SISTEMI E MICROSISTEMI

TAKEDO® - 3VF HYDROVERT NXP

USER MANUAL

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ALPHABETICAL INDEX

HYDRAULIC LIFTS : INSTALLED POWER AND CURRENTS

MOTOR POWER		ABSORBED CURRENT FROM MAINS (1)					INSTALLED POWER (4) WITHOUT SPEED REDUCTION			INSTALLED POWER WITH SPEED REDUCTION	
RATING PLATE (MECHANICAL) (kW)	ABSORBED (ELECTRIC) (kW) (2)	RATED (A)	DIRECT STARTING (A)	SOFT STARTER STARTING (A)	HYDROVERT (A)		DIRECT STARTING (kW)	SOFT STARTER (kW)	HYDROVERT (kW)	POWER LIMIT set by HYDROVERT kW (A)	SPEED REDUCTION AT FULL LOAD (%)
					RATED (3)	STARTING					
3	4.4	8	40	18	6.5	6.5	15	6	4.5	3 (4.8)	-20
4	5	9	55	25	7.2	7.2	20	10	4.5	3 (4.8)	-30
6	8	14.5	60	30	12	12	20	10	10	6 (9.6)	-15
7.7	9.7	17.5	70	35	14	14	25	15	10	6 (9.6)	-25
9.5	12	21.8	90	45	17.5	17.5	30	15	15	10 (16)	-5
11	13.8	25	113	55	20	20	35	20	15	10 (16)	-15
15	17.7	32	136	65	26	26	45	25	20	15 (24)	-5
22	26	48	210	90	38	38	65	30	25	20 (32)	-20

NOTES:

1) Power supply voltage 400V.
2) Calculated considering cosφ at full load = 0.8.
3) With HYDROVERT cosφ = 0.98.
4) The INSTALLED POWER is the higher value of the 2 given by the following formulae:

(a) $P(kW) = \frac{\sqrt{3} * V * I_{start} * \cos\varphi\ (0.9)}{2}$

(b) $P(kW) = \sqrt{3} * V * I_{rated} * \cos\varphi\ (0.9)$

1 – INTRODUCTION

HYDROVERT NXP is an inverter with special software for hydraulic systems, able to work both with old and new hydraulic power units.
It controls the up run and, with prearranged hydraulic power units, also the down run.
The advantages are:

- **No starting current peaks. The maximum starting current is the rated current.**
- **Power factor correction of absorbed current from mains. Cosφ 0.98.**
- **Energy saving.**
- **Run comfort optimisation.**
- **Emergency rescue operation possible even upward.**
- **Adjustable inspection speed.**
- **Possibility of setting a maximum limit for the absorbed power from the mains, to limit the installed power.**

2 – SAFETY INSTRUCTIONS AND PRECAUTIONS

Read all of this manual before powering the equipment, following the step by step procedures. In particular**, carefully read the Sections:**
ADJUSTMENT PROCEDURE and ACTIVE FAULTS.

2.1 SAFETY INSTRUCTIONS

Carefully follow the procedures given below, to prevent the risk of serious accidents.

1- **The leakage current from the inverter to earth is greater than 30mA**, therefore a differential switch with **Id of at least 300mA, type B or type A**, must be provided. Regulations require the use of a cable with a section of at least 10 mm² for the earth connection. **If the differential switch trips when the main power switch is closed, do not repeat the operation in succession, because the inverter could become permanently damaged**.

2- If the parameters are incorrect, the inverter can cause the motor to rotate at a speed higher than synchronous speed. Do not run the motor beyond its electrical and mechanical limits. The installer is responsible for ensuring that movements occur in safe conditions, without exceeding the specified operating limits.

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

4- The external braking resistor heats up during operation. Do not install it near or in contact with inflammable materials. To improve heat dissipation it is advisable to fix it to a metal plate. Make sure it is suitably protected and cannot be touched.

5- The inverter must always be connected to the mains. In case of an interruption, wait at least 1 minute before reconnecting. **RECONNECTING WITHOUT WAITING LONG ENOUGH WILL DAMAGE THE INVERTER.**

6- Do not use an oscilloscope or similar instruments to test the internal circuits of the inverter. This type of operation must be performed only by specialised personnel.

2.2 PRECAUTIONS

Carefully follow the procedures given in the manual to avoid the risk of damaging the inverter.

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

2- **To avoid damaging the inverter in case of prolonged stoppages with no power supply, before restarting proceed as follows:**
   - **If the inverter has been idle for several months, connect it to the power supply for at least 1 hour in order to regenerate the bus capacitors.**
   - **If the inverter has been idle for more than one year, power it for 1 hour at 50% lees than the nominal voltage, and then for 1 hour at nominal voltage.**

3- Do not connect capacitors to the inverter outputs.

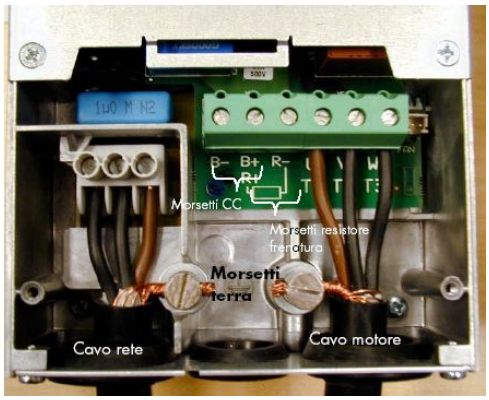
4- Before resetting an inverter fault, carefully check what caused activation of the protection.

5- Use an inverter with rated current equal to or higher than the motor rated current.

6- **If necessary, the braking resistor must be connected between B+ and R-.**
If it is connected between B+ and B– the inverter will be damaged.

3 – POWER CIRCUIT CONNECTION

L1;L2;L3	Mains power supply input	Connect the mains power supply input phases in any order.
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 (if necessary)
⏚	Earth	Connect to the building's earth system



Example of power circuit connection

3.1 SAFETY INSTRUCTIONS

1- Do not power the inverter without first making the earth connection.
2- To increase inverter protection (especially against overvoltage due to electrical storms), three extrafast-blow fuses (one for each phase) can be installed in series with the supply mains input terminals. The fuses must be rated according to the various sizes as given in the table below.
The set of fuses, complete with protection box, can be supplied on request (not indispensable!).
3- To avoid permanently damaging the inverter, **do not connect braking resistors with resistance or power ratings lower than those given in the TABLE**
4- The inverter drive must be connected <<upstream>> of the power contactors.
5- The external braking resistor heats up during operation. Do not install it near or in contact with inflammable materials; protect it to prevent direct contact.
6- Wire earth connections and masses correctly (as indicated in par. 3.2) to avoid problems of EMC interference.
7- Pay particular attention to the power connection; if the input and output are inverted, **the inverter will inevitably be damaged.**

INVERTER NXP SERIES 400VOLT (380÷500V)					
RATED CURRENT (A)	VACON CODE	DIMENSIONS LxHxD (mm)	BRAKING RESISTOR		
			SUPPLIED BY SMS	MINIMUM VALUE (Ω)	DIMENSIONS LxDxH (mm)
14	NXP0013	128x292x190	500Ω 1500W	42Ω	445x110x140
27	NXP0032	144x391x214	2x50Ω 1500W	14Ω	445x110x140 (*)
38	NXP0038	195x519x237	2x50Ω 1500W	21Ω	445x110x140 (*)
45	NXP0045	195x519x237	2x50Ω 1500W	21Ω	445x110x140 (*)
61	NXP0061	195x519x237	3x50Ω 1500W	14Ω	445x110x140 (*)
72	NXP0072	237x591x257	5x50Ω 1500W	6.1Ω	445x110x140 (*)
87	NXP0087	237x591x257	5x50Ω 1500W	6.1Ω	445x110x140 (*)
105	NXP0105	237x591x257	Ask SMS		
140	NXP0140	291x758x344	Ask SMS		
168	NXP0168	291x758x344	Ask SMS		

(*) The total size is that indicated multiplied by the number of resistors.

