
	Code	Enclosure size	$I_{L\text{-}cont}$ [A]	I_{1min} [A]	$I_{H\text{-}cont}$ [A]	I_{1min} [A]	I_{2s} [A]
INU	NXI_0004 6 A2T0CSS	FR6	4.5	5	3.2	5	6.4
	NXI_0005 6 A2T0CSS		5.5	6	4.5	7	9
	NXI_0007 6 A2T0CSS		7.5	8	5.5	8	11
	NXI_0010 6 A2T0CSS		10	11	7.5	11	15
	NXI_0013 6 A2T0CSS		13.5	15	10	15	20
	NXI_0018 6 A2T0CSS		18	20	13.5	20	27
	NXI_0022 6 A2T0CSS		22	24	18	27	36
	NXI_0027 6 A2T0CSS		27	30	22	33	44
	NXI_0034 6 A2T0CSS		34	37	27	41	54
	NXI_0041 6 A2T0CSS	FR7	41	45	34	51	68
	NXI_0052 6 A2T0CSS		52	57	41	62	82
	NXI_0062 6 A0T0CSS	FR8	62	68	52	78	104
	NXI_0080 6 A0T0CSS		80	88	62	93	124
	NXI_0100 6 A0T0CSS		100	110	80	120	160
	NXI_0125 6 A0T0ISF	FI9	125	138	100	150	200
	NXI_0144 6 A0T0ISF		144	158	125	188	213
	NXI_0170 6 A0T0ISF		170	187	144	216	245
	NXI_0208 6 A0T0ISF		208	229	170	255	289
	NXI_0261 6 A0T0ISF	FI10	261	287	208	312	375
	NXI_0325 6 A0T0ISF		325	358	261	392	470
	NXI_0385 6 A0T0ISF		385	424	325	488	585
	NXI_0416 6 A0T0ISF		416	458	325	488	585
	NXI_0460 6 A0T0ISF	FI12	460	506	385	578	693
	NXI_0502 6 A0T0ISF		502	552	460	690	828
	NXI_0590 6 A0T0ISF		590	649	502	753	904
	NXI_0650 6 A0T0ISF		650	715	590	885	1062
	NXI_0750 6 A0T0ISF		750	825	650	975	1170
	NXI_0820 6 A0T0ISF		820	902	650	975	1170
	NXI_0920 6 A0T0ISF	FI13	920	1012	820	1230	1476
	NXI_1030 6 A0T0ISF		1030	1133	920	1380	1656
	NXI_1180 6 A0T0ISF		1180	1298	1030	1464	1755
	NXI_1500 6 A0T0ISF	FI14	1500	1650	1300	1950	2340
	NXI_1900 6 A0T0ISF		1900	2090	1500	2250	2700
	NXI_2250 6 A0T0ISF		2250	2475	1900	2782	3335

Electrical ratings

380-500 VAC Front-end modules (AFE, NFE)

Type	Unit		Low overload (AC current)		High overload (AC current)		DC Power *	
	Code	Enclosure size	$I_{L\text{-}cont}$ [A]	I_{1min} [A]	$I_{H\text{-}cont}$ [A]	I_{1min} [A]	400 V mains $P_{L\text{-}cont}$ [kW]	500 V mains $P_{L\text{-}cont}$ [kW]
AFE	1 x NXA_0168 5 A0T02SF	1 x FI9	170	187	140	210	114	143
	1 x NXA_0205 5 A0T02SF	1 x FI9	205	226	170	225	138	172
	1 x NXA_0261 5 A0T02SF	1 x FI9	261	287	205	308	175	220
	1 x NXA_0385 5 A0T02SF	1 x FI10	385	424	300	450	259	323
	1 x NXA_0460 5 A0T02SF	1 x FI10	460	506	385	578	309	387
	2 x NXA_0460 5 A0T02SF	2 x FI10	875	962	732	1100	587	735
	1 x NXA_1150 5 A0T02SF	1 x FI13	150	1265	1030	1545	773	966
	1 x NXA_1300 5 A0T02SF	1 x FI13	1300	1430	1150	1725	874	1092
	2 x NXA_1300 5 A0T02SF	2 x FI13	2470	2717	2185	3278	1660	2075
	3 x NXA_1300 5 A0T02SF	3 x FI13	3705	4076	3278	4916	2490	3115
	4 x NXA_1300 5 A0T02SF	4 x FI13	4940	5434	4370	6550	3320	4140
NFE	1 x NXN_0650 6 X0T0SSV	1 x FI9	650	715	507	793	410	513
	2 x NXN_0650 6 X0T0SSV	2 x FI9	1235	1359	963	1507	780	975
	3 x NXN_0650 6 X0T0SSV	3 x FI9	1853	2038	1445	2260	1170	1462
	4 x NXN_0650 6 X0T0SSV	4 x FI9	2470	2717	1927	3013	1560	1950
	5 x NXN_0650 6 X0T0SSV	5 x FI9	3088	3396	2408	3767	1950	2437
	6 x NXN_0650 6 X0T0SSV	6 x FI9	3705	4076	2890	4520	2340	2924

