




# USER MANUAL

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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 NXP original manual, 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 SAFETY WARNINGS

Follow the procedures indicated below with care, to avoid any risk of serious accidents.

- 1 - **Risk of electric shock. Power the drive only with the front cover attached. Never remove during operation. Before working on the equipment, disconnect the main input power and wait a few minutes to allow the internal capacitors to discharge.**
- 2 - **TAKEDO ENERGY** must always be connected to the main motor inverter (terminals B+ and B-) and to the mains (terminals L1 - L2 - L3), downstream the existing mains power switch.  
In the event of an interruption in the mains power supply, wait at least 1 minute before reconnecting.  
**EXCESSIVELY RAPID RECONNECTION TO THE POWER SUPPLY CAN DAMAGE THE INVERTER.**

## 2.2 CAUTIONS

Follow the procedures indicated in the manual with care, to avoid risk of damaging or destroying the drive.

- 1- Do not connect the equipment to a voltage higher than the permissible input voltage. Excessive voltage can cause irreparable damage to internal components.
- 2- Periodically check the fan: Verify that the air flow is smooth and remove dust.
- 3- To avoid damaging the inverter in the event of prolonged stoppages with no power supply, before restarting the drive proceed as follows:
  - If the inverter has been idle for several months, connect it to the power supply for at least 1 hour 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.
- 4- Don't connect capacitors or inductances to the terminals L1 - L2 - L3 because they are already provided within TAKEDO ENERGY.
- 5- If an alarm or fault message appears, does not reset it without first having thoroughly analyzed the causes of the intervention.

# 3 – TECHNICAL SPECIFICATIONS

Input voltage	3 ~ 400V +/- 15%
Max. output current	3 ~ 4,3A
Max. power regenerated	3000W
Harmonic content (THD)	16%
Stand-By consumption	19W
Working duty-cycle	100%
FAULT relay power	24Vdc/8A 250Vac/8A 125Vdc/0,4A
Minimum switching load	5V/10mA

## 4 – WORKING PRINCIPLE

When the lift motor brakes (running upward with load less than 50%, or downward with load greater than 50%), the main bus voltage of the inverter increases.

Normally, under these conditions the energy that is transferred from the inverter load is dissipated on a resistor.

Installing TAKEDO ENERGY, all the excess energy is "returned" to the power supply, however the existing braking resistor have not to be discarded, as it can be useful in emergency situations and to ensure the functioning of the system even in case of TAKEDO ENERGY failure.

TAKEDO ENERGY is constantly connected to the BUS of the main inverter and to the mains. When the lift starts, a contact of the motor contactors warns TAKEDO ENERGY, which is synchronized with the network, monitors the voltage of the BUS and when it reaches a predetermined value, the energy generated is recovered and 'sent' over the mains.

Of course the energy counter does not go "back", but the energy recovered is used for the other loads connected to the same meter as the car light, control panel operation, motor brake, staircase, etc..

## 5 –TAKEDO ENERGY 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 overvoltages due to weather events), can be expected, in series with the input terminals of the mains supply, three fuses (one for each phase), dimensioned according to the different sizes.  
The fuse kit, complete with protective box, can be supplied on request (not indispensable !).
- 3 - The device must be connected as indicated in 5.3 and 5.4, following the application diagram.  
An incorrect connection may cause damages. Pay particular attention to the connection of B + and B- :  
If connected reversed may cause damage of both the main inverter and TAKEDO ENERGY.
- 4 - Perform the wiring as described in Section 5.2 to avoid EMC problems.

### 5.2 TAKEDO ENERGY 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 linked within the main inverter in the same terminal in which the earth cables are connected to the building.
- 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 resistance to the inverter (50 cm at least).

