SISTEMI E MICROSISTEMI

TAKEDO® - 3VF NXP

(For asynchronous or permanent magnet synchronous motors)

USER MANUAL

P05	09-02-2009	
REV.	DATE	R.T. Check and Approval

CONTENTS

1 – INTRODUCTION

The TAKEDO–3VF NXP is an inverter drive **with built-in EMC filter and smoothing choke**, responding to Council Directives 89/336/CEE (electromagnetic compatibility) 73/23/CEE (low voltage equipment). The drive can operate both in open loop mode than in closed loop mode. For operation in closed loop mode, an optional circuit board is required, and an encoder as described in the following pages.

This manual provides you with the necessary information about putting on duty and the operation of NXP frequency converter. You can find further information about application and installation in a lift control panel in the **ANNEX NXP FOR PANEL WIRING SPECIALISTS**, available in electronic edition on our website: **www.sms.bo.it**.

2 – SAFETY WARNINGS AND PRECAUTIONS

Read this manual in its entirety before powering up the equipment, following the procedures step by step. In detail, please read carefully the Chapters:
7 – ADJUSTMENT PROCEDURE
6.4 – ACTIVE FAULTS

2.1 SAFETY WARNINGS

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

1- Do not use an oscilloscope or other such instrument to test the internal circuits of the inverter. This type of operation must be performed only by a specialist technician.

2- **The leakage current from the inverter to ground is greater than 30mA**, and accordingly, the power circuit must incorporate a differential circuit breaker with **Id not less than 300mA, type B or type A**. European directives require that the connection to ground be made with cable of not less than 10 mm² section. **Powering up the drive, if the differential circuit breaker doesn't remain connected, don't repeat the operation a lot of consecutive times , because the drive could be permanently damaged.** Verify that the differential circuit breaker current is ≥ 300 mA.

3- If the parameters used in programming the drive are incorrect, the motor may be caused to rotate at a speed higher than synchronous. Do not run the motor beyond its specified electrical and mechanical limits. The installer is responsible for ensuring that movements are generated in conditions of safety, without exceeding specified operating limits.

4- Risk of electrocution. Power up the inverter only with the front cover fitted. **NEVER** remove the cover during operation. Before carrying out any operation on the equipment, isolate from the electrical power supply and wait a few minutes for the internal capacitors to discharge.

5- The external braking resistor heats up during operation. Do not install it close to or in contact with inflammable materials. To improve heat dissipation it is good practice to fix the resistor to a metal plate. Ensure it is properly protected and cannot be touched.

6- The inverter have to be always connected to the mains supply . In case of interruption wait 1 minute at least before restore supply . **TOO NEAR INSERTIONS OF THE MAINS CAN CAUSE A PERMANENT DAMAGE OF THE INVERTER.**

2.2 PRECAUTIONS

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

1- Do not connect the equipment to a voltage higher than the permissible input voltage. An excessive voltage can cause irreparable damage to internal components.

2- To avoid the risk of damaging the drive in case it stays not working without power supply for a long time, you should follow these precautions:
- **If the inverter doesn't work since several months, before starting the operation, regenerate the bus capacitors powering up the drive at least for 1 hour preventing it can operate.**
- **If the inverter doesn't work since one year or more, to regenerate the bus capacitors power up the drive, preventing it can operate, for 1 hour at an input voltage less than 50% the rated voltage, then for 1 hour at the rated input voltage.**

3- Do not connect capacitors to the inverter outputs.

4- If the drive protection functions trip, do not reset the fault before having analysed and removed the cause of the fault.

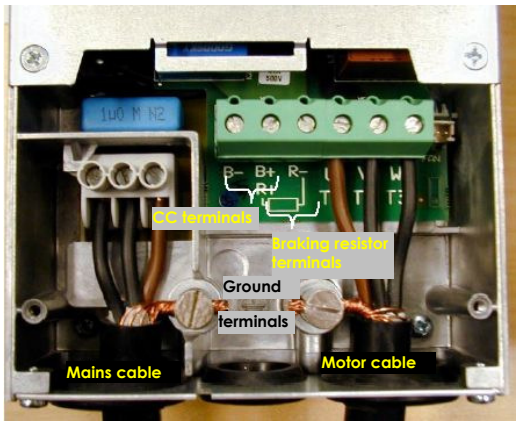
5- The lift system should be counterweighted at 50%, if counterweighted at 40% the current in up direction with full load is greater and requires a larger capacity inverter to that normally necessary, with consequent greater cost.

6- Use a drive having rated current equal to or greater than the motor rated current .

7- The braking resistor have to be connected between B+ and R-. If connected between B+ and B-, the inverter will be permanently damaged.

3 – CONNECTING THE POWER CIRCUIT

L1;L2;L3	A.C. mains power input	Connect the three phases of the power supply to any three terminals, in any order
L1;L2	D.C. power input	Connect the batteries in the event of emergency operation (evacuation)
U;V;W	Inverter output	Connect the three output phases to the contactors, then to the motor
B+;R-	External braking resistor	Connect the external braking resistor
⏚	Ground	Connect to the ground system



Example of power circuit connection

3.1 SAFETY WARNINGS

1- Ground the unit before powering it.

2- To increase the protection of the internal diodes and connecting wires (especially against the overvoltage due for example to atmospheric phenomena), you should connect three fast-acting fuses (one for each phase) in series with the a.c. power input terminals; fuses must be rated to match the different size designations as indicated in ***TABLE – Recommended braking resistors and fuses.*** The fuse kit, complete with box, is available on request.

3- To avoid irreparable damage to the inverter, **do not connect braking resistors with resistance or power ratings lower than those indicated in TABLE**. For long run lifts or high reverse gain gears, install the braking resistor with oversized power but with the same value in ohms (if needed, contact SMS for advices).

4- The inverter drive is connected <<up line>> of the power contactors. The drive is able to pilot operation of the motor in two directions, accordingly, the system can incorporate only two power contactors to switch the inverter – motor line, as prescribed by safety regulations.

5- The external braking resistor heats up during operation. Do not install it close to or in contact with inflammable materials. Ensure it is properly protected and cannot be touched.

6- Wire and bond ground connections in accordance with professional standards (as indicated under heading 3.2) to avoid problems with EMC interference.

7- Take particular care over the power connections. If the input and output connections are reversed, **the inverter will be inevitably damaged.**

INVERTER 400 VOLT (380÷500V) SERIES								
SIZE (kW)	NOMINAL CURRENT (A)	VACON CODE	DIMENSIONS LxHxW (mm)	FAST ACITNG FUSES (A)	BRAKING RESISTANCE			
					SUPPLIED BY SMS (Geared motor)	SUPPLIED BY SMS (Gearless motor)	MINIMUM VALUE (Ω)	DIMENSIONS LxWxH (mm)
3	8	NXP0009	128x292x190	25	65Ω 350W	65Ω1500W	61Ω	200x35x30
4	10	NXP0012	128x292x190	25	65Ω 350W	65Ω1500W	61Ω	200x35x30
5.5	13	NXP0016	144x391x214	25	2x130Ω 350W	65Ω1500W	61Ω	200x35x30 (*)
6	14	NXP0013	128x292x190	55	Ask to SMS	50Ω1500W	42Ω	445x110x140
7.5	18	NXP0022	144x391x214	55	50Ω 1500W	50Ω1500W	42Ω	445x110x140
11	24	NXP0031	144x391x214	55	50Ω 1500W	50Ω1500W	42Ω	445x110x140
14	27	NXP0032	144x391x214	80	Ask to SMS	2x50Ω1500W	14Ω	445x110x140 (*)
15	32	NXP0038	195x519x237	80	2x50Ω 1500W	2x50Ω1500W	25Ω	445x110x140 (*)
18.5	42	NXP0045	195x519x237	110	2x50Ω 1500W	2x50Ω1500W	20Ω	445x110x140 (*)
22	48	NXP0061	195x519x237	110	3x50Ω 1500W	3x50Ω1500W	14Ω	445x110x140 (*)
30	61	NXP0072	237x591x257	140	5x50Ω 1500W	5x50Ω1500W	6,1Ω	445x110x140 (*)
37	75	NXP0087	237x591x257	140	5x50Ω 1500W	5x50Ω1500W	6,1Ω	445x110x140 (*)

(*) Full dimension is the one indicated multiplied by the number of resistors.

TABLE *– Fuses and recommended braking resistors*

IMPORTANT: For high travel (>30m) or gear with high inverse efficiency, install the braking resistor recommended as value in ohm, but power corresponding to the next higher size.

For higher powers and voltages, or advices on application, consult SMS.

3.2 INVERTER/MOTOR CABLING RULES TO ASSURE EMC CONFORMITY

The correct INVERTER – MOTOR cabling must follow the rules below:

1- The building ground plant must be connected to both the inverter and motor.

2- The inverter/contactor and contactor/motor cable runs must be as short as possible, shielded with four poles (three phases plus yellow/green ground wire), or four unshielded wires bound together running in a duct or grounded metal tube. In other words, in the same cable or tube there must be a ground wire running as close as possible to the power cables. In the case of a shielded cable the shield must be unbroken between the inverter/contactor and contactor/motor .

The shield have to be grounded at both ends with a 360° clamp (Fig. 1), or with special terminals (Fig. 2).

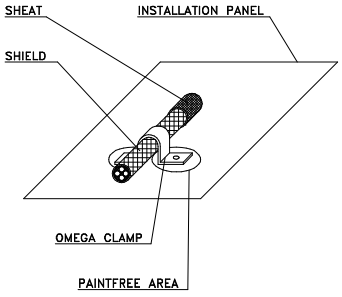
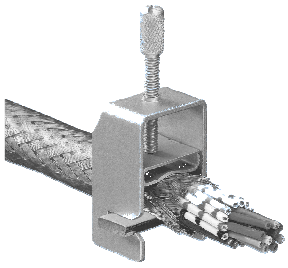


FIG. 1

FIG. 2



If the shield cannot be grounded with a 360° clamp on the motor terminal block itself, the shield must be grounded on the motor casing before the cable enters the terminal box.

3- Use a shielded cable also for the inverter input power line to avoid radiated EMC emissions in the system. The mains input power cables and inverter output cables MUST NOT be run in the same duct and their runs must be as far apart as possible (at least 50 cm.).

4- The power and control cables must be run as far apart as possible and not parallel to each other, even if they are shielded; if the cable runs cross they must do so at an angle of 90°.

5- Independently of the connection to the building grounding plant, the motor casing MUST be connected both to the cable shield and to the yellow/green ground wire inside the shielded cable.

6- The inverter emits electromagnetic radiation which can be captured and transmitted by cables, in particular by the flexible cables in the shaft.
To avoid this problem, use shielded cables for the control panel logic / inverter connections, with the shield grounded at both ends. DO NOT use shielded cables without grounding the shields: this leads to higher levels of EMC disturbance than if unshielded cables are used.
Any wire in a multi-pole cable which is not in use **must be grounded at both ends**.

7- Any cable, whether control and external shaft or car connections, **must never run parallel/near to the power cable**, even if shielded; if they must be parallel for any reason, they should be run through separate metal ducts.

8- The pulse generator cable must be shielded and the shield grounded at the inverter end, **as far as possible from the motor cable**.
The motor/pulse generator coupling must be isolated to avoid parasitic currents looping through the pulse generator. As for all other shields, the ground connection must be via a 360° clamp.

9- All ground connections should be as short as possible and wide .

Copper braid (a) is better than wire (b).

10- To avoid unintentional tripping of the differential circuit breakers take the following steps:
- make the power cable runs as short as possible
- use circuit breakers designed for harmonics (type B or type A, with tripping current 300mA).
- reduce the inverter carrier frequency (if possible); lower frequency means greater motor noise, but smaller grounding currents and smaller EMC phenomena.

4 – ENCODER: CONNECTION AND TYPES

ASYNCHRONOUS MOTORS

Board NXOPTA4 or NXOPTA5 (for LINE DRIVER 5V Encoder type) or NXOPTA5 (for PUSH-PULL 15 / 24V Encoder type), inserted in slot C (3° from left)

When operating in closed-loop mode, the inverter drive requires a feedback signal provided by an industrial encoder , resolution 1024 pulse/rev (encoders specified within the range 300 - 5000 pulse/rev can also be used) , of type :
Line driver powered at 5Vdc or
Push-pull powered at 15 or 24 Vdc.
SMS can supply a LIKA I581024H encoder, 1024 pulse/rev , that works with both NOXOPTA4 and NXOPTA5 boards , working in line driver mode if powered at 5Vdc , push-pull mode if powered at 15 or 24 Vdc.

TERMINAL	SIGNAL	LIKA I581024H ENCODER
terminal 01	A+	YELLOW
terminal 02	A-	BLUE
terminal 03	B+	GREEN
terminal 04	B-	ORANGE
terminal 09	– Power supply	BLACK
terminal 10	+ Power supply	RED

CAUTION!
If the encoder used is not supplied by SMS , if it is LINE DRIVER type , the NXOPTA4 encoder board have to be used, whereas if a 15V or 24V PUSH-PULL type is installed, the NXOPTA5 encoder board will be needed.