* In case you need to recalculate the power, please use the following formulas:

$$P_{H\text{-}cont} = P_{L\text{-}cont} \times \frac{I_{H\text{-}cont}}{I_{L\text{-}cont}}$$

$$P_{1min} = P_{L\text{-}cont} \times 1.1 \text{ (Low overload)}$$

$$P_{1min} = P_{H\text{-}cont} \times 1.5 \text{ (High overload)}$$

$$P_{L\text{-}cont} \times \frac{U_x}{400\,V}$$

$$P_{L\text{-}cont} \times \frac{U_x}{690\,V}$$

525-690 VAC Front-end modules (AFE, NFE)

Type	Unit		Low overload (AC current)		High overload (AC current)		DC Power *
	Code	Enclosure size	$I_{L\text{-}cont}$ [A]	I_{1min} [A]	$I_{H\text{-}cont}$ [A]	I_{1min} [A]	690 V mains $P_{L\text{-}cont}$ [kW]
AFE	1 x NXA_0125 6 A0T02SF	1 x FI9	125	138	100	150	145
	1 x NXA_0144 6 A0T02SF	1 x FI9	144	158	125	188	167
	1 x NXA_0170 6 A0T02SF	1 x FI9	170	187	144	216	198
	1 x NXA_0261 6 A0T02SF	1 x FI10	261	287	208	312	303
	1 x NXA_0325 6 A0T02SF	1 x FI10	325	358	261	392	378
	2 x NXA_0325 6 A0T02SF	2 x FI10	634	698	509	764	716
	1 x NXA_0920 6 A0T02SF	1 x FI13	920	1012	820	1230	1067
	1 x NXA_1030 6 A0T02SF	1 x FI13	1030	1133	920	1380	1195
	2 x NXA_1030 6 A0T02SF	2 x FI13	2008	2209	1794	2691	2270
	3 x NXA_1030 6 A0T02SF	3 x FI13	2987	3286	2668	4002	3405
	4 x NXA_1030 6 A0T02SF	4 x FI13	3965	4362	3542	5313	4538
NFE	1 x NXN_0650 6X0T0SSV	1 x FI9	650	715	507	793	708
	2 x NXN_0650 6X0T0SSV	2 x FI9	1235	1359	963	1507	1345
	3 x NXN_0650 6X0T0SSV	3 x FI9	1853	2038	1445	2260	2018
	4 x NXN_0650 6X0T0SSV	4 x FI9	2470	2717	1927	3013	2690
	5 x NXN_0650 6X0T0SSV	5 x FI9	3088	3396	2408	3767	3363
	6 x NXN_0650 6X0T0SSV	6 x FI9	3705	4076	2890	4520	4036

* In case you need to recalculate the power, please use the following formulas:

Dimensions and weights

Type	Enclosure size	H (mm)	W (mm)	D (mm)	Weight (kg)
Power module	FR4	292	128	190	5
	FR6	519	195	237	16
	FR7	591	237	257	29
	FR8	758	289	344	48
	FI9	1030	239	372	67
	FI10	1032	239	552	100
	FI12	1032	478	552	204
	FI13	1032	708	553	306
	FI14*	1032	2*708	553	612

* Only as inverter unit

Type	Suitability	H (mm)	W (mm)	D (mm)	Weight (kg) 500 / 690 V
LCL filter	AFE FI9	1775	291	515	241 / 245 *
	AFE FI10	1775	291	515	263 / 304 *
	AFE FI13	1442	494	525	477 / 473 *
AC choke	NFE	449	497	249	130

* Weight is different for 500 / 690 V versions, other dimensions are identical for both voltage classes

380-500 VAC Brake chopper modules (BCU)