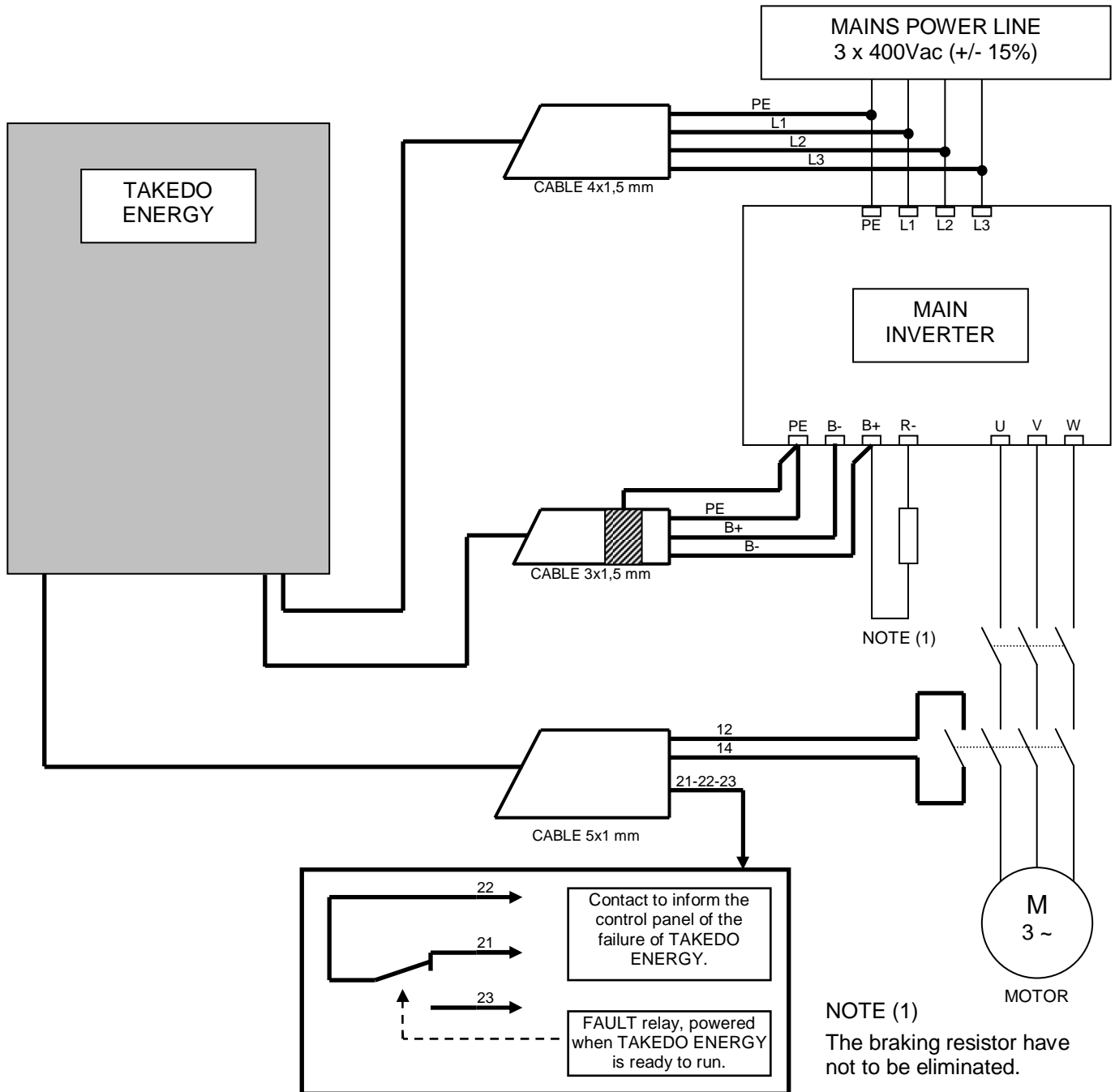
### 5.3 POWER CONNECTIONS

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

## 5.4 CONTROL CONNECTIONS

RUN command	Available at input terminals 12-14, to be connected to a clean contact of a run contactor. The command must be activated BEFORE the opening of the mechanical brake and disabled AFTER the closing of the mechanical brake.
FAULT relay	Available at output terminals 21-22-23, is a changeover contact relay, powered when the TAKEDO ENERGY is ready to run. In case of malfunction or failure this relay is disabled.

## 6 – APPLICATION DIAGRAM



## 7 – KEYPAD AND PROGRAMMING (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 product, no parameterization is required.

The control panel has an alphanumeric display with nine status indicators and three lines of text for the menu, the descriptions of the menu/submenu and the number of the submenu or the value of the function displayed. There are also nine keys used to control the drive, set parameters and display values. The panel is removable, since all parts are isolated from the a.c. input voltage.