***TABLE –** Fuses and braking resistors*

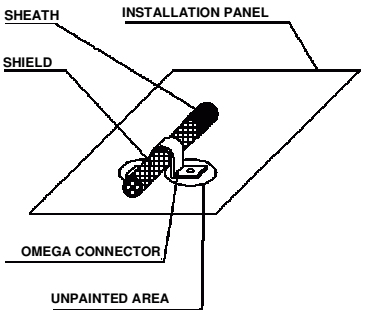
The braking resistor is necessary only if HYDROVERT is used to control the down run.

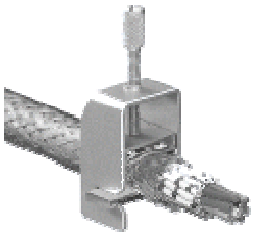
3.2 RULES FOR EMC COMPLIANT MOTOR - INVERTER WIRING

For correct INVERTER – MOTOR assembly wiring, proceed as follows:

1- The inverter and motor must be connected directly to the building's earth system.

2- The power cables for the inverter/contactors and contactors/motor connection must be as short as possible, shielded four-core (three phases plus yellow/green earth wire), or four unshielded cables bound together and inserted in a raceway or a metal pipe connected to earth. In other words, there must be an earth wire as close as possible to the power wires in the same cable or in the same pipe. If shielded cable is used, continuity of the earth braid between the inverter/contactors and contactors/motor section must be ensured.
It is advisable to connect the shielding to earth at both ends by means of a U-clip or with special terminals that can be supplied by SMS.





If the shield cannot be connected with a U clip inside the motor terminal block, it must be earthed on the frame before entering the block.

3- It is also advisable (though not indispensable) to use shielded cable on the power input line, to avoid the possibility of radiated interference going outside the cable.
The mains power input and inverter output cables must <u>not</u> be placed in the same raceway and should be kept as far apart as possible (at least 50 cm).

4- The inverter power cables (input and output) and control cables must be kept as far apart as possible and <u>must not run parallel</u>, even if shielded; if the cables cross, they must be arranged at an angle of 90°.

5- Irrespective of the connection to the building's earth system, the motor frame MUST be connected to the cable shield and to the yellow/green earth wire inside the shielded cable.

6- The inverter emits radiated interference, which can therefore be picked up and carried outside the panel by the cables, especially by flexible cables which radiate the interference into the lift shaft.
If this problem is to be avoided, the connections between the panel and the inverter must be made using shielded wires with shield connected to earth at both ends. Shielded cables must not be used without the shield connected to earth, as in this case any interference will be greater than with an unshielded cable.
Any free or unused wires in a multicore cable must be connected to earth at both ends.

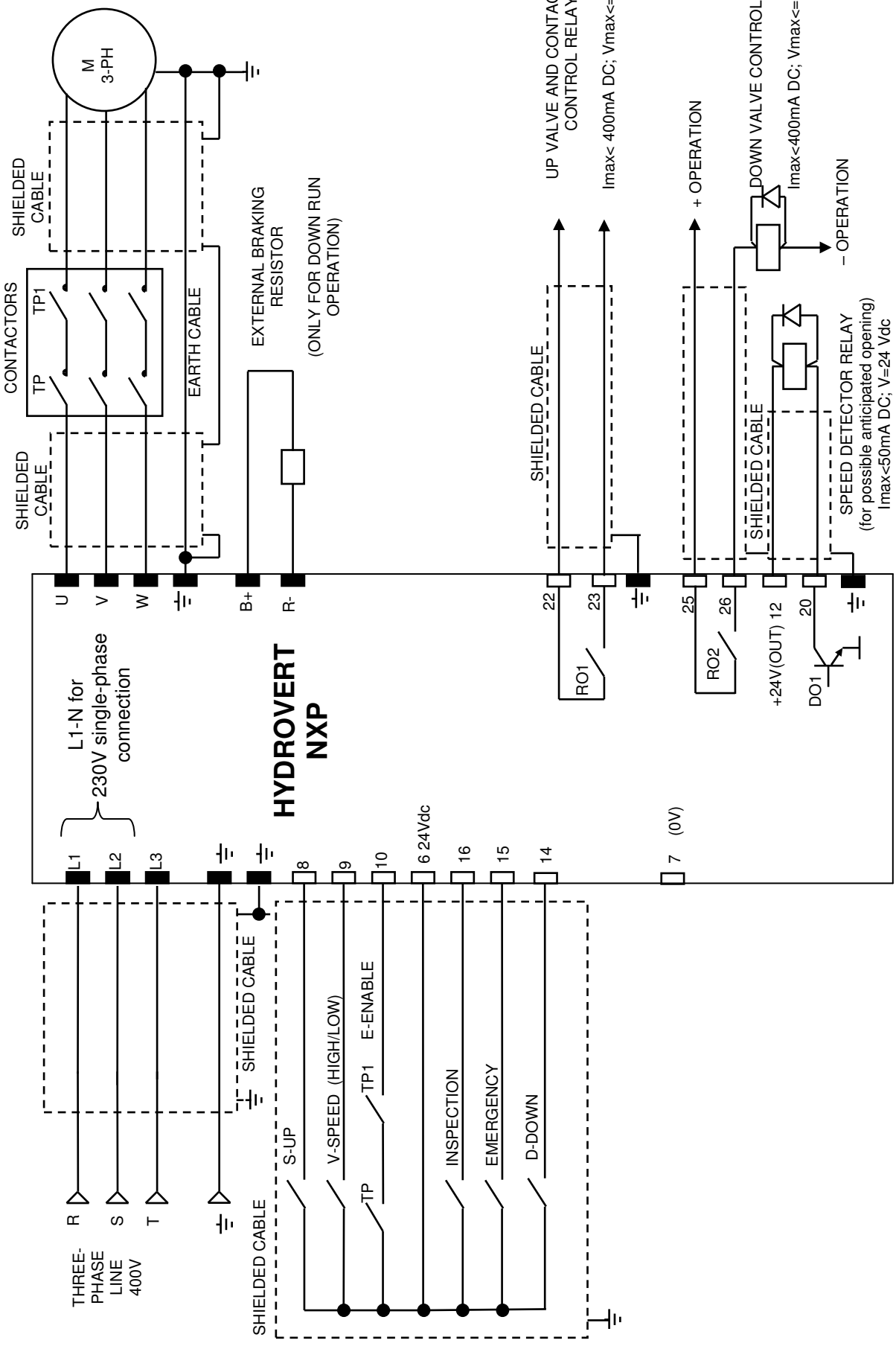
7- Any cable, for control or external connections for the shaft and lift car, must never run near and parallel to the power cable, even if shielded; if parallel routing cannot be avoided, they must be in separate metal raceways.

8- All earth connections must be as short and wide as possible.

Solution (a) (copper braid) is preferable to solution (b) (wire).

9- To avoid unwanted tripping of the differential switch:
- Make the power connection as short as possible
- Use suitable differential switches (type A or B 300mA)
- When possible, reduce the inverter carrier frequency: in fact, the lower the frequency the greater the motor noise, but with less current leakage to earth and less EMC interference; the motor windings are less stressed.

