

Programming manual

# Altivar 66 Telemecanique

speed controllers  
for asynchronous motors

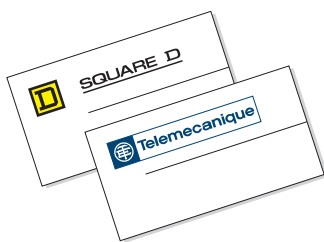
Constant / variable torque :  
2.2 to 250 kW, 400 V

Constant / variable torque :  
3 to 400 HP, 460 V

Constant / variable torque :  
2.2/3 to 30/37 kW, 230 V

Constant / variable torque :  
3/5 to 40/50 HP, 230 V

Configuration and adjustment via the terminal



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## CAUTION

This document relates to the graphic terminal on the Altivar 66 with no added options.

Some modes or menus may be modified if the speed controller has been fitted with one or more options.

[Any such modifications are indicated in the accompanying documentation.](#)

For instructions on how to install, connect and start the Altivar, [refer to the User's Manual.](#)



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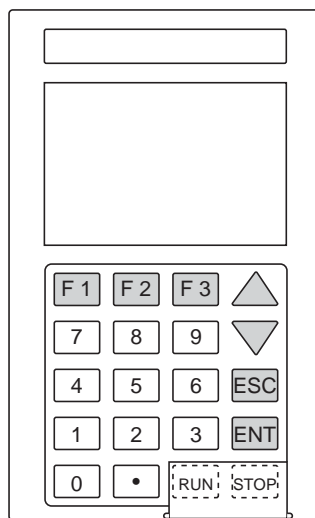
## Introduction

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Altivar 66 has a removable graphic terminal (keypad) on the front panel.

This graphic terminal is used to :

- Display (in plain language) the speed controller identification, operating parameters or faults.
- Modify the settings and configuration of the Altivar.
- Select local control mode using the keypad.



### Front view

Liquid crystal graphic display (128 x 64 points, with 6 lines of 21 characters) which displays bargraphs during operation, with reverse video to highlight text or a numerical value.

### Keypad with 20 keys

- 1 ENT (enter) key
- 1 ESC (escape) key
- 2 direction keys ▲ ▼
- 11 numerical keys (0 to 9 and the decimal •)
- 3 function keys F1, F2, F3
- 2 RUN and STOP keys under a removable protective cover

### Use

ENT key : – go to next menu,  
– confirm a selection or setting.

ESC key : – return to previous menu,  
– abandon current setting and return to its original value.

▲ ▼ keys : – scroll through and select from menus,  
– set a value (in + – mode),  
– select a function.

Numerical keys : enter or set a value.

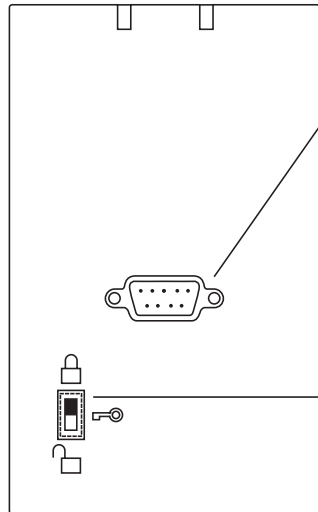
F1, F2, F3 keys : can be assigned for local control mode. In programming mode, F1 accesses the help menu, F2 returns to Display mode, and F3 provides direct access to a menu or a mode selected by its number.

The RUN and STOP keys are used in local control mode of the speed controller, independently of the inputs : starting and stopping the motor on a ramp, if local control mode is selected.

If local control mode has not been selected, the STOP key remains active, and the motor stops following the deceleration ramp.



## Introduction



### Rear view (with graphic terminal removed)

9-pin SUB-D connector for connection to the speed controller.

For remote operation, the graphic terminal can be connected by a cable, supplied separately :

- length 3 metres, reference **VW3-A66311**,
- length 2 metres, reference **VW3-A66312**.

Access switch to limit access to programming functions (modify settings and configuration, select local control mode).

### Removing the graphic terminal

Unscrew



Remove



### Access to RUN and STOP keys



For ease of access, it is advisable to remove the graphic terminal.

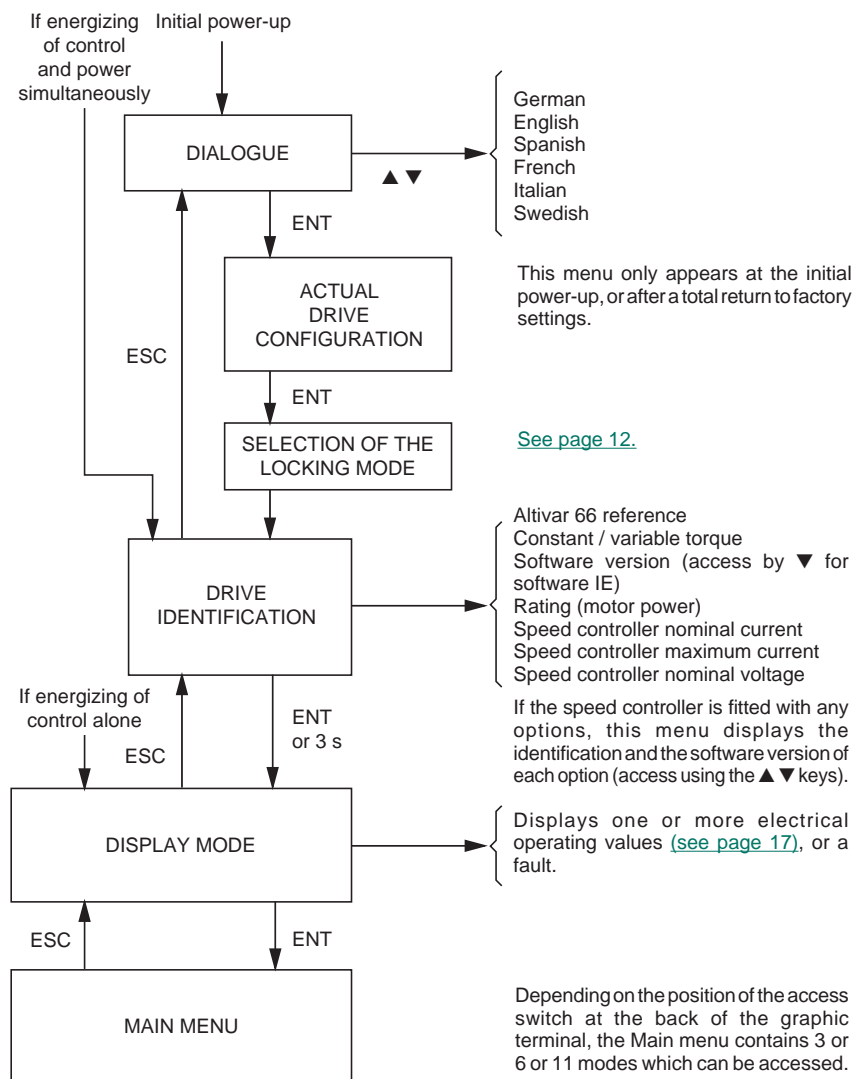


## Principle of access to menus

On initial power-up, or after a total return to factory settings ([page 67](#)), a message appears on the screen for selecting the dialogue language using the ▲ and ▼ keys.

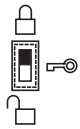
The second message displayed enables the operator to confirm or change the factory configuration of the speed controller ([see page 12](#)).

If it is not the initial power-up, the Display mode message appears in the language which has previously been selected. To change the language, return to the Dialogue menu using the ESC key.



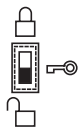
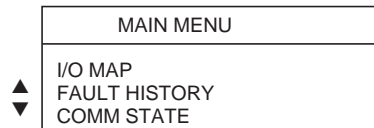


## Principle of access in the Main menu



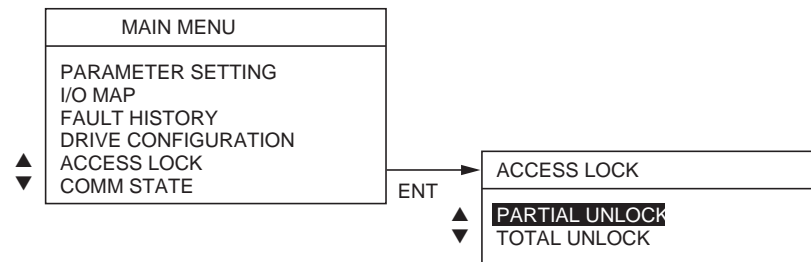
### Switch in locked position (factory setting)

Speed controller programming is locked, and the graphic terminal is used for display only (and in local control mode using the keypad if this has previously been selected and programmed).

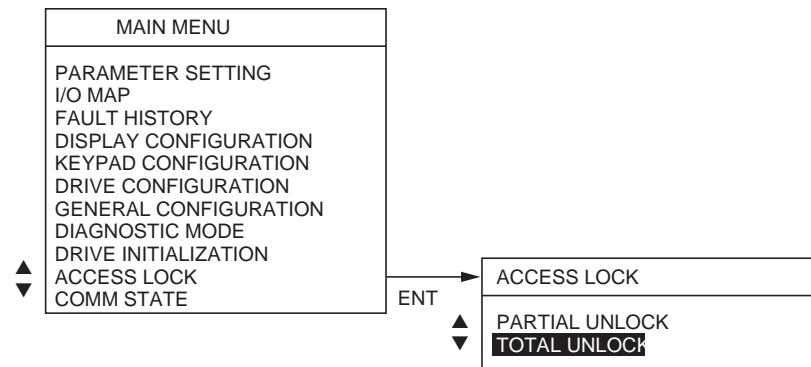


### Switch in unlocked position

Speed controller programming using the keypad is partially unlocked.



When total unlock is selected in the Main menu, five additional programming modes can be accessed.





## Contents of the Main menu

---

1	PARAMETER SETTING	Display and modification of the main settings, with the speed controller stopped or running.
	LOW SPEED HIGH SPEED ACCELERATION DECELERATION IR COMPENSATION DAMPING MOTOR OVERLOAD	Adjustment of motor thermal protection by thermal current selection (presetting to motor rated current).  Setting the drive parameters according to the control type selected, which determines the motor power characteristics : IR compensation, voltage boost, bandwidth, profile, damping, etc ( <a href="#">see page 15</a> ).
2	I/O MAP	Display assignment of the I/O and their state (0 or 1) or their value (as a %).
	2.1 LOGIC INPUT MAP 2.2 ANALOG INPUT MAP 2.3 LOGIC OUTPUT MAP 2.4 ANALOG OUTPUT MAP	
3	FAULT HISTORY	Display the last faults which occurred during operation.
<b>Menus 4 to 10 can only be accessed if the speed controller is locked and the motor is stopped.</b>		
4	DISPLAY CONFIGURATION	Select the display mode :
	4.1 ONE BAR GRAPH 4.2 TWO BAR GRAPH SCROLL, 4 ITEMS	– 1 or 2 values with bargraph, – 4 tables which can be accessed in succession.  Selection of values which can be displayed.
5	KEYPAD CONFIGURATION	Select local control mode using the keypad, and program the function keys.
	5.1 PROGRAM FUNCTION KEYS	
6	DRIVE CONFIGURATION	Modify the speed controller configuration :
	6.1 TORQUE TYPE 6.2 COMMAND TYPE 6.3 MOTOR POWER (ATV-66U41N4 only)	– According to the application : constant, variable or low noise variable torque. – According to the command mode : 2-wire or 3-wire.  Altivar ATV-66U41N4 : it is possible to change the motor power to be able to adapt the speed controller currents to the real power of the motor to which it is connected.



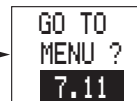


## Contents of the Main menu

7 GENERAL CONFIGURATION	Modification of the general configuration of the speed controller :
7.1 DRIVE PARAMETERS 7.2 APPLICATION FUNCTIONS 7.3 OUTPUT ASSIGNMENT 7.4 FAULT MANAGEMENT	<ul style="list-style-type: none"> <li>– Configuration and setting of the drive parameters.</li> <li>– Selection of the application functions.</li> <li>– Reassignment of logic and analog outputs.</li> <li>– Fault management.</li> </ul>
7.1 DRIVE PARAMETERS	<b>Motor parameters</b> : programming parameters specific to the motor. These depend on whether the speed controller is configured for constant or variable torque, and on the control type selected ( <a href="#">see page 21</a> ).
7.11 MOTOR PARAMETERS 7.12 CONTROL PARAMETERS 7.13 CONTROL TYPE	<b>Control parameters</b> : modification of the speed controller settings by extending the adjustment ranges, modifying the ramp type, and selecting the skip frequency.
	<b>Control type</b> : selecting the motor power characteristics for adapting the speed controller to the application.
8 DIAGNOSTIC MODE	Tests the speed controller : <ul style="list-style-type: none"> <li>– Autodiagnostic : control card of transistors.</li> <li>– I/O test.</li> <li>– Testing of microprocessor and internal power supplies <math>\pm 15</math> V.</li> </ul>
9 DRIVE INITIALIZATION	Total or partial return to factory settings.
9.1 TOTAL FACTORY SETTING 9.2 PARTIAL FACTORY SETTING 9.3 CUSTOMER SETTING MEMORIZATION 9.4 RECALL USER SETTING	Saves the configuration and the settings to a PCMCIA card which can be installed in the speed controller.
	Transfer of data to the speed controller from a PCMCIA card on which data was previously loaded.
10 ACCESS LOCK	Selects partial or total unlock.

### Procedure for direct access to a numbered menu

Press the F3 key : a message appears on the screen  
 Enter the number using the numerical keys and press ENT.  
 Example opposite : menu 7.11 Motor parameters.



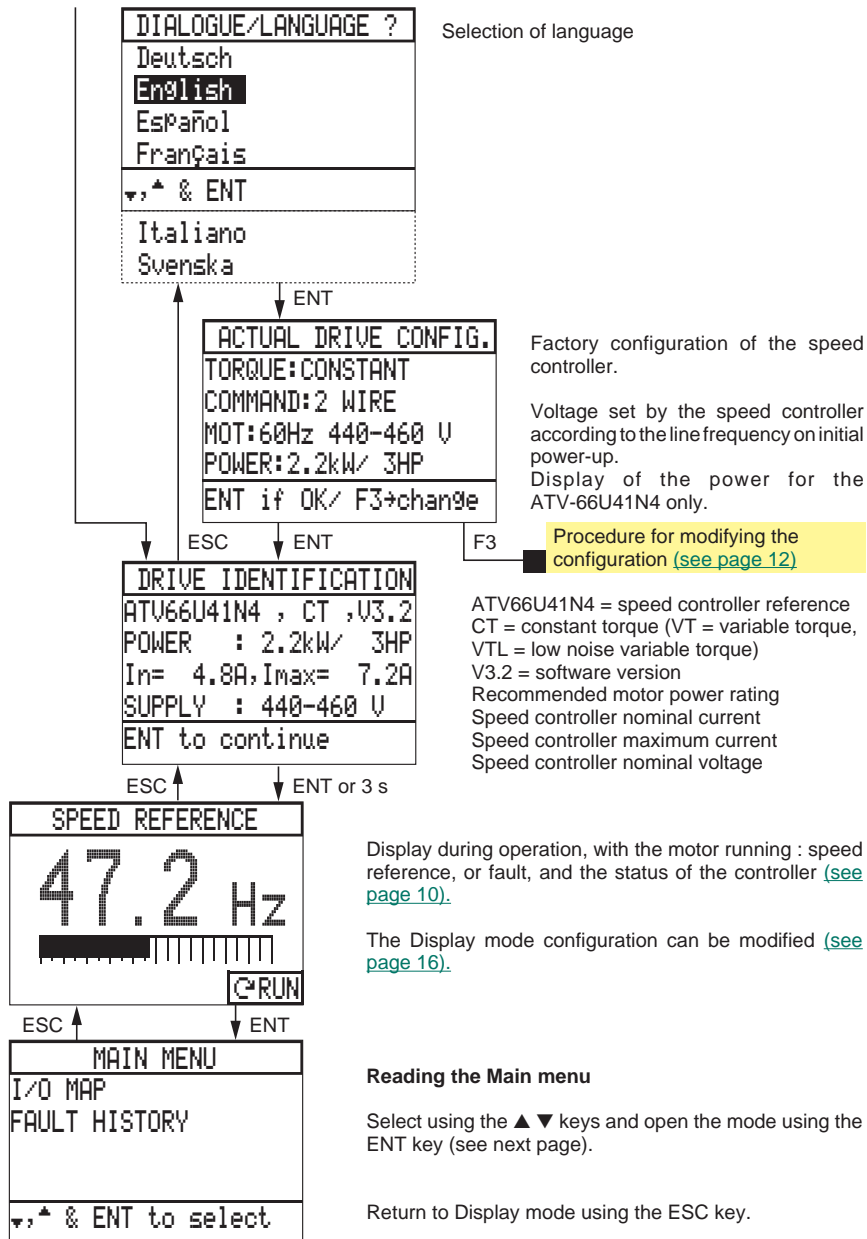
The position of the switch on the graphic terminal and the access lock selected determines the menus which can be accessed. If the menu requested is not accessible, a warning message appears on the screen.



## Switch in locked position

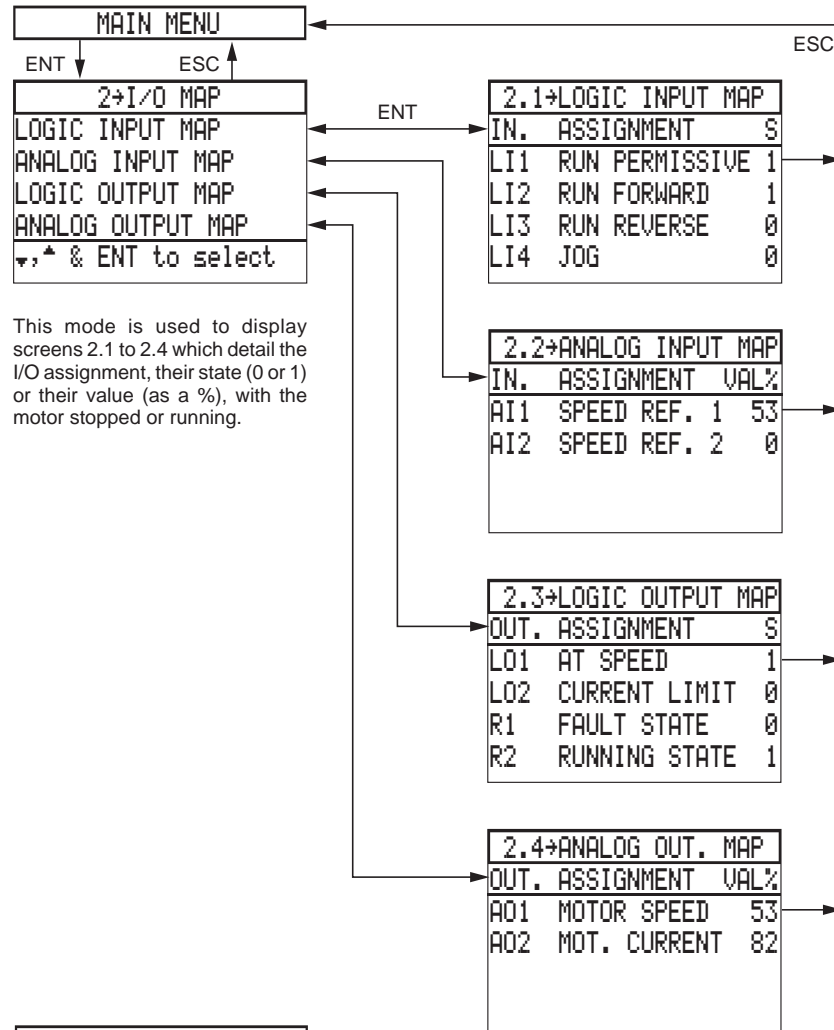
Power-up

Initial power-up

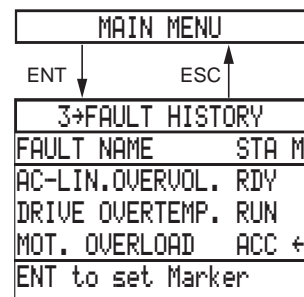




## Switch in locked position



This mode is used to display screens 2.1 to 2.4 which detail the I/O assignment, their state (0 or 1) or their value (as a %), with the motor stopped or running.



