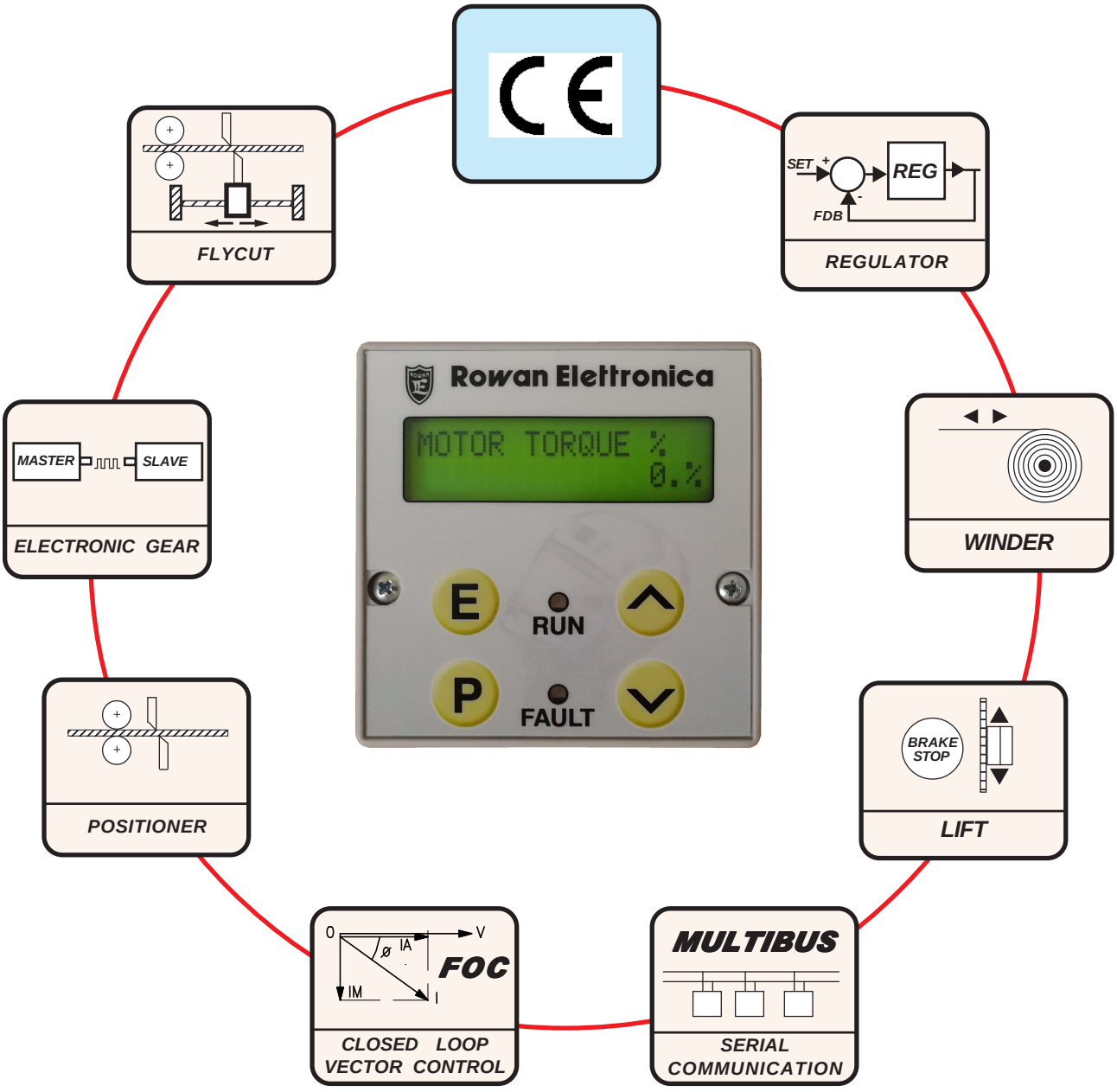
INVERTER SERIE 700

(BRUSHLESS SYNCHRONOUS VECTOR DRIVE)



Rowan Elettronica
Motors, actuators, accessories and services for automation
Via Ugo Foscolo, 20 - 36030 CALDOGNO (VICENZA) - ITALY
Phone: 0444 - 905566 Fax: 0444 - 905593
Email: info@rowan.it http:// www.rowan.it
Share Capital Euro 78.000,00 v.i.
registered to R.E.A of Vicenza to n.146091
Tax Identification / VAT and Business Register No. IT 00673770244

The **POSITIONER** function available for the C700A series has the specific manual **MANU.400A**. You can REQUEST by mailing to info@rowan.it or call directly to Rowan Elettronica s.r.l.

To get more detailed characteristics of the Rowan Brushless AC servomotors, you can download the catalog in the download area from our website **www.rowan.it**

Attention! → ***Missing chapters are found in the manual MANU.700S QUICKSTART.***

Chapter 8: TERMINAL BOARD DESCRIPTION ..... ***pages 4-8***
- Power terminal board description ..... page 4
- Standard terminal board for signals description ..... page 4
- Optional card-edge connectors description ..... page 8

Chapter 9: PARAMETERS AND VISUALISATIONS ..... ***pages 9-62***
- Menu complete structure ..... page 9
- DISPLAY STATUS description ..... page 10
- BASIC DATA MENU description ..... page 11
- BASIC DATA MENU in DEFAULT mode ..... page 11
- BASIC DATA MENU in OPERATOR mode ..... page 12
- Groups and menu description **1. MOTOR CONTROL** ..... ***pages 12-33***
- Menu parameters description 1.1 INV/MOTOR DATA ..... page 13
- Menu parameters description 1.2 SPEED RAMP ..... page 14
- Menu parameters description 1.3 SPEED LIMIT ..... page 16
- Menu parameters description 1.4 TEST MANUAL ..... page 16
- Menu parameters description 1.5 VOLTS/Hz CONTROL ..... page 16
- Menu parameters description 1.6 ENCODER VECTOR ..... page 22
- Menu parameters description 1.7 PARAM ESTIMATION ..... page 24
- Menu parameters description 1.8 POWER LOSS CNTR ..... page 25
- Menu parameters description 1.9 I1 FUNCTION ..... page 26
- Menu parameters description 1.10 TORQUE CONTROL ..... page 28
- Menu parameters description 1.11 CURRENT CONTROL ..... page 31
- Menu parameters description 1.12 PWM GENERATOR ..... page 31
- Menu parameters description 1.13 BRAKE UNIT ..... page 32
- Menu parameters description 1.14 STALL FAULT ..... page 32
- Menu parameters description 1.15 AUTORESTART ..... page 32
- Menu parameters description 1.16 DC BRAKING (INACTIVE) ..... page 33
- **Groups and menu description 2. DISPLAY VARIABLE** ..... **pages 34-41**
- Menu visualisations description 2.1 GENERAL VARIABLE ..... page 34
- Menu parameters description 2.2 DEFAULT DISPLAY ..... page 39
- Menu visualisations description 2.3 FAULT HISTORY ..... page 40
- Menu parameters description 2.4 SETUP OPERATOR. ..... page 41
- **Groups and menu description 3. APPLICATIONS** ..... **pages 41-48**
- Groups and menu description **3.1 SPEED** ..... **page 42**
- Menu parameters description 3.1.1 SPEED COMMANDS ..... page 42
- Menu parameters description 3.1.2 SPEED MAX ..... page 43
- Menu parameters description 3.1.3 SPEED THRESHOLD ..... page 43
- Menu parameters description 3.1.4 MANUAL ..... page 44
- Menu parameters description 3.1.5 MOTOPOTENTIOM ..... page 45
- Menu parameters description 3.1.6 FIXED SPEED ..... page 45
- Menu parameters description 3.1.7 FIXED ACC. RAMPS ..... page 46
- Menu parameters description 3.1.8 FIXED DEC. RAMPS ..... page 47
- Menu parameters description 3.1.9 MANUAL OPERATOR ..... page 48
- Menu parameters description 3.1.10 SPECIAL FUNCTION (INACTIVE) ..... page 48
- **Groups and menu description 4. SET UP IN/OUT** ..... **pages 49-56**

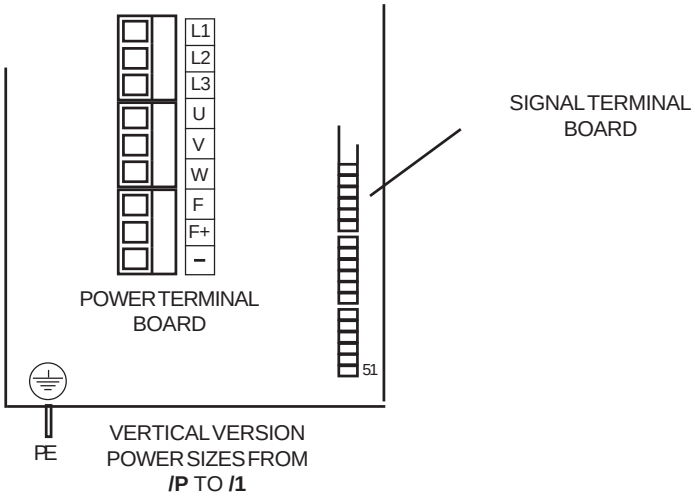
(For function assignations to I/O resources, read Chapter 14:
Function assignations to analog and digital INPUT/OUTPUT resources")
- Menu parameters description 4.1 DIGITAL INPUT ..... page 49
- Menu parameters description 4.2 DIGITAL OUTPUT ..... page 50
- Groups and menu description **4.3 ANALOG INPUT** ..... **pages 50-53**
- Menu parameters description 4.3.1 ANALOG INPUT AI1 ..... page 51
- Menu parameters description 4.3.2 ANALOG INPUT AI2 ..... page 51
- Menu parameters description 4.3.3 ANALOG INPUT AI3 ..... page 51
- Menu parameters description 4.3.4 ANALOG INPUT AI4 ..... page 52
- Menu parameters description 4.3.5 ANALOG INPUT AI5 ..... page 52
- Menu parameters description 4.3.6 ANALOG INPUT AI6 ..... page 52
- Menu parameters description 4.3.7 ANALOG INPUT AI7 ..... page 53
- Menu parameters description 4.3.8 ANALOG INPUT AI8 ..... page 53
- Menu parameters description 4.3.9 ANALOG INPUT AI9 ..... page 53
- Groups and menu description **4.4 ANALOG OUTPUT** ..... **pages 54-56**
- Menu parameters description 4.4.1 OUTPUT VARIABLES ..... page 54
- Menu parameters description 4.4.2 ANALOG OUTPUT AO0 ..... page 55
- Menu parameters description 4.4.3 ANALOG OUTPUT AO1 ..... page 55
- Menu parameters description 4.4.4 ANALOG OUTPUT AO2 ..... page 56
- Menu parameters description 4.4.5 ANALOG OUTPUT AO3 ..... page 56
- Analogue output answer times and example for assignation to variables ..... page 56
- Groups and menu description **5. SERIAL COMUNICAT** ..... **pages 57-59**
- Groups and menu description 5.2 MODBUS CONFIG ..... page 57
- Groups and menu description 5.3 ANYBUS CONFIG ..... page 58
- Parameter description **5.4 IN LOCAL RUN** ..... page 59

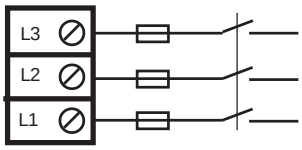
*Complete description in the manual enclosed: **INVERTER SERIES 400 SERIAL TRANSMISSION: MANU.400TS***
- ***Menu 100. parameters description*** ..... ***pages 60-62***

Chapter 18: INVERTER SETUP PARAMETERS FOR SERVOMOTORS BRUSHLESS AC ..... pag. 63-64

Attention! This manual is updated to the inverter C400 firmware version: **2502XX.XX**

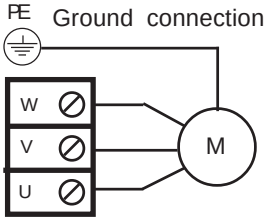
Power terminal board description



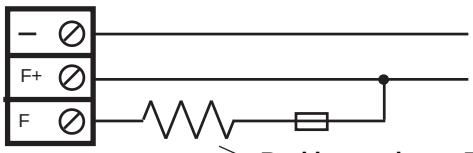


THREEPHASE FEEDING.

For protection fuses values, see the “Electric and power characteristics summary tables for the inverter Series 700” in Chapter 4: TECHINCAL FEATURES.



Threephase asynchronous motor connection



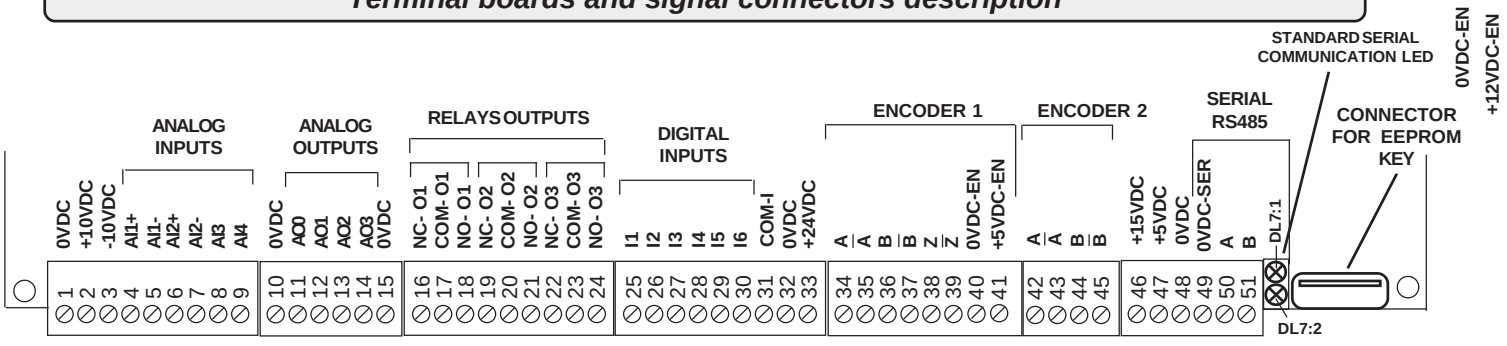
busdc negative

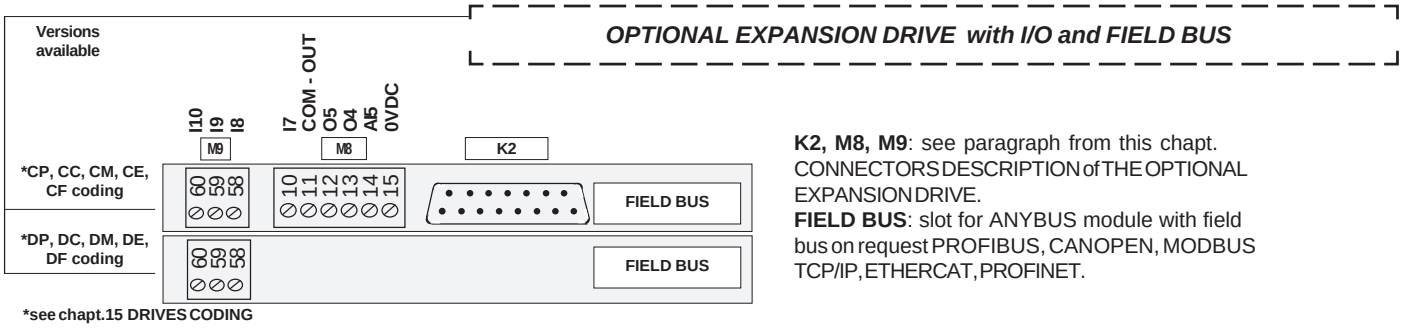
busdc positive

Useful connections for BUS DC common to other inverters (through suitable protection fuse).

Braking resistor. For the protection fuse value, see the tables in Chapter 7: BRAKING RESISTORS.

Terminal boards and signal connectors description





K2, M8, M9: see paragraph from this chapt. CONNECTORS DESCRIPTION of THE OPTIONAL EXPANSION DRIVE.

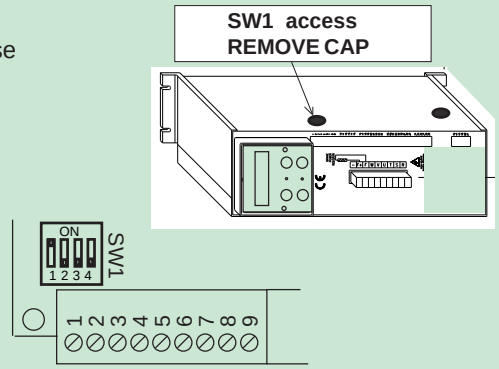
FIELD BUS: slot for ANYBUS module with field bus on request PROFIBUS, CANOPEN, MODBUS TCP/IP, ETHERCAT, PROFINET.

0VDC	1	Common Negative
+10VDC	2	Voltage reference for external potentiometers +10Vdc/10mA
-10VDC	3	Voltage reference for external potentiometers -10Vdc/10mA
AI1+	4	**10Vdc differential** analog input, programmable, 14 bit resolution.
AI1-	5	Standard setup: 0/+10VDC input (**par. 4.3.1.3 TYPE INPUT= 0/+10V**) Standard function: SPEED REFERENCE (**par. 3.1.1.1 SPEED SOURCE= AI1**)
AI2+	6	+/-**10Vdc, 0-20mA, 4-20mA differential** analog input, programmable, 12 bit resolution.
AI2-	7	Standard setup: 4-20mA input (**par. 4.3.2.3 TYPE INPUT= 4/20mA**) Standard function: NONE

It is possible to set AI2 input for a 0Vdc/+10Vdc or +/-10Vdc voltage input; in order to do so, it is necessary to set SW1 (1, 2, 3) microswitches which are inner the inverter. The standard setup is for 0-20mA, 4-20mAinput, with micro 1 ON, micro 2 OFF, micro 3 OFF.

To change the input setup, you must follow the instructions below:

- if inverter /P to /L sizes remove the cap as shown in the pitcure otherwise remove the drive covering for inverter /2.
- Set micro 1 OFF, micro 2 ON, micro 3 ON.
- Set **par. 4.3.2.3 TYPE INPUT= 0/+10V**, if you have a 0Vdc/+10Vdc signal.
- Set **par. 4.3.2.3 TYPE INPUT= -10/+10V**, if you have a -10Vdc/+10Vdc signal.
- Set the offset again following **par. 4.3.2.2 OFFSET** and the full-scale range following **par. 4.3.2.1 SCALE**, for the correct setup.



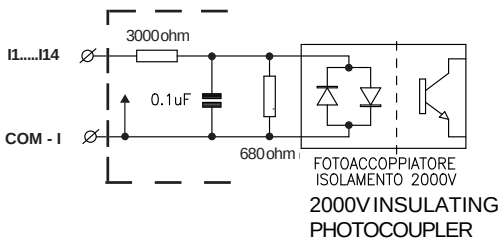
Leave out the cover form the inverter just in case of lack of supply and only when the continuos voltage between terminal (F+) and terminal (-) is lower than 50Vdc.

Before handling the card, provide for discharging yourself electrostatically; a lot of components may be damage by electrostatic discharges (ESD).
Select only the microswitches and avoid touching all other components.

0VDC	1	**+/-10Vdc non differential** analog input, programmable, 12 bit resolution.
AI3	8	Default setup: 0/+10VDC input (**par. 4.3.3.3 TYPE INPUT= 0/+10V**) Default function: TORQUE REFERENCE (**par. 1.10.2 TORQUE SOURCE=AI3**) enabled in case of vector control.
0VDC	1	**+/-10Vdc non differential** analog input, programmable, 12 bit resolution.
AI4	9	Default setup: 0/+10VDC input (**par. 4.3.3.3 TYPE INPUT= 0/+10V**) Default function: NONE
0VDC	10	Common negative
0VDC	10	**+/-10Vdc** analog output, programmable, 12 bit resolution.
AO0	11	Default setup: +/- 10VDC output (**par. 4.4.2.4 TYPE OUTPUT= DIRECT**) Default function: MOTOR CURRENT (**par. 4.4.2.1 VAR DISPLAY=1**)
0VDC	10	**+/-10Vdc** analog output, programmable, 12 bit resolution.
AO1	12	Default setup: +/- 10VDC output (**par. 4.4.2.4 TYPE OUTPUT= DIRECT**) Default function: MOTOR CURRENT (**par. 4.4.2.1 VAR DISPLAY=3**)
0VDC	15	**+/-10Vdc** analog output, programmable, 8 bit resolution.
AO2	13	Default setup: +/- 10VDC output (**par. 4.4.4.4 TYPE OUTPUT= DIRECT**) Default function: MOTOR SPEED (**par. 4.4.4.1 VAR DISPLAY =*3***)
0VDC	15	**+/-10Vdc** analog output, programmable, 8 bit resolution.
AO3	14	Default setup: +/- 10VDC output (**par. 4.4.5.4 TYPE OUTPUT= DIRECT**) Default function: MOTOR TORQUE (**par. 4.4.5.1 VAR DISPLAY= 5**)
0VDC	15	Common negative

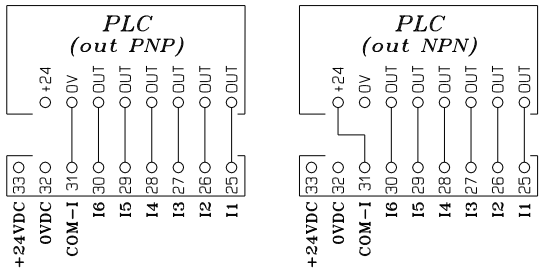
NC- O1	16	**O1 relay** programmable digital output contact. Contact current-carrying capacity 0,5A-120Vac/ 2A-30Vdc. Default function: MOTOR SPEED THRESHOLD (0 RELAY) (**par. 3.1.3.3 OUT THRESHOLD1= O1**) Relay ON with motor speed over the threshold in **par. 3.1.3.1 SPEED THRESHOLD1** Relay OFF with motor speed under the threshold in **par. 3.1.3.1 SPEED THRESHOLD1**
COM - O1	17	
NO - O1	18	
NC- O2	19	**O2 relay** programmable digital output contact. Contact current-carrying capacity 0,5A-120Vac/ 2A-30Vdc. Default function:INVERTER IN FAULT (**par. 1.9.5 OUT FAULT= O2**) Relay ON for normal functioning, OFF for inverter in fault. **When feeding the inverter, the relay displays OFF for about 3sec, then it displays OFF in absence of FAULTS**
COM - O2	20	
NO - O2	21	
NC- O3	22	**O2 relay** programmable digital output contact. Contact current-carrying capacity 0,5A-120Vac/ 2A-30Vdc Default function: INVERTER RUN (**par. 1.9.4 OUT RUN= O3**) Relay ON for running inverter, OFF for inverter in OFF running or in fault.
COM - O3	23	
NO - O3	24	
I1	25	Non-programmable digital input with inverter RUN fixed function. **Even if this input is already active, the inverter starts running about 6sec after its power on**
I2	26	Programmable digital input Default function: STOP IN RAMP (**par. 3.1.1.2 IN STOP SPEED= I2**) Input OFF, the motor accelerates in ramp to reach the set speed. Input ON, the motor decelerates in ramp and then it keeps the stop position.
I3	27	Programmable digital input Default function: FIXED SPEEDS ACTIVATION (**par. 3.1.6.8 IN1 SPEED= I3**) For speeds activation, see Chapter 9: PARAMETERS AND VISUALIZATIONS, par. MENU PARAMETERS DESCRIPTION: **3.1.6 FIXED SPEED**
I4	28	Programmable digital input Default function: FIXED SPEEDS ACTIVATION (**par. 3.1.6.9 IN2 SPEED= I4**) For speeds activation, see Chapter 9: PARAMETERS AND VISUALIZATIONS, par. MENU PARAMETERS DESCRIPTION: **3.1.6 FIXED SPEED**
I5	29	Programmable digital input. Default function: FIXED 1 ACC. RAMP ACTIVATION (**par. 3.1.7.4 IN1 ACC= I5**) For fixed ramps activation, see Chapter 9: PARAMETERS AND VISUALIZATIONS, par. MENU PARAMETERS DESCRIPTION: **3.1.7 FIXED ACC. RAM**
I6	30	Programmable digital input Default function: FIXED 1 DEC. RAMP ACTIVATION (**par. 3.1.8.4 IN1 DEC= I6**) For fixed ramps activation, see Chapter 9: PARAMETERS AND VISUALIZATIONS, par. MENU PARAMETERS DESCRIPTION: **3.1.8 FIXED DEC. RAMPS**
COM-I	31	Digital inputs polarisation terminal Connect to positive if the inputs are to be connected with **NPN** logic Connect to negative if the inputs are to be connected with **PNP** logic
OVDC	32	Common negative
+24VDC	33	Positive +24VDC Digital inputs polarisation, +24VDC/250mA Protected by an auto-restore fuse operating at 650mA.

Electric drawing: inside of the digital input from I1 to I4



2000V INSULATING PHOTOCOUPLER

Connection example: digital inputs with external logics (PLC type)



A	34	A channel
$\overline{A}$	35	Negative A channel
B	36	B channel
$\overline{B}$	37	Negative B channel
Z	38	Z channel
$\overline{Z}$	39	Negative Z channel
OVDC-EN	40	Negative encoders 1,2 supply
+5VDC-EN	41	Positive encoders 1,2 supply

ENCODER 1 CONNECTION
Encoder mounted on the motor, in default setting for vector control.
LINE DRIVER type

Protected against short circuit by an auto restore fuse operating at 250mA

A	42	A channel
$\overline{A}$	43	Negative A channel
B	44	B channel
$\overline{B}$	45	Negative B channel

ENCODER 2 CONNECTION.
LINE DRIVER type

Caution!

