User Manual NERIDRIVE

NERIMOTORI

Experience the power

NERIDRIVE MANUAL

CODICE DOCUMENTAZIONE: Manuale NERIDRIVE
DATA EDIZIONE: 20/07/2023
N° E DATA ULTIMA REVISIONE: 4.00 del 21/02/2023
FIRMWARE VERSION: 29.0 e successful
HARDWARE VERSION: 123-6

Summary

REVISION HISTORY

changes applied Rev. 4.00 del 21/02/2023:

- Added parameters S012, P029 and P030.
- Added section 3.8 – "R" parameters.
- Screen printing updated for the latest hardware version.
- Updated chapter on method of connecting display to inverter.
- Added description for Under Voltage, Ramp Down, Ramp Up and VIPK errors.

changes applied Rev. 3.00 del 03/10/2022:

• Added D092;
• Added P028, P053 and P054;
• Added examples for P053 and P054;
• Updated screen printing RD2-131.

changes applied Rev. 2.01 del 17/11/2021:

• Typo on the formula for calculating acceleration and deceleration ramps.

changes applied Rev. 2.00 del 12/01/2021:

• Added parameters from D250 to D255 (WiFi status display parameters);
• Fixed parameter S007 with new values (reduction ratio with only positive values);
• Table with possible parameters for S010 added;
• Fixed descriptions for parameters S011;
• Added new A parameter settings and fixed the graphs;
• Table added for possible configurations of S011, P001, P005
• Added requests for CE regulations in the WARNINGS AND RISKS chapter
• Modified description of parameters S010, P001, P005, P004, P024
• Added example for P024
• Fixed configuration examples for A parameters
• Added symbols on connection diagrams to comply with CE regulations
• Fixed chapter 2

changes applied Rev. 1.02 del 15/10/2020:

• Added parameters D090 and D091 (speed in rpm and in %);
• Added parameters D140 and D141 (Password);
• Parameters from F009 to F016 max value modified from 25s to 250s;
• Eliminated o001=13 (motor temperature);
• Added o001=18 (pulse);
• Added parameters P026 (motor voltage) and P027 (enable constant motor voltage);
• Added parameters P050 (modbus slave add) and P051 (com speed) related to the auxiliary RS485 connection.

These changes are valid for the software version rev.29 and later of the display option.

1   INTRODUCTION

1.1 FIELD OF APPLICATION

• This manual applies to the following models of Electronic Drives: NERIDRIVE Junior, NERIDRIVE Small, NERIDRIVE Medium single-phase, NERIDRIVE Medium three-phase, NERIDRIVE Big single-phase, NERIDRIVE Big three-phase, NERIDRIVE Premium.

• The electronic variators are designed and built to operate, in compliance with the rating plate, in environments with temperatures between 0°C and 40°C and a maximum altitude of 1000m above sea level. Maximum relative humidity 90%, no internal condensation.

• Use the Electronic variators only for the applications for which it was designed. Comply with the specifications of the plate. Failure to observe the instructions contained in this manual and the reference standards could make the electronic variator unsuitable for use.

1.2 SAFETY

• The installation, maintenance and disposal of the electronic variator must be carried out by qualified personnel, in compliance with the regulations in force, after having read this use and maintenance manual.

• The Electronic Variator formed by a rotating electric machine, with moving parts. The engine can reach high temperatures.

• Any work on the electronic variator must be carried out with the machine stopped and disconnected from the mains.

• The Electronic Variator is intended to be incorporated into other equipment or machinery and must never be put into operation unless the equipment or machine complies with the Machinery Directive, as set out in Annex II B) of Directive 2006/ 42/EC.

• The electronic variator is not suitable for being powered by an AC generator.

• It is FORBIDDEN to use the motor in environments with conditions other than those specified "IP" on the data plate.

• IT IS FORBIDDEN to start the electronic variator without the shaft cover as the key could be dangerously expelled due to the centrifugal force as established in EN 60204-1.

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1.3 DECLARATION OF CONFORMITY EU

Declaration of conformity downloadable from the manufacturer's website.

2 PRODUCT DESCRIPTION

2.1 OVERALL DIMENSIONS

Modello	Taglia	SD m	LC m	LL m	LH mm	PG1	PG2
JUNIOR	56	113	125	195	60	PG11	2xPG
	63	125	125	195	60	PG11	2xPG
	71	143	125	195	60	PG11	2xPG
SMALL	63	146	125	195	78.5	PG11	2xPG
	71	156	125	195	78.5	PG11	2xPG
	80	161	125	195	78.5	PG11	2xPG
	90	169	125	195	78.5	PG11	2xPG
MEDIUM monofase / trifase	80	179	150	206	102	PG11	3xPG
	90	187	150	206	102	PG11	3xPG
	100	198	150	206	102	PG11	3xPG
	112	208	150	206	102	PG11	3xPG
BIG monofase / trifase	80	204	171	261	123.	PG13,	3xPG
	90	212	171	261	123.	PG13,	3xPG
	100	223	171	261	123.	PG13,	3xPG
	112	233	171	261	123.	PG13,	3xPG
	132	252	171	261	123.	PG13,	3xPG
PREMIUM	90	204	208	334	117	PG13,	3xPG
	100	215	208	334	117	PG13,	3xPG
	112	224	208	334	117	PG13,	3xPG
	132	243	208	334	117	PG13,	3xPG
	160	272	208	334	117	PG13,	3xPG
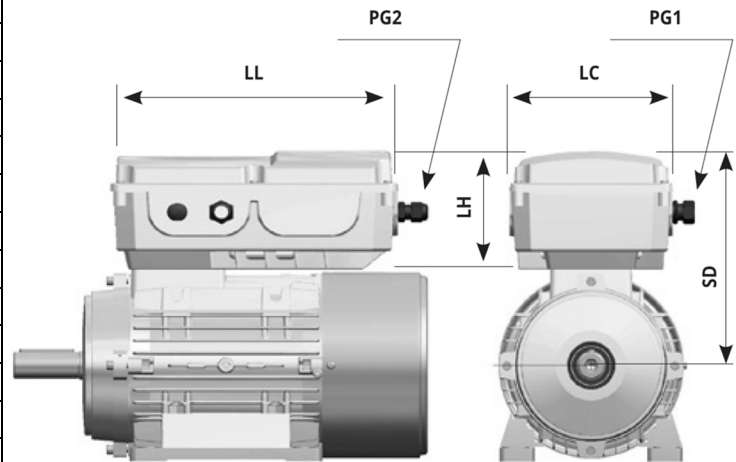
2.2 GENERAL FEATURES

	NERIDRIVE JUNIOR	NERIDRIVE SMALL	NERIDRIVE MEDIUM single phase	NERIDRIVE MEDIUM Threephase	NERIDRIVE BIG single phase	NERIDRIVE BIG Threephase	NERIDRIVE PREMIUM
supply	Monofase 230 V 50 Hz	Monofase 230 V 50 Hz	Monofase 230 V 50 Hz	Trifase 400 V 50 Hz	Monofase 230 V 50 Hz	Trifase 400 V 50 Hz	Trifase 400 V 50 Hz
Voltage [V]	180 - 264	180 - 264	180 - 264	340 - 440	180 - 264	340 - 440	340 - 440
Frequency [Hz]	42 - 60	42 - 60	42 - 60	42 - 60	42 - 60	42 - 60	42 - 60
Power [kW]	Up to 0,18	Up to 0,75	Up to 2,2	Up to 2,2	Up to 3	Up to 4	Up to 7,5
overload	150%	150%	150%	150%	150%	150%	150%
EMC class	C2/C3*	C2/C3*	C2/C3*	C3	C3	C3	C3
digital inputs	4	4	6	6	6	6	6
Analog input	1	1	1	1	1	1	1
digital output	1	1	1	2	2	2	2
serial port RS485	1	1	1	1	1	1	1
Output Frequency [Hz]	3 - 159						
torque	In accordance with the characteristics of the motor						
Control Type	VF scalar						
Modulation	Frequency Modulation PWM-SVM – Space Vector Modulation						
Frequenza di PWM [kHz]	2,5 - 15						
	* For class C2, the jumper for the filter earth connection must be installed						

2.3 VERSIONS

Version	Description	Command signals	Programming
B	Basic version	The motor can be controlled by analog inputs and digital inputs	The inverter can be programmed via the ALS1 programming terminal
T	Version with membrane keypad	The motor can be controlled via the inverter keypad	The inverter can be programmed via the ALS1 programming terminal
D	Version with LCD display	The motor can be controlled via the inverter keypad	The inverter can be programmed directly by display keypad

Version B	Version T	Version D

2.4 PRODUCT IDENTIFICATION AND LABEL

Voltage, frequency and rated current on the input side of the inverter

Serial number e rated power

NERIMOTORI
Via A. Fleming 6-8 40017 S. Giovanni in Persiceto -BO-ITALY

Type NERIDRIVE M 80 1.1 4P

In	400V	3 ph	50/60Hz	A
Out	0-400V	3 ph	1-200Hz	A
SN			kW	

WARRANTY VOID IF REMOVED   CE

www.nerimotori.com   MADE IN ITALY

TYpe NERIDRIVE

CE marking

3 WARNINGS AND RISKS

Do not carry out any type of direct operation on the internal parts or open the cover of the electronic variator if it is powered by the mains. If in doubt, disconnect the direct power supply voltage to the electronic variator with the appropriate switching devices located in the electrical panel and wait at least 60 seconds before proceeding with opening the cover for the drives **NERIDRIVE J, NERIDRIVE S, NERIDRIVE SN and at least 5 minutes for models NERIDRIVE ST, NERIDRIVE E, NERIDRIVE M, NERIDRIVE L, NERIDRIVE B.**

Powering up is permitted only after closing the inverter cover and tightening the four fastening screws.
Pay particular attention to the correct positioning of the gasket between the lid and the base of the box before tightening the screws..

The version with the on-board display comes with all the necessary connections already made. Reading this chapter is only necessary if you need to reconnect the display to the inverter.

The inverter version with display is supplied complete and configured. Its eventual modification in different versions will invalidate the validity of the guarantee. For further information, contact our Technical Service.

The commissioning operations can only be performed by adequately trained personnel or in possession of the professional skills and/or qualifications necessary to operate on live systems and moving mechanical parts. Compulsory reading of this entire manual. If in doubt, contact the NERI MOTORI technical service for further information on installation and commissioning.

The instructions given in this manual lead to rotation of the motor shaft. Therefore it is essential to check that the electronic variator (if not connected to the mechanical transmission) has already been mechanically fixed to a solid anchorage or (if already connected to the mechanical transmission) is able to rotate without causing damage to the transmission components or creating situations of danger to people or animals.

All the inverters comply with the EMC standard with the emission limits set for the industrial sector (C3), with extension to the limits prescribed for the domestic ambient.

⚠ The installer must take care to connect the earth of the power cable directly to the inverter frame to avoid ground loops which create the antenna effect for EMC emissions.

⚠ For instructions on connecting the inverter to the electricity grid, on correctly sizing the cables and for putting the system into operation, refer to the installation and use manual of the inverter.

4 DISPLAY AND CONTROL PANEL

The display, installed on the inverter cover, allows you to view and manage all the inverter programming parameters. The display is already connected to the inverter via the appropriate black sheathed cable

.1.1.1

4.1 BUTTONS

BUTTON	DESCRIPTION
	button FWD/STOP: by pressing the FWD/STOP button, the motor rotate will start in FWD mode (followed by the green FWD LED lighting up). Press the button again to stop driving. If the mlotor is running and the REV/STOP key is pressed, the motor stops.
	button REV/STOP: by pressing the REV/STOP button, the motor rotate will start in REV mode (followed by the green REV LED lighting up). Press the button again to stop driving. If the motor is running and the FWD/STOP key is pressed, the motor stops.
	button M: from the main screen, press the M key to navigate in the parameter menu. It also allows you to exit a parameter without saving it.
	button E: Allows you to select a parameter and, following modification of the same, to save the new value. During the programming phase, the yellow PRG LED stays on.
	Arrow keys UP/DOWN: Allows you to select a parameter and, following modification of the same, to save the new value. During the programming phase, the yellow PRG LED stays on.

5 STANDARD PARAMETERS

Parameter P099 = 1 allows you to restore the factory settings of the inverter.

The parameters will assume the default value as indicated in the following tables. These values coincide with the standard settings of the basic version.

For all the other available versions or in the case of custom settings it will be necessary to reset the modified parameters.

Upon request, a reserved numerical value for P099 can be supplied, in order to restore the custom parameters requested at the time of purchase. For further information contact our Technical Service.

In the event that the inverter was supplied with a custom parameterization and an accidental reset of the factory settings was carried out, before restarting the system, contact our Technical Service in order to avoid malfunctions (or breakages) due to a incorrect setting of settings.

Attention: restoring the default values, to re-enable the use of the graphic display panel for start/stop and speed regulation, it will be necessary to set the parameter S011 = 38.

6 PARAMETER OF ELETTRONIC VARIATOR

6.1 GROUP "d" PARAMETERS

These are the read-only parameters through which it is possible to view the operating status of the inverter.