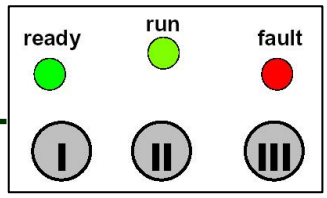
4 – HYDROVERT NXP APPLICATION DIAGRAM



5 – KEYPAD AND MENUS

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 inverter, setting parameters and displaying values. The panel is removable, since all parts are isolated from the a.c. input voltage.
The data on the panel is arranged in **menus** and **submenus,** necessary for displaying and processing control signals, displaying faults, measurements and for editing parameters.

Control panel with Liquid Crystal Display



STATUS INDICATORS

RUN = lights up when the motor is running
= shows the selected rotation
STOP = lights up when the motor is not running
READY = lights up when the unit is powered and ready to use
FAULT = lights up when a drive fault occurs
ALARM = lights up when an alarm occurs

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

The symbol ***I/O term*** indicates that the I/O terminals are the selected control interface; in other words, the commands are given via the I/O terminals.

IMPORTANT: When used for lifts, the message **Keypad** or **Bus/Comm** must never appear in place of ***I/O term.***

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

Values line: displays 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 on. Indicates that the inverter is ready for use.

II ● Lights up when the drive is in operation.

III ● Lights up when risk conditions have arisen causing the drive to stop (Shutdown due to fault). At the same time, the FAULT indicator blinks on the display, which also shows a description of the fault; see Section 5.4 – Active Faults.

Left Menu key
Go back through menus. Move cursor to left (in the parameters menu). Exit edit mode. Hold down for 2…3 seconds to return to the main menu.

Right Menu key
Go forward through menus. Move cursor to right (in the parameters menu). Access edit mode.

Up arrow
Scroll the main menu and pages of various submenus. Edit values, increasingly.

Down arrow
Scroll the main menu and pages of various submenus. Edit values, decreasingly.

Reset key
Use to reset active faults.

Enter key
Confirm selections
Reset fault memory (2…3 seconds)

Select key
Use to shift between the last two indications displayed.
Useful when wishing to see how the new changed value affects some other value.

START key (NOT Used)

STOP key (NOT Used)

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 another **submenu** that can be displayed by pressing the key . To go back to the **main menu** from the submenu, just press the key .
The data on the keypad is divided into Menus and Submenus. The main menus are arranged on six levels: M1-P2-F3-H4-S5-E6.

To go from one menu to the next, press the keys or .

M1=Visualizzazione / Monitor	**H4**=Storico guasti / Fault history
P2=Parametri / Parameters	**S5**=Menù di sistema / System menu
F3=Guasti attivi / Active faults	**E6**=Schede espansione / Expansion boards

Each menu contains submenus, which can also be on several levels. To access the submenus, press the key , then use the +/- keys to display the various quantities; to quit the submenu, press the key .

KEY OF SYMBOLS CONTAINED IN MENUS AND SUBMENUS:

M = menu (internal modes V,P,H,F)

V = read only

P = editable parameter

F = active fault

H = fault history

5.0 COPY OF PARAMETERS WITH KEYPAD

The programming keypad can also be used to copy parameters from and to the inverter. This function is very handy when finding the optimum parameterisation for a system and other systems with the same characteristics must be prepared, but **CAN ONLY BE USED TO COPY PARAMETERS BETWEEN INVERTERS WITH THE SAME APPLICATION SOFTWARE VERSION** (the application software version is given on a label placed under the keypad).

5.0.1 - COPY FROM INVERTER TO KEYPAD

Press the left arrow until 'M' followed by the menu number (e.g. M2) appears in the top left.
Press the arrows at the top or bottom until M6 appears. Follows the indications on the display :

S5 **System menu** **S1>S11 →**	S5.3 **TransferParam** **P1>P4 →**	S5.3.2 **To Panel** **Selection →**	S5.3.2 **To Panel** **All Param.**	S5.3.2 **To Panel** **Wait…**	S5.3.2 **To Panel** **OK**
Press the right arrow and S6.1 appears. Press the arrow at the top to S6.3.	*Press the right arrow and S6.3.1 appears. Press the arrow at the top to S6.3.2.*	*Press the right arrow.*	*Press enter and copying of parameters starts.*	*Wait for copy to end.*	*Copy ended . The keypad now contains the inverter data.*

5.0.2 COPY FROM KEYPAD TO INVERTER

The same method described above applies.
By selecting S5.3.3 instead of S5.3.2 the display will show "From Panel" instead of "To Panel", then proceed as above.

Attention: Copy the data from keypad when the data contained in it has been drawn by an inverter of the same size as that in which the copy is being made.
When connecting the keypad to the inverter on which the data is to be copied, the following will appear :

Copy To Panel? **enter/reset**	**Copy From Panel?** **enter/reset**
Press RESET to copy the contents of the keypad to the inverter.	*Press ENTER to start the copy procedure and wait.*

5.1 M1 = VISUALIZZAZIONE (MONITOR)

CODE	NAME OF SIGNAL	CODE	NAME OF SIGNAL
V1.1	Frequenza uscita / Output frequency	V1.11	DIN1, DIN2, DIN3 Inputs 8 – 9 – 10 Up, Speed (High/Low), Enable
V1.2	Rif. Frequenza / Freq. Reference	V1.12	DIN7, DIN8 Not Used
V1.3	Velocità motore / Motor Speed	V1.13	R01, R02, R03 Relay outputs Contactor Control, Down Valve Control, Not Used
V1.4	Corrente motore / Motor Current	V1.14	Number of anticipated contactor openings at stop.
V1.5	Coppia motore / Motor Torque	V1.15	DIN4, DIN5, DIN6 Inputs 14 – 15 – 16 Down, Emergency, Inspection
V1.6	Potenza motore / Motor Power	V1.16	DO1, AODig Outputs 12-20 and 18-19 Speed detector, Fault
V1.7	Tensione motore / Motor Voltage	V1.17	Motor Temperature in % (110% = Overtemperature Alarm)
V1.8	Tensione bus C.C. / DC-link Voltage	V1.18	Actual Power (kW)
V1.9	Temperatura inverter / Unit temperature	V1.19	Deceleration Distance
V1.10	Analogue Output (20mA)		

5.2 P2 = PARAMETERS

IMPORTANT
Parameters with grey background can only be changed on advice of SMS!