The full load on the positive supply of the encoders (clamps 39, 45 e pin 11 of the connector K2) must never exceed 200mA.

- The standard encoder voltage output supply is +5Vdc;
- The standard encoder voltage input supply is +5Vdc

In case of vector control, it is possible to setup manually or by a non-programmed digital input, the feedback by ENCODER 1 or by ENCODER 2; this function can be set in **1.6.7 IN ENABLE ENC 2.** (See Chapter 9: PARAMETERS AND VISUALISATIONS, paragraph MENU PARAMETERS DESCRIPTION **1.6 ENCODER VECTOR**)

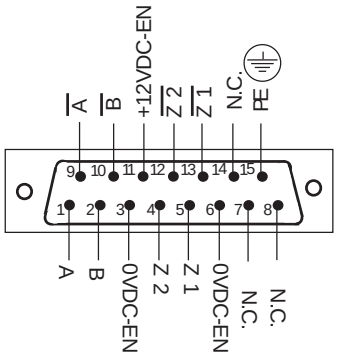
+15VDC	46	+15Vdc/200mA power supply for signal transducers
0VDC	48	Protected against short circuit by an auto-restore fuse operating at 250mA
+5VDC	47	+5Vdc/200mA power supply for signal transducers
0VDC	48	Protected against short circuit by an auto-restore fuse operating at 250mA
0VDC-SER	49	Serial RS485 common negative
A	50	Channel A serial line
B	51	Channel B serial line

RS485 SERIAL LINE CONNECTION ACCORDING TO MODBUS RTU. ROWAN standards. For the activation, see the menu parameters **5. SERIAL COMUNIC.** and its related "INSTRUCTION MANUAL FOR INVERTER 400 SERIAL CONNECTION"

USB CONNECTOR  USB CONNECTOR FOR PARAMETERS BIDIRECTIONAL TRANSFER FROM THE EEPROM KEY TO THE INVERTER AND VICEVERSA (See **Chapter 10: PARAMETER TRANSFER**)

Optional board connectors description

CONNECTOR K2
(ZEROS / ENCODER 3)



A	A channel	ENCODER 3 CONNECTION LINE DRIVER type
$\overline{A}$	Negative A channel	
B	B channel	
$\overline{B}$	Negative B channel	
Z 2	Z channel	ZERO ENCODER 2 OR PHASE SENSOR 2
$\overline{Z\ 2}$	Negative Z channel	
Z 1	Z channel	ZERO ENCODER 1 OR PHASE SENSOR 1
$\overline{Z\ 1}$	Negative Z channel	

0VDC-EN Encoders/sensors common negative

0VDC-EN Encoders/sensors common negative

+5VDC-EN Encoders/sensors supply positive 5Vdc.
Protected against short circuit by an auto-restore fuse operating at 250mA

PE Screened wire connection; the terminal is connected internally to the PE common mass point

N.C. Non connected pin

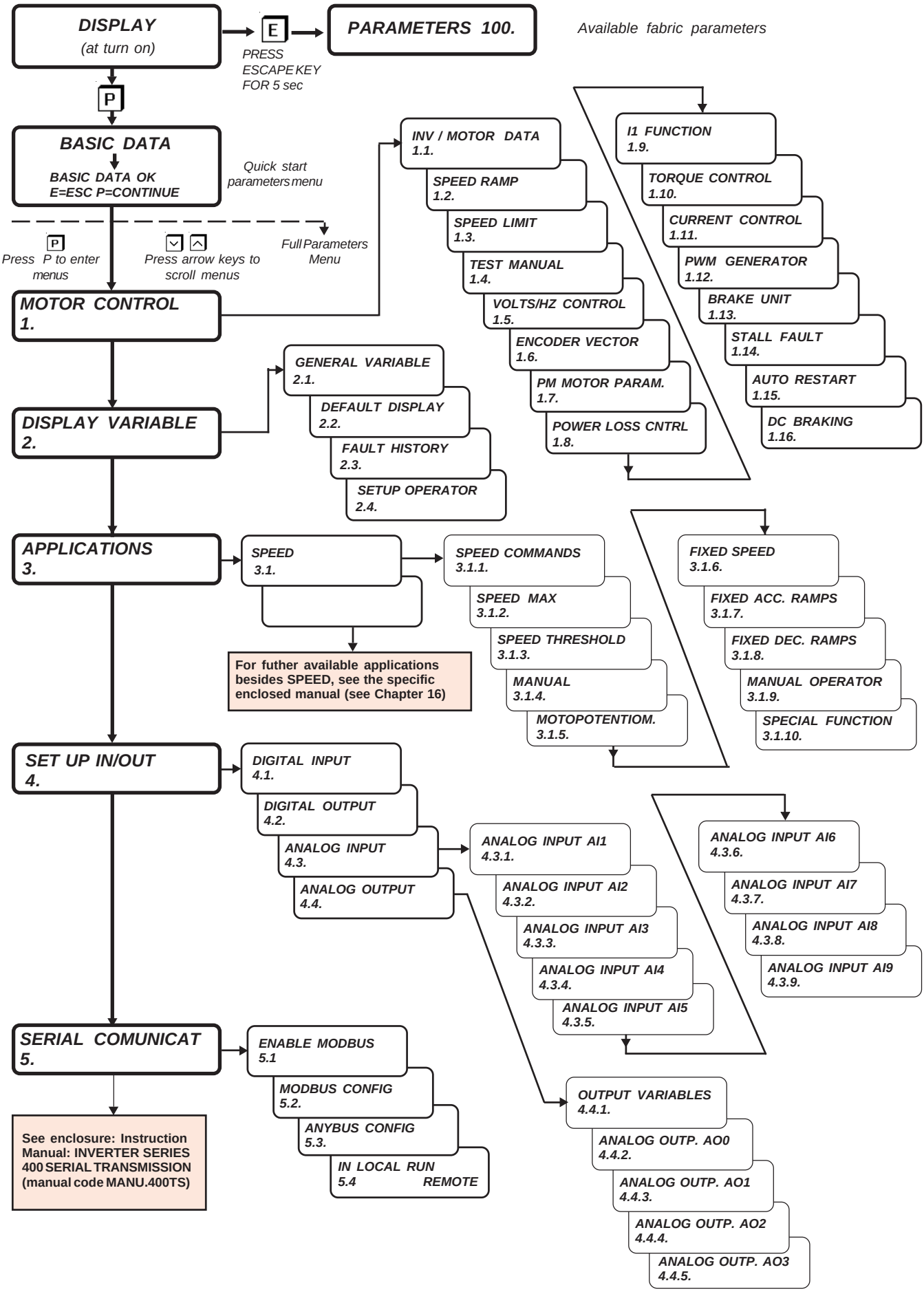
M8 connector 6 poles

I7	57	Digital input programmable. Default function: NONE
COM-OUT	56	Polarization clamp of the digital output - Connect the supply positive to activate the input in PNP logic - Connect the supply negative to activate the input in NPN logic
O5	49	Digital output programmable. NPN/PNP, max 100VDC/80mA. Default function: NONE
O4	50	Digital output programmable. NPN/PNP, max 100VDC/80mA. Default function: NONE
AI5	51	Analog input, **not differential +/-10Vdc**, programmable, resolution 10bit. Default setting: input 0/+10VDC (**par. 4.3.5.3 TYPE INPUT=0/+10V**) Defaut function: NONE
0VDC	49	Negative common

M9 connector 3 poles

I10	60	Hall probes input servomotor from encoder. See description Encoder wiring Chap. 17
I9	59	
I8	58	

Menus complete structure

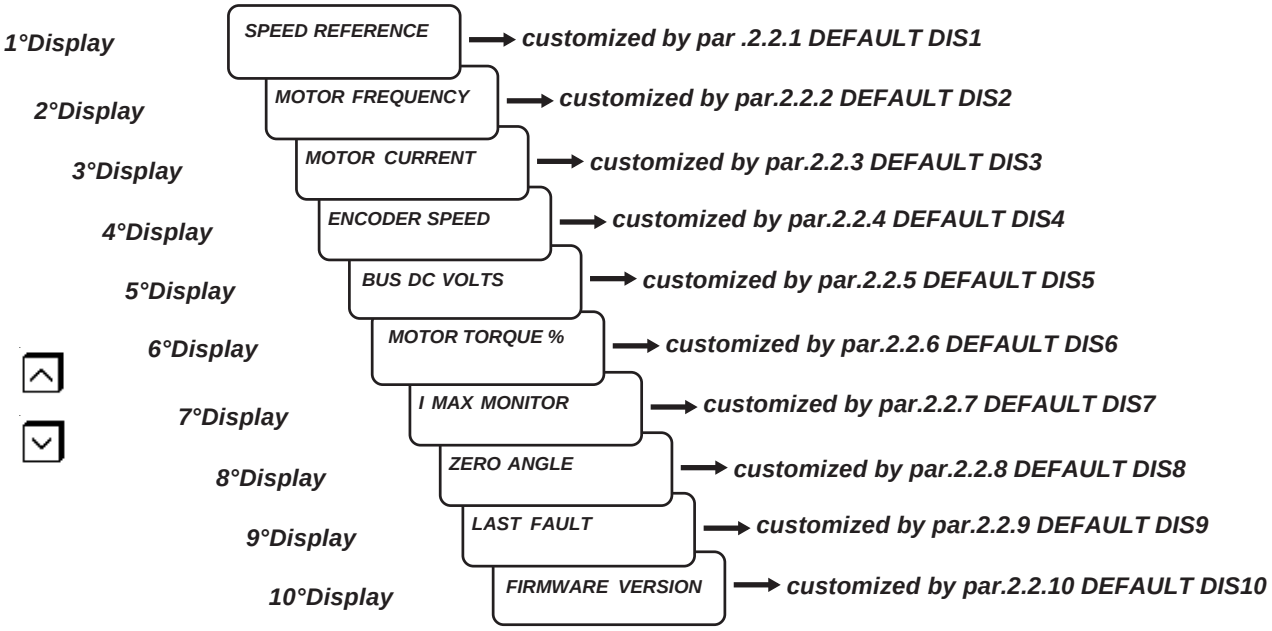


DISPLAY STATUS description

DISPLAY STATUS

It is the first status level the inverter displays when it is powered up and to which it always goes back by repeatedly pressing ESCAPE key during setup operations.

In DISPLAY STATUS, with standard setup, the following 10 variables from 2.1 DISPLAY VARIABLE menu are displayed:



Use UP and DOWN keys to scroll the variables

The last variabe displayed is always the one displayed when the inverter is powered up.

As for DEFAULT choice, the 10 variables can be changed by their related 10 parameters from 2.2 DEFAULT DISPLAY menu, by choosing among the visualisations from the 2.1 DISPLAY VARIABLE menu and those of the application enabled by par.100.5 APPLICATION.

Eg: If you want the third variable displayed in DISPLAY STATUS to be **2.1.16** LAST FAULT:
Set order nr **2.1.16** in par.2.2.3 DEFAULT DIS3.
As for the selection mode, see paragraph **Menu parameters description 2.2 DEFAULT DISPLAY**.

BASIC DATA MENU description

BASIC DATA — ***It includes the first group of parameters to be set after pressing PROGRAM key.***

BASIC DATA menu has 2 important functions:

In **DEFAULT** configuration, it includes the small group of basic parameters that enables the user to install the inverter in the shortest time, without scrolling all menus.

DEFAULT configuration can be activated in 2 ways, by **par. 100.3 MENU OPERATOR:**

- **par.100.3 MENU OPERATOR= DEFAULT**, besides BASIC DATA menu parameters, all parameters accessible.

- **par.100.3 MENU OPERATOR= BLOCK,** only BASIC DATA menu parameters are accessible, all further parameters are blocked.

In **OPERATOR** configuration, BASIC DATA menu is free for manual parameters **OPERATOR-type** setup, which is useful when the inverter keyboard is used as machine terminal.

OPERATOR configuration can be activated in 2 ways, by **par. 100.3 MENU OPERATOR:**

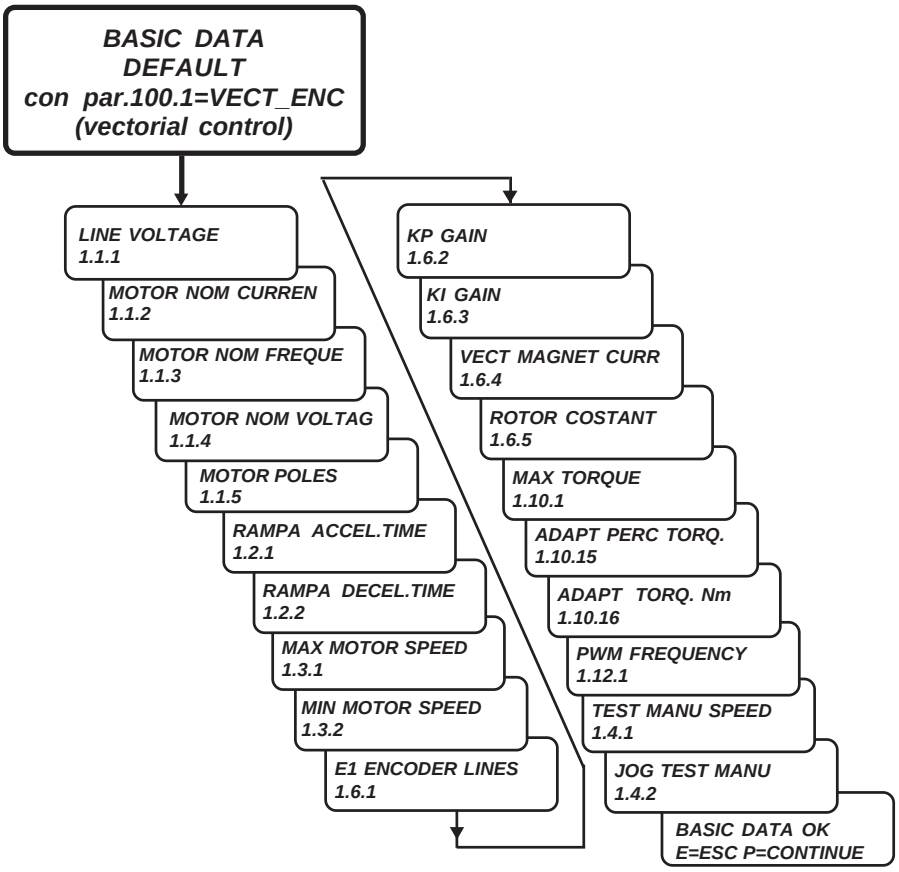
- **par.100.3 MENU OPERATOR=OPERATOR**, besides BASIC DATA menu parameters, all parameters accessible.

- **par.100.3 MENU OPERATOR= OP_BLOCK,** only BASIC DATA menu parameters are accessible, all further parameters are blocked.

• BASIC DATA MENU in DEFAULT mode

In **DEFAULT** configuration, BASIC DATA menu includes a selection of basic parameters that enables the inverter to work, without scrolling all menus; for this reason, they are used for the inverter quick installation, in scalar and vectorial mode, with the basic function of motor speed control by potentiometer.

The menu content depends on the type of motor control which has previousely been set in par. 100.1 MOTOR CONTROL TYPE.



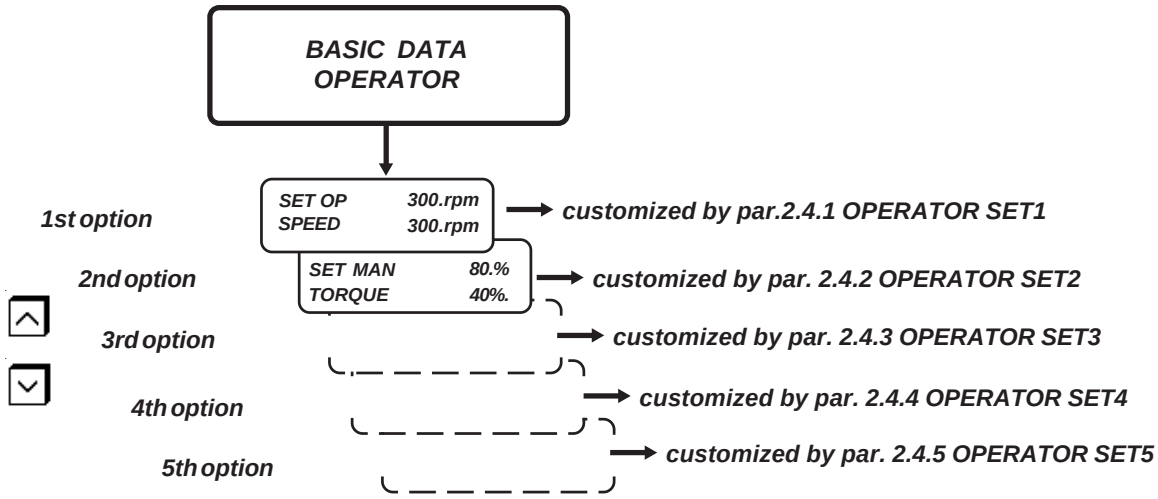
Caution !

BASIC DATA menu parameters are described even in **Chapter 3: QUICK INSTALLATION.**

BASIC DATA menu in OPERATOR configuration

When the keyboard is remoted to be used as manual setup terminal, it is useful to use the OPERATOR function, to customize BASIC DATA menu thanks to a parameter selection performed by the operator. This way, by pressing PROGRAM key, the user can enter the options he is interested in directly, without scrolling the menu.

BASIC DATA menu in OPERATOR function may include up to 5 setup parameters (operator set); in DEFAULT, just 2 parameters are enabled: OPERATOR SET1= par. 3.1.9.2, OPERATOR SET2= par.1.10.14.



These 5 options can be customized freely by **2.4 SETUP OPERATOR** menu parameters.

In parameters OPERATOR SET 1..2..3..4..5, the **order nr** of the chosen OPERATOR parameter must be set. By par. **2.4.6 ACTIVE SET OPER.**, the **max. nr** of parameters to be enabled in BASIC DATA menu must be selected.

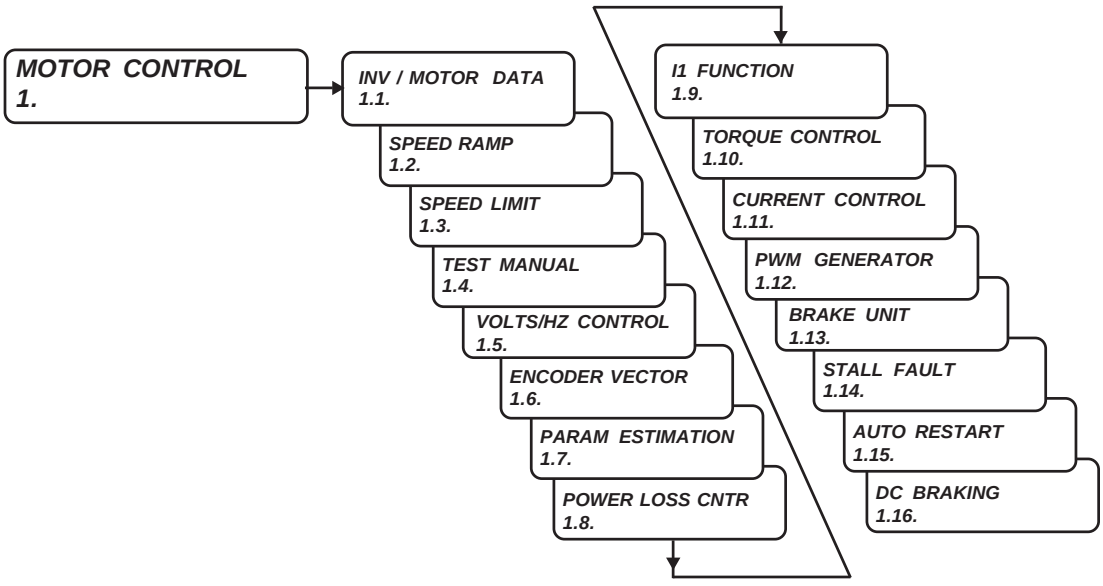
In DEFAULT: **par.2.4.1 OPERATOR SET1= 3.1.9.2**; **par.2.4.2 OPERATOR SET2= 1.10.14**; **par.2.4.6 ACTIVE SET OPER.= 2**.

For the selection mode, see paragraph in this Chapter:

Menu parameters description 2.4 SETUP OPERATOR

Menu structure diagram 1. MOTOR CONTROL

1. MOTOR CONTROL menu includes the menus of the motor plate parameters and of all setup regulating its functioning.



Menu parameters description 1.1. INV. MOTOR DATA

INV / MOTOR DATA
1.1.

Group of parameters including the plate data of the inverter and of the motor connected to U V W outputs.

LINE VOLTAGE
1.1.1 400.V

Supply voltage line connected to L1 L2 L3 terminals

Setup range: from 150V to 600V.

MOTOR NOM CURREN
1.1.2 10.0A

Motor nominal current.

Setup range: from 0.1A to the value set in a standard parameter

MOTOR NOM FREQUE
1.1.3 50.0Hz

Motor nominal frequency

Setup range: from 0.1 Hz to 800.0 Hz

MOTOR NOM VOLTAG
1.1.4 400.V

Motor nominal pover voltage

Setup range: from 1.V to 2000.0V

MOTOR POLES
1.1.5 4_POLES

Motor poles nr.

Setup range: 2_POLES, 4_POLES, 6_POLES, 8_POLES

NAMEPLATE SLIP
1.1.6 50. rpm

Motor plate power (INACTIVE)

Setup range from 0.rpm to 1000.rpm

This parameter is useful for the following functions:

- In scalar control, it is used to determine the min. rate slip speed (see **par.1.5.2 MIN SPEED % SLIP**).
- In vector control, it is used for slip compensation, if enabled by **par.1.5.17 SLIP COMPENSATION ENABLE= YES** (see Chapter 15, par. SLIP COMPENSATION FUNCTION)
- In scalar control, it is used for current quick limitation by the related parameter **1.5.11.3 PERC SLIP DEC** (see Chapter 15, par. QUICK MOTOR CURRENT LIMITING FUNCTION).

NAMEPLATE KWatt
1.1.7 4.00KW

Motor plate power

Setup range: from 0.00kW to 10000.00kW

NAMEPLATE COS (Ø)
1.1.8 0.730

Motor plate COS Ø. Motor nominal torque phase angle cosine function

Setup range: from 0 to 1000

This data is useful for the correct functioning of the slip compensation in scalar control, if enabled by **par.1.5.10 SLIP COMP ENABLE= YES**

MOTOR PTC AI4
1.1.9 10.00V

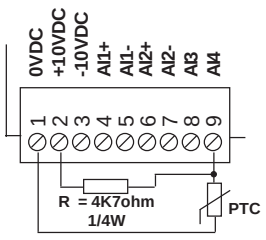
Overheating fault from thermal switch

Setup range: from 0.00V to 10.00V.
This fault is enable if setup value is below 10.00V; In case par.1.1.9 =10.00V the fault is disable, as factory default.
Thermal switch connection is from analogic input AI4 (terminal nr.9) therefore if this control is on, **AI4 cannot be used for other functions.**

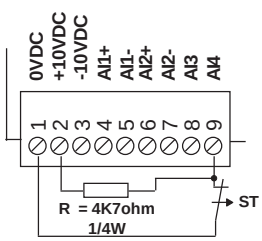
Typical layouts for thermal switch connection:

In both cases set par.1.1.9 = 3.50V.
When analogic input AI4 is over the setup voltage for more than a second, this fault will be on:

33 (MOTOR_PTC_OVER_TEMPERATURE)

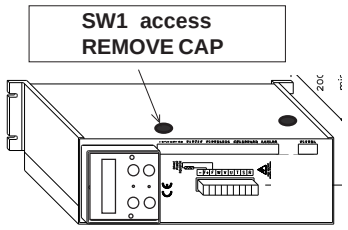


PTC Thermal switch



ON/OFF Contact Thermal switch

As an alternative to external resistor between terminals 2 and 9, we can close the microswitch N. 4 of SW1 on the internal card.
To access SW1, switch off the inverter and wait at least 5 min (for the capacitors to discharge high voltage) and open the cap as shown in the drawing.



MOTOR LOAD FUNC
1.1.10 NO

Allows higher limit torque in continuous duty if motor/inverter settings has rated frequency arounf 100 Hz

Setup range: NO, YES

NO: Function disabled, Max Torque is limited to rated value, through the I^2t overload control.

YES: Function enabled, Max Torque limit is increased of 25% of the rated torque, if the frequency is between 0Hz - 55Hz, over this value I^2t overload control intervenes. When frequency has value higher then 55Hz the torque limit is proportionally reduced from 25% to 0 at 100Hz.

Menu parameters description *1.2. SPEED RAMP*

SPEED RAMP
1.2.

Group of parameters with acceleration / deceleration ramps setup on the motor speed.

RAMP ACCEL. TIME
1.2.1 10.00s

Ramp acceleration time of the motor speed from 0 to 1500 rpm

Setup range: from 0.01s to 600.00s
Note: the time of ramp is proportional to the speed; at 3000 rpm the time is doubled.

