

**VACON**<sup>®</sup>  
DRIVEN BY DRIVES



**VACON**<sup>®</sup> LOW HARMONIC FAMILY  
DELIVERING SUPERIOR POWER



## FINDING THE HARMONICS BALANCE

When designing a drive system, it is key to look for solutions that give the best possible balance between cost and performance. In order to achieve the optimal efficiency levels that are important for businesses in, for example, the water and wastewater, marine and offshore industries, it is essential to reduce the impact of harmonic distortion.

### INCREASED NETWORK RELIABILITY

Significant cost savings are achievable by utilizing solutions that mitigate the issue of harmonics. Distortion in the power supply, caused by the presence of harmonic currents and voltages, can cause disturbances to equipment and processes connected to that supply. For over a decade, Vacon has focused on providing AC drives with state-of-the-art technology that dramatically reduces the harmonic content in the power supply. With fewer production disturbances, businesses enjoy higher efficiency and reduced costs.

### GREATER FLEXIBILITY

The advantages that Vacon's family of low harmonic products offers are clear. One of the main benefits is that it is a supremely flexible solution. The family includes three different implementation options to tackle the harmonics issue: VACON® NXC Low Harmonic, VACON® NXC AFE and VACON® ADF. Which one you choose depends on whether you are simply looking for low harmonic management or whether you also need to capture regenerative energy.

#### REGULATORY REQUIREMENTS



- Including:
- IEEE 519/1993, G5/4
  - IEEE 519 – 2014, G5/5
  - IEC 61000-3-12
  - IEC 61000-3-2

#### HIGH EFFICIENCY



- Reduced infrastructure costs by optimal equipment dimensioning
- Maximized efficiency even with partial operation loads
- Power factor correction function available

# VACON® LOW HARMONIC FAMILY

VACON® NXC LOW HARMONIC

VACON® NXC AFE



The flexibility also relates to industries and applications. Vacon's products are already being successfully utilized in a variety of industries, such as water and wastewater, marine and offshore. The wide power/voltage range also makes the products ideal for an extensive scope of applications:

- Pumps and fans
- Conveyors and crushers
- Winches
- Extruders
- Feeders and mixers
- Compressors
- Main propulsion and bow thrusters
- Test benches
- Static power supply
- Wood-handling machines
- Water treatment
- Industrial elevators

## REDUCE COSTS

Of course, the main goal for businesses is to increase their efficiency and profitability. Vacon's low harmonic products are designed to deliver purer power. And with

power quality at its best, you'll benefit from lower energy consumption and a reduction in total costs. You can read more about the benefits each product has to offer on the following pages.

### FLEXIBILITY



- Ideal for a variety of industries and applications
- Wide power/voltage range
- Three implementation options – unique products for different use cases
- Well-suited for retrofits

### COST SAVINGS



- Optimum cables/neutrals dimensioning
- Optimized sizing of transformers and generators
- Minimized malfunctions in sensitive equipment (fewer production shutdowns)



## MINIMIZED DISTORTION WITH VACON® NXC LOW HARMONIC

With a built-in active filter, the VACON® NXC Low Harmonic drive is the ideal choice for the most demanding power quality requirements. It significantly lowers harmonic currents, reduces infrastructure costs and increases the lifetime of the motor.

### ENHANCED POWER SAVES ENERGY AND MONEY

By minimizing harmonic currents, VACON NXC Low Harmonic improves overall grid quality. At brownfield sites, purer power means there are fewer risks of production disturbances and more opportunities to save energy and increase the lifetime of motors. VACON NXC Low Harmonic reduces the THDi to less than 5%.

The low total current distortion (THDi) of the supply power

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

Complying with regulatory standards and requirements, VACON NXC Low Harmonic also ensures a higher level of redundancy. If, for some reason, the active filter fails, the drive continues to function normally.