Index	Descrizione	Valore	*Description*	*Value*	Unit
P2.1 - PARAMETRI BASE / *BASIC PARAMETERS*					
P 2.1.1	Limite corrente	1,1 * In Inverter	*Current Limit*	*1.1 * In Inverter*	A
P 2.1.2	TensioneNomMotor	400	*Motor Nom Voltg*	*400*	V
P 2.1.3	FrequenNomMotore	50,00	*Motor Nom Freq*	*50.00*	Hz
P 2.1.4	VelocitàNomMotor	2800	*Motor Nom Speed*	*2800*	rpm
P 2.1.5	CorrenteNomMotor	In Inverter	*Motor Nom Currnt*	*In Inverter*	A
P 2.1.6	Cos fi motore	0,80	*Motor Cos Phi*	*0.80*	
P 2.1.7	Identificazione	0	*Identification*	*0*	
P 2.1.8	Max Potenza	150	*Max Power*	*150*	%
P 2.1.9	Control Ventola	1 / Marcia	*Fan Control*	*1 / Run*	
P 2.1.10	Sblocco Menù	0	*Unlock Menu*	*0*	
P2.2 – SALITA / *UPWARD*					
P 2.2.1	Rampa Pre Avviam	0,2	*PreStart Ramp*	*0.20*	s
P 2.2.2	Freq PreAvviamen	2,00	*PreStart Freq*	*2.00*	Hz
P 2.2.3	Tempo PreAvviam	1,0	*PreStart Time*	*1.0*	s
P 2.2.4	Tempo Acceler	2,0	*Accelerat Time*	*2.0*	s
P 2.2.5	Tempo Deceler	1,0	*Decelerat Time*	*1.0*	s
P 2.2.6	Alta Velocità	50,00	*High Speed*	*50.00*	Hz
P 2.2.7	Bassa Velocità	7,00	*Low Speed*	*7.00*	Hz
P 2.2.8	Vel Rilivellamen	2,00	*Levelling Speed*	*2.00*	Hz
P 2.2.9	Vel Manutenzione	25,00	*Maintenance Speed*	*25.00*	Hz
P 2.2.10	Tempo Incr Accel	2,00	*Accel Inc Time*	*2.00*	s
P 2.2.11	Tempo Decr Accel	0,20	*Accel Dec Time*	*0.20*	s
P 2.2.12	Tempo Incr Decel	0,20	*Decel Inc Time*	*0.20*	s
P 2.2.13	Tempo Decr Decel	1,00	*Decel Dec Time*	*1.00*	s
P 2.2.14	Tempo Dec Final	1,5	*Final Decel Time*	*1.5*	s
P 2.2.15	CoeffDecLim Pote	120	*PowLimDecFactor*	*120*	%
P 2.2.16	Compens Perdite	0	*Losses Compensat*	*0*	rpm
P 2.2.17	CorrenteNoCarico	0,7 * In Inverter	*NoLoadCurrent*	*0.7 * In Inverter*	A
P 2.2.18	CorrentMaxCarico	In Inverter	*MaxloadCurrent*	*In Inverter*	A
P 2.2.19	Compens Carico	2,00	*Load Compens*	*2.00*	Hz
P 2.2.20	Comp Temp Olio	1,00	*Oil Temp Compens*	*1.00*	Hz
P 2.2.21	Livel 1a Rampa	2,00	*Level 1st Ramp*	*2.00*	s
P 2.2.22	Misura Pot %	80,00	*Power Meas %*	*80.00*	%
P 2.2.23	Misura Pot Hz	60,00	*Power Meas Hz*	*60.00*	Hz
P 2.2.24	IncrCorrMisPot	30,0	*PowMcCurrentIncr*	*30.0*	%
P 2.2.25	SogliaMinCarico	35,00	*MinLoadThresh*	*35,00*	%
P2.3 - DISCESA / *DOWNWARD*					
P 2.3.1	Rampa Pre Avviam	2,0	*PreStart Ramp*	*2.0*	s
P 2.3.2	Freq PreAvviamen	2,00	*PreStart Freq*	*2.00*	Hz
P 2.3.3	Tempo PreAvviam	1,0	*PreStart Time*	*1.0*	s
P 2.3.4	Tempo Acceler	2,0	*Accelerat Time*	*2.0*	s
P 2.3.5	Tempo Deceler	1,0	*Decelerat Time*	*1.0*	s
P 2.3.6	Alta Velocità	50,00	*High Speed*	*50.00*	Hz
P 2.3.7	Bassa Velocità	7,00	*Low Speed*	*7.00*	Hz
P 2.3.8	Vel Rilivellamen	2,00	*Levelling Speed*	*2.00*	Hz
P 2.3.9	Vel Manutenzione	25,00	*Maintenance Speed*	*25.00*	Hz
P 2.3.10	Tempo Incr Accel	2,00	*Accel Inc Time*	*2.00*	s
P 2.3.11	Tempo Decr Accel	0,20	*Accel Dec Time*	*0.20*	s
P 2.3.12	Tempo Incr Decel	0,20	*Decel Inc Time*	*0.20*	s
P 2.3.13	Tempo Decr Decel	1,00	*Decel Dec Time*	*1.00*	s

P 2.3.14	Tempo Dec Final	1,0	*Final Decel Time*	*1.0*	s
Index	**Descrizione**	**Valore**	***Description***	***Value***	**Unit**
CONT. P2.3 - DISCESA / *DOWNWARD*					
P 2.3.15	Arrot Finale 1	0,00	*Final Round 1*	*0.00*	s
P 2.3.16	Arrot Finale 2	0,00	*Final Round 2*	*0.00*	s
P 2.3.17	Frequenza Finale	2,00	*Final Frequency*	*2.00*	Hz
P 2.3.18	Tempo Finale	2,0	*Final Time*	*2.0*	s
P 2.3.19	Rampa Finale	1,0	*Final Ramp*	*1.0*	s
P 2.3.20	Minima Frequenza	1,00	*Min Low Freq*	*1.00*	Hz
P 2.3.21	Compens Perdite	0	*Losses Compensat*	*0*	rpm
P 2.3.22	Soglia MinCarico	50,0	*Min Load Thresh*	*50.0*	%
P 2.3.23	CorrenteNoCarico	0,7 * In Inverter	*NoLoadCurrent*	*0.7 * In Inverter*	A
P 2.3.24	CorrentMaxCarico	In Inverter	*MaxLoadCurrent*	*In Inverter*	A
P 2.3.25	Compens Carico	2,00	*Load Compens*	*2.00*	Hz
P 2.3.26	Comp Temp Olio	1,00	*Oil Temp Compens*	*1.00*	Hz
P 2.3.27	FattoreScorrim	50,0	*MotorSlipFactor*	*50.0*	%
P 2.3.28	CompBassaVeloc	-3	*LowSpeedComp*	*-3*	Hz
P2.4 - CONTROLLO VALVOLA / *VALVE CONTROL*					
P 2.4.1	MinCorrenteValv	0,0	*Valve Min Curr*	*0.0*	%
P 2.4.2	RitardoAperValv	2,00	*Valve OpenDelay*	*2.00*	s
P 2.4.3	RitardoChiusValv	3,00	*Valve CloseDelay*	*3.00*	s
P2.5 - CONTROLLO AZIONAMENTO / *DRIVE CONTROL*					
P 2.5.1	ChopperFrenatura	1 / Attivo	*Brake Chopper*	*1 / Active*	
P 2.5.2	ModoContMotSali	1 / OL Contr vel	*MotorContrModeUp*	*1 / OL SpeedCont*	
P 2.5.3	FreqCommutazione	6,0	*Switching Freq*	*6.0*	kHz
P 2.5.4	ControlSottotens	1 / Attivo	*Undervolt Contr*	*1 / On*	
P 2.5.5	Ottimizzaz V/f	1 / "Boost"autom	*U/f Optimisation*	*1 / AutoTorqBoos*	
P 2.5.6	PntoIndebolCampo	50,00	*Field WeakngPnt*	*50.00*	Hz
P 2.5.7	Tensione al PIC	100,00	*Voltage at FWP*	*100.00*	%
P 2.5.8	V/fFreqIntermdia	2,00	*U/f Mid Freq*	*2.00*	Hz
P 2.5.9	V/fTensIntermdia	6,00	*U/f Mid Voltg*	*6.00*	%
P 2.5.10	Tensione a Freq0	4,00	*Zero Freq Voltg*	*4.00*	%
P 2.5.11	Riservato	0	*Reserved*	*0*	
P 2.5.12	Bassa Freq Switc	5,0	*Low Switch Freq*	*5.0*	kHz
P 2.5.13	Soglia BasFreSwi	5,00	*LSF Threshold*	*5.00*	Hz
P 2.5.14	Caduta RS Misura	0	*Ident RS VltDrop*	*0*	
P 2.5.15	Corrente a 0Hz	80	*Current at 0 Hz*	*80*	%
P 2.5.16	Reg Veloc Kp	3000	*Speed Control Kp*	*3000*	
P 2.5.17	Reg Veloc Ki	300	*Speed Control Ki*	*300*	
P 2.5.18	GuadStabCoppia	300	*TorqStabilGain*	*300*	
P 2.5.19	GuadStabTens	100	*VoltStabilGain*	*100*	
P 2.5.20	ModoContMotDisc	1 / OL Contr vel	*MotorContrModeDn*	*1 / OL SpeedCont*	
P2.6 - EMERGENZA / *EVACUATION*					
P 2.6.1	Vel EmergSalita	5,00	*Evac Speed Up*	*5.00*	Hz
P 2.6.2	Vel EmergDiscesa	10,00	*Evac Speed Down*	*10.00*	Hz
P 2.6.3	Modo	1 / Automatico	*Mode*	*1 / Automatic*	
P 2.6.4	FreqCommutazione	3,0	*Switching Freq*	*3.0*	kHz
P2.7 - RISERVATO / *RESERVED*					
P2.8 – SEGNALI INGRESSO / *INPUT SIGNALS*					
P 2.8.1	Sel Salita mors.8	1 / DIN1	*Sel Start FWD term.8*	*1 / DIN1*	
P 2.8.2	Sel Discesa mors.14	4 / DIN4	*Sel Start REV term.14*	*4 / DIN4*	
P 2.8.3	Sel Vel Alta mors.9	2 / DIN2	*Sel High Speed term.9*	*2 / DIN2*	
P 2.8.4	Sel Ispezione mors.16	6 / DIN6	*Sel Maintenance term.16*	*6 / DIN6*	
P 2.8.5	Sel Abilitazione mors.10	3 / DIN3	*Sel Enable term.10*	*3 / DIN3*	