RAMP DECEL. TIME
1.2.2 10.00s

Ramp deceleration time of the motor speed from 0 to 1500 rpm

Setup range: from 0.01s to 600.00s
Note: the time of ramp is proportional to the speed; at 3000 rpm the time is doubled.

ENABLE S RAMP
1.2.3 NO.

Enable S ramps on set speed

Settings: NO, YES
NO = linear ramps; ***YES*** = S ramps
The S ramps are obtained by rounding the linear ramps with a filter, with its filtration time set at **par. 1.2.4 ROUNDING FILTER.**
In practice the S ramps will have a duration equal to the sum of the ramp time set at parameters **par.1.2.1 RAMP ACCEL TIME** or **par.1.2.2 RAMP DECEL TIME**, plus the filtration time set at parameter **par.1.2.4 ROUNDING FILTER**.
To optimise the S ramp it is best to set **par.1.2.4 ROUNDING FILTER** equal to the ramp time to have to round.
The same setting is used both accelration and decelration ramps, so the value set has to be the shortest.

Caution !

If **par.1.3.1 MAX MOTOR SPEED** is greater than 6000rpm the "S" ramps are automatically disabled.
If S ramps are enabled or disabled during a ramp, the ramp continuity is always guaranteed (without discontinuity).
If parameter **par.1.8.1 ENABLE LOSS CNTR = YES** is enabled, when there is a voltage drop that triggers the speed drop control , the ramps are forced into linear even if **par.1.1.3 ENABLE S RAMP = YES**.
Since the S ramps are obtained by rounding the linear ramps with a filter a delay is created, which is dependent on **par.1.2.4 ROUNDING FILTER** so, if a stop is performed by digital input during an S ramp, the ramp speed does not start decelerating immediately as would happen with a linear ramp.
The S ramps can only be enabled with the SPEED application, linear ramps are performed for all other applications, even with **par.1.1.3 ENABLE S RAMP = YES**.

ROUNDING FILTER
1.2.4 30.00s

Linear ramp rounding filter time for S ramps

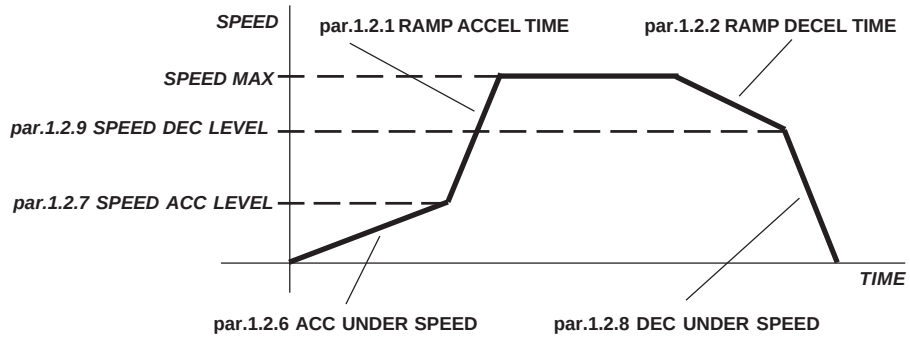
Settings: 0.01s to 300.00s.
The parameter is only enabled with **par.1.1.3 ENABLE S RAMP = YES** and only in the SPEED application.

FUNC. CHANGE RAMP	
1.2.5	NO.

Enable the facility of automatically selecting the ramp change on the set speed according to 2 programmable speed thresholds.

Settings: NO, YES
NO = the ramps on the set speed are given by **par.1.2.1 RAMP ACCEL TIME** and **par.1.2.2 RAMP DECEL TIME** or the ramps set in menu **3.1.7 FIXED ACC.RAMPS** or **3.1.8 FIXED DEC.RAMPS** if enabled by a digital input.
YES = the ramp change is enable in the following way (see graph):
In ACCELERATION:
- with speeds below the threshold set at **par.1.2.7 SPEED ACC LEVEL**, the enabled acceleration ramp is set at **par.1.2.6 ACC UNDER SPEED,** while with greater speeds, the enabled ramp is set at **par.1.2.1 RAMP ACCEL TIME** (or a ramp of menu **3.1.7 FIXED ACC.RAMPS** if selected).

In DECELERATION:
- with speeds below the threshold set at **par.1.2.9 SPEED DEC LEVEL**, the enabled deceleration ramp is set at **par.1.2.8 DEC UNDER SPEED,** while with greater speeds, the enabled ramp is set at **par.1.2.2 RAMP DECEL TIME** (or a ramp of menu **3.1.8 FIXED DEC.RAMPS** if selected).



Caution !

The rampechange function is only possible with the SPEED application (**par.100.5 APPLICATION=SPEED**), in SCALAR and VECTOR control.

ACC UNDER SPEED	
1.2.6	30.00s

Acceleration ramp time with motor speed under the threshold set at par.1.2.7 SPEED ACC LEVEL.

Settings: 0.01s to 600.00s
Rampa attiva only with **par.1.2.5 FUN CHANGE RAMP=YES**. (see description of parameter 1.2.5).

SPEED ACC LEVEL	
1.2.7	800.rpm

Set motor speed threshold for acceleration ramp change

Settings: 0.rpm to setting in ***par.1.3.1 MAX MOTOR SPEED.***
Ramp enabled only with **par.1.2.5 FUN CHANGE RAMP=YES**. (see description of parameter 1.2.5).
If 0 rpm is set the ramp change is disabled and the ramp at ***par.1.2.6 ACC UNDER SPEED*** is never performed.

DEC UNDER SPEED	
1.2.8	30.00s

Deceleration ramp time with motor speed under the threshold in par.1.2.9 SPEED DEC LEVEL.

Settings: 0.01s to 600.00s
Ramp enabled only with **par.1.2.5 FUN CHANGE RAMP=YES**.

SPEED DEC LEVEL	
1.2.9	800.rpm

Set motor speed threshold for deceleration ramp change

Settings: 0.rpm to setting in ***par.1.3.1 MAX MOTOR SPEED.***
Ramp enabled only with **par.1.2.5 FUN CHANGE RAMP=YES**. (see description of parameter 1.2.5).
By setting 0 rpm the ramp change is disabled and the ramp at **par.1.2.8 ACC UNDER SPEED** is never performed.

Menu parameters description 1.3. SPEED LIMIT

SPEED LIMIT
1.3.

Group of parameters with setup of the motor speed basic limits.

MAX MOTOR SPEED
1.3.1 1500.rpm

Max. motor speed.

Setup range: from 30.rpm to 24000rpm

MIN MOTOR SPEED
1.3.2 0.rpm

Min. motor speed.

Setup range: from 0.rpm to the value set in **par.1.3.1 MAX MOTOR SPEED.**

Caution!

By par.1.9.1 I1 SPEED STOP = YES, the min. speed setup by par.1.3.2 MIN MOTOR SPEED is no longer active, like it is set equal to 0.

Menu parameters description 1.4. TEST MANUAL

TEST MANUAL
1.4.

Group of parameters enabling the motor rotation test by the keyboard.

TEST MANU SPEED
1.4.1 300.rpm

Reference motor speed during the motor rotation test by the keyboard manual commands.

Setup range: from 0.rpm to the value set in **par.1.3.1 MAX MOTOR SPEED.**

JOG TEST MANU
1.4.2 NO

Enables the rotation test by the keyboard manual commands.

Select YES to enter the test; the following screen will be displayed:

UP=DX DOWN=SX
SPEED 0.rpm

- ***o perform the rotation test by UP and DOWN keys:***
  - Close the RUN contact the RUN light power on
  - Press UP and DOWN keys to rotate the motor in both directions.

  In SPEED, the motor speed will be displayed, which must correspond with the value set in par.1.4.1
- Press ESCAPE to end the rotation test by the keyboard manual commands. The display will return to par.1.4.2

Caution !

In applications different from SPEED, the rotation test is not possible.

Menu parameters description 1.5. VOLTS/Hz CONTROL

VOLTS/Hz CONTROL
1.5

Group of parameters regulating the V/F scalar control functioning.
FUNCTIONALITY NOT PROVIDED IN THE DRIVE C700

FIXED BOOST
1.5.1 10.0%

Boost power voltage applied to the motor in a permanent way.
In % on the L1 L2 L3 supply voltage line

Setup range: from 0.0% to 25.0%. The boost is active from 0.0Hz to 20.0Hz

To determine the best value to be indicated as boost voltage, in no-load condition adjust the motor speed just over the min. working speed VF MIN SPEED (see par.1.5.2 MIN SPEED % SLIP) and set in this parameter a value bringing the motor absorbed nominal current between ½ and ¾ of the nominal value.

MIN SPEED % SLIP
1.5.2 200.%

Parameter determining the min. working speed in V/F scalar control, below which rate is disabled.

Setup range: from 0.% to 500.% of the slip speed set in par.1.1.6 NAMEPLATE SLIP.

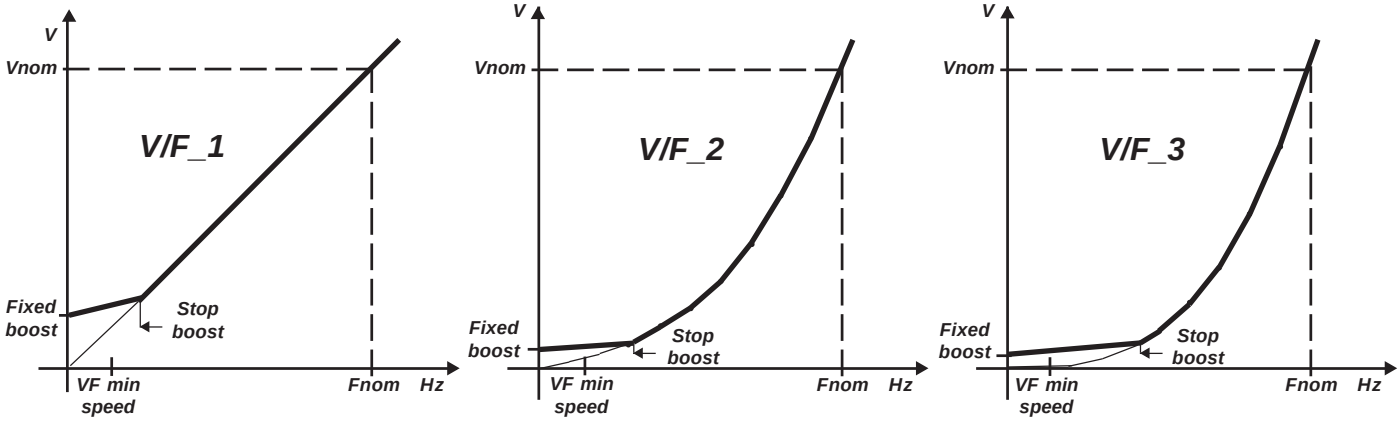
The min. working speed is calculated automatically as follows:

VFmin speed= (par.1.1.6 NAMEPLATE SLIP* par.1.5.2 MIN SPEED % SLIP)/100

V/F TYPE	
1.5.3	V/F_1

Selects 3 Voltage/Frequency features in V/F scalar control.

Setup range V/F_1, V/F_2, V/F_3 according to the features shown in the diagrams below:



Fnom= Motor nominal frequency set in **par.1.1.3 MOTOR NOM FREQUE** (motor plate data).
Vnom= Motor nominal voltage supply set in **par.1.1.4 MOTOR NOM VOLTAG** (motor plate data).
Fixed boost= Power voltage applied to the motor in a permanent way by **par.1.5.1 FIXED BOOST**; this power voltage is active from 0Hz to the frequency set in **par.1.5.4 STOP BOOST FREQ.** and it helps improving low speeds torque performance.
VF min speed= Frequency below which run is disabled; it is calculated automatically as follows:
VF min speed= (par.1.1.6 NAMEPLATE SLIP * par.1.5.2 MIN SPEED % SLIP) / 100.

Stop boost= Frequency to be set in **par.1.5.4 STOP BOOST FREQ.**, over which the set boosts in **par.1.5.1 FIXED BOOST** and **par.1.5.5 ACCELER BOOST** are reset.

STOP BOOST FREQ.	
1.5.4	25.0Hz

Motor frequency, above which the boost power voltages set in par.1.5.1 FIXED BOOST and par.1.5.4 ACCELER BOOST are cleared.

Setup range: from 10.0Hz to the value set in par.1.1.3 MOTOR NOM FREQUE.

Boost power voltages set in par. 1.5.1 FIXED BOOST and par.1.5.4 ACCELER BOOST are summed to the V/F curve to the frequency set in this parameter; this way, V/F curve boost can be fit more easily, not only in amplitude, but its frequency range as well

ACCELER BOOST	
1.5.5	0.0%

Boost power voltage applied to the motor only in acceleration phase.
In % on the L1 L2 L3 supply voltage line

Setup range: from 0.0% to 25.0%.

It is automatically enabled during an acceleration ramp from 0Hz to frequency value set in par. 1.5.4 STOP BOOST FREQ

ENABLE FLYING VF	
1.5.6	NO.

Enables the motor pick-up when the RUN commands is activated.

Setup range: NO, YES.

NO= Motor pick-up disabled; **YES**= Motor pick-up enabled

If the motor pick-up is enabled, the activation of the run command is postponed by 5sec.

SLIP COMP ENABLE	
1.5.7	NO.

Enables the motor slip compensation

Setup range: NO, YES.
NO= compensation disabled; **YES**= compensation enabled

NO LOAD I COS (Ø)	
1.5.8	3.0A

Current absorbed in no-load motor multiplied for phase angle cosine function.

Setup range: from 0.1A to 3000.0A.
This parameter is useful for the correct functioning of the motor slip compensation.
The value to be set is calculated as follows:
Bring the motor in no-load condition reach its rated speed (e.g. 1500rpm) and read the the value displayed in var.2.1.11 I x COS(Ø); insert the displayed value in par.1.5.8.

OVERLOAD FUNC
1.5.9

Group of parameters which regulate the motor current SLOW limitation function in scalar V/F, (overload control). For details see also cap.15 "SLOW MOTOR CURRENT LIMITATION")

ENABLE OVERLOAD
.1 DISABLE.

Par. 1.5.9.1 Select overload control modality

Setup range:

DISABLE = Overload control disabled

ON/OFF = Overload control enabled with on/off modality on ramp, like C330 serie works.

REG_PI = Overload control by PI regulator enabled

MAX OVERLOAD CUR
1.5.5 300.0%

Max. overload current in % on the motor nominal current set in par.1.1.2 MOTOR NOM CUR.

Setup range: from 100.0% to 300.0%.
When the motor current get over the value set in this parameter, the overload managing starts.
If you set the parameter at 300.0%, the overload control is disabled, as well as parameter 1.5.9.1 ENABLE OVERLOAD=DISABLE.

MIN OVERLOAD SPE
.3 300.rpm

Par. 1.5.9.3. Min. speed in overload control

Setup range: from 0.rpm to the value set in par.1.3.1 MAX MOTOR SPEED.

DEC.RAMP.OVERLO.
.4 10.00s

Par.1.5.9.4. Deceleration ramp in overload control

Setup range: from 0.1s to 300.00s.

This parameter is always on even if par.1.5.9.1 ENABLE OVERLOAD = REG_PI.

KP REG OVERLOAD
.5 20.

Par.1.5.9.5 PI regulator proportional gain in overload control

Setup range: from 0. to 250. (advised value= 1000.)

This parameter is on only if par.1.5.9.1 ENABLE OVERLOAD = REG_PI.

KI REG OVERLOAD
.6 10.

Par.1.5.12.7 PI regulator integral gain in overload control

Setup range: from 0. to 250.

This parameter is on only if par.1.5.9.1 ENABLE OVERLOAD = REG_PI.

MIN SPEED TIME
.7 0.0s

Par.1.5.9.7 Max time at minimum speed in overload control

Setup range: from 0.0s to 1800.0s.

MIN SPEED UNLOCK
.8 REMOTE.

Par.1.5.9.8 Unlock the minimum speed limit during the overload control.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE = Command is OFF and there's no assigned digital input. Command is ON only with apposite serial flag.

I2 ... I14 = Command is assigned to the selected digital input (in OR with apposite serial flag).

ENABLE = Command is ALWAYS ON.

Command ON unlocks minimum speed status.
Note: On vector control (par.100.1= VECT_ENC) this command has a different function:
- when the command is ON, the KI gain set in par.1.6.3 KI GAIN is forced to 0;
- when the command is OFF the KI gain is get back to the original value set in par.1.6.3 KI GAIN.

Caution !

OVERLOAD CONTROL WARMINGS

Overload control works together with HIGH TORQUE function (1.5.10 Menu: HIGH TORQUE FUNC):

- If Par 1.5.10.4 HT OVERL. SPEED = 0 or is equal / lower than **VF min speed**, overload control is always on.

- If Par 1.5.10.4 HT OVERL. SPEED is greater than **VF min speed**, overload control is on when speed set is greater than par.1.5.10.4 HT OVERL. SPEED value.

Overload control works distincly from current quick limiting (1.5.11 menu CURRENT LIMIT); so these controls can work at the same time.

HIGH TORQUE FUNC
1.5.10

Group of parameters which regulate HIGH TORQUE function (Automatic BOOST) that increases starting torque in V/F SCALAR control.

PERC UP V/F
.1 6.0%

Par.1.5.10.1. Maximum BOOST voltage, by HIGH TORQUE control regulator. Value is expressed as percent of L1 - L2 - L3 values.

Setup range: from 0.0% to 25.0%

Automatic BOOST function is on for whole speed set range.

KP UP V/F
.2 10.

Par.1.5.10.2. HIGH TORQUE control regulator proportional gain.

Setup range: from 0. to 100.

If motor current is greater than nominal motor current, current error is amplified with this parameter value in proportion, regulator output is saturated (Volts) by par. 1.5.10.1 PERC UP V/F; this amount is added to V/F curve.

Examples of possible gains are the following:

KP = 1	200% of Nominal Current increases motor voltage of +1.0%
KP = 1	110% of Nominal Current increases motor voltage of +0.1%
KP = 1	100% of Nominal Current increases motor voltage of +0.0%
KP = 10	200% of Nominal Current increases motor voltage of +10.0%
KP = 10	110% of Nominal Current increases motor voltage of +1.0%
KP = 10	100% of Nominal Current increases motor voltage of +0.0%
KP = 100	200% of Nominal Current increases motor voltage of +100.0%
KP = 100	110% of Nominal Current increases motor voltage of +10.0%
KP = 100	100% of Nominal Current increases motor voltage of +0.0%

HT MAX TIME MSEC
.3 10.000s

Par.1.5.10.3. Automatic BOOST maximum duration.

Setup range: from 0.000s to 30.000s.

If V/F SCALAR control with HT function is on, this parameter limits the maximum BOOST duration on V/F voltage, once this limit has expired, voltage returns on the V/F curve even if the absorbed motor current isn't lower than nominal current. Furthermore, before HT function will be newly available, the corresponding Par. 1.5.10.3 HT MAX TIME MSEC time has to run on.

HT OVERL. SPEED
.4 1300rpm

Par.1.5.10.4. Speed reference for HIGH TORQUE and OVERLOAD controls.

Setup range: from 0rpm to 30000rpm.

Using this setting and par. 1.5.10.5 SPEED DISABLE HT, you can determine these HIGH TORQUE FUNC in SCALAR V/F Control functions:

-If HT OVERL. SPEED = 0 or <= **VF min speed** (see also par.1.5.3 V/F TYPE), HIGH TORQUE FUNC and OVERLOAD FUNC are always ON (see also par.1.5.9 OVERLOAD FUNC).

-If HT OVERL. SPEED > **VF min speed** and par.1.5.10.5 SPEED DISABLE HT = YES, at start OVERLOAD FUNC is off but HIGH TORQUE FUNC is on. Once the speed ramp is greater than HT OVERL. SPEED, OVERLOAD FUNC will be on, instead HIGH TORQUE FUNC will be off.

-If HT OVERL. SPEED > **VF min speed** and par.1.5.10.5 SPEED DISABLE HT = NO, at start OVERLOAD FUNC is off but HIGH TORQUE FUNC is on. Once the speed ramp is greater than HT OVERL. SPEED, OVERLOAD func DECREASE will be on and, at the same time, HIGH TORQUE FUNC will be on too.

SPEED DISABLE HT
.5 YES

Par.1.5.10.5. See also par 1.5.10.4 HT OVERL. SPEED

Setup range: YES - NO.

Caution !

- An important parameter for the full efficiency of HT function is par.1.5.1 FIXED BOOST, which is the permanent voltage on motor. We suggest to put the motor on slightly over th minimum speed without load and set this value to keep the absorbed current between 1/2 and 3/4 of nominal current.

- For HT - HIGH TORQUE function details see also **Chap.15 par. "TORQUE AUGMENTATION (HIGH TORQUE)"**

CURRENT LIMIT
1.5.11

Group of parameters which regulate the quick current limitation function in SCALAR control, both in Acceleration Ramp and in steady state.

MOD I LIM RAMP
.1 StopRAMP.

Par.1.5.11.1 selects the current limitation function mode in acceleration ramp, in scalar control.

Setup range: DISABLE, STOP_RAMP, PI_RAMP

DISABLE= current limitation function in acceleration ramp, disabled.

STOP_RAMP= when the current value is higher than the value set in par.1.5.11.2 Imax ACC RAMP, the speed ramp is slowed 10 times down and, if par.1.5.11.3 PERC SLIP DEC is different from 0, the frequency set (speed reference) is derated for one speed defined through: (1.1.6 NAMEPLATE SLIP* 1.5.11.3 PERC SLIP DEC)/ 100.
PI_RAMP= when the current is higher than the value set in par.1.5.11.2 Imax ACC RAMP, the PI regulator is enabled; the regulator output is taken off from the speed set when the acceleration ramp is ended.

Caution !

In any case, with the current limitation function enabled, the speed set can decrease to max. **VF min speed**, so the motor goes on working at the lowest speed (below **VF min speed**, run is disabled).

Imax ACC RAMP
.2 10.0A

Par. 1.5.11.2 Max limits of the motor current in Acceleration ramp.

Setup range: from 0.1A to the value set in a default parameter.

The limitation is enabled only by par.1.5.11.1 MOD I LIM RAMP= STOP_RAMP or PI_RAMP.

Par. 1.5.11.1 MOD I LIM RAMP has NO effect on BOOST limiter control set by par. 1.5.11.8 KP Imax BOOST and par.1.5.11.9 KI Imax BOOST).

PERC SLIP DEC
.3 50.%

Par.1.5.11.3 determines the speed reduction in current limitation mode set by par.1.5.11.1 MOD I LIM RAMP= STOP_RAMP.

Setup range: from 0.% to 300% of the value set in par.1.1.6 NAMEPLATE SLIP.
The speed reduction takes place when the current value is higher than the value set in par.1.5.11.2 Imax ACC RAMP; at the same time the speed ramp growth is stopped. The speed reduction is defined:
(1.1.6 NAMEPLATE SLIP * 1.5.11.3 PERC SLIP DEC)/ 100

MOD I LIM STEADY
.4 PI_REG

Par.1.5.11.4 selects the current limitation function mode in steady state.

Setup range: DISABLE, PI_REG
DISABLE= current limitation function, while motor is running in steady state condition in scalar mode, disabled.
PI_REG= when the speed set acceleration ramp is over and the current value is higher than the value set in par.1.5.11.5 Imax STEADY, PI regulator is enabled.

Imax STEADY
.5 15.0A

Par.1.5.11.5 limits the max. current of the motor running in steady state.

Setup range: from 0.1A to the value set in a default parameter.

The limitation is enabled only by par.1.5.12.4 MOD I LIM STEADY= PI_REG.

Par. 1.5.11.4 MOD I LIM STEADY has NO effect on BOOST limiter control set by par. 1.5.11.8 KP Imax BOOST and par.1.5.11.9 KI Imax BOOST).

KP REG PI
.6 1000.

Par.1.5.11.6 PI regulator proportional gain for the limitation of the current in acceleration ramp and in steady state functioning.

Setup range: from 0. to 1000. (suggested value= 1000.)
In case of too high KP values, when the current value is exceeding, the speed decreases too much and the control may start oscillating; In case of too low KP values, when the current value is exceeding, the speed decreases too little and the current may cause the inverter stop for FAULT1 (MAX PEAK CURRENT).

KI REG PI
.7 1.

Par.1.5.11.7 PI regulator integral gain for the limitation of the current in acceleration ramp and in steady state functioning.

Setup range: from 0. to 1000. (advised value= 1.)
In case of too high KI values, when the current value is exceeding, the speed decreases too much and the control may start oscillating; In case of too low KI values, when the current value is exceeding, the speeed decreases too slowly and the current may cause the inverter stop for FAULT1 (MAX PEAK CURRENT).

Caution !

CURRENT QUICK LIMITING WARNINGS

Current quick limiting works distincly from Overload control (1.5.9 OVERLOAD FUNCT); so these controls can work at the same time

KP Imax BOOST	
.9	300

Par.1.5.11.8 PI regulator proportional gain for BOOST voltage limitation function, in ACCELERATION and in steady state functioning, when Imax is passed.

Setup range: from 0. to 1000.

KI Imax BOOST	
.9	50

Par.1.5.11.9 PI regulator integral gain for BOOST voltage limitation function, in ACCELERATION and in steady state functioning, when Imax is passed.