D001 – OUTPUT FREQUENCY

IGBT module temperature	$32.0\,_{°C}$	90_{rpm}	rpm motor
	F. 3.0_{Hz}		
active power RMS	6.00_{W}	0.66_{pf}	Power factor (cos φ)

D002 – MOTOR SPEED

IGBT module temperature	$32.0\,_{°C}$	3.0_{Hz}	Output frequency
	S. 90_{rpm}		
Motor current RMS	0.31_{A}	0.63_{pf}	Power factor (cos φ)

D003 – SETPOINT FREQUENCY

IGBT module temperature	$32.0\,_{°C}$	90_{rpm}	rpm motor
	F. 3.0_{Hz}		
Motor current RMS	0.42_{A}	0.65_{pf}	Power factor (cos φ)

D004 – MOTOR VOLTAGE

IGBT module temperature	$32.0\,_{°C}$	3.0_{Hz}	Output Frequency
	U. 32.1_{Vrms}		
Motor current RMS	0.42_{A}	0.65_{pf}	Power factor (cos φ)

D005 – MOTOR CURRENT

IGBT module temperature	$32.0_{°C}$	90_{rpm}	rpm motor
	I. 1.54_{Arms}		
active power RMS	4.00_W	0.66_{pf}	Power factor (cos φ)

D006 – ELECTRIC OUTPUT POWER

IGBT module temperature	$32.0_{°C}$	3.0_{Hz}	Output Frequency
	P. $50.0_{W.}$		
Motor current RMS	0.31_A	0.66_{pf}	Power factor (cos φ)

D007 – MOTOR COS φ

IGBT module temperature	$32.0_{°C}$	3.0_{Hz}	Output Frequency
	pf. 0.68		
Motor current RMS	0.31_A	6.00_W	Potenza attiva RMS

D008 –BUS D.C. VOLTAGE

Output frequency	3.0_{Hz}	90_{rpm}	rpm motor
	VB 560_{Vdc}		
Motor current RMS	0.31_A	0.66_{pf}	Power factor (cos φ)

D009 –INVERTER TEMPERATURE

Output frequency	3.0_{Hz}	90_{rpm}	rpm motor

T. **33.0**$_{°C}$

| Motor current RMS | 0.31_A | 0.66_{pf} | Power factor (cos φ) |

Layout:

Output frequency → 3.0_{Hz} | 90_{rpm} ← rpm motor

T. **33.0**$_{°C}$

Motor current RMS → 0.31_A | 0.66_{pf} ← Power factor (cos φ)

D010 – SLIP MOTOR

IGBT module temperature → $32.0_{°C}$ | 90_{rpm} ← rpm motor

F. **0.0**$_{Hz}$

active power RMS → 6.00_W | 0.66_{pf} ← Power factor (cos φ)

D011 – DIGITAL INPUT STATE

Output frequency → 3.0_{Hz} | 90_{rpm} ← rpm motor

I. **000000**

Motor current RMS → 0.31_A | 0.66_{pf} ← Power factor (cos φ)

The layout of the inputs is as per the table below. Digit 1 is the rightmost one. For the state of the inputs, 0 = OFF, 1 = ON.

Digit 6	Digit 5	Digit 4	Digit 3	Digit 2	Digit 1
INPUT 6 10.2[1]	INPUT 5 10.1[2]	INPUT 4 8.4	INPUT 3 8.3	INPUT 2 8.2	INPUT 1 8.1

[1] Input 6 is present only in the models: NERIDRIVE SN, NERIDRIVE ST, NERIDRIVE M, NERIDRIVE E, NERIDRIVE L, NERIDRIVE B. These inputs refer to terminal numbered 10 for the inverters mentioned above.

D012 – DIGITAL OUTPUT STATE

Output frequency	3.0_{Hz}	90_{rpm}	rpm motor
	O. **0000**		
Motor current RMS	0.31_A	0.66_{pf}	Power factor (cos ϕ)

The layout of the outputs is as per the table below. Digit 1 is the rightmost one. For the state of the outputs, 0 = OFF, 1 = ON.

Digit 4	Digit 3	Digit 2	Digit 1
USCITA 4 7.7 – 7.8 [3]	USCITA 3 7.5 – 7.6 [4]	USCITA 2 7.3 - 7.4 [5]	USCITA 1 7.1 – 7.2

D013 – ANALOG INPUT LEVEL 1

Output frequency	3.0_{Hz}	90_{rpm}	rpm motor
	A1 **20**%		
Motor current RMS	0.31_A	0.66_{pf}	Power factor (cos ϕ)

D014 –ANALOG INPUT LEVEL 2

Output frequency	3.0_{Hz}	90_{rpm}	rpm motor
	A2 **20**%		

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[2] Input 5 is present only in the models: NERIDRIVE SN, NERIDRIVE ST, NERIDRIVE M, NERIDRIVE E, NERIDRIVE L, NERIDRIVE B. These inputs refer to terminal numbered 10 for the inverters mentioned above.
[3] Output 4 is only available for the NERIDRIVE L model.
[4] Output 3 is only available for the NERIDRIVE L model.
[5] Output 2 is only available for the following models: NERIDRIVE E, NERIDRIVE L and NERIDRIVE B.

Motor current RMS	0.31_A	0.66_{pf}	Power factor (cos φ)

Available for all inverters on future hardware releases. For now, ANALOG INPUT 1 LEVEL is displayed in this parameter.

D015 –BUS D.C. CURRENT

IGBT module temperature	$32.0_{°C}$	90_{rpm}	rpm motor
	IB 0.65_{Idc}		
active power RMS	6.00_W	0.66_{pf}	Power factor (cos φ)

D090 –RPM

IGBT module temperature	$32.0_{°C}$		
	S. 90_{rpm}		
Velocità in percentuale	$28_\%$	▪▪▪▪▪▮▮▯▯▯	Percent bar

D091 – SPEED IN %

IGBT module temperature	$32.0_{°C}$		
	S. $28_\%$		
Velocità in rpm	90_{rpm}	▪▪▪▪▪▮▮▯▯▯	Percent bar

D092 – MULTISPEED

IGBT module temperature	$32.0_{°C}$	
	V1. 90_{rpm}	

speed in rpm	28%	▁▂▃▄▅▆▇□□□	Percent bar

In this mode, the speed change from V1 to V4 takes place by pressing the M key, to exit the multispeed display, keep the M key pressed for 10 seconds.

D100 – ERROR NUMBER STORED

Output frequency	3.0_{Hz}	90_{rpm}	rpm motor
	ERR. **209**		
Motor current RMS	0.31_A	0.66_{pf}	Power factor (cos φ)
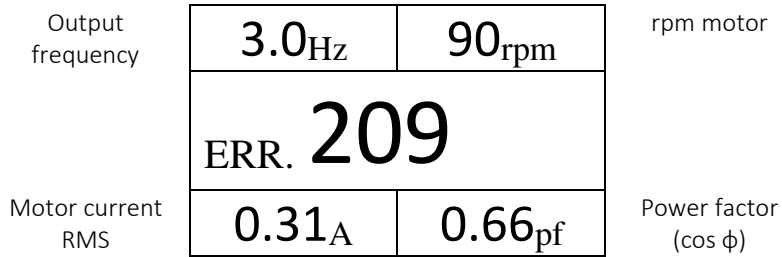
D101 – D105 – 5 LAST ERROR OCCOURED

Err. CB	

Err. OL	

Err. OV	

Err. CL	

Err. PF	

D120 – DISPLAY PID VALUE

Output frequency	3.0_{Hz}	90_{rpm}	rpm motor
	3.55		
Motor current RMS	0.31_A	0.66_{pf}	Power factor (cos φ)
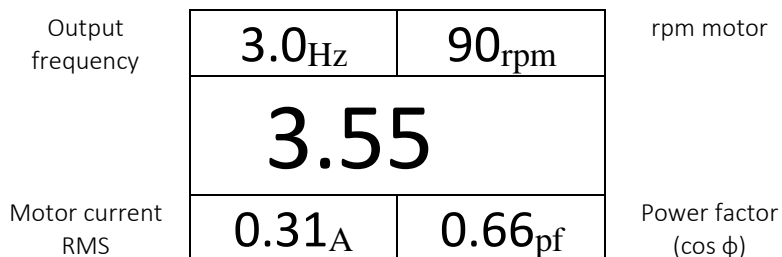
D140 – D141 - PASSWORD

Parameter D141 allows setting a 4-digit numeric password. By setting a password other than 0000, the menus A, F, P, S, I, O are disabled.

In order to access and modify the parameters it is necessary to enter the password in D140 ( ).

With the set password it is possible to view only the D parameters, act on the START/STOP and on the frequency variation.

After unlocking the display, after one minute of inactivity on the keys, access to the setup menu will automatically lock. Inactivity time is not settable.

To remove the password, after unlocking it is necessary to re-set parameter D141 to 0000.

Screen D140 and D141 display without password:

Password
0000

New Password
0000

Screen D140 and D141 display with password set:

Password
0000

New Password
Password locked

D150 – PARTIAL HOUR METER – Hours and tenths of hours

H. meter.
0066.7

D151 –TOTAL HOUR METER – hours and tenth of an hour

H. meter. T.	
0566.7	

D201 –INVERTER FIRMWARE VERSION

inverter fw.	
rev 4.50	

Parameters from D250 to D255 concern inverters equipped with WiFi connection. For further information contact the Technical Service.

D250 –WIFI IP ADDRESS

This parameter displays the IP address of the inverter in NET MODE and AP MODE. In case of WiFi malfunction or non-activation of the latter, 000.000.000.000 will be displayed.

IP address	
192.168.004.066	

D251 – WIFI MAC ADDRESS

If the WiFi does not work or if it is not activated, 00:00:00:00 will be displayed.

mac address	
00:98:f4:ab:e3	

D252 –WIFI CONNECTION MODE

If the inverter is not equipped with WiFi or in the event of a malfunction, NOT READY is displayed.

Depending on the operating mode of the inverter equipped with WiFi, one of the following values is displayed:

• AP MODE when the inverter is in soft AP mode;

• NET MODE when the inverter is connected to a WiFi network.

Wifi conn.	
NET MODE	

D253 – WIFI NET CONNECTED

The parameter shows the WiFi network to which the inverter is connected. If it is not connected to any network the field will remain empty.

Wifi Net	
AP-RD2	

D254 – NET NAME IN AP MODE

The parameter shows the name of the network to connect to when the inverter is in AP MODE. When the inverter is connected to a WiFi network, the field will remain empty.

AP Net	
Altair-SN-9E34	

D255 – NODE NET MESH[6]

Identification number of the node within the MESH network.

Mesh node	
00	

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[6] The MESH network will be available for WiFi firmware versions from 2.0.0. For further information contact the Technical Service.

6.2 GROUP "S" PARAMETERS

These are the "Set-up" parameters, i.e. the basic parameters for inverter operation.

PARAMETER	DESCRIPTION	VALUES	DEFAULT
S001	MAXIMUM FREQUENCY	S002÷159[7]	50
S002	MINIMUM FREQUENCY	P012÷S001	3
S003	ACCELERATION TIME RAMP	0,05÷300	5,00
S004	DECELERATION TIME RAMP	0,05÷300	5,00
S005	BUS D.C. VOLTAGE	-	-
S006	RATED SPEED	-	-
S007	REDUCTION RATIO	0,10÷9999	1
S008	POLES NUMBER	2 - 4 - 6 - 8 - 12	4
S009	SWITCHING FREQUENCY	2,5 - 5- 7,5 - 10 - 15	5
S010	'd' PARAMETER DISPLAYED AT START	1÷15	1
S011	SPEED REFERENCE CONFIGURATION	1÷40	4
S012	RAMP S ENABLE	1÷10	0

6.2.1 Detailed description of the startup menu parameters S

S001 - MAXIMUM FREQUENCY - Frequency reached with the maximum speed reference value. The standard value is 50 Hz. Be careful: you must evaluate the maximum mechanical value of the transmission before increasing this value. In fact, for example, for a 2 pole motor, 159 Hz corresponds to over 9000 Rpm.

S002 - MINIMUM FREQUENCY - Frequency reached with the minimum speed reference value. The standard value is 3 Hz but you can decrease this value after a modification on P012 parameter[8]. You can't set a value in S002 lower than the value set in P012. The maximum limit of this value is 0,1 Hz smaller than S001 value. You can stop the motor with the speed reference at 0 by setting P006 = 1.

S003 - ACCELERATION RAMP - Time needed to accelerate from 0 to 50 Hz. The total acceleration time will depend on the speed jump that the NERIDRIVE must make (for example, if the maximum frequency is set at 100 Hz, with the standard value of S003 = 5, the NERIDRIVE will go from 0 to 100 in 10 seconds). About the calculus of the parameter you can use the following formula:

$$x = \frac{t^*}{f^*} \cdot 50$$

Where x is the value to set in S003, t* is the wished acceleration time in seconds and f* is the desidered frequency (it usually is the same of S001 value) that the NERIDRIVE will reach.

Caution: acceleration ramps too short may cause the overcurrent protection and deceleration ramps too short may cause the overvoltage protection.
Under 1,00 seconds, the value variates with step of 0,05 seconds.

S004 – DECELERATION RAMP - Time needed to decelerate from 50 to 0 Hz. It is the same principle of S003.

S005 – D.C. BUS VOLTAGE - This parameter must be kept to the factory default setting. You can modify it only for particular applications. Please contact our technical service for further information.

S006 - NOMINAL SPEED – Read only parameter. It depens on S008 value.

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[7] Upon request, the frequency can be increased up to 310 Hz, otherwise the highest value that can be set is 159 Hz.
[8] See the paragraph 3.7 "Group "P" parameters" for further details.

S007 - REDUCTION RATIO - You can set the mechanical ratio between the load and the motor shaft. You can see the power transmission speed on the D002 parameter. The value 1 is neutral (no ratio between motor shaft and load), the values from -10 to -1 are multiply factors, the values from 2 to 9999 are reduction ratios. The value 0 is admitted but meaning less.

S008 - POLES MOTOR NUMBER - For the correct visualization of the speed in D002, this value must be correspond with the poles number of the motor.

S009 - SWITCHING FREQUENCY - It is the IGBT's switching frequency. Higher values permit the operation of the NERIDRIVE without audible frequencies. In case of extended overloading operation, the NERIDRIVE can automatically reduce the switching frequency until 7,5 kHz (see P009 parameter).

 Attention: high switching frequencies generate greater overheating of the inverter with the risk of tripping the OT (Over Temperature) alarm. Motor power must derated if application is on S1 duty.

S010 – "d" PARAMETER SHOWN AT POWER ON – Set the first parameter displayed when the inverter is switched on. The allowed values are shown in the table below. Values other than those shown in the D parameter table will be ignored.