Items of data are organized in **menus** and **submenus**, by way of which to display and process control signals, indicate faults and measurements and change parameters.

### STATUS INDICATORS

**RUN** = lights up when the motor is running

**STOP** = indicates the direction of rotation selected

**READY** = lights up when the motor is at standstill

**FAULT** = lights up when a fault is detected in the drive

**ALARM** = lights up when an alarm is tripped

**Indication of position: shows the symbol and number of the menu, the parameter, etc.**

The *I/O term* symbol indicates that the I/O terminals have been selected as the control position; in other words, the various commands are given via the I/O terminals.

**IMPORTANT:** When using with lifts, the word *Keypad* or *Bus/Comm* must never appear instead of *I/O term*.






**Description line: shows the description of the menu, value or fault.**

**Values line: displays numerical values and text for parameters etc. and the number of sub-menus available in each menu.**



*Control panel with LCD display*

- Lights up when power supply is on. Indicates that the inverter is ready.
- Lights up when the inverter is running.
- Lights up when a potentially hazardous situation has been encountered following which the inverter was stopped (stopped due to failure). At the same time, the FAULT state indicator light flashes on the display where the fault is described; see Chapter 5.4 - Active Faults.

<p> <b>Menu left</b> Moves the cursor to the left (in the PARAMETERS menu). Used to quit edit mode. Press and hold for 2...3 seconds to return to the main menu.</p> <p> <b>Menu right</b> Go forward in menus. Moves the cursor to the right (in the PARAMETERS menu). Used to access edit mode.</p> <p> <b>Up arrow</b> Scroll main menu and pages of various submenus. Changes a parameter by increasing the value.</p> <p> <b>Down arrow</b> Scroll main menu and pages of various submenus. Changes a parameter by decreasing the value.</p> <p> <b>Reset</b> Resets active faults.</p>	<p> <b>Enter</b> Confirm selection. Used to reset faults memory: press and hold for 2...3 seconds</p> <p> <b>Select key</b> Toggles between the last two items displayed. Useful for verifying how a newly edited value will impact on another value.</p> <p> <b>START (NOT used)</b></p> <p> <b>STOP (NOT used)</b></p>
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Sub-menus are accessible from the main menu using the  key. The **M** on the first line of the text indicates the **main menu**. It is followed by a number designating the relative **sub-menu**. The arrow ( $\rightarrow$ ) in the bottom right corner of the display indicates an additional **sub-menu** that can be retrieved by pressing the  key. To go back to the **main menu** from the sub-menu, just press the  key. Data are split into menus and submenus on the keypad. Each main menu has seven levels M1 - M7. Press the  or  keys to go to another menu.

<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 also be on several levels. To access the submenus, press the  key, then use the +/- keys to show the various quantities; to quit the submenu, press the  key.

KEY TO SYMBOLS CONTAINED IN MENUS AND SUBMENUS:

<b>M</b> = Menu (internal modes G,V,P,H,F)	<b>V</b> = Read only
<b>G</b> = Group (internal modes V,P)	<b>H</b> = Fault history
<b>P</b> = Modifiable parameter	<b>F</b> = 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.

Index	Description	Index	Description
V1.2	Tensione bus C.C. / DC-link Voltage	V1.9	Tensione di rete / Supply Voltage
V1.3	Corrente Apparente / Total Current	V1.10	Frequenza di rete / Supply Frequency
V1.4	Corrente Attiva / Active Current	V1.11	DIN1,DIN2,DIN3 (non utilizzati)
V1.5	Corrente Reattiva / Reactive Current	V1.12	DIN4(Marcia), DIN5,DIN6 (non utilizzati)
V1.6	Corrente fase U / U Phase Current	V1.13	DO1(n.u), R01(Fault), R02(Contattore)
V1.7	Corrente fase V / V Phase Current	V1.14	Temp inverter / Unit temperature
V1.8	Corrente fase W / W Phase Current		

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 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.

SMS advises against modifying other parameters relative to this MENU.

If necessary, contact SMS or see the original manual available at [www.vacon.com](http://www.vacon.com).