### BENEFITS

- High-efficiency solution
- No need to have harmonics knowhow
- Up to 30% savings on infrastructure costs
- Higher level of redundancy



UP TO  
**30%**  
SAVINGS ON  
INFRASTRUCTURE COSTS



COST SAVINGS

VACON® NXC LOW HARMONIC



## **AFE TECHNOLOGY FEEDS BRAKING ENERGY BACK TO THE NETWORK**

Featuring active front end (AFE) technology, VACON® NXC AFE is ideal for a wide range of applications. The most significant benefits come when the drive is used with applications with a braking need – such as elevators and cranes. The braking energy can be fed back to the mains to be effectively used elsewhere.

### **THE LOW HARMONIC AND REGENERATIVE DRIVE**

The source of harmonic currents is eliminated by utilizing VACON® NXC AFE; the diode rectifier is replaced with a controlled rectifier bridge which creates a sinusoidal current with very low harmonic content. AFE technology reduces the THDi to less than 5%.

The lower harmonic content in the input current allows better use of supply transformers and power cabling which significantly reduces infrastructure costs. Load

power can also be controlled. In retrofit projects, higher transformer loadability makes it possible to increase motor power without having to invest in a larger transformer.

In applications with a frequent braking need, the regenerative function allows the drive to feed energy back to the network. Savings in energy costs are achievable thanks to this feature. One of the many additional features in AFE, DC boost, is important in compensating output filter losses to ensure full motor voltage.

### **BENEFITS**

- Energy regeneration
- Power factor correction function available
- Reduced infrastructure costs



# AFE

FOR ENERGY  
REGENERATION  
APPLICATIONS



FLEXIBILITY

VACON® NXC AFE



## GROUP COMPENSATION WITH AN EXTERNAL ACTIVE FILTER

Harmonics increase downtime and operating costs and lower productivity. VACON® ADF is an active dynamic filter (ADF) which eliminates the effect of harmonics by constantly monitoring a network and, at its point of common coupling, injecting currents into the supply to dynamically eliminate the harmonic currents created by drives.

### PREVENT POWER AND ENERGY LOSSES

This process often takes place at a central location, or an existing breaker group in the switchgear lineup. Vacon technology helps to adjust the system power factor and eliminate power system resonances.

Group compensation using a point of common coupling (PCC) is ideal when there is a wide internal network with several drives connected to one power supply.

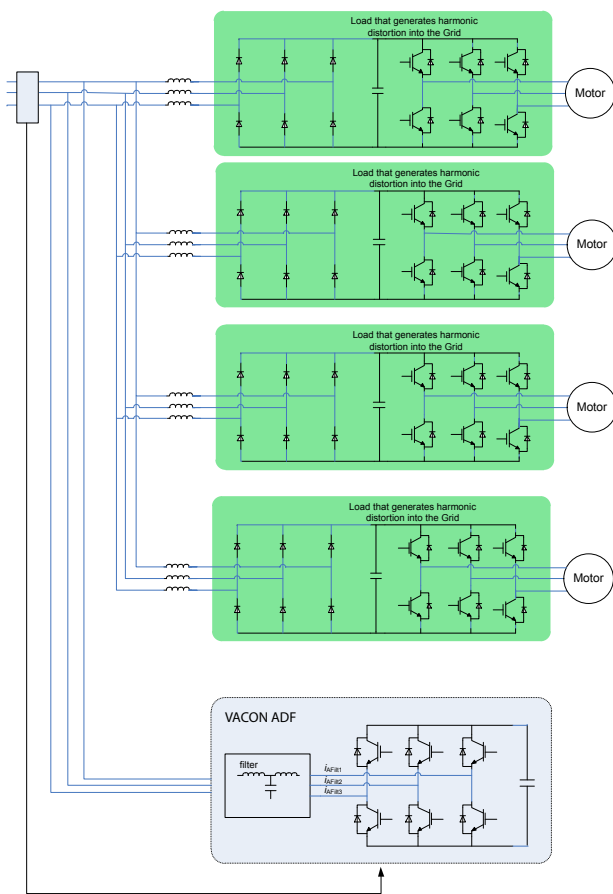
VACON ADF is particularly useful in larger installations and systems by helping compensate the harmonics created by large loads. Modular in design, they are ideal for retrofits and can be easily expanded to accommodate higher power as required.