This mode displays the last faults (8 maximum) which occurred during operation, and the speed controller status when the faults appeared.

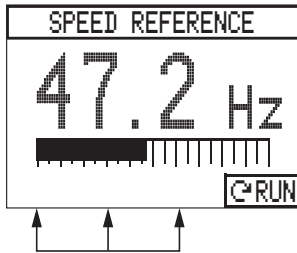
Use the ▲ ▼ keys to scroll through the menu.

The arrow indicates the fault marking at the time of the last control.



## Switch in locked position

### Display mode during operation



If the speed controller was programmed for local control mode via the keypad, 3 codes appear on the last line of the screen indicating the function of the F1, F2 and F3 keys ([see page 20](#)).

Display of the speed reference with bargraph, or of a fault (see next page).

The other values displayed can be accessed in succession using the ▲▼ keys ([see list, page 17](#)). If these keys are not pressed, the value currently displayed remains on screen.

Return to display initially programmed on energizing of variator after cut-off of control power supply and power.

The speed controller status is coded on the last line of the screen on the right hand side :

NLP	no power supply
NRP	operation not authorized
RDY	speed controller ready
RUN	running (steady state)
↻	forward operation
↺	reverse operation
ACC	accelerating
DEC	decelerating
DCB	DC injection braking
CLI	current limit or not following ramp
JOG	step by step operation
BRK	resistor braking
FLT	in fault mode

The Display mode configuration can be modified in the Main menu (Access lock set to total unlock) : [Display configuration, see page 16](#).

Other values can also be programmed :

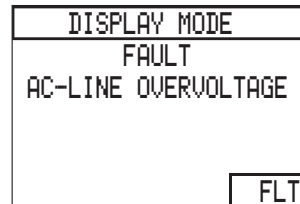
- 1 or 2 values with bargraph,
- 4 tables which can be accessed by scrolling using the ▲▼ keys.

If the programmed display is 2 values with bargraph, displaying the other values by scrolling using the ▲▼ keys only affects the second value : the first value remains displayed.



## Switch in locked position

### Displaying a fault



When a fault occurs : the speed controller is locked and the motor freewheels to a stop.

Clear display of the fault type and additional information for certain faults.

See example opposite.

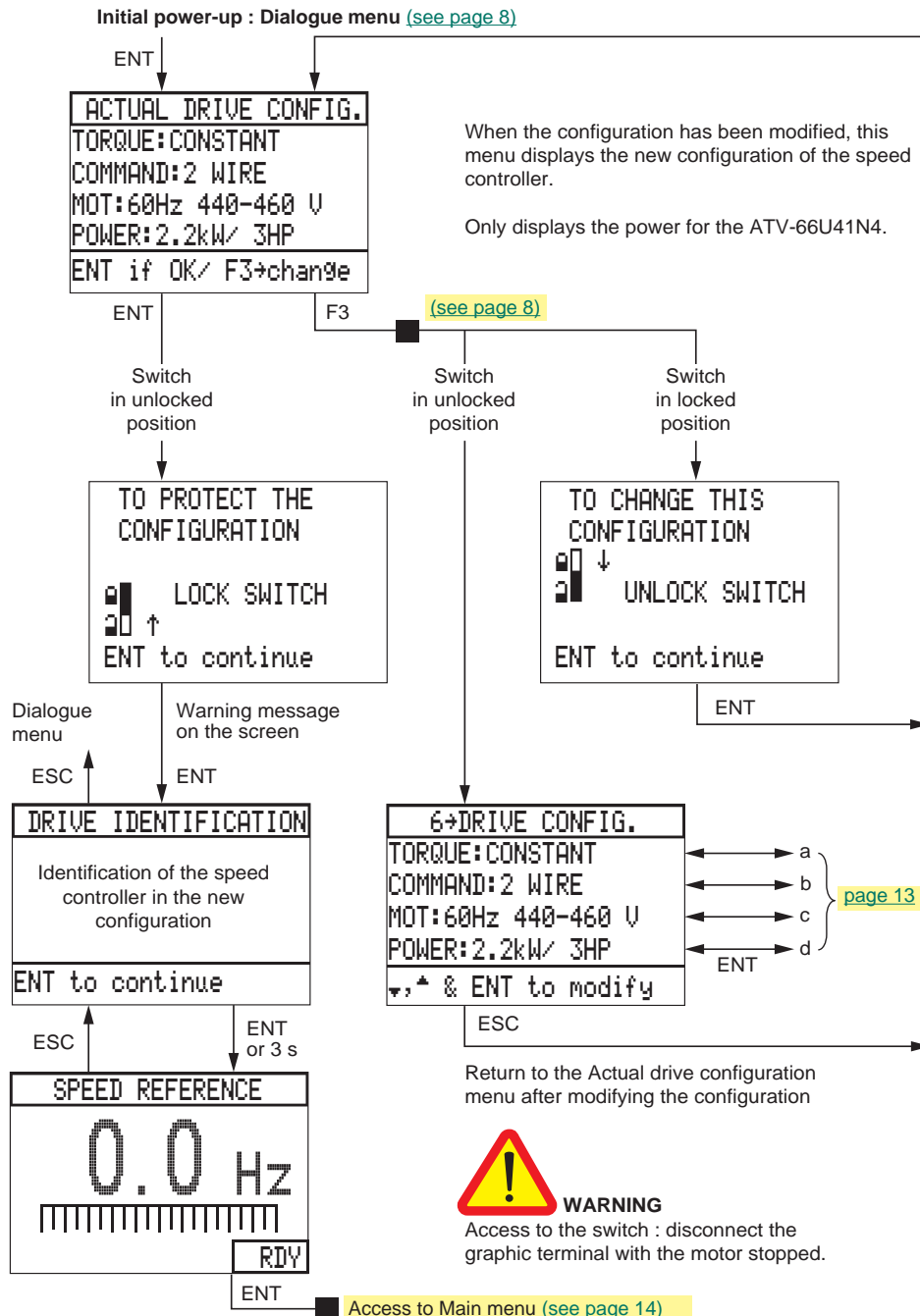
### List of faults

Input phase loss	: incorrect supply to controller or blown fuses, transient fault of one phase of the line supply ( $t \geq 1$ s).
Undervoltage	: line supply too low or transient voltage dip ( $t \geq 200$ ms), load resistor damaged, speed controller incorrectly powered or blown fuses.
AC-line overvoltage	: line supply too high.
Drive overtemperature	: heatsink temperature too high.
Motor overload	: thermal tripping caused by prolonged overload.
DC-bus overvoltage	: excessive braking or driving load.
Output phase loss	: fault on one phase at speed controller output.
Loss follower	: loss of the 4-20 mA reference on input AI2.
Short-circuit	: short-circuit between phases at speed controller output.
Ground fault	: grounding (earthing) at speed controller output.
Precharge failure or load resistor damaged,	: control fault in the capacitor charging relay, or braking resistor short-circuited.
Internal fault	: internal or connection fault.
Memory failure	: memory error in EEPROM.
Serial link loss	: serial link communication fault (PCMCIA card or terminal port).
Link fault product.	: communication fault between the graphic terminal and the
Overspeed	: with tachogenerator feedback <ul style="list-style-type: none"> <li>• motor speed greater than 111% of HSP,</li> <li>• motor overspeed or loss of load.</li> </ul> : without tachogenerator feedback <ul style="list-style-type: none"> <li>• estimated motor speed greater than 1.2 F max.,</li> <li>• overspeed.</li> </ul>
Transistor short-circuit	transistor fault detected by the automatic self-test each time the speed controller is powered up.
Open transistor	
Dynamic brake fault	
Sequence time out fault	with bypass function ( <a href="#">see page 38</a> ).
Process time out fault	

Other faults may also appear if they have been programmed ([see pages 60 to 64](#)). The speed controller stopping method may also have been modified ([see page 60](#)).



## Switch unlocked : partial unlock





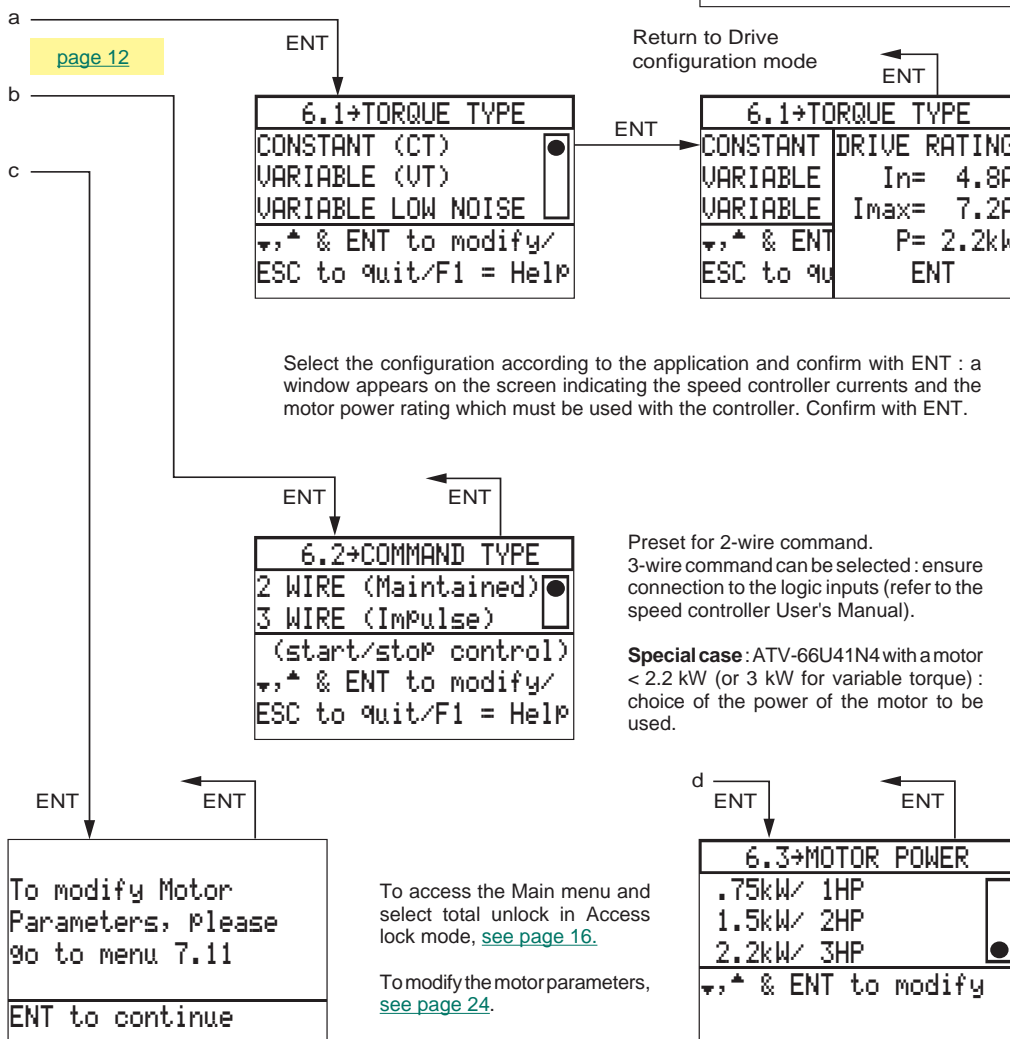
## Switch unlocked : partial unlock

### Modifying the speed controller configuration

This operation can only be performed if the speed controller is locked and the motor is stopped.

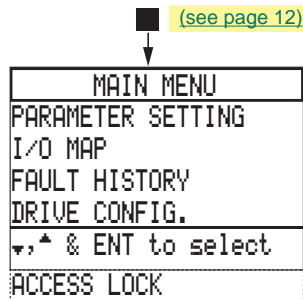
If they are not, a warning message appears on the screen.

```
IMPOSSIBLE TO
CONFIGURE THE DRIVE
WHILE RUNNING
ESC to return to
Main menu
```



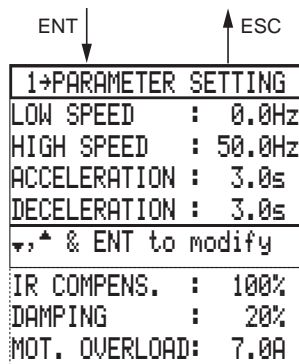


## Switch unlocked : partial unlock



### Parameter setting

Select the Parameter setting mode.



In variable torque configuration, IR COMPENS. : 100 % is replaced by PROFILE : 20 %.

See other cases on the next page.

The settings can be selected with the motor running or stopped.

#### Setting procedure :

- select the line in reverse video using the ▲ ▼ keys,
- press ENT : the numerical value stays underlined,
- adjust it to the required value using the numerical keys or the ▲ ▼ keys in + – mode and confirm with ENT.

Settings :

- Low speed : from 0 to high speed, preset value is 0.
- High speed : from low speed to maximum frequency ([see page 29](#)), preset value is 50/60 Hz.
- Acceleration and deceleration : from 0.1 to 999.9 s, preset value is 3 s, corresponds to the time to go from 0 to the nominal frequency (preset value is 50 Hz for a 50 Hz supply, and 60 Hz for a 60 Hz supply), (menu 7.11, motor parameters/nominal frequency).

When the torque capability is exceeded, the ramp times are adapted automatically.





## Switch unlocked : partial unlock

The following settings depend on the control type selected, which determines the motor power characteristics ([see page 21](#)); other parameters may also appear.

Parameters	Constant torque			Variable torque	
	Normal	High torque	Special	Normal	NOLD
IR COMPENS.	0- <b>100</b> %	0- <b>100</b> -150 %	0- <b>100</b> -800 %	No	No
VOLTAGE BOOST	No	0- <b>20</b> -100 %	0- <b>20</b> -100 %	No	No
BANDWIDTH	No	0- <b>20</b> -100 %	No	No	No
PROFILE	No	No	No	0- <b>20</b> -100 %	No
DAMPING	1- <b>20</b> -100 %	1- <b>20</b> -100 %	1- <b>20</b> -800 %	1- <b>20</b> -800 %	1- <b>20</b> -100 %

Factory settings are in bold type.

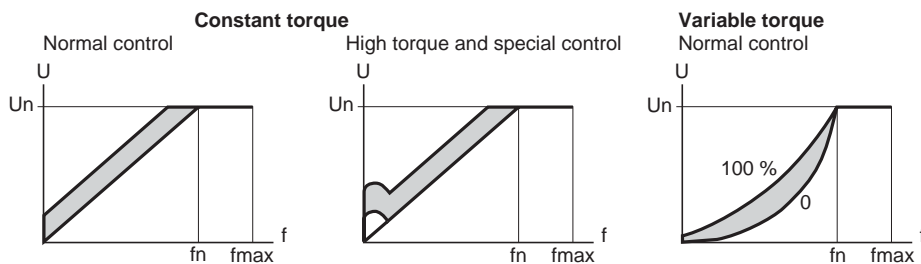
IR COMPENS. : – 100 % to 0 : reduction of torque available at low speed,  
 – 100 % to 150 % : increase in torque available at low speed,  
 – 100 to 800 % : adaptation of IR compensation to increase torque at low speed in the case of special motors or motors connected in parallel.

VOLTAGE BOOST : setting the motor voltage at a very low speed to increase or decrease the torque build-up time.

BANDWIDTH : setting the response time according to a speed scale or a torque scale.

PROFILE : setting the voltage/frequency curve to obtain correct and silent operation with minimum current (with NOLD control, this setting is continuous and automatic so as to minimize the current).

DAMPING : setting from 1 to 100 % or 800 %, preset value is 20 %. Setting the speed damping according to the dynamics of the application : – 20 % to 0 for low inertia,  
 – 20 % to 100 % or 800 % for high inertia.



MOT. OVERLOAD : setting 0.45 to 1.36 times the nominal current of the speed controller, preset at 0.9 times (for the ATV-66U41N4, this current is a function of the selected motor power, [see page 13](#)), or at the NOM. CURRENT parameter value ([see page 24](#)).

Set at the nominal current shown on the motor identification plate.

To inhibit the thermal protection or adapt it to the particular motor type (self-cooled or force-ventilated), go to the Main menu with Access lock in total unlock ([see page 63](#)).

Other settings may also appear :

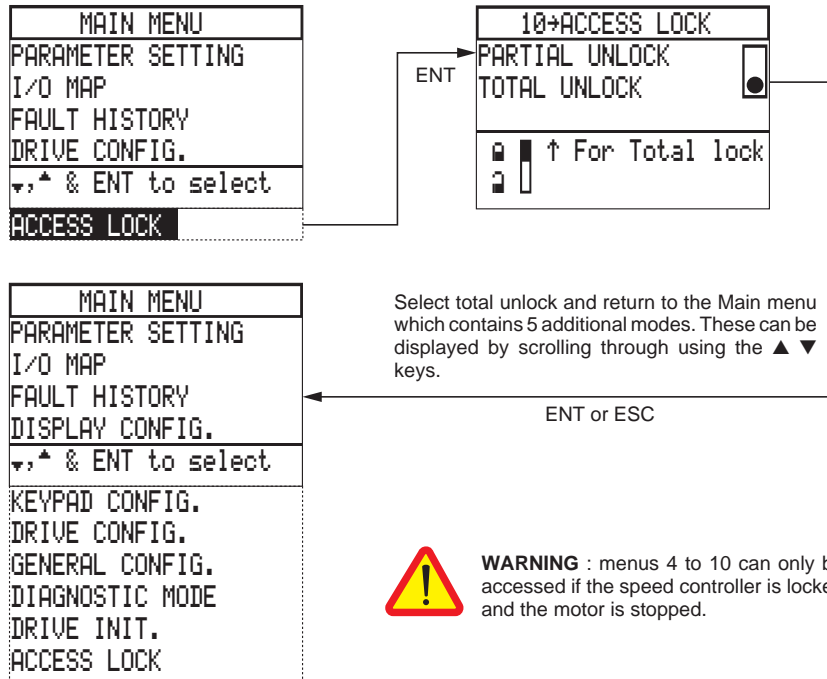
– Acceleration 2 and deceleration 2, if the alternate ramp parameter has been selected ([see page 31](#)).

– Slip compensation for constant torque applications, if manual configuration has been selected ([see page 27](#)).