PERMANENT MAGNET SYNCHRONOUS MOTORS

For this application EnDat™ absolute encoders are recommended or , in alternative incremental sin-cos type, resolution 2048 pulse/rev.
To connect the ECN 113 or ECN 413 Heidenhain encoder to the inverter, use the following table.
To connect sin-cos encoders (for example Heidenhain ERN1387), use the following table as well, but ignore the first 4 connections (DATA+,DATA-,CLOCK+,CLOCK-) because they don't exist in this kind of encoder.

NXOPTBE or NXOPTBB Board (Slot C)

Terminal X6

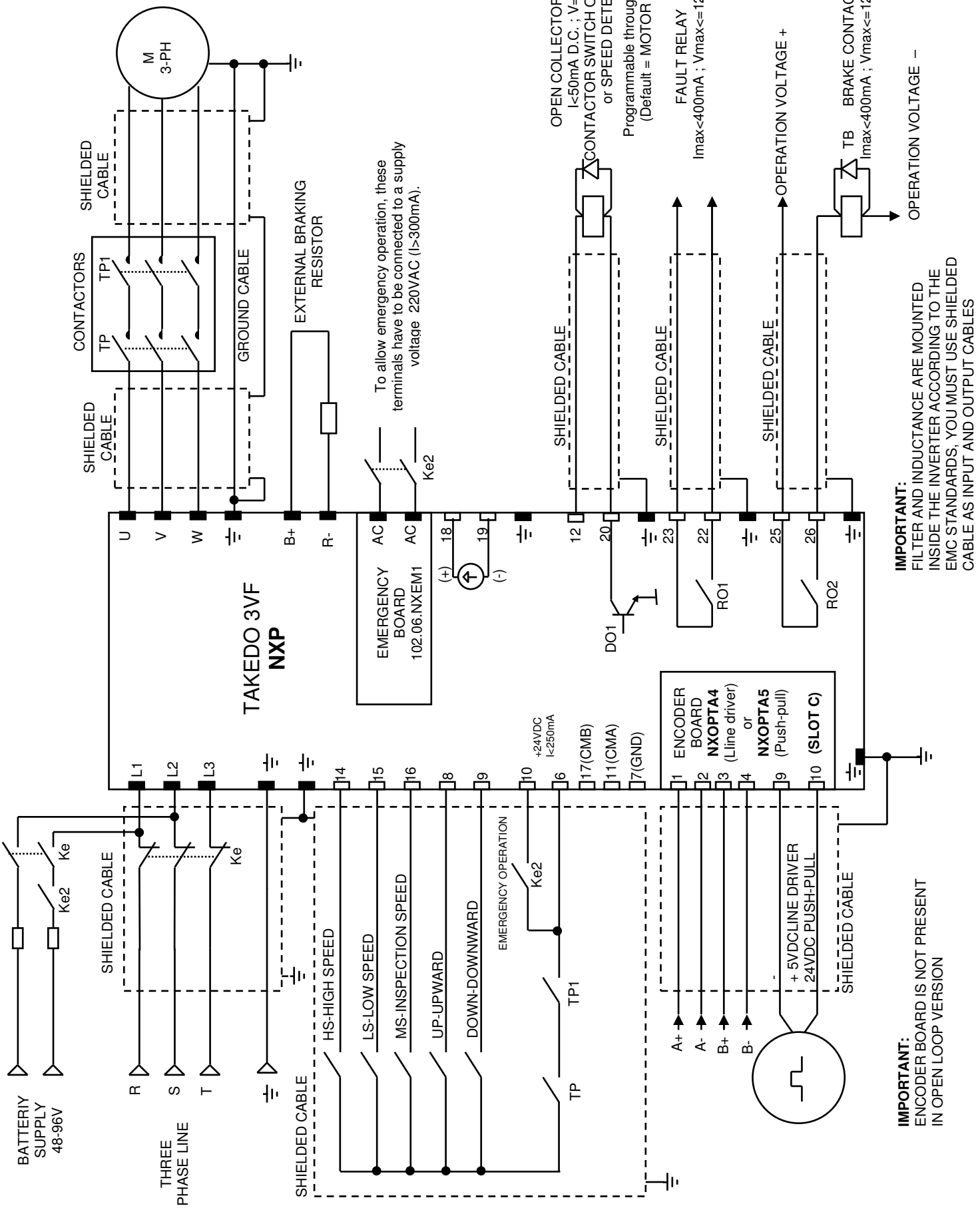
Terminal number	Signal	Heidenhain color code ECN 113 / ECN 413
1	DATA+	Grey (for EnDat® only)
2	DATA–	Pink (for EnDat® only)
3	CLOCK+	Violet (for EnDat® only)
4	CLOCK–	Yellow (for EnDat® only)
5	A+	Green / Black
6	A-	Yellow / Black
7	B+	Blue / Black
8	B-	Red / Black
9	GND	White / Green
10	Encoder power	Brown / Green

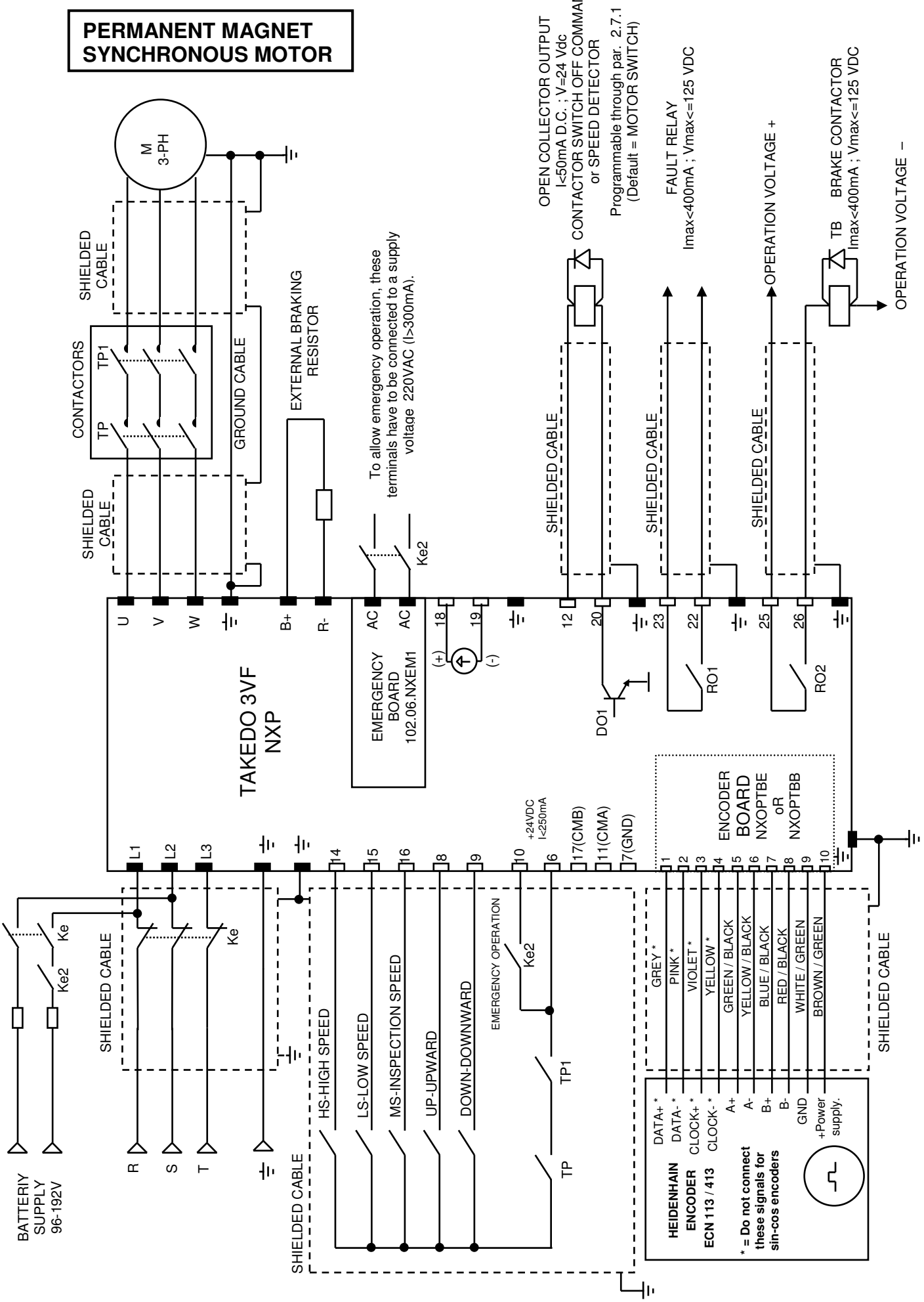
ADVICE VALID FOR ALL THE ENCODER TYPES

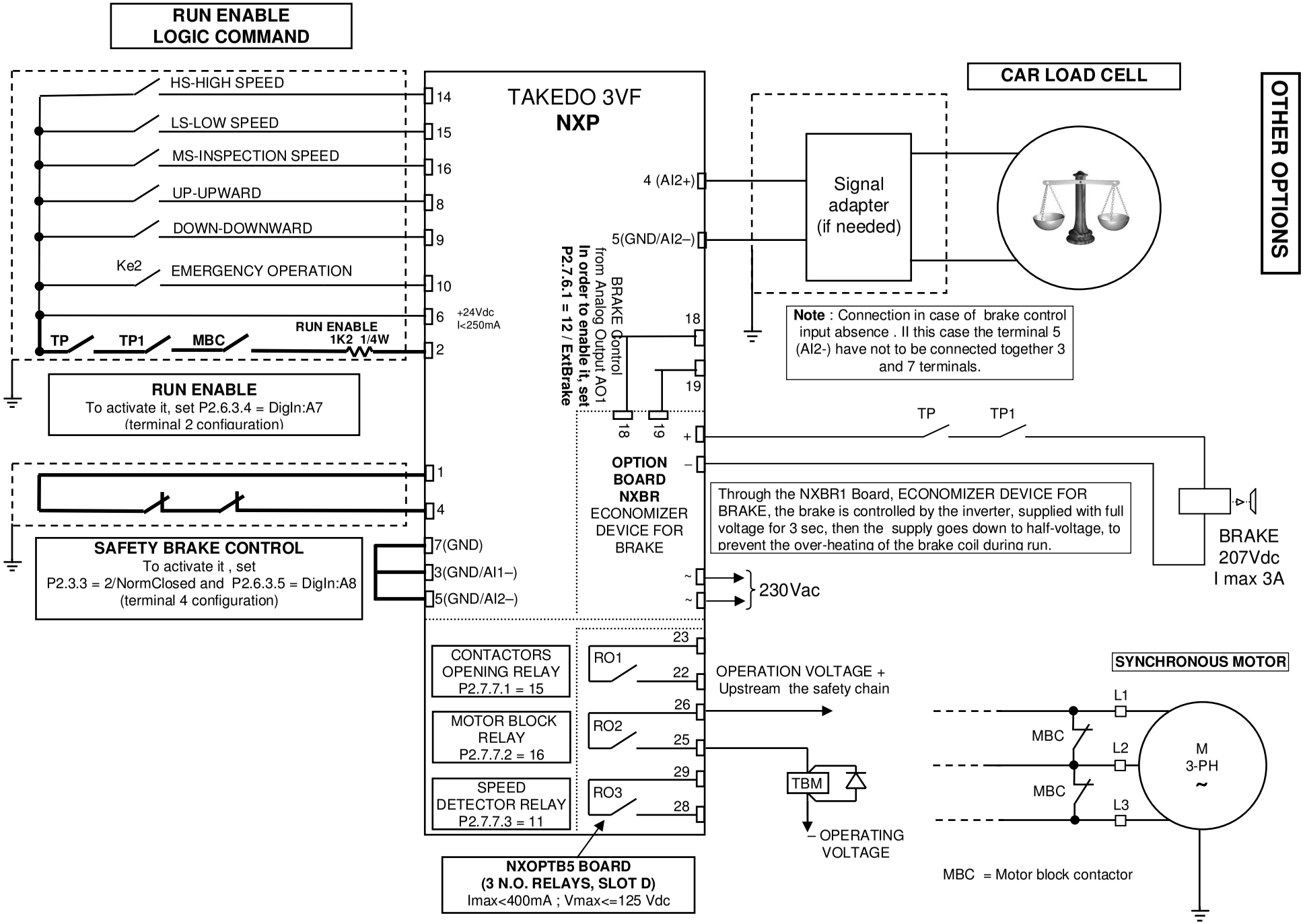
The encoder cable must be shielded, and the shield connected (as indicated in heading 3.2) to the inverter ground terminal. In any event, the encoder should have a shielded cable of length sufficient to allow connection direct to the inverter, following the shortest possible run and located WELL AWAY FROM THE POWER CABLES.
Remaining wires have to be isolated one by one and left unconnected.