Setup range: from 0. to 1000.

NOTES ON THE BOOST VOLTAGE LIMITATION

It is realized with a regulator lowing the boost voltage (sum of all possible voltage boosts) in order to avoid getting over the maximum set current. The limitation is done by par. 1.5.11.2 Imax ACC RAMP during the acceleration and by par. 1.5.11.5 Imax STEADY in steady-state conditions.
You can disable the function by setting par.1.5.11.9 KI Imax BOOST = 0.

SPEED JUMP
1.5.12

Group of parameters which determines two speed sets into which motor stop is forbidden both in SCALAR V/F and VECTOR (Encoder) mode

JUMP SET1	
..12.1	0.rpm

Par.1.5.12.1 First speed set to be skipped

Setup range: 0.rpm to 24000.rpm
speed value is absolute, its direction is not relevant.

JUMP SET2	
..12.2	0.rpm

Par.1.5.12.2 Second speed set to be skipped

Setup range: 0.rpm to 24000.rpm
speed value is absolute, its direction is not relevant.

JUMP BAND	
..12.3	0.rpm

Par.1.5.12.3 Hysteresis range around the frequency to be skipped

Setup range: 0.rpm to 600.rpm
speed value is absolute, its direction is not relevant.
if it is set = 0, speed jump functions is disable

SPEED JUMP NOTE:

These functions are really useful to skip certain speed ranges which may cause resonance disturbs to the mechanical transmission. These specific ranges can be performed during a ramp anyway.
To avoid oscillations around the speed to be jumped, set par.1.5.12.1 JUMP SET1 and par.1.5.12.2 JUMP SET2 and raise the hysteresis by par.1.5.12.3 JUMP BAND. To disable the jumps, set par.1.5.12.3 JUMP BAND=0.

Menu parameters description 1.6. VECTOR ENCODER

ENCODER VECTOR 1.6

Group of parameters regulating the vector control functioning.

E1 ENCODER LINES 1.6.1 2000.

ENCODER 1 pulse per revolution number

Setup range: from 1. to 5000. pulses/r

Caution ! → At the motor fastest rate, the encoder pulse frequency can't exceed 125KHz.

KP GAIN 1.6.2 25.

KP proportional gain of the motor speed regulator.

Setup range: from 0. to 100
-KP GAIN = 0 proporzional gain excluded
-KP GAIN = 100 proportional gain with the maximum precision of the speed control.

KI GAIN 1.6.3 25.

KI integral gain of the motor speed regulator.

Setup range: from 0. to 100
-KI GAIN = 0 integral gain excluded
-KI GAIN = 1 integral gain with slow response time
-KI GAIN = 100 integral gain with fast response time
Note: You can reset the integral gain by the programmable command in par.1.5.9.8 MIN SPEED UNLOCK:
- when the command is ON the gain is forced to 0 (and the visualization in this parameter too).
- when the command is OFF the gain is get back to the original value set in this parameter.

VECT MAGNET CUR 1.6.4 50.0%

Magnetization current of the motor in no-load conditions
In % to the motor nominal current set in par.1.1.2 MOTOR NOM CURREN.

Setup range: from 0.0% to 100.0%.

ROTOR CONSTANT 1.6.5 6.8Hz.

Represents the max. slip, at the max. current, of the vector control without any torque limitations enabled.

Setup range: from 0.0Hz to 150Hz

Caution ! → Regarding Inverter sizes to /D to /F, you must multiply the actual value 16 time.

E2 ENCODER LINES 1.6.6 1000.

ENCODER 2 pulse per revolution number

Setup range: from 1. to 5000. pulses/r

Caution ! → At the encoder fastest rate, the pulse frequency can't exceed 125KHz.

IN ENABLE ENC 2 1.6.7 REMOTE

Assigns the encoder selection between ENCODER 1 and ENCODER 2, for vector control

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, II0, I11, I12, I13, I14, ENABLE

REMOTE= Set ENCODER 1 in a fixed way; ENCODER 2 activation is possible only by hte serial driven flag (see Instruction Manual INVERTER 400 SERIAL TRANSMISSION).

I2..I14= Command assignation to the selected digital input (in OR with its related serial flag).

ENABLE= ENCODER 2 fixed activation.

Selection mode: By input or flag OFF, ENCODER 1 is used. By input or flag ON, ENCODER 2 is used

ADAPT Id TABLE 1.6.8 100.0%

It enables to fit the curve of the magnetization current in constant power zone, so the torque diplayed in % is as close as possible to the real one. (INACTIVE)

Setup range: from 10.0% to 200.0%.

By setting 100.0%, the curve of the Id current in constant power zone remains that for default. For different values, the curve is modified as follows:

The magnetization current is redeced from the value set in par. 1.6.4 VECT MAGNET CURR using the value set in this parameter: e.g. if par.1.6.8 = 100%, at 3000rpm (twice the nominal speed) the field weakening curve imposes a 0.500 magnetization current, if you want it to impose 0.333, you must adapt the value as follows:

ADAPT Id TABLE = (1 - 0.333) / (1 - 0.5) *100.0 = 133%

Therefore, if ADAPT Id TABLE= 133.0%, the magnetization current at 3000rpm is 0.333 times the value set in par. 1.6.4 VECT MAGNET CURR.

EMPTY
1.6.9

Not enabled group of parameters

FT DERIVATIVE	
1.6.10	150.Hz

Cut frequency for Derivative Action (KD) in speed control

Setup range: from 1.Hz to 1000.Hz

KD GAIN	
1.6.11	0.

Motor speed regulator KD Derivative Gain in speed control

Setup range: from 0. to 100.

DERIVATIVE MODE	
1.6.12	FEEDBACK

Derivative Action Mode

Setup range: FEEDBACK, ERROR, BOTH

FEEDBACK = Derivative Action is taken from speed feedback (encoder), this is the best choice for speed overshoot limiting in step response.

ERROR = Derivative Action is taken from chasing error, which is the difference between set and feedback; this modality increases the additional torque at start of sudden transient.

BOTH = FEEDBACK and ERROR modes are enabled together.

Caution ! → If speed set is noisy, the derivative action may increase noise.

KP KI REGULATOR
1.6.13

Group of parameters that control the gain of the current loop of the vector control. Should be set according to the combination with the Rowan vectorial motor (see cap.20).

KP ID REGULATOR	
1.6.13.1	0.9500

Proportional gain of the Id current

Setup range: from 0.0000 to 3.0000

KI ID REGULATOR	
1.6.13.2	0.1000

Integral gain of the Id current

Setup range: from 0.0000 to 3.0000

KP IQ REGULATOR	
1.6.13.3	0.9500

Proportional gain of the Iq current

Setup range: from 0.0000 to 3.0000

KI IQ REGULATOR	
1.6.13.4	0.1000

Integral gain of the Iq current

Setup range: from 0.0000 to 3.0000

KI UP NOM SPEED	
1.6.14	5

Integral gain setup of speed regulator, for speed over at nominal speed value (INACTIVE)

Setup range: from 0 to 100.

For the speed lower than nominal speed the integral gain value of the speed regulator is equal to the par.1.6.3 KI GAIN.

If the set value on the par.1.6.14 KI UP NOM SPEED is bigger than 0 for speed values are bigger than nominal speed, the integral gain takes the new setting value.

Settings the par. equal to 0 the integral gain value don't have any variation, remain equal to the par.1.6.3 KI GAIN value for entire speed variation range.

FIELD WEAK TYPE	
1.6.15	TABLE

Selection of asynchronous motor control algorithm in costant power zone (INACTIVE)

Setup range: TABLE, FEEDBACK

Settings 1.6.15 FIELD WEAK TYPE = TABLE for speed bigger than nominal value, the motor magnetizazion reduce, decreasing the magnetizing current settle through a predefine table. This table is adaptable through the par.1.6.8 ADAPT Id TABLE.

Settings 1.6.15 FIELD WEAK TYPE = FEEDBACK the motor magnetizazion in costant power function zone, reduce through a voltage control loop. The magnetizing current it is automatically reduce directly to the speed increase to mantain the voltage value supply to the motor, lower than nominal value set to the par.1.1.4 MOTOR NOM VOLTAGE. The voltage is limited to the maximum value available of the inverter, in case it is lower than nominal motor value.

Menu parameters description 1.7. PM MOTOR PARAM.

PM MOTOR PARAM. 1.7.

Group of parameters that regulate the Encoder installation / checking procedure and the synchronization identification of the brushless motor at the first RUN consent, when the inverter switch-on.

POS START CURR. 1.7.1 50.0%

Current amplitude supplied during the encoder installation / checking procedure.

Setup range from 0.0% to 100.0%.
The amplitude of the current supplied to the motor during this procedure is defined in percentual value than the motor current nominal value set in par. 1.1.2 MOTOR NOM CURREN.

SET ZERO ANGLE 1.7.2 0.0deg

Motor synchronization angle.

Setup range from 0.0deg to 359.9deg.
Zero encoder timing angle, determined by the installation procedure / encoder verification described in the Chap.3 (MANU.700S.QUICKSTART).

ENCODER TUNING 1.7.3 NO

Enable the encoder installation procedure.

Setup range: YES, NO.
Selecting YES at the RUN consent will be done the installation procedure described in the Chap.3 (MANU.700S.QUICKSTART).

Menu parameters description 1.8. POWER LOSS CNTR

POWER LOSS CNTR
1.8.

Group of parameters regulating the inverter functioning in case of main line voltage dips.

ENABLE LOSS CNTR
1.8.1 NO

Enables or not the motor speed control in case of main line voltage dips.

Setup range: NO, YES

Functioning description in case of voltage dips:

par.1.8.1= NO, in case of voltage dip causing a BUSDC fall under the set value in a standard parameter, the RUN is off; it is automatically restored when the BUSDC is over the value set in another standard parameter.

par.1.8.1= YES, in case of voltage dip, the following operation will be performed in order to avoid a machine block: when the voltage dip causes the BUSDC level decreasing under the threshold set in **par.1.8.2 START THRESHOLD**, the motor decelerates until it reaches the speed set in **par.1.8.6 START SPEED** with deceleration ramp set in **par.1.8.5 DECEL TIME**. If the voltage dip lasts longer than the time period set in par.1.8.7 TIME LIMIT, the speed set is decreased to 0rpm up to inverter powering off.

If during the voltage dip the line voltage is restored normally, when the BUSDC exceeds the value set in **par.1.8.3 +STOP THRESHOLD**, the speed deceleration ramp set stops and the initial speed value is restored after 500ms, with acceleration ramp set in **par.1.8.4 ACCEL TIME**.

In both cases, voltage dips are counted in **variable 2.1.42 POWER LOSS COUNT**.

START THRESHOLD
1.8.2 150.V

BUSDC voltage below which, in case of voltage dips, the motor decelerates until it reaches the speed set in par.1.8.6 START SPEED.

Setup range: from 0.V to 2000.V

Parameter enabled only if par.1.8.1 ENABLE LOSS CNTR= YES

+STOP THRESHOLD
1.8.3 50.V

Voltage that, if added to the value in par.1.8.2, determinates the BUSDC limit exceeding which the speed set is restored after a voltage dip

Setup range: from 0.V to 2000.V

Parameter enabled only if par.1.8.1 ENABLE LOSS CNTR= YES

ACCEL TIME
1.8.4 15.00s

Acceleration ramp in speed set restoring after a voltage dip.

Setup range: from 0.01s to 600.00s

Parameter enabled only if par.1.8.1 ENABLE LOSS CNTR= YES

DECEL TIME
1.8.5 15.00s

Deceleration ramp in case of voltage dip.

Setup range: from 0.01s to 600.00s

Parameter enabled only if par.1.8.1 ENABLE LOSS CNTR= YES

START SPEED
1.8.6 500.rpm

Speed set in case of voltage dip for a max. period set in par.1.8.7 TIME LIMIT

Setup range: from 0rpm to the value set in par.1.3.1 MAX ROTOR SPEED

Parameter enabled only if par.1.8.1 ENABLE LOSS CNTR= YES

TIME LIMIT
1.8.7 10.000s

Max. voltage dip time exceeding which the speed set is kept to 0 until the inverter powers off.

Setup range: from 0.001s to 30.000s

Parameter enabled only if par.1.8.1 ENABLE LOSS CNTR= YES

Menu parameters description *1.9. I1 FUNCTION*

I1 FUNCTION
1.9.

Group of parameters regulating the run control by I1 digital input or by its related flag command in serial mode. The rate control activates 0.5sec after powering up, which increases up to 5sec, in case of pick-up in scalar function.

I1 SPEED STOP
1.9.1 NO.

It selects the motor stop type at run command disabling.

Setup range: NO, YES

NO= At rate disabling, the voltage is powered off immediately.

YES= At run command disabling, the motor runs to 0rpm with deceleration ramp set and the voltage is powered off.

Caution !

- It is not possible to set par.1.9.1, if par.1.9.3 I1 DC BRAKE= YES.

By par.1.9.1= YES, the min. speed set by par.1.3.2 MIN MOTOR SPEED is no longer active and it is as if it was set to 0.

I1 RESET FAULT
1.9.2 NO.

It enables the possibility to clear FAULT status (FAULT light on), by activating the run command.

Setup range: NO, YES

NO= The fault block can be reset only by powering off and then on the inverter again.

YES= The fault block can be reset by powering the interter off and then on disabling the rate control and serial (if it is on).

Caution !

It is not possible to reset the block by rate command, if this is caused by short circuit on voltage components (see FAULT 4.SHORT IGBT MODUL or SHORT IGBT BRAKE in Chapter DRIVE BLOCK).

I1 DC BRAKE
1.9.3 NO.

It enables the direct current brake at run command disabling.

Setup range: NO, YES
NO= Brake disabled
YES= At rate disabling, the CD brake starts according to the parameters set in 1.16 CD BRAKING menu.

Caution !

It is not possible to to set par.1.9.3 if par.1.9.1 I1 SPEED STOP= YES

OUT RUN
1.9.4 O3

It assignes a digital output the run activation state.

Setup range: REMOTE, O1, O2, O3, O4, O5, O6, O7, O8.

REMOTE= no output assigned

O1…O8= Assignation of the state to the selected output:

Drive running= ON output. Drive stopped= OFF output.
The function can be inverted in each parameter output in 4.2 DIGITAL OUTPUT menu.

OUT FAULT
1.9.5 O2

It assignes a digital output the drive fault block state.

Setup range: REMOTE, O1, O2, O3, O4, O5, O6, O7, O8.

REMOTE= no output assigned

O1…O8= Assignation of the state to the selected output:

Drive blocked in fault condition= OFF output. Drive not blocked= ON output.

The function can be inverted in each parameter output in 4.2 DIGITAL OUTPUT menu.

At inverter power supplying, the digital output is OFF for about 5sec, then, if no FAULTS occurr, it changes into ON.

MECHANICAL BRAKE
1.9.6.

Group of parameters regulating the mechanical brake (in both scalar and vector mode) and the encoder out of order alarm (only in vector mode). The description of start and stop cycles by mechanical brake is in paragraph "MECHANICAL BRAKE IN LIFTING SYSTEMS" (LIFT function), Chapter 13.

ENABLE MEC. BRAKE
.1 NO

Par.1.9.6. Enables the mechanical brake.

Setup range: NO, YES

NO= Brake function disabled.

YES= Brake function enabled

IN RUN - SPEED	
.2	REMOTE

Par. 1.9.6.2 Assign the run control command as by I1 but with the reference speed set sign inverted.

Setup range: REMOTE, I1, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command OFF and no digital input assigned. Command ON is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always ON.

Select mode:

By input or flag OFF, the run is disabled.

By input or flag ON, the rate is active, but with the reference speed set sign inverted (the sign remains inverted if I1 input – or serial rate flag- is enabled at the same time).

The command is enabled only by the mechanical brake function enabled by par.1.9.6.1 ENABLE MEC. BRAKE= yes.

OUT MEC. BRAKE	
.3	REMOTE

Par. 1.9.6.3 Assignes a digital output the brake command.

Setup range: REMOTE, O1, O2, O3, O4, O5, O6, O7, O8.

REMOTE= no output assigned

O1…O8= Assignation of the state to the selected output:

Brake blocked= OFF output. Brake free= ON output.

The function can be inverted in each parameter output in 4.2 DIGITAL OUTPUT menu.

DELAY STOP	
.4	0.250s

Par.1.9.6.4 STOP CYCLE delay on brake control.

Setup range: from 0.000s to 30.000s.

It delays the run command disabling after the brake block

PERC In START	
.5	30.%

Par.1.9.6.5. Threshold on the motor current used in START CYCLE..

Setup range: from 0.% to 1000.% of the motor nominal current.

At start, when the motor current exceed this threshold, the brake is unblocked automatically.

If 1000.% is set, the function of this parameter is disabled

DELAY START	
.6	30.000s

Par.1.9.6.6 START CYCLE delay on brake control.

Setup range: from 0.000s to 30.000s.

After this delay, at start, brake is loose in any case.

If 30.000s is set, the function of this parameter is disabled.

Disable this function in case of vector control.

DELAY RAMP START	
.7	0.200s

Par.1.9.6.7 START CYCLE delay in vector control.

Setup range: from 0.000s to 30.000s.

After this delay, at start, the speed set starts its acceleration ramp.

% In LIMIT SPEED	
.8	110.%

Par.1.9.6.8. Setting of speed and current limits in START CYCLE.

Setup range: from 0.% to 1000.% of the motor nominal current.

At start, if the motor current exceed this threshold for the time period set in par.1.9.6.9 DELAY% In LIMIT, the max. motor speed cannot exceed the limit set in par.1.9.6.10 LIMIT SPEED; the limitation is disabled only after a stop and a later start cycles.

If 1000.% is set, the function of this parameter is disabled

DELAY % In LIMIT	
.9	1.000s

Par.1.9.6.9 Current and speed limit delay on START CYCLE.

Setup range: from 0.000s to 30.000s.

Speed limitation activation delay, if the current threshold set in par.1.9.6.8 % In LIMIT SPEED has been surpassed.

LIMIT SPEED	
.10	1500.rpm

Par. 1.9.6.10. Speed limit enabled by the START CYCLE.

Setup range: from 30.rpm to 30000rpm.

Speed limit enabled if the current threshold set in par.1.9.6.8 % In LIMIT SPEED is surpassed for the time period set in par.1.9.6.9 DELAY% In LIMIT

SPEED FAULT ENC.	
.11	20.rpm

Par.1.9.6.11 parameter to setup fault 10 in case of anomalies on the reading of the encoder used for speed feedback (enabled only in vector control).

Setup range: from 0.rpm to 30000rpm. The default setup is 0.rpm. **Set 0rpm to disable fault 10.**

- If the par.1.9.6.11 is different to zero, the encoder control is always active and based to pulse count - indipendent if the mechanical brake is active (par.1.9.6.1); if the inverter doens't detect any pulse from ENCODER 1 for a time period longer than par.1.9.6.12 DELAY FAULT ENC., fault 10 is activated.

- If the mechanical brake is active (par.1.9.6.1 = YES) and the par.1.9.6.11 is different from zero, the both encoder controls pulse count and the setup speed threshold are enabled. With rate on and brake open, if the real speed remains < than the value set in this parameter for a time period longer than par.1.9.6.12 DELAY FAULT ENC., fault 10 is activated.

DELAY FAULT ENC.	
.12	0.200s

Par.1.9.6.12 parameter to setup fault 10 in case of anomalies on the reading of the encoder used for speed feedback (enabled only in vector control).

Setup range: from 0.s to 30000s

In this parameter fault 10 activation delay is set.

INRESET FAULT	
1.9.7	REMOTE

Assigns an input to reset the active faults

Setup Range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE

REMOTE = OFF with no assigned digital input, ON is possible only with corresponding serial flag **I2 ... I14** = Reset by corresponding digital input (with OR if corresponding serial flag is enabled). **ENABLE** = Reset is always ON.

ON will reset all faults, with the exception of Fault 4, 13, 112, which compel to re-start the inverter. Reset is also possible by I1, with Par.1.9.2 I1 RESET FAULT = YES.

Menu parameters description 1.10. TORQUE CONTROL

TORQUE CONTROL
1.10.

Group of parameters regulating the motor torque in vector control

MAX TORQUE	
1.10.1	200%.

Max. motor torque in both signs.
In % of the nominal torque of the related motor

Setup range: from 0.% to a value related to motor/inverter coupling

TORQUE SOURCE	
1.10.2	AI3.

Assignes the motor torque adjusting source.

Setup range: REMOTE, AI1, AI2, AI3, AI4, AI5, MOTOPOT, OPERATOR.
REMOTE= Torque adjusting by a value tranferred in serial mode. Starting value= 0
AI1....AI5= Torque adjusting by the selected analog input.
The input 100% (+/-10VCD) corresponds to the value set in par.1.10.1 MAX TORQUE.
MOTOPOT= Torque adjusting by 2 digital inputs increase/decrease motopotentiometer-type.
Digital inputs must be set in par.1.10.8 and 1.10.9.
OPERATOR= Torque adjustment by the keyboard by par.1.10.14 SET TORQ OPERAT.
In any case max. torque adjusting corresponds to the value set in par.1.10.1 MAX TORQUE.

Caution !

Whatever the selected torque regulation source be, this one is active only if enabled by the commands programmed in par.1.10.5 IN DX ENABLE LIM and IN SX ENABLE LIM.

TORQUE CONTROL	
1.10.3	MAX_TORQ

Selects the motor torque control

Setup range: MAX_TORQ, SET_TORQ

MAX_TORQ= The torque is **limited** as max value, without sign, while the motor rotation direction is determined by the speed set source sign, selected in par.3.1.1.1 SPEED SOURCE.

(see MENU PARAMETERS DESCRIPTION 3.1.1 SPEED COMMANDS).

In this case, to enable the torque limitation it is necessary to set inputs (or flags in serial mode) ON, programmed in par.1.10.5 IN DX ENABLE LIM and 1.10.6 IN SX ENABLE LIM.

Each input which has been activated enables the torque limitation separately for each rotation direction.

Activate both inputs for torque limit in any case.

SET_TORQ= The torque is **set** with its sign; the torque sign determines the motor rotation direction, while speed is limited as max. value without sign in par.1.3.1 MAX MOTOR SPEED (see MENU PARAMETERS DESCRIPTION 3.1 SPEED LIMIT).

In this case, to enable the torque limitation it is necessary to set input (or flag in serial mode) ON, programmed in par.1.10.5 IN DX ENABLE LIM

RAMP TORQUE	
1.10.4	1.0s

Torque set acceleration and deceleration ramp.

Setup range: from 0.1s to 300.0s

Caution !

By par.1.10.2 TORQUE SOURCE= REMORE, at rate activation, no torque ramp is performed.

IN DX ENABLE LIM	
1.10.5	REMOTE

Assignes the torque limitation command in rightwards rotation (see description in par.1.10.3 TORQUE CONTROL)

Setup range: REMOTE, I1, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**

IN SX ENABLE LIM	
1.10.6	REMOTE

Assignes the torque limitation command in leftwards rotation (see description in par.1.10.3 TORQUE CONTROL)

Setup range: REMOTE, I1, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON.**

.

SAVE MOTOPOT.	
1.10.7	YES

Enables or not saving in eeprom of the motopotentiometer torque setup at RUN command disabling (I1 OFF) and at inverter powering off.

Setup range: NO, YES

If NO is set, when powering up or at RUN command enabling, the reference torque setting starts from 0.

IN +TORQUE MOT.	
1.10.8	REMOTE

Assignes the motopotentiometer torque set increase command

Setup range: REMOTE, I1, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**

IN -TORQUE MOT.	
1.10.9	REMOTE

Assignes the motopotentiometer torque set decrease command.

Setup range: REMOTE, I1, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

TORQUE THRESHOLD	
1.10.10	100.%

Motor torque threshold in % to the motor nominal torque displayed in var.2.1.15 MOTOR TORQUE %

Setup range: from 0.% to 300.%

When the motor torque, with both signs, exceeds the threshold set in this parameter for the time period set in par.1.10.11 THRESHOLD DELAY, the output set in par.1.10.12 OUT TORQUE THRES is enabled.

THRESHOLD DELAY	
1.10.11	5.0s

Threshold intervention delay on the motor torque threshold set in par.1.10.10.

Setup range: from 0.1s to 30.0s

OUT TORQUE THRES	
1.10.12	REMOTE.

Assignes a digital output to the threshold state on the motor torque set in par.1.10.10

Setup range: REMOTE, O1, O2, O3, O4, O5, O6, O7, O8.

REMOTE= no output assigned

O1…O8= Assignation of the state to the selected output:

Motor torque > than par.1.10.10 + delay in par.1.10.11= ON output.

Motor torque < than par.1.10.10= OFF output

SAVE SET MANUAL	
1.10.13	YES

Enables or not saving in eeprom, at run stop (LI1 OFF) and when powering off, of the manual torque set by par.1.10.14 SET MAN....%)

Setup range: NO, YES

If NO is set, when powering up or at RUN command enabling, the torque setting starts from 0

SET TORQ OPERAT.
1.10.14

Includes manual setup by the keyboard of the motor torque and the real torque display.

It is an **OPERATOR type** parameter. See paragraph at the beginning of this Chapter "**BASIC DATA MENU in OPERATOR mode".**

SET MAN	80.%
TORQUE	40.%

SET MAN= Motor torque setup enabled only by par.1.10.2 TORQUE SOURCE= OPERATOR.