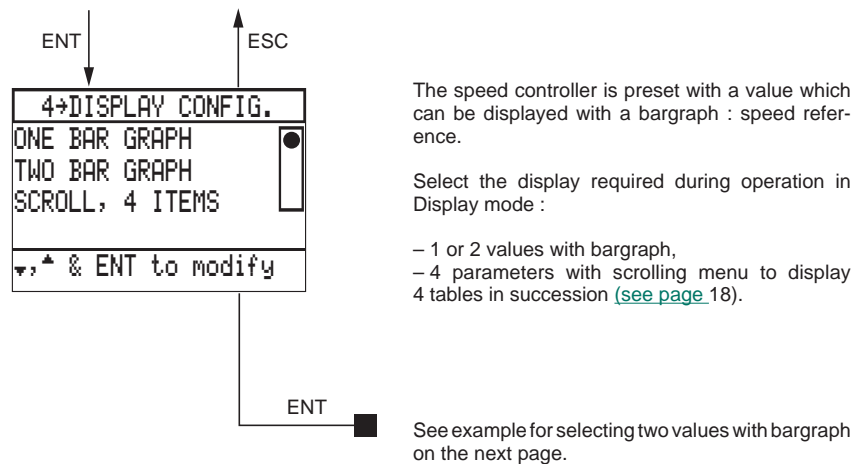
## Total unlock : access procedure

### Access procedure



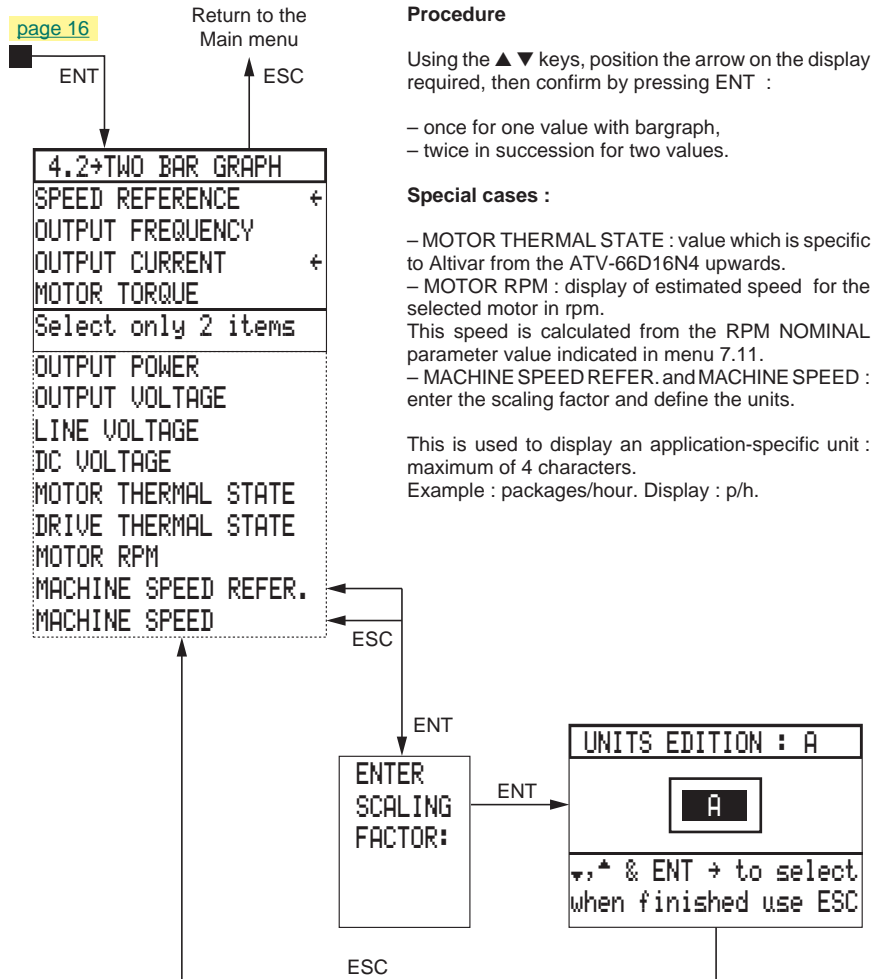
### Display configuration

Select Display configuration mode in the Main menu.





## Total unlock : display configuration



### Procedure

Using the ▲▼ keys, position the arrow on the display required, then confirm by pressing ENT :

- once for one value with bargraph,
- twice in succession for two values.

### Special cases :

- MOTOR THERMAL STATE : value which is specific to Altivar from the ATV-66D16N4 upwards.
- MOTOR RPM : display of estimated speed for the selected motor in rpm. This speed is calculated from the RPM NOMINAL parameter value indicated in menu 7.11.
- MACHINE SPEED REFER. and MACHINE SPEED : enter the scaling factor and define the units.

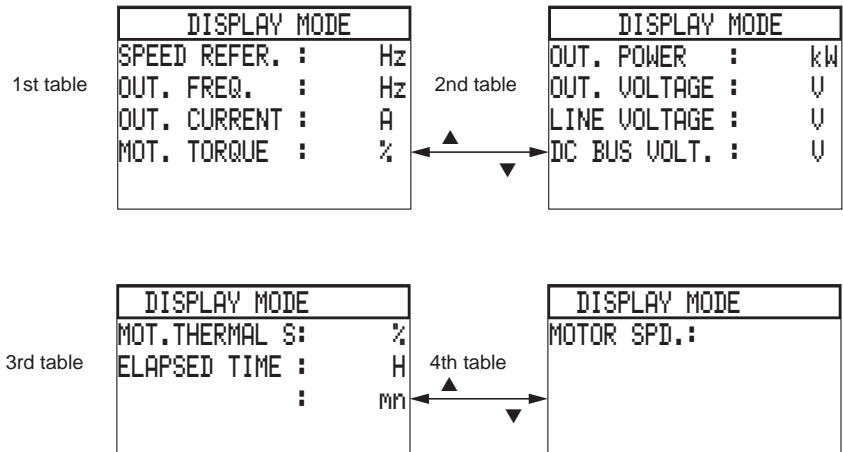
This is used to display an application-specific unit : maximum of 4 characters.

Example : packages/hour. Display : p/h.



## Total unlock : display configuration

Example of a display with 4 tables which can be accessed by scrolling from the four-parameter selection.



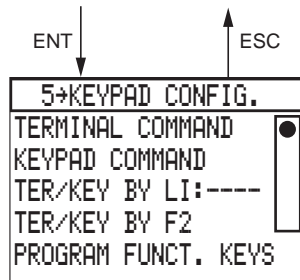
DRIVE THER.S : This parameter is displayed instead of MOT.THERMAL S only for rating ATV-66D16N4 to 66D79N4 and ATV-66D12M2 to 66D46M2.



## Total unlock : keypad configuration

### Keypad configuration

Select Keypad configuration mode in the Main menu.



Select the required configuration, and confirm with ENT :

– TERMINAL COMMAND (factory setting) : speed controller is controlled via the standard terminal block ([refer to the User's Manual](#)).

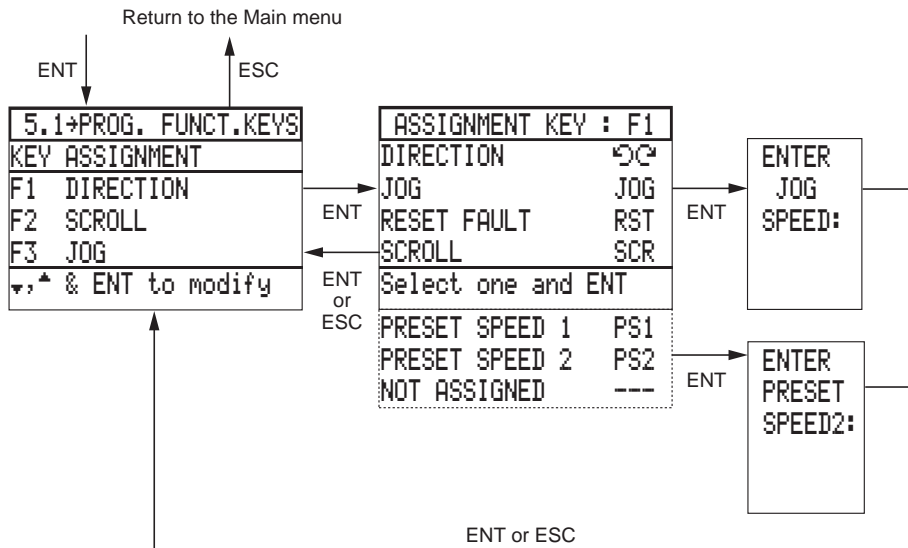
– KEYPAD COMMAND : local control of the speed controller via the keypad (in this case, it is not necessary to connect the terminal block logic and analog inputs, except LI1 and +24 to be connected).

– Switching from terminal command to keypad command and vice versa : from the terminal block by reassigning logic input LI3 or LI4 (select TER/KEY BY LI) or from the keypad using the F2 key (select TER/KEY BY F2).

To reassign a logic input, follow the instructions which are displayed on the screen ([see example on page 27](#)).

The PROGRAM FUNCT. KEYS menu displays the default assignments of the function keys. To change these, select the keys to be reassigned in succession (see example below).

If TER/KEY BY F2 switching is selected, the F2 key cannot be reassigned.

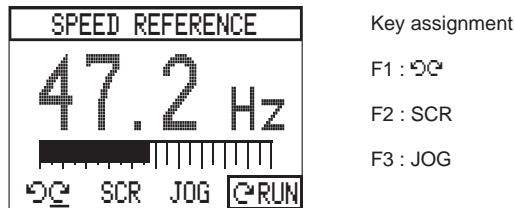




## Total unlock : keypad configuration

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Example of the display in Display mode



The assignment codes appear on the last line of the screen.

### Using keypad command

This command mode enables the speed controller to operate independently from its logic and analog inputs.



**WARNING** : check that driving the motor does not represent any danger to personnel, as the speed controller does not take any account of the safety devices of the machine being driven.

#### Starting and stopping on the motor ramp

- Start by a single press on the RUN key.
- Stop by a single press on the STOP key.

**Direction of movement** via the key assigned to (F1 for example) :

= forward, = reverse.

The selected direction of movement is underlined on the screen.  
Changing the direction is achieved by a single press on the appropriate key.

If no key is assigned to the direction of movement, the normal direction of rotation of the motor is forward.

**Speed reference** : selected using the key, displayed using the numerical keys, confirmed by pressing ENT, and corrected using the keys.

**SCR function** : scrolls through the values which can be displayed in Display mode by pressing the key assigned to the function.

**JOG function** : controlled by pressing the key assigned to the function; lasts for the time the key is pressed.

**RST function** : resets the speed controller if it has stopped on a fault (if the fault has disappeared) by a single press on the key assigned to the function.

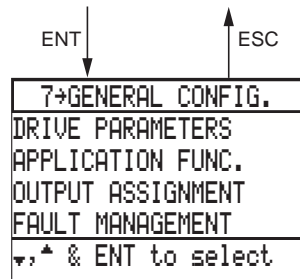
**VP1 and VP2 functions** : displays a programmed speed reference by a single press on the key assigned to the function. Correction is possible using the keys.

**Special case** : the F2 key is assigned to terminal/keypad switching. The T/K code is displayed on the screen and the selected control mode is underlined.



## Total unlock : general configuration

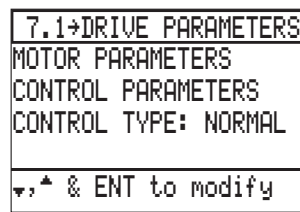
### General configuration



Select General configuration mode in the Main menu.

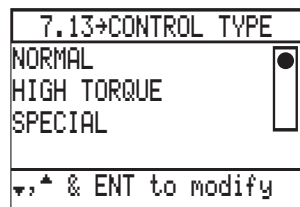
This mode includes 4 menus for totally changing the speed controller configuration and settings, selecting application functions, assigning logic and analog outputs, and fault management.

### Drive parameters menu



The Motor parameters menu is used to program parameters which are specific to the motor. Its contents depends on whether the speed controller is configured for constant torque or variable torque, and on the control type selected (see the next page).

### Constant torque

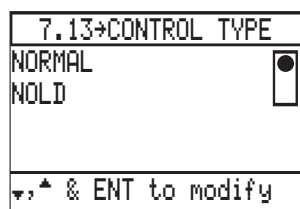


Factory setting : NORMAL control.  
Speed range : 1 to 20.

When controlling a single motor, if the application requires higher torque at very low speed and an extended speed range (1 to 100), select HIGH TORQUE control (sensorless flux vector control).

It is possible to control special motors or motors connected in parallel : select SPECIAL control.

### Variable torque



Factory setting : NORMAL control.

To operate with minimum power consumption, select the NOLD function. This function automatically adapts the voltage/frequency ratio to minimize the current taken by the motor.

Do not use this function if several motors are connected in parallel. Where there is high inertia, operation could be unstable.



## Total unlock : general configuration

### Contents of the Motor parameters menu

Constant torque : NORMAL control

7.11 MOTOR PARAMETERS
NOMINAL CURRENT
NOMINAL FREQUENCY
NOMINAL VOLTAGE
RPM NOMINAL
IR COMPENSATION
DAMPING
ROTATION NORMALIZATION : ABC
CURRENT LIMIT
SLIP COMPENSATION
BRAKE SEQUENCE

Constant torque : HIGH TORQUE control

7.11 MOTOR PARAMETERS
NOMINAL CURRENT
NOMINAL FREQUENCY
NOMINAL VOLTAGE
RPM NOMINAL
IR COMPENSATION
VOLTAGE BOOST
DAMPING
BANDWIDTH
PHASE NORMALIZATION : ABC
TORQUE LIMIT
CURRENT LIMIT
SLIP COMPENSATION
BRAKE SEQUENCE

Constant torque : SPECIAL control

7.11 MOTOR PARAMETERS
NOMINAL CURRENT
NOMINAL FREQUENCY
NOMINAL VOLTAGE
RPM NOMINAL
IR COMPENSATION
VOLTAGE BOOST
DAMPING
ROTATION NORMALIZATION : ABC
CURRENT LIMIT
SLIP COMPENSATION
BRAKE SEQUENCE

Variable torque

7.11 MOTOR PARAMETERS
NOMINAL CURRENT
NOMINAL FREQUENCY
NOMINAL VOLTAGE
RPM NOMINAL
PROFILE (*)
DAMPING
ROTATION NORMALIZATION : ABC
CURRENT LIMIT

(\*) This parameter is not displayed if the NOLD function is selected : automatic setting.

### Contents of the Control parameters menu

7.12 CONTROL PARAMETERS
MAXIMAL FREQUENCY
LOW SPEED
HIGH SPEED
ACCELERATION
DECELERATION
ACCELERATION TYPE
DECELERATION TYPE
ALTERNATE RAMP
SKIP FREQUENCY

This menu enables modification of the speed controller settings with an extension of the settings range, adjustment of the ramp type, and prevention of mechanical resonance phenomena by skip frequencies.





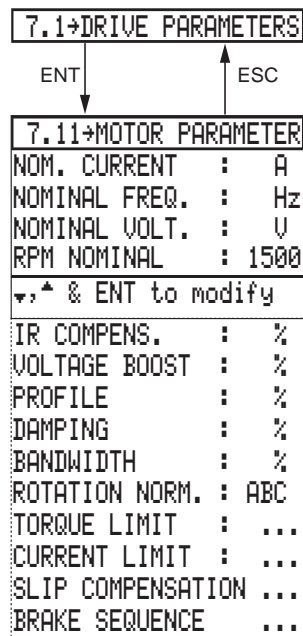
## Total unlock : drive parameters

---

### Drive parameters

#### Setting procedure :

- select the Drive parameters menu,
- if necessary, select the control type ([see page 21](#)),
- program the required values in succession in the Motor parameters and Control parameters menus,
- quit the Drive parameters menu and General configuration mode,
- return to Parameter setting mode to adjust the various parameters while the motor is running ([see pages 14 and 15](#)).



### Motor parameters

The menu opposite contains all the parameters which can be displayed in the various configurations described on page 22.

#### Procedure for programming and setting parameters :

- select in reverse video using the ▲▼ keys,
- press ENT : the numerical value stays highlighted,
- program or set to the required value using the numerical keys or the ▲▼ keys in +- mode and confirm with ENT.



## Total unlock : motor parameters

---

### NOM. CURRENT

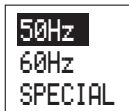
This setting is used to adapt the speed controller to the motor.  
Adjustment range : 0.45 to 1.05 times the nominal current of the speed controller.  
Factory setting : 0.9 times. Set at the nominal current shown on the motor identification plate.

If this setting is changed, the MOT. OVERLOAD setting is automatically modified ([see Parameter setting mode on page 15](#)).

### NOMINAL FREQ.

The value displayed is the line frequency detected at the initial power-up or during a full factory setting.

Example



If necessary, change the value by selecting the special law.

In the case of a special motor, enter the frequency specific to the motor.

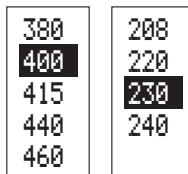
Setting : from 25 Hz up to the maximum frequency ([see page 29](#))

**Warning** : when the power supply is changed, ensure that the value displayed conforms with the frequency of the motor.

### NOMINAL VOLT.

The value displayed depends on the line frequency detected at the initial power-up or during a full factory setting.

Example



50 Hz supply : 400 V or 230 V.  
60 Hz supply : 460 V or 230 V.

If necessary, select the actual motor voltage.

**RPM NOMINAL** corresponds to the number of rpm at the nominal frequency. The value to be set is that indicated on the motor rating plate.

Example : 1500 rpm for a 4-pole motor supplied at 50 Hz, and 1800 rpm for a 4-pole motor supplied at 60 Hz.

**IR COMPENS.** (constant torque only)

**VOLTAGE BOOST** (constant torque only : HIGH TORQUE or SPECIAL)

**PROFILE** (variable torque only : NORMAL)

**DAMPING**

**BANDWIDTH** (constant torque only : HIGH TORQUE)

These settings (expressed as %) are used to adapt the speed controller to the application in order to optimize transient operation.  
Modify the factory settings if necessary.



## Total unlock : motor parameters

### ROTATION NORM.

7.11→MOTOR PARAMETER	
PROFILE	: %
DAMPING	: %
BANDWIDTH	
ROTATION NORM.	ABC <input checked="" type="radio"/>
↓, ↑ & ENT to M	ACB <input type="radio"/>

If necessary, the normal direction of rotation of the motor can be reversed (ABC → ACB) without having to modify the connection to the terminals of the speed controller or the motor.

### TORQUE LIMIT (constant torque only : HIGH TORQUE)

TORQUE LIMIT	
DEFAULT LIMIT	<input checked="" type="radio"/>
BY LOGIC IN. :	----
BY ANALOG IN. :	---
MOTOR TORQUE :	200 %
GENE. TORQUE :	200 %

#### Default limit :

– the motor and generator torque is directly limited by the values entered for the MOTOR TORQUE and GENE. TORQUE parameters.

#### LI limit (logic input) :

– if LI is active : the motor and generator torque is limited by the values entered for the MOTOR TORQUE and GENE. TORQUE parameters.  
– if LI is not active : limit at 200 % Tn.

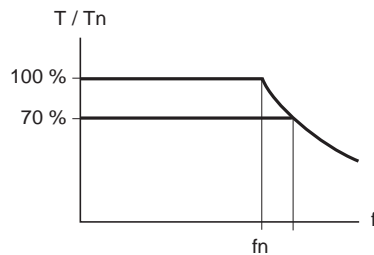
#### AI limit (analog input) :

The motor and generator torque is limited by the AI input selected as an absolute value :

Min. AI value = 0 % Tn motor,  
0 % Tn generator.

Max. AI value = 200 % Tn motor,  
200 % Tn generator.

x % of AI = 2 times x % of Tn motor,  
2 times x % of Tn generator.



The 2 parameters MOTOR TORQUE and GENE. TORQUE are used to limit torque independently of the current, with separate settings for the motor and generator quadrants (speed controller with brake resistor).

Example opposite : extension of the constant torque operating zone above the nominal speed (in the constant power zone) by limiting the motor torque to 70 % for low resistive torque applications.

