# Altivar 31

Programming manual

Variable speed drives for asynchronous motors









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NOTE: Please also refer to the "Installation Guide".

When the drive is powered up, the power components and some of the control components are connected to the line supply. It is extremely dangerous to touch them. The drive cover must be kept closed.

In general, the drive power supply must be disconnected before any operation on either the electrical or mechanical parts of the installation or *machine*.

After the ALTIVAR has been switched off and the display has disappeared completely, wait for 10 minutes before working on the equipment. This is the time required for the capacitors to discharge.

The motor can be stopped during operation by inhibiting start commands or the speed reference while the drive remains powered up. If personnel safety requires prevention of sudden restarts, this electronic locking system is not sufficient: *fit a cut-off on the power circuit.* 

The drive is fitted with safety devices which, in the event of a fault, can shut down the drive and consequently the motor. The motor itself may be stopped by a mechanical blockage. Finally, voltage variations, especially line supply failures, can also cause shutdowns.

If the cause of the shutdown disappears, there is a risk of restarting which may endanger certain machines or installations, especially those which must conform to safety regulations.

In this case the user must take precautions against the possibility of restarts, in particular by using a low speed detector to cut off power to the drive if the motor performs an unprogrammed shutdown.

The drive must be installed and set up in accordance with both international and national standards. Bringing the device into conformity is the responsibility of the systems integrator who must observe the EMC directive among others within the European Union.

The specifications contained in this document must be applied in order to comply with the essential requirements of the EMC directive.

The Altivar 31 must be considered as a component: it is neither a machine nor a device ready for use in accordance with European directives (machinery directive and electromagnetic compatibility directive). It is the responsibility of the end user to ensure that the machine meets these standards.

The drive must not be used as a safety device for machines posing a potential risk of material damage or personal injury (lifting equipment, for example). In such applications, overspeed checks and checks to ensure that the trajectory remains under constant control must be made by separate devices which are independent of the drive.

The products and equipment described in this document may be changed or modified at any time, either from a technical point of view or in the way they are operated. Their description can in no way be considered contractual.

## Steps for setting up the starter

### 1 - Delivery of the drive

- · Check that the drive reference printed on the label is the same as that on the delivery note corresponding to the purchase order.
- · Remove the Altivar 31 from its packaging and check that it has not been damaged in transit.

### 2 - Check that the line voltage is compatible with the supply voltage range of the drive

(see the ATV 31Installation Manual)



- The drive may be damaged if the line voltage is not compatible.

#### 3 - Fit the drive

### 4 - Connect the following to the drive:

- · The line supply, ensuring that it is:
  - compatible with the voltage range of the drive
  - switched off
- · The motor, ensuring that its coupling corresponds to the line voltage
- The control via the logic inputs
- The speed reference via the logic or analog inputs

#### 5 - Switch on the drive, but do not give a run command

#### 6 - Configure the following:

The nominal frequency (bFr) of the motor, if it is different from 50 Hz.

#### 7 - Configure the following in the drC- menu:

The motor parameters, only if the factory configuration of the drive is not suitable.

#### 8 - Configure the following in the I-O-, CtL- and FUn- menus:

The application functions (only if the factory configuration of the drive is not suitable), for example the control mode: 3-wire, or 2-wire transition detection, or 2-wire level detection, or 2-wire level detection with forward direction priority, or local control for ATV31•••A.



The user must ensure that the programmed functions are compatible with the wiring diagram used.

### 9 - Set the following in the SEt- menu:

- The ACC (Acceleration) and dEC (Deceleration) parameters
- The LSP (Low speed when the reference is zero) and HSP (High speed when the reference is maximum) parameters
- The ItH parameter (Motor thermal protection)

#### 10 - Start the drive

#### **Practical recommendations**

- Preparations can be made for programming the drive by filling in the configuration and settings tables (see page 70), in particular when
  the factory configuration has to be changed.
- It is always possible to return to the factory settings using the FCS parameter in the drC-, I-O-, CtL- and FUn- menus (set InI to activate
  the function, see page 22, 25, 36 or 59).
- Auto-tuning, which is performed using the drC- menu, can be applied to optimize performance in terms of accuracy and response time.
   Auto-tuning measures the stator resistance of the motor in order to optimize the control algorithms.

## **Factory configuration**

### **Factory settings**

The Altivar 31 is factory-set for the most common operating conditions:

- · Display: Drive ready (rdY) with motor stopped, and motor frequency with motor running
- Motor frequency (bFr): 50 Hz
- Constant torque application with sensorless flux vector control (UFt = n)
- Normal stop mode on deceleration ramp (Stt = rMP).
- · Stop mode in the event of a fault: Freewheel
- Linear ramps (ACC, dEC): 3 seconds
- Low speed (LSP): 0 Hz
- High speed (HSP): 50 Hz
- Motor thermal current (ItH) = nominal motor current (value depending on drive rating)
- Standstill injection braking current (SdC) = 0.7 x nominal drive current, for 0.5 seconds
- · Automatic adaptation of the deceleration ramp in the event of overvoltage on braking
- No automatic restarting after a fault
- Switching frequency 4 kHz
- Logic inputs:
- LI1, LI2 (2 directions of operation): 2-wire transition detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI1 = forward, LI2 = reverse, inactive on ATV 31 detection control, LI2 = reverse, LI2 =
- LI3, LI4: 4 preset speeds (speed 1 = speed reference or LSP, speed 2 = 10 Hz, speed 3 = 15 Hz, speed 4 = 20 Hz).
- LI5 LI6: Inactive (not assigned)
- · Analog inputs:
  - Al1. Speed reference 0-10 V, inactive on ATV 31
  - Al2: Summed speed reference input 0±10 V
  - Al3: 4-20 mA inactive (not assigned)
- · Relay R1: The contact opens in the event of a fault (or drive off)
- · Relay R2: Inactive (not assigned)
- Analog output AOC: 0-20 mA inactive (not assigned)

### ATV 31

When they leave the factory, ATV 31•••••• A drives are supplied with local control activated: the RUN, STOP buttons and the drive potentiometer are active. Logic inputs LI1 and LI2 and analog input Al1 are inactive (not assigned).

If the above values are compatible with the application, the drive can be used without changing the settings.

## **Basic functions**

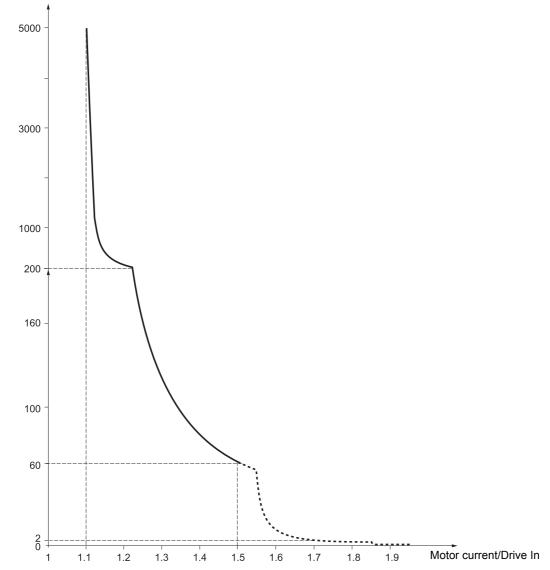
## **Drive thermal protection**

### **Functions:**

Thermal protection by PTC probe fitted on the heatsink or integrated in the power module. Indirect protection of the drive against overloads by tripping in the event of an overcurrent. Typical tripping points:

- Motor current = 185% of nominal drive current: 2 seconds
- Motor current = 150% of nominal drive current: 60 seconds

Time (seconds)



## **Drive ventilation**

The fan starts up when the drive is powered up then shuts down after 10 seconds if a run command has not been received. The fan is powered automatically when the drive is unlocked (operating direction + reference). It is powered down a few seconds after the drive is locked (motor speed < 0.2 Hz and injection braking completed).

## **Basic functions**

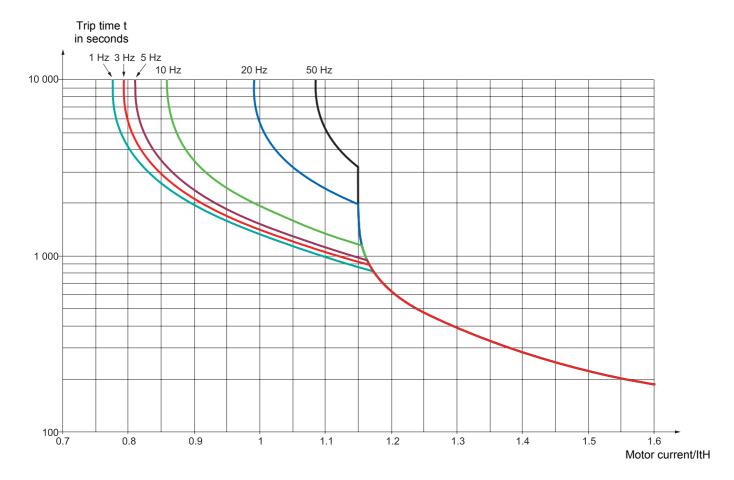
## **Motor thermal protection**

## **Function:**

Thermal protection by calculating the  $I^2t$ . The protection takes account of self-cooled motors.



Caution: The memory of the motor thermal state returns to zero when the drive is disconnected.



## **Setup - Preliminary recommendations**

## Prior to switching on and configuring the drive



- Check that the line voltage is compatible with the supply voltage range of the drive (see pages 3 and 4 of the ATV 31 Installation Manual). The drive may be damaged if the line voltage is not compatible.
- Ensure the logic inputs are switched off (state 0) to prevent accidental starting. Otherwise, an input assigned to the run command may cause the motor to start immediately on exiting the configuration menus.

### With power switching via line contactor



- Avoid operating the contactor frequently (premature ageing of the filter capacitors). Use inputs LI1 to LI6 to control
  the drive.
- These instructions are vital for cycles < 60 s, otherwise the load resistor may be damaged.

## User adjustment and extension of functions

If necessary, the display and buttons can be used to modify the settings and to extend the functions described in the following pages. It is very easy to **return to the factory settings** using the FCS parameter in the drC-, I-O-, CtL- and FUn- menus (set InI to activate the function, see page 22, 25, 36 or 59).

There are three types of parameter:

- Display: Values displayed by the drive
- Setting: Can be changed during operation or when stopped
- Configuration: Can only be modified when stopped and no braking is taking place. Can be displayed during operation.



- Check that changes to the current operating settings do not present any danger. Changes should preferably be made with the drive stopped.

### Start up

**Important:** In factory settings mode on power-up, or in a manual fault reset or after a stop command, the motor can only be powered once the "forward", "reverse" and "DC injection stop" commands have been reset. If they have not been reset, the drive will display "nSt" but will not start. If the automatic restart function is configured (parameter Atr in the FLt- menu, see page <u>60</u>), these commands are taken into account without a reset being necessary.

## Test on a low power motor or without a motor

- In factory settings mode, "motor phase loss" detection is active (OPL = YES). To check the drive in a test or maintenance environment without having to switch to a motor with the same rating as the drive (particularly useful in the case of high power drives), deactivate "motor phase loss" detection (OPL = NO).
- Configure the voltage/frequency ratio: UFt = L (drC- menu on page 21)



Motor thermal protection will not be provided by the drive if the motor current is less than 0.2 times the nominal drive current.

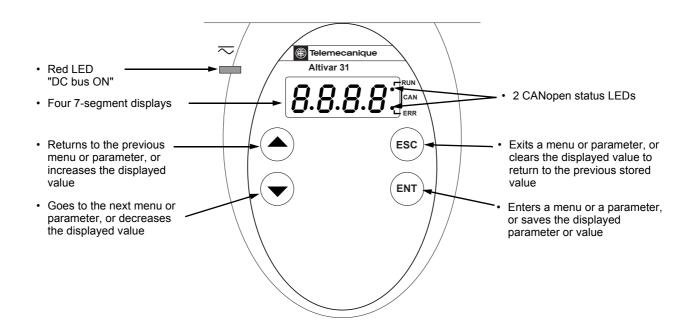
### Using motors in parallel

Configure the voltage/frequency ratio: UFt = L (drC- menu on page 21)



· Motor thermal protection is no longer provided by the drive. Provide an alternative means of thermal protection on every motor.

## Functions of the display and the keys





- Pressing (▲) or (▼) does not store the selection.
- Press and hold down (>2 s) or to scroll through the data quickly.

To save and store the selection: ENT

The display flashes when a value is stored.

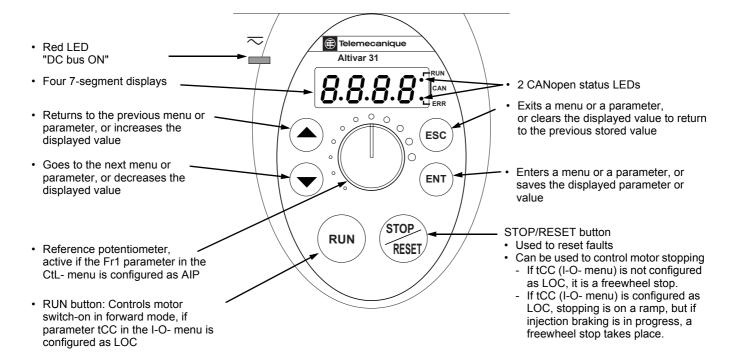
#### Normal display, with no fault present and no starting:

- 43.0: Display of the parameter selected in the SUP- menu (default selection: motor frequency). In current limit mode, the display flashes.
- init: Initialization sequence
- rdY: Drive ready
- dcb: DC injection braking in progress
- nSt: Freewheel stop
- FSt: Fast stop
- tUn: Auto-tuning in progress

The display flashes to indicate the presence of a fault.

## Functions of the display and the keys

### ATV31eeeeeA:





- Pressing (▲) or (▼) does not store the selection.
- Press and hold down (>2 s) or to scroll through the data quickly.

#### To save and store the selection: ENT

The display flashes when a value is stored.

## Normal display, with no fault present and no starting:

- 43.0: Display of the parameter selected in the SUP- menu (default selection: output frequency applied to the motor). In current limit mode, the display flashes.
- init: Initialization sequence
- rdY: Drive ready
- dcb: DC injection braking in progress
- nSt: Freewheel stop
- FSt: Fast stop
- tUn: Auto-tuning in progress

The display flashes to indicate the presence of a fault.

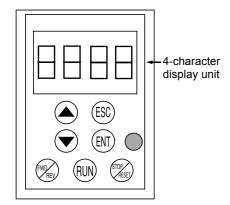
## Remote terminal option

This module is a local control unit which can be mounted on the door of the wall-mounted or floor-standing enclosure. It has a cable with connectors, which is connected to the drive serial link (see the manual supplied with the terminal). It has the same display and the same programming buttons as the Altivar 31 with the addition of a switch to lock access to the menus and three buttons for controlling the drive:

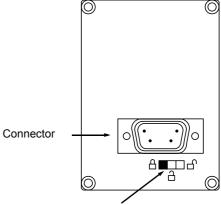
- FWD/REV: reversal of the direction of rotation
- RUN: motor run command
- · STOP/RESET: Motor stop command or fault reset

Pressing the button a first time stops the motor, and if DC injection standstill braking is configured, pressing it a second time stops this braking.

View of the front panel:



View of the rear panel:



Access locking switch:

• positions:  $\left\{\begin{array}{c} \triangle \\ \bigcirc \end{array}\right\}$  settings and display accessible (SEt- and SUP- menus)

• position: all menus can be accessed

**Note:** Customer password protection has priority on the switch.



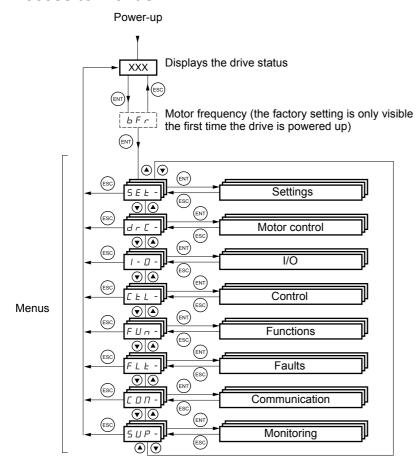
- · The access locking switch on the remote terminal also prevents the drive settings being accessed via the keypad.
- When the remote terminal is disconnected, if the drive has been locked, the keypad will remain locked.
- In order for the remote terminal to be active, the tbr parameter in the COM- menu must remain in factory settings mode: 19.2 (see page 73).

## Saving and loading configurations

Up to four complete configurations for ATV 31 drives can be stored on the remote terminal. These configurations can be saved, transported and transferred from one drive to another of the same rating. 4 different operations for the same device can also be stored on the terminal. See the SCS and FCS parameters in the drC-, I-O-, CtL- and FUn- menus.

# **Programming**

## **Access to menus**



Some parameters can be accessed in a number of menus for increased user-friendliness:

- Entering settings
- Return to factory settings
- Restoring and saving the configuration

 $\begin{tabular}{lll} A dash appears after menu and sub-menu codes to differentiate them from parameter codes. \\ Examples: FUn- menu, ACC parameter. \\ \end{tabular}$ 

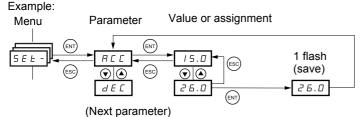
## **Programming**

## Accessing menu parameters

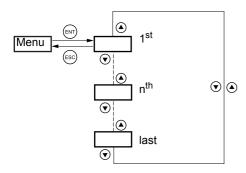
To save and store the selection:

ı: ENT

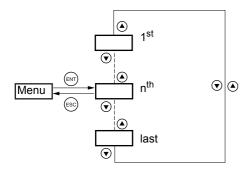
The display flashes when a value is stored.



All the menus are "drop-down" type menus, which means that after the last parameter, if you continue to press  $\blacktriangledown$ , you will return to the first parameter and, conversely, you can switch from the first parameter to the last parameter by pressing  $\blacktriangle$ .



If, after modifying any of the parameters (n<sup>th</sup>), you quit a menu and return to this menu without having accessed another menu in the meantime, you will be taken directly to the n<sup>th</sup> parameter (see below). If, in the meantime, you have accessed another menu or have restarted the system, you will always be taken to the first parameter in the menu (see above).



## Configuration of the bFr parameter

This parameter can only be modified in stop mode without a run command.