5 – EXAMPLES OF APPLICATION

ASYNCHRONOUS MOTOR




PERMANENT MAGNET
SYNCHRONOUS MOTOR
M
3-PH
SHIELDED
CABLE
CONTACTORS
TP1
TP
GROUND CABLE
EXTERNAL BRAKING
RESISTOR
To allow emergency operation, these
terminals have to be connected to a supply
voltage 220VAC (I>300mA).
Ke2
OPEN COLLECTOR OUTPUT
I<50mA D.C. ; V=24 Vdc
CONTACTOR SWITCH OFF COMMAND
or SPEED DETECTOR
Programmable through par. 2.7.1
(Default = MOTOR SWITCH)
FAULT RELAY
Imax<400mA ; Vmax<=125 VDC
OPERATION VOLTAGE +
TB BRAKE CONTACTOR
Imax<400mA ; Vmax<=125 VDC
OPERATION VOLTAGE –
SHIELDED CABLE
U
V
W
B+
R-
AC
AC
18
19
12
20
23
22
25
26
(+)
(-)
DO1
RO1
RO2
TAKEDO 3VF
NXP
EMERGENCY
BOARD
102.06.NXEM1
L1
L2
L3
+24VDC
I<250mA
17(CMB)
11(CMA)
7(GND)
ENCODER
BOARD
NXOPTBE
oR
NXOPTBB
BATTERIY
SUPPLY
96-192V
Ke
Ke2
R
S
T
HS-HIGH SPEED
LS-LOW SPEED
MS-INSPECTION SPEED
UP-UPWARD
DOWN-DOWNWARD
EMERGENCY OPERATION
TP
TP1
HEIDENHAIN
ENCODER
ECN 113 / 413
* = Do not connect
these signals for
sin-cos encoders
DATA+ *
DATA- *
CLOCK+ *
CLOCK- *
A+
A-
B+
B-
GND
+Power
supply.
GREY *
PINK *
VIOLET *
YELLOW *
GREEN / BLACK
YELLOW / BLACK
BLUE / BLACK
RED / BLACK
WHITE / GREEN
BROWN / GREEN


RUN ENABLE
LOGIC COMMAND
HS-HIGH SPEED
LS-LOW SPEED
MS-INSPECTION SPEED
UP-UPWARD
DOWN-DOWNWARD
Ke2
EMERGENCY OPERATION
TP
TP1
MBC
RUN ENABLE
1K2 1/4W
+24Vdc
I<250mA
RUN ENABLE
To activate it, set P2.6.3.4 = DigIn:A7
(terminal 2 configuration)
SAFETY BRAKE CONTROL
To activate it , set
P2.3.3 = 2/NormClosed and P2.6.3.5 = DigIn:A8
(terminal 4 configuration)
TAKEDO 3VF
NXP
14
15
16
8
9
10
6
2
1
4
7(GND)
3(GND/AI1–)
5(GND/AI2–)
4 (AI2+)
5(GND/AI2–)
BRAKE control
from Analog Output AO1
In order to enable it, set
P2.7.6.1 = 12 / ExtBrake
18
19
18
19
+
–
OPTION
BOARD
NXBR
ECONOMIZER
DEVICE FOR
BRAKE
~
~
230Vac
CONTACTORS
OPENING RELAY
P2.7.7.1 = 15
MOTOR BLOCK
RELAY
P2.7.7.2 = 16
SPEED
DETECTOR RELAY
P2.7.7.3 = 11
RO1
RO2
RO3
23
22
26
25
29
28
NXOPTB5 BOARD
(3 N.O. RELAYS, SLOT D)
Imax<400mA ; Vmax<=125 Vdc
CAR LOAD CELL
Signal
adapter
(if needed)
Note : Connection in case of brake control input absence . II this case the terminal 5 (AI2-) have not to be connected together 3 and 7 terminals.
OTHER OPTIONS
TP
TP1
Through the NXBR1 Board, ECONOMIZER DEVICE FOR BRAKE, the brake is controlled by the inverter, supplied with full voltage for 3 sec, then the supply goes down to half-voltage, to prevent the over-heating of the brake coil during run.
BRAKE
207Vdc
I max 3A
OPERATION VOLTAGE +
Upstream the safety chain
TBM
– OPERATING
VOLTAGE
SYNCHRONOUS MOTOR
L1
L2
L3
MBC
MBC
M
3-PH
~
MBC = Motor block contactor

6 – KEYPAD AND PROGRAMMING

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 for controlling the drive, setting parameters and displaying 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.

FIG. 4 – *Control panel with Liquid Crystal Display*

STATUS INDICATORS

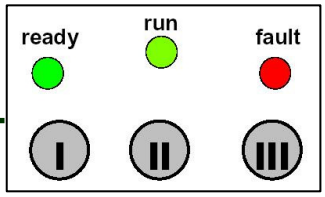
RUN = lights up when the motor is running
= indicates the direction of rotation selected
STOP = lights up when the motor is at standstill
READY = lights up when the drive is powered up and ready for use
FAULT = lights up when a fault is detected in the drive
ALARM = lights up when an alarm is tripped

Position indication: displays the symbol and the number of the menu, the parameter, etc..

The symbol ***I/O term*** indicates that that the I/O terminals are the selected control interface; in other words, the commands are given via the I/O terminals
IMPORTANT: When the drive is used with lift motors, neither ***Keypad*** nor ***Bus/Comm*** must ever appear in place of ***I/O term***

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

Values line: indicates the numerical value and descriptor of reference data, parameters etc. and the number of submenus available in each menu.



I Lights up when power is supplied to the drive. Indicates that the inverter is ready for use.

II Lights up when the drive is in operation.

III Lights up when risk conditions have been identified and caused the drive to shut off (lock-up caused by fault). At the same time, the FAULT status indicator blinks in the display, which also shows a description of the fault; see Heading 7.3.4, Active Faults.

Menu left
Explore menu back. 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.

Menu right
Explore menu forward. Moves the cursor to the right (in the PARAMETERS menu).
Used to access edit mode.

Up arrow
Scroll main menu and pages of various submenus.
Changes a parameter by increasing the value.

Down arrow
Scroll main menu and pages of various submenus.
Changes a parameter by decreasing the value.

Reset
Resets active faults.

Enter:
Confirm selection.
Used to reset faults memory: press and hold for 2…3 seconds

Select
Toggles between the last two items displayed.
Useful for verifying how a newly edited value will impact on another value.

START (NOT used)

STOP (NOT used)

FIG. 5 – *Control keypad*

The submenus are accessible from the main menu using the ▶ key. The symbol **M** on the first text line indicates the **main menu**. It is followed by a number that refers to the **submenu** in question. The arrow **(→)** at the bottom right of the display indicates a further **submenu** that can be recalled by pressing the ▶ key. To go back to the **main menu** from the submenu, simply press the ◀ key.
Data are divided into Menus and Submenus. The main menus are organized on seven levels M1-M7.
To go from one menu to the next, use the increase/decrease keys ▲ or ▼ .

M1=Visualizzazione / Monitor	**M5**=Storico guasti / Fault history
M2=Parametri / Parameters	**M6**=Menu di sistema / System menu
M4=Guasti attivi / Active faults	**M7**=Schede espansione / 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:

M= menu (internal modes G,V,P,H,F)
G= group (internal modes V,P)
P= modifiable parameter
V= read only
H= fault history
F= active fault

6.0 – COPY OF PARAMETERS WITH KEYPAD

Programming keypad can also be used to copy parameters to or from the inverter.
This function is very useful when is needed to transfer the optimal parameter set found for a lift on another lift of the same type, but **YOU CAN ONLY USE IT TO COPY PARAMETERS BETWEEN INVERTERS EQUIPPED WITH THE SAME APPLICATION SOFTWARE RELEASE**
(the Application software release is written on a label under the keypad).

6.0.1 – COPY FROM INVERTER TO KEYPAD

Push the left arrow key until the 'M' letter , followed by the menu number (e.g. M2) , is not appeared on the left high corner of the display . Push up or down arrow key to reach M6.

M6 **System Menù** **S1>S8 →**	S6.3 **Copy Parameters** **P1>P4 →**	S6.3.2 **Up to keypad** **Select →**	S6.3.2 **Up to keypad** **All param.**	S6.3.2 **Up to keypad** **Wait…**	S6.3.2 **Up to keypad** **OK**
Pushing the right arrow key will be displayed S6.1.Push the up arrow key to reach S6.3.	*Pushing the right arrow key will be displayed S6.3.1.Push the up arrow key to reach S6.3.2.*	*Push the right arrow key.*	*Push Enter to start data copy.*	*Wait the end of the copy.*	*Copy done . Keypad contains the inverter data.*

6.0.2 – COPY FROM KEYPAD TO INVERTER

Selecting S6.3.3 , will be displayed "Down from keypad" . Proceed in the same way described before.
Note : During the copy from keypad to inverter some data copy will appear as "Locked" . This happens because there are fixed parameters that are not modifiable (reserved) . Pushing Enter key any time "Locked" appears (about 6-7 times) copy proceeds and "Ok" will be displayed.
Attention : Copy from a keypad when its data comes from an inverter of the same size of the one you are copying into.
Connecting the keypad to the inverter in which you want to copy the data , it will appear :

Copy To Panel? **enter/reset**	**Copy From Panel?** **enter/reset**
Push RESET because you want to copy the keypad data into the inverter.	*Push ENTER to start the copy and wait .*

6.1 M1 = MONITOR

This menu allows to see values and data during the inverter operation and it is split into 3 different sub-menus The caption V1→Vn appears under the menu. This means there are 'n' quantities that can be monitored.

CODE	DESCRIPTION	CODE	DESCRIPTION
Drive – Motor			
V1.1.1	Frequenza uscita / Output frequency	V1.1.6	Corrente motore / Motor Current
V1.1.2	RifFrequenza / FreqReference	V1.1.7	Tensione motore / Motor Voltage
V1.1.3	Velocità motore / Motor Speed	V1.1.8	Tensione bus C.C. / DC-link Voltage
V1.1.4	Coppia motore / Motor Torque	V1.1.9	Temp inverter / Unit temperature
V1.1.5	Potenza motore / Motor Power	V1.1.10	Memoria Cont Antic / Advan Cont Memory
Input – Output			
V1.2.1	DIN1, DIN2, DIN3 (Up, Down, Evacuation)	V1.2.4	DO1, R01, R02 (Programm. Outputs: Motor Switch, Fault, Brake
V1.2.2	DIN4, DIN5, DIN6 (High, Low, Inspection Speed)	V1.2.5	RE1, RE2, RE3 (NXOPTB5 Programmable Outputs: Motor Switch, Motor Block, Speed Detector)
V1.2.3	DIN7, DIN8 (Run Enable, Safety Brake Control)	V1.2.6	Uscita analogica / Analog Iout
Ride Values			
V1.3.1	Vel. cabina m/s / Lift Speed m/s	V1.3.4	DistRallentamen / Slowing Distan (mm) (Slowing-down distance)
V1.3.2	Vel. Encoder / Encoder Freq (Hz) (+ upward, - downward)	V1.3.5	DistBassaVeloc / LowSpeedDistan (mm) (low speed distance)
V1.3.3	DistArrestTotale / TotalStopDistan (mm)	V1.3.6	DistArrestFinale / FinalStopDistan (mm) (stop distance)

6.2 M2 = PARAMETRI / PARAMETERS

Full list of parameters with associated descriptions is in the paragraph "10 – PARAMETERS LIST".

6.4 M4 = GUASTI E ALLARMI ATTIVI / 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	Cures / Indications
1	**Overcurrent**: current 4 times the nominal value detected at the inverter output	Check the condition of cables and motor, also the size of the inverter drive
2	**Overvoltage:** detection of DC link voltage too high	Increase the deceleration time, check the value of the braking resistor.
5	**Charge switch**: The charge switch is open when the drive is in running.	Reset the fault and restart . If the fault happens again , contact SMS.
7	**Saturation trip** : One or more power component malfunctioning.	Cannot be reset from the keypad. Switch off power. DO NOT RE-CONNECT POWER! Contact factory. If this fault appears simultaneously with Fault 1, check motor cables and motor.
8	**System fault** : - Damaged or malfunctioning component. - Verify data register 7.3.4.3	Reset the fault and restart . If the fault happens again , contact SMS.
9	**Undervoltage**: detection of DC link voltage too low.	Check that the voltage input to the inverter drive is correct and steady. If the fault occurs during acceleration, increase the acceleration time.
3 **10** **11**	**Power stage faults** : 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 motor insulation .

Code	Description	Cures / Indications
12	**Braking fault**: fault affecting braking resistor or chopper	Check the connection and/or the size of the resistor .
13 **14** **16**	**Temperature** inverter drive undertemperature; (-10°C) inverter drive 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.
15	**Motor stall**: the motor has not started while the inverter has already reached 90% of the limit current settled in 2.1.1	Check the brake or the counterweight if the stall happens in down run without load.
17	**Motor underload**	Make certain the motor is not too small for the rated power of the drive.
22 **23**	**EEPROM "Checksum" error** : Parameter recovery failed -Damaged or malfunctioning component	Reset the fault and restart . If the fault happens again , contact SMS.
25	**Microprocessor watch-dog error** : -Damaged or malfunctioning component	Reset the fault and restart . If the fault happens again , contact SMS.
26	**Start up prevented**	Cancel prevention of start-up.
32	**Fan cooler not working**	Contact SMS.
36	**Control unit fault** : NXS control unit can't drive power unit NXP and vice-versa.	Change the control unit.
37	**Device changed** : Option board or control unit changed. Same type of board or same power rating of drive.	Reset Note: No fault time data record!
38	**Device added** : Option board or drive added. Drive of same power rating or same type of board added.	Reset Note: No fault time data record!
39	**Device removed** : Option board removed. Drive removed.	Reset Note: No fault time data record!
40	**Device unknown** : Unknown option board or drive.	Reset Note: No fault time data record!
41	**IGBT temperature** : IGBT Inverter Bridge overtemperature protection has detected a short term too high overload current.	Check loading. Check motor size.
43	**Encoder alarm**	Channels inverted (modify the parameter P2.1.13 "EncoderDirection"); connection loss or made incorrectly, or faulty encoder. **SUBCODE S6** – in case of PMSM, it means wrong or missing connection to terminals 1-2-3-4, if the encoder type is set to ABSOLUTE (ENDAT) **SUBCODE S7** – wrong or missing channel connection **SUBCODE S9** – angle identification error in PMSM
52	**Keypad communication fault** : The connection between the control keypad and the frequency converter is broken.	Check keypad connection and possible keypad cable.
54	**Slot fault** : Defective option board or slot.	Check board and slot Contact SMS.
56	**Speed Error**	Channels inverted (modify the parameter P2.1.13 "EncoderDirection") or the motor doesn't follow the speed curve set by the inverter because of a wrong setting.
57	**Overload**	Motor limit torque exceeded. Verify the working current and the correct brake opening.
59	**Wrong run**	The run direction (up or down) has been activated for more than 5 seconds without a speed level. Check the control panel commands.

