



# USER MANUAL

<b>3</b>	<b>05-11-2015</b>	<b>D. Cavalli</b>
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## 1 – INTRODUCTION

TAKEDO ENERGY is a device able to recover, directly on the mains, the energy normally dissipated by the braking resistor in lift systems driven by an inverter.

Its built-in LCL filter can reduce the current harmonic contents, to be compliant to the EN 12015 standard, for low frequency harmonics.

## 2 – SAFETY WARNINGS AND CAUTIONS

Detailed informations are available inside the VACON original manual (NXP series), on [www.vacon.com](http://www.vacon.com) website.

Read carefully this manual before powering the unit, following the procedures step by step.

### 2.1 CAUTIONS

To avoid damaging the inverter in the event of prolonged stoppages with no power supply, before restarting the drive, connect it to the power supply for at least 1 hour, with no commands to the lift system, in such a way as to recharge the bus capacitors.

If the inverter has been idle for more than one year, supply it for 1 hour with a level of voltage 50% lower than the nominal input voltage, and then supply it with the nominal input voltage for 1 hour.

## 3 – TECHNICAL SPECIFICATIONS

Input voltage	3 ~ 400V +/- 15%
Max. output current	4,3A (Size 4.3) 12A (Size 12)
Max. power regenerated	3000W (Size 4.3) 8000W (Size 12)
Harmonic content (THD)	16%
Stand-By consumption	3W
Working duty-cycle	100%
FAULT OPTION relay (with NXOPTA2 Board only)	
Switching Power:	24Vdc/8A 250Vac/8A 125Vdc/0,4A
Minimum switching load:	5V/10mA

## 4 – OPERATION PRINCIPLE

When the lift motor is pulled by the load (for example running upward with empty car or downward with full load in the car, or in any case of favorable weight) all the energy of the excess weight that descends to the ground floor must be dissipated to prevent the escape of the weight itself.

Normally in a lift system with speed controlled by an inverter, all the energy generated by the motor driven by the load is dissipated via a braking resistor, which converts the energy into heat. The regenerated energy depends, besides the weight, on the system type, on the motor type, on the gear type, etc. ..

TAKEDO ENERGY is a device which “returns” the excess energy to the mains: in this way, rather than heat the environment, it reduces the consumption, since the recovered energy feeds the other loads of the system: operation, brake, car light, etc.; only the excess is fed back into the supply network for supplying other building utilities.

With the objective of ensuring maximum energy savings, TAKEDO ENERGY has an internal system to reduce power consumption in stand-by from about 19W to 3W.

After a minute from the motor contactors dropping, the system turns off; it will turn on again, ready to recover energy, at the next activation of a new command.

## 5 –CONNECTIONS

### 5.1 WARNINGS

- 1 - Do not power the device without having done the EARTH cable connection.
- 2 - To increase the security of the device (especially against over voltages due to weather events), three fuses (one for each phase) are provided in series with the input terminals of the mains supply (their size depends on the device size).
- 3 - The device must be connected as indicated in 5.3 and 5.4, following the application diagram in Chapter 6. An incorrect connection may cause damages.
- 4 - Perform the wiring as described in Section 5.2 to avoid EMC problems.

### 5.2 WIRING RULES

In order to avoid problems related to EMC, wiring must be treated according to the following guidelines :

- 1 - The cable connection between the bus of the main inverter and TAKEDO ENERGY should be as far away as possible from any other wiring (although shielded) and never parallel. If the wires are crossed, should be arranged to form a 90 degrees angle.
- 2 - The earth and the shield of the cable that connects TAKEDO ENERGY to the main inverter BUS must be connected, inside the main inverter, to the same terminal in which the building earth cables are connected.
- 3 - The cable that connects TAKEDO ENERGY to the mains must be far away from the power cable that connects the main inverter to the motor and from the cable that connects the braking resistor to the main inverter (50 cm at least).