Code	Description	Adjustment range	Factory setting
ЬFг	Standard motor frequency		50
	This parameter is only visible the first time the drive is switched on. It can be modified at any time in the drC- menu.  50 Hz: IEC  60 Hz: NEMA  This parameter modifies the presets of the following parameters: HSP pag  22.	e <u>16,</u> Ftd page <u>19,</u> Fr	S page <u>20</u> and tFr page

## **Function compatibility**

## Incompatible functions

The following functions will be inaccessible or deactivated in the cases described below:

#### **Automatic restart**

This is only possible for 2-wire level detection control (tCC = 2C and tCt = LEL or PFO).

### Flying restart

This is only possible for 2-wire level detection control (tCC = 2C and tCt = LEL or PFO). This function is locked if automatic standstill injection is configured as DC (AdC = Ct).

#### Reverse

On the ATV31 •• A range only, this function is locked if local control is active (tCC = LOC).

## Function compatibility table

The choice of application functions may be limited by the number of I/O and by the fact that some functions are incompatible with one another. Functions which are not listed in this table are fully compatible.

If there is an incompatibility between functions, the first function configured will prevent the remainder being configured.

	Summing inputs	+/- speed (1)	Management of limit switches	Preset speeds	Pl regulator	Jog operation	Brake sequence	DC injection stop	Fast stop	Freewheel stop
Summing inputs		•		Ť	•	Ť				
+/- speed (1)	•			•	•	•				
Management of limit switches					•					
Preset speeds	+	•			•	Ť				
PI regulator	•	•	•	•		•	•			
Jog operation	+	•		+	•		•			
Brake sequence					•	•		•		
DC injection stop							•			1
Fast stop										1
Freewheel stop								+	+	

•	Ind	compatil	ole fui	nctions	3	Com	patible	func	tions		Not ap	plicable
						_						

Priority functions (functions which cannot be active simultaneously):

The function indicated by the arrow has priority over the other.

Stop functions have priority over run commands.

Speed references via logic command have priority over analog references.



## Logic and analog input application functions

Each of the functions on the following pages can be assigned to one of the inputs.

A single input can activate several functions at the same time (reverse and 2<sup>nd</sup> ramp for example). **The user must therefore ensure that these functions are compatible**.

The SUP- display menu (parameters LIA and AIA on page <u>66</u>) can be used to display the functions assigned to each input in order to check their compatibility.

# List of functions which can be assigned to inputs/outputs

Logic inputs	Page	Code	Factory setting		
			ATV31●●●	ATV31●●●A	
Not assigned	-	-	LI5 - LI6	LI1 - LI2 LI5 - LI6	
Forward	-	-	LI1		
2 preset speeds	<u>44</u>	P 5 2	LI3	LI3	
4 preset speeds	<u>44</u>	P 5 4	LI4	LI4	
8 preset speeds	<u>44</u>	P 5 8			
16 preset speeds	<u>45</u>	P5 16			
2 preset PI references	<u>51</u>	Pr2			
4 preset PI references	<u>51</u>	Pr4			
+ speed	<u>48</u>	U S P			
- speed	<u>48</u>	d 5 P			
Jog operation	<u>46</u>	J 0 G			
Ramp switching	<u>38</u>	r P 5			
Switching for 2 <sup>nd</sup> current limit	<u>55</u>	L C 2			
Fast stop via logic input	<u>39</u>	F 5 Ł			
DC injection via logic input	<u>39</u>	4 C I			
Freewheel stop via logic input	<u>40</u>	n 5 E			
Reverse	<u>23</u>	r r 5	LI2		
External fault	<u>61</u>	ELF			
RESET (fault reset)	<u>60</u>	r 5 F			
Forced local mode	<u>63</u>	F L O			
Reference switching	<u>34</u>	rF[			
Control channel switching	<u>35</u>	C C 5			
Motor switching	<u>56</u>	C H P			
Limiting of forward motion (limit switch)	<u>58</u>	LAF			
Limiting of reverse motion (limit switch)	<u>58</u>	LAr			
Fault inhibit	<u>62</u>	In H			

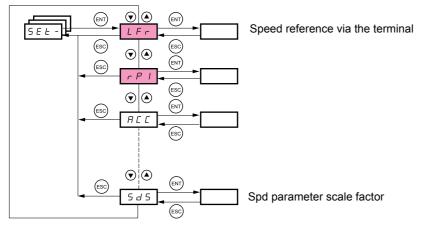
Analog inputs	Page	Code	Factory setting		
			ATV31•••	ATV31●●●A	
Not assigned	-	-	Al3	Al1 - Al3	
Reference 1	<u>33</u>	FrI	Al1	AIP (potentiometer)	
Reference 2	<u>33</u>	Fr2			
Summing input 2	<u>42</u>	5 A 2	Al2	Al2	
Summing input 3	<u>42</u>	5 A 3			
PI regulator feedback	<u>51</u>	PIF			

Analog/logic output	Page	Code	Factory setting
Not assigned	-	-	AOC/AOV
Motor current	<u>24</u>	0 C r	
Motor frequency	<u>24</u>	rFr	
Motor torque	<u>24</u>	0 L 0	
Power supplied by the drive	<u>24</u>	0 P r	
Drive fault (logic data)	<u>24</u>	FLE	
Drive running (logic data)	<u>24</u>	гИп	
Frequency threshold reached (logic data)	<u>24</u>	FLA	
High speed (HSP) reached (logic data)	<u>24</u>	FLA	
Current threshold reached (logic data)	<u>24</u>	C Ł A	
Frequency reference reached (logic data)	<u>24</u>	5 r A	
Motor thermal threshold reached (logic data)	<u>24</u>	Ł S A	
Brake sequence (logic data)	<u>54</u>	P L C	

# List of functions which can be assigned to inputs/outputs

Relay	Page	Code	Factory setting
Not assigned	-	-	R2
Drive fault	<u>24</u>	FLE	R1
Drive running	<u>24</u>	гИп	
Frequency threshold reached	<u>24</u>	FLA	
High speed (HSP) reached	<u>24</u>	FLA	
Current threshold reached	<u>24</u>	CEA	
Frequency reference reached	<u>24</u>	5 r A	
Motor thermal threshold reached	<u>24</u>	Ł 5 A	
Brake sequence	<u>54</u>	ЬГС	

## Settings menu SEt-



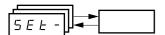
The adjustment parameters can be modified with the drive running or stopped.

Check that it is safe to make changes during operation. Changes should preferably be made in stop mode.

These parameter appear regardless of how the other menus have been configured.

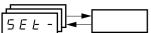


These parameters only appear if the corresponding function has been selected in another menu. When the corresponding function is also accessible and adjustable from within the configuration menu, to aid programming their description is detailed in these menus, on the pages indicated.



Code	Description		Adjustment range	Factory setting			
LFr	Speed reference via the remote terminal		0 to HSP				
	This parameter appears if LCC = YES (page 35) or online. In this case, LFr can also be accessed via LFr is reset to 0 when the drive is powered down.			he remote terminal is			
r P I	Internal PI regulator reference	See page <u>51</u>	0.0 to 100%	0			
ACC	Acceleration ramp time		0.1 to 999.9 s	3 s			
	Defined as the acceleration time between 0 and the	ne nominal frequ	ency FrS (paramet	er in the drC- menu).			
A C 2	2 <sup>nd</sup> acceleration ramp time	See page 38	0.1 to 999.9 s	5 s			
9 E S	2 <sup>nd</sup> deceleration ramp time	See page 38	0.1 to 999.9 s	5 s			
d E C	Deceleration ramp time		0.1 to 999.9 s	3 s			
	Defined as the deceleration time between the non Check that the value of dEC is not too low in relat	ninal frequency Fion to the load to	rS (parameter in the be stopped.	ne drC- menu) and 0.			
ŁЯΙ	Start of CUS-type acceleration ramp rounded as % of total ramp time (ACC or AC2)	See page 37	0 to 100	10%			
£ A ≥	End of CUS-type acceleration ramp rounded as % of total ramp time (ACC or AC2)	See page 37	0 to (100-tA1)	10%			
Ł A ∃	Start of CUS-type deceleration ramp rounded as % of total ramp time (dEC or dE2)	See page 37	0 to 100	10%			
E A Y	End of CUS-type deceleration ramp rounded as % of total ramp time (dEC or dE2)	See page 37	0 to (100-tA3)	10%			
L 5 P	Low speed		0 to HSP	0 Hz			
	(Motor frequency at min. reference)		<u>"</u>	-			
H 5 P	High speed		LSP to tFr	bFr			
	(Motor frequency to max. reference): Check that t	his setting is suit	able for the motor a	and the application.			
I E H	Motor thermal protection - max. thermal curren	nt	0.2 to 1.5 ln (1)	According to drive rating			
	Set ItH to the nominal current on the motor rating plate. Please refer to OLL on page 61 if you wish to suppress thermal protection.						

(1) In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.



Code	Description		Adjustment range	Factory setting			
UFг	IR compensation/voltage boost		0 to 100%	20			
	- For UFt (page 21) = n or nLd: IR compensation - For UFt = L or P: Voltage boost Used to optimize the torque at very low speed (increatheck that the value of UFr is not too high for when the  Modifying UFt (page 21) will cause UFr to return the compensation of the	motor is warm	(risk of instability)				
FLG	Frequency loop gain		1 to 100%	20			
	Parameter can only be accessed if UFt (page 21) = n The FLG parameter adjusts the drive's ability to follow being driven. Too high a gain may result in operating instability.  Hz I FLG low Hz I FLG low Hz I FLG low		mp based on the i	inertia of the machine			
	In this case, increase FLG 20 10 10 10 10 10 10 10 10 10 10 10 10 10	0.3 0.4 0.5	50	In this case, reduce FLG			
5 L A	Frequency loop stability	0.3 0.4 0.3	1 to 100%	20			
	Parameter can only be accessed if UFt (page 21) = n Used to adapt the return to steady state after a speed the dynamics of the machine.  Gradually increase the stability to avoid any overspeed to the stability to avoid any overspeed to the dynamics of the machine.  Gradually increase the stability to avoid any overspeed to t	transient (acc	Hz 40	StA high  In this case, reduce StA			
5 L P	Slip compensation		0 to 150%	100			
	Parameter can only be accessed if UFt (page 21) = n or nLd. Used to adjust the slip compensation value fixed by nominal motor speed. The speeds given on motor rating plates are not necessarily exact.  If slip setting < actual slip: the motor is not rotating at the correct speed in steady state.  If slip setting > actual slip: the motor is overcompensated and the speed is unstable.						
190	Level of DC injection braking current activated via logic input or selected as stop mode (2).	See page 39	. ,	0.7 In (1)			
FAC	Total DC injection braking time selected as stop mode (2).	See page 39	0.1 to 30 s	0.5 s			
<u> </u>	Automatic standstill DC injection time	See page 41	0.1 to 30 s	0.5 s			
<u>5 d C I</u>	Level of automatic standstill DC injection current		0 to 1.2 In (1)	0.7 In (1)			
<u>F 4 C 2</u>	2 <sup>nd</sup> automatic standstill DC injection time	See page 41	0 to 30 s	0 s			
<u>5 d C 2</u>	2 <sup>nd</sup> level of standstill DC injection current	See page 41	0 to 1.2 In (1)	0.5 ln (1)			

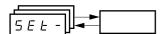
(1) In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.

(2) Caution: These settings are not related to the "automatic standstill DC injection" function.

These parameters only appear if the corresponding function has been selected in another menu. When the corresponding function is also accessible and adjustable from within the configuration menu, to aid programming their description is detailed in these menus, on the pages indicated.

Those which are underlined appear in factory settings mode.

# Settings menu SEt-



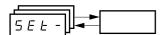
Code	Description		Adjustment range	Factory setting		
JPF	Skip frequency		0 to 500	0 Hz		
	Prevents prolonged operation at a frequency range of ± 1 Hz around JPF. This function prevents a critical speed which leads to resonance. Setting the function to 0 renders it inactive.					
JF ≥	2 <sup>na</sup> skip frequency		0 to 500	0 Hz		
	Prevents prolonged operation at a frequency range of speed which leads to resonance. Setting the function	of ± 1 Hz aroun n to 0 renders i	d JF2. This function t inactive.	prevents a critical		
J G F	Jog operating frequency	See page 46	0 to 10 Hz	10 Hz		
r P G	PI regulator proportional gain	See page <u>51</u>	0.01 to 100	1		
r 16	PI regulator integral gain		0.01 to 100/s	1/s		
F 6 5	PI feedback multiplication coefficient	See page <u>51</u>	0.1 to 100	1		
PIC	Reversal of the direction of correction of the PI regulator	See page <u>51</u>	nO - YES	nO		
r P 2	2 <sup>nd</sup> preset PI reference	See page <u>51</u>	0 to 100%	30%		
r P 3	3 <sup>rd</sup> preset PI reference	See page <u>51</u>		60%		
r P 4	4 <sup>th</sup> preset PI reference	See page <u>51</u>	0 to 100%	90%		
<u>5 P 2</u>	2 <sup>nd</sup> preset speed	See page 45	0 to 500 Hz	10 Hz		
<u>5 P 3</u>	3 <sup>rd</sup> preset speed	See page 45		15 Hz		
<u>5 P 4</u>	4 <sup>th</sup> preset speed	See page 45	0 to 500 Hz	20 Hz		
5 P S	5 <sup>th</sup> preset speed	See page 45		25 Hz		
5 P 6	6 <sup>th</sup> preset speed	See page <u>45</u>		30 Hz		
5 P 7	7 <sup>th</sup> preset speed	See page 45		35 Hz		
5 P B	8 <sup>th</sup> preset speed	See page 45		40 Hz		
5 P 9	9 <sup>th</sup> preset speed	See page 45		45 Hz		
5 P I D	10 <sup>th</sup> preset speed	See page 45		50 Hz		
5 <i>P</i> I I	11 <sup>th</sup> preset speed	See page 45	0 to 500 Hz	55 HZ		
5P 12	12 <sup>th</sup> preset speed	See page 45		60 Hz		
5 <i>P</i> 13	13 <sup>th</sup> preset speed	See page 45		70 Hz		
5 <i>P</i> 14	14 <sup>th</sup> preset speed	See page 45		80 Hz		
5 <i>P</i> 15	15 <sup>th</sup> preset speed	See page 45		90 Hz		
5 <i>P</i> 16	16 <sup>th</sup> preset speed	See page 45	0 to 500 Hz	100 Hz		
CL I	Current limit Used to limit the torque and the temperature rise of t	he motor.	0.25 to 1.5 ln (1)	1.5 ln (1)		
C L Z	2 <sup>nd</sup> current limit	See page <u>55</u>	0.25 to 1.5 ln (1)	1.5 ln (1)		
ŁL5	Low speed operating time		` '	0 (no time limit)		
	Following operation at LSP for a defined period, a motor stop is requested automatically. The motor restarts if the frequency reference is greater than LSP and if a run command is still present.  Caution: Value 0 corresponds to an unlimited time					
r 5 L	Restart error threshold ("wake-up" threshold)	See page <u>52</u>	0 to 100%	0		
UF r 2	IR compensation, motor 2	See page <u>57</u>	0 to 100%	20		
FLG2	Frequency loop gain, motor 2	See page <u>57</u>	1 to 100%	20		
5 L A 2	Stability, motor 2	See page <u>57</u>	1 to 100%	20		
5 L P 2	Slip compensation, motor 2	See page <u>57</u>	0 to 150%	100%		

(1) In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.



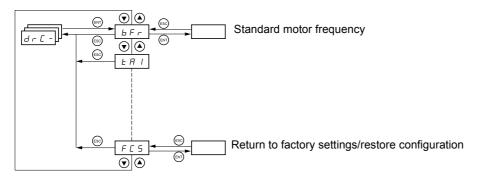
These parameters only appear if the corresponding function has been selected in another menu. When the corresponding function is also accessible and adjustable from within the configuration menu, to aid programming their description is detailed in these menus, on the pages indicated. Those which are underlined appear in factory settings mode.

# Settings menu SEt-



Code	Description	Adjustment range	Factory setting
FEd	Motor frequency threshold above which the relay contact (R1 or R2 = FtA) closes or output AOV = 10 V (dO = StA)	0 to 500 Hz	bFr
FFd	<b>Motor thermal state threshold</b> above which the relay contact (R1 or R2 = tSA) closes or output AOV = 10 V (dO = tSA)	0 to 118%	100%
СFЯ	Motor current threshold beyond which the relay contact (R1 or R2 = CtA) closes or output AOV = 10 V (dO = CtA)	0 to 1.5 In (1)	In (1)
5 d 5	Scale factor for display parameter SPd1/SPd2/SPd3 (SUPmenu on page 65)	0.1 to 200	30
	<ul> <li>If SdS ≤ 1, SPd1 is displayed (possible definition = 0.01)</li> <li>If 1 &lt; SdS ≤ 10, SPd2 is displayed (possible definition = 0.1)</li> <li>If SdS &gt; 10, SPd3 is displayed (possible definition = 1)</li> <li>If SdS &gt; 10 and SdS x rFr &gt; 9999:</li> <li>Display of Spd3 = SdS x rFr / 1000 to 2 decimal places</li> <li>Example: For 24 223, display is 24.22</li> </ul>		
	- If SdS > 10 and SdS x rFr > 65535, display locked at 65.54		
	Example: Display motor speed for 4-pole motor, 1500 rpm at 50 Hz (synchronous speed): SdS = 30 SPd3 = 1500 at rFr = 50 Hz		
5 F r	Switching frequency See page 22	2.0 to 16 kHz	4 kHz
	This parameter can also be accessed in the drC- menu.	1	1

(1) In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.

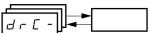


With the exception of tUn, which can power up the motor, parameters can only be modified in stop mode, with no run command present.

On the optional remote terminal, this menu can be accessed with the switch in the  $\Box$  position.