P 2.8.6	Sel Emergenza mors.15	5 / DIN5	*Sel Emergency term.15*	*5 / DIN5*	
Index	**Descrizione**	**Valore**	***Description***	***Value***	**Unit**
P2.9 – SEGNALI USCITA / *OUTPUT SIGNALS*					
P 2.9.1	Funzione RO1 mors.22-23	3 / Contattore	*RO1 Function term.22-23*	*3 / Contactor*	
P 2.9.2	FunzDigAO mors.18-19	1 / Pronto	*AODigitalFunct term.18-19*	*1 / Ready*	
P 2.9.3	Funzione RO2 mors.25-26	2 / ContrValvola	*RO2 Function term.25-26*	*2 / Valve Cntrl*	
P 2.9.4	Funzione RO3	Non Usato	*RO3 Function*	*Not Used*	
P 2.9.5	Funz DO mors.20	4 / SupervFreq	*DO term.20*	*4 / FreqSuperv*	
P 2.9.6	Funzione AO1	0 / FunzDigitale	*AO1 Function*	*0 / DigitalFunct*	
P 2.9.7	Filtro AO1	0,00	*AO1 Filter Time*	*0.00*	s
P 2.9.8	Minimo AO1	0 / 0 mA	*AO1 Minimum*	*0 / 0 mA*	
P 2.9.9	Scalat AO1	100	*AO1 Scale*	*100*	%
P 2.9.10	Lim1SupervisFreq	1 / Limite infer	*Freq Supv Lim 1*	*1 / Low Limit*	
P 2.9.11	Soglia1SuprvFreq	30,00	*Freq Supv Val 1*	*30.00*	Hz
P2.10 – PROTEZIONI / *PROTECTIONS*					
P 2.10.1	SquilibrFasiUsc	2 / Guasto	*OutputPh. Superv*	*2 / Fault*	
P 2.10.2	ReazionSottotens	2 / Guasto	*UVolt Fault Resp*	*2 / Fault*	
P 2.10.3	Guasto a terra	2 / Guasto	*Earth fault*	*2 / Fault*	
P 2.10.4	Protez di Stallo	2 / Guasto	*Stall Protection*	*2 / Fault*	
P 2.10.5	Corrente Stallo	110,0	*Stall Current*	*110.0*	%
P 2.10.6	Lim Tempo Stallo	3,00	*Stall Time Lim*	*3.00*	s
P 2.10.7	Lim Freq Stallo	6,00	*Stall Freq Lim*	*6.00*	Hz
P 2.10.8	SensoreTempPoten	0 / Legge	*PwrUnitTempSense*	*0 / Read*	
P 2.10.9	Max Sovraveloc	110,0	*Max Overspeed*	*110.0*	%
P 2.10.10	ApertAnticContat	20	*AdvancContFault*	*20*	
P 2.10.11	TimeOut Abilitaz	3,0	*EnableOn TimeOut*	*3.0*	s
P 2.10.12	VerifCadutaAbili	1 / Sì	*Enable Off Check*	*1 / Yes*	
P 2.10.13	Costante Termica	45	*Thermal Constant*	*45*	min
P 2.10.14	Raffred a 0Hz	40,0	*Cooling at 0Hz*	*40.0*	%
P 2.10.15	TVerifCoppiaDisc	3,0	*DWTorqueChekTime*	*3.0*	s
P 2.10.16	SogliaVerCoppDisc	0	*DwTorqueChekLevel*	*0*	%
P2.11 – RIAVVIO AUTOMATICO / *AUTO RESTART*					
P 2.11.1	RiavvioAutomatic	1 / Abilitato	*Autom. Restart*	*1 / Enabled*	
P 2.11.2	Funzione Riavvio	0 / Rampa	*Restart Function*	*0 / Ramping*	
P 2.11.3	Tempo di tentat	60,00	*Trial Time*	*60.00*	s
P 2.11.4	Tempo di attesa	3,00	*Wait Time*	*3.00*	s
P2.12 – TEMPERATURA / *TEMPERATURE*					
P2.12.1	Drive TempMin	10	*Drive TempMin*	*10*	°C
P2.12.2	Drive TempMax	60	*Drive TempMax*	*60*	°C
P2.12.3	Motore TempMax	80	*Motor TempMax*	*80*	°C
P2.13 – TEST PARACADUTE / *PARACHUTE TEST*					
P 2.13.1	Test Attivo	0 / No	*Test Active*	*0 / No*	
P 2.13.2	Sovravelocità	150,0	*Test Overspeed*	*150.0*	%
P 2.13.3	Tempo Acceler	2,0	*Accelerat Time*	*2.0*	s
P 2.13.4	TimeOut MaxVeloc	2,0	*MaxSpeed TimeOut*	*2.0*	s
P 2.13.5	Tempo Deceler	1,5	*Decelerat Time*	*1.5*	s
P 2.13.6	FreqChiusValvola	5,00	*ValveCloseFreq*	*5.00*	Hz
P2.14 – INTERPIANO / SHORT FLOOR					
P 2.14.1	Sel VelocInterp	0 / Nessuna	*Sel ShortFloorSp*	*0 / None*	
P 2.14.2	VelocSalitInterp	20,0	*SF Speed UP*	*20.0*	Hz
P 2.14.3	VelocDisc Interp	20,0	*SF Speed DW*	*20.0*	Hz
P2.15 – CODICE LICENZA / *LICENCE KEY*					
P 2.15.1	Codice Licenza	0	*Licence Key*	*0*	

5.3 F3 = ACTIVE FAULTS

Listed below are the most common fault messages. Do not to reset the alarm or fault without first checking what caused activation of the protection.