Type	Unit		Braking current	Min. braking resistor (Per resistor)		Continuous braking power	
	Code	Enclosure size	$I_{L\text{-}cont}$ * [A]	540 VDC [Ω]	675 VDC [Ω]	540 VDC [kW]	675 VDC P [kW]
BCU	NXB_0004 5 A2T08SS	FR4	8	159.30	199.13	5	6
	NXB_0009 5 A2T08SS		18	70.80	88.50	11	14
	NXB_0012 5 A2T08SS		24	53.10	66.38	15	19
	NXB_0016 5 A2T08SS	FR6	32	39.83	49.78	20	25
	NXB_0022 5 A2T08SS		44	28.96	36.20	28	35
	NXB_0031 5 A2T08SS		62	20.55	25.69	40	49
	NXB_0038 5 A2T08SS		76	16.77	20.96	48	61
	NXB_0045 5 A2T08SS		90	14.16	17.70	57	72
	NXB_0061 5 A2T08SS	FR7	122	10.45	13.06	78	97
	NXB_0072 5 A2T08SS		148	8.61	10.76	94	118
	NXB_0087 5 A2T08SS		174	7.32	9.16	111	139
	NXB_0105 5 A2T08SS		210	6.07	7.59	134	167
	NXB_0140 5 A0T08SS	FR8	280	4.55	5.69	178	223
	NXB_0168 5 A0T08SF	FI9	336	3.79	4.74	214	268
	NXB_0205 5 A0T08SF		410	3.11	3.89	261	327
	NXB_0261 5 A0T08SF		522	2.44	3.05	333	416
	NXB_0300 5 A0T08SF		600	2.12	2.66	382	478
	NXB_0385 5 A0T08SF	FI10	770	1.66	2.07	491	613
	NXB_0460 5 A0T08SF		920	1.39	1.73	586	733
	NXB_0520 5 A0T08SF		1040	1.23	1.53	663	828
	NXB_1150 5 A0T08SF	FI13	2300	0.55	0.69	1466	1832
	NXB_1300 5 A0T08SF		2600	0.49	0.61	1657	2071
	NXB_1450 5 A0T08SF		2900	0.44	0.55	1848	2310

525-690 VAC Brake chopper modules (BCU)

Type	Unit		Braking current	Min. braking resistor (Per resistor)		Continuous braking power	
	Code	Enclosure size	$I_{L\text{-}cont}$ * [A]	708 VDC [Ω]	931 VDC [Ω]	708 VDC P [kW]	931 VDC P [kW]
BCU	NXB_0004 6 A2T08SS	FR6	8	238.36	274.65	6.7	9
	NXB_0005 6 A2T08SS		10	190.69	219.72	8	11
	NXB_0007 6 A2T08SS		14	136.21	156.94	12	15
	NXB_0010 6 A2T08SS		20	95.34	109.86	17	22
	NXB_0013 6 A2T08SS		26	73.34	84.51	22	29
	NXB_0018 6 A2T08SS		36	52.97	61.03	30	40
	NXB_0022 6 A2T08SS		44	43.34	49.94	37	48
	NXB_0027 6 A2T08SS		54	35.31	40.69	45	59
	NXB_0034 6 A2T08SS		68	28.04	32.31	57	75
	NXB_0041 6 A2T08SS	FR7	82	23.25	26.79	69	90
	NXB_0052 6 A2T08SS		104	18.34	21.13	87	114
	NXB_0062 6 A0T08SS	FR8	124	15.38	17.72	104	136
	NXB_0080 6 A0T08SS		160	11.92	13.73	134	176
	NXB_0100 6 A0T08SS		200	9.53	10.99	167	220
	NXB_0125 6 A0T08SF	FI9	250	7.63	8.79	209	275
	NXB_0144 6 A0T08SF		288	6.62	7.63	241	316
	NXB_0170 6 A0T08SF		340	5.61	6.46	284	374
	NXB_0208 6 A0T08SF		416	4.58	5.28	348	457
	NXB_0261 6 A0T08SF	FI10	522	3.65	4.21	436	573
	NXB_0325 6 A0T08SF		650	2.93	3.38	543	714
	NXB_0385 6 A0T08SF		770	2.48	2.85	643	846
	NXB_0416 6 A0T08SF		832	2.29	2.64	695	914
	NXB_0920 6 A0T08SF	FI13	1840	1.04	1.19	1537	2021
	NXB_1030 6 A0T08SF		2060	0.93	1.07	1721	2263
	NXB_1180 6 A0T08SF		2360	0.81	0.93	1972	2593