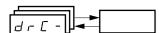
Drive performance can be optimized by:

- Entering the values given on the motor rating plate in the drive menu
   Performing an auto-tune operation (on a standard asynchronous motor)

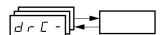


Code	Description	Adjustment range	Factory setting
ЬFг	Standard motor frequency		50
	50 Hz: IEC 60 Hz: NEMA This parameter modifies the presets of the following parameters: HS tFr page 22.	P page <u>16</u> , Ftd page <u>1</u>	19, FrS page <u>20</u> a
U n 5	Nominal motor voltage given on the rating plate	According to drive rating	According to dri rating
	ATV31•••M2: 100 to 240 V ATV31•••M3X: 100 to 240 V ATV31•••N4: 100 to 500 V ATV31•••S6X: 100 to 600 V		
F r 5	Nominal motor frequency given on the rating plate	10 to 500 Hz	50 Hz
	ATV31eeeM2: 7 max.		
25.2	ATV31•••M3X: 7 max. ATV31•••N4: 14 max. ATV31•••S6X: 17 max. The factory setting is 50 Hz, or preset to 60 Hz if bFr is set to 60 ld		According to dr
nEr	ATV31•••M3X: 7 max. ATV31•••N4: 14 max. ATV31•••S6X: 17 max.	Hz. 0.25 to 1.5 In (1)	According to dr
n[r	ATV31•••M3X: 7 max. ATV31•••N4: 14 max. ATV31•••S6X: 17 max. The factory setting is 50 Hz, or preset to 60 Hz if bFr is set to 60 ld		
	ATV31•••M3X: 7 max. ATV31•••N4: 14 max. ATV31•••S6X: 17 max. The factory setting is 50 Hz, or preset to 60 Hz if bFr is set to 60 Nominal motor current given on the rating plate  Nominal motor speed given on the rating plate  0 to 9999 RPM then 10.00 to 32.76 KRPM If, rather than the nominal speed, the rating plate indicates the sy a %, calculate the nominal speed as follows:	0.25 to 1.5 ln (1) 0 to 32760 RPM	rating According to dr
	ATV31•••M3X: 7 max. ATV31•••N3: 14 max. ATV31•••N3: 17 max. The factory setting is 50 Hz, or preset to 60 Hz if bFr is set to 60 Nominal motor current given on the rating plate  Nominal motor speed given on the rating plate  0 to 9999 RPM then 10.00 to 32.76 KRPM If, rather than the nominal speed, the rating plate indicates the sy a %, calculate the nominal speed as follows:  Nominal speed = Synchronous speed x 100 - slip as a % 100	0.25 to 1.5 ln (1) 0 to 32760 RPM nchronous speed and	rating According to dr rating
	ATV31•••M3X: 7 max. ATV31•••M3X: 14 max. ATV31•••N4: 14 max. The factory setting is 50 Hz, or preset to 60 Hz if bFr is set to 60 Nominal motor current given on the rating plate  Nominal motor speed given on the rating plate  0 to 9999 RPM then 10.00 to 32.76 KRPM If, rather than the nominal speed, the rating plate indicates the sy a %, calculate the nominal speed as follows:  Nominal speed = Synchronous speed x  or Nominal speed = Synchronous speed x  100 - slip as a % 100 50 - slip in Hz	0.25 to 1.5 ln (1) 0 to 32760 RPM  nchronous speed and	rating According to dr rating
	ATV31•••M3X: 7 max. ATV31•••N3: 14 max. ATV31•••N3: 17 max. The factory setting is 50 Hz, or preset to 60 Hz if bFr is set to 60 Nominal motor current given on the rating plate  Nominal motor speed given on the rating plate  0 to 9999 RPM then 10.00 to 32.76 KRPM If, rather than the nominal speed, the rating plate indicates the sy a %, calculate the nominal speed as follows:  Nominal speed = Synchronous speed x 100 - slip as a % 100	0.25 to 1.5 ln (1) 0 to 32760 RPM  nchronous speed and	rating According to dr rating

(1) In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.

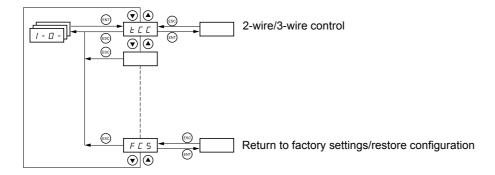


Code	Description	Adjustment range	Factory setting
r 5 C	Cold state stator resistance		nO
	<ul> <li>n D: Function inactive. For applications which do not require high performance or do not tolerate automatic autotuning (passing a current through the motor) each time the drive is powered up.</li> <li>In IE: Activates the function. To improve low-speed performance whatever the thermal state of the motor.</li> <li>XXXX Value of cold state stator resistance used, in mΩ.</li> <li>Caution:         <ul> <li>It is strongly recommended that this function is activated in Lifting and Handling applications.</li> <li>The function should only be activated (InIt) when the motor is in cold state.</li> <li>When rSC = InIt, parameter tUn is forced to POn. At the next run command, the stator resistance is measured with an auto-tune. Parameter rSC then changes to this value (XXXX) and maintains it; tUn remains forced to POn. Parameter rSC remains at InIt as long as the measurement has not been performed.</li> <li>Value XXXX can be forced or modified using the</li> </ul> </li> </ul>		
ŁUπ	Motor control auto-tuning		nO
	It is essential that all the motor parameters (UnS, FrS, nCr, nSP, COS) are configured correctly before performing auto-tuning.  ¬□: Auto-tuning not performed.  ¬□: Auto-tuning is performed as soon as possible, then the parameter automatically switches to dOnE or nO in the event of a fault (the tnF fault is displayed if tnL = YES (see page 62).  ¬□: Use of the values given the last time auto-tuning was performed.  ¬□: Auto-tuning is performed every time a run command is sent.  ¬□: Auto-tuning is performed on every power-up.  L I to L IE: Auto-tuning is performed on the transition from 0 → 1 of a logic input assigned to this function.  Caution:  tUn is forced to POn if rSC is other than nO.  Auto-tuning is only performed if no command has been activated. If a "freewheel stop" or "fast stop" function is assigned to a logic input, this input must be set to 1 (active at 0).  Auto-tuning may last for 1 to 2 seconds. Do not interrupt; wait for the display to change to "dOnE" or "nO".  During auto-tuning the motor operates at nominal current.		
Ł U 5	Auto-tuning status (information only, cannot be modified)		tAb
	E R b: The default stator resistance value is used to control the motor.  PEnd: Auto-tuning has been requested but not yet performed.  Pr□□: Auto-tuning in progress  FR IL: Auto-tuning has failed.  d□□□: The stator resistance measured by the auto-tuning function is used to control the motor.  5 Erd: The cold state stator resistance (rSC other than nO) that is used to control the motor.		
UF Ł	Selection of the type of voltage/frequency ratio		n
	L: Constant torque for motors connected in parallel or special motors  P: Variable torque: pump and fan applications  n: Sensorless flux vector control for constant torque applications  n L d: Energy saving, for variable torque applications not requiring high dynamics (behaves in a similar way to the P ratio at no load and the n ratio on load)  Voltage  UnS  Frequency		

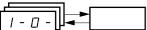


Code	Description	Adjustment range	Factory setting
nrd	Random switching frequency		YES
	YE 5: Frequency with random modulation         n D: Fixed frequency         Random frequency modulation prevents any resonance which may occur at a fixed frequency.		
5 <i>F</i> r	Switching frequency	2.0 to 16 kHz	4 kHz
]	(1)	2.0 10 10 11 12	1 1012
	The frequency can be adjusted to reduce the noise generated by the If the frequency has been set to a value higher than 4 kHz, in the ev the drive will automatically reduce the switching frequency and increturned to normal.	ent of an excessive ease it again once t	he temperature has
Ł F r	Maximum output frequency	10 to 500 Hz	60 Hz
	The factory setting is 60 Hz, or preset to 72 Hz if bFr is set to 60 Hz	<u>z</u> .	
5 r F	Suppression of the speed loop filter		nO
	n □: The speed loop filter is active (prevents the reference being example of the speed loop filter is suppressed (in position control applicand the reference may be exceeded).  Hz ↑  Hz ↑		s the response time
	SrF = nO  SrF = nO  0  10  0  10  0  10  0  10  0  10  0	SrF = YES	
5 C 5	0 0,1 0,2 0,3 0,4 0,5 t 0 0,1 0,  Saving the configuration	2 0,3 0,4 0,5 t	nO
FC5	<ul> <li>n : Function inactive</li> <li>5 : F : Saves the current configuration (but not the result of auto-tswitches to nO as soon as the save has been performed. This function in reserve, in addition to the current configuration.</li> <li>When drives leave the factory the current configuration and the back the factory configuration.</li> <li>If the remote terminal option is connected to the drive, the following appear: F IL I, F IL 2, F IL 3, F IL 4 (files available in the for saving the current configuration). They can be used to store be which can also be stored on or even transferred to other drives of SCS automatically switches to nO as soon as the save has been Return to factory settings/restore configuration (1)</li> </ul>	on is used to keep and up configuration are and additional select be remote terminal's etween 1 and 4 differ the same rating.	nother configuration both initialized with ion options will EEPROM memory
	<ul> <li>□ Enunction inactive</li> <li>□ E I: The current configuration becomes identical to the backup SCS = Strl. rECl is only visible if the backup has been carried out. FC as this action has been performed.</li> <li>In I: The current configuration becomes identical to the factory snO as soon as this action has been performed.</li> <li>If the remote terminal option is connected to the drive, the following as long as the corresponding files have been loaded in the remote files): F IL I, F IL Z, F IL Z, F IL Y. They enable the current of the 4 configurations which may be loaded on the remote terming FCS automatically changes to nO as soon as this action has been Caution: If n R d appears on the display briefly once the parameter the configuration transfer is not possible and has not been perform If n L r appears on the display briefly once the parameter has succonfiguration transfer error has occurred and the factory settings In both cases, check the configuration to be transferred before the set of the configuration transfer error has occurred and the factory settings.</li> </ul>	es automatically cha setting. FCS autom ing additional select te terminal's EEPRO int configuration to b nal. the performed. ter has switched to ned (different drive ra witched to nO, this ra must be restored u ying again.	anges to nO as soon atically changes to ion options appear, DM memory (0 to 4 e replaced with one nO, this means that atings for example). means that a sing InI.

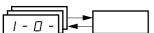
(1)SCS and FCS can be accessed via several configuration menus but they concern all menus and parameters as a whole. (2)Parameter can also be accessed in the settings menu (SEt-).



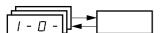
The parameters can only be modified when the drive is stopped and no run command is present. On the optional remote terminal, this menu can be accessed with the switch in the  $\Box$  position.



Code	Description	Factory setting		
FCC	2-wire/3-wire control (Type of control)	2C ATV31•••A: LOC		
	Control configuration:  2	= L3, see page <u>33</u> ).		
	2-wire control: The open or closed state of the input controls running or stopping.			
	Wiring example:  LI1: forward  LIx: reverse			
	3-wire control (pulse control): A "forward" or "reverse" pulse is sufficient to control starting, a sufficient to control stopping.  Example of wiring:  LI1: stop  LI2: forward  LIX: reverse			
	To change the assignment of tCC press the "ENT" key for 2 s. This causes the to return to their factory setting: rrS, tCt and all functions affecting logic inputs.			
FCF	Type of 2-wire control (parameter only accessible if tCC = 2C)	trn		
	LEL: State 0 or 1 is taken into account for run or stop.  Lrn: A change of state (transition or edge) is necessary to initiate operation, in order to prevent accident restarts after a break in the power supply.  PFD: State 0 or 1 is taken into account for run or stop, but the "forward" input always takes priority ove the "reverse" input.			
r r 5	Reverse operation via logic input	if tCC = 2C: LI2 if tCC = 3C: LI3 if tCC = LOC: nO		
	If rrS = nO, reverse operation is active, by means of negative voltage on Al2 for exam n : Not assigned L	ple.		

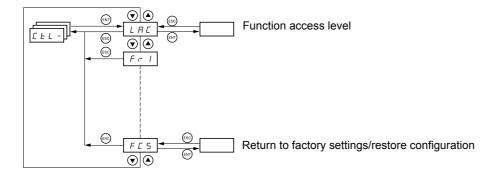


Code	Description	Factory setting
[rl] [rH]	Value for low speed (LSP) on input Al3, can be set between 0 and 20 mA Value for high speed (HSP) on input Al3, can be set between 4 and 20 mA	4 mA 20 mA
	These two parameters are used to configure the input for 0-20 mA, 4-20 mA, 20-4 mA  Frequency  Frequency  Example: 20 - 4 mA  LSP  Crl.3  Crl.	CrL3 AI 3 (20 mA) (mA)
AO IE	Configuration of the analog output	0A
	☐ F: 0 - 20 mA configuration (use terminal AOC)  H F: 4 - 20 mA configuration (use terminal AOC)  I ☐ U: 0 - 10 V configuration (use terminal AOV)	
40	Analog/logic output AOC/AOV	nO
	□ □: Not assigned □ □ □ r: Motor current. 20 mA or 10 V corresponds to twice the nominal drive current. □ □ □ r: Motor frequency. 20 mA or 10 V corresponds to the maximum frequency tFr (p □ □ □ r: Motor torque. 20 mA or 10 V corresponds to twice the nominal motor torque. □ □ P r: Power supplied by the drive. 20 mA or 10 V corresponds to twice the nominal dr Making the following assignments (1) will transform the analog output to a logic output the Installation Manual): □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	ive power. It (see the diagram in eactivated from the ception of FLt (state 1
r 1	Relay r1	FLt
r 2	n □: Not assigned  F L E: Drive fault  r U n: Drive running  F E R: Frequency threshold reached (Ftd parameter in the SEt- menu, page 19)  F L R: High speed (HSP) reached  C E R: Current threshold reached (Ctd parameter in the SEt- menu, page 19)  5 r R: Frequency reference reached  E 5 R: Motor thermal threshold reached (ttd parameter in the SEt- menu, page 19)  R P L: Loss of 4-20 mA signal, even if LFL = nO (page 62)  The relay is powered up when the selected assignment is active, with the exception of the drive is not faulty).  Relay r2	of FLt (powered up if
	n □: Not assigned	_1
	F L E: Drive fault  r Un: Drive running  F L R: Frequency threshold reached (Ftd parameter in the SEt-menu, page 19)  F L R: High speed (HSP) reached  L E R: Current threshold reached (Ctd parameter in the SEt-menu, page 19)  5 r R: Frequency reference reached  L 5 R: Motor thermal threshold reached (ttd parameter in the SEt-menu, page 19)  L L: Brake sequence (for information, as this assignment can be only be activated or d  FUn-menu, see page 54)  R P L: Loss of 4-20 mA signal, even if LFL = nO (page 62)  The relay is powered up when the selected assignment is active, with the exception of the drive is not faulty).	



Code	Description	Factory setting
5 C 5	Saving the configuration (1)	
<ul> <li>n □: Function inactive</li> <li>5 Ł r I: Saves the current configuration (but not the result of auto-tuning) to EEPROM. SCS switches to nO as soon as the save has been performed. This function is used to keep another in reserve, in addition to the current configuration.</li> <li>When drives leave the factory the current configuration and the backup configuration are both it the factory configuration.</li> <li>If the remote terminal option is connected to the drive, the following additional selection op appear: F IL I, F IL ⊇, F IL ∃, F IL Y (files available in the remote terminal's EEPR for saving the current configuration). They can be used to store between 1 and 4 different c which can also be stored on or even transferred to other drives of the same rating. SCS automatically switches to nO as soon as the save has been performed.</li> </ul>		both initialized with on options will EEPROM memory
F [ 5	Return to factory settings/restore configuration (1)	
	<ul> <li>n □: Function inactive</li> <li>r ∈ □: The current configuration becomes identical to the backup configuration previously saved by</li> <li>SCS = Strl. rECl is only visible if the backup has been carried out. FCS automatically changes to nO as soon as this action has been performed.</li> <li>In I: The current configuration becomes identical to the factory setting. FCS automatically changes to nO as soon as this action has been performed.</li> <li>If the remote terminal option is connected to the drive, the following additional selection options appear, as long as the corresponding files have been loaded in the remote terminal's EEPROM memory (0 to 4 files): F IL I, F IL ⊇, F IL ∃, F IL Y. They enable the current configuration to be replaced with one of the 4 configurations that may be loaded on the remote terminal.</li> <li>FCS automatically changes to nO as soon as this action has been performed.</li> <li>Caution: If n R d appears on the display briefly once FCS has switched to nO, this means that the configuration transfer is not possible and has not been performed (different drive ratings for example). If n E r appears on the display briefly once the parameter has switched to nO, this means that a configuration transfer error has occurred and the factory settings must be restored using InI. In both cases, check the configuration to be transferred before trying again.</li> </ul>	
	For rECI, InI and FL1 to FL4 to be taken into account, the ENT key must be held	d down for 2 s.

(1) SCS and FCS can be accessed via several configuration menus but they concern all menus and parameters as a whole.



The parameters can only be modified when the drive is stopped and no run command is present. On the optional remote terminal, this menu can be accessed with the switch in the  $\bigcap$  position.

## Control and reference channels

Run commands (forward, reverse, etc.) and references can be sent using the following methods:

Command CMD		Reference rFr
tEr:	Terminal (LI.)	Al1-Al2-Al3: Terminal
LOC:	Keypad (RUN/STOP) on ATV31●●●A only	AIP: Potentiometer on ATV31•••A only
LCC:	Remote terminal (RJ45 socket)	LCC: ATV31 keypad or ATV31 ●●● A keypad or remote terminal
Mdb:	Modbus (RJ45 socket)	Mdb: Modbus (RJ45 socket)
CAn:	CANopen (RJ45 socket)	CAn: CANopen (RJ45 socket)

#### Note:

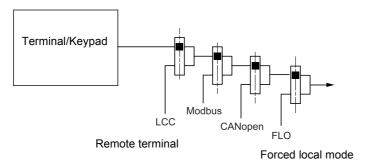
The STOP keys on the keypad and the remote terminal may retain priority (PSt parameter in the CtL- menu).

The LAC parameter in the CtL- menu can be used to select priority modes for the control and reference channels. It has 3 function levels:

- LAC = L1: Basic functions, with priority via communication bus. This level is interchangeable with ATV28.
- LAC = L2: Provides the option of additional functions compared with L1:
  - +/- speed (motorized potentiometer)
  - Brake control
  - Switching for 2nd current limit
  - Motor switching
  - Management of limit switches
- LAC = L3: Same options as with L2, plus mixed mode for control and reference channels.

### These channels can be combined as follows if parameter LAC = L1 or L2.

Highest priority to lowest priority: Local forcing, CANopen, Modbus, Remote terminal, Terminal/Keypad (from right to left in the diagram below).