With VACON ADF, problems are reduced and costs and energy consumption are minimized without any compromises in productivity. Compared to per-drive compensation, uptime and redundancy are also improved.

### BENEFITS

- Higher level of redundancy
- Ideal for retrofits thanks to modular construction
- High performance and reliability
- Eliminates extra losses in cables and transformers
- Efficiently handles changes in network conditions





**GROUP  
COMPENSATION**  
IDEAL  
FOR RETROFITS



HIGH EFFICIENCY

**GROUP COMPENSATION SOLUTION**

# TECHNICAL DATA

## RATINGS & DIMENSIONS

### VACON NXC LOW HARMONIC AND VACON NXC AFE

Mains voltage	AC drive type VACON® NXC LOW HARMONIC VACON® NXC AFE	Loadability					Motor shaft power			Model	Dimensions & weight W x H x D (mm)/kg
		Low [+40°C]		High [+40°C]		Maximum current I <sub>S</sub>	400 V / 690 V				
		Rated continuous current I <sub>L</sub> (A)	10% overload current (A)	Rated continuous current I <sub>H</sub> (A)	50% overload current (A)		10% overload P (kW)	50% overload P (kW)			
380-500 V  50/60 Hz 3~	NXC 0261 5 A 2 H 0 SSF	261	287	205	308	349	132	110	LH	1006 x 2275 x 605/571	
	NXC 0300 5 A 2 H 0 SSF	300	330	245	368	444	160	132	AFE	1006 x 2275 x 605/680	
	NXC 0385 5 A 2 L 0 SSF	385	424	300	450	540	200	160	LH	1006 x 2275 x 605/603	
	NXC 0460 5 A 2 L 0 SSF	460	506	385	578	693	250	200	AFE	1006 x 2275 x 605/700	
	NXC 0520 5 A 2 L 0 SSF	520	572	460	690	828	250	250			
	NXC 0590 5 A 2 L 0 SSF	590	649	520	780	936	315	250	LH	1406 x 2275 x 605/927	
	NXC 0650 5 A 2 L 0 SSF	650	715	590	885	1062	355	315	AFE	2006 x 2275 x 605/1400	
	NXC 0730 5 A 2 L 0 SSF	730	803	650	975	1170	400	355			
	NXC 0820 5 A 2 L 0 SSF	820	902	730	1095	1314	450	400	LH	1806 x 2275 x 605/1160	
	NXC 0920 5 A 2 L 0 SSF	920	1012	820	1230	1476	500	450	AFE	2006 x 2275 x 605/1400	
	NXC 1030 5 A 2 L 0 SSF	1030	1133	920	1380	1656	560	500			
	NXC 1150 5 A 2 L 0 SSF	1150	1265	1030	1545	1854	630	560	AFE	2206 x 2275 x 605/1950	
	NXC 1300 5 A 2 L 0 SSF	1300	1430	1150	1725	2070	710	630			
	NXC 1450 5 A 2 L 0 SSF	1450	1595	1300	1950	2340	800	710	AFE	4406 x 2275 x 605/3900	
NXC 1770 5 A 2 L 0 SSF	1770	1947	1600	2400	2880	1000	900				
NXC 2150 5 A 2 L 0 SSF	2150	2365	1940	2910	3492	1200	1100	AFE			
525-690 V  50/60 Hz 3~	NXC 0125 6 A 2 L 0 SSF	125	138	100	150	200	110	90	LH	1006 x 2275 x 605/571	
	NXC 0144 6 A 2 L 0 SSF	144	158	125	188	213	132	110			
	NXC 0170 6 A 2 L 0 SSF	170	187	144	216	245	160	132	AFE	1006 x 2275 x 605/680	
	NXC 0208 6 A 2 L 0 SSF	208	229	170	255	289	200	160			
	NXC 0261 6 A 2 L 0 SSF	261	287	208	312	375	250	200	LH	1006 x 2275 x 605/603	
	NXC 0325 6 A 2 L 0 SSF	325	358	261	392	470	315	250			
	NXC 0385 6 A 2 L 0 SSF	385	424	325	488	585	355	315	AFE	1006 x 2275 x 605/700	
	NXC 0416 6 A 2 L 0 SSF*	416	458	325	488	585	400	315			
	NXC 0460 6 A 2 L 0 SSF	460	506	385	578	693	450	355	LH	1206 x 2275 x 605/927	
	NXC 0502 6 A 2 L 0 SSF	502	552	460	690	828	500	450			
	NXC 0590 6 A 2 L 0 SSF*	590	649	502	753	904	560	500	AFE	2006 x 2275 x 605/1400	
	NXC 0650 6 A 2 L 0 SSF	650	715	590	885	1062	630	560	LH	1806x2275x605/1160	
	NXC 0750 6 A 2 L 0 SSF	750	825	650	975	1170	710	630			
	NXC 0820 6 A 2 L 0 SSF*	820	902	650	975	1170	800	630	AFE	2006 x 2275 x 605/1400	
	NXC 0920 6 A 2 L 0 SSF	920	1012	820	1230	1410	900	800	AFE	2206 x 2275 x 605/1950	
	NXC 1030 6 A 2 L 0 SSF	1030	1133	920	1380	1755	1000	900			
	NXC 1180 6 A 2 L 0 SSF*	1180	1298	1030	1463	1755	1150	1000	AFE	4406 x 2275 x 605/3900	
	NXC 1500 6 A 2 L 0 SSF	1500	1650	1300	1950	2340	1500	1300			
NXC 1900 6 A 2 L 0 SSF	1900	2090	1500	2250	2700	1800	1500	AFE	4406 x 2275 x 605/3900		
NXC 2250 6 A 2 L 0 SSF*	2250	2475	1900	2782	3335	2000	1800				