PARAMETER	DESCRIPTION	PARAMETER	DESCRIPTION
D001	OUTPUT FREQUENCY	D092	MULTISPEED
D002	OUTPUT SPEED	D100	NUMBER ERRORS STORED
D003	SETPOINT FRREQUENCY	D101÷D105	ERROR STORED
D004	MOTOR VOLTAGE	D120	PID VALUE
D005	MOTOR CURRENT	D140	INSERISCI PASSWORD
D006	ELECTRIC POWER	D141	IMPOSTA PASSWORD
D007	MOTOR cosφ	D150	PARTIAL HOUR METER
D008	BUS D.C. VOLTAGE	D151	TOTAL HOUR METER
D009	INVERTER TEMPERATURE	D201	FIRMWARE INVERTER VERSION
D010	SLEEP	D202	FIRMWARE VERSION ALS-1
D011	DIGITAL INPUT STATE(0=OFF/1=ON)	D250	IP WIFI ADDRESS
D012	DIGITAL INPUT STATE (0=OFF/1=ON)	D251	MAC WIFI ADDRESS
D013	ANALOG INPUT LEVEL 1	D252	WIFI CONNECTION MODE
D014	ANALOG INPUT LEVEL 2[9]	D253	WIFI NET CONNECTED
D015	BUS DC CURRENT	D254	NET NAME IN AP MODE
D090	SPEED IN RPM	D255	NODE NET MESH
D091	SPEED IN %		

S011 - SPEED REFERENCE CONFIGURATION - With this parameter you can choose the speed reference and the digital inputs configuration (it can be modified if the value of P001 parameter isn't 0).
The standard configuration of digital inputs are shown in the following table.
The inputs refers to clamp number 8, present in all the manuals of use and installation of the NERIDRIVE's inverter.

 Parameter S011 for display version inverters must be modified only if operating modifications to the start/stop and speed variation commands are required. Incorrect modification of this parameter could lead to malfunction of the display keyboard. We therefore recommend that you be careful when changing this parameter. For the input and output connection diagrams, refer to the inverter use and maintenance manual.

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[9] Available for all inverters on future hardware releases. For now, ANALOG INPUT 1 LEVEL is displayed in this parameter.

⚠️ Values other than those shown, although applicable, are settings reserved for special applications. For these configurations we do not guarantee that the modification of the other groups of parameters allows the desired operation of the inverter and they are therefore to be considered prohibited if not already set by default on the inverter supplied [10].

The table below shows the values allowed for parameter S011:

S011 VALUE	COMMAND TYPE	STANDARD CONFIGURATION OF DIGITAL INPUTS	
1	-	Reserved for special applications	
2	-	Reserved for future applications	
3	FORWARD + REVERSE	8.1 = REV/STOP 8.2 = FWD/STOP Speed reference: Analogue 1 Caution: if P001=4 the inputs 8.4 and 8.3 have a particular function. See the paragraph "Group "P" parameters" for details.	8.3 not used 8.4 not used
4	START/REVERSE	8.1 = FWD/REV 8.2 = START/STOP Speed reference: Analogue 1 Caution: if P001=4 the inputs 8.4 and 8.3 have a particular function. See the paragraph "Group "P" parameters" for details.	8.3 not used 8.4 not used
5	MULTISPEED 1[11]	8.1 = REV 8.2 = START/STOP	8.3 = bit 2^0 frequency selection 8.4 = bit 2^1 frequency selection
6	4 KEYS KEYBOARD	Enable the use of 4 keys membrane – NO ONE INPUT AVAILABLE.	
7	MODBUS	ALS-1 terminal, or ModBus-RTU	
8	MOTOPOTENTIOMETER [7]	8.1 = decrease speed 8.2 = increase speed	8.3 = FWD 8.4 = REV
9	-	Reserved for special applications	
10	MULTISPEED 2 [7]	8.1 = V1 FWD 8.2 = V2 FWD	8.3 = V3 REV 8.4 = V4 REV
11	RECIPROCATOR	8.1 = STOP in phase 8.2 = START	8.3 = limit switch forward 8.4 = limit switch reverse
12	RUN/STOP WITH SELF-HOLDING [7]	8.1 = REV 8.2 = START (N.A.)	8.3 = STOP (N.C.) 8.4 = impulsive run
13	COCHLEA	Reserved for special applications-available on request	
14	MULTISPEED 3 [7]	8.1 = V1 8.2 = V2	8.3 = V3 8.4 = V4
15-37	RESERVED	Reserved for special applications	
38	COVER DISPLAY(D version) [12]	Enable the front display	
39-40	RESERVED	Reserved for special applications	

S012 – ENABLE S RAMP – By setting this parameter to a value other than 0, the inverter will use S-ramps instead of linear ramps for both acceleration and deceleration. Set to 1, the ramp will have the knee of the S at its minimum value, while setting this value to 10 the knee will be at its maximum. The meaning of parameters S003 and S004 remain unchanged.

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[10] For further information on the reserved settings, contact our Technical Service
[11] Speed reference: see "Example of configuration" chapter.
[12] This parameter must be set with the Display version, DON'T SET this parameter on NERIDRIVE S: the display version isn't available.

6.3 GROUP "F" PARAMETERS

The F parameters are used to set the rotation frequencies and the ramps only in the "Multispeed" operating modes (S011=5; S011=10; S011=14).

PARAMETER	DESCRIPTION	VALUE	MEANING		DEFAULT
F001	MAX FREQUENCY V1	0÷S001 Hz	V1 max frequency		50
F002	MIN FREQUENCY V1	P012÷F001 Hz	V1 min frequency		3
F003	MAX FREQUENCY V2	0÷S001 Hz	V2 max frequency		50
F004	MIN FREQUENCY V2	P012÷F003 Hz	V2 min frequency		3
F005	MAX FREQUENCYV3	0÷S001 Hz	V3 max frequency		50
F006	MIN FREQUENCYV3	P012÷F005 Hz	V3 min frequency		3
F007	MAX FREQUENCYV4	0÷S001 Hz	V4 max frequency		50
F008	MIN FREQUENCYV4	P012÷F007 Hz	V4 min frequency		3
F009	ACCELERATION RAMP V1	0,05÷99,9 s	Acceleration ramp to F001	All the ramps refer to the frequency of 50Hz (see group "S" parameters).	5,00
F010	DECELERATION RAMP V1	0,05÷99,9 s	Decelaration ramp to F002		5,00
F011	ACCELERATION RAMPV2	0,05÷99,9 s	Acceleration ramp to F003		5,00
F012	DECELERATION RAMP V2	0,05÷99,9 s	Deceleration ramp to F004		5,00
F013	ACCELERATION RAMPV3	0,05÷99,9 s	Acceleration ramp to F005		5,00
F014	DECELERATION RAMPV3	0,05÷99,9 s	Deceleration ramp to F006		5,00
F015	ACCELERATION RAMPV4	0,05÷99,9 s	Acceleration ramp to F007		5,00
F016	DECELERATION RAMP V4	0,05÷99,9 s	Deceleration ramp to F008		5,00
F017	ANALOGUE REF. V1	4,7,38	Assign speed reference to V1, V2, V3, V4 Admitted values: 4 = Analogue 1 7 = MODBUS For different values it takes the value 4.		4
F018	ANALOGUE REF. V2				
F019	ANALOGUE REF. V3				
F020	ANALOGUE REF. V4				

To calculate the ramp values, refer to the formula in the description of parameter S003.

These parameters allow you to set up to 4 different speeds (F001 – F008) with different ramps (F009 – F016) which can be controlled via the various usable references (F017 – F020). For further information go to chapter 4 "EXAMPLES OF CONFIGURATION".

6.4 GROUP "I" PARAMETERS

Parameters from I001 to I006 allow choosing whether each input will be ACTIVATED by a normally open contact which works on closing or by a normally closed contact which works on opening.

Each input can be associated with the numerical value "00" or "01", adapting the inverter to the most varied possible pre-existing driving schemes.

PARAMETER	DESCRIPTION	VALUE	MEANING	DEFAULT
I001	ACTIVATION STATE OF INPUT 1 (8.1)	00	The input will activate at the closure of the contact (N.O. contact)	0
		01	The input will activate at the opening of the contact (N.C. contact)	
I002	ACTIVATION STATE OF INPUT 2 (8.2)	As I001	As I001	
I003	ACTIVATION STATE OF INPUT 3 (8.3)			
I004	ACTIVATION STATE OF INPUT 4 (8.4)			

PARAMETER	DESCRIPTION	VALUE	MEANING	DEFAULT
I005	ACTIVATION STATE OF INPUT 5 (10.1) [13]			
I006	ACTIVATION STATE OF INPUT 6 (10.2)			

6.5 GROUP "A" PARAMETERS

PID control configuration parameters.

PARAMETER	DESCRIPTION	VALUE	MEANING	DEFAULT
A001	Analog input 1 source	0=0-10V 3=2-10V 1=0-20mA 2=4-20mA	Set electric value of input sensor 1	0=0-10V
A002	Analog input 2 source*	0=0-10V 3=2-10V 1=0-20mA 2=4-20mA	Set electric value of input sensor 2	0=0-10V
A003	SLOPE FEEDBACK SIGNAL	Normal Reverse	Normal = positive slope sensor Reverse = negative slope sensor	Normal
A004	PID ENABLE	Enable Disable		Disable
A005	PROPORTIONAL FACTOR BAND P%	0÷100	Proportional coefficient PID control	0
A006	INTEGRAL FACTOR I%	0÷100	integral coefficient PID control	0
A007	DERIVATIVE FACTOR D%	0÷100	derivative coefficient PID control	0
A008	MINIMUM REFERENCE FREQUENCY	0÷100	lower frequency limit in % of S002	0
A009	MAXIMUM REFERENCE FREQUENCY	0÷100	Upper frequency limit in % of S001	100
A010	MINIMUM % FEEDBACK INPUT	0÷100		20
A011	MAXIMUM % FEEDBACK INPUT	0÷100		100
A012	FEEDBACK INPUT	Analog 1 Reserverd	Analog 1 Reserved = Riservato per applicazioni future	Analog 1

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[13] The inputs 5 and 6 are present only for NERIDRIVE SN, NERIDRIVE ST, NERIDRIVE M, NERIDRIVE E, NERIDRIVE L, NERIDRIVE B models. These inputs refer to clamp number 10.
*available for DISPLAY version

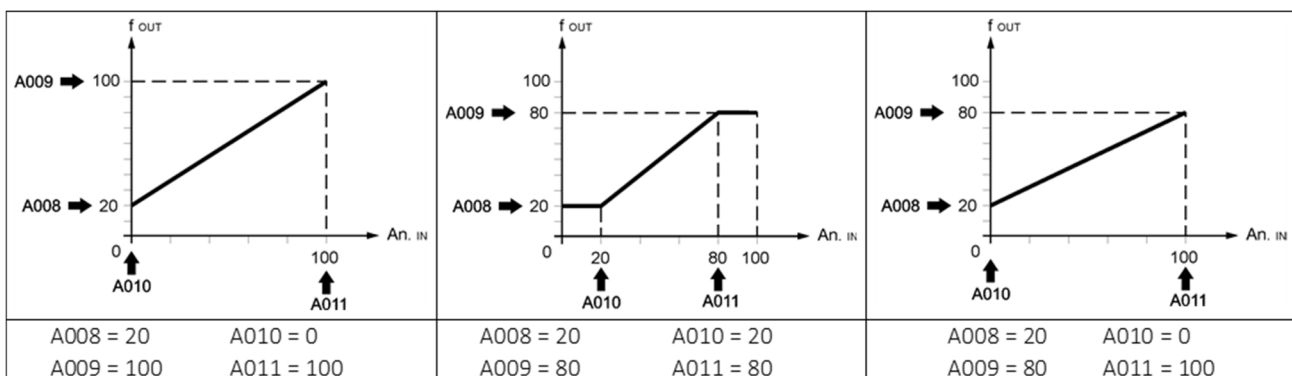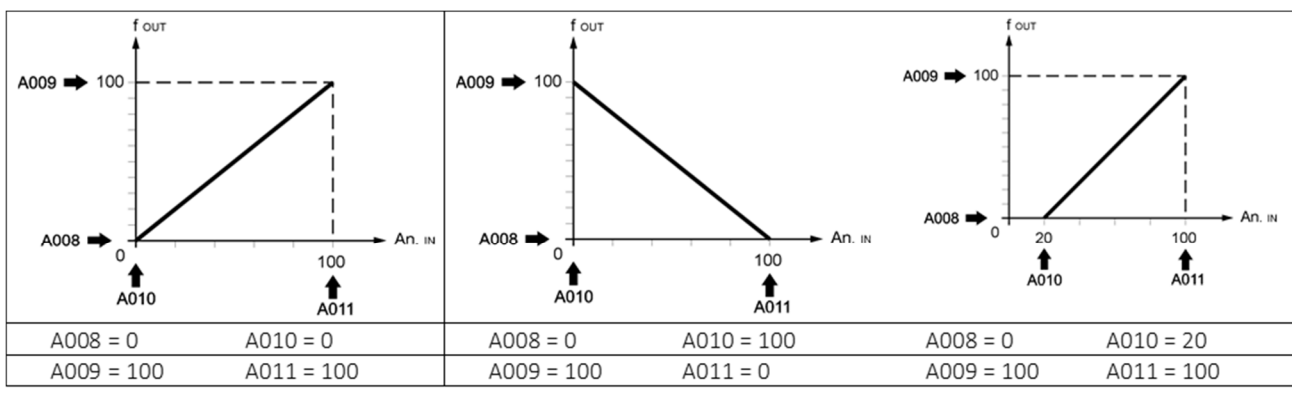| | | Torque | Torque = motor current | |
		Encoder	Encoder = Encoder	
A013	FULL SCALE VALUE	0÷100	Full scale value of sensor	**10**
A014	MEASURE UNIT	Bar, mBar kPa, Pa A °C, °F L/h, Gal/h	Permette di impostare l'unità di misura del controllo PID in base al tipo di sensore o del tipo di ingresso utilizzato per il controllo in retroazione.	**Bar**
A015	SET POINT	0÷100		**0**
A016	INTEGRATION TIME [ms]	10÷60k	Integration time in ms	**200**
A017	BIDIRECTION SIGNAL[14]	0÷1	0 = OFF; 1 = ON	**0**

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[14] Only available for inverter firmware versions later than 4.6.