* Only as inverter unit

Electrical ratings

Supply connection	Input voltage U_{in} (AC) Front-end modules	380-500 VAC / 525-690 VAC -10%...+10% (according to EN60204-1)
	Input voltage U_{in} (DC) Inverter and brake chopper modules	465...800 VDC / 640...1100 VDC. The voltage ripple of the inverter supply voltage, formed in rectification of the electric network's alternating voltage in basic frequency, must be less than 50 V peak-to-peak
	Output voltage U_{out} (AC) Inverter	3~ 0…U_{in} / 1.4
	Output voltage U_{out} (DC) Active front-end module	1.10 x 1.35 x U_{in} (Factory default)
	Output voltage U_{out} (DC) non-regenerative front-end module	1.35 x U_{in}
Control characteristics	Control performance	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: 1…16 kHz; Factory default 10 kHz From NX_0072: 1…6 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 T_N (without brake resistor), flux braking
Ambient conditions	Ambient operating temperature	–10 °C (no frost)…+40 °C: I_H –10 °C (no frost)…+40 °C: I_L 1.5% derating for each 1 °C above 40 °C Max. ambient temperature +50 °C
	Storage temperature	–40 °C…+70 °C
	Relative humidity	0 to 95% RH, non-condensing, non-corrosive, no dripping water
	Air quality: - chemical vapours - mechanical particles	IEC 721-3-3, unit in operation, class 3C2 IEC 721-3-3, unit in operation, class 3S2
	Altitude	100% load capacity (no derating) up to 1000 m 1.5% derating for each 100 m above 1000 m Max. altitudes: NX_5: 3000 m; NX_6: 2000 m
	Vibration EN50178/EN60068-2-6	FR4 - FR8: Displacement amplitude 1 mm (peak) at 5…15.8 Hz Max acceleration 1 G at 15.8…150 Hz
		FI9 - FI13: Displacement amplitude 0.25 mm (peak) at 5…31 Hz Max acceleration 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)
	Cooling capacity required	Approximately 2%
	Cooling air required	FR4 70 m³/h, FR6 425 m³/h, FR7 425 m³/h, FR8 650 m³/h FI9 1150 m³/h, FI10 1400 m³/h, FI12 2800 m³/h, FI13 4200 m³/h
	Unit enclosure class	FR8, FI9 - 14 (IP00); FR4 - 7 (IP21)
EMC (at default settings)	Immunity	Fulfils all EMC immunity requirements, level T
Safety		CE, UL, CUL, EN 61800-5-1 (2003), see unit nameplate for more detailed approvals
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
	Advance safety option	STO (+SBC),SS1,SS2, SOS,SLS,SMS,SSM,SSR
Control connections	Analogue input voltage	0…+10 V, R_i = 200 kΩ, (–10 V…+10 V joystick control) Resolution 0.1%, accuracy ±1%
	Analogue input current	0(4)…20 mA, Ri = 250 Ω differential, resolution 0.1%, accuracy ±1%
	Digital inputs	6, positive or negative logic; 18…30 VDC
	Auxiliary voltage	+24 V, ±15%, max. 250 mA
	Output reference voltage	+10 V, +3%, max. load 10 mA
	Analogue output	0(4)…20 mA; R_L max. 500 Ω; resolution 10 bits. Accuracy ±2%.
	Digital outputs	Open collector output, 50 mA / 48 V
	Relay outputs	2 programmable change-over relay outputs Switching capacity: 24 VDC / 8 A, 250 VAC / 8 A, 125 VDC / 0.4 A Min. switching load: 5 V / 10 mA
	Thermistor input (OPT-A3)	Galvanically isolated, Rtrip = 4.7 kΩ
Protections	Overvoltage protection	NX_5: 911 VDC; NX_6: 1200 VDC
	Undervoltage protection	NX_5: 333 VDC; NX_6: 460 VDC
	Earth fault protection	Yes
	Motor phase supervision	Trips if any of the output phases is missing
	Overcurrent protection	Yes
	Unit overtemperature protection	Yes
	Motor overload protection	Yes
	Motor stall protection	Yes
	Motor underload protection	Yes
	Short-circuit protection of +24 V and +10 V reference voltages	Yes