Always deselect the run command before resetting a fault.

1	Overcurrent: The inverter has detected excessively high current.
2	Overvoltage: The DC voltage of the intermediate circuit has exceeded the specified limits.
3	Earth fault: The current measurement system has detected that the sum of motor phase currents is not equal to 0, therefore possible current to earth.
5	Charge contact: The charge contact is open when the START command is active.
8	System fault: Component fault. Faulty operation. Braking resistor not connected.
9	Undervoltage: The DC voltage of the intermediate circuit is below the specified limits.
11	Output phases: No current on one or more output phases. The test is performed 3 times, the FAULT occurs the 4th time
13	Inverter undertemperature: The heat sink temperature is below –10°C.
14	Inverter overtemperature: The heat sink temperature is above 90°C.
15	Motor stall: The motor stall protection has tripped.
16	Motor overtemperature: The inverter motor temperature module has detected overheating of the motor. Probable motor overtemperature.
17	Motor underload: The motor underload protection has tripped.
22	Checksum error: Failed parameter retrieval from EEPROM. Faulty component.
24	Counter fault: The value displayed by the counters is incorrect.
25	Watchdog fault: Microprocessor fault.
26	Start inhibit: Starting of the drive has been inhibited.
29	Thermistor. (NOT USED)
34	Internal bus communication.
39	Removal of device: The optional circuit board or power unit has been removed
40	Device not recognised: Optional circuit board or power unit not recognised.
41	IGBT temperature: The IGBT overtemperature protection device has detected excessively high short-term overload current (the motor on load does not start).
44	Modification of device: The optional circuit board has been changed.
45	Addition of device. The optional circuit board has been added.
50	The current at the analogue input is < 4mA.
52	Panel communication fault: Interrupted connection between control panel and inverter.
53	Field bus fault: The data connection between field bus Master and field bus board is interrupted
60	Anticipated stop with respect to low speed: The car reaches the floor when still decelerating
61	Low current.
62	Enable lost during run.
63	Output phases: No current in one or more output phases.
64	Low reference.
65	Time out enable: The enable command is still ON 3 seconds after contactor control switch-off.
67	Overspeed: Due to a fault the inverter exceeds the maximum frequency.
***68**	Anticipated contactor opening: (See Alarm 68 NOTE) The contactors between inverter and motor opened before inverter switch-off.
69	No Enable: Indicates that the contactors closed signal (input 10) was not activated within 2 sec. of the contactor command (output terminals 22-23).
70	Wrong licence key: The correct licence key was not entered in parameter P2.15.1 as a result of an application software upgrade by the client.
71	No identification: The procedure indicated in par. 6.2 was unsuccessful. Check the connection between inverter and motor.
76	Down valve not open: The valve closed during the down run. Check valve operation and its electrical connections.

***NOTE Alarm 68** After 20 activations of this alarm, the system goes out of service and it is necessary to press the RESET key to restore operation. Eliminate the problem by delaying contactor opening. If the problem persists, contact SMS.
CONTINUOUS ACTIVATION OF ALARM 68 CAN CAUSE INVERTER BREAKAGE.

5.4 H4 = FAULT MEMORY

The inverter memory can store up to 10 faults in the order in which they occur. The last fault is designated H4.1, the second last H4.2 etc. If the memory contains 10 faults that have not been erased, the next fault to occur will replace the oldest fault present in the memory.

To reset faults, press the (ENTER) key  for at least 3 seconds.

5.5 S5 = SYSTEM MENU

The message S1→S11 appears under the menu name. This indicates that there are 11 submenus.

S5.1 Language Setting: ITALIAN / ENGLISH / FRENCH .

S5.2 Application Setting: SMS Hydrov

SMS advises against modifying other parameters relevant to this MENU.

5.6 E6 = EXPANSION BOARDS (Monitor I/O board OPTA2)

V 6.1.1.1	DigOUT:B.1 (Output RO1 status)		V 6.1.1.2	DigOUT:B.2 (Output RO2 status)

6 – ADJUSTMENT PROCEDURE

Before any adjustment or modification of parameters, proceed as follows:

6.1 – Set the motor rating in parameters P2.1.2/3/4/5/6

6.2 – Carry out motor identification (or auto-tuning) through parameter P2.1.7

After entering the correct motor values, **it is essential to do the IDENTIFICATION routine**:

- Set parameter **2.1.7** to 1 and carry out a call command. The contactors energise, the motor does not start, and the message "RUN" appears on the keypad.
- When the message “STOP” appears, deactivate the call (e.g. opening the operation valve).
- The low speed boost parameters are now optimised.

If any motor value is modified, the IDENTIFICATION routine must be repeated

6.3 – FAN CONTROL

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

0 = continuous operation
1 = run - works during run and for another minute after the stop.
2 = temperature - works only if the inverter reaches a temperature of 45°C.
3 = speed contr. - works during run and for another minute after the stop, at 3 speed levels depending on the heat sink temperature (< 40°C, between 40 and 50°C, > 50°C)

6.4 – Set the required value for the nominal speed P2.2.6 (P2.3.6 for down run).

6.5 – Set the required value for the inspection speed P2.2.9 (P2.3.9 for down run).

6.6 – Set the required value for the low speed P2.2.7 (P2.3.7 for down run).

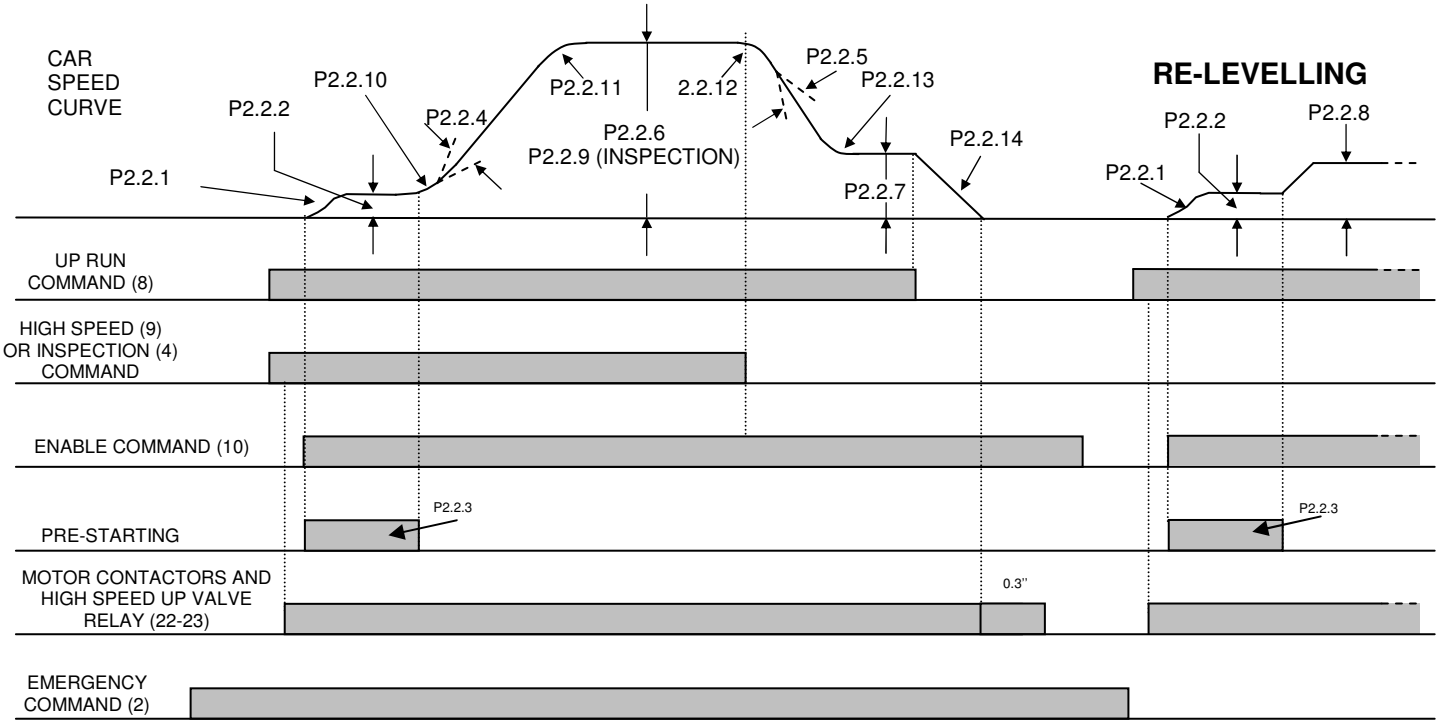
6.7 – Set the motor current values for up run with car empty (P2.2.17) and fully loaded (P2.2.18) – if necessary, also the corresponding values P2.3.23 and P2.3.24 for down run –