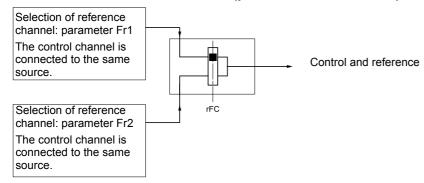


See the detailed diagrams on pages 28 and 29.

- · On ATV31 drives, in factory settings mode, control and reference are managed by the terminal.
- On ATV31•••A drives, in factory settings mode, control is via the keypad and the reference is set via the potentiometer for this keypad.
- With a remote terminal, if LCC = YES (CtL- menu), control and reference are managed by the remote terminal (reference via LFr, SEtmenu).

## These channels can be combined in other ways described below if LAC = L3.

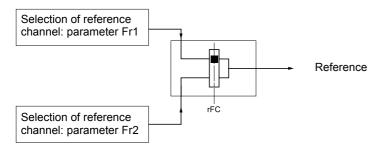
## Combined control and reference (parameter CHCF = SIM):



Parameter rFC can be used to select channel Fr1 or Fr2 or to configure a logic input or a control word bit for remote switching of either. See the detailed diagrams on pages 30 et 32.

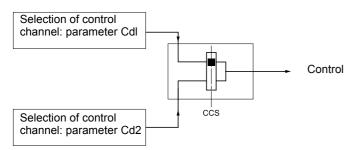
### Separate control and reference (parameter CHCF = SEP):

#### Reference



Parameter rFC can be used to select channel Fr1 or Fr2 or to configure a logic input or a control word bit for remote switching of either.

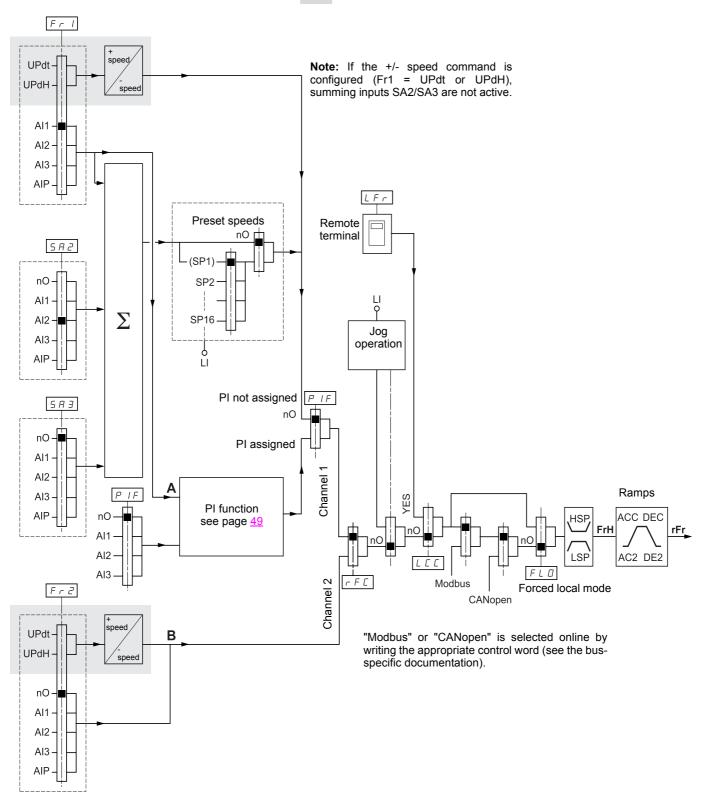
### Control



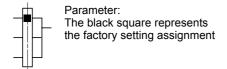
Parameter CCS can be used to select channel Cd1 or Cd2 or to configure a logic input or a control word bit for remote switching of either.

See the detailed diagrams on pages 30 and 31.

## Reference channel for LAC = L1 or L2



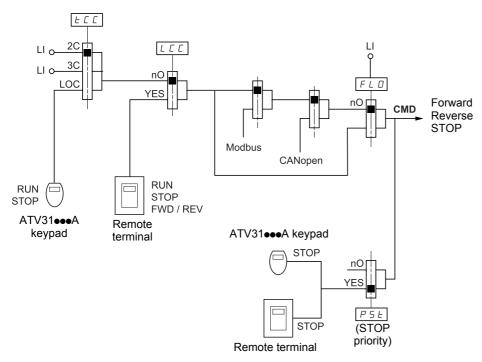
### Key:



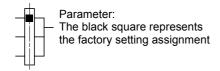
Function accessible for LAC = L2

## Control channel for LAC = L1 or L2

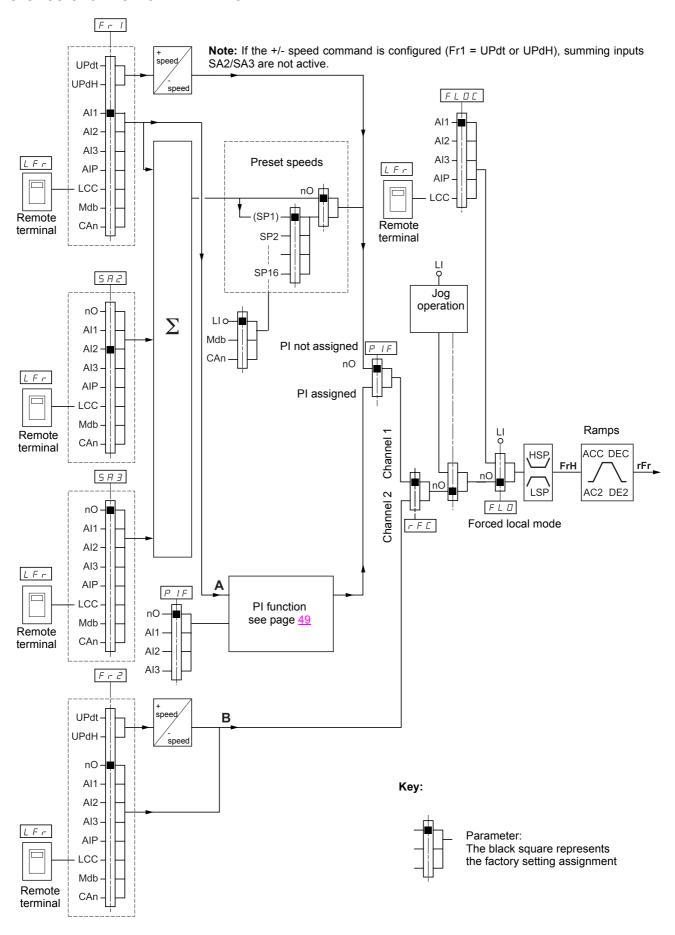
Parameters FLO, LCC and the selection of the Modbus or CANopen bus are common to the reference and control channels. Example: LCC = YES sets the drive to control **and** reference via the remote terminal.



#### Key:



## Reference channel for LAC = L3

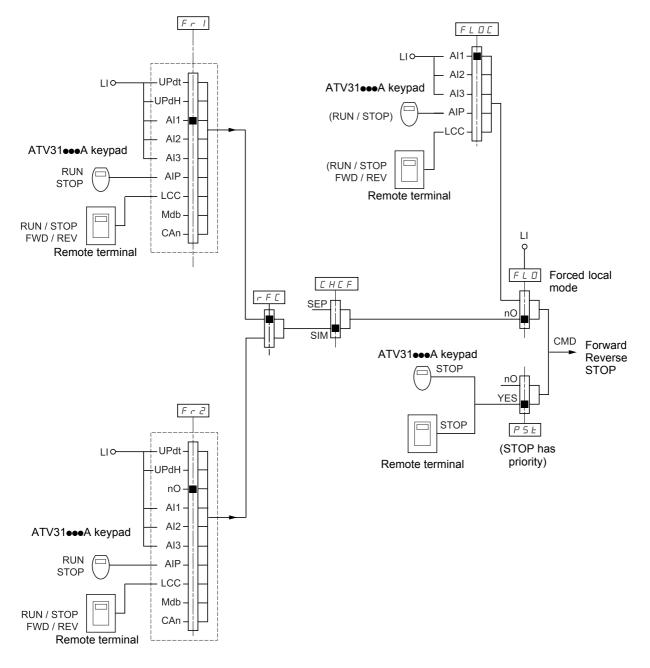


### Control channel for LAC = L3

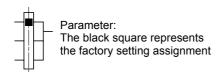
### Combined reference and control

Parameters Fr1, Fr2, rFC, FLO and FLOC are common to reference and control. The control channel is therefore determined by the reference channel.

Example: If reference Fr1 = Al1 (analog input on terminal block).



Key:

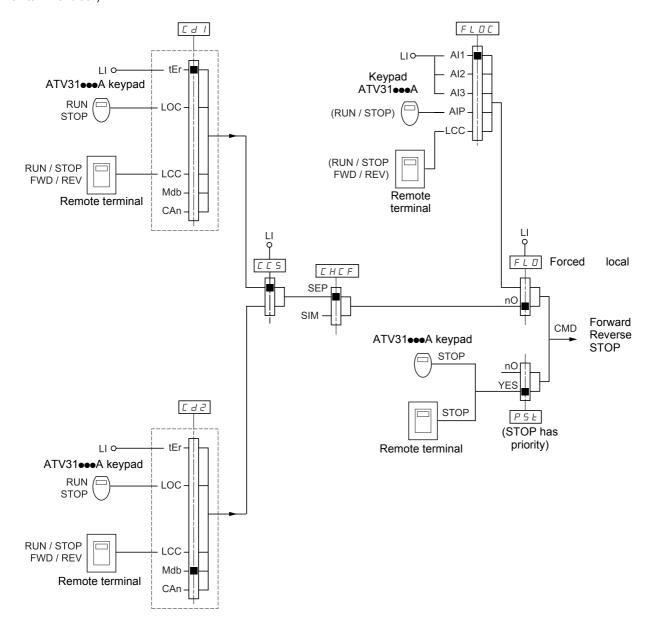


## Control channel for LAC = L3

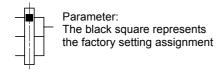
### Mixed mode (separate reference and control)

Parameters FLO and FLOC are common to reference and control.

Example: If the reference is in local forced mode via Al1 (analog input on terminal block) control in local forced mode is via LI (logic input on terminal block).

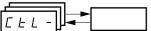


#### Key:





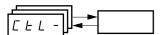
There may be an incompatibility between functions (see the incompatibility table  $\underline{13}$ ). In this case, the first function configured will prevent the remainder being configured.



Code	Description	Adjustment range	Factory setting	
LAC	Function access level		L1	
	L 1: Access to standard functions. Significantly, this level is interchangeable with ATV28.  L 2: Access to advanced functions in the FUn- menu: - +/- speed (motorized potentiometer) - Brake control - Switching for second current limit - Motor switching - Management of limit switches L 3: Access to advanced functions and management of mixed control modes.  Assigning LAC to L3 will restore the factory settings of the Fr1 (below), Cd1 (page 34), CHCF (page 34), and tCC (page 23) parameters. The latter is forced to "2C" on ATV31●●●A. L3 can only be restored to L2 or L1 and L2 to L1 by means of a "factory setting" via FCS (page 36).			
	In order to change the assignment of LAC, you must press and hol	d down the "ENT"	key for 2 seconds.	
FrI	Configuration reference 1		AI1 AIP for ATV31•••A	
	<u> </u>			
	If LAC = L2 or L3, the following additional assignments are possible	):		
	UPdE: (1) + speed/- speed via LI UPdH: (1) + speed/- speed via keys ▲ ▼ on the ATV31 or ATV31•••A keypad or remote termin operation, display the frequency rFr (see page 65)			
	If LAC = L3, the following additional assignments are possible:			
	L C C: Reference via the remote terminal, LFr parameter in the SEt  □ d b: Reference via Modbus □ □ □ □ Reference via CANopen	t- menu page <u>16</u> .		
Fr2	Configuration reference 2		nO	
	☐ D: Not assigned ☐ I I: Analog input Al1 ☐ I I: Analog input Al2 ☐ I I: Analog input Al3 ☐ I I: Potentiometer (ATV31•••A only)			
	If LAC = L2 or L3, the following additional assignments are possible	e:		
	UPdE: (1) + speed/- speed via LI UPdH: (1) + speed/- speed via keys ▲ ▼ on the ATV31 or ATV31•••A keypad or remote termi operation, display the frequency rFr (see page 65)			
	If LAC = L3, the following additional assignments are possible:			
	L Γ Γ: Reference via the remote terminal, LFr parameter in the SE Π Δ Β: Reference via Modbus Γ Π π: Reference via CANopen	t- menu page <u>16</u> .		

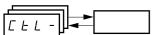
<sup>(1)</sup> Caution: You cannot assign UPdt to Fr1 or Fr2 and UPdH to Fr1 or Fr2 at the same time. Only one of the UPdt/UPdH assignments is permitted on each reference channel.

# Control menu CtL-



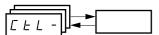
Code	Description	Adjustment range	Factory setting
r F C	Reference switching		Fr1
	Parameter rFC can be used to select channel Fr1 or Fr2 or to confiremote switching of Fr1 or Fr2.  Fr I: Reference = Reference 1  Fr 2: Reference = Reference 2  L I I: Logic input L11  L I 2: Logic input L12  L I 3: Logic input L13  L I 4: Logic input L14  L I 5: Logic input L15  L I 5: Logic input L16	gure a logic input o	or a control bit for
CHCF	If LAC = L3, the following additional assignments are possible:    I		SIM
	Can be accessed if LAC = L3 5 In: Combined 5 E P: Separate	1	
	Configuration of control channel 1		tEr LOC for ATV31•••A
	Can be accessed if CHCF = SEP and LAC = L3  LEr: Terminal block control  LDC: Keypad control (ATV31●●A only)  LCC: Remote terminal control  Πdb: Control via Modbus  LRC: Control via CAN		
C 4 2	Configuration of control channel 2		Mdb:
	Can be accessed if CHCF = SEP and LAC = L3  LEr: Terminal block control  LDΓ: Keypad control (ATV31●●A only)  LCΓ: Remote terminal control  Πdb: Control via Modbus  CRn: Control via CAN		

These parameters only appear if the function has been enabled.



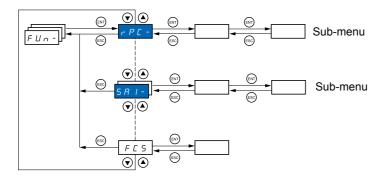
Code	Description	Adjustment range	Factory setting
C C 5	Control channel switching		Cd1
	Can be accessed if CHCF = SEP and LAC = L3 Parameter CCS can be used to select channel Cd1 or Cd2 or to coremote switching of Cd1 or Cd2.  L d I: Control channel = Channel 1  L d 2: Control channel = Channel 2  L I I: Logic input Ll1  L I 2: Logic input Ll2  L I 3: Logic input Ll3  L I 4: Logic input Ll5  L I 5: Logic input Ll6  L I I : Bit 11 of the Modbus control word  L I I 2: Bit 12 of the Modbus control word  L I I 3: Bit 13 of the Modbus control word  L I I 4: Bit 14 of the Modbus control word  L I I 5: Bit 15 of the Modbus control word  L I I 5: Bit 15 of the CANopen control word  L I I 5: Bit 10 of the CANopen control word  L I I 3: Bit 10 of the CANopen control word  L I I 3: Bit 10 of the CANopen control word  L I I 3: Bit 10 of the CANopen control word  L I I 3: Bit 10 of the CANopen control word  L I I 3: Bit 10 of the CANopen control word  L I I 3: Bit 10 of the CANopen control word  L I I 3: Bit 10 of the CANopen control word  L I I 3: Bit 10 of the CANopen control word	onfigure a logic inpu	ut or a control bit for
	Channel 1 is active when the input or control word bit is in state 0. Channel 2 is active when the input or control word bit is in state 1.		
C O P	Copy channel 1 to channel 2		nO
	(copy only in this direction)  Can be accessed if LAC = L3		
	<ul> <li>5 P: Copy reference</li> <li>L d: Copy control</li> <li>RL L: Copy control and reference</li> <li>If channel 2 is controlled via the terminal block, channel 1 control</li> <li>If channel 2 reference is set via Al1, Al2, Al3 or AlP, channel 1 re</li> <li>The reference copied is FrH (before ramp) unless the channel 2 case, the reference copied is rFr (after ramp)</li> <li>Copying the control and/or the reference may change the</li> </ul>	eference is not copio reference is set via	+/- speed. In this
LCC	Control via remote terminal		nO
	Parameter can only be accessed with the remote terminal option ar n : Function inactive y E 5: Enables control of the drive using the STOP/RESET, RUN The speed reference is then given by parameter LFr in the SEt-men injection stop commands remain active on the terminal block. If the terminal has not been connected, the drive locks in an SLF fault.	and FWD/REV buttonu. Only the freewhe	ons on the terminal. el, fast stop and DC
P 5 Ł	Stop priority		YES
	This function gives priority to the STOP key on the keypad (ATV31•• terminal, regardless of the control channel (terminal block or comm n : Function inactive y E 5: STOP key priority In order to change the assignment of PSt, you must press and hold	unication bus).	
r O E	Direction of operation authorized		dFr
	Direction of operation authorized for the RUN key on the keypad (A remote terminal.  d F r: Forward d r 5: Reverse b D L: Both directions are authorized (except for the keypad on the	.,	·

These parameters only appear if the function has been enabled.



Code	Description	Adjustment range	Factory setting
5 C S	Saving the configuration (1)		
	<ul> <li>n □: Function inactive</li> <li>5 Ł r I: Saves the current configuration (but not the result of auto-t switches to nO as soon as the save has been performed. This function reserve, in addition to the current configuration.</li> <li>When drives leave the factory the current configuration and the back the factory configuration.</li> <li>If the remote terminal option is connected to the drive, the following appear: F IL I, F IL ⊇, F IL ∃, F IL Y (files available in the for saving the current configuration). They can be used to store be which can also be stored on or even transferred to other drives on SCS automatically switches to nO as soon as the save has been</li> </ul>	on is used to keep are up configuration are ng additional select remote terminal's etween 1 and 4 differ the same rating.	nother configuration both initialized with ion options will EEPROM memory
F C 5	Return to factory settings/Restore configuration (1)		
	<ul> <li>□ Function inactive</li> <li>□ E □ I: The current configuration becomes identical to the backup</li> <li>= Strl. rECl is only visible if the backup has been carried out. FCS a this action has been performed.</li> <li>In I: The current configuration becomes identical to the factory snO as soon as this action has been performed.</li> <li>If the remote terminal option is connected to the drive, the following as long as the corresponding files have been loaded in the remote files): FILI, FILZ, FILZ, FILZ, FILY. They enable the current of the 4 configurations that may be loaded on the remote terminal FCS automatically changes to nO as soon as this action has been Caution: If n R d appears on the display briefly once FCS has strongiguration transfer is not possible and has not been performed n E r appears on the display briefly once the parameter has switconfiguration transfer error has occurred and the factory settings In both cases, check the configuration to be transferred before the form the configuration to the configuration to be transferred before the configuration transferred before the config</li></ul>	utomatically change setting. FCS automing additional select te terminal's EEPRC into configuration to bull. In performed, witched to nO, this reduced to nO, this manust be restored uping again.	atically changes to a sically changes to a sically changes to a sically changes to a sically change and a sically changes to a sically change that a sing InI.