Code	Description	Cures / Indications
60	**Levelling**	Low speed input falls during slow-down, before the motor has reached the steady low speed.level
61	**Low current**	The inverter doesn't open the brake because current doesn't reach the value settled in 2.3.1.1 for open loop or in 2.3.2.1 for closed loop.
62	**Emergency**	Emergency input signal falls during the emergency run.
63	**Output phases**	Missing current in one phase or unbalanced current in the output phases.
64	**Low reference**	The active speed level has a frequency reference which is lower than the DC electrical braking start frequency (open loop only).
67	**Overspeed**	The inverter, due to some malfunctioning, exceeds the maximum allowed speed.
68	**Anticipated opening of the contactors (Please see the "Alarm 68 NOTE" below)**	The contactors between the inverter and the motor open before the inverter switch-off.
69	**No Enable**	It can occur only If you use the ENABLE input (terminal 2), indicates that the Enable input has not been activated within 2 seconds from the contactor command.
70	**Wrong license code**	After the SMS application software download , the licence code is not entered correctly.
71	**Identification error**	The motor identification or the rotor angle identification for PMSM has not come correctly to an end..
72	**Wrong brake opening**	The safety brake input control has not detected the brake opening after the P2.3.4 time.
73	**Wrong brake closing**	The safety brake input control has not detected the brake closing after the P2.3.5 time.
74	**Wrong Angle identification**	In case of PMSM, the brake doesn't open because the encoder angle identification at start is not correct.
75	**Phase Check not OK**	In case of PMSM, the brake doesn't open because there is no good feedback to the initial current pulse (maybe a phase is open or the identified angle is not correct)
If other types of fault should occur, please contact SMS.		

Alarm 68 NOTE After 20 trips of this alarm, the drive goes out of service and you need to use RESET key to resume the operation.
To check the total amount of the Alarm 68 trips, please see the Menu M1 MONITOR – V1.1.10.

Eliminate the malfunctioning by delaying the contactors opening. If you can't do this (for example, in lifts with manual doors, where people opens the car door while car stopping), set parameters P2.3.1.5 and P2.3.1.2 to 0.
If the alarm still occurs, please contact SMS.

THE MOTOR CONTACTOR EARLY OPENING SHORTENS THE INVERTER LIFE.

6.5 M5 = STORICO GUASTI / 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). To reset faults, the (ENTER) key must be pressed and held for at least 3 seconds.

6.6 M6 = MENU DI SISTEMA / SYSTEM MENU

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

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

S6.2 Application Setting: SMSLift Asyn / SMSLift Sync

SMS advises against modifying other parameters relative to this MENU.
Should the need arise, contact SMS or use the original manual (www.vacon.com).

6.7 M7 = SCHEDE ESPANSIONE / EXPANDER BOARDS

The caption G1→G5 appears under the menu. This means there can be up to 5 submenus. The number of submenus depends on the number of optional circuit boards connected.

G7.1 NXOPTA1 G1→G2 (Board on Slot A)

SMS advises against modifying the parameters relative to this submenu.

G7.2 NXOPTA2 G1→G1 (digital relay outputs, Slot B)

G7.2.1 I/O monitor V1→V2

Par.	Description	Unit	Default	Value
V7.2.1.1	DigOUT:B1 (Digital output B.1)			
V7.2.1.2	DigOUT:B2 (Digital output B.2)			

G7.3 NXOPTA4 G1→G2 (5V line driver encoder board) or NXOPTA5 G1→G2 (24V push-pull) (Slot C)

G7.3.1 Parametri / Parameters P1→P3

Par.	Description	Unit	Default	Value
P7.3.1.1	Pulse/revolution (Number of encoder pulses)		1024	
P7.3.1.2	Invert direction (Encoder direction)		No	
P7.3.1.3	Reading rate (Encoder sampling)	ms	5	

G7.3.2 Monitor V1→V2

Par.	Description	Unit	Default	Value
V7.3.2.1	Encoder frequency	Hz	x	
V7.3.2.2	Encoder speed	rpm	x	

G7.3 NXOPTBE G1→G2 (ENDAT, SSI, SIN/COS encoder board for synchronous motor, Slot C)

G7.3.1 Parameters P1→P8

Par.	Descrizione	u.d.m.	Def.	Valore
P7.3.1.1	Operate Mode		SinCos	
P7.3.1.2	Pulse revolution		2048	
P7.3.1.3	Invert direction		0 / No	
P 7.3.1.4	Reading rate	ms	1	
P 7.3.1.5	Interpolation		1 / Yes	
P 7.3.1.6	SSI data coding			
P 7.3.1.7	SSI total bits		13	
P 7.3.1.8	SSI revol bits		0	

G7.3.2 Monitor V1→V6

Par.	Descrizione	u.d.m.	Def.	Valore
V7.3.2.1	Encoder freq	Hz		
V7.3.2.2	Encoder speed	rpm		
V7.3.2.3	Comm. Counter			
V7.3.2.4	RevolutionCountr			
V7.3.2.5	Abs pos Hi word			
V7.3.2.6	Abs pos Lo word			

G7.3 NXOPTBB G1→G2 (ENDAT and SIN/COS encoder board for synchronous motor, Slot C)

G7.3.1 Parametri / Parameters P1→P4

Par.	Descrizione	u.d.m.	Def.	Valore
P7.3.1.1	Invert direction		0 / No	
P7.3.1.2	Reading rate	ms	1	
P7.3.1.3	Interpolation		1 / Yes	
P 7.3.1.4	Pulse revolution		2048	

G7.3.2 Monitor V1→V7

Par.	Descrizione	u.d.m.	Def.	Valore
V7.3.2.1	Encoder freq	Hz		
V7.3.2.2	Encoder speed	rpm		
V7.3.2.3	Encoder Pos			
V7.3.2.4	EncRevolution			
V7.3.2.5	EncAlarm			
V7.3.2.6	EncWarning			
V7.3.2.7	EncMessages			

G7.4 NXOPTB5 G1→G1 (3 digital relay outputs, Slot D)

G7.3.1 MONITOR I/O V1→V3

Par.	Description	Unit	Default	Value
V7.4.1.1	DigOUT:D1 (Digital output D.1)		1	
V7.4.1.2	DigOUT:D2 (Digital output D.2)		0	
V7.4.1.3	DigOUT:D3 (Digital output D.3)		0	

7 – ADJUSTMENT PROCEDURE

IMPORTANT

It is necessary to know the characteristics of the motor, normally indicated on dataplate, before proceeding to modify parameters.

If you are using a SASSI motor:

- if it's an ASYNCHRONOUS one, and it is present in the SUMMARY TABLE OF SASSI MOTORS (CHAPTER 9), you have only to set the parameter P2.1.7 "Motor Code" and the data of the motor will be automatically set inside the drive.

- if it's a SYNCHRONOUS one, set the parameter P2.1.3 to:
8Hz for motors series G400
11Hz for motors series G300 / G200

Check that the parameter P2.1.4 (Motor Nominal Speed) is set to 60 rpm, whatever are the adjustment frequency and the motor nominal speed.

If the motor is not a SASSI motor or it's not present on the table, you have to set the following parameters :

NOMINAL VOLTAGE, NOMINAL FREQUENCY, NOMINAL SPEED, NOMINAL CURRENT, COS φ , inside the BASIC PARAMETERS Group of the drive.

If you are using a NXP closed loop drive with an asynchronous motor, you have to set the parameter P2.5.4.1 the NO-LOAD current of the motor (MAGNETISING CURRENT).

If these parameters aren't programmed correctly , the drive won't work correctly.

FOR PERMANENT MAGNETS SYNCHRONOUS MOTOR , PLEASE REFER TO PAR. 7.11

There is a guided procedure in order to set the basic parameters of the motor and the travel (SET UP) which starts automatically at the very first switch-on of the drive, or when you modify the Application type (SYSTEM MENU S6.2).

Before starting to change any parameter or regulation, proceed in this way :

7.1 – Go to the System Menu M6, choose the language (S6.1) and check that in S6.2 is set the right Application, referring to the motor you are going to control (ASYNCHRONOUS or PERMANENT MAGNET SYNCHRONOUS).

SET THE MOTOR DATA PLATE DATA INTO PARAMETERS P2.1.2/3/4/5/6/7
SET THE MOTOR TYPE IN P2.1.11 AND THE ENCODER TYPE (if any) IN P2.1.12.

The SET UP procedure starts automatically if you modify the Application type, for instance if it is set the Application for Asynchronous motor, while it is installed a Synchronous one, setting in S6.2 the Application for Synchronous motor, the SET UP starts, automatically setting all the parameters to their default value, as shown in the Table PARAMETER LIST in Chapter 10.

If the motor rpm at nominal load is not known, or if the nominal value on data plate is 1500 rpm:
- if the motor is 1 or 2 speed, or for conventional ACVV regulator, set 1350/1380 rpm
- if it is for a VVVF speed regulator, set 1440 rpm.

If the cos phii value is not known:
- if the motor is 1 or 2 speed, or for conventional ACVV regulator, set 0,76
- if it is for a VVVF speed regulator, set 0,82.

7.2 – PLACE THE DECELERATION COMMANDS AT A DISTANCE FROM FLOOR AS INDICATED IN THE TABLE

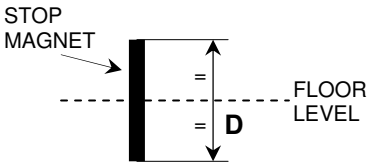
DECELERATION DISTANCE TABLE							
Nominal lift speed (m/s)	**0.6 - 0.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**2.0**
Deceleration distances (mm)	**1000**	**1400**	**1700**	**2000**	**2200**	**2600**	**2800**

If the distance is greater than the one shown in the Table, the lift system will operate more smoothly.

You can check the actual deceleration distance (distance between the deceleration switch and the stop switch) through the menu M1 MONITOR – V1.3.3 (TotalStopDistance), but this works only if the parameters "Maximum frequency" P2.2.1 and "Lift nominal speed" P2.2.2, corresponding to the maximum frequency, are set in the right way.

In addition, position the stop switch centrally with respect to the floor.

The STOPPING DISTANCE TABLE shows guideline values to consider in order to define activation distance of the stop switch (or switches):



STOPPING DISTANCE TABLE		
System nominal speed (m/s)	**0.6 – 0.8**	**> 1.0**
Total stopping distance (D) (mm)	**60**	**80**
= , = means to center the magnet of length 'D' at stop level		

To activate the 'Direct arrival at floor' function (see 7.10.1 paragraph), the P2.2.21.6 parameter have to be set different from 0 , with the ½ D value. Recommended value ½ D is about 150 mm .
Higher or lower values can also be used to your taste.
Stop adjustment is performed using the inverter parameters (see the points **7.9 – 5 and 7.10 – 5**).

7.3 – SET THE EXACT VALUES OF MAXIMUM FREQUENCY P2.2.1 (CORRESPONDING TO THE NOMINAL LIFT SPEED) AND HIGH SPEED P2.2.2.

7.4 – ADJUST THE INSPECTION FREQUENCY P2.2.10 TO OBTAIN A CAR SPEED LOWER THAN 0,63 m/s.

7.5 – SET THE MOTOR CONTROL TYPE : V/F FREQUENCY CONTROL , OPEN LOOP OR CLOSED LOOP.

7.6 – PAY ATTENTION:

ALWAYS VERIFY THAT PARAMETERS P2.2.1 E P2.2.7 ÷ P2.2.10 ARE PROGRAMMED WITH FREQUENCIES COMPATIBLE WITH THE MOTOR RATED FREQUENCY.
For example it is possible to find motors working at 30Hz, 38Hz, 45Hz, 55Hz, 60Hz, etc., mounted on gears.

7.7 – IDENTIFICATION (FOR OPEN LOOP ONLY)

After setting the correct motor data, **it is essential to perform the IDENTIFICATION routine**.

- Set parameter **P2.1.8** to 1 and transmit a call command: the contactors energizes, the brake doesn't open, and "RUN" lights on.
- When "RUN" lights off, "STOP" appears and the parameter P2.1.8 goes to 0, deactivate the call (e.g. by opening the operation valve)
- The boost parameters at low speed are now optimized if the motor is actually built up for a VVVF speed regulator, if the motor is of a different kind, may be you often need to increase manually the parameter P2.5.3.4 in order to get the needed torque.