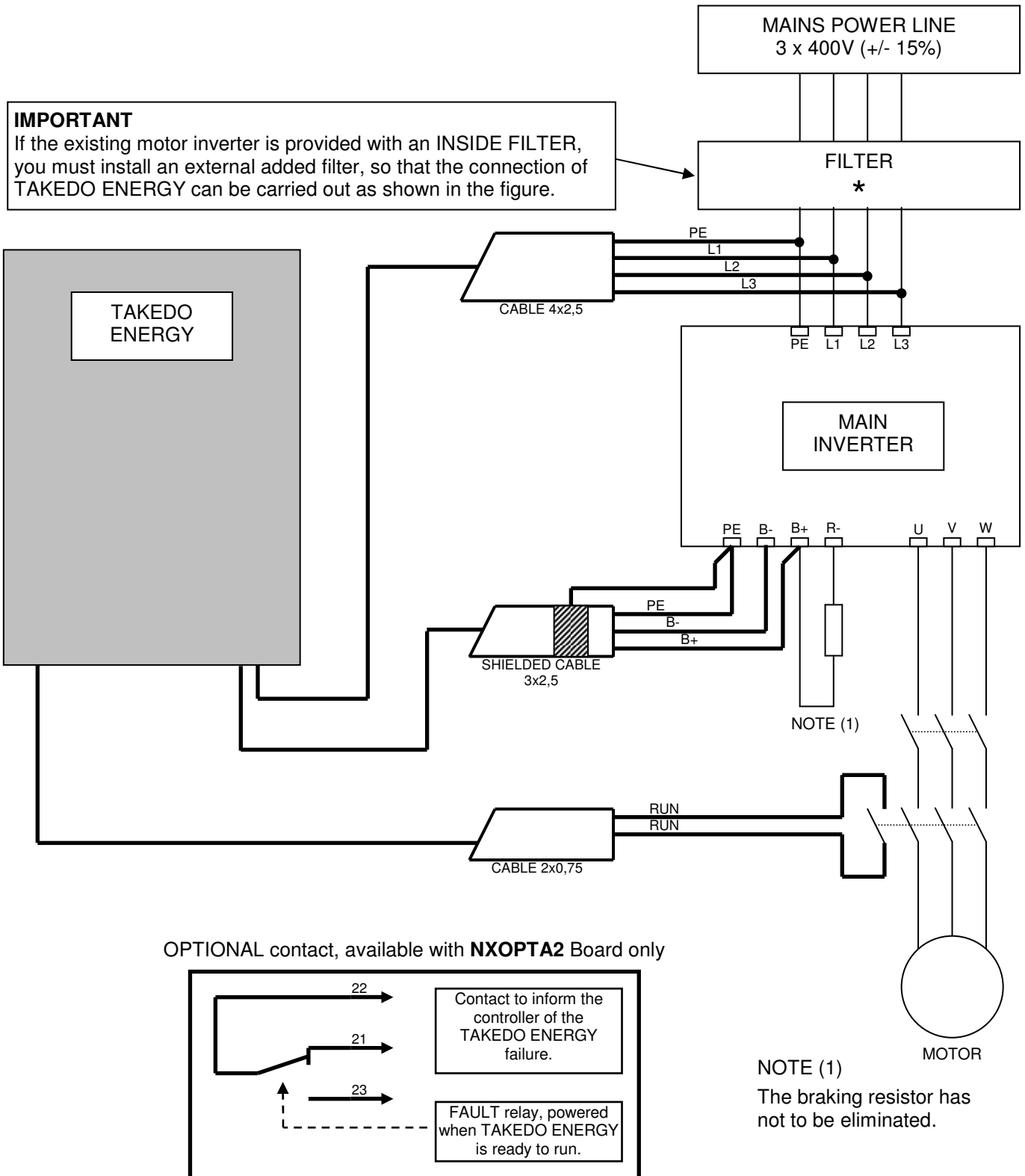
### 5.3 POWER CONNECTIONS

MAINS wiring	The mains must be connected to terminals L1-L2-L3 of TAKEDO ENERGY, following the drawing shown at Chapter 6. It is not necessary to respect the phase sequence.
BUS wiring	The terminals B + and B- must be connected to the BUS of the main inverter. <u>Should NOT be connected in parallel with the braking resistor.</u> Normally the inverters have a resistor terminal connected to the positive terminal of the BUS. The negative of the BUS is usually a terminal with no other connections. With motor inverter powered , between the positive and negative BUS terminals there are 500Vdc ÷ 650Vdc.
EARTH wiring	TAKEDO ENERGY has two earth wires that must be both connected : one on the mains EARTH cable and the second one on the cable connected to the motor inverter BUS.
SHIELD	The only shield to be connected is on the cable connected to the motor inverter BUS. Please read carefully the notes in section 5.2

### 5.4 CONTROL CONNECTIONS

RUN command	INPUT to terminals RUN – RUN, to be connected to a “voltage free” contact of a run contactor. The command must be activated BEFORE the lifting of the mechanical brake and disabled AFTER the dropping of the mechanical brake.
FAULT relay (OPTION)	If the NXOPTA2 Board is provided, at output terminals 21-22-23 is available a switching contact of a relay, powered when the TAKEDO ENERGY is ready to run. In case of malfunction or failure this relay is disabled.

