WE ARE DRIVES

VACON® NXP COMMON DC BUS PRODUCTS

DRIVE CENTRE
Industrial Automation Systems Integrators

57 Galaxy Blvd., Units 1 & 2, Toronto, ON M9W 5P1
TEL: (416) 231-6767
www.drivecentre.ca

MODULAR DRIVE SOLUTIONS

Vacon offers 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 & paper, steel, metal & 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

Vacon is committed to being 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 & Harmonics approvals. Likewise, we continue to develop innovative solutions utilizing ie. regenerative energy and smart grid technology to help customers effectively monitor and control energy use and costs.

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.

AIR COOLED DRIVE MODULES WITHIN THE VACON NXP COMMON DC BUS PRODUCT RANGE

WHAT'S IN IT FOR YOU

VACON NXP COMMON DC BUS

Typical segments	Key features	Benefits
• Metal • Pulp & paper • Crane systems • Mining & minerals • Marine	Full power(0.55 to 2.2 MW) and voltage (380 to 690V) range for both induction and permanent magnet motors.	Same software tool, same control option boards allowing the maximum utilization of 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 & unwinders
- Crane systems eg. main hoists, gantry & trolley drives
- Centrifuges
- Winches
- Conveyors
- Excavators

THE COMPLETE RANGE

Vacon's 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.

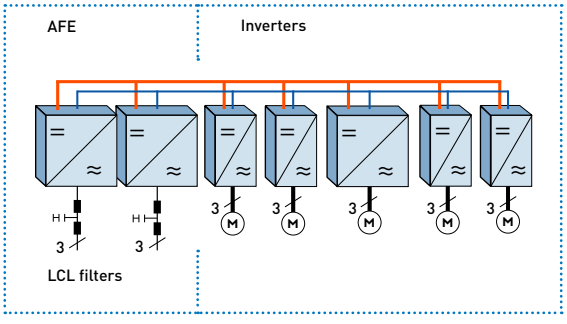
FRONT-END UNITS

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.

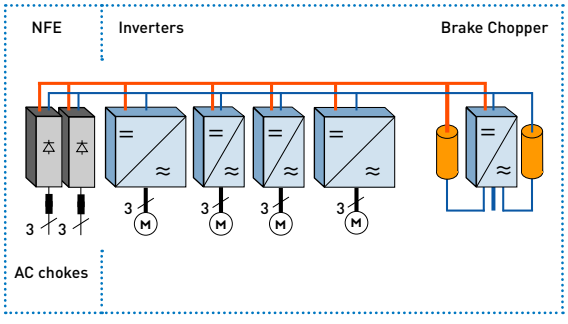
ACTIVE FRONT-END (AFE)

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



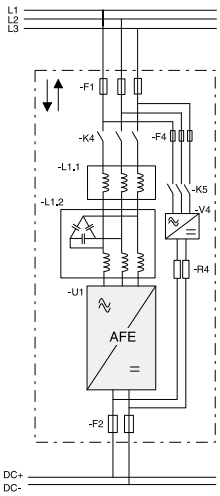
A non-regenerative common DC bus system



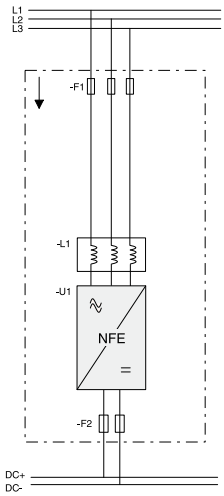
CONSISTENTLY RELIABLE

Vacon's proven performance, reliability and drive system modularity meet the needs of pulp & paper drive systems around the world.

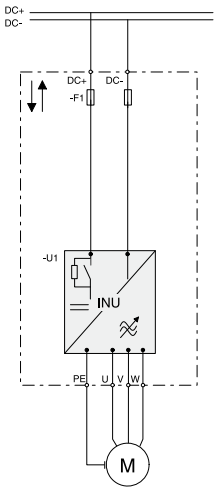
TYPICAL DEVICE CONFIGURATIONS



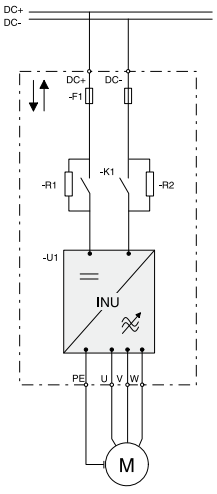
Active front-end



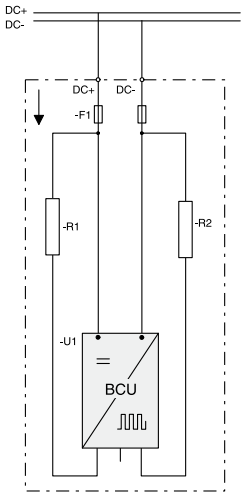
Non-regenerative front-end



Inverter Unit (FR4-FR8)