Modifying any motor data, it is essential to perform the IDENTIFICATION routine again.

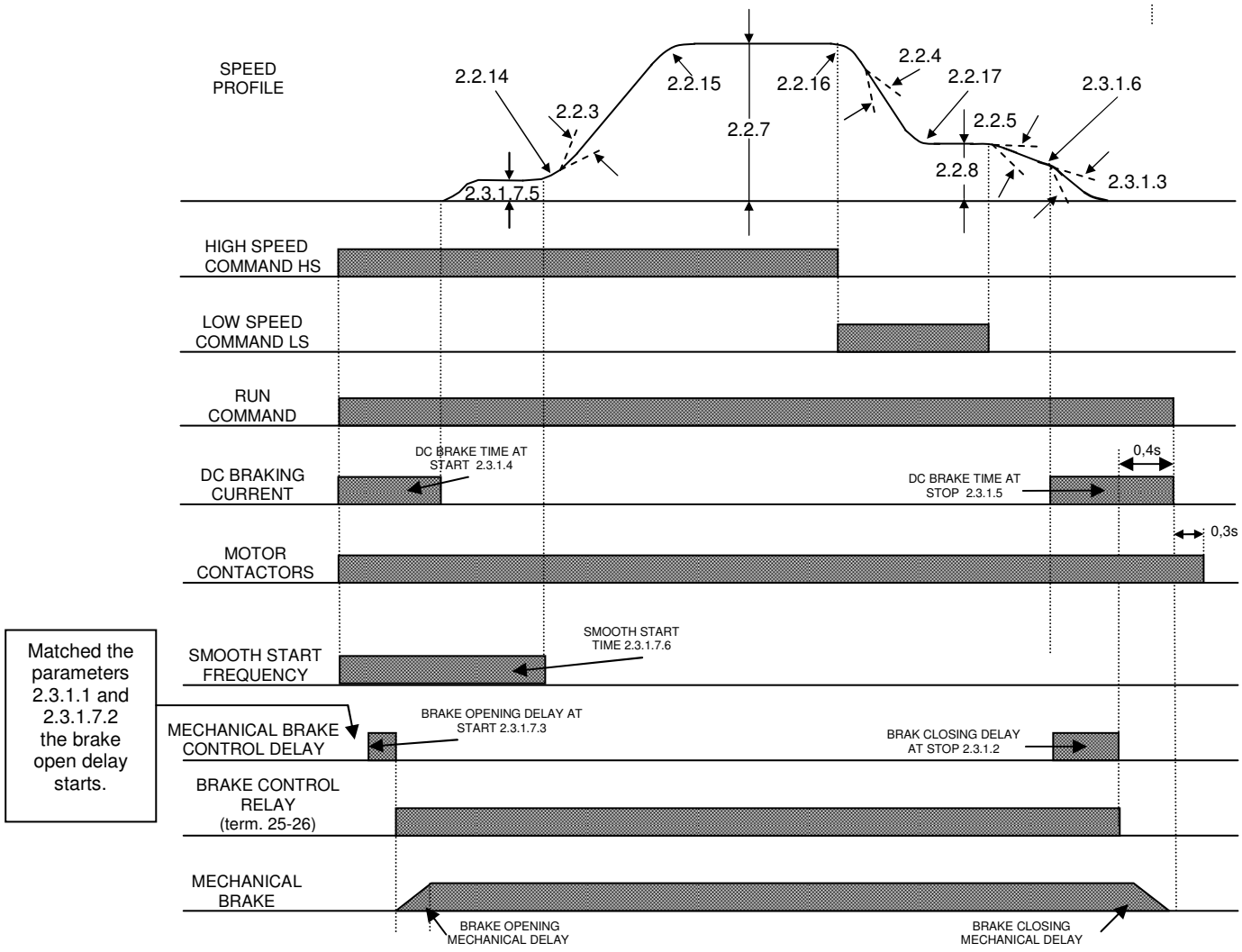
7.8 – FAN CONTROL

Set parameter **P2.1.9** (fan control) as desired:

0 = Continuous
1 = Run - the fan runs during run and for 1 further minute after the stop.
2 = Temperature - the fan starts only when the drive temperature reaches 45°C.
3 = Speed Cntrl - the fan runs during run and for 1 further minute after the stop, at 3 different speed levels, depending on the heatsink temperature (< 40°C, between 40° and 50°C, > 50°C)
This option is valid for several drive types only.

SMS advices not to modify the fan operation from default value (1), in order to assure a good cooling of the power part at each run of the lift, or to set P2.1.9 to "Speed Cntrl"" in those models where it is allowed.

7.9 – OPEN LOOP ADJUSTMENTS



After done what indicated at points 7.1/2/3/4/5/6/7/8 , proceed as follows:
IMPORTANT: Parameters have to be changed ALWAYS ONCE AT A TIME.

1 - Adjust the starting with brake control parameters

		JERK	BACK ROTATION
2.3.1.7.3	Brake open delay	▼	▲
2.3.1.7.5	Smooth start frequency	▼	▲
2.3.1.7.6	Smooth start time	▲	▲

Starting comfort has to be 'soft', without jerks nor back rotations.

- If an higher torque at starting is needed, set the starting current at 0Hz in P2.5.3.7.6 (default=50%) to a greater value (do not set a value over 60%) and perform the IDENTIFICATION routine again.

2 - During the **high** speed run , the rpm of the motor have to reach the required value, and the speed of the lift has to be constant. If not constant (oscillating) increase or decrease the value of the parameter P2.1.4. (Motor speed).

3 - Adjust now the **deceleration** phase. Lift has to reach the floor running for a short space at constant speed (10cm max.) without oscillations nor vibrations, with the same speed for both up and down directions and in any load condition.
Adjust the space travelled at low speed with parameter 2.2.4 (Deceleration ramp).

4 - If, at the **end of the deceleration phase**, motor stops, hardly reaching the floor level, adjust the following parameters:

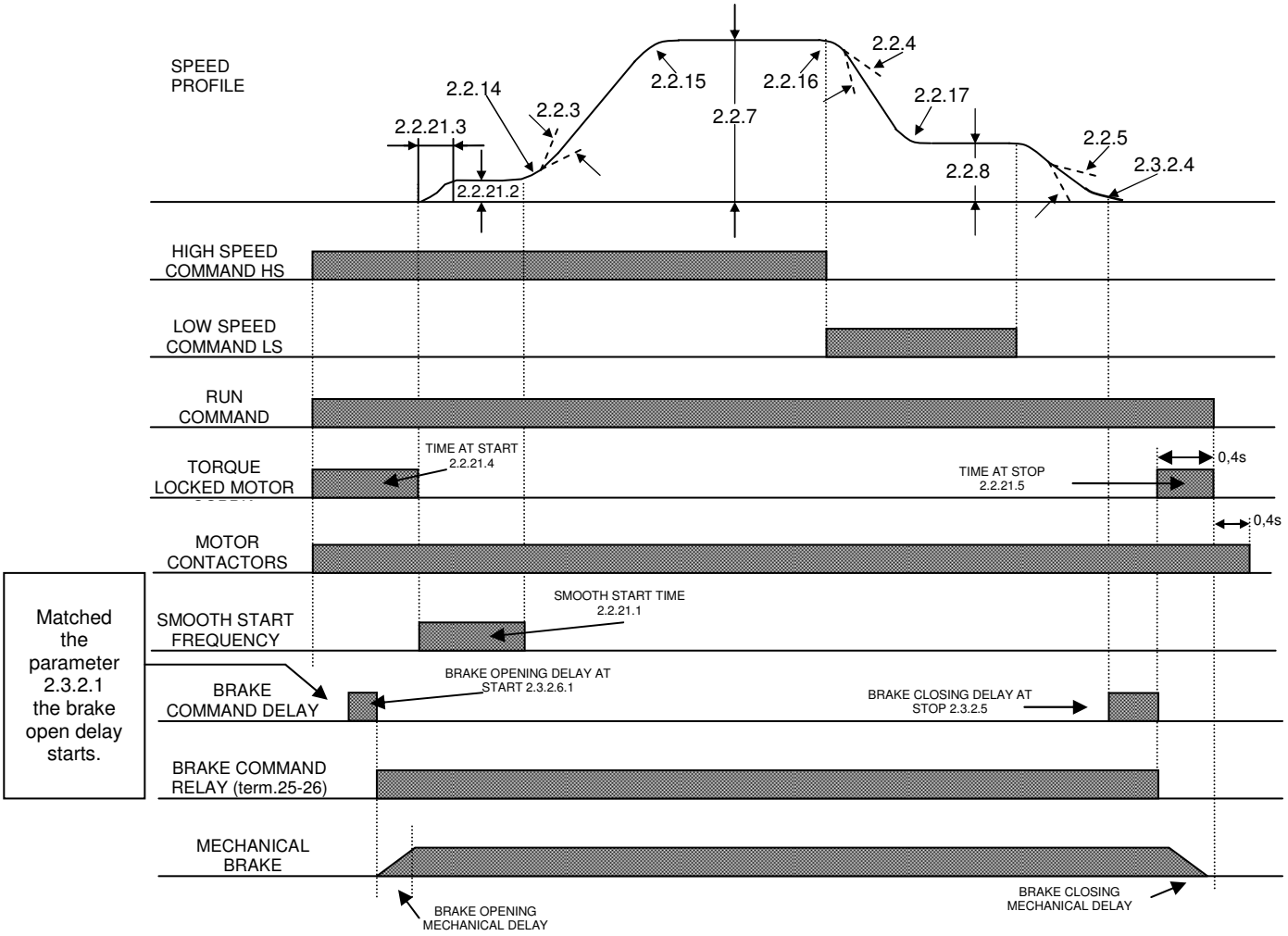
2.1.4	Motor Speed	▲
2.5.3.4	V/F mid voltage	▲
2.2.8	Low speed	▲

5 - If, **at floor arrival**, car is not perfectly aligned at floor, the parameters to be adjusted are :

		If car stops **BEFORE**	If car stops **AFTER**	If position is different with or without LOAD
2.2.5	Final deceleration at stop	▲	▼	-
2.2.8	Low speed	▲	▼	-
2.3.1.3	DC motor braking current	▼	▲	▲
2.3.1.6	Stop DC braking current	▼	▲	-

IMPORTANT
For low speed frequency, a value of 1/10 of the rated frequency is suggested:
Example – low speed set at 5Hz if motor rated frequency is equal to 50 Hz.

7.10 – CLOSED LOOP ADJUSTMENTS



1 - Set the magnetising motor current with parameter 2.5.4.1: if this current is unknown, it is possible to find it with this procedure :
- Balance the car load with weights until to reach the same current for both up and down direction
- Set the inverter in V/F control mode (P2.5.1 = Frequency)
- Set the high speed level to 2/3 of the motor rated frequency
- Read the current absorbed at constant speed at middle travel
- Set the value found in parameter P2.5.4.1

2 - Adjust **starting** comfort with the following parameters :

		JERK	BACK ROTATION
2.2.21.1	Smooth start time	▲	▼
2.2.21.2	Smooth start frequency	▼	▲
2.2.21.3	Initial acceleration ramp	▲	▼
2.2.21.4	0Hz time at start (about 0,7")	▲	▼
2.3.2.6.1	Brake open delay (min. 0,5")	▼	▲

Starting comfort has to be 'soft', without jerks nor vibrations, nor roll back.
Check the RollBack Control Gain (P2.5.4.9.7 e .8) (generally, the default value works very well).

3 - If during the **acceleration** or during high speed travel motor has vibrations, check the parameters :

2.5.4.6	Speed control KP2	▼
2.5.4.7	Speed Control TI2	▲

Check also that the encoder connections match the indications in paragraphs 3.2.8 and 4.
The encoder cable have to be separated from the power cable and distant 50 cm at least from the motor cable . It have to be connected with a unique cable, without added terminals, and with the shield connected to earth at the inverter side.
Encoder pulses per revolution have to match the relative parameter of the Encoder Board (P7.3.1.1 for NXOPTA4/A5, P7.3.1.2 for NXOPTBE and P7.3.1.4 for NXOPTBB). Check the parameter P7.3.1.3: it must be set at 5ms for incremental encoder (NXOPTA4/A5). A good mechanical coupling between encoder and the fast motor shaft is very important: verify also the screws, the alignment of the joint, etc.

4 - Verify the **slowing** phase. Lift has to reach floor in a very small space (few centimetres) , at constant speed without oscillations nor vibrations, both for up and down direction.
Adjust the space travelled at low speed with parameter 2.2.4 (Deceleration ramp).
IMPORTANT: Considering the high precision of the inverter, it is important to set the position of the slowing command with the best possible accuracy, to have the same space travelled at low speed for any floor.