6.5.1 How the PID works

The operating principle provides that a set point, fixed by parameters, is automatically maintained by the inverter by regulating the motor speed. The feedback signal can be provided by a suitable sensor connected to the inverter reference analog input, by an encoder or directly by the inverter if you want to carry out a feedback control on the current (and therefore on the drive torque) supplied to the motor. From parameters it is possible to set the relationship between the analog input feedback and the output frequency.

Parameterization of parameters A must be done carefully: depending on the type of feedback analog input and the type of sensor chosen, it is necessary to modify the scale parameters and the percentages of the proportional, integrative and derivative actions to obtain the desired operation based on the application. Particular attention should also be paid to parameter A016: short times ensure a fast response from the system but can generate instability on the same. For further information, see examples 7.f,7.g,7.h of chapter 7 "CONFIGURATION EXAMPLES".

Below are some typical relationships that can be set by appropriately programming the parameters:

A008 = 0	A010 = 0
A009 = 100	A011 = 100

A008 = 0	A010 = 100
A009 = 100	A011 = 0

A008 = 0	A010 = 20
A009 = 100	A011 = 100

A008 = 20	A010 = 0
A009 = 100	A011 = 100

A008 = 20	A010 = 20
A009 = 80	A011 = 80

A008 = 20	A010 = 0
A009 = 80	A011 = 100

6.6   GROUP "o" PARAMETERS

Digital output configuration menu.

PARAMETER	DESCRIPTION	VALUE	MEANING	DEFAULT
o001	OUTPUT 1 FUNCTIONS	0	Disabled	8
		1	Ready (power supply ok, no alarm)	
		2	Run	
		3	Stop	
		4	Reverse	
		5	Decelerating ramp	
		6	Accelerating ramp	
		7	End of acceleration ramp	
		8	Current alarm (also " "external fault" if programmed)	
		9	No error	
		10	RS485 remote control	
		11	Forward	
		12	Module temperature	
		13	Motor temperature	
		14	Input 5	
		15	Input 6	
o002	OUTPUT 2 FUNCTIONS [15]	0÷15	As output 1	5
o003	OUTPUT 3 FUNCTIONS [16]	0÷15	As output 1	12
o004	OUTPUT 4 FUNCTIONS [17]	0÷15	As output 1	10
o101	O1 EXCITATION DELAY	0.0÷999	Delay time between function and excitation of output 1	0
o102	O1 DISEXCITATION DELAY	0.0÷999	Delay time between function and disexcitation of output 1	0
o103	O2 EXCITATION DELAY	0.0÷999	Delay time between function and excitation of output 2	0
o104	O2 DISEXCITATION DELAY	0.0÷999	Delay time between function and disexcitation of output 2	0
o105	O3 EXCITATION DELAY	0.0÷999	Delay time between function and excitation of output 3	0
o106	O3 DISEXCITATION DELAY	0.0÷999	Delay time between function and disexcitation of output 3	0
o107	O4 EXCITATION DELAY	0.0÷999	Delay time between function and excitation of output 4	0
o108	O4 DISEXCITATION DELAY	0.0÷999	Delay time between function and disexcitation of output 4	0

6.6.1   Detailed description of O parameters

o001=12 IGBT MODULE TEMPERATURE - parameter o101 becomes "Temperature ON" (temperature at which the relay switches on) and o102 becomes "Temperature OFF" (temperature at which the relay switches off).

o001=14 DIG. IN 5 - parameters o101, o102, o103, o104 are deactivated. The relay turns on when IN5 goes ON and turns off when it is OFF. The ON/OFF states depend on the configuration of parameter I005.

o001= 15 DIG. IN 6 - parameters o101, o102, o103, o104 are deactivated. The relay turns on when IN6 goes ON and turns off when it is OFF. The ON/OFF states depend on the configuration of parameter I006.

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[16] Output 2 is available only for ESV E, ESV L and ESV B models.
[16] Output 3 available only for ESV L model.
[16] Output 4 available only for ESV L model.

o001=16 PULSE – the relay command becomes impulsive. Commanding it via ModBus or WiFi it will generate a pulse with a duration given by the value set in o101/o103/o105/o107 (depending on the relay set).

6.7 GROUP "P" PARAMETERS

The P parameter menu configures the main motor control functions, type of commands, speed regulation, overload protection levels, serial communication

PARAMETER	DESCRIPTION	VALUE	MEANING	DEFAULT
P001	START/STOP FORWARD/REVERSE CONFIGURATION COMMAND (different from standard default)	0	Disabled	00
		1	Disabled	
		2	Disabled	
		3	8.1 = REV/STOP – 8.2 = FWD/STOP	
		4	8.1 = FWD/REV – 8.2 = START/STOP – 8.4 = EXT. FAULT	
		5	Disabled	
		6	2/ 4 keys membrane keypad	
		7	ModBus	
		26	Reserved	
		38	DISPLAY	
		44	reserved	
P002	ENABLED DIRECTIONS	0	Both directions are allowed	00
		1	Enabled only forward direction	
		2	Enabled only reverse direction	
P003	STOP MODE	0	Stop with ramp	00
		1	Coast stop (not controlled from converter)	
P004	DEFAULT DIRECTION AT START WHEN POWER ON	0	FWD	00
		1	REV	
P005	SAFE START	0	restart at start-up when command is active	00
		1	Wait start command is disabled and turn-on	
P006	FREQUENCY AT ZERO REFERENCE	0	Set the motor at minimum with reference at 0 V/4mA/0mA	00
		1	Stop the motor with reference at 0 V	
P007	BRAKE AT ZERO FREQUENCY	0	Motor shaft free under fmin (S002)	00
		1	Motor shaft locked at 0 Hz	
P008	RESET MOTOPOTENT.	0	Store last setpoint speed (not resetted)	00
		1	Restart at minimum speed every power on	
P009	ENABLE REDUCTION FREQUENCY MODULATION	0÷1	If parameter is setted, PWM modulation is decreased if over temperature occour.	00
P010	cosφ PROTECTION	0,4÷0,99	"PF" protection occour if the cosφ is over the value setted.	0,90
P011	INTEGRATION TIME	5÷1800	Integration time in seconds for the average used for "PF" protection.	480
P012	MIN. FREQUENCY INVERTER	0÷159	Total minimum frequency	3,00
P013	NUMBER OF RESTART WHEN ERROR OCCURRED	0÷200	0 = Disabled autorestart after an error 200 = Max number of restart in case of an error.	OFF
P014	RESTART TIME BETWEEN ERRORS	0÷3600	Value (in sec.) between two automatic restart.	1
P015	MODBUS SLAVE ADD	1÷247	RS485 slave address.	001
P016	COM SPEED	9600	RS485 baud rate value	9600
P017	RS485 TIMEOUT COMMUNICATION	0 ÷60	Timeout value (in sec.) for RS485 communication (ModBus and ALS-1 terminal); 0 = no timeout	02
P018	RESET ALARMS MEM.	1	Reset memorized alarms	00
P019	CURRENT LIMIT	-	Current limit at start-up	-
P020	DC BRAKE ENABLE	0÷1	Enable DC brake	00

P021	DC BRAKE VOLTAGE	20÷53	% of voltage	20
P022	DC BRAKE TIME	0÷9999	Time in ms for DC brake	1500
P023	SLIP OFF	0÷1	0=disabled control of the slip; 1=enable slip control.	1
P024	MAX VOLTAGE FREQ.	40÷400	Frequency at maximum voltage.	50
P025	BOOST	0÷25	Value in % of boost at start-up	00
P026	RATED MOTOR VOLTAGE	*	rated motor voltage of data plate	
P027	CONSTANT VOLTAGE ENABLE	0-1	0=disabled control 1=enable constant voltage control to P26 value.	
P028	FAST STOP	0-1	0=disabled 1=enable fast stop	
P029	UNDERVOLTAGE	0-1	0=disabled 1=enable undervoltage control	
P030	RAMP CONTROL	0-1	0=disabled 1=enable ramp control	
P050	MODBUS SLAVE ADDRESS	1-127	Drive Address auxiliary installed on display board	
P051	MODBUS SPEED COM.	19200	Baud rate of auxiliary serial on display board	
P053	ANALOG SIGNAL DISPLAY ENABLE	0-1	0=disabled 1=enable analog input installed on display board	
P054	DISPLAY MULTISPEED	0-1	0=disabled 1=enable MULTISPEED from display	
P099	RESTORE DEFAULT SETTINGS	1÷32	1=restore factory parameters 2÷32=reserved parameters	00

Descrizione dettagliata dei registri P

P001 - RUN AND REVERSE COMMANDS CONFIGURATION - If different from the value "0", it forces the function of the command of parameter S011 to the function set in P001.

P004 - DIRECTION OF ROTATION AT START-UP – This parameter allows you to change the direction of rotation of the motor shaft by exchanging the directions identified with FWD and REV. The table below shows an example for S011 = 4:

P004	Input value 8.1	Input value 8.2	Sense of rotation
0 = Forward	OFF	ON	Forward
	ON	ON	Reverse
1= Reverse	OFF	ON	Reverse
	ON	ON	Forward

P005 –SAFE START - It's a working mode that you can use for all the allowed configuration in S011. It's useful function for all applications (like cooling pumps, ventilation plants, etc) which a power-off and an automatic restart is dangerous (e.g. blackout) for people or the system. If this parameter is set to 1, the automatic restart is disabled. At the start-up after a shutdown, it will be necessary reset the inputs of START and STOP (set by the S011 and/or P001 parameter).
If this parameter is set to 0 (default value), the automatic restart is enabled, useful for all application don't give unsafe operations and service is important

The setting of parameter P005 in "restart not allowed" mode does not relieve the installer of the electronic variator in any way from adopting the most appropriate solutions (external to the electronic variator) aimed at guaranteeing the safety of the Users, in accordance with the provisions of the "Machine Directive" and of the Harmonized Standards applicable to their Product.

P006 - FREQUENCY AT ZERO REFERENCE - This parameter allows you to establish whether with the analog speed reference at zero the motor must move at the minimum frequency (set in parameter S002 ( )) or if it must be stopped.

P007 – DC BRAKE - FREQUENCY AT ZERO REFERENCE - This parameter allows you to establish whether with the analog speed reference at zero the motor must move at the minimum frequency (set in parameter S002 ( )) or if it must be stopped.

P008 - RESET MOTOPOTENTIOMETER - When S011 = 6 or S011 = 8, you can use this parameter to save the last speed set (if this value is set to 0) or start at minimum speed after every power on of the ESV (if this value is set to 1).
<u>Caution</u>: the motor speed changes immediately but it is saved every 5 seconds. So, if a power off occurs immediately after a speed change, the last value couldn't be saved.

P010 - P011 - cosφ PROTECTION – INTEGRATION TIME - While working the inverter makes the measure of the motor's power factor (when this value is to high, it means that the motor is absorbing too much current and it is overheating). The value set in P010 determines the threshold for the power factor and P011 determines the integration time (in seconds) for the average of 5 values. When the average value passes the threshold, the "PF" protection occurs.
The configuration of this two parameters depends of the motor used and of the type of application.

P012 - MINIMUM FREQUENCY - This parameter permits to set the minimum frequency which the converter starts generate voltage; the value of parameter S002 "MINIMUM FREQUENCY" is the minimum setpoint of stable condition.

 Caution: the parameter P012 must be less or equal to the S002 parameter. If, for example, the minimum speed reference must be set to 40 Hz with a minimum START frequency of 30 Hz, parameter mustbe setted as: P012 = 30 and S002 = 40. Otherwise, the S002 parameter will be overridden from the value set in P012.
It isn't possible set a value of S002 lower than the P012 value.

P013 - P014 - NUMBER OF RESTART WHEN ERROR OCCURRED - RESTART TIME BETWEEN ERRORS
It permits at the ESV to try an automatic restart in case of error. With the P013 parameter you can set the number of the attempts and with the P014 parameter you can set the pause between two restarts. It is a function to use with caution but it can be very useful in some applications (e.g. automatic plants without personal, hydraulic pumps, ventilation) where the manual restart it is not easy.
If the parameter P013 = 3 (default value) the restart function is disabled and, if the error is reversable, only the power off or a start and stop can restart the motor.
.

 The automatic restart function must be programmed keeping in mind the safety of the plant, adopting all the protection to prevent the automatic restart of the motor if there are dangerous situations for people.

P018 - ALARMS MEMORY RESET – Alarms are stored in 5 'd' parameters from d101 to d105. Set P018=1 to erase the alarms.After this reset d100=0

P019 - CURRENT LIMIT –

current limit is the maximum value supplied. If load need more drive goes il overcurrent alarm,protection (message 'Ol' on terminal keyboard). Drive stop to supply motor and wait a manual or automatic reset.

<u>We recommend caution with this parametrization because a too high value, in case of an extended mechanical overload of the motor shaft, could be stall ESV.</u>

 In case of "Ol" error, increase progressively the set value and repeat the test until a maximum value of 150%.

In some conditions, the value set in P019 can be also the double of the current of motor plate without a loss in the reliability of the ESV. However, if during the operating test also at 150% of current plate value the protection occours, it is necessary verify the sizing of the ESV in the application. In that case, we suggest to contact our Technical Service.

In case of matching of an inverter with a motor with a lower size than nominal, the recalibration of P019 is always recommanded.

- Caution: refers at the effective current on the motor plate about the 400V winding and don't exceed the double of the value declared from the motor manufacturer.

Usual values of P019 are:

MODEL		150% of standard rated current In
NERIDRIVE J		3
NERIDRIVE S	0,37kW	4
	0,75kW	8
NERIDRIVE SN	0,37kW	4
	0,75kW	8
NERIDRIVE ST		5
NERIDRIVE M		10
NERIDRIVE E		12
NERIDRIVE L		20
NERIDRIVE B	4kW	16
	5,5kW	20

 Changing default value testing with care the current value using d005 monitor parameter, checking to avoid stall conditions

P020 - P021 - P022 – DECELERATION RAMP WITH DC BRAKE–

P020 =1 / ENABLED enables braking through the injection of a DC voltage directly on the motor.