(1)SCS and FCS can be accessed via several configuration menus but they concern all menus and parameters as a whole.



The parameters can only be modified when the drive is stopped and no run command is present. On the optional remote terminal, this menu can be accessed with the switch in the  $\bigcap$  position.

Some functions have numerous parameters. In order to clarify programming and avoid having to scroll through endless parameters, these functions have been grouped in sub-menus.

M

There may be an incompatibility between functions (see the incompatibility table  $\underline{13}$ ). In this case, the first function configured will prevent the remainder being configured.



Code	Description	Adjustment range	Factory setting
rPE-	Ramps	•	•
rPt	Type of ramp Defines the shape of the accelera	tion and deceleration ramps.	Lin
	L In: Linear 5: S ramp U: U ramp L U 5: Customized		
	S ramps  f (Hz) HSP HSP	The curve coefficient is fixed, with t2 = 0.6 x t1	
	0 t 12 t 1	with t1 = set ramp time.	
	U ramps f (Hz) HSP HSP 12 t 11 t 12 t	The curve coefficient is fixed, with t2 = 0.5 x t1 with t1 = set ramp time.	
	Customized ramps  f (Hz)  HSP  HSP  HSP  ACC or AC2  HSP  LA3  LA4  LA4  LA4  LA4  LACC or AC2	tA1: Can be set between 0 and tA2: Can be set between 0 and or AC2) tA3: Can be set between 0 and tA4: Can be set between 0 and dE2)	d (100% - tA1) (of ACC 1 100% (of dEC or dE2)
LAI	Start of CUS-type acceleration as % of total ramp time (ACC or	ramp rounded 0 to 100	10%



Co	de	Description	Adjustment range	Factory setting		
r P E - (continued)	Ŀ A Z	End of CUS-type acceleration ramp rounded as % of total ramp time (ACC or AC2)	0 to (100-tA1)	10%		
	Ŀ A ∃	Start of CUS-type deceleration ramp rounded as % of total ramp time (dEC or dE2)	0 to 100	10%		
	L A Y	End of CUS-type deceleration ramp as % of total ramp time (dEC or dE2)	0 to (100-tA3)	10%		
	A C C	Acceleration and deceleration ramp times (1)	0.1 to 999.9 s 0.1 to 999.9 s	3 s 3 s		
		Defined for accelerating and decelerating betweer (parameter in the drC- menu). Check that the value of dEC is not too low in relati				
	r P 5	Ramp switching		nO		
	FrE	This function remains active regardless of the config I: Not assigned L I I: Logic input LI1 L I I: Logic input LI2 L I I: Logic input LI3 L I I: Logic input LI3 L I I: Logic input LI4 L I I: Logic input LI5 L I I: Logic input LI6  If LAC = L3, the following assignments are possible If LAC = L3, the following assignments are pos	le: I word I word I word I word I word I word Control word bit is control word bit is in	n state 1.		
		The second ramp is switched if the value of Frt is not equal to 0 (0 deactivates the function) and the output frequency is greater than Frt.  Threshold ramp switching can be combined with switching via LI or bit as follows:				
		LI or bit Frequency Ramp				
		0 <frt acc,="" dec<="" td=""><td></td><td></td></frt>				
		0 >Frt AC2, dE2 1 <frt ac2,="" de2<="" td=""><td></td><td></td></frt>				
		1 >Frt AC2, dE2				
	A C 5	2 <sup>nd</sup> acceleration ramp time (1): Enabled via logic input (rPS) or frequency threshold (Frt).	0.1 to 999.9 s	5 s		
	4 E 2	<b>2<sup>nd</sup> deceleration ramp time</b> (1): Enabled via logic input (rPS) or frequency threshold (Frt).	0.1 to 999.9 s	5 s		
	ЬгЯ	Deceleration ramp adaptation		YES		
		Activating this function automatically adapts the de too low a value for the inertia of the load.  ¬ □: Function inactive  ¬ E 5: Function active. The function is incompatib  • Positioning on a ramp  • The use of a braking resistor (no guarantee of the brA is forced to nO if brake control (bLC) is assign	le with applications	requiring:		

(1) Parameter can also be accessed in the SEt- menu.



^ - JJ•		` L				
	C	ode		Description	Adjustment range	Factory setting
	5 E C -			Stop modes		
			5 Ł Ł	Normal stop mode		Stn
				Stop mode on disappearance of the run command r ПР: On ramp F 5 L: Fast stop n 5 L: Freewheel stop L I: DC injection stop	or appearance of a	stop command.
			F 5 Ł	Fast stop via logic input		nO
				n □: Not assigned  L I I: Logic input LI1  L I Z: Logic input LI2  L I J: Logic input LI3  L I Y: Logic input LI3  L I Y: Logic input LI5  L I E: Logic input LI5  L I E: Logic input LI6  If LAC = L3, the following assignments are possible  L J I: Bit 11 of the Modbus or CANopen control  L J I Z: Bit 12 of the Modbus or CANopen control  L J I Z: Bit 13 of the Modbus or CANopen control  L J I S: Bit 15 of the Modbus or CANopen control  L J I S: Bit 15 of the Modbus or CANopen control  L J I S: Bit 15 of the Modbus or CANopen control  L J I S: Bit 15 of the Modbus or CANopen control  L J I S: Bit 15 of the Modbus or CANopen control  The stop is activated when the logic state of the ir bit changes to 1. The fast stop is a stop on a reduction falls back to state 1 and the run command is still activated control has been configured (tCC = 2C and tC)	I word I word I word I word I word I word onput changes to 0 are ed ramp via parame ctive, the motor will o	ter dCF. If the input only restart if 2-wire
			d C F	cases, a new run command must be sent.  Coefficient for dividing the deceleration ramp	0 to 10	4
				time for fast stopping.  Ensure that the reduced ramp is not too low in rela The value 0 corresponds to the minimum ramp.	tion to the load to b	e stopped.
			d C I	DC injection via logic input		nO
				□ : Not assigned  L I I: Logic input L11  L I I: Logic input L12  L I I: Logic input L13  L I I: Logic input L14  L I I: Logic input L15  L I I: Logic input L15  L I I: Logic input L16  If LAC = L3, the following assignments are possible  □ I I: Bit 11 of the Modbus or CANopen control  □ I I: Bit 12 of the Modbus or CANopen control  □ I I: Bit 13 of the Modbus or CANopen control  □ I I: Bit 14 of the Modbus or CANopen control  □ I I: Bit 15 of the Modbus or CANopen control  □ I I: Bit 15 of the Modbus or CANopen control  □ I I: Bit 15 of the Modbus or CANopen control	I word I word I word I word	
				Braking is activated when the logic state of the inp	ut or control word bi	t is at 1.
			IdC	Level of DC injection braking current activated via logic input or selected as stop mode (1)(3)		0.7 ln (2)
				After 5 seconds the injection current is peak limited	d at 0.5 Ith if it is set	at a higher value.
			FAC	Total DC injection braking time selected as normal stop mode (1)(3)	0.1 to 30 s	0.5 s

<sup>(1)</sup> Parameter can also be accessed in the settings menu (SEt-).
(2) In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.
(3) Caution: These settings are not related to the "automatic standstill DC injection" function.



Co	de	Description	Adjustment range	Factory setting
5 £ C -	n 5 Ł	Freewheel stop via logic input		nO
(continued)		n □: Not assigned L I I: Logic input L11 L I 2: Logic input L12 L I 3: Logic input L13 L I 4: Logic input L14 L I 5: Logic input L15 L I 6: Logic input L16  The stop is activated when the input is in logic state run command is still active, the motor will on configured. In other cases, a new run command	ly restart if 2-wire I	



		J			
Со	de	Description	n	Adjustment range	Factory setting
A9C-		Standstill	DC injection	+	
	A 9 C	(at the end	d of the ramp)		YES
		# E 5: Sta E E: Conti ↑ This	ndstill injection for adjustable period nuous standstill injection s parameter gives rise to the injection of	f current even if a r	un command has not
	FGCI	Automatic	standstill DC injection time (1)	0.1 to 30 s	0.5 s
	5 d C 1			0 to 1.2 In (2)	0.7 In (2)
					•
	F G C S				0 s
	5 d C 2	2 <sup>na</sup> level o	f standstill DC injection current (1)	0 to 1.2 In (2)	0.5 ln (2)
		⚠ Che	ck that the motor will withstand this cur	rent without overhe	eating.
	AdC YES Ct Ct Speed	SdC2 x ≠ 0 = 0	Operation  SdC1 SdC2  tdC1  SdC1 SdC2  tdC1	tdC1+tdC2	
		### E  ##	### Standstill  ### Automatic (at the end  ### E S: Sta  ### E F: Contin  This bee  ### Level of an current (1)  ### Che  ### Automatic  ### Standstill  ### Automatic  ### Che  ### Automatic  ### Che  ### Che  ### Automatic  ### Che  ### Che  ### Automatic  ### Che  ### Ct  ### Ct  ### Ct  ### Ct  ### Ct  #### Ct  #### Ct  #### Che  ##### Che  ##### Che  ##### Che  ##### Che  ##### Che  ###### Che  ###################################	Standstill DC injection  Automatic standstill DC injection (at the end of the ramp)  A D: No injection  B E S: Standstill injection for adjustable period E S: Standstill DC injection for for adjustable period E S: Standstill DC injection for for adjustable period E S: Standstill DC injection for for adjustable period E S: Standstill DC injection for	Standstill DC injection  Automatic standstill DC injection [at the end of the ramp)  a D: No injection  y E 5: Standstill injection for adjustable period  L E: Continuous standstill injection of current even if a r  been sent. It can be accessed with the drive running.  E d L 1  Automatic standstill DC injection time (1)  Automatic standstill DC injection time (1)  Check that the motor will withstand this current without overhalt beautomatic standstill DC injection time (1)  and Check that the motor will withstand this current without overhalt beautomatic standstill DC injection time (1)  Check that the motor will withstand this current without overhalt beautomatic standstill DC injection current (1)  AdC SdC2 Operation  AdC SdC2 Operation

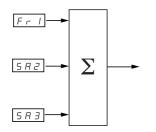
<sup>(1)</sup> Parameter can also be accessed in the settings menu (SEt-).

<sup>(2)</sup> In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.



Co	de	Description	Adjustment range	Factory setting
5 A I -		Summing inputs Can be used to sum one or two inputs to reference	ce Fr1 only.	
	5 A 2	Summing input 2		Al2
		n □: Not assigned  R I I: Analog input Al1  R I 2: Analog input Al2  R I 3: Analog input Al3  R I P: Potentiometer (type A drives only)  If LAC = L3, the following assignments are possib  I d b: Reference via Modbus  E R n: Reference via CANopen  L E E: Reference via the remote terminal, LFr pa		- menu page <u>16</u> .
	5 A 3	Summing input 3		nO
		n □: Not assigned  R I I: Analog input Al1  R I 2: Analog input Al2  R I 3: Analog input Al3  R I P: Potentiometer (type A drives only)  If LAC = L3, the following assignments are possib  I d b: Reference via Modbus  E R n: Reference via CANopen  L E E: Reference via the remote terminal, LFr pa		- menu page <u>16</u> .

### **Summing inputs**



### Note:

Al2 is an input  $\pm$  10 V, which can allow a subtraction by summing a negative signal.

See the complete diagrams on pages  $\underline{28}$  and  $\underline{30}$ .

### **Preset speeds**

 $2,\,4,\,8$  or 16 speeds can be preset, requiring 1, 2, 3 or 4 logic inputs respectively.

The following order of assignments must be observed: PS2, then PS4 then PS8, then PS16.

Combination table for preset speed inputs

16 speeds LI (PS16)	8 speeds LI (PS8)	4 speeds LI (PS4)	2 speeds LI (PS2)	Speed reference
0	0	0	0	Reference (1)
0	0	0	1	SP2
0	0	1	0	SP3
0	0	1	1	SP4
0	1	0	0	SP5
0	1	0	1	SP6
0	1	1	0	SP7
0	1	1	1	SP8
1	0	0	0	SP9
1	0	0	1	SP10
1	0	1	0	SP11
1	0	1	1	SP12
1	1	0	0	SP13
1	1	0	1	SP14
1	1	1	0	SP15
1	1	1	1	SP16

<sup>(1)</sup> See the diagrams on page 28 and page 30: Reference 1 = (SP1).

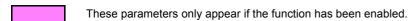


Code	Description	Adjustment range	Factory setting
P55-	Preset speeds		
P 5 2	2 preset speeds		If tCC = 2C: LI3
	Selecting the assigned logic input activates the normal: Not assigned L I I: Logic input LI1 L I 2: Logic input LI2 L I 3: Logic input LI3 L I 4: Logic input LI4 L I 5: Logic input LI5 L I 6: Logic input LI6	e function.	If tCC = 3C: nO If tCC = LOC: LI3
	If LAC = L3, the following assignments are po  L d I I: Bit 11 of the Modbus or CANopen of L d I Z: Bit 12 of the Modbus or CANopen of L d I Z: Bit 13 of the Modbus or CANopen of L d I Y: Bit 14 of the Modbus or CANopen of L d I S: Bit 15 of the Modbus or CANopen of	ontrol word ontrol word ontrol word ontrol word	
P 5 4	4 preset speeds		If tCC = 2C: LI4
	Selecting the assigned logic input activates the Check that PS2 has been assigned before assignment before assignments are poor before as it is before assignment before assignment before as it is before assignment before ass	signing PS4. ssible: ontrol word ontrol word ontrol word ontrol word ontrol word ontrol word	If tCC = 3C: nO If tCC = LOC: LI4
P 5 8	8 preset speeds  Selecting the assigned logic input activates th Check that PS4 has been assigned before as:  n : Not assigned  L ! !: Logic input L!1  L ! 2: Logic input L!2  L ! 3: Logic input L!3  L ! 4: Logic input L!4  L ! 5: Logic input L!5  L ! 6: Logic input L!6  If LAC = L3, the following assignments are po  E d ! !: Bit 11 of the Modbus or CANopen co  E d ! 3: Bit 12 of the Modbus or CANopen co  E d ! 4: Bit 13 of the Modbus or CANopen co  E d ! 4: Bit 14 of the Modbus or CANopen co  E d ! 5: Bit 15 of the Modbus or CANopen co	signing PS8. ssible: ontrol word ontrol word ontrol word ontrol word ontrol word ontrol word	nO



Code		Description	Adjustment range	Factory setting
,	P 5 1 6	16 preset speeds		nO
		Selecting the assigned logic input activates the Check that PS8 has been assigned before as a B: Not assigned L I I: Logic input L11 L I B: Logic input L12 L I B: Logic input L13 L I H: Logic input L14 L I D: Logic input L15 L I D: Logic input L16 L I D: Bit 11 of the Modbus or CANopen C L D I D: Bit 12 of the Modbus or CANopen C L D I D: Bit 13 of the Modbus or CANopen C L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O L D I D: Bit 14 of the Modbus O	ossigning PS16.  ossible:  ontrol word ontrol word ontrol word ontrol word ontrol word	
	5 <i>P 2</i>	L d 15: Bit 15 of the Modbus or CANopen c  2 <sup>nd</sup> preset speed (1)	0.0 to 500.0 Hz	10 Hz
	5 P 3	3 <sup>rd</sup> preset speed (1)	0.0 to 500.0 Hz	15 Hz
	5 P Y	4 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	20 Hz
	5 P S	5 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	25 Hz
	5 P 6	6 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	30 Hz
	5 P 7	7 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	35 Hz
	5 P B	8 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	40 Hz
	5 P 9	9 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	45 Hz
	5 <i>P I</i> 0	10 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	50 Hz
	5 <i>P I I</i>	11 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	55 Hz
	5 <i>P 12</i>	12 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	60 Hz
	5 <i>P</i> 13	13 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	70 Hz
	5 P 1 4	14 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	80 Hz
	5 <i>P</i> 15	15 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	90 Hz
	5 <i>P 16</i>	16 <sup>th</sup> preset speed (1)	0.0 to 500.0 Hz	100 Hz

<sup>(1)</sup> Parameter can also be accessed in the settings menu (SEt-).





	ode	Description	Adjustment range	Factory setting
J 0 G -		Jog operation		
	7 O C	Jog operation		If tCC = 2C: nO If tCC = 3C: LI4 If tCC = LOC: nO
		Selecting the assigned logic input activa  □ : Not assigned  L I I: Logic input L11  L I Z: Logic input L12  L I J: Logic input L13  L I Y: Logic input L14  L I S: Logic input L15  L I E: Logic input L16  Example: 2-wire control operation (tCC =  Motor Ramp frequency DEC/DE2 Reference  JGF reference		
		JGF reference		
		LI (JOG)		
		Forward	≥ 0.5 s	-
		Reverse 1 0		
	J G F	Jog operation reference (1)	0 to 10 Hz	10 Hz

(1) Parameter can also be accessed in the settings menu (SEt-).

### +/- speed

The function can only be accessed if LAC = L2 or L3 (see page  $\underline{33}$ ). Two types of operation are available.

- 1 Use of single action buttons: Two logic inputs are required in addition to the operating direction(s).