* With OPT-AF board

Standard features and Option boards

Standard features	AFE	NFE	INU			BCU		
	NXA AAAA V	NXN AAAA V	NXI AAAA V			NXB AAAA V		
	FI9 - FI13	FI9	FR4, 6, 7	FR8	FI9 - FI14	FR4, 6, 7	FR8	FI9 - FI13
IP00	■	■		■	■		■	■
IP21			■			■		
IP54			□			□		
Air cooling	■	■	■	■	■	■	■	■
Standard board	■		■	■	■	■	■	■
Varnished board		■						
Alphanumeric keypad	■		■	■	■	■	■	■
EMC class T (EN 61800-3 for IT networks)	■	■	■	■	■	■	■	■
Safety CE / UL	■	■	■	■	■	■	■	■
Line reactor, external (required)		□						
LCL filter, external (required)	□							
No integrated charging	■				■			■
Integrated charging (DC side)		■	■	■		■	■	
Diode/thyristor rectifier		■						
IGBT	■		■	■	■	■	■	■

Type	Description	Card slot					Module			I / O signal																		
		A	B	C	D	E	AFE	INU	BCU	DI	DO	DI DO	AI (mA/V/±V)	AI (mA) isolated	AO (mA/V)	AO (mA) isolated	RO (NO/NC)	RO (NO)	+10Vref	Therm	+24V/ EXT +24 V	pt100	KTY84	42-240 VAC input	DI/DO (10...24 V)	DI/DO (RS422)	DI ~ 1Vp-p	Resolver	Out +5 V/+15 V/+24 V	Out +15 V/+24 V	Out +5 V/+12 V/+15 V
Basic I/O cards (OPTA)																															
OPTA1	DI/DO/AI/AO/ 10V/ 24V	■					■	■	■	6	1		2		1				1		2										
OPTA2	Relay output (NO/NC)		■				■	■	■								2														
OPTA3	Relay output + Thermistor input		■				■	■	■								1	1		1											
OPTA4	Encoder TTL type			■			■	■	■	2																3/0			1		
OPTA5	Encoder HTL type			■			■	■	■	2															3/0				1		
OPTA7	Double encoder HTL type			■			■	■	■																6/2				1		
OPTA8	"OPTA1 + Analogue signals galvanically isolated as a group"	■					■	■	■	6	1		2		1				1		2										
OPTA9	OPTA1 + 2,5mm2 connectors	■					■	■	■	6	1		2		1				1		2										
OPTAE	Encoder HTL type (Divider + direction)			■							2														3/0				1		
OPTAF	STO, ATEX therm		■							2							1	1		1											
OPTAK	Sin/Cos encoder interface			■																							3			1	
OPTAN	DI/AI/AO	■					■	■	■	6			2		2																
I/O expander cards (OPTB)																															
OPTB1	Programmable I/O		■	■	■	■	■	■	■			6									1										
OPTB2	Relay output + Thermistor input		■	■	■	■	■	■	■								1	1		1											
OPTB4	"Analog input/output Analogue signals galvanically isolated separately"		■	■	■	■	■	■	■					1		2					1										
OPTB5	Relay output		■	■	■	■	■	■	■									3													
OPTB8	"Temperature Measurement option PT100"		■	■	■	■	■	■	■												1	3									
OPTB9	DI + Relay output		■	■	■	■	■	■	■	2								1						5							
OPTBH	"Temperature Measurement option pt100, pt1000, Ni1000, KTY84"		■	■	■	■	■	■	■													3	3								
OPTBB	EnDat + Sin/Cos 1 Vp-p			■				■		2																0/2	2				1
OPTBC	Resolver, 3xDO (Wide range)			■	■	■		■																	3/3			1			
OPTBE	EnDat/SSI/BiSS C		■	■	■	■		■																							
OPTBL	Advanced safety option			■	■	■		■		4	2										1										
OPTBM	OPTBL+ HTL/TTL encoder			■	■	■		■		4	2										1										
OPTBN	OPTBL+ Sin/Cos encoder			■	■	■		■		4	2										1										
Fieldbus cards (OPTC and OPTE)*																															
OPTE2	RS485 with screw terminal				■	■	■	■	■	RS485 with screw terminal																						
OPTE3	PROFIBUS DP with screw terminal				■	■	■	■	■	PROFIBUS DP with screw terminal																						
OPTE5	PROFIBUS DP with D9-connector				■	■	■	■	■	PROFIBUS DP with D9-connector																						
OPTE6	CANopen				■	■	■	■	■	CANopen																						
OPTE7	DeviceNet				■	■	■	■	■	DeviceNet																						
OPTE8	RS485 with D9-connector				■	■	■	■	■	RS485 with D9-connector																						
OPTE9	Dual-port Ethernet				■	■	■	■	■	Dual-port Ethernet																						
OPTEA	Advanced Dual-port Ethernet				■	■	■	■	■	Advanced Dual-port Ethernet																						
OPTC2	RS485 with screw terminal				■	■	■	■	■	RS485 with screw terminal																						
OPTC3	PROFIBUS DP with screw terminal				■	■	■	■	■	PROFIBUS DP with screw terminal																						
OPTC4	LonWorks				■	■	■	■	■	LonWorks																						
OPTC5	PROFIBUS DP with D9-connector					■	■	■	■	PROFIBUS DP with D9-connector																						
OPTC6	CANopen				■	■	■	■	■	CANopen																						
OPTC7	DeviceNet				■	■	■	■	■	DeviceNet																						
OPTC8	RS485 with D9-connector				■	■	■	■	■	RS485 with D9-connector																						
OPTCI	Modbus/TCP				■	■	■	■	■	Modbus TCP																						
OPTCJ	BACnet MS/TP				■	■	■	■	■	BACnet MS/TP																						
OPTCP	PROFINET IO				■	■	■	■	■	PROFINET IO																						
OPTCQ	EtherNet/IP				■	■	■	■	■	EtherNet/IP																						
Communication cards (OPTD)																															
OPT-D1	SystemBus adapt, 2xfibre-optic				■	■	■	■	■	System Bus adapter (2 x fiber optic pairs)																						
OPT-D2	SystemBus (1xfiber), isol. CAN				■	■	■	■	■	System Bus adapter (1 x fiber optic pair) & CAN-bus adapter (galvanically decoupled)																						
OPT-D3	RS232 adapter (no galv.isol.)				■	■	■	■	■	RS232 adapter card (galvanically decoupled), used mainly for application engineering to connect another keypad																						
OPT-D6	CAN-Bus (galv. decoupled)		■		■	■	■	■	■	CAN-bus adapter (galvanically decoupled)																						
OPT-D7	Line voltage measurement			■			■	■		Line voltage measurement																						

*) *OPTE series fieldbus cards provide most recent features on market and they are recommended for new installation*

■ = included □ = optional

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

Type code keys

VACON® NX Inverter (INU)

NX	I	AAAA	V	A	2	T	0	C	S	S	A1 A2 00 00 00

NX — **Product generation**

I — **Module type**
I = INU Inverter

AAAA — **Nominal current** (low overload) **eg.**
0004 = 4 A, **0520** = 520 A, etc.

V — **Nominal supply voltage**
5 = 380-500 VAC / 465-800 VDC
6 = 525-690 VAC / 640-1100 VDC

A — **Control keypad**
A = standard (alpha numeric)

2 — **Protection rating**
5 = IP54, FR4-7 **2** = IP21, FR4-7
0 = IP00, FR8, FI9-14

T — **EMC emission level**
T = IT networks (EN61800-3)

0 — **0** = N/A (no brake chopper)

C — **C** = INU – with integrated charging circuit, FR4-FR8
I = INU – no charging circuit, FI9-FI14

S — **S** = Standard air cooled drive
U = Standard air cooled power unit – external supply for main fan (FR8 - FI14)

S — **Hardware modifications; module type - S Boards**
S = Direct connection, standard boards, FR4-8
V = Direct connection, varnished boards, FR4-8
F = Fiber connection, standard boards, FI9-FI14
G = Fiber connection, varnished boards, FI9-FI14
If OPT-AF option board is used
N = IP54 control box, fiber connection, standard boards, FI9-FI14
O = IP54 control box, fiber connection, varnished boards, FI9-FI14

A1 / A2 / 00 / 00 / 00 — **Option boards; each slot is represented by two characters:**
A = Basic I/O board **B** = Expander I/O board
C = Fieldbus board **D** = Special board

VACON® NX Active front-end (AFE)

NX	A	AAAA	V	A	0	T	0	2	S	F	A1 A2 00 00 00

NX — **Product generation**

A — **Module type**
A = AFE Active Front-End

AAAA — **Nominal current** (low overload) **eg.**
0261 = 261 A, **1030** = 1030 A, etc.

V — **Nominal supply voltage**
5 = 380-500 VAC / 465-800 VDC
6 = 525-690 VAC / 640-1100 VDC

A — **Control keypad**
A = standard (alpha numeric)

0 — **Protection rating**
0 =IP00, FI9-13

T — **EMC emission level**
T = IT networks (EN61800-3)

0 — **Internal brake chopper**
0 = N/A (no brake chopper)

2 — **Delivery include**
2 = AFE module

S — **S** = Standard air cooled drive
U = Standard air cooled power unit – external supply for main fan

F — **Hardware modifications; module type - S Boards**
F = Fiber connection, standard boards, FI9-FI13
G = Fiber connection, varnished boards, FI9-FI13

A1 / A2 / 00 / 00 / 00 — **Option boards; each slot is represented by two characters:**
A = Basic I/O board **B** = Expander I/O board
C = Fieldbus board **D** = Special board

VACON® LCL filters for AFE

VACON	LCL	AAAA	V	A	0	R	0	1	1	T

LCL — **Product generation**
LCL = LCL filter for AFE

AAAA — **Nominal current eg.**
0460 = 460 A
1300 = 1300 A

0261	5
0460	5
1300	5
0170	6
0325	6
1030	6

V — **Voltage Class**
5 = 380-500 VAC
6 = 525-690 VAC

A — **Version** (hardware)
A = DC fan without DC/DC power supply
B = DC fan with integrated DC/DC power supply

0 — **Protection rating**
0 =IP00

R — **Reserve**

0 — **Reserve**

1 — **Reserve**

1 — **Cooling fan type**
1 = DC fan

T — **Manufacturer**
T = Trafotek

VACON® NX Non-regenerative front-end (NFE)

NX	N	0650	6	X	0	T	0	S	S	V	00 00 00 00 00

NX	**Product generation**
N	**Module type** **N** = NFE Non-Regenerative Front-End
0650	**Nominal current** (low overload) **eg.** **0650** = 650 A only
6	**Nominal supply voltage** **6** = 380-690 VAC / 513-931 VDC
X	**Control keypad** **X** = standard (alpha numeric)
0	**Protection rating** **0** =IP00, FI9
T	**EMC emission level** **T** = IT networks (EN61800-3)
0	**Internal brake chopper** **0** = N/A (no brake chopper)
S	**Delivery include** **N** = NFE module **S** = NFE module + AC choke
S	**S** = Standard air cooled drive **U** = Standard air cooled power unit – external supply for main fan
V	**Hardware modifications; module type - S Boards** **V** = Direct connection, varnished boards
00	**Option boards; each slot is represented by two characters:** No option board possible
00	
00	
00	
00	

VACON® NX Brake chopper unit (BCU)

NX	B	AAAA	V	A	2	T	0	8	S	S	A1 A2 00 00 00

NX	**Product generation**
B	**Module type** **B** = BCU Brake Chopper Unit
AAAA	**Nominal current** (low overload) **eg.** **0004** = 4 A, **0520** = 520 A, etc.
V	**Nominal supply voltage** **5** = 380-500 VAC / 465-800 VDC **6** = 525-690 VAC / 640-1100 VDC
A	**Control keypad** **A** = standard (alpha numeric)
2	**Protection rating** **5** = IP54, FR4...7 **2** = IP21, FR4-7 **0** =IP00, FR8, FI9-13
T	**EMC emission level** **T** = IT networks (EN61800-3)
0	**0** = N/A (no brake chopper)
8	**8** = BCU - with integrated charging circuit. FR4-FR8
S	**S** = Standard air cooled drive **U** = Standard air cooled power unit – external supply for main fan
S	**Hardware modifications; module type - S Boards** **S** = Direct connection, standard boards, FR4-8 **V** = Direct connection, varnished boards, FR4-8 **F** = Fiber connection, standard boards, FI9-FI13 **G** = Fiber connection, varnished boards, FI9-FI13
A1	**Option boards; each slot is represented by two characters:** **A** = Basic I/O board **B** = Expander I/O board **C** = Fieldbus board **D** = Special board
A2	
00	
00	
00	

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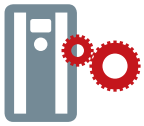

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Danfoss Drives

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 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.

VLT® | VACON®

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