\* max. ambient temperature of +35°C

LH = VACON® NXC LOW HARMONIC  
AFE = VACON® NXC AFE

**RATINGS & DIMENSIONS**  
**ACTIVE FILTER**

Model	ADF P300-120/480 [ADF P300-90/690]	ADF P300-240/480 [ADF P300-180/690]	ADF P300-360/480 [ADF P300-270/690]
Rated power *	83 / 100 / 94 / 108 kVA	166 / 200 / 187 / 215 kVA	249 / 299 / 281 / 323 kVA
Compensation current capacity at 50/60 Hz	120 A <sub>RMS</sub> [90 A <sub>RMS</sub> ]	240 A <sub>RMS</sub> [180 A <sub>RMS</sub> ]	360 A <sub>RMS</sub> [270 A <sub>RMS</sub> ]
System voltage **	480 V [208 – 480 V], 690 V [480 – 690 V]		
Nominal frequency **	50/60 Hz ± 2%		
Number of phases	3 phase 3 wire		
Connection type	3 phase without neutral (TN, TT, IT)		
Harmonic current compensated	individual compensation up to 49 <sup>th</sup> order		
Rate of harmonic reduction	better than 98%		
Current compensation of cos φ	up to 1.0		
Expandability	ADF P300 units can be used in parallel		
Response time	< 1 ms		
Power dissipation 480 V [690 V]	< 2725 W [ $< 2969$ W]	< 5325 W [ $< 5813$ W]	< 7925 W [ $< 8657$ W]
Maximum air flow requirement	600 m <sup>3</sup> /h	1200 m <sup>3</sup> /h	1800 m <sup>3</sup> /h
Noise level	< 70 dB[A]		
Environment	0 to 95% RH non-condensing, max altitude 1000 m		
Operating temperature	0 to 50°C, up to 40°C without derating		
Dimensions	800 x 2155 x 610 mm (W x H x D)		
Weight 480 V [690 V]	335 kg [351 kg]	472 kg [495 kg]	609 kg [639 kg]
Cabinet color	cabinet RAL 7035 (gray), base RAL 7022 (dark gray)		
Protection class	IP20 according to IEC 529		
Environmental conditions	chemical 3C3, mechanical 3S3		
Electromagnetic compatibility	EN 61000-6-2, EN 61000-6-4		
Certificates	CE		
Art no 480 V [690 V]	400 089 [400 092]	400 090 [400 093]	400 091 [400 094]