DC braking function starts in the deceleration ramp below 10HZ

P021 DC voltage level applied to the motor

P022 defines the DC braking application time.
The optimal values of P021-P022 are to be set during commissioning

 If setting is incorrect, drive interrupt the DC braking and motor shaft stop by inertia.

P023 – OFF SLIP COMPENSATION – P023=1 disable slip compensation motor.

P024 – BASE FREQUENCY [18] – base frequency motor (data plate)

Note: if P027 is enabled, this function is automatically disabled.

P025 – BOOST – this parameter modify the Vf diagram as shown in the graph.
Increasing the parameter improves the starting torque but increases the motor current both with no load and with load.

The boost is useful when dealing with fast accelerations and/or heavy loads.
Since the motor current is increased, it must be monitored via parameter d005.

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[18] For further information, see chapter "Configuration examples".

If the set value is lower than the default, pay attention to avoid stalling at low frequencies or in the acceleration ramp.

If it is not possible to find a satisfactory value, it is necessary to consider a change in the size of the electronic variator.
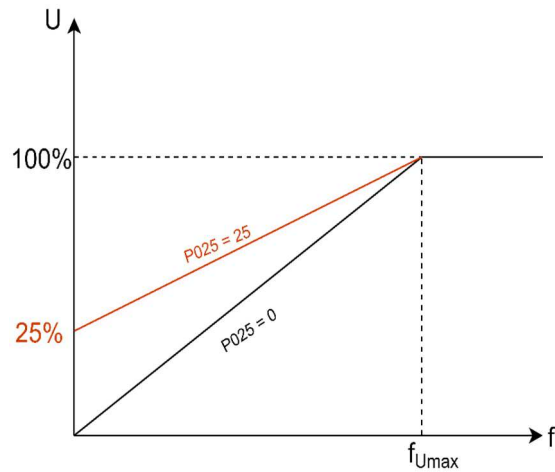
For further information contact our Technical Service.

When setting up the boost parameter, it is necessary to check that the current set in parameter P019 is high enough to avoid the OL (Overcurrent Limit) error.

⚠️ Longer operation of the motor at low speeds can lead to overheating of the motor. If the motor is not forced-ventilated, install it

P026 RATED VOLTAGE
Parameter P026 is the motor rated voltage

P027 – TENSIONE MOTORE COSTANTE –
P027 = ENABLED, the inverter will supply a constant voltage to the motor regardless of the value of the power input (within the operating values of the inverter itself).

⚠️ This function is useful in all those applications where the input power supply can vary over time or in the case of electricity distribution systems other than the 230/400V European standard (such as 120/240V).

In order to guarantee better functioning, it is recommended to deactivate the slip control (parameter P023 = DISABLED). In this way the inverter will be able to keep the output voltage constant without having to compensate for any loss of revolutions due to other external factors.

P028 – EMERGENCY STOP
By enabling this parameter, closing the button on terminals 10.1 and 10.2 immediately stops the inverter. For more information on how it works, contact our Technical service

⚠️ This parameter does not provide compliant certifiable STO type safety, as the system remains enabled. This functionality cannot therefore replace the normal safety system, which must be present.

P029 –UNDERVOLTAGE ENABLE
If enabled, the inverter will go into Under Voltage fault when it measures a voltage at its input equal to the value set in S005 – 10%. This check is carried out in all operating phases of the inverter.

P030 – RAMP CONTROL ENABLE

If enabled, control the deceleration ramp. If a ramp is too short for the applied load, the inverter will automatically extend the deceleration duration without going into a "Ramp Down" error.

Leaving this parameter disabled, in the event of a too short descent ramp, the inverter will go into a "Ramp Down" error and will remain in this state for 3 seconds before returning to operation.

> ⚠️ The automatic modification of the deceleration ramp depends on the type of load applied to the electronic variator. In some cases of short ramp, the enabling of this parameter may in any case not be sufficient to prevent the inverter from entering the "Ramp Down" error.

P053 – ANALOG INPUT ENABLE ON DISPLAY –

By enabling this parameter, it is possible to connect an analog signal reference installed on display For more information, see chapter 7. Configuration examples.

P054 – MULTISPEED DISPLAY –

This parameter allows you to set up to 4 speeds that can be set from the display using the special menu P092. For more information, see chapter 7. Configuration examples.

P099 - RESTORE DEFAULT –

By setting P099 = 1, the inverter can be reset to the factory configuration of the basic model.
Attention: if you have versions with keyboard and/or with potentiometer and/or custom parameterizations, setting P099 = 1 these configurations will be reset and the parameters will be brought back to their default values.
Therefore, to restore use of the version with keyboard, parameter S011 = 6 must be set; in the version with potentiometer it is necessary to set the parameter P001 = 6 and in the version with graphic display panel it is necessary to set the parameter S011 = 38. In the case of custom parameterisations, it is necessary to set again the configured parameters differently from their default values. It is possible to request, during the purchase phase, the enabling of a personalized value of the parameter P099 which will allow to restore the custom configuration of the parameters.

CONFIGURATIONS OF PARAMETERS S011, P001, P005

⚠️ The values with FORBIDDEN can generate unwanted behavior of the inverter. The setting of these combinations by the user is to be avoided.

S011	P001	Speed reference	Start/Stop command	Safe start P005
3	3	Analog input 1	8.1 = REV/STOP 8.3 = NOT USED 8.2 = FWD/STOP 8.4 = NOT USED	OK
	4	Analog input 1	8.1 = FWD/REV 8.3 = NOT USED 8.2 = START/STOP 8.4 = EXT. FAULT	OK
	6	Analog input 1	MEMBRANE KEYPAD 2/4 button	OK
	7	Analog input 1	Modbus/ALS-1	OK
	38	Analog input 1	Display	OK
4	3	Analog input 1	8.1 = REV/STOP 8.3 = NOT USED 8.2 = FWD/STOP 8.4 = NOT USED	OK
	4	Analog input 1	8.1 = FWD/REV 8.3 = NOT USED 8.2 = START/STOP 8.4 = EXT. FAULT	OK
	6	Analog input 1	MEMBRANE KEYPAD 2/4 button	OK
	7	Analog input 1	Modbus/ALS-1	OK
	38	Analog input 1	Display	OK
5	3	8.3 = bit 2^0 select frequency 8.4 = bit 2^1 select frequency	8.1 = REV/STOP 8.2 = FWD/STOP	OK
	4	FORBIDDEN		-
	6	8.3 = bit 2^0 select frequency 8.4 = bit 2^1 select frequency	MEMBRANE KEYPAD 2/4 button	OK
	7	8.3 = bit 2^0 select frequency 8.4 = bit 2^1 select frequency	Modbus/ALS-1	OK
	38	8.3 = bit 2^0 select frequency 8.4 = bit 2^1 select frequency	Display	OK
6	3	FORBIDDEN		-
	4	FORBIDDEN		-
	6	MEMBRANE KEYPAD 4 button	MEMBRANE KEYPAD 4 button	OK
	7	MEMBRANE KEYPAD 4 button	Modbus/ALS-1	OK
	38	FORBIDDEN		-
7	3	Modbus/ALS-1	8.1 = REV/STOP 8.2 = FWD/STOP	OK
	4	Modbus/ALS-1	8.1 = FWD/REV 8.2 = START/STOP	OK
	6	Modbus/ALS-1	MEMBRANE KEYPAD 2/4 button	OK
	7	Modbus/ALS-1	Modbus/ALS-1	OK
	38	RESERVED		-
8	3	FORBIDDEN		-
	4	FORBIDDEN		-
	6	8.1 = decrease speed 8.2 = increase speed	MEMBRANE KEYPAD 2/4 button	NO
	7	8.1 = decrease speed 8.2 = increase speed	Modbus/ALS-1	NO
	38	8.1 = decrease speed 8.2 = increase speed	Display	NO
10		Valori diversi da P001 = 0 sono PROIBITI		NO
11		Valori diversi da P001 = 0 sono PROIBITI		NO
12		Valori diversi da P001 = 0 sono PROIBITI		NO
14		Valori diversi da P001 = 0 sono PROIBITI		NO
38	3	FORBIDDEN		-
	4	FORBIDDEN		-
	6	FORBIDDEN		-
	7	RESERVED		-
	38	Display	Display	OK

6.8 GROUP "R" PARAMETERS

The parameters of group R allow you to remap the modbus registers of the inverter so as to be able to carry out one or more consecutive readings via modbus of the desired parameters simply by entering the HOLDING register number of the concerned registers as consecutively as possible. It is possible to remap up to 16 registers whose values can be read in the HOLDING registers 500÷515. For further information consult the "Modbus Manual".

PARAMETER	DESCRIPTION	VALUE	ACTION	DEFAULT
R001	Remapped 1	0 ÷ 433	HOLDING register remapped	0
R002	Remapped 2	0 ÷ 433	HOLDING register remapped	0
R003	Remapped 3	0 ÷ 433	HOLDING register remapped	0
R004	Remapped 4	0 ÷ 433	HOLDING register remapped	0
R005	Remapped 5	0 ÷ 433	HOLDING register remapped	0
R006	Remapped 6	0 ÷ 433	HOLDING register remapped	0
R007	Remapped 7	0 ÷ 433	HOLDING register remapped	0
R008	Remapped 8	0 ÷ 433	HOLDING register remapped	0
R008	Remapped 9	0 ÷ 433	HOLDING register remapped	0
R010	Remapped 10	0 ÷ 433	HOLDING register remapped	0
R011	Remapped 11	0 ÷ 433	HOLDING register remapped	0
R012	Remapped 12	0 ÷ 433	HOLDING register remapped	0
R013	Remapped 13	0 ÷ 433	HOLDING register remapped	0
R014	Remapped 14	0 ÷ 433	HOLDING register remapped	0
R015	Remapped 15	0 ÷ 433	HOLDING register remapped	0
R016	Remapped 16	0 ÷ 433	HOLDING register remapped	0

7 EXAMPLES OF CONFIGURATIONS

a. MULTISPEED 1 - S011 = 5

In this configuration the inputs **8.3** and **8.4** select 4 different speeds:

8.3	8.4	
OFF	OFF	V1 = F001÷F002
ON	OFF	V2 = F003÷F004
OFF	ON	V3 = F005÷F006
ON	ON	V4 = F007÷F008

ON = set condition of parameters I003-I004.

The speeds can be set by a fixed or variable value: to set one or more fixed speeds the couple of parameters must have the same value while to set one o more variable speeds the couple of parameters define the limit about the maximum and minimum frequency for any speeds.
The limits of setting frequency are anyway determined from the parameters S001 and S002. Also the acceleration and deceleration ramps for each speeds can be set with the parameters from F009 to F016.

Configurations example:
We suppose to run the motor with the four following choosen speeds and ramps:
- V1 = between 10 Hz and 50 Hz, acceleration and deceleration of 5 seconds
- V2 = 100 Hz, acceleration of 10 seconds and deceleration of 5 seconds
- V3 = 40 Hz, acceleration of 20 seconds and deceleration of 2 seconds
- V4 = 70 Hz, About V4 acceleration and deceleration of 15 seconds
-

The parameters must be set as:

PARAMETER	FUNCTION	VALUE	DESCRIPTION
S001	MAX FREQUENCY	100	Max. inverter frequency
S002	MIN FREQUENCY	5	Min. inverter frequency
S011	SPEED REFERENCE CONFIGURATION	5	Multispeed 1
F001	V1 MAX FREQUENCY	50	V1 max. frequency
F002	V1 MIN FREQUENCY	10	V1 min. frequency
F003	V2 MAX FREQUENCY	100	V2 max. frequency
F004	V2 MIN FREQUENCY	100	V2 min. frequency
F005	V3 MAX FREQUENCY	40	V3 max. frequency
F006	V3 MIN FREQUENCY	40	V3 min. frequency
F007	V4 MAX FREQUENCY	70	V4 max. frequency
F008	V4 MIN FREQUENCY	70	V4 min. frequency
F009	V1 ACCELERATION RAMP	5	Min to max ramp for F001
F010	V1 DECELERATION RAMP	5	Max to min ramp for F002
F011	V2 ACCELERATION RAMP	5	Min to max ramp for F003
F012	V2 DECELERATION RAMP	2,50	Max to min ramp for F004
F013	V3 ACCELERATION RAMP	25	Min to max ramp for F005
F014	V3 DECELERATION RAMP	2,50	Max to min ramp for F006
F015	V4 ACCELERATION RAMP	10	Min to max ramp for F007
F016	V4 DECELERATION RAMP	10	Max to min ramp for F008

<u>Advanced configuration example:</u>

Suppose we need to run the motor with the following four speed presets, ramps and analog references:
 • V1 = between 10 and 50 Hz with acceleration and deceleration of 5 seconds
 • V2 = between 40 and 100 Hz with acceleration of 10 seconds and deceleration of 5 seconds
 • V3 = between 10 and 40 Hz with acceleration of 20 seconds and deceleration of 2 seconds
 • V4 = between 1 and 70 Hz acceleration and deceleration of 15 seconds
 • V1 Analogue
 • Modbus V2
 • V3 Display
 • V4 Analogue
In this way V1 speed will be controllable through the analog reference, V2 speed through the ModBus or ALS-1 Keypad, V3 speed through the cover mounted display and V4 speed through the analog reference (like V1).
Finally, we note that in the first example it was not necessary to set parameter P012 as the minimum frequencies used for the four speeds were all higher than the default value.