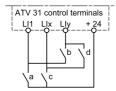
  The input assigned to the "+ speed" command increases the speed, the input assigned to the "- speed" command decreases the speed.
- 2 Use of double action buttons: Only one logic input assigned to "+ speed" is required.
- + speed/- speed with double action buttons:

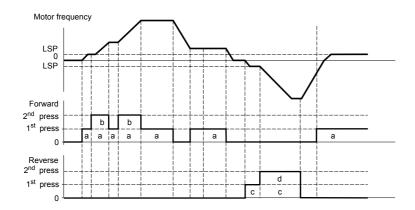
Description: 1 button pressed twice for each direction of rotation. Each action closes a contact.

	Released (- speed)	1 <sup>st</sup> press (speed maintained)	2 <sup>nd</sup> press (+ speed)
Forward button	_	а	a and b
Reverse button	_	С	c and d

Example of wiring:

LI1: forward Llx: reverse Lly: + speed





This type of +/- speed is incompatible with 3-wire control.

Whichever type of operation is selected, the max. speed is set by HSP (see page 16).

#### Note:

If the reference is switched via rFC (see page 34) from any reference channel to another with "+/- speed" the value of reference rFr (after ramp) is copied at the same time. This prevents the speed being incorrectly reset to zero when switching takes place.

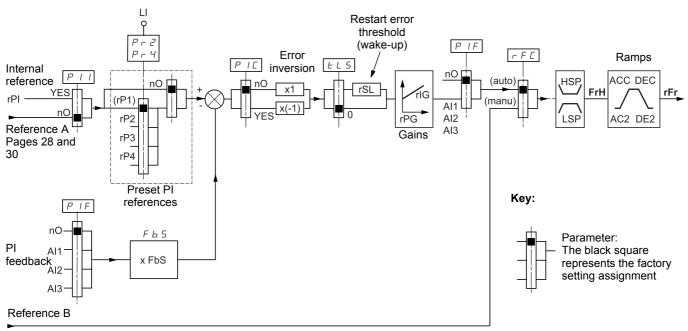


Co	ode	Description	Adjustment range	Factory setting
UPd-		+/- speed (motorized potentiometer) The function can only be accessed if LAC = L2 or I (see page 33).	L3 and UPdH or U	Pdt has been selected
	U S P	+ speed Can only be accessed for UPdt.		nO
		Selecting the assigned logic input activates the fund: Not assigned  Lil: Logic input LI1  Lil: Logic input LI2  Lil: Logic input LI3  Lil: Logic input LI4  Lil: Logic input LI5  Lil: Logic input LI5  Lil: Logic input LI6	nction.	
	4 S P	- speed Can only be accessed for UPdt.		nO
		Selecting the assigned logic input activates the fund: Not assigned  Lil: Logic input LI1  Lil: Logic input LI2  Lil: Logic input LI3  Lil: Logic input LI4  Lil: Logic input LI5  Lil: Logic input LI5  Lil: Logic input LI6	nction.	
	5 t r	Save reference		nO
		Associated with the "+/- speed" function, this parar • When the run commands disappear (saved to F • When the mains supply or the run commands d On the next start-up, the speed reference is the la π □: No save r ਜ Π: Save to RAM E E P: Save to EEPROM	RAM) lisappear (saved t	o EEPROM)

#### PI regulator

#### Diagram

The function is activated by assigning an analog input to the PI feedback (measurement).



Pages 28 and 30

#### PI feedback:

The PI feedback must be assigned to one of the analog inputs (Al1, Al2 or Al3).

#### PI reference:

The PI reference can be assigned to the following parameters in order of priority:

- Preset references via logic inputs (rP2, rP3, rP4)
- Internal reference (rPI)
- Reference Fr1 (see page 33)

Combination table for preset PI references

LI (Pr4)	LI (Pr2)	Pr2 = nO	Reference	
			rPI or Fr1	
0	0	<u> </u>	rPI or Fr1	
0	1		rP2	
1	0		rP3	
1	1	rP4		

#### Parameters which can be accessed in the settings menu (SEt-):

- Internal reference (rPI)
- Preset references (rP2, rP3, rP4)
- Regulator proportional gain (rPG)
- Regulator integral gain (rIG)
- FbS parameter:

The FbS parameter can be used to scale the reference on the basis of the variation range of the PI feedback (sensor rating).

E.g.: Pressure control

PI reference (process) 0 - 5 bar (0 - 100%)

Rating of pressure sensor 0 - 10 bar

FbS = Max. sensor scale/Max. process

FbS = 10/5= 2

rSL parameter:

Can be used to set the PI error threshold above which the PI regulator will be reactivated (wake-up) after a stop due to the max. time threshold being exceeded at low speed (tLS).

Reversal of the direction of correction (PIC): If PIC = nO, the speed of the motor will increase when the error is positive, for example: pressure control with a compressor. If PIC = YES, the speed of the motor will decrease when the error is positive, for example: temperature control via a cooling fan.

#### "Manual - Automatic" operation with PI

This function combines the PI regulator and the switching of reference rFC (page <u>34</u>). The speed reference is given by Fr2 or by the PI function, depending on the state of the logic input.

### Setting up the PI regulator

#### 1 Configuration in PI mode

See the diagram on page 49

#### 2 Perform a test in factory settings mode (in most cases, this will be sufficient).

To optimize the drive, adjust rPG or rIG gradually and independently and observe the effect on the PI feedback in relation to the reference.

#### 3 If the factory settings are unstable or the reference is incorrect:

Perform a test with a speed reference in Manual mode (without PI regulator) and with the drive on load for the speed range of the system:

- In steady state, the speed must be stable and comply with the reference and the PI feedback signal must be stable.
- In transient state, the speed must follow the ramp and stabilize quickly and the PI feedback must follow the speed.

If this is not the case, see the settings for the drive and/or sensor signal and cabling.

#### Switch to PI mode.

Set brA to no (no auto-adaptation of the ramp).

Set the speed ramps (ACC, dEC) to the minimum permitted by the mechanics without triggering an ObF fault.

Set the integral gain (rIG) to minimum.

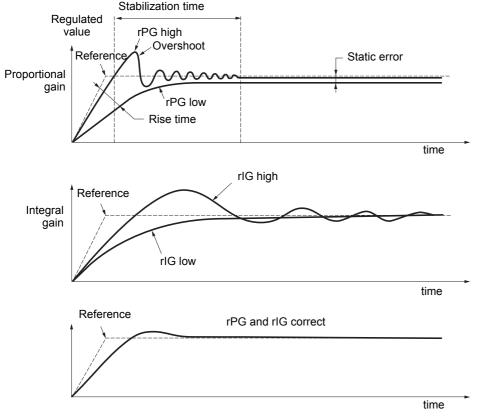
Observe the PI feedback and the reference.

Do several RUN/STOP or vary the load or reference rapidly.

Set the proportional gain (rPG) in order to ascertain the ideal compromise between response time and stability in transient phases (slight overshoot and 1 to 2 oscillations before stabilizing).

If the reference varies from the preset value in steady state, gradually increase the integral gain (rIG), reduce the proportional gain (rPG) in the event of instability (pump applications), find a compromise between response time and static precision (see diagram).

Perform in-production tests throughout the reference range.



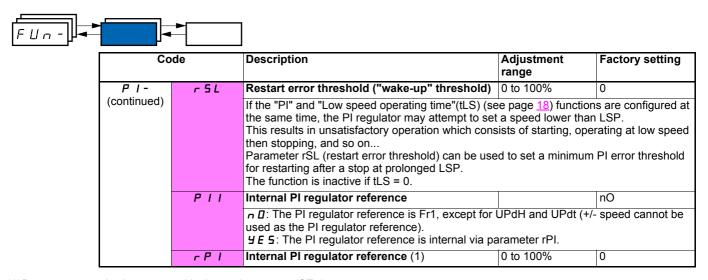
The oscillation frequency depends on the system kinematics.

Par	ameter	Rise time	Overshoot	Stabilization time	Static error
rPG	1	**	1	=	`
rlG	A	*	11	1	11



ሥ .					
	Co	ode	Description	Adjustment range	Factory setting
	P 1-		PI regulator	!	
		PIF	PI regulator feedback		nO
			# I. Not assigned # I I: Analog input Al1 # I Z: Analog input Al2 # I J: Analog input Al3		
		r P G	PI regulator proportional gain (1)	0.01 to 100	1
			Contributes to dynamic performance during rapi	d changes in the P	I feedback.
		r 16	PI regulator integral gain (1)	0.01 to 100	1
			Contributes to static precision during slow chang	ges in the PI feedba	ack.
		F 6 5	PI feedback multiplication coefficient (1)	0.1 to 100	1
			For process adaptation		
		PIC	Reversal of the direction of correction of the PI regulator (1)		nO
			n □: normal y E 5: reverse		
		Pr2	2 preset PI references Selecting the assigned logic input activates the	_	nO
			n □: Not assigned L I I: Logic input LI1 L I □: Logic input LI2 L I □: Logic input LI3 L I □: Logic input LI3 L I □: Logic input LI4 L I □: Logic input LI5 L I □: Logic input LI6 If LAC = L3, the following assignments are poss □ □ I I: Bit 11 of the Modbus or CANopen cont □ □ I □: Bit 12 of the Modbus or CANopen cont □ □ I □: Bit 13 of the Modbus or CANopen cont □ □ I □: Bit 14 of the Modbus or CANopen cont □ □ I □: Bit 15 of the Modbus or CANopen cont	trol word trol word trol word trol word	
		Pr4	4 preset PI references		nO
			Selecting the assigned logic input activates the Check that Pr2 has been assigned before assign I: Not assigned  L I I: Logic input LI1  L I I: Logic input LI2  L I I: Logic input LI3  L I II: Logic input LI4  L I I: Logic input LI4  L I I: Logic input LI5  L I I: Logic input LI6  If LAC = L3, the following assignments are poss	ning Pr4.	
			☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	trol word trol word trol word trol word	
		r P 2	2 <sup>nd</sup> preset PI reference (1)	0 to 100%	30%
			Only appears if Pr2 has been enabled by selecti	• •	
		rP3	3 <sup>rd</sup> preset PI reference (1) Only appears if Pr4 has been enabled by selecti	0 to 100%	60%
		r P 4	4 <sup>th</sup> preset PI reference (1) Only appears if Pr4 has been enabled by selection	0 to 100%	90%
			any appears in the flat been ellabled by selecti	g an impat.	

(1) Parameter can also be accessed in the settings menu (SEt-).



(1) Parameter can also be accessed in the settings menu (SEt-).

	These parameters only appear if the function has been enabled.
--	--

#### **Brake control**

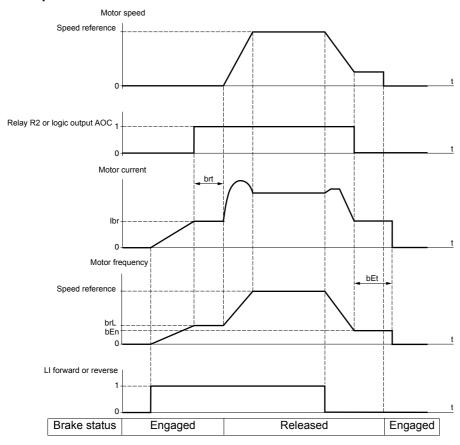
The function can only be accessed if LAC = L2 or L3 (page 28).

This function, which can be assigned to relay R2 or to logic output AOC, enables the drive to manage an electromagnetic brake.

#### Principle:

Synchronize brake release with the build-up of torque during start-up and brake engage at zero speed on stopping, to prevent jolting.

#### **Brake sequence**



Settings which can be accessed in the FUn-menu:

- Brake release frequency (brL)
- Brake release current (lbr)
- Brake release time (brt)
- Brake engage frequency (bEn)
- Brake engage time (bEt)
- Brake release pulse (blP)

Recommended settings for brake control:

- 1 Brake release frequency:
  - Horizontal movement: Set to 0.
  - Vertical movement: Set to a frequency equal to the nominal slip of the motor in Hz.
- 2 Brake release current (lbr):
  - Horizontal movement: Set to 0.
  - Vertical movement: Preset the nominal current of the motor then adjust it in order to prevent jolting on start-up, making sure that the maximum load is held when the brake is released.
- 3 Brake release time (brt):

Adjust according to the type of brake. It is the time required for the mechanical brake to release.

- 4 Brake engage frequency (bEn)
  - Horizontal movement: Set to 0.
  - Vertical movement: Set to a frequency equal to the nominal slip of the motor in Hz. Caution: bEn maxi = LSP, you must therefore
    first set LSP to a sufficient value.
- 5 Brake engage time (bEt):

Adjust according to the type of brake. It is the time required for the mechanical brake to engage.

- 6 Brake release pulse:
  - Horizontal movement: Set to nO.
  - Vertical movement: Set to YES and check that the motor torque direction for "Forward" control corresponds to the upward direction of the load. If necessary, reverse two motor phases. This parameter generates motor torque in an upward direction regardless of the direction of operation commanded in order to maintain the load whilst the brake is releasing.



Co	de	Description	Adjustment range	Factory setting
<i>₽</i>		Brake control The function can only be accessed if LAC = L2 or	L3 (page <u>28</u> ).	
	ЬЬС	Brake control configuration		nO
		n ☐: Not assigned r æ: Relay R2 d ☐: Logic output AOC  If bLC is assigned, parameter FLr (page 61) and parameter OPL (page 61) is forced to YES.	d brA (page <u>38</u> ) are	e forced to nO, and
	b r L	Brake release frequency	0.0 to 10.0 Hz	According to drive rating
	ІЬг	Motor current threshold for brake release	0 to 1.36 ln (1)	According to drive rating
	brt	Brake release time	0 to 5 s	0.5 s
	L 5 P	Low speed	0 to HSP (page <u>16</u> )	0 Hz
		Motor frequency at min. reference. This parameter (page <u>16</u> ).	r can also be modifie	ed in the SEt- menu
	b E n	Brake engage frequency threshold	nO - 0 to LSP	nO
		п 🏻: Not adjusted 0 to LSP: Adjustment range (Hz) If bLC is assigned and bEn remains equal to nO, first run command.	the drive will lock of	on a bLF fault at the
	Ь E Ł	Brake engage time	0 to 5 s	0.5s
	ЬІР	Brake release pulse		nO
		n   : Whilst the brake is releasing, the motor torqu of rotation commanded.  ! E 5: Whilst the brake is releasing, the motor regardless of the direction of operation commanded.  Check that the motor torque direction for upward direction of the load. If necessary	or torque direction ed. or "Forward" control	is always forward, corresponds to the

(1) In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.



Code		Description	Adjustment range	Factory setting
L C 2 -		Switching for second current limit The function can only be accessed if LAC = L2 or	L3 (page <u>28</u> ).	•
	L C 2	Switching for second current limit		nO
		Selecting the assigned logic input activates the full in II: Not assigned L I I: Logic input LI1 L I I: Logic input LI2 L I I: Logic input LI3 L I I: Logic input LI3 L I I: Logic input LI4 L I S: Logic input LI5 L I I: Logic input LI6 If LAC = L3, the following assignments are possible LAC = L3, the following	le: ol word	Et- menu page <u>18</u> ).
	C L 2	2 <sup>nd</sup> current limit (1)	0.25 to 1.5 ln (2)	1.5 In (2)

<sup>(1)</sup>Parameter can also be accessed in the settings menu (SEt-).
(2)In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.



Code		Description	Adjustment range	Factory setting
CHP-		Motor switching The function can only be accessed if LAC = L2 or	L3 (page 28).	4
	CHP	Switching, motor 2		nO
		n : Not assigned L		
		If LAC = L3, the following assignments are possible	e:	
		□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	l word l word l word	
		LI or bit = 0: Motor 1 LI or bit = 1: Motor 2		
		- The motor switching function disables means of motor thermal protection mus - If you use this function, do not use the motor 2 and do not configure tUn = rUn - Changes to parameters are only taken	t therefore be provio tUn auto-tuning fur or POn.	ded. nction (page <u>21</u> ) or
L	J n 5 2	Nominal motor voltage (motor 2) given on the rating plate	According to drive rating	According to driverating
	*	ATV31•••M2: 100 to 240 V ATV31•••M3X: 100 to 240 V ATV31•••N4: 100 to 500 V ATV31•••S6X: 100 to 600 V		
F	r 5 2	Nominal motor frequency (motor 2) given on the rating plate	10 to 500 Hz	50 Hz
		The ratio UnS (in volts) FrS (in Hz)  ATV31•••M2: 7 max.  ATV31•••M3X: 7 max.  ATV31•••N4: 14 max.  ATV31•••S6X: 17 max.  The factory setting is 50 Hz, or 60 Hz if bFr is set to	d the following value	es
	n [ r 2	rating plate	0.25 to 1.5 ln (2)	According to driv rating
	∍ 5 P 2	Nominal motor speed (motor 2) given on the rating plate	0 to 32760 RPM	According to driv rating
		0 to 9999 RPM then 10.00 to 32.76 KRPM If, rather than the nominal speed, the rating plate in slip in Hz or as a %, calculate the nominal speed a	dicates the synchro	nous speed and th
		Nominal speed = Synchronous speed x	- P - 2 - 1 1	Alle masteres
		or	50 \	Hz motors) Hz motors)

<sup>(1)</sup>Parameter can also be accessed in the settings menu (SEt-).
(2)In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.