Values as a % : adjustment from 0 to 200 % of the motor nominal torque, preset at 200 %.

#### Note :

When the torque limit function is used, the speed error control must be deleted in order to prevent OVERSPEED. In menu 7.4 FAULT MANAGEMENT set the SPEED ERR + VE protection to NO.



## Total unlock : motor parameters

---

### CURRENT LIMIT

CURRENT LIMIT	
DEFAULT LIMIT	<input checked="" type="radio"/>
BY FREQ. LEV: Hz	<input type="radio"/>
BY LOGIC IN.: ----	<input type="radio"/>
BY ANALOG IN: ---	<input type="radio"/>
CURR. LIMIT :	A

It is possible to reduce the current limit for certain applications.

Factory setting : DEFAULT LIMIT.

Select the command mode if necessary : see below and the next page.

Reduction value in (A) : adjustment from 40 % to 136 % (or 110 % in variable torque configuration) of the speed controller nominal current, preset at 136 % (or 110 %).

Selection of the control mode (3 choices) :

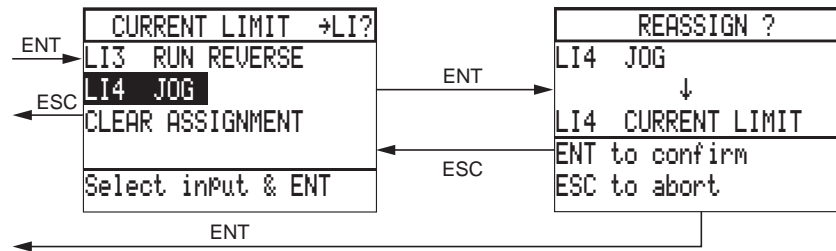
1. At a specific frequency level (example : limitation of torque above a certain speed), adjustment from 0 to maximum frequency ([see page 29](#)), preset at 50/60 Hz (supply frequency).
2. Assignment of a logic input (example : cutting to length followed by a stop and maintaining torque at a mechanical end stop).
3. Speed variation on an analog input (example : winder with simple regulation of traction).

CURRENT LIMIT controlled either by frequency threshold or by logic input.

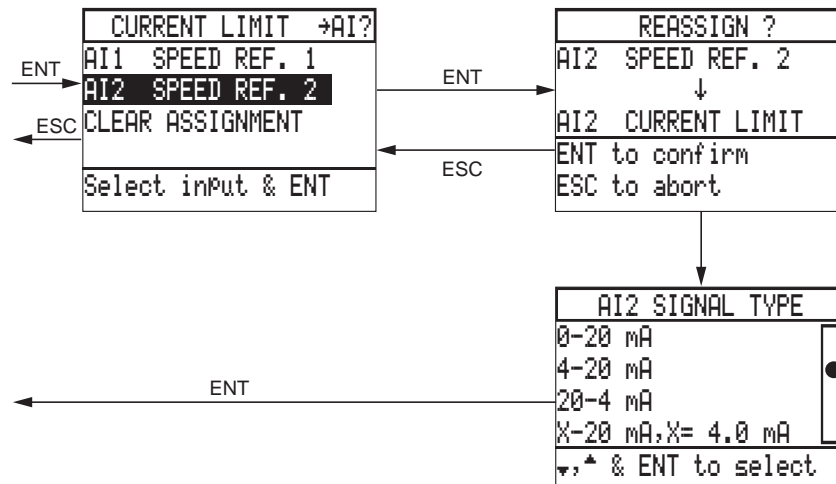


## Total unlock : motor parameters

### Procedure for reassigning a logic input

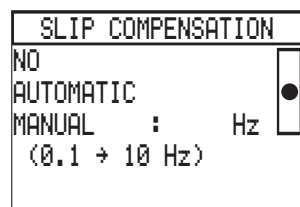


### Procedure for reassigning an analog input



If necessary, modify the type of signal on input AI2. X can be programmed with a resolution of 0.1 mA. When set at 0-20 mA, it is possible to convert AI2 to a 0-5 V voltage input using a switch on the control card (to the left of terminal block J13), set I → U.

### SLIP COMPENSATION (constant torque only)



Factory setting : AUTOMATIC.

It is possible to inhibit slip compensation (example : controlling a synchronized asynchronous motor).

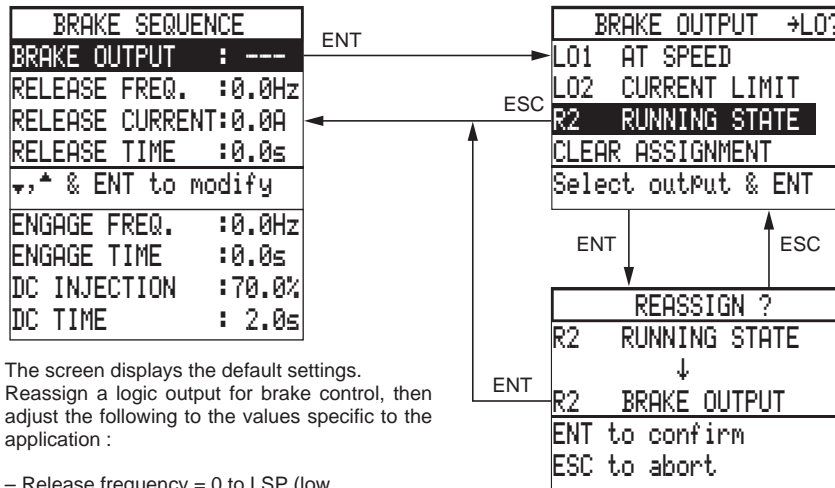
It is possible to select a compensation which can be adjusted between 0.1 and 10 Hz in order to adapt the speed controller to the characteristics of the motor (example : motor with low slip).

This adjustment can be accessed in Parameter setting mode (see page 15).



## Total unlock : motor parameters

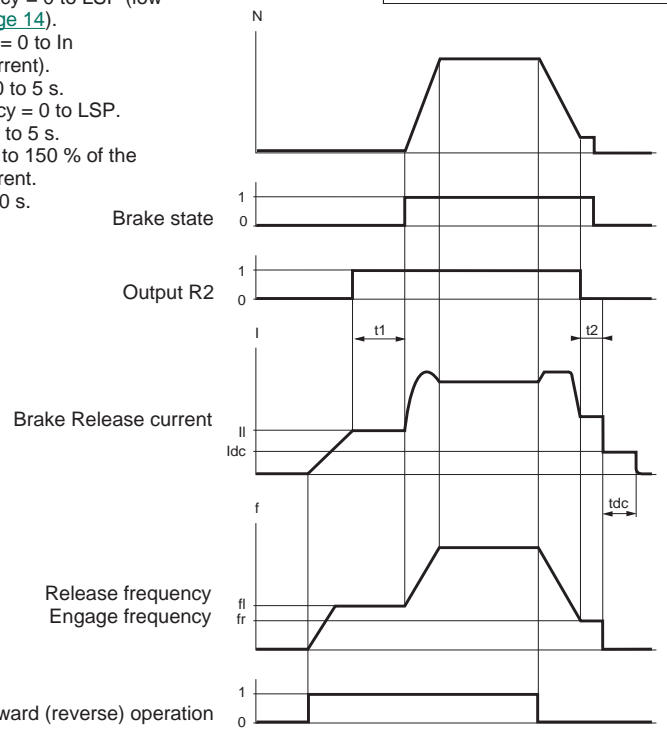
### BRAKE SEQUENCE (constant torque only)



The screen displays the default settings. Reassign a logic output for brake control, then adjust the following to the values specific to the application :

- Release frequency = 0 to LSP (low speed set, [see page 14](#)).
- Release current = 0 to  $I_n$  (motor nominal current).
- Release time = 0 to 5 s.
- Engage frequency = 0 to LSP.
- Engage time = 0 to 5 s.
- Injection = 50 % to 150 % of the motor nominal current.
- DC time = 0 to 30 s.

t1 = Release time  
t2 = Engage time  
tdc = DC time



#### Recommendation :

In menu 7.4 FAULT MANAGEMENT/DB FAULT select YES to remove self-adaption of the deceleration ramp. In the event of the speed controller capacity being exceeded this will generate a fault.

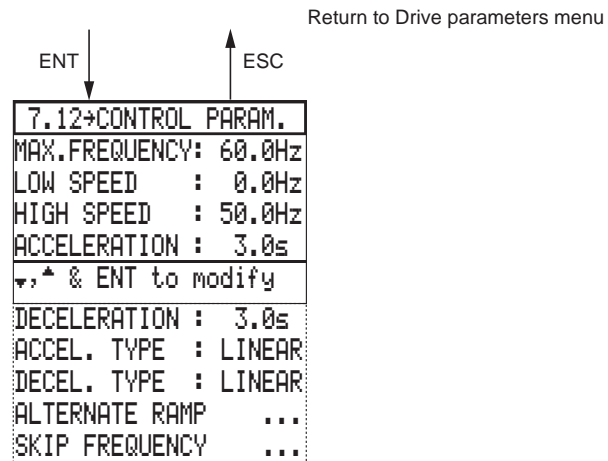


## Total unlock : control parameters

---

### Control parameters

Select the Control parameters menu in the Drive parameters menu.



Set to the required values using the ▲ ▼ keys in + – mode and confirm with ENT.

Settings :

– Maximum frequency :

- in constant torque : 400 Hz for ATV-66U41N4 to D79N4 and 66U41M2 to 66D46M2, 200 Hz for ATV-66C10N4 to C31N4,
- in variable torque : 75/90 Hz (50/60 Hz line frequency)
- factory setting : 60/72 Hz.

– Low speed : from 0 to high speed.

– High speed : from low speed to an speed varying by 25 Hz at maximum frequency.

– Acceleration and deceleration : from 0.1 to 999.9 s.

#### Note

When selecting a parameter, the original setting appears on the screen : factory setting or a value which has previously been programmed in Parameter setting mode ([see page 14](#)).

The new value programmed in the Control parameters menu is automatically recorded in Parameter setting mode.

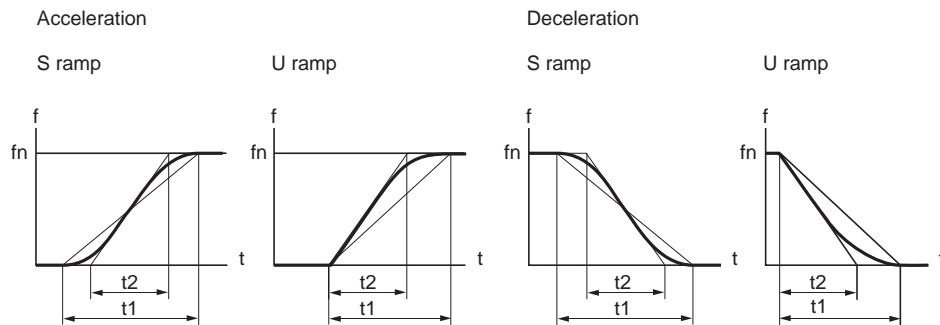


## Total unlock : control parameters

### ACCEL. TYPE and DECEL. TYPE

The ramp types are linear by default.

Each ramp can be independently selected as S or U.



In each case, the rounding factor can be programmed as a % of the total time  $t_1$ . Overall times remain unchanged.

The new linear time  $t_2$  which represents the slope of the ramp is displayed on the screen.

Adjustment range : 0 to 100 %, that is  $t_2$  can be adjusted from  $t_1$  to 0.5  $t_1$ .

Factory settings :

- 20 % for S ramp,
- 50 % for U ramp.

ACCEL. TYPE	
LINEAR	<input checked="" type="radio"/>
S.Round Fact: 20 %	
U.Round Fact: 50 %	
Linear Part : 3.0s	
Select and set value	

DECEL. TYPE	
LINEAR	<input checked="" type="radio"/>
S.Round Fact: 20 %	
U.Round Fact: 50 %	
Linear Part : 3.0s	
Select and set value	





## Total unlock : control parameters

### ALTERNATE RAMP

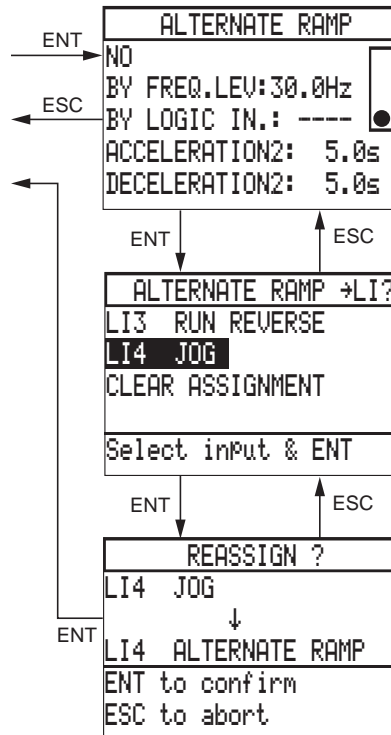
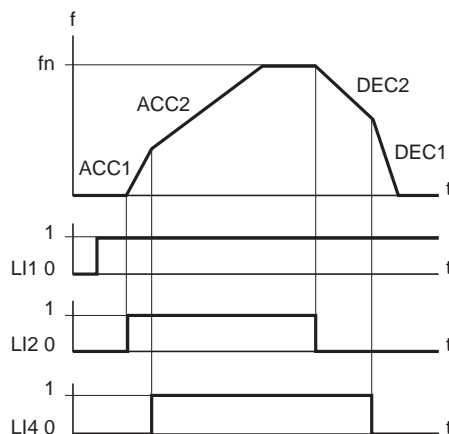
Choice of a second ramp time for acceleration and deceleration.  
In this case, ramps 1 and 2 are automatically linear.

Select the type of switching between the two ramp times :

- at a specific frequency level, adjustment from 0 to maximum frequency, preset at 30 Hz,
- or by reassigning and changing the state of a logic input.

Then adjust the ramp times : from 0.1 to 999.9 s, preset at 5 s.  
These adjustments can be accessed in Parameter setting mode ([see page 15](#)).

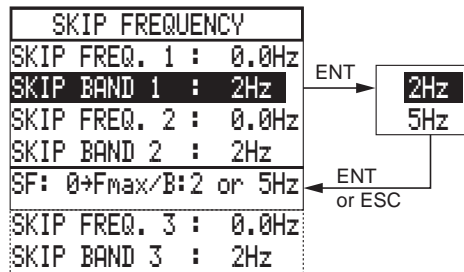
Example of switching using LI4



### SKIP FREQUENCY

Prevents critical speeds which would cause mechanical resonance phenomena.

Prolonged operation of the motor can be prohibited in up to 3 adjustable frequency bands with a bandwidth of 2 or 5 Hz.

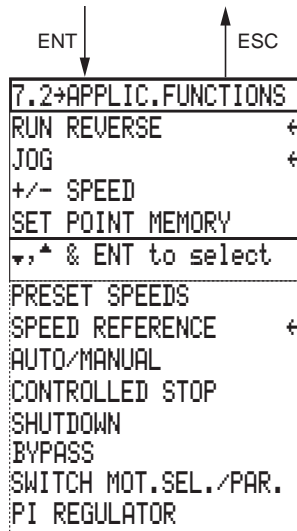




## Total unlock : application functions

### Application functions

Select the Application functions menu in the General configuration mode.



A number of application functions can be selected using this menu.

The three arrows indicate the factory settings :

- RUN REVERSE (input LI3),
- JOG (input LI4),
- SPEED REFERENCE.

The selection of functions is limited by :

- the number of reassignable logic inputs LI on the speed controller,
- the incompatibility of certain functions with each other, or with the selection of the brake sequence, in the case of constant torque configuration.

### Inputs and outputs necessary for selecting functions

Application functions	LI inputs	AI inputs	LO or R2 outputs
Run reverse	1		
JOG (step by step)	1		
+/- speed	2		
Set point memory	1		
Preset speeds	1 or 2		
Speed reference	0	1 or 2	
Auto / manual	1 or 2		
Controlled stop	0 or 1		
Shutdown	0		1
Terminal / keypad (1)	0 or 1		
Bypass	2		1
Switch mot. sel./Par.	1 or 2	1 or 2	
PI regulator	1 or 2		

(1) This function is selected in the Keypad configuration mode ([see page 19](#)).



## Total unlock : application functions

Table showing application functions which are not compatible

The ● indicates incompatibility

	RUN REVERSE	JOG	+ / - SPEED	SET POINT MEMORY	PRESET SPEEDS	SPEED REFERENCE	AUTO / MANUAL	CONTROLLED STOP	SHUTDOWN	TERMINAL / KEYPAD	BYPASS	BRAKE SEQUENCE	PI	SWITCH MOT.SEL./PAR
RUN REVERSE	■												●	
JOG		■							●				●	
+ / - SPEED			■	●	●								●	
SET POINT MEMORY			●	■	●		●						●	●
PRESET SPEEDS			●	●	■								●	
SPEED REFERENCE						■							●	
AUTO / MANUAL				●			■						●	
CONTROLLED STOP								■				●		●
SHUTDOWN		●							■			●	●	●
TERMINAL / KEYPAD										■			●	
BYPASS											■			
BRAKE SEQUENCE								●	●			■	●	
PI	●	●	●	●	●	●	●		●	●		●	■	
SWITCH MOT.SEL./PAR.				●				●	●					■

If a function is selected which is not compatible with another which has previously been validated, a warning message appears on the screen.

```
THIS FUNCTION IS NOT
COMPATIBLE WITH :

F1 Help/ESC to quit
```



## Total unlock : application functions

### RUN REVERSE

RUN REVERSE	
NO	<input type="checkbox"/>
YES, LOGIC IN: LI3	<input checked="" type="checkbox"/>
↓, ↑ & ENT to modify ESC to quit	

It is possible to inhibit this function for applications with a single direction of rotation of the motor.

Input LI3 then becomes available, and can be reassigned to another function.

Reassignment procedure : [see example on page 27](#).

### JOG

JOG	
NO	<input type="checkbox"/>
YES, LOGIC IN: LI4	<input checked="" type="checkbox"/>
JOG SPEED : 5.0Hz	
DUTY CYCLE : 0.5s	
JOG OUTPUT : ---	

Fast pulsed operation with minimum ramp times : 0.1 s.

It is possible to inhibit this function or to modify the settings :

- JOG speed : preset at 5 Hz, adjustment from 0.2 to 10 Hz,
- duty cycle (time between 2 pulses) : preset at 0.5 s, adjustment from 0.2 to 10 s.

It is possible to assign a logic output to indicate the validation of this function (see example of reassignment on page 28).

### +/- SPEED

+/- SPEED	
NO	<input type="checkbox"/>
YES, WITH MEMORY	<input checked="" type="checkbox"/>
YES, WITHOUT MEM.	<input type="checkbox"/>
(+)SPEED LI : ----	
(-)SPEED LI : ----	

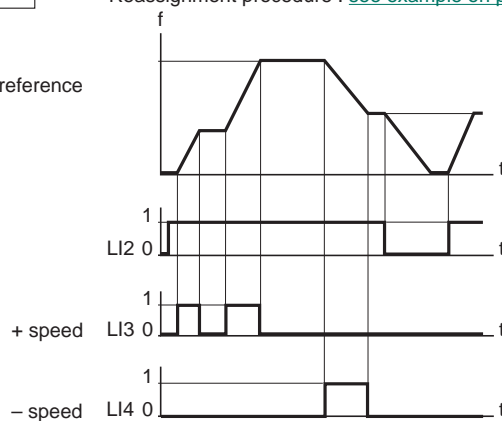
Speed reference increased or decreased via 2 logic commands with or without saving the last reference.