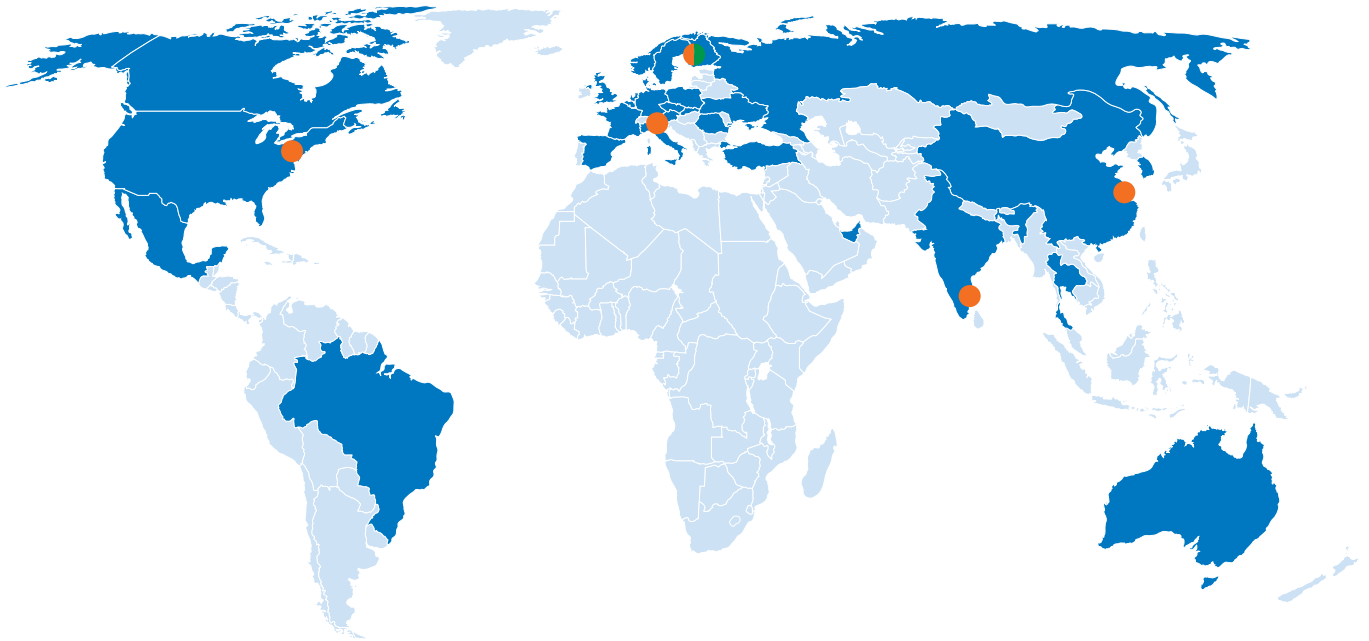
\* Compensation power at 400 V / 480 V / 600 V / 690 V nominal voltage

\*\* Please state your system voltage and line frequency when ordering

## VACON – AT YOUR SERVICE

Vacon is driven by a passion to develop, manufacture and sell the best AC drives and inverters in the world – and provide customers with efficient product lifecycle services. Our AC drives offer optimum process control and energy efficiency for electric motors. Vacon inverters play a key role when energy is produced from renewable sources. Vacon has production and R&D facilities in Europe, Asia and North America, and sales offices in 32 countries. Further, Vacon has sales representatives and service partners in nearly 90 countries. Vacon is part of the Danfoss Group.

## VACON – TRULY GLOBAL



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

**MANUFACTURING**  
and R&D on 3 continents

**VACON SALES & SERVICES**  
in 32 countries

**SALES & SERVICE PARTNERS**  
in nearly 90 countries



Vacon partner



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