## 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.

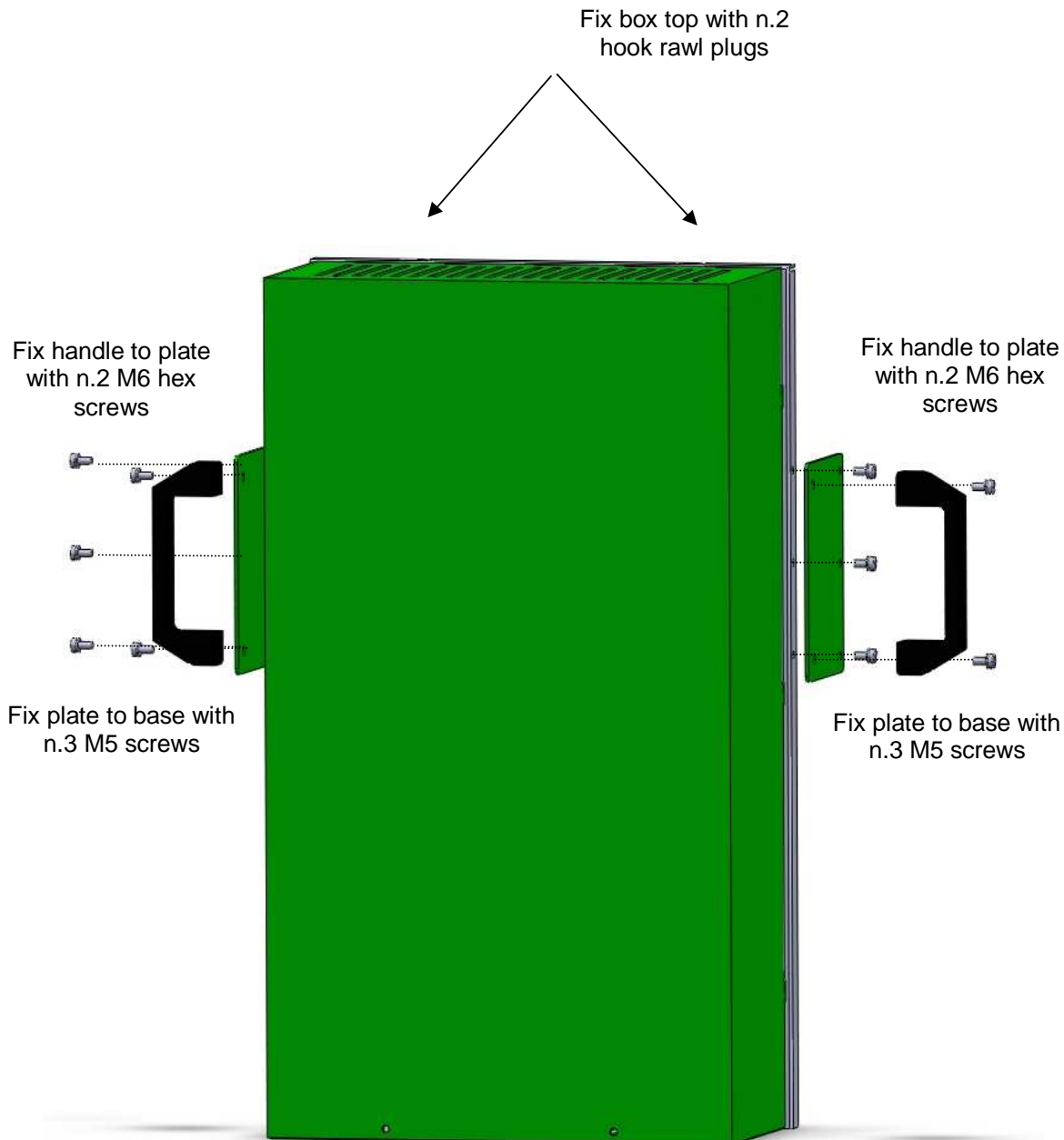
If necessary, you must disconnect the terminals L1, L2, L3, B + and B-and short circuit them together, checking the insulation between this node and ground.

Do not Megger test the control circuits.

## 9 – DIMENSIONS AND WEIGHT

Width (mm)	Width with handles (mm)	Height (mm)	Depth (mm)	Weight (kg)
330	420	580	172	23

### FIXING DRAWING



## 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

**For further information and advice contact:**  
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