The speed reference cannot exceed the reference given by the summing of AI1 and AI2.

In this case, reassign 2 logic inputs.

Reassignment procedure : [see example on page 27](#).

Example with saving the last reference





## Total unlock : application functions

### SET POINT MEMORY

```

SET POINT MEMORY
NO
YES, LOGIC IN: ----
↓, ↑ & ENT to modify
ESC to quit
  
```

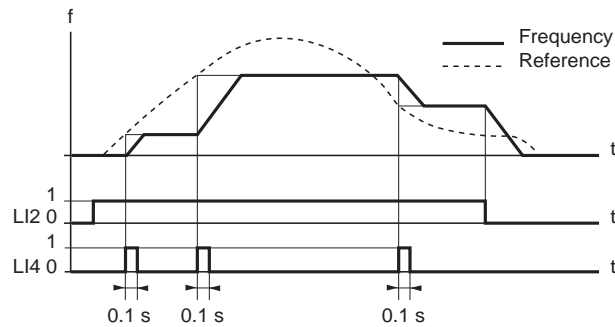
Acceptance and storing of a speed reference level for the reference input with a logic command lasting longer than 0.1 s.

The memory is maintained until the next command or inhibition of the direction of rotation command.

This function enables the speed of several speed controllers to be controlled via a single analog reference and a logic input for each speed controller.

To reassign a logic input, follow the procedure described on page 27.

Example of control via input LI4



### PRESET SPEEDS

```

PRESET SPEEDS
NO
1 PRESET SPEED
3 PRESET SPEEDS
  
```

Switching between preset speed references using logic commands.

Selection between 1 or 3 preset speeds by reassigning 1 or 2 logic inputs.

Adjustment from 0.1 Hz to maximum frequency, factory settings :  
 - 1 speed : 5 Hz,  
 - 3 speeds : 5, 10 and 15 Hz.

Reassignment of logic inputs : follow the procedure described on page 26.

```

1 PRESET SPEED
LOGIC INPUT a: ----
SPEED 1 : 5.0Hz
Enter all values +ESC
  
```

```

3 PRESET SPEEDS
LOGIC INPUT a: ----
LOGIC INPUT b: ----
SPEED 1 : 5.0Hz
SPEED 2 : 10.0Hz
Enter all values +ESC
SPEED 3 : 15.0Hz
  
```

	LIb	LIa
Speed ref.	0	0
Speed 1	0	1
Speed 2	1	0
Speed 3	1	1



## Total unlock : application functions

### SPEED REFERENCE

SPEED REFERENCE	
SPEED REF. 1	: AI1
SPEED REF. 2	: AI2
CLAMP SUM	: YES
▼, ▲ & ENT to modify	

The screen below is obtained by pressing ENT after 2 intermediate screens.

AI2 SIGNAL TYPE	
0-20 mA	<input type="radio"/>
4-20 mA	<input checked="" type="radio"/>
20-4 mA	<input type="radio"/>
X-20 mA, X= 4.0 mA	<input type="radio"/>
MULTIPLY BY (-1): NO	<input type="checkbox"/>

It is possible to change the characteristics of current analog input AI2 but analog input AI1 for the reference remains as a voltage input (0-10 V).

The 2 inputs AI1 and AI2 are summing inputs.

Application example : machine whose speed is controlled by a corrector signal on input AI2.

AI2 preset at : 4-20 mA.

Settings : 0-20 mA, 4-20 mA, 20-4 mA, or X-20 mA by programming X with a resolution of 0.1 mA between 0 and 20, preset at 4 mA.

When set at 0-20 mA, it is possible to convert AI2 to a 0-5 V voltage input using a switch on the control card (to the left of terminal block J13), set I → U.

It is possible to assign a negative signal by selecting YES.

In this case, the AI2 reference is subtracted from the AI1 reference.



Clamping the sum :

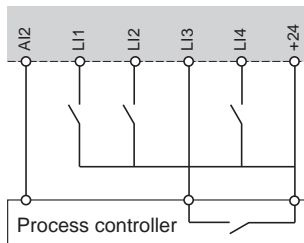
- YES (factory setting) : if AI1 - AI2 is zero or negative, the result is low speed,
- NO : if AI1 - AI2 is negative, the direction of rotation is reversed.

### AUTO / MANUAL

AUTO/MANUAL	
NO	<input checked="" type="radio"/>
YES, LOGIC IN:	<input type="checkbox"/>
AUTO RUN LI : ----	
▼, ▲ & ENT to modify	
ESC to quit	

Connection diagram :

- switch by LI4,
- automatic operation by LI3.



Switching 2 analog references by logic command.

This function avoids switching low-level signals, and makes the 2 inputs speed reference 1 and speed reference 2 independent.

Local manual control by speed reference 1.

Automatic control by a process controller (or PLC) on speed reference 2, enabled by the logic input at state 1. Program AI2 according to the PID controller characteristics in the Speed reference function (see above).

The 3rd line AUTO RUN LI appears on the screen if the function is selected, and offers the possibility of reassigning a logic input to control the run command via the PID controller in automatic mode, while input LI2 is inactive in AUTO position. This function is optional, and not essential for the application.

Reassignment procedure : [see example on page 27](#).

Example opposite : run command given automatically by the process controller on input LI3.



## Total unlock : application functions

### CONTROLLED STOP

```

CONTROLLED STOP
NO
BY LOGIC INPUT
BY FREQUENCY LEVEL
BY LI / FREQ.LEVEL
▼,▲ & ENT to modify

```

Selecting the stop command :

- by reassigning a logic input,
- by a specific frequency level,
- or by using both these commands.

In each case, there are three stopping methods :

- "Freewheel" stop : locks the speed controller and stops the motor according to the inertia and the resistive torque.
- Fast stop : braking with minimum acceptable deceleration ramp time without locking on a fault.
- Adjustable DC injection braking.

### Control by logic input

```

CONT. STOP BY LI
LOGIC INPUT : ----
ACTIVE STATE : LOW
STOP TYPE   : FREEW
Enter all values →ESC

```

ENT

```

LOW
HIGH

```

Select the state of the input : active at low (0) or high (1), preset at low.

ENT

```

FREEWHEEL
FAST
DC-INJ.: 70%
DC-TIME: 2.0s

```

Select the stopping method.

For DC injection, adjust the values.

Adjust the level : from 50 % to 150 % of the nominal motor current, preset at 70 %.

Adjust the time : from 0 to 30 s, preset at 2 s.

Other possibility : set the time at 30.1 s.

In this case, braking is permanent with an injection level programmed during the first 30 s and at 50 % for the remainder of the time.

### Control by frequency level

```

CONT.STOP BY FREQ.L.
FREQ. LEVEL : 0.0Hz
STOP TYPE   : FREEW
Enter all values →ESC

```

Set at the required frequency level.

Adjustment range : from 0 to the maximum frequency.

Select the stopping method (see above).

When a shutdown request is made, the controlled shutdown type that is selected will be activated as soon as the motor frequency drops below the threshold value.

### Control by logic input and frequency level

```

CONT.STOP LI&FREQ.L.
LOGIC INPUT : ----
ACTIVE STATE : LOW
STOP TYPE   : FREEW
FREQ. LEVEL : 0.0Hz
STOP TYPE   : FREEW

```

Reassign, select and set as shown above.

Operation is as follows :

- at the initial stop command, the stopping method which corresponds to this command is validated,
- if the other stop command is given, the stopping method which corresponds to this command is only validated if it has priority over the first (priority : "freewheel", fast, DC injection).



## Total unlock : application functions

### SHUTDOWN

SHUTDOWN	
NO	<input type="checkbox"/>
YES	<input checked="" type="checkbox"/>
LOGIC OUTPUT : ---	
DWELL TIME : 1.0s	
▼,▲ & ENT to modify	

Low speed maintained for an adjustable time between 0.1 and 60 s : preset at 1 s.

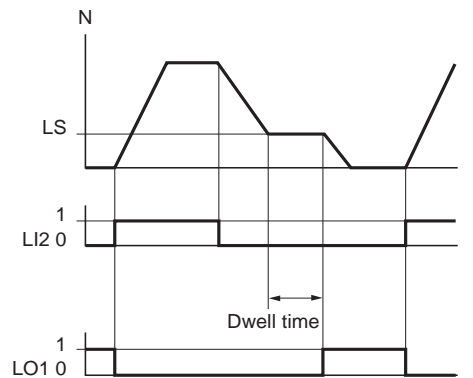
Indicates the end of low speed operation by the change in state of a logic output.

Application example : pumping station with monitoring valve closing before the pump stops completely.

Reassign a logic output ([see example on page 28](#)), and set the dwell time.

Example with LO1

**Comment :** a run command given during the dwell time will only be enabled at the end of low speed operation.



### BYPASS

BYPASS	
NO	<input type="checkbox"/>
YES, DEFINE I/O	<input checked="" type="checkbox"/>
DECAY TIME : 2.0s	
SEQUENCE Tof : 5.0s	
PROCESS Tof : 60.0s	
ENT ↓ ↑ ESC	
BYPASS I/O	
SEQUENCE INPUT :----	
PROCESS INPUT :----	
RUN OUT.COMMAND :----	
Enter all values →ESC	

This function can be used :

- either to isolate the motor when there is no run command, using a contactor between the speed controller and the motor : see the next page,
- or to supply the motor by direct connection to the line supply ([see pages 40 and 41](#)).

Reassign 2 logic inputs :

- LI4 for SEQUENCE INPUT,
- LI3 for PROCESS INPUT (if necessary).

Reassign relay output R2 for RUN OUT. COMMAND.

Set the values according to the application :

- DECAY TIME (motor demagnetization) : adjust from 0.2 to 10 s, preset at 2 s,
- SEQUENCE Tof (dwell time to be set above the energization time of KM2) : adjust from 0.2 to 300 s, preset at 5 s,
- PROCESS Tof ([optional dwell time to be set, see page 41](#)) : adjust from 0.2 to 300 s, preset at 60 s.



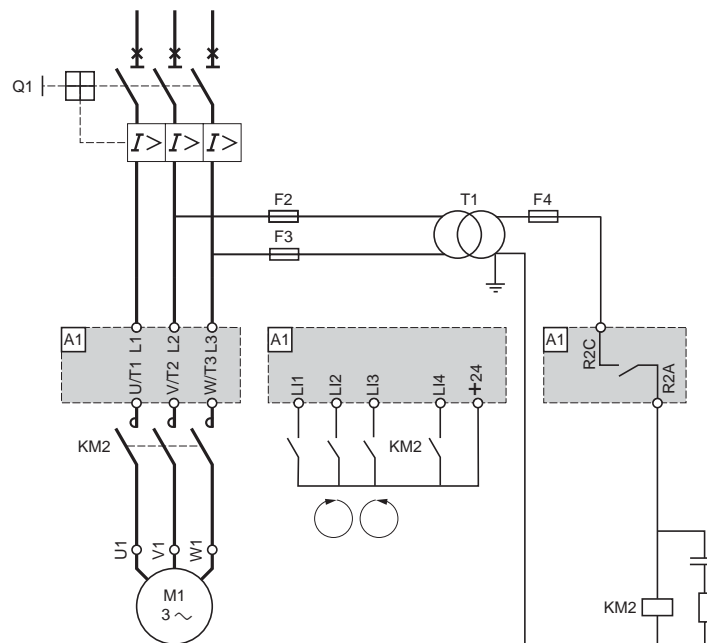


## Total unlock : application functions

### BYPASS : isolating the motor

This function avoids frequent switching of the power circuit upstream of the speed controller, and must be used for cycles < 60 s requiring isolation of the motor when stationary.

**Connection diagram** (example with circuit-breaker)



Input LI3 can be reassigned to RUN REVERSE for example.

### Operation

Stopping by inhibiting the run direction command on input LI2 or LI3 :

- de-energization of relay R2 when the deceleration ramp is at zero,
- de-energization of contactor KM2.

Validation of a run direction command on input LI2 :

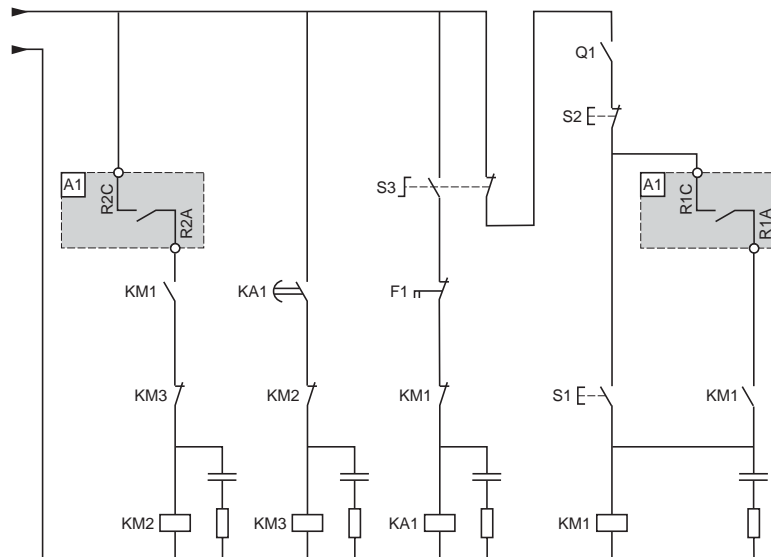
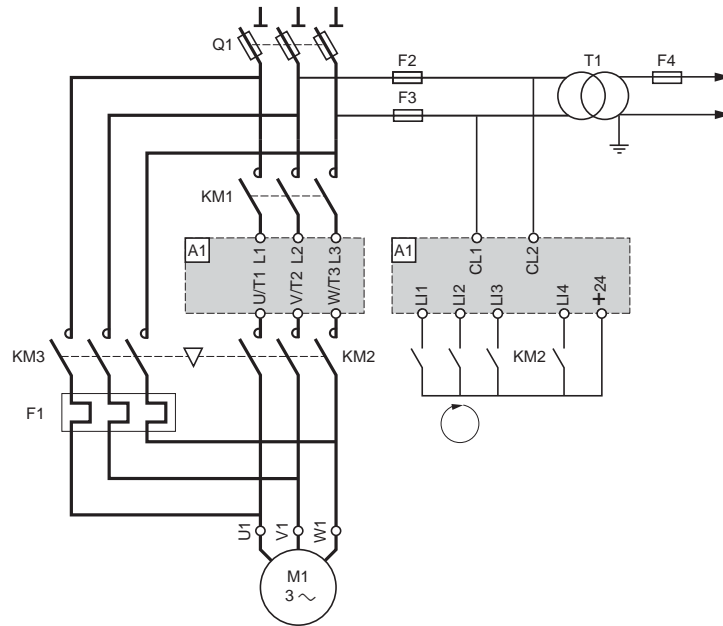
- motor demagnetization (DECAY TIME),
- energization of relay R2,
- energization of contactor KM2 : input LI4 (SEQUENCE INPUT) is validated by closing the auxiliary contact; if not, the speed controller locks after the dwell time SEQUENCE Tof.



## Total unlock : application functions

**BYPASS : motor supplied directly from line supply**

**Connection diagram (control by switch)**





## Total unlock : application functions

---

### Operation

The motor is connected directly to the line supply in the event of a speed controller fault :

- manual control via switch S3,
- de-energization of contactors KM1 and KM2 : isolates the speed controller power,
- dwell time of auxiliary contactor KA1 : demagnetizes the motor,
- energization of contactor KM3.

After the fault has disappeared, the motor power supply can be reconnected by the speed controller (this can be performed without the need for a prior stop request) :

- manual control via switch S3,
- de-energization of contactor KM3,
- manual control via pushbutton S1,
- energization of contactor KM1 : supplying power to the speed controller,
- enabling of run commands on inputs LI1 and LI2,
- motor demagnetization (DECAY TIME),
- energization of relay R2,
- energization of contactor KM2 : input LI4 (SEQUENCE INPUT) is enabled by closing the auxiliary contact; if not, the speed controller locks after the dwell time SEQUENCE Tof,
- if necessary, validate input LI3 (PROCESS INPUT) by closing a load detection contact; if not, the speed controller locks after the dwell time PROCESS Tof (example : checking flow rate or pressure in a pumping station).

### Other possibilities :

- Start on a ramp up to nominal frequency, then direct connection to the line supply.
- Reconnection of supply via the speed controller for controlled deceleration.

**Applications** : conveyor systems, starting several motors in cascade.



**WARNING** : when the BYPASS function is selected, the “motor phase fault” is no longer taken into consideration.

### Note :

Motor parameters are measured when the speed controller is powered up.

If the motor is present on power-up : the measured parameters are used.

If the motor is missing on power-up : tabulated parameters or the last parameters measured are used.

For maximum performance when the motor is electrically isolated from the speed controller on power-up, an initialization sequence (motor connected to the speed controller on power-up) must be performed in order to measure and memorize the motor parameters at least once.

This sequence will result in optimal performance.

If this initialization sequence is not performed, the speed controller will operate using parameters from standard motors memorized in the speed controller.



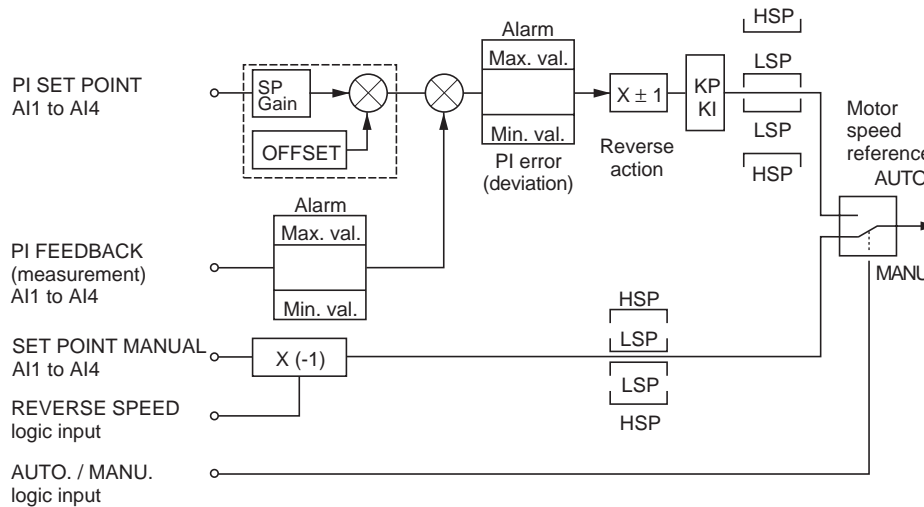
## Total unlock : application functions

### PI REGULATOR

The PI regulator operates in one of the following two modes :

- AUTO. : process set point with PI regulator,
- MANU. : motor speed reference (excluding PI regulation).

AUTO. / MANU. is selected using a logic input (MENU 7.2 SET POINT MANUAL)



#### Possible in MANU. mode :

- REVERSE DIRECTION of rotation of the motor by logic input

#### Possible in AUTO. mode : MENU 7.2 PI PARAMETER

- Selection of the analog input for the set point and feedback :  
(0 -> 10 V, 0/4 -> 20 mA, - 10 V + 10 V with the I/O card).
- Adaption of the set point input to the process feedback : SP GAIN and OFFSET.
- REVERSE PI ACTION possible (error  $\nabla$  motor speed  $\blacktriangleright$ ).
- Adjustment of the integral and proportional gain (KI, KP).
- Prevention of motor rotation in reverse direction.
- Motor speed limited to LSP (low speed) and HSP (high speed).
- Alarm when logic output exceeds the Max. and Min. thresholds of the PI error and feedback.
- Analog output for PI set point, PI feedback, PI error.