# 6 – APPLICATION DIAGRAM



## 7 –PROGRAMMING AND MONITORING KEYPAD (OPTION)



The keypad for control and configuration is not included in the TAKEDO ENERGY, but it is supplied as an option because, for the operation of the device no parameterization is required.

About the use of the keypad please refer to the VACON original manual (NXP series), on [www.vacon.com](http://www.vacon.com) website.

The menus available are:

<b>M1</b> =Monitor	<b>M5</b> =Fault History
<b>M2</b> =Parameters	<b>M6</b> =System Menu
<b>M4</b> =Active Faults	<b>M7</b> =Expander Boards

Each menu contains submenus, which can be on several levels.

To access the submenus, press the  key, then use the +/- keys to show the various items; to quit the submenu, press the  key.

KEY TO SYMBOLS CONTAINED IN MENUS AND SUBMENUS:

**M**= Menu (internal modes G,V,P,H,F)

**V**= Read only item

**G**= Group (internal modes V,P)

**H**= Fault history

**P**= Modifiable parameter

**F**= Active faults

### 7.1 M1 = MONITOR

This menu allows the display of variables and data during operation of TAKEDO ENERGY. The table below shows only the main variables significant for the application.

Indice	Descrizione	Unità	Indice	Descrizione	Unità
V1.1	Tensione bus C.C. / DC-link Voltage	V	V1.11	R01 (Fault), R02 (Contactor)	
V1.2	Corrente Totale / Total Current	A	V1.13	Rif. Ingr. Analogico / Analogic input	%
V1.3	Potenza Rigenerata / Regenerated Power	kW	V1.14	Inseguitore / Follower	%
V1.4	Corrente Attiva / Active Current	%	V1.15	Corrente fase U / U Phase Current	A
V1.5	Corrente Reattiva / Reactive Current	%	V1.16	Corrente fase V / V Phase Current	A
V1.6	Tensione di rete / Supply Voltage	V	V1.17	Corrente fase W / W Phase Current	A
V1.7	Frequenza di rete / Supply Frequency	Hz	V1.18	Temp inverter / Unit temperature	°C
V1.8	DIN1,DIN2,DIN3 (not used)		V1.19	Rif. Tensione DC / Ref. DC Voltage	%
V1.9	DIN4 (Run), DIN5,DIN6 (not used)		V1.20	Rif. Corrente Reattiva / Ref. Reactive Current	%
V1.10	DO1(n.u), DAO1		V1.21	Multimonitor	

Another useful display can be found inside the menu M6 - **S6.8.2.1 = MWH Counter**.

This monitor shows the energy in kWh or MWh regenerated from the device. The value shown will have negative sign, because is energy recovered and not consumed.

### 7.2 M2 = PARAMETERS

There are no parameters that normally require changes.

ATTENTION, changing certain parameters can affect product reliability.

Before changing any parameter, please contact SMS.




## 7.4 M4 = ACTIVE FAULTS AND WARNINGS


Listed below are the most common fault messages. Be careful not to reset the alarm or fault without first having investigated the problems that caused the protection mechanism to cut in.