PARAMETER	FUNCTION	VALUE	DESCRIPTION
S001	MAX FREQUENCY	100	Max. inverter frequency
S002	MIN FREQUENCY	5	Min. inverter frequency
S011	SPEED REFERENCE CONFIGURATION	5	Multispeed 1
F001	V1 MAX FREQUENCY	50	V1 max. frequency
F002	V1 MIN FREQUENCY	10	V1 min. frequency
F003	V2 MAX FREQUENCY	100	V2 max. frequency
F004	V2 MIN FREQUENCY	100	V2 min. frequency
F005	V3 MAX FREQUENCY	40	V3 max. frequency
F006	V3 MIN FREQUENCY	40	V3 min. frequency
F007	V4 MAX FREQUENCY	70	V4 max. frequency
F008	V4 MIN FREQUENCY	70	V4 min. frequency
F009	V1 ACCELERATION RAMP	5	Min to max ramp for F001
F010	V1 DECELERATION RAMP	5	Max to min ramp for F002
F011	V2 ACCELERATION RAMP	5	Min to max ramp for F003
F012	V2 DECELERATION RAMP	2,50	Max to min ramp for F004
F013	V3 ACCELERATION RAMP	25	Min to max ramp for F005
F014	V3 DECELERATION RAMP	2,50	Max to min ramp for F006
F015	V4 ACCELERATION RAMP	10	Min to max ramp for F007
F016	V4 DECELERATION RAMP	10	Max to min ramp for F008
F017	REF. V1	4	ANALOG INPUT
F018	REF. V2	7	MODBUS
F019	REF. V3	38	DISPLAY
F020	REF. V4	4	ANALOG INPUT

b.   MULTISPEED 2 - S011 = 10

In this mode at the inputs 8.1 and 8.2 are matched two speeds in a sense of rotation and at the inputs 8.3 and 8.4 are matched two speeds in the opposite sense of rotation. Also in this case the speeds can be fixed (setting each couple "maximum frequency-minimum frequency" at the same value) or they can be variable responding at the source of reference set in the parameters from F017 to F020.

Caution: the speeds don't sum each other. If you close more contacts together the motor will stop.(follow NOR logic)

ACTIVE INPUT	SPEED SELECTED	F_{Max} SET BY THE PARAMETER	F_{Min} SET BY THE PARAMETER
8.1	1ª FORWARD (FWD)	F001	F002
8.2	2ª FORWARD (FWD)	F003	F004
8.3	1ª REVERSE (REV)	F005	F006
8.4	2ª REVERSE (REV)	F007	F008

c.   MULTISPEED 3 - S011 = 14

In this mode at each input is matched a speed frequency which the motor will be brought when such input will be activated. But if you activate more inputs together, the frequencies will sum each other until the maximum frequency set in the parameter **S001.**
Caution: the sense of rotation is set in P004 (as default FWD). To change the sense of rotation of the four speeds will be necessary to modify that parameter.

ACTIVE INPUT	SPEED SELECTED	F_{Max} SET BY THE PARAMETER	F_{Min} SET BY THE PARAMETER
8.1	V1	F001	F002
8.2	V2	F003	F004
8.3	V3	F005	F006
8.4	V4	F007	F008

d.   START/STOP WITH SELFHOLDING - S011 = 12

The input REV must be kept to obtain the inversion of the sense of rotation of the motor.
The input START is acquired with the impulse (filtering 100 ms). The inverter starts only if the STOP input is N.C. (normally closed). It is an impulse with an selfholding circuit inside the inverter.
Opening the STOP contact (filtering 100 ms) the motor will stop in ramp.
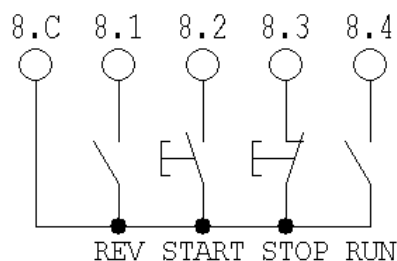
If "run" is closed:
- in case of the inverter is running it stops in ramp;
- in case of the inverter is stopped, the activation of START doesn't cause the selfholding of the run command ("run" mode, the motor rounds only if START is held down).

Caution: in any case, if STOP is open it prevails on eventual START command and the motor doesn't run (neither in self holding mode nor at impulses).

e. REGULATION OF THE PRESSURE OF A FLUID

The electronic variator drives an hydraulic pump. A sensor of pressure with 4÷20mA output, full scale 100bar, is on the pipeline.
The motor speed is set to keep the pressure at the fixed setpoint of the parameter A014, with the arbitrary variation of the operating conditions that generate falls or increase of pressure in the circuit (*see Figure 1, page 21*).

PARAMETER	FUNCTION	VALUE	DESCRIPTION
A004	ENABLE PID	1	Enable PID control
A005	PROPORTIONAL PID PART %	-	Depends on the application
A006	INTEGRAL PID PART %	-	Depends on the application
A007	DERIVATIVE PID PART %	-	Depends on the application
A008	MIN FREQUENCY REFERENCE	0	Minimum frequency limit of the inverter
A009	MAX FREQUENCY REFERENCE	100	Maximum frequency limit of the inverter
A010	START SCALE FEEDBACK INPUT %	20	20% = 4mA (1/5 of full scale)
A011	END SCALE FEEDBACK INPUT %	100	100% = 20mA
A012	ANALOG INPUT FEEDBACK	0	Sensor of pressure connected to analog input 1
A013	SCALE FACTOR	100	Sensor's full scale (100% = 100Bar)
A015	SET POINT	70	Setpoint fixed at 70 Bar (it is the absolute value if A013 is correctly set).
A016	INTEGRATION TIME [ms]	-	Depends on the application
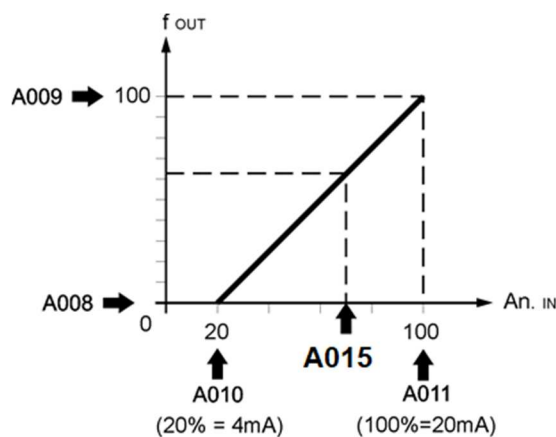
f. ADJUSTMENT OF A COOLING FAN G

The ESV drives a cooling fan. The increase of the temperature of the system, measured with a sensor with a 0-10 V scale, full scale 50°C, it requires an increase of the cooling action. The speed of the motor is regulated to keep a fixed setpoint (of 25°C) of temperature, with the arbitrary variation of the operating conditions of the system (*see Figure 2, page 21*).

PARAMETER	FUNCTION	VALUE	DESCRIPTION
A004	ENABLE PID	1	Enable PID control
A005	PROPORTIONAL PID PART %	-	Depends on the application
A006	INTEGRAL PID PART %	-	Depends on the application
A007	DERIVATIVE PID PART %	-	Depends on the application
A008	MIN FREQUENCY REFERENCE	0	Minimum frequency limit of the inverter 0% = f min. set in S002
A009	MAX FREQUENCY REFERENCE	100	Maximum frequency limit of the inverter 100% = 50Hz if S001 = 50
A010	START SCALE FEEDBACK INPUT %	100	100% = 10V (100% of full scale)
A011	END SCALE FEEDBACK INPUT %	0	0% = 0V
A012	ANALOG INPUT FEEDBACK	0	Sensor of pressure connected to analog input 1
A013	SCALE FACTOR	50	Scale factor at 100% of sensor's signal (100% = 50°C)
A014	MEASURE UNIT PID	°C	Sensor measuring °C
A015	SET POINT	25	Setpoint fixed at 25 °C (it is the absolute value if A013 is correctly set).
A016	INTEGRATION TIME [ms]	-	Depends on the application
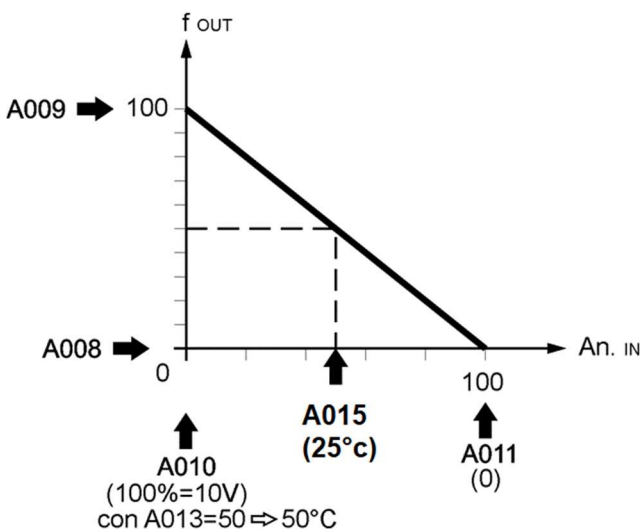
g.   CONSTANT TORQUE WITH CURETN CONTROL

The electronic variator must operate with a constant torque with a current of 1,5 A. The application requires the setting of the following parameters:

PARAMETER	FUNCTION	VALUE	DESCRIPTION
A001	ANALOG 1 CONFIGURATION	0	Set to 0-10V
A004	ENABLE PID	1	Enable PID control
A005	PROPORTIONAL PID PART %	-	Depends on the application
A006	INTEGRAL PID PART %	-	Depends on the application
A007	DERIVATIVE PID PART %	-	Depends on the application
A008	MIN FREQUENCY REFERENCE	0	Minimum frequency limit of the inverter 0% = f min. set in S002
A009	MAX FREQUENCY REFERENCE	100	Maximum frequency limit of the inverter 100% = 50Hz if S001 = 50
A010	START SCALE FEEDBACK INPUT %	0	0% = 0V
A011	END SCALE FEEDBACK INPUT %	100	100% = 10V
A012	ANALOG INPUT FEEDBACK	2	Measured current
A013	SCALE FACTOR	1	No scale factor
A014	SET POINT	1,5	Desired current value
A015[19]	INTEGRATION TIME [ms]	-	Depends on the application

h.   CONFIGURATION FOR 87 Hz MOTOR TECHNIQUE

The application requires a 400 volt three-phase power supply, motor 230/400Volt delta connected for 230volt supply.
Cyclic work service, not continuous.
Suppose we have a motor with the following plate data:
Power = 0.37kW
VΔ/Y = 230/400V
Number of poles = 4
At Δ/Y = 1.7/1A

First of all, let's calculate the torque at 50Hz:

$$C_n = 9749 \frac{P_N}{n} = 9749 \frac{0,37}{1500} = 2,4 Nm$$

Where C_n is the nominal torque in Nm, P_N is the nominal motor power expressed in kW and n are the revolutions per minute at nominal frequency.

$$P_N = \frac{C_n n}{9749} = \frac{2,4 \cdot 2610}{9749} = 0,64 kW$$

---

[19] The A015 parameter must be set with caution: a too much short times could make the PID inaccurate while a too much long times could bring a too slow answer from the system.

Size will be NERIDRIVE SN 0.75kW version but we must check that the maximum current that can be supplied by the inverter is higher than the 230V rated current of the motor. From the table of maximum currents in the description of parameter P019 we note that the maximum current that can be supplied by this inverter is 8A, therefore in continuous operation it can supply a current of:

$$:I_N = \frac{I_{MAX}}{1,5} = 5,3A > 2,2A = I_\Delta$$

Higher than the value required by the motor delta configuration. We can use a NERIDRIVE SN 0.75kW version setting S001 = 87Hz, P024 = 87 and P019 = 8. For a more accurate regulation of the current protection tripping, the current limit set in P019 can be decreased checking the inrush current required to start the electronic variator.

Thermal design must be checked because power motor is increased as well as losses.

i.   ANALOG INPUT OF DISPLAY

The electronic variator must operate in the following ways:
- Speed regulation via 0-10V analog signal
- START/STOP via display mounted on the cover.
The application foresees the use of the analog mounted on the display instead of that of the inverter. Once the 0-10V signal has been correctly connected (see paragraph 5.1 for connection details), the application requires setting the following parameters:

PARAMETER	FUNCTION	VALUE	
S011	SPEED SOURCE CONTROL	38	Display command speed
P053	ANALOG INPUT DISPLAY	Enable	Enable analog input on display board

j.   MULTISPEED BY DISPLAY ON BOARD OR REMOTE DISPLAY

The electronic variator must operate via the display mounted on the inverter with the following four pre-set speeds:

- V1 from 10 to 20Hz
- V2 from 20 to 30Hz
- V3 from 30 to 40Hz
- V4 from 40 to 50Hz

All speeds need acceleration and deceleration ramps of 5 sec.

PARAMETER	FUNCTION	VALUE	DESCRIPTION
S001	MAX FREQUENCY	50	Max. frequency
S002	MIN FREQUENCY	10	Min. frequency
S011	SPEED REFERENCE CONFIGURATION	38	Display
P012	MIN FREQUENCY	10	Min. global frequency
F001	V1 MAX FREQUENCY	20	V1 max. frequency
F002	V1 MIN FREQUENCY	10	V1 min. frequency
F003	V2 MAX FREQUENCY	30	V2 max. frequency
F004	V2 MIN FREQUENCY	20	V2 min. frequency
F005	V3 MAX FREQUENCY	40	V3 max. frequency
F006	V3 MIN FREQUENCY	30	V3 min. frequency
F007	V4 MAX FREQUENCY	50	V4 max. frequency
F008	V4 MIN FREQUENCY	40	V4 min. frequency
F009	V1 ACCELERATION RAMP	5	Min to max ramp for F001
F010	V1 DECELERATION RAMP	5	Max to min ramp for F002
F011	V2 ACCELERATION RAMP	5	Min to max ramp for F003
F012	V2 DECELERATION RAMP	5	Max to min ramp for F004
F013	V3 ACCELERATION RAMP	5	Min to max ramp for F005
F014	V3 DECELERATION RAMP	5	Max to min ramp for F006
F015	V4 ACCELERATION RAMP	5	Min to max ramp for F007
F016	V4 DECELERATION RAMP	5	Max to min ramp for F008
F017	REF. V1	38 o 7	DISPLAY/ Modbus speed reference
F018	REF. V2	38 o 7	DISPLAY/ Modbus speed reference
F019	REF. V3	38 o 7	DISPLAY/ Modbus speed reference
F020	REF. V4	38 o 7	DISPLAY/ Modbus speed reference

The application requires the setting of the following parameters:

NOTE : To use the NERIDRIVE display set F017, F018, F019, F020 to 38, while to use the remote display use 7.