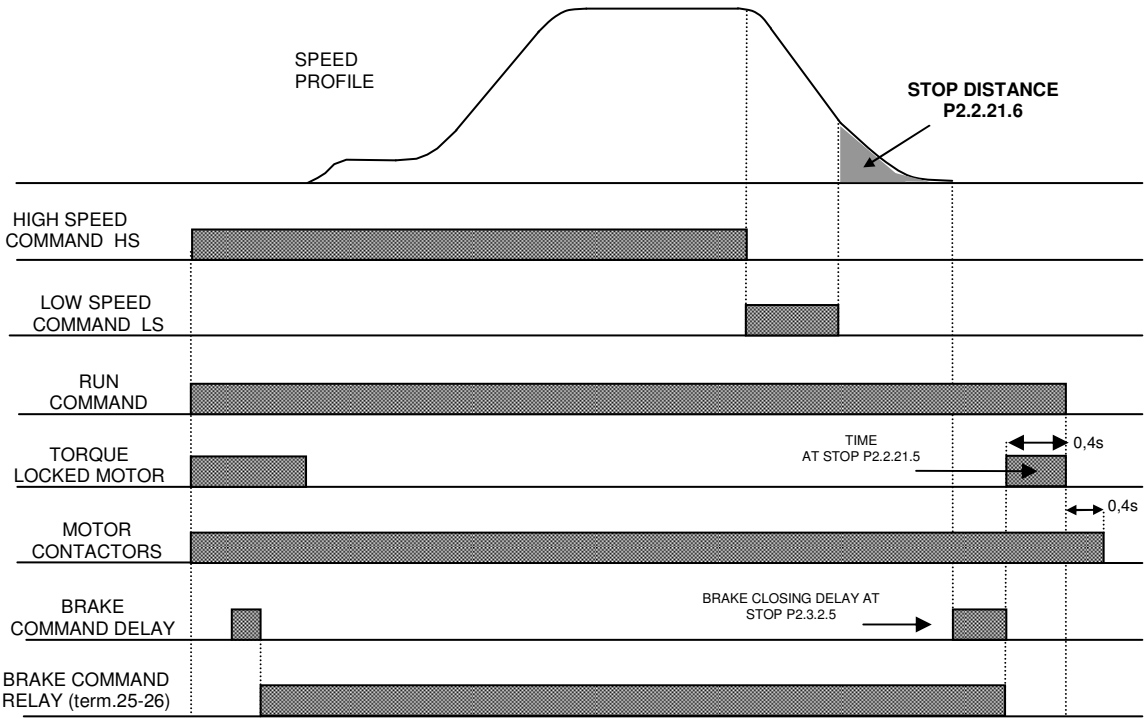
5 - If, **at floor arrival**, the car is not perfectly aligned at floor, even if the stop switches are centred to the floor, the parameters to be adjusted are :

		It stops **BEFORE**	It stops **AFTER**
2.2.5	Final deceleration ramp	▲	▼
2.2.8	Low speed level	▲	▼

A very good comfort can be obtained (for a 50 Hz rated frequency lift motor) with a 3Hz low speed and a 0,8 seconds final deceleration(P2.2.5).

7.10.1 DIRECT FLOOR ARRIVAL FUNCTION

This function is available for all the motor types, only in closed loop mode, if P2.2.21.6 different from 0 and the command control sequence is as shown below:



To obtain a precise arrival to any floor proceed as follows:

1) Put the stop magnets like indicated in par. 7.2
2) **½ D** recommended distance is 150 mm (that means 300 mm magnet) and have to be set in the range 100÷200 mm (DEPENDING ON THE LIFT SYSTEM SPEED).
3) Set the deceleration points like described in the table in par. 7.2
4) Set P2.2.4 (deceleration time) at 1,5 sec.
5) Set P2.2.21.6 (Stop distance) to 0
6) Execute a call command: the car has to arrive at floor at low speed and stop with a big distance from the floor level.
7) Set P2.2.4 in order to have a low speed space of a few centimeters and equal for any floor both for up and down direction
8) Set P2.2.21.6 at **½ D** , reduced of about 20 mm. For example, with a **½ D** = 150 mm magnet , set 130 mm
9) Execute another call command. At the arrival into the stop magnet, the car will run slowly to reach the floor position.
10) Check the stopping accuracy at floor. If the car stops before the floor level, increase P2.2.21.6 (stop distance), otherwise decrease the value.
11) Increase P2.2.4 in order to have the desired arrival. Increasing P2.2.4, a faster arrival at floor can be obtained..
12) If the car stopping at floor isn't comfortable enough, verify parameters:
    a) P2.2.21.7: the higher the speed, the 'strongest' the stop
    b) P2.2.21.8: the higher the space, the 'smoothest' the stop
    c) P2.2.4: the higher this value, the 'strongest' the stop
    d) P2.3.2.5: the brake closing delay must be set so that the brake closes when the motor is already stopped.
    e) If you notice a vibration in the final run reaching the floor, decrease Kp1 (P2.5.4.4) and increase P2.5.4.2 and P2.5.4.3.

7.11 – PUTTING ON DUTY AND ADJUSTMENTS FOR PERMANENT MAGNET SYNCHRONOUS MOTOR (PMSM)

The previous indications for open and closed loop operations are conceptually valid both for asynchronous than for permanent magnets synchronous motors (PMSM).

However the PMSM requires a dedicated start up described in the following pages and a different parameters setting already pre-configured by SMS in the specific Application for Synchronous motors.
Please note that a synchronous motor can work in open loop ONLY IN NO-LOAD CONDITION, it means WITHOUT ROPES or WITH EXACTLY BALANCED LOAD.

7.11.1 - PUTTING ON DUTY A SYNCHRONOUS MOTOR (FREE MOTOR WITHOUT ROPES)

1) Make the connections as indicated in this manual, taking the following advices into consideration:
   - Make the Inverter – Motor connection following this sequence:
     U inverter output terminal to U or L1 motor terminal
     V inverter output terminal to V or L2 motor terminal
     W inverter output terminal to W or L3 motor terminal
     In this way, the motor pulley will rotate clockwise with an UP direction command (terminal 8 – DIN1=ON) (looking at the motor from the pulley side).
     If the pulley must rotate anti-clockwise in up direction, exchange the output phase V with W, do NOT move the U phase.
   - Connect the encoder as described in Chapter 4.
     Pay a special attention to the shield connection to the inverter ground and place the encoder cable at least 50 cm away from the power cable.

2) Check that in the System Menu M6, in S6.2 is set the SYNCHRONOUS MOTOR Application ("SMSLift Sync").
   If the set application is ASYNCHRONOUS MOTOR ("SMSLift Asyn"), change this parameter to "SMSLift Sync"; this will cause the SET UP to start, automatically setting all the parameters to their default value, as shown in the Table PARAMETER LIST in Chapter 10.
   Pay attention to the pole pair number, which the inverter calculates as follows:

$$\text{pole pair number} = \frac{\text{nominal frequency (P2.1.3)} * 60}{\text{nominal speed (P2.1.4)}}$$

   The resulting value must be a full-value (without decimal units) and it's displayed in P2.5.5.1.
   For the SASSI motor series G400, it must be 8 pole pairs (16 poles), for the G300/ G200 series, it must be 11 pole pairs (22 poles).

The PERMANENT MAGNET SYNCHRONOUS MOTOR can work only in closed loop, with special encoders, ABSOLUT type (ENDAT, SSI, etc) or INCREMENTAL (SIN/COS).
The putting on duty procedure is different in the 2 cases:

A) ABSOLUTE ENCODER type ENDAT (ECN 113, ECN 413 or equivalent)

- Set the parameter P2.1.12 (Encoder Type) = EnDat
- Set the parameter P2.5.1 (Motor Control Mode) = Frequency.
- Go to the parameter V1.3.2 in the del Menu M1 – MONITOR to display the motor speed read by the encoder.
- Give a run command through the inspection control box.
- Check that the speed in Hz is POSITIVE in UP direction (check V1.2.1, DIN1=ON) and NEGATIVE in DOWN direction (DIN2=ON), checking that the motor rotating direction is correct..
  If the rotating direction is wrong, exchange the output phase V with W.
- If the speed read by the encoder is NEGATIVE in UP direction, change the parameter P2.1.13 "EncoderDirection":
  - if it is "Not Inverted", set it to "Inverted"
  - if it is "Inverted", set it to "Not Inverted"
- Check again the speed read by the encoder, it should have the correct sign in up and down direction.
- Change the parameter P2.5.1 from Frequency to Closed Loop.

- If you already know the ENCODER ANGLE (supplied by the motor manufacturer), set it into the parameter P2.5.5.4 (Encoder Angle)

  If you don't know the ENCODER ANGLE, perform the Encoder Calibration, setting:
  P2.5.5.8 (Angle Identification at Start) = Enabled
  P2.5.5.3 (Encoder Calibration) = 1

  Give a run command within 20 seconds.

  When P2.5.5.3 goes automatically to 0 after the current injection into the motor windings (which takes a few seconds), the encoder angle is identified and written in the parameter P2.5.5.4 (Check the value!).

  Set again P2.5.5.8 = Disabled.
- Switch the power off, wait for the drive is off, and switch the power on again.

NOW THE MOTOR SHOULD WORK PROPERLY.
Check that there are no vibrations, noises or other anomalies, that the motor current displayed in V1.1.6 is about 0,1 – 0,2A.

B) INCREMENTAL ENCODER type SIN-COS (ERN1387, ERN487 or equivalent)

- Set the parameter P2.1.12 (Encoder Type) = Incremental and set the parameter "Pulse Revolution" to the encoder pulse/revolution number,usually 2048 (P7.3.1.2 in case of NXOPTBE Board and P7.3.1.4 in case of NXOPTBB Board)
- Set the parameter P2.5.1 (Motor Control Mode) = Frequency.
- Go to the parameter V1.3.2 in the del Menu M1 – MONITOR to display the motor speed read by the encoder.
- Give a run command through the inspection control box.
- Check that the speed in Hz is POSITIVE in UP direction (check V1.2.1, DIN1=ON) and NEGATIVE in DOWN direction (DIN2=ON), checking that the motor rotating direction is correct..
  If the rotating direction is wrong, exchange the output phase V with W.
- If the speed read by the encoder is NEGATIVE in UP direction, change the parameter P2.1.13 "EncoderDirection":
  - if it is "Not Inverted", set it to "Inverted"
  - if it is "Inverted", set it to "Not Inverted"
- Check again the speed read by the encoder, it should have the correct sign in up and down direction.
- Change the parameter P2.5.1 from Frequency to Closed Loop.
- Switch the power off, wait for the drive is off, and switch the power on again.

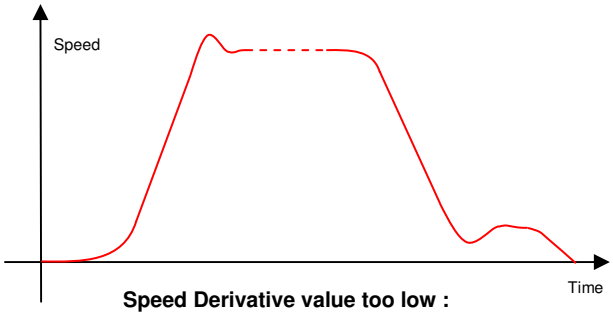
NOW THE MOTOR SHOULD WORK PROPERLY.
Check that there are no vibrations, noises or other anomalies.
At the first starting, you notice the encoder angle identification current injection, which will be made each time you switch the power off and on again, and next every 200 runs (default value of the parameter P2.5.5.9, which you can modify).
Check that the motor current displayed in V1.1.6 is about 0,1 – 0,2A.

7.11.2 – SPECIAL PARAMETERS

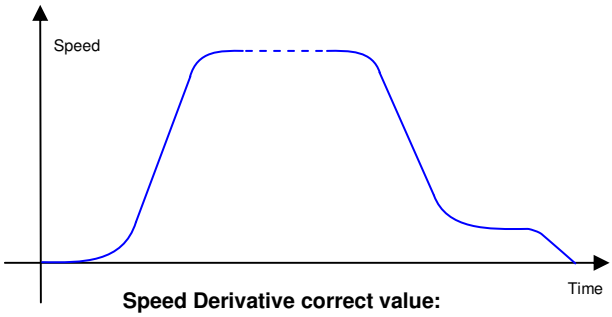
PARAMETERS FOR BOTH ASYNCHRONOUS AND SYNCHRONOUS MOTORS

P2.5.4.9.1/2/3/4 For these parameter, the modification is allowed on SMS advice only.

P2.5.4.9.5: Speed Derivative
P2.5.4.9.6: Derivat Filter time
These are the parameters of the derivative gain used to adjust the speed transitions, to avoid, for example, the stop and restart of the motor at the end of the deceleration, or the speed overshoot at the end of the acceleration that can cause undesired over-speed, more than the lift specifications. Values have to be set proportionally to the system's inertia. The higher the inertia, the higher values have to be set.



Speed Derivative value too low :
Speed Profile



Speed Derivative correct value:
Speed Profile

P2.5.4.9.7: RollBack Control Gain
P2.5.4.9.8: RollBack Treshold
These parameters are useful to avoid the "rollback" of the motor at starting, when the brake opens. Generally the default values work fine: too high values can cause noises and jerks at starting, too low values can cause an undesired "rollback".

P.2.5.5.1 : Pole pair monitor
It's the pole pair number calculated by the drive, referring to the motor data in the "Basic Parameters" Group.

P.2.5.5.2 : Pole pair number
It's the pole pair number to set in case of the value calculated in P2.5.5.1 is not correct.