Setup range: from 0.% to the value set in par.1.10.1 MAX TORQUE.

TORQUE= Display of the real motor torque. Display range: from 0% to 300% of the motor nominal torque. It corresponds to var.2.1.15 MOTOR TORQUE %

ADAPT PERC. TORQ.	
1.10.15	100.0%

Adaptation parameter to be set so as the 100% value displayed in var.2.1.15 MOTOR TORQUE % and in torque setups corresponds to the motor nominal torque.

Setup range: from 10.0% to 200.0%.

This parameter standard setup is 100%, which corresponds, in both scalar and vector control, to the torque of a motor whose power is equal to the max. nominal power of the inverter.

For a less powerful motor, an automatic adaptation of the display is performed, but the error could be consistent; in this case, it is necessary to modify the visualisation by setting this parameter as follows: e.g. If the torque displayed in par.2.1.15 MOTOR TORQUE % is 100%, while the real torque is 120% of the motor nominal torque, set par.1.10.15 ADAPT PERC TORQ.=120.0%

ADAPT TORQ. [Nm]	
1.10.16	100.0%

Adaptation parameter to be set so as the value dislayed in var.2.1.14 MOTOR TORQUE corresponds to the motor nominal torque in Nm

Setup range: from 10.0% to 200.0%.

This parameter standard setup is 100%, which corresponds, in both scalar and vector control scale, to the torque of a motor whose power is equal to the max. nominal power of the inverter.

For a less powerful motor, an automatic adaptation of the display is performed, but the error could be consistent; in this case, it is necessary to modify the visualisation by setting this parameter as follows: e.g. If the torque displayed in par.2.1.14 MOTOR TORQUE is 100.0Nm, while the real torque is 120.0Nm, set par.1.10.16 ADAPT TORQ.(Nm)=120.0%

IN EN.TORQ. FIL	
1.10.17	REMOTE

Gives the command enabling the Second order filter for torque pulse stabilization at low speed

Setting field: REMOTE, I2 , I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE
REMOTE =Command **OFF** and no digit input assigned. Command **ON** possible with the relative serial flag only.
I2.....I14 = Assignment of the digit input selected (in OR with the relative serial flag).
ENABLE = Command always **ON**.
In addition to this, to enable the filter, it is necessary to activate the torque limitation by ON on both settable commands in parameters 1.10.5 IN DX ENABLE LIM and 1.10.6 IN SX ENABLE LIM .

TORQUE FIL	
1.10.18	5.0Hz

Cut-off frequency of the torque filter.

Setting field from 0.0 Hz to 100.0Hz
Lower is the frequency, more the pulses tend to stabilize; on the other side, the answer by the motor torque tends to slow down.
This cut off frequency is kept from 0 to 1Hz of the frequency of the motor currents, over that range, is proportionally increased and excluded from the frequency of the motor currents set by par.1.10.19 F. STOP FIL.

F. STOP FIL	
1.10.19	25.0Hz

Frequency of the voltage on the motor, over this value the effect of the filter on the torque is canceled

Setting field from 0.0 Hz to 100.Hz

Menu parameters description 1.11. CURRENT CONTROL

CURRENT CONTROL 1.11.

Group of parameters controlling the current absorbed by the motor.

CURRENT THRESHOL 1.11.1 5.0A

Motor current threshold on the value displayed in var.2.1.4 MOTOR CURRENT.

Setup range: from 0.0A to 3000.0A

When the motor current exceeds the threshold set in this parameter for the time period set in par.1.11.2 THRESHOLD DELAY, the output set in par.1.11.3 OUT CUR THRESHOL is enabled

THRESHOLD DELAY 1.11.2 3.0s

Threshold intervention delay on the motor current, set in par.1.11.1

Setup range: from 0.1s to 30.0s

OUT CUR THRESHOL 1.11.3 REMOTE

Assignes a digital output the threshold function on the motor current set in par.1.11.1.

Setup range: REMOTE, O1, O2, O3, O4, O5, O6, O7, O8.

REMOTE= no output assigned

O1…O8= Assignation of the state to the selected output:

Motor current > than par.1.11.1 + delay in par.1.11.2= ON output.

Motor current < than par.1.11.1= OFF output

RESET MAX Imax 1.11.4 YES

Resets 2.1.7 MEMO MAX Imax to ZERO

Setup Range: YES, NO

If YES, it resets the var. 2.1.7 MEMO Imax to zero. YES lasts 2 seconds, then it turns back to NO.

Menu parameters description 1.12. PWM GENERATOR

PWM GENERATOR 1.12.

Group of parameters regulating the voltage sine wave generation on the motor by PWM logics (Pulse With Modulation).

PWM FREQUENCY 1.12.1 5.00KHz

PWM frequency in vector control. As for scalar control, it represents the PWM frequency when the motor speed is higher that that set in par.1.12.3

Setup range: from 0.5KHz to a value set in a standard parameter according to the inverter size. As for vectorial control, a min. 5KHz min. frequency is advised

START PWM FREQ. 1.12.2 0.50KHz

PWM frequency with motor speed lower than that set in par.1.12.3 CHANGE PWM SPEED (enabled only in scalar control).

Setup range: from 0.5KHz to a value set in a standard parameter according to the inverter size.

CHANGE PWM SPEED 1.12.3 500.rpm

Threshold on the motor speed for the automatic PWM frequency change (enabled only in scalar control).

Setup range: from 0.rpm to 30000.rpm.

When the motor speed set in ramp is below the threshold set in this parameter, the PWM frequency is that set in par.1.12.2 START PWM FREQ.

When the motor speed set in ramp exceeds the threshold set in this parameter, the PWM frequency is that set in par.1.12.1 PWM FREQUENCY

By setting the parameter at 0.rpm, the automatic PWM frequency change is disabled; in this case, the PWM frequency will be that set in par.1.12.1 PWM FREQUENCY.

The automatic PWM frequency change in scalar control is useful when big sized motors are driven and it is necessary to reduce the instability due to modulation pulses dead times; it is for this reason that at start a low PWM frequency is set (even 0.5Hz) in par.1.12.2, so as to improve the dead times internal compensation as well. Once the speed threshold set in par.1.12.3 CHANGE PWM SPEED has been exceeded, the PWM frequency can be higher (like e.g. 2KHz) and set in par.1.12.1, in order to reduce the current ripple on the motor.

Caution !

PWM frquencies over 5KHz causes the inverter derating, as explained in paragraph:

“Inverter derating according to PWM frequency”, in Chapter 5 TECHNICAL FEATURES.

Menu parameters description 1.13. BRAKE UNIT

BRAKE UNIT
1.13.

Group of parameters regulating the brake unit functioning for the dissipation of the energy regenerated by the motor on the resistor connected to F+ and F- terminals.

ENABLE
1.13.1 **YES**

Enables braking or not

Setup range: NO, YES

BRAKE RESISTANCE
1.13.2 **140.0 Ω**

Braking resistor ohmic value

Setup range: from 0.1ohm to 200.0ohm

NOMINAL CURRENT
1.13.3 **2.0A**

Braking resistor nominal current

Setup range: from 0.0A to 3000.0A

For braking resistors supplied by ROWAN EL., draw this information from the **"Table of braking resistors for Rowan inverters"**, in Chapter 7 BRAKING RESISTORS

5 SEC CURRENT
1.13.4 **3.3A**

Braking resistor max. current for 5s

Setup range: from 0.0A to 3000.0A

For braking resistors supplied by ROWAN EL., draw this information from the **"Table of braking resistors for Rowan inverters"**, in Chapter 7 BRAKING RESISTORS

Caution!

The inverter is equipped with an electronic control of the braking unit and its related resistor overload, so it is important to set the right resistors data, in order to avoid dangerous overheating of the same resistor. For further information, see Chapter 8 BRAKING RESISTORS

Menu parameters description 1.14. STALL FAULT

STALL FAULT
1.14.

Group of parameters setting the inverter block modes for current stall at U V W outputs (STALL FAULT).

STALL TIME
1.14.1 **5.000s**

Max. current stall time, exceeding which fault nr 11 STALL FAULT is enabled.

Setup range: from 0.000s to 30.000s

CURRENT LIMIT
1.14.2 **3000.0A**

Set the current level considered as fault

Setup range from 0.1A to 3000.0A

Menu parameters description 1.15. AUTORESTART

AUTORESTART
1.15.

Group of parameters setting the inverter autorestart after fault. Please see Chap.17, paragraph "Automatic re-start after a Fault" for Auto re-start loop description.

ENABLE
1.15.1 **NO**

Enables autorestarting or not after faults described in par. from 1.15.4 to 1.15.7.

Setup range: NO, YES

ATTEMPTS
1.15.2 **5.**

Sets the restarts max. nr

Setup range from1. to100.

RESTART DELAY
1.15.3 **3.0s**

Max. waiting time before restarting after a fault

Setup range from 0.1s to 300.0s

1° FAULT	
1.15.4	1.

1st fault resettable by restarting

Setup range: from 0 to 100 (see Chapter 17 FAULT INVERTER for faults list).

2° FAULT	
1.15.5	5.

2nd fault resettable by restarting

Setup range: from 0 to 100 (see Chapter 17 FAULT INVERTER for faults list).

3° FAULT	
1.15.6	6.

3rd fault resettable by restarting

Setup range: from 0 to 100 (see Chapter 17 FAULT INVERTER for faults list).

4° FAULT	
1.15.7	0.

4th fault resettable by restarting

Setup range: from 0 to 100 (see Chapter 17 FAULT INVERTER for faults list).

RESET TIME	
1.15.8	3600.s

Time period exceeding which the restart counter is cleared.
(See var.2.1.36 COUNT AUTORESTART in 2.1 GENERAL VARIABLE menu).

Setup range: from 0.s to 100000s

OUT RESTART END	
1.15.9	REMOTE

Assigns to a digital output to Auto re-start enabling activated if Auto restart loops attempts are equel to the number set in par. 1.15.2 ATTEMPTS

Setup range: REMOTE, O1, O2, O3, O4, O5, O6, O7, O8.

REMOTE = No assigned Dig. Output for Auto re-start

O1 ... O8 = Anabling is assigned to the corresponding output.

ON = when maximum numbers of Auto re-start loops are reached (set in par. 1.15.2 ATTEMPTS), Fault12 AUTORESTART FAULT flags.

OFF = Only if the inverter is restarted manually.

If a not resetable fault happens, OUT RESTART END output is enabled.

Caution !

The fault reset function by rate control (par.1.9.2 I1 RESET FAULT= YES), doesn't clear the autorestart counter, but only the restart delay time of par.1.15.3

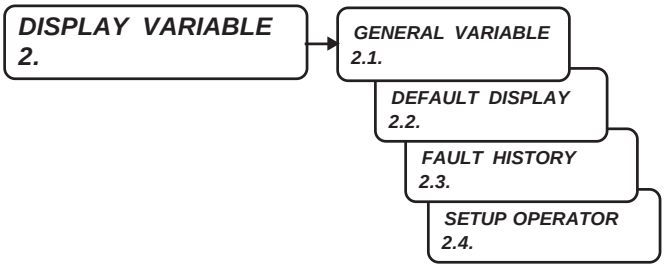
Menu parameters description 1.16. DC BRAKING

DC BRAKING
1.16.

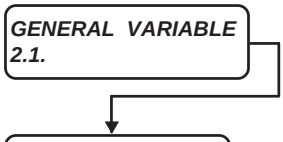
Group of parameters INACTIVE

Groups and menu description 2. DISPLAY VARIABLE

Menu 2.DISPLAY VARIABLE includes the menus of all basic functions display variables of both the inverter and the SPEED application



Display description of the menu 2.1. GENERAL VARIABLE



It includes the display variables which are always enabled in the inverter, indepentently from the enabled application (e.g. SPEED, AXIS, WINDER).
Among these variables (and those of the enabled application described in the specific manual), 10 visualisations can be chosen to be included in DISPLAY STATUS by menu par.2.2 DEFAULT DISPLAY

Speed reference set without ramp

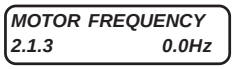
Display range: from -30000.rpm to +30000rpm

The preset speed display is enabled in run command OFF as well, but the value is zero if the command selected by the par.3.1.1.2 IN STOP SPEED (stop in ramp) is enabled.

Motor speed

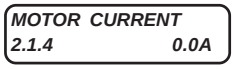
Display range: from -30000.rpm to +30000rpm

In scalar mode, the speed is estimated, while in vectorial mode it corresponds to the real motor speed.



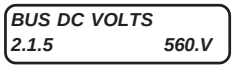
Voltage frequency on the motor

Display range: from 0.0Hz to 800.0Hz.



Motor absorbed current

Display range: from 0.0A to 3000.0A

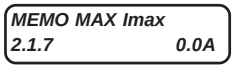


BUSDC voltage on F+ and - terminals

Display range: from 0.V to 3000.V

Motor voltage

Display range: from 0.V to 3000.V



Store the highest istantaneous maximum motor current value (Imax).
Imax is displayed in var.2.1.49 I MAX MONITOR

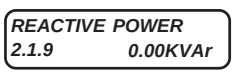
Display range: from 0.0A to 3000.0A.

This value is stored into the eeprom when inverters shuts down and then is reloaded again at the restart.

This information indicates the maximum current that is reached in the functioning period, or the current value that has cuased a particular fault. This variable can be reset by par.1.11.4 RESET MAX Imax

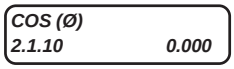
Active power absorbed by the motor

Display range: from 0.00KW to 900.00KW



Reactive power absorbed by the motor

Display range: from 0.00KWAr to 900.00KWAr



Cosine of Voltage/motor current phase angle

Display range: from 0.000 to 1.000.

I x COS (Ø)	
2.1.11	0.0A

Motor absorbed current multiplied to the cosine of voltage/current phase angle.

Display range: from 0.0A to 3000.0A

MOTOR SLIP V/F	
2.1.12	0.rpm

Motor speed slip in scalar control, when compensation is enabled by par.1.5.17 SLIP COMP ENABLE= YES

Display range: from 0 rpm to 1000rpm

CALC MOTOR TORQ.	
2.1.13	0.0Nm

Estimated motor torque enabled, only in scalar control

Display range: from 0.0Nm to 10000.0Nm

MOTOR TORQUE	
2.1.14	0.0Nm

Real motor torque in Nm, enabled only in vector control

Display range: from 0.0Nm to 10000.0Nm

Caution !

This display is correct only if a motor with power = the inverter max. nominal power. If a less powerful motor is used, it is necessary to set again par.1.10.16 ADAPT TORQ [Nm], or the displayed torque doesn't correspond to reality. In this case you can contact ROWAN EL

MOTOR TORQUE %	
2.1.15	0.%

Real motor torque in %, in vector control

Display range: from 0.% to 100.%

Caution !

This display is correct only if a motor with power = the inverter max. nominal power. If a less powerful motor is used, it is necessary to set again par.1.10.15 ADAPT PERC TORQ, or the displayed torque doesn't correspond to reality. In this case you can contact ROWAN EL.

LAST FAULT	
2.1.16	0.

Last fault causing the inverter block

Display range: from 0. to 100.

To understand the fault type linked to this nr, please see Chapter 17 INVERTER FAULTS AND ALARMS.

Caution !

After each restart, the faults nr in this variable is reset. However, the last fault is memorised in par.2.3.1 FAULT from the FAUL HISTORY menu

INVERTER I x I	
2.1.17	100.%

Medium current on the inverter U V W terminals squared, calculated on a 300sec. control window

Display range: from 0.% to 10000.%

Use the display to calculate the % value referred to the inverter nominal current: **In%=** $\sqrt{\text{var.2.1.17}}$ **x 10**

In% = **100% %** corresponds to the NOMINAL CURRENT IN U-V-W OUTPUT as described in the "SUMMARY TABLE OF POWER ELECTRICAL FEATURES FOR INVERTERS SERIES 700", in Chapter TECHNICAL FEATURES.

MOTORI x I	
2.1.18	100.%

Medium current absorbed by the motor squared, calculated on a 300sec. control window

Display range: from 0.% to 10000.%

Use the display to calculate the % value referred to the motor rated current **In%=** $\sqrt{\text{var.2.1.18}}$ **x 10**

In% = **100%** is the motor nominal current set in par.1.1.2 MOTOR NOM CURREN.

IGBT BRAKE CURR.	
2.1.19	0.0A

Current absorbed by the braking resistor connected to F and F+ terminals

Display range: from 0.0A to 3000.0A

The visualized current is not directly measured but it is deducted basing on the resistive value set into par.1.13.2 BRAKE RESISTANCE and on the measured value of the Bus DC, visualized even by the var. 2.1.5 BUSDC VOLTS; the calculation of the current doesn' take into consideration the parasite impedance characteristic of the wire resistors, for this reason, mostly with very low duty cycles, the value visualized could reach a maximum error of +10% in spite of the real one.

DIG. INPUT I1..8	
2.1.20	11000001.

Binary visualisation of the digital inputs from I1 to I8 status.

Display range: from 0 to 255 BINARY.

The inputs state corresponds to that of each bit: 1= input ON, 0= input OFF.

The first bit on the right is related to I1 input and so on leftwards up to I8.

e.i. if par.2.1.20= 11000001, I1, I7 and I8 digital inputs are ON. All left are OFF.

DIG. INPUT I9 . 14	
2.1.21	00100100.

Binary visualisation of the digital inputs from I9 to I14 status

Display range: from 0 to 63 BINARY.
The inputs state corresponds to that of each bit: 1= input ON, 0= input OFF.
The first bit on the right is related to I9 input and so on leftwards up to I14.
e.i. if par.2.1.21= 00100100, I11 and I14 digital inputs are ON. All left are OFF

DIG. OUTPUT O1.8	
2.1.22	00000101.

Binary visualisation of the digital outputs from O1 to O8 status

Display range: from 0 to 255 BINARY.
The outputs state corresponds to that of each bit: 1= output ON, 0= output OFF.
O1, O2, O3 relay outputs, 1= energized coil, 0= deenergized coil.
The first bit on the right is related to O1 output and so on leftwards up to O8.
e.i. if par.2.1.21= 00000101, O1 and O3 digital outputs are ON. All left are OFF

ANALOG INPUT AI1	
2.1.23	100.00%

Signal display in % on analog input AI1.

Display range: from -100.00% to +100.00% (max. values, exceeding which the input gets saturated).

ANALOG INPUT AI2	
2.1.24	100.00%

Signal display in % on analog input AI2.

Display range: from -100.00% to +100.00% (max. values, exceeding which the input gets saturated).

ANALOG INPUT AI3	
2.1.25	100.00%

Signal display in % on analog input AI3.

Display range: from -100.00% to +100.00% (max. values, exceeding which the input gets saturated).

ANALOG INPUT AI4	
2.1.26	100.00%

Signal display in % on analog input AI4.

Display range: from -100.00% to +100.00% (max. values, exceeding which the input gets saturated).

ANALOG INPUT AI5	
2.1.27	100.00%

Signal display in % on analog input AI5.

Display range: from -100.00% to +100.00% (max. values, exceeding which the input gets saturated).

ANALOG INPUT AI6	
2.1.28	100.00%

Signal display in % on analog input AI6.

Display range: from -100.00% to +100.00% (max. values, exceeding which the input gets saturated).

ANALOG INPUT AI7	
2.1.29	100.00%

Signal display in % on analog input AI7.

Display range: from -100.00% to +100.00% (max. values, exceeding which the input gets saturated).

ANALOG INPUT AI8	
2.1.30	100.00%

Signal display in % on analog input AI8.

Display range: from -100.00% to +100.00% (max. values, exceeding which the input gets saturated).

ANALOG INPUT AI9	
2.1.31	100.00%

Signal display in % on analog input AI9.

Display range: from -100.00% to +100.00% (max. values, exceeding which the input gets saturated).

ACTIVE VAR AO0	
2.1.32	100.00%

Signal display in % on analog output AO0.

Display range: from -100.00% to +100.00% (max. values, exceeding which the output gets saturated).

ACTIVE VAR AO1	
2.1.33	100.00%

Signal display in % on analog output AO1.

Display range: from -100.00% to +100.00% (max. values, exceeding which the output gets saturated).

ACTIVE VAR AO2	
2.1.34	100.00%

Signal display in % on analog output AO2.

Display range: from -100.00% to +100.00% (max. values, exceeding which the output gets saturated).

ACTIVE VAR AO3	
2.1.35	100.00%

Signal display in % on AO3 analog output

Display range: from -100.00% to +100.00% (max. values, exceeding which the input gets saturated.

COUNT AUTORESTAR	
2.1.36	0.

Autorestart counter for the automatic autorestart function.

Display range: from 0. to 100.

As for this variable function, see Menu parameters description 1.15 AUTORESTART

MOTOR CONTROL I	
2.1.37	0.0A

Motor current in vector control

Display range: from 0.0A to 3000.0A.

FIRMWARE VERSION	
2.1.38	497.01.06

① ② ③

Inverter firmware version

Display field from 0.00 to 999999.99 shared in 3 parts:
1) number of firmware version; **2)** Active applications (Ex. 01= "SPEED + AXIS" active applications, see also chap.18)
3) additional number of the firmware version referring to firmware modifications that do not make changes on parameters.

OPERATE HOURS	
2.1.39	51.26h

Inverter functioning time in RUN

Display range: from 0.00 hours to 100000.00 hours.

HARDWARE VERSION	
2.1.40	15.00

① ②

Inverter hardware version

display range from 0.00. to 300.00 shared in 2 parts:
1) number of the drive size: 15 = /R, 20=/0, 22=/0M, 25=/1, 30=/L, 35=/2, 38=/2,5, 40=/3, 45=/3.5, 50=/4, 55 = /5, 60=/6, 65=/6.5, 70=/7, 75=/8, 80=/8.5, 85=/9, 90=/A, 95=/B, 100=/C, 105=/D, 110=/E, 115=/F, 120=/G.
2) version of parameters configuration.

LAST RESTORE	
2.1.41	DEFAULT.

It displays the last parameters memory loaded in WORK MEMORY

Display range: from 0. to 2.

0= DEFAULT memory, 1= SETUP_1 memory, 2= SETUP_2 memory

See paragraph “Possible operations with parameters memories”, in Chapter 11 PARAMETERS TRANSFER.

POWER LOSS COUNT	
2.1.42	0.

Voltage dips counter.

Display range: from 0. to 30000.

See the **Menu parameters description 1.8 POWER LOSS CNTR** for functioning in case of voltage dips.

LAST TWO ERR COM	
2.1.43	XXYY.

It includes the identification number of the last 2 errors in serial communications. YY= last error nr, XX= previous error nr

Display range: from 0. to 9999.

The value can be reset by par.5.2.6 RESET ERR. COUNT

See the manual INVERTER 400 SERIAL TRANSMISSION for faults descriptions

COUNT ERRORS COM	
2.1.44	0.

Error counter in serial communications

Display range: from 0. to 32000.

The counter can be reset by par.5.2.6 RESET ERR. COUNT

SET TORQUE %	
2.1.45	0.%

Visualization of the active torque reference, in % on the nominal torque. It's active only in vector control.

Display range: from 0.% to 300.%.

ENCODER SPEED	
2.1.46	0.rpm

Speed of the encoder selected for vector control (ENCODER1 or ENCODER2).

Display range: from -30000.rpm to +30000.rpm

The display is enabled in scalar control as well.

SET	80.%
TORQUE	40.%

Var.2.1.47. Includes the torque set and the motor torque display in case of manual setup by the keyboard (par.1.10.2 TORQUE SOURCE= OPERATOR).

SET= torque set display in % on the nominal motor torque set by par.1.10.14 SET MAN.....%

TORQUE= displays the motor torque in % on the nominal torque. It corresponds to var.2.1.15 MOTOR TORQUE % visualisation

SET OPER	300.rpm
SPEED	300.rpm

Var.2.1.48. Includes the speed set and the motor speed display in case of manual setup by the keyboard (par.3.1.1.1 SPEED SOURCE= OPERATOR).

SET OPER= speed set display set by par.3.1.9.2 SET MAN OPER.....rpm

SPEED= displays the motor speed. It corresponds to var.2.1.2 MOTOR SPEED visualisation.

I MAX MONITOR	
2.1.49	0.0A

Max. motor current in scalar and vector function

Display range: from 0.0A to 3000.0A.

Each second displays the max. current peak from a 1sec display window.

This display enables to detect even a single current peak of 50microseconds last, keeping it visualised for 1sec. So it helps verifying the edge during overloading before the protection FAULT 1 (MAX PEAK CURRENT) intervenes.

INVERTER ALARM	
2.1.50	NONE

Last active alert display (fault light flashing)

String display range: NONE, CAP_LIFE, PROG_IN, PROG_OUT, AXIS_LIM, NO_PHASE.

See Chapter 17 FAULTS AND ALARMS for alarms description.
For the AXIS_LIM, NO_PHASE alarms see the specific MANU.400A AXIS manual.

ANYBUS TYPE	
2.1.51	NONE

It displays the "ANYBUS" serial communication module

Display range: NONE, CAN_OPEN, PROFIBUS, MODBUS_TCP/IP, ETHERCAT, PROFINET

ANYBUS STATE	
2.1.52	SETUP

It displays the state of the "ANYBUS" serial communication module

Display range: SETUP, NW_INIT, PROCESS, IDLE, PROCESS_ACTIVE, ERROR, EXCEPTION.
For the functioning description, see the MANU.400TS serial communication manual .