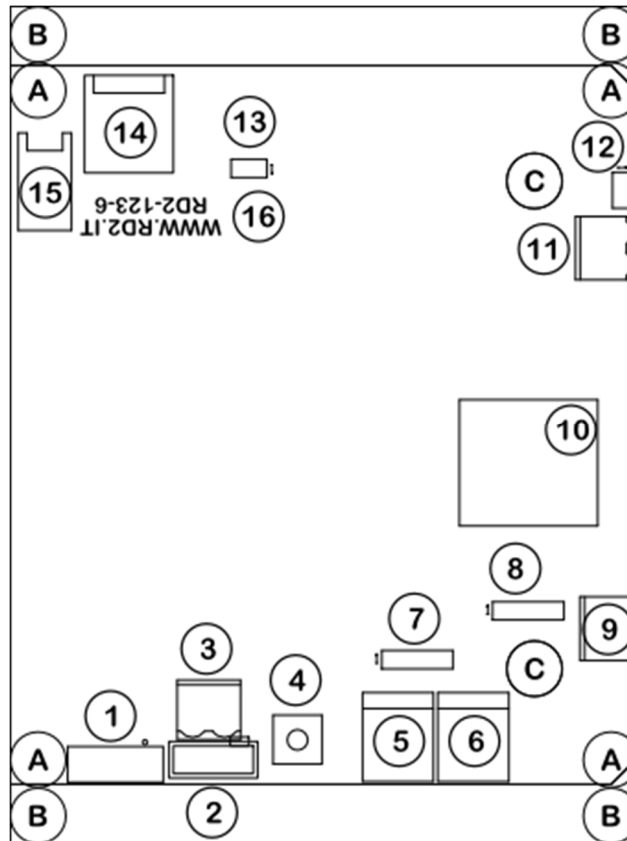# 8 WIRING LAYOUT

a. DISPLAY BOARD LAYOUT

Figura 1

LEGENDA

1	JST connector for RS485 connection drive-display	9	Reserved for special applications
2	Connector AMP MOD II RS485 remote connection	10	Antenna WiFi
3	Connector 2 poles for RS485	11	Uscita Analog output[29]
4	Trimmer to set max current [20]	12	Selector Analog output [29]
5	Analog input 1[29]	13	Reserved CANBUS connector
6	Analog input 2[29]	14	Reserved CANBUS connector
7	Selector Analog input 1[29]	15	Reserved connector
8	Selector Analog input 2[29]	16	Hardware version

b. WIRE DISPLAY TO INVERTER

The display must be connected to the inverter using the single cable supplied, equipped on one side with a JST type connector and on the other with an AMP MODU II type connector. The connection is simple: connect the JST connector to the JST connector of the display (connector number 1 in figure 1 pg. 38) while the AMP MODU II connector is connected to the inverter. To find the inverter connector, refer to the following images and the model in your possession (connector number 6)

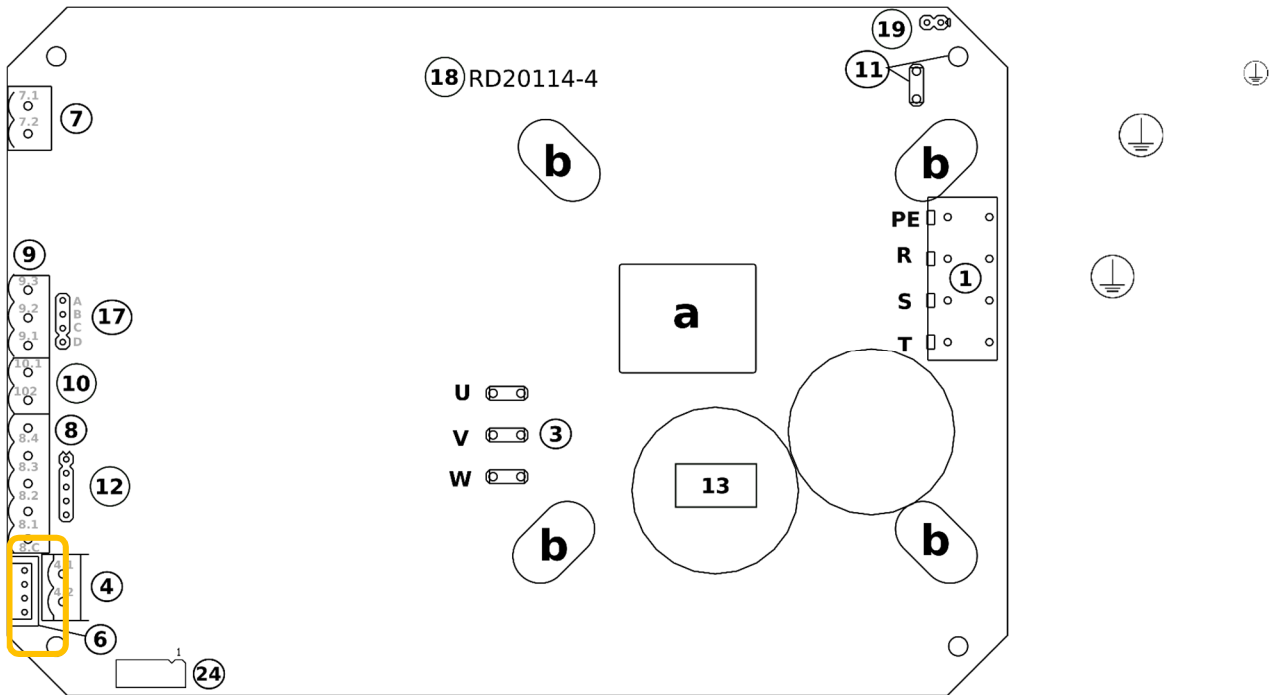[20] On demand; for further information contact the Technical Service
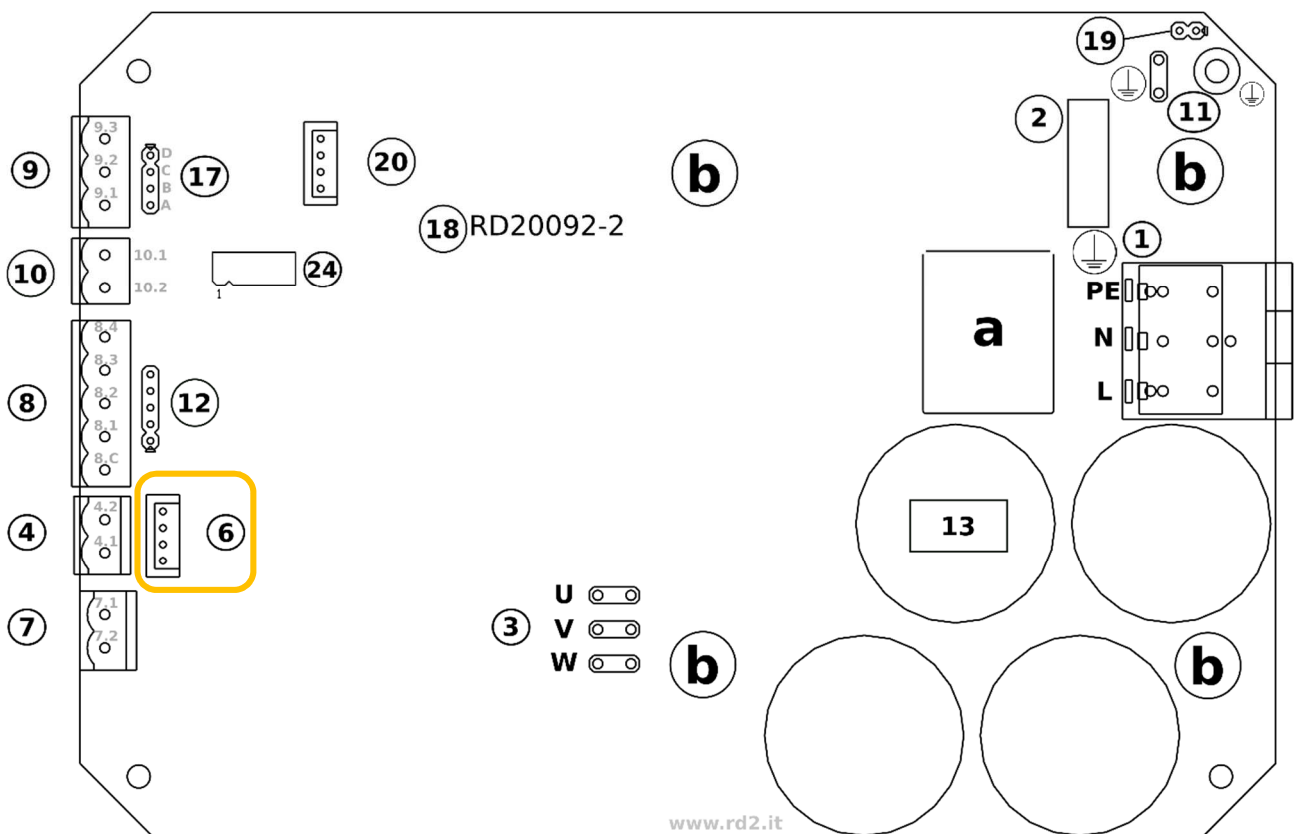
LAYOUT NERIDRIVE J BOARD

RD20091-4
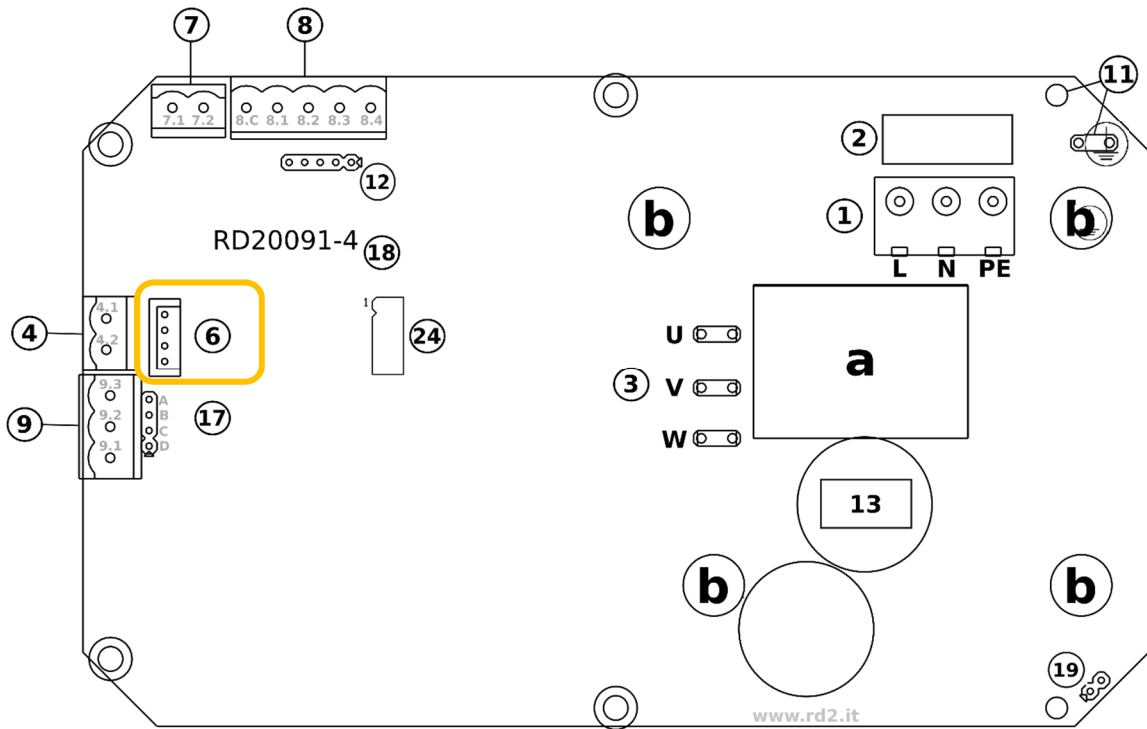
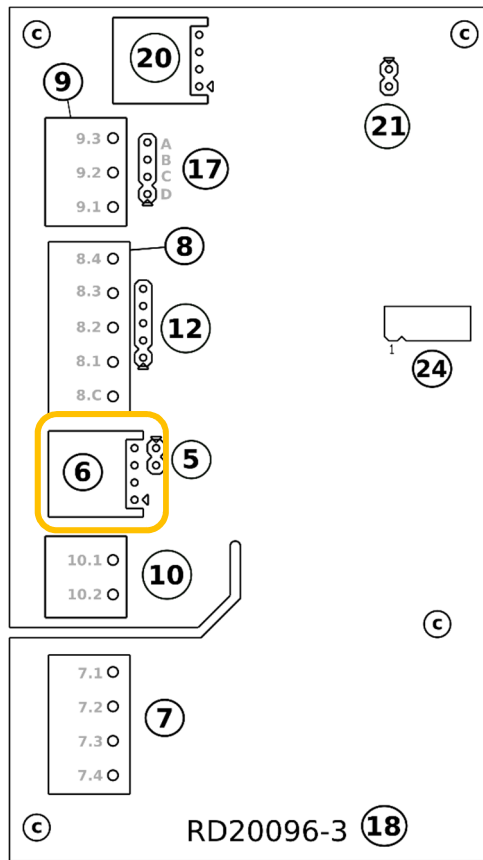**LAYOUT NERIDRIVE SN BOARD**
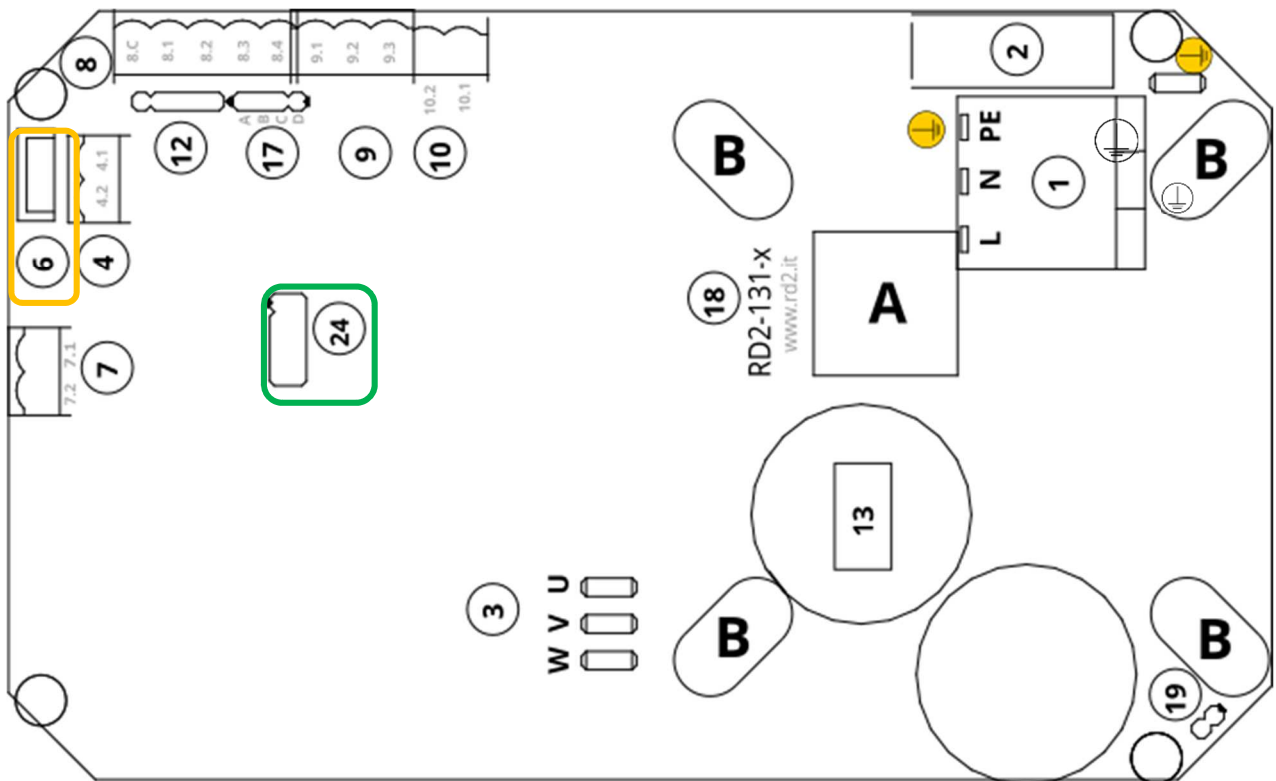
LAYOUT NERIDRIVE ST BOARD