PARAMETERS FOR SYNCHRONOUS MOTORS ONLY

P2.5.5.3 : Encoder calibration (see description at Par. 7.11.1 – A)

P2.5.5.4 Encoder angle (see description at Par. 7.11.1 – A)

P2.5.5.5 Flux current Kp

P2.5.5.6 Flux current Ti
These are the flux regulator proportional and integral gains.
Please contact SMS Technical Support before changing them.

P2.5.5.7 Modulator Type (Space Vector - DO NOT MODIFY)

P2.5.5.8 Angle Identification at Start (see description at Par. 7.11.1)

P2.5.5.9 Rides Angle Identification Refresh
After this run number, the angle identification is automatically performed again, **for SIN-COS encoder only.** The default value is 200.

P2.5.5.10 Start Angle Current
The lower this value, the more noiseless the motor, but for several motors, a problem can occur during identification if the current value is too low.

P.2.5.5.11 : Torque Falling Time
During the stop, if the current to the motor goes off instantly, a strong jump is perceived inside the car, like a stop with the brake with motor already running: the current from the inverter to the motor must go off gradually. Normally a 'soft stop' can be obtained setting a 0.8 sec. torque fall time.
If you increase the Torque Falling Time, you have to increase equally the 0Hz Stop Time (P2.2.21.5).

7.11.3 – FINAL ADJUSTMENTS FOR SYNCHRONOUS MOTORS

1) Set deceleration time P2.2.4 at about 1,5 " and put the slowing switches in according to the table "DECELERATION DISTANCE" in this instruction manual in chapter "ADJUSTMENT PROCEDURE".

2) Set P2.2.7 High speed at 20% of the rated value and verify the good functioning. Increase gradually the speed up to the rated value.
Check that starting and stop are good, check the distance in low speed (levelling) and ad just the parametrs as per the asynchronous motor, following the Instruction Manual.

3) Set the P2.1.1 Current limit to a value around 1,7 ÷ 2 times the motor rated current, and load the counterweight up to obtain the required lift balance (normally 50% of the car load).
IMPORTANT:
If the lift balance is lower than 50% (for example 40%), check the functioning in the maximum load condition, that means in UP direction with full car. This test is important because the functioning performances of a PMSM are particularly dependent from load conditions.

4) Tips and tricks (please modify parameters once at a time)
   a) Back-rotation of motor at start :
      - Increase RollBackCtrGain (P2.5.4.9.7)
      - Increase the 0Hz Start Time (P2.2.21.4)
   b) Rips of the motor at start: modify parameters P2.2.21.1,P2.2.21.4,P2.3.2.6.1 as described in "Closed Loop Adjustments" (as per asynchronous motor)
   c) Motor vibrations during high speed travel:
      - Decrease Kp2 Speed Gain (P2.5.4.6)
      - Increase Ti2 Integral Speed Gain Time (P2.5.4.7)
      - Modify Current Regulator Kp (P2.5.4.9.1).
        It may be increased or decreased (any motor and any lift system has different torque, load, inertia characteristics). The reguator response may change also depending on the load condition, so an inadequate value can cause vibrations.
   d) Motor stops and restarts at the end of the slowing down:
      - Increase the Speed Derivative time (P2.5.4.9.5)
      - Decrease the Derivative Filter time (P2.5.4.9.6)
   e) At the stop, the motor counter-rotates or "run away" pulled by the load, while the brake is closing:
      - increase the Torque Fall time (P2.5.5.11) and the 0Hz Stop time(P2.2.21.5), which must be always higher than P2.5.5.11.
        Verify that the opening of the main contactors happens with a proper delay after the opening of the brake contactor.

At the end of adjustments , with lift stopped, power off the drive, wait 15-20 seconds and power it on again. This operation ensures that the modified parameters are stored definitively in memory.

7.12 – ONE FLOOR TRAVEL (for both open and closed loop)

When the desired starting and stopping comfort has reached and, running between far floors, the space travelled at low speed is the same for any floor for both up and down direction, you have to set the slowing distance, especially useful for one floor travel, with parameter P2.2.19 as follows:

- Set parameter P2.2.18 to 1.
- Make a car call for 2 floors at least.
- When lift will reach low speed, P2.2.18 will return automatically to 0 , while the distance travelled will be set into P2.2.19.
- Make a car call for one floor only, verify comfort, and check that the space travelled at low speed is the same as a travel between far floors .

To increase comfort further, decrease parameter P2.2.20 (Half floor frequency).

7.13 – MOTOR NOISE

In case of motor noise , increase switching frequency P2.5.2, considering that higher is the frequency, higher are EMC emissions. In addition, the motor insulation and the inverter power components are more "stressed".

7.14 – ALARMS THAT MAY APPEAR DURING THE SYSTEM SETUP PHASE

43 = Encoder:
Encoder is damaged, not properly connected or it runs in opposite direction.
For this last case, change the parameter “Invert Direction” in the sub-menu G7.3.1 in the menu of the installed encoder board.

56 = Speed error:
Real speed is different from settled speed. Check the magnetising current (P2.5.4.1), the motor nominal speed (P2.1.4), the lift system balance, and in case increase a few tenths of a second 0Hz Start time (P2.2.21.4) and brake open delay (P2.3.2.6.1).

59 = Run Error: Up/Down run command is active, but there is none speed level.

60 = Levelling:
Lift stops at floor when low speed is not yet reached , that means during the deceleration . In this case decrease deceleration time P2.2.4.

02 = Overvoltage:
DC link voltage exceeded the limit. Check the connection of the braking resistor and its value in according to the table at page 5.If necessary, increase the slowing distance.

61 = Low current:
Brake doesn’t open because the motor current doesn’t reach the value set in P2.3.1.1 (open loop) or in P2.3.2.1 (closed loop).
Generally this alarm is caused by a lack of connection to the motor, even in a single phase.
Check the output current on the 3 phases going to the M6 menu, function V6.11 “Power multimonitor”, and pressing the right arrow.

63 = Output phase: Missing current in one phase during start.

64 = Low reference: Check speed level parameters and command signal cabling.

68 = ANTICIPATED OPENING OF THE CONTACTORS:
The contactors between inverter and motor have been opened during the stop sequence, with the drive still ON.
A repeated intervention of this alarm can permanently damage the inverter and decreases significantly the contactors lifetime.

71-74 = Identification Error:
The motor identification or the encoder angle identification for PMSM was not successful.

75 = Phase Check not OK: maybe a phase is open or the encoder identified angle is not correct

7.15 – PARAMETERS ONLY EFFECTIVE FOR EMERGENCY OPERATION WITH BATTERY POWER SUPPLY

The minimum allowed battery voltage is 48V for ASYNCHRONOUS motors, 96V for SYNCHRONOUS motors. There are several synchronous motors though, which need higher voltage in emergency operation (up to 200V).

2.10.1 EVACUATION MODE:
0 = NOT USED (EMERGENCY FEATURE EXCLUDED)
1 = MANUAL (DOES NOT SELECT FAVOURABLE RUN DIRECTION)
2 = AUTOMATIC (SELECTS FAVOURABLE RUN DIRECTION)

CONSTANT PRESSURE PUSH BUTTON EMERGENCY CONTROL
Regardless of the value set in P2.10.1, for the synchronous motors, you can enable an other type of emergency operation, the CONSTANT PRESSURE PUSH BUTTON EMERGENCY.
To enable this operation, you must supply only the control logic of the drive (not the power section), set the parameter P2.10.10 (see below) different from 0, and activate simultaneously the up and down commands (of course in addition to the emergency input).
The inverter will activate the brake command output only, while the control panel must supply the brake circuit with the proper voltage and make a by-bass on the main motor contactors in the brake circuit.
These operations enables the brake opening so that the car runs in the direction where the motor is pulled by the load; the TBM contactor, which makes a short-circuit between the motor windings at stop, doesn’t energize, so that the car runs at reduced speed.
Moreover, the inverter checks the car speed doesn’t exceed the speed limit set in P2.10.10:
in case the car speed goes over this limit, the inverter makes the brake to close, then makes it to open again after a few seconds, and goes on this way, with a jogging operation, until the up/down commands stay on, allowing the car to stop at a floor level without reaching a dangerous speed.

The control panel manufacturer should provide the appropriate audio-visual signalizations, to give warning the car has reached the floor.

2.10.3 MAXIMUM SPEED IN EVACUATION: this is the maximum speed of the motor, whatever the level effectively activated (high, low, inspection, etc.).

2.10.9 SWITCHING FREQUENCY. (maintain the default value).

2.10.10 MAN MAXIMUM SPEED (CONSTANT PRESSURE PUSH BUTTON EMERGENCY OPERATION)
It is the maximum speed, expressed in m/sec, which the car musn't exceed during the constant pressure push button operation. It's adjustable from 0 to the nominal speed set in P2.2.2.
If it is set to 0, the constant pressure push button emergency operation is DISABLED.

2.10.11.1 MOTOR CONTROL MODE: (FREQUENCY, OPEN LOOP, CLOSED LOOP).
If the input supply voltage is lower than 96V, frequency control is the preferred mode in an evacuation situation;
For the PM synchronous motors you must always select the closed loop control.

2.10.11.2 CURRENT CONTROL DELAY: is the delay between start and the control of the current when inverter chooses the run most favourable direction.

Durino emergency operation, whatever is the selected operation, the inverter display automatically shows the car speed in m/sec, showing also the run direction.

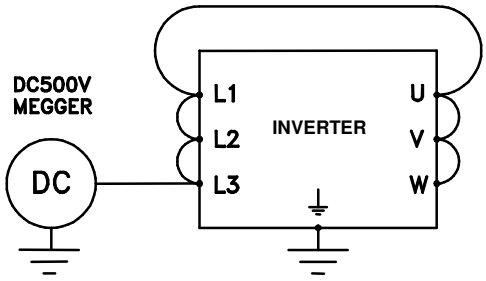
8 – CHECKS AND MAINTENANCE

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 the operation of the inverter drive is <<normal>> and that there are no signs of overheating.

7.1 MEGGER TEST

When performing insulation tests using a Megger tester on the input/output cables or on the motor, remove all the connections to all terminals of the drive and perform the test only on the power circuit, in accordance with the adjacent diagram. Do not Megger test the control circuits.



9 – PARAMETER SUMMARY TABLES - SASSI MOTORS FOR VVVF

PARAMETERS FOR SASSI MOTORS TYPE WF4-400V 4-POLES 50 Hz					
MOTOR TYPE		MOTOR SPEED (rpm) 2.1.4	MOTOR CURRENT (Amps) 2.1.5	MOTOR COS PHII 2.1.6	MAGNETISING CURRENT (Amps) 2.5.4.1
200120A	5,5kW	1443	11.6	0.83	6.0
240095A/1	4kW	1420	9	0.82	5.0
240095A/2	5.9kW	1420	14	0.78	8.8
240118A	7.3kW	1430	17	0.78	10.1
240142A/1	9.2kW	1425	21	0.80	11.8
240142A/2	11kW	1425	25	0.79	14.9
240171A	13.2kW	1430	29	0.82	16.9
270172A	17.6kW	1420	36	0.82	15.9
270196A	20kW	1430	41	0.82	19.8
330160A	25kW	1485	56	0.73	35.2
330200A	28kW	1480	58	0.77	34

PARAMETERS FOR SASSI MOTORS TYPE WF4-400V 4-POLES FOR FREQUENCIES OTHER THAN 50 Hz						
MOTOR TYPE		RATED FREQUENCY 2.1.3	MOTOR SPEED (rpm) 2.1.4	MOTOR CURRENT (Amps) 2.1.5	MOTOR COS PHII 2.1.6	MAGNETISING CURRENT (Amps) 2.5.4.1
240095/3 3kW		38	1050	6.7A	0.76	3.5
240095/4 5.5kW		66	1900	11.5	0.76	6
240142/3 5.5kW		30	825	12.6	0.82	7.2
240142/4 9.5kW		52	1435	21	0.82	11.4
240095/5 3kW		29	798	7.8	0.84	4.6
240095/6 5.9kW		50	1420	13	0.84	8.6

10 – PARAMETER LIST (M2 menu)

IMPORTANT : Parameters with grey background have not to be modified.