ROTOR K CORR	
2.1.53	1.00

Proportional correction factor determined from the constant rotoric algorithm

Display range: from 0.25 to 2.00.
During the vector control operation with the algorithm of rotor constant correction enable (par.1.7.1 ENABLE EST TAUR = YES) the setup value in par.1.6.5 ROTOR CONSTANT will be moltiply for the value, display in this parameter.

IP ADDRESS	
2.1.54	192.168.1.100

Drive's current IP address.
Active just in case of use Optional serial module "ANYBUS MODBUS TCP/IP".

Display range: from 000.000.000.000 to 255.255.255.255

ZERO ANGLE	
2.1.55	0.0

Zero encoder pulse Counter
Synchronization angle of the motor, determined from the procedure of installation or checking encoder

Display range: from 0.0 to 359.9.
During the normal operation, the variable is a zero pulse counter encoder read from the inverter.
It used in the installation/checking procedure encoder (see Chap.3) to showing the synchronization angle, to setting then, in the par.1.7.9 SET ZERO ANGLE.

ATTENTION! With the set par. 1.7.8 AUTO START ZERO = YES and if it used the Hall probes (par. 1.7.7 START TYPE = HALLPROB), the determined value, will have to correspond to set value in the par. 1.7.9 SET ZERO ANGLE.

Menu parameters description 2.2 DEFAULT DISPLAY

DEFAULT DISPLAY 2.2.

It includes those parameters enabling to select the DISPLAY STATUS variables (max. 10 visualisations).

DEFAULT DIS1 2.2.1 — 2.1.1

It selects the order nr of the variable to be included as 1st visualisation.

Setup range for SPEED application: 2.1.1,.....2.1.50.

DEFAULT DIS2 2.2.2 — 2.1.2

It selects the order nr of the variable to be included as 2nd visualisation.

Setup range for SPEED application: 2.1.1,.....2.1.50.

DEFAULT DIS3 2.2.3 — 2.1.3

It selects the order nr of the variable to be included as 3rd visualisation.

Setup range for SPEED application: 2.1.1,.....2.1.50.

DEFAULT DIS4 2.2.4 — 2.1.4

It selects the order nr of the variable to be included as 4th visualisation.

Setup range for SPEED application: 2.1.1,.....2.1.50.

DEFAULT DIS5 2.2.5 — 2.1.46

It selects the order nr of the variable to be included as5th visualisation

Setup range for SPEED application: 2.1.1,.....2.1.50.

DEFAULT DIS6 2.2.6 — 2.1.5

It selects the order nr of the variable to be included as 6h visualisation

Setup range for SPEED application: 2.1.1,.....2.1.50.

DEFAULT DIS7 2.2.7 — 2.1.15

It selects the order nr of the variable to be included as7th visualisation

Setup range for SPEED application: 2.1.1,.....2.1.50.

DEFAULT DIS8 2.2.8 — 2.1.49

It selects the order nr of the variable to be included as 8th visualisation

Setup range for SPEED application: 2.1.1,.....2.1.50.

DEFAULT DIS9 2.2.9 — 2.1.16

It selects the order nr of the variable to be included as 9th visualisation.

Setup range for SPEED application: 2.1.1,.....2.1.50

DEFAULT DIS10 2.2.10 — 2.1.38

It selects the order nr of the variable to be included as 10th visualisation.

Setup range for SPEED application: 2.1.1,.....2.1.50

For different applications (par.100.5 APPLICATION, set differently from SPEED), the setup range for parameters DEFAULT DIS1...DIS10 is described in the manuals enclosed.

Caution !

In paragraph **"DISPLAY STATUS description"** at the beginning of this Chapter, the process to change default visualisations is described.

Menu parameters description 2.3. FAULT HISTORY

FAULT HISTORY 2.3. — *It includes the last 10 faults display.*

FAULT 1 2.3.1 0. — *It displays the nr of the 1st fault (the last one).*

Display range: from 0. to 100

FAULT 2 2.3.2 0. — *It displays the nr of the 2nd fault*

Display range: from 0. to 100

FAULT 3 2.3.3 0. — *It displays the nr of the 3rd fault*

Display range: from 0. to 100

FAULT 4 2.3.4 0. — *It displays the nr of the 4th fault*

Display range: from 0. to 100

FAULT 5 2.3.5 0. — *It displays the nr of the 5th fault*

Display range: from 0. to 100

FAULT 6 2.3.6 0. — *It displays the nr of the 6h fault*

Display range: from 0. to 100

FAULT 7 2.3.7 0. — *It displays the nr of the 7h fault*

Display range: from 0. to 100

FAULT 8 2.3.8 0. — *It displays the nr of the 8th fault*

Display range: from 0. to 100

FAULT 9 2.3.9 0. — *It displays the nr of the 9th fault*

Display range: from 0. to 100

FAULT 10 2.3.10 0. — *It displays the nr of the 10th fault (less recent).*

Display range: from 0. to 100

See Chapter 17 INVERTER FAULTS AND ALARMS for fault list and related description.

Menu parameters description 2.4. SETUP OPERATOR

SETUP OPERATOR 2.4.

It includes those parameters enabling to select OPERATOR-type options, to be activated into BASIC DATA menu in OPERATOR mode.

OPERATOR SET1 2.4.1 1.10.14

It selects the order nr of the parameter to be included as 1st option.

Setup range for SPEED application: 1.10.14, 3.1.9.2.

OPERATOR SET2 2.4.2 3.1.9.2

It selects the order nr of the parameter to be included as 2nd option.

Setup range for SPEED application: 1.10.14, 3.1.9.2.

OPERATOR SET3 2.4.3 3.1.9.2

It selects the order nr of the parameter to be included as 3rd option.

Setup range for SPEED application: 1.10.14, 3.1.9.2.

OPERATOR SET4 2.4.4 3.1.9.2

It selects the order nr of the parameter to be included as 4th option.

Setup range for SPEED application: 1.10.14, 3.1.9.2.

OPERATOR SET5 2.4.5 3.1.9.2

It selects the order nr of the parameter to be included as 5th option.

Setup range for SPEED application: 1.10.14, 3.1.9.2.

ACTIVE SET OPER. 2.4.6 2.

It selects the max. nr of OPERATOR-type parameter to be enabled into the starting BASIC DATA menu.

Setup range: from 1. to 5.

1= only 1st option enabled, 2= only 1st and 2nd options enabled, ..., 5= all options enabled.

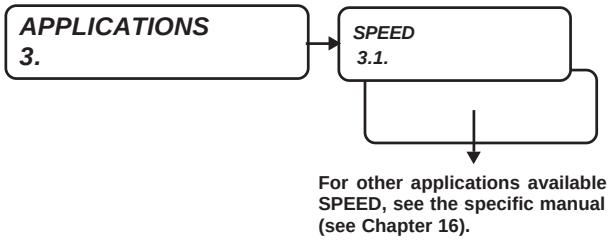
For different applications (par.100.5 APPLICATION, set differently from SPEED), the setup range for parameters OPERATOR SET1.... SET5 is described in the manuals enclosed.

Caution !

In paragraph **"BASIC DATA menu in OPERATOR mode"** at the beginning of this Chapter, the process to customize the keyboard basic options is described

Groups and menu description 3. APPLICATIONS

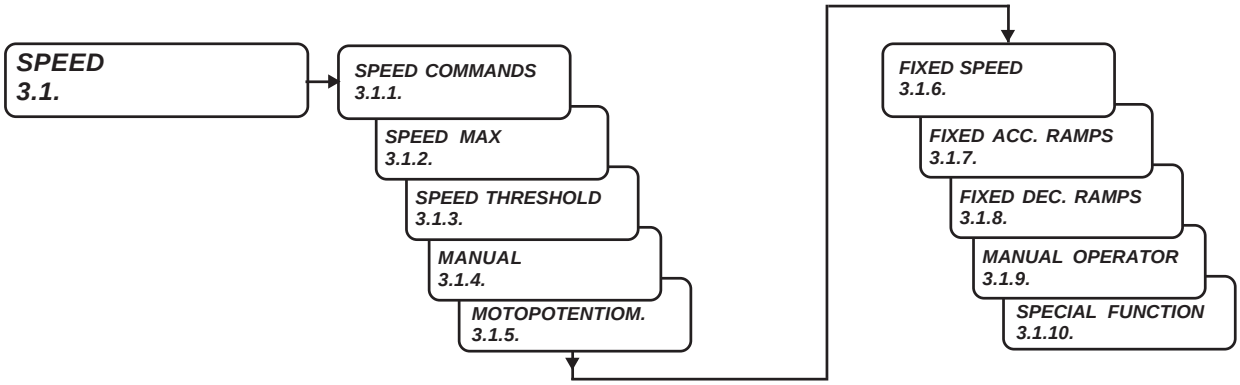
Menu 3. APPLICATIONS includes the parameters of those menus enabling all possible applications of this inverter.



For other applications available besides SPEED, see the specific manual enclosed (see Chapter 16).

Groups and menu description 3.1 SPEED

Menu 3.1 SPEED includes the parameters of those menus setting the basic application functioning: MOTOR SPEED CONTROL.



Menu parameters description 3.1.1 SPEED COMMANDS

SPEED COMMANDS
3.1.1.

It includes the parameters enabling some features on the speed set.

SPEED SOURCE
.1 AI1

Par.3.1.1.1. Assignes the motor speed adjusting source

Setup range: REMOTE, AI1, AI2, AI3, AI4, AI5, MOTOPOT, OPERATOR.

REMOTE= Speed adjusting by a value tranferred in serial mode. Starting value= 0

AI1....AI5= Speed adjusting by the selected analog input.

The input 100% (+/-10VCD) corresponds to the value set in par.1.3.1 MAX MOTOR SPEED.

When a +/-10VCD analog input is assigned (par.TYPE INPUT= -10Vdc / +10Vdc), the signal polarity determines the motor rotation speed, both in scalar and in vector control; **in this case, in order to avoid an irregular functioning with 0Vdc analog reference, it is advised to set par.1.3.2 MIN MOTOR SPEED= 0rpm.**

MOTOPOT= Speed adjusting by 2 digital inputs increase/decrease as motopotentiometer.

Digital inputs must be set in par.3.1.5.1 IN INCREASE MOT and 3.1.5.2 IN DECREASE MOT.

OPERATOR= Speed adjustment by keyboard by par.3.1.9.2 SET MAN OPERATOR.

In any case the max. adjusting corresponds to the value set in par.1.3.1 MAX MOTOR SPEED.

IN STOP SPEED
.2 I2

Par. 3.1.1.2. Assignes the STOP IN RAMP command.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

STOP IN RAMP command:

ON= the motor is brought to at 0rpm with active deceleration ramp.

OFF= the motor is brought up to the set speed with active acceleration ramp.

IN REVERSE SPEED
.3 I6

Par. 3.1.1.3. Assignes the ROTATION DIRECTION INVERSION command.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

ROTATION DIRECTION INVERSION command:

ON= the motor reverse its rotation direction compared to the present speed reference sign.

OFF= the motor direction according to the present speed reference sign.

Menu parameters description 3.1.2 SPEED MAX

SPEED MAX
3.1.2.

It includes those parameters enabling the binary selection of 3 motor max. speed limits, in absolute value for both rotation directions.

SET SPEED MAX1
.1 1250.rpm

Par.3.1.2.1. Setup of max. speed limit N.1

Setup range: from 30.rpm to 24000.rpm

SET SPEED MAX2
.2 1000.rpm

Par. 3.1.2.2. Setup of max. speed limit N.2.

Setup range: from 30.rpm to 24000.rpm

SET SPEED MAX3
.3 750.rpm

Par. 3.1.2.3. Setup of max. speed limit N.3.

Setup range: from 30.rpm to 24000.rpm

IN1 SPEED MAX
.4 REMOTE

Par. 3.1.2.4. **Assignes a command for the binary selection of max. speed limits from N.1 to N.3.**

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**

IN2 SPEED MAX
.5 REMOTE

Par. 3.1.2.5. Assignes a command for the binary selection of max. speed limits from N.1 to N.3.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**

Max. speed limits selection modes:

IN1 SPEED MAX	IN2 SPEED MAX	BINARY COMBINATION RESULT
OFF	OFF	Max. speed limit by par.1.3.1 MAX MOTOR SPEED
ON	OFF	Max. speed limit by par.1.3.2.1 SET SPEED MAX 1
OFF	ON	Max. speed limit by par.1.3.2.2 SET SPEED MAX 2
ON	ON	Max. speed limit by par.1.3.2.3 SET SPEED MAX 3

Menu parameters description 3.1.3. SPEED THRESHOLD

SPEED THRESHOLD
3.1.3.

It includes the parameters enabling the motor speed thresholds

SPEED THRESHOLD1
.1 100.rpm

Par.3.1.3.1. Threshold N.1 on the motor speed displayed in var.2.1.2 MOTOR SPEED.

Setup range: from 0.rpm to 30000.rpm

THRESHOLD1 DELAY
.2 0.0s

Par.3.1.3.2. N.1 threshold intervention delay on the motor speed.

Setup range: from 0.1s to 30.0s

OUT THRESHOLD1
.3 O1

Par.3.1.3.3. Assignes a digital output the N.1 threshold state

Setup range: REMOTE, O1, O2, O3, O4, O5, O6, O7, O8.

REMOTE= no output assigned

O1…O8= Assignation of the state to the selected output:

Motor speed > than par.3.1.3.1 + delay in par.3.1.3.2= ON output; Motor speed < than par.3.1.3.1= OFF output.

SPEED THRESHOLD2
.4 1500.rpm

Par.3.1.3.4. N.2 threshold on the motor speed displayed in var.2.1.2 MOTOR SPEED

Setup range: from 0.rpm to 30000.rpm

THRESHOLD2 DELAY
.5 1.0s

Par.3.1.3.5. N.2 threshold intervention delay on the motor speed.

Setup range: from 0.1s to 30.0s

OUT THRESHOLD2
.6 REMOTE

Par.3.1.3.6. Assignes a digital output the N.2 threshold state on the motor speed

Setup range: REMOTE, O1, O2, O3, O4, O5, O6, O7, O8

REMOTE= no output assigned

O1…O8= Assignation of the state to the selected output:

Motor speed > than par.3.1.3.4 + delay in par.3.1.3.5= ON output.

Motor speed < than par.3.1.3.4= OFF output.

SPEED THR. STOP
.7 0.rpm

Par. 3.1.3.7. Threshold on the speed set for the ramp stop function

Setup range: from 0.rpm to 300.rpm
When the set speed is reduced, in absolute value, below the value of this parameter, it runs an internal command that stops in ramp, this function is typically used to prevent that the motor rotates even when the speed reference from analog input is set to zero (caused by the analog input offset).
If the fixed speeds selection is enabled, through the par. 3.1.6.8, par. 3.1.6.9 and par. 3.1.6.10, this function is disable.
Setting the value to 0 the function is excluded.

Menu parameters description 3.1.4 MANUAL

MANUAL
3.1.4.

It includes the parameters enabling and adjusting the motor speed manual commands.

MANUAL SPEED
.1 300.rpm

Par.3.1.4.1. Speed set in manual commands or in JOG commands.

Setup range: from 0.rpm to the value set in par.1.3.1 MAX MOTOR SPEED.

IN ENABLE MANUAL
.2 REMOTE

Par.3.1.4.2. Assignes the JOG commands enabling.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

Command ON= JOG enabled; Command OFF= JOG disabled.

IN JOG +
.3 REMOTE

Par.3.1.4.3. Assignes the manual JOG commands with positive rotation direction (counterclockwise, see from shaft side).

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

Command ON= JOG + (if enabled); Command OFF= STOP

IN JOG -
.4 REMOTE

Par.3.1.4.4. Assignes the manual JOG commands with negative rotation direction (clockwise, see from shaft side).

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

Command ON= JOG + (if enabled); Command OFF= STOP

Menu parameters description 3.1.5 MOTOPOTENTIOM

MOTOPOTENTIOM. 3.1.5.

It includes the parameters which determine the speed reference functioning by motopotentiometer-type command, which are ON if par.3.1.1 SPEED SOURCE = MOTOPOT

SAVE MOTOPOT. .1 YES

Par.3.1.5.1. Enables or not saving in eeprom of the motopotentiometer speed setup at RUN stop (I1 OFF) and when powering off.

Setup range: NO, YES

If NO is set, when powering up or at rate start, the setup starts from 0.

IN INCREASE MOT .2 REMOTE

Par.3.1.5.2. Assignes the motopotentiometer speed reference increase command..

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**

IN DECREASE MOT .3 REMOTE

Par.3.1.5.3. Assignes the motopotentiometer speed reference decrease command.

Setting range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**

ACC DEC MOTP SET .4 10.00s

Par. 3.1.5.4. Setting of acceleration/deceleration ramps on speed reference from motopotentiometer.

Setup range: from 0.01s to 600.00s.

MOTOPOTENTIOMETER FUNCTIONING:

By the INCREASE command ON, the set increases slowly for the first 3s with a 300s fixed ramp; then with an active acceleration ramp setting by **par.3.1.5.4 ACC DEC MOTP SET**. Idem for DECREASE command for decreasing setup

Menu parameters description 3.1.6 FIXED SPEED

FIXED SPEED 3.1.6.

It contains the parameters enabling the binary selection of 7 fixed speeds.

SET SPEED 1 .1 500.rpm

Par.3.1.6.1. Setup of fixed speed N.1

Setup range: from -30000.rpm to 30000.rpm

SET SPEED 2 .2 1000.rpm

Par. 3.1.6.2. Setup of fixed speed N.2.

Setup range: from -30000.rpm to 30000.rpm

SET SPEED 3 .3 -500.rpm

Par. 3.1.6.3. Setup of fixed speed N.3.

Setup range: from -30000.rpm to 30000.rpm

SET SPEED 4 .4 1500.rpm

Par. 3.1.6.4. Setup of fixed speed N.4.

Setup range: from -30000.rpm to 30000.rpm

SET SPEED 5 .5 -750.rpm

Par. 3.1.6.5. Setup of fixed speed N.5.

Setup range: from -30000.rpm to 30000.rpm

SET SPEED 6	
.6	-1500.rpm

Par. 3.1.6.6. Setup of fixed speed N.6.

Setup range: from -30000.rpm to 30000.rpm

SET SPEED 7	
.7	-1000.rpm

Par. 3.1.6.7. Setup of fixed speed N.7.

Setup range: from -30000.rpm to 30000.rpm

IN1 SPEED	
.8	I3

Par.3.1.6.8. Assignes a command for the binary selection of fixed speeds from N.1 to N.7.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

IN2 SPEED	
.9	I4

Par. 3.1.6.9. Par.3.1.1.9. Assignes a command for the binary selection of fixed speeds from N.1 to N.7.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

IN3 SPEED	
.10	REMOTE

Par.3.1.6.10. Assignes a command for the binary selection of fixed speeds from N.1 to N.7.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

Max. fixed speeds selection modes:

IN1 SPEED	IN2 SPEED	IN3 SPEED	BINARY COMBINATION RESULT
OFF	OFF	OFF	Speed reference by source set in par.3.1.1.1 SPEED SOURCE
ON	OFF	OFF	Speed reference by fixed speed set in par.3.1.6.1 SET SPEED 1
OFF	ON	OFF	Speed reference by fixed speed set in par.3.1.6.2 SET SPEED 2
ON	ON	OFF	Speed reference by fixed speed set in par.3.1.6.3 SET SPEED 3
OFF	OFF	ON	Speed reference by fixed speed set in par.3.1.6.4 SET SPEED
ON	OFF	ON	Speed reference by fixed speed set in par.3.1.6.5 SET SPEED 5
OFF	ON	ON	Speed reference by fixed speed set in par.3.1.6.6 SET SPEED 6
ON	ON	ON	Speed reference by fixed speed set in par.3.1.6.7 SET SPEED 7

Menu parameters description 3.1.7. FIXED ACC. RAMPS

FIXED ACC. RAMPS	
3.1.7.	

It contains the parameters enabling the binary selection of 3 acceleration ramps on the motor speeds set.

SET ACC1	
.1	1.00s

Par. 3.1.7.1. Setup of acceleration ramp N.1.

Setup range: from 0.01s to 600.00s

SET ACC2	
.2	2.00s

Par. 3.1.7.2. Setup of acceleration ramp N.2

Setup range: from 0.01s to 600.00s

SET ACC3	
.3	3.00s

Par. 3.1.7.3. Setup of acceleration ramp N.3.

Setup range: from 0.01s to 600.00s

IN1 ACC
.4 I5

Par.3.1.7.4. Assignes a command for the binary selection of acceleration ramps from N.1 to N.3.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**

IN2 ACC

Par.3.1.7.5. Assignes a command for the binary selection of acceleration ramps from N.1 to N.3.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

Fixed acceleration ramps selection modes :

IN1 ACC	IN2 ACC	BINARY COMBINATION RESULT
OFF	OFF	Acceleration ramp by par.1.2.1 RAMP ACCEL.TIM
ON	OFF	Acceleration ramp by par. 3.1.7.1 SET ACC1
OFF	ON	Acceleration ramp by par. .1.7.2 SET ACC2
ON	ON	Acceleration ramp by par. 3.1.7.3 SET ACC3

Menu parameters description 3.1.8. FIXED DEC. RAMPS

FIXED DEC. RAMPS
3.1.8.

It contains the parameters enabling the binary selection of 3 deceleration ramps on the motor speeds set.

SET DEC 1
.1 1.00s

Par. 3.1.8.1. Setup of deceleration ramp N. 1.

Setup range: from 0.01s to 600.00s

SET DEC 2
.2 2.00s

Par. 3.1.8.2. Setup of deceleration ramp N.2.

Setup range: from 0.01s to 600.00s

SET DEC 3
.3 3.00s

Par. 3.1.8.3. **Setup of deceleration ramp** ***N.3.***

Setup range: from 0.01s to 600.00s

IN1 DEC
.4 I5

Par.3.1.8.4. Assignes a command for the binary selection of deceleration ramps from N.1 to N.3

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

IN2 DEC
.5 REMOTE

Par.3.1.8.5. Assignes a command for the binary selection of deceleration ramps from N.1 to N.3.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.

Fixed deceleration ramps selection modes:

IN1 DEC	IN2 DEC	BINARY COMBINATION RESULT
OFF	OFF	Acceleration ramp by par. 1.2.2 RAMP DECEL. TIME
ON	OFF	Acceleration ramp by par. 3.1.8.1 SET DEC 1
OFF	ON	Acceleration ramp by par.3 .1.8.2 SET DEC 2
ON	ON	Acceleration ramp by par. 3.1.8.3 SET DEC 3

Menu parameters description 3.1.9. MANUAL OPERATOR

MANUAL OPERATOR
3.1.9.

It contains the parameters enabling the speed manual setup by the keyboard in OPERATOR mode.

SAVE MAN OPERAT.
.1 YES

Par. 3.1.9.1. When powering off, it enables or not saving in eeprom of the speed manual setup by par. 3.1.9.2 SET OP.....rpm

Setup range: NO, YES

SET MAN OPERATOR
.2

Par. 3.1.9.2 It includes the keyboarded manual setup of the motor speed and the real speed display.

It is an **OPERATOR-type** parameter. See paragraph at the beginning of this Chapter: "**BASIC DATA MENU in OPERATOR mode".**

SET OP 300.rpm
SPEED 0.rpm

SET OP= Motor speed setup enabled only by par.3.1.1.1 SPEED SOURCE= OPERATOR.

Setupg range: from -30000.rpm to 30000.rpm

SPEED= Display of the real motor speed. It corresponds to var.2.1.2 MOTOR SPEED display

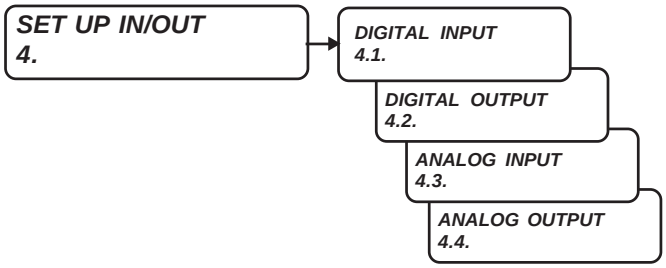
Menu parameters description 3.1.10. SPECIAL FUNCTION

SPECIAL FUNCTION
3.1.10.

INACTIVE MENU

Groups and menu description 4. SET UP IN/OUT

The menu 4. SET UP IN/OUT includes the adaptation parameter menus of all digital and analog inputs/outputs.
See paragraph **"Function assignation to INPUT/OUTPUT resources**" in Chapter 14 for functions assignation to I/O resources



Groups and menu description 4.1. DIGITAL INPUT

DIGITAL INPUT
4.1.