proceeding as follows:

- display the motor current on the MONITOR menu (V1.4)
- with car empty, command an up run, read the current value and set it in P2.2.17.
- if necessary, do the same operation in down run, read the current value and set it in P2.3.23.
- carry out the same operation with car fully loaded in up run (down run) and set the read values in P2.2.18 (P2.3.24).

IMPORTANT: When reading the current absorbed at full load, check the Absorbed Power value in V1.18: THIS is the **ABSORBED** power measured by the electricity company; the motor rating plate gives the motor **OUTPUT**.

6.8 – UP RUN adjustments



Exact command sequence

Up run:

1- Entering of UP command (8), output R01(22-23) is energised. When the contactors are closed, the ENABLE input (10) must be activated: in this way motor start is enabled.
If the HIGH or INSPECTION speed level is enabled, the motor goes to "high" or "inspection" speed (P2.2.6 or P2.2.9). If no speed level is enabled (e.g. during re-levelling at floor) the motor will run at re-revelling speed (P2.2.8).

2- During the normal run, the HIGH SPEED signal (9) must be deactivated for a deceleration command: in this way, the inverter automatically goes to “low” speed (P2.2.7).

3- On reaching the floor, the UP command (8) must open, the inverter slows down the motor until it stops, deactivating the contactor command R01(22-23). As a result, the ENABLE command (10) is deactivated.

6.9 – Adjusting UP STARTING

In order to obtain good starting controlled by the inverter, it is advisable to operate on the hydraulic valve, adjusting the maximum opening, like for having an immediate and quick start without inverter (“open the valve fully”).

To obtain "smooth" starts without jerking, the car must move a little before acceleration starts. This is obtained with parameters P2.2.1, P2.2.2, P2.2.3 suitably adjusted. Then adjust acceleration with parameters P2.2.4 and P2.2.10.

PARAMETER	THE CAR STARTS WITH A JERK	THE CAR STARTS WITH A DELAY	THE CAR ACCELERATES TOO QUICKLY
P2.2.2	↑	↑	=
P2.2.3	↑	↑	=
P2.2.4	=	=	↑
P2.2.10	↑	=	↑

Key: ↑ increase the parameter value
↓ decrease the parameter value
= the parameter does not affect the adjustment

6.10 – Adjusting UP STOP

When the HIGH SPEED command is deactivated and the UP command stays on, the slow-down stage starts; when the car reaches the floor, the UP command is deactivated and the motor automatically goes to zero speed.
To obtain the required stopping precision, adjust parameters P2.2.7 (Low Speed) and P2.2.14 (Final Deceleration).

PARAMETER	THE CAR REACHES THE FLOOR AFTER A TOO LONG LOW SPEED RUN	THE CAR REACHES THE FLOOR WITHOUT ANY LOW SPEED RUN	THE CAR GOES PAST THE FLOOR AFTER THE LOW SPEED RUN	THE CAR STOPS BEFORE THE FLOOR AFTER THE LOW SPEED RUN
P2.2.5	↑	↓		=
P2.2.7	=	=	↓	↑
P2.2.14	=	=	↓	↑

Stopping precision depends on the car load (weight to be lifted) and the oil temperature. **To make stopping precise in any conditions, proceed as follows:**

- **Adjust the stop with oil cold and car empty, by means of parameters P2.2.7 and P2.2.14**.
- **Test stopping at floor level with car fully loaded**: the car normally stops a little before the floor level. **Increase parameter P2.2.19 until obtaining the required precision**.
- **Do numerous runs to heat up the oil** then test stopping precision when the oil is hot. **If the car stops before the floor level, increase parameter P2.2.20 until obtaining the required precision**.
- Lastly, with oil cold and car empty, check that the stopping precision is still the same as that obtained with the initial tests.

6.11 – Adjusting RE-LEVELLING

Test re-levelling with the car empty and loaded, adjusting parameter P2.2.8 until obtaining the required stopping.

6.12 – Adjusting MAXIMUM ABSORBED POWER

When having to limit absorbed power, to reduce the installed power and therefore energy costs, proceed as follows:

- Set in P2.1.8 the required percentage of maximum power absorption.

  Example:
  A motor of **10kW** power (rating), V=400V, Frequency=50Hz, I=22A, cos phi=0.8
  Current measured in up run at full load = 25A
  Power value read in V1.18 = 14kW
  To limit the max. absorbed power to 10kW, set 70% in P2.1.8, because 10kW is 70% of 14kW.

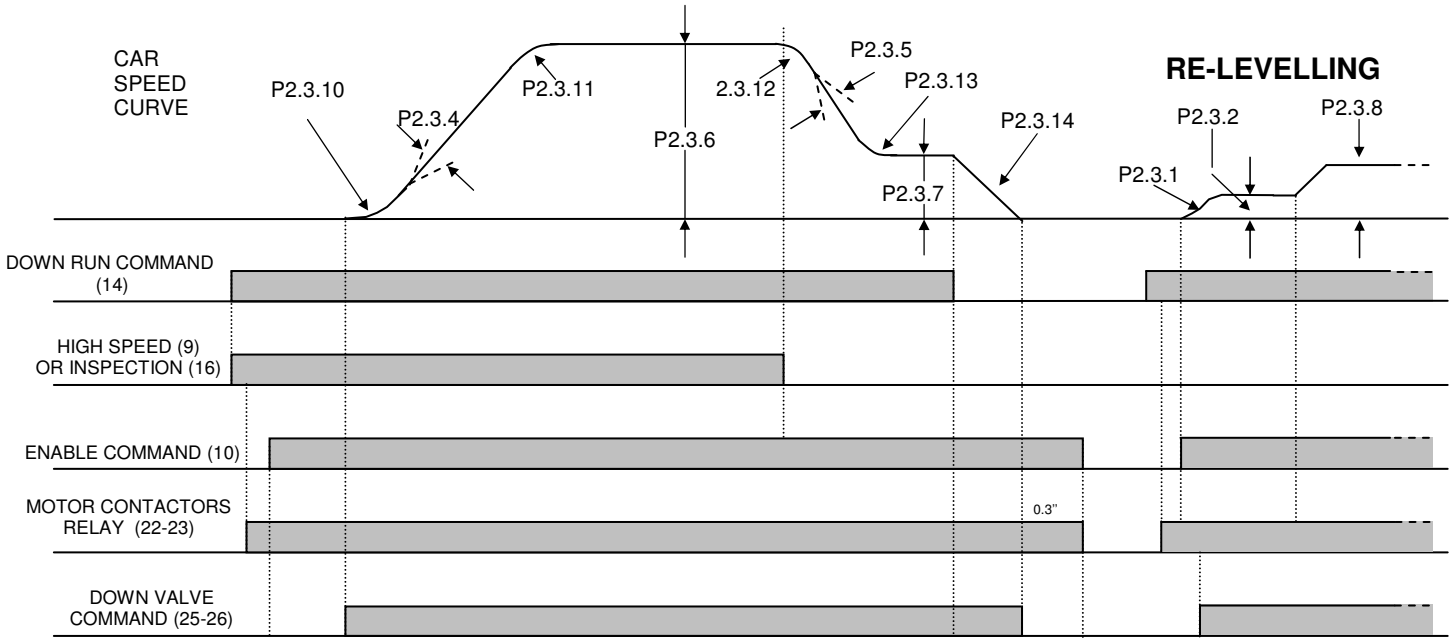
- Set in P2.2.23 the frequency value for the power check (the default value is 60Hz, therefore it is never enabled).
  A value of between 20 and 25Hz is usual.
  After the measurement, the motor will not exceed the speed limit, which remains within the set maximum power.