**Note :** REVERSE mode (reversing the direction of operation) is not available.

The acceleration and deceleration ramps of the speed controller are activated at the regulator output.

- It is possible to display the PI set point or PI feedback on a bar graph (MENU 4.1 : ONE BAR GRAPH).



## Total unlock : application functions

### WIRING PI SET POINT / SET POINT MANUAL, PI FEEDBACK INPUTS.

The input should be wired to an analog input selected according to the following table and the type of signal.  
Take care to respect the following ranges: minimum and maximum values imposed by the input selected.

Input	Type of signal	Range of signal		Available
		MIN.	MAX.	
AI1	Voltage	0	10 V	On standard product
AI2	Current	0 4	20 mA 20 mA	On standard product
AI3	Differential voltage	- 10 V	+ 10 V	With I/O card
AI4	Current	0 4	20 mA 20 mA	With I/O card

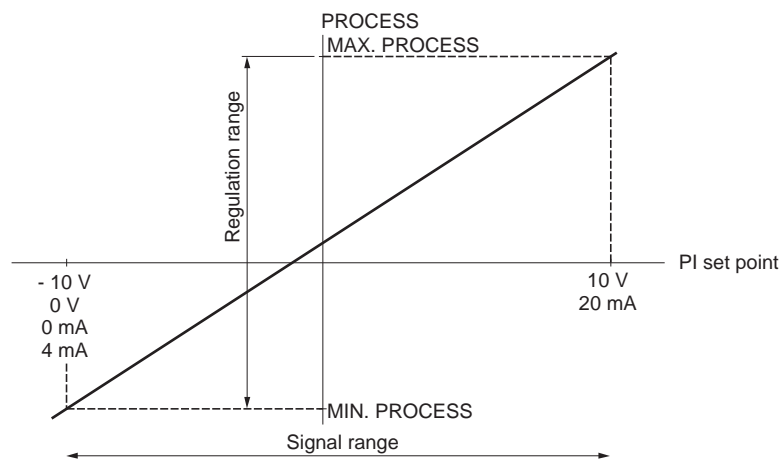
### Vocabulary :

MAX. PROCESS and MIN. PROCESS correspond to the regulation range expressed in units defined by the user.

Example : regulate between 5 bars and 10 bars,

MAX. PROCESS corresponds to the maximum analog input signal (10 V, 20 mA) selected for the PI set point,

MIN. PROCESS corresponds to the minimum analog input signal (- 10 V, 0V, 0 mA, 4mA) selected for the PI set point.





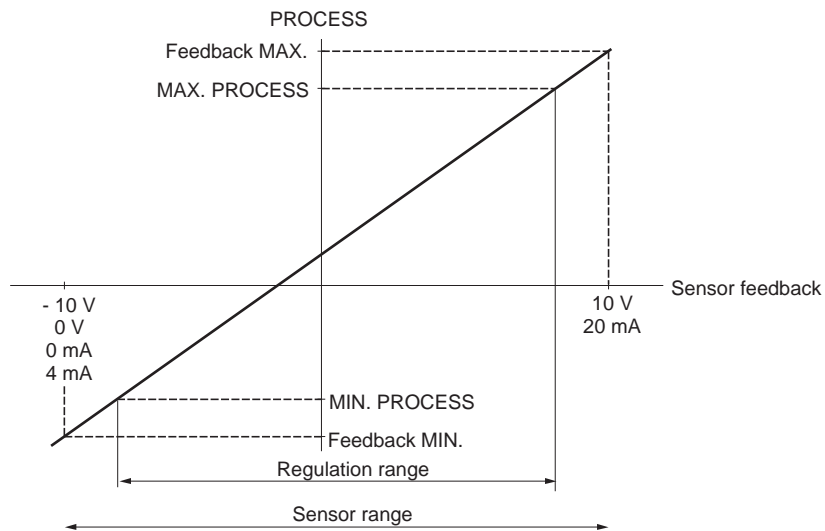
## Total unlock : application functions

Feedback MIN. and Feedback MAX. correspond to the sensor range expressed in units defined by the user.

Example : 0 mA -> 0 bar  
20 mA -> 20 bars

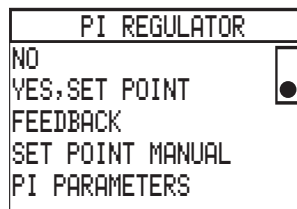
Feedback MIN. corresponds to the minimum analog input signal (- 10 V, 0V, 0 mA, 4 mA) selected for the PI feedback.

Feedback MAX. corresponds to the maximum analog input signal (10 V, 20 mA) selected for the PI feedback.



**Note :** the regulation range [MIN PROCESS and MAX PROCESS] must be included in the sensor range [FEEDBACK MIN. and FEEDBACK MAX.]

### PI REGULATOR



- NO : PI not active.
- YES, SET POINT : activates the PI and accesses the PI set point menu.
- FEEDBACK : accesses the PI feedback menu.
- SET POINT MANUAL : accesses the speed reference menu (only to be used for a motor speed reference which is external to the process regulation).
- PI PARAMETERS : accesses the regulation loop menu.

**Note :** AUTO. = loop regulated  
MANU. = loop not regulated

Selection is made via the logic input, menu 7.2 PI regulator / PI set point



## Total unlock : application functions

### PI SET POINT

PI SET POINT	
KEYPAD	: <input checked="" type="radio"/>
SP INPUT	: AI.
SP GAIN	: ±----
OFFSET	: ±----
↓, ↑ & ENT to modify	

- KEYPAD : the set point is sent directly by the graphic terminal. The set point value can be set using menu 1 PARAM. SETTINGS / PI SET POINT. 0000 corresponds to MIN. PROCESS, 9999 corresponds to MAX. PROCESS.
- SP INPUT : selects the analog input for the PI regulation set point.
- SP GAIN : adapts the sensor feedback to the set point  

$$\text{Gain} = \left( \frac{\text{MAX. PROCESS} - \text{MIN. PROCESS}}{\text{Max. Feedback} - \text{Min. Feedback}} \right) \times 9999.$$
 Can be set between - 9999 and + 9999.
- OFFSET : parameter correction  

$$\text{OFFSET} = \left( \frac{\text{MIN. PROCESS} - \text{Min. Feedback}}{\text{Max. Feedback} - \text{Min. Feedback}} \right) \times 9999.$$
 Can be set between - 9999 and + 9999.

#### Note :

OFFSET and SP GAIN can be set during operation using menu 1 PARAMETER SETTINGS.

### PROCESS FEEDBACK

FEEDBACK	
FB INPUT	: AI.
MIN. FEEDBACK	: ±----
MAX. FEEDBACK	: ±----
LOW LEVEL ALM	: ±----
↓, ↑ & ENT to modify	
HI.LEVEL ALM	: ±----

- FEEDBACK INPUT : selects the analog input for the control sensor feedback.
- MIN. FEEDBACK : process value expressed in user-defined units for the minimum sensor signal. Can be set between - 9999 and + 9999.  
 Example : 0 V corresponds to 2 bars or 2000 mbars.  
 Enter value 2 or 2000.
- MAX. FEEDBACK : process value expressed in user-defined units for the maximum sensor signal. Can be set between - 9999 and + 9999.  
 Example : 10 V corresponds 9 bars or 9000 mbars.  
 Enter value 9 or 9000.
- LOW LEVEL ALM : process value in user-defined units, below which the FB. LOW ALARM output (menu 7.2 PI PARAMETERS) changes to 1.  
 Example : 2 bars enter 2.
- HI. LEVEL ALM : process value in user-defined units, above which the FB. HIGH ALARM output (menu 7.2 PI PARAMETERS) changes to 1.  
 Example : 9 bars enter 9.

#### Note :

MIN. FEEDBACK ≤ FAULT MIN, FAULT MAX. ≤ MAX. FEEDBACK



## Total unlock : application functions

Examples of calculating the GAIN and OFFSET.

**The user wants to regulate the volume of a tank between 100 m<sup>3</sup> and 10 m<sup>3</sup>.**

- ① The sensor provides a current signal  
0 mA -> 5 m<sup>3</sup>  
20 mA -> 200 m<sup>3</sup>  
input : AI2  
min. signal = 0 mA, max. signal = 20 mA  
find the process value corresponding to the min. and max. input signal to define the MIN. and MAX. feedback values.

Signal provided by input AI2	Corresponding process value
MIN. signal 0 mA MAX. signal 20 mA	5 m <sup>3</sup> = MIN. feedback 200 m <sup>3</sup> = MAX. feedback

- ② The user selects a voltage set point input between 0 -> 10 V  
input : AI1  
min. signal = 0 V, max. signal = 10 V.  
the user wants to regulate the volume between 100 m<sup>3</sup> and 10 m<sup>3</sup>.

Signal provided by input AI1	* Corresponding process value
MIN. signal 0 V MAX. signal 10 V	100 m <sup>3</sup> = MIN. PROCESS set point 10 m <sup>3</sup> = MAX. PROCESS set point

- ③ Scaling.

$$\text{SP GAIN} = \left( \frac{10 - 100}{200 - 5} \right) \times 9999 = -0.4615 \times 9999 = -4615$$

$$\text{OFFSET} = \left( \frac{100 - 5}{200 - 5} \right) \times 9999 = 0.4871 \times 9999 = 4871$$

**Note :**

\* This configuration has been chosen to demonstrate the possibilities of the function.  
However, the most common values are :  
– MIN PROCESS = 10 m<sup>3</sup>  
– MAX PROCESS = 100 m<sup>3</sup>

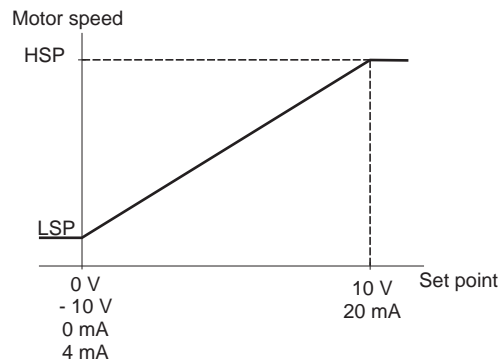




## Total unlock : application functions

### SET POINT MANUAL :

SET POINT MANUAL	
KEYPAD :	<input type="checkbox"/>
SPM INPUT :	<input checked="" type="checkbox"/>
AUTO/MANU :	<input type="checkbox"/>
REV. SPEED :	<input type="checkbox"/>
▼, ▲ & ENT to modify	



– KEYPAD : the set point is sent directly by the graphic terminal. The set point value can be set using menu 1 (PI SP MANUAL setting in Hz). Can be adjusted from low speed to high speed.

– SPM INPUT : selects the analog input for the speed reference.

**Note** : if the input (- 10 V, + 10 V) is selected,  
- 10 V → LSP  
+ 10 V → HSP

– AUTO./ MANU. : selects the logic input for switching between AUTO. mode (process regulation) and MANU. mode (speed regulation).  
LI. at high level : AUTO.  
LI. at low level : MANU.

– REV. SPEED : select the logic input to reverse the direction of movement.  
LI. at high level : reverse operation ↺  
LI. at low level : forward operation ↻

**Note** : to configure this function, one analog input and one logic input must be programmed.



## Total unlock : application functions

### PI PARAMETERS

PI PARAMETERS	
KP	: 100 %
KI	: 0
NEG. VALUES	: NO
REV. ACTION	: NO
↓, ↑ & ENT to modify	
PI FLT RATIO	: 100.0%
PI REF OUTPUT	: AO.
PI FB OUTPUT	: AO.
PI ERR OUTPUT	: AO.
PI INTEGRATOR	: AO.
FB LIMIT	: LO.
FB HIGH ALARM	: LO.
FB LOW ALARM	: LO.

– KP : proportional gain :  
can be adjusted from 0 to 9999.  
The proportional gain affects the speed of the loop.  
Factory setting : 100 (100 = gain of 1)

– KI : integral gain :  
can be adjusted from 0 to 9999.  
The integral gain affects the precision of regulation.  
Factory setting : 0 (1 = 1 s<sup>-1</sup>)

– NEG. VALUES :  
Yes : the motor can rotate in a reverse direction (↺ ↻ possible).  
No : the motor cannot rotate in a reverse direction (↻ possible).

– REV. ACTION :  
No : an increase in the PI error causes an increase in the speed of the motor.  
Yes : an increase in the PI error causes an decrease in the speed of the motor.

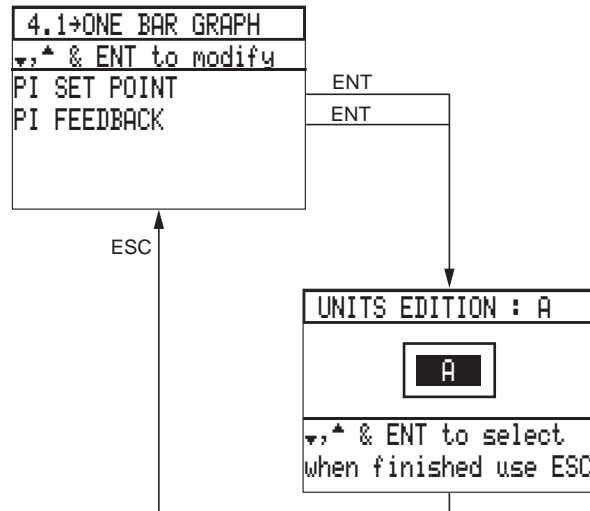
- PI FLT RATIO : ratio of the PI error as a %.  
The PI fault Ratio is given as a % of the sensor range = % (MAX. feedback - MIN. feedback).  
When the actual error becomes greater or equal to the value set, the logic output configured in the FB limit [PI PARAMETER menu] changes to 1.  
Can be adjusted from [ 0 % to 100 %].
- PI REF OUTPUT : configuration of an analog output as PI set point.  
MIN. PROCESS → 0 (0 → 20 mA) or 4 (4 → 20 mA)  
MAX. PROCESS → 20 mA.
- PI FEEDBACK : configuration of an analog output as PI feedback.  
MIN. PROCESS → 0 (0 → 20 mA) or 4 (4 → 20 mA)  
MAX. PROCESS → 20 mA.
- PI ERR OUTPUT : configuration of an analog output as PI ERROR, this error is given as a % of the sensor range = % (Max. feedback - Min. feedback).  
- 5 % → 0 (0 → 20 mA) or 4 (4 → 20 mA)  
+ 5 % → 20 mA.
- PI INTEGRATOR : configuration of an analog output on the integral of the error.  
LSP → 0 (0 → 20 mA) or 4 (4 → 20 mA)  
HSP → 20 mA.  
corresponds to the frequency in steady state.
- FB LIMIT : configuration of the logic output indicating that the error (MAX. feedback - MIN. feedback) given as a % has exceeded the value set in PI FLT RATIO at high level : error ≥ PI FLT RATIO.
- FB HIGH ALARM : configuration of the logic output indicating that the process feedback has exceeded the value set in FB HIGH ALARM in menu 7.2 PI Parameters / FEEDBACK at high level : Process Feedback ≥ FB HIGH ALARM.
- FB LOW ALARM : configuration of the logic output indicating that the process feedback is less than the value set in FB LOW ALARM in menu 7.2 PI Parameters / FEEDBACK at high level : Process Feedback ≤ FB LOW ALARM.



## Total unlock : application functions

### DISPLAY CONFIGURATION

- MENU 4. DISPLAY CONFIG. : it is possible to configure a value for PI which can be displayed : ONE BAR GRAPH menu with the following options : PI set point or PI feedback.  
A user-defined unit can be selected in the same menu by setting the parameters for each letter (max. of 4).



### PARAMETER SETTING

In order to access the most commonly used parameter settings more easily, some PI parameters have been added to menu 1. PARAMETER SETTING.

These are :

1 PARAMETER SETTING	
SP GAIN	:+9999
OFFSET	:+0
KP	: 100 %
KI	: 0
PI FLT RATIO	: 100.0%
PI SET POINT	:----
PI SP MANUAL	:---- Hz

- SP GAIN AND OFFSET : scales the PI set point input.
- KP, KI : sets the proportional and integral gain.
- PI FLT RATIO : sets the PI fault ratio : % (MAX. feedback - MIN. feedback).
- PI SET POINT : PI set point given by the graphic terminal. This set point is taken into account when the KEYPAD set point is selected in menu 7.2 - PI REGULATOR / PI SET POINT.  
0000 corresponds to MIN. PROCESS,  
9999 corresponds to MAX. PROCESS.
- PI SP MANUAL : speed reference given by the graphic terminal to be set in Hz. This set point is taken into account when the KEYPAD set point is selected in menu 7.2 PI REGULATOR / SET POINT MANU.



## Total unlock : application functions

### MOTOR AND PARAMETER SWITCHING

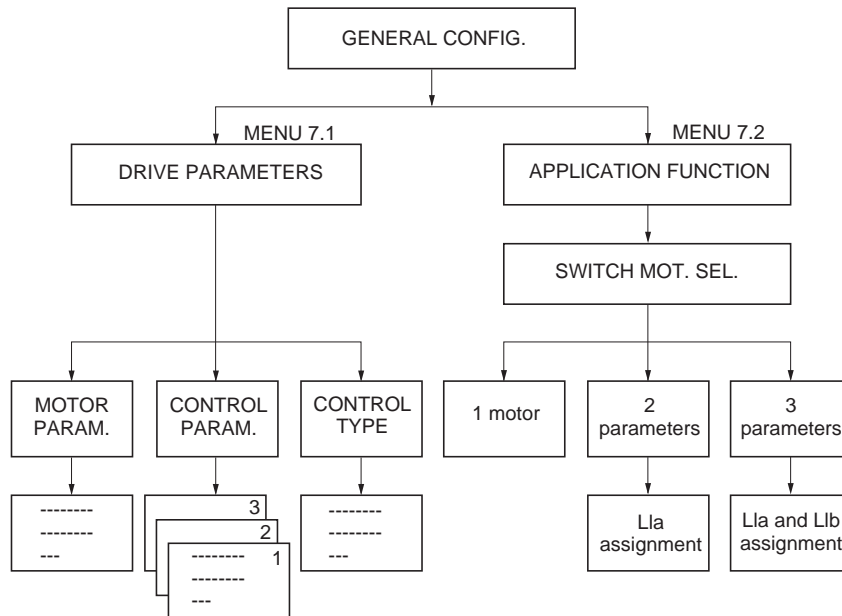
SWITCH MOT. SEL.	
1 MOTOR	<input type="radio"/>
2 MOTORS	<input type="radio"/>
2 PARAMETER SETS	<input checked="" type="radio"/>
3 MOTORS	<input type="radio"/>
3 PARAMETER SETS	<input type="radio"/>

The SWITCH MOT. SEL. menu accesses two types of function :

- motor switching
- switching parameters for the same motor.

#### PARAMETER SWITCHING

- During parameter switching, only control parameters can be switched. The parameters are set in menu 7.1. Drive Parameters - Control Parameters 1, 2, or 3.



The parameter blocks 1, 2 or 3 can be selected during operation using logic input L1a or L1b.



## Total unlock : application functions

### CONFIGURATION :

Menu : 7.2 APPLICATION / SWITCH MOT. SEL. function

SWITCH MOT.SEL.
1 MOTOR
2 MOTORS
2 PARAMETER SETS
3 MOTORS
3 PARAMETER SETS

Selects the number of parameter blocks.