Inverter Unit (FI9-FI14)



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.

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

INVERTER UNIT

The INU (Inverter unit) 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

The BCU (Brake chopper unit) 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.

ELECTRICAL RATINGS

380-500 VAC INVERTER MODULES

Type	Unit			Frame	Low overload (AC current)		High overload (AC current)		I_{max}
	Code				$I_{L\text{-}cont}$ [A]	I_{1min} [A]	$I_{H\text{-}cont}$ [A]	I_{1min} [A]	I_{2s} [A]
INU	NXI	0004	5A2T0CSS	FR4	4.3	4.7	3.3	5.0	6.2
	NXI	0009	5A2T0CSS		9	9.9	7.6	11.4	14
	NXI	0012	5A2T0CSS		12	13.2	9	13.5	18
	NXI	0016	5A2T0CSS	FR6	16	17.6	12	18	24
	NXI	0022	5A2T0CSS		23	25.3	16	24	32
	NXI	0031	5A2T0CSS		31	34	23	35	46
	NXI	0038	5A2T0CSS		38	42	31	47	62
	NXI	0045	5A2T0CSS		46	51	38	57	76
	NXI	0072	5A2T0CSS	FR7	72	79	61	92	122
	NXI	0087	5A2T0CSS		87	96	72	108	144
	NXI	0105	5A2T0CSS		105	116	87	131	174
	NXI	0140	5A2T0CSS	FR8	140	154	105	158	210
	NXI	0168	5A0T0ISF	FI9	170	187	140	210	280
	NXI	0205	5A0T0ISF		205	226	170	255	336
	NXI	0261	5A0T0ISF		261	287	205	308	349
	NXI	0300	5A0T0ISF		300	330	245	368	444
	NXI	0385	5A0T0ISF	FI10	385	424	300	450	540
	NXI	0460	5A0T0ISF		460	506	385	578	693
	NXI	0520	5A0T0ISF		520	572	460	690	828
	NXI	0590	5A0T0ISF	FI12	590	649	520	780	936
	NXI	0650	5A0T0ISF		650	715	590	885	1062
	NXI	0730	5A0T0ISF		730	803	650	975	1170
	NXI	0820	5A0T0ISF		820	902	730	1095	1314
	NXI	0920	5A0T0ISF		920	1012	820	1230	1476
	NXI	1030	5A0T0ISF		1030	1133	920	1380	1656
	NXI	1150	5A0T0ISF	FI13	1150	1265	1030	1545	1854
	NXI	1300	5A0T0ISF		1300	1430	1150	1725	2070
	NXI	1450	5A0T0ISF		1450	1595	1300	1950	2340
	NXI	1770	5A0T0ISF	FI14	1770	1947	1600	2400	2880
	NXI	2150	5A0T0ISF		2150	2365	1940	2910	3492
	NXI	2700	5A0T0ISF		2700	2970	2300	3278	3933