,,, L	Co	de	Description	Adjustment	Factory setting
			•	range	
	CHP - (continued)	C 0 S 2	Motor Cos Phi (motor 2) given on the rating plate	0.5 to 1	According to drive rating
		UF Ł Z	Selection of the type of voltage/frequency ratio motor 2		n
			L : Constant torque for motors connected in paralle P: Variable torque: Pump and fan applications	el or special motors	
			n: Sensorless flux vector control for constant torque		ala di manazione
			n L d: Energy saving, for variable torque application (behaves in a similar way to the P ratio at no load		
			Voltage UnS UnS		
			L		
			FrS Frequency		
		UF r 2	IR compensation/Voltage boost, motor 2 (1)	0 to 100%	20
			For UFt2 = n or nLd: IR compensation. For UFt2 = Used to optimize the torque at very low speed (inc Check that the value of UFr2 is not too high for who Modifying UFt2 will cause UFr2 to return to the fac	rease UFr2 if the to en the motor is warm	rque is insufficient).
		F L G 2	Frequency loop gain, motor 2 (1)	1 to 100%	20
			Parameter can only be accessed if UFt2 = n or nLi The FLG2 parameter adjusts the drive's ability to f inertia of the machine being driven. Too high a gain may result in operating instability.		np based on the
			FLG2 low FLG2 corre		FLG2 high
			Hz 4 50 50	Hz 4 50	<u> </u>
			In this case, increase FLG2 20 10 0	40 - 30 - 20 - 10 -	In this case, reduce FLG2
			-10 -10 -10 -10 0.1 0.2 0.3 0.4 0.5 t -10 0 0.1 0.2 0.3 (	0.4 0.5 t -10 0 0.1	0.2 0.3 0.4 0.5 t
		5 L A 2	Frequency loop stability, motor 2 (1)	1 to 100%	20
			Parameter can only be accessed if UFt2 = n or nL Used to adapt the return to steady state after a specific deceleration), according to the dynamics of the magnaturally increase the stability to avoid any overs	eed transient (accel achine.	eration or
			StA2 low StA2 correct		StA2 high
			Hz 4 50	Hz 4 50	
			40	40 - 30 - 20 - 10 -	In this case, reduce StA2
			-10 0 0.1 0.2 0.3 0.4 0.5 t -10 0.1 0.2 0.3 0	0 0.4 0.5 t -10 0 0.1	0.2 0.3 0.4 0.5 t
		5 L P 2	Slip compensation, motor 2 (1)	0 to 150%	100
			Parameter can only be accessed if UFt2 = n or nL Used to adjust the slip compensation value fixed b		and
			The speeds given on motor rating plates are not no	ecessarily exact.	
			<ul> <li>If slip setting &lt; actual slip: the motor is not rotati</li> <li>If slip setting &gt; actual slip: the motor is overcom</li> </ul>		
<u>.</u>			<u> </u>		

(1) Parameter can also be accessed in the settings menu (SEt-).

### Management of limit switch

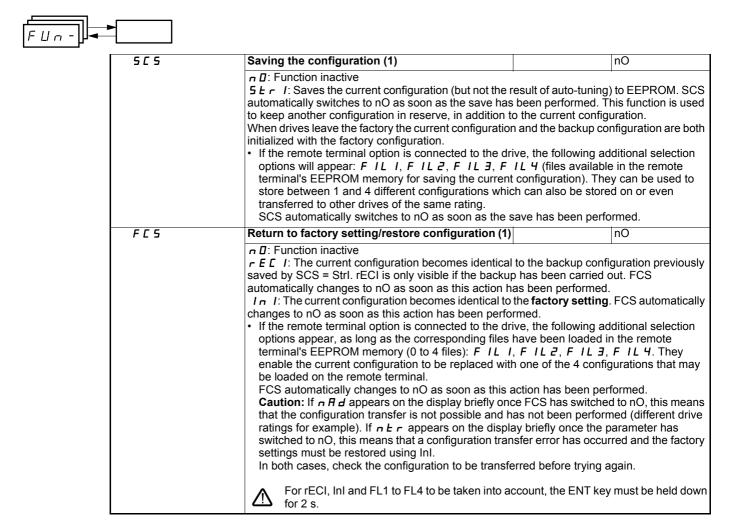
The function can only be accessed if LAC = L2 or L3 (page  $\underline{28}$ ). It can be used to manage the operation of one or two limit switches (1 or 2 directions of operation):

- Assignment of one or two logic inputs (forward limit, reverse limit)
- Selection of the type of stop (on ramp, fast or freewheel)
  - Following a stop, the motor is permitted to restart in the opposite direction only.
- The stop is performed when the input is in state 0. The direction of operation is authorized in state 1.



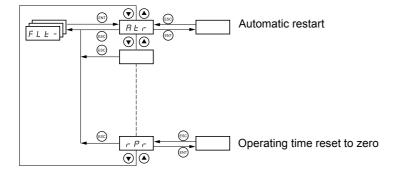
Cod	de	Description	Adjustment range	Factory setting
L 5 E -		Management of limit switches The function can only be accessed if LAC = L2 or L3	3 (page <u>28</u> ).	
	LAF	Limit, forward direction		nO
		n □: Not assigned L I I: Logic input LI1 L I ≥: Logic input LI2 L I ∃: Logic input LI3 L I 4: Logic input LI4 L I 5: Logic input LI5 L I 6: Logic input LI6		
	LAr	Limit, reverse direction		nO
		n □: Not assigned L I I: Logic input Ll1 L I ≥: Logic input Ll2 L I ∃: Logic input Ll3 L I Ч: Logic input Ll4 L I 5: Logic input Ll5 L I E: Logic input Ll6		
	L A S	Type of limit switch stop		nSt
		F Γ P: On ramp F 5 L: Fast stop π 5 L: Freewheel stop		

These parameters only appear if the function has been enabled via the selection of a logic input.



(1)SCS and FCS can be accessed via several configuration menus but they concern all menus and parameters as a whole.

### Fault menu FLt-

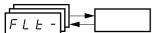


The parameters can only be modified when the drive is stopped and no run command is present. On the optional remote terminal, this menu can be accessed with the switch in the  $\Box$  position.

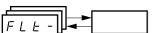


Code	Description	Factory setting
Atr	Automatic restart	nO
HEF	n □: Function inactive  y E 5: Automatic restart, after locking on a fault, if the fault has disappeared and the o conditions permit the restart. The restart is performed by a series of automatic attemptincreasingly longer waiting periods: 1 s, 5 s, 10 s, then 1 min for the following periods. If the restart has not taken place once the configurable time tAr has elapsed, the proceethe drive remains locked until it is powered down then powered up. The following faults permit this function:  External fault (EPF)  Loss of 4-20 mA reference (LFF)  CANopen fault (COF)  System overvoltage (OSF)  Loss of a line phase (PHF)  Loss of a motor phase (OPF)  DC bus overvoltage (ObF)  Motor overload (OLF)  Serial link (SLF)  Drive overheating (OHF)  The drive safety relay remains activated if this function is active. The speed reference direction must be maintained.  Use 2-wire control (tCC = 2C) with tCt = LEL or PFO (page 23).  Check that an automatic restart will not endanger personnel or equipment.	other operating is separated by dure is aborted and and the operating
Ł A r	Max. duration of restart process	5
	5: 5 minutes  I □: 10 minutes  I □: 30 minutes  I h: 1 hour  I h: 2 hours  I h: 3 hours  I h: 3 hours  I h: 3 hours  I h: 3 hours  I h: 4 minutes  I h: 6 minutes  I h: 6 minutes  I h: 7 minutes  I h: 9 minutes  I h: 9 minutes  I h: 10 minutes	estarts on a recurrent
r 5 F	Reset of current fault	no
	n D: Not assigned L I I: Logic input LI1 L I 2: Logic input LI2 L I 3: Logic input LI3 L I 4: Logic input LI4 L I 5: Logic input LI5 L I 6: Logic input LI6	

### Fault menu FLt-

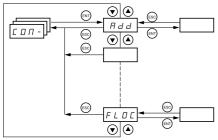


Code	Description	Factory setting
FLr	Flying restart (automatic catching a spinning load on ramp)	nO
	Used to enable a smooth restart if the run command is maintained after the following e  - Loss of line supply or disconnection  - Reset of current fault or automatic restart  - Freewheel stop  The speed given by the drive resumes from the estimated speed of the motor at the time follows the ramp to the reference speed.  This function requires 2-wire control (tCC = 2C) with tCt = LEL or PFO.  n D: Function inactive  y E 5: Function active  When the function is operational, it activates at each run command, resulting in a slight (1 second max.)	e of the restart, then
EEF	FLr is forced to nO if brake control (bLC) is assigned (page 54).  External fault	nO
	n □: Not assigned  L I I: Logic input LI1  L I □: Logic input LI2  L I □: Logic input LI3  L I □: Logic input LI3  L I □: Logic input LI4  L I □: Logic input LI5  L I □: Logic input LI6  If LAC = L3, the following assignments are possible:  L □ I I: Bit 11 of the Modbus or CANopen control word  L □ I □: Bit 12 of the Modbus or CANopen control word  L □ I □: Bit 13 of the Modbus or CANopen control word  L □ I □: Bit 14 of the Modbus or CANopen control word  L □ I □: Bit 15 of the Modbus or CANopen control word	
EPL	Stop mode in the event of an external fault EPF	YES
	n ☐: Fault ignored  9 E 5: Fault with freewheel stop  ¬ П P: Fault with stop on ramp  F 5 L: Fault with fast stop	
OPL	Configuration of motor phase loss fault	YES
	n ☐: Function inactive  ☐ E 5: Triggering of OPF fault  ☐ R ☐: No fault triggered but management of the output voltage in order to avoid an ov link with the motor is re-established and flying restart even if FLr = nO. To be used with contactor.  OPL is forced to YES if brake control (bLC) is assigned (page 54).	n downstream
IPL	Configuration of line phase loss fault	YES
	This parameter is only accessible on 3-phase drives.  ¬ □: Fault ignored  ¬ E 5: Fault with fast stop	
OHL	Stop mode in the event of a drive overheating fault OHF	YES
	n □: Fault ignored  9 E 5: Fault with freewheel stop  □ □ □ □ Fault with stop on ramp  F 5 L: Fault with fast stop	
OLL	Stop mode in the event of a motor overload fault OLF	YES
	□ : Fault ignored  9 E 5: Fault with freewheel stop  □ □ P: Fault with stop on ramp  F 5 L: Fault with fast stop	



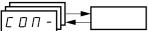
Code	Description	Adjustment range	Factory setting
5 L L	Stop mode in the event of a Modbus serial link fault SLF	rango	YES
	Π D: Fault ignored  9 E 5: Fault with freewheel stop  Π P: Fault with stop on ramp  F 5 L: Fault with fast stop		
C 0 L	Stop mode in the event of a CANopen serial link fault COF		YES
	☐ ☐: Fault ignored ☐ ☐ ☐: Fault with freewheel stop ☐ ☐ ☐ ☐: Fault with stop on ramp ☐ ☐: Fault with fast stop		
EnL	Configuration of auto-tuning fault tnF		YES
	☐ ☐: Fault ignored (the drive reverts to the factory settings) ☐ ☐: Fault with drive locked	1	
LFL	Stop mode in the event of a loss of 4 - 20 mA signal fault LFF		nO
	<ul> <li>□ : Fault ignored (only value possible if CrL3 ≤ 3 mA, see page 24)</li> <li>□ : Fault with freewheel stop</li> <li>□ : F : The drive switches to the fallback speed (LFF parameter)</li> <li>□ : L : The drive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : □ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : □ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : □ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disappeared.</li> <li>□ : The trive maintains the speed at which it was travelling when the fault occurred until the fault has disapp</li></ul>		
LFF	Fallback speed	0 to 500 Hz	10 Hz
	Fallback speed setting for stopping in the event of a fault		
drn	Derated operation in the event of an overvoltage		nO
	n □: Function inactive  9 E 5: The line voltage monitoring threshold is:  ATV31•••M3: 130 V  ATV31•••M3: 130 V  ATV31•••N4: 270 V  ATV31•••S6X: 340 V  In this case, a line choke must be used and the performance of the drive cannot be guaranteed.  In order to assign this function, you must press and hold down the "ENT" key for 2 seconds.		
5 <i>E P</i>	Controlled stop on mains power break		nO
	π Δ: Locking of the drive and freewheel stopping of the motor  Π Π 5: This stop mode uses the inertia to maintain the drive power supply as long as possible.  r Π P: Stop according to the valid ramp (dEC or dE2)  F 5 L: Fast stop, the stopping time depends on the inertia and the braking ability of the drive.		
I n H	Fault inhibit		nO
	Inhibiting faults may damage the drive beyond repair. This w  In II: Not assigned  L I I: Logic input L11  L I II: Logic input L12  L I II: Logic input L13  L I II: Logic input L14  L I II: Logic input L15  L I II: Logic input L16  Fault monitoring is active when the input is in state 0.  It is inactive when the input is in state 1.  All active faults are reset on a rising edge (from 1 to 0) of the input. In order to assign this function, you must press and hold down the		
r P r	Operating time reset to zero		nO
	n ☐: No r Ł H: Operating time reset to zero The rPr parameter automatically falls back to nO as soon as the re	set to zero is perfo	rmed.

### Communication menu COM-



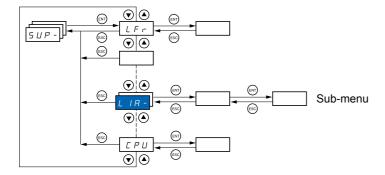
The parameters can only be modified when the drive is stopped and no run command is present. Modifications to parameters Add, tbr, tFO, AdCO and bdCO are only taken into account following a restart.

On the optional remote terminal, this menu can be accessed with the switch in the position.



		<u> </u>	
Code	Description	Adjustment range	Factory setting
Add	Modbus: Drive address 1 to 247 1		1
ŁЬг	Modbus: Transmission speed		19200
	4.8: 4800 bps9.6: 9600 bps19.2: 19200 bps (Caution: The remote terminal can only be used with this value.)		
Ł F O	Modbus communication format		8E1
	<ul> <li>B□ I: 8 data bits, odd parity, 1 stop bit</li> <li>BE I: 8 data bits, even parity, 1 stop bit (Caution: The remote ter</li> <li>B□ I: 8 data bits, no parity, 1 stop bit</li> <li>B□ I: 8 data bits, no parity, 2 stop bits</li> </ul>	minal can only be	used with this value.)
F F O	Modbus: Time-out	0.1 to 10 s	10 s
AGCO	CANopen: Drive address	0 to 127	0
6 d C O	CANopen: Transmission speed		125
ErCO	2 □. □: 20 kbps 5 □. □: 50 kbps I 2 5 . □: 125 kbps 2 5 □. □: 250 kbps 5 □ □. □: 500 kbps I □ □ □: 1000 kbps CANopen: Error registry (read-only)	T	
= - L U	D: "No error"		
	I: "Bus off error"  2: "Life time error"  3: "CAN overrun"  4: "Heartbeat error"		
F L O	Forced local mode		nO
	n □: Not assigned L I I: Logic input L11 L I 2: Logic input L12 L I 3: Logic input L13 L I 4: Logic input L14 L I 5: Logic input L15 L I 6: Logic input L16 In forced local mode, the terminal block and display terminal regain	n control of the driv	e.
FLOC	Selection of the reference and control channel in forced local		Al1
	mode		AIP for
	Can only be accessed if LAC = 3	t Difunctions sum	ATV31
	In forced local mode, only the speed reference is taken into accoun not active.  See the diagrams on pages 28 to 31.  # I I: Analog input Al1, logic inputs LI  # I 2: Analog input Al2, logic inputs LI  # I 3: Analog input Al3, logic inputs LI  # I P: Potentiometer (type A drives only), RUN/STOP buttons  L C C: Remote terminal: LFr reference page 16, RUN/STOP/FWD.		ining inputs, etc. are

### Display menu SUP-



Parameters can be accessed with the drive running or stopped.

On the optional remote terminal, this menu can be accessed with the switch in any position.

Some functions have numerous parameters. In order to clarify programming and avoid having to scroll through endless parameters, these functions have been grouped in sub-menus.

Like menus, sub-menus are identified by a dash after their code: LIR- for example.

When the drive is running, the value displayed is that of one of the monitoring parameters. By default, the value displayed is the output frequency applied to the motor (rFr parameter).

Whilst the value of the new monitoring parameter required is being displayed, press and hold down the "ENT" key (2 seconds) to confirm the change of monitoring parameter and store this. From now on, the value of this parameter will be displayed while the drive is running (even after it has been disconnected).

If the new choice is not confirmed by pressing the "ENT" key a second time, the drive will return to the previous parameter after it has been switched off.

## Display menu SUP-



Code	Description	Variation range
LFr	Frequency reference for control via built-in	0 to 500 Hz
	terminal or remote terminal	
rPl	Internal PI reference	0 to 100%
FrH	Frequency reference before ramp (absolute value)	0 to 500 Hz
rFr	Output frequency applied to the motor	- 500 Hz to + 500 Hz
5 <i>P d 1</i> or		
5 P d 2	Output value in customer units	
or 5 <i>P d 3</i>	SPd1 or SPd2 or SPd3 depending on the SdS pasettings mode).	arameter, see page 19 (SPd3 in factory
LEr	Current in the motor	
OP r	Motor power	
	100% = Nominal motor power, calculated using th	
ULn	Line voltage (gives the line voltage via the DC bu	is, motor running or stopped)
Ł H r	Motor thermal state	
	100% = Nominal thermal state 118% = "OLF" threshold (motor overload)	
Ł H d	Drive thermal state	
	100% = Nominal thermal state 118% = "OHF" threshold (motor overload)	
LFE	Last fault	
	Last rault  L L F: Brake control fault  C F F: Configuration (parameters) incorrect  C F I: Configuration (parameters) invalid  C □ F: Communication fault line 2 (CANopen)  C r F: Capacitor pre-charge fault  E E F: EEPROM memory fault  E P F: External fault  I n F: Internal fault  L F F: 4 - 20 mA fault on Al3  n □ F: No fault saved  □ L F: DC bus overvoltage fault  □ L F: Overcurrent fault  □ L F: Motor overload fault  □ L F: Motor overload fault  □ P F: Motor phase loss fault  □ S F: Line supply overvoltage fault  P H F: Line supply phase loss fault  S C F: Modbus communication fault  S □ F: Motor overspeed fault  E n F: Auto-tuning fault  L n F: Auto-tuning fault  U S F: Line supply undervoltage fault	
0 t r	Motor torque	
	100% = Nominal motor torque, calculated using the	e parameters entered in the drC- menu.
r Ł H	Operating time	0 to 65530 hours
	Total time the motor has been powered up: 0 to 9999 (hours), then 10.00 to 65.53 (kilo-hours) Can be reset to zero by the rPr parameter in the F	



Code	Description
C 0 4	Terminal locking code
•	Enables the drive configuration to be protected using an access code.
	Caution: Before entering a code, do not forget to make a careful note of it.
	□ F F : No access locking codes
	- To lock access, enter a code (2 to 9999). The display can be incremented using 🛦.
	Now press "ENT". "On" appears on the screen to indicate that the parameters have been locked.
	• 🗓 <u>n</u> : A code is locking access (2 to 9999)
	<ul> <li>To unlock access, enter the code (incrementing the display using ▲) and press "ENT". The code remains on the display and access is unlocked until the next power down. Parameter access will be locked again on the next power-up.</li> </ul>
	<ul> <li>If an incorrect code is entered, the display changes to "On" and the parameters remain locked.</li> </ul>
	<ul> <li>XXXX: Parameter access is unlocked (the code remains on the screen).</li> <li>To reactivate locking with the same code when the parameters have been unlocked, return to "On" using the ▼ button then press "ENT". "On" appears on the screen to indicate that the parameters have been locked.</li> </ul>
	<ul> <li>To lock access with a new code when the parameters have been unlocked, enter a new code (increment the display using ▲ or ▼) and press "ENT". "On" appears on the screen to indicate that the parameters have been locked.</li> </ul>
	<ul> <li>To clear locking when the parameters have been unlocked, return to "OFF" using the         w button and press "ENT". "OFF" remains on the screen. The parameters are         unlocked and will remain unlocked until the next restart.</li> </ul>
	When access is locked using a code, only the monitoring parameters can be accessed with only a temporary choice of parameter displayed.
Ł U 5	State of auto-tuning
	<ul> <li>Ł Ħ ₺: The default stator resistance value is used to control the motor.</li> <li>P E n ඪ: Auto-tuning has been requested but not yet performed.</li> <li>P r □ □: Auto-tuning in progress.</li> <li>F Ħ I L: Auto-tuning has failed.</li> <li>ඪ □ n E: The stator resistance measured by the auto-tuning function is used to manage</li> </ul>
	the drive. $5 E r d$ : The cold stator resistance (rSC other than nO) that is used to control the motor.
UdP	Indicates the ATV31 firmware version. E.g.: 1102 = V1.1 IE02.
LIA-	Logic input functions
L I I A L I 2 A L I 3 A L I 4 A L I 5 A L I 6 A	Can be used to display the functions assigned to each input. If no functions have been assigned, nO is displayed. Use the <b>\( \)</b> and <b>\( \)</b> arrows to scroll through the functions. If a number of functions have been assigned to the same input, check that they are compatible.
L 15	Can be used to display the state of the logic inputs (using the segments of the display: high = 1, low = 0)
	State 1
	State 0 LI1 LI2 LI3 LI4 LI5 LI6
	Example above: LI1 and LI6 are at 1, LI2 to LI5 are at 0.
AIA-	Analog input functions
A I IA A I 2 A A I 3 A	Can be used to display the functions assigned to each input. If no functions have been assigned, nO is displayed. Use the ▲ and ▼ arrows to scroll through the functions. If a number of functions have been assigned to the same input, check that they are compatible.