Index	Description	SMS settings (Asynchronous motor)	SMS settings (Synchronous motor)	User setting	Unit
G2.1 BASIC PARAMETERS					
P 2.1.1	Current Limit	1,8 * I Inverter	**1,8 * I Inverter**		A
P 2.1.2	Motor Nom Voltg	380	**400**		V
P 2.1.3	Motor Nom Freq	50,00	**8,00**		Hz
P 2.1.4	Motor Nom Speed	1440	**60**		rpm
P 2.1.5	Motor Nom Currnt	I Inverter	**I Inverter**		A
P 2.1.6	Motor Cos Phi	0,82	**0,9**		
P 2.1.7	Motor Code	0 / Not Used	**0 / Not Used**		
P 2.1.8	Identification	0	**0**		
P 2.1.9	Fan Control	1 / Run	**1 / Run (*)**	(*) For the "HIGH CURRENT" models, set 3 / Speed Contr.	
P 2.1.10	ParEditPassword	0	**0**		
P 2.1.11	Motor Type	0 / Asinc Induct	**1 / PMSM**		
P 2.1.12	Tipo Encoder	1 / Incremental	**0 / Incremental**		
P 2.1.13	EncoderDirection	Not Inverted	**Not Inverted**		
G2.2 RUN CONFIGURATION					
P 2.2.1	Max Frequency	50,00	**8,00**		Hz
P 2.2.2	NominalLinSpeed	1,00	**1,00**		m/s
P 2.2.3	Acceleration	2,50	**2,50**		s
P 2.2.4	Deceleration	2,00	**2,00**		s
P 2.2.5	Final Decelerat.	0,50	**0,80**		s
P 2.2.6	v0 000 zero	0,00	**0,00**		Hz
P 2.2.7	v1 100 high	50,00	**8,00**		Hz
P 2.2.8	v2 010 low	5,00	**0,80**		Hz
P 2.2.9	v3 110 high+low	25,00	**4,00**		Hz
P 2.2.10	v4 001 inspect.	25,00	**4,00**		Hz
P 2.2.11	v5 101 high+insp	0,00	**0,00**		Hz
P 2.2.12	v6 011 low+insp	0,00	**0,00**		Hz
P 2.2.13	v7 111 hi+lo+ins	0,00	**0,00**		Hz
P 2.2.14	Acc Inc Jerk	2,00	**1,20**		s
P 2.2.15	Acc Dec Jerk	0,60	**0,60**		s
P 2.2.16	Dec Inc Jerk	0,60	**0,6**		s
P 2.2.17	Dec Dec Jerk	1,20	**1,20**		s
P 2.2.18	Auto HalfF Dist	0	**0**		
P 2.2.19	Half Floor Dist	1000	**1000**		mm
P 2.2.20	Half Floor Freq	25,00	**4,00**		Hz
G2.2.21 CLOSED LOOP					
P 2.2.21.1	SmoothStartTime	0,00	**0,00**		s
P 2.2.21.2	SmoothStartFreq	0,30	**0,10**		Hz
P 2.2.21.3	Initial Acceler.	0,50	**1,00**		s
P 2.2.21.4	0 Hz TimeAtStart	0,700	**1,000**		s
P 2.2.21.5	0 Hz TimeAtStop	0,400	**1,000**		s
P 2.2.21.6	Stop Distance	0	**0**		mm
P 2.2.21.7	Final Stop Speed	0,50	**0,10**		Hz
P 2.2.21.8	Final Stop Time	0,050	**0,200**		s
P 2.2.21.9	Initial Speed	0,00	**0,00**		Hz
P 2.2.21.10	TotalDecDistance	0	**0**		
P 2.2.21.11	OptimStopSpeed	0	**0**		
P 2.2.21.12	Test Mode	0 / No	**0 / No**		
G2.3 BRAKE CONTROL					
G2.3.1 OPEN LOOP					
P 2.3.1.1	MinCurrBrakeOpen	10,0	**2,0**		%
P 2.3.1.2	BrakeCloseDelay	0,30	**0,30**		s
P 2.3.1.3	DC-Brake Current	0,7 * I Inverter	**0,7 * I Inverter**		A
P 2.3.1.4	Start DC-BrakeTm	0,000	**0,000**		s
P 2.3.1.5	Stop DC-BrakeTm	0,400	**0,400**		s
P 2.3.1.6	Stop DC-BrakeFr	1,50	**0,20**		Hz

Index	Description	SMS settings (Asynchronous motor)	SMS settings (Synchronous motor)	User setting	Unit
G2.3.2.1.7 ADVANCED FUNCTION					
P 2.3.1.7.1	Reserved	0	**0**		
P 2.3.1.7.2	MinFreqBrakeOpen	0,00	**0,00**		Hz
P 2.3.1.7.3	BrakeOpenDelay	0,00	**0,00**		s
P 2.3.1.7.4	MinFreBrakeClose	0,50	**0,10**		Hz
P 2.3.1.7.5	SmoothStartFreq	0,30	**0,00**		Hz
P 2.3.1.7.6	SmoothStartTime	0,30	**0,00**		s
G2.3.2 CLOSED LOOP					
P 2.3.2.1	MinCurrBrakeOpen	10,0	**0,0**		%
P 2.3.2.2	Reserved	0	**0**		
P 2.3.2.3	MinFreqBrakeOpen	0,00	**0,00**		Hz
P 2.3.2.4	MinFreBrakeClose	0,50	**0,10**		Hz
P 2.3.2.5	BrakeCloseDelay	0,30	**0,20**		s
G2.3.2.6 ADVANCED FUNCTIONS					
P 2.3.2.6.1	BrakeOpenDelay	0,50	**0,00**		s
P 2.3.2.6.2	MaxFreq If Close	0,15	**0,15**		Hz
P 2.3.3	BrakeExt SuperV	0 / Not Used	**2 / NormClosed**		
P 2.3.4	MaxOpenTime	0,50	**2,00**		s
P 2.3.5	MaxCloseTime	0,50	**1,00**		s
G2.5 MOTOR CONTROL					
P 2.5.1	Motor Ctrl Mode	1 / Open Loop	**2 / Closed Loop**		
P 2.5.2	Switching Freq	10,0	**10,0**		kHz
G2.5.3 OPEN LOOP					
P 2.5.3.1	U/f Optimization	1 / AutoTorqBoos	**0 / None**		
P 2.5.3.2	U/f Ratio Select	2 / Programmable	**0 / Linear**		
P 2.5.3.3	U/f Mid Freq	1,75	**0,00**		Hz
P 2.5.3.4	U/f Mid Voltg	5,00	**0,00**		%
P 2.5.3.5	Zero Freq Voltg	3,50	**0,00**		%
G2.5.3.6 ADVANCED FUNCT					
P 2.5.3.6.1	Field WeakngPnt	50,00	**8,00**		Hz
P 2.5.3.6.2	Voltage at FWP	100,00	**100,00**		%
P 2.5.3.6.3	VoltStabGain	100	**100**		
P 2.5.3.6.4	VoltStabDamp	900	**900**		
P 2.5.3.6.5	TorqStabGain	100	**100**		
P 2.5.3.6.6	TorqStabDamp	800	**980**		
P 2.5.3.6.7	MotorBoostGain	67	**67**		%
P 2.5.3.6.8	GeneratBoostGain	50	**50**		%
G2.5.3.7 ADVANCED FUNCT 1					
P 2.5.3.7.1	Speed Control Kp	3000	**3000**		
P 2.5.3.7.2	Speed Control Ki	300	**300**		
P 2.5.3.7.3	LowSp.SwitchFreq	6,0	**6,0**		kHz
P 2.5.3.7.4	LowSp. Level	5,00	**0,80**		Hz
P 2.5.3.7.5	Current at 0Hz	50	**50**		%
P 2.5.3.7.6	RsVoltDrop	Different from 0, it depends on the size	**Different from 0, it depends on the size**		
P 2.5.3.7.7	LsdVoltDrop	“	”		
P 2.5.3.7.8	LsqVoltDrop	“	”		
G2.5.4 CLOSED LOOP					
P 2.5.4.1	MagnCurrent	0,5 * I Inverter	**0,00**		A
P 2.5.4.2	Adaptive Lim 1	0,10	**0,10**		Hz
P 2.5.4.3	Adaptive Lim 2	0,50	**0,20**		Hz
P 2.5.4.4	Speed Cntrl Kp 1	40	**10**		
P 2.5.4.5	Speed Cntrl Ti 1	40,0	**40,0**		ms
P 2.5.4.6	Speed Cntrl Kp 2	20	**10**		
P 2.5.4.7	Speed Cntrl Ti 2	40,0	**40,0**		ms
P 2.5.4.8	Encoder1FiltTime	0	**0**		ms
G2.5.4.9 ADVANCED FUNCT					
P 2.5.4.9.1	CurrentControlKp	40,00	**100,00**		%
P 2.5.4.9.2	CurrentControlTi	2,5	**2,5**		ms
P 2.5.4.9.3	LoadDrooping	0,00	**0,00**		%

Index	Description	SMS settings (Asynchronous motor)	SMS settings (Synchronous motor)	User setting	Unit
P 2.5.4.9.4	Droop time const	0,000	**0,000**		s
P 2.5.4.9.5	SpeedDerivative	1,00	**0,50**		s
P 2.5.4.9.6	DerivatFilterTime	50	**50**		ms
P 2.5.4.9.7	RollBackCtrGain	**500**	**500**		
P 2.5.4.9.8	RollBackThresh	**1**	**1**		
G2.5.5 PMSM (Permanent magnets synchronous motor)					
P 2.5.5.1	Pole Pair Monitor	2	**8**		
P 2.5.5.2	Pole Pair Number	0	**0**		
P 2.5.5.3	EncoderCalibrat	0	**0**		
P 2.5.5.4	Encoder Angle	0	**0 (To be calibrated for EnDat, leave 0 for sin-cos)**		
P 2.5.5.5	Flux Current Kp	3,00	**3,00**		%
P 2.5.5.6	Flux Current Ti	20,0	**20,0**		ms
P 2.5.5.7	Modulator type	0 / ASIC	**1 / SpaceVector**		
P 2.5.5.8	Angl id at Start	0 / Disabled	**0 / Disabled for EnDat, 1 / Enabled for sin-cos**		
P 2.5.5.9	RidesAngleIdRefr	200	**200**		
P 2.5.5.10	StartAngleCurren	70,0	**70,0**		%
P 2.5.5.11	Torque Fall Time	0,60	**0,80**		s
P 2.5.5.12	Speed limit	0 / Disabled	**0 / Disabled**		
P 2.5.5.13	Speed Lim factor	100,0	**100,0**		%
P 2.5.5.14	Max Synchro Err	10,0	**10,0**		%
G2.7 OUTPUT SIGNALS					
P 2.7.1	DO1 Content	15 / Motor Switch	**15 / Motor switch**		
P 2.7.2	D01 Inversion	0 / Off	**0 / Off**		
P 2.7.3	D01 Delay	0,00	**0,00**		s
P 2.7.4	FreqSupervLimit	1 / Low Limit	**1 / Low Limit**		
P 2.7.5	FreqSupervValue	30,00	**5,00**		Hz
G2.7.6 ADVANCED FUNCT					
P 2.7.6.1	Iout Content	12 / ExtBrake	**12 / ExtBrake**		
P 2.7.6.2	Iout Filter Time	0,00	**0,00**		s
P 2.7.6.3	Iout Invert	0 / No Inversion	**0 / No Inversion**		
P 2.7.6.4	Iout Minimum	0 / 0 mA	**0 / 0 mA**		
P 2.7.6.5	Iout Scale	100	**100**		%
P 2.7.6.6	RO1 Content	4 / FaultInvert	**4 / FaultInvert**		
P 2.7.6.7	R01 Inversion	0 / Off	**0 / Off**		
P 2.7.6.8	R01 Delay	0,00	**0,00**		s
P 2.7.6.9	RO2 Content	13 / ExtBrake	**13 / ExtBrake**		
P 2.7.6.10	R02 Inversion	0 / Off	**0 / Off**		
P 2.7.6.11	MotorTorqSuperV	200,0	**200,0**		%
P 2.7.6.12	GenerTorqSuperV	200,0	**200,0**		%
G2.7.7 OPTIONAL OUTPUTS					
P 2.7.7.1	Opt R01 Content	15 / Motor Switch	**15 / Motor switch**		
P 2.7.7.2	Opt R02 Content	16 / MotorSwitDelay	**16 / MotorSwitDelay**		
P 2.7.7.3	Opt R03 Content	11 / Vel Supervis	**11 / Vel Supervis**		
P 2.7.7.4	FreqSupervLimit	1 / Low Limit	**0 / No**		
P 2.7.7.5	FreqSupervValue	30,00	**5,00**		Hz
G2.10 EVACUATION					
P 2.10.1	Evacuation Mode	2 / Automatic	**2 / Automatic**		
P 2.10.2	Evacuation Input	DigIN:A.3	**DigIN:A.3**		
P 2.10.3	MaxSpeedInEva	5,00	**0,80**		Hz
P 2.10.4	U/f Optimization	1 / AutoTorqBoos	**1 / AutoTorqBoos**		
P 2.10.5	U/f Mid Freq	1,75	**0,00**		Hz
P 2.10.6	U/f Mid Voltg	5,00	**0,00**		%
P 2.10.7	Zero Freq Voltg	3,50	**0,00**		%
P 2.10.8	MagnCurrent	0,5 * I Inverter	**0**		A
P 2.10.9	Switching Freq	3,0	**3,0**		kHz
P 2.10.10	Man MaxSpeed	0,00	**0,00**		m/s
G2.10.10 ADVANCED FUNCT					
P2.10.11.1	Motor Ctrl Mode	0 / Frequency	**2 / Closed Loop**		
P2.10.11.2	CurrentReadDelay	2,0	**3,0**		s

SISTEMI E MICROSISTEMI

vacon

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 0520 5....

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

Safety: EN50178 (1997), EN60204-1 (1996)
EN 60950 (3rd edition 2000, as relevant)

EMC: EN61800-3 (1996)+A11(2000), EN 61000-6-2 (1999), EN 61000-6-4 (2001)

and conforms to the relevant safety provisions of the Low Voltage Directive (73/23/EEC) as amended by the Directive (93/68/EEC) and EMC Directive 89/336/EEC.

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, 5th of May, 2003

Vesa Laisi
President

The year the CE marking was affixed: 2002

For further information and advice contact:

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