- 1 Motor : standard operation.
- 2 Parameters : 2 blocks (1 logic input required).
- 3 Parameters : 3 blocks (2 logic inputs required)

1 MOTOR : selecting 1 motor deconfigures the motor and parameter SWITCHING function. Operation is then standard.

2 PARAMETERS		
SWITCH 2 PARAMETERS		
PARAM.SEL. LIa:---		
	PAR1	PAR2
LIa	0	1

2 PARAMETERS :

- 2 parameter blocks can be selected.
- Assign the logic input used to select the parameter block.
- Note the combination of LIa, LIb inputs in the parameter selection menu.

3 PARAMETERS			
SWITCH 3 PARAMETERS			
PARAM. SEL. LIa:---			
PARAM. SEL. LIb:---			
	PAR1	PAR2	PAR3
LIa	0	1	0
LIb	0	0	1

3 PARAMETERS :

- 3 parameter blocks can be selected.
- Assign the 2 logic inputs used to select the parameter block.
- Note the combination of LIa, LIb inputs in the parameter selection menu.

**Note :**

LIa = LIb =1 : no switching.

### PARAMETER BLOCK SETTINGS

7.1→ DRIVE PARAMETERS
MOTOR PARAMETERS
CONTROL PARAM.1
CONTROL PARAM.2
CONTROL PARAM.3
↵, * & ENT to modify
CONTROL TYPE :NORMAL

Go to MENU 7.1 DRIVE PARAMETERS.

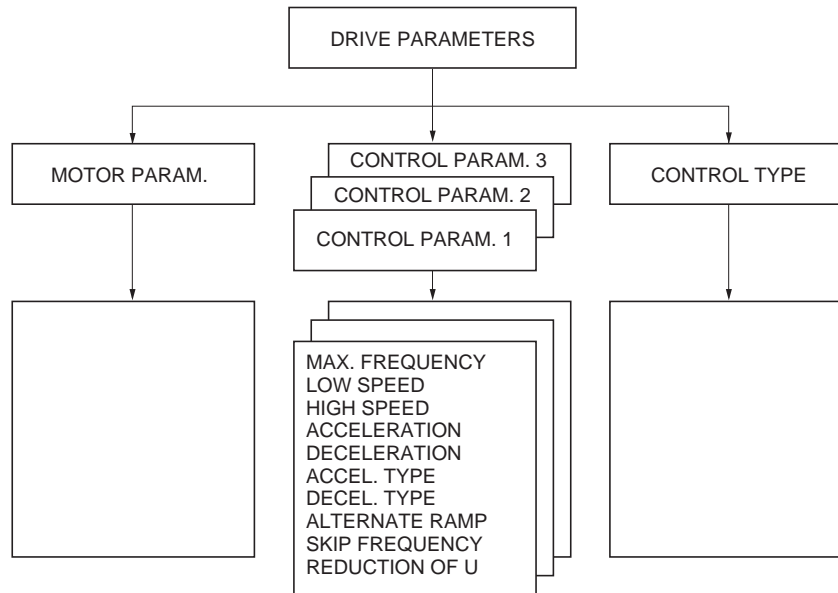
Only control parameters can have 1, 2 or 3 configurations. The motor parameters and the control type are the same for all selections.

- Select :

CONTROL PARAM. 1 for the 1<sup>st</sup> configuration  
CONTROL PARAM. 2 for the 2<sup>nd</sup> configuration  
CONTROL PARAM. 3 for the 3<sup>rd</sup> configuration.



## Total unlock : application functions



– Set the parameters using the programming manual, [Control Parameters section](#).

### MOTOR SWITCHING

#### Introduction

The speed controller can only control one motor at a time. The motor must be selected when the motor is stopped.

This function imposes the use of a sequence of contactors located between the speed controller and the motor.

#### Restrictions on use

I/O :

Logic and analog inputs, logic and analog outputs and relay commands are not multimotor. They retain their configuration regardless of the motor selected. However, they are assigned to the motor selected, and can therefore change state during switching.

An external sequence may be required in some cases.

Command rules :

The configuration of the high torque rule menu 7.13 is only possible on motor 1.

Thermal fault :

Thermal protection is assigned to the motor identified as MOTOR 1 in the configuration.

The calculation is incremented when motor 1 is selected and decremented when motor 2 or 3 is selected.



## Total unlock : application functions

### Measurement of motor parameters :

Motor parameters are only measured on motor 1 as long as this motor is connected to the speed controller at least once on power up. It is therefore possible to obtain maximum performance on motor 1.

On motors 2 and 3, the speed controller uses the tabulated parameters of standard motors available on the market.

### Motor switching :

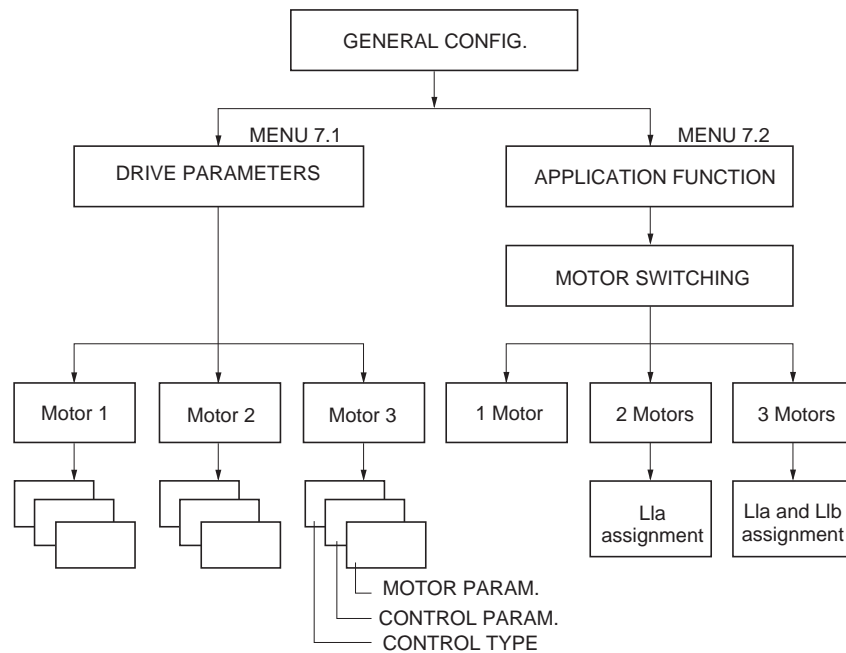
Motors must only be switched when they are stopped.

The motor switched to the speed controller using the external sequence must always conform to the state of L1a and L1b (MOTOR SEL) configured in menu 7.2 Application function / SWITCHMOT. SEL.

### Adjustment mode :

In multimotor operation, the control parameters, motor parameters, and control type can be switched.

The parameters are set in menu 7.1 DRIVE PARAMETERS



The torque type function (Menu 6.1) constant torque, variable torque, low noise variable torque is not multimotor. The configuration will be the same for all three motors.



## Total unlock : application functions

### Configuration :

Menu : 7.2 APPLICATION / SWITCH MOT. SEL. function.

SWITCH MOT.SEL.	
1 MOTOR	●
2 MOTORS	
2 PARAMETER SETS	
3 MOTORS	
3 PARAMETER SETS	

Selects the number of motors.

- 1 Motor : 1 single motor
- 2 Motors : 2 motors
- 3 Motors : 3 motors

1 MOTOR : selecting 1 Motor deconfigures the SWITCH MOT. SEL. function. Operation is then standard.

2 MOTORS	
SWITCH 2 MOTORS	
MOTOR SEL. LIa:---	
MOT1 MOT2	
LIa	0 1

2 MOTORS :

- 2 motor configurations can be selected.
- Assign the logic input used to select the configuration.
- Note the combination of LIa and LIb inputs in the motor selection menu.

3 MOTORS	
SWITCH 3 MOTORS	
MOTOR SEL. LIa:---	
MOTOR SEL. LIb:---	
MOT1 MOT2 MOT3	
LIa	0 1 0.1
LIb	0 0 1

3 MOTORS :

- 3 motor configurations can be selected.
- Assign the logic inputs used to select the motor.
- Note the combination of LIa and LIb inputs in the motor selection menu.

**Note :**

LIa = LIb =1 : no switching.

### CONFIGURING THE PARAMETERS OF MOTORS 1, 2 AND 3

7→ GENERAL CONFIG.	
DRIVE PARAMETERS	
MOTOR 1	
MOTOR 2	
MOTOR 3	
↓,↑ & ENT to select	

Go to MENU 7. GENERAL CONFIGURATION.

Select menu 7.1 DRIVE PARAMETERS

A window appears :

- Motor 1 for the parameters of motor 1,
- Motor 2 for the parameters of motor 2,
- Motor 3 for the parameters of motor 3.

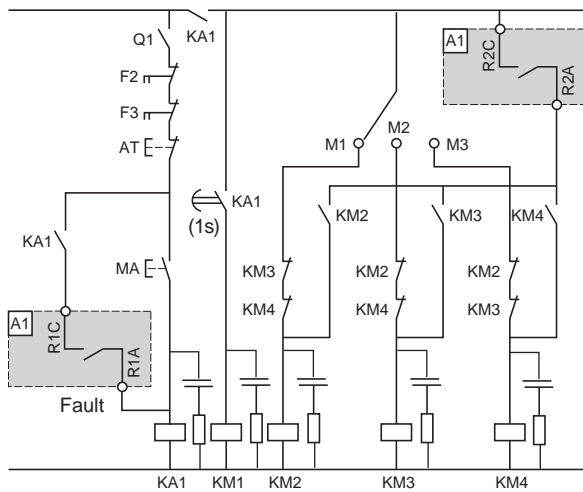
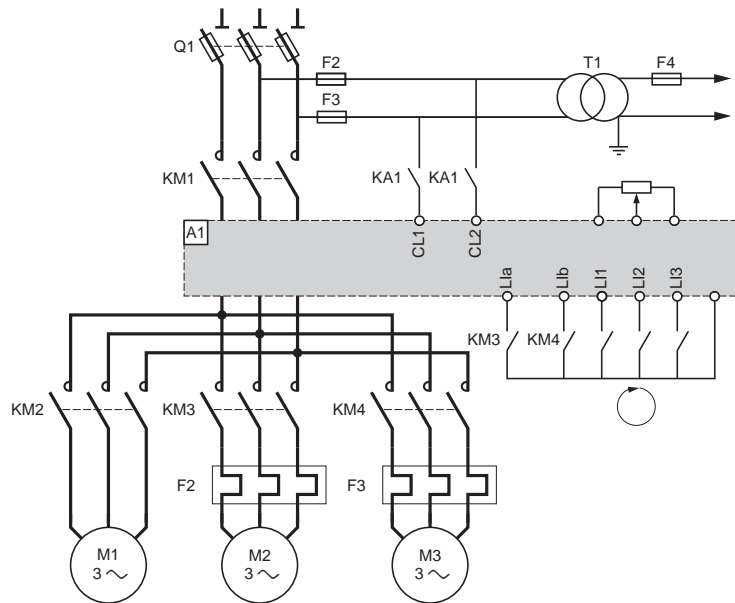






## Total unlock : application functions

Recommended sequence :



R2 configured with the speed controller running. It is necessary to cut the run signal to change the motor, because relay R2 in this configuration does not change state for a zero reference if the run signal has not been disabled. Thermal protection only on motor 1.



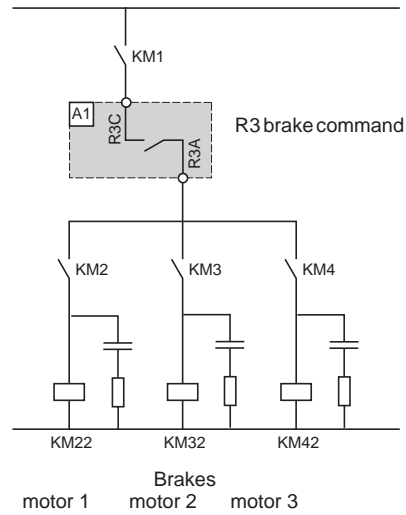
**Check that the power required for the contactor coils corresponds with that provided by contacts R1 and R2.**



## Total unlock : application functions

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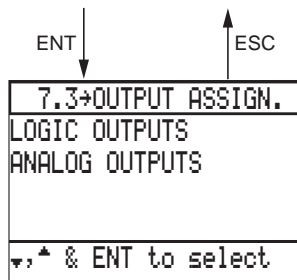
Example of brake sequence :





## Total unlock : output assignment

### Output assignment

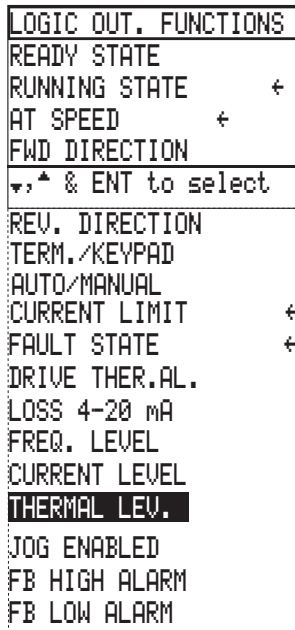


Select the Output assignment menu in the General configuration mode.

This menu is used to :

- display the assignment of the logic and analog outputs,
- reassign outputs which have not previously been reassigned.

### LOGIC OUTPUTS



Lists the functions which can be assigned to logic outputs.

Each assigned function is marked by an arrow : these are either factory settings or reassignments carried out previously.

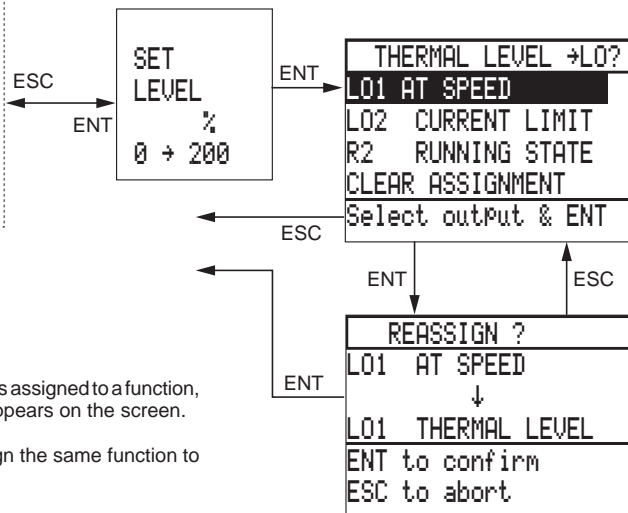
#### Comments :

- The FAULT STATE function is assigned to relay R1 which cannot be reassigned.

- The DRIVE THER. AL. function only applies to Altivar models from the ATV-66D16N4 upwards.

The TERM./KEYPAD, AUTO/MANUAL, LOSS FOLLOWER, JOG ENABLED, FB HIGH ALARM, FB LOW ALARM functions appear on this screen only when validated previously.

### Example of reassigning a logic output



#### Comments :

- If the selected output is assigned to a function, a warning message appears on the screen.

- It is possible to assign the same function to several logic outputs.



## Total unlock : output assignment

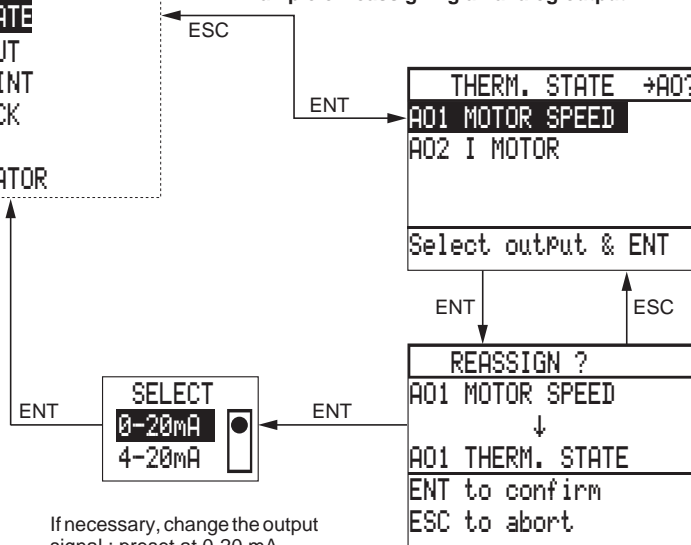
### ANALOG OUTPUTS

ANALOG OUT.FUNCTIONS	
MOT. CURRENT	←
MOTOR SPEED	←
MOTOR POWER	
MOTOR TORQUE	
▼, ▲ & ENT to select	
THERM. STATE	
RAMP OUTPUT	
PI SET POINT	
PI FEEDBACK	
PI ERROR	
PI INTEGRATOR	

Lists the functions which can be assigned to analog outputs.

Each function assigned as a factory setting is marked by an arrow.

#### Example of reassigning an analog output



If necessary, change the output signal : preset at 0-20 mA.

#### Special case : modification of the signal of an assigned output

ANALOG OUT.FUNCTIONS	
MOT. CURRENT	←
MOTOR SPEED	←
MOTOR POWER	
MOTOR TORQUE	
▼, ▲ & ENT to select	

SELECT	
0-20mA	●
4-20mA	

Modify the output signal and confirm by pressing ENT.

#### Characteristics :

- MOT. CURRENT : 20 mA = 200 % of the motor nominal current.
- MOTOR SPEED : 20 mA = 100 % of high speed HS, 0 mA or 4 mA = zero speed.
- MOTOR POWER : 20 mA = 200 % of the power of the motor to be used with the speed controller in constant torque configuration.
- MOTOR TORQUE : 20 mA = 200 % of nominal torque.
- THERM. STATE : 20 mA = 200 % of the nominal thermal state of the motor,
- RAMP OUTPUT : 20 mA = 100 % of high speed, 0 mA or 4 mA = low speed.



## Total unlock : fault management

### Fault management

#### Methods of stopping on a fault

- For safety reasons, certain faults cause a “freewheel” stop : the speed controller locks and the motor stops according to the inertia and the resistive torque.
- The brake resistor temperature fault causes a normal stop.

The method of stopping for other faults can be programmed :

- Normal stop, following the deceleration ramp.
- Fast stop with minimum deceleration ramp time to avoid causing an overvoltage on the DC bus.
- “Freewheel” stop : factory setting.

Only one selection can be made for faults of this type.

#### Methods of restarting :

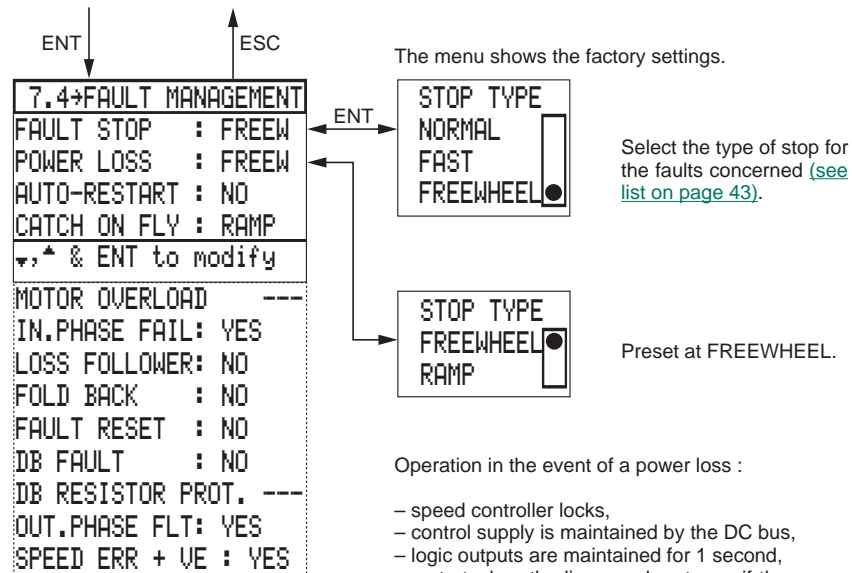
- For faults which can be reset :
  - manual after intervention to correct the fault, either by use of a logic input assigned to a fault reset, or by disconnecting and then reconnecting the power supply on L1, L2, L3.
  - automatic without intervention - select the function.
- For faults which cannot be reset :
  - reinitialize the speed controller by disconnecting and then reconnecting the power supply on L1, L2, L3 and control parts CL1, CL2.