- Then do a test with load, checking that the value displayed in V1.18 is the required value (10kW in the example).

- If the read value is higher or lower, decrease or increase P2.1.8 until obtaining the required value.

Power limitation occurs by reducing the car speed, however, stopping at the floor and the run at low speed must be the same as with empty car (when power limitation is not active):
If the low speed run is longer, increase P2.2.15, and if the low speed run is shorter decease P2.2.15, until obtaining the required condition.

6.13 – RUN DOWN adjustments (only with special hydraulic power unit)



6.14 – Adjusting DOWN STARTING

To obtain "smooth" starts without jerking, the car must move a little before acceleration starts. This is obtained with parameters:

PARAMETER	THE CAR MOVES UP FIRST, THEN DOWN	THE CAR STARTS DOWN WITH A JERK	THE CAR ACCELERATES TOO QUICKLY
P2.3.2	↓	↑	=
P2.3.3	↓	↑	=
P2.3.4	=	=	↑
P2.3.9	=	=	↑

Key: ↑ increase the parameter value
↓ decrease the parameter value
= the parameter does not affect the adjustment

6.15 – Adjusting DOWN STOP

To obtain a precise and "smooth" stop, with minimal variations in load conditions, it is necessary to adjust some parameters:

PARAMETER	THE CAR REACHES THE FLOOR WHEN STILL DECELERATING (NOT AT A STEADY SPEED)	THE CAR REACHES THE FLOOR AFTER A TOO LONG LOW SPEED RUN	THE CAR STOPS AFTER THE FLOOR	THE CAR STOPS BEFORE THE FLOOR	THE CAR STOPS SUDDENLY	THE CAR STOPS UP WITH A JERK
P2.3.5	↓	↑	=	=	=	=
P2.3.7	=	=	↓	↑	=	=
P2.3.13	=	=	↓	↑	=	=
P2.3.16	=	=	=	=	↑	↓
P2.3.17	=	=	=	=	↑	↓
P2.4.3	=	=	=	=	↑	↓

ALWAYS CHANGE THE PARAMETERS ONE AT A TIME.

To obtain a correct stop, with car empty and loaded, with oil cold or hot, adjust parameters P2.3.25 and P2.3.26 in the same way as for the up stop adjustment.

6.16 – General rules for correct adjustment

- If the car speed is not steady at high speed, check the motor data. In particular, the motor data must match the "real" data. Also make sure the mechanical part (car/piston) has even friction along the run.
- To obtain a stop with constant precision, the car must travel a short distance (5÷10cm) at a steady low speed (adjust the parameters as indicated in the table).
- Adjust the low speed to the required value, bearing in mind that too low a value increases the time taken to reach the floor.
- Do not adjust the switching frequency to values that are too high, otherwise unnecessary motor and inverter overheating will occur.

6.17 – EMERGENCY operation parameters (Input DIN5 – Terminal 15)

Operation on batteries is used only when the motor works in up run and down run.
If the EMERGENCY MODE (P2.6.3) is AUTOMATIC, car movement is always controlled in down run; if MANUAL, movement can be controlled in the required direction (up or down).
The battery power supply must be at least 96Vdc

P2.6.1 Up emergency speed

P2.6.2 Down emergency speed

P2.6.3 Emergency mode
MANUAL must be set (P2.6.3=0) to go up; in AUTOMATIC (P2.6.3=1) it starts in any case in down direction)

P2.6.4 Switching frequency (3 kHz is sufficient)

P2.6.5 Motor control mode - Open loop (P2.6.5=1)

6.18 – ALARMS THAT CAN APPEAR DURING SYSTEM COMMISSIONING

60 = Anticipated stop:
the system arrives at the floor before low speed has been reached, i.e. when still decelerating; in this case, reduce the deceleration time 2.2.5 (2.3.5 in DOWN RUN).

2 = Overvoltage:
the internal bus has reached too high values. Make sure the braking resistor is connected and has the resistance value according to the table. Increase the deceleration distance if necessary.

61= Low current:
The valve fails to open because the motor current is too low (change 2.4.1=minimum valve opening current).

63= Output phases:
The inverter has detected the lack of current in one or more output phases.

68= ANTICIPATED CONTACTOR OPENING:
The contactors between inverter and motor opened BEFORE inverter switch-off.
Repeated activation of this alarm causes inverter breakage and early wear of the contactors.

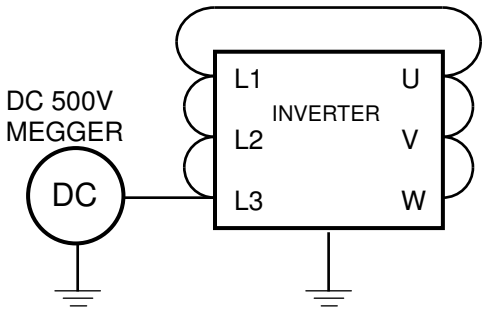
7 – CHECKS AND MAINTENANCE

To ensure long service life and optimum operation of the inverter, carry out the following checks at regular intervals. Operate on the inverter only after disconnecting the power and making sure the keypad is off.

1- Remove the dust collected on the cooling fins and control circuit board, if possible by blowing with compressed air or using a vacuum cleaner.
2- Make sure no screws are loose in the power or control terminal blocks.
3- Make sure inverter operation is <<normal>> and that there are no signs of anomalous overheating.

7.1 MEGGER TEST

When doing insulation tests using a Megger tester on the input/output cables or on the motor, remove all the connections from all the inverter terminals and perform the test only on the power circuit, according to the diagram opposite. Do not test the control circuits.



For further details and suggestions, contact:

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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 NXL Frequency Converter

Model designation: Vacon NXL 0001 5...to 0061 5...
Vacon NXL 0002 2...to 0006 2

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

Safety: EN 50178 (1997), EN 60204-1 (1996)
EN 60950 (3rd edition 2000, as relevant)

EMC: EN 61800-3 (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, 6th of September, 2002

Vesa Laisi
President

The year the CE marking was affixed: 2002