**Always deselect the run command before resetting any fault.**

Code	Description	Remedies / Indications
1	<b>Overcurrent:</b> current 4 times the nominal value detected at the inverter output.	Check the condition of cables connected to L1,L2,L3. Check insulation of LCL filter.
2	<b>Overvoltage:</b> bus voltage is too high.	Check that during the main inverter braking phase, the voltage between B + and B-do not exceed 800Vdc.
5	<b>Charge switch:</b> The charge switch is open when the drive is in running.	Reset the fault and restart . If the fault happens again, contact SMS.
7	<b>Saturation trip:</b> several potential causes, including a faulty component.	Cannot be reset from the keypad. Switch off power and don't reconnect it. Contact SMS.
8	<b>System error:</b> -Component damaged -Malfunction.	Reset the fault and restart . If the fault happens again, contact SMS.
9	<b>Undervoltage:</b> BUS voltage is too low.	Check that the voltage input to the inverter is correct and steady.
3 10 11	<b>Power stage faults :</b> Detection of fault in power connections (input or output phase missing, earth fault, etc.).	Check the power cables on the input/output sides and/or the insulation of LCL filter.
13 14 16	Temperature inverter undertemperature (-10°C) inverter overtemperature (+90°C) motor overtemperature.	Make certain the air flow around the drive is sufficient to cool the heat sink and/or check for possible motor overload.
22 23	<b>EEPROM "Checksum" error:</b> - Parameter recovery failed - Damaged or malfunctioning component	Reset the fault and restart . If the fault happens again, contact SMS.
25	<b>Microprocessor watch-dog error:</b> - operational fault - component failure	Reset the fault and restart. If the fault happens again, contact SMS.
26	<b>Start up prevented:</b> Start-up of the inverter has been impeded.	Cancel prevention of inverter start-up.
32	<b>Fan not working</b>	Contact SMS.
36	<b>Control unit:</b> The control unit can't control the power unit and vice versa.	Replace the control unit.
37	<b>Device changed:</b> Optional board or control unit changed.	Reset
38	<b>Device added:</b> An optional board or power unit with different nominal rating has been added.	Reset
39	<b>Remove device:</b> An optional board or power unit has been removed.	Reset
40	<b>Device unknown:</b> Unknown optional board or drive.	Reset
41	<b>IGBT temperature:</b> IGBT Inverter Bridge overtemperature protection has detected a short term too high overload current.	Check device sizing. Reduce the current limit of the device (requires the keypad). Check the correct operation of the cooling fan.
52	<b>Keypad communication error:</b> The connection between the control keypad and the frequency converter is broken.	Check keypad connection and possible keypad cable.
54	<b>Slot error:</b> Optional board or connection slot faulty.	Check board and slot Contact SMS. .
<b>If other types of fault should occur, please contact SMS.</b>		

## 7.5 M5 = FAULT HISTORY

The caption H1→Hx appears under the menu. This indicates how many faults are memorized. Up to 30 faults can be memorized and displayed chronologically in reverse order (most recent fault displayed first). Pressing the  key when viewing the fault code, opens the "Instant fault data register", in which the values of several key variables are saved (e.g. output frequency, motor current, motor torque, etc.) as they occur. Press the  or  keys to scroll this register.

To reset faults, the  (ENTER) key must be pressed and held for at least 3 seconds.

## 7.6 M6 = SYSTEM MENU

The caption S1→S11 appears under the menu. This means there are 11 submenus.

**S6.1 Language Setting:** ITALIAN / ENGLISH / FRENCH / GERMAN.

## 8 – CHECKS AND MAINTENANCE

To ensure long service life and smooth operation of the drive, carry out the following checks at regular intervals. Always isolate the drive from the power supply and make certain the keypad is off before proceeding.

- 1- Remove the dust that collects on the cooling fans and on the control circuit board, preferably by means of compressed air or using a vacuum cleaner.
- 2- Check that there are no screws loose at the power or control terminals.
- 3- Check that inverter function is <<normal>> and there is no abnormal overheating.

### 8.1 TEST MEGGER

Insulation tests are normally not required on TAKEDO ENERGY.

If necessary, you must disconnect the terminals L1, L2, L3, B + and B- and short circuit them together, checking the insulation between this node and ground.