Faults causing a “freewheel” stop	
Cannot be reset	Can be reset
Short-circuit Ground fault Precharge failure Internal fault Memory failure DB resistor fault (fault which can be configured) Transistor short-circuit Open transistor Dynamic brake fault	Overspeed Undervoltage AC-line overvoltage DC-bus overvoltage Sequence Tof (with bypass)
Faults with a programmable stop	
Cannot be reset	Can be reset
	Serial link loss Input phase loss Drive overtemperature Motor overload Output phase loss Loss follower Process Tof (with bypass)



## Total unlock : fault management

Select the Fault management menu in the General configuration mode.



FOLD BACK only appears in variable torque configuration.

If a considerable amount of kinetic energy has been stored by the machine in motion (high inertia and low resistive torque), selecting a RAMP stop ensures controlled deceleration in the event of a power loss.

Operation :

- when the DC bus voltage reaches 80 % of its initial value, the deceleration follows a ramp which depends on the stored kinetic energy,
- when the DC bus voltage becomes too low, the speed controller locks and the motor stops on “freewheel”. To activate this function, it is necessary to devalidate the “In. phase fail” fault.

### AUTO-RESTART

Selecting YES validates the automatic restart function when the speed controller has locked on a fault : [see faults concerned on page 60](#).

The power supply and the control commands must be maintained.

**Applications** : machines operating without supervision, where a restart does not present any danger to either personnel or equipment.

Operation and settings : [see page 62](#).



## Total unlock : fault management

---

Operation of the automatic restart :

- In the event of a fault, the speed controller locks for an adjustable period of time, then restarts the motor if the fault has disappeared and the other operating conditions are suitable.
- If the fault persists, the "locking + restart command" sequence is repeated (up to a maximum of 5 sequences) before the final locking.

```
AUTO-RESTART
NO
YES,RESTARTS : 5
DELAY TIME   : 30.0s
1-5 restarts/time 1-
600s / ESC to quit
```

Select the number of restarts : from 1 to 5, preset at 5.

Display the locking time : set between 1 and 600 s, preset at 30 s.

Confirm by pressing ENT.

### CATCH ON FLY

```
CATCH TYPE
RAMP
I LIMIT.
NO
```

RAMP function

The motor speed is estimated by means of the remanent field of the motor when the supply is cut off or when a resettable fault occurs, if the run command is present (2-wire control); the variator then activates the acceleration ramp beginning from the estimated speed of the motor. In the case of a 3-wire control, it is necessary to give an operating order in order to ensure catch on fly restart.

I LIMIT. function

Catch on fly restarting is activated when control and power are energized simultaneously and if the run commands are present (2-wire or 3-wire control). In this case, the speed reference displayed is taken into account without a ramp.  
Application : high inertia machine with weak remanent field.

NO function

Catch on fly restart is never activated.





## Total unlock : fault management

---

### MOTOR OVERLOAD

MOTOR OVERLOAD	
NO THERMAL PROT.	●
MOT. SELF COOLED	
MOT. FORCED VENT.	
MANUAL TUNING	
MOT. OVERLOAD:	

MANUAL TUNING OVL.	
MIN.SPD at F.L.:	50%
Imax at 0 SPD :	50%
Enter all values →ESC	

Select the motor thermal protection :

– Adaption to the motor : self-cooled (factory setting) or force-ventilated.

– No thermal protection.

– Manual tuning and programming of the minimum motor speed at nominal current, and the maximum current at zero speed (as a % of the nominal values), adjust from 0 to 100 %, preset at 50 %.

Motor overload : factory preset at 0.9 times the nominal current of the speed controller. Adjust the motor nominal current if this has not already been performed in Parameter setting mode : [see page 15](#).

### IN. PHASE FAIL

Inhibit this fault by selecting NO either when the speed controller is powered by a DC bus at the + and – terminals or when a stop on gradient is selected in the POWER LOSS function.

### LOSS FOLLOWER

NO	●
GO TO: 0.0Hz	
FAULT	

Select operation in the event of a 4-20 mA speed reference failure on input AI2 :

– NO : no detection (factory setting).

– GO TO : programming an adjustable speed reference from 0 to 60 Hz, preset at 0.

Function activated if AI2 is the single frequency reference ([AI1 devalidated, see page 36](#)).

– FAULT : lock on a fault.



## Total unlock : fault management

### FOLD BACK

This function is displayed if the speed controller is configured for **variable torque**.

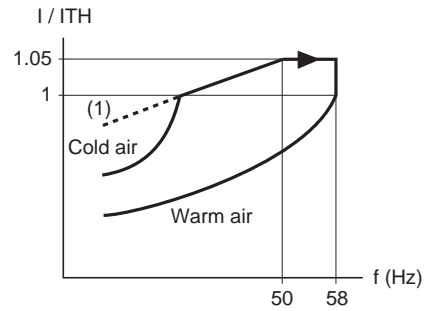
Selecting YES validates this function which is specific to **fan applications**.

Reducing air density by increasing the temperature enables the flow rate to be increased.

The motor is then operating in overspeed.

To avoid a motor overload fault if the load increases, this function automatically adapts the current limit.

See the curves opposite.



(1) Current limit

### FAULT RESET

FAULT RESET	
NO	<input type="radio"/>
YES, LOGIC IN: ----	<input checked="" type="radio"/>
↓, ↑ & ENT to modify	
ESC to quit	

Selecting YES offers the possibility of resetting the speed controller after locking on a fault (if the fault has disappeared) by reassigning a logic input, active at state 1 (on positive-going edge).

### DB FAULT

Speed controller with braking resistor : selecting YES means that a check is made on power-up that the resistor is present and the connection is correct. A fault appears in the event of a failure.

### DB RESISTOR PROT.

DB RESISTOR PROT.	
NO	<input type="radio"/>
YES	<input checked="" type="radio"/>
RESISTOR VAL.:	<input type="text" value="Ω"/>
RATED POWER :	<input type="text" value="W"/>
Enter all values →ESC	

Selecting YES enables thermal protection of the braking resistor.

Program the characteristics of the resistor.

### OUT. PHASE FLT

The speed controller may or may not recognize the output phase fault : preset at YES.

### SPEED ERR + VE

Acceptance or not by the speed controller of the motor running too fast (motor speed faster than the ramp selected). The fault signalled is OVERSPEED. The condition for detecting this fault is : motor speed and speed setpoint having the same sign. Preset at YES.





## Total unlock : diagnostic mode

---

### Results of the autodiagnostic tests

AUTODIAGNOSTIC
INTERNAL MEMORY : OK
± 15 SUPPLY : OK
SUP. FREQ. DETECT: X
OK or X=fault
ESC to quit

#### Control test

Example on the screen opposite :

- OK if the test is positive.
- X if the test fails or the element tested is faulty.

AUTODIAGNOSTIC
CELL TEST : FINISHED
T1:OK T3:OK T5:OK
T4:OK T6:X T2:X
OK, or X=fault
ESC to quit

#### Transistor test

During the test, the 1st line displays the message IN PROCESS. The duration of the test is variable but no indication is given if it is still in progress.

At the end of the test, the 1st line displays the message FINISHED and each transistor is assigned a state, see example on the screen opposite :

- OK if the transistor is satisfactory.
- X if the transistor is faulty.

#### I/O test

Selecting the tests on the Diagnostic mode screen displays screens similar to those obtained in I/O map mode ([see page 9](#)) : display of the I/O assignment, and their state or value.

To test the inputs, change their state one after the other, checking the display on the screen.

For outputs, selecting the test line displays their state at 0 on the screen, whatever their real state.

To force their state, press key 1, then confirm with ENT : the display changes to 1 for a logic output, or to 100 for an analog output.



**WARNING** : ensure that forcing the outputs does not present any danger.

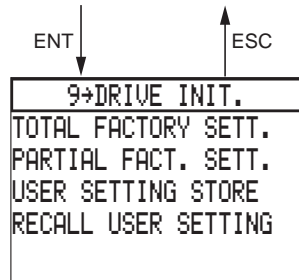
Checking the change of state requires the use of a measuring device which must be connected to the output being tested.



## Total unlock : drive initialization

### Drive initialization

Select Drive initialization mode in the Main menu.



When this mode is used, the motor must be stationary.

This mode is used to return to factory settings :

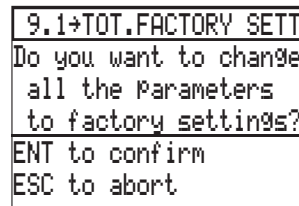
- either totally,
- or partially.

It can also be used to download the configuration and all the settings remotely onto a blank PCMCIA card which can be installed on the speed controller.

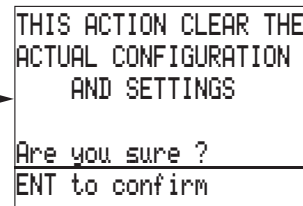
Conversely, after a PCMCIA card to which data has been remotely downloaded has been installed, this mode is used to transfer data to the speed controller.

### Return to factory settings

Total return

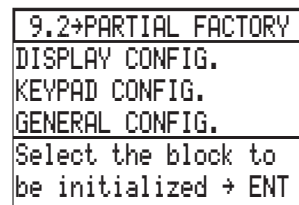


ENT →

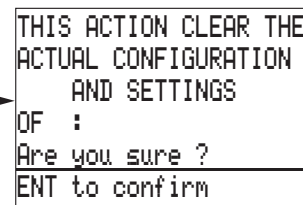


Warning message

Partial return



ENT →



Warning message with indication of the mode selected

Select the required mode to be reset to factory settings.

**Comment :** a total return to factory settings returns the speed controller to its initial state before the first power-up ([see pages 4 and 8](#)).



## Total unlock : drive initialization

### Saving the settings on a PCMCIA card

Please insert  
the MEMORY CARD  
into the PCMCIA  
connector

ENT when ready

Warning message for inserting the PCMCIA card into the connector : follow the instructions in the leaflet supplied with the card.

If there is an "application" card in the connector, a message appears on the screen to indicate that it must be removed.

9.3→STORE USER SETT.

1	5	9	13
2	6	10	14
3	7	11	15
4	8	12	16

SELECT FILE NUMB.: 11

Transfer

STORE SETTINGS

ATV	File
66	11
	Memory

ENT to confirm

The card can contain up to 16 configurations (1 per speed controller).

The black boxes correspond to the configurations loaded in the card.

Select 1 white box for transfer to the card, example above : 11.

Confirm the transfer with ENT. When the loading is complete, a message appears on the last line of the screen : TRANSFER OK.

FAULTY TRANSFER is displayed in the event of an error.

### Recall user settings

Transfer data which has been remotely downloaded to a PCMCIA card : if the card is not installed, a message appears requesting its insertion in the connector.

Adjustment transfer takes place only with variators bearing the same catalogue reference.

9.4→RECALL USER SETT

This operation change  
the ACTUAL SETTINGS  
by the USER SETTINGS

ENT to confirm  
ESC to abort

ENT

DIRECTORY

1	5	9	13
2	6	10	14
3	7	11	15
4	8	12	16

SELECT FILE NUMB.: 10

Select 1 black box for transfer to the speed controller, example above : 10. Confirm with ENT.

When the transfer is complete, a message appears on the last line of the screen :

- TRANSFER OK,
- or FAULTY TRANSFER.

If there is an error on the number, a message appears :

- INCOMPATIBLE FILE,
- or EMPTY FILE.

RECALL SETTINGS

ATV	File
66	10
	Memory

ENT to confirm



## Saving configuration and settings

	Factory setting	Customer setting
<b>1 – PARAMETER SETTING</b>		
LOW SPEED	0.0 Hz	
HIGH SPEED	50.0 Hz	
ACCELERATION	3.0 s	
DECELERATION	3.0 s	
IR COMPENS.	100 %	
DAMPING	20 %	
MOTOR OVERLOAD	0.9 In.Var.	
<b>2 – I/O MAP</b>		
<b>2.1 – LOGIC INPUT MAP</b>		
IN. ASSIGNMENT	S	
LI1	1	Run permissive
LI2	1	Run forward
LI3	0	Run reverse
LI4	0	JOG
<b>2.2 – ANALOG INPUT MAP</b>		
IN. ASSIGNMENT	(VAL%)	
AI1	53	Speed ref. 1
AI2	0	Speed ref. 2
<b>2.3 – LOGIC OUTPUT MAP</b>		
OUT. ASSIGNMENT	S	
LOI1	1	AT speed
LOI2	0	Current limit
R1	0	Fault state
R2	1	Running state
<b>2.4 – ANALOG OUT. MAP</b>		
OUT. ASSIGNMENT	(VAL%)	
AO1	53	Motor speed
AO2	82	Mot. current
<b>3 – FAULT HISTORY</b>		
1		
2		
3		
4		
5		
6		
7		
8		
<b>4 – DISPLAY CONFIG.</b>		
ONE BAR GRAPH	<input checked="" type="checkbox"/>	Speed refer.
TWO BAR GRAPH	<input type="checkbox"/>	
SCROLL, 4 ITEMS	<input type="checkbox"/>	
<b>5 – KEYPAD CONFIG.</b>		
TERMINAL COMMAND	<input checked="" type="checkbox"/>	
KEYPAD COMMAND	<input type="checkbox"/>	
TER/KEY BY LI	<input type="checkbox"/>	
TER/KEY BY LI	<input type="checkbox"/>	
PROGRAM FUNCT. KEYS	<input type="checkbox"/>	
<b>6 – DRIVE CONFIG.</b>		
TORQUE		Constant
COMMAND		2 wire
MOT		
POWER		



## Saving configuration and settings

	Factory setting	Customer setting
<b>7 – GENERAL CONFIG.</b>		
<b>7.11 – MOTOR PARAMETERS</b>		
NOMINAL CURRENT	Constant torque/Normal 0,9 In. var	
NOMINAL FREQUENCY		
NOMINAL VOLTAGE		
RPM NOMINAL	1500	
IR COMPENS.	100 %	
VOLTAGE BOOST		
PROFILE		
DAMPING	20 %	
BANDWIDTH		
ROTATION NORMALIZATION	A B C	
TORQUE LIMIT MOTOR		
CURRENT LIMIT	Default limit	
SLIP COMPENS.	Automatic	
BRAKE SEQUENCE		
BRAKE OUTPUT		
RELEASE FREQ.	0	
RELEASE CURRENT	0	
RELEASE TIME	0	
ENGAGE FREQ.	0	
ENGAGE TIME	0	
DC INJECTION	70.0 %	
DC TIME	2.0 s	
<b>7.12 – CONTROL PARAM.</b>		
MAX. FREQUENCY	60/72 Hz	
LOW SPEED	0.0 Hz	
HIGH SPEED	50/60 Hz	
ACCELERATION	3.0 s	
DECELERATION	3.0 s	
ACCEL. TYPE	Linear	
DECEL. TYPE	Linear	
ALTERNATE RAMP	NO	
BY FREQ. LEV		
BY LOGIC IN		
ACCELERATION 2		
DECELERATION 2		
SKIP FREQUENCY	NO	
SKIP FREQ. 1	0.0 Hz	
SKIP BAND 1	2 Hz	
SKIP FREQ. 2	0.0 Hz	
SKIP BAND 2	2 Hz	
SKIP FREQ. 3	0.0 Hz	
SKIP BAND 3	2 Hz	
<b>7.13 – CONTROL TYPE</b>		
NORMAL	<input checked="" type="checkbox"/>	
HIGH TORQUE	<input type="checkbox"/>	
SPECIAL	<input type="checkbox"/>	
NOLD (variable torque)	<input type="checkbox"/>	
<b>7.2 – APPLIC. FUNCTIONS</b>		
RUN REVERSE		
JOG		
YES, LOGIC IN		
JOG SPEED		
DUTY CYCLE		
JOG OUTPUT		





## Saving configuration and settings

	Factory setting	Customer setting
+/- SPEED	NO	
YES, WITH MEMORY		
YES, WITHOUT MEM.		
(+) SPEED LI		
(-) SPEED LI		
SET POINT MEMORY	NO	
YES, LOGIC IN		
PRESET SPEEDS	NO	
LOGIC INPUT a		
LOGIC INPUT b		
SPEED 1		
SPEED 2		
SPEED 3		
SPEED REFERENCE		
SPEED REF. 1		
SPEED REF. 2		
CLAMP SUM		
AUTO/MANUAL		
YES, LOGIC IN		
AUTO RUN LI		
CONTROLLED STOP	NO	
BY LOGIC INPUT		
BY FREQUENCY LEVEL		
BY LI/FREQ. LEVEL		
ACTIVE STATE		
STOP TYPE		
FREQ. LEVEL		
STOP TYPE		
SHUTDOWN	NO	
LOGIC OUTPUT		
DWELL TIME		
BYPASS	NO	
DECAY TIME		
SEQUENCE Tof		
PROCESS Tof		
SWITCH MOT.SEL.		
1 MOTOR		
2 MOTORS		
2 PARAMETERS		
3 MOTORS		
3 PARAMETERS		
PI PARAMETERS		
KP	100 %	
KI	0	
NEG. VALUE	YES	
REV. ACTION	NO	
PI FLT RATIO		
PI REF OUTPUT	100.0 %	
PI FB OUTPUT		
PI ERR OUTPUT		
PI INTEGRATOR		
FB LIMIT		
FB HIGH ALARM		
FB LOW ALARM		



## Saving configuration and settings

	Factory setting	Customer setting
<b>7.3 – OUTPUT ASSIGN.</b>		
LOGIC OUTPUTS		
READY STATE		
RUNNING STATE	●	
AT SPEED	●	
FWD. DIRECTION		
REV. DIRECTION		
TERM./KEYPAD		
AUTO/MANUAL		
CURRENT LIMIT	●	
FAULT STATE	●	
DRIVE THER. AL.		
LOSS FOLLOWER		
FREQ. LEV.		
CURRENT LEV.		
THERMAL LEV.		
JOG ENABLED		
FB HIGH ALARM		
FB LOW ALARM		
ANALOG OUTPUTS		
MOT. CURRENT		
MOT. SPEED		
MOT. POWER		
MOT. TORQUE		
THERM. STATE		
RAMP OUTPUT		
PI SET POINT		
PI FEEDBACK		
PI ERROR		
PI INTEGRATOR		
<b>7.4 – FAULT MANAGEMENT</b>		
FAULT STOP		
POWER LOSS		
AUTO. RESTART	NO	
YES, RESTARTS		
DELAY TIME		
CATCH ON FLY		
MOTOR OVERLOAD		
NO THERMAL PROT.		
MOT. SELF COOLED	●	
MOT. FORCED VENT.		
MANUAL TUNING		
MIN. SPD at F.L.	50 %	
I max at 0 SPD	50 %	
MOT. OVERLOAD	0.9 In. Var.	
IN. PHASE FAIL.	YES	
LOSS FOLLOWER	NO	
GO TO		
FAULT		
FOLD BACK (variable torque)		
FAULT RESET	NO	
DB FAULT	NO	
DB RESISTOR PROT.	NO	
RESISTOR VAL.		
RATED POWER		
OUT. PHASE FLT	YES	
SPEED ERR + VE	YES	



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