It includes adaptation parameters for each digital input with the following setup range:
NO= not inverted input
YES= inverted input

INVERT I2 4.1.1 NO	***I2 Digital input adaptation.***
INVERT I3 4.1.2 NO	***I3 Digital input adaptation.***
INVERT I4 4.1.3 NO	***I4 Digital input adaptation.***
INVERT I5 4.1.4 NO	***I5 Digital input adaptation.***
INVERT I6 4.1.5 NO	***I6 Digital input adaptation.***
INVERT I7 4.1.6 NO	***I7 Digital input adaptation.***
INVERT I8 4.1.7 NO	***I8 Digital input adaptation.***
INVERT I9 4.1.8 NO	***I9 Digital input adaptation.***
INVERT I0 4.1.9 NO	***I10 Digital input adaptation.***
INVERT I11 4.1.10 NO	***I11 Digital input adaptation.***
INVERT I12 4.1.11 NO	***I12 Digital input adaptation.***
INVERT I13 4.1.12 NO	***I13 Digital input adaptation.***
INVERT I14 4.1.13 NO	***I14 Digital input adaptation.***

Menu parameters description 4.2. DIGITAL OUTPUT

DIGITAL OUTPUT 4.2. — *It includes the parameters enabling digital outputs inversion.*

INVERT O1 4.2.1 NO — *Enables or not the O1 digital inputs inversion.*
Setup range NO, YES.

INVERT O2 4.2.2 NO — *Enables or not the O2 digital inputs inversion.*
Setup range NO, YES.

INVERT O3 4.1.3 NO — *Enables or not the O3 digital inputs inversion.*
Setup range NO, YES.

INVERT O4 4.2.4 NO — *Enables or not the O4 digital inputs inversion.*
Setup range NO, YES.

INVERT O5 4.2.5 NO — *Enables or not the O5 digital inputs inversion.*
Setup range NO, YES.

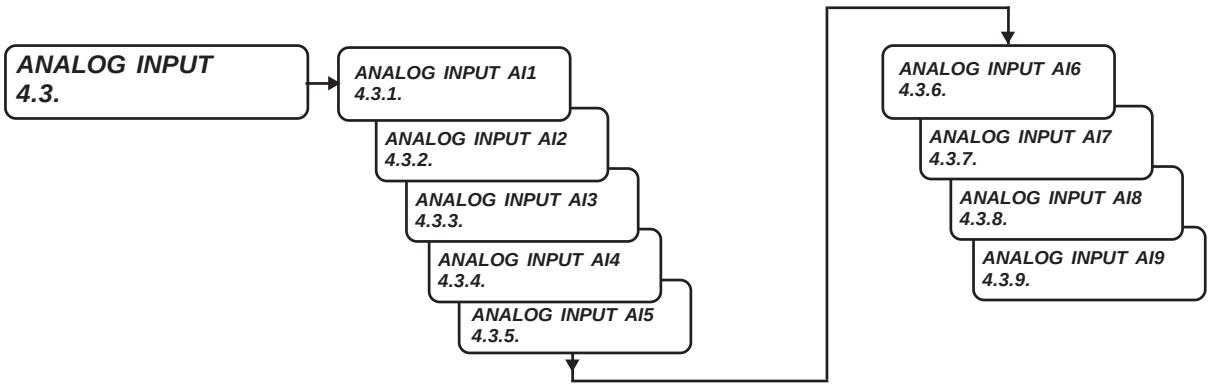
INVERT O6 4.2.6 NO — *Enables or not the O6 digital inputs inversion.*
Setup range NO, YES.

INVERT O7 4.2.7 NO — *Enables or not the O7 digital inputs inversion.*
Setup range NO, YES.

INVERT O8 4.2.8 NO — *Enables or not the O8 digital inputs inversion.*
Setup range NO, YES.

Groups and menu description 4.3. ANALOG INPUT

Menu 4. 3 ANALOG INPUT includes the parameter menus adapting analog inputs signal.



Menu parameters description 4.3.1. ANALOG INPUT AI1

ANALOG INPUT AI1
4.3.1.

It includes those parameters adapting AI1 analog input signal.

SCALE
.1 100.00%

Par. 4.3.1.1. Adaptes AI1 analog input full scale.

Setup range: from -300.00% to +300.00%.
100% value doesn't alter the scale. -100% value doesn't alter the scale and changes the sign.

OFFSET
.2 0.00%

Par. 4.3.1.2. Clears the AI1 analog input offset.

Setup range: from -50.00% to +50.00%.

TYPE INPUT
.3 -10V/+10V

Par. 4.3.1.3. Selects the signal type connected to AI1 analog input.

Setup range: 0/+10V, -10V/+10V.

Menu parameters description 4.3.2. ANALOG INPUT AI2

ANALOG INPUT AI2
4.3.2.

It includes those parameters adapting AI2 analog input signal.

SCALE
.1 100.00%

Par. 4.3.2.1. Adaptes AI2 analog input full scale.

Setup range: from -300.00% to +300.00%.
100% value doesn't alter the scale. -100% value doesn't alter the scale and changes the sign.

OFFSET
.2 0.00%

Par. 4.3.2.2. Clears the AI2 analog input offset.

Setup range: from -50.00% to +50.00%.

TYPE INPUT
.3 4/20mA

Par. 4.3.2.3. Selects the signal type connected to AI2 analog input.

Setup range: 0/+10V, -10V/+10V, 0/20mA, 4/20mA.

Menu parameters description 4.3.3. ANALOG INPUT AI3

ANALOG INPUT AI3
4.3.3.

It includes those parameters adapting AI3 analog input signal.

SCALE
.1 100.00%

Par. 4.3.3.1. Adaptes AI3 analog input full scale.

Setup range: from -300.00% to +300.00%.
100% value doesn't alter the scale. -100% value doesn't alter the scale and changes the sign.

OFFSET
.2 0.00%

Par. 4.3.3.2. Clears the AI3 analog input offset.

Setup range: from -50.00% to +50.00%.

TYPE INPUT
.3 0/+10V

Par. 4.3.3.3. Selects the signal type connected to AI4 analog input.

Setup range: 0/+10V, -10V/+10V.

Menu parameters description 4.3.4. ANALOG INPUT AI4

ANALOG INPUT AI4
4.3.4.

It includes those parameters adapting AI4 analog input signal.

SCALE
.1 100.00%

Par. 4.3.4.1. Adaptes AI4 analog input full scale.

Setup range: from -300.00% to +300.00%.
100% value doesn't alter the scale. -100% value doesn't alter the scale and changes the sign.

OFFSET
.2 0.00%

Par. 4.3.4.2. Clears the AI4 analog input offset.

Setup range: from -50.00% to +50.00%.

TYPE INPUT
.3 0/+10V

Par. 4.3.4.3. Selects the signal type connected to AI4 analog input.

Setup range: 0/+10V, -10V/+10V.

Menu parameters description 4.3.5. ANALOG INPUT AI5

ANALOG INPUT AI5
4.3.5.

It includes those parameters adapting AI5 analog input signal.

SCALE
.1 100.00%

Par. 4.3.5.1. Adaptes AI5 analog input full scale.

Setup range: from -300.00% to +300.00%.
100% value doesn't alter the scale. -100% value doesn't alter the scale and changes the sign.

OFFSET
.2 0.00%

Par. 4.3.5.2. Clears the AI5 analog input offset.

Setup range: from -50.00% to +50.00%.

TYPE INPUT
.3 0/+10V

Par. 4.3.5.3. Selects the signal type connected to AI5 analog input.

Setup range: 0/+10V, -10V/+10V.

Menu parameters description 4.3.6. ANALOG INPUT AI6

ANALOG INPUT AI6
4.3.6.

It includes those parameters adapting AI6 analog input signal.

SCALE
.1 100.00%

Par. 4.3.6.1. Adaptes AI6 analog input full scale.

Setup range: from -300.00% to +300.00%.
100% value doesn't alter the scale.

OFFSET
.2 0.00%

Par. 4.3.6.2. Clears the AI6 analog input offset.

Setup range: from -50.00% to +50.00%.

TYPE INPUT
.3 0/+10V

Par. 4.3.6.3. Selects the signal type connected to AI6 analog input.

Setup range: 0/+10V.

Menu parameters description 4.3.7. ANALOG INPUT AI7

ANALOG INPUT AI7
4.3.7.

It includes those parameters adapting AI7 analog input signal.

SCALE
.1 100.00%

Par. 4.3.7.1. Adaptes AI7 analog input full scale.

Setup range: from -300.00% to +300.00%.
100% value doesn't alter the scale.

OFFSET
.2 0.00%

Par. 4.3.7.2. Clears the AI7 analog input offset.

Setup range: from -50.00% to +50.00%.

TYPE INPUT
.3 0/+10V

Par. 4.3.7.3. Selects the signal type connected to AI7 analog input.

Setup range: 0/+10V.

Menu parameters description 4.3.8. ANALOG INPUT AI8

ANALOG INPUT AI8
4.3.8.

It includes those parameters adapting AI8 analog input signal..

SCALE
.1 100.00%

Par. 4.3.8.1. Adaptes AI8 analog input full scale.

Setup range: from -300.00% to +300.00%.
100% value doesn't alter the scale.

OFFSET
.2 0.00%

Par. 4.3.8.2. Clears the AI8 analog input offset.

Setup range: from -50.00% to +50.00%.

TYPE INPUT
.3 0/+10V

Par. 4.3.8.3. Selects the signal type connected to AI8 analog input.

Setup range: 0/+10V.

Menu parameters description 4.3.9. ANALOG INPUT AI9

ANALOG INPUT AI9
4.3.9.

It includes those parameters adapting AI9 analog input signal..

SCALE
.1 100.00%

Par. 4.3.9.1. Adaptes AI9 analog input full scale.

Setup range: from -300.00% to +300.00%.
100% value doesn't alter the scale.

OFFSET
.2 0.00%

Par. 4.3.9.2. Clears the AI9 analog input offset.

Setup range: from -50.00% to +50.00%.

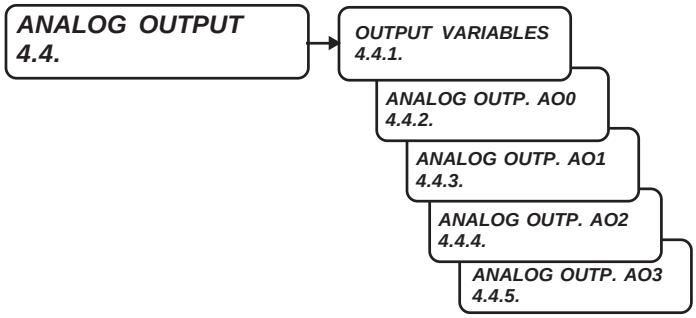
TYPE INPUT
.3 0/+10V

Par. 4.3.9.3. Selects the signal type connected to AI9 analog input.

Setup range: 0/+10V.

Groups and menu description 4.4. ANALOG OUTPUT

Menu 4.4. ANALOG OUTPUT includes the parameter menus adapting analog outputs signal and programming their function.



Menu parameters description 4.4.1. OUTPUT VARIABLES

OUTPUT VARIABLES
4.4.1.

It includes variables whose function is linked to an analog output.
Variables are in % and the ratio to the analog output is:
+100.00%= +10Vdc analog output, -100.00%= -10Vdc analog output
+/-100% value correspond to the analog output saturation limits too.

MOTOR CURRENT %
.1 100.00%

Variable N.1. Motor absorbed current in % to the nominal current in par.1.1.1 MOTOR NOM CURREN.

Display range: from -100.00% to +100.00%. Post time 5ms.

SET SPEED F %
.2 100.00%

Variable N.2. Reference to the speed set in % to the max. speed in par.1.3.1 MAX MOTOR SPEED. Fast signal (FAST variable).

Display range: from -100.00% to +100.00%. Post time 1ms.

MOTOR SPEED %
.3 100.00%

Variable N.3. Motor speed in % to the max speed in par.1.3.1 MAX MOTOR SPEED. Filtered signal.

Display range: from -100.00% to +100.00%. Post time 5ms.

MOTOR SPEED F %
.4 100.00%

Variable N.4. Motor speed in % to the max speed in par.1.3.1 MAX MOTOR SPEED. Fast signal (FAST variable).

Display range: from -100.00% to +100.00%. Post time 1ms.

MOTOR TORQUE %
.5 100.00%

Variable N.5. Motor torque in % to the nominal torque. Filtered signal.

Display range: from -300.00% to +300.00%. Post time 2 sec.

Real torques over +/-300.00% get saturated at +/-300.00%. For +/-10Vdc analog output to be equivalent to +/-300.00% torque, you must set 33.33% in SCALE parameters.

MOTOR TORQUE F %
.6 100.00%

Variable N.6. Motor torque in % to the nominal torque. Fast signal (FAST variable).

Display range: from -300.00% to +300.00%. Post time 1ms.

Real torques over +/-300.00% get saturated at +/-300.00%. For +/-10Vdc analog output to be equivalent to +/-300.00% torque, you must set 33.33% in SCALE parameters.

REMOTE SET1 %
.7 100.00%

Variable N.7. % value to be setup in serial mode. See enclosure: Instruction Manual INVERTER SERIES 400 SERIAL TRANSMISSION.

Display range: from -100.00% to +100.00%. Post time 5ms.

REMOTE SET2 %
.8 100.00%

Variable N.8. % value to be setup in serial mode. See enclosure: Instruction Manual INVERTER SERIES 400 SERIAL TRANSMISSION.

Display range: from -100.00% to +100.00%. Post time 5ms.

REMOTE SET3 %
.9 100.00%

Variable N.9. % value to be setup in serial mode. See enclosure: Instruction Manual INVERTER SERIES 400 SERIAL TRANSMISSION.

Display range: from -100.00% to +100.00%. Post time 5ms.

REMOTE SET4 %
.10 100.00%

Variable N.10. % value to be setup in serial mode. See enclosure: Instruction Manual INVERTER SERIES 400 SERIAL TRANSMISSION.

Display range: from -100.00% to +100.00%. Post time 5ms.

STRETCH %	
.11	100.00%

Variable N.11. Active STRECH on the material during the winding / unwinding. (visible only in the inverter C400W series with WINDER application)

Display range: from 0.00% to +100.00%. 100.00% corresponds to the set value in par. 3.6.6.3/3.6.7.3 STRETCH MAX SET

DIAMETER %	
.12	100.00%

Variable N.12. Actual coil DIAMETER during the winding / unwinding. (visible only in the inverter C400W series with WINDER application)

Display range from 0.00% to +100.00%. 100.00% corresponds to the set value in par. 3.6.3.14.2 MAX DIAMETER

COIL LINE SPEED %	
.13	100.00%

Variable N.13. Actual coil PERIPHERAL SPEED during the winding / unwinding. (visible only in the inverter C400W series with WINDER application)

Diplay range: from 0.00% to +100.00%. 100.00% corresponds to the set value in par. 3.6.3.8 LINE SPEED MAX.

Menu parameters description 4.4.2. ANALOG OUTP. AO0

ANALOG OUTP. AO0
4.4.2.

It includes those parameters adapting the AO0 analog output signal and determining its function.

VAR DISPLAY	
.1	1.

Par. 4.4.2.1. Set in this parameter the menu 4.4.1 OUTPUT VARIABLES variable nr, whose function is required to be associated with AO0 analog output.

Setup range: from 1. to 10.

Caution !

AO0 analog output sampling time is shorter than all other outputs, so this is the one which could follow in the best way FAST variables variations.

SCALE	
.2	100.00%

Par. 4.4.2.2. Adaptes AO0 analog output full scale.

Setup range: from -300.00% to +300.00%.

100% value doesn't alter the scale. -100% value doesn't alter the scale and changes the sign.

OFFSET	
.3	100.00%

Par. 4.4.2.3. Clears AO0 analog output offset.

Setup range: from -10.00% to +10.00%.

TYPE OUTPUT	
.4	ABS

Par. 4.4.2.4. Selects the signal type connected to AO0 analog output.

Setup range: DIRECT, ABS.

DIRECT= the analog output follows directly the associated variable value and sign.

ABS= the analog output can only be set at positive values and follows only the associated variable absolute value.

Menu parameters description 4.4.3. ANALOG OUTP. AO1

ANALOG OUTP. AO1
4.4.3.

It includes those parameters adapting the AO1 analog output signal and determining its function.

VAR DISPLAY	
.1	2.

Par. 4.4.3.1. Set in this parameter the menu 4.4.1 OUTPUT VARIABLES variable nr, whose function is required to be associated with AO1 analog output.

Setup range: from 1. to 10.

SCALE	
.2	100.00%

Par. 4.4.3.2. Adaptes AO1 analog output full scale.

Setup range: from -300.00% to +300.00%. 100% value doesn't alter the scale. -100% value doesn't alter the scale and changes the sign.

OFFSET	
.3	100.00%

Par. 4.4.3.3. Clears AO1 analog output offset.

Setup range: from -10.00% to +10.00%.

TYPE OUTPUT	
.4	DIRECT

Par. 4.4.3.4. Selects the signal type connected to AO1 analog output.

Setup range: DIRECT, ABS.

DIRECT= the analog output follows directly the associated variable value and sign.

ABS= the analog output can only be set at positive values and follows only the associated variable absolute value.

Menu parameters description 4.4.4. ANALOG OUTP. AO2

ANALOG OUTP. AO2 4.4.4.

It includes those parameters adapting the AO2 analog output signal and determining its function.

VAR DISPLAY .1 3.

Par. 4.4.4.1. Set in this parameter the menu 4.4.1 OUTPUT VARIABLES variable nr, whose function is required to be associated with AO2 analog output.

Setup range: from 1. to 10.

SCALE .2 100.00%

Par. 4.4.4.2. Adaptes AO2 analog output full scale.

Setup range: from -300.00% to +300.00%.

100% value doesn't alter the scale. -100% value doesn't alter the scale and changes the sign.

OFFSET .3 100.00%

Par. 4.4.4.3. Clears AO2 analog output offset.

Setup range: from -10.00% to +10.00%.

TYPE OUTPUT .4 DIRECT

Par. 4.4.4.4. Selects the signal type connected to AO2 analog output.

Setup range: DIRECT, ABS.

DIRECT= the analog output follows directly the associated variable value and sign.

ABS= the analog output can only be set at positive values and follows only the associated variable absolute value.

Menu parameters description 4.4.5. ANALOG OUTP. AO3

ANALOG OUTP. AO3 4.4.5.

It includes those parameters adapting the AO3 analog output signal and determining its function.

VAR DISPLAY .1 5.

Par. 4.4.5.1. Set in this parameter the menu 4.4.1 OUTPUT VARIABLES variable nr, whose function is required to be associated with AO3 analog output.

Setup range: from 1. to 10.

SCALE .2 100.00%

Par. 4.4.5.2. Adaptes AO3 analog output full scale.

Setup range: from -300.00% to +300.00%.

100% value doesn't alter the scale. -100% value doesn't alter the scale and changes the sign.

OFFSET .3 100.00%

Par. 4.4.5.3. Clears AO3 analog output offset.

Setup range: from -10.00% to +10.00%.

TYPE OUTPUT .4 DIRECT

Par. 4.4.5.4. Selects the signal type connected to AO3 analog output.

Setup range: DIRECT, ABS.

DIRECT= the analog output follows directly the associated variable value and sign.

ABS= the analog output can only be set at positive values and follows only the associated variable absolute value.

• Analog outputs response times and variables assignation example

- AO0 analog output associated to FAST variables has a 2,6ms max. post time, while if associated to other variables, its max. post time is 6,6ms.

- AO1 analog output associated to all variables has always a ,6ms max. post time.

- AO2, AO3 analog output associated with all variables have a 20ms max. post time.

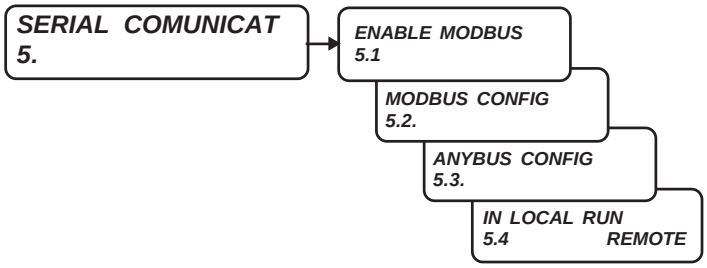
ASSIGNATION EXAMPLE

If you want to associate var. 4.4.1.4 MOTOR SPEED F% with AO0 analog output:

Set par. 4.4.2.1 VAR DISPLAY=4.

Groups and menu description 5. SERIAL COMUNICAT

Menu 5. SERIAL COMUNICAT includes those parameters menus setting the serial communication for the different field busses.See enclosure: Instruction manual INVERTER SERIES 400 SERIAL TRANSMISSION, for a complete description of the serial communication



ENABLE MODBUS
5.1 DISABLE

It enables and disables the standard serial transmission (MODBUS RTU or ROWAN)

Setup range: DISABLE, ENABLE.

DISABLE= It disables the standard field busses (not ANYBUS) and keeps in reset mode the related peripheral devices; it clears reception and transmission messages.

Caution ! To enable variations on serial transmission setup parameters of menu 5.2 MODBUS CONFIG, it is necessary to select DISABLE and then ENABLE or to power off and then power the inverter up again.

ENABLE= It enables the standard serial transmission by MODBUS RTU or ROWAN protocols.

Menu parameters description 5.2 MODBUS CONFIG

MODBUS CONFIG
5.2.

It includes the parameters setting the basic standard RS485 serial communication by MODbus OR ROWAN protocols

PROTOCOL
5.2.1 MODBUS

It enables the basic standard RS485 serial communication protocol.

Setup range: MODBUS, ROWAN.

MODBUS= enables the MODBUS RTU serial protocol; ROWAN= enables the ROWAN serial protocol.

ADDRESS
5.2.2 2.

It sets the inverter serial address.

Setup range: from 1 to 247.

BAUD RATE
5.2.3 9600.

It sets the bps transmission speed.

Setup range: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200.

PARITY
5.2.4 NONE

It enables or disable the parity control of the single character or type.

Setup range: NONE, EVEN, ODD.

NONE= It disables the character parity control. **EVEN**= It enables the EVEN character parity control. **ODD**= It enables the ODD character parity control.

BIT STOP
5.2.5 1.

It sets the stop bit nr for each character.

Setup range: from 1 to 2.

RESET ERR. COUNT
5.2.6 NO

It enables to clear the communication errors displayed in variables: var.2.1.43 LAST TWO ERR COM, var. 2.1.44 COUNT ERROR COM.

Setup range: NO, YES.

To clear up, select **YES** and after 2s the selection goes back to **NO** automatically.

INACTIVITY TIME
5.2.7 30.00s

It enables/disables the serial line activity timed control.

Setup range: from 0.00s to 30.00s.

If 0.00s or 30.00s is set, the control is excluded. If a value between 0.01s and 29.9s is set, the control is enabled. If from the last message some time passes without another message is got, the inverter blocks for **fault 40. LOST COMMUNICATION**. At the inverter power supplying, the timed control is kept disabled and will be enabled only after the reception of the first valid message.

Menu parameters description 5.3 ANYBUS CONFIG

ANYBUS CONFIG
5.3.

It contains parameters useful for the serial communication functioning through the ANYBUS module installed in the optional expansion card.
Field bus now available : CANOPEN, PROFIBUS, MODBUS TCP/IP, ETHERCAT, PROFINET

ADDRESS
5.3.1 **0.**

Set the CANOPEN, PROFIBUS or MODBUS TCP/IP serial address, depending on the ANYBUS kind of module.
Setting field from 0 to 250.
The 0 setting switches off completely the functioning of the ANYBUS module.

CYCLIC CONFIG
5.3.2

It contains parameter for configuration of the cyclic trasmission (max priority data trasmission), used by protocols:
CANOPEN, PROFIBUS, MODBUS TCP/IP, ETHERCAT, PROFINET

PZD1 READ
5.3.2.1 **0.**

Cyclic Data address to read PZD1
Setup range from 0 to 250.

PZD2 READ
5.3.2.2 **0.**

Cyclic Data address to read PZD2
Setup range from 0 to 250.

PZD3 READ
5.3.2.3 **0.**

Cyclic Data address to read PZD3
Setup range from 0 to 250.

PZD4 READ
5.3.2.4 **0.**

Cyclic Data address to read PZD4
Setup range from 0 to 250.

PZD5 READ
5.3.2.5 **0.**

Cyclic Data address to read PZD5
Setup range from 0 to 250.

PZD6 READ
5.3.2.6 **0.**

Cyclic Data address to read PZD6
Setup range from 0 to 250.

PZD7 READ
5.3.2.7 **0.**

Cyclic Data address to read PZD7
Setup range from 0 to 250.

PZD8 READ
5.3.2.8 **0.**

Cyclic Data address to read PZD8
Setup range from 0 to 250.

PZD1 WRITE
5.3.2.9 **0.**

Cyclic Data address to write PZD1
Setup range from 0 to 250.

PZD1 WRITE
5.3.2.10 **0.**

Cyclic Data address to write PZD2
Setup range from 0 to 250.

PZD1 WRITE
5.3.2.11 **0.**

Cyclic Data address to write PZD3
Setup range from 0 to 250.

PZD1 WRITE
5.3.2.12 **0.**

Cyclic Data address to write PZD4
Setup range from 0 to 250.

PZD1 WRITE
5.3.2.13 **0.**

Cyclic Data address to write PZD5
Setup range from 0 to 250.

PZD1 WRITE
5.3.2.14 **0.**

Cyclic Data address to write PZD6
Setup range from 0 to 250.

PZD1 WRITE
5.3.2.15 **0.**

Cyclic Data address to write PZD7
Setup range from 0 to 250.

PZD1 WRITE
5.3.2.16 **0.**

Cyclic Data address to write PZD8
Setup range from 0 to 250.