(18) RD20114-4

LAYOUT NERIDRIVE M BOARD

(18) RD20092-2

www.rd2.it

LAYOUT NERIDRIVE E BOARD

RD20096-3

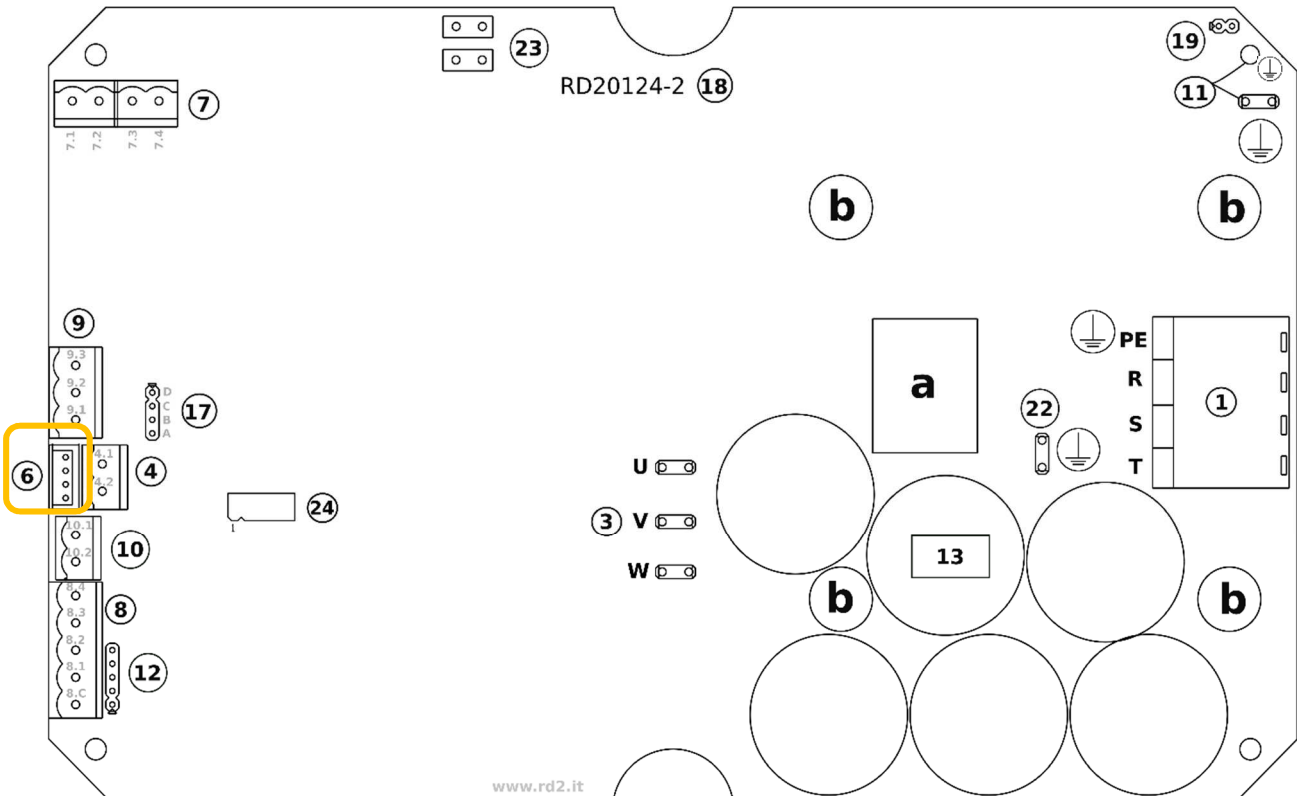## LAYOUT NERIDRIVE L BOARD
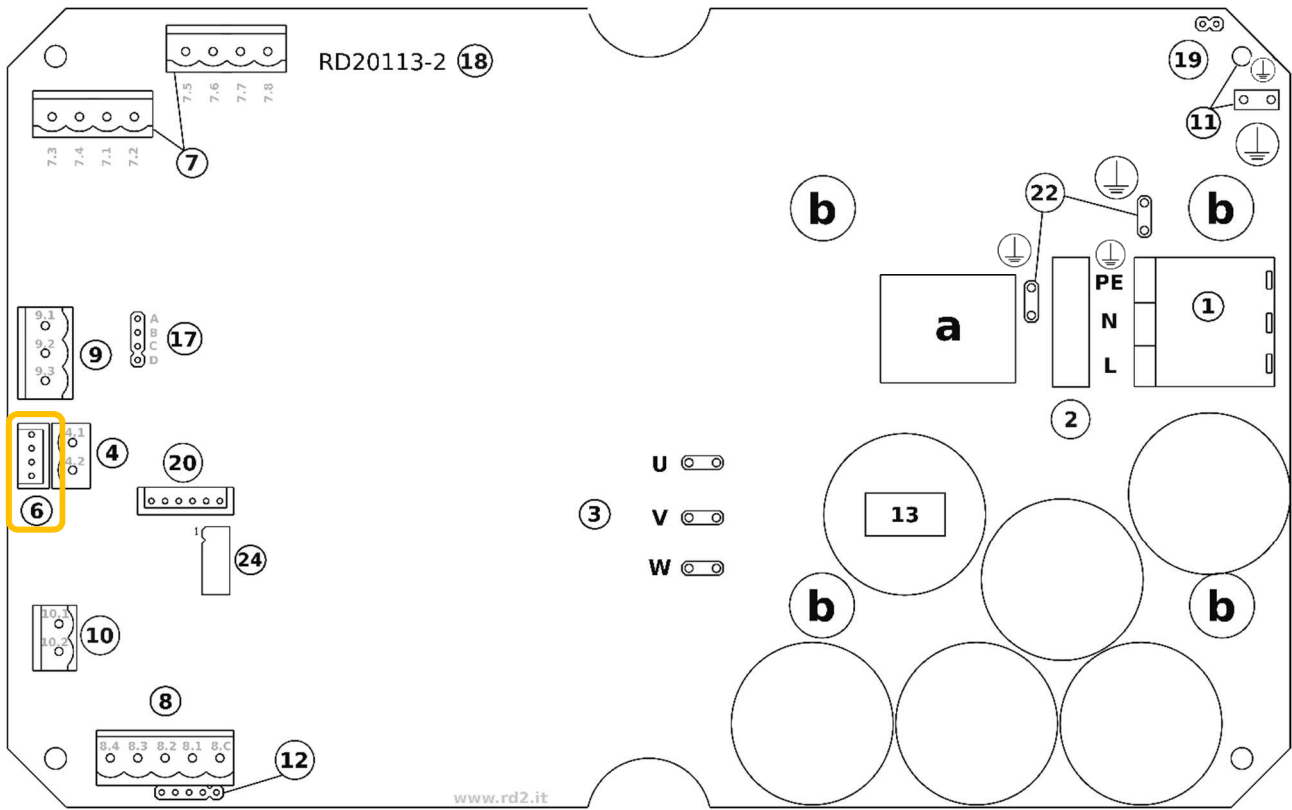
LAYOUT NERIDRIVE B BOARD

9 DIAGNOSTICS AD TROUBLESHOOTING

a. INTERVENTION OF THE PROTECTIONS

The intervention of any protection of the inverter causes a motor shut-off. With DISPLAY on board or the terminal ALS-1 connected you can view:
- the number of protection errors occurred;
- the codes of the last five errors.

You can also view the "ongoing error" and the errors codes through ModBus (see the "ModBus manual" for all details).

The appropriate programmation of the outputs can permit the report to external equipments the possible presence of ongoing errors (or the NOT presence of errors). The programmability of the output function is limited only for the condition of error, it isn't possibile get informations about the type (code) of error.

The inverter is featured with the following electronic protections:

- **Overtemperature:** it occours when the temperature of the power module is more than 80°C. In case of this type of error, verify that the ESV is installed in a zone with enought air exchange to cool the case of the inverter. <u>Caution:</u> this protection doesn't depend on with the temperature of the motor. However a good thermal protection of the motori is obtained with the $\cos\phi$ control (see "$\cos\phi$ protection" below).

- **Overcurrent:** it occours in case of instantaneous output overcurrent (at motor). It can occour also in particular conditions of work with a very low supply voltages and high mechanical loads applied to the motors shafth.

- **Overvoltage:** it occours when the voltage on each capacitors goes over the maximum admitted value. It is a condition that can show when you made sharp decelerations with highly inertial loads. In this case you have to increase the deceleration time (S004 parameter). It also can occour with a supply voltage over the operating limit of the inverter. In case of a repeated intervention, you have to verify if the error occours during the deceleration of the motor, at still motor or with constant speed.

- **Cosϕ protection:** it is the protection about the power factor that the inverter does moment by moment on the motor. The standard parameters contained in P010 and P011 permit to protect effectively the motor from overheating in any condition of work. The modify of the parameters P010 and P011 isn't suggested to solve problems about the action of this protection (these problems must be solved with the addiction of an auxiliari ventilating on the motor, otherwise you have the risk to burn the motor). For more details and about the optimization of protection, please contact our Technical Support.

- **RS485 communication error:** it occours in case of timeout of the RS485 communication (see the "ModBus Manual" for any details).

- **"Communication Line" error:** it is an inside error and it shows a possible failure on one of the two inverter's microprocessors.
- **"UnderVoltage" error**: The inverter input voltage is lower than the value set in S005 – 10%. It is necessary to check the mains voltage or verify that parameter S005 has been set correctly.

- **"Ramp Down" error**: the set deceleration ramp is too low for the type of load applied to the electronic variator. To avoid breakage, the inverter avoids braking the load and lets the system stop by inertia. The inverter remains in a fault state for 3 seconds before returning to operation. Check parameter S004

- **"Ramp Up" error**: The set acceleration ramp is too low for the type of load applied. Check parameter S003.

• **"VIPK" error**: Inverter hardware error caused by a peak exceeding the IGBT module limit. Check engine and application type. Contact our Technical Service in case of repeated alarms.

b.   DISPLAYING ERRORS AND E PROTECTIONS

In case of error, connecting the ALS-1 terminal to the ESV will possible verify the code of the occured error and see the type of interviewed protection.

In case of the ESV was switched off before the connection of ALS-1 terminal, it will be anyway possible to see the last five occured errors.

If the function of "auto restart" is enabled, after any errors (P013 must be different from 0), every intervention of a protection will be anyway stored.

Inside the parameter P014 you can set the range (in seconds) between the intervention of the protection and the next restart.

If the function of "auto restart" is disabled (parameter P013 = 0), the restart of the motor will get with a new command of start on the right command input, after the causes of intervention of protection have been removed.

Error codes (stored in parameters D101 to D105) displayed on DISPLAY

ERROR CODE	DISPLAY	DESCRIZIONE
1	ERR OT	Power module overtemperature
2	ERR OL	overcurrent
3	ERR EF	"External Fault" (emergency input activation)
4	ERR OV	overvoltage
5	ERR PF	Motor protection for mean cosφ greater than the P010 value over a time greater than 5 times P011
6	ERR UV	undervoltage
10	ERR cL	Error "Communication Line"
19	ERR RD	Ramp deceleration Error
20	ERR RU	Ramp acceleration Error
21	ERR VIPK	Current peak motor

c. RIPRISTINO REST ERRORS AND PROTECTONS

The restarting of the motor is always subordinated to the removal of the cause that caused the error.

Furthermore, if parameter P013 = OFF, restarting will only be possible following a new "start" command (if in an operating mode which provides for the start input to be kept active).

Parameters D101 to D105 contain a memory of occurred errors. This memory can be reset to zero using parameter P01