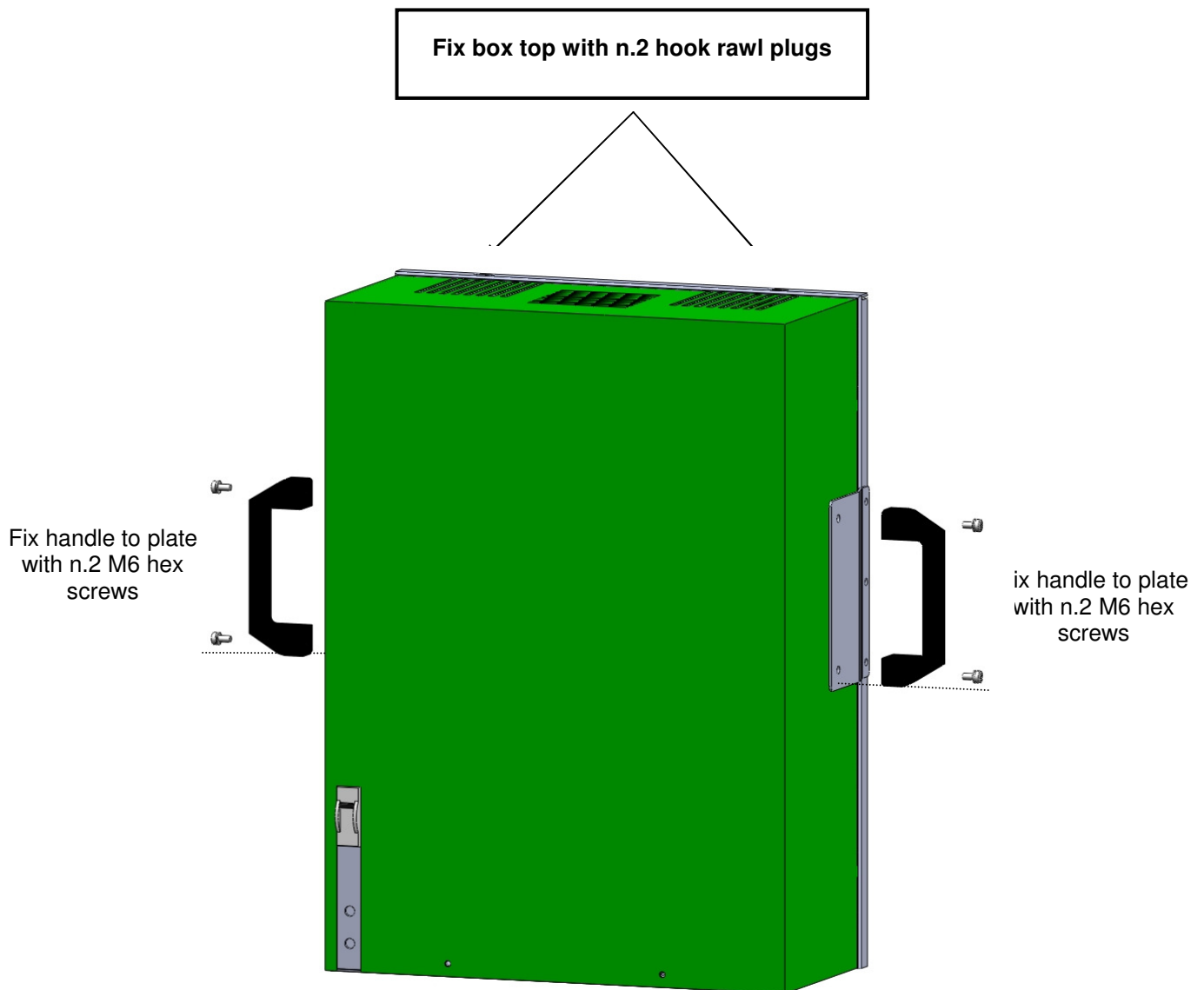
Do not perform the test on the control circuits.



## 9 – DIMENSIONS AND WEIGHT

SIZES	Max Rigenerated Power (kW)	Width (mm)	Width with handles (mm)	Height (mm)	Depth (mm)	Weight (kg)
TAKEDO ENERGY 4.3	3,00	394	480	520	180	22,5
TAKEDO ENERGY 12	8,00	394	480	520	180	35

### FIXING DRAWING



For further information and advice contact:

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## EU DECLARATION OF CONFORMITY

We

**Manufacturer's name:** Vacon Oyj  
**Manufacturer's address:** P.O.Box 25  
Runsorintie 7  
FIN-65381 Vaasa  
Finland

hereby declare that the product

**Product name:** Vacon NXS/P Frequency converter  
**Model designation:** Vacon NXS/P 0003 5.... to 1030 5....

has been designed and manufactured in accordance with the following standards:

**Safety:** EN 60204 -1 (2009) (as relevant)  
EN 61800-5-1 (2007)

**EMC:** EN61800-3 (2004)

and conforms to the relevant safety provisions of the Low Voltage Directive (2006/95/EC) and EMC Directive 2004/108/EC.

It is ensured through internal measures and quality control that the product conforms at all times to the requirements of the current Directive and the relevant standards.

In Vaasa, 25th of September, 2009

  
Vesa Laisi  
President

The year the CE marking was affixed: 2002