ETHERNET CONFIG
5.3.3

It contains parameter for configuration of the ANYBUS module in ETHERNET serial communication

DHCP Option
5.3.3.1 0.

Enable / Disable the use of DHCP server, for automatic address IP acquisition.

Setup range: NO, YES.

IP Field 1
5.3.3.2 192.

Network parameter: IP ADDRESS, 1° Field Setup

Setup range from 0 to 255.

IP Field 2
5.3.3.3 168.

Network parameter: IP ADDRESS, 2° Field Setup

Setup range from 0 to 255.

IP Field 3
5.3.3.4 1.

Network parameter: IP ADDRESS, 3° Field Setup

Setup range from 0 to 255.

IP Field 4
5.3.3.5 100.

Network parameter: IP ADDRESS, 4° Field Setup

Setup range from 0 to 255.

NETMASK Field 1
5.3.3.6 255.

Network parameter: NETMASK, 1° Field Setup

Setup range from 0 to 255.

NETMASK Field 2
5.3.3.7 255.

Network parameter: NETMASK, 2° Field Setup

Setup range from 0 to 255.

NETMASK Field 3
5.3.3.8 255.

Network parameter: NETMASK, 3° Field Setup

Setup range from 0 to 255.

NETMASK Field 4
5.3.3.9 0.

Network parameter: NETMASK, 4° Field Setup

Setup range from 0 to 255.

GATEWAY Field 1
5.3.3.10 192.

Network parameter: GATEWAY, 1° Field Setup

Setup range from 0 to 255.

GATEWAY Field 2
5.3.3.11 168.

Network parameter: GATEWAY, 2° Field Setup

Setup range from 0 to 255.

GATEWAY Field 3
5.3.3.12 1.

Network parameter: GATEWAY, 3° Field Setup

Setup range from 0 to 255.

GATEWAY Field 4
5.3.3.13 1.

Network parameter: GATEWAY, 4° Field Setup

Setup range from 0 to 255.

To obtain more detailed information about field bus functioning, please see the specific serial transmission manual code MANU.400TS.

Descrizione parametro 5.4 IN LOCAL RUN

IN LOCAL RUN
5.4 REMOTE

Par.5.4 Assigns a command to LOCAL RUN enabling

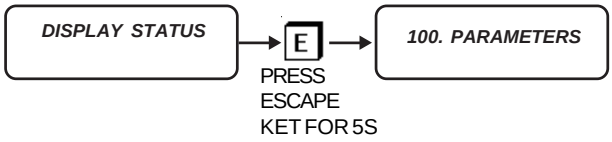
Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned. Command **ON** is possible only by its related serial flag.

I2...I14= Assignation of the command to the selected digital input (in OR by the related serial flag).

ENABLE= Command always **ON**.
If the command is ON then the RUN is enable only through the I1 digital input, not depending on the serial command.

Menu 100. parameters description



Caution !

In menu 100. some parameters concerning the inverter basic functions are included, such as: Motor control type, applications, keyboard setup, parameters copy and transfer. For this reason they must be set carefully.

To enter the 100. parameters programming, the display must be in variables DISPLAY STATUS. By pressing ESCAPE key for 5s, you enter the first parameter programming.

MOT CONTROL TYPE
100.1 V/F

It enables the motor control type

Setup range: V/F, VECT_ENC.

V/F= V/F SCALAR. (INACTIVE)

VECT_ENC= VECTORIAL, WITH ENCODER FEEDBACKED FIELD ORIENTATION.

The setup modification is enabled only at RUN command OFF. The new function will be received at RUN command ON.

RESET LAST FAULT
100.2 NO

It clears the last inverter fault displayed in var.2.1.16 LAST FAULT.

Setup range: NO, YES.

To clear up, select **YES** and after 2s the selection goes back to NO automatically.

MENU OPERATOR
100.3 DEFAULT

Remote keyboard parameters setup access modality after P Key (Program) is pushed

Setup range: DEFAULT, BLOCK, OPERATOR, OP_BLOCK.
DEFAULT = Free access to BASIC DATA menu with default parameters and to following menu (1. 2. 3. 4. 5.)
BLOCK = Denied access to all parameters.
OPERATOR = Free access to BASIC DATA menu with OPERATOR type parameters and to following menu (1. 2. 3. 4. 5.)
OP_BLOCK = Free access to BASIC DATA menu only, with OPERATOR type parameters.

See paragraph **BASIC DATA menu in OPERATOR mode description**.

PAR.99 BLOCK
100.4 NO

It enables or not the access to 99. standard parameters, both in manual and in serial mode.

Setup range: NO, YES.

APPLICATION
100.5 SPEED

Application selection.

Setup range: SPEED, AXIS, REGUL, GEN_AFE, COSTUM1, WINDER

SPEED= basic application: MOTOR SPEED CONTROL. It enables all 3.1 SPEED menù setups.

AXIS= application: AXIS CONTROL (ELECTRIC AXIS, POSITIONER).

It enables all 3.2 AXIS menù setups, only if firmware is XXX.01

REGUL.= application: REGULATOR WITH DIFFERENT FUNCTION

It enables all 3.3 REGULATOR menù setups, only if firmware is XXX.02
GEN_AFE.= application: SINUSOIDAL GENERATOR. It enables all 3.4 GEN_AFE menù setups, only if firmware is XXX.03
CUSTOM1 = application: CUSTOM. It enables all 3.5 CUSTOM1 menu setups, only if firmware is XXX.04.
WINDER = Application: WINDING/UNWINDING SYSTEMS.
Enables all 3.6 WINDER menu setups, but on firmware versions XXX05.XX only.

The setup modification is enabled only at RUN command OFF. The new function will be received at RUN command ON.

SET UP
100.6

It enables to manage inverter parameters copies and their bidirectional transfer by USB key. All menu 100.6 setups modification are possible only at RUN OFF.

RESTORE SETUP
100.6.1 DEFAULT

It selects the memory area to be restored on the WORKING MEMORY, through the manual command of par.100.6.2 ENABLE RESTORE.

Setup range: DEFAULT, SETUP_1, SETUP_2.
The inverter eeprom buffer is divided into the following 4 areas, each including copy of all inverter parameters.
WORKING MEMORY = all parameters which can be modified by the keyboard are saved in this eeprom buffer area and shown at each inverter starting.
DEFAULT MEMORY = it includes copy of all inverter standard parameters, which cannot be modified by the operator.
If no parameter is modified, the WORKING MEMORY is the same as DEFAULT MEMORY.
SETUP_1 MEMORY = customizes copy of all parameters available to the operator.
SETUP_2 MEMORY= customizes copy of all parameters available to the operator.

ENABLE RESTORE
100.6.2 NO

It contains the manual command to restore, on the WORKING MEMORY, all parameters from the memory area selected by par.100.6.1 RESTORE SETUP.

Setup range: NO, YES.

Select **YES** and confirm by P key to enable restoring. **YES** will be displayed for all restore operation, then the selection will go back to **NO** automatically.

SAVE SETUP
100.6.3 SETUP_1

It selects the kind of SETUP memory where all parameters of the WORKING MEMORY will be saved through the manual command by par.100.6.4 ENABLE SAVE.

Setup range: SETUP_1, SETUP_2.

ENABLE SAVE
100.6.4 NO

It contains the command saving all parameters of the WORKING MEMORY on the SETUP memory selected by par.100.6.3 SAVE SETUP.

Setup range: NO, YES.

Select **YES** and confirm by P key to enable saving. **YES** will be displayed for all copy operation, then the selection will go back to **NO** automatically. Post time: about 20s.

IN START RESTORE
100.6.5 REMOTE

It assignes the command for restoring, in the WORKING MEMORY , all parameters of the SETUP memory area. This SETUP memory area is selected by the command assigned in par. 100.6.6 IN RESTORE SETUP.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.
REMOTE= Command **OFF** and no digital input assigned.
I2...I14= Assignation of the command to the selected digital input.
ENABLE= Command always **ON**.
Select ON for at least 10ms to start restoring (pulse command).

IN RESTORE SETUP
100.6.6 REMOTE

It assignes the command to select SETUP_1 MEMORY or SETUP_2 MEMORY to be restored in WORKING MEMORY by the command assigned in par.100.6.5 IN START RESTORE.

Setup range: REMOTE, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, ENABLE.

REMOTE= Command **OFF** and no digital input assigned.

I2...I14= Assignation of the command to the selected digital input.

ENABLE= Command always **ON**.

Command OFF= SETUP1 MEMORY selected. Command ON= SETUP2 MEMORY selected.

When starting, RESTORE SETUP is disabled for 3.5s

TYPE RESTORE	
100.6.7	FULL

It choses the restore type in JOB BUFFER.

Setup range: FULL, QUICK.

FULL= COMPLETE restore of all parameters in the selected memory area (SETUP1 or SETUP2). Post time: about 20s.

QUICK= Partial restore of the parameters in the selected memory area (SETUP1 or SETUP2).

Post time: about 0,3s. The restore is limited to the following parameters:

100.1 MOT CONTROL TYPE, 1.1.2 MOTOR NOM CURREN, 1.1.3 MOTOR NOM FREQUE, 1.1.4 MOTOR NOM VOLTAG, 1.1.5 MOTOR POLES, 1.2.1 RAMO ACCEL. TIME, 1.2.2 RAMP DECEL. TIME, 1.3.1 MAX MOTOR SPEED, 1.3.2 MIN MOTOR SPEED, 1.5.1 FIXED BOOST, 1.6.1 E1 ENCODER LINES, 1.6.4 VECT MAGNET CURR, 1.6.5 ROTOR CONSTANT, 3.1.10.1 MOTOR ENABLE OUT, 1.6.2 KP GAIN, 1.6.3 KI GAIN, 1.10.1 MAX TORQUE, 1.10.15 ADAPT PERC TORQ., 1.10.16 ADAPT TORQ. Nm, 1.12.1PWM FREQUENCY.

Caution ! → It is not possible to activate the inverter RUN command during restoring or saving operations.

COPY KEY >> INV	
100.6.8	0.

It enables restoring in the inverter internal memory of all parameters copies from the external EEPROM KEY, by USB CONNECTOR.

Setup range: 0. , 100.

EEPROM KEY has a eeprom memory which is equivalent to that of the inverter with the same division into areas such as:

WORKING MEMORY, DEFAULT MEMORY, SETUP_1 MEMORY, SETUP_2 MEMORY.

Select **NUMBER 37** and confirm by P key to enable restoring. **NUMBER 37** will be displayed for all restore operation, then the selection will go back to **ZERO** automatically. Post time: about 70s.

Caution !

During the restoring operation, the keyboard is blocked and it is not possible to enable the inverter RUN command. If restoring procedure is performed with no EEPROM KEY inserted, the internal memory won't be modified, but the keyboard remains blocked; in this case it is necessary to power the inverter off and then to start it again in order to unblock it.

COPY INV >> KEY	
100.6.9	0.

It enables saving in the external EEPROM KEY of all parameters copies in the inverter internal memory, by USB CONNECTOR.

Setup range: 0. , 100.

Select **NUMBER71** and confirm by P key to enable restoring. **NUMBER71** will be displayed for all restore operation, then the selection will go back to **ZERO** automatically. Post time: about 70s

Caution !

During the saving operation, the keyboard is blocked and it is not possible to enable the inverter RUN command. If saving procedure is performed with no EEPROM KEY inserted, the keyboard remains blocked; in this case it is necessary to power the inverter off and then to start it again in order to unblock it.

Caution!

See Chapter 11 PARAMETERS TRANSFER for a complete description of parameters copies management by EEPROM KEY and USB CONNECTOR.

ALARM SETUP
100.7

Menu to enable/disable the alert at I/O resources assignation.

ALARM PROG IN	
100.7.1	YES

It enables or not the alarm in case of multiple assignations to a digital input.

Setup range: NO, YES.

NO= it disables the alarm if a multiple assignations to a digital input is necessary.

YES= alarm enabled; when the same digital input is assigned in 2 or more parameters, the fault light starts flashing and in **var. 2.1.50 INVERTER ALARM** the **PROG_IN** string is displayed. In this case it is necessary to check where this parameter has already been assigned; to make this easier, see the table in Chapter 13 where all digital inputs assignation parameters and their default setups are summed up.

ALARM PROG OUT	
100.7.2	YES

It enables or not the alarm in case of multiple assignations to a digital output.

Setup range: NO, YES.

NO= it disables the alarm if a multiple assignations to a digital output is necessary.

YES= alarm enabled; when the same digital output is assigned in 2 or more parameters, the fault light starts flashing and in **var. 2.1.50 INVERTER ALARM** the **PROG_OUT** string is displayed. In this case it is necessary to check where this parameter has already been assigned; to make this easier, see the table in Chapter 13 where all digital outputs assignation parameters and their default setups are summed up.

Nameplate data table of 1500 rpm servo-motors

MOTOR Code		MEC 63L TBI4O5B5A....	MEC 63L TBI4O5B5X....	MEC 71 TBB4O5B5A....	MEC 71 TBB4O5B5X....	MEC 71L TBQ4O5B5A....	MEC 71L TBQ4O5B5X....
NOMINAL POWER	kW	1,1	0,8	1,1	0,7	2,1	1,0
RATED SPEED	rpm	1500	1500	1500	1500	1500	1500
MAX SPEED	rpm	2000	2000	2000	2000	2000	2000
RATED TORQUE*	Nm	7,3	4,9	7	4,7	13,2	6,5
RATED CURRENT*	A	2,8	1,9	3	2	5,5	2,7
STALL TORQUE**	Nm	7,4	5,6	7,7	5,6	15,8	11,4
STALL CURRENT**	A	2,8	2,1	3,3	2,3	6,2	4,4
ROTOR INERTIA	Kgm²	0,000496	0,000496	0,000745	0,000745	0,001397	0,001397
POLES NUMBER	-	4	4	4	4	4	4
WEIGHT	Kg	9,3	8,7	9,7	9,25	16,6	16,2
VENTILATION FAN	-	SI	NO	SI	NO	SI	NO

MOTORE Code		MEC 80 TBC4O5B5A....	MEC 80 TBC4O5B5X....	MEC 80L TBW4O5B5A...	MEC 80L TBW4O5B5X...	MEC 90 TBD4O5B5A....	MEC 90 TBD4O5B5X....	MEC 90L TBE4O5B5A....	MEC 90L TBE4O5B5X....
NOMINAL POWER	kW	1,8	1,1	3,3	1,4	2,7	1,6	4,8	2,4
RATED SPEED	rpm	1500	1500	1500	1500	1500	1500	1500	1500
MAX SPEED	rpm	2000	2000	2000	2000	2000	2000	2000	2000
RATED TORQUE*	Nm	11,4	6,9	21	9,2	17,1	10,5	30,7	15,3
RATED CURRENT*	A	5	3	8,5	3,7	7	4,4	12	6
STALL TORQUE**	Nm	14,5	9,1	24,6	17,8	21,5	13,7	37,8	27,2
STALL CURRENT**	A	5,7	3,6	9,3	6,7	8,3	5,3	13,8	9,9
ROTOR INERTIA	Kgm²	0,00214	0,00214	0,004281	0,004281	0,002674	0,002674	0,005348	0,005348
POLES NUMBER	-	4	4	4	4	4	4	4	4
WEIGHT	Kg	14,2	13,2	22	21	19,1	17,4	30,1	28,4
VENTILATION FAN	-	SI	NO	SI	NO	SI	NO	SI	NO

* reported data are measured in continuous duty (S1) at 40 C environment temperature. Considering intermittent duties the motor performances should be higher.
** stall datas are measured in continuous duty (S1) at 20 rpm speed, for lower speed the load should be reduced about 15%.

Inverter selection tables for 1500 rpm servo-motors

MOTORE Code		MEC 63L TBI4O5B5A....	MEC 63L TBI4O5B5X....	MEC 71 TBB4O5B5A....	MEC 71 TBB4O5B5X....	MEC 71L TBQ4O5B5A....	MEC 71L TBQ4O5B5X....
Nominal Power Nominal Torque		1,1 kW 7.3 Nm	0,8 kW 4.9 Nm	1,1 kW 7 Nm	0,7 kW 4.7 Nm	2,1 kW 13.2 Nm	1,0 kW 6.5 Nm
INVERTER 700		/ P	/ P	/ P	/ P	/ 0	/ P
Parameters	unit						
1.1.1 LINE VOLTAGE	V	400	400	400	400	400	400
1.1.2 MOTOR NOM CURREN *	A	3.0	2.0	3.0	2.0	5.7	2.9
1.1.3 MOTOR NOM FREQUE	Hz	50.0	50.0	50.0	50.0	50.0	50.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES	4 POLES	4 POLES	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	1500	1500	1500	1500	1500	1500
1.6.1 E1 ENCODER LINES	ppr	2048	2048	2048	2048	2048	2048
1.6.2 KP GAIN	-	20	20	20	20	20	20
1.6.3 KI GAIN	-	20	20	20	20	20	20
1.10.1 MAX TORQUE	%	200	200	200	200	200	200
1.10.15 ADAPT PERC TORQ.	%	100.0	100.0	100.0	100.0	99.9	100.0
1.10.16 ADAPT TORQ. [Nm]	%	98.9	99.5	94.8	95.5	80.7	91.1

MOTORE Code		MEC 80 TBC4O5B5A....	MEC 80 TBC4O5B5X....	MEC 80L TBW4O5B5A...	MEC 80L TBW4O5B5X...	MEC 90 TBD4O5B5A....	MEC 90 TBD4O5B5X....	MEC 90L TBE4O5B5A....	MEC 90L TBE4O5B5X....
Nominal Power Nominal Torque		1,8 kW 11.4 Nm	1,1 kW 6.9 Nm	3,3 kW 21 Nm	1,4 kW 9.2 Nm	2,7 kW 17.1 Nm	1,6 kW 10.5 Nm	4,8 kW 30.7 Nm	2,4 kW 15.3 Nm
INVERTER 700		/ R	/ P	/ 0M	/ R	/ 0	/ R	/ L	/ 0
Parameters	unit								
1.1.1 LINE VOLTAGE	V	400	400	400	400	400	400	400	400
1.1.2 MOTOR NOM CURREN *	A	5.0	3.0	8.7	3.9	7.0	4.6	12.0	6.2
1.1.3 MOTOR NOM FREQUE	Hz	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES	4 POLES	4 POLES	4 POLES	4 POLES	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	1500	1500	1500	1500	1500	1500	1500	1500
1.6.1 E1 ENCODER LINES	ppr	2048	2048	2048	2048	2048	2048	2048	2048
1.6.2 KP GAIN	-	20	20	20	20	20	20	20	20
1.6.3 KI GAIN	-	20	20	20	20	20	20	20	20
1.10.1 MAX TORQUE	%	200	200	200	200	200	200	200	200
1.10.15 ADAPT PERC TORQ.	%	100.0	100.0	100.3	100.0	99.9	100.0	100.3	99.9
1.10.16 ADAPT TORQ. [Nm]	%	85.1	93.4	89.6	88.0	85.1	82.2	76.7	86.0

* at stall condition and continuous duty a drive overload fault could be occur.

Nameplate data table of 3000 rpm servo-motors

MOTORE Code		MEC 63 TBA4O7B5A....	MEC 63 TBA4O7B5X....	MEC 63L TBI4O7B5A....	MEC 71 TBB4O7B5A....	MEC 71 TBB4O7B5X....	MEC 71L TBQ4O7B5A....
NOMINAL POWER	kW	1,3	1,0	2,2	2,3	1,6	3,9
RATED SPEED	rpm	3000	3000	3000	3000	3000	3000
MAX SPEED	rpm	4000	4000	4000	4000	4000	4000
RATED TORQUE*	Nm	4,2	3,2	6,9	7,2	5	12,4
RATED CURRENT*	A	3,4	2,6	5,2	6	4,1	10,3
STALL TORQUE**	Nm	4,4	3,4	7,7	8,4	5,9	15,8
STALL CURRENT**	A	3,5	2,6	5,6	6,7	4,8	12,3
ROTOR INERTIA	Kgm²	0,000248	0,000248	0,000496	0,000745	0,000745	0,001397
POLES NUMBER	-	4	4	4	4	4	4
WEIGHT	Kg	5,9	5,3	9,3	9,7	9,25	16,6
VENTILATION FAN	-	SI	NO	SI	SI	NO	SI

MOTORE Code		MEC 80 TBC4O7B5A....	MEC 80 TBC4O7B5X....	MEC 80L TBW4O7B5A...	MEC 90 TBD4O7B5A....	MEC 90 TBD4O7B5X....	MEC 90L TBE4O7B5A....
NOMINAL POWER	kW	3,8	2,2	5,9	5,8	3,3	8,4
RATED SPEED	rpm	3000	3000	3000	3000	3000	3000
MAX SPEED	rpm	4000	4000	4000	4000	4000	4000
RATED TORQUE*	Nm	12,2	7,1	18,7	18,4	10,5	26,8
RATED CURRENT*	A	10,5	6	15	15,1	8,7	21
STALL TORQUE**	Nm	14,5	9,5	24,5	22	15	37,8
STALL CURRENT**	A	12	8,4	18,7	17,1	11,7	27,6
ROTOR INERTIA	Kgm²	0,00214	0,00214	0,004281	0,002674	0,002674	0,005348
POLES NUMBER	-	4	4	4	4	4	4
WEIGHT	Kg	14,2	13,2	22	19,1	17,4	30,1
VENTILATION FAN	-	SI	NO	SI	SI	NO	SI

* reported data are measured in continuous duty (S1) at 40 C environment temperature. Considering intermittent duties the motor performances should be higher.
** stall datas are measured in continuous duty (S1) at 20 rpm speed, for lower speed the load should be reduced about 15%.

Inverter selection tables for 3000 rpm servo-motors

MOTORE Code		MEC 63 TBA4O7B5A....	MEC 63 TBA4O7B5X....	MEC 63L TBI4O7B5A....	MEC 71 TBB4O7B5A....	MEC 71 TBB4O7B5X....	MEC 71L TBQ4O7B5A....
Nomonal Power Nominal Torque		1,3 kW 4.2 Nm	1,0 kW 3.2 Nm	2,2 kW 6.9 Nm	2,3 kW 7.2 Nm	1,6 kW 5 Nm	3,9 kW 12.4 Nm
INVERTER 700		/ R	/ P	/ 0	/ 0	/ R	/ 1
Parameters	unit						
1.1.1 LINE VOLTAGE	V	400	400	400	400	400	400
1.1.2 MOTOR NOM CURREN *	A	3.5	2.8	5.4	6.1	4.1	10.3
1.1.3 MOTOR NOM FREQUE	Hz	100.0	100.0	100.0	100.0	100.0	100.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES	4 POLES	4 POLES	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	3000	3000	3000	3000	3000	3000
1.6.1 E1 ENCODER LINES	ppr	2048	2048	2048	2048	2048	2048
1.6.2 KP GAIN	-	20	20	20	20	20	20
1.6.3 KI GAIN	-	20	20	20	20	20	20
1.10.1 MAX TORQUE	%	200	200	200	200	200	200
1.10.15 ADAPT PERC TORQ.	%	104.0	102.5	99.9	98.0	100.0	100.1
1.10.16 ADAPT TORQ. [Nm]	%	46.1	48.9	44.5	40.2	46.6	39.3

MOTORE Code		MEC 80 TBC4O7B5A....	MEC 80 TBC4O7B5X....	MEC 80L TBW4O7B5A...	MEC 90 TBD4O7B5A....	MEC 90 TBD4O7B5X....	MEC 90L TBE4O7B5A....
Nominal Power Nominal Torque		3,8 kW 12.2 Nm	2,2 kW 7.1 Nm	5,9 kW 18.7 Nm	5,8 kW 18.4 Nm	3,3 kW 10.5 Nm	8,4 kW 26.8 Nm
INVERTER 700		/ 1	/ 0	/ L	/ L	/ 1	/ 2
Parameters	unit						
1.1.1 LINE VOLTAGE	V	400	400	400	400	400	400
1.1.2 MOTOR NOM CURREN *	A	11.0	6.4	15.0	15.0	8.7	21.0
1.1.3 MOTOR NOM FREQUE	Hz	100.0	100.0	100.0	100.0	100.0	100.0
1.1.5 MOTOR POLES	-	4 POLES	4 POLES	4 POLES	4 POLES	4 POLES	4 POLES
1.3.1 MAX MOTOR SPEED	rpm	3000	3000	3000	3000	3000	3000
1.6.1 E1 ENCODER LINES	ppr	2048	2048	2048	2048	2048	2048
1.6.2 KP GAIN	-	50	20	20	20	25	20
1.6.3 KI GAIN	-	50	20	20	20	25	20
1.10.1 MAX TORQUE	%	200	200	200	200	200	200
1.10.15 ADAPT PERC TORQ.	%	99.0	98.9	100.3	101.0	100.1	100.0
1.10.16 ADAPT TORQ. [Nm]	%	35.8	38.7	37.3	36.7	39.4	38.1

* at stall condition and continuous duty a drive overload fault could be occur.

Rowan Elettronica
Motors, actuators, accessories and services for automation
Via Ugo Foscolo, 20 - 36030 CALDOGNO (VICENZA) - ITALY
Phone: 0444 - 905566 Fax: 0444 - 905593
Email: info@rowan.it http:// www.rowan.it
Share Capital Euro 78.000,00 v.i.
registered to R.E.A of Vicenza to n.146091
Tax Identification / VAT and Business Register No. IT 00673770244
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