### **Maintenance**

#### Servicing

The Altivar 31 does not require any preventative maintenance. It is nevertheless advisable to perform the following regularly:

- · Check the condition and tightness of connections.
- Ensure that the temperature around the unit remains at an acceptable level and that ventilation is effective (average service life of fans: 3 to 5 years depending on the operating conditions).
- Remove any dust from the drive.

#### Assistance with maintenance, fault display

If a problem arises during setup or operation, ensure that the recommendations relating to the environment, mounting and connections have been observed.

The first fault detected is stored and displayed, flashing, on the screen: the drive locks and the fault relay (RA - RC) contact opens, if it has been configured for this function.

#### Clearing the fault

Cut the power supply to the drive in the event of a non-resettable fault.

Wait for the display to go off completely.

Find the cause of the fault in order to correct it.

The drive is unlocked after a fault by:

- · Switching off the drive until the display disappears completely, then switching on again
- Automatically in the cases described in the "automatic restart" function (FLt- menu, Atr = YES)
- Via a logic input when this input is assigned to the "fault reset" function (FLt- menu, rSF = LI●)

#### Monitoring menu:

This is used to prevent and find the causes of faults by displaying the drive status and its current values.

#### Spares and repairs:

Consult Schneider Electric product support.

### Faults - Causes - Remedies

#### Drive does not start, no fault displayed

- If the display does not light up, check the power supply to the drive.
  The assignment of the "Fast stop" or "Freewheel stop" functions will prevent the drive from starting if the corresponding logic inputs are not powered up. The ATV31 then displays "nSt" in freewheel stop mode and "FSt" in fast stop mode. This is normal since these functions are active at zero so that the drive will be stopped safely if there is a wire break.
- Check that the run command input(s) have been actuated in accordance with the chosen control mode (tCC parameter in the I-O- menu).
- · If an input is assigned to the limit switch function and this input is at zero, the drive can only be started up by sending a command for the opposite direction (see page <u>58</u>).

  • If the reference channel (page <u>28</u>) or the control channel (page <u>29</u>) is assigned to Modbus or CANopen, the drive displays nSt on
- power-up and remains at stop until the communication bus sends a command.

#### Faults which cannot be reset automatically

The cause of the fault must be removed before resetting by switching off and then on again. CrF, SOF, tnF, bLF and OPF faults can also be reset remotely via logic input (rSF parameter in the FLt- menu page 60).

Fault	Probable cause	Remedy
Brake sequence	<ul> <li>Brake release current not reached</li> <li>Brake engage frequency bEn = nO (not adjusted) when brake logic bLC is assigned.</li> </ul>	<ul> <li>Check the drive/motor connection.</li> <li>Check the motor windings.</li> <li>Check the Ibr setting in the FUn- menu (see page 54).</li> <li>Carry out the recommended adjustment of bEn (see pages 53 and 54).</li> </ul>
<i>LrF</i> Capacitor load circuit	Load relay control fault or charging resistor damaged	Replace the drive.
E E F EEPROM fault	Internal memory fault	<ul><li>Check the environment (electromagnetic compatibility).</li><li>Replace the drive.</li></ul>
In F Internal fault	Internal fault	<ul><li>Check the environment (electromagnetic compatibility).</li><li>Replace the drive.</li></ul>
Overcurrent	<ul> <li>Incorrect parameters in the SEt- and drC- menus</li> <li>Inertia or load too high</li> <li>Mechanical blockage</li> </ul>	<ul> <li>Check the SEt- and drC- parameters.</li> <li>Check the size of the motor/drive/load.</li> <li>Check the state of the mechanism.</li> </ul>
S C F Motor short-circuit	<ul> <li>Short-circuit or earthing at the drive output</li> <li>Significant earth leakage current at the drive output when several motors are connected in parallel</li> </ul>	<ul> <li>Check the cables connecting the drive to the motor, and the motor insulation.</li> <li>Reduce the switching frequency.</li> <li>Connect chokes in series with the motor.</li> </ul>
5 D F Overspeed	<ul><li>Instability or</li><li>Driving load too high</li></ul>	<ul> <li>Check the motor, gain and stability parameters.</li> <li>Add a braking resistor.</li> <li>Check the size of the motor/drive/load.</li> </ul>
EnF Auto-tuning fault	Special motor or motor whose power is not suitable for the drive     Motor not connected to the drive	<ul> <li>Use the L or the P ratio (see Uft page 21).</li> <li>Check the presence of the motor during auto-tuning.</li> <li>If a downstream contactor is being used, close it during auto-tuning.</li> </ul>

### Faults - Causes - Remedies

### Faults which can be reset with the automatic restart function, after the cause has disappeared

These faults can also be reset by switching the drive off and on again or via a logic input (rSF parameter in the FLt- menu page 60)

Fault	Probable cause	Remedy
С 🛮 F CAnopen fault	Interruption in communication on the CANopen bus	<ul><li>Check the communication bus.</li><li>Please refer to the product-specific documentation.</li></ul>
EPF External fault	According to user	According to user
L F F Loss of 4-20mA	Loss of the 4-20 mA reference on input Al3	Check the connection on input Al3.
Пь F Overvoltage during deceleration	Braking too sudden or driving load	<ul> <li>Increase the deceleration time.</li> <li>Install a braking resistor if necessary.</li> <li>Activate the brA function (page 38) if it is compatible with the application.</li> </ul>
☐ H F Drive overheated	Drive temperature too high	Check the motor load, the drive ventilation and the environment. Wait for the drive to cool down before restarting.
☐ L F Motor overload	Triggered by excessive motor current	Check the ItH setting (motor thermal protection) (page 16), check the motor load. Wait for the drive to cool down before restarting.
☐ P F Motor phase loss	Loss of one phase at drive output     Downstream contactor open     Motor not connected or motor power too low     Instantaneous instability in the motor current	<ul> <li>Check the connections from the drive to the motor.</li> <li>If a downstream contactor is being used, set OPL to OAC (FLt- menu page 61).</li> <li>Test on a low power motor or without a motor: In factory settings mode, motor phase loss detection is active (OPL = YES). To check the drive in a test or maintenance environment without having to switch to a motor with the same rating as the drive (particularly useful in the case of high power drives), deactivate motor phase loss detection (OPL = no).</li> <li>Check and optimize the UFr (page 17), UnS and nCr (page 20) parameters and perform auto-tuning with tUn (page 21).</li> </ul>
<b>□ 5 F</b> Overvoltage	<ul><li>Line voltage too high</li><li>Disturbed line supply</li></ul>	Check the line voltage.
PHF Line phase failure	<ul> <li>Drive incorrectly supplied or a fuse blown</li> <li>Failure of one phase</li> <li>3-phase ATV31 used on a single phase line supply</li> <li>Unbalanced load This protection only operates with the drive on load.</li> </ul>	<ul> <li>Check the power connection and the fuses.</li> <li>Reset.</li> <li>Use a 3-phase line supply.</li> <li>Disable the fault by setting IPL = nO (FLt- menu page 61).</li> </ul>
5 L F Modbus fault	Interruption in communication on the Modbus bus	Check the communication bus.     Please refer to the product-specific documentation.

### Faults which can be reset as soon as their cause disappears

Fault	Probable cause	Remedy
□ F F Configuration fault	The current configuration is inconsistent.	Return to factory settings or call up the backup configuration, if it is valid. See the FCS parameter in the I-O-, drC-, CtL- or FUn- menu.
CF I Configuration fault via serial link	<ul> <li>Invalid configuration         The configuration loaded in the drive via the serial link is inconsistent.     </li> </ul>	<ul> <li>Check the configuration loaded previously.</li> <li>Load a consistent configuration.</li> </ul>
U 5 F Undervoltage	<ul><li>Line supply too low</li><li>Transient voltage dip</li><li>Damaged load resistor</li></ul>	<ul><li>Check the voltage and the voltage parameter.</li><li>Replace the drive.</li></ul>

Drive ATV 31......

Customer ID no. (if applicable).....

#### 1st level adjustment parameter



Code	Factory setting	Customer setting
ЬГг	50	

# Settings menu 5 E L -

Code	Factory setting	Customer setting
ACC	3 s	S
A C 5	5 s	S
9 E S	5 s	S
<b>∃</b> E C	3 s	S
LA I	10%	%
F A S	10%	%
L A 3	10%	%
L A 4	10%	%
L 5 P	0 Hz	Hz
H 5 P	bFr	Hz
I E H	According to drive rating	A
UFг	20%	%
FLG	20%	%
5 Ł A	20%	%
5 L P	100 Hz	%
IdC	0.7 ln (1)	Α
FGC	0.5 s	S
<u>FGCI</u>	0.5 s	S
<u>5 d C I</u>	0.7 ln (1)	A
<u>F9C5</u>	0 s	S
<u>5 d C 2</u>	0.5 ln (1)	A
JPF	0 Hz	Hz
JF ≥	0 Hz	Hz
J G F	10 Hz	Hz
r P G	1	
r 16	1/s	/ s
F 6 5	1	
PIC	nO	

Code	Factory setting	Customer setting
r P 2	30%	%
r P 3	60%	%
r P 4	90%	%
<u>5 P 2</u>	10 Hz	Hz
<u>5 P 3</u>	15 Hz	Hz
<u> 5 P 4</u>	20 Hz	Hz
5 P S	25 Hz	Hz
5 P 6	30 Hz	Hz
5 P 7	35 Hz	Hz
5 P B	40 Hz	Hz
5 P 9	45 Hz	Hz
5 <i>P 10</i>	50 Hz	Hz
5 <i>P I I</i>	55 HZ	Hz
5 <i>P 12</i>	60 Hz	Hz
5 <i>P</i> 13	70 Hz	Hz
5 <i>P</i> 14	80 Hz	Hz
5 <i>P</i> 15	90 Hz	Hz
5 <i>P 16</i>	100 Hz	Hz
C L I	1.5 ln (1)	A
C L 2	1.5 ln (1)	A
ŁL5	0 (no time limit)	s
r 5 L	0	
UF r 2	20%	%
F L G 2	20%	%
5 L A 2	20%	%
5 L P 2	100%	%
FLd	bFr	Hz
FFd	100%	%
ГŁЫ	In (1)	A
5 d 5	30	
5 F r	4 kHz	kHz

(1) In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.

These parameters only appear if the corresponding function has been selected in another menu. The majority can also be accessed and adjusted in the function configuration menu.

Those which are underlined appear in factory settings mode.



Code	Factory setting	Customer setting	
ЬFг	50 Hz		Hz
U n 5	According to drive rating		V
F r 5	50 Hz		Hz
n [ r	According to drive rating		Α
n 5 P	According to drive rating		RPM
C 0 5	According to drive rating		
r 5 C	nO		

Code	Factory setting	Customer setting
Ł U 5	tAb	
UFE	n	
nrd	YES	
5 F r	4 kHz	kHz
Ł F r	60 Hz	Hz
5 r F	nO	



Code	Factory setting	Customer setting
FCC	2C ATV31•••A: LOC	
FCF	trn	
r r 5	if tCC = 2C, LI2 if tCC = 3C, LI3 if tCC = LOC: nO	
[rL3	4 mA	mA
[rH3	20 mA	mA

Code	Factory setting	Customer setting
AOIL	0A	
40	nO	
rl	FLt	
r 2	nO	



Code	Factory setting	Customer setting
LAC	L1	
FrI	AI1 AIP for ATV31	
F r 2	nO	
r F C	Fr1	
CHCF	SIM	
САІ	tEr LOC for ATV31●●●A	

Code	Factory setting	Customer setting
C 9 5	Mdb	
C C 5	Cd1	
C 0 P	nO	
LCC	nO	
P 5 Ł	YES	
r O E	dFr	

These parameters only appear if the corresponding function has been enabled.

### **Application functions menu**



Co	de	Factory setting	Customer setting
rP[-	rPL	Lln	
	Ł A I	10%	%
	EA2	10%	%
	EA3	10%	%
	E A Y	10%	%
	ACC	3 s	
	de C	3 s	S
	r P S	nO	S
	FrE	0	Hz
	AC2	5 s	
	4E2	5 s	S
		YES	S
	БгЯ		
5 L C -	5	Stn nO	
	# 5 E	nO 4	
	4 C I	nO	Λ
	IdC	0.7 ln	A
	FAC	0.5 s	S
0.15	n 5 Ł	nO YES	
AGC-	AGC		_
	FACI	0.5 s	S
	5 d C 1	0.7 ln (1)	A
	FACS	0 s	S
5 A I -	5 d C 2	0.5 ln (1) Al2	A
5H 1-	5 A 2		
0.5.5	5 A 3	nO If tCC = 2C: LI3	
P55-	PSC	If tCC = 2C. LI3 If tCC = 3C: LI4 If tCC = LOC: LI3	
	P 5 4	If tCC = 2C: LI4 If tCC = 3C: nO If tCC = LOC: LI4	
	P 5 8	nO	
	P5 16	nO	
	5 P 2	10 Hz	Hz
	5 P 3	15 Hz	Hz
	5 P 4	20 Hz	Hz
	5 P S	25 Hz	Hz
	5 P G	30 Hz	Hz
	5 P 7	35 Hz	Hz
•	5 P B	40 Hz	Hz
	5 P 9	45 Hz	Hz
	5 <i>P</i> 10	50 Hz	Hz
	5 <i>P</i> I I	55 Hz	Hz
	5 <i>P 12</i>	60 Hz	Hz
	5 <i>P</i> 13	70 Hz	Hz
	5 <i>P</i> 14	80 Hz	Hz
	5 <i>P</i> 15	90 Hz	Hz
	5 <i>P</i> 16	100 Hz	Hz
		1	<u>. –                                     </u>

Co	de	Factory setting	Customer setting
J 0 G -	J 0 G	If tCC = 2C: nO	
		If tCC = 3C: LI4	
		If tCC = LOC: nO	
	JGF	10 Hz	Hz
UPd-	U 5 P	nO	
	d 5 P	nO	
	5 t r	nO	
P 1 -	PIF	nO	
	r P G	1	
	r 1G	1	
	F 6 5	1	
	PIC	nO	
	P r 2	nO	
	Pr4	nO	
	r P 2	30%	%
	r P 3	60%	%
	r P 4	90%	%
	r 5 L	0	
	PII	nO	
	r P I	0%	%
ЬLС-	ЬΙС	nO	
	b r L	According to drive	Hz
	Ibr	rating	Α
	br E	0.5 s	S
	ЬЕп	nO	Hz
	Ь E Ł	0.5 s	S
	ЬІР	nO	
L C 2 -	L C 2	nO	
	C L 2	1.5 ln (1)	A
	55		
CHP-	CHP	nO	
	Un52	According to drive	V
		rating	
	Fr52	50 Hz	Hz
	n[r2		A
	n 5 P 2	According to drive	RPM
	C 0 5 2	rating	
	UF E 2	n	
	UFr2	20%	%
	F L G 2	20%	%
	5 L A 2	20%	%
	5 L P 2	100 Hz	Hz
LSE-	LAF	nO	
	LAr	nO	
	L A S	nSt	
			ı

<sup>(1)</sup>In corresponds to the nominal drive current indicated in the Installation Manual and on the drive rating plate.

These parameters only appear if the corresponding function has been enabled. They can also be accessed in the SEt menu.



Code	Factory setting	Customer setting
Atr	nO	
Ł A r	5	
r 5 F	nO	
FLr	nO	
EŁF	nO	
EPL	YES	
0 P L	YES	
IPL	YES	
OHL	YES	
OLL	YES	

Code	Factory setting	Customer setting
5 L L	YES	
C O L	YES	
E n L	YES	
LFL	nO	
LFF	10 Hz	Hz
drn	nO	
5 Ł P	nO	
InH	nO	
r P r	nO	



Code	Factory setting	Customer setting
Add	1	
t b r	19200	
Ł F D	8E1	
F F D	10 s	S
AGCO	0	

Code	Factory setting	Customer setting
P9C0	125	
FLO	nO	
FLOC	AI1 AIP for ATV31	

These parameters only appear if the corresponding function has been enabled.

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