525-690 VAC INVERTER MODULES

Type	Unit			Frame	Low overload (AC current)		High overload (AC current)		I_{max}
	Code				$I_{L\text{-}cont}$ [A]	I_{1min} [A]	$I_{H\text{-}cont}$ [A]	I_{1min} [A]	I_{2s} [A]
INU	NXI	0004	6A2T0CSS	FR6	4.5	5	3.2	5	6.4
	NXI	0005	6A2T0CSS		5.5	6	4.5	7	9
	NXI	0007	6A2T0CSS		7.5	8	5.5	8	11
	NXI	0010	6A2T0CSS		10	11	7.5	11	15
	NXI	0013	6A2T0CSS		13.5	15	10	15	20
	NXI	0018	6A2T0CSS		18	20	13.5	20	27
	NXI	0022	6A2T0CSS		22	24	18	27	36
	NXI	0027	6A2T0CSS		27	30	22	33	44
	NXI	0034	6A2T0CSS		34	37	27	41	54
	NXI	0041	6A2T0CSS	FR7	41	45	34	51	68
	NXI	0052	6A2T0CSS		52	57	41	62	82
	NXI	0062	6A2T0CSS	FR8	62	68	52	78	104
	NXI	0080	6A2T0CSS		80	88	62	93	124
	NXI	0100	6A2T0CSS		100	110	80	120	160
	NXI	0125	6A0T0ISF	FI9	125	138	100	150	200
	NXI	0144	6A0T0ISF		144	158	125	188	213
	NXI	0170	6A0T0ISF		170	187	144	216	245
	NXI	0208	6A0T0ISF		208	229	170	255	289
	NXI	0261	6A0T0ISF	FI10	261	287	208	312	375
	NXI	0325	6A0T0ISF		325	358	261	392	470
	NXI	0385	6A0T0ISF		385	424	325	488	585
	NXI	0416	6A0T0ISF		416	458	325	488	585
	NXI	0460	6A0T0ISF	FI12	460	506	385	578	693
	NXI	0502	6A0T0ISF		502	552	460	690	828
	NXI	0590	6A0T0ISF		590	649	502	753	904
	NXI	0650	6A0T0ISF		650	715	590	885	1062
	NXI	0750	6A0T0ISF		750	825	650	975	1170
	NXI	0820	6A0T0ISF		820	902	650	975	1170
	NXI	0920	6A0T0ISF	FI13	920	1012	820	1230	1476
	NXI	1030	6A0T0ISF		1030	1133	920	1380	1656
	NXI	1180	6A0T0ISF		1180	1298	1030	1464	1755
	NXI	1500	6A0T0ISF	FI14	1500	1650	1300	1950	2340
	NXI	1900	6A0T0ISF		1900	2090	1500	2250	2700
	NXI	2250	6A0T0ISF		2250	2475	1900	2782	3335

380-500 VAC FRONT-END MODULES

Type	Unit		Low overload (AC current)		High overload (AC current)		DC Power *	
	Code	Frame	$I_{L\text{-}cont}$ [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 0261 5 A0T02SF	1 x FI9	261	287	205	308	176	220
	1 x NXA 0460 5 A0T02SF	1 x FI10	460	506	385	578	310	388
	2 x NXA 0460 5 A0T02SF	2 x FI10	875	962	732	1100	587	735
	1 x NXA 1300 5 A0T02SF	1 x FI13	1300	1430	1150	1725	876	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:

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

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

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

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

525 - 690 VAC FRONT-END MODULES

Type	Unit		Low overload (AC current)		High overload (AC current)		DC Power *
	Code	Frame	$I_{L\text{-}cont}$ [A]	I_{1min} [A]	$I_{H\text{-}cont}$ [A]	I_{1min} [A]	690 V mains $P_{L\text{-}cont}$ (kW)
AFE	1 x NXA 0170 6 A0T02SF	1 x FI9	170	187	144	216	198
	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 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:

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

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

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

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

DIMENSIONS & WEIGHTS

Type	Frame	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

ELECTRICAL RATINGS

380-500 VAC BRAKE-CHOPPER MODULES

Type	Unit				Braking current	Min. Braking resistor (Per resistor)		Continuous braking power	
	Code			Frame	I_{L-cont}* [A]	540 VDC [Ω]	675 VDC [Ω]	540 VDC [kW]	675 VDC P [kW]
BCU	NXB	0004	5A2T08SS	FR4	8	159.30	199.13	5	6
	NXB	0009	5A2T08SS		18	70.80	88.50	11	14
	NXB	0012	5A2T08SS		24	53.10	66.38	15	19
	NXB	0016	5A2T08SS	FR6	32	39.83	49.78	20	25
	NXB	0022	5A2T08SS		44	28.96	36.20	28	35
	NXB	0031	5A2T08SS		62	20.55	25.69	40	49
	NXB	0038	5A2T08SS		76	16.77	20.96	48	61
	NXB	0045	5A2T08SS		90	14.16	17.70	57	72
	NXB	0061	5A2T08SS	FR7	122	10.45	13.06	78	97
	NXB	0072	5A2T08SS		148	8.61	10.76	94	118
	NXB	0087	5A2T08SS		174	7.32	9.16	111	139
	NXB	0105	5A2T08SS		210	6.07	7.59	134	167
	NXB	0140	5A2T08SS	FR8	280	4.55	5.69	178	223
	NXB	0168	5A0T08SF	FI9	336	3.79	4.74	214	268
	NXB	0205	5A0T08SF		410	3.11	3.89	261	327
	NXB	0261	5A0T08SF		522	2.44	3.05	333	416
	NXB	0300	5A0T08SF		600	2.12	2.66	382	478
	NXB	0385	5A0T08SF	FI10	770	1.66	2.07	491	613
	NXB	0460	5A0T08SF		920	1.39	1.73	586	733
	NXB	0520	5A0T08SF		1040	1.23	1.53	663	828
	NXB	1150	5A0T08SF	FI13	2300	0.55	0.69	1466	1832
	NXB	1300	5A0T08SF		2600	0.49	0.61	1657	2071
	NXB	1450	5A0T08SF		2900	0.44	0.55	1848	2310

525 – 690 VAC BRAKE CHOPPER MODULES

Type	Unit				Braking current	Min. Braking resistor (Per resistor)		Continuous braking power	
	Code			Frame	I_{L-cont}* [A]	708 VDC [Ω]	931 VDC [Ω]	708 VDC P [kW]	931 VDC P [kW]
BCU	NXB	0004	6A2T08SS	FR6	8	238.36	274.65	6.7	9
	NXB	0005	6A2T08SS		10	190.69	219.72	8	11
	NXB	0007	6A2T08SS		14	136.21	156.94	12	15
	NXB	0010	6A2T08SS		20	95.34	109.86	17	22
	NXB	0013	6A2T08SS		26	73.34	84.51	22	29
	NXB	0018	6A2T08SS		36	52.97	61.03	30	40
	NXB	0022	6A2T08SS		44	43.34	49.94	37	48
	NXB	0027	6A2T08SS		54	35.31	40.69	45	59
	NXB	0034	6A2T08SS		68	28.04	32.31	57	75
	NXB	0041	6A2T08SS	FR7	82	23.25	26.79	69	90
	NXB	0052	6A2T08SS		104	18.34	21.13	87	114
	NXB	0062	6A2T08SS	FR8	124	15.38	17.72	104	136
	NXB	0080	6A2T08SS		160	11.92	13.73	134	176
	NXB	0100	6A2T08SS		200	9.53	10.99	167	220
	NXB	0125	6A0T08SF	FI9	250	7.63	8.79	209	275
	NXB	0144	6A0T08SF		288	6.62	7.63	241	316
	NXB	0170	6A0T08SF		340	5.61	6.46	284	374
	NXB	0208	6A0T08SF		416	4.58	5.28	348	457
	NXB	0261	6A0T08SF	FI10	522	3.65	4.21	436	573
	NXB	0325	6A0T08SF		650	2.93	3.38	543	714
	NXB	0385	6A0T08SF		770	2.48	2.85	643	846
	NXB	0416	6A0T08SF		832	2.29	2.64	695	914
	NXB	0920	6A0T08SF	FI13	1840	1.04	1.19	1537	2021
	NXB	1030	6A0T08SF		2060	0.93	1.07	1721	2263
	NXB	1180	6A0T08SF		2360	0.81	0.93	1972	2593

* total braking current

Standard features						INU			AFE	NFE	BCU		
						NXI AAAA V			NXA AAAA V	NXN AAAA V	NXB AAAA V		
						FR4, 6, 7	FR8	FI9 - FI14	FI9 - FI13	FI9	FR4, 6, 7	FR8	FI9 - FI13
IP00							●	●	●	●		●	●
IP21						●					●		
IP54						o					o		
Air cooling						●	●	●	●	●	●	●	●
Standard board						●	●	●	●		●	●	●
Varnished board										●			
Alphanumeric keypad						●	●	●	●		●	●	●
EMC class T (EN 61800-3 for IT networks)						●	●	●	●	●	●	●	●
Safety CE / UL						●	●	●	●	●	●	●	●
Line reactor, external (required)										o			
LCL filter, external (required)									o				
No integrated charging								●	●				●
Integrated charging (DC side)						●	●			●	●	●	
Diode/thyristor rectifier										●			
IGBT						●	●	●	●		●	●	●
Standard I/O	Card slot												
	A	B	C	D	E	Number of I/O channels							
OPT-A1 Binary input (24 VDC)						6	6	6	6	n/a	6	6	6
OPT-A1 Binary output (24 VDC)						1	1	1	1	n/a	1	1	1
OPT-A1 Analog input						2	2	2	2	n/a	2	2	2
OPT-A1 Analog output						1	1	1	1	n/a	1	1	1
OPT-D7 Voltage measurement						-	-	-	z	n/a	-	-	-
OPT-A2 Relay output (NO/NC)						2	2	2	2	2 (NO)	2	2	2
Options													
Optional I/O cards													
OPT-A3 Relay output + Thermistor input						o	o	o	o	n/a	o	o	o
OPT-A4 Encoder TTL type						o	o	o	-	n/a	-	-	-
OPT-A5 Encoder HTL type						o	o	o	-	n/a	-	-	-
OPT-A7 Double encoder HTL type						o	o	o	-	n/a	-	-	-
OPT-A8 I/O as OPT-A1 (galvanic isolation)						o	o	o	o	n/a	o	o	o
OPT-A9 I/O as OPT-A1 (2.5 mm² terminals)						o	o	o	o	n/a	o	o	o
OPT-AE Encoder HTL type (Divider + direction)						o	o	o	-	n/a	-	-	-
OPT-AF Safe disable EN954-1, cat 3						o	o	o	-	n/a	-	-	-
I/O expander cards (OPT-B)													
OPT-B1 Selectable I/O						o	o	o	o	n/a	o	o	o
OPT-B2 Relay output						o	o	o	o	n/a	o	o	o
OPT-B4 Analog input/output						o	o	o	o	n/a	o	o	o
OPT-B5 Relay output						o	o	o	o	n/a	o	o	o
OPT-B8 PT100						o	o	o	o	n/a	o	o	o
OPT-B9 Binary input + RO						o	o	o	o	n/a	o	o	o
OPT-BB + EnDat + Sin/Cos 1 Vp-p						o	o	o	-	n/a	-	-	-
OPT-BC Encoder out = Resolver simulation						o	o	o	-	n/a	-	-	-
Fieldbus cards (OPT-C)													
OPT-C2 RS-485 (Multiprotocol)						o	o	o	o	n/a	o	o	o
OPT-C3 Profibus DP						o	o	o	o	n/a	o	o	o
OPT-C4 LonWorks						o	o	o	o	n/a	o	o	o
OPT-C5 Profibus DP (D9-type connector)						o	o	o	o	n/a	o	o	o
OPT-C6 CANopen (slave)						o	o	o	o	n/a	o	o	o
OPT-C7 DeviceNet						o	o	o	o	n/a	o	o	o
OPT-C8 RS-485 (Multiprotocol, D9-type connector)						o	o	o	o	n/a	o	o	o
OPT-CG SELMA 2 protocol (SAMI)						o	o	o	o	n/a	o	o	o
OPT-CI Modbus / TCP (Ethernet)						o	o	o	o	n/a	o	o	o
OPT-CP Profinet I/O (Ethernet)						o	o	o	o	n/a	o	o	o
OPT-CQ Ethernet I/P (Ethernet)						o	o	o	o	n/a	o	o	o
Communication cards (OPT-D)													
OPT-D1 System Bus adapter (2 x fiber optic pairs)						o	o	o	o	n/a	o	o	o
OPT-D2 System Bus adapter (1 x fiber optic pair) & CAN-bus adapter (galvanically decoupled)						o	o	o	o	n/a	o	o	o
OPT-D3 RS232 adapter card (galvanically decoupled), used mainly for application engineering to connect another keypad						o	o	o	o	n/a	o	o	o
OPT-D6 CAN-bus adapter (galvanically decoupled)						o	o	o	o	n/a	o	o	o
OPT-D7 Voltage measurement card						o	o	o	o	n/a	-	-	-

● = included o = optional

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 m^3/h, FR6 425 m^3/h, FR7 425 m^3/h, FR8 650 m^3/h FI9 1150 m^3/h, FI10 1400 m^3/h, FI12 2800 m^3/h, FI13 4200 m^3/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
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, R_i = 250 